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From the Selected Works of Patrick Martin

2009

The International Conservation for the Industrial Heritage Congress 2009

Patrick Martin, *Michigan Technological University*



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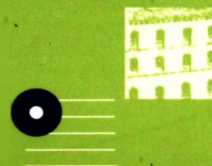
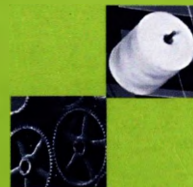
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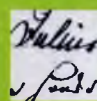


Industrial Heritage – Ecology & Economy

XIV. International TICCIH Congress 2009 in Freiberg, Germany | Selected Papers



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Industrial Heritage – Ecology & Economy

XIV. International TICCIEH Congress 2009
in Freiberg, Germany
Selected Papers

herausgegeben von
Helmuth Albrecht,
Alexander Kierdorf,
Norbert Tempel

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Editorial

The 14th International TICCIIH Congress in Freiberg/Germany from August, 30th to September, 5th 2009 was a great success. More than 350 participants from 37 countries and all continents of this world joined the congress. The congress main topic "Industrial Heritage, Ecology and Economy" and other special topics were discussed in more than 200 papers and posters presented in 25 different sessions and workshops. A pre-congress tour to Berlin and two alternative post-congress tours to Saxony and to the Polish-Czech boarder region in Silesia as well as two one-day congress excursions to the International Building Exhibition (IBA) in Lower Lusatia and to the Saxon Museum of Industry and the industrial townscape of Chemnitz gave the participants a practical introduction into the present problems and solutions of industrial heritage and industrial landscapes in the heart of Europe. Several social events like concerts, exhibitions and film presentations accompanied the congress.

From the beginning it was quite clear that it would be impossible to publish all papers presented at the congress. The programme committee decided therefore to publish only a selection of the papers discussed at the congress. The selection process followed two criteria: First of all it should cover the broad variety of topics of the sessions and workshops and secondly it should represent the "best" and interesting papers of the sessions and workshops. To match these goals all session organizers and session chairs were asked to announce the most outstanding papers of their sessions and workshops. In a second step all authors of these selected papers were asked to send in the manuscript of their presentations together with a selection of illustrations. As always a process like this took a while and not every author was able or wanted to deliver a manuscript. The result of this two year process is this publication of the "Selected Papers of the 14th International TICCIIH Congress in Freiberg/Germany 2009".

Together with the session organizers we have selected 60 papers. Except the five papers of the plenary session most of these papers (34 papers) come from the eight internal sessions (A Sessions) organized by the programme committee of the congress. Three papers belong to the TICCIIH Special Sections (B Sessions) and eight papers to the externally organized sessions (C Sessions) of the congress. The free paper sessions (D Sessions) are represented by seven papers and the workshops (W) by three papers.

Finally we added a short "in memoriam" for our TICCIH honorary president Marie Nisser to this publication. Much too early Marie Nisser died in the night from the 11th to the 12th of August 2011. Marie Nisser was one of the members of the programme committee of the TICCIH congress in Freiberg and not at least thanks to her engagement the programme of the congress was a great success. The photography we have chosen for this "in memoriam" shows Professor Nisser together with some of her friends and colleagues at the entrance hall of the Industrial Museum of Chemnitz/Germany during the TICCIH Congress 2009 in Freiberg.

As editors of this publication we like to thank Mrs. Michaela Luft for her never lasting energy in bringing together the manuscripts from all over the world, Mr. Calder Fong for his critical final reading of the manuscript of this publication and the Association of Friends and Supporters of the TU Mining Academy of Freiberg for their financial and administrative support for this project.

We hope that it will give all interested readers an impression of the current topics, problems and solutions in the field of industrial heritage all over the world.

Freiberg/Germany in September 2011

A handwritten signature in black ink, appearing to read 'Helmuth Albrecht', written in a cursive style.

Prof. Dr. Helmuth Albrecht

President of the Organizing and Program
Committee Freiberg 2009

In Memoriam Prof. Marie Nisser (1937–2011)

TICCIH President (1984–1990)
TICCIH Honorary President'

With great sadness we mark the death of our dear friend and colleague Marie Nisser. As one of the founding members of the small interest group that became TICCIH, Marie had a profound influence on the shape of Industrial Heritage Studies on a global level. She was a steadfast supporter of industrial heritage in Sweden, an activist in preservation issues as well as a pioneer of education and training. As a true internationalist, her vision of industrialization as a global enterprise led her to foster efforts that crossed boundaries of all sorts. Her keen intellectual focus was matched by her heartfelt compassion and concern for her colleagues and students. We will miss her steady attention to detail, her earnest critique in support of excellence and her firm insistence on inclusiveness. But most of all we will miss her kind spirit and ready smile.

She was very much present and active at the last TICCIH Congress in Freiberg during 2009.

Patrick Martin
TICCIH President



TICCIH Congress Freiberg 2009. Marie Nisser amongst her colleagues. (from left to right): Werner and Evelyn Kroker, Keith Falconer, Marie Nisser, Helena and Robert Vogels, Neil Cossons, Stuart Smith (©Neil Cossons).

Prospects, Perceptions and the Public

Sir Neil Cossons

It is thirty-six years since the First International Congress on the Conservation of Industrial Monuments (FICCIM as it was then called) took place at Ironbridge, in 1973,¹ and thirty-four since TICCIH, as it was to become, was last held in Germany – at Bochum in 1975.² In the intervening period the world has undergone profound change. So too has our view of the industrial past and of its material evidence.

At Ironbridge in 1973 there were just 61 delegates, from 8 countries, who arrived, out of the blue so to speak, in response to a letter of invitation to speak at what was then an unknown congress on an unknown subject. Today we have here over 350 people from 38 countries, attending the triennial gathering of a major international organisation, respected and increasingly valued for its work. We can I believe look back on the last thirty years with a real sense of achievement.

But it is the nature of the fundamental changes that have taken place in the wider industrial world over that period that I want to address, that and to offer some thoughts on prospects for the future. This turmoil has been cataclysmic in its scale, impact and consequences, such that the world in which we live now would have been unimaginable, even by the most far-sighted of futurologists, just thirty years ago. In 1973 daily supersonic passenger services across the North Atlantic were still three years away,³ and there was no internet.⁴ Today we no longer have the one but can't live without the other. Climate change was an unknown concept and there were no World Heritage Sites. The first global 'oil shock' hit in the October of 1973, taking crude prices for the first time above \$ 50 a barrel, to be followed by a stock market crash and rocketing inflation. If the age of industry has been, and to a great extent still is, the age of carbon, we might look back on 1973 as the year in which the first signs of a change in the established world order were beginning to emerge. And, while it would be hyperbole to claim any divine prescience in anticipating the way that world order might evolve, looking back on the seventies in general we can see a decade in which the past was to become popular and heritage in general and the industrial heritage in particular, came of age.

It is worth reminding ourselves that it has been industrial and technological change that has been one of the primary causes, for good or ill, of these great global upheavals. As in the eighteenth century, industrialisation – and now of course de-industrialisation – have been the most significant of the various forces affecting societies and economies across the world. It is in this new and changed

environment that we now contemplate the prospects for conservation of the industrial heritage and the changing perceptions of the public towards this crucially important aspect of their history.

When industrial archaeology emerged in the middle years of the twentieth century there were, broadly speaking, two worlds, the developed – or industrial – and the developing – or non-industrial. Today, we might add a third, the post-industrial. Within the then industrial world there was a growing recognition – for which there was then a surprising amount of popular public support – that the origins and subsequent evolution of industrialisation deserved recognition, that its material evidence was a legitimate and rewarding field of study, that some of that evidence was sufficiently emblematic of a vital and vivid past to justify retention, and that future generations might gain from it inspiration and understanding. Industrial archaeology struck a chord with a public who, perhaps for the first time, could see their own history, places that reflected their own lives and their own values, being taken into care for the future. In this respect industrial archaeological conservation was if not unique certainly novel.

In today's world we cannot take those views for granted. The justifications are no longer self-evident. In the old industrial world consciousness of the importance of the social and economic changes wrought by industrialisation, first-hand knowledge and experience of industry and all it represented, is evaporating as generations change and the public experience of work, in the industrial sense of the term, fades. And with it has gone the powerful collective memories of those industrial communities. That is inevitable. If the years of industrial growth were characterised by rapid and fundamental change, so too the era of industrial decline has arrived with even greater speed and brought about equally cataclysmic social and economic change at a pace again unimaginable thirty years ago.

Already we can see the age of industry as a defining epoch in our history, not only in the context of its origins and consequences but now, for the first time, in terms of its demise. Industrialisation is at once a distinctive and distinguishing historical phenomenon and at the same time the single most influential social and economic force affecting global societies today.

So if in this old world, the great age of industry has come and gone, it is to be expected that the values and meanings attaching to its inheritance will disappear too. We must now consider the future for this particular past in

the context of new public perceptions. For this new public the industrial past and all it represents will be as distant, as alien, as incomprehensible, and perhaps as irrelevant, as the remains of ancient Athens or Rome.

In 1953 the English author, L. P. Hartley (1896–1972), famously wrote: 'The past is a foreign country; they do things differently there'.⁵ In the case of the industrial past we can expect that sentiment increasingly to become a truism. We should not be surprised. In this new world managing public perception and public attitude will I suggest be at least as much of a challenge as managing the physical remains themselves. We shall need to re-articulate the value of the industrial heritage for those for whom it has no immediate or obvious meaning. It will be a task we neglect at our peril.

But that of course is in the old industrial world. Decline is a geographically relative term. Simultaneously, in other parts of the globe – in India, or China, or Brazil for example – industrialisation in its contemporary manifestation is being actively advanced as the path from rural poverty to some new form of prosperity. Here a new world of work is being defined. It is not unlike that which emerged in Europe two centuries and more ago.

The age of industry then has defined us – and continues to define us – in more ways than we care to think. What we do is what we are. Work, once considered a curse, lies at the heart of our being, our identity, our self-esteem, our financial security. Work, in the sense that we understand it today, is a product of the industrial age. So is capitalism, and socialism, and communism; that all three are now seen as profoundly flawed is perhaps the surest sign yet that the age of industry – at least in the old industrial world – is now a thing of the past.

In an age where our prosperity derived from the output of mines, mills, factories and foundries, the value and meaning of work made some sort of sense. There was a simple clarity about what went in at one end, gained value as a result of work, and came out at the other. Profits were made, workers were paid. Today, men who once made steel now pump iron; people not only go out to work, they work out. Muscles are for decoration and magazine covers. In the modern post-industrial world we have to exercise our bodies because work no longer does that for us. But neither of course does it exhaust to the point of collapse, leave lungs destroyed by silicosis, or the lives of men and women terminated before their prime. That is a privilege reserved to those who are creating new

industrial economies in the new industrial world. Bhopal and the events of December 3, 1984 may well be seen as its awful warning; urbanisation, increasing prosperity and material wellbeing, and a progressive shift of the epicentre of the world's economy as its inevitable destiny.

In Britain, as in much of Europe and North America, the symbolically most significant metaphor of change is the virtual extinction of deep-pit coal mining in some fifteen years during the 1980s and 1990s. In 1913, when production peaked, there were 3,100 collieries in Britain, employing 1.2 million miners. By the early 1980s there were 130 pits; today there are just six. Employment in mining now numbers 5,600. There are more members of the musicians union than of the mining unions. In almost every other area of traditional industrial activity similar change has taken place. Textiles, for 150 years the cornerstone of the nation's economy, have seen similar effects. In the 1980s mills in the Greater Manchester area were being destroyed at the rate of two a week. None of this is of course unique to Britain. It has characterised huge expanses of traditional industrial activity across Europe and North America. If we are contemplating the social and economic eco-systems of the old industrial world we need to recognise that a new international common denominator has been added to our lexicon. It links Flint, Michigan; Consett, County Durham; or Gunkanjima, Kyushu, to name just three. That common denominator is industrial extinction.

So, if the age of industry is now gone, what do we want of it its remains? Do its vestiges and its memories matter, and if so to whom? Is this a history we wish to take forward with us, that future generations might gain from it some understanding and meaning? Or, can we let it go, relieved that the problem has quietly slipped away? Was it all too much to handle and the loss of its departing of no real consequence? Indeed, is this a chapter of history we might wish to consign, consciously and even enthusiastically, to oblivion? I think not.

This Congress points a way ahead in its themes of ecology and economy. Just as industrialisation challenged so industrial conservation tests our ingenuity to find new and workable solutions. We now recognise the importance of landscapes rather than just specific sites or buildings, and are beginning to tackle the issues of their conservation. Places are what people value and we need to understand and articulate the distinctive qualities of industrial places before we intervene in their regeneration. Understanding leads to valuing, valuing leads to informed conservation,

informed conservation enables us to reconcile the voices of the past with the needs of today and tomorrow; to inform the processes of change in a conscious and rational way. Without that level and depth of understanding the future of precious places – however we may define that term – will fall into the hands of those who have other agendas which will, almost inevitably, erode distinctiveness, intimacy, and the very qualities and milieu that people cherish.

Adaptive re-use is a well-established genre seen as a logical and justifiable approach not simply for economic reasons but increasingly for social and environmental benefits; so too energy conservation and sustainability. The high thermal inertia of many old buildings makes them peculiarly suitable for recycling into new uses. And, perhaps paradoxically, heritage-led regeneration of industrial landscapes can bring economic and social diversification to areas that were once single industry mono-cultures.

Then, there is the issue of housing. When the workplaces have gone what often remain are the houses of those who worked in them. In many post-industrial landscapes they represent the most prolific evidence of former industrial activity. The future of this housing is of vital concern to the people who live there. The understanding of these places, and the ability to debate the options for their future, has I believe to be central to our agenda.

Critical to the debate about industrial conservation are the views of the public. Without public understanding there will be no support for the retention – through conservation or preservation – of the physical evidence of the industrial world. There is I believe an important and achievable role here for TICCIH, to present exemplars of good practice; set out arguments for conservation based on sustainable solutions; and demonstrate that increasingly a conservation-led approach can transform what are often seen as liabilities into real social and economic assets.

I shall conclude with the words of the celebrated German architect, Fritz Schupp (1896–1974), architect with Martin Kremmer of the Zollverein pithead XII, a World Heritage Site since 2001. As long ago as 1929 he summed up many of these views, neatly and succinctly and with perhaps unconscious prescience. He wrote: "we must recognize that industry with its enormous buildings is no longer a disturbing link in our townscape and our landscape, but a symbol of work, a monument of the town, which every citizen should present to the foreigner with at least the same pride as his public buildings".⁶

¹ See Trinder, B. S. 2000 URL: <http://www.mnactec.com/TICCIH/imagenes/pdf/Trinder> for a summary of the First International Congress on the Conservation of Industrial Monuments (FICCIM) and subsequent events down to the TICCIH 2000 Congress. Neil Cossons, Director of the Ironbridge Gorge Museum, and Barrie Trinder, the Museum's Honorary Historian, ran the 1973 Congress.

² Kroker, Werner (ed.) 1978 SICCIM Transactions [Transactions of the Second International Congress on the Conservation of Industrial Monuments, 1975]

³ Transatlantic Concorde services were initiated by British Airways and Air France in 1976 and ended in 2003 when continued maintenance of the aircraft was deemed impossible. No viable supersonic transport is currently in prospect. This is a rare example of a new and workable technology that did not lead to an improved successor.

⁴ E-mail was adapted for ARPANET by Ray Tomlinson of BBN in 1972. He picked the @ symbol from the available symbols on his teletype to link the username and address. The telnet protocol, enabling logging on to a remote computer, was published as a Request for Comments (RFC) in 1972. The ftp protocol, enabling file transfers between internet sites, was published as an RFC in 1973, and from then on RFCs were available electronically to anyone who had use of the ftp protocol. The birth of the Internet is often traced back to these events in 1972 and 1973.

⁵ Hartley, L P 1953. The opening line in *The Go Between*.

⁶ Quoted without source in: URL: <http://www.ihtourism.pl/index.php?lang=en> (website of the International Documentation and Research Centre on Industrial Heritage for Tourism)

Industrial Heritage and Cultural Landscape

Jörg Dettmar

CULTIVATED LANDSCAPE – AN INTRODUCTION

Traditionally cultivated landscape was a symbiosis of nature and culture, as shown by the pre-industrial landscape of the late 18th and 19th century (Neiss 1999) – with the continuing industrialisation this is threatened to be lost in modern times. This first led to protection of the habitat, then to conservation of nature and finally to the protection of cultivated landscape. Pre-industrial cultivated landscape was the result of cultivation making use of the available possibilities and techniques, based on the limited exchange of information and on material that was only available locally as well as limited energy resources (Sieferle 1997).

The landscape of the Industrial Age was often characterized by exploitation and consumption of resources as well as the fast transformation of areas for the increase of production and profit improvement. General set-up was the technical acceleration, the steadily increasing exchange of information, material that was available globally and seemingly unlimited energy resources. The consequences of an ever increasing urbanisation and an industrialised agriculture were an increasing homogeneity of the landscape.

Post-industrial landscape of the Information Age is particularly urbanized landscape, characterized by substantial accelerated rates of change, among others due to economic general set-up that changes at short notice. Growth and decline happen at the same time leading to urbanised villages and fragmented towns. Homogeneous heterogeneity with many patchwork-like structures as it can be found today in many metropolis regions is going to spread further. Characteristic pictures of landscape as we know of historic cultivated landscape are hard to imagine anymore.

THESIS ON THE FUTURE OF INDUSTRIAL HERITAGE – THE RUHR REGION IN FOCUS

Basis of the development of industrial landscape was a maximized exploitation of the resources and orientation by profit, late phases of development then can be characterized by a publicly subsidized conservation of unprofitable economy. This way in the Ruhr region an urban industrialized agglomeration with its own character was developed; town planning qualities are hardly visible. On the other hand a rather incidental looking patchwork of settlements, infrastructure, industry, free spaces and rests of pre-industrial cultivated landscape.

The structural change – although being artificially delayed by political programmes of stabilization – eventually had to lead to a radical change. After traditional promotion of economic development failed at the beginning of the 1990s the bad image of the Ruhr region came into focus. The lack of quality of environment and landscape and the missing cultural orientation towards the future was the central issues of the IBA Emscher Park (1989–1999).

The search for points of contact for a regional identity does not find enough in the pre-industrial cultural age and is based on "industrial heritage" as an anchor point. Nowhere in the world has this been implemented as well as in the Ruhr region. For the purists among the industrial monument conservators it may still not be enough, but the creation of a post-industrial cultivated landscape is more than the conservation of as many industrial monuments as possible.

It is more important to integration of single industrial monuments into the whole system of present and future landscape. Solutions including museum islands might be positive for research, the self-confidence of the supporting institution and as model. But if they are not complemented by a network of sites of industrial background that are integrated into 'present-day uses' it will always just be a 'memory' and too few of a perspective.

The Emscher Landschaftspark in the Ruhr region offers just this perspective. The park is about the continuous transformation of a landscape that is formed by industry to a regional park, as a bearer of regional identity. The re-use of old industrial sites, the new interpretation of old industrial plants and buildings as well as the integration of slagheaps, landfills, sewers and infrastructural elements form a syntax of this landscape. The perspective of a nature that is formed by industrial activities of humankind is turning into an "industrial nature".¹ Nature and landscape are just as social processes never static but constantly developing.

This means that further development is never finished. The next step leads from post-industrial cultivated landscape to urban cultivated landscape of the metropolis region of the Ruhr area ("Metropolis Ruhr"). These further developments are tested within the scope of the European Capital of Culture 2010. Industrial heritage remains an important basis, further development aims at wider connection of isolated components. Large infrastructures have to be integrated into this urban landscape both in regard to design and ecology. Important elements then

are the development of the river valley 'Neues Emschertal' und the attempt of redesigning the existing Autobahn A42 into a Park Motorway.²

SUSTAINABLE DEVELOPMENT OF THE INDUSTRIAL HERITAGE

To preserve monuments of the modern age, particularly industrial plants, holds a contradiction in terms regarding the way of thinking of their time of origin. A principle of the modern age was just the revolt against the transtemporal and therefore also the consequent "consumption" of its architectural records. A boundless belief in progress and the possibilities of technology left little space for records of steps of development which were overcome. Negative consequences of the progress were also ignored. A sustainable development is inevitably the consequence. Particularly massive social and ecological problems calmed down the optimism of progress of the modern age. When preserving the industrial heritage the aspect of "disregard of sustainability" has to be made clear. This is a useful connection to the development of future-proof post-industrial societies and their landscapes.

In this connection it is not enough, to use relics or fragments of old industrial plants as labels for new industrial estates or venues. The further development of the structural substance in the course of the re-use stays the crucial key of sustainable development. The restriction to the façade does not break with the principles of fragmentation. This also applies to the ever dominating contaminated lands. Problems with contaminated land that are viewed in isolation often hinder concepts for the future of old industrial sites. We'll have to pay dearly for the fragmentation of powers in disciplines and sectors. More often than not sealing of contaminated sites degenerates into symbolic acts that solve legal questions but do not lead to a really sustainable improvement for the site – legitimating and economically supporting the institutions that are involved.

At the moment Germany prepares a sustainability label for buildings.³ This is a chance for the re-use of old industrial buildings. Elements like the life cycle consideration and a comprehensive ecological balancing of all aspects, from the plans to the demolition, usually provide influential arguments to maintain existing buildings. This requires an appropriate compromise on preservation and development in the sense of an "adaptive industrial heritage". Preservationists should therefore also translate and explain the social details of the period of origin of old buildings.

At the same time places of dilapidation are important. Every development process has a beginning and an end. The uncontrolled dilapidation of old industrial sites, the transformation of old industrial sites in the course of nature succession leads to industrial forests with ruins of the modern times. It is not about the "controlled dilapidation" but we need a "consequent dilapidation" which can be viewed from a secure distance. To leave a site to its own devices intentionally and not only until planning, legal or economical blockades are disposed of would be in a general way an act of liberation of the principles of the modern age that are still valid.

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Unbound Prometheus – 40 Years of Preserving Industrial Monuments in Germany

Axel Föhl

I stole this title from David Landes' book "The Unbound Prometheus" published in England in 1969. He in turn stole it from the poet Percy Bysshe Shelley who in 1820 published a play "Prometheus Unbound" who I turn stole it from Aeschylus who wrote a play of that name around the 5th century BC.

It all goes to show that we are all standing on each others shoulders. And that brings me immediately to what I would like to say: that German Industrial Archaeology stands on the shoulders of English Industrial Archaeology. Landes' book appeared in 1969, its German translation followed suit in 1973. Some time before that, it took David D. Klingender's book "Art and the Industrial Revolution", originally published in 1947 and revised by Arthur Elton in 1968 twenty seven, respectively six years (the revised English edition was translated) to reach Germany. So one can state that intellectual transfer had been accelerated. The same was true at the very beginning of the Industrial Revolution for the transfer of technology: Richard Arkwright opened his mechanized, water driven cotton mill in 1771 in Cromford/Derbyshire. A mere twelve years later, an Elberfeld textile entrepreneur called Johann Gottfried Brügelmann opened his mechanized water driven cotton mill near Düsseldorf in 1783 in a place he later also called Cromford, having obtained the necessary know-how by means not unusual at the time: commercial espionage.

The English-German relationship in industrial archaeological matters does not end here: In 1962 the shock of the demolition of the famous Euston Arch in London forced Industrial Archaeology into being in England. The same foundation stone effect was effectuated in Germany six years later, in 1968, by the threatened demolition of the functionalistic steel and glass construction of the central machine hall of Zollern II/IV coal mine in Dortmund in the Ruhrgebiet.

The motherland of industrialization was first in decisively securing some of the remains of that world-changing process and Germany followed straight as it had followed the development of production on the other side of the channel up to the point when in the year 1900 Germany had outmatched British steel production.

This "special relationship" still was to go on: In 1973 the first conference of what later was to be called "TICCIH" was held in Ironbridge/England. Two years later the second event of that kind took place in Bochum/Germany. Since I started work as state officer for the preservation of industrial monuments of North Rhine-Westphalia, the

part of Germany that encompasses the Ruhrgebiet, only in 1974, I missed this first occasion. I am proud to say however, that in Ironbridge a representative of my office was present, so the "pedigree" is spotless.

At this point I would like to say a few words of gratitude towards the institution of TICCIH. It is my conviction that the development of the Industrial World cannot adequately be followed within national boundaries. Long before "globalization" industry from the beginning has never respected national limitations. Therefore we have to develop transboundary dimensions to competently judge the importance of individual developments or objects. I am glad to say that UNESCO since its seminal "filling the gaps" turning point after 1990 is following these principles too. From the beginning, TICCIH has been a great instrument to further these aims.

When I think back to the early years of the 1970s when continental countries in Europe started to think about preserving their industrial past, I remember with thankfulness the opportunity to look to England for advice and experience in that field. In my specific case, this took the form of a participation in several of the University of Nottingham's "Summer Schools on Industrial Archaeology" held by the unforgotten later keeper of a World Heritage Site – the Derwent valley in Derbyshire – Christopher Charlton.

At the beginning of the 1970s in Germany it seemed as if there was no cumulated knowledge at all of objects representing the industrial heritage of one of the most heavily industrialized nations in the world. A mere two people, an architect and an historian were the only ones furnished with the official title of "keeper of the industrial heritage". Both were working in the federal state of North Rhine-Westphalia where one of Europe's most massive concentrations of heavy industry was located. It is true that in the second half of the 1960s the first inventories had been accumulated that not only listed churches and castles but also factories and coal mines as worth while preserving. But from the first scientific inklings of the importance of this field of knowledge, fed by the reforming departments of history at the universities, it was still to be a long way till some acceptance in society could be generated to include objects from this field into the range of monuments generally considered to be worth preserving.

In 1970 my office published the first still rather primitively produced booklets on workers' dwellings in the Ruhrgebiet, a category of buildings that were under heavy

threat from the structural crises of the coal industry since the late 1950s. Publications on bridges, the famous "Schwebebahn" the world widely unique suspended railway in the city of Wuppertal followed and in 1976 I prepared a first overview on industrial monuments from railway stations to cotton mills – years after the first famous David & Charles inventories "The Industrial Archaeology of ..." had appeared in England. In 1973 in the other Germany, the German Democratic Republic, an overview had appeared "Technische Denkmale in der DDR". Here, the ideological background was favourable for the preservation of industrial monuments, even the preservation laws especially mentioned objects from the world of industrial labour but far too often political-economic reasons stood in the way of successful preservation strategies.

After some time, a survey of the office archives unearthed surprising evidence that we were indeed standing on other's shoulders. As early as 1910 a Rhenish publication revealed that our predecessors had closely observed the disappearance of times pre-industrial and from there decided that it was high time to get an overview over early technological remains. Astonishing as that was in itself, still more amazing was the fact that one felt at the time that the aesthetic quality of early industrial architecture was suited to inform contemporary architects on how to shape coming modern factory buildings. Historical objects in the 1910 publication were confronted with recent industrial buildings considered exemplary, very much in the spirit that informed James Maud Richard's book "The Functional Tradition in Early Industrial Buildings" with its delightful photographs by Eric de Mare. It was one of the very rare moments in time when the movement for the protection of historic monuments was very close to the contemporary architectural debate. Some people involved in this publication represented links with the famous German "Werkbund" founded in 1907 to improve the quality of industrial design as well as that of industrial architecture. When cooperating with Barry Trinder in the publication of the "Blackwell Encyclopaedia of Industrial Archaeology" in 1990–1992, I came to the awareness what important role the industrial architecture of the early 20th century had played for the development of the International Style in modern architecture and what important role Germans such as Peter Behrens, Walter Gropius and Alfred Fischer had played, who were all involved in industrial architecture.

After the hiatus of World War I it was only in the early 1920s that an interest in industrial architecture became manifest in the publications of the official organs for the

preservation of historic buildings. Mainly in North Rhine-Westphalia, Saxony and Brandenburg we find thematic publications covering that topic. Again like in 1910 it was the pre-industrial world of technical buildings that met the interest of the professionals. Wind and water mills were threatened by more modern means of production, the early iron industry came into focus as well as early cast iron engines like the famous neo-Gothic "Schwarzenberg Gebläse", a blowing engine of 1831 that in 1936 was translocated to a Saxon coal mine that served and serves as part of Europe's oldest surviving mining University of Freiberg, founded in 1765.

For a short moment in time, a sort of coalition was on the horizon between Germany's engineers, organized in the "VDI" – "Association of German Engineers" and "Deutsches Museum", founded in Munich in 1903 by Oskar von Miller to further the corporate reputation of engineers, as well as some people involved in the business in preserving historic monuments to collect items able to throw light on German industrialization.

Regrettably it has to be said that these activities did not amount to much and from the late 1930s the threat of war overshadowed many initiatives. World War Two and the difficult years after it were to stifle any systematic approaches to the questions of industrial archaeology in Germany for a long time. The bodies in charge of the built heritage were much too busy to balance losses and look for what war damages had left intact to widen the scope of what was regarded as worth protecting.

Only at the end of the 1960s – a politically mobile period anyway – changes in the academic approaches to history brought change. Slogans like "Oral History" and "History from below" or the history of workaday life may characterize what was happening. Even in the rather conservative realm of art history new protagonists started to pose new questions. The beginnings of the oil era from around 1960 threatened traditional production patterns like the mining of hard coal in the Ruhrgebiet and other German mining areas and it became clear that another industrial revolution endangered the physical remains of the former period of technology.

A decisive starting point for industrial archaeology in Germany was the disappearance of the traditional miners' and steel workers' colonies. Numbering in the many hundreds, they especially for the Ruhrgebiet constituted a typical feature of the industrialized landscape. As mentioned above, the Rhenish state office for the protection

of historic buildings started to draw public attention to this type of heritage by publishing the first brochures on this topic. The imminent demolition of the "Art Nouveau" machine hall of Zollern mine in Dortmund then led citizen's initiatives to alert political circles and in an astonishingly short time the federal state government of North Rhine-Westphalia reacted by putting the preservation of the industrial heritage prominently on the list of their legislative agenda.

In its "NWP-Program 1975" the protection of mines, canal locks or paper mills was made a special point and seventy million Deutsche Mark were set aside for this purpose. In due course the appointed agencies for the protection of the heritage were enabled to finance established posts for specialists in industrial archaeology.

When my colleague Helmut Bönninghausen and I in 1973 respectively 1974 took up our jobs, we were anything but specialists in this field and our "apprentice time" began with a little help from our colleagues on the other side of the English channel – see above – and soon in close interchange with colleagues from neighbouring countries like Belgium or Holland.

The archive drawers began to be filled with photographs and descriptions of industrial monuments. In the beginning we followed the principle of "putative areas" of historic industry, meaning parts of the country where the findings of history of economy and technology told us to expect a high density of remains from production processes like in the mining or textile businesses.

Soon we were joined by Rainer Slotta who for the German Mining Museum started to take stock of industrial remains all over Germany. In 1975 his "Monuments of Technology in Germany" appeared, followed by my "Industrial Monuments of the Rhineland" in 1976. As mentioned above, in 1973 an overview for the then "other Germany" had appeared, compiled by the Saxon scholars Otfried Wagenbreth and Eberhard Wächtler.

By and by in other federal states in Germany the offices for the preservation of historic monuments started to build up know-how in this field, although only very tentatively in the shape of employing specialists. From 1983 on, an all-German working group of state-employed specialists in two yearly meetings tries to overcome the obstacles of an organization that leads to no less than eighteen different departments for the protection of Germany's historic heritage. When I took over as a speaker of this working

group in 1991, I step by step enlarged its membership by specialists from universities, museums and from industry.

1991 also brought the first joint meeting of group members from all over a recently re-united Germany. The events around this process brought fast-motion changes to an economic and technological sector that frequently had retained conditions from history long gone in other parts of the world. New legislation was passed in the new federal states and the aim to preserve the remains of the industrial heritage was included in most of these new laws. Most expressively this was the case in Thuringia in 1994, where industrial monuments were particularly mentioned in the law following the precedent of North Rhine-Westphalia from 1970.

Also in 1994 a venture celebrated its first five years between Rhine and Ruhr. The federal state of North Rhine-Westphalia in 1989 launched a ten-year building exhibition after a Berlin model that was to give the heavily battered former heavy industry agglomeration of the Ruhrgebiet with its five million inhabitants a new perspective. What is important from our point of view here is that it was the markedly stated intention of IBA – International Building Exhibition 1989–1999 – to include the preservation and re-use of a choice of large-scale industrial monuments into its agenda.

From this vantage point one can date a new era in the field of preserving industrial monuments in Germany. Money was available now that would never have been disposable for the mere purposes of preserving cultural monuments alone. Although in North Rhine-Westphalia an enlightened ministry of building and transport had funnelled means set aside for general urban development programmes in the direction of preserving historic monuments during the 1980s, what was now available surmounted these sums enormously.

Now the preservation of objects that always had been designated historic monuments but would never had had a chance to survive became possible. Big complexes like Zollverein Central Shaft XII from 1928–1932 or an entire iron works from around 1900 in Duisburg along with many other historic technical structures could be expertly conserved and partly put to new uses. In due course this was acknowledged by international bodies like UNESCO and consequently we now can boast of three large-scale industrial complexes representing 20th century industrial history in Germany: Rammelsberg Ore Mine, Völklingen Iron Works and Zollverein Coal Mine.

Another part of the country where industrial archaeology has been eminently successful is the old and new capital Berlin, since around 1900 also called "Electropolis". Here a big number of significant 20th century installations from the electrical industry beginning with Peter Behrens' famous AEG turbine hall from 1909 and not ending with a number of architectonically highly significant expressionist transformer stations from the late 1920s form a densely woven ensemble of the second industrial revolution.

It may be a specificum of German industrial architecture as a whole that outstanding architects have been involved in this field from the beginning. Names like Muthesius, Behrens, Mendelsohn, Gropius or Poelzig come to mind.

All in all one can say that today we can look back on forty years of rather successful work in the field of industrial archaeology. Of course there have been heavy losses too: The main administration building of Krupp's steel works in Essen, demolished in 1976 would figure on this list as well as some eminently well designed mine buildings like mine Jacobi in Oberhausen or the spectacular site of the glass mosaic firm of Puhl & Wagner in Berlin, demolished in 1972.

On the other hand it can be said that for all major branches of industry we have representative examples of buildings and sites as protected heritage, illustrating the industrial history of Germany with an emphasis on the time between 1850 and the 1950s with England, Germany was industrialized somewhat later, the focal point of preservation concerns later periods too with a special emphasis on the epoch after 1900.

Popularization of the industrial heritage in some parts of the country like the Ruhrgebiet but also along the Eastern borders with its ample brown coal fields or Saxony's age old mining areas is well under way. In 2010 the Ruhrgebiet was made Cultural Capital of Europe not least because of its industrial heritage well cared for.

The very success however saddles us with some considerable problems for the future. Just because we have been lucky with a number of large scale objects and sites, the challenge will be to secure their survival in times of scarcer public funding and to assure the public consent that alone can guarantee the considerable financial means necessary to maintain large scale industrial monuments. The numberless re-used water towers, textile mills, for-

mer railway stations more or less take care of themselves: it is the survival of the large scale heritage that will keep us busy in the future.

From Bochum to Freiberg – TICCIH-Germany from 1975 to 2009

Rainer Slotta

Ladies and Gentlemen,

Prof Albrecht asked me to build – with a contribution – a bridge between the "Second International Congress on the Conservation of Industrial Monuments" in Bochum in 1975 and the current 14th TICCIIH-Congress in Freiberg, and to outline the development of Industrial Heritage in Germany with reference to TICCIIH. I will try my very best.

Till now, Bochum and Freiberg are the only German cities to have hosted a TICCIIH-Congress. The "First International Congress on the Conservation of Industrial Monuments" took place in Ironbridge in 1973: This congress – seen from today – has been a meeting of like-minded people and was the result of a "grand idea" of Neil Cossons, the former director of the Ironbridge Gorge Museum Trust, who was continuously occupied in conserving industrial monuments for his open-air museum. This meeting in Ironbridge – more precisely in Attingham Hall near Shrewsbury, the birthplace of Darwin – has been the "inspiration and conception" of TICCIIH: Nearly private and based on the personal initiative of those who were interested in this topic were invited. From the German side – in those days two German states existed – these were Werner Kroker from the German Mining Museum, Roland Günter from Oberhausen, Akos Paulinyi from Darmstadt, Wolfhard Weber from Bochum und Eberhard Wächtler from Freiberg. The meeting in Ironbridge had the charm of an informal meeting – you presented a paper, discussed it and gave information, you improvised if necessary and the nights were spent in the local manor house of Attingham Hall.

At the end of the meeting in Ironbridge, the following questions had to be answered: should, and if, where will the next meeting take place? And: is it reasonable to establish TICCIIH as a sub-committee of UNESCO, because this would be very favourable for the socialist states.

Shortly after the end of the congress in Ironbridge Werner Kroker offered – while sitting in the train from Birmingham to London – in a letter to Neil Cossons to organise the next conference in Bochum at the German Mining Museum. It took place two years later, from the 3rd to the 9th September and received substantial financial support. A preparatory meeting in 1974 was financed by the German Department for Foreign Affairs and the Ministry for Culture and Scientific Research of the Land North Rhine-Westphalia. The congress itself was financed by the Ministry of Education of North Rhine-Westphalia and the management of the industrial unions representing workers in the mining, energy and metal industry. The congress was opened by the Minister of Science

and Research of North Rhine-Westphalia (the later Head of State Johannes Rau), demonstrating the strong interest of North Rhine-Westphalia in the conservation of industrial monuments that was impressively supported by his colleagues in the Ministry of Education in those years.

This congress took place in a very favourable period for industrial heritage in Western Germany, in an atmosphere of awakening, for just now the interest in industrial monuments grew significantly in the former Federal Republic of Germany. New perspectives for the conservation of monuments were opened in the public, such as the conservation of the abandoned coal mine Zollern II/IV in Dortmund-Bövinghausen – a mine that was very outstanding from the architectural point of view and is today the "heart" of the Westphalian Industrial Museums. Another example has been the translocation of the headgear of the mine "Germania" from its original location in Dortmund to Bochum as an exhibition object for the German Mining Museum. The politicians in North Rhine-Westphalia understood that in times of downward trends in the heavy industries and the permanent changes in structures and culture not only castles, churches, cities and town houses has to be considered as documents of social importance for the public, but also industrial installations, even if they did not have any aesthetic appeal: These monuments were of interest as documents of a rapidly disappearing period.

This point of view was quite new and innovative in the Federal Republic of Germany, although in the first centuries of the 20th century Industrial Monuments have intuitively been preserved by cultural heritage bodies because of their architectural qualities: The German Museum in Munich, the Society of German Engineers, the Saxon Society for Regional Protection, the Rhenish Society for Protection of Monuments and Sites, that as early as 1910 published the progressive journal "Historic Industrial Buildings – Modern Industrial Buildings", also the Society of German Metallurgists, the Georg-Agricola Society and even the mining industry itself as a very traditional minded industrial branch were each engaged by their means. But only when the new scientific discipline "Industrial Archaeology" swept over the channel from the United Kingdom to Germany an intensive interest in these monuments began. Especially the state officials for historical monuments in North Rhine Westphalia, by name Günter Borchers in Bonn and Eberhard G. Neumann in Münster, later Axel Föhl und Helmut Bönninghausen were instrumental in promoting its cause. Universities and museums discovered the new discipline and explored the industrial

monuments. Among the first were the Department of Economic and Technical History at the Ruhr-University in Bochum with Albrecht Timm and Wolfhard Weber, and the German Mining Museum with its director Hans Günter Conrad, Werner Kroker and myself: In Bochum the attempt of a first general inventory for the Federal Republic after the Second World War began, the Departments for Historical Monuments in Bonn and Münster published their "Working Journals", exploring workers' settlements and special industrial installations. Roland Günter took an important role by discussing the importance of the workers in the process of industrialisation.

The protagonists of TICCIIH in the Federal Republic had the chance to "learn" from their colleagues in the former GDR. In the GDR as well as in the whole Eastern bloc Industrial monuments had been seen and evaluated as objects similar to monuments of art and were appreciated as monuments of the working class and therefore especially important to preserve as monuments of the worker's and farmer's state. Initiated by Otfried Wagenbreth in Dresden and Eberhard Wächtler in Freiberg sensational and pioneering books were published – beginning with "Industrial Monuments in the German Democratic Republic" at the same time as the "Industrial Monuments in the Federal Republic of Germany", as well as the books about the Industrial Monuments on the Mining Industry in Freiberg, about the Mining Industry of the Erzgebirge and – later – about the monuments of Industrial and Traffic History in the GDR. We in the western part of Germany often recognized the publications and the measures of conservation of industrial monuments in the GDR with great respect and admiration. Furthermore, the Industrial Monuments were a category of their own in the law of conservation of monuments in the GDR, the centrally directed state didn't have the problems that a federal structured state like Western Germany had; the GDR planned a decentralized multi-site National Technical Museum, all these things were remarkable and exemplary for us.

The cooperation between the industrial archaeologists in the western and eastern part of Germany was very successful in spite of different political views. Even for the preparatory meeting in 1974 for the "Second International Congress on the Conservation of Industrial Monuments" in Bochum one year later Eberhard Wächtler was allowed to come as representative of the International Union of the History and Philosophy of Science to cooperate in an organisation with the "western enemy", and later he was elected into the newly established board of TICCIIH, as well as Werner Kroker who for 15 years was its treasurer.

Contacts were established, they could have been closer, but the government of the GDR did not allow Otfried Wagenbreth to travel to the western countries until 1987. So contacts with him were limited to meetings in Freiberg or greetings and information via postal service. It has to be stressed that during meetings in 1974 and 1975 to prepare the congress in Bochum Evelyn and Werner Kroker have developed a TICCIIH-statute saying that TICCIIH should be understood as a sub-committee of UNESCO: but an agreement could not be reached during the conference in Bochum, and only three years later during the congress in Sweden the statute was accepted – since that time TICCIIH feels as a part of UNESCO.

So, Ladies and Gentlemen, the relations between Bochum and Freiberg had been very close in 1975 and the following years – TICCIIH as a worldwide organisation played a very important role in the relation. At the end of the 7-day-conference in Bochum with its excursions, the more than 70 participants voted for the next congress to be held in Sweden – in Stockholm and Grangärde. Since then more or less regular international general assemblies of TICCIIH took place in a three year interval – until today when the 14th TICCIIH-Congress begins here in Freiberg and for the second time in Germany.

Many things have changed during the 34 years between the TICCIIH-conference in Bochum and the congress in Freiberg: not only do we see a great internationalisation and globalisation at TICCIIH as organisation, but also in the comprehension of TICCIIH-members concerning industrial monuments there are differences in important fields.

- At first TICCIIH was formed as a loose, almost private union of colleagues with the one aim to explore and preserve industrial monuments. This has not changed fundamentally, because members in the different states are either individuals – with a specific job-background – or unions and institutions. TICCIIH Germany currently has about 50 members. Still the team spirit is more private than strictly regulated and institutionalised, and since 1995 the journal "Industriekultur" published by the Westphalian Industrial Museum Dortmund and the Landschaftsverband Rheinland considers the interests of TICCIIH Germany. TICCIIH Germany still "lives" by the initiatives of individuals.
- During TICCIIH meetings there was a discussion for years in which way TICCIIH should be organised on an international basis: should it join ICOMOS or UNESCO or stay independent. Today TICCIIH means "The International Committee for the Conservation of the In-

dustrial Heritage", the world organization for Industrial Heritage. Its goals are to promote international cooperation in preserving, conserving, investigating, documenting, researching, interpreting, and advancing education of the Industrial Heritage. TICCIH is recognized by the International Council on Monuments and Sites (ICOMOS) as the designated consultant in all matters related to the study and preservation of Industrial Heritage. ICOMOS is the global non-governmental organization dedicated to conservation of the world's Historic Monuments and Sites. In particular, ICOMOS' network of experts advises UNESCO on sites to be added to the World Heritage List. Therefore, TICCIH recommends historically significant industrial sites for the World Heritage List".

- TICCIH has changed its name which documents a changing view of its interests and tasks. The first meetings took place under the title "**The International Congress on the Conservation of Industrial Monuments (TICCIM)**", later this changed to "**The International Committee for the Conservation of the Industrial Heritage (TICCIH)**", to show a wider range of institutional tasks. In the beginning only the preservation and the handling of industrial installations getting a new and permanent use were important, later the spectrum of tasks comprised the whole area of Industrial Heritage. We in Germany have to confess, that the term "Heritage" was not very familiar to us in the beginning.
- This change in self-perception of TICCIH is extremely driven by the changing tasks and role of the German Offices for the Conservation of Monuments, and extreme globalisation and internationalisation caused a change in the understanding of the sense and task of conservation of monuments in the society in correlation with a growing importance of economic advantages. No doubt the activities of TICCIM initially only comprised the documentation and preservation of Industrial Monuments. Nearly almost – so the doctrine – the monument in its last state before the stop of production should be preserved with all its traces of use and changes, it should be adapted in an educational-didactical way to preserve it for further generations as a true document. The use, value and importance of the Industrial Monument has been seen alone in its function as a "report" and "document" of a bygone period. A new use was accepted but almost always in combination with a "museum" or "location to visit".

today the necessary money, and decreasing funding did not allow to restore and preserve the Industrial Monuments only as a monument without practical use and to give it to the public as a document. On the contrary, it became necessary to give the monument to a partner or enterprise that denies the character as a monument by other kinds of use and so the character as a pure monument vanished more and more. The bigger and more anonymous the enterprise was the bigger the danger for the monument to lose its original character.

- As a result of the growing globalisation and internationalisation with their great changes some industrial branches – both in the East and the West of Germany – had to be given up almost entirely after 1990; the coal and lignite mining industry and the ore industry as well as the heavy industry in the united German Federal Republic are good examples. Before the political change, especially in the GDR a lot of excellent monuments were used in daily life, now the sudden death of the mining industry and iron and steel works evoked a lot of problems: How to handle so many, so huge and so big Industrial Monuments? This was too much for the Offices for the Conservation of Industrial Heritage to cope with, and in the focus of politics and public opinion the question of working places and of employment has been always more important than monuments.

In addition a great number of Industrial Monuments are situated in the new federal states in the East of Germany: This was really due to a lucky chance of the Industrial Heritage, the History of Technology and TICCIH, that the former GDR had to use their historical installations as long as possible due to a lack of investments. Thus they had been preserved in use, but now they had ran out of use and had to be replaced. This again was too much for the Offices for the Conservation of Industrial Heritage to cover, and often success in restoration briefly reached was destroyed years later by lack of support and money to maintain the monuments.

Often the work of the Offices for the Conservation of Industrial Heritage was translated with "preventing solutions", and great solutions often cast a shadow over a structural change of a whole region, as documented in the framework of the Internationale Bauausstellung Emscherpark. This caused a kind of competition between the Offices for the Conservation of the Industrial Heritage and the work of developing companies, having other aims and often using Industrial Monuments only as a public "front". Thus it was clear that the success of the developing companies changed into the suffering of the Offices

This point of view has changed for different reasons. First of all money plays an important role. The Offices for the Conservation of Monuments never have had nor have even

for the Conservation of the Industrial Heritage. Nowadays the Offices for the Conservation of the Industrial Heritage in Germany have nearly disappeared or have been transferred to the planification department of the cities, and mostly, there is no action but only reaction.

In addition – even today – a huge complex of financing the permanent conservation of Industrial Monuments exists. Industrial Monuments – especially the huge ones – are expensive and in times of little money we have to think about what a society can reach and afford. Our society has demonstrated that it can reach nearly everything in the field of Industrial Heritage, and what politicians want to preserve, they pay for. We have and had enough money. Our society – to name it anonymously – has preserved gigantic monuments in parts and as a whole, has reconstructed and has replaced originals by copies, has preserved singular objects and entire ensembles. In general one can testify that the Offices for the Conservation of Industrial Monuments can look on great successes in the conservation of the Industrial Heritage: it is more necessary than ever.

The question "what a monument can stand" to preserve its character as a monument, is after all the main problem for the Offices for the Conservation of the Industrial Heritage concerning the problems of conservation and surely it depends on the quality of monument. For example:

- The monumental character of the mining direction in Saarbrücken, a very special monument in the Saar region, was destroyed by the actual construction, when only the exterior walls and the stair cases remained original.
- During the conversion of the mine Zollverein in Essen – included in the World Heritage List of the UNESCO – the only existing coal washing plant of the German and central European coal mining industry from the 1920s was reduced to a minimum, this also may be discussed. In my opinion the cultural nation of Germany would have done better to preserve this coal washing plant entirely – in the sense of TICCIM in the 1970s and 1980s. A former iron bridge, like that in Coalbrookdale, which at any time only had the function to guarantee the transport over a river, surely has the best qualities to be and to stay a "monument". Other kinds of monuments, like trains, planes or in general rolling goods that are not fixed to a place, still have qualities of an original monument, but are not fixed to a special location. The same we see concerning even the headgears of closed mine shafts, some of which have a different location now, or the completely im-

mobile ones, such as blast furnaces, coke plants and refineries: each monument is a special "case" and thus has to be judged and evaluated in its own right. Therefore it is quite logical that TICCIIH has created a new field in assessing technical monuments and publishes expert reports for the UNESCO.

Ladies and Gentlemen

TICCIIH and the German Offices for the Conservation of the Industrial Heritage face huge problems – this was the case also in 1973 when TICCIM was founded. On the one hand it has to publish and to promote Industrial Heritage and conservation of Industrial Monuments respectively the conservation of the Industrial Heritage, for we need monuments to determine our own positions now and in the future. The well known words of the official industrial heritage convention "Only who knows his past and wants to manage his future, can live in the present with awareness" are surely true. On the other hand there is the question which kind of monuments and heritage have to be preserved and in which form, because each change in function and each kind of restoration and conservation means the loss of its original substance, losing the monument as document, but increasing its character of a "symbol". Here are the challenges of TICCIIH and the Offices for the Conservation of the Industrial Heritage – there is enough to do. Looking back we recognize: The foundation of TICCIIH in 1973 was necessary and a lucky case; TICCIIH has the right to exist and proves this.

During the congress in Bochum 1975 the journalist Kenneth Hudson entitled his plenary contribution "Who owns Industrial Archaeology?" His result at the end after exploring the Industrial Monuments and the stock of monuments in the different European countries has been: "Ladies and Gentlemen, this conference will be concerned with mills, canals, coal-mines, railway stations and all the other tangible evidence of our industrial past. I hope, too, that it will be concerned with the spirit of the men and women behind the archaeology, with the little people and the big people who earned a living from it, designed it and were proud of it. They, like ourselves, own these monuments". I think Kenneth Hudson was right: especially we have advantages from the Industrial Monuments as parts of our heritage. We should fight for them. This TICCIIH has done with more or less success and should continue its way. This was predetermined in Bochum in 1975, and should continue here in Freiberg. This is the one and most important message from Bochum to Freiberg, no more and no less.

Glückauf!

Industrial Heritage between Economy and Ecology

Norbert Tempel

INTRODUCTION

By now it is commonplace that industrial activity changes the environment. The exploitation of the earth which is economically profitable also influences the ecology. Natural resources are used; soil, water and air are polluted. Actually every industrial plant can be interpreted as testimony of the economical reality of its time. Every industrial monument affected its environment directly and indirectly and left ecological footprints. Today we understand that the consequences of industrial activities are not limited to a certain region but lead to changes of global dimensions. In Germany¹ a growing environmental consciousness developed at the same time as the interest in the preservation of industrial monuments. This paper examines the current handling of post-industrial landscapes and industrial monuments and names future tasks for the preservation of industrial monuments in the area of conflict between economy and ecology.

THE ECOLOGICAL FOOTPRINT OF THE INDUSTRY

Economy and ecology already play an important role in the choice of site of a mill or a pit: access to energy, mineral deposits and other natural resources are as decisive for the success of an industrial venture as political, economical and social factors. The multitude of consequences of industrial activity on the environment should only be indicated. Industrial plants like pits, cookeries, power plants, ore dressing, steel works as well as textile factories or tanneries produce contaminant-laden exhaust steams and fumes, slag and ashes, heavy metal and poisons, acids and bases – or even nuclear waste. Even when operating regularly every industrial sector has its own distinctive emission profile that pollutes the environment – air, soil and water – but also the substance of the plant itself and endangers or even injures the employees. In most cases it is only later the public hears about the risks and side effects of a process which were not known, underestimated or even kept secret when it was started. The global consequences of the environmentally unfriendly greenhouse gases – caused by industry and traffic but also by industrialized agriculture – are only highly visible in recent times.

In addition there is a risk of disasters. Thus the explosion in the Indian pesticide plant Bhopal on December 3, 1984 – the biggest industrial catastrophe with several thousand victims – is one of the best known environmental disasters of history, besides the worst nuclear power plant accident in Chernobyl on April 26, 1986.

For economic reasons waste that cannot be disposed was or still is dumped or burnt – even when there are technical solutions for their avoidance or recycling. This does not only lead to aesthetic problems – as in the case of slag heaps – the pollutants end up in (drinking) water or in the air and endanger humans and nature. Entire courses of a river were sacrificed for the industry – they were straightened, canalized, deepened, used as sewer for waste water. The withdrawal of water for industrial processes and the discharge of heated cooling water interfere heavily in the ecology of the rivers. Gas emissions of methane from old coal mines are not only environmentally unfriendly but are still an explosion hazard in the surrounding of former pits even many years after the mines were closed down. Lakes that were formed by subsidence caused by mining were regarded as harmful to the image of a region – until their use as ecological niche was recognized.

REACTIONS OF THE AUTHORITIES

Many of the consequences mentioned above were already identified and pilloried in the early period of industrialisation by contemporaries and fought with changing, rather poor success in most cases. Interventions by the state were limited and economy had priority over ecology. Whereas in contemporary painting of the middle of the 19th century the industry was idyllically fitted into a ideal landscape, a couple of years later the negative consequences of unrestricted industrial producing are highly visible. In early years people concerned tried to defend themselves by legal means but were seldom successful. Public authorities intervened only half heartedly in favour of neighbours of industrial plants until recently.

The Prussian mining authority already realized that unregulated mining does not only reduce the profit of a mine and therefore the productiveness of the deposit resulting in lower tax revenue but also lead to local depression, subsidence and other environmental damage. Not only because of this were the underground mining at the coal mines directly lead by state officials until 1865, later by a strict mining authority. Today an operating plan regulates the controlled retreat and the security of a plant when it is shut down – too often meaning 'tabula rasa' and leaving behind a faceless brown field land without any traces of history. In cases when mining law does not take effect so-called 'excavations' are permitted by the local authorities. They are more likely to bend the rules and many stone or clay pits could make their second career as waste yard or dump.

The environmental consequences of big open-pit mining companies are particularly blatant. Conflicts with landscape and nature conservation during the operation are said to be reduced by sanctions (for example a certain management for cut top soil) and the obligations to re-cultivate (using areas again for agriculture or forestry) or renaturation respectively. Today this is explicitly ordered in the operation permits. In the Rhineland coal mining district re-cultivation of areas that are used by brown coal mining can look back to more than 200 years of tradition: Already in 1766 in a lease contract of the mine 'Roddergrube' near Brühl first criteria for rehabilitation the mining landscape were determined. In 1784 Kurfürst (elector) Maximilian Friedrich enacted the oldest known Act of recultivation. Whereas shut down ore mines of Brazil today still only get donated a barbed wire fence at the most! Model for renaturation is mostly the vision of a second-hand landscape which should look as natural as possible – technical elements only disrupt this vision and should be eliminated according to the imagination of conservationists and environmentalists.

The Nature Protection Law of 1935 was the first to provide for general landscape protection. In protected landscapes deformations and damages could be corrected earlier, for example dumps and slag heaps could be greened and freed from bothersome objects. However, plants that had been approved by the authorities were excluded from these regulations. Many instructions were developed until 1941 by the Reich authorities which should secure a gentle handling of nature when commissioning hydraulic and road constructions, mining, energy supply and land consolidation. It was never put into practice because of the priority of the national socialist war economy and the consequences of the war. In the 1950s extensive plants were optically improved by planting of grass or trees, for example in the iron and steel industry, later on green belts were planted around the works. But these rather lead to the hiding of an industrial set than to real problem solving. Today environmental impact assessments that aims for a real compensation measures by ecological means are necessary to approve industrial plants and transport facilities.

A romanticized understanding of landscape by 1829 lead to a first governmental protection measure: The hilltop of the 'Drachenfels' of the range of hills Siebengebirge near Bonn was protected by a royal act themed "*Conservation by expropriation*" and bought by the state (in 1836) in order to protect it from the destruction by quarries and to preserve the romantic beauty of the hill and its castle ruins! The volcanic trachyte that was won at this hill was appreciated as building material and is used for example

at the Cologne Cathedral. However, the Siebengebirge only became a protected area in 1928 and all quarries in the range of hills were only shut down in the same year.

"THE TIMES THEY ARE A-CHANGING" – GROWING ENVIRONMENTAL AWARENESS AND INTEREST IN INDUSTRIAL HERITAGE

"Zero emission" of the industrial production is still an aim for the future, the engineers in the "good old dirty times" did not spoil any thought on this – resources seemed endless and the nature patient. In the 1970s the Club of Rome voiced objections in their study *The Limits To Growth* (1972) to a further unlimited economic growth and reached worldwide attention – at least among experts. At this time the first citizens' action groups were formed in Germany that disapproved of the extension of nuclear energy. Upon public pressure some of the most obvious crimes against the environment were cut down.² In 1980 the ecologically orientated party "The Greens" (Die Grünen) and the German section of the environmental organization Greenpeace were founded. At the time the problem of industrial abandoned polluted areas was realized. It is not enough to just shut down and tear down old environmental hazards and then sow green grass – the problem was sitting much deeper. The contamination had already reached the ground water and had to be expensively disposed of. For this elaborate procedures were developed and published in the meantime.³ In the USA the expression "brownfields to greenfields" was coined later on. Since the 1980s historians also have been working at the environmental issue. At the same time disused 'uneconomical' large-scale industrial plants were seen as essential witnesses of history and conservation officers started to list them: mines, coking plant, gas tanks, blast furnaces, textile and porcelain factories, brickworks, glass factories and even transport facilities. The federal state of North Rhine-Westphalia paved the way with combative citizens' movements, a new National Monuments Act and understanding people in the ministries and institutions. These mostly 'bulky' monuments are turned into industrial or art museums, office buildings, studios, lofts, cultural centres, discos, shopping malls and so on. In the end our unequal sisters economy and ecology decide on success or failure of these projects.

THE CURRENT DEALING WITH POST-INDUSTRIAL LANDSCAPE

During the last decades the model of brown coal open cast mines recultivation changed from restoration of areas used for agriculture and forestry to the creation of a

varied former mining landscape with a "holistic development of habitats". Already in the early years big slagheaps were regarded as aesthetic problem for the landscape and it was tried to get it right. In 1929 the forest administrator of the Lower Lusatia coalmines in Schipkau, Rudolf Heusohn, is said to have said: "Parks on rocks and slagheaps leaves space for our imagination and sense of beauty." Today decommissioned opencast mines in Lusatia are transformed into vacation getaways of unexpected dimensions. Pit heaps of coal mining also changed. They used to be just deposited like a pointed cone, later on they were formed in plateau; today they are modelled as landscape building and planted with grass while deposited – the future use as leisure facility already in mind. On top there often is a piece of 'land art', cost-intensive works of aspiring artists. The operators of big quarries (like *Rheinkalk*) pursue a clever strategy together with the nature conservation groups to create ecological niches for endangered animal and plant species and to market the advantages of 'second-hand nature'. An honest handling of landscape that is transformed industrially, the conscious preservation and demonstration of traces of industrial activity as an integral part of a post-industrial landscape could only be realized recently. The International Building Exhibition *IBA Emscherpark* in the Ruhr region internationally set standards in the 1990s which are continued among others by the current International Building Exhibition *IBA Fürst-Pückler-Park* in the brown coal area of Lusatia. The acceptance among the population was probably also influenced by neologism as 'industrial nature' in the Ruhr region or 'industrial garden world' in the area of Dessau-Wörlitz. In the meantime a new trend appeared: the interest of wide parts of the population in the experience value of bizarre lunar landscape as it was made in Lusatia in the course of mining activities. David Blackbourne also argues in his well regarded book *The Conquest of Nature* that an extensive 'renaturation' should be avoided: the artificial state has its own sentimental value as well. Renaturation and recultivation have their limits due to economic and ecologic reasons anyway! Isolated monuments could no longer apply to become world heritage sites but today the essential criterion for being inscribed on the list is the integration into the surrounding landscape with all its traces of human activity.

CURRENT AND FUTURE PROBLEMS

Although these new models are more acceptable from the industrial culture's point of view there will be no ideal solution – the ideas of the various players are to balance out again and again. Production of raw materials, agri-

culture and forestry, nature conservation, preservation of historic buildings and monuments, tourism and the needs of a leisure-orientated society that sees itself as post-industrial are difficult to coordinate.

As an argument for jobs tourism is often presented since it could make use of an 'intact' landscape in a sustainable way. Industrial ruins with their presumed bad image do disturb, even wind turbines that produce energy in an eco-friendly way are considered as a negative visual intrusion. The danger of overuse of post-industrial culture landscape by (motor) tourism and event culture is less mentioned.

Recently the apparently irresolvable conflict between nature protection and the protection of historic buildings and monuments won an unexpected up-to-dateness in the case of the old hydroelectric power station Rheinfelden: since the construction of the new and bigger power plant intervened in nature extensively an ecological balance had to be achieved. In order to create appropriate ecological compensation area the approval of plans arranges for the tear-off of the old power station. The extremely high value of the monument that is a pioneering plant for the creation of power by water power was not recognized by the authority involved in the approval of plans. One even must assume that this 'handicap' was dropped deliberately. A local citizens' group committedly fighting for the preservation of the power plant supported by TICCIIH, ICOMOS and the association of the monument conservators of Germany could show a way for ecological compensation where the old power station would be retained, but were unsuccessful with the authorising body and parts of the nature conservation organisations. A change of the valid approval of plans is said to be impossible and prevents the commissioning of the new power plant. The power of nature conservation organisations that are entitled to the claim as opposed to the powerless institutional monument conservation that is bound by instructions and the largely influenceless organisations that are committed to the preservation of monuments – even if they are supposed to become UNESCO World Heritage.

There are many questions that need to be discussed at the XIV International TICCIIH Congress 2009 in Freiberg themed "Industrial Heritage, Ecology and Economy": how can extensive industrial activity be kept visible lastingly, to which extent can this be expected of the environment and the population? Which structures are suitable as extensive monuments of industrial heritage? How to keep the industrial character? How to stop 'unwanted' reactions

by nature – without being harmful to the environment? Examples are slag heaps that should keep their industrial character, should not turn green, nevertheless, a permanent use of herbicides would be unthinkable because of ecological reasons! At the moment many of these slag heaps are cleaned up, i.e. sealed and planted with grass in order to prevent the input of heavy metal into ground water – ecologically this is irrefutable. Do we have to say good-bye to our ever loved tar and silver seas, coloured slag heaps and the riverbed of the river Emscher that is encased in concrete but not yet renatured?

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¹ This paper mostly relates to the situation in Germany.

² For example between 1969 and 1989 dumping of 750,000 tons of dilute acid from the production of titanium dioxide into the North Sea

³ This way ecology became a giant business for planners and performing companies. Unfortunately, the usual method for removal of contaminates tends to raze traces of industrial history worth preserving rather than to decontaminate.

A1 Economical and Ecological Aspects of Industrial World Heritage Sites

Organizer: Helmuth Albrecht (Germany)

Since Ironbridge in Great Britain has been declared the very first industrial World Heritage Site in 1986, UNESCO included a wide range of other industrial monuments and sites around the world in its World Heritage list. They strongly differ in size, and focus on different types and time periods of industrialization (from Roman and mediaeval times up to modern industry).

This session aims to bring together actors from different backgrounds involved in the management of industrial World Heritage Sites. We ask for papers presenting best practice examples in order to exchange experiences of various industrial World Heritage Sites and intensify discussion on: economical concepts for the cleaning and re-use of industrial buildings; depollution of industrial sites, environmental protection and preservation of nature; contribution of the world heritage status to the region's economic regeneration; reconciliation between safety restrictions and the wish to assure public access to the sites; typical conflicts of interests in the elaboration of a Management Plan for industrial sites; heritage concepts for cultural landscapes and the protection of their social fabric.

The World Heritage Project
"Mining Landscape Ore Mountains"

Helmuth Albrecht
Jane Ehrentraut

The mountain region "Erzgebirge" (Ore Mountains) is located at the border of Germany and the Czech Republic in the southeast of Germany. It is a bi-national region of around 6,000 km², 150 km long (southwest-northeast), around 40 km wide (south-north) and up to 1,244 m high. Its name derives from the rich deposits of ore – silver, iron, lead, tin, zinc, copper, cobalt, bismuth, nickel and uranium. They formed the base of the flourishing mining and smelting activities since the Middle Ages.

The colonization of the forest and mountain region Erzgebirge started in the middle of the 12th century from both sides of the border between Saxony in the north and Bohemia in the south. Only one hundred years later the main parts of the Erzgebirge mountains, especially along the river banks, were colonized and a great part of the wild forest was changed into farming land. Shortly after the beginning of the colonisation in 1168 rich deposits of silver ore were found on the ground of the small village of Christiansdorf, a settlement founded round 1150 near the river Mulde in the south of the region. This caused a dramatic change in the development of the settlement within a few decades. Thousands of miners, craftsmen, merchants, adventurers and other people followed the fast spreading news of the new found fortune in the Erzgebirge. Around 1230 the small village had changed into the biggest town of the medieval county of Meißen with about 5,000 inhabitants, a cathedral and other churches, several market places, a castle and a strong fortification around the town to protect the new wealth of the country. The name of the settlement changed into "Freiberg" (literally 'free mountain'), which means that everyone could come and dig for silver in and around the town. Hundreds of small mines and about 40 smelting places were founded during that time in the surroundings of Freiberg.

In the following centuries the mining activities in the Erzgebirge spread over the whole mountain region. During the first period from 1168 to the middle of the 15th century silver, tin, copper and iron mining and production started all over the region. Since 1456 the discovery of rich silver deposits in the upper regions of the Erzgebirge led to a second period of mining activities characterized by the founding of a great number of mining settlements and mining towns in the upper part of the Erzgebirge. During that time the Saxon state established a system of economic and technological control over all mining and smelting activities in the region, called the "direction principle", to secure the economic base of the state. New technologies for deep mining, large water power systems and pre-capitalistic economic systems of financing were introduced during that period. This second mining period of the Erzgebirge ended with the political and economic catastrophe of the Seven Years' War (1756/1963). The founding of the Mining Academy in Freiberg in 1765 opened the third mining period of the region, which lasted up to the first decades of the 20th century. It was characterized by the introduction of new industrial and scientific ways of mining and smelting and the growing importance of the production of lead, tin, nickel and cobalt. The change to an industrial production since 1830 led to growing ecological problems and to the invention of new technologies in the utilization of by-products like sulphur, arsenic or wolframite. The change from the silver to the gold standard in the German economy in 1873 and the growing international competition on the ore-markets at the end of the 19th century led to a controlled closing of all mining activities in the Erzgebirge between 1890 and 1913. Only the smelting-plants carried on with imported ore. The fourth and last period of mining in the Erzgebirge started in 1934 with the resumption of the tin production caused by the Nazi policy of autarky. After World War II the Soviet occupying power started the mining of the rich uranium deposits in the western part of the Erzgebirge under the codename "Wismut" (bismuth). This large scale mining and production activities led not only to the first Soviet atomic bomb but also to lasting modifications in the landscape and the ecological system of the region. During the time of the German Democratic Republic the former Nazi activities in tin and lead mining in the Erzgebirge were continued for autarky reasons until 1969. This last period of the mining activities in the region ended with the closing of the uranium mines and plants as well as the last tin and lead plants in the Erzgebirge in the time of the German reunification in 1990/1991.



Wismut – Shaft 371 in Hartenstein (photo: Jens Kugler)

These more than 800 years of mining had left a large number of historic monuments from all mining periods in the Erzgebirge. Hundreds of mines, shafts, pitheads, drainage adits, haulage installations, crushing mills, washing and concentration floors, engine-houses, blast furnaces, miners cottages, auxiliary and administration buildings as well as machinery like water-wheels, water-pumps, turbines, blowers, steam winders or forging hammers are still testifying to the long mining tradition of the region. Still a lot of underground workings from the middle ages up to the twentieth century as well as parts of its timbering and machinery can be seen and visited. The landscape of the Erzgebirge is still shaped by a large number of historical pit heaps, day-holes, drifts and waterpower systems with their canals, tunnels and lakes for the storage and the supply of water-energy for the mines and foundries. Over the centuries these min-



"Schwarzenberggebläse" Blast furnace blower developed by Christian Friedrich Brendel in 1831, now presented at the University of Technology and Mining Academy of Freiberg (Shaft Alte Elisabeth) (photo: Jens Kugler)

ing landscape became the home of special plants and animals and are thus forming unique biospheres in our days. But the hundreds of years of mining activity not only formed a unique landscape, they also deeply influenced the culture of the region. A large number of mining settlements and mining towns with their characteristic houses, labour colonies, administration buildings and churches are giving architectural evidence of the long term influence of mining in the region. Some of these towns were planned settlements which are still giving evidence of the renaissance ideals of modern town building in the 16th century. Moreover a lot of special collections in museums, libraries and archives are testifying the importance of this tradition for the development of handicraft, arts, music and literature in the Erzgebirge and in Saxony. Over the centuries special rites were introduced by the people living in the region in close context with the work in the mines and in the smelting plants. These rites are still in use in the Erzgebirge, where numerous societies keep these traditions alive. The mining activities in the Erzgebirge also deeply influenced the technological and scientific development of mining and smelting as well as the development of modern geology and of the mining laws in Europe. The work of the great humanistic scientist Georgius Agricola or of the technicians and scientists at the first Mining Academy in the world at Freiberg are testimony for this influence. The economical and political importance of the mining industry in the Erzgebirge for Saxony led to the setting up of a modern mining bureaucracy since the 16th century and thus played an important role in the consolidation of the modern Saxon state. At the beginning of the 19th century the mining industry finally formed a major base for the industrialization of the region. Since the 16th century the ups and downs of the mining activities in the Erzgebirge caused the development of following industries like weaving, glass-making, paper-making, clock-making and wood carving. The construction and use of mining-machinery like water-wheels, water-pumps, turbines and steam-engines led to the formation of a group of skilled engineers and craftsmen since the second half of the 18th century. They became an important reserve for the development of textile, engine building and machine-tool industry in the region during the 19th century. During the 20th century these industries were followed by the automobile industry and at the end of the century by the semiconductor industry, which are still important in the region. Both new industries profit directly and indirectly from technological and scientific inventions and from the skilled labour reservoir introduced and formed during the last two periods of mining activities in the Erzgebirge.

Thus mining became an important factor for the creation of the landscape, the culture and the industry of the Erzgebirge and moreover of modern Saxony. An enormous number of historical monuments and artefacts, of landscapes and biospheres, of architecture, settlements and towns, of arts and craft, of cultural rites, of technological and scientific inventions, of economic, political and social developments formed and influenced by hundreds of years of mining activities are still visible and can be experienced in the region. The industrial and cultural landscape of the Erzgebirge represents the combined works of nature and of man. It illustrates the evolution of human society and settlement over time under the external and internal influence of the physical constraints and opportunities presented by their natural environment and of successive social, economic and cultural forces. Moreover, the Erzgebirge is a clearly defined geo-cultural region with the capacity to illustrate the essential and distinct cultural elements of such a region. The outstanding universal value of the Erzgebirge is defined by four of six possible criteria of the world heritage convention for cultural heritage:

- (1) It exhibits an important interchange of human values, over a span of time and within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design
- (2) it bears a unique or at least exceptional testimony to a cultural tradition which is living;
- (3) it is an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates significant stages in human history; and
- (4) it is directly associated with living traditions, with ideas, with artistic and literary works of outstanding universal significance.

For all these reasons the mining area Erzgebirge is qualified to be enlisted as a cultural landscape on the world heritage list of the UNESCO.

In 1998 the Erzgebirge was nominated for the German tentative list of the future projects for the inscription on the UNESCO world heritage list. But a lot of problems are to be solved before the Erzgebirge can be nominated in 2013 or 2014. The world heritage project "Mining



Pit heaps of the Bauer Morgengang nearby Marienberg (photo: Jens Kugler, 2005)

Region Erzgebirge" is a very large project even in UNESCO terms: the area of the region spans over 6,000 km² and includes hundreds of monuments and sites which are more or less closely connected with the history of mining in the region. Not the whole area in total and not all the existing monuments and sites could become part of the world heritage project because the Erzgebirge is one of the most dense populated mountain regions of Europe with a vivid society, economy and infrastructure. Therefore the project is going to be a cultural landscape project with ongoing development, a "continuing landscape" in the terms of the guidelines for the implementation of the UNESCO World Heritage Convention. A continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it has to exhibit significant material of its evolution over time. The extent of the World Heritage landscape should be related to its functionality and intelligibility. Furthermore the sample of the selected monuments and sites must be substantial enough to represent the totality of the cultural landscape adequately. Therefore the project is designed as a cluster-project with a carefully selected number of 35 historical and cultural significant sites on the German and around 12 to 14 sites on the Czech side of the Erzgebirge. Each site is a combination of historically and functionally connected monuments and/or ensembles. All together these sites will represent all the aspects as well as the variety of this unique industrial landscape.

The project is a cross-boarder and bi-national project because the Erzgebirge is part of Saxony and Bohemia since the Middle Ages and therefore part of Germany and the Czech Republic today. Nevertheless the boarder between the two national parts of the Erzgebirge was in history and is again within the European Union today not a shut one. The Erzgebirge in total has been a central European natural and cultural landscape for most of the time with common traditions and a closely connected development of the social and economic structures. And it has the chance to get this status again since the end of the cold war and the enlargement of the European Union into the east of Europe. The world heritage project "Mining Region Erzgebirge" could and should be a step into this direction.

Since 2000 a World Heritage Project Group (WHPG) is working at the Institute for Industrial Archaeology, History of Science and Technology at the University of Technology and Mining Academy of Freiberg to realize this complex project. In addition, in 2003 an association of partnerships with the major towns, communities and counties of

the Erzgebirge was founded. This association is organizing and directing several subprojects and the cooperation with the Czech partners on the Bohemian side of the Erzgebirge. One main subproject is the recording and documentation of all potential objects for the project. This has been done by the WHPG at the University of Technology of Freiberg since 2004, financed by special programmes of the European Union. An electronic database of all relevant objects is under construction and will be the base for the selection and description of the objects of the world heritage project. It is also the first step to an internet based electronic information system for the future World Heritage "Mining Region Erzgebirge".

Another subproject is dealing with the complex coordination process between the various owners of the monuments and sites, the urban and infrastructural planning authorities, the heritage administration and the economical and political decision makers. It started in 2007 and includes all relevant areas in the Erzgebirge on both sides of the border. Since July 2010 this subproject is partly funded by the European Community. It aims at three goals at the same time. First: the preparation of the world heritage application. Second: the coordination of the project with the economical and infrastructural planning of the region, and third: to build up a strong political and public support for the project in the region. For the realization of this programme the special instrument of Joint Working Groups (JWG) was introduced into the project. At community level these Joint Working Groups of external and internal experts are discussing the possible world heritage objects and sites chosen by the project group for every world heritage cluster. Single objects or sites could be rejected from or added to the cluster. Then each chosen object or site of the cluster is described, exactly documented and fitted into the local development plans. The results of this discussing and planning process are written down in an agreement which at the end has to be accepted by the local town council.

Further subprojects are dealing with the preservation and management plan as well as with the marketing of the world heritage project. The preservation and management plan has to include all strategies for the future management, development and financing of the world heritage site. For this a World Heritage Office is going to be established at the existing Regional Management Agency. This office has to manage the whole application process, the cooperation with the Czech project partners and the world heritage site after its nomination. It is financed by the participating communities and counties. These are members of a special

World Heritage Council which functions as main decision board for the project. A Scientific Board of internal and external experts provides advice to the World Heritage Office and the World Heritage Council. The marketing of the project and of the future world heritage site is delegated to the existing Regional Marketing Agency.

During the application and nomination process the scientific work for the selection, documentation and evaluation of all potential objects or ensembles for the world heritage project on the German side as well as for the management plan of the whole project is done by the World Heritage Project Group at the Institute for Industrial Archaeology, History of Science and Technology at the University of Technology and Mining Academy of Freiberg. Similar project groups have been established on the Czech side of the project. All project groups are working closely together but the German project side is the lead partner for the project. It is planned to finish all mentioned subprojects in 2012 and to apply for the world heritage nomination in February 2013.

Still there is a long way to go. At the moment one of the main problems is the political discussion in Saxony about the compatibility of heritage projects with the economical development. This discussion is caused by the decision of the World Heritage Committee to deprive the 2004 enlisted World Heritage site of the Dresden Elbe Valley of its world heritage status because of the project to cross the Elbe Valley in Dresden with a large 4-lane-bridge. For the Saxon Government this seems to confirm the preconception that any heritage project in the country will inevitably stop any further infrastructural or economic development. Of course this is nonsense, but the political waves of this notion are traceable everywhere and they form a big problem for any heritage project in Saxony. At the moment the fight for the UNESCO world heritage project "Mining Region Erzgebirge" therefore is not only a struggle for a very prestigious heritage project but also a struggle for the protection of all industrial monuments and sites in a country which played a major role in the industrialization of Germany.



Lime works Lengefeld (photo: Jens Kugler)

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Managing New Lanark as a Sustainable Community

Lorna Davidson

The village of New Lanark in South Lanarkshire, Scotland, was founded as a completely new industrial settlement in 1785. Its location was chosen by the founding partners David Dale (1739–1806) and Richard Arkwright (1732–1792) because water from the nearby Falls of Clyde could be harnessed to provide a reliable power supply for cotton-manufacturing machinery. The industrial buildings and the tenement-style housing which accommodated the mill workers were constructed from locally quarried sandstone and roofed with Scotch slate. The enterprise was expanded and developed, both as a business and as a model community between 1800 and 1825, under the ownership and management of Dale's son-in-law, the pioneering social reformer Robert Owen (1771–1858). Owen introduced an enlightened system of community education and recreation, centred on the Institute for the Formation of Character, which included the first workplace nursery and free Infant School, as well as shorter working hours, free medical care and many other benefits for the 2,200 villagers. New Lanark's international cultural significance was recognised by inscription on UNESCO's World Heritage List in 2001.

COTTON-MILL CLOSURE, DECLINE AND CRISIS

The New Lanark cotton-mills were in continuous production from 1786 until 1968, but profitability declined after 1950.

In 1963 ownership of the workers' housing was transferred by the mill company to a newly-formed housing association with charitable status. A pilot project to create refurbished flats for rent was undertaken between 1965 and 1967. However, in 1968 the unexpected closure of the cotton-mills caused a major crisis. The industrial area of the site was sold in 1970 to a scrap metal company. Further intervention by the public agencies and conservation bodies was required to halt, and attempt to reverse, the already well established process of decay and environmental degradation. A Working Party was set up to examine the options for the future of New Lanark and in 1973 its ambitious recommendations – to attempt complete restoration and regeneration of the site – were published. Under the auspices of the then planning authority, Clydesdale District Council, and the Historic Buildings and Monuments Directorate (now Historic Scotland) the village was designated as an Outstanding Conservation Area, and all the buildings were Listed Category A. In 1974 the New Lanark Conservation & Civic Trust was formed as independent charity, charged with the challenging task of restoring and revitalising the historic village.

RESTORATION AND REGENERATION

Since 1974, the village has been the subject of one of the largest programmes of conservation in Europe. Under the direction of Jim Arnold between 1974 and 2010, the New Lanark Trust pioneered a radical approach to heritage management, which ensures that the village remains a living community, providing employment opportunities for local people. The first task of the Trust was to recommence the social housing refurbishment programme, and in addition, a restorer-purchaser scheme was established for 20 of the housing units. A ground-breaking campaign to recover the buildings from Metal Extractions Ltd. began in 1979 with the issue by Clydesdale District Council of a Compulsory Repairs Notice. This process culminated in 1983 with a fiercely-contested Compulsory Purchase Order, ultimately confirmed by the Secretary of State for Scotland. It was the first time this legal process had been used in Scotland to save historic buildings. The costs were underwritten by the National Heritage Memorial Fund. Ownership of the site was transferred to the New Lanark Conservation Trust in 1983. New Lanark Trust has been at the centre of a complex web of partnerships set up to channel funding into the project from a wide variety of organisations. The main sources of finance in recent years have been the economic development section of the local government authority South Lanarkshire Council, Scottish Enterprise Lanarkshire, the Scottish government via Historic Scotland, the European Union, through the Strathclyde European Partnership, the Heritage Lottery Fund, as well as many smaller contributions from charitable trusts.

NEW LANARK TODAY

New Lanark Trust has restored and converted the historic buildings in ways which facilitate the Trust's key strategies for regeneration and sustainability – housing, tourism and hospitality, commercial lets and hydro-electricity production. This approach depends on an intelligent application of Planning and Listed Building legislation, so that the A Listed buildings retain their essential historic character, while being sympathetically adapted to accommodate new enterprises. As a result, these historic buildings have been saved, and are once again in productive use.

A vibrant mixture of established and start-up businesses is based in the historic mill buildings. The Trust itself has three wholly-owned trading subsidiaries: New Lanark Trading Ltd. operates the award-winning Visitor Centre (permanent exhibitions in six of the original buildings, retail, catering and hydro-electricity production). New Lanark

Hotels Ltd. operates the 38 room New Lanark Mill Hotel and Leisure Suite, and 8 self-catering apartments. New Lanark Homes Ltd. manages the rented social housing. Hydro-electricity is self-supplied for the Hotel and Visitor Centre buildings, and surplus power is exported to the grid. Profits from these commercial operations are returned to the Trust to be reinvested in the project. The Trust and its trading subsidiaries together employ around 165 people, with a further 60 or so employed by the other businesses, such as a firm of Chartered Accountants in the Mechanics' Workshop, and Renewable Resources Ltd. in David Dale's House. Today, the Trust generates almost 90% of its own revenue from its commercial activities. Around 350,000 people from all over world visit the New Lanark and Falls of Clyde each year. The resident population currently stands at just under 200. There are 45 tenancies and 20 privately owned properties, with one row of tenements remaining to be developed. One tenement row has been converted as a 60 bed Youth Hostel – owned by the Trust, but operated by the SYHA – while the Scottish Wildlife Trust owns and manages the adjacent Falls of Clyde Wildlife Reserve, a National Nature Reserve. Recent economic impact studies

show that New Lanark contributes around £ 7,000,000 to the economy of South Lanarkshire.

And so the story of New Lanark continues into the 21st century as it began in the 18th century – with a spirit of enterprise allied to a vision for the future. New Lanark is widely recognised as a cultural heritage site of international significance, but it remains, as it always has been, a living, working community, which welcomes visitors from all over the world.

RECOMMENDED READING:

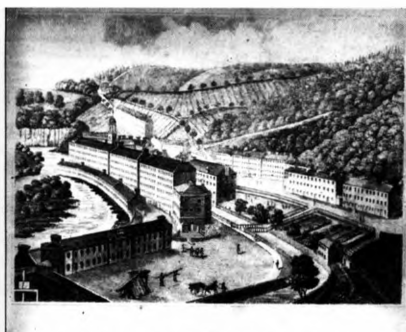
"The Nomination of New Lanark for Inclusion in the World Heritage List", Historic Scotland, 2000. This contains a useful bibliography.

"Historic New Lanark" Donnachie & Hewitt, Edinburgh University Press, 1993. A comprehensive history of the site from the 1780s to 1990.

An extensive list of resources and publications available by mail order can be found on the New Lanark website <http://www.newlanark.org>.



1891 Platts Spinning mule



Export Label with children in playground



Repairs Notice on Mills



Pool in New Lanark Hotel

(© New Lanark Trust)



Aerial View crop

The Comparative Regeneration of the Blaenavon and Pontcysyllte World Heritage Areas

Stephen Hughes

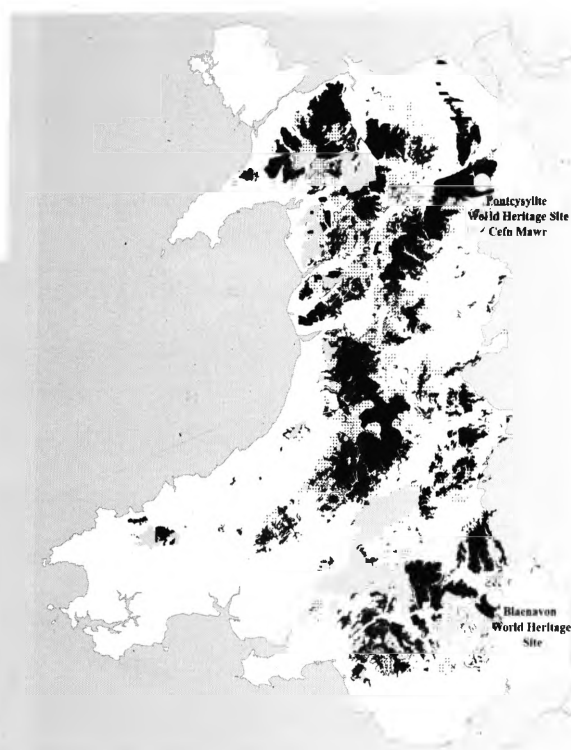
Both these coal and iron mining and iron-smelting towns are sited in internationally important landscapes and have management partnerships striving to develop a critical mass of projects that will provide economic regeneration for their associated areas. They already have a measure of success in that the Blaenavon World Heritage area, inscribed in 2000, is the only United Kingdom World Heritage site where economic regeneration can be identified as a definite outcome of its international status by the business consultants Price Waterhouse.¹ The Pontcysyllte Aqueduct & Canal area, nominated as a World Heritage Site in 2008 and inscribed in 2009, is already the most popular heritage and pleasure-boat canal in Britain.

The Blaenavon World Heritage area consists of 33,000 hectares of the former coal and iron mining upland (70 to 581 m high) surrounding the Blaenavon Ironworks (founded 1788–1789). The town that grew up around the ironworks and its mines reached a peak population of 12,500 by 1921. After the closure of the ironworks in 1900 and the decline in coal-mining ('Big Pit' the last deep mine closed in 1980) in the twentieth century its population has halved to some 6,349.

The Pontcysyllte Aqueduct and Canal is a narrow corridor 18 km long following the inscribed World Heritage Waterway but with much of its course traversing the coal and iron-mining area.² The mines and 'British Ironworks' closed in the twentieth century and the main Cefn Mawr settlement now functions as a commuter centre with a twentieth-century housing-estate taking the present population of the area to 8,211.

A core problem, in both World Heritage Areas and Buffer Zones, is how to maximise economic benefits from the use of a major tourist attraction that is divorced from the deprived traditional worker communities in each area. At Blaenavon, the major tourist draw is the underground 'experience' available at the Big Pit Colliery Museum (165,000 visitors per annum) where visitors can still go down the vertical shaft to arrive deep underground and wander round several kilometers of mining galleries, underground stables for horses and engine-houses.³ At Pontcysyllte visitors arrive in some 15,000 traditionally-shaped narrow pleasure-boats a year to have the thrill of crossing what remained the highest canal aqueduct in the world for its first two-hundred years from completion in 1805. Added to this are the 200,000 visitors, or so, who usually arrive at the aqueduct by car every year.⁴ However, it is not so much the numbers of visitors as how long they stay and what they do that generates an income. At present the new World Heritage Site at Pontcysyllte does this poorly and its potential economic benefits are not spread along what is an economically deprived corridor.

Both World Heritage Areas have sections of canal built in the early decades of the nineteenth century to take away the products of the coalmines, limestone quarries and ironworks. These waterways have achieved a new sustain-



Maps showing the location of the Blaenavon and Pontcysyllte World Heritage Sites with land over 244 metres surveyed as part of the Uplands Archaeology Initiative also shown (Crown copyright: RCAHMW).

able life as pleasure cruise ways. Income is derived for the stimulation of local businesses by boat marina provision, former warehouses turned into shops, pleasure-boat hire including accommodation boats and day boats. United Kingdom waterways return ten times as much to the local economy as is directly spent on managing and maintaining them.

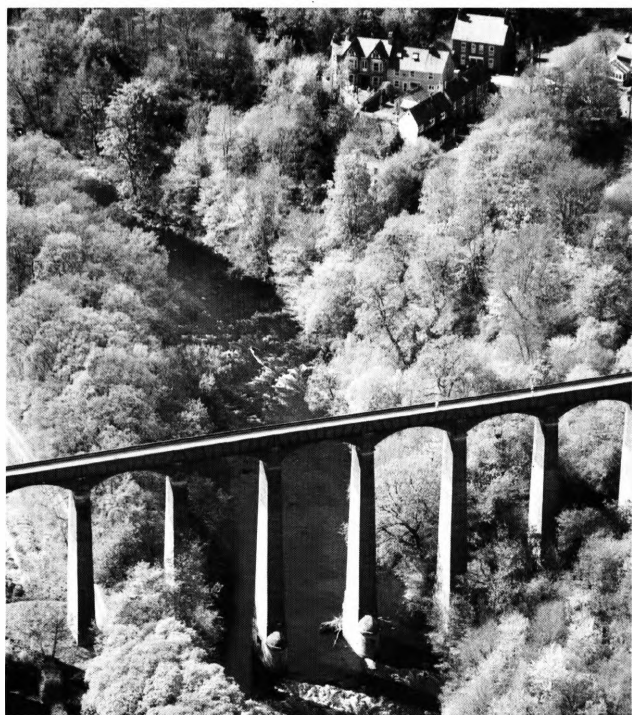
After the bicentenary of the Pontcysyllte Aqueduct and during the preparations for World Heritage inscription in 2009 extra boat moorings were built near the town of Llangollen so that the occupants of the boats approaching the head of navigation could contribute to the local economy by having the opportunity to stay overnight and patronise local shops and restaurants. Between December 2003 and August 2004 some £ 1,900,000 was spent, converting a rare widening of the waterway on the steep hillside into a 32 berth overnight mooring-basin. Activity data showed that the basin had led to a four-fold increase in the number of boats staying at Llangollen in 2005.

In 2006 an economic impact assessment was commissioned by British Waterways to assess the results of building the new basin.⁵ The 3,710 additional boat days per annum produced an additional 28,800 holiday visits and 123,000 day visits per annum with the effect of an additional visi-

tor spend of £ 477,000. This was enough to ensure the employment of an extra 16.5 people in the local economy and two seasonal posts to manage the mooring basin whilst 21 person years of employment were generated by the construction of the mooring basin. The Blaenavon World Heritage Site, at Govilon Marina and Llanfoist Touring-boat base, already benefits from canal-generated jobs and income with some of the staff housed in what were some of the earliest railway warehouses in the world built in the 1820s.⁶

At the northern end of the Pontcysyllte Aqueduct, Trevor Canal Basin is already filled to overflowing with the touring accommodation boats of a very successful boat-hire business. A solution to releasing this historic coal-loading basin as a more accessible cultural tourism lies in re-opening the now filled-in branch canal that extends for 1.5 km eastwards to the economically deprived former coalmining and ironworking community of Cefn Mawr. Over the site of this canal is a large redundant chemical works now undergoing demolition. Wrexham County Borough Council is negotiating for the purchase of this site which may give more badly needed boat-mooring space, with resultant jobs, & the space for a new greatly enlarged Visitor Centre for the World Heritage Site.

A second type of transport, railways, also stimulates regeneration in both the Pontcysyllte and Blaenavon areas. Both areas had horse-worked railways linking, collieries, ironworks, limestone quarries, iron-ore mines and canals from their inception. The main roads around which Cefn Mawr and Blaenavon are presently built both originated



Pontcysyllte Canal Aqueduct, at 38.4 m high the highest for two hundred years from its completion in 1805. (Crown copyright: RC-AHWW)



Big Pit, Blaenavon, early nineteenth-century underground galleries (Crown copyright: Cornwell Collection, Royal Commission on the Ancient & Historical Monuments of Wales).

as horse-drawn mine and ironworks railway formations.⁷ In both areas these early railway formations are being re-used as walking-routes; walking tourism is now a major element in the Welsh economy. These early railways, some later locomotive railways, and also canals are being developed as cycle-ways which additionally help to spread the effects of regeneration beyond a narrow core and into the wider community.

Both areas have seen the need to develop a critical mass of tourist attractions, and cultural assets, in order to attract tourists and to encourage them to stay long enough in the area to generate tourist income. One of the early canal railways (the 'Glyn Valley Tramway') is being redeveloped at the eastern end of the 18 km long Pontcysyllte Aqueduct and Canal World Heritage site at Chirk as a tourist attraction by a local volunteer group. However, both the Blaenavon and Pontcysyllte World Heritage Sites have established volunteer-supported steam railways that originally supported later nineteenth-century industry in the area of these two World Heritage Sites and their buffer zones. The 18 km long Vale of Llangollen Steam Railway at the western end of the Pontcysyllte site already attracts 83,000 visitors a year while the at present much shorter (1 km) Pontypool and Blaenafon Railway Company increased its visitor numbers from 6,878 to 8,701 in the year following Blaenavon's inscription as a World Heritage Site.⁸ The proposal is to extend the latter railway to 3.5 km in the short term and then to 10 km so that it can hopefully generate the size of visitor numbers already seen on the Vale of Llangollen Railway.

This development of cultural, or historical, tourism is made more sustainable by the hire of GPS (satellite) enabled computer guides from visitor centres newly established in old schools and warehouses. The need for vulnerable notice boards and resource-hungry paper publications with a larger carbon-footprint can be avoided. Site survey, recording and interpretation has also provided a greatly enhanced resource available on-line at <http://www.coflein.gov.uk>. The Blaenavon landscape has been intensively surveyed by archaeologists walking in 30 m transects which has increased the number of sites known tenfold.

The restored historic transport formations attract visitors away from the major historic sites to the wider landscape but a major focus for regeneration must be the former worker communities with their presently economically and socially deprived remaining populations. When Blaenavon was made a World Heritage site over half of the shops in its main street were boarded-up and empty.

The impression created in such a deprived community, where the population had halved since the beginning of the twentieth century with the virtual cessation of the iron and coal industries, was of a town centre environment that equated to a 'plywood city' which provide a totally unsuitable environment in which to invest. Here the fabric of the town centre has been progressively restored by Torfaen County Borough Council with the benefit of Neighbourhood Renewal Area grants worth £ 15 million over the ten years since inscription in 2000: money provided by the Welsh Assembly Government.⁹

In the Pontcysyllte World Heritage site buffer zone, the nearest community to the Pontcysyllte Aqueduct is the old deprived coalmining and ironworking settlement of Cefn-Mawr. During the preparations for World Heritage inscription in 2005–2006 this has been restored by Wrexham County Borough Council under a £ 3.5 m Townscape Heritage Initiative (a 'THI') scheme. The Townscape Heritage Initiative (THI) is the Heritage Lottery Fund's grant giving programme for the repair and regeneration of the historic environment in towns and cities throughout the UK.¹⁰

The former iron smelting and coal-mining workers settlements at both Cefn-Mawr & Blaenavon are characterised by Calvinistic nonconformist chapels built by the workers, many now in other uses. Ebenezer Chapel (originally built in 1873) at the centre of Cefn-Mawr has a cafe bar, community meeting rooms, office and gallery spaces.

Once the urban fabric of these old industrial settlements has been secured then these offer an envelope in which new businesses can be attracted. With the decline in population, and a change in shopping habits towards out of town superstores and the use of buying over the internet, there seemed no hope of directly reviving these now empty premises. However, an opportunity for private investment has been created through publically-funded work. Initially specialist shops and outlets attracted by World Heritage status and conservation work included a Restaurant ('Butterflies') where World Heritage Steering Committee annual partnership meetings were held and a relatively short-lived 'Liptons' Tea Shop with a fine traditional marble counter brought-in from the nearby coalmining town of Abertillery.

To give the town a firmer focus for the development of specialist shops, the expertise of a consultancy developed in nearby Hay on Wye was used to develop the idea of Blaenavon joining the international book-towns movement. In 2003, three years after World Heritage Inscription the Blaenavon World Heritage Officer, John Rodger, was in-

strumental in bringing American-borne James Hanna the to town and noted a year later that 'We achieved five years' worth of regeneration in the first five months of the book town, after 50 years of downhill slide'.¹¹ By 2005 there were five bookshops and three have survived in use. But bookshops will only ever be one part of a retail mix aimed at visitors to the area. Visitors are finally starting to see the visible benefit from the local council's considerable and continuing investment in the town's infrastructure. The local preserved railway's model and book shop has also been recently joined by a 'chocolate factory and shop', a combined bicycle-hire and cheese shop with the cheeses being matured underground in the mining museum. In 2008 the first art gallery and studio was added. Overall, despite setbacks, the main shopping street of Broad Street at Blaenavon has been transformed.

However for Blaenavon town to develop as a destination it needed a focus where visitors could be welcomed and introduced to the concept of what the town represented. The World Heritage Centre opened in its former ironworkers school in Easter 2008 and in its first year of operation has welcomed 17,596 visitors, making it by far the town's largest tourist attraction. It is the first dedicated World Heritage Centre to be opened in the United Kingdom.

The previous main attraction in the town area was Blaenavon Ironworks which achieved 8,361 visitors in 2007 (the number of visitors to Blaenavon Ironworks had risen significantly since inscription: from 4,284 in the year preceding inscription to 7,212 in the year following Blaenavon being made a World Heritage Site. It was subsequently decided that all state-owned attractions in the World Heritage area should have free admission and by 2008 visitors to the ironworks had more than doubled again to 15,463 for just the six months of Spring-Summer. This partly reflects the decision to use the refurbished workers' houses as the base for two TV series with modern families re-enacting nineteenth and early twentieth-century life.

In the long-term the continued viability of these economically deprived former mining communities can only be ensured by a new economic base and much of this will depend on a sufficient level of Cultural Tourism based on the attainment of a critical mass of economic projects. Cefn Mawr and Blaenavon are both Conservation areas and after study the latter is now being enlarged.¹² Both retain a distinctive character of stone-built workers housing enhanced by the institutional elements of a mining community: workers' nonconformist chapels and workers children's schools.¹³ There is a balance between Conservation

needs and the economic re-use of buildings and towns but without the latter, even for internationally significant townscapes, the former may become irrelevant as shops, houses and chapels become redundant and collapse.

Information on all these sites is available from the Royal Commission on the Ancient & Historical Monuments of Wales at <http://www.coflein.gov.uk> or <http://www.rcahmw.gov.uk>.

Further academic research continues to enhance the knowledge base that can be interpreted to the public especially by two UNESCO Cymru Bursary Students studying the Pontcysyllte World Heritage Area.

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⁴ Blockley, M., 2008 Pontcysyllte Aqueduct and Canal: Audience Development Plan, British Waterways, Nantwich, U.K., 21.

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⁹ Rodger 2003: 106.

¹⁰ Cligman, Judy, 2001 'The Townscape Heritage Initiative: Renewing the heart of our historic towns and cities', *The Building Conservation Directory*, pp. 1-2, available at URL: <http://www.buildingconservation.com/articles/thi/thi.htm>, 1.

¹¹ Kennedy, M., 2004 'Book no defeat', *The Guardian*, Wednesday 7 July 2004 available at URL: <http://www.guardian.co.uk/books/2004/jul/07/wales.1>.

¹² Wakelin, Peter (Ed.), 2008, Pontcysyllte Aqueduct & Canal, Nomination as a World Heritage Site: Management Plan, Royal Commission on the Ancient & Historical Monuments of Wales, Aberystwyth, U.K., 47.

¹³ Hughes, S. R., 2004, 'Social archaeology: a possible methodology of the study of workers' settlements based on the 18th- and 19th-century copper industry of Swansea', in *The Archaeology of Industrialization*, ed. D. Barker & D. Cranstone, Society for Post Medieval Archaeology, Leeds, pp. 137-54.
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The Effects of the Promotion of Tourism on an
Industrial World Heritage Site –
A Case Study of the Iwami Ginzan Silver Mine and its
Cultural Landscape in Japan

Masami Morita
Shinji Morita

INTRODUCTION

Nowadays, the promotion of industrial tourism arises as the main stream in heritage policy. In this situation, reconciliation between preservation of the sites and promotion of tourism is needed, because the former needs some restrictions and the latter requests to assure public access to the sites.

However, few previous studies have proposed the conditions for the reconciliation. How to contribute the World Heritage Site brand to regional regeneration? How to reconcile the interests of those concerned in charge of the Site? What scheme is needed for a sensible approach on addressing the problems?

This paper attempts to analyze the effects of tourism promotion on an Industrial World Heritage Site and to propose the ideas for the reconciliation based on a case study of the Iwami Ginzan Silver Mine and its Cultural Landscape in Japan. The Site and its region show the successful practice example.

A BIG INFLUX OF TOURISTS INTO THE IWAMI GINZAN SITE

In July, 2007, "Iwami Ginzan Silver Mine and its Cultural Landscape" was inscribed on UNESCO's World Heritage List. The Site was categorized into 3 groups: the "silver mine site and mining towns", the "ports and port towns" and the "transportation routes known as Kaido". The property of the Site extends to 442 ha and the buffer zone 3,221 ha in the city of Ohda, Shimane Prefecture in the Honshu Island of Japan. About 2,000 people are now living in the Site and its region.

As soon as Iwami Ginzan Silver Mine was registered as a World Heritage Site, enormous numbers of tourists flocked to the Site. In 2006 the number of tourists was 400,000. Suddenly it swelled to 713,700 in 2007 and in 2008 it rose to 813,200. This figures proved that the World Heritage Site brand can be a big attraction for tourists. However, does the brand contribute to economic revitalization of the Site and its region? By the lack of data, it is difficult to answer this question at present and I can only infer the following points.

Although the Site spreads out widely within the city, tourists always rush into the "silver mine site and mining towns" located in the town of Omori. In the Ginzan zone of the town, there remain many sites: over 600 outcroppings, mine shafts, over 1,000 small flat lands for refineries and so on. Today, they are hidden and preserved in the mountain forests claiming themselves as part of the landscape, but we can easily explore them by guided tours. Also, in the Omori zone there remain the administrative office of the Tokugawa Shogunate reused now as Iwami Ginzan Resource Center, the residences of administrative officers and powerful merchants, temples, and



Mining Town, July 2009 (photo: Masami Morita)



Flat Land for Refineries and Dwelling, July 2009 (photo: Shinji Morita)

shrines. Besides the old grouping of buildings, small-sized shops for tourists and houses of local residents line both sides of the very narrow and short streets.

The town is the most popular place with tourists within the Site. During busiest 10 days of 2008, 88,000 tourists visited there. We can assume that every day about 8,000 strangers came into the limited narrow residence space where around 400 people live. This situation confused local inhabitants as well as visitors themselves. Against this, the Site and its region suggested a solution which will be elaborated in the next chapter.

There are several reasons why tourists do not visit other places within the Site. The neighboring properties are not attractive in appearance. Moreover, there is a poor transportation network under restoration, insufficient information, as well as other reasons. However, the most crucial reason is that tourists have not enough time to explore and enjoy the remains of the industry within the Site: tourists from distant places arrive by tour bus and spend only two hours or so walking around. Then they pass through to other destinations famous for the Shinto shrine and hot spring resorts.

In spite of a big influx of tourists, the Site and its region will not be able to get reasonable profits. In other words, the Site and its region bear the cost of welcoming tourists and other regions enjoy more profits.

"IWAMI GINZAN STYLE" TRAFFIC RESTRICTION

The process of serious depopulation and graying also characterize there. The population of the town has been decreasing continuously from 1,236 in 1960 to 403 in

2009. In 50 years, the population has decreased by about one-third and it has never increased even once. The number of households has also declined from 361 in 1960 to 191. Simultaneously, the age composition of the region showed a declining number of children and a higher percentage of elderly citizens, and now the ratio of the latter has reached 38.7%.

The inhabitants lived with rich nature till now and from now on they want to preserve the current ecological living environment. Therefore, a tourist numerical management is necessary for sustainable development of the Site and tranquility of the inhabitants' life.

They practiced the Transport Demand Management named "Iwami Ginzan Style". This action has made strides step-by-step as follows:

Step 1:

In April 2007, "Iwami Ginzan Style" park and ride system started. The tour buses and cars were banned entering both of Omori and Ginzan zones. After arrival at the parking lot, tourists had to ride on the public bus or walk to the "silver mine site and mining towns". As the frequency of the bus service was not enough (every 30 minutes on weekdays and every 15 to 20 minutes on Saturdays and Sundays) and the parking space was limited. Tourists had to wait for one hour before they could get on the bus. Against this situation tourists complained and requested more frequency. On the other hand, the local inhabitants were suffering from the noise, vibration and exhaust gas by the frequent operations of the public bus.

Step 2:

In Spring of 2008, the city of Ohda tentatively suspended the bus service on the Ryugenji mine shaft route within Ginzan zone and let tourists explore the Site on foot. This experiment received favorable evaluation by tourists. In addition, a temporary parking lot was prepared in a nearby city and a shuttle bus serviced to the Site. Although there were traffic jams near the gate of the parking lot and the tourists formed a long line waiting for the bus, there were no complaints from the tourists. The reasons for no trouble were due to the favorable location of the parking lot and the exact information given by local people and their friendly attitudes warmed the heart of visitors.

Step 3:

In October 2008, the city of Ohda completely abolished the Ryugenji mine shaft route bus service con-



Okubo Mine Shaft in November 2008 (photo: Shinji Morita)

necting several tourist spots distributed over both Omori and Ginzan zones. This means all those concerned with the "Iwami Ginzan Style" traffic restriction reached an agreement on giving top priority to walking. Indeed, the "Iwami Ginzan Style" means the system of "park and walk."

The "Iwami Ginzan Style" is supported by sub-systems: group of local people, charged or free guided tours by volunteer guides, transportation by the Velo Taxi, etc. In short, "Iwami Ginzan Style" traffic restriction system is the whole system for welcoming tourists face to face by those human resources.

"IWAMI GINZAN RULE" FOR PRESERVATION AND MANAGEMENT OF THE WORLD HERITAGE SITE

The process mentioned above suggests a series of P (Plan), D (Do), C (Check), and A (Action) cycle of the "Iwami Ginzan style" traffic restriction system worked very well. By the way, who makes this plan? Who decides what to do or not to do? Who practices? Who checks? All the issues are on the agenda of the "Iwami Ginzan Cooperative Association Conference". The Conference was held to come out with some measures to preserve and manage the Mine in June 2005, two years before the registration for the World Heritage Site. The organization crystallizes the idea of working in cooperation with private and public sectors. The participants all have the same authority and it depends on the agenda who undertakes which initiative.

In March 2006, they published the "Iwami Ginzan Action Plan" which worked out the scheme of strategy to accomplish their purpose. Then based on the Plan, they sensibly approached addressing the problems of the Site and its region. About 200 members played important roles in all the processes; drafting, execution, examination, and revision of the plan. This means each member of the Conference took the responsibility for the future of the Site and its region.

In August 2007, the inhabitants of the town of Omori established "The Charter of Omori-cho Inhabitants" in three principles: "We preserve our history, remains, and nature", "We cultivate our town towards safe, relieved, and comfortable residence space", and "We harmonize calm and excitement with each other in living". This Charter declares their ideals of the regional regeneration. Also, it is the fruit of their preservation movement for many years.

The local inhabitants inaugurated the "Association for the Preservation of the Cultural Assets in Omori-cho" in 1957. As the result of their activities, the row of houses along the street was designated as the "Important Traditional Buildings Preservation Area" of Japan in 1987. The tradition of preservation activity has taken root among the inhabitants.

However, the World Heritage Site brand attracts numerous outside people who want to enjoy a tour or to begin business in the town. The local inhabitants hope that the visitors and newcomers agree with the Charter and co-operative with them. So, making the new rule called the "Iwami Ginzan Rule" was urgently needed; the rules about management of traffic, keeping security, utilization of unoccupied houses, developing business, and so on. That is to say, the "Iwami Ginzan Rule" is the way of reconciliation of interests of the local people related to the Site and its region directly or indirectly. Making the "Iwami Ginzan Rule" is one of the latest agendas of the Conference and it is under consideration.

By the way, the "Iwami Ginzan Monetary Fund" was established in March 2008. The period of accumulation of the Fund is five years and the target Figure is three hundred million yen. The Fund will be managed according to the "Iwami Ginzan Rule". It is the platform of their ideas to pursue sustainable development of the Site and its region.

CONCLUSION

By analyzing the case of the Iwami Ginzan World Heritage Site, I found how effectively the name of the World Heritage Site creates a branded tourist product and that the following conditions are necessary for the reconciliation between preservation of the Site and tourism promotion.

1. The traffic restriction scheme is supported by the human resources in the region. The "Iwami Ginzan Style" is the whole system for welcoming tourists face to face.
2. The PDCA cycle functions well. All of the actions advance step by step with local resident's consent.
3. There exists the organization crystallized the idea of working in cooperation with private and public sectors.
4. It is necessary to make the rule for the platform of their ideas to pursue sustainable development of the Site and its region with newcomers and visitors.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the information support given by Kenichi Fukunishi (President of LINUS ONE corp.), Hiromi Endo (assistant manager of the Iwami-Ginzan section of the city of Ohda), and Hiroshi Kaminishi (chief of the industrial development division of the city of Ohda).

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TICCIH, ICOMOS and the World Heritage Sites –
The Industrialisation of Japan

Stuart B. Smith

At the last General Assembly of TICCIH held in Italy it was strongly suggested that TICCIH should play a leading role in the development of industrial preservation in Asia and in the creation of industrial world heritage sites throughout the region. The presence at this conference of representatives from China, India, Japan, Taiwan and Indonesia, indicates that progress is being made in this area and a separate report will be made to the General Assembly. We are now in the Process of establishing formal links with mAAN (modern Asia Architecture Network) of which you will hear more later.

As we all know, TICCIH is the official adviser to ICOMOS on all matters of industrial history, and in particular the development and examination of potential industrial world heritage sites. This narrative therefore is on one such site in Japan which is being put forward as a world heritage site.

1851 was a very significant year as it saw the opening of the Great Exhibition of Industry of All Nations in London which attracted huge crowds. At the same time in Kagoshima, Japan, the Satsuma clan started to develop an industrial complex in the grounds of their country house near Kagoshima at Shuseikan.

The Satsuma clan were very concerned that the British had recently decidedly won an opium war with the Chinese, between 1840 and 1842, and warships from many American and European nations were trying to contact Japan, both to encourage trade and also to obtain coal supplies. In Kagoshima, therefore, a reverberatory furnace was built in 1851 followed by a blast furnace and eventually

the production of guns, but there were also factories for the production of glass and ceramics. Shipyards were also developed and built several military vessels, and when the British fleet came into site in 1863 the short-lived battle of Kagoshima took place which almost destroyed Kagoshima itself but also put the English fleet to flight as they had suffered so many casualties. A contemporary description by one of the commanders of the British fleet indicates that they had seriously underestimated the power of the Kagoshima batteries and the British Armstrong guns were so powerful that they overshoot the targets by several miles, whereas one of their ships was equipped with old-fashioned guns – ie. not rifled – and that ship inflicted the most damage on the Kagoshima forts. The British fleet retreated to Yokohama and a month later the envoys of Satsuma arrived in Yokohama to pay recompense for the British citizen who had been murdered earlier that year. Along with the money which they brought, they also gave oranges for the sailors which forever after have been called Satsumas in Britain but have never been known by this name in Japan.

After this battle, the Satsuma clan asked whether they could buy British warships but were informed that they could not buy them from the British Navy but could go to England and buy them from the manufacturers. Subsequently, in 1865, a group of students from Kagoshima left by devious means to travel to Britain where they spent a considerable time gaining information about British manufacturers. As a result of this cooperation, the first textile mill in Japan was erected at Kagoshima in 1866 by Mather and Platt of Oldham, with buildings being devoted to engineering – which now forms the museum of the



Kagoshima Textile Mill (© Stuart B. Smith)



Kosuge Slip Dock, Nagasaki (photo: Stuart B. Smith)

Shuseikan – and a building for foreign workers which still survives.

The year after the Satsuma clan were able to exhibit at the Paris Exhibition of 1867 independently of the Tokugawa government who by this time had lost control of Kagoshima and other distant parts of Japan. In fact in Saga a great deal of experimentation was taking place to develop furnaces for the manufacture of Iron, for which there is a wonderful museum but nothing survives above ground. In Hagi, Bronze founding were brought to perfection for the manufacture of cannons, which was effective in the various battles in 1863 and 1864 at Shimonoseki against various foreign fleets. They also produced a reverberatory furnace in 1858, substantial remains of which survive together with a dockyard and slipway.

In Nagasaki the Dejima had been a source of contact with Dutch traders for many hundreds of years but on severely restricted terms. It was only with the arrival of Thomas Glover from Scotland that Nagasaki started to develop with the construction of the Kosuge slipway in 1868 and the development of the Mitsubishi shipyard and iron-works slightly later. The Glover House inside the open air museum in Nagasaki is well preserved, including a copy of a print of his birthplace in Scotland. Nagasaki was also the location of the first cable station in 1871 to join Japan telegraphically to the rest of the world.

Nagasaki was also the home of Dr. Siebold, the originator of western medicine in Japan. Thomas Glover also developed the first European-type coal mine on Takoshima Island, which shortly afterwards led to the development

of Hashima Island, a prodigious development which is without parallel in the rest of the world. This island, which is known as ' Battleship Island' and 'Gunkanjima', saw the most extreme elements of coal mining with many thousands of people crowded into a very small area.

Another city showing the development of coal mining on a massive scale is Omuta, with its excellent museum and interpretation together with several remains of large coal mines dating from the 19th century on which physical work has now started. The large port from which coal was exported survives, together with its sluice gear manufactured in Bath, England, and also the very European club house still in active use.

Towards the north of Kyushu is the city complex of Kitakyushu with its mix of rail terminals, port facilities, gentlemen's club, and a water supply system for the blast furnace complex at Higashida blast furnace number one. There is no question that in the island of Kyushu and Yamaguchi there are sufficient sites of critical importance to the historic development of Japanese industry for these cumulatively to form a serial nomination world heritage site. Every expert who has come to this area has expressed delight at the survival of so many early technological sites with many more yet to be explored and with further potential for interpretation and industrial tourism. These sites cannot be seen just as places where European technology was introduced but where European technology was blended with existing Japanese technology – which in many areas was already highly developed – and created within a 50 year period a new world superpower.



Glover House, Nagasaki (photo: Stuart B. Smith)



Hashima Island, Nagasaki (photo: Stuart B. Smith)

It must also be borne in mind that this was not just a one-way trade. As a result of the opening up of Japan the effect on the result of the world was dramatic with particular influences in art, natural history, gardening, opera, ceramics and architecture. I think it is true to say that from 1870 to 1910 Europe was obsessed with everything Japanese.

POSTSCRIPT

The theme of this congress is economical and ecological aspects of industrial world heritage sites of which I think I can provide few examples. Most of the sites mentioned are thriving industrial cities, although some are suffering from the effects of the closures of coal mines and iron-works. The main impact on Japan will be the recognition that some of its ugliest and most unpopular sites are actually of world importance because of the way in which they contributed to the industrialisation of Japan. But even more importantly it is hoped that this application for world heritage site status will convince the Japanese

population that industrialisation was not entirely a bad thing. The second world war was obviously a disaster for Japan and its public image, but nevertheless the material benefits of industrialisation are to be seen everywhere in Japan, making it the second greatest economic centre in the world. However, none of this is talked about in Japanese schools, and it is largely ignored by the Japanese population. Perhaps the work of TICCIIH will change this perception.



Yawata Steelworks offices (photo: Stuart B. Smith)

A2 Creative Re-Use: Industrial Heritage, Building Assessment, Real Estate and Brownfield Redevelopment

Organizer: Alexander Kierdorf (Germany)

"To adapt and re-use industrial buildings avoids wasting energy and contributes to sustainable development" (Charta of Nishnii Tagil, § 5.5). Growing public interest in heritage concerns and the people's rising affection towards industrial heritage push forward new political and economical concepts for the preservation of industrial monuments. Conversion and redevelopment projects all over the world prove that the re-use of monuments – many of them industrial – can be very profitable on the commercial real estate market. So the re-use of historic buildings today is a serious and important field of architectural activity. From the "preservation perspective" though, many conversions "overdo" and cause unnecessary harm to the historic buildings. In order to open up a broad discussion on creative re-use, papers for this session should focus on: Traditions of re-use and adaptation; Conventional and surprising re-uses; Studies on the material value of monuments and economic impact of re-uses; Conflicts of interest between heritage qualities and function; The dangers of re-use and conversion; Heritage management as part of a region's sustainable economy.

The session invites people from different backgrounds to present and discuss case studies and conceptual approaches to the assessment and preparation of buildings and complexes for further uses, the management of contaminated or otherwise restricted sites, and the integration of industrial monuments into programmes of sustainable regional tourism and redevelopment schemes.

Shanghai Pattern: Combination of Industrial Heritage and Creative Industry – Some Cases of Industrial Heritage Conservation in Shanghai

Yiping Dong
Binchao Hou

BACKGROUND

Compared with the other historical cities in China, Shanghai is a relative young city with more than 700 years history.¹ Though Shanghai was a small trade port under the Suzhou before 1840, the city links inland China and overseas with a natural deep water harbor. After the Opium War, Shanghai started its way to be metropolis. "South Bund", "East Bund" and Suzhou Creek are the three main waterside industrial sites in Shanghai before 1949. (See Map 1).

Closure and Economic Pressure

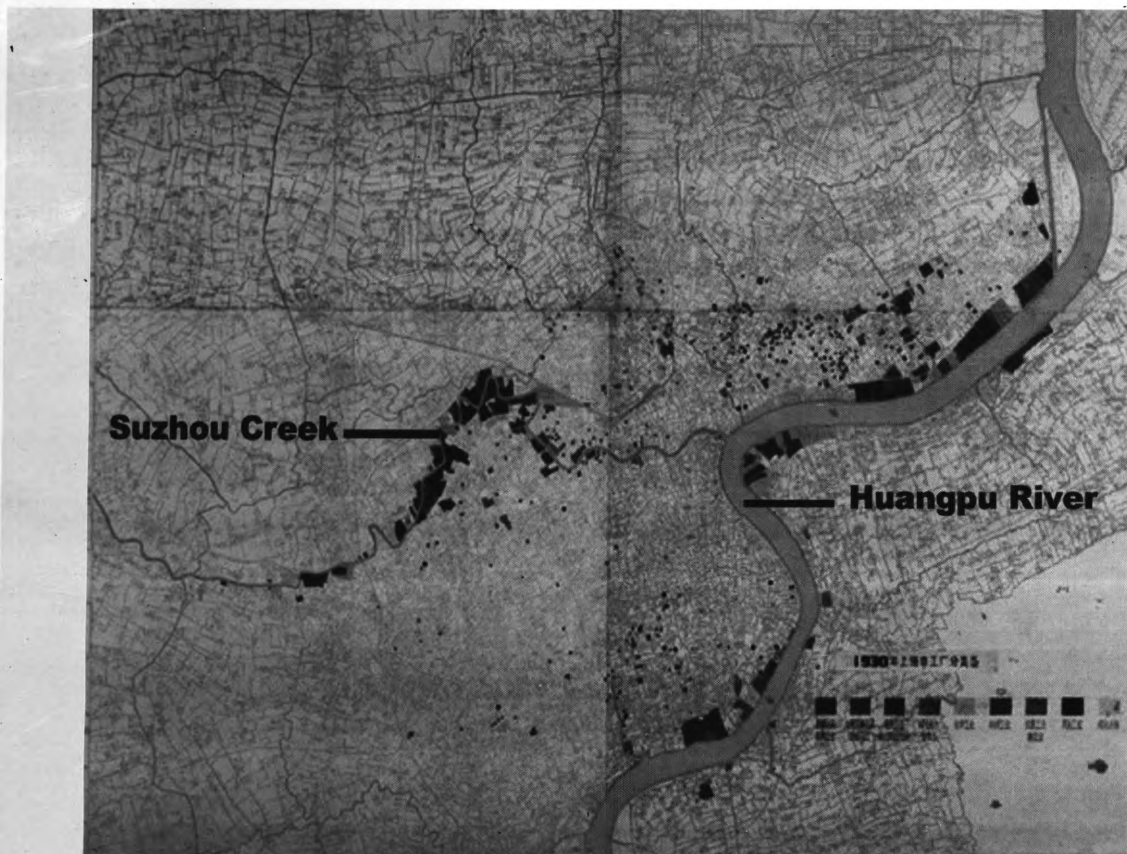
For the environmental and economic consideration, many factories closed and relocated since the 1990s. The industrial building stocks are all state-owned. As the statistic shows over 40,000,000 m² of industrial floor space are vacant from textile, machinery, automobile, shipbuilding, warehouses and etc. Take textile for example, from 1992–1999, more than 500,000 spinners got laid off. The laid-off workers were not officially unemployed though, because they had not completely broken away from the state-owned company. The original management group

was required to support these laid-off workers, including providing continuous education for new positions, a minimum monthly allowance as well as contributions to the social security accounts of individual workers before they reached their retirement age.²

At first factory spaces were considered ugly, insanitary and should be demolished. Some "lucky" companies found developers qualified to remised factory sites to build new high-rise flats. Other "unlucky" companies lent out factory properties separately while waiting for developers. Typically large space was converted to large furniture markets with a low rent, or some other may be rent as large restaurants. But just these "unlucky" and slow procedures of the property transformation left Shanghai a chance to maintain its Industrial Heritage.

Spontaneous Re-use and Urban Industrial Park (before 2004)

From the mid-1990s, several leading artists were back from overseas to Shanghai and rented warehouse space as their studios. Their individual trial was amplified through public media. Like the story of New York SoHo, the cultural



Map 1: Industrial Land in Shanghai in 1930. The marked areas indicate industrial land.
(Source: Shanghai Urban Construction Archives)

economy sectors were closely linked to marginal urban spaces, including obsolete industrial building. Those trials sowed seeds for the flourish of creative industry later.

Since 2000, the governor started to promote the "Urban Industrial Park" (UIP) project in the closed factories. The "Urban Industries" are clean, environmental-friendly, have great job opportunities, and knowledge-based "modern" technologies. For cheaper rent and good location, inner-city UIPs also attracted cultural workers. M50 and Tian Zi Fang were the very typical example to show this "underground" Art Park in Industrial Park.

Case 1: M50

M50 was a cotton mill along Suzhou Creek established by a Chinese industrialist in 1937. After several management changes it was shut down in 1999. The architectural legacy of over sixty years of textile production at M50 was a mélange of industrial buildings with characteristics of different historical periods, from the 1930s to the 1990s. Bearing the economic pressure from the former hundreds of workers, the factory had rented the space to small private industries at first. In 2000 SCSC (M50) was selected to be a UIP with some financial support from the government. By chance one artist, Xue Song rented his space in SCSC UIP, but not legally while culture is not very fit in with the Urban Industry. Later the manager group found that to lend to artists is both quiet, safe (especially for fireproof consideration) and looks more civilized and attracts some more high level intellectuals, so they decided to rent the space rather for artists than productive craftsmen. More artists came to M50, and later on many fashion reports about the parties in M50 attracted art students, foreign tourists, which gave M50 a good fame. But M50 still have the pressure from

its developer. This plot was already conveyed to a Hong Kong developer, and is due to be demolished in 2003. All artists united together with the manager group to make proposals for "saving the only left industrial clusters in Suzhou Creek".³

Fortunately, the "industrial heritage" and its conservation were also introduced to the academia around 2000. One conservation plan was proposed for M50 in 2003, which suggested protecting this representative legacy of the former textile industry, and raising a new concept of "art district". The conservators wanted to use the plan to amend the detail plan by state. According to the detail zoning plan, M50 site was still for industrial use, but finally they reach acquiescence about such cultural usage. Such acquiescence later became an initial of the quickly increasing of "Creative Industrial Cluster".⁴ M50 was assigned as a CIC in 2006, and was assigned as Culture Industry Park in 2009.

Case 2: Tian Zi fang (Tai Kang Rd.)

Like M50, Tian Zi Fang was also an "Urban Industrial Park". There were a typical group of factories set up in a lane during 1930, composed of six small factories including food, machinery, and plastic industry. The factories lied idle for years before local governor started to promote the "Urban Industry Park" in 2000. Yifei Chen, an accomplished artist in New York and Deke Erh, a famous photographer from Hong Kong were invited by the manager of Tian Zi Fang to establish their studios. Their semi-open studios later attracted many other artists to follow. Gradually, the nearby traditional Lilong houses were rent as Cafés and Restaurants, small souvenirs shops, galleries, and finally became a tourist spot. Nowadays tourists visit Tian Zi Fang for a typical middle-class image in Shanghai.

Table 1: Statistics of the Creative Park and Industrial Buildings

CICs	Issued Date	Numbers	Floorspace (m ²)	Re-use vacant industrial buildings	Protected building	Building life	
						Older than 50 years	Older than 30 years
First	April 28, 2005	18	410,000	15	1	8	10
Second	Nov. 30, 2005	18-1	630,000	12	2	4	10
Third	May 20, 2006	14-1	520,000	12	3	6	10
Fourth	Nov. 22 2006	27	650,000	25	3	9	19
Subtotal		75	2,210,000	64	9	27	49

Source: according to data by Shanghai Creative industry Development Report 2006-2008, edited by author

"18-1 and 14-1": these two Creative Parks no longer fit the criteria, cancelled both in 2007.

CREATIVE INDUSTRY AND INDUSTRIAL BUILDINGS
(2004–NOW)

From Urban Industry to Creative Industry (CI)

While the UIP is going on, the "Creative Industry" was introduced to Shanghai as a new engine. The CI here refers to design, media, communication, consulting and public relation, most related to cultural industry. The western cases like Dockland, SOHO, Ruhr Emscher Park projects show Shanghai a new possibility for the urban transformation: the container of new creative industries. But Shanghai shows some special features which should be discussed here.

Booming of Creative Industrial Clusters

By 2005, the Municipal Government had largely changed its attitude toward creative industries and vacant industrial buildings. It acknowledged not only the importance of creative industries for the city's economy; it also began to accept the role of vacant, especially old industrial buildings in nurturing such industries. A few events reflect this changed perception. One was the establishment of the Shanghai Creative Industry Center (SCIC) in November 2004. As a semi-government organization, it was mandated to promote creative industries in Shanghai. Another important event was the designation of "Creative Industry Clusters" by the Economic Commission of the Municipal Government.⁵ The number of CIC issued by city level reaches 75 from 2005 until 2006, and it is planned to have 100 clusters before 2010. More than three forth of the 75 clusters are reusing the vacant industrial buildings; and there are at least 49 clusters in buildings older than 30 years. (See Table 1 and Map 2)

INDUSTRIAL HERITAGE CONSERVATION

Shanghai has a double system for building conservation. One is under the State Administration of Cultural Heritage (SACH), which is the local agent in charge of the monuments; while another is the Shanghai Municipal Bureau of Housing and Land (SMBHL) which manages the so-called outstanding historical buildings.

It's not long ago that the value of "industrial heritage" was admitted. Since 2003 the outstanding historical buildings regulation added "industrial heritage" as one potential type, claim that any workshop, store, factory and warehouse, which is older than 30 years and can be representative of the industrial history might be assigned as an outstanding historical building after evaluation by the committee.

Up to now, only 40 outstanding historical buildings belong to IH and there are only 5 industrial listed unmovable cultural heritage under the SACH system. 4 are mentioned in both systems, so there are only 41 sites under the name of IH. As Shanghai has a huge industrial building stock with very typical industrialization history, these 40 sites are only the tip of the iceberg. The M50 and Tian Zi Fang have no listed buildings inside yet. There should be much more than 40 sites.

Case 3: 1933 Old Millfun – a listed IH case

"1933 Old Millfun" was the new name of the former largest slaughterhouse in Far East. Funded by the Municipal Committee, the SMC slaughterhouse was designed by English architect Balfour and built by a Chinese Construction Co in 1933. The functional round space and corridors are unique to be a representative for the modernization in food processing industry in China.

It was listed as industrial monument in 2005 and the redevelopment project started in 2006. The investment is ca. 10 million Euro for restoration and renovation. SCIS was involved in the development process from the start. The new slogan of the special space is: "a new life style" which is focused on new upstart. As a fashion spot, the rent of 1933 is higher than the normal office. The renovation of the architecture seems successful but the letting ratio is not so satisfying.

Case 4: Red Town – a case of unlisted IH case

Red Town is the new name for a former steel factory dated from 1950s. Set in the city center with three

Table 2: Double systems for conservation historical buildings

SACH Shanghai Agency	SMBHL
listed unmovable cultural heritage (industrial):	outstanding historical buildings (industrial):
5	40

Source: according the data by SACH and SMBHL on 2009 SACH is in charge of the 3rd National Heritage Survey (2007–2011), which focuses on the modern cultural heritage, and pays special attention to IH. There are some achievements in past years' surveys.

metro lines across, the change of function seems unavoidable. Shanghai Urban Planning Bureau promoted this space converted to Shanghai Sculptural Space (SSS) and the surrounding to creative industry community in 2005. The SSS is a flagship public art space by Municipal, the exhibition is free for everyone; the other tenants are restricted to creative industry such as design, gallery, media, and top gastronomy. The gated industrial area was turned successfully into a green public square with huge sculptures dotted inside. But none of the buildings of the Red Town Project are listed yet.

SHANGHAI PATTERN: COMBINATION OF INDUSTRIAL HERITAGE AND CREATIVE INDUSTRIAL

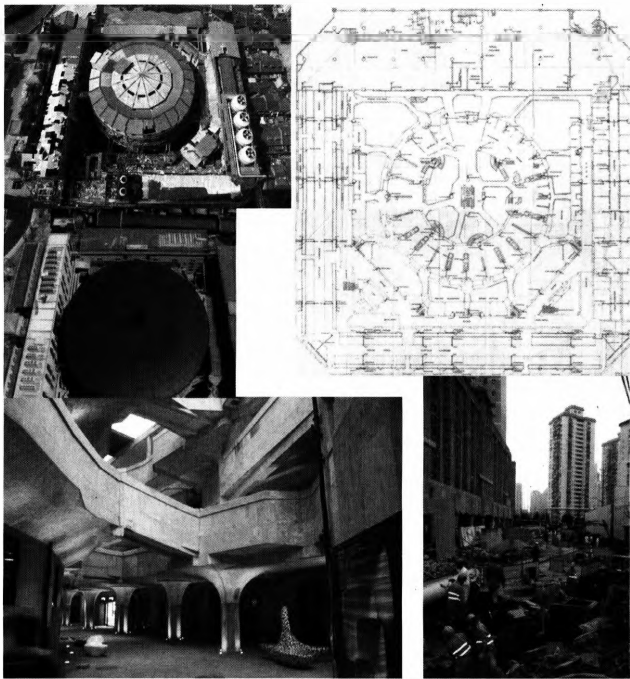
As Shan, Qixiang, the director of SACH pointed out in 2008, "Shanghai Pattern" is a practical way to protect industrial heritage. Other researchers also take Shanghai cases as model to study (Ruan, 2004, Zhang, 2006), but this is still a vague concept. Shanghai Pattern could be defined as the adaptive re-use of vacant industrial buildings which have the following features: 1.) provisionality, only rent for re-use; 2.) the combination of the creative industry with the industrial buildings; 3.) the strong promotion by the local governments. Most CICs in Shanghai are following the Shanghai Pattern to revitalize the vacant industrial building stocks. Shanghai

is the pioneer to take such pattern in China and Beijing, Suzhou, Hangzhou, Chongqing, Guangzhou, and more cities follow suit.

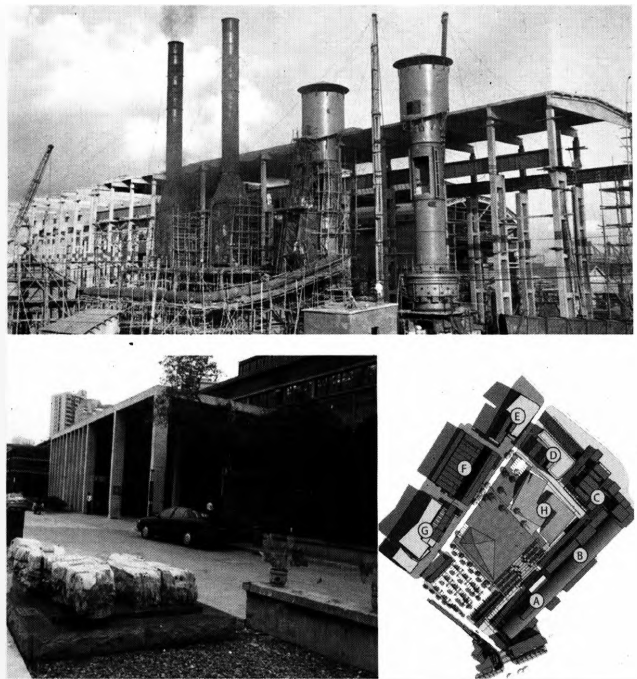
Policy analysis

These features of "Shanghai Pattern" are generated by a policy called "three fixed criteria and three matters should be changed" which is determinant to CICs' booming. The three fixed criteria are: 1.) the ownership of the property; 2.) the buildings cannot be demolished; 3.) the zoning type of the lot is fixed as industrial. The three matters changed should be: 1.) function-shift to creative industry; 2.) employment shift to creative industry; 3.) the trade shift to mixed multicultural.⁶

The fixed ownership shows the basic land system in China is that all the land is state-owned. Fixed ownership prevents the loss of state assets and ensures the profit maximization; on the other hand, the fixed zoning allows the re-use procedure trigger in a comparatively lower threshold. In most redevelopment cases, the normal land remise fund is too high to find a powerful developer for a quick start. The fixed construction means façade and interior change is possible to new functions (except for the listed buildings and monuments). The usage also stops the physical deterioration, and makes it possible to be recognized as industrial heritage later.



*The former slaughterhouse renovated as 1933 Old Millfun.
(© authors)*



Red Town before and after reuse Red Town (© authors)

Further thinking

The Shanghai Pattern has brought gains to the city in the past five years: firstly the temporary usage avoided the rapid vanishing of industrial buildings; secondly due to CICs and the creative class the quality and fame of the district rises; thirdly Shanghai Pattern combined with the official conservation system raised the public interests in industrial heritage conservation. And the last is to use the private funds to restore the historical buildings while the public financial sources are quite limited. Still Shanghai Pattern has several problems and might be adjusted to run more properly in further practice.

PROBLEMS AND PERSPECTIVES

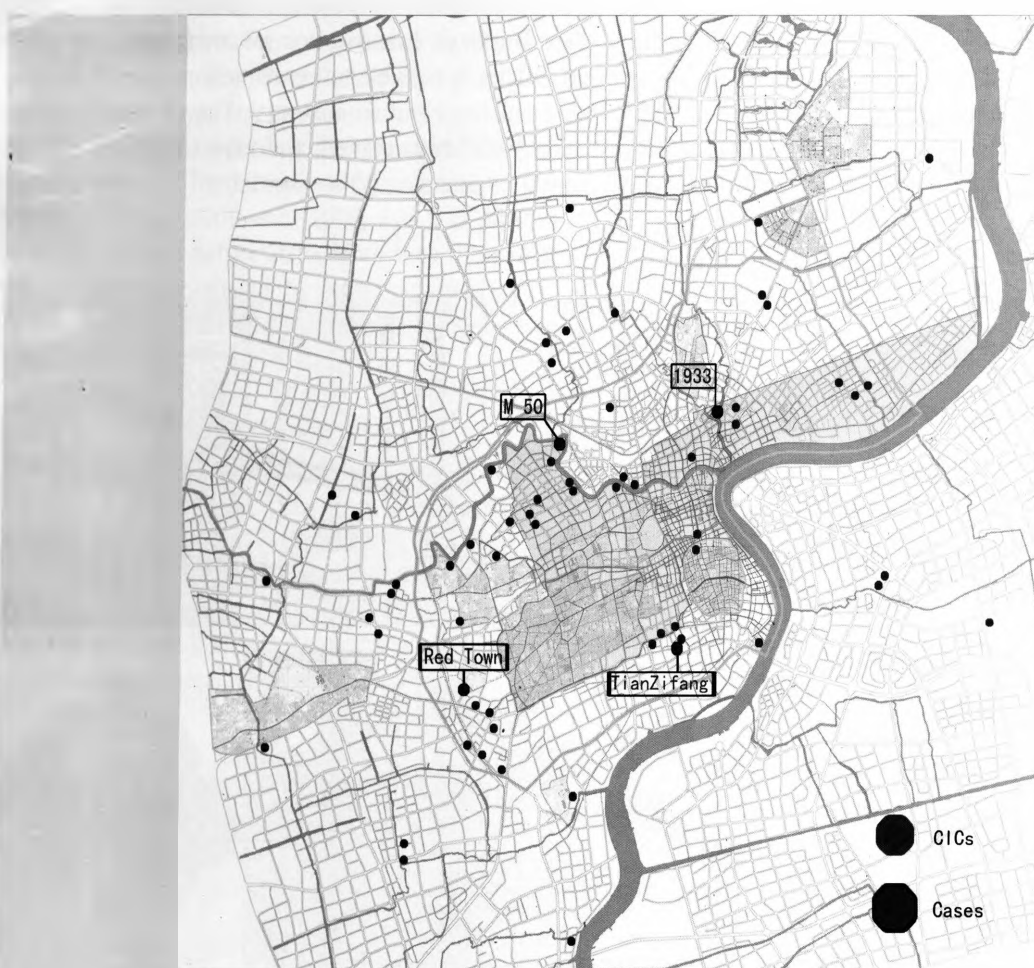
1. Short term consideration.

Since the rent period for CIC is usually 10–15 years and the longest period being 20 years, the developers pay much more attention to get profit back. The rent is the only income through the property, so the prices rise

quickly as soon as the Cluster got the fame. In former times industrial space was for newcomer artists or small companies, now the rent is high enough to stop their dreams. To avoid the short term usage, a public funding system is necessary. A public fund will help to establish facilities such as industrial museums and public educational organization.

2. Mono-user and Mono-function.

The transformation usually sets artists and designers as main user group. The former workers and neighbors rarely have the chance to take part in the CICs. They are somewhat isolated and without community issues considerations. Successful re-uses of the Western world such as museums and galleries, concert halls, schools, shopping centers, apartments, landscape parks should be studied carefully and the possibilities both in Shanghai and the whole of China should be considered. The CICs should be accessible by every class, especially the former workers; this could let the goodness be shared during the conservation of industrial heritage.



Map 2: 75 CICs distribution map and the cases mentioned.
Based on the CICs database, redrawn by author.

3. Lack of Historical and Social Insight.

As a commercial purpose development, only the economic value and space value is important. The commoditization of history and space changed the meaning of "Industrial Heritage" in Shanghai. There is no proper industrial archaeology study before re-use, and thus there is no good interpretation of the particular sites of the industrial past at all. We should pay more attention to the technology research rather than spaces. The listing process should be more efficient in protecting IH.

¹ Shanghai was pointed as a county town in 1291 AD, Yuan Dynasty.

² Interview with M50's manager on 2009-6-2

³ URL: <http://www.M50.com.cn> & Interview with the M50 manager and artist renters.

⁴ Interview with Prof Zhang Song

⁵ Interview with the Secretary of SCIC, 2009-5-31

⁶ Interview with the former head of SMBHL on 2009-6-4

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Sustainable Re-Use of Historic Industrial Sites – Revisited

Keith Falconer

Four years ago in Prague at the Vestiges of Industry Biennial I gave a paper with a similar title, fired with the optimism of prevalent building boom.¹ Now, with the chastening experience of the present economic recession I have revisited the paper to examine what has changed and what still holds true. Certainly the assertion that sustainable re-use of industrial sites is nothing new – they have a long record of being re-used for different purposes from that for which they were built because they offered cheap easily utilised space. There was often minimal intervention but there was seldom any respect for the character or integrity of the building. The considered re-use of industrial buildings in Britain began some 35 years ago with Cantacuzino's seminal book *New Uses for Old Buildings* published in 1975. Industrial sites account for nearly half the examples but that those buildings were perceived to 'offer (the architect) considerably more freedom' than the conversion of other types of historic buildings was a sign of the times.² Twenty-five years later the second seminal book on this topic *Industrial Buildings – Conservation and Regeneration* was published by Michael Stratton. This collection of essays illustrated the huge advances made in the philosophy of conserving and converting industrial buildings.³ With the concept of the sympathetic management of change firmly established in the planning agenda the implications for heritage industrial buildings was set to be promising.

Now, in Britain, with the collapse of the building boom, the situation seems less rosy. Many of the regeneration resources, and agencies, that were developed towards the close of the 20th century have gone or at least have been scaled down. In the 1980s the involvement of some twelve Urban Development Corporations had a huge impact on urban landscapes but, with a few exceptions such as Albert Dock, Liverpool, did not produce many exemplary industrial redevelopments. Similarly English Partnerships, the national regeneration agency established in 1994, which had emerged as the largest player involved in the regeneration of industrial sites by the end of the century was eventually to lose its effectiveness. At its peak in 2004/2005 it invested some 650 million Euros in regeneration projects and levered in an equivalent amount of private sector investment. As well as developing its own portfolio of strategic projects, it acted as the Government's specialist advisor on brownfield sites. It operated the National Land Use Database and the National Coalfields Programme which had a ring-fenced budget of 540 million Euros throughout its life. The latter programme ensured the survival of historic pithead buildings as at Chatterley Whitfield Colliery, the finest surviv-

ing example of an early twentieth century coal mine in England. But in 2008 English Partnerships, despite regenerating areas such as the Newcastle waterfront where a successful mix of old warehouses, Victorian commercial buildings and apartments rippled across the river to Gateshead where the striking silo building of the Baltic Flour Mills were converted into a modern art gallery, was absorbed into the Housing and Communities Agency and its industrial regeneration effectiveness was lost.

A second player to emerge in the 1990s was Regeneration Through Heritage, which has now been absorbed into The Prince's Regeneration Trust and continues to promote the re-use of heritage industrial buildings at risk. Its staff, supported by voluntary experts, assists community partnerships develop project proposals on the basis that the regeneration will have a catalytic effect on the wider area. Projects supported by the Trust have rescued several major historic industrial buildings and attracted substantial inward investment for a relatively small outlay of public funds to meet its core operating costs. Another source of regeneration funding, the initial impact of which was dramatic but is now diminishing by national cuts in the agencies' funding, is the English network of the Regional Development Agencies. Thus English Heritage's acquisition of the Ditherington Flax Mills in Shrewsbury, the first iron framed fire-proof textile mill in the world, was facilitated by funds from Advantage West Midlands, the local RDA.

The last three decades witnessed the realization of the need for new uses to be financially sustainable in the long term. This was demonstrated as early as the 1980s in pub-



The Baltic Flour Mill, River Tyne (© English Heritage)

lished analyses by Eley and Worthington⁴ and by URBED.⁵ URBED's research on the subject, led by Nicholas Falk embraced over 600 examples and involved every imaginable kind of building and use. Regrettably this practical advice has been too often ignored in publically financed schemes. The virtues of flexibility, realistic financial aspirations, close budget control are also convincingly extolled by entrepreneurs such as Bennie Gray of the SPACE Organisation.⁶ SPACE did not just develop and design but actually ran numerous projects re-using industrial buildings. These included the much-lauded Custard Factory and the Big Peg in Birmingham and Canalot and Danceworks in London. Though largely having to find backing from financial institutions with the occasional small grant from public funds, SPACE has provided workspace for about 1000 small start-up companies at a fraction of the cost of many government backed schemes. Gray's *ad hoc* and personal approach is in the same vein as Ernest Hall and Jonathan Silver's early development of Dean Clough Mills, Silver's mixed re-use of Salts Mill at Saltaire and George Ferguson's conversion of the Tobacco Factory in Bristol. These are all salutary counters to some of the more ponderous public funded initiatives elsewhere. Therefore when experts from very different standpoints all argue for the virtues of incremental development as opposed to 'big bang' solutions the advice is worth heeding.

A look at some notable examples of conversion illustrates the circumstances and varying success of different types of regeneration. Jesse Hartley's Albert Dock and Warehouses were constructed 1846–1848 and are the finest expression of the closed wet dock systems in England. Their regeneration, which has spanned quarter of a cen-

tury, encapsulates a great many of the factors affecting sustainable re-use. When Liverpool's South Docks were closed to shipping in 1972 Albert Dock and its neighbouring docks were allowed to silt up and the future for the abandoned warehouses was bleak. Economic unrest in Liverpool culminating in 1981 in the Toxteth riots focused Government attention on Liverpool's waterfront and the Merseyside Development Corporation was created to stimulate regeneration. One of its first initiatives was to back a detailed survey of the South Docks with a book which firmly established the dock system as of supreme international interest.⁷ A master-plan recognised that complete restoration and re-use of all the enormous warehouse stacks would take many years but that confidence could be generated by rehabilitation of the structural envelopes and prestigious re-use of some elements. Thus part of one warehouse stack was converted into the Tate Gallery of the North another block was conserved as the Maritime Museum and bars and restaurants opened at quayside level. This pump priming and cultural adventure was spectacularly successful. Twenty years later the stacks are fully occupied by apartments, offices, hotels, tourist attractions, restaurants and bars while neighbouring warehouses such as those at Wapping Dock have been converted into apartments and a marina has developed in docks to the south.

The regeneration of the Great Western Railway's Works at Swindon followed a very different path – speculative, piecemeal and opportunist – but with similar positive results. Started by I K Brunel in 1842, the GWR Works were, by 1900, one of the largest such works in the world but declining in the post-war years they closed in 1986. The site was bought by a commercial developer but the property crash at the end of the 1980s rendered an ambitious scheme for redevelopment uneconomic. The undesignated buildings were demolished and those workshops and offices that were listed were left abandoned. The catalyst for regeneration was the conversion of the listed GWR General Offices into the headquarters of the Royal Commission on the Historical Monuments of England and the building of its state-of-the-art archive store. Now it is English Heritage's largest office, housing the National Monuments Record and much of its commercial and research staff. The vast Grade II* sheds remained empty until the American firm McArthurGlen had the vision to convert them into an outlet shopping mall. Opened in 1997 with over 100 units, the Great Western Designer Outlet Village attracts some four million shoppers a year and the quality of its conversion (insisted upon by English Heritage and the local authority) has led to it being



Albert Dock, Liverpool (© English Heritage)

regarded as a regeneration exemplar. Its success has encouraged other developments on the site. STEAM: the museum of the GWR occupies other historic workshops and the National Trust has built its headquarters alongside.⁸

At the same time as these large area regeneration schemes were being undertaken by public agencies and large developer firms, there had been equally influential single site conversions which were the result of individual entrepreneurs or specialist firms. These conversions were largely achieved with slight input from public funds and have proved to be sustainable. Their success prompted a spate of conversion projects undertaken by specialist firms which had emerged in the late 1990s and become synonymous with adventurous mixed use and apartment developments – Urban Splash being the supreme example. Set up in 1993 by Bloxham and Falkingham, Urban Splash made its name initially by innovative projects such as the conversion of Box Works, and Waulk Mill in Manchester and The Matchworks and The Vanilla Factory in Liverpool. The practice then expanded to other parts of the country and had perhaps overreached itself when the property crash manifested and the firm has had to contract considerably. An examination of some of Urban Splash's more recent projects illustrates the point.

In Yorkshire, Lister's Manningham Mills, Bradford was once the largest silk mill in the world employing 11,000 workers. Derelict for over 20 years it was one of the country's most prominent Buildings at Risk until Urban Splash led a consortium of English Heritage, Yorkshire For-

ward (the RDA) and Bradford City Council to undertake its repair and conversion. The new uses included commercial offices, studios, community space and leisure activities as well as apartments. The first phase of conversion to apartments was completed before the property crash and the enthusiastic take-up created a new vibrancy in an area much in need of regeneration. In Plymouth, the Royal William Yard, a grand naval 1830s victualling yard with the ten huge buildings comprising over 48,000 m², was acquired in 1999 by the South West RDA and in partnership with Urban Splash developed this problematical site. With funding for repairs from English Partnerships, the Brewery, Clarence Block and the Bakery have been converted and all the apartments in the first phase have been sold though, with the recession, work on further conversions has now slowed. A similar story unfolds at Fort Dunlop near Birmingham where the owners, RDA Advantage West Midlands and with Urban Splash have only partially completed the revamp of the huge derelict storehouse, a hotel having opened but not all the offic-



Listers Mill Manningham, Bradford (© English Heritage)



Paintworks in Bristol (photo: Keith Falconer)

es and retail while other Urban Splash projects such as Lakeside Tobacco Factory, Bristol have stalled.

As these examples show the options for re-use may be both numerous and imaginative but are very susceptible to property market conditions. The commonest and most interventionist are apartment conversions and they are particularly vulnerable to the vicissitudes of the property market. A mixture of uses is being increasingly recognised as the most appropriate solution for large industrial complexes while an incremental rather than 'Big Bang' approach is seen to be more effective. Small schemes, such as the Paintworks in Bristol where a complex of modest industrial buildings is being converted into offices, studios, cafes and residential properties have demonstrated how an organic growth of phased development can succeed when more capital intensive schemes are failing. The British experience is therefore really quite revealing and, despite the pitfalls, rather heartening. The advent of the Heritage Lottery Fund has been of huge significance for publically fundable schemes while the thoughtful conversion of other historic industrial sites can contribute greatly to the sympathetic regeneration of our cities in the post-industrial era.

¹ ARCHITEKT 11/2005 and Understanding Historic Building Conversion ed M Forsyth 2007 pp. 74–87

² Cantacuzino, S. (1975) *New Uses for Old Buildings*, Architectural Press London

³ Stratton, M. ed (2000) *Industrial Buildings: Conservation and Regeneration*, E & F N Spon, London

⁴ Eley, P. & Worthington, J. (1984) *Industrial Rehabilitation*, Architectural Press, London

⁵ URBED (1987) *Reusing Redundant Buildings: Good practice in Urban Regeneration* HMSO, London

⁶ Stratton, M. (2000) Chapter Six

⁷ Richie-Noakes, N. (1985) *Liverpool's Historic Waterfront* HMSO London

⁸ See Cattell, J & Falconer, K. (2000) *Swindon: the Legacy of a Railway Town* English Heritage Swindon and Falconer, K. (2000) *Swindon's Head of Steam, the regeneration of the GWR's Works in Patrimoine de L'industrie Vol 3 2000 TICCIH Le Creusot Montceau Les Mines* pp. 21–28

"The Old Factory" – Traditions, Patterns and Perspectives of Re-Use

Alexander Kierdorf

Long before Industrial Heritage as a cultural category was established, conversion and re-use were practiced to save the material and mental values of buildings and structures which had lost their original function. Archaeology, architectural and conservation history are full of interesting and often surprising examples and stories how structures managed to survive, how they were converted and re-interpreted. But a general theory of re-use has never been developed, probably because conditions, reasons and methods were extremely diverse and individual.

Re-use, for whatever reason, is a permanent and normal phenomenon in the world of building and real estate. It might be regarded as rather unusual that the buildings and structures of the industrial and technical world and age were not included in this tradition. One reason might be that the growing impact on nature and "natural" landscapes caused public opinion, legislation and owners to insist on and get used to the removal of industrial structures which had lost their original function.

But step by step, it was recognized that the hostility towards "Industrial Heritage" led to an unbalanced picture of history, hindered the understanding of existing structures and caused a great loss of material resources.

One might characterize many industrial monuments as objects which beyond plain re-use options possess qualities which must be defined and preserved "alongside", whose value is not open to direct capitalization. To find a balance between commercially demonstrable and successful conversion and integration of historic equipment, for example, is the central question of many preservation schemes. To describe and establish the value in a broader and durable context often helped to protect "useless" objects.

Another argument says that, in an economy including central ecological principles, re-use economically has massive advantages. But the building industry, real estate management, legislation and design are still mainly based on permanent replacement and concentrate on the construction of new buildings.

The positive image of "The Old Factory" as a place of successful, integrated preservation and use of cultural, material and social values can be one element of a society moving towards sustainable and human structures.

INTRODUCTION

Monuments have a cultural and a material aspect. Their material existence is part of scientific and economic systems and evaluations which follow the progress of theoretical and practical thinking. Development and regeneration are basic features of almost all levels of material, ecological and social systems. To preserve something absolutely without changes therefore seems rather absurd and is in fact impossible. So in modern preservation theory, it would make more sense to speak of influencing development and prolonging life by making certain decisions about what to keep and what not. In this dynamic model of preservation strategies Re-Use and Adaptation play a central role. Re-Use was not invented by Heritage Management; it is a tradition and pattern of dealing with valuable buildings and artefacts for reasons which mostly lie beyond historic consciousness.

It is fascinating to observe and analyze the ways and conditions of Re-Use, and we can learn a lot from it to understand our own perspective, develop strategies and influence future developments. This is especially valuable on the background of the idea of sustainable development as a general material and cultural principle to ensure the survival of human civilization. Such traditions and patterns, carefully studied and evaluated (as cannot be done here!), can teach a lot about possible future strategies not only in heritage, but in the whole field of use of buildings and infrastructure.

TRADITIONS AND PATTERNS

The reasons for re-use in history are manifold. The romantic image of fugacity, symbolized by the decay and primitive use of monuments of the past in pictures follows an artistic tradition. In reality, poverty was behind the re-use of Roman arenas and theatres like the Marcellus theatre in Rome (finished in 13 BC, later used as dwellings and castle) or the ruins of the antique Palace of Diocletian in Split who became organic part of the medieval city. The use of building material from antique ruins to build medieval structures was absolutely normal.

Other monuments, especially religious and aesthetically representative ones, were converted and reinterpreted for new religious or public uses, like the Roman Pantheon (built ca 120 AD by Hadrian, consecrated as church in 609), the Hagia Sophia in Istanbul (built in the 6th century as Christian orthodox church, converted into mosque after the Muslim conquest of Constantinople in 1453), or Porta

Nigra in Trier (built ca. 180 AD), which even influenced Romanesque architecture when it was converted into a church in early 11th century. "Purification" was done here on order of Napoleon. Building or decoration elements like antique columns and capitals were re-used and incorporated in new contexts as signs of tradition and apology.²

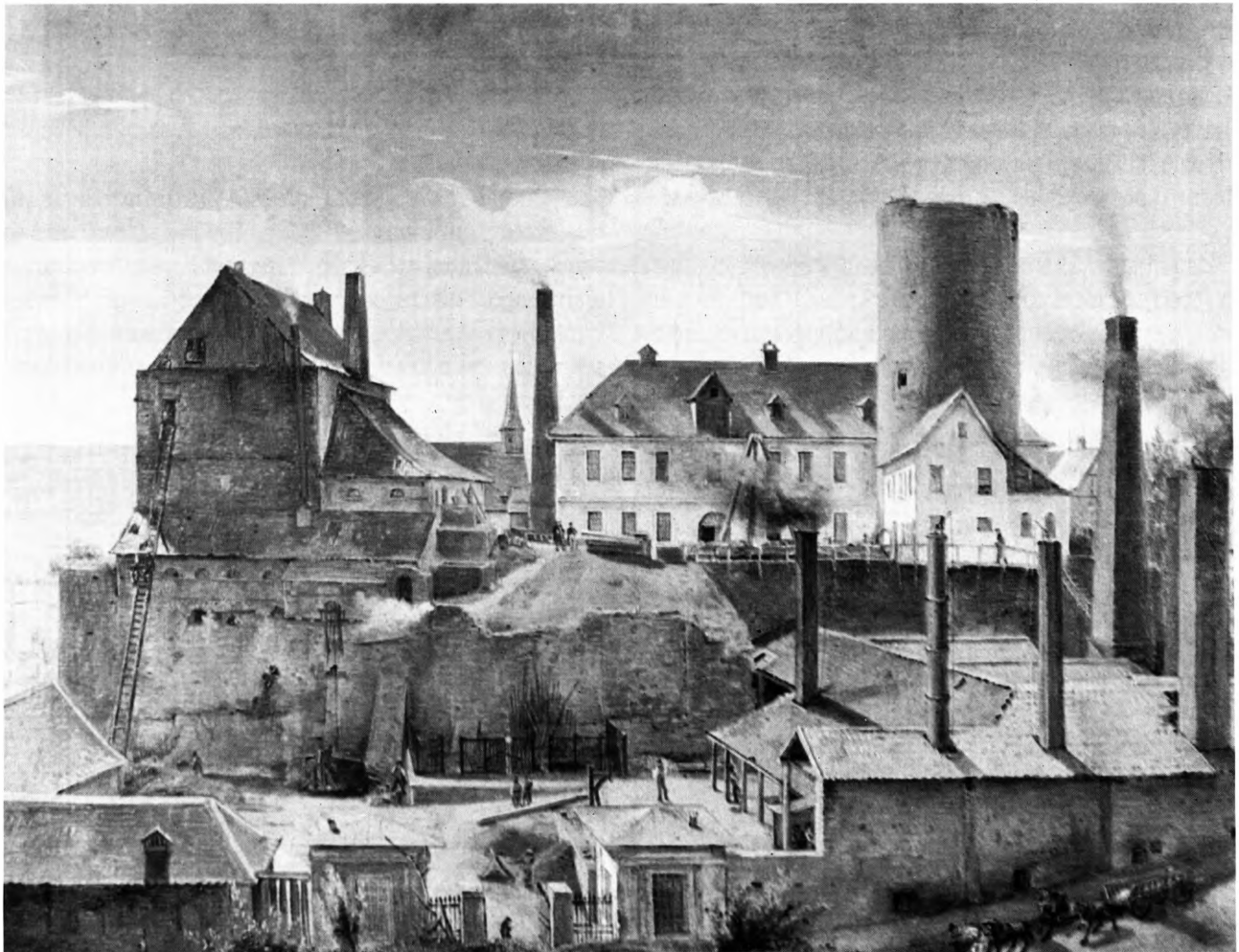
Ideological reasons, combined with economic regroupings, formed the background for re-use "waves" during the upcoming of Protestantism, the French or the Soviet Revolution sweeping away monarchy and feudalism, and when Democracy came up in many countries.³ Secularization meant the re-use of churches and monasteries for secular means in the fields of administration, education (not so far from their original uses), but also degradation like factory, warehouse, barracks (Freiberg Castle!). Especially communist regimes, apart from ostentatively blowing up religious buildings, converted them into "productive" units like bakery or mechanical workshop, sym-

bolizing the replacement of religion by technology as leading ideology.

The same happened to "secular" monuments of power: castles and palaces became museums, garrisons, schools, infirmaries, prisons, but also factories or warehouses – and so even are parts of industrial heritage now. In the upcoming of the age of industry, those abandoned, often rather uncomfortable buildings were welcome as places of production and industry, like the world renowned ceramics factory of Villeroy & Boch in the former Abbey of Mettlach/Saar.

RE-USE AND CONSERVATION

Although many monuments only survived because they were re-used, this was seen as something negative in conservation theory for a long time, sometimes even is today. The "original" appearance and use, a kind of "per-



In Wetter/Ruhr, a medieval castle became one of the birthplaces of industry (Alfred Rethel, 1834) (© author)

fect" state is seen as ideal, whereas traces of history and constant change are neglected. This is typical with castle, but also church restorations in many cases in the 19th and early 20th century.⁴

There is much for the argument that conversion – in different grades – is a normal and intelligent way for surviving and protecting material and cultural values, knowledge and experience. No built structure did not face changes in technical demands and social structures. With habitations, this was and is normal, but rather "soft" over centuries and generations. Essential is the turn of this tradition into a conscious strategy applied to different kinds of "functional" buildings, especially industrial structures, which were before seen as too "specialized" and non-cultural. This took place – apart from "emergency conversions" in case of war or other catastrophes – in the atmosphere of the urban revitalisation movement starting in the 1960s and 1970s in the US and UK, when artists and intellectuals discovered old industrial estate as living and working space⁵, inventing the "loft" apartment which is now an established real estate trademark worldwide. Alternative ways of living were also transferred to ships and industrial structures like water towers and mills. Typical for many of them is an abundance of space and a unique location – including the conquest of former "forbidden" places and industrial landscapes.

Old industrial premises were also discovered by social workers as ideal, because cheap, robust and aesthetically unusual locations for social and cultural regeneration platforms in old industrial quarters ("Soziokulturelle

Zentren")⁶. So indirectly, industrial monuments also in this aspect played an important role in the change of urban development strategies to soft regeneration. This also has become a cultural trend, and now "authentic" industrial places are more and more looked for. The interest shifted from bare "spatial" to "atmospherical" adaptation.

The idea of re-use was for a long time connected with Industrial Heritage – a new use seemed essential for the survival of industrial monuments. Under new economic and social circumstances, creative artists have discovered monuments also as background and raw material to new designs, often not to the advantage of the monument. Preservationists, favouring the "contrasting" method of re-use and architectural treatment, had to face that "Conversion" and "Bauen im Bestand" became trendy perspectives in architecture.⁷ Unfortunately, in many cases there was no respect any more for the unity of building and technical equipment, traces of use and history, and basic functional situation. Historic facades were integrated into new designs dominating the monument, and historic buildings deliberately fragmented for aesthetic reasons.

PERSPECTIVES – BUILT ENVIRONMENT AND CONSERVATION

The success of "industrial locations" with rather negative effects on historical value brought researchers to think more about basic qualities of industrial monuments and how to better protect and integrate them into new concepts of use. This led to the industrial museum and bare monument concept which is the only



Engelskirchen textile plant, Germany, converted in the 1980s by visible architectural interventions into museum, administration and apartments (photo: Alexander Kierdorf).



A former textile plant was converted into a religious centre in Linz/Austria (photo: Alexander Kierdorf)

chance of rather unchanged survival for many industrial monuments.⁸

The built heritage as a whole was also seen as a storehouse of materials and technologies, developed and used in times of short resources. Forgotten specialist knowledge as well as experience of generations, had never been put down literally. In ecological construction, it has already been discovered that "regional", "modest" and "bare" are categories of sustainability, and even ornament is often functional.⁹

In order to integrate monuments into sustainability concepts, they were seen as part of the building stock, formed by the whole of the existing buildings. With the help of the German Parliament (Bundestag) and the German Environmental Foundation (Deutsche Bundesstiftung Umwelt), the composition, ecological impact and development perspectives of the building stock under sustainability aspects were studied.¹⁰ The idea was that the material and ecological value of buildings would generally speak for their preservation and intelligent maintenance. In this framework, the industrial buildings were seen as especially important because of their massive constructions, space and infrastructure resources and, on the other hand, their relatively short modernisation and replacement periods.

On the other hand, problematic aspects like contamination, situation and ownership seemed to cause serious problems to a systematic re-use of such buildings¹¹

Professionalization and methodical changes in the Real Estate business have put existing industrial building com-

plexes in the focus of development, finding new ways of bringing unused space resources on the market and using the attractiveness of industrial heritage as major, if not unique quality for the development of industrial real estate. Local studies and development schemes like in Berlin show successful regional solutions.¹²

The chance to integrate conservation into a larger system of protection and development of the building stock under the sustainability aspect is discussed controversially (Wohlleben 2003). It is seen as a danger to the traditional heritage idea by those who favour aesthetical and historical aspects. Studies aiming at estimating the material and cultural value and defining synergies of environmental and building protection have not yet led to clear results. Meanwhile, financial crisis and the deeming climate collapse let appear conservation as minor problem or objective.

This is seen as a chance by those who always regarded scarcity as the best heritage climate. But in this case, the interests of the building industry, directed towards the building stock, threaten every single building with heavy changes, under environmental aspects called inevitable. Resource efficiency, although often not defined clearly, is massively executed with use of problematical materials, causing structural harm and producing complicated situations, which can be observed in many cases.¹³

CONCLUSION

Integration of heritage theory into ecological thinking and sustainability concepts means to get new, powerful, but also self-conscious partners. Interests, perspectives and priorities must be argued about and balanced. Sometimes, a traditional idea of conservation in other disciplines make fertile exchange more difficult, and synergies might turn into harm and destruction. Ideology on both sides will defect the acceptance and realization of complex objectives and difficult development processes.

Good solutions for industrial heritage projects need common, generally accepted principles as well as individual answers based on the local situation which must be carefully analyzed and handled with patience and creativity. The concept of this session was to connect general reflections about the character and advantages of re-use with case studies on different levels from town planning and regeneration to different re-use and conservation concepts. It can be concluded that re-use is very much related to general ecological and economical levels which are rather difficult to visualize.



Cologne: conversion of regional-style warehouse ("Siebengebirge") into apartments; maximization of profit by perforating the roof (photo: Alexander Kierdorf)

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¹ Ministerium für Bauen und Verkehr des Landes NRW 2008

² Poeschke 1996; Esch 2005; Binding 2007

³ Hahn 2003

⁴ Kierdorf/Hassler 2000

⁵ Cantacuzino 1989

⁶ Flagge 1990

⁷ Powell 1999; Wüstenrot 2000

⁸ Kierdorf/Hassler 2000; Stratton 2000

⁹ Hassler et al 1999

¹⁰ Hassler/Kohler 2004

¹¹ Hassler/Kohler 2004.

¹² Halder-Hass 2002; Grube 2007; Santifaller et al 2008

¹³ Hassler et al 1999

A Consensus Building Process and an Architectural Competition for the Future of the Old Foundry

Rossella Ruggeri

As an industrial town in Northern Italy, Modena is not a very big city (181,000 inhabitants), but it is nevertheless one of the areas, in Italy and in Europe, with the highest income per capita since its province includes several industrial districts. The ceramic tile industry, the textile industry, and the bio-medical industry own a relevant share of the global market, but are not probably so well-known as the most traditional sector of light engineering industry which includes about four thousands of small and medium-sized firms specializing in the production of mechanical parts as well as final products for end users, such as Ferrari and Maserati cars. This is the core of the so-called "Emilian model" where industrial policy, local government and social consensus are tightly knit into a successful system of local administration which, as a case-study, attracted great interest from University research in the 1980s.

The mechanical industry started to develop in the 19th century and expanded especially in the first half of the 20th century in an area immediately north of the railway line which borders the city centre. Here, a whole industrial settlement developed until, mainly in the 1970s and 1980s, these industries, several of which were foundries, experienced a crisis and closed down. While two important industrial plants still survive in the area (Maserati cars and Case New Holland – FIAT), for the rest it has been re-planned and is now being re-built as a mixed residential-commercial-office area.

This plan aroused much controversy, in particular because all the remnants of the industrial past of the town were destroyed with the exception for an old foundry called "Fonderie Riunite di Modena".

The reason for this fortunate rescue is due to historical/political reasons. The building is in fact the testimony to the most dramatic event in the recent history of the town: in its vicinity, on January 9, 1950, six workers were killed by the police during a strike. It has therefore stood, since then, as the symbol of the fights for the workers' rights and for better working condition.

When, in 2005, the city administrators had apparently in mind to demolish the plant and build some municipal offices in its place, a protest was set up against this decision by many citizens who made appeals and requested that the new use of the building should retain its symbolic meaning for the whole town. In 2006 an agreement with the city administrators was eventually achieved on the following grounds: if this building is so "sacred" and

dear to the citizens, then the citizens themselves must be called to decide upon it, and take in part the responsibility of its future on their shoulders.

During a working lunch – as it seemed appropriate in a town which is also a renowned food sanctuary – among the Mayor, two deputy mayors and an expert of Participatory Methodologies, Prof Marianella Pirzio Biroli Sclavi from the Polytechnic University of Milan, a strategy was agreed upon accordingly.

An experience of deliberative democracy seemed a good choice as the most suitable way to meet the proposals of different groups. The "Consensus building approach", in fact, looks for mutually advantageous agreements and works towards that end by putting aside the win-lose thinking that resides at the heart of traditional parliamentary procedures: through an inclusive democratic process where listening to the minorities and trust in the group's creativity are the two main rules, it aims at meeting the most important interests of everyone concerned.

The experience has seen a wide participation of citizens with a variety of proposals and goals and has given birth to a new project inspired by these proposals but shaped into a thoroughly new idea: the prospective creation of a centre for research and experimentation in the fields of industrial design, science and technology, local development, social history and contemporary art. The old foundry will therefore be refurbished for a shared re-use in view of multidisciplinary initiatives as well as training experiences for students of the local schools and university.

The process started in March 2007 and a call for proposals about the refurbishment both architectural and urban of the site was launched in July 2008.

Previously, a board composed by representatives of all the stakeholders concerned, and supported by the competences of both the City Council and the Professional Association of Architects, had produced a document with detailed information and clear, stimulating clues about the prospective destination and use of the spaces, thus engaging the architects in a complex and original task.

In spite of the complexity of the plan, which required careful consideration of the importance of the relations among the different functions in order to plan spaces for active and creative connections among them, the Call proved very successful: about 60 proposals were submitted and on January 9, 2009 the winner was proclaimed.

The chosen project (by a team composed by Centro Cooperativo Di Progettazione, Studio Sofia Cattinari, and Modostudio-Cibinel Laurenti Martocchia architetti associati) focuses on a conversion of the former metal-smelting complex into a mixed-use public space by creating glass and metal towers of different heights that enhance the potentiality for sharing the spaces while preserving the existing fascinating spaces of the old plant beneath. These new volumes will be clad in perforated shining metal, which the architects claim will evoke the past use of the building and qualify it as a new landmark, clearly recognizable in the urban pattern.

HOW THE CONSENSUS BUILDING PROCESS WORKED

The two key words around which the whole process was planned were "Consensus Building Process" and "Open Space Technology". The latter conveys the idea of a meeting to convene the concerned stakeholders and active citizens and to collect their initial ideas and proposals. Then the "Consensus Building Process" focuses on meeting everyone's interests, looking for a general solution which hopefully each of the participants will like better than their original proposals. The procedure is about *generating mutually advantageous proposals* and discussing disagreements through the "Active Listening" approach, a joint exploration and the enlargement of the range of possibilities. Thus the process draws upon the best available information and ensures that a range of possible solutions, including some that no one had thought of before or were considered as "impossible", are taken into account and discussed.

The final agreement is reached not by simply "voting", but by coming as close as possible to meeting the most important interests of everyone concerned and stating how and why agreement was reached.

The process developed through five steps:

1. convening
2. assigning roles and responsibilities
3. facilitating group problem setting and solving
4. reaching agreement
5. holding people to their commitments.

The participatory process was set off by a series (45) of interviews to community leaders, among whom all the main political parties, the trade unions, the association representing the industries, local authorities, youth organizations etc.

The project was presented to the town as a chance for Modena to strengthen its presence in Europe by doing something

important, beautiful and oriented toward the empowerment of a local/regional community in a postmodern world.

A training course of 16 hours was offered to young facilitators (they were 32) who volunteered in order to explain the participatory process to local groups in the schools, elderly people associations, different types of associations, etc. Besides giving information, they invited everybody to contribute to the various actions of the process by offering ideas and proposals.

The convening phase started with "The city explores", a presentation and common discussion about interesting examples of re-use of former industrial buildings from all over the world, and a first collection of ideas posted on a "board" in a dedicated web-site (URL: <http://www.comune.modena.it/fonderie>) and in two other locations in the town. Besides, guided visits to the industrial plant of the old foundry were promoted in which anybody interested in the project could take part.

On March 17 and 18, 2007, an Open Space Technology town meeting was proclaimed, where whoever had in mind a proposal could make it official and discuss it. At the end of the session, an instant book with all the proposals was produced and given to the participants.

The "Consensus Building Process" phase, which represents the heart of the process, was set up at the point when the 20 different ideas which had been proposed were meant to mingle together into a single project which everybody liked and approved.

The original proposals were the following:

- A park, to extend the local green areas
- A sports centre
- A cultural associations' network centre
- A school of DESIGN, at university level
- "Doing things together": a Participatory Foundation to implement shared projects
- A centre for performing arts
- A centre for research on the history of work, with exhibition rooms and laboratories
- A project for the refurbishment of the old building, restoring it to its original shape
- A transparent roof for the foundry's court, to be shared as a common space
- A centre to enhance the quality of life, promoting slow times, healthy food, soft gyms
- A network centre for NGO, and no-profit associations

- A centre for the memory of the industrial past and industrial innovation
- "Officina Emilia": a University project to foster local competences and innovation in the light engineering industry sector
- A drug-free Club for teen-agers
- A centre for the elderly and co-housing apartments
- A centre of studies on how to promote participation for handicapped or marginalized people
- A museum for locally produced race-cars, with emphasis on technological information
- A multi-ethnic centre
- A contemporary art centre
- "Public money must be spent on projects which are useful for the city": a proposal which opposed the idea of refurbishing and re-using the building.

A board of representatives of the 20 proposals was set up, and several meetings took place in the course of the next three months, which was the assigned deadline to achieve a definite result. The situation evolved: some of the proposals became the main focus of the discussion, while some were withdrawn for different reasons, and others found differ-

ent locations in the city (for example the sports centre, the museum, etc). Most of the proposals were essential for the project as important contributions to its richness, diversification and vibrant vitality, in fact the final agreement was signed by almost all the participants.

The final project presents itself as a unitary, interdisciplinary project, with a central management (through the creation of a Foundation), to be developed on largely shared spaces (80% of the total area) by the different initiatives which are looked upon as the overlapping and interplay of four main areas or "connections": Design, Arts, Science and Technology (hence the acronym DAST).

An important clue towards a positive result was the linguistic analysis of the original proposals for the re-use of the foundry site, many of which were clearly expressions of the local culture and contained some meaningful keywords that became the actual and symbolic focus around which the final proposal was built.

These key words were, for example, "Officina" (technically "industrial workshop", but with a much wider resonance



The Old Foundry in the 1930s (© author)

addressing the arts, etc., which was also the name of one of the proposals: "Officina Emilia"), and "Prototipo" (referring to the capabilities of Modena's mechanical workers and engineers specializing in the art and science of the production of unique mechanical parts). Slowly and through personal hard work, "workshop and prototype" came to be used as "lenses" through which the original proposals could be looked upon and reconsidered to the end of imagining and building a new, shared one. A crucial result was achieved when the "Design" key word came to be seen as a postmodern continuation of this local practitioners' tradition. *They had always been "designers"!* became the new, shared awareness of an important aspect of the local heritage.

From here to D.A.S.T. the step was easy.

The role of Prof. Marianella Sclavi appointed by the City Council in order to follow, guide and monitor the whole process, was essential and the professional technique adopted cannot be overemphasized in consideration of the final result which led, in the course of one year, the local administrators to change their plans and launch an inter-

national architectural competition for the refurbishment of the industrial building which they had had in mind to demolish.

The industrial plant of former "Fonderie Riunite" will therefore be preserved, both for its historical/symbolical value and for its fascinating architecture, as a testimony to the industrial past of the town, a prominent aspect of the local cultural heritage. In order to bear witness to all this, a further result of the consensus building process was achieved with the publication of a book which Officina Emilia (an initiative of the University of Modena and Reggio Emilia, one of the participants in the process) edited in Italian and English as a contribution of information and historical documentation – to be enjoyed also for its beautiful images – in view of the international architectural competition (Ruggeri 2007).



Inside the Old Foundry (© author)

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A3 Conservation, Restoration and Management of Technical Heritage

Organizer: Nörbert Tempel (Germany)

This session undertakes an historical review and analyzes current perspectives of conservation, restoration and management methods for Technical Heritage. On the one hand, we want to focus discussion on what kind of strategies for a sustainable maintenance of Industrial Monuments we need today. A second aspect is Big Scale Industrial Heritage. Big-sized technical equipment and industrial monuments (short term: "Big Stuff") need special methods of management and conservation, because conditions for their safeguarding are particularly problematic.

Papers for this section report on the inspection, monitoring, maintenance and sustainable conservation of Technical Heritage and Big Scale Industrial Heritage.

The session will be followed by a meeting of the international Big-Stuff-network in order to push forward the forthcoming third Big-Stuff conference which is to be held in 2010 in the UK.

Maintenance Programmes – A Management Tool for the long-term Conservation of major Industrial Heritage Sites

Jens Daube

INTRODUCTION

Basis for any kind of public access to industrial heritage sites is a meticulous analysis of structural damage, as well as the historically appropriate safeguarding and repair of such damage. Within publicly accessible sites, structural instability or any other hazards cannot be tolerated. However, in terms of the utilization of available financial resources, the sheer size of large industrial sites (with their multitude of constituent parts) demands a high degree of strategic planning. The financial management of major industrial heritage sites also depends largely upon the level of funding and must be flexible in its response to the often dynamically changing political framework, within which it operates. In today's climate, the process of applying for funding (as well as its allocation) now requires a maintenance management plan.

Within this context, the following two statements sum up the current situation:

- Viewed against the background of today's funding landscape, the conservation (of every constituent part) of industrial heritage sites has become all but impossible.
- Therefore the planning process is not only concerned with the conservation of the whole, but also with the selective planned loss of some of those parts.

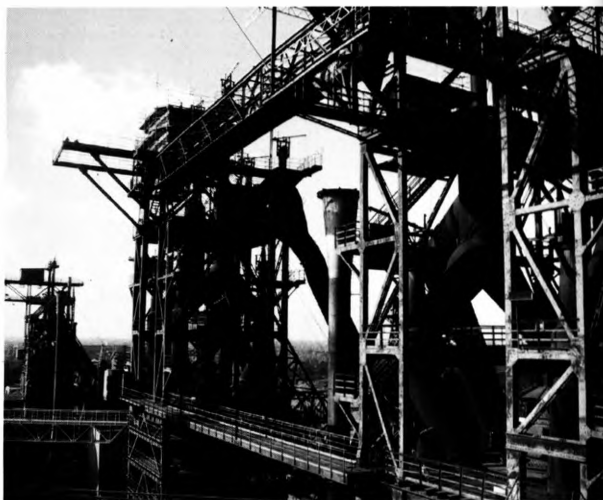
The landscape park 'Duisburg-Nord', which includes the former blast furnace works in Duisburg (Meiderich), provides an example of the various advantages a maintenance programme can offer and demonstrates the sort of demands, which require dynamic conservation management. A maintenance programme can also provide new opportunities. In the context of new media, Internet based databases can offer a common working platform, for all those taking part in the conservation process. The updating and intensive care of the shared information not only supports the on-going development of the maintenance strategy, but also serves to increase efficiency in the expenditure of limited financial resources.

In order to plan selective demolition and removal works if necessary, it is required to compare current conservation conditions against the predicted schedule of dilapidations. It is also important, that all historical building elements are subject to cyclical maintenance checks, similar to those carried out on public highway bridges and tunnels. Such results need to be recorded in a single document, namely the maintenance programme. In cases

where the funding available is not sufficient to enable comprehensive conservation of a complete historical site, the maintenance programme can also be used to develop and compare strategy alternatives, ensuring a meaningful and sustainable use of the financial resources available.

LANDSCAPE PARK 'DUISBURG NORD'

The landscape park "Duisburg Nord", former blast furnace plant 'Duisburg-Meiderich', has become one of the key projects of the International Building Exhibition 'Emscher Park' (IBA), owing to the sheer largeness of the 200 ha site and to its radical conceptual approach. Beyond that, the conversion started already in the early nineteen-nineties, so that nowadays the results of this process can be examined and the development of the site can be regarded as uniquely completed.



Blast furnace plant Duisburg Meiderich, 1950/2009 (© author)

Apart from the blast furnaces, the historic iron works were equipped with different secondary structures, such as a sintering plant and a pig-iron casting plant. Founded in 1903 the ironworks were in service for more than eighty years until they were permanently shut down in 1982. During the 1950s the ironworks provided jobs to more than 1500 steelworkers. In 1989, shortly after the termination of the iron production, a committee of experts started to examine the possibilities of conservation of the whole plant. Owing to the fact, that the full cost of the demolition of all buildings and constructions of the plant was evaluated much higher than the maintenance expense necessary in mid-term, IBA officials decided to list 'Duisburg-Meiderich' ironworks as an IBA project.

At the same time a report evaluating the heritage status was authorized and, based on the results of a landscape designer-competition, the transformation works began. Today the site is listed as a technical monument and is still publicly funded by the state North Rhine-Westphalia. Its own facility management company operates on site. The Landscape Park 'Duisburg Nord' accommodates today a potpourri of event halls, catering services and offices.

Within this context:

- the former power station has become a huge multi-purpose arena
- the gasholder has been transformed into a diving centre
- and parts of the ore storage bunker nowadays are in use as a free climbing parcours.

Spectacular theatrical staging of the site, for example the installation of a permanent light show, are central in promoting the site publicly.

MANAGEMENT PLAN

The need for a maintenance programme (for the more than 90 buildings and plants) evolved from the desire to maintain and develop the momentum created by the IBA Emscher Park. As a result of the IBA works, almost all of the buildings were refurbished, but most of the plant was not, thus it was in much worse conditions. At first the maintenance programme effectively became a 10 years status report in accordance with the above mentioned heritage status report. The detected changes during this short span of time were substantial and photo-documented in detail, comparing the viewpoints from first report. Generally it could be said that:

- some buildings and some plant disappeared totally (for example the sintering plant and a brick shelter)

- many objects were successfully reused (for example the acid storage building which became an office building or the ore storage bunker which partly changed to a playground)
- there were considerable visual changes because of the overgrowing vegetation.

At the end, the status report of the maintenance programme for the 90 preserved objects on the site included a total of eighteen large folders in addition to digital data. The previously mentioned incorporation of the provided data into a web-based database is currently on-going.

The maintenance programme is composed of booklets for all of the above mentioned preserved objects, which contain the gathered information about the case history, the potential of reuse, but most of all the structural conditions. The detected structural damages and proposals to safeguard the technical monuments are recorded in reports supported by site photographs.

All information is collated in a list of prioritised tasks, which controls the strategy for future structural maintenance. The list of priorities provides information about the status of all 90 objects (and their constituent parts), with regard to their stability, road safety and the level of dilapidation. The signal colour red indicates immediate need for action because of one of the three mentioned criteria. The list of priorities today constitutes a dynamically changing instruction and is the primary source for the efficient expenditure of annually available financial resources.



Selective demolition, cooling water pipe system (© author)

PRACTICAL DIGRESSION

Unfortunately, the budget of the Landscape Park 'Duisburg Nord' is insufficient to cover the needs of maintaining all of the technical monuments and all of their constituent parts in a sustainable way. Therefore the list of priorities is also used for the selective planned loss of some of those parts. The following examples for selective demolition and removal works will be put into practice by October 2009:

- Parts of the cooling water pipe system of the blast furnaces will be removed (because of excessive corrosion due to its original function).
- Staircases and maintenance accesses of the former gas washing plant will be demolished (because of road safety matters in a zone of controlled dilapidation).
- The upper part of the gas chimneys will also be removed for reasons of road safety and due to their exposed position and the associated corrosion.

Summing up, I would like to make a case for management programmes within the German context:

The nature of most large scale technical industrial plants prevents enduring preservation of all constituent parts of the monuments, owing to limited financial resources. In order to plan such necessary selective demolition and removal works, one requires broad and up-to-date information regarding structural conditions. A maintenance programme is not only a useful management tool for the overall preservation of the site, it also provides an instrument to control and document selective planned loss.



Selective demolition, gas washing plant (© author)

Deterioration or Restoration? – Different Tasks for Structural Engineers dealing with Industrial Heritage

Martin Gersiek

INTRODUCTION

If you have to deal with the reconstruction or modification of an existing building, there are always some special tasks for the structural engineer. In general those buildings will not have been constructed following the rules and standards we have today. If it is about an architectural monument, you will have to achieve the appearance and therefore it will be necessary to violate technical rules. When dealing with industrial heritage there will be another issue. The structures of those plants and buildings usually have been constructed first of all in a very economic way. Long term aspects were almost irrelevant. For instance there is no structural corrosion prevention in structures with a steel framework combined with masonry infill, where again and again water gets between steel and masonry and causes damage of the steel structure. So, if the goal is to achieve a structure like this, it must be clear, that this cannot be done in compliance with rules and standards of today.

If furthermore the goal is to return a building to use, it seems to be problematic to achieve a structure like the described example.

This means: First of all it has to be decided, what is the goal concerning the future use of an industrial heritage, because there can be very different goals. They can be classified as follows:

- Complete restoration of the building and preparing it for a new utilization. The structure has to be restored externally and possibly strengthened internally to achieve standards equal to the requirements for new buildings.
- Conservation of the structure without a new utilization of the building for the time being.
- Measures of protection to conserve only the structural stability.
- Slow deterioration of the structures, being controlled to achieve security for staff and visitors in order to conserve the plant or the ensemble of the buildings at least for some time.

Due to the different goals there are different topics for the structural engineer. At a first glimpse it seems to be the most ambitious goal to renovate the old building for a new utilization. But in fact it is a greater challenge to keep the deterioration under control. In the first section these different tasks will be described by means of some examples.

Whenever you start working on a project concerning an industrial heritage you will have to investigate the structural status quo.

This investigation can be organized as follows:

Step 1: Initial Inspection

Step 2: Survey of the structural system, random checks of the structural status

Step 3: Analysis of the causes of the damages on the basis of the acknowledgements obtained in step 2

Step 4: Overall survey

Step 5: Survey during construction

Step 6: Periodic survey after partial repair

Step 1 to step 5 will always be necessary. Step 6 "Periodic survey after partially repair", of course, must only be done, if there is a partial repair. How the survey of the structures can be done we will discuss in the second section.

First of all I would like to show the different tasks depending on the different goals. For each of them the tasks for the engineer can be shown by an example.

PROJECTS WITH DIFFERENT GOALS AND TOPICS (EXAMPLES)

1. Complete Restoration, example: "Zeche Nordstern" in Gelsenkirchen, a former coal mine
2. Structural conservation, example: engine house of the former coal mine "Zollern".
3. Restoration of the structural stability only, example: shaft head frame Consolidation shaft 9, Gelsenkirchen.
4. Deterioration under control, Example: Coking plant Hansa in Dortmund.

The following table shows an abstract of the different tasks.



"Zeche Nordstern" after restoration (© author)

Complete Restoration means:

All requirements defined for a new building have to be fulfilled. Structural stability as well as serviceability and structural fire protection.

Conservation means:

Structural stability must be provided of course, but the serviceability might be limited due to monument conservation requirements for instance.

Restoration of structural stability:

Structural stability is usually required, if it cannot be provided for special parts of the structure, there must be a prohibition of access, there are no requirements concerning the serviceability and no structural fire protection, because there is no use of the building.

Controlled deterioration means:

Even the structural stability must not be provided over the whole structure, where it is not, access must be prohibited.

The central building of the coal mine including the shaft head frame, the shaft tower and the coal mine circuit was restored and is now used as an office building.

First example:

The example shows that it is possible to restore an industrial building in a way that provides all features of a modern office building. Therefore it was necessary to demolish parts of the structure which were affected by heavy corrosion. Also the exterior walls had to be demolished and reconstructed due to the building physical

"Zeche Nordstern Gelsenkirchen"	"Maschinenhaus Zeche Zollern Dortmund"	"Doppelstrebengerüst Consol Gelsenkirchen"	"Kokerei Hansa Dort- mund"
Complete restoration	Conservation	Restoration of structural stability	Controlled deterioration
Investigation and appraisal of structures, analysis of materials, taking of measurements			
<ul style="list-style-type: none"> - Structural stability is required - Possible change of loads must be regarded, frequently the load becomes smaller. - Concerning the serviceability: deformations must be limited, durability, corrosion protection, requirements of rules and standards must be regarded as far as possible - Structural fire protection is required, partially missing protection can be compensated by other measures, for instance by reducing the fire load 	<ul style="list-style-type: none"> - Structural stability is required - Possible change of loads must be regarded, frequently the load becomes smaller, i.e. if the crane does not work anymore - Concerning the serviceability: deformations must NOT be limited, durability restricted, corrosion protection, requirements of rules and standards must be regarded only concerning security - Usually no structural fire protection, if fire protection is required frequently compensated by other measures 	<ul style="list-style-type: none"> - Usually structural stability is required, as an exception; prohibition of access to unsafe areas - Change of loads, frequently smaller - Serviceability: no requirements - Usually no structural fire protection 	<ul style="list-style-type: none"> - Structural stability not required for all parts, prohibition of access to unsafe areas - Change of loads, frequently smaller - Serviceability: no requirements - No structural fire protection

problems in the missing durability of the original structure consisting of masonry and steel framework. For this reason the building was taken out of the list of monuments.

This shows that the requirements of serviceability can have decisive effect on the restoration planning. Head frame and shaft tower were restored and both remained monuments. Although numerous surveys were conducted before the beginning of construction, unexpected damages occurred during the construction phase. We guessed that this local damage was created by production processes, when water leaked into the ceiling during a long time.

The horizontal stability had to be strengthened due to serviceability requirements. The added staircases could not be used for the stability, because they could not be connected to structure due to the strain of the steel structure in case of fire. All added parts of the structure are recognizable by the different color grey whereas the original parts are red. The whole steel structure was coated with a fire protection coating "F30" which means that the stability in case of fire is provided for 30 minutes.

Second example:

Engine house of the former coal mine Zollern in Dortmund, now part of the Westphalian State Museum of Industrial Heritage.

The goal was: Restoration only to conserve structural stability, limited serviceability due to monument protection, this means conservation of the masonry front walls takes precedence over corrections to steel structure, insufficient corrosion protection is acceptable, furthermore of

course a limit for deformations of the steel structure after rules and standards of today cannot be provided. If this were required, the structure must be modified in a way that would not be acceptable due to monument preservation.

Restoration of structural stability has to be created by replacement or strengthening of corroded members and a corrosion protection coating.

Third example:

Head frame of the coal mine Consolidation shaft 9 with no future use up to the present.

Restoration shall only conserve structural stability, brick facade is to be taken out, as the conservation is too expensive. Platform of mine car circuit is to be demolished due to corrosive damage. The corroded steel plates of the mine car circuit will be replaced by bracings, which are required for horizontal stability. These measures have not been carried out by now.

The head frame and its platforms have already been restored by replacement of damaged structures and a new corrosion protection coating.

This building is in the possession of the Stiftung für Industriedenkmalpflege und Geschichtskultur, the foundation, that looks after several industrial monuments in the Ruhr area. Actually the ensemble consists not only of the head frame but also the building beneath containing the mine car circuit.

The coking plant "Hansa" was prepared for visitors, who can walk through the plant following secured walkways



Stairs of the head frame before restoration (© author)



Stairs of the head frame after restoration (© author)

across the conveyor bridge, blending tower, coal tower and further parts and areas of the plant.

Fourth example: The coking plant is also in the possession of the foundation. The plant can be visited by guided groups on secured walkways, and occasional events in the blower hall or on the black place.

Controlled Deterioration means: No restoration as far as possible. No use except for visiting and sightseeing. The goal is presentation of the former industrial production and the decay of the plant. Visitors are guided through the deteriorating monument. For the structural engineer this is at first a strange task. Reparation is not desired, whereas security of the visitors is essential. For this new task it was necessary to develop a strategy consisting of several measures. The following table shows this strategy.

METHODS FOR THE INVESTIGATION OF THE STRUCTURAL STATUS

Being faced with industrial heritage for the first time it is often recommended to get a first impression of the structural status without conducting numerous, time-



Machine house coal mine "Zollern" Dortmund (© author)

consuming and expensive investigations. First it must be clear that a structure can be restored at all. After a positive answer to this question, one will have to get a first approximation of the cost for the conservation or restoration.

Strategy for controlled deterioration

Restoration of structures beside the walkway to make them safe for visitors	Addition of walk-ways on or to existing structures	Strengthening of defective structures instead of repair	Security measures beside and above the walkways
Examples <ul style="list-style-type: none"> - Repair of reinforced concrete in accessible areas - Repair of bridges which are part of the tracks 	Examples <ul style="list-style-type: none"> - Walkways as a steel structures for safe visits - Appraisal of the status of the existing structures lying close to the tracks - If required repair or strengthening 	Examples <ul style="list-style-type: none"> - Additional supports of pipelines to reduce spans - Additional supports of existing tracks 	Examples <ul style="list-style-type: none"> - Demolition of structures that might fall down - Construction of shelters to prevent visitors from falling objects - Definition of areas to be closed
coal bunker, conveyor bridge	New walkways beneath the coal bunker and on the pipe bridge	Bridge over railway station	Repair facade of the coal tower, demolition of roof plates, closing of salt depot

Essential part of the strategy: Periodic inspections (as we will see in part 2)

Due to the different topics restoration, conservation and controlled deterioration the structural engineer has to conduct a variety of investigations on the condition of the structure and the materials. These investigations have to be adequate at any time and have to be done step by step. Already the first appraisal can be determining for the future of the project. This surely requires profound experience.

The investigations should be done step by step, for two reasons: First of all the decision about the future use will usually depend on the structural status quo. Therefore there will not be very much money available for the first surveys.

Secondly the conclusions of the results of the first appraisals will help to plan the following steps of the investigation. (Step 3)

The steps of the investigations can be described as follows:

Step 1: Initial Inspection

Step 2: Survey of the structural system, random checks about the structural status

Step 3: Analysis of the causes of the damages on the basis of the acknowledgements, obtained in step 2

Step 4: Over-all survey

Step 5: Survey during construction

Step 6: Periodic survey after partially repair

Steps 4 and 5 can be done, after the realization of the project is sure. Step 6 applies only to the controlled deterioration.

In the first step the engineer walks through the building or plant, looking at all parts of the structure, taking as many photographs as possible, in order to get a first impression of the status quo. Usually there is a lot to learn about a structure during this first step. Changes of the structure are not always made professionally and can affect structural stability. Especially bracings are often cut through. The photographs will help to remember details and to prepare the second step.

The second step consists of random checks. Experience is needed to choose significant parts of the structure. These checks can verify assumed problems i.e. corrosion at the girder web in a vaulted ceiling. The amount of random checks depends on the kind of structure, the assumed damages after step 1, on the planned future use of the building or plant and on the available money. Usually the appraisal of a steel structure is much easier than that of a concrete structure, as the reinforcement is not visible.

- If there are vaulted ceilings, there will usually be some corrosion at the webs of the beams

- Random checks allow to appraise the amount of corrosion
- Random checks of the hidden parts of columns are conducted to determine the corrosive damage. Some bricks of the masonry have to be taken out to make the hidden parts of the columns visible. The samples should be taken from walls with different geographic orientations and possibly from different positions in the structure.
- It is useful to compare the status of the steel close to connections with that in a distance
- Measurements of thickness by ultrasonic pulse-echo instruments at selected points, close to connections, far from connections, near by the bottom, beneath the roof, eastern and western face
- Testing of material will give acknowledgement about strength and weldability of the steel. Usually the first result is: no weldability. You have to question this! After a discussion concerning this point welding will be possible with restrictions concerning the kind of welding and the calculated strength of the welding connections

Dealing with reinforced concrete you will have to uncover the reinforcement to see the corrosion.

Carbonatization depth in the concrete indicates how far the concrete can prevent corrosion of the reinforcement. The alkalinity provides the corrosion protection of the concrete. As the carbon dioxide of the air destroys the alkalinity, it loses its corrosion protection after several decades.

Non-destructive testing of the concrete strength can be done with the concrete test hammer (Schmidt Hammer). Again you need to question the results of the measurements. Carbonated concrete surfaces get harder and this hardening takes influence to the measurement. The strength of the concrete however does not increase by the carbonatization.

With the results of step 2 the following should be possible: Verification or correction of the Acknowledgements found in the first step survey, a first Appraisal of the amount of expenses and estimation of cost, basis for the planning of the further procedure: Conservation and restoration or deterioration or even demolition.

Evaluation of the conducted surveys and analysis of the causes of the damages may save a lot of work and cost in the next step. Frequently there is a correlation between the amount of damages and the location of the structural member.

If the restoration or conservation shall start, it will be necessary to conduct surveys over the whole structure or as a sample with more numerous measurements. Using the acknowledgements of step 2 it will be possible to constrain the investigations to the typical weak points.

As said in the first section you have to conduct periodic inspections, if there is a controlled deterioration. The name already says this. Deterioration without control would be dangerous. The missing durability of the structures must be substituted by the periodic inspection.

Inspections of the Hansa Coking Plant take place annually. The structures of the walkways themselves are inspected as well as the structures beside the ways. Photographs are taken every year from the same points of view.

The status quo of the structures is described and necessary repairs are recommended as shown in the following table.

CONCLUSION

- The tasks of the structural engineer can be very different and depend on the future use.
- The Preservation of Industrial Heritage projects pose very special tasks for the structural engineer, specific knowledge is required.
- It can be necessary to violate construction rules and standards.
- The survey of the structures should be done step by step, evaluation after the first steps helps reduce effort and cost.
- If there is no structural durability, safety of visitors can be provided by periodic inspections.

The table is part of the annual report.

Location	Performed Check	Photo	Result	Appraisal/Recommendation
Emergency stair case in the coal blending bunker	Visual inspection, picking with a hammer	sthaus_1.jpg sthaus_2.jpg	During the first preparation and repair of the walkways, steel beams and columns were added to the emergency staircase. The columns are mounted on existing concrete beams. One of these beams has several spallings, the reinforcement is corroded.	Strengthening of the concrete beam

The Hansa Coking Plant in Dortmund – Conservation Problems and Preservation Strategies

Marita Pfeiffer

HISTORY AND TECHNOLOGY

The Hansa Coking Plant was built in 1927/1928 as part of a comprehensive project aimed at increasing industrial efficiency and concentrating production. Modern, highly efficient large-scale coking plants now replaced the small, obsolete coking plants at the individual collieries. The Hansa Coking Plant was a central coking plant serving the Dortmund coal and steel industry: the coking plant was supplied with coal from the neighbouring collieries, including the adjoining Hansa Colliery, and delivered coke to the Dortmunder Union iron and steel works. During peak periods, over 5,000 tons of coke could be produced. At times, as many as 1,000 people worked at the coking plant.

Coal is fed to the coking plant, where it is indirectly heated in hermetically closed ovens to a temperature of over 1,000° C. During this process, the volatile matter contained in the coal evaporates, leaving only the solid component, coke, which on account of its high carbon content, its purity and its consistency is a better fuel than coal and, as such, is used above all for the industrial production of pig iron in blast furnaces. The coking process generates a gas mixture from which so-called "by-products" are obtained: ammonium sulphate, sulphuric acid, crude benzene and tar. These by-products, which were also produced by the Hansa Coking Plant, served for many decades as important raw materials for the chemical industry. In addition, part of the high-grade coke oven gas was compressed in steam-driven compressors and then scrubbed, cooled and fed into the gas grid of Ruhrgas AG. Before energy supply companies ultimately converted to natural gas, the production of gas was a lucrative source of business for the coking industry, although some of this high-grade coke oven gas had to be reclaimed for the actual heating of the coke ovens.

With the inception of the structural crisis in the mining and steel industries in North Rhine-Westphalia, the Hansa Coking Plant no longer played a central role in the coal and steel community. The neighbouring Hansa Colliery ceased operating in 1980. The Hansa Coking Plant was shut down on December 15, 1992.

STATUS AS AN INDUSTRIAL MONUMENT

The Hansa Coking Plant has been listed as one of Dortmund's industrial monuments since 1998. Its value as a monument lies in the fact that even today it is still a largely authentic documentation of the coking technology

of the 1920s and 1930s. The clarity of its architecture in the style of the twenties has survived in spite of all the subsequent modernizing measures. The Hansa Coking Plant is the last surviving large-scale coking plant of the 1920s that was integrated into the production network of the mining, coke producing, iron and steel and gas supply industries.

In 1997 the coking plant became the property of the Foundation for the Preservation of Industrial Monuments and Historical Culture. The foundation then set up its headquarters on the Hansa site, from where it now manages a total of 12 different industrial monument sites, the Hansa Coking Plant being one of them. Since 1999 the Hansa site has been one of the so-called anchor points along the "Industrial Heritage Trail", which is the responsibility of the Regional Association of the Ruhr. The coking plant has been part of the European Garden Heritage Network since 2006. It also participates in the "Industrial Forest Ruhr Region Project" and is an anchor point along the "Industrial Nature Trail".

GUIDELINES FOR DEVELOPMENT

The Hansa Coking Plant is being developed along the lines of a large-scale walk-through sculpture that unites industrial technology and industrial nature. This means in actual practice, that all the architectural elements of the industrial monument, such as buildings, machines, pipelines and so on, are surrounded by the flora and fauna typical of the industrial wastelands of the Ruhr region, and that birch trees, for example, may grow out of the roofs of coke oven batteries.

A visitor's trail links the essential production areas of the coking plant along three different routes. Temporary artistic interventions accompany and mark the coking plant's development as an industrial monument, as do other projects, such as the industrial history and landscape design projects.

FROM THE "STUDY ON THE HANSA COKING PLANT'S CHANCES OF BECOMING AN INDUSTRIAL MONUMENT" TO THE "MASTERPLAN"

The listing of parts of the Hansa Coking Plant as historic buildings was already proposed by the Westphalian Office for the Preservation of Historic Buildings and Monuments on 3rd December 1992, only just after the coking plant had been shut down. Five years later, in 1997, a comprehensive study was conducted with the aim of establishing

the value of the individual buildings and installations as historic monuments and the possibilities of them being used for new purposes. The study formed the basis of a masterplan, which the City of Dortmund commissioned in 2001.

Basically, the masterplan constitutes a proposal for the tourism-oriented redevelopment of the site, an essential factor being the development of the visitor's trail. Emphasis is also placed on the urban development component of the project. The masterplan also has provision for an opening of the coking plant's grounds to the south and also to Dortmund's district of Huckarde in the west, the development measures here including the integration of new buildings. An important component of the masterplan, too, is the linking of the industrial monument with the recultivated waste dump in the east by a footbridge. The historic ring road will continue to serve as a link between the individual parts of the site in future, too. The masterplan also provides for various places to be designed in keeping with the main theme of the project "Nature and Technology".

DEVELOPMENT OF A VISITOR'S TRAIL

The first main objective of the Foundation for the Preservation of Industrial Monuments and Historical Culture was to make the industrial monument accessible to visitors. The visitor's trail "Nature and Technology" was laid at the Hansa Coking Plant between the years of 1998 and 2002. Built in three stages and comprising walk-along conveyor bridges, pipeline bridges and catwalks, the new visitor's trail afforded access to all the essential areas of production.

In order that visitors could obtain as many different views of the industrial monument as possible during the guided tours, the side walls of the slope conveyor and bucket elevator bridges were fitted with windows and a panorama window was installed in the coal storage tower.

The development of the visitor's trail also necessitated roof restoration and repair. And in the vicinity of those areas to which visitors have access it was necessary to render safe all facades, including those of two towers. Roofs were installed as an additional safety precaution at various points along the trail.

As the concept served only a partial redevelopment, the visitor's trail had to be clearly marked and all other areas – for reasons of safety – had to be made inaccessible.

COMPRESSOR HALL AND THE RESTORATION OF THE MACHINES

The compressor hall of the Hansa Coking Plant, with its unique set of five historical steam-driven compressors dating from the years between 1928 and 1941, is a valuable testament to the gas industry of the 1920s. It was completely restored in 2004. The aim of the restoration work was to make the hall the nucleus of the "Nature and Technology" trail and at the same time to create a space for events – cultural events, for example. The work consisted in repair and/or renewal of the roof, walls and load-bearing structures and in the restoration of the machines and equipment. The compressors were carefully cleaned and conserved with wax. One of them was converted for demonstration purposes and is meanwhile one of the popular attractions along the visitor's trail.

HOW WE APPROACHED THE PROBLEMS WITH THE COKING OVEN BATTERIES

While for the restoration measures described so far we were able to draw on our experience with conventional methods for the conservation of historic buildings and the restoration of metal structures, we had no prior experience when it came to the conservation of the coke oven batteries, the essential purpose of such conservation work being the repair and development of an oven battery for visitor access.

Coke oven batteries are the very nucleus of a coking plant. Of the five original oven batteries at the Hansa Coking Plant, four have survived. The oven doors are closed. On one of the batteries, there are two places where visitors can look inside the ovens with the doors removed.

In 2002, a study was undertaken by historic monument conservationists, oven builders and the Foundation's own personnel concerning the exemplary restoration of historic coke oven batteries. One of the aims of the study was to ensure "that the original appearance of the oven roofs and the battery itself would be largely preserved" and would not convey the impression of a new building.

The proposed conservation measures for the coke ovens were concerned primarily with structural stability and protection against moisture.

Of decisive importance for the stability of the building structure are the longitudinal and transverse steel ties and the 'I' girders. They must be tested for stability un-

der load and protected against corrosion. If necessary, the outsides of the batteries must be reinforced with additional steel girders. A further necessary measure is to protect the oven roof against ingress of moisture. To this end, the study recommends removing the uppermost layer of refractory stones, placing a layer of concrete, providing channels and gutters for draining away rainwater and filling the flues with concrete in order to obtain additional structural stability. The historic refractory stones can then be replaced on the oven roof.

A particular problem is posed by the refractory material inside the ovens. Unlike the silica refractory material in the upper part of the oven, the fireclay and insulating bricks in the lower part are sensitive to moisture. Consequently, it will be necessary to seal the oven doors in order to render them waterproof. The lower part of the oven may under certain circumstances have to be equipped with a pump in order to keep it free from rainwater and groundwater.

The proposed conservation measures for the coke oven batteries are scheduled to begin in 2010. For financial reasons, however, the measures will have to be carried out in small steps, year by year, and financed by a budget consisting of our own funds and funds provided by the Land of North Rhine-Westphalia via the Regional Association of the Ruhr.

THE CONSERVATION CONCEPTS WITHIN THE CONTEXT OF PUBLIC SUBSIDIES

The building measures carried out from 1997 until 2006 were financed both with public funds and with funds provided by the Foundation. The financing programmes differed according to the nature of the actual building measure – the restoration of the compressor hall, the development of the visitor's trail, and so on.

In North Rhine-Westphalia it is possible to finance redevelopment measures with the aid of, for example, urban development programmes or the Emscher Lippe Ecology Programme in conjunction with a share of the costs provided from the Foundation's own resources. Naturally, certain conditions must be complied with depending on the source of the subsidies, that is to say, a building measure financed by means of an urban development programme must have provision for new uses that come under the category of urban development. The compressor hall, for example, has facilities for private and public functions and is already a popular venue for exhibitions,

concerts and other events. Thus the development of the compressor hall for other uses was the Foundation's ticket to public subsidies. Any independent, non-aligned redevelopment of an industrial monument "purely for its own sake" has so far been extremely difficult to finance. In the case of the "Nature and Technology" trail, which was financed from an ecology programme, the theme of "Industrial Nature" must always be the leitmotif of its purpose and use, and so here we are already performing a tightrope walk between "industrial nature" on the one side and classic conservation practices on the other. Subsidies from the Historic Monument Preservation Programme of the Land of North Rhine-Westphalia have so far not been utilized, one of the reasons being the fact that the costs of redeveloping such large industrial sites generally far exceed the subsidies available through such programmes. So far there are no subsidizing programmes specially earmarked for the redevelopment of industrial monuments.

An additional source of funds for the Hansa Coking Plant is a budget set up in 2007 by the Land of North Rhine-Westphalia and the Regional Association of the Ruhr for the basic safeguarding and maintenance of a total of six high-profile industrial monuments in North Rhine-Westphalia for the limited duration of ten years. On this basis it will be possible during the next several years – initially until 2016 – to implement a concept for the safeguarding, maintenance and care of the redeveloped buildings and installations and the green and open spaces. Further applications for funds for more extensive building redevelopment projects are in hand.

All told, we have succeeded in achieving a high degree of flexibility in our approach to the preservation and redevelopment of the Hansa Coking Plant. The risk potential inherent in such industrial buildings and installations can in this way be effectively contained and controlled.

Finally, it is important to note that the concept for the preservation and redevelopment of the Hansa Coking Plant is not a static one that permits just one approach. On the contrary, it affords scope for a great many different approaches. Concepts for landscape planning, partial redevelopment, complete redevelopment, basic safeguarding, maintenance and care are implemented flexibly and alongside one another. It was – and is – not least financial reasons that made such a concept necessary. Nonetheless, the essential aim – the creation of a walk-through sculpture under the leitmotif "Nature and Technology" – could be achieved within only a few years.

What has become clear, too, is the fact that all the individual modules of the project fit in with one another very well and that the Hansa Coking Plant is on the right track and going the right way forward. And the Foundation for the Preservation of Industrial Monuments and Historical Culture will do everything it can to ensure that this remains so in the future.

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*The Hansa Coking Plant has been listed as one of Dortmund's industrial monuments since 1998.
(photo: Klaus-Peter Schneider, 2008.)*



*A visitor's trail links the essential production areas of the coking plant along three different routes.
(photo: Manfred Vollmer, 2004.)*



The compressor hall of the Hansa Coking Plant, with its unique set of five historical steam-driven compressors dating from the years between 1928 and 1941, is a valuable testament to the gas industry of the 1920s. (photo: Manfred Vollmer, 2005.)



Coke oven batteries are the very nucleus of a coking plant. Of the five original oven batteries at the Hansa Coking Plant, four have survived. (photo: Manfred Vollmer, 2002)

The Preservation of a Milestone of Industrial
Architecture – The Zollern II/IV Colliery Engine House
in Dortmund

Norbert Tempel

SOMETHING NEW IN THE WEST

At the turn of the 20th century (1898–1905) a new, representative coal mine was erected in the Ruhr mining area, situated in a no-man's land between Dortmund, Bochum and Castrop-Rauxel. The name of the colliery, "Zollern", was an abbreviation of the name of the "Hohenzollern" imperial dynasty and its owner, the *Gelsenkirchener Bergwerks-Aktien-Gesellschaft* (GBAG), was the biggest mining company in the Ruhr at the time.

Two shafts were sunk and surface buildings erected in a structured layout. Head gears No. II and No. IV were erected as steel framework constructions (the "Deutsches Strebengerüst" type). The engine house and the adjoining boiler house, which made up the colliery's power plant, also housed all the major electrically-driven engines, air compressors and winding engines, including the world's first large-scale DC electric winding engine on a main shaft.

Most of the buildings were designed in a historicist style – massive Gothic red brick design – by the architect Paul Knobbe¹, the head of the company's construction department. The elaborate layout of the plant followed the basic layout prescribed by the technical foreman, Wenzel Köller, which included many expansive details like onion domes, gables and pinnacles, coloured wooden ceilings, a number of stained glass windows etc, all of which can be attributed to his influence.²

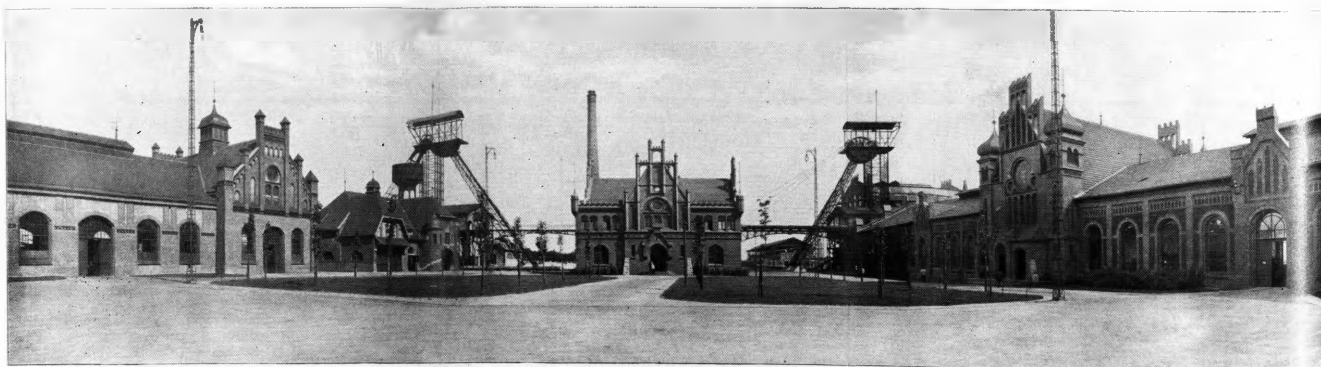
The overall aim of the design was to make it clear to the outside world that this colliery was a model of technical

innovation.³ A garden-city type housing settlement was built for managers, craftsmen and miners directly in front of the colliery.

A REVOLUTION IN BUILDING DESIGN

But there was a sudden reversal of attitudes during the construction period after Emil Kirdorf⁴, the managing director of the GBAG returned from a visit to the Düsseldorf Trade Exhibition in 1902, where he had seen a modern pavilion intended for the *Gutehoffnungshütte* (GHH). He now decided to abandon the traditional architectural approach and have the engine house at the Zollern colliery – the power house of the colliery and hence a building of key importance on the site – constructed as a contemporary steel skeleton framework, the panes filled with bricks. This sober, purely functional method of construction had been in existence for around two decades and, till then, was mainly used for less important buildings like coal wash plants, boiler houses etc. Hence it tended to be disdained as nothing more than an "engine shell". There has been much speculation as to the reasons for this sudden change of attitude.⁵ The most likely seems to have been the time factor: the building needed to be put up quickly because output quotas in the Ruhr mining area were soon to be redistributed.

The building retained the style of an exhibition pavilion and was further upgraded by generous areas of stained-glass windows and additional design elements and contemporary decorations. For this, the company hired the well-known Berlin "Jugendstil" architect, Bruno Möhring.⁶ He was the man who had designed the GHH exhibition



This general view of the Zollern II/IV coal mine in Dortmund, seen from the entrance, has been published in 1905. The yard is surrounded by historicist architecture; the modern engine house is not visible from this point of view. (Collection LWL-Industriemuseum, Dortmund)

pavilion in Düsseldorf along with the chief constructor at GHH in Oberhausen, Reinhold Krohn.⁷

Möhring decorated the main entrance to the engine house in a "Jugendstil" manner with an oval doorway and a windshield with stained glass decorations portraying vine leaves and grapes (!), and a canopy which is said to have been influenced by the metro entrances in Paris.

Möhring considered himself an artist and, as a result, this led to conflicts not only with Paul Knobbe⁸, who had originally drawn up the historicist design for the engine house, but also with the GHH because Möhring kept changing his plans and missing his deadlines. The GHH, in turn, put the main responsibility for the considerable delays in construction on the GBAG because they were responsible for hiring Möhring in the first place. All these conflicts resulted in considerable delays in construction.

A REVOLUTION IN MONUMENT CARE

65 years later, this sudden change of attitude can be seen as a happy accident for monument preservation. Truly, the original splendour of the engine house has faded over the years. Nonetheless the remaining Jugendstil elements have always been regarded with considerable admiration in expert circles. Their opinion was shared by contemporary authorities who made a surprisingly quick decision to preserve the building from demolition after the colliery was closed in 1966. This in turn marked a paradigm change in attitudes because the decision to list the en-

gine house at the *Zollern II/IV colliery* signalled the start of a new movement to preserve industrial buildings in Western Germany.

The crucial factor in deciding to preserve the building was the unusually splendid design, rather than the state of the building which had been heavily affected by its industrial use. There were many ideas for redeveloping the site. These included turning it into a railway museum or an art exhibition hall, and even foresaw the removal of the historic driving engines. The unspoken core idea was to "recover the icon", and it went without saying that this would include the restoration of the stained-glass windows and the Jugendstil canopy over the entrance.

Now, 40 years later, the engine house is finally due to undergo comprehensive conservation and restoration. Over the years there have been considerable changes in approaches to monument preservation. The building substance has degraded and the repair of damage and the need for a sustainable approach to reconstruction demands that it must be comprehensively replaced. This has not made it easier for us to answer current questions regarding the best methods of conservation. Other questions facing us include: "How do we make museum use compatible with monument preservation?"; and "What are our priorities? To conserve the material and the colouring handed down to us or to highlight the original idea behind the building as an impressive showplace for the outside world? How much reconstruction does there have to be, and how much is permissible?"

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South façade of the engine house. An elevated monorail connects the coal washery and the boiler house, early 20th century (Bergbau-Archiv, Bochum)



Interior space of the engine house with air compressors and winding machines, early 20th century (Siemens Archives, Munich)

From decline to a living museum – a short survey:

- 1935: Plans are drawn up for a new central shaft in the adjacent *Zollern* and *Germania* coalfields. Hence all further investment in the old technical equipment is stopped. Due to the lack of building materials work on the erection of the central shaft ceases between 1939 and the 1950s, with the exception of two more powerful compressors and electrical equipment being installed in the Zollern engine house in 1940.
- 1955: Coal ceases to be brought to the surface at the *Zollern* colliery and this operation is transferred to the new *Germania* central pit a few kilometers away. Shaft No. II is henceforth only used to transport men and material underground. The Jugendstil canopy above the entrance of the engine house is dismantled and much of the damage to the brickwork is stabilised in a basic manner.
- 1966: *Zollern* colliery finally closes and the buildings on the site are let out to different companies
- 1969: Plans to demolish the engine house are met with a grass-roots campaign of heavy protest. At the end of the year the engine house is recognised as an icon of modern industrial design and put under a preservation order. This signals the start of a new movement to preserve industrial buildings in Western Germany.
- The photographers Bernd and Hilla Becher, who were very little known at the time, start their unique documentation work of industrial buildings⁹ by taking photos of the colliery buildings soon after the site was closed.
- 1973–1980: First attempts to stabilise the structures of the engine house. Contemporary restoration approaches result in some indispensable repair work and comprehensive repainting distorting the interior appearance.
- Since 1981: The *Westphalian Museum of Industry*¹⁰ takes over the remainder of the colliery. Start of restoration activities on the site. The headquarters of the museum and the central restoration workshops are officially opened. Two similar head gears replace the ones which had been lost in the 1930s (shaft 4) and after the closure (shaft 2). The museum opens to the general public in 2001.
- 2008: The engine house closes to the general public in late 2007. Restoration work commenced in 2008 with an estimated budget of € 7,600,000. We hope to finish the work by late 2011.

SOME THOUGHTS ON APPROACHES TO RESTORATION

Many problems arise when considering how best to safeguard this monument after more than hundred years of

existence. We now know that the steel skeleton design used for the engine house is not as durable as the massive brick building method. During our intensive examination of the building we have learnt a lot about aspects of statics, the physics of building materials, the original coating and decoration, hazardous materials etc. Treating a huge industrial monument of this kind means that we have to find a balance between safeguarding the authenticity of the monument, redeveloping it for new uses and deciding on the best way to conserve the building on a long-term basis. The building is in a vulnerable state and we have to develop effective, constant and durable methods of care and maintenance in order to ensure its long-term preservation.

THE SCOPE AND COMPLEXITY OF THE CHALLENGE

The engine house spans an area of around 2,000 m² (length 96.47 m, width 22.14 m, height of the eaves 11 m, top of the roof 20.3 m). Unfortunately the cellars, where the engine foundations are laid out, are very damp. This is a typical Jugendstil building not only because of the dialogue between different building materials such as steel, brick and glass; but also because the façade may be considered as a semi-permeable membrane. Unfortunately the building structure itself has turned out to be semi-permeable in the negative sense of the word: the specific Jugendstil building design is responsible for the poor quality of construction.

As late as the 1970s damage to the building had reached such an extent that it was necessary to conduct a comprehensive corrective maintenance. This included repainting the interior according to the taste of the time, despite the fact that it was on the whole even then possible to recognize and deduce what the original appearance had been. The changes were – as most of them before that – in no way documented systematically.¹¹

Before we began the current process of comprehensive restoration, we submitted the building to a thorough going programme of examination with regard to its constructional history, the building construction and static, hazardous substances in the building and its technical equipment,¹² and how it had been painted over the years.

As a result we established that the following major interventions were inevitable:

- Checking and partly renewing all the column bases, the major load-bearing elements and the sheet plates of the steel trelliswork.

- Roof repairs (the membrane and parts of the wooden rafters, rain gutters and down pipes)
- Repairs of all window constructions
- Dampproof insulation work on the exterior wall of the cellar, the installation of a drainage system and the lowering of the groundwater table.

This work involved:

- opening up the exterior walls in the substructure area and cladding the interior substructure which consisted of the remains of the original marble panels, plastering and other substitute materials
- opening up the wall in the area where the steel trellis-work had to be repaired, in order to create the necessary working space. This also involved the loss of the great majority of the plasterwork on the interior wall, most of which was damaged anyway.¹³

NEW USAGES FOR THE MUSEUM AND THEIR EFFECTS

Before the engine house was closed for restoration work it was open to the general public for a long time (1985–2007) for occasional major exhibitions during the summer months, and other special events some of which used their own heating arrangements. During this period we were able to gather a lot of knowledge and experience. It is clear that the climatic conditions in the engine house have been exceedingly problematic since the colliery closed down because of the loss of warmth emitted by the operation of the engines. At the same time it was quickly clear from a closer examination that the installation of a heating and insulation system would involve an intolerable intervention in the original architecture. But to dispense with this would negatively affect the comfort of visitors and strongly reduce the chances of using the engine house during the winter months.

In future we foresee using the engine house in the following appropriate ways:

- Making it freely accessible to the general public (ground floor and cellar), also for disabled persons.
- Setting up a permanent exhibition in a part of the cellar (only using climate-insensitive exhibits, or copies).
- Regular demonstrations of some of the restored working engines (a hauling machine dating back to 1902, a converter and a compressor).
- Presenting special events during the summer months, like concerts with a maximum capacity of up to 800 visitors – all special exhibitions will have movable partitions and walls).

This very restricted usage concept has meant that the following interventions are indispensable:

- Additional emergency exit stairs from the cellar (outside the building) and one extra escape door in the east gable. The existing ridge turret must be strengthened for ventilation purposes. After much agonising we have decided to do without a fire sprinkling system and a coat of fire-proofing paint on the steel construction.
- The construction of an adequate public toilet in an empty part of the cellar. For this, however, the cellar level must be connected to the ground floor by an additional staircase and lift in the south east corner of the building.

ETHICAL GROUND RULES FOR THE RESTORATION PROCESS

The necessary interventions to restore the building substance and make it usable for the museum necessarily entail a certain loss of the old building substance. In connection with these steel construction works and corrosion protection measures and other repair work, a large part of the surface must be re-walled, re-plastered and repainted. The resultant strictures – you might also call them design margins – demand a set of ethical ground rules for dealing with the engine house.

Our main restoration target has to be the long-term conservation of the engine house. The original material should be retained as far as possible. The premises for cleaning up the building and putting it to new uses are as follows: monument protection has the highest priority. Preserving the character of the monument is more important than its extensive use. As far as changes are concerned, as a rule the changes which happened during the time the colliery was in operation have precedence over those which happened during the interim period (ca. 1969–2006). All the new building works and reconstruction work must be as clearly as possible recognisable for what they are. That said, these ground rules have their limits in the detail. We want to prevent the creation of a "patchwork" which would run counter to a cohesive all-round aesthetic.

The work has to comply with the requirements of monument authorities. In addition the Museum has set up an expert monument-care advisory board, all of whose members are experienced in industrial archaeology.

THE ETHICS AND AESTHETICS OF RECONSTRUCTIONS – TWO CASE STUDIES

As described above, restoration work on the roof and the interior facade require a new coat of paint, and we cannot avoid making a decision on the exact colour.

At the moment the ceiling is painted white, but it used to be dark. The chamfers of the girders by contrast, were in a garish red, the wall areas – field by field – were painted in stripes to mirror the steel construction, and the substructure was clad with two different types of marble. The great majority of the engines were once black but in the 1970s they were irreversibly coated with red lead and painted over in light grey. Apart from the marble control panel and the stained glass on the windscreen near the door, little remains of the original decoration. Despite all our efforts to the contrary we have only been able to retain the idea behind the building rather than the original material.

Our restoration plan throws up a crucial question of how to make the engine house a vivid and comprehensible experience for our visitors as a total work of art. After intense discussions we decided on presenting the original character of the place by repainting and re-glazing it in an appropriate manner. But what do we mean by appropriate?

We are not trying to create the fiction of an exact "reconstruction" but a re-creation which makes no claim to being the original.

Each attempt at a re-creation throws up methodical problems. First, we need a secure database. How reliable is our knowledge of building components and of layers of paint which are no longer available? Monument conservators would like to be 100% certain. At the same time, however, visitors must be able to recognize a reconstruction at second sight and differentiate it from the original on which it is modelled.

Despite all our rational attempts at being "faithful to the work", it seems to me – as an engineer and admirer of this unique building – legitimate to interpret the re-creation of the original building idea as being true to the spirit of the place. Just as every new performance of a classical piece of music is of, necessity, a reinterpretation, we wish to reinterpret our monument in a consciously responsible manner.

This process comes up against its limits when the existing substance is destroyed at the expense of re-creation.

It goes without saying that we also have to discuss the scope and positioning of the re-creation in the context of the building itself.

Two basic decorative elements in Bruno Möhring's building will serve as practical examples here: the stained glass in the large windows in the façade, and the Jugendstil canopy over the entrance door to the engine house.

The surviving windows on the outer façade all have clear transparent glass. There are many signs that the steel window frames were partially repaired, changed or even renewed in the 1950s, and at this point of course they would have received new panes of glass. When we look at the sources and the old black and white photographs it is possible to clearly establish that the windows were originally lavishly equipped with stained glass. Both the large windows in the central projection contained lead glazing motifs. But what colour were they and what was the quality of the glass? A good indication of what it might have been like is provided by the interior windscreen near the door, where 98% of the glazing still exists,¹⁴ although it is clear that the motifs were entirely different from those of the main windows on the façade. Intensive searches made in obscure corners of the interior of the building and in the ground outside threw up a few very small coloured glass splinters. That said, it is still difficult to reconstruct an exact quantitative arrangement of the motifs in the windows. There now exist new methods of making a comparison by using black-and-white photos and "reference glass fragments", and these have enabled us to make a plausible reconstruction of the original stained glass. But we have still not solved the problem of how to establish the exact properties and surface structure of the glass. And even if we do, today's coloured glazing, including so-called cathedral glass, differs considerably from the original glazing in its method of manufacture and the materials used.

Such differences would not really matter if we simply used the replica of a complete stained-glass window without comparing it with the original. What is to stop us from making a conscious new interpretation and presentation of the original? Many recent publications have described the engine house as a "cathedral of labour" – and it must have made a similarly solemn impression over 100 years ago. For this reason I would be in favour of at least furnishing the windows on the west wing of the engine house, which still contains original engines, with new stained glass, provided there is no attempt to imitate the original state of the window but merely present it a "surrogate" in the sense of a one-to-one model. In this

way the colours could be presented by means of glued transparencies or sprayed on patterns using templates. The overall aim must be to present this icon of industrial heritage in an adequate manner by creating an aesthetically pleasing, cohesive spatial harmony of colours which have as close reference as possible to the original. More detailed information on which to base further decisions will be provided by large-scale one-to-one trials.

The imposing Jugendstil canopy over the entrance disappeared from the building about 50 years ago. It not only provided an impressive demonstration of the architectural ambitions of the coal mining company, but put it on a level with those of other public buildings like railway stations, theatres and concert halls. It was very probably dismantled because it had fallen into disrepair due to poor maintenance: Whatever the case, there is no evidence to indicate that any consideration was given to the subsequent appearance.

What remains is a torso, laboriously concealed clues and rough profiles. A complete new re-creation would heal this wound and provide a clear indication of the original splendour of the building. None of the original building substance has to be sacrificed in order to achieve this. The construction of the canopy could be achieved in a coherent manner and presented graphically in such a way as to banish all doubts as to its relevance. The original canopy was constructed with rivets, but the new version could substitute these with screws or welding methods. The profile could be differentiated from the surrounding colours by using zinc coating for example. Both measures would be reversible, thereby enabling people to take a different approach to the monument at any time without any detriment to the original substance. We are still discussing all the relevant issues, and no final decisions have yet been made. The question remains: can we truly recover the Icon? The answer is no.

Given the circumstances outlined above, this is impossible. Nonetheless I would strongly plead for the re-creation of the engine house in a consciously responsible manner.

SUMMARY

The 1903 engine house of the Zollern colliery in Dortmund is generally acknowledged to be an icon of modern industrial design. The building documents the change in industrial buildings from a traditional, historicist style to a modern, economical design. The state-of-the-art nature

of the technical equipment was reflected in the style of the engine house.

Rescuing this example of outstanding industrial heritage from demolition in 1969 signalled the start of a new movement to preserve industrial buildings in Western Germany.

A3



Conservation work of the façade has been tested in a small scale in order to get experience for the entire task (photo: N. Tempel, LWL-Industriemuseum, Dortmund, 2008)

Recovering the monument after more than hundred years throws up a great deal of problems. As we now know, the durability of the more modern design cannot match that of the massive brick building method. During our intensive examination of the building we have learnt a lot about aspects of statics, the physical qualities of building materials, the original coating and decoration, hazardous materials etc. Treating a huge industrial monument of this type entails finding a balance between safeguarding the authenticity of the monument, putting it to new usages and finding the best way forward to ensure the long-term conservation of the building.

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¹ Paul Knobbe * 2.1.1867 in Eastern Prussia, † 4.4.1956 in Essen 1901–06 Head of the construction department at GBAG, Gelsenkirchen

² Interestingly enough, the balustrade to the open staircase in the administration building hallway illustrates the change in style from historicism to Jugendstil.

³ A model of the colliery was presented at the world exhibition Lüttich/Liège 1905

⁴ Emil Kirdorf * 8.4.1847 in Mettmann bei Düsseldorf; † 13.07.1908 in Mülheim an der Ruhr

⁵ see Literature: Fischer/Horstmann [1988]

⁶ Bruno Möhring * 11.12.1863 in Königsberg (Eastern Prussia), † 25.3.1929 in Berlin

⁷ Dr.-Ing. Reinhold Krohn (* 25.12.1852 in Hamburg – † 29.6.1904), starting in 1904 – when the Technical Academy in Danzig was founded – he was Professor of Bridge Building and Structural Engineering. He had constructed the roof truss system with arched girders without a beam tie ("Tragsystem mit Bogenträgern ohne Zugband") especially for the GHH exhibition pavilion. This was also retained in the Zollern engine house.

⁸ Both men seem to have been hard-headed Eastern Prussians, and both studied at the TH Charlottenburg in Berlin. Möhring, by the way, never completed his course.

⁹ Bernd und Hilla BECHER [1977]: *Zeche Zollern 2.* München

¹⁰ The Westphalian Museum of Industry (WIM, recently renamed "LWL-Industriemuseum") was established under the aegis of the regional authority, the Landschaftsverband Westfalen-Lippe (LWL). The museum consists of eight industrial monuments in Westphalia, all of which document important aspects of industrial history in the region. The Westphalian Museum of Industry (like its partner the Rhineland Museum of Industry) was set up by its regional authority to preserve industrial sites as monuments, present them as valuable evidence of a bygone age, and find contemporary usages for them. WIM's specific job is to present and research the culture of the industrial era and its development in Westphalia. It aims to shed light on the technical, economic, political, legal and social developments in the industry and show how they affected the lives of working people and their families (cited from KIFT, 2000, p. 36). See also the publication "Schätze der Arbeit – 25 Jahre Westfälisches Industriemuseum" (Treasures of work – 25 years Westphalian Museum of Industry), Westfälisches Industriemuseum Schriften Band 23; Dortmund, 2004; and the museum homepage on the internet: <http://www.industriemuseum.de>.

¹¹ Our knowledge of the revised version has recently been enlarged by coloured slides by the artist Friedrich Gräsel, made as working outlines for an art project in the engine house.

¹² The following experts and offices were involved in the examination so far: LWL-Bau- und Liegenschaftsbetrieb, Münster; Büro für Industriearchäologie, Darmstadt; Deutsches Bergbau-Museum, Bochum; HEG-Ingenieure, Dortmund; Moll Steinrestaurierung, Viersen; Planinghaus Architekten, Darmstadt; Engineering and Restoration Workshops Department of the LWL-Industriemuseum, Dortmund; Wessling Beratende Ingenieure GmbH, Altenberge.

Publications on hazards in industrial monuments with case studies from the Zollern engine house include: Norbert Tempel: Beiträge zur Restaurierung von industriellem Kulturgut, Folge 1: Verborgene Schätze. Zum Umgang mit Schmutz und Gefahrstoffen im Industriedenkmal – Erkennen, stabilisieren, entfernen, In: *IndustrieKultur* 3/2007, S. 22–25; Norbert Tempel: Hidden Treasures. Investigation and Treatment of Hazardous Substances in Industrial Monuments; In: Benjamin Fagner (ed.): *Pr myslové d dictví – Industrial Heritage. Conference Proceedings from the international Biennial "Vestiges of Industry"* (Prague 2007). Published by the Research Centre for Industrial Heritage of the Czech Technical University in Prague, in cooperation with the Technical Monuments Committee of the Czech Chamber of certified Engineers and Technicians and the Czech Union of Civil Engineers. Prag 2008, pp. 116–124 (Czech) and pp. 295–298 (English)

¹³ The quantification of interventions according to the latest state of knowledge is: steel construction ca. 20 %; brickwork: brickstones ca. 20 %, mortar joints ca. 90 %; plastering ca. 30 %; the interior panelling ca. 80 %.

¹⁴ Some of the pieces of glass, which do not "fit" the windscreen allow us to pinpoint several earlier stages of repairs even though it is impossible to put a date on them.

Landscapes – as the German language suggests: *Landschaft* (*schaffen* = create) – are the result of an ongoing creation process, influenced by both natural and human factors. They are also an expression of political choices taken over time in the social, economic and environmental fields. To understand landscapes properly, we have to ask: Who 'scaped' the land? why? and what was the context in which that 'scaping' process took place? Heritage is an interpretation by past and present generations on what part of history should be handed on to the next. What we preserve is a selection, depending on values that change through time, place and culture. It is a 'story' we tell, while others remain untold. Heritage work, therefore, should be a public interpretation process, (re-) defining the public value of tangible and intangible heritage and highlighting the active role of communities in the creation, interpretation and valuation processes of their surrounding landscapes.

The session aimed to become a permanent platform to exchange international experiences related to new approaches of landscape understanding. By bringing together people from different professions presenting their respective work and projects, we started a controversial debate on new conceptual approaches to a global understanding of landscapes and on the role heritage work can and should play in tomorrow's regional development strategies in order to contribute to the local community's sustainable development. We also focussed on public interpretation processes of industrial landscapes and on the role tourism on active sites can play to raise awareness for the concerns of an industrial culture. In order to deepen the discussion engaged during the session day in Freiberg, the following day we invited people from this session on a joint field trip to Welzow.

A4 Telling the whole Story – New Conceptual Approaches to the Understanding of Landscapes and Community Development

Organizers: Marion Steiner, Karsten Feucht (Germany)

The Lusatian open cast mining community Welzow currently experiences a dramatic landscape transformation. In the morning, we enjoyed a trip through the active coal mine with an authentic miner's personnel carrier and experienced a walking-tour through the bizarre mining landscape. We saw that an active coal mine can work as a touristic event, and learnt that our perception of landscape strongly depends on the way we look at it. In the afternoon, invited by Vattenfall Europe Generation, we visited the Industrial Park 'Black Pump'. The Chief of Energy Economics told us the social and economical story of the site during former GDR times and after the German reunification. We came to understand that Black Pump's Whole Story is in fact made up of two different stories – depending on the specific value systems of the two former German states. That was the culminating point of a really vivid, controversial and inspiring debate: How do different political and societal contexts influence on the public interpretation of industrial heritage?

Collecting the Uncollectible: Presenting Energy at National Museums Scotland

Rowan Julie Brown

Communicating Scotland's response to the global energy crisis is no mean feat. The country boasts the first fast reactor anywhere in the world to provide energy to the national grid, the world's first marine energy testing centre and is now arguably at the forefront of the production of renewable energy devices. Ensuring that this phenomenon is objectively and accurately presented to the public at a time when energy concerns are a regular feature of news broadcasts and parliamentary debate has provided the impetus for a number of focussed projects, mapping the energy picture nationwide.

In National Museums Scotland's 2001 Acquisition and Disposal Policy, a notable gap was identified in 'Equipment and materials representing the generation of power from hydro, wave and marine current, solar, wind and nuclear energy.' Through further analysis of the collection, identifying and collecting material culture, undertaking oral histories, working in partnership with industry and academia and contributing to heritage strategies for industrial landscapes, National Museums Scotland is addressing this imbalance and creating a legacy for future generations. Key issues such as sustainability, national identity, the politics of energy provision and technical innovation underpin the project.

The Science & Technology Collections of National Museums Scotland originated with the Industrial Museum of Scotland in 1854. Funded by the profits of the Great Exhibition, 1851, the Industrial Museum, and its sister institution, the South Kensington Museum were administered by the London-based Department of Science and Art. Lyon Playfair, the Department's Secretary and Edinburgh University graduate, stated the Edinburgh institution's purpose as:

'...an institution in the capital of Scotland would be of great national benefit by affording the means of definite information in regard to the mineral wealth of this kingdom, its ores and coals, its building, paving and ornamental stones, granites and marbles, the localities and composition of soils, the qualities and capabilities of its different clays for bricks, tiles or pottery wares, and of its limestones for building purposes and manure and generally as a means of developing the industrial resources of its territorial products.'

Under the stewardship of George Wilson (1818–1859), the Regius Professor of Technology at Edinburgh University, and friend of Playfair, a collection was formed which presented the rapid technological and scientific progress

then taking place. His four-year directorship resulted in the collection of 10,350 models and specimens characterised by an interest in 'the industry of the world in relation to Scotland.'²

Subsequent periods of collecting were more reactive. The rapid post-war decline of the Scottish manufacturing industry displaced numerous survivors of the pre-electrical age. The energy collections comprising mining and mineral processing, public utilities and prime movers benefited enormously. Numerous items were added to the collection, aided and abetted by a group known as the Scottish Society for the Preservation of Historic Machinery. Though the quantity was impressive, the quality was diminished somewhat by the rate at which collections had to be salvaged from buildings on the verge of demolition and companies undergoing receivership. In such conditions, only skeletal provenances and little contextual material could be acquired.

When the collections were reviewed in 2001, approximately 5000 items were identified which demonstrated Scotland's history of energy use and production. The largest holding was the Mining and Mineral processing collection with a total of 3,300 items. Hydrocarbons including coal, oil, bitumen and oil shale have had vast economic importance to Scotland. Coal has been mined since Roman times and the collection includes many early wooden implements – the result of industrial archaeology. There is a significant collection of safety equipment such as miners' lamps and protective clothing and a very fine model of William Baird's 1864 Gartsherrie coal cutter – the first to be used on a significant scale. The exploitation of forbanite, the oil-rich coal, came to prominence in the late 19th century through the pioneering work of another Scot, James 'Paraffin' Young. Models of extraction and refining plant and samples of minerals and products represent the industry which transformed the landscape of the Scottish Central Belt.

The public utilities were less well represented. Opportunistic collecting had resulted in the acquisition equipment recovered from now demolished Scottish gas works. Integral items to the industry such as the continuous vertical retort were represented by photographs and models. Of the full scale items, there was a three-cylinder vertical gas engine of 120hp, built in 1925 by the National Gas Engine Company, and an Andrew Barclay Gasworks locomotive acquired from Granton Gasworks, Edinburgh. Electricity was represented by instruments and switchgear produced by the firm with which Lord Kelvin was

associated, Kelvin & James White of Glasgow; an early 20th century alternator by the British Electric Plant Co, Alloa, and a 1920s rotary converter by their successors, the Harland Engineering Co. The collection also contained a number of electric motors and generators, both full-size and model.

With a total of 26 hydroelectric power stations built in Scotland between 1943 and 1987, hydroelectric power was of tremendous geographical and industrial significance to the country. The era is mainly represented by photographs documenting the North of Scotland Hydro-Electric Board's scheme. This is symptomatic of both the scale of the equipment concerned and the fact that in 2001, much original plant was still in use.

The developments in offshore oil and gas production in Scotland in the late 1960s are represented by contemporary drill and platform models, used to inform manufacture; samples of North Sea Oil, presented by BP and more unusually, the Ferranti Argus 500 computer which, until 1987, monitored and controlled the flow of oil from BP's North Sea wells to the refinery at Grangemouth.

As stated above, Scotland had the first fast reactor anywhere in the world to provide energy to the national grid and had six operating nuclear power stations. The modest collection recorded in 2001 consisted of a model of the Dounreay Fast Reactor and the Control Desk from Hunterston A Power Station.

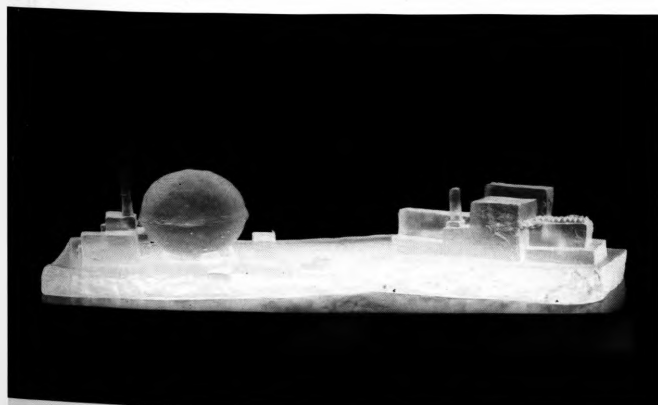
To address the imbalance in collections representing Scotland's history of energy production and use, a number of solutions were devised. Public engagement with science became an organisational priority, new exhibitions were

planned to demonstrate the application of science, partnerships were proposed and proactive collecting projects were initiated. These solutions acknowledged both the controversial and contemporary nature of the subject and the difficulty of collecting full scale items, often containing hazardous materials.

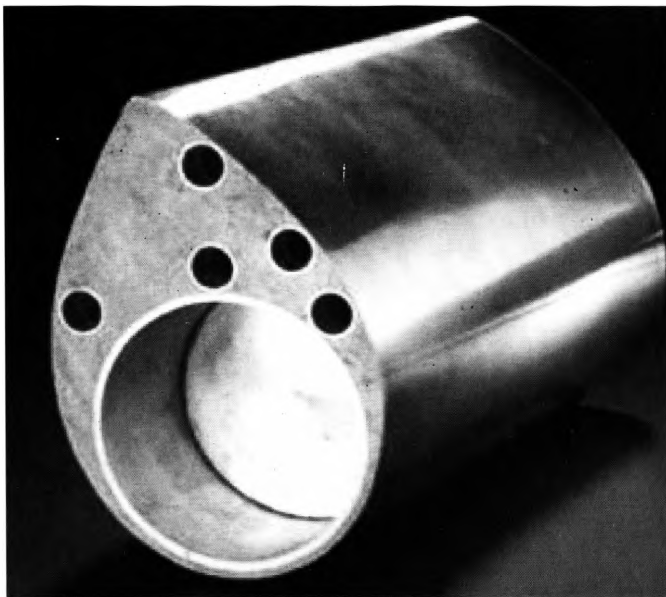
The Museum has long been committed to both formal and informal learning and aims to communicate scientific research carried out within the institution; help the public better understand the significance of the collections and the science that underpins them. A number of programmes targeted at both children and adult learners facilitate these aims. Drop-in *Super Science Shows* are run every weekend for audiences aged five and above. There is also a regular programme of informal *Meet the Scientist* events underpinned by *Meet the Scientist* training which is run in partnership with Ecsite-uk and funded by the Engineering and Physical Sciences Research Council (EPSRC). The *Understanding Technology* lecture series, open to general audiences, features internationally acclaimed guest speakers such as Professor Mario Biagioli of Harvard University and Professor David Edgerton of Imperial College, London. Special programmes are conducted annually to coincide with National Science & Engineering Week and the museum is the largest single venue in the Edinburgh International Science Festival, reaching c. 25,000 visitors through a fortnight of activity.³

Formal learning is conducted through in-house teacher training, web pages highlighting the links between exhibits and the National Curriculum and teachers' packs available on the website. Educational collaborations with Higher Education Institutions enable the Museum to provide expertise in the supervision and examination of undergraduate, Masters and Doctoral studentships in addition to facilitating internships and providing specimens for study.

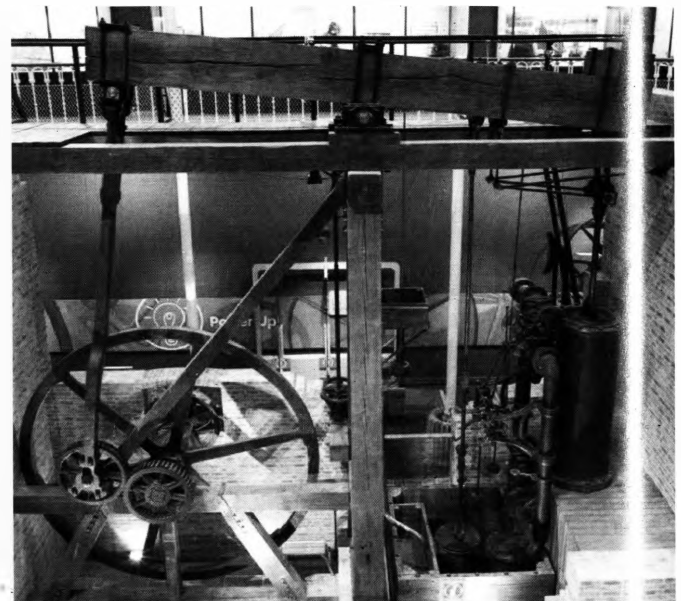
The two new galleries which interpret Scotland's energy production are *Connect*, an applied science gallery targeted at family audiences and *Scotland: a Changing Nation*, a gallery focussing on the history of the twentieth century. These exhibitions were opened in 2006 and 2008 respectively and their development necessitated the acquisition of items relating to energy generation and supply. *Connect* contains numerous treasures from the collection such as Dolly the Sheep, the working 1786 Boulton & Watt Beam Engine and Wylam Dilly, one of the world's oldest steam locomotives. A Swift Mini Turbine was acquired from the Edinburgh-based firm, Renewable



Dounreay Sculpture (© author)



Salter's Duck (© author)



Boulton and Watt (© author)

Devices to introduce the topic of modern energy solutions. The Beam Engine and Swift together communicate energy use and production past and present. Manual and hi-tech interactives enable visitors to generate electricity, try out the role of Energy Minister, and listen to the opinions of academics, politicians and energy professionals.

The content development for *Scotland: a Changing Nation* highlighted the dearth of twentieth century material in the collections. The first item acquired for display in the gallery was a luminous uranium glass sculpture of Dounreay Nuclear Power Station, made by the artists Kate Williams and John Lloyd. Kate Williams had previously exhibited with the North Lands Glass Studio, a consortium of artists specialising in glassmaking which can trace its origins to the specialist glass manufacturers employed at the Power Station. Relationships were formed with Total UK, which resulted in the loan of a model North Sea Oil Rig; FMC Technologies of Dunfermline who lent a model subsea tree and EMEC, the world's first European Marine Energy Centre. The EMEC relationship resulted in exclusive use of footage from their test sites off the coast of Orkney and broadcast rights to a documentary illustrating the purpose of the organisation. Subsequent work with EMEC resulted in the acquisition of their model of the Wave Test Site at Billia Croo.

Two proactive collecting initiatives have also shaped the energy collections in recent years. The first responded to

Scotland's leading position in the development of wave and tidal renewable devices linked to the research conducted for the *Scotland: a Changing Nation Gallery*. The decision was taken early on, that the only way to convey the scale of devices and record the passion of those involved, was to collect both material culture and oral history interviews. To a certain extent, this circumvented the issues of limited storage space, the cost of shipping items and potential hazards, as only items of international significance merited physical acquisition. The first candidate selected for interview was Professor Stephen Salter, Emeritus Professor of Engineering Design at the University of Edinburgh. The founder of the wave energy pursuit in Scotland, Salter donated his 'Duck' to the collections in 2000. Once on display in the *Changing Nation Gallery*, it provided the impetus to conduct an oral history with the Professor in front of his test tank, thus capturing another renewable energy innovation – the world's first multi-directional wave tank equipped with absorbing wavemakers. The first object to be collected under the auspices of the project was the Loch Linnhe Rotor, part of the world's first moored tidal stream kinetic energy conversion turbine for electricity generation. The 10kW turbine was tested at Corran narrows, Loch Linnhe from August 1993 till June 1994 and proved the concept of tidal stream power generation. It was designed by Peter Fraenkel, Technical Director of Marine Current Turbines Ltd., Bristol. Working with an emerging and highly competitive industry does have its challenges; there is naturally concern over intellectual property, and the Museum has devised

confidentiality clauses for transfer of title agreements to overcome potential issues in that regard.

The second focussed collecting project was part of a wider initiative to record the legacy of the Dounreay Nuclear Site. Dounreay Site Restoration Ltd. (DSRL) is licensed to undertake the programme of decommissioning and clean-up of the 140 acre site, on behalf of the Nuclear Decommissioning Authority (NDA). National Museums Scotland in partnership with the NDA, DSRL, Historic Scotland, Atkins Heritage, and Caithness Horizons have worked together to establish a way forward for creating a lasting cultural legacy of the site. This strategy is due to be published in late 2010 following public consultation. Once the strategy is finalised, and scheduling decisions are reached, a panel of heritage experts will ensure that the material culture representing the story of Dounreay's creation, development and decommissioning are appropriately and accurately recorded.

Collecting the story of Scotland's energy production is a challenging task. Readdressing the collections balance to reflect the key energy innovations of the past, present and future involves research and persistence. Work continues at National Museums Scotland to collect, publish and acquire items reflecting the energy topic, and with the prospect of future displays on the subject, and the public debate surrounding EU renewable energy targets, energy provision will continue to be the subject of focussed activity for many years to come.

A4

¹ The Wealth of a Nation, pp. 9, published by National Museums Scotland & Richard Drew Publishing Ltd, 1989

² The Wealth of a Nation, pp. 9, published by National Museums Scotland & Richard Drew Publishing Ltd, 1989

³ Science at National Museums Scotland, 2009



Though Dynasties pass: Preserving the oldest commercial Oil Field in the World – Oil Springs, Canada

Charles Fairbank

I own, but consider myself a trustee, of a small, aged, but important oil field in Oil Springs, Canada. The Village of Oil Springs and its neighbour, Petrolia can be found a half-hour southeast of the base of Lake Huron, two hours northeast of Detroit or two hours west of Niagara Falls.

There was a special ambience about growing up in that fabled oil town of Petrolia 60 years ago. I met many men who worked in oil and knew many more who had been to the four corners of the earth looking for it. But more persuasive was the air, redolent with the smell of oil, atmosphere with body suitable for swimming in or dining on. We breathed it lustily, while visitors coming to town were shocked by the smell. The squeaking of the jerker lines, as they pulled the wells, worked over us like the ceaseless ebb and flow of the sea. But imperceptibly, that music stilled until one day we awoke to silence and realized something had left our lives and diminished us.

Petrolia, after many trials, had been sentenced by oil's law – declining production. Some producers hung on for they knew and loved the fields. But, finally with age or desperation, they abandoned their fields or sold them to brave new men whose heads were full of oil, money and grand ideas, but with little appreciation of the harsh realities of pumping oil for less than the cost of production. A few men, luckier or more tenacious, hung on.

Thomas Hardy expressed the feeling of those times:

*"Just a man harrowing clods
In a slow silent walk
With an old horse that stumbles and nods
Half-asleep as they stalk."*

Yet Oil Springs, 11 km south of Petrolia, continued on with the old technologies.

A century and a half ago, it was said, "There are more ways than one to Oil Springs but whichever way you select, you will wish you had taken the other.

"The number of mud holes is something wonderful. Not little paltry affairs, but big things, large enough for a horse and wagon to swim in, gifted with powers of suction, burying horses up to their shoulders, and retaining wagons firmly in its grasp. Wagons pushed aside into the bush tell where attempts to reach Oil springs have been abandoned in despair."

The Chippewa Indians had been using crude oil as a liniment for millennia. They also used it as medicine and

considered it a preventative against cholera. With irrefutable logic, they realized that those who drank crude did not get the disease and happily, drinking crude didn't kill them either.

But it was not until 1849, shortly after the Geological Survey of Canada became aware of the oil shows in the area, that the Tripp brothers arrived and bought 1500 acres of land containing two bitumen beds and six natural oil springs.

They began to make asphalt, and in 1854, a charter was granted for their company – The International Mining and Manufacturing Company – the first oil company in the world. After their asphalt won an Honorable Mention at the Paris Exhibition of 1855, they received an order for seven boat loads for the streets of Paris. Apparently the authorities realized asphalt streets made it more difficult for a hostile population to hurl cobblestones at police.

It is no wonder that their asphalt business failed the following year because of the condition of the road in Oil Springs, that "slough of despond – that muddy canal through the dank dark woods."

The Tripp brothers sold their land to James Miller Williams who was looking for crude oil to distill into lamp oil. In July of 1858, he found it. The newspaper gushed: "An important discovery has just been made – while digging a well at the edge of a bed of bitumen, men struck upon a vein of oil – an almost inexhaustible supply of wealth." Williams very quickly distilled his crude into kerosene and advertised it for sale.

There are many claims for the beginning of the world's modern oil age, and certainly, it is Williams' well at Oil Springs that establishes Canada's claim. However, Drake's well, of Titusville, Pennsylvania in August of 1859 has been proclaimed by the Americans with great force and bluster as the true beginning and the world has generally agreed. We should not neglect the fact that Williams was refining and selling kerosene a full year before Drake's well came in.

Moreover, I am fully convinced that when Drake went at night to check the progress of his well, he carried a lamp burning kerosene from Williams' well at Oil Springs, Canada.

And finally, during the birth of our modern age – while the Americans were busy at home drilling their numerous

fields, it was our Canadian drillers with nowhere left to drill in Canada, who took their technology and passed it on in 86 foreign countries. We transformed the Galician fields with William McGarvey and his Canadian Rig and discovered the first well in the Middle East in Persia in 1908. Canada's influence in the modern age of oil was colossal.

The Globe newspaper from Toronto described conditions at Oil Springs in 1861: "There can be not less than 1,600 people gathered together at this spot. The provision for their comfort is very inadequate and very rough. Thrown together suddenly in the woods, they have experienced great hardships. Close by, the principle hotel, runs a small sluggish flowing stream. In it, the diggers, covered with oil, washed themselves, watered their horses, and took water for their tea, and with which they boiled their fat salt pork, their staple diet."

On a happy note: "There is scarcely any drunkenness. No rows have taken place, knifing and shootings being entirely unknown." And another report, almost poetic: "I came across a well every few rods. There in the wild woods, were hundreds of men, all quiet, intent on their work. There was no talking but tramp, tramp, tramp went the foot. Click, click, click. The sharp sound of the drill as the steel bit its way into the rock."

Wells in these days were four-foot cribbed shafts sunk through the clay to rock, 40 to 100 feet deep. Some of them within a few feet of the rock, quickly filled with oil, which with much noise and uproar of gas bursts in.

When the surface well is depleted, the slow process of drilling is carried on by foot with a spring pole, by horsepower or with steam engines sinking from a few inches to 10 feet per day.

My great grandfather, J. H. Fairbank, arrived in 1861 as a surveyor. Much to his wife's displeasure, he decided to try his hand at oil. She refused to join him, stayed at home in Niagara Falls and referred to Oil springs as "that hole" or "that miserable swamp".

J. H.'s first Christmas was lonely. "Rather queer Christmas minus turkey and such like. At work in mud and oil all day, such is Enniskillen. Received nothing from somebody, and gave something to nobody, total zero."

When he built a log house 12 by 16 feet, his wife called it "a house without hope". His 75-year old mother and

four-year old son, Charlie, and family dog came to live with him.

"The nasty Black Creek – aptly named – winds its way slowly along its narrow channel, between banks covered with derricks and well-charred stumps, piles of barrels filled with the unctuous liquid and mounds of sand and clay."

Oil Springs looks like a small edition of South Staffordshire, quite as dirty and smelling a great deal worse."

Many of the early producers had their own refineries or stills – my great grandfather was not fond of them. His diary notes: "Oct. 18: Run still. About as miserable a day as I ever put in, run 'til dark and quite fully resolved that I won't run a damned leaky oil kettle that acts as if it would go up any minute, for love nor money. Don't want to become as nervous as an old maid and feel like a coward all the time. I am down on the thing and won't stand it anyway. Can stand work as well as anyone but damn a leaky still. Them's my sentiments."

Nov. 14: "Port Huron works exploded. All hands went over. No one hurt. No damage done."

Dec. 11: "Sisk's Refinery burnt today."

Today, in 2009, 100 m from our home, a shallow grassy depression in the ground, under a three-pole derrick, marks the site of the Shaw well – Canada's first gusher. It was drilled with a spring pole and it blew out on January 18, 1862. For four days, uncontrolled, 2,500 barrels a day flooded the land and escaped to the creek where the oil flowed to Lake St. Clair and shut down shipping.

The well was finally controlled with a seed packer – a leather pouch tied to tubing, filled with flax seed, which swelled with fluid.

By March 2, 1862, two more flowing wells came in. As geologist Alexander Winchell wrote in Sketches of Creation, "There was no quarter of the world where the production of oil has attained such prodigious dimensions as in 1862 upon Black Creek in the Village of Oil Springs.

By October of that year, no less than 35 wells had commenced to drain a storehouse which provident nature had occupied untold thousands of years in filling for the uses, not the amazement, of man.

"There was no use for oil at that time. The price had fallen to 10 cents per barrel. Three years later, the oil would have brought \$10 per barrel. Now its escape was the mere pastime of full-grown boys," he admonished.

"I have determined that during the spring and summer of 1862, no less than five million barrels of oil floated away. A national fortune totally wasted, by those not educated to an understanding of the amount of labour and time consumed in the accumulation of such fortunes." This is an observation relevant today.

These events caught the world's attention. In June 1862, a group from England arrived with a plan to build a 16-km tramway to the Great Lakes where boats would be filled with crude and sailed to England. The cheap oil would replace coal as feedstock for the coal oil industry of England. Surely this was an early concept of globalization: cheap oil plus cheap transportation. They reasoned they could repeat the American experience when 70 coal oil plants in northeastern United States converted from coal to the much cheaper crude oil. But before they could act, the wells went dry.

And finally, February 11, 1863: "Poor H. N. Shaw drowned in this well today. In him, I have lost one of my best friends in Enniskillen. A good man and most obliging neighbour. Sad, sad, sad calamity." In 1866, the King well blew in at Petrolia and most of the activity moved there. For the next 40 years, Petrolia became The Oil Capital of Canada. By 1900, it supplied 90% of Canada's needs. In the 1880s, deep oil rejuvenated the Oil Springs field.

What remains of the Oil Springs fields? We are still using our 19th century technology. Gone is the oil-soaked ground of the 1860s, eaten up by nature's immaculate cleaners – bacteria. Gone too are the steam engines and gas engines. At the east gum bed in spring, when the trees are still without leaves, the works of the 1850s and 1860s of man and horse are visible. The west gum bed, where Williams dug his well, after 150 years of inactivity, has recently been pushing bitumen to the surface again.

The locations of the Vaughn well, the first flowing well of 1860, and of an original natural spring, are known. Of the 35 flowing wells of 1862, 20 are visible from the surface, the rest lurk a few feet underground. A cultural landscape shaped by steam, horses, sheep and jerker lines, survives.

The jerker line is a mechanical system, there was no electricity then. Invented by J.H. Fairbank in 1863, it could

pump multiple wells from one steam engine. It came as the production fell off.

"The majority of wells were then worked by man power with a spring pole. The jerker is universal now and it would be impossible to work the old system."

By 1907, our big rig or powerhouse was pumping 212 wells from one steam engine. In 1973, we were operating 10 km of jerker line.

From the rig, two main lines of wood are attached to a five-foot horizontal field wheel. The wood pieces strapped and bolted together are suspended from posts by hangers. The alternate pulling of the lines causes the wheel to oscillate through 16 inches, 11 times a minute.

To the wheel are attached the lines that pull the various wells. The system is balanced so as one well is going up, another is going down. My most efficient rig uses one-tenth horsepower per well. Fifty years ago, my father was showing off the system to Exxon's brightest engineers. After looking for a while, one man turned to Dad and said, "It won't work." My father was amused.

Aristotle would disagree with the engineer, for he would recognize jerker lines are physical manifestation of The Golden Mean. The system only works well when balanced. An inspired journalist recently pointed out that the lines moving at 11 strokes a minute were like relaxed breathing, and humanized the system.

And if jerker lines can be seen as a metaphor for life – they also inspire – Bach would appreciate the ever-changing musical themes of four to six notes filling the air.

A few nights ago, I stepped out to Surround Sound – two rigs singing themes at different speeds – a g and fugue.

And who was the poet who wrote, "Ask not for whom the jerker line sings – it sings for thee."? Perhaps someone else will see the charm in a system but does its job with economy and grace and sings while it works.

People ask me why I have not converted the system to something more modern. The simple answer I give deals with capital and efficiency. The real answer, the one I don't give, is also simple. I don't modernize because it isn't up to me. Oil Springs is a legacy and it transcends the individual. It is the creation of all men who ever

worked here. It reminds us of our beginnings. Stripped to the essentials, it teaches men the elements of our business.

Oil Springs is the oil industry on a human scale and demystifies by bringing us back to first principles – how man can drill and pump a well by spring pole. The history of the area shows oil to be finite. When it is gone, there is no more.

What are we doing to protect this legacy? The oil field was given national recognition in 1925 by Canada's Parks and Monuments Board because of Shaw and Williams' wells. Five years ago, we asked for expanded recognition and that was done.

Because history is not visible, we have attempted to bring the landscape into focus by placing lifesize steel sculptures of men, horses and equipment in the field to recreate elements of oil's first 100 years. This has the remarkable effect of bringing people from the village to walk around the oil fields.

Horse-drawn wagon rides and walking trails through the forest and fields connect people with this remarkable heritage.

Last year, during our sesquicentennial, we produced folk songs, a video, two successful conferences and a musical play "Oil Rush" enjoyed by 7,000 people. Happily, the larger community has taken notice.

My great grandfather said late in his life, "I thought there was something in this oil for me. I never lost faith – haven't yet."

And today I can say that I haven't lost faith – that with your help the world will recognize the value of this place, this Oil Springs.

"And it will go onward the same, though dynasties pass."

How Perception constructs Landscape

Karsten Feucht

INTRODUCTION

The value of industrial heritage and mining landscape depends on human perception and on the cultural conversation about these perceptions. It is product of our interpretation: we 'tell' it. Based on this systemic approach in Welzow a new, interactive kind of mining tourism has been created, which not only generates a new form of tourism but is itself a contribution to the interpretation and regeneration of the region.

PHILOSOPHY

Conversation is the strongest building material. The renowned constructivist biologist Humberto Maturana from Chile described this context like this: "We are constructing the reality through the communication about our perceptions". His colleague Heinz von Foerster from California investigated the context of perception and action: "If you want to understand, learn to act." A simple experiment shows what that means: just try to know, which material you are touching with your finger without moving it above the surface. It will be impossible to distinguish between trousers, table and paper if you do not move your finger, if you do not act. But this relation is a paradox. The architect Lars Lerup described this paradox as follows: "We are still blind in a way, when we begin to act."

LAUSITZ

This relation becomes more evident in situations of economic and cultural disjunction, as for example in East Germany after the unification, which caused profound processes of transformation. The region of Lausitz, already being an energy district of East Germany, lost important parts of its market for brown coal from one day to the next due to the unification in 1990. As a result hundreds of excavation machines and thousands of hectares of devastated landscape became redundant and about 80% of the miners lost their jobs. At the same time the open cast mine of 'Welzow-Süd' run by Vattenfall still moves mountains of earth material to win 90,000 tons of coal a day out of the ground. Villages are resettled and hectares of land removed and then recultivated.

HERITAGE

This ongoing conversion of a whole region forces a permanent process of re-design and reinterpretation: In 10 years the former pits will be developed as tourist lakes,

with floating homes and swimming bridges. Some industrial heritage is being saved in order to preserve identity. While at the same time in other places industrial settlements are still pulled down in order to expand mining activities. Besides its environmental, economical and social implications this revolution of the physical and cultural landscape makes evident what role identification, identity and tradition is playing and can play, how heritage is socially interpreted and constructed.

CONVENTIONAL TOURISM

While conventional tourism normally comes out of a predictable set of factors with a positive image, mine tourism in contrast attempts to make tourist attractions out of mining landscapes and industrial sites that are in change and may have been left behind by past mining activities, often the subject of public controversy. Abandonment, emptiness and the change brought about by active excavations – often with negative connotations – play a far greater role than in 'normal' tourism. This demands special qualities of the tourist 'offer' and specific training for tour guides. Anyone really wishing to involve the local population or to reach tourists must move them inwardly. This is especially important in mining tourism, where the (possibly dirty or desolate) object cannot do this by itself. The specific qualities of the industrial and of mining landscapes must therefore first be identified before mine tourism can be developed. These unique features then need to be developed and brought to the attention of those outside.

PERCEPTION

A very useful instrument revealing this process is a new kind of tourism focused on industrial heritage and mining landscapes. Perception-Workshops® help to uncover the qualities of sites through directly sensing the existing situation, as it is: in guided 'tours of the senses' different interpretations and explanations are brought to the light and discussed. They form a conscious process of creating a public consensus about the meaning or so-called 'genius loci' of an industrial heritage site and its meaning for the community. They are the base for a new cultural and economic activity.

MINING TOURISM

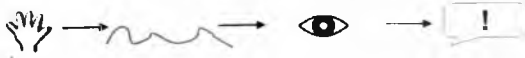
The Bergbautourismus-Verein "Stadt Welzow" ('City of Welzow' Mine Tourism Association) develops the cultural potential of mining. Mining covers a broad spectrum. This

New Paradigm



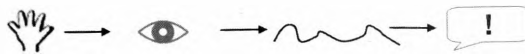
traditional handling of Landscape

**The Remodelling of Landscape
causes its new perception**

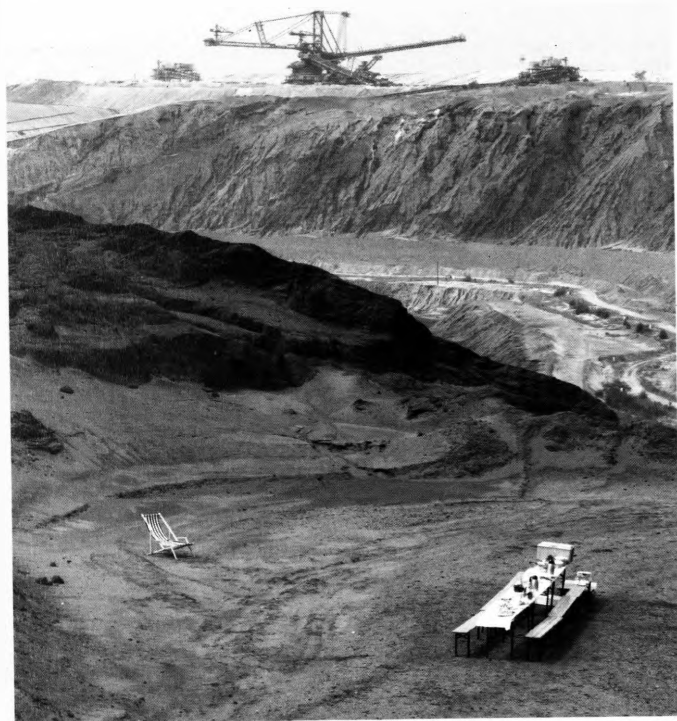


Action-orientated handling of Landscape

**The new Perception of Landscape
remodels it**



(photo: Doede Sijtsma)



A4

ranges from industrial culture to landscapes in flux, and from technical aspects to social and environmental ones. Mining tourism is new. The idea of it only came to the IBA, Internationale Bauausstellung (International Building Exhibition) in Lusatia, recently in the course of its transformation of Lusatia and it is currently being pursued professionally by Bergbautourismus-Verein "Stadt Welzow" e.V. International expertise in the appreciation and revitalisation of unusual landscapes and industrial premises is pooled together and developed here.

SPECIFIC QUALITIES

When it comes to mining tourism, the design of the tour, the applications to the tour and tour guide has a greater role and more responsibility but also more influence on the visitor than in conventional tourism. The guide needs good faculties of perception and powers of description to open and broaden the horizons of visitors. In this sense mining tourism of Welzow raises the tour guide's awareness of his or her own role. Innovative methods of tour guiding and resources are needed, which utilise stimuli from fields such as the science of perception, art and drama.

RESPECT AND ENTHUSIASM

As demonstrated by the German neuroscientist Gerald Hüther, it is primarily enthusiasm that inspires people to absorb new things and to learn. "Man needs enthusiasm, he needs curiosity and to take delight in experimenting, to have an appetite for trying new things and solving problems. And he needs a world that understands this, that respects human effort," says Hüther (Natur und Medizin, 02/2010). This means that the successful tourism should enthuse its visitors. He also affords his visitors respect and leaves them space to form their own perceptions. So he must grab his visitors and yet let go of them at the same time. How does this work?

AN INSPIRING MESSAGE

A message is not an opinion, however, it is more of an attitude. A statement of opinion would encroach on the space to respect the visitors – who could then only be in the right or wrong. A clearly expressed attitude on the other hand opens up this space, precisely because it encourages visitors to develop their own perceptions.

If mining tourism is to take its visitors with it, then it must awaken 'perceptions': in contrast to conventional 'point-out-and-explain' tourism, mine tourism is all about letting visitors see it like it is and perceive it afresh with all its attributes, problems and potential. Sentiments range all the way from awe at monumental feats of engineering to horror at the monumental destruction of landscape – but emotions are always involved. These emotions must be given space. In allowing them, sustaining them, listening to them and communicating through them, an intense experience is created for everyone involved. And everyone learns something new along the way and broadens their horizons – without being lectured to.

REGIONAL DEVELOPMENT

As this approach brings mining and landscape transformation to life, so a greater awareness of their potential emerges. The presented approach makes this process accessible, open to be experienced and discussed on an international level. The 'mine tourism' institute in Welzow develops an innovative, 'soft' tourism in and around active and decommissioned mines. The aim is to enable local residents and visitors to have their own close encounter with mining and/or its conversion process. This kind of cultural exposure to landscape change is a direct contribution to regional identity and development.

The visitors from all over the world honour this effort and proclaim that mining tourism designed in a manner similar to Welzow opens up a new dimension of perception and participation to them. In her thesis in 'Corporate Communications/Linguistic' Jana Tschitschke explored in 2004 the effects of mining tourism by asking the participants before and after the tour about their association with open cast mining: before the tour about 60% associated neutral items like 'coal, technology, excavation machine, powerstation etc.' and about 30% associated negative notions like 'pollution, moon-landscape, hole, dirt, etc.' After the tour more than 80% of the participants named positive associations like 'tranquillity, future life, respect for the effort, fascinating landscape, adventure, etc.' with the mine. Doede Sijtsma from the Department of Foreign Affairs of the Provincie Gelderland focused in his email from August 20, 2009 on the effects for regional development: "Dear Mr. Feucht, first of all it was great fun to participate in this kind of 'safari'. So if that is the first goal, it has been reached and in between – without giving me the idea to go to class – I got all the information on the 'Tagebauprojekt' as an extra. More striking to me was the fact that you were able to change a problematic regional situation (and let's be clear, the effects on the communities were clearly demonstrated) in a specific regional 'product' that brings money and additional jobs to your region. This creative process is the most im-



(photo: Mining Tourism)



(photo: Mining Tourism)

tant thing you have shown me. You were really able to see with other eyes to your region and created touristic 'chances', where others only would have seen 'problems'. In regional development we need to develop new products that sell our region and I think you have developed something special. I can only congratulate you with this and wish you all the success needed."

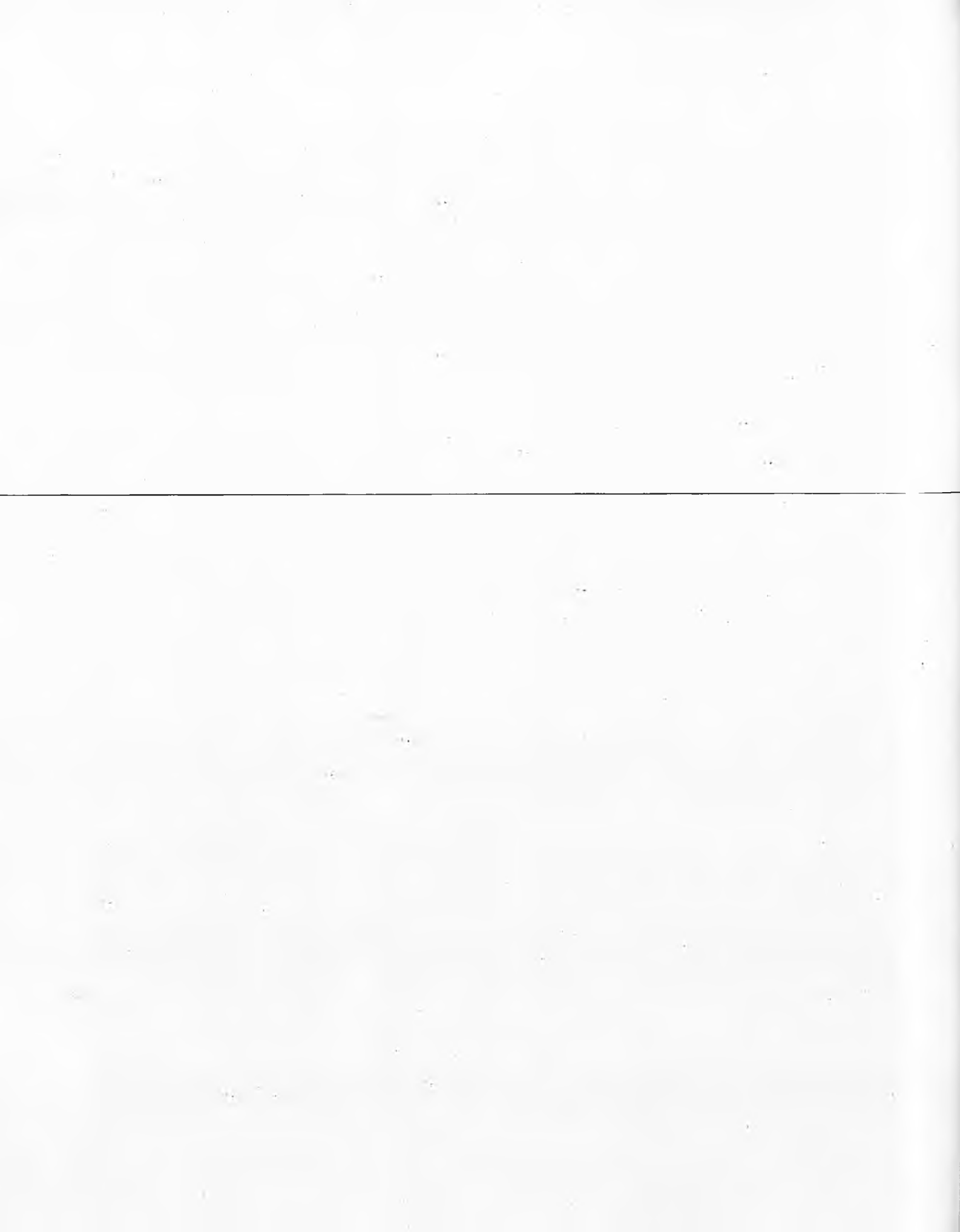
RESULTS

Based on this experience EXCURSIO has been founded in Welzow as a 'Center of Culture and Tourism around an Active Mine'. It concentrates, explores and advances internationally competences in the perception and revitalisation of mining landscapes and industrial heritage. To facilitate this further, a 'Travel Business', a 'Tourism-School' and a 'Research Centre for Tourism' are currently creating three broad fields of activity: 'making tourism', 'learning tourism' and 'thinking tourism'.

CONCLUSION

The Industrial Heritage and Mining Landscape Tourism in Welzow is an example of how it is possible to offer a platform for conscious reinterpretation of an industrialized region. Tourism is no longer understood as exposing an objective industrial heritage reality, but it is in fact part of its creation.

- This consciousness about how 'telling the story' causes new responsibility for the own role of the provider of tourism as 'story teller'.
- It is a new origin for economic activity based on industrial heritage.
- It is an interactive form of how to redesign the site by working with the perception of its users and in this way it forms a new reality.



Schwarze Pumpe Industrial Park – Retrospective and Perspective

Hans-Rüdiger Lange
Detlev Mundt

The evolution of the Schwarze Pumpe industrial site in the period 1945–2010 mirrors some of the most dynamic and dramatic contextual changes in European industrial development. The site itself is a response to the cold war geographical division of Germany. Its growth, decline and resumed growth are the outcome of economic as well as political discontinuities in 1945 and 1989. The societal footprint of Schwarze Pumpe in terms of consumed natural resources, mobilized economic capacities as well as its implication of society and culture is a rich account of history and an insightful experience of German industrial heritage.

THE INDUSTRIAL COMPLEX IN SCHWARZE PUMPE – A CORNERSTONE OF POST-WWII INDUSTRIAL RECONSTRUCTION IN THE GDR

At the origin of the industrial site Schwarze Pumpe stands the Second World War and emerging Cold War. The war did not only destroy industrial infrastructure (45% of industrial basis was in ruins). The reshaping of political borders in central Europe cut across traditional cooperation patterns of modern industrial Germany. The village Schwarze Pumpe and its adjacent town of Spremberg – in the beginning of the 20th century located in the geographic centre of Germany – found themselves 50 years later situated at its Eastern border. For the German Democratic Republic (GDR), the resources of energy and primary industrial goods such as steel and basic chemical products used to come from the Western provinces of Germany or from the Eastern provinces that suddenly were beyond the Polish border. In 1936 30% of its industrial inputs originated from the Western, 10% from the Eastern provinces. The rise of tensions between East and West culminating in the blockade of Berlin and the following interruption of free exchanges of goods put the GDR in front of a new challenge: to rebuild not only the destroyed infrastructure but to complement torn off sections of entire industrial value chains. Cut off from the free world market by the Soviet trade system, the GDR turned in this endeavour to its key domestic resource: lignite. And Schwarze Pumpe is located very much in the centre of the by then future lignite fields.

The industrial reconstruction emerged under the premises of the new, socialist political system and its underlying mind-sets of centralized planning, self-sufficient primary energy supply and Soviet inspired large production units. This approach unfolded amidst a general restructuring of industry and trade in the GDR: an exodus of private firms and part of the work force (15% of companies moved

from the GDR to the FRG until 1953, about the same number was dismantled for reparations; 200,000 inhabitants left the GDR per year). The government concentrated its development efforts on a small number of huge industrial centers: Stalinstadt (Eisenhüttenstadt) for steel, Schwarze Pumpe for lignite and gasification, Schwedt for petrol products. On March 31, 1955 the Minister Fritz Selbmann started the industrial site of Schwarze Pumpe with the ground-breaking ceremony in a dry pine wood forest.

CONTINUED GROWTH OF THE COMPLEX AND OF ITS SUPPORTING INFRASTRUCTURE 1955–1989

The 'Braunkohlekombinat' and later 'Gaskombinat' went into operation in several phases:

- Power Plant I and Briquette Plant 'West' (1959),
- Power Plant II (1962),
- Briquette Plant 'Mitte' (1963),
- Gasification Plant (1964),
- Briquette Plant 'Ost 1' (1966),
- Power Plant III (1968),
- Briquette Plant 'Ost 2' and Carbonization Plant (1969)
- and finally Power Plant IV (1974).

The original plan was partially adapted to advances (productivity increases of generators) and set-backs (failed direct gasification of dried lignite) in process technology as well as to changing economic conditions (facilitation of access to Russian primary energy resources in the 1970s).

The evolution of the Schwarze Pumpe industrial complex mirrored also the evolution of industry concepts of the central planning institutions in the GDR. In the 1960s an approach termed "new economic system" intended to increase economic performance by a series of "free market" instruments such as prices, investment rates and employee incentives – before being abandoned in the early 1970s. It followed a period of even further concentration in a run for economies of scale. In this endeavour the Schwarze Pumpe industrial complex extended its control to similar production plants in the GDR (units in Zwickau, Magdeburg, Lauchhammer, Espenhain and Trattenberg). As a consequence, the by then largest European lignite production complex employed some 35,000 workers and fielded impressive national 'market shares': the complex produced 84.3% of town gas, 100% of lignite coke, anthracite and semi-coke, 41% of briquettes and 9.4% of produced electricity (1985).

This growth from a dry pine forest into a major industrial site had a far reaching societal and cultural impact on

the region. New cities emerged – the hamlet Hoyerswerda grew from 7,000 inhabitants in 1955 into the "Second Socialistic Model City" with 70,000 in 1980. Young men and women from all over the country were attracted by relatively good wages and prospects of otherwise scarce modern flats – bringing the average age in the city down to 27. In the early 1960s, the city nicknamed "hoy" stood for a modern vibrant place. A committee of architects initially designed some innovative modern architecture and adequate urban structures. In order to satisfy the demand in flats, this approach was later abandoned and engineers developed an industrialized building process instead (eliminating the time consuming use of scaffoldings). The industrial complex took also the cultural sphere in charge: education of the young (own kindergartens, schools, polytechnics), music clubs, newly created holidays ('Tag der Frauen', 'Tag des Elektroarbeiters' while traditional ones vanished), vacation sites (owned, built and operated by the company), own newspapers. The day of the city was synchronized with the three shift rhythm of the industrial complex – including traffic logistics and shopping phases during the day.

In spite of the efforts and progress in certain areas, the overall economic and technological performance in the GDR fell behind the standards of world leading industrial nations. The per capita consumption of the GDR in primary and electrical energy was above that of the FRG, the productivity in the energy sector was in vast areas at about 45% of FRG. The GDR had to devote one third of its investment resources to the energy sector. On a state level, similar inefficiencies loomed in other product markets. Little resources remained to be dedicated to consumption – let alone investments into environmental protection (only 52% of the vast open pit lignite mines were re-naturalized, dust filters in Schwarze Pumpe went out of operation for the lack of spare parts). These malfunctions and continuously degrading material conditions together with the political reforms in the Soviet Union and Eastern Europe lead to the demise of the Socialistic State in 1989 after the 'peaceful revolution' and, subsequently to the reunification of divided Germany.

WEATHERING THE POLITICAL AND ECONOMIC STORMS OF 1989

Industrial restructuring followed with an unprecedented speed. Within a day monetary union (July 1, 1990) transformed economic conditions abruptly. The political system of the FRG pursued at the time of the reunification a radically liberal approach to the restructuring of the

nationalized industry of the former GDR. The dominant mind sets were 'no state enterprises', energy policy based on global fuel sourcing and a strict 'environmental protection' agenda. The state agency 'Treuhand' screened companies with a 'sell or close' approach (the initial 8.500 business entities were broken up to about 14.000 units, thereof 3,000 were immediately shut down, all remaining sold until 1994 except for 400 firms). At the same time, a wide program for environmental protection and recovery of polluted areas was rolled out.

This general picture is mirrored by the events taking place in the aftermath of reunification at the industrial site of Schwarze Pumpe. The immediate application of world market conditions and environmental standards implied an extremely fast shut down of noncompetitive production processes – such as the gasification process as a substitute for natural gas and lignite coke as substitutes for hard coal coke. This provoked a domino effect. The massive decline in industrial demand triggered itself an implosion of sales volume at otherwise competitive production units (for the industrial complex in Schwarze Pumpe total sales plunged to 42% from 1990 to 1992) and forced the legal entities to proceed quickly to massive lay off of staff (staff levels at 'ESPA', a sub-unit of the industrial complex: 15,016 in 1989, 12,640 in 1990, 9,694 in 1991 and 6,591 in 1992). Approximately 55% of the laid-off staff left for unemployment. Pollution levels at Schwarze Pumpe have decreased meanwhile dramatically: NO_x reduced by 61%, dust by 98%, SO₂ by 91% and CO₂ by 31% in the case of the new power plant with respect to the old power plants.

The impact of these dramatic industry transformations on the individuals and local communities are difficult to describe but easy to imagine. A strong emigration from the Lusatian region set in. Hoyerswerda, the former young and vibrant model city decreased since then its population by half – and is expected to converge close to its pre-1955 level at about 10,000 inhabitants in the future. In 2020, the average age is estimated to reach 54 years. The cities in the region have become cities of the elderly as many young, especially young women, leave. Social tensions have increased.

With the political and economic structures changed the culture: institutions such as schools, universities and spare time activities formerly organized by the industrial complex Schwarze Pumpe had to adapt. Former full day schools changed towards the half day school scheme of FRG without providing alternatives for the afternoon ac-

tivities. Even holidays and professional traditions were in some places abandoned and in others reintroduced. For instance, the medieval traditions of mining professions – the Sancta Barbara Day – have been reintroduced in the professional culture including traditional uniforms and songs in Schwarze Pumpe replacing the former 'Bergarbeitertag' of GDR times.

BUILDING FUTURE INDUSTRIAL HERITAGE IN A CONTEXT OF FURTHER EUROPEAN INTEGRATION AND INCREASING GLOBAL COMPETITION

Schwarze Pumpe industrial complex emerges a second time in its short history from a complete rewriting of its political borders and economic conditions (with reunification federal states reappeared and the border between Brandenburg and Sachsen cuts now across the industrial site complicating administrative processes). In 2004 Poland entered the European Union shifting Schwarze Pumpe from temporarily peripheral into a more central position within Europe.

At the site itself, the privatization process has regrouped the temporarily separated activities of lignite mines and power generation in the hands of Vattenfall – a state owned Swedish company with over 30,000 employees and an electricity production of about 170 TWh/a (indeed a remarkable trait of history as the assets passed from one political shareholder to another: from the GDR to the Swedish state). The technological capabilities in lignite fuels subsist as a part of Vattenfall's activities. The technological capabilities related to lignite gasification finally ceded operation in 2010. Various service activities of the former industrial complex continue as independent enterprises or as subsidiaries of larger service firms such as Siemens, ThyssenKrupp etc.

The systematic environmental clean-up and preparation of the site for new companies has started to bear some fruits. The municipalities of Spremberg and Spreewitz have been eager to attract new companies to the industrial site. An Austrian paper mill has opened two production sites and builds an industrial power plant in the coming three years. A Swiss utility company purchased remnants of the gasification plant and produces electricity from natural gas. A technology firm from Southern Germany has built a silicon factory and a production development centre for photovoltaic applications based on technology developed in the former Soviet Union. Schwarze Pumpe stands with this project as well as with Vattenfall's Carbon Capture and Storage technology (Oxyfuel-Pilote-

Plant) again at the frontier of energy related technologies and climate policies. The gradual transformation of open cast mines into a lake district will alter the character of the region both in terms of life quality and as a basis for touristic development.

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The Transformation of Chi-Ku Salt Field in Taiwan and the surrounding Landscape

Hsiao-Wei Lin
Bo-Chi Cheng

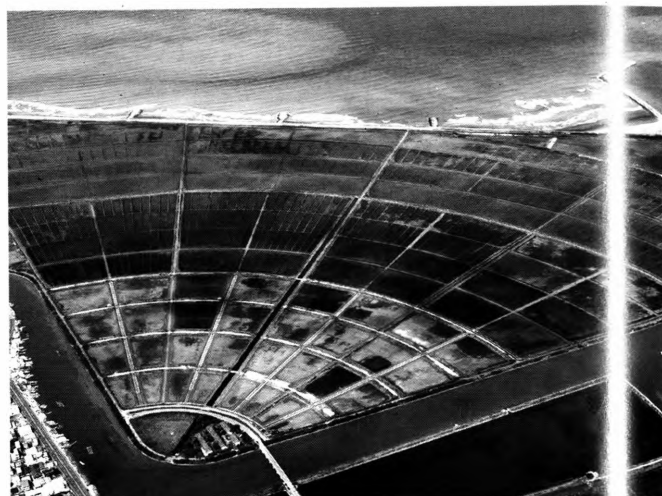
INTRODUCTION

In human history salt production has been an ancient industry. Wieliczka Salt Mine in Poland, and Arc et Senans Royal Salt Factory in France, are World Heritage Sites with distinctive associated cultural landscapes. Sea salt fields have been developed in many countries, and this paper will introduce Chi-Ku salt fields¹ in Taiwan, and it will elaborate on how the production of salt has affected the natural and cultural landscape. It will demonstrate how the closure of salt production has led to community development and ecological tourism in the original salt field landscape. The major issues of this paper are to understand how the integration of industrial heritage and cultural landscape has been deployed as a major tool to generate the development of Chi-Ku salt field and the surrounding neighbourhood and how the landscape has been transformed by human activities in this region.

RESEARCH METHODOLOGY AND READING CULTURAL LANDSCAPE

In order to understand the landscape transformation of Chi-Ku, the concept of cultural landscape has been deployed. Taiwan has progressively promoted works and related regulations regarding the conservation of cultural heritage in recent years. The Council for Cultural Affairs (C.C.A.) of Taiwan has proposed the concepts of "Community Empowerment", "Local Community Museum" and "Reuse of Deserted Space" and so on, which provoke and initiated a broad survey for the cultural and industrial assets of various public and privately owned properties. Moreover, the policy of re-using cultural heritage is gradually changing the landscape of city and countryside. In 2005, the renewed Cultural Heritage Preservation Act lists the 'Cultural Landscape' as an important category of cultural asset. However, as this is a diverse, complex, and relatively new field in Taiwan, there is difficulty and contradictions for people to identify the conservation boundaries, criteria, and potential reuse, in terms of the operational systems and appropriate regulations. In addition, there is often the debate that the conservation of cultural landscape would slow down urban development.

However, industrial heritage as an important type of cultural landscape which can ensure the recognition of 'the combined works of nature and man' by the elaboration of the production history, conservation and management of an outstanding cultural landscape, Chi-Ku salt field in Taiwan. This research aims at an analysis of the charac-



Chi-Ku salt fields in Taiwan (© author)

teristics of the conservation and regeneration of the cultural landscape.

Thus, the industrial landscape of Chi-Ku salt field is analysed from the point of view of cultural landscape and the adaptive reuse through production models and associated social factors. The major focuses are:

1. How is the landscape of Chi-Ku salt field transformed through economic activities?
2. How does the industrial heritage of salt production and its ecological perspective become the driving force for local community and rural development?

LOCATION AND THE PRODUCTION HISTORY OF CHI-KU SALT FIELD

Chi-Ku salt pans are located in Taiwan's southwest coast, which is a flat geo-depression. Taiwan's early modern settlement began in this southwest coastal region in the 17th century, and therefore its landscape has changed dramatically due to human activities, such as farming, fishing and salt production. The formation of Chi-Ku tidal land was created by the flooding of the Chan-Wen River. The development of the salt industry was introduced to Taiwan in 1680s and was one of the most important industries in this region. The advantages of Chi-Ku's natural environment for salt production are due to the dry climate, flat tidal land, increased formation of lagoons, salty soil and high salinity of the seawater. The development of salt industry can be divided into 3 periods:

1. Ching dynasty: During the Ching dynasty (1683–1895), there were 9 salt fields in Taiwan. Until 1887, the first

into Chi-Ku to improve the production and workers' lives, such as: a new salt field for machine operation, worker's accommodations, and so on. By 1987, all the salt fields had become machine operated. They finally closed all production in 2002.

PRODUCTION MODELS & INDUSTRIAL HERITAGE OF CHIKU SALT FIELDS

The remaining production artefacts and structures illuminate the context of people's work in the past. The technology of salt production has transformed the landscape.

1. Salt field structure: The planning and structure of salt-fields in Chi-Ku has 3 types:
 - Individual grid system – The salt fields are combined by individual grids. Each individual grid includes big and small evaporation pools and crystallization pools. The size for the tile paved grid is $377 \times 66 \text{ m}^2$ and for the soil paved grid is $360 \times 140 \text{ m}^2$.
 - Central grid system – The sea water is drained from evaporation pools to gathered crystallization pools by windmill or pump. The size is around $3000 \times 310 \text{ m}^2$.
 - Mechanical salt field – This planning is similar to central grid system but has improved facilities for



heavy machines, such as the red brick paving crystallization pools and banks.

2. Production artefacts: The major artefacts on site are watermills, windmills and later pumps for *transferring* sea water between salt pans. In addition, there are various tools for making and transporting salt, and machines to clean and repair salt pans.
3. Transportation: The salt used to be exported to Japan and abroad during the Japanese Occupation. Therefore, most of the salt fields had canals and simple harbours. Later, a salt train was developed, along the same lines as a sugar train. It is also used by local students as transportation.
4. Workers accommodation: Since 1952, Taiwan Salt Company established a company policy to improve the living standards of salt workers. 250 new accommodation units and 13 activity centres were built in different salt fields. Chi-Ku salt field also had new accommodation units and activity centre.
5. Related Facilities: Other important facilities include salt police towers, a power house, water gate and drainage system.
6. Surrounding fish farming: Fish farming in Chi-Ku area has a long history dated to 1733. It is still the major economic resource of this area. Milkfish and oyster farms dominate the landscape. They both are the



The salt train (© author)

representation of integration of natural character and human activity.

THE CONSERVATION OF CULTURAL LANDSCAPE AND THE DEVELOPMENT OF ECOTOURISM

A series of efforts to preserve this industrial and cultural landscape emerged after the closure of salt production in 2002. Firstly, in 1996, Taiwan Salt Company started a survey and collection of salt industry heritage. Then, the Salt Glory and Education Foundation were organized by the retired salt workers and their children in 1997. The survey result generated promoted the concept for Taiwan Salt Company to set up a newly built and modern display, Taiwan Salt Museum in 1998. The museum was managed by Taiwan Salt Company first, Tainan City Government in 2003, the Salt Glory and Education Foundation in 2004, and since 2005, Toong-Mao Resorts and Hotels. However, although this museum has a very high standard quality collection of salt industry heritage, the financial situation caused frequent changes of management bodies and an unreliable visitor program. The salt making tour doesn't run regularly. A gigantic salt mountain (20 m high) and



The salt mountain – a major tourist attraction (© author)

60,000 tones in weight) has been formed as a major tourist attraction.

As part of a natural evolution, the decline of the salt pan has become a rich resource for an ecological wetland. Chi-Ku area is now a Listed Important Bird Area by the Bird Lschaife International Organization.² The Black-faced Spoonbill Conservation and Management Center was set up in Chi-Ku Wetland in 2005.³ Various local communities have become involved in ornithological tours and also self-guided salt tours. The nearby community members of Sihcao village regularly run boat trip ornithological tours through the old salt transportation canal. In fact, the use of Chi-Ku tidal land for fish farming and salt field inevitably caused damage to the natural environment. However, the salt field has become a characteristic artificial wetland after the closure of salt production. Special mangrove forest, algae, shrimps, fish and water birds create a unique and rich natural character on this industrial landscape and have helped to promote this area to become the Southwest Coast National Scenic Area.

In addition to the broad salt fields, the old office buildings and workers accommodation of the salt field (some of them dated 1919) are preserved for community use. Two buildings are used for small exhibition rooms which display local salt making history and the conservation of water birds in this area. The integration of industrial heritage and ecological resource has been deployed as a major tool to generate the development of Chi-Ku salt fields and the surrounding neighbourhood.

Nevertheless, there is a recurring theme of dispute between various central and local authorities for the reuse of this industrial and natural heritage. The ownerships of various facilities are an unresolved and complicated issue. For example, the workers village, new Museum, and Salt Mountain are managed by three different authorities. The salt making tour is sometime arranged by local community. It would be helpful for visitors if there was an organized guided tour to link these elements of this rich salt industry heritage, to provide a better understanding of Chi-Ku salt field from past to present. Moreover, the ecological and environmental protection organizations are the most active groups in this area. Nevertheless, certain active heritage management on the salt fields should be continued in order to maintain the salt field landscape as it is gradually taken over by the wetland.

CONCLUSION: REGENERATION OF CHI-KU SALT FIELD AND REUSE OF CULTURAL LANDSCAPE OF TAIWAN

This paper provides valuable information about the transformation of Chi-Ku salt field and demonstrates to the world the development of an important industrial cultural landscape in Taiwan.

Through the case study of Chi-Ku salt field, we can see the transformation of the landscape of Chi-Ku salt field through different economic activities and policy. The intensive colonial policy expanded the scale and technology of salt production. It turned the Chi-Ku natural wetland from *fish farming* to become an artificial industrial site for salt making. Taiwan Salt Company became privatized and finished monopolized salt manufacturing in 2003. The monopoly policy of Republic of China enhanced the production and also secured the salt industrial heritage. The outstanding collection of salt industrial heritage, associate landscape, and Taiwan Salt Museum, are the major outcomes.

In addition, we also see the industrial heritage of salt production and its ecological elements become the driving force for local community and rural development. The Salt Glory and Education Foundation, the various ecological organizations, and local community groups, are developing adaptive reuse of the existing industrial and natural heritage and related culture. To be included in the Southwest Coast National Scenic Area might also be a good future for these heritage elements.

Chi-Ku Salt field has had a good start for its conservation of the industrial cultural landscape. More work can be undertaken to co-ordinate the different authorities involved to use related artefacts together to tell the whole story. *"... preservation is only part of industrial archaeology and its main thrust should be towards the recording of artefacts and structures and illuminating the context of people work in the past."* (Palmer & Neaverson, 1998).

Another issue is to ensure that we identify and respect the evolution of natural features into the industrial landscape. The ecotourism in Chi-Ku salt field is an inspirational result of the integration of nature and human activities. As Professor Peter Latz stated in his design work of Duisburg-Nord in Ruhr area, *"Let the nature take over it (industrial heritage) and find its balance."* While the Chi-Ku salt field gradually returns to its wetland function, there is reasonable maintenance of this impressive salt field, and this ensures the survival of this characteristic landscape while it undergoes sustainable development.

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The Bassin Minier du Nord-Pas de Calais, France – An Evolutionary Cultural Landscape

Massimo Preite

The candidacy of the "Bassin Minier du Nord-Pas de Calais" to be listed as a World Heritage site, in the category of "Evolutionary Cultural Landscapes", represents an innovative experience in more than one respect: in terms of its scale, its model of "conservation amid change", and its system of management. Each of these aspects alters our traditional conceptions of the landscape.

The size of the Bassin Minier challenges the custom of restricting the "landscape" to the visual horizon of the observer, and of viewing the landscape as a fixed image, bringing in more complex forms of understanding and interpreting its deeper structure. The involvement of the Bassin Minier in dynamics of modern social and economic changes marks a break with the static tradition of the "picturesque landscape": the reuse of elements of its heritage is part of the process of relaunching the economy and the local area, while respecting its identity. The model of management proposed for the landscape of the Bassin Minier is also a challenge, because it does not advocate any recourse to special administrative tools: the model envisages collaboration between all the existing tools of area management, at all levels, with them being turned into a system and optimized, and the collaborative definition of the aims of protection and conservation.

The exceptional nature of this landscape lies primarily in its scale. A central sector of the huge coal formation ranging from the Ruhr to Britain, via Belgium, the Bassin Minier is stretched out like a ribbon, 120 km long and 10 to 20 km wide. There is nothing arbitrary in the selection of this vast geographical area: on the contrary, it is determined by wholly objective reasons, of two kinds:

- First, by geological reasons. Specifically, the development of the mineral field determines here, on the surface, a "landscape unit" of a corresponding size. Geological determinants are set to have an influence for a long time yet to come: a return to hydraulic equilibrium (filling in the empty tunnels left by mining, thanks to underground water) is not anticipated before the year 2300. This means that, for some time to come, the inter-relations between what lies underground, and what lies above ground, will have to be managed across the entire area, and thus across the whole landscape;
- Second, by anthropic reasons, since the variety (which is never repetitious) of the mining facilities and habitat systems which have been developed, during mining activity, may only be appreciated on this scale. The

assemblage of evidence of mining activity which survives in the region between Valenciennes, where the history of the Bassin begins, and Bruay, help to draw up, according to the terms of the UNESCO Convention (1972), a "well-defined geo-cultural region" where one can read, in an integral way, "the evolution of human society and settlements under the influence of constraints, and/or of the advantages presented by their natural environment".

So, what are the particular features of this landscape, the characteristics which identify it in relation to other examples of a mining landscape, and, most of all, the aspects which justify its "exceptional universal value"?

Firstly, the "Bassin Minier du Nord-Pas de Calais" offers a 20th century industrial landscape, and thus an example "of that cult of recency" (Neil Cossons, 2000) which bears witness to an era which, to a certain extent, is also our own era. While there are few industrial landscapes on the list of World Heritage Sites, those shaped in the course of the 20th century are even fewer. Moreover, we are dealing with a landscape where it is clearly possible to recognize the stages in its evolution, one by one: the surviving pit headframes testify to the changes in extraction techniques; equally, the shape of the slag heaps is determined by the customs of each period. The 60 mining towns (70,000 living quarters) constitute one of the largest encyclopaedias, internationally, of types of housing for workers: from mining villages to housing estates, from garden cities to modern apartments.

One must not forget another quality specific to this landscape. There are landscapes which radiate, which can be defined as "exporting landscapes", or, if one prefers, "centrifugal landscapes": Blaenavon, where the "Thomas and Gilchrist" method perfected in 1878 (allowing the production of iron from phosphorous iron) spread over the world and became the basis of the modern steel industry; the mines of Cornwall, where a piece of machinery was created for exploiting deep mines (the "Newcomen's engine"), a technique which has spread throughout the world. By contrast, the Bassin Minier landscape is an "importing landscape" (a "centripetal" landscape), which has drawn on the most important innovative currents in technology and the habitat. The Bassin Minier is a landscape where history has been made by immigrant manpower (Polish immigration, for example), by the stationing of enemy armies during the two world wars, and by the resources (technical, financial, and labour resources) which had to be concentrated for reconstruction in the

post-war period (the "battle for coal"). It is a landscape which, like no other, is the bearer of a concentrated memory of the past, marked by the intangible values of remembrance which one attaches to the dramatic series of events which have marked its recent history.

While the History of the past has indeed entered the Bassin Minier, the area's candidacy for the World Heritage List is an opportunity, for elected representatives and other politicians, to see to it that this landscape becomes part of future history, too. This goal is the greatest challenge in its candidacy: if cultural landscapes, under the 1972 Convention, are "the combined products of nature and of man", the Bassin Minier landscape will also be a "combined product of conservation and evolution", in which heritage protection will be an opportunity for a bold project of regeneration of the local area and of its economy ("*regeneration through heritage*" to cite the urging made by Neil Cossons).

This "scenario" represents a "point of added strength" of the candidacy: a piece of heritage which attains the size and scale of a landscape demands a form of protection which will necessarily fail, if it aims solely to fix the "status quo". Landscape is a living organism: living organisms are protected by allowing them to live. This task means undertaking to highlight all the potential (to reinforce social identity and cohesion, to develop the local economy, and to modernize local society) which still lies hidden in a landscape, if that potential is not built upon and enhanced, by means of a project which is shared in, by all the players involved. The projection of the territory toward the future, and its nature as a "living landscape" "*which conserves an active social role in con-*

temporary society", are aspects which can be seen in the processes which have already been initiated across all the individual parts of the mining landscape. One may cite, as regards environmental aspects, the "Green Network" which has been conceived for reclaiming the local territory, and to change the image of the former black country; and also the highly innovative project involving the adaptation and conversion of slag heaps for leisure purposes (for example, the De la Mare slag heap, at Goriaux). Among mining towns, a certain number of "pilot towns" have been selected, so as to test, on a "real-life scale", the ability of the accommodation to evolve, while enhancing their heritage value. Larger mining sites are also involved in projects which give them cutting-edge functions, in a development strategy involving the whole Nord-Pas de Calais area: the site of Lewarde is the "interpretation centre" for mining history throughout the basin; Wallers-Arenberg is the subject of plans which envisage the creation of a regional cultural and tourism pole dedicated to the image, and technologies, of its numerical processing; at the Oignies site, there are plans to set up a music pole, while at Loos-en-Gohelle plans involve a theatre pole (Culture Commune), and activities devoted to sustainable development.

All these projects concern specific sites, and have been initiated by various different players, but their consistency lies in the general outline which the *Association Bassin Minier*, with the help of the *Mission Bassin Minier Unesco*, is currently drawing up for the candidacy of Nord-Pas de Calais as an "Evolutionary Cultural Landscape". The general project, which will need to combine the conservation and evolution of a mining landscape, finds its main support in the official undertaking which



Loos-en-Gohelle (photo: M. Preite)



Loos-en-Gohelle (photo: M. Preite)



Oignies (photo: M. Preite)



Wallers-Arenberg (photo: M. Preite)

the regional authorities and Agglomeration Communities entered into, on the occasion of the talks on December 13, 2007 at Wallers-Arenberg: on that occasion, emphasis was laid on the unanimity of all the Agglomeration Communities and municipal councils over the path travelled thus far, and on what remains to be done. These talks marked an important point, because they showed this collective participation in the process of official listing that was called for by the 1972 Convention. This participation is not found only in institutional spheres: indeed, one must not forget the presence of several players in the social and cultural sphere. These include: the "CPIE-Slag Heap Chain" association, whose aim is the implementation of a global policy of protection and conservation of slag heaps; the "Culture Commune" association, which devotes itself exclusively to the conservation of the intangible heritage, bringing together professional theatre companies and local people, and staging performances

around the themes of the memory and the history of mining; and the clubs set up at the invitation of the BMU association to carry out, on the scale of a municipality or an educational establishment, essential tasks of heritage enrichment. A large public of players, associations and clubs has mobilised, during these last few years, around the candidacy, which has drawn sustenance from and been perfected by, the contributions which it has received.

The third challenge concerns the criteria of management which need to be implemented for the protection of the landscape that is being put forward for listing. The challenge derives from the dramatic distance between the landscape unity of the territory concerned (a unity of culture, history and memory), and the division of the agents and tools that ought to be responsible for its management.

Thus, let us think about the multiple effects of this fragmentation on the landscape of the Bassin Minier:

- the gradual breaking up of property, which has followed the transferral of mining elements from mining companies to municipal authorities;
- the plurality of players involved: the state administrations (Drac, Abf), the bodies set in place to manage the end purpose of extraction (Girzom, Epf), two General Councils, eight Agglomeration Communities more than 100 municipalities, the Scarpe Escaut Regional Nature Park, the administrator of mining accommodation (Houses and Towns), etc.;
- the multiplicity of planning documents currently in force (Local Planning Schemes, territorial Cohesion Schemes, plans for the prevention of mining risks etc.) which can lead both to overlaps and to gaps between the various levels of planning;
- the heterogeneous nature of the elements which make up the landscape: industrial fallow land and slag heaps, mining towns (collective housing and amenities), mining sites, infrastructure, etc. These elements are subject to managers, regulations, and degrees of protection that are markedly different, and not always consistent one with another.

This splitting up of responsibilities and tools has not gone as far as to prevent the protection of the mining heritage. All the players involved have, in the critical post-mining phase, made considerable efforts to protect the mining heritage, and to enhance it. In this connection, one must recall, among other things, the role played by the State Ministry of Culture to secure recognition of the industrial

heritage in the region (1992), the efforts made by EPF to make safe headframes in the Bassin Minier, the purchase and conservation of the Oignies site by the Agglomeration Community of Henin-Carvin, and the state-region pact in 2000–2006, which brought in specific funding for reconversion, etc.

There has been great mobilization by bodies responsible for defending the mining landscape, which, even if this has taken place in the absence of an overall, consistent framework, nevertheless shows a great awareness of what is at stake in connection with the heritage of the Bassin Minier.

Faced with the task of conserving and developing one of the richest landscapes in terms of the number of remains of the former mining activity, the candidacy of the Bassin Minier for listing as a World Heritage Site is an opportunity to join together in a network, and to coordinate, as of now, the management and protection systems currently in force. A prior condition for this is that a *Heritage Development Scheme* is set in place, which must set out the aims, rules and forms of partnership, so as to form a federation bringing together the various individual players.

Nitrate Offices – Social and Cultural Oasis in the Atacama Desert

Maria Schöne

The Atacama Desert extends along the Pacific Ocean in the north of Chile until Peru. To pass through this vast area you need to cross more than 1,000 km. As it is the driest desert on Earth only very few living creatures have managed to adapt to the arid climate. Nevertheless there are constructions that point out different cultures, built by human beings in the middle of this bizarre landscape.

Primarily the Atacama Desert is known for its beautiful landscapes and its rich copper deposits. But it was a totally different material, which generated economic interest in this desert since the mid-19th century. Complete villages were constructed in the so-called "Pampa"; people settled and tried to make a living despite the hard climate. The reason for this: Nitrate, the White Gold of Chile.

Nitrate was already known to the "Atacameños", the natives of this inhospitable region. But only with a special method developed by the German chemist Thaddeus Hönke in 1809 the raw material became interesting for its commercial mining. Firstly nitrate was used for the production of gunpowder. But since the discovery of the meaning of mineral fertilizer by Justus von Liebig in 1840, the raw material was used more and more for the production of fertilizer and was exported worldwide.

The huge demand for natural fertilizer led to the construction of more than 130 Nitrate offices in the middle of the Atacama Desert. Apart from the industrial constructions they had to build houses for the workers and their families due to the missing infrastructure. These artificial oases were equipped with all necessary social services like school, church, purchase hall and hospital on the one hand and with cultural facilities like theater, dance hall and sports fields on the other hand, which allowed them to enjoy independence and autonomy to develop all aspects of life. Complete villages came into existence, and their inhabitants gave birth to the singular "Pampas Culture".

The "island like" life concerned primarily to the worker families, which had no possibility of leaving the nitrate towns due to the payment with "fichas" (artificial money which was only valid in the respective work settlement) until the year 1922. The social classes were strongly separated – so the higher employees and administrators, often Europeans or Americans, lived luxuriously according to the European style, whereas the worker families coming mainly from the south of Chile, Bolivia or Peru lived under the simplest conditions. The social differences

didn't turn out only in the furnishings but also in the cultural offers, in different sporting activities or in the school education.

The pampas culture was marked by the language specialized on industrial processes, by the special clothes style due to the climate and by social activities like music, sports and literature of the "Oasis inhabitants". However, the nitrate industry did not only mark a new life culture; the complete development of the economically strong north of Chile took place thanks to the nitrate. The foundation of the larger and smaller towns, the construction of the railroad junction, the ports and hydroelectric dams as well as the development of the infrastructure dates back to the discovery of this raw material.

The nitrate industry caused incidents of national and international importance. Indeed: the military conflict from 1879 to 1884 (the Pacific War) didn't let wait for itself long time and tangled Chile up in a fight against Peru and Bolivia. This part of the history not only gave the country numerous episodes of heroism but also consolidated the national sovereignty on the extensive territories of Tarapacá (near Iquique) and Antofagasta. These acquisitions secured the world monopoly on natural nitrate for Chile.

Looking from another viewpoint, the farmer became a proletarian in the saltpeter offices, breaking the modest social structure of aristocracy and farmers. The presence of the proletarians which felt pressurized by the troubles derived from the cruel behavior of the industrialists, almost exclusively foreigners, caused new polemics and opened the way for social discussions. The formation of common worker associations and the Chilean federation of workers later led to the foundation of the unions.

With force, passion and popular support the Democratic Party was formed before the end of the 19th century, and at the beginning of the 20th century, the Socialist Labor Party was organized, followed by the organization of the Communist Party. Perhaps the inhabitants of the "Pampa" did not notice the changes and the transformations that the nitrate industry caused in the country. The "pampinos" loved their small piece of desert and filled its territories with humanity.

But nitrate was not only the economic main beam for Chile. The country lived on this miraculous substance which fertilized the fields in the countries of Europe, Asia, Africa and America. Nitrate, so to speak, allowed an am-

pler and better diet of many citizens worldwide and with the significant increase of the agricultural productivity it not at least also contributed to the industrialization. In this respect, significance of world rank must be attached to the nitrate industry.

But the period of glory was only of short duration. Between 1907 and 1912 Carl Bosch and Fritz Haber developed the chemical high pressure synthesis – the fundamental process necessary for the production of fertilizer and explosives and already in 1914 the Germans built the first nitrate factory, where they could produce gunpowder for the First World War in sufficient quantities. This was the beginning of the end of the Nitrate Era. Within the following years in the first half of the 20th century the nitrate industry was repeatedly heavily hit by domestic policy crises, worldwide economic crises and wars. Bit by bit the nitrate offices had to put out their fires. Unemployment was the consequence: More than half of the 60,000 workers were dismissed.

Almost overnight the lively culture oasis turned into ghost towns and today there is only one fully operative. What remained are ruins of the past flourishing industrial and cultural life, whose traditions remain very much alive and present up to this day. But most of the settlements are falling into oblivion and the desert is recapturing the oasis.

Nonetheless there are efforts to preserve the industrial patrimony. Chacabuco, which beside of the world heritage sites Humberstone and Santa Laura is one of the best conserved former nitrate offices, shall serve as an example.

CHACABUCO

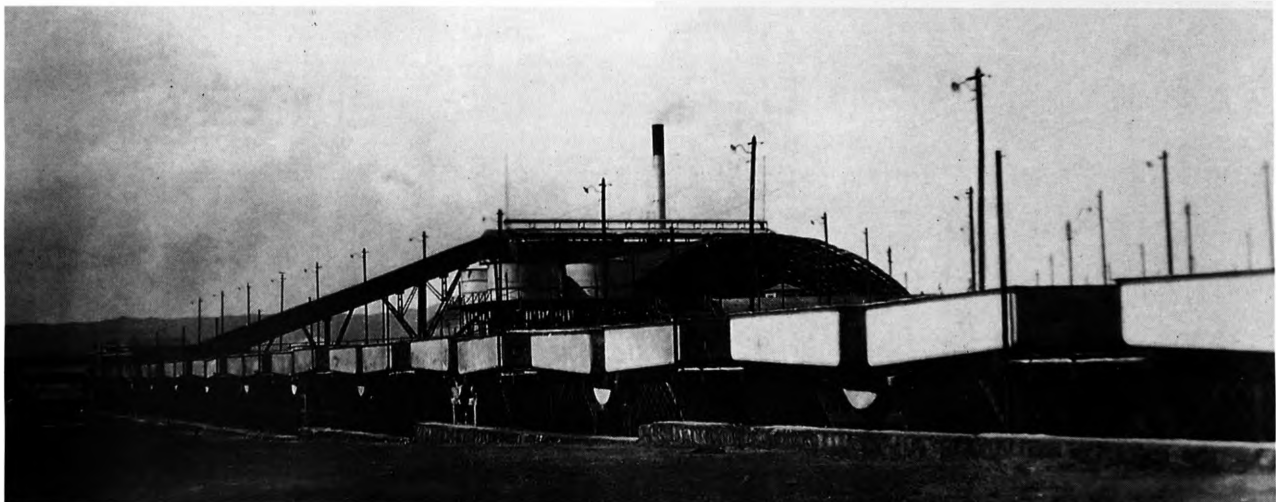
Chacabuco is situated in the Central Canton, 100 km northeast of Antofagasta. Erected between 1922 and 1924 the construction falls already in the time of the artificial nitrate. Even worse was the inner political situation in Chile, when the president Arturo Alessandri Palma left the country after a military coup in 1924.

Despite these circumstances the English company The Lautaro Nitrate Co Ltd. put their plans into effect and built this nitrate town as an example of modernity as much in its constructions and equipment as in its life and social organization.

Chacabuco stands out for its complete urban facilities that made the self-sufficiency possible. Indeed, it is a little town that counts with all the necessary conditions



Theater of Chacabuco in 1925 (© author)



General view of the nitrate factory Chacabuco 1924 (© author)

to accommodate a population of around 6,000 people: hospital, church, hotel, school, grocery store, market, gymnasium, swimming pool, soccer field, theater and a public square. It was the largest nitrate town with the production system "Shanks". The machinery was implemented to produce 15,000 metric tons of nitrate, even though it only produced between 8 and 10 tons a month. On average, caliche with a nitrate content of 18% was processed. The final product was exported from the ports in Antofagasta and Mejillones.

The closure of the nearby factories allowed extracting selected "caliche". So the deposits of the José Santos Ossa, Agustín Edwards, Aurelia, Carmela, Ausonia y Puelma Offices were exploited. This way Chacabuco became the headquarters of the Lautaro Nitrate Co. Ltda., from where they administrated all the other nitrate offices owned by the same British company.

But the technological obsolescence – the new production system "Guggenheim" had been already experienced successfully in the nitrate office "North Coya", soon called "Maria Elena" – and mainly the Great Depression, prevented "Chacabuco" to economize profitably, stopping its operation in 1938.

Once assumed the impossibility of the reactivation of the nitrate production in 1945, its dismantling started. In 1968 the owners sold Chacabuco to the Chemical and Mining Society of Chile (SOQUIMICH).

In 1971 the Ex-Nitrate Office Chacabuco was declared National Monument. This was the first step for the preservation of this enormous testimony of the industrial development of nitrate in Chile and to preserve the memory of the way of life in those days.

Shortly after the military coup in 1973, the armed forces started using the isolated location of Chacabuco as a camp for political prisoners. Those men, coming from all over Chile and different social classes, filled Chacabuco with new life, art and culture until it was completely abandoned in 1974.

Later on, since 1990 to the present, the Ministry of National Patrimony became the proprietor of the Ex-Nitrate Office Chacabuco.

In 2003 the Association "Corporación Museo del Salitre Chacabuco" was founded and since then has been engaged to administrate and develop a uniform plan for its

management in a long term concession. The main objectives of the charitable organization are the preservation, recovery and distribution of the cultural heritage Chacabuco. The canalization and harmonization of the different efforts for its restoration and establishment of a culture – and tourism center shall make possible the revival of the National Monument Chacabuco.

For the past few years now, the "Association Chacabuco" has tried to breathe new life into this ghost town and to turn it into a modern cultural oasis. In a region largely determined by mining industry, it is very important to point the way to the future and to re-connect past and present. It is essential to build opportunities for the future of Chacabuco that will make it more than just a museum and a tourist attraction. The idea is to establish an identity object in a region where the feeling of identity is missing among the inhabitants since most people come only for working in the mines.

Via different action lines the association primarily wants to arouse interest in the history of the place and in this way generate respect and consciousness concerning our responsibility for future generations. Only those who respect the history and its importance will contribute to the preservation of our cultural heritage.

As in the past, Chacabuco was enriched by cultural events like film presentations, operas, dance performances and sports competitions, now special interactive offers for tourists, events like theater performances or concerts and different exhibition want to tie to these customs and at the same time give a modern interpretation in order to revive the tradition and to use this fascinating ambience and its historical value in new and innovative ways.

Of course the putting into action of the ideas is connected to great difficulties which on the one hand result from the geographical situation and on the other hand from sociopolitical problems.

Chacabuco is located approx. 100 km away from the next urban centers in an earthquake active zone in the middle of the Atacama Desert. 90% of the houses are built with clay bricks and react very severely to frequent seismic movements. But the urgently necessary conservation measures fail primarily because of the missing financial resources. In addition, size and localization make it difficult to hire qualified and responsible protection staff to make sure that the national monument is not used any more by unscrupulous

people as a material source. This shows once more the necessity to create identity values.

Dedicated persons want to try to regain the population for Chacabuco's maintenance with regular cultural events. But the missing infrastructure – the place neither is connected to the regional power supply system, nor is there a direct bus connection – makes every kind of event very expensive. It seems to be a cycle, which only can be broken through when all authorities cooperate and political interests are subordinated.

Despite of the mentioned difficulties the association Chacabuco could reach some progress and carry out several events. The most important project in the last time was the acquirement of a master plan for Chacabuco. The Master Plan is constituted in the "navigation map", that harmonizes the conservation and viability; that combines the conservation plan, with a good management and possibilities of sustainable development, raised for a period of specific time, presenting/displaying guidelines in relation to the needs and possibilities of the site and considering its protection, conservation and value.

With the appropriation of the master plan it will be possible to canalize and concrete step by step the different interests in using this ghost city. The main objective is the conservation and structural consolidation of the ruins without going back to the year 1924. Freezing the ex-nitrate office does not allow to keep it alive and a complete reconstruction erases the history written between the ruins.

In consequence the first steps for Chacabuco are its conservation and restoration of selected buildings. But a living future of this industrial heritage site and its transformation in a modern cultural oasis lays in the combination of both cultural and education programs and economic and scientific programs.

A4



Chacabuco 2009 (photo: Corporación Museo del Salitre Chacabuco)



Fiesta Pampina, Chacabuco 2008 (photo: Corporación Museo del Salitre Chacabuco)

A5 Power Stations: Technology and Society

Organizer: Friedhelm Henseler (Germany)

Electrical power is the foundation of energy for our global society's economy. Since the beginning of the industrial age, power stations have been built to generate energy. Technological proceedings changed through time; and the plants became largescale. Since the 1960s, industrial enterprises strive to take into account ecological aspects in the processing of technologies. Fossil fuels, nuclear energy and renewable energies follow different economic and ecological logics. The decision about which power generating technology is engineered, put up and publicly supported is mainly a political one. As such, it depends on values and ideologies that predominate a society during a specific time period. Power plants of all types can therefore be interpreted as an expression and monument representing a political culture of a society that changes through time.

This session aims to discuss power stations in the cultural context of energy and environmental policies and asks for papers on the technology of power stations and their building structure, on environmental movements and technologies and on the history of ideas related to energy policies.

Architecture and Electricity – Power Stations between
1885 and 1945. Industrial Construction as an Expression of Culture and Politics

Elke Mittmann

1928 schrieb der Architekturkritiker Robert Breuer im Kunstblatt über eines des damals größten Kraftwerks Deutschlands: „Aus dem Bau des Großkraftwerkes ist der letzte Rest des Anthropomorphen verschwunden, es blieb nur die Rechnung des Technikers übrig. Das Sichtbare ist die Projektion des Betriebes und dessen Ratio.“

Der Autor beschreibt das Werk als eine Art Einheit von Architektur und Technik – die bauliche Gestaltung als Ausdruck und Entsprechung der inneren Technologie des Werkes. Erstmals in der Geschichte des deutschen Kraftwerksbaues wird ein Werk derartig beschrieben. Eigentlich erstaunlich, wenn man bedenkt, dass die Elektrizität zu diesem Zeitpunkt seit bereits 30 Jahren immer mehr zum zentralen wirtschaftlichen Motor geworden war und man hätte vermuten können, dass die Architektur hierauf schon längst hätte Bezug nehmen können.

Ausgehend von der industriellen Bedeutung der Elektrizität und dem durch sie eingeleiteten Zeitalter der Zweiten Industriellen Revolution stellt sich nun die Frage, ob also die eigentlichen Produktionsorte der Elektrizität von Beginn ihrer Entwicklung an bereits eine dieser technologischen Innovationsleistung entsprechende baukonstruktive und baukünstlerische Gestaltung erhielten? Gelang es den Architekten, mit der Gestaltung der Kraftwerksbauten ein baukünstlerisches Abbild des speziellen Charakters der Elektrizität zu schaffen? Welche Rolle spielten dabei kulturelle und politische Aspekte?

Die folgenden Ausführungen werden sich an den drei maßgeblichen technologischen Entwicklungsschritten im Kraftwerksbau orientieren. Eine erste Phase (1885–1903) ist gekennzeichnet durch zahlreiche Experimente in technischer sowie in baulicher Hinsicht. Da auf keine konkreten Vorgänger Bezug genommen werden konnte, musste das Kraftwerk aus dem Geflecht unterschiedlicher Parameter, die sich selbst nur prozesshaft herauskristallisierten, entwickelt werden.

Die Überlegung, dass ein Kraftwerk als einheitlicher Organismus begriffen wird, in dem Technik, Konstruktion und bauliche Gestaltung eine synthetische Einheit bilden, wird erst in der darauf folgenden zweiten Phase realisiert, die sich bis 1919 erstreckt.

In der letzten Phase, die zeitlich zwischen 1920 und 1945 anzusiedeln ist, wird das Prinzip des Kraftwerkes als einheitlicher Organismus weiterentwickelt.

1. PHASE: EXPERIMENTE UND EMPIRIE

Eines der wenigen Vorbilder, die als ein Beginn des Kraftwerksbaues hinsichtlich der Technik und der Raumdisposition als beispielgebend gelten konnten, war ein Werk in der Pearl Street in New York – das wohl erste öffentliche Kraftwerk der Welt – das bereits 1881/1882 nach den Plänen des amerikanischen Ingenieurs Thomas Alva Edison errichtet worden war. Edison galt damals neben seiner Bedeutung für die Lichttechnik als Pionier für die Kraftwerksentwicklung. Aufgrund der New Yorker Grundstückspreise und der Notwendigkeit, den begrenzten innerstädtischen Raum maximal auszunutzen, wählte Edison eine vertikale Anordnung des Produktionsablaufes in Stockwerken. In den Kellerräumen waren die Dampfmaschinen untergebracht. In den folgenden Stockwerken standen die Dampfkessel, Vorwärmer und Kohlenbehälter, so dass der Produktionsablauf von oben nach unten organisiert war.

Übertragen ließ sich dieses System, infolge der bedeutenden Gebäudehöhe von nahezu 50m und der technischen Probleme wie der Feuergefährlichkeit, nur bedingt auf europäische und deutsche Verhältnisse.

Allerdings wurde die Vertikalanordnung des Produktionsbetriebes in veränderter Form übernommen. Die erste deutsche Zentrale war 1885 in der Berliner Markgrafenstraße dergestalt errichtet worden. Zudem musste sich die Berliner Elektrizitätswerke AG, eine 1884 gegründete Tochtergesellschaft der AEG, den entsprechenden innerstädtischen Parzellengrößen mit dem Bau ihrer Kraftwerke unterordnen, so dass auch von dieser Seite aus technisch und wirtschaftlich ausgerichtete Raumdispositionen für diese Werke nicht entwickelt werden konnten. An eine Errichtung der Werke außerhalb der Städte war nicht zu denken, da in den 1880er Jahren Gleichstrom produziert wurde, der nur verlustreich über wenige Kilometer transportiert werden konnte. Gestalterisch traten die Werke nicht hervor. Die Bauaufgabe Kraftwerk war noch nicht entdeckt. Meistens wurde straßenseitig vor das Werk das Verwaltungsgebäude im Habitus eines kombinierten Wohn- und Geschäftshauses errichtet.

Nachdem sich in Deutschland insbesondere nach der 1. Elektrotechnischen Ausstellung in Frankfurt/Main die Wechselstromtechnik durchsetzen konnte, entstanden zahlreiche Werke, die nun in den Industriearealen der Städte errichtet werden konnten. Die Wechselstromtechnik ermöglichte die Weiterleitung des Stromes ver-

lustarm über weite Strecken hinweg. Das war ein bedeutender technologischer Fortschritt. Die Gebäude konnten erstmals außerhalb der Innenstädte errichtet werden, so dass bereits adaptierte Grundrisse entwickelt wurden. Der horizontale ersetzte den vertikalen Produktionsablauf. Die Parallelanordnung der Gebäude setzte sich durch. Zudem wurden die Gebäude nicht länger in den hinteren Parzellen errichtet, sondern bestimmten zunehmend, durch ihre wachsenden Dimensionen ihr unmittelbares Umfeld. Monumentalisierung und Hierarchisierung der Funktionseinheiten (Maschinenhaus, Kesselhaus) beherrschten die Gestaltung, ohne jedoch die Technizität des Gebäudes offen darzulegen. Gestalterisch konjugierten sie alle möglichen Schattierungen der Neostile wie damals im Übrigen der Industriebau insgesamt. Oftmals waren lediglich die Hauptfassaden als Schaugiebel verkleidet.

Es zeigt sich also, dass in dieser ersten Phase des Kraftwerksbaues in Deutschland die Entwicklung eines speziellen Bauprogramms, in dem funktionelle, technische und architektonische Aspekte miteinander verbunden werden sollten bis zur Jahrhundertwende unbedeutend blieb. Durch den Bezug zu etablierten Bautypologien, verbunden mit der Verwendung einer Vielfalt historischer Stilisierungen, sollte der Kraftwerksbau als zunehmend stadtbildbeherrschendes Element gestalterisch unterstrichen werden, was auch aus werbestrategischer Sicht zu einer größeren Akzeptanz der noch jungen Elektrizitätsindustrie in der Gesellschaft führen sollte.

2. PHASE: SYSTEMATISIERUNG UND ORGANISATION

Seit 1905 entstand erstmals in der Elektrizitätsgeschichte das Paradigma einer technisch wirtschaftlichen Projektierungslehre. Ihr Erfinder, der von der AEG seit 1902 in leitender Position beschäftigte Ingenieur Georg Klingenberg, hat für dieses entscheidende Entwicklungsmoment, das eine neue Kraftwerksgeneration zur Folge haben sollte, eine zentrale Bedeutung. Erstmals wurden unter ihm alle Vorgänge im Kraftwerk vom Kohlentransport bis zur Energieübertragung systematisch erfasst. Mit Klingenberg's Bestrebungen setzte die Entwicklung eines neuartigen Projektierungsvorganges ein. Erstmals wurde auch der architektonischen Gestaltung eine entscheidende Rolle zuerkannt. Als wesentliche technologische Voraussetzung für Klingenberg's Überlegungen galt die Einführung der Dampfturbine um 1900. Diese neue Technologie veränderte das Verhältnis der einzelnen technischen Transformationsprozesse zueinander grundlegend.

Nach verschiedenen Elektrizitätswerken, die von der AEG für die südafrikanischen Goldminen errichtet worden waren, gelang es Klingenberg 1909 den Prototyp einer neuen Kraftwerksgeneration zu entwickeln: das Kraftwerk Heegermühle bei Eberswalde. Das Werk wurde nach einem Funktionsdiagramm entwickelt, berechnet nach dem für die Produktion geringsten Reibungsverlust. Hierauf aufbauend entwickelte Klingenberg eine spezielle Raumdisposition, nach der die einzelnen Funktionseinheiten des Werkes angeordnet waren. Hiermit entstand ein Grundriss, der für nahezu 2. Jahrzehnte wegweisend für den Kraftwerksbau war. Das Kesselhaus stand nun senkrecht zum Maschinenhaus. Das Schaltheus erhielt ein eigenes Gebäude. Diese Anordnung war als Funktionseinheit gedacht, die nahezu beliebig vergrößert werden konnte.

Zur Umsetzung bedurfte es der Zusammenarbeit unterschiedlichster Spezialisten. Deshalb wurden technische, konstruktive und architektonische Aspekte von Beginn an als eine Planungseinheit angesehen – eine Innovation im Industriebau insgesamt. Klingenberg schuf eine Organisationsstruktur in der AEG – die Abteilung für den Bau von Centralstationen, die in verschiedene Sonderabteilungen differenziert, die unterschiedlichen Teilbereiche zur Realisierung eines Kraftwerkes ausführte. In dieser Abteilung beschäftigte Klingenberg seit 1906 zwei Architekten: Werner Issel und seinen Bruder Walter Klingenberg.

Ausgehend von Klingenberg's 1909 aufgestellten Richtlinien für den Kraftwerksbau, entwickelten die Architekten einen Gestaltungsansatz, der den Versuch darstellte, eine bauliche Übersetzung der inneren Technizität des Werkes zu schaffen. Die Gliederung der Bauten entsprach den einzelnen technischen Funktionseinheiten, was jeweils zu einer baulichen Individualisierung führte. Dabei wurde meist das Kesselhaus in Eisenfachwerk realisiert und Bauten wie Maschinenhalle und das Schaltheus in Ziegelmauerwerk. Der baulichen Ausführung kam somit eine kommentatorische Aufgabe zu, die die einzelnen Funktionseinheiten nach außen hin übersetzte.

Allerdings erwuchsen die Gestaltungsansätze nicht nur aus der Konstruktion und Bauaufgabe. Dazu trat ein weiteres Geflecht von Einflussebenen:

Insbesondere der 1904 in Dresden gegründete Deutsche Bund Heimatschutz übte bis zum Ersten Weltkrieg eine bedeutende Rolle auf die architektonische Gestaltung von

Industriebauten aus. Die Forderung nach der architektonischen Integration der Industriebauten ins Landschaftsbild, verbunden mit der Verwendung regionaler Bautraditionen, wurde von zahlreichen Unternehmen umgesetzt. So zum Beispiel orientierte sich die Gestaltung des um 1905/1906 errichteten Werkes in Bad Nauheim gemäß den Ideen des Deutschen Bundes Heimatschutz an regionalen Salinenbauten aus der Zeit um 1800. Die AEG, deren Büro für den Bau von Centralstationen Mitglied in dieser Vereinigung war, suchte baulich diese damals als reformerisch verstandenen Tendenzen in ihren Kraftwerken umzusetzen.

Die Ideen des 1907 gegründeten Deutschen Werkbundes galten als weitere zentrale Einflussebene. Mit der Forderung nach der Verbindung von Kunst und Industrie sollten nicht nur Gebrauchsgegenstände eine qualitative und der industriellen Kultur gemäße Gestaltung erhalten, vor allem auch die Industriearchitektur.

In diesem Kontext hatte die AEG den Künstler und Architekten Peter Behrens als künstlerischen Beirat für sich verpflichten können, um die gesamte Produktpalette – vom Teekessel über die Dampfturbine bis zum Kraftwerk – dem Werkbund gemäß künstlerisch veredeln lassen. Die AEG Kraftwerksbauten orientierten sich u.a. an der von Behrens für die AEG realisierten Industriebauten. Neben dem von Behrens verwendeten neoklassizistischen Formenvokabular schien auch das System des „linearen Rahmen- und Konturenstiles“, wie Kurt Asche die Außengestaltung der 1905 von Behrens errichteten Kunsthalle auf der Nordwestdeutschen Kunstausstellung in Oldenburg bezeichnet hatte, im AEG-Kraftwerksbau in Architektur übersetzt. Hierbei basierte das Fassadensystem beispielsweise der Kraftwerke Gersteinwerk bei Herne (Westf.) aus geometrischen Lineamenten, die sich aus Lisenen, Pfeilern, Rundbögen, vertikalen Fensterbändern etc. zusammensetzen. Das bedeutete für die AEG-Kraftwerksarchitekten, dass sie trotz eng gesetzter Richtlinien eine gestalterische Spannweite entwickeln konnten, die sich beliebig oft variieren ließ und zu immer neuen Lösungen führen konnte, hierbei aber dennoch ein einheitlicher Gestaltungsansatz erkennbar blieb. Selbst bei Werken, die in Dimension und Komplexität die hier bereits genannten Werke noch überboten, wie etwa bei dem 1915/1916 von der AEG errichteten Kraftwerk Zschornewitz bei Bitterfeld kamen diese Gestaltungsansätze zu Umsetzung.

Abschließend lässt sich für diese 2. Phase feststellen, dass analog der fortschreitenden technischen Perfektionierung im Kraftwerksbau auch eine entsprechende

Architektur hierfür entwickelt wurde, die letztlich in ihrer stereometrischen Klarheit einen Anfang dafür zeigte, wie eine dem Inhalt entsprechende Architektur aussehen könnte.

3. PHASE: RATIONALISIERUNG UND VERWISSENSCHAFTLICHUNG

Nach 1919 stehen zunehmend moderne wirtschaftliche und technische Errungenschaften wie Mechanisierung und Rationalisierung im Mittelpunkt. Als grundlegende technische Neuerungen galten die Kohlenstaubfeuerung sowie die automatische Kesselregelung. Das führte zu Veränderungen in der Raumdisposition und den Größenverhältnissen. Durch die Steigerung der Stromproduktion nach 1924 wurden die Dimensionen der Zschornewitzer Anlage noch übertroffen. Der erste Höhepunkt dieser Entwicklung in Deutschland war der Bau des eingangs erwähnten Kraftwerkes Klingenberg. Durch die technische und konstruktive Innovationsleistung dieses Werkes setzte es nach seiner Fertigstellung 1927 auch weltweit neue Maßstäbe. Es schloss technisch und architektonisch eine Entwicklungsreihe der AEG ab.

Zu dieser Entwicklungsreihe zählten insgesamt auch Kraftwerksbauten der Firma Siemens wie beispielsweise das 1924 nach dem Entwurf von Hans Hertlein realisierte Werk Fortuna II bei Köln.

Als Weiterentwicklung zu diesen Werken sollte das maschinelle Konzept nun die gesamte Anlage durchziehen. Das Werk sollte in Architektur und Technik gemäß dem System einer geschlossenen Maschine funktionieren.

Der Grundriss des Berliner Kraftwerkes Klingenberg nahm das bekannte Schema der Vorkriegswerke auf. Der im Grundriss schon sichtbare Aspekt äußerster Klarheit, Übersichtlichkeit und Einfachheit prägte auch die konstruktive Ausführung des Werkes. Die Montage sollte schnell und rationell ausgeführt werden können, so dass ein Großteil der Bauten in Stahlkonstruktion mit Klinkerausfachung und -verblendung realisiert wurden. Die gigantische Menge von 20.000t Stahl wurde hier verbaut. In fast allen Gebäudeteilen kamen beispielsweise Steifrahmenbinder in Nietkonstruktion zur Umsetzung. Außerdem sollten Kessel und Schornsteine aus Ersparnisgründen konstruktiv miteinander verbunden werden.

Die bereits genannten Gestaltungsansätze der vorherigen AEG-Kraftwerksbauten wurden in diesem Werk weiter-

entwickelt umgesetzt; jede Funktionseinheit unterschiedlich herausgebildet.

Die Architektonisierung der Baukonstruktion zeigte sich insbesondere anhand der Kesselhäuser, des Turbinenhauses und der Kohlenmahanlage. Bei Kessel- und Turbinenhaus strukturierte das Wechselspiel zwischen Klinkerausfachung, Eisenfachwerk und Fenstern das Ensemble. Aus dem konstruktiven Gerüst der Kohlenmahanlage entstand ein weit hin sichtbarer charakteristischer Baukörper. Bemerkenswert war, dass die konstruktive Rohform und die zu Volumen und Flächen gestaltete Konstruktion in einem Baukörper sichtbar wurden. Weitere gestalterische Eindrücke, die das Kraftwerksensemble hinterließ, war das spezifische Schaffen von Raumbezügen und Sichtachsen; die letztlich den Blick leiteten und neue Symmetrien und Blickrichtungen und einen inneren Zusammenhang des Ensembles schufen.

Die Einheitlichkeit, Sachlichkeit und Klarheit, die für den Außenbau galt, durchzog wie ein roter Faden weite Teile des Gebäudes auch im Innenbereich. Die am Außenbau bemerkenswerte Auseinandersetzung mit den zeitgenössischen Fragen der Materialästhetik des Backsteins kam auch im Innenbereich zur Ausführung.

Dieser kurze Einblick in die vielschichtige deutsche Kraftwerksarchitektur zeigt, dass vor dem Hintergrund der eingangs gestellten Fragen die Architektur der Elektrizitätswerke nach 1909 gestalterisch nicht ausschließlich rationalen Anforderungen folgte.

Aus dem Spannungsgeflecht zwischen einer neuen Auseinandersetzung mit Architekturgeschichte und den ingenieurtechnischen und baukonstruktiven Parametern in Verbindung mit damaligen Architekturdiskussionen und firmeneigenen Repräsentationsansprüchen, hatte sich bei der AEG eine spezielle Kraftwerksarchitektur entwickelt. Hierbei avancierte das Zweckmäßige zu einer neuen abstrakten Architektursprache, die nun sinnfällig, durch den Fokus und die Reduktion auf die Grundelemente der Gestaltung in einen baukünstlerischen Ausdruck übersetzt wurde. Funktionalität, Zweckmäßigkeit rekurrten nicht ausschließlich auf unmittelbare technische Aspekte. Letztlich ließe das die Interpretation zu, dass das gleichmäßig Präzisionshafte der Maschinen und der Stromproduktion hier gestalterisch in Architektur übersetzt wurde. Diese Form gestalterischer Zweckmäßigkeit, ja Apparathaftigkeit, bestimmte nachfolgende Kraftwerksbauten maßgeblich.

The Power of Scotland – From Illumination to Enlightenment

Miles Oglethorpe
Miriam McDonald

INTRODUCTION

In the more developed world where consumer society is well-established, day-to-day necessities such as electricity tend to be taken for granted, despite greener political agendas and the promotion of climate-change issues. When a switch is turned on by a consumer, little if any thought is given to where the electricity supply comes from or how it is generated. It is not surprising therefore that, with a few prominent exceptions, the buildings and plant responsible for generating electricity have not attracted much interest in recent decades, many being swept away by a tide of progress as the technologies of generation and distribution have evolved, and development pressures have grown.

Against this background, the two bodies responsible for the protection and recording of the built heritage in Scotland, Historic Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland, are trying to ensure that the historic importance of the electricity industry is properly recognised. This has involved initiatives to save important archives, field survey, and the selection of key sites for statutory protection. The purpose of this paper is to provide a summary account of this work in the context of a short history of electricity generation in Scotland.

BRIEF HISTORICAL BACKGROUND TO ELECTRICITY GENERATION IN SCOTLAND

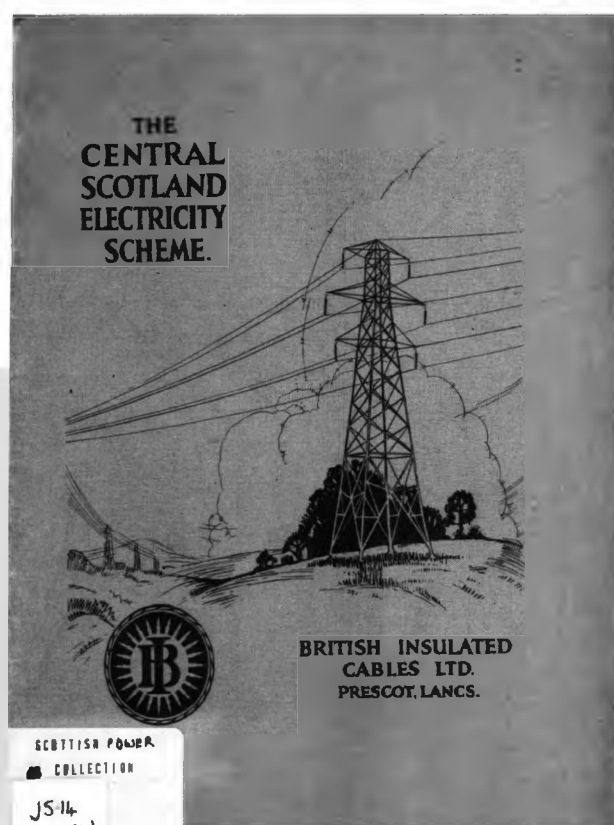
Large-scale electricity generation in Scotland dates back to the late 19th century, and although there were a num-

ber of independent pioneering industrial users, such as in the coal-mining industry (Oglethorpe, 2006, p.12) and aluminium smelting, most activity centred on municipal authorities. As was the case with gas and water supplies, as demand grew there was an increasing need for co-ordination both to ensure security of supply and to enforce safety and standards.

Taking Glasgow as an example, which had grown to become 'The Second City of the British Empire' by 1914 (Hume, 1974): electricity generation had evolved from the establishment of a number of small private companies, each with different voltages and frequencies. From 1890, The Corporation of the City of Glasgow (the City's local government) established its own supply and gradually bought over (municipalized) the private companies, establishing a uniform supply. Initially, the electricity was used primarily for supplying the tramways, which were being converted from horse to electric power, and then the city's underground train system, the 'Subway' (Corporation of the City of Glasgow 1914, pp.127-133). This pattern was not untypical of cities elsewhere in Scotland and in the UK.



Pinkston Power Station, the main generating station for the City of Glasgow Corporation, 1904 (Crown Copyright: RCAHMS)



The cover of a booklet produced by British Insulated Cables Limited commemorating the start of work in 1927 on what was to become the National Grid. (© author)

Demand for electricity grew rapidly, resulting in the construction of a large coal-fired power station at Pinkston, and with further growth in demand from industrial and domestic users, new generating stations were built such as those at Port Dundas, St Andrews Cross and Dalmar-nock. An important new use for electricity was for street lighting, but even by 1914, less than 8% of the city's 19,437 street lights were electric, the remainder being fuelled by town gas.

From 1918, after the end of the Great War, demand for electricity continued to grow rapidly. In 1926, the UK Central Electricity Board (CEB, 1947, p.3) was established in an attempt to standardise and promote the development of a national supply, which at that time comprised a mixture of several hundred generators in both the private and public sector. One of the CEB's first projects was to establish 'The Grid', a national network of supply. In Scotland, this took the form of 'The Central Scotland Electricity Scheme', which was described as, 'The First of the great schemes for unification and co-ordination of electric power on a national basis, known as "Grid Schemes" (BICL, 1927, p.3). This was carried out by the company 'British Insulated Cables Limited', and similar initiatives followed in the other nine designated regions of the UK, with the Grid becoming nationally operational in 1938.

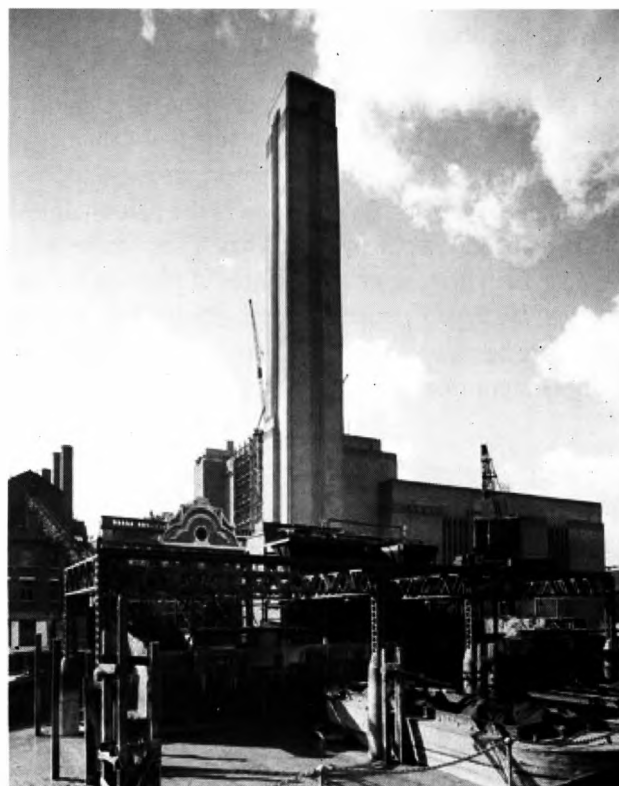
In the same period, Scotland also witnessed a growth in hydro-electric generation, which proved to be a very important part of rural electrification. The first big hydro-electric scheme had been established by the British Aluminium Company at Foyers on Loch Ness in 1894, with others following at Kinlochleven (1907) and Lochaber in 1929 (British Aluminium Company, c.1955). However, bigger regional schemes producing electricity for public consumption were to follow in the south with the Galloway Scheme and in the north with the Grampian Hydro-electric (Tummel Bridge and Rannoch) and the Lochaber Schemes in the 1930s. These schemes were extended very significantly and new schemes added in 1950s and 1960s (Historic Scotland, 2010).

The election of a UK socialist government in 1945 resulted in the nationalisation of electricity and the creation of a new British Electricity Authority, which continued to enlarge 'The Grid' and to increase capacity. As its annual report's title, *Giant Power* (British Electricity Authority, 1950) suggests, new large power stations were built all over the UK, with associated investment in mining resulting in the term 'coal by wire'. A new generation of even bigger power stations followed in the late 1950s and 1960s, the biggest

in Scotland being on the central coalfields at Kincardine, Barony, Methil, Cockenzie, and Longannet.

In addition to these domestic projects, Scottish engineers were heavily involved in power station construction in England, an example being Sir William Arrol & Co (builders of the Forth Bridge), who were major contractors responsible for the construction of Battersea and Bankside (now *Tate Modern*) Power Stations in the 1930s and 1950s respectively.

By the 1960s, major change was occurring with the development of nuclear power, with a pioneering strand of the industry being established at Dounreay on the north coast of Scotland. Its prototype reactor was the first fast-breeder nuclear reactor in the world to generate electricity for a national grid in 1962. In the meantime, conventional fission reactors were also coming on stream, such as those at Chapelcross (1959) and Hunterston A (1964).



Bankside Power Station (now Tate Modern art gallery), under construction in 1953. Scottish engineering companies, in this case Sir William Arrol & Co (builders of the Forth Bridge), built the steel frames for many of the UK's power stations during the 20th century, including Bankside and Battersea (Crown Copyright: RCAHMS, Scottish Power Collection)

There followed a brief flirtation with oil in the 1970s which led to the building of one oil-fired station at Inverkip, just in time for OPEC and big increases in petroleum prices in 1973. Thereafter, the exploitation of gas from the North Sea resulted in a new phase of generating stations in what was known as the 'Dash for Gas'. This accelerated the exhaustion of the gas fields in the North Sea, and combined with climate change worries, promoted a surge in renewable energy projects in the 21st century, led in particular by wind power.

DRIVERS FOR CHANGE: THREATS TO HISTORIC INFRA-STRUCTURE

Few early electricity generating stations have survived through time, although some buildings or parts of buildings, such as early sub-stations, can still be found within the urban grain of cities, including Glasgow. Many of the early buildings, for example, were swept away because of development pressure on land, or were erased by the building of newer power stations. However, a small number of significant buildings have survived.

Survival has become even more difficult since the 1990s for a number of reasons. These include privatisation and the associated selling off of assets for re-development, combined with the minimising of potential liabilities in a new private-sector business context, accelerating demolition programmes. An exception to the pattern of loss has been hydro-electricity, which has tended to be more durable. Even here, however, heightened focus on renewable energy now demands greater efficiencies, and old plants are being upgraded or replaced in order to achieve higher output from the same water sources.



Rannoch Power Station, one of Scotland's early Hydro-electric schemes (1933), which has been given the highest level of statutory listing, Category 'A'. (Crown Copyright: Historic Scotland)

RESPONDING TO THREAT: RECORDING AND PROTECTION PROGRAMMES

The rapidity of change has therefore resulted in the need to ensure that as much as possible of the historic electricity generation industry is recorded in some way. Responsibility for this falls to RCAHMS, whose Industrial Survey operations have included terrestrial and aerial photography and desk-based research covering all types of power station. This work has also involved collaboration with a number of organisations, including the Institution of Civil Engineers (Paxton & Shipway, 2007). However, most important has been work with the power companies themselves.

Following privatisation, Scottish Power gifted to RCAHMS extensive records which including 202 photograph albums (9,395 prints) and 190 items of printed material from its library including material dating back to the early expansion of the Grid in the 1920s. Similarly, in 2001, Scottish Hydro (now Scottish & Southern Energy) gifted to RCAHMS 14,000 negatives of photographs recording the construction and development of the main hydro schemes in the north of Scotland, as well as associated manuscript material.

RCAHMS has also acquired a number of other significant collections containing material on historic power generation, including those of the engineers Sir Alexander Gibb, and Sir William Arrol (RCAHMS, 1998, and McDonald & Oglethorpe, 2000). It also holds a number of architects' collections, an example being Shearer & Annand, whose work included power stations such as the picturesque scheme at Fasnakyle, completed in 1952. Those interested in architects may also be interested in consulting the Historic Scotland online website, *The Dictionary of Scottish Architects*, which is increasing the industrial content of its database and rapidly extending into the modern period.¹

As for protection, Historic Scotland, an agency of the Scottish Government², has provided statutory protection in the form of listed-building status for a number of early coal-fired power stations and some sub-stations, including McDonald Road Power Station in Edinburgh (1899) and St Andrews Power Station in Glasgow (1900). More recently, it has been focusing attention on post-1945 power stations which were embraced in a thematic study of Post-War architecture (Historic Scotland, 2009). One of the biggest challenges has been assessing the options associated with the early nuclear stations, and for this reason, Historic

Scotland has been heavily involved in the current Dounreay Heritage Strategy.³

However, the largest single initiative has been a thematic survey of Scotland's hydro-electric generating stations completed in 2010 by Historic Scotland's listing team, in collaboration with Scottish Power, Scottish & Southern Energy and Rio Tinto (formerly Alcan). This project, which has been carried out by David Fleetwood, concludes with a one-day conference in Perth on June 22, 2010, and the launch of a book, *Power to the People: The built heritage of Scotland's Hydroelectric Power*. A major consequence has been the listing of a number of important hydro-electric sites, and the upgrading of several existing listings. In the context of growing awareness of climate change issues, this is a fitting outcome, given the historical importance of Scotland's early renewable energy projects. The work has also subsequently assisted with the development of the TICCIH specialist section on Hydro electricity and electrochemical industry (<https://sites.google.com/a/nvim.no/hydel/>).

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¹ URL: <http://www.scottisharchitects.org.uk/>

² URL: <http://www.historic-scotland.gov.uk/>

⁴ URL: http://www.dounreay.com/UserFiles/File/Heritage%20Strategy%20consultation%20/DSRL%20FC-010B_photos.pdf

A6 Industrial Heritage Tourism

Organizer: Wolfgang Ebert (Germany)

Industrial Heritage Tourism (IHT) is an international trend: at least in Europe, a lot of projects have achieved public interest and are working successfully. The time is ripe to discuss this matter within TICCIH more intensively and on a broader inter-national level. In order to be most efficient, this session calls for papers focusing on the important aspects such as: Experiences with existing IHT networks and an outlook on the planning of new ones; The perspective of scientific research on IHT and the role and the knowledge of scientific institutions; Best-practice examples of sites dealing with IHT and what we can learn from them; Best-practice examples in the field of marketing linked to the interpretation on site; Marketing, the special perspective of tourist agencies and their role in site marketing; The contribution of network marketing between IHT-sites to a more successful marketing and a global interpretation of industrial landscapes; The role of the local communities and how to involve them more; New technologies for guiding and interpretation and their impact on the future of IHT.

The session starts with a key note by the chairman Prof Dr Wolfgang Ebert and ends with a discussion on future activities of the new TICCIH Industrial Heritage Tourism-section: How can TICCIH intensify discussion on IHT and what projects could be organized together? The session is followed by the 2009 Annual Assembly of the ERIH-network (European Route of Industrial Heritage).

ERIH – Connecting Europe's Industrial Heritage
European Route of Industrial Heritage

Christiane Baum



www.erih.net

**European
Route
of Industrial
Heritage**

Industrial Heritage is an important part of Europe's history as 200 years of "industrial revolution" have helped to shape the continent. During the industrial era, across Europe there were many similarities in the living and working conditions of the workers – a miner in the Ruhr dug coal with the same tools as a miner in the valleys of Wales. Miners migrated all over the continent in their search for "Black Gold" as did workers in many other industries. Industrial heritage is therefore a common heritage of all European peoples and an important part of our European identity.

Many of our former industrial plants and sites have been conserved, maintained and reused. Today, they are reminders of our industrial past and a symbol of the identity and heritage of our communities. It is important that we preserve these remnants of our past as they help define who we are, and that shapes our future.

These sites are also symbols of change. Across Europe, former industrial sites have been transformed to become alive again as places to visit, to work in and to live in and many are now major attractions of cultural tourism. No longer is industrial heritage tourism a niche market, it is now an increasingly popular and economically important tourism offer. However, there is still a big challenge to raise awareness of the fascinating and unique industrial heritage sites as cultural assets by developing innovative and sustainable concepts for maintenance and interpretation.

This is the basis of the original concept of ERIH – to unite and connect Europe's rich and varied industrial heritage and to raise awareness of its cultural significance and its tourism potential.

THE GENESIS

The challenge was how to do this? In 1999 a small group of enthusiasts met for the first time and discussed the idea of establishing a European Route of Industrial Heritage. The idea was based on the Route Industriekultur developed in the Ruhr area in Germany. The concept was to identify the industrial heritage sites in Europe which are most important historically and which are most popular as visitor attractions. These sites became the so-called Anchor Points of ERIH.

The group successfully applied for EU INTERREG IIC funding in North-West Europe which enabled it to develop the concept and produce a master plan. Subsequently, the implementation of this master plan was funded by the

INTERREG IIIB programme and the results of that work now form the basis of today's network. In 2008, when the funding expired, ERIH founded a legal entity established under German law.

THE ERIH NETWORK TODAY

Today ERIH is one of the most comprehensive cultural networks in Europe. The website contains over 850 sites in 32 countries, including 72 Anchor Points in 12 countries. There are also listed 101 biographies of personalities who influenced European industrial history ... and the network continues to grow.

ERIH is primarily a tourism and marketing network for industrial heritage. Its aim is to raise awareness of the subject, stimulate people's interest in it and, as a result, attract more visitors to the many exciting industrial heritage sites across Europe. ERIH has become a European brand for industrial heritage tourism with an attractive and recognisable logo and corporate design.

In order to assist visitors to discover and enjoy Europe's industrial history, ERIH has established a Europe-wide network of sites and routes. As mentioned earlier, the 'backbone' of the network is made up of Anchor Points. The 'ideal' ERIH **Anchor Point** is a nationally important industrial heritage visitor attraction which offers its visitors attractive and up-to-date facilities, including demonstrations of factory operations, multimedia installations and special trails or activities for children. These sites will tell their stories through imaginative interpretation and exhibits.

The ERIH Board has drawn up a set of Quality Criteria against which applications to become Anchor Points are evaluated. Sites which do not (yet) meet these Anchor Point criteria can join the network as **Individual Sites**, for example, sites which are historically important but not (regularly) open to visitors or sites which are under development or construction.

In addition, ERIH has currently established fourteen **Regional Routes**. These routes link landscapes and sites at a regional level and they help visitors to discover the industrial history of the region and provide a basis for the development of regional tourism offers and initiatives.

At a European level **Theme Routes** focus on specific aspects of European industrial history and reveal potential links between very different industrial monuments across Europe. The result is a 'circuit diagram' of the many and varied routes

of European industrial heritage. At present, ERIH has ten **European Theme Routes** but there is potential for more.

Another category in the ERIH network is that of **Corporate Members**. These are mostly public and private organisations, public authorities, tourist boards and others who are interested or active in the field of industrial heritage. At present, the network has approximately 150 members but the number is increasing all the time.

CROSS-MARKETING

One of the largest benefits of the ERIH network is the cross-marketing of sites. Industrial heritage is already presented individually by many sites in Europe. However, most sites do not have large marketing budgets and they have to compete with many brands and destinations in the tourism market. The cross-marketing of ERIH sites encourages co-operation rather than competition, in order

to strengthen industrial heritage within the wider tourism market. The Anchor Points are the highlights of this corporate marketing strategy. As the most important and attractive sites they act as the "flagships" of the network.

The potential of cross-marketing is huge and it is easy for sites to benefit from. Millions of visitors, already interested in industrial heritage, visit the sites and they are potential future visitors to other ERIH sites across Europe. Signs, leaflets and a single website are the basic information tools. ERIH has established a common European brand for industrial heritage which is recognisable and which also acts as a quality standard. This helps to raise awareness of and interest in individual sites.

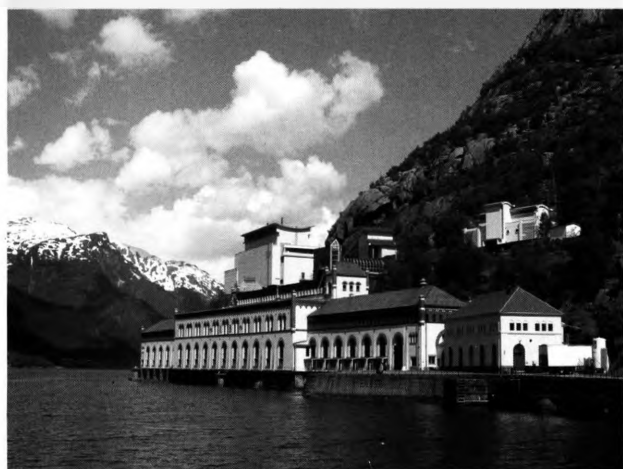
The network of Regional Routes and European Theme Routes provide people with a way into local, regional, national and European industrial history and they invite them to travel on these exciting routes.

Currently, most ERIH sites are found in the North-West of Europe, because the initial setting up of the network was funded by INTERREG IIIB in that area. However, co-operation with TICCIH has been helpful in extending the network more widely across Europe and recently the network has welcomed new members and Anchor Points in Sweden, Norway and Denmark as well as in Eastern Europe (Czech Republic and Poland) and Southern Europe (Italy and Spain).

Our vision is to create a truly pan-European network with Anchor Points and sites in every European country – each new country that we welcome into the network takes us a step closer to that goal.



Museum of Science and Technology of Catalonia (mNACTEC) in Terrassa, Spain (© author)



Tyssedal power plant, Odde, Norway (© author)



Völklinger Hütte, Germany (© author)

Santralistanbul – ein Kraftwerk für Istanbul

Wolfgang Ebert

Helles Tageslicht flutet durch großzügige Bogenfenster in einen Saal, der sich selbstbewusst als Kathedrale der Technik inszeniert: Schaltpulte wie Altäre, manche von ihnen schrankhoch, andere im Halbrund aufgestellt, als ahmten sie einen sakralen Chorraum nach. Von hier öffnet sich der Blick auf eine weite Maschinenhalle mit vier ebenso gewaltigen wie betagten Turbogeneratoren der Marken AEG, Brown Boveri, Siemens und Thomson.

Das ehemalige Kraftwerk Silahtaraga war das erste Kraftwerk des osmanischen Reiches und lieferte ab 1904 den Strom für die modernen Paläste des Sultans und die Beleuchtung der berühmten Galata-Brücke. Seiner Entstehungsgeschichte verdanken Gebäude und Anlagen heute besonderes technikgeschichtliches Interesse: Der Sultan erwartete von dem Generalunternehmer, der Firma Ganz aus Ungarn, dass die Ausstattung einen Querschnitt der Technik der Zeit repräsentiere. Damit wollte man Erfahrungen machen, die an weiteren Standorten genutzt werden sollte. Da nur wenige Änderungen vorgenommen wurden, repräsentiert das Kraftwerk heute noch eine interessante Sammlung von Anlagen unterschiedlichster Hersteller.

Die Erfolgsstory endete vorläufig den frühen 1980er Jahren. Danach verfielen Gebäude und Anlagen in einen Dornröschenschlaf. Der war relativ ungestört: Die Lage auf der Halbinsel, welche die zwei Flüsse am Beginn des Goldenen Horns bilden, schützte es relativ gut vor Vandalismus, ebenso eine anhaltende Teilnutzung als Werkstatt und Wohngelände von Angestellten des staatlichen Energiemonopols. 1994 wurde das Werk unter Denkmalschutz gestellt, wobei es dem Autor nie möglich war, den Anlass dafür zu ergründen. Schließlich wurden zu dieser Zeit die Ufer des Halic (Goldenes Horn), welche die industrielle Kernregion Istanbuls, ja der ganzen Türkei, darstellten, fast komplett leer geräumt. Man wundert sich also über den Denkmalschutz für das Kraftwerk, wenngleich es heute natürlich einen erfreulichen Umstand bildet.

Nach der Unterschutzstellung schief das Gelände noch bis zum Jahre 2003 weiter. Zu diesem Zeitpunkt suchte die private Bilgi-Universität eine Möglichkeit, ihre zwei schon vorhandenen Gelände um ein Drittes zu erweitern. Dazu muss man wissen, dass ein solches Vorhaben im Kern Istanbuls mangels Flächen (oder zumindest erschwinglichen Flächen) praktisch unmöglich zu verwirklichen ist. Außerdem ist es interessant zu lernen, welche Bedeutung universitäre Bildung in privater Trägerschaft in Stadt und Land haben. Hier geht es um ein einträgliches Geschäft mit Ausstrahlung in den ganzen Mittleren Osten.

Nun, so kamen zwei Interessen zusammen: Das Energieministerium wusste schon immer nichts mit seinem Denkmal anzufangen, und die Hochschule konnte sich auf der weitestgehend leeren Fläche von ca. 25 ha ausbreiten. Daher schloss man einen Generationen-Vertrag in dem festgelegt wurde, dass durch den neuen Nutzer aus der Denkmalsubstanz etwas Sinnvolles zu entwickeln sei und im Gegenzug die Hochschule einige Neubauten errichten durfte.

Die Frage, was man denn mit den Gebäuden anfangen könnte, war relativ schnell beantwortet. Es entstand die Vision eines Energie-Museums, welches die Geschichte des Werkes ebenso erzählen sollte, wie die der historischen Energieverwendung und auch eine Perspektive für die Zukunft eröffnen wollte.

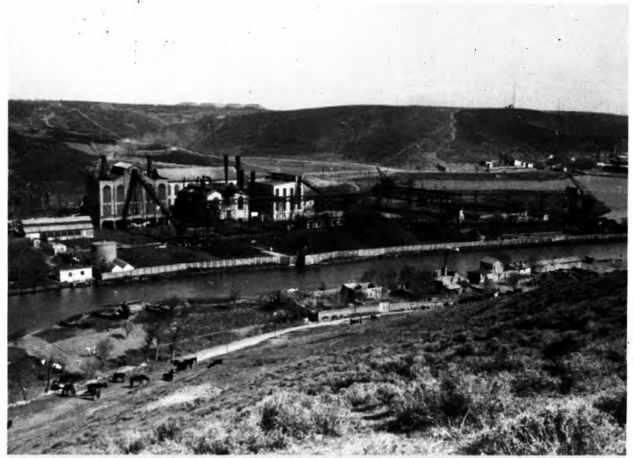
Aber, wie sollte diese Vision verwirklicht werden? Vor Ort gab und gibt es wenig bis keine Fachkenntnisse zum industriellen Denkmalschutz und auch nicht für die museologischen Aspekte. Daher wurde der Autor um Rat gefragt, der sich seither mit der Umsetzung (unter allen denkbaren Begleiterscheinungen einer anderen Kultur!) beschäftigen darf. Eine echte Herausforderung ...

Dabei standen zunächst die Probleme der Architektur im Vordergrund. Das fing schon mit der Gebäudegründung an, die auf den lockeren Schwemmsanden der Flussmündung beruht und daher umfangreichster Stabilisierung bedurfte. Schlimmer noch: Die notwendige Erdbebensicherheit – hierzulande weniger ein Problem – verlangte massive Verstärkung der tragenden Strukturen der Stahlfachwerks-Gebäude. Und dies im Interesse des Denkmals natürlich so unsichtbar wie möglich. Schwierig und sehr teuer.

Die fachgerechte Restaurierung der Anlagen wie Turbinen, Kräne und Schaltanlagen etc. war ein anderes großes Problem. Dazu standen keinerlei Fachkräfte zur Verfügung. Mühsam wurden einheimische Arbeiter ausgebildet und diese interessante Truppe hat tatsächlich ein Ergebnis gezeitigt, welches internationalen Standards entspricht. Auch dieses ist ein sehr aufwändiger Prozess, der noch nicht abgeschlossen ist und als Work-in-Progress vor den Besuchern mittlerweile viel Interesse findet.

Interpretiert wird das Denkmal mittlerweile von einem Grundbestand an Flachware und neuen Medien, die einen guten Überblick über die Geschichte des Ortes bieten. In Zusammenarbeit mit der Firma Hüttinger aus Deutschland wurde auch eine erste Ausstattung an Hands-On-

Objekten beschafft, die eine spannende Erlebniswelt zum Thema Energieverwendung bieten. „Santralistanbul“ nennt sich das 2007 in einem ersten Bauabschnitt eröffnete Projekt jetzt. „Santral“ heißt schlicht „Kraftwerk“ und steht heute für eine neue Keimzelle für Kunst und Kultur in der Stadt. In der Tat geht es auch darum, denn eines der nicht mehr vorhandenen Kesselhäuser wurde als schlichter Kubus nachgebaut und dient heute für hochwertige Wechselausstellungen. Außerdem entstand eine große Seebühne mit Arena am Ufer des Halic. Zusammen mit den weitläufig Grünanlagen und auch den historischen Gebäuden bieten sich viele Möglichkeiten für Veranstaltungen. Und auch gut Essen und Trinken kann man in vier Restaurants, ja sogar ein Gästehotel entstand in den Arbeiterwohnhäusern. So hat sich Santralistanbul zu einem der lebendigsten und meistbesuchten Orte in Istanbul entwickelt, auch wenn noch viel zu tun ist, was im Moment leider angesichts der internationalen Finanzkrise etwas schwieriger geworden ist ...



Santralistanbul 1929 (© author)

A6



Santralistanbul – Turbinenhaus (© author)

The 'Hill' that Refused to Break: Cultural Tourism Regenerates the Mining Town of Broken Hill

Sue Jackson-Stepowski

This is the story of The Hill that changed the Australian Nation. Mineral extraction redirected its economy from colonial grain and fibres to focus on 20th century manufacturing. While any mining towns disappear with cyclic mineral booms-busts, Broken Hill survives against the odds in a harsh environment yet one also a larger-than-life inspiration landscape. There is definitely a spiritual element, always known to the traditional Wiljakali owners who call The Hill 'Willyama'.

When explorer Charles Sturt came in 1844 looking for the fabled 'inland sea' he referred to a 'broken hill'. As bull-dock teams and horses failed in the harsh conditions and erratic water supplies, Afghan cameleers initiated trade routes carting essentials to outlining cattle stations and camps building of the Adelaide to Darwin telegraph line and railway, still known as *The Ghan*. Tangible evidence of Broken Hill's Afghan community is the oldest mosque in Australia built in 1892.

The discovery of lead-silver-zinc ore in 1875 triggered a world-wide influx of prospectors. At 'Umberumberka' Creek Silverton sprang up in 1883. Today this ghost town features in more than 140 films and commercials, cinematographers and artists attracted by the clear light, and tourists drawn to its evocative scenery and haphazardly sited historic buildings. Nearby is 21st century wind technology where the Mundi Mundi Plain distant horizon shows the earth's curvature.

While diggers searched for minerals, by 1877 remote Mt Gipps Station of 550,000 acres ran 77,000 sheep. Fences enforced by the Enclosure Act were maintained by boundary riders. Charles Rasp was one who found seemingly tin oxide rocks on the 'broken hill'. Born 1848 in Saxony and educated in the Baltic States, he worked in a Hamburg chemical plant, fought in the Franco-Prussian War, before arriving in Australia by 1876. His samples proved to contain quality grade lead-zinc. Rasp formed a 'Syndicate of 7' to peg-out a 40 acre claim and in 1884 'Rasp's Shaft' stuck a rich vein of silver chloride. 'The Silver City' epithet persists to this day.

News quickly spread causing Silverton to decline. Peoples from differing ethnic and religious backgrounds arrived from North-Central Europe, the Mediterranean, Indian sub-continent and Asia. In 1905 Herbert Hoover founded the Zinc Corporation here before becoming President of the USA. Within 8 years the population grew to 21,000 and in 1915 to 35,000. In 1907 Broken Hill was the largest settlement in New South Wales, after its capital Sydney.

Promptly the 'Syndicate' amalgamated its Block 10 to 16 leases to form a public company in 1885 – the Broken Hill Proprietary Company Limited or simply BHP. Early difficulties to extract zinc concentrate, known as 'the sulphide problem', led BHP metallurgists to develop a floatation separation process by 1904–1907. The emerging Garden Suburb Movement influenced company housing and its Arts & Crafts inspired office building which survives around Proprietary Square at the base of Block 10; nearby are the later Rainbow Avenue houses. The wealth won from the leases financed the emerging Australian iron and steel industry in 1920s.

When BHP left in 1939 it had removed 12.3 million tons of ore. Today Rasp's company is a global multinational corporation BPH Billiton. 14 other mining companies made their fortunes from The Hill.

When the 'Syndicate' lodged its claim this was the biggest and richest single ore body in the world. Imagine a 7.5 km long boomerang, each side continuing 1.6 km deep into the red earth. It is one of the most varied assemblages in the world containing 112 identified minerals, 11 being first described here and several 'rare' minerals. At one time Broken Hill produced a third of the world's silver alone. The ore body has generated over 100 billion Australian dollars.

Remaining mining structures demonstrate technological practices invented or pioneered at Broken Hill, or employ innovative design or building practices. Junction Mine, now of open air museum on the mullock heap, is testimony of a consistently operated early lease from 1886 to 1972 containing Brown's Shaft, concentration Mill, Mine Managers House, change house and offices.

Miners' rights were also pioneered here. Hundreds of men were killed in the mines. The 1890s depression coincided with declining metal prices and mine management altering employment arrangements. Industrial unrest led to the formation of the Broken Hill Barrier Industrial Council, an affiliation of 18 unions to improve working conditions and settle disputes. The first privately owned Trades Hall in the southern hemisphere became the rallying point for the largest strikes in Australian history in 1909 and 1919, resulting in improved mine safety, health compensation for tubercular and fibrotic conditions, a 35 hour week and a 8 hour working day that became the standard for all Australian workers.

Early conditions for the miners and their families were poor. The shortage of fresh food and water led to disease, often coinciding with drought. Many suffered from lead poisoning and lung disease. As late as 1892 the Stephens Creek Reservoir was built to supply reticulation water systems to the Town and mines. The water supply problem was finally eased in 1952 by a 109 km pipeline from the Menindee Lakes and two artificial Zinc Lakes were created as a worker recreation facility.

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With building materials in short supply, many of Silvertown's buildings were simply relocated here on wagons pulled by teams of bullocks, donkeys and camels. Miners built homes, chimneys and fences clad in corrugated iron, an easily transportable and less expensive material. Now known as 'tinnies' these modest vernacular buildings, once derided as second class, are now respected as unique and integral to the Town's history and character.

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Existing mining operations are expected to continue but employing a fraction of early peaks. The 1952 peak employing 6500 people coincided with a post war mineral boom and influx of migrants. A steady decline since reflects mine closures and technological change. Due to the volatility of mining cycles, and a predominantly working class population, the Town knew it had to find other sources of income if it was to retain local businesses and survive.

Initial moves to conserve the Town's built heritage were tentative. In 1974 a margin of 1 vote retained the 1891 Town Hall façade which needed considerable expenditure while another controversial single vote margin saved the Bond Store from demolition. The combination of declining population and an 'unloved' town in dire economic circumstances induced the Council to commission a future strategies report in 1982. By 1990 the Council resolved to redirect a total reliance from extraction industry to focus on tourism, creative and leisure enterprises emphasising the Town's unique character. As most of the town's built heritage was in place by World War One, depopulation had left historic building stock and industrial heritage largely intact. These now form the focus of heritage-based diversification strategies.

A heritage-based renewal approach coincided with new planning legislation and State Government directives to do a heritage survey. The 1986 survey was included in the planning scheme and both became the basis for policy decision making to protect and manage the Town's assets. Of 357 places 111 relate to 'mining and mineral processing' plus 3 power stations, 5 water storages and 3 fire stations; only 20 are 'residential buildings' including several mine related houses, plus 3 conservation areas. 9 places are also on the NSW State Heritage Register.

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This is the story of The Hill that changed the Australian Nation. Mineral extraction redirected its economy from colonial grain and fibres to focus on 20th century manufacturing. While any mining towns disappear with cyclic mineral booms-busts, Broken Hill survives against the odds in a harsh environment yet one also a larger-than-life inspiration landscape. There is definitely a spiritual element, always known to the traditional Wiljakali owners who call The Hill 'Willyama'.

When explorer Charles Sturt came in 1844 looking for the fabled 'inland sea' he referred to a 'broken hill'. As bull-dock teams and horses failed in the harsh conditions and erratic water supplies, Afghan cameleers initiated trade routes carting essentials to outlining cattle stations and camps building of the Adelaide to Darwin telegraph line and railway, still known as *The Ghan*. Tangible evidence of Broken Hill's Afghan community is the oldest mosque in Australia built in 1892.

The discovery of lead-silver-zinc ore in 1875 triggered a world-wide influx of prospectors. At 'Umberumberka' Creek Silverton sprang up in 1883. Today this ghost town features in more than 140 films and commercials, cinematographers and artists attracted by the clear light, and tourists drawn to its evocative scenery and haphazardly sited historic buildings. Nearby is 21st century wind technology where the Mundi Mundi Plain distant horizon shows the earth's curvature.

While diggers searched for minerals, by 1877 remote Mt Gipps Station of 550,000 acres ran 77,000 sheep. Fences enforced by the Enclosure Act were maintained by boundary riders. Charles Rasp was one who found seemingly tin oxide rocks on the 'broken hill'. Born 1848 in Saxony and educated in the Baltic States, he worked in a Hamburg chemical plant, fought in the Franco-Prussian War, before arriving in Australia by 1876. His samples proved to contain quality grade lead-zinc. Rasp formed a 'Syndicate of 7' to peg-out a 40 acre claim and in 1884 'Rasp's Shaft' struck a rich vein of silver chloride. 'The Silver City' epithet persists to this day.

News quickly spread causing Silverton to decline. Peoples from differing ethnic and religious backgrounds arrived from North-Central Europe, the Mediterranean, Indian sub-continent and Asia. In 1905 Herbert Hoover founded the Zinc Corporation here before becoming President of the USA. Within 8 years the population grew to 21,000 and in 1915 to 35,000. In 1907 Broken Hill was the largest settlement in New South Wales, after its capital Sydney.

Promptly the 'Syndicate' amalgamated its Block 10 to 16 leases to form a public company in 1885 – the Broken Hill Proprietary Company Limited or simply BHP. Early difficulties to extract zinc concentrate, known as 'the sulphide problem', led BHP metallurgists to develop a floatation separation process by 1904–1907. The emerging Garden Suburb Movement influenced company housing and its Arts & Crafts inspired office building which survives around Proprietary Square at the base of Block 10; nearby are the later Rainbow Avenue houses. The wealth won from the leases financed the emerging Australian iron and steel industry in 1920s.

When BHP left in 1939 it had removed 12.3 million tons of ore. Today Rasp's company is a global multinational corporation BHP Billiton. 14 other mining companies made their fortunes from The Hill.

When the 'Syndicate' lodged its claim this was the biggest and richest single ore body in the world. Imagine a 7.5 km long boomerang, each side continuing 1.6 km deep into the red earth. It is one of the most varied assemblages in the world containing 112 identified minerals, 11 being first described here and several 'rare' minerals. At one time Broken Hill produced a third of the world's silver alone. The ore body has generated over 100 billion Australian dollars.

Remaining mining structures demonstrate technological practices invented or pioneered at Broken Hill, or employ innovative design or building practices. Junction Mine, now of open air museum on the mullock heap, is testimony of a consistently operated early lease from 1886 to 1972 containing Brown's Shaft, concentration Mill, Mine Managers House, change house and offices.

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heritage protection framework as a basis for economical sustainability with a range of financially self-sustaining initiatives. Unique visitor experiences 'tell the story' of settlement evolution in an engaging and creative way based on authentic history.

Partnerships bring long term benefits within the community between local residents, business people and relevant authorities. Essential management components are leadership with commitment to heritage management, financial incentives in a variety of forms, experienced technical expertise by a Heritage Advisor, committed Council staff and community participation. The Residential Buildings Conservation Policy, commenced in 1991, aimed to encourage improvements to residential buildings by a number of initiatives.

- The Paint and Repair Assistance Scheme provides grants to encourage individuals to preserve a building's character, cumulatively resulting in restoration dramatically changing the Town's overall appearance.
- The free Heritage Advisor Service, commenced in 1987 continues to create enthusiasm on all areas of heritage conservation and management from practical advice to commercial, residential and public places, building facades upgrades, external paint schemes, heritage strategies and advocacy for heritage issues.
- Starting with seed funds, the \$ 100,000 p.a. Heritage Restoration Fund, designed as a self-sustaining, revolving structure, allows on-going projects to continue with an applicant providing 50% and the balance via a loan scheme.
- The Verandah Restoration Programme is to improve conservation standards, methods and building techniques using traditional skills. Business owners' incentives include financial assistance, low interest loan payable over four years, and providing simple drawings and standard details for proposals, referenced to a site's significance, early photographs and fit within the streetscape. A video/CD summaries verandah benefits, being a critical key initiative to the Town's ongoing promotion and image, plus having environmental implications to ameliorate temperature extremes, high UV rays and flash flooding sporadic rains.
- A Council approved contractors' list experience in heritage work.
- Heritage training workshops to ensure contractors use appropriate materials. Traditional techniques and construction approaches. The overall conservation framework utilises the Australia ICOMOS *Burra Charter*.
- The National Trust Heritage Week and awards are important annual events.

- The illustrated 'Silver Trail' booklet and map is an interpretive guide to a 40 km heritage drive and a heritage walk, supplemented by outdoor interpretive signs.

The appearance of commercial and residential buildings since 1986 has improved markedly, demonstrating a tangible result of 25 years of commitment by the Council. Most importantly there is now a new attitude and pride within the population of Broken Hill.

The Town positioned itself as a 'Living Museum in the Accessible Outback' in its 1989 sustainable cultural tourism strategy, attracting 40,000+ tourists in 2008. Whilst not an alternative to mining, tourism retains skilled tradesmen, services, a vibrant commercial centre and provides employment. Combined with the Conservation Policy, tourism seeks to communicate Broken Hill's story in an imaginative and engaging way. Now in place are Line of Lode Museum and Restaurant, Outback Regional Gallery housed in the restored c1885 *Sully's Emporium*, Outback Art and Film Projects, including public art installations and town murals based on the mining theme, such as 'Kintore Headframe', Pro Hart's 'Ant', and 'The Desert Sculptures', plus 35 private art galleries make a living and many operating from historic buildings. The 'the brushmen of the desert' artist colony comprised former miners inspired by mining infrastructure set in arid landscapes.

Heritage and cultural tourism are integral to Broken Hill's future. The 25-year strategy required a vision, consistency of advice, staff commitment, short-medium-long term goals, community participation and endorsement, and engaging the local residents as ambassadors of Broken Hill. Along the way small and larger achievements are recognised. To ensure the project continues there is a Council staff succession plan.

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A6

Networked Industrial Heritage – Consideration of the Old Colliery in Wałbrzych (Poland)¹

Karolina Hettchen

The period of industrialization brought a dynamic development of the regions rich in raw materials. The structural change in the second half of the 20th century, reinforced through the political changes of 1989, has become noticeable foremost in the regions with the heavy industry. The massive closing down of factories, mines and iron works has left behind not only high rates of unemployment, but also a lot of vacant industrial buildings. In such regions, tourism is often utilized as a successful measure for regional revitalization and economic development. Thus, the tourism industry has developed into an important socio-economic phenomenon (Xie 2006, p.1321).

Recently the global trend for networking can be observed in tourism, too. The positive experiences with the existing routes encouraged many locations to cooperate.

Based on the three key premises:

1. Economic potential of heritage,
2. Cooperation as an important factor of success in tourism,
3. Industrial tourism as a tool of successful preservation of industrial heritage, the work searches the advantages of regional or international networks for an industrial location.

Ashworth (Ashworth 1996, p.43–44) pointed out that heritage possesses a huge economic potential. The past is everywhere that means, all locations have the potential to create their own heritage. It is very important to work out the soft location factors, and to create an exciting story about this site, because tourists do not come to each heritage at each place.

In the literature on tourism, networks are held as the general success factors for the industrial tourism destinations (see Wolf 2005, p.135). The aim of a tourism network is to integrate the individual arrangements, facilities and location, that – if separated – don't have sufficient quality as tourism destination, and to promote it under a leitmotiv as cultural routes and campaigns. The networks in the form of routes are kind of self-help for the communes. They also allow achieving profit through exchange of experiences and know-how between the network members.

THE SITE

Wałbrzych is situated in the southwestern part of Lower Silesia, Poland, near the Czech and German border. With its 127,000 inhabitants, it grew to the second largest agglomeration in the Lower Silesia following Wrocław.

From the mid-19th Century, the region of Wałbrzych had evolved to the centre of mining, iron and steel industry in Lower Silesia. Since then, the industry shaped the development of the city and the region. Although the industrial architecture of the Wałbrzych district resembles the one of the Western Europe, the location makes it very unique. Wałbrzych is picturesquely situated in a valley, and surrounded by mountains (Wałbrzyskie Mountains) that gives the city an exceptional character.

THE MUSEUM

Similarly to other regions shaped by the industry, since 1990 Wałbrzych has undergone the process of structural change. Various industrial plants were destroyed or exploited to such an extent that they had to be demolished. In such a way, several industrial monuments have been lost (Dobesz 2001, Januszewski 2002, p.18–19). In 1993, as a counter-initiative, the Museum of Industry and Technology (Muzeum Techniki i Przemysłu) came into existence.

The museum is placed in the former colliery KWK Thorez/Julia that was closed down in 1996. The area of the museum is about six ha. The plant includes 22 buildings. 16 of them are inscribed into the state list of monuments, and adits; including registered in a state list of monuments Fox Adit (Szewczyk, Zydlik 2007, p.6).

The ensemble has an exceptionally high grade of authenticity. After World War II, only few interventions were made in the physical substance of the complex. Besides new cooling towers, no new buildings were constructed.



*The Area of the Museum of Industry and Technology
(photo: S. Hettchen)*

There are several important features of the Julia Colliery; the most essential ones are listed below.

1. The large scale coal processing plant was built in 1902 and decommissioned in 2000. It is the only entirely preserved mechanical coke processing plant in Europe dating from the beginning of the 20th century with a full technological profile. It clearly demonstrates the process of sorting, cleaning and flotation of coal that contains several pieces of unique machinery and equipment.
2. Three Malakov type towers are the next unique feature of the site. Two of the 25 m high towers above shafts, Julia and Sobótka (former Julius and Ida), were erected from 1867 to 1869. In 1884 an additional shaft – Dampfschacht (steam-shaft), was built with a Malakov-type Tower, but it had only an auxiliary function (Piątek, Piątek 2006, p.425). In the 1890s steel head frames designed and manufactured in Carl iron works in Waldenburg were introduced on the top of the Julius and Ida shafts. The architecture of the buildings was not affected, except that the iron structures protruded above the roof of the towers.
3. The electrically driven winding engines are among the first such engines to be commissioned in Europe. The engines of the Koepe-5000 type and the BB-4050 type manufactured at the Donnersmarck Metallurgical Works in Zabrze and the Siemens-Schuckert-Werke in Berlin, were introduced in 1911 and 1912 at the Julia and the Sobótka Shaft respectively. They are also in

perfect working condition and therefore very rare in European mining.

4. The Fox Adit is the subsequent special feature of the Old Colliery. The inauguration of the first adit on the European continent, where coal was transported by boats, took place in September 1794. (Piątek, E. 2002, p.81) From the beginning, the Fox Adit was a popular tourist attraction. In May 1854 the adit was put dry, because of the unprofitability of the boat transport. The special significance of the Fox Adit is that it is a witness of the quest for technical innovations and improvements. Not only its navigability, but also the fact that it is one of the oldest maintained adits in the coal mining industry in Europe, has a great implication for the history of coal mining (Piątek, E. 2002, p.83–84; Kosmaty 2005, p.137–142).

NETWORKING

Local

Currently the museum is not involved in any network; thus, hypothetical networks had to be created. The approach of this analysis was based on the regional marketing process.

The former Waldenburg-Neurode district that shares common (industrial) history and served for more than 200 years as an industrial area (Zagłębie Dolnośląskie) was chosen for the study. The region consists of the administrative district Walbrzych, the city Nowa Ruda, and Nowa Ruda district. The process of structural change, and

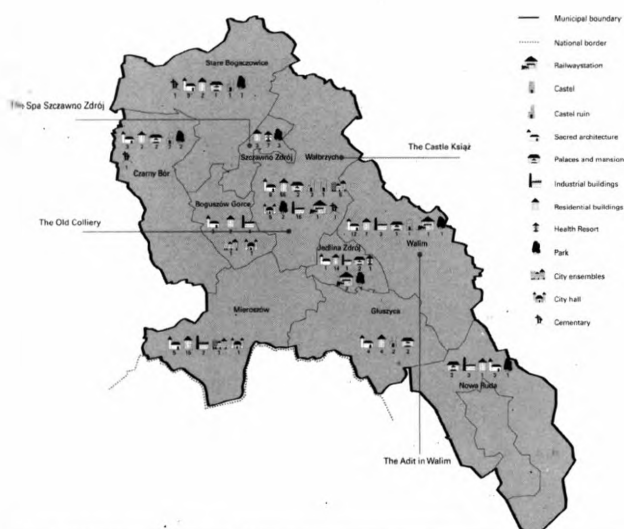
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The Coal Processing Plant (photo: S. Hettchen)



The Malakov type Tower Julia (photo: S. Hettchen)



The Main Route (map: K. Hettchen)

its consequences, such as high unemployment, and passivity of the inhabitants, are characteristic for all communities in the region.

The unique quality of the region is created by the bundle of the following kinds of tourism: active, cycle, industrial (currently only rudimentarily available), and historical. All these aspects should be considered within the planned route.

The main route – Route of the Secrets has four focal points:

- Castle Książ (Secrets of the Princess Daisy, Secret Underground Corridors),
- The Museum of Industry and Technology (Secrets of the Technique),
- Adits in Walim (Secrets of World War II),
- Spa Szczawno Zdrój (Secrets of the Water) – link to the Route of the Resorts of Lower Silesia.

From this crystallization points start theme routes:

- The Castle Książ: The Route of the Castles and Manor Houses,
- MPiT: The Industrial Route,
- Walim: The Underground Route,
- Szczawno Zdrój: The Route of the Resorts.

The route is planned as a bike, horse-back riding, hiking and car route, so that all sites can be actively explored. The focal points of the route assure to target as many tourists as possible, and then lead them to other stations on the route.

The starting point of the route is the Castle Książ that acts as a magnet, and attracts the tourists. The connec-

tion of the museum to a regional network means that the museum is tied up with a route that is not limited to the issues of industrial heritage. In the regional network, the museum has equal rights in the design of the network policy, and development direction. Since the ensemble has a national importance, and it is considered as one of the main attractions of the region, it is quite possible that it can also exert greater influence on the network's activities. The joint region marketing reflects the regional and supra-regional context, and shows the interdependence of all types of heritage, as well as contributes to regional identity. The cooperation creates bigger, virtual size, so that the museum has more possibilities for financial donations at the regional level. Both the museum and the local economy benefit from networking. Since the main route is connecting the major attractions under one leitmotiv, the risk to fail the tourists will be reduced in the case the industrial tourism loses its popularity. On the other hand, such a broad range of topics brings a risk that the industrial heritage in the region will be missed out. The main problem can result from the resistance to cooperation, e.g. between the Castle Książ and the museum (actually present), and the resistance to problem solution among network members. The differences of opinions as a consequence of the heterogeneity constitute a great challenge for the communication design. Furthermore, as the region boundaries differ from the administrative boundaries, the coordination of the network and the objective target can cause problems.

International

For the analysis of international networking, the ERIH network was chosen as the largest network of the industrial heritage sites in Europe.

Linking the museum to the network as a site in the European Theme Route Mining is associated only with the mapping of the place on the route, and the addition of the information on the web page. There are no further coupled activities such as joint marketing or signage of the site. To tap the full potential of the network, the nomination of the museum as an anchor point is needed. The anchor points constitute the ERIH main route, and are named in the selection process.

For the suitability assessment, the ERIH has defined selection criteria, e.g. attraction and symbolic value, authenticity, or infrastructure. Regarding the criteria, at the present time the museum meets only two of

them. The site is characterized by a very large degree of authenticity. In addition, the significant importance of the colliery as oldest in the region along with the Fox Adit, leads to a very high rank of the museum. However, in regard to other criteria still much has to be done.

Currently a new concept for the museum has been developed, and big investments are planned; therefore, valorization of the offer can be assumed.

The ERIH network is made up of cultural institutions (anchor points), and the project partners. In the future the network will be expanded by tourism providers, hotels and restaurants. As one of many anchor points, the museum will not be able to exert any significant influence on the network policy. It is also questionable, whether the site has to expect noticeable increase in number of visitors. The investments and upgrading of the museum should be completed only in 2020; therefore, there is a risk that it remains in the shadow of well established industrial tourism attractions. Furthermore, a poor condition of the plant could have an anti-advertising effect.

Regarding the growing importance of the ERIH network, the nomination as an anchor point is a great chance for the museum. It gives the museum an excellent reputation, and attracts international tourists. Moreover, it allows working with other prestigious industrial tourism destinations. The exchange of experiences gives the possibility to learn, to make new contacts, and to qualify the offer. What's more, the membership opens up an access to communication paths that for the museum alone are not available, such as participation in trade fairs. Not without significance are the contribution to the economic development of the region, and the access to international markets.

Local versus Global

Both forms of networking can benefit not only the museum, but also the region. Formation of a network means for a site above all exploitation of synergy effects, learning effects, cost savings, and virtual size.

However, the comparison points out that the regional network enables a faster increase of the number of tourists. In addition, the classification of a site as an anchor point in the ERIH network requires an existing connection to a regional route. This means that existing (established) regional context is a requirement for entering an international network.

The latest events in Wałbrzych show that the city focuses on regional networking. In the summer of 2009, from July 4, to August 30, a small 17-passenger bus cruised 6 times a day between the most interesting places surrounding Wałbrzych (among others the old Colliery).

The name Zagadkobus (the mystery bus) refers to the great mysteries of history. Although there is no formal cooperation between the individual stations, it is the first step towards the formation of a regional network.

At the same time, the city of Wałbrzych tries to qualify the museum. The municipality has pushed a large project of re-use. "Multicultural Park Old Mine" is for the most part financed by the Ministry of Culture. The implementation of the project schedules a revitalization of the ensemble. Except for the museum's functions, new features will be added. The renovated buildings should house Dance Ensemble Wałbrzych, non-governmental organizations, smaller cultural institutions, and the gallery for contemporary art in pithead bath.

However, the question arises to which extent the structural substance will be affected by the restoration work, and whether the unique ambience will be carefully handled, so that through this activities the old mine does not forfeit the most valuable, namely its authenticity.

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¹ Following work based for the most part on the Master Thesis (2008) submitted to the BTU Cottbus for the WHS study course.

ENERGY Route of Lusatian Industrial Heritage – A Tourism Product and Marketing Network

Antje Boshold

The ENERGY Route of Lusatian Industrial Heritage is an integral element of the new Lusatian Lakeland. This Lakeland is being created in the former lignite mining region Lusatia, 100 km south of Berlin and 50 km west of Poland, by flooding abandoned open-cast mines to bring into existence a new landscape with 30 lakes and a water surface of ca. 14,000 ha. The Lusatian Lakeland will be the largest man-made lake district in Europe with a large variety of attractions, such as navigable junction canals, floating houses and modern water sports. The technical origin of the development is not denied in landscape design but deliberately staged.

In other parts of Lusatia the industrial past is still present. From the nineteen-fifties to the nineteen-nineties Lusatia was the power house of the GDR and supplied millions of tonnes of coal. The landscape used to be marked by huge power stations and extensive open-cast mining areas, the monumental character of the buildings and the landscape being a fascinating sight. Some of the finest examples of historical industrial constructions, giant mining structures and workers' settlements have been preserved. These imposing industrial monuments have been made accessible to visitors by guided tours, artistic productions and cultural offerings. This was made possible during the redevelopment regime spearheaded by the Internationale Bauausstellung (IBA) Fürst-Pückler-Land 2000-2010 (International Construction Exhibition).

IBA FÜRST-PÜCKLER-LAND

In Germany, international construction exhibition projects have been characterising pushes in urban development for over one hundred years in the form of great constructional innovations. Traditionally, domestic architecture was in the centre of attention. From 1989 to 1999 it was IBA Emscher Park which was dedicated to the restructuring of an entire region for the first time – the Emscher area in the Ruhr region. It has developed a new type of cultural landscape there. This approach is being addressed by IBA Fürst-Pückler-Land in the south of Brandenburg where from 2000 to 2010 the subject 'landscape' is and will be in the centre of activities.

In Lusatia millions of cubic meters of soil are being moved within the framework of lignite extraction and redevelopment. Today, Lusatia is Europe's largest landscape construction site. Part of this process of change are industrial buildings, mining equipment, company towns and large-

area industrial sites for which new perspectives are to be found. Through 30 exemplary projects and EU-projects, IBA gives economical, creative and ecological impulses for the required structural change. The presentational year is 2010.

The man behind the name is Hermann Fürst von Pückler-Muskau. His parks in Bad Muskau and Branitz are to this day considered masterpieces of landscape gardening all over the world. Over and above that, he also embodies openness towards the world and stands for unusual ideas arranging exceptional landscapes. The logo "see" invites you to see the landscape with different eyes and to follow the process all the way to the lake landscape while getting involved in the creation.

One of the initial touristic IBA projects in the Lusatian Lakeland is a spectacular look-out tower. This landmark of rusty Corten steel was built in a present-day architecture. It is a metaphor for history, presence and future of Lusatia – a powerful sculpture as a memento to an industrially produced landscape which is converted into a modern water sport region. This landmark is the only building structure in the entire lakescape in memory of the industrial origin of the Lusatian Lakeland.

This is why the marketing for the ENERGY Route starts here. An information stele explains the interrelation and invites visitors to go and see the sites along the route. Anyone who follows the trail will find out how the landscape has evolved. Thus the IBA in Lusatia supports also the identity shift 'from mineland to lakeland – from miner to sailor'.



(© author)

CONCEPT OF THE ENERGY ROUTE

The ENERGY Route offers to its visitors impressive experiences concerning the topic of energy being the determining factor of Lusatian industrial history. The clear orientation towards the topic 'Energy' as well as the conscientious choice of the ten participating locations was the result of a long and intensive discussion process on a regional level which by the interconnection of parallel developments finally led to a fruitful network of the different sites.

This network is organised as an interest group of an advisory council and 10 locations. The advisory council is composed of regional tourism associations and the IBA Fürst-Pückler-Land. The IBA-Fürst-Pückler-Land performs the tasks of a coordination office until 2010 and will hand it to another partner of the ENERGY Route from 2011.

The interest group 'ENERGY Route' developed criteria for the admission of locations. These criteria are based on the experiences of the 'European Route of Industrial Heritage' (ERIH), the 'Route of Industrial Heritage' of the Ruhr region as well as of the Lusatia Strategy Group. The purpose was to develop a clear profile, i.e. to enter the tourism market with an unequivocal topic in order to be perceived on an (inter)national level.

The basic concern was to impart regional industrial history in a genuine and event-oriented way. Original industrial locations with existing tourism structures were admitted only, with a special emphasis on large industrial complexes which are typical for Lusatia.

The locations have been registered by a questionnaire and have been analysed by means of a list of quality acceptance criteria. The aim was to find out interesting tourist locations and to promote those places with the utmost honesty. On the basis of a 3-level system, the chosen locations were classified into highlight locations, places of interest and insider tips, i.e. places not yet completely developed but worth to be discovered. This procedure was chosen to guarantee that the visitors get a distinct picture of each attraction and visit the site with realistic expectations. One further important aspect of the route is that it continues admitting new locations provided that they meet the quality acceptance criteria.

For advertising, the highlights are put first – like 'light-houses' the highlight locations are promoting all the locations of the route, just as the Eiffel Tower promotes

the places of interest of the city of Paris. However, great importance is attached to the equality of the partners regarding the co-operation concerning the content.

Launched in 2007, the ENERGY Route links ten surviving witnesses of the industrial past – including working open-cast mines, bizarre transitional landscapes and modern power plant technology – to form one long chain of discovery for tourists. The sights of the ENERGY Route explain the old and the new landscape and tell the exciting story of Lusatia's industrial heritage. The route offers a complete overview from coal mining to coal treatment and even includes active factories. In addition, the route also includes other forms of energy production, as for example a diesel electric power station.

MARKETING

One important impetus for marketing the ENERGY Route, which is mainly financed from membership dues by the 10 locations, was provided by lotto funds made available by the Ministry of Infrastructure of the State of Brandenburg. These funds were used to finance the information stele at the landmark, marking signs for the 10 locations and various presentation media for trade fair appearances in 2009/2010. In addition, the website <http://www.energie-route-lausitz.de> was launched which is linked to the international website <http://www.erih.net>. Here detailed information about the route and its locations is available in English, German, French and Dutch.

EUROPEAN ROUTE OF INDUSTRIAL HERITAGE (ERIH)

The determined and purposeful approach of the ENERGY Routes' development proved to be successful. ERIH being a network of the most important locations of European industrial heritage admitted the ENERGY Route as one of 11 'Regional Routes'. The Regional Routes are supposed to develop landscapes and regions marked by their industrial history, as for example the Ruhr region in Germany or South Wales in England, the 'first industrial nation of the world'. The ERIH-network is growing continuously and is supposed to be extended in Eastern Europe as well within the next years.

ENERGY Route – Highlight Locations

1. Visitor Centre IBA Terraces

Starting point for tours on foot, by bicycle, jeep and bus into the former mining region which is changing into the Lusatian Lakeland.

2. F60 Visitor Mine

A former overburden conveyor bridge. The largest mobile technical facility that was ever built in the world now has the nick name 'lying Eiffel Tower' and is one of Lusatia's most famous attractions.

3. Energy Factory Knappenrode

Located in a briquetting plant of the 20th century. Lusatian mining history is displayed in twelve exhibition and experience sections. Shifts start three times a day!

4. Art Museum Dieselkraftwerk Cottbus

The collections of the Diesel-fuelled Power Station Museum and changing exhibitions are presented in a technical ambience.

ENERGY Route – Places of Interest

5. LOUISE Briquetting Plant

19th century technical equipment that is still functioning in live steam operation revives active production time.

6. Plessa Event Power Plant

A first-generation power plant. The 'Coal Path' illustrates how electric power was generated from lignite in the last 100 years.

7. Schwarze Pumpe Power Plant

One of the most modern lignite power plants of the world with fascinating futuristic architecture.

ENERGY Route – Insiders Tips

8. Lauchhammer Bio-Towers

The wastewater purification towers of the disused industrial cokery plant are today a lookout point and a grand and impressive setting for various events.

9. 'Marga' Garden City

A company town presenting ambitious urban architecture. The first garden city in Germany is reputed to be the most beautiful industrial housing estate in Lusatia.

10. Welzow-Süd Open-cast Mining Site

An active surface mine with several lookout points at its edges plus exploration tours of the abandoned open-cast mine with cross-country vehicles.

The decisive factors for the successful establishment of the ENERGY Route were, in my view, the long-standing broad-based networking activities within the region and fruitful professional contacts on the supra-regional and international level. This approach ensured that the project could be discussed in the whole region over several years with involvement of external experiences and specific benchmarks for Lusatia could be developed. A further success factor was that appropriate points in time were used to advance the project in phases. A critical mass for a route devoted to the energy topic, however, was only formed after the official inauguration of the IBA projects Visitor Mine F60, Visitor Centre IBA Terraces, Plessa Event Power Plant, Lauchhammer Bio-Towers and 'Marga' Garden City.

Preservation, re-utilisation and networking of these important sites of Lusatian energy industry into an event-oriented tourism product under the umbrella of the IBA have made an essential contribution to strengthening the touristic profile and unique selling proposition of the Lusatian Lakeland.

All efforts towards making disused factories, power stations and landscapes heavily affected by industrial use into elements of an attractive new landscape will increase the chances to preserve such industrial heritage. Successful integration of heritage sites plays a key role in a new perception and assessment of cultural and design qualities of landscape.

For further information see:

URL: <http://www.iba-see2010.de>

URL: <http://www.energie-route-lausitz.de>

SUMMARY

The ENERGY Route is an excellent example to illustrate how IBA is developing projects in cooperation with partners to build bridges between the region's tradition and future. The ENERGY Route is a guide post to understanding the basic turnaround of a whole region.

A7 Art and the Industrial Revolution

Organizer: Axel Fohl (Germany)

Since its beginnings, art and architecture reacted in a very creative and imaginative way to Industrialization. TICCIEH has not paid sufficient attention to that phenomenon. The section "Art and the Industrial Revolution – The iconography of Industry" asks for contributions that research the vast cosmos of art, graphic and applied art as well as architecture in regards to the representation of technological and industrial processes and developments in paintings, books, journals, printed matter and the inside and outside of buildings from railway stations to cathedrals, from factories to town halls.



When Mechanization took Command – The Impact
of Industrialization Mirrored in Literature and
the Arts – Prometheus and Pandora

Franziska Bollerey

"When Mechanization took Command" points at the fact of a conquest: the conquest of the pre-industrial world by the machine. This triumph of mechanization in all its positive and negative connotations is a janus-headed phenomenon. In Greek mythology we find for this combination the figures of Prometheus and Pandora.²

The recurrent theme in all reflections and interpretations of mechanization is the idea that devices having transcended their original purpose of serving humanity in order to lead a life of their own, which still is the case in today's virtual world. The words quoted above mark the imagery including literature and the arts as part of the cultural reaction to rapid industrialization. The situation was described very well by Marshall Berman in his classic study "All That is Solid Melts into Air", where he examines modernist culture in terms of its expression of both the great hope for a new world to come as well as the anxiety over an uncertain future in an era of accelerated transformation.³

Progress, modernism and cultural pessimism in this context are topoi that are discussed again and again. "Still against another error that is very much in fashion today and against which I will be on my guard like against hell: I am speaking about the idea of progress. This dark signal ... this modern lantern throws its darkness over all objects of awareness",⁴ writes Charles Baudelaire.

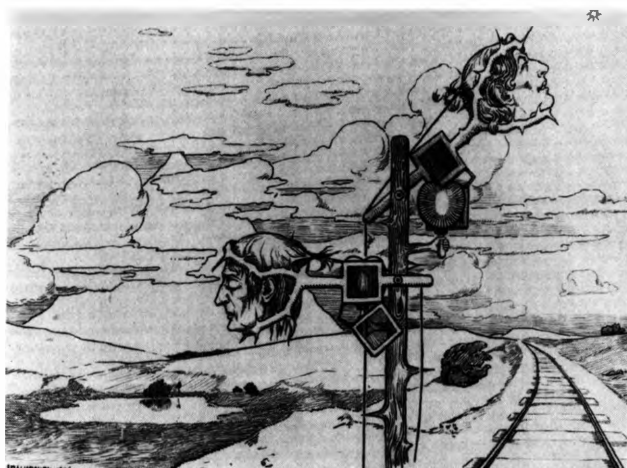
Likewise, a drawing by Hans Baluschek, a Berlin fin-de-siècle painter "Railway installation with symbolic human heads" from 1896⁵ can be interpreted as a signal of casting doubt on the concept of progress. Imbedded into a land-

scape on the right hand side of a railway line a signal post is standing. It is not made from iron or concrete, but resembles a thorny tree trunk. Besides two small signal arms – portrayed as real arms with hands – two poles are fixed to it shaped like branches with thorny twigs that clench two heads. A signal rope connects the tufts of hair at the back of the respective heads. The head on the left with closed eyes and furrowed face is fixed to the signal post horizontally. The right head, pointing upward diagonally gazes at a star open eyed. This tableau speaks – as already indicated – of demonization but likewise of a glorification – with a question mark – of a mechanized world.

EARLY INDUSTRIAL LANDSCAPES

Next to scientific publications painting and literature – followed by photography and film – are the media commenting the changes evoked by industrialization.

In an early phase of portraying production processes and the industrial landscape that Francis D. Klingender⁶ analyses as one of the first, painting still very much remains in the realm of traditional styles such as landscape painting. Philippe Jacques de Loutherbourg's (1740–1812) view of Coalbrookdale from 1810/05 adopts even the foreground motif from Nicolas Poussin (1594–1665) and Claude Lorrain (1600–1682). What are antique spoils with Poussin and Lorrain, Loutherbourg and Thomas Hornor Hull (Rolling Mills, ca. 1817) picture as cast iron components such as fluted columns. Another view of Coalbrookdale, William Pickett's Iron Works (ca. 1805, after Joseph Wright of Derby) shows the nightly spectacle of production with flames rising to the sky.



"Railway Installation with Symbolic Human Heads"
Hans Baluschek, 1896



From above left to below right: Joseph Wright, "Arkwright's Cotton Mills by Night", 1782/83; Philippe Jacques de Loutherbourg, "Coalbrookdale by Night", 1801; William Pickett, "Ironworks Coalbrookdale", 1805; Thomas Hornor, "Rolling Mills Merthyr Tydfil", ca. 1817

Aesthetic principles formulated by William Gilpin⁷ and most notably Edmund Burke⁸ stimulated artists to poetically interpret their motifs. Here the categories of the "Sublime" as well as of the "Picturesque" gain access to the depiction of extraordinary natural phenomena (J.M.W. Turner's "Fall of an Avalanche in the Grisons", 1810)⁹ but also to spectacular processes of production or later revolutionary changes in transport, exemplified in Turner's "Rain, Steam and Speed – the Great Western Railway", 1844.¹⁰

... AND IN THE CENTRE THE BLAZING LIGHT

Richard Arkwright's cotton mill, too, painted by Joseph Wright of Derby in 1782/83 bears the trait of the sublime and the picturesque. In a dramatic moon-sky-clouds landscape, embedded in a dark nightly foreground, the blazingly lighted factory building jumps into the beholder's eye. Natural and artificial light do not seem to compete. Still the latter constituted a breach with times pre-industrial and therefore was predestined to catch the painter's attention. Artificial lighting also indicates working conditions that became subjected to the optimal exploitation of the machinery.

Parallel to an industry embedded into the landscape – I will refer to the matter of "Vanishing Countryside and Changing Townscape" further down – the very process of producing things catches the attention of the painter. Joseph Wright of Derby,¹¹ who has already been mentioned, in his paintings "A Black Smith's Shop", 1771, and "An Iron Forge", 1772 shows small scale scenes from pre-factory-era production. Blistering iron emitting light and enormous heat is in the centre of activities. As in Peter Paul Rubens' "Woman at Charcoal Fire", ca. 1619, the faces of the bystanders appear in reflected light. "... and in the

centre the blazing light" is a topos that can already be found in the works of Georges de la Tour. Here, too, the vision is guided by the source of light as in "Adoration of the Shepherds", ca. 1640 or "The Players", ca. 1650 or before that in Rutilio Manetti's "Gamblers", although these paintings treat different subjects.

In 1895 Maximilien Luce will arrange his painting "Steel-works" with lookers-on like a flaming stage play. And earlier Adolph Menzel in his painting "Rolling Mill", 1872–1875,¹² puts the glowing iron slabs, contrasted against the workers standing by, into the centre.

This painting would merit a more elaborate interpretation since processes from the periphery of production such as the lunch break depicted at the lower left hand corner of the picture also are shown. Before the setting up of factory canteens it was common for worker's wives to bring meals into the factory or up to the factory gates.

In 1875, the year of the completion of Menzel's painting and during the phase of the economic boom of the "Gründerzeit", the Prussian "Verein für Gewerbefleiß" ("Association for Manufacturing Zeal") celebrates the hundred years' anniversary of James Watt's improvements of the steam engine. Ernst Engel, director of the Statistical Office of Prussia, anthropomorphizing steam and engine, speaks of a marriage. "The Husband was a true child of Nature, of ancient stock, whose hot-headed ancestors went so far back as to have witnessed the creation of the world, while the wife's family was much younger, as not long ago 'they were very simple and rough hewn people', writes Minsoo Kang in his article worth reading "The happy marriage of steam and engine produces beautiful daughters and bloody monsters ...".¹³



Maximilien Luce, "Steel Works", 1895; Adolph Menzel, "Rolling Mill", 1872–1875

Rutilio Manetti, "Gamblers", 1628; Georges de la Tour, "Dice Players", ca. 1650; Georges de la Tour, "Adoration of the Shepherds", ca. 1644; Peter Paul Rubens, "Woman at Charcoal Fire", ca. 1619; Joseph Wright, "An Iron Forge", 1772; Joseph Wright, "A Blacksmith's Shop", 1771

Engel's eulogy, cited in Dolf Sternberger, goes on: "The marriage performed in 1775 is, despite the vast differences between the spouses, one of the happiest on the face of the earth and is still in its heyday. And it is also the most fruitful. Its offspring numbers in the hundreds of thousands. With very few exceptions, they are the best bred, hardest working, and most docile of creatures. They never rest by day or night and are veritable models of obedience and temperance ... Wherever we build huts for them and treat them properly, their entrance is followed by success and abundance close at their heels."¹⁴

CAUGHT IN THE COGWHEELS OF MACHINES

Obedience, abstemiousness and the willingness to work night and day are the demands of the "Lords of the Machines" from the "Servants of the Machines". This submission under the machine resembling a symbiotic state originates – as we have already seen in the context of Richard Arkwright's factory – in the uninterrupted operation of the machines. Treadmills, common in English workhouses, are the predecessors of a workforce chained to the mechanism. Complete subjugation happens in the very moment when machines dictate the rhythm of work. Driving and conveyor belts and cog wheels define the tempo of work. Numerous documents illustrate this. Among the best known is Charlie Chaplin's film "Modern Times".¹⁵ It is a striking document that translates the assembly line working conditions and the human response to it. The New York Herald Tribune's commentary on the premiere on February 7, 1936 goes like this: "It is the story of an individual who, eight hours a day, year in and year out, must perform the same motion, and for whom the

whole world is transformed into nuts to be turned by his wrench. The monotony and compulsion of the high-speed conveyor belt destroy his mental balance. The mechanized individualist goes mad and proceeds to turn the factory into the madhouse that it really always has been."

Fritz Lang, too, in his film "Metropolis" shows a worker manipulating the clock hands of the big central machine who is not up to the demands of the rhythm of the mechanism.

Expressionist poet Paul Zech who was also a social critic writes in his poem "Proletarian":

"You are turning round and round like a carousel
And have to be quietly guided step by step
With duress that spoils your year with piercing whistles
That swipe you up when you are becoming tired and white."¹⁶

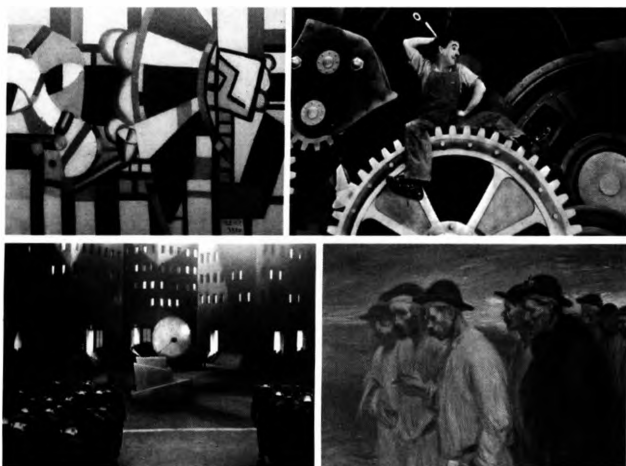
Zech dedicates a whole collection of novelettes to the topic of conditions of work: "Der schwarze Baal" ("Black Baal") in 1917. Common to all these short novels is the motif of poverty, exploitation and death in German, French and Belgian coal mining areas. "Coal mines where waste tips glower like giant butcher's dogs over the hungry flocks of men like servants of an idol of Black Baal", Zech writes.¹⁷

None less than Vincent van Gogh (Return of the Miners, 1880)¹⁸ as well as Constantin Meunier with a painting of the same title and his cycles at the beginning of the 1890s¹⁹ or Théophile Alexandre Steinlen's "Les mineurs"²⁰ portray these conditions. Émile Zola's "Germinal", 1885²¹ is the literary counter-piece for these pictorial commentaries.

"Everywhere in the morning fog the flock of workers wandered along still half dark paths, long columns of men with lowered heads like cattle being led to the slaughterhouse. They shuddered in their linen coats, they crossed their arms and rounded their backs ... and you could tell of these masses that came back to work mute and gloomy, without a laugh without a side glance that they secretly were gnashing their teeth and that they solely had given in following the command of their stomachs."²² This description can be read as a commentary to Fritz Lang's film "Metropolis".²³

MEN AT WORK

The realistic description of working conditions in the industrialized world also knows its antipode: glorification. As heroization of the machine occurs, so there also exists a heroization of the worker. We can find it in the photo-



Fernand Léger, "The Blue Wheel", 1929; Charles Chaplin, *Modern Times*, 1936; Fritz Lang, Film Still from "Metropolis", 1927; Théophile Alexandre Steinlen, "The Miners", 1903

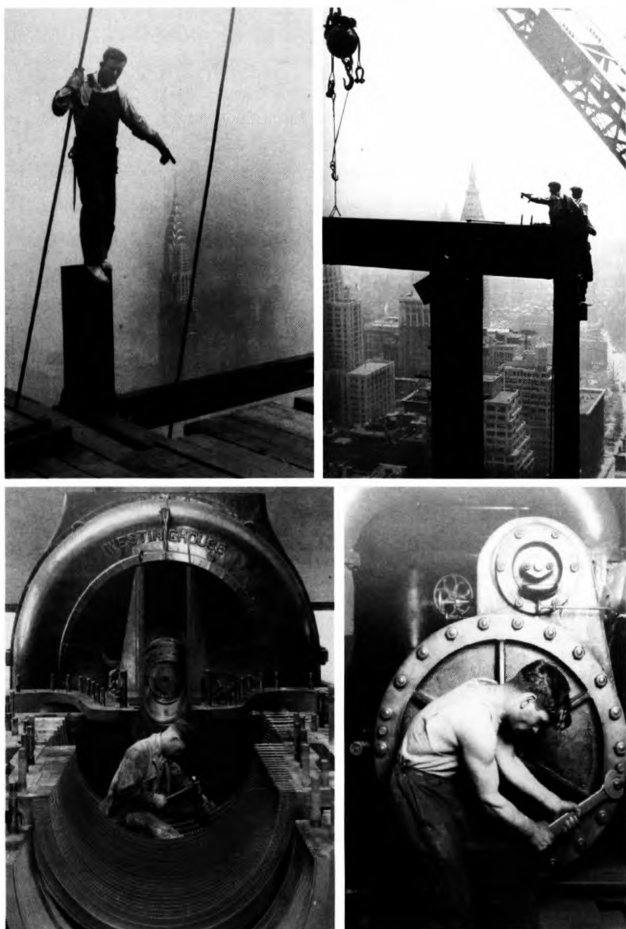
graphs of Lewis Hine. "This is a book of Men at Work" he writes in 1932 in a preface titled "The Spirit of Industry", "men of courage, skill, daring and imagination. Cities do not build themselves, machines cannot make machines, unless in back of them all are the brains and toil of men. We call this the Machine Age. But the more machines we use the more do we need real men to make and direct them."²⁴

"Hine looked at working men with his camera and found a strength in them and a pride in their work that was common to all," Johan L. Doherty writes (preface) and continues: "They are not dwarfed by the construction of a grand turbine or railroad car or a great skyscraper, for they are the ones who built them ... In 'Men at Work' Hine elevated the American worker to the status of a hero."²⁵

Studying his photographs, film shoots from Louis Trenker's film "Der verlorene Sohn" ("The Lost Son") come to mind that show Trenker himself as construction worker in dizzying altitudes above New York. The heroization

typical for Hine's photographs is also to be found after 1917 in amongst others the photographs of Alexander Rodchenko or the film documents of Dziga Vertov. It also is an essential ingredient of fascist propaganda in Germany and Italy in the 1920s and 1930s and, as a recent Berlin exhibition showed, also in the United States of America.

A predecessor of this propaganda since 1909 (first manifesto by F. T. Marinetti) were the actions and pronouncements of the Futurists.²⁶ Glorification of work goes along here with glorification of the machine, likewise of mechanization and acceleration. The admiration expressed in futurist painting, sculpture and texts reminds us of the eulogy voiced by Ernst Engel in 1875 in Berlin. But technophilia is not the futurists' concern as oriented towards the ideology of enlightenment as a rational domination of nature – as represented by the Encyclopédie – the futurists aim at a deployment of machines as an ideological means. For their desire to abolish and destroy the bourgeois world within the realm of art, literature and social



Lewis W. Hine, "Men at Work" several photos, 1920s



Top: Ernesto (Thayat) Michahelles, "Friendship", 1932
Bottom: Gino Severini, "The War", 1914



From left to right: Sasha Stone, "Ballet", 1926; Fortunato Depero, "Heads and Pipes", 1945; Albino Siviero Verossi, "Balilla", 1937

mores as well as politics, machines have to play the role of the destroyers but also as creators of new social conditions. The ideology of war and destruction as bases for change (Gino Severini: "The War", 1914) seamlessly morph into Benito Mussolini's propaganda: "operare insieme, cantare insieme, pugnare insieme".

If enlightenment still strove for the liberation of the individual from the restraints of absolutist sovereignty and the church, it is now the subordination of the individual. "Credere, obedire, combattere" is one of the central mottoes of Italian fascism. Obedience towards the machine as demanded in the early times of industrialization now transforms itself into obedience towards an ideology. Art comments on this change by depicting man in serial form. Men mutate into uniform objects. In their indiscriminate they resemble machine made objects. Man and machine merge into a symbiosis.

Consequently the Futurists were anarchist in political alignment and overtly anti-romantic in their aesthetics, their works filled with dynamic images of motion, speed, transformation and cataclysmic destruction followed by an equally awesome rebirth. What appealed to Marinetti about modern technology was precisely its ability to bring about such rapid changes by forcing people to reconsider the very notions of space and time, a process that was under way in the general culture of Western Europe during this period, through the expanding use of machines such as trains, automobiles, airplanes and the telegraph.²⁷

STEAM AND VELOCITY

Initially we spoke of a union of steam and engine and their "offspring". Probably the most revolutionary "child" was the railway. Maybe still more efficient than the mechanization of production processes the railway system altered the perception of space and time, as Wolfgang Schivelbusch²⁸ so adequately analyses. Its appearance triggered manifold utterances by writers and painters.

"There it rushes along with roaring train
Past meadows and woods ...
Clouds of Steam obscure the dimming picture
And below the white surging round dance
But below me it is stomping and smashing wildly
And below me it is not going to be silent"²⁹

comments the German poet Gerhart Hauptmann in his poem "Im Nachtzug" ("In the Night Train").

Georg Heym writes:

"Clouds of Smoke, pink, like a spring day
Which quickly the black lung of trains discharges
Sail down the river that hugely rafts

...

Trains thunder on the mile-track
That runs into the woods, the day's silence
Their smoke rises like a fire flame"³⁰

Both quotations can be read as commentaries of two famous paintings: J. M. W. Turner's "Rain, Steam and Speed", 1844,³¹ already mentioned and Adolph Menzel's "Die Berlin-Potsdamer Eisenbahn", 1847.³²

Another German author describes the experience, portrayed by Menzel in a sketch: "He opened the window and leant out. The wheels rhythmically stamped and roared along under him, rain and soot hit his face and out of the dark shadows rushed towards him, gawked at him with their glowing lights and reared up as if to throw themselves over him and ripped themselves back into the night lightning."³³

It is Theodor Fontane who casts a critical light on human hubris concerning the "offspring" of industrialization in his poem "Die Brücke am Tay" ("The Tay Bridge"):

"And it was the train. At the Southern tower
It wheezed by against the storm.
And Johnie said: 'Only the bridge still.'
But whatever, we are going to make it.
A firm boiler, and double steam
They will be victors in such a fight,
And how it may rage and wrestle and run
We will knuckle it under, the element."³⁴



Top left: J. M. W. Turner, "Rain, Steam and Speed" 1844; bottom, left: Adolph Menzel, "Die Berlin-Potsdamer Eisenbahn", 1847; right: A. Menzel, "Running Train", 1881

The locomotive itself also becomes a motif for painting, mainly in its frontal view with its headlamps like giant eyes and generally in its anthropomorphization. This also occurs in literature, for example in Emile Zola's "La Bête humaine"³⁵ and in Gerhart Hauptmann's "Bahnwärter Thiel" ("Lineman Thiel").³⁶ Locomotives are also protagonists in many films of the 1920s and 1930s such as Walter Ruttmann's "Berlin. Die Sinfonie der Großstadt".³⁷

The impressionists make the railway their topic. There is especially Oscar-Claude Monet with his pictures of railway stations (Gare Saint Lazare) or realists like Hans Baluschek or expressionists like Ernst Ludwig Kirchner.

They now show trains and locomotives within their urban environment where Turner or Menzel still depicted them crossing the countryside. It is hard to say in what measure criticism plays a role, criticism of the destruction of the landscape by separating, cutting and destroying it that today is associated with motorways. Turner's motif of the hare running in front of the locomotive can be interpreted as evidence for the superiority of technology, of the domination over nature.

VANISHING COUNTRYSIDE AND CHANGING TOWNSCAPE

"When mechanization took command": One consequence of this process was urbanization either of the countryside or in form of the extension of existing towns. One of the most striking comments on this is George Cruikshank's caricature "London going out of Town – or – The March

of Bricks and Mortar", 1829.³⁸ A veritable cannonade with bricks makes haystacks that bear contorted human faces run away. Bricks deploy. Cottages under black sooty clouds either already inhabited or still with scaffolding advance into the landscape.

What has been called by H. J. Dyos,³⁹ the great analyst of the Victorian City, "the full declension – meadow land to slum" did not usually occur in one generation,⁴⁰ but occasionally as in the case of North London (Camden and Kentish Town) with an explosive rapidity. "The changes have been so swift, the progress so rapid and sudden ...", writes Gillian Tindall in the "The Fields Beneath"⁴¹ and she continues: "Still, a feeling of regret will arise when the pleasing pictures are destroyed, and the regret at the uprooting of an old tree or the destruction of a field by its conversion into bricks, plainly shows an inherent love of nature which is implanted in the human breast ..."⁴²

Of course the most well known literary description of an industrial town is to be found in Dickens' "Hard Times": "It was a town made of red bricks, or better of bricks that would have been red if smoke and soot would have allowed for it, but as things lay, it was a town that was coloured red and black in an unnatural way like the painted face of a savage. It was a town of machines and of high chimneys from which endless snakes of smoke were winding upwards without ever getting tired."⁴³

"If you looked at Coketown under this weather from a certain distance, it was positioned in a self created



From above left to below right: Hans Baluschek, "Railway in Townscape", 1890; Claude-Oscar Monet, "Station Gare Saint-Lazare", 1877; Paul César Hellen, "Station Gare Saint-Lazare", 1885; Ernst Ludwig Kirchner, "Arriving at the Station Dresden-Löbtau", 1911



Top: George Cruikshank, "London Going out of Town – or – The March of Bricks and Mortar!", 1829; bottom, left: Vincent van Gogh, "Factories at Asnieres Seen from the Quai de Clichy", 1887; bottom right: Laurence Stephen Lowry, "Industrial Panorama", 1974 (© All images: Franziska Bollerey)

fog, obviously impenetrable by the sun's rays. The onlooker now did know that the city was there, just because he knew that without a city such a dark spot on the landscape would not exist. A spot of soot and smoke."⁴⁴

The portraying of the industrialized city – first in painting, later also in photographs and film – knows many examples from the dawn of industrialization to the paintings of Vincent van Gogh like "Factories at Asnières", 1887, or "Industrial Landscape at Montmartre", also 1887,⁴⁵ and further views of the North English industrial areas around Salford by Lawrence Stephen Lowry in the 1950s and 1960s.⁴⁶

Simultaneously with van Gogh the Austrian poet Peter Rosegger in "Jacob the Last. The Story of the Woodsmen", 1888, describes the process of rural exodus and the drift to the cities. As the following citation shows, he criticises the inexorable destruction of the environment as selfishness without any thoughts of future generations: "Today, even the thistle refuses to flower. Too much shadow everywhere. Down in Krebsau and further away people complain that there is not left enough woodland for them because the factories ate it all away, its enough now. People cannot moderate themselves any more, they cannot. Just like fast gain demands, so they act, they ask for nothing else. What our descendants will do does not matter to them."⁴⁷

Even more articulately Paul Zech, who has already been mentioned, defines capitalist greed in his poem "City in Iron" of 1911:

"The town opens wide its red lap of greed
And lets railways crash over bridges
There the freight with thousandfold weights rolls to-
wards this never satisfied belly
And steel turns into interest rates and coal into securities."⁴⁸

Pandora's box is open. Upon mechanization followed information technology. Also here it is true that a symbiosis of man and virtual networks leads to the same incapacitation as that of man and machine. "With an expertise earned through decades of work in this field [Internet] [Jaron] Lanier challenges us to express our essential humanity via the 21st century technology instead of disappearing in it", Dan Reed, Microsoft's vice president for extreme computing comments in the May 2010 edition of "Time" magazine.⁴⁹ Carl Sternheim utters a comparable warning: "That the massive wasting way of all of life's

utensils educated him (the consumer) not to regard the individual thing any more and to throw feelings, judgments and oneself away and use it up like everything else and being unable to give any quality to things."⁵⁰

Because every contribution of an artistic, literary but also scientific nature at the same time is an avowal to society, I would like to emphasize my position in relation to my initial thesis by a quotation of Herbert Marcuse's: "To a complete refurbishing or rebuild of our cities and towards the regeneration of the open country ... to the regaining of nature, after the force of technology has vanished and the power of capitalist industry will be broken, to the creation of an inner and outer space of silence, of individual autonomy and tranquillity, to getting rid of the noise, of the cultural dependence of the obsessive massing together, of dirt and ugliness."⁵¹

¹ Varying Sigfried Giedion's book title "Mechanization Takes Command", Oxford 1948

² Prometheus, a titan, "the one who thinks ahead", is a benefactor of mankind and a bringer of culture. Pandora, a woman endowed with all advantages, whom Zeus, who wants to punish mankind for the theft of the fire by Prometheus, sends to Epithemeus,

Prometheus' brother, "the one who always considers too late" with a clay jug filled with all evils that Epithemeus opens, and spreading evil amongst mankind.

³ Berman, Marshall: *All that is Solid Melts into Air. The Experience of Modernity*, New York 1982. Concerning the accelerated digitalization of the world Gilles Deleuze speaks of the passage from the analogous to the digital that simultaneously is the passage from a disciplinary to a controlled society. Norbert Schneider, director of the federal state agency for media of North Rhine-Westphalia, titles an article in "Frankfurter Allgemeine Zeitung" (10.8.2010) "The digital readers of mankind" and writes: "Who abandons himself to the net, becomes a man of the Second Creation. He allows the digital gods to make use of every means of control."

⁴ Baudelaire, Charles: *Exposition universelle (1855)*, in: *Oeuvres complètes*, Paris, Calman-Levy, 1899, 2nd vol., p. 580

⁵ In: Meißner, Günther: Hans Baluschek, Dresden 1985, p. 25

⁶ Klingender, Francis: *Art and the Industrial Revolution*, London 1947

⁷ Gilpin, William: *Observations relative chiefly to Picturesque Beauty, Made in the Year 1772 ...*, London 1786

⁸ Burke, Edmund: *A Philosophical Enquiry into the Origins of our Ideas of the Sublime and the Beautiful*, London 1757

⁹ J.M.W. Turner: *Fall of an Avalanche in the Grisons, 1810*. Oil on canvas, 90x120 cm, Tate Britain Gallery London

¹⁰ J.M.W. Turner: *Rain, Steam and Speed – the Great Western railway, 1844*. Oil on canvas, 91x122 cm, National Gallery London

¹¹ Cf. Daniels, Stephen: Joseph Wright, Tate Gallery London, n.d. and Solkin, David H.: Joseph Wright of Derby and the Sublime Art of Labour, in: "representations", summer 2003, no. 83

¹² Adolph Menzel: *Iron Rolling Mill*, Oil on canvas, 155x253, Berlin Staatliche Museen. Cf. For Menzel: Lammel, Gisold: Adolph Menzel und seine Kreise; and Adolph Menzel: *Bildwelt und Bildregie*, Dresden and Basel 1993

¹³ Kang, Minsoo: The happy marriage of steam and engine produces beautiful daughters and bloody monsters: descriptions of locomotives as living creatures in modernist culture, 1875–1935, in: Kang, Minsoo and Amy Woodson-Boulton (Ed.): *Visions of the Industrial Age 1830–1914. Modernity and the Anxiety of Representation in Europe*, Aldershot (GB) and Burlington (USA) 2008, p. 3–20

¹⁴ Sternberger, Dolf: *Panorama oder Ansichten vom 19. Jahrhundert*, Düsseldorf und Hamburg 1938; Sternberger, Dolf: *Panorama of the 19th Century*, New York 1977, p. 17/18.

¹⁵ *Modern Times*, USA 1933–36, 87 minutes, with Charlie Chaplin as chief character, director, script writer, producer, cutter and composer. The film was first shown on February 5, 1936

¹⁶ Paul Zech (1881–1946) cited after: Bullivant, Keith and Hugh Ridley: *Industrie und deutsche Literatur. 1830–1914. Eine Anthologie*, München 1976, p. 188.

¹⁷ *Kindlers Literaturlexikon*, München 1974, vol. 19, p. 8537

¹⁸ Vincent van Gogh: *Return of the Miners, 1880*, drawing 43x60 cm

¹⁹ Constantin Meunier: *Return of the Miners*, ca. 1890, Brussels, private collection; id.: *Mining Triptych: Descent. Calvary Mountain. Ascent*, ca. 1894, oil on canvas 140x85 cm, 140x170 cm, 140x85 cm, Musées Royaux des Beaux-Arts de Belgique Brussels. Both pictured in: *Neue Gesellschaft für Bildende Kunst (Ed.): Arbeit und Alltag. Soziale Wirklichkeit in der belgischen Kunst*, exhibition catalogue Berlin 1979

²⁰ Theophile Alexandre Steinlein: *Les Mineurs, 1903*, oil on canvas 81x65 cm, Musée du petit Palais Genève

²¹ Zola, Émile: *Germinal, 1885*, German translation Munich 1982

²² Op. cit., p. 597/598

²³ *Metropolis, Germany 1926*, director: Fritz Lang, script: Thea von Harbou, designers: Erich Kettelhut, Otto Hunte, Karl Vollbrecht, actors: Brigitte Helm, Alfred Abel; 93 minutes. Cf. *Metropolis. Un film de Fritz Lang. Images d'un tournage. Une coproduction du Centre National de la photographie et de la Cinémathèque Française*, Paris 1985.

²⁴ Hine, Lewis W.: *Men at Work*, New York 1932, preface

²⁵ Doherty, Jonathan (Ed.): Lewis W. Hine: *Men at Work. Photographic Studies of Modern Men and Machines (1932)*. Reprint New York 1977, preface

²⁶ Cf. Hulten, Pontus: *Futurismo and Futurismi*, exhibition catalogue Milano, Venice 1986

²⁷ Kang, Minsoo: Op. cit., p. 14.

²⁸ Schivelbusch, Wolfgang: *Geschichte der Eisenbahnreise. Zur Industrialisierung von Raum und Zeit*, Munich, Vienna 1977; English Edition: *The Railway Journey: The Industrialization of Time and Space in the Nineteenth Century*, Berkeley 1986

²⁹ Hauptmann, Gerhart: *Im Nachtzug, 1888*. In: *Sämtliche Dichtungen und Schriften*, vol. 1, ed. von Karl Ludwig Schneider, München 1964, p. 189.

³⁰ Schneider, Karl Ludwig (Ed.): Georg Heym: *Die Züge (1910)*, in: *Dichtungen und Schriften*, vol. 1, Munich 1964, p. 189

³¹ cf. footnote 10

³² Adolph Menzel: *Die Berlin-Potsdamer Eisenbahn*, Oil on canvas 1847, 42x52 cm, Alte Nationalgalerie Berlin

³³ Sack, Gustav: *Ein verbummelter Student (1910–1913)*. In: *Gesammelte Werke*, Berlin 1920, p. 215.

³⁴ Fontane, Theodor: "Die Brücke am Tay", 1880

³⁵ Zola, Emile: "La Bête humaine, Paris 1890. The novel was picturized a couple of times, amongst others by Jean Renoir in 1938. For Fritz Lang's "Human Desire", 1954, the novelette served as model

³⁶ Hauptmann, Gerhart: *Bahnwärter Thiel*, Berlin 1892

³⁷ Berlin. *Die Sinfonie der Großstadt*, experimental documentary, Germany 1926/27. Director: Walter Ruttmann, script: Karl Freund, Carl Mayer, Walter Ruttmann, first release September 1927

³⁸ George Cruikshank: *London going out of Town – or – The March of Bricks and Mortar, 1829*, etching, in: George Cruikshank: *Scraps and Sketches, 1828–1832*

³⁹ Dyos, H.J. und Michael Wolff: *The Victorian City, 2 vols.*, London and Boston 1973.

⁴⁰ Tindall, Gillian: *The Fields Beneath*, London 1977, p. 127

⁴¹ Op. cit., p. 162.

⁴² Ibid.

⁴³ Dickens, Charles: *Harte Zeiten*, München 1964, p. 506 (Original: "Hard Times – For These Times", London 1854).

⁴⁴ Op. cit., p. 605.

⁴⁵ Vincent van Gogh: *Factories in Asnières, 1887*, Oil on canvas, 72x54 cm, Saint Louis Art Museum. And *Industrial Landscape at Montmartre (Factories seen from a Hillside in Moonlight) 1887*, Oil on canvas, 21x46,5 cm, Van Gogh Museum Amsterdam

⁴⁶ Cf. McLean, David: *L.S. Lowry*, London 1978

⁴⁷ Rosegger, Peter: *Jacob der Letzte. Eine Waldbauerngeschichte*, Leipzig 1888, p. 335–338.

⁴⁸ Zech, Paul: *Stadt in Eisen (1913)*. Cited in: Bullivant, Keith und Hugh Ridley: Op. cit. p. 215.

⁴⁹ "Time" Magazine, 17.5.2010

⁵⁰ Sternheim, Carl: *Aus dem bürgerlichen Heldenleben. Schauspiele (1911–1916)*. In: *Das Gesamtwerk*, Neuwied and Berlin 1964, p. 53.

⁵¹ Marcuse, Herbert: *Befreiung von der Überflusgesellschaft*. In: *Kursbuch 16 (1969)*, p. 94.

Art and the Industrial Revolution.
Decorative Systems of Industrial Buildings –
a Foray into uncharted Regions

Axel Föhl

It is a good 240 years ago that James Watt took out a patent on his decisive improvements of the steam engine that on its part had been around a good seventy years already. It was also 240 ago that Richard Arkwright, peruke maker from Nottingham, took out a patent on his machine to spin cotton yarn "without fingers". Both events made the year 1769 to the moment in time that Walt Whitman Rostow was to call the "take-off-phase" of the Industrial Revolution.¹ From now on, it was impossible to ignore the changes that started to be noticeable first in England and, spreading from there, on the European continent and later in other parts of the world too. Industrialization changed and accelerated the life of each and every living soul since the last quarter of a millennium.

It also changed the way in which art reacted to the alterations caused by the mechanization and machinization, a process that Sigfried Giedion described by the title of his 1948 book as "Mechanization Takes Command",² a book he called "a contribution to anonymous history".

One year earlier, in 1947, another expatriate, Francis Donald Klingender published one of the first systematic researches into the way art reacted to the phenomenon of the industrial revolution: "Art and the Industrial Revolution".³ By art, Klingender exclusively understood painting and the graphic arts. The first version of his book argued from a decisively Marxist point of view, no glorification of the process of industrialization is to be found there. When Arthur Elton in 1968 prepared a second edition of Klingender's book, this perspective was distinctly attenuated.⁴

From quite another direction another group of protagonists approached the phenomenon of industry and art: In 1912, the steelmaking firm of Alfred Krupp celebrated its 100-year-anniversary by holding an exhibition titled "Die Industrie in der bildenden Kunst" – "Industry in the Visual Arts" – in the museum of art in Krupp's hometown of Essen.⁵

Exactly forty years and one World War later, in Düsseldorf another exhibition was held "Kunstausstellung Eisen und Stahl" – "Art Exhibition Iron and Steel".⁶

Behind both these ventures the intention stood to glorify industrial activity and to guild the business of production by a cultured attitude. In the Germany of 1952, another outspoken aim of the exhibition was to gloss over by culture the all too willing attitude of the German heavy industry to see Hitler's war preparations as a welcome opportunity to increase sales.

From the academic side, one first ambitious attempt to focus on the history of the representation of working processes in art that predated Klingender's book by twenty years, was Paul Brandt's "'Schaffende Arbeit und bildende Kunst" – "Productive Work and the Visual Arts" from 1927/1928,⁷ covering the entire period between Ancient Egypt and the present. Klaus Türk went one step further in the year 2000 by carrying forward this examination up to our present day.⁸ The latter work is seen through the eyes of the sociologist, not from the perspective of art history. It illuminates the respective society's interpretation of human labour under different socio-economic conditions.

Although what we have enumerated so far has never really mirrored mainstream academic research, it can be said now that over the last decennia the reflection of the world of labour and industry in art, at least where painting and the graphic arts are concerned, has earned a certain attention.

There are many museums that treasure corresponding works of art. To name just a couple, there is the Danish Arbejdmuseet, that together with Nordjyllands Kunstmuseum in 2007 held a magnificent exhibition called "Industriens billeder – Industry's Images"⁹ or the Museum of Modern and Contemporary Art in Rijeka/Croatia that holds a collection mirroring the industrial development of this important harbour and industrial city (cf. the contribution in this section by Daina Glavočić: "Industrial Landscape in Art").

Sculpture is another field of art, where we can state a seeping in of industrial motifs into a classical canon that for centuries had excluded allusions to labour and technology. In 1972, an essay traced this process that took place in the course of the nineteenth century involving names like that of Belgian painter and sculptor Constantin Meunier or Frenchman Jules Dalou. 1880 is the date that is introduced here as the first moment in time where workers or industrial work appears in sculpture.¹⁰

What however can be said after the 35 years I have spent in the business of researching and preserving industrial architecture, is that the extensive number of buildings that since the beginning of industrialisation have been erected in connection with manifold technical purposes from railway stations to slaughterhouses, from power plants to coal mines have not sufficiently been surveyed with respect to their ornamental and sculptural systems representing on their part the course of technological development.

These are systems of ornamentation – decorations, reliefs or architecture-bound sculptures – that on the one hand served as a kind of illustrated bible of the religion of technology, explaining new phenomena to a wider and often technically illiterate public.

On the other hand these systems also posed an enormous challenge for all kinds of artists that had to invent and develop artistic languages for the interpretation of a newly emerging technological world.

It is this act of having to create worlds of artistic expression for everyday use in rapidly changing and modernising surroundings that after my interpretation embodies a huge potential of creativity that had to be freed and developed and that hitherto has not found sufficient attention in proportion to its everyday presence for over two hundred years.

Step by step artists amalgamated the new manifestations of industry in an ever growing measure of perfection,

adding them to buildings that served the purposes of production, transport and supply and so helped to make them acceptable and understandable to a contemporary population that had to come to terms with this rapidly developing world.

Of course, systems of ornamentation and decoration of buildings are absolutely not restricted to the industrial age. From palaeolithic times up to the period after Adolf Loos spoke his verdict "Ornament und Verbrechen" ("Ornament and Crime") in 1908¹ and even beyond, ornamental and decorative elements and systems have been an indispensable part of architecture for every conceivable kind of building.

Antiquity, Gothic, Renaissance or Baroque all have cultivated systems of decorating buildings and the nineteenth century has given birth to a thoroughly research-based revival of ornaments of all styles of bygone ages. Neither is the informative character of architectural ornamentation anything new. If we think of the medieval guilds, we

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Marble plate with the exact representation of a water mill, 1648. (© author)



A 18th century warehouse in the Netherlands that shows barrels, bags or wrapped boxes as symbols of the transport trade. (© author)



Balcony of Antwerp's main railway station, ornated by a three dimensional rendering of a winged wheel from 1899. (© author)

find that they used a kind of ornamental abbreviation for the trade they were involved in that took the shape of either a tool or a product typical for the respective guild.¹² House signs may also often have depicted tools or for example a water mill. In the museum of Mantova/Italy we find a 1648 marble plate with the exact representation of a water mill complete with water wheel as a document for the acquisition of the building. Therefore motifs of technological character appeared on buildings already long before the industrial revolution.

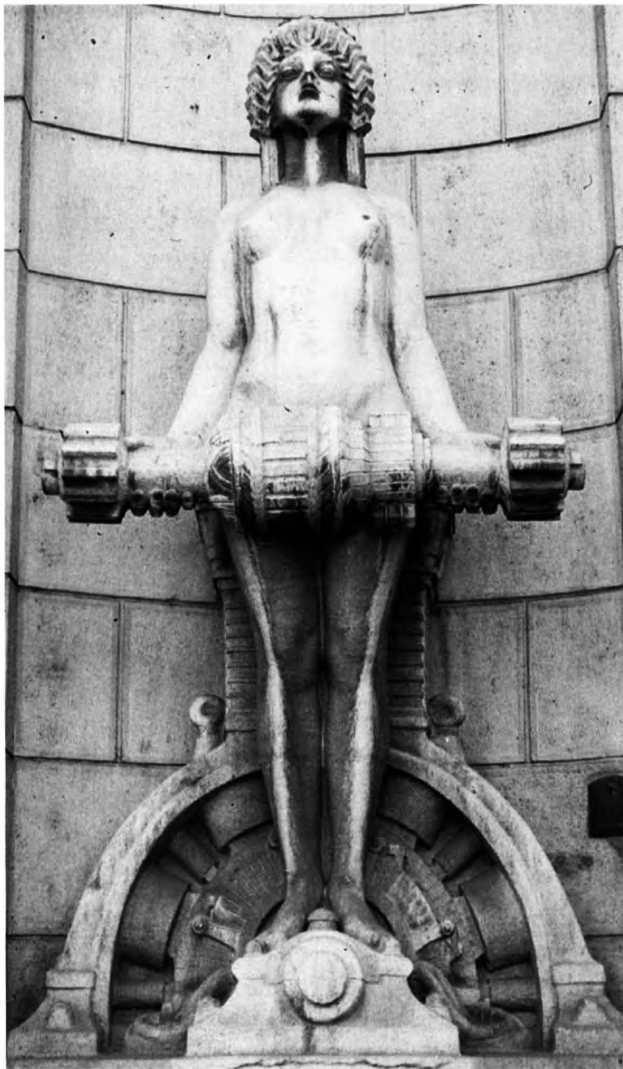
Now when the steam engine and textile machinery appeared on the scene for good around 1770 the architects had to face the task to design new building types such as a factory. A famous prototype in this context is Lombe's silk mill in Derby, erected for the Lombe brothers as early as 1718–1721,

that already housed water powered spinning machines.¹³ A little later, the dawning of the railway age from 1825 made for the necessity to invent the new building type of the railway station. From the Liverpool Street Station in Manchester from 1830 on, an architectural expression had to be found to accommodate steam driven rail transport.

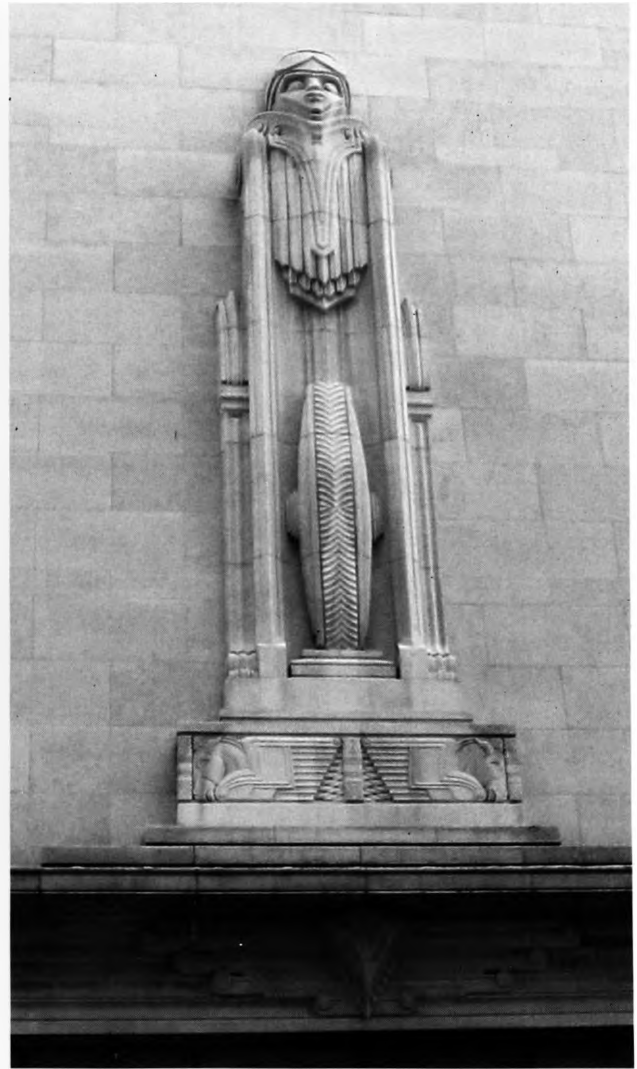
The first generation of industrial buildings sprang up without the involvement of any architect. Richard Arkwright's 1771 mill No. 1 in Cromford/Derbyshire was erected by millwrights as the persons most closely familiar with the requirements of mechanized production. Its "Spartan design offered few concessions to decoration or appearance".¹⁴

With commercial success, this was to change very quickly, but Arkwright's 1783 "Masson Mill" differed from its

A7



Sculpture by F. Ehrenhöfer of a nude woman standing on an electrical motor near the entrance to the Bolzano main railway station, A. Mazzoni 1928. (© author)



Liverpool's ventilation tower for the Queensway tunnel, an art deco landmark by James Rowse from 1932. (© author)



Administration building of the Stockholm electricity works; frieze of light bulbs garlanding the entrance translocated, 1892. (© author)

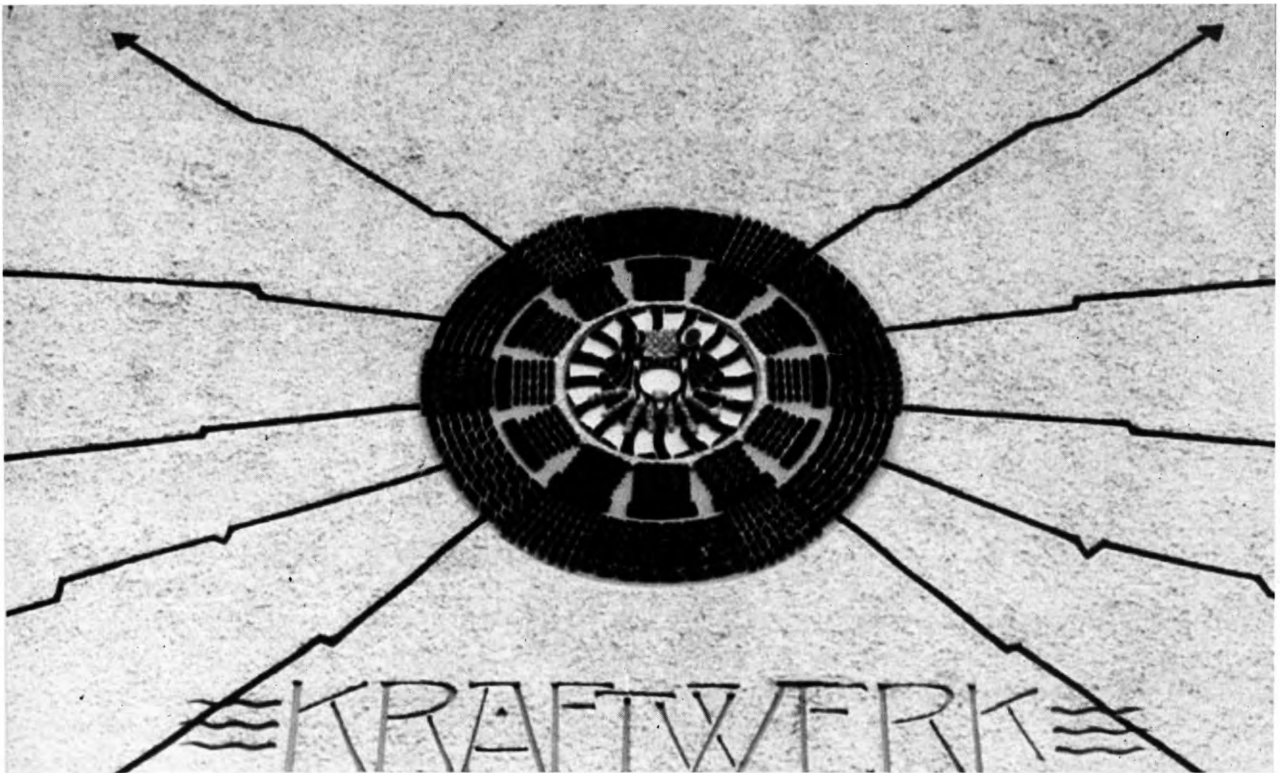


Rhenish electricity works; a renaissance-like scroll ornament holds light bulbs instead of a bunch of grape, 1905. (© author)

predecessor only insofar as it incorporated classical elements of architectural design such as the Palladio or Serlio motif of its staircase windows.

On the other hand we already can notice specifically work-related ornamentation in pre-industrial buildings,

may it be a 18th century warehouse in the Netherlands that shows barrels, bags or wrapped boxes as symbols of the transport trade or an early 19th century Italian spinning mill that uses Hermes' winged hat, his staff and the intertwined serpents as an indication of trading activities. In the course of time the industrial revolution then was to



Hydropower station of Heimbach-Hasenfeld; stucco ornament on machine hall front showing a combination of a turbine and an electrical motor, 1904 (© author)

multiply the number of buildings and facilities that came into being exclusively out of technical purposes.

We can only make a short choice here of categories within the technological development to illustrate the pervading character of the principle of information-giving ornamentation in industrial buildings.

THE RAILWAY STATION

At the beginning of the railway age the concept of the "conquest of time and space" was very present in the mind of the contemporaries.¹⁵ One very telling symbol for exactly this phenomenon was from the beginning of railway travel the winged wheel combining the concept of wheeled transport with the many connotations the figure of antique god Hermes evoked, amongst which travel and commerce dominate. The wings that were attached to the wheel of railway travel constituted another loan from antiquity: Chronos' attribute were the wings symbolizing time that by this new means of transport was conquered finally, as we can see for example at the front of the 1899 Antwerp railway station where a balcony is ornated by a three dimensional rendering of a winged wheel.

The newly developing building type of the "railway station", "Bahnhof" in German, the "yard of the railway" did not only bear the symbol of conquest over time on its facade. Space was another victim of railway travel. So if you look at the street façade of Paris' Gare du Nord, designed by Jakob Ignaz Hittorff and opened in 1865, there are no less than 23 statues of females symbolizing the different destinations that could be reached from here, distinguishing between national and international destinations like Frankfurt or Amsterdam, Rouen or Amiens. In Paris, this tradition had already started with the 1847 Lyon railway station.¹⁶ The building type of "railway station" from the beginning has been a projection screens for local, regional or national issues. One of the most magnificently decorated station concourses is the hall of the São Bento station, built 1914 in Porto/Portugal. Here white and blue decorated tiles tell rural but also national stories. If one leaves the station, one notices large-scale tile clock faces with the central motif of a locomotive that seems to drive out of the picture between two telegraph poles.¹⁷ In Wrocław/Poland the motif of speed symbolized by a running locomotive takes on three dimensional forms: crowning the top of the triumph-arch-like side front of the 1874 Freiburg railway station, a larger-than-life Hermes and a goddess probably symbolizing speed



Dortmund industrial merchant's house. Pediment showing tools and implements of the coal mining and iron industry, 1900. (© Axel Föhl)



Budapest insurance administration building with multiple sculptured representations of industrial accidents, 1930 (© author)

flank the front of a locomotive that seems to drive out of the façade in a nearly threatening manner.¹⁸ More examples could be given nearly indefinitely. One last document concerning rail traffic may be the 1928 Bolzano railway station by Angiolo Mazzoni, where the naked expressionistic figures of a man and a woman stand on parts of a generator, holding the rotor of an electrical motor to proudly indicate the commencement of electrified railway travel. Not only rail, but also automobile traffic generated figurative representation: Liverpool's ventilation tower for the Queensway tunnel, an art deco landmark by James Rowse from 1932, shows a goggled car driver on top of a much larger-than-life car tyre.

BUILDINGS FOR ELECTRICITY

Another sector representing an exuberant urge to decorate its buildings was the flagship of the second industrial revolution, electricity. As a commodity that at first had to fight for its market, the propaganda motif might have been strong from the beginning. Again the diversity of decorative motifs is so enormous that one can only stick to a very few examples: The most striking element that by and by gained access to every household was the electric bulb and consequently we find it on the façade of many buildings related to the generation of electricity. From the 1892 administration building of the Stockholm electricity works,¹⁹ where we find a frieze of light bulbs garlanding the entrance to the 1905 front of a Rhenish electricity works²⁰ of 1905 where a renaissance-like scroll ornament holds light bulbs instead of a bunch of grapes the element of the light bulb heralded the new way of lighting apartments as well as city streets. Power plants have been decorated since the late 19th century

by all kinds of implements associated with the technology of creating light and power: electrical motors, generators, insulators or the ubiquitous symbol of electricity, Zeus' thunderbolt. This latter arrow shaped motif we find from the art-nouveau hydropower station of Heimbach-Hasenfeld from 1904, where it is combined with the representation of the turbine blades and generator coils that exactly tell the passer-by in what way electricity is created inside the building, to the 1930 transformer station in Budapest's Markó utca, where an expressionistic heroic figure throwing lightning bolts crowns the door of the building, today occupied by a Russian bank.

One can go on endlessly – such is the wealth of the illustrative world of technical buildings. The mining industry has its ubiquitous mallet-and-iron motif that adorns mining sites as well as miner's tombstones or workers' dwellings. Every kind of product has been depicted to give information about what is manufactured behind a building's walls from beer barrels in the Pilsen brewery to guns in a Düsseldorf metal works. Raw materials have been portrayed from Titus Salt's alpaca as the base of his spinning success in Bradford/England to the stately ram's heads in the woollen district of Verviers/Belgium. Every kind of tool or machine appears on the walls of factory buildings from pincers on Cologne banks to pneumatic drills in the Russian Urals. Entire processes of production appear on facades from bread baking to the reading of gas meters, from carrying coal underground to turning cog wheels.

In short: it may be clear by now what wealth of historic sources lies hidden untapped and unused. Neither art history, nor history of technology nor history of archi-

ecture has so far sufficiently taken cognizance of this field of interpreting the past. All kinds of information are waiting to be exploited here: matters important to the development of the arts, evolvement of styles, questions of how society was informed, manipulated or interested, the question if it does not establish a quality when buildings tell us of their purpose and whether one should not strive for the inclusion of such elements of architecture in contemporary building.

It can be said that the period of creative, enlightened and inspired artistic activity in the field of embellishing the buildings of the industrial age came to a tentative end around 1960. So we have a time span of about 150 years to consider and to find out what discoveries from this period can contribute to our general knowledge of history since the industrial revolution.

A good place to start would be the 1930 Budapest building of an industrial insurance company where the whole imposing building was by a group of different sculptors decorated with a sheer endless band of friezes depicting all kinds of accidents that can befall the participants of the industrial life (Figure 11). Even this slightly ghastly very long frozen film throws light on our knowledge of living and working conditions in bygone times that can be obtained in no other way than by making use of this so far underchallenged historical source.

¹ Walt Whitman Rostow, *The Stages of Economic Growth: A non-Communist Manifesto*, Cambridge/USA 1960

² Sigfried S. Giedion, *Mechanization Takes Command*, a contribution to anonymous history, Oxford 1948; German edition: *Die Herrschaft der Mechanisierung. Ein Beitrag zur anonymen Geschichte*, Frankfurt a.M. 1982 (!)

³ Francis Donald Klingender, *Art and the Industrial Revolution*, London 1947; German edition: *Kunst und industrielle Revolution*, Dresden 1974 (following the 1968 edition of Arthur Elton)

⁴ Francis Donald Klingender, *Art and the Industrial Revolution*, rev. and ed. by Arthur Elton, New York 1968

⁵ Cf. Lutz Engelskirchen, *Eisen und Stahl. Ausstellungen zum Industriebild in Deutschland*, in: *Die zweite Schöpfung*, exhibition catalogue Berlin 2002, p. 108–113 (catalogue financed by the same firm of Krupp that held the 1912 exhibition in Essen)

⁶ Kuratorium Kunstaussstellung Eisen und Stahl (Ed.), *Kunstaussstellung Eisen und Stahl*, exhibition catalogue Essen 1952

⁷ Paul Brandt, *Schaffende Arbeit und bildende Kunst*, 2 vol., Leipzig 1927/28

⁸ Klaus Türk, *Bild der Arbeit. Eine ikonographische Anthologie*, Wiesbaden 2000

⁹ Hanne Abildgaard and Aase Bak (Ed.): *Industriens billeder*, exhibition catalogue, Odder 2007

¹⁰ Josef Adolf Schmoll genannt Eisenwerth, *Denkmäler der Arbeit – Entwürfe und Planungen*, in: Hans-Ernst Mittig, Volker Plagemann (Ed.): *Denkmäler im 19. Jahrhundert. Deutung und Kritik (=Studien zur Kunst des 19. Jahrhunderts 20)* München 1972, p. 253–281; 443–464

¹¹ Adolf Loos, *Ornament und Verbrechen*, Wien 2000 (reprint of the 1908 original)

¹² For examples see: Karin Depicker and others, *Enseignes, images de pierre. XVII et XVIII siècles*, Alleur/Belgium 1991

¹³ Edgar Jones, *Industrial Architecture in Britain 1750–1939*, London 1985, p. 16f.

¹⁴ id., p. 24; in this context also very interesting: James Maud Richards, *The Functional Tradition in Early Industrial Buildings*, London 1958

¹⁵ Wolfgang Schivelbusch, *Geschichte der Eisenbahnreise. Zur Industrialisierung von Raum und Zeit im 19. Jahrhundert*, München/Wien 1977; English Edition: *The Railroad Journey: The Industrialization of Time and Space in the Nineteenth Century*, Berkeley 1986

¹⁶ Karen Bowie (Ed.), *Les grandes gares parisiennes du XIX siècle*, Paris 1987

¹⁷ Axel Föhl, Manfred Hamm, *Bahnhöfe*, Berlin 1984, p. 98–100. 140

¹⁸ Janusz Dobesz, *Die Breslauer Bahnhofsarchitektur im 19. Jahrhundert und ihre Beziehung zur Schinkel-Schule*, in: *neue heimat Monatshefte* 3/81, p. 74–76

¹⁹ Ann Thorson Walton, Ferdinand Boberg Architect. *The Complete Work*, Cambridge/USA 1994, p. 118–121

²⁰ Axel Föhl, *Technische Denkmale im Rheinland*, Köln 1976, p. 84, 98–99

Industrial Landscape in Art

Daina Glavočić

Rijeka was since the mid-18th century known as a significant manufacturing, and subsequently industrial, center of production that in some branches of its industry (e.g. sugar production, oil refinery) was able to cover the needs of the whole Austro-Hungarian monarchy and in others – especially in torpedo production – to satisfy worldwide demands. It therefore followed that, in a city that was a free port and had important privileges and concessions, many enterprising European industrialists and manufacturers developed their business dealings and reached European and even global results (e.g. in torpedo and shipbuilding, production of paper and tobacco) and this tradition continued nearly up to the end of the 20th century.

During the 1990s the adverse circumstances of the recent Croatian War of Independence brought about essential changes of the general conditions of production, hence of the industry in Rijeka as well. With the ruin or quenching of industrial production, the abandonment of many one-time peripheral industrial buildings followed. Industrial buildings, which had for centuries depicted the urban horizon and the city's identity, today are abandoned and – as big and empty constructions now in the city center – they are obstacles to the modern development of the city.

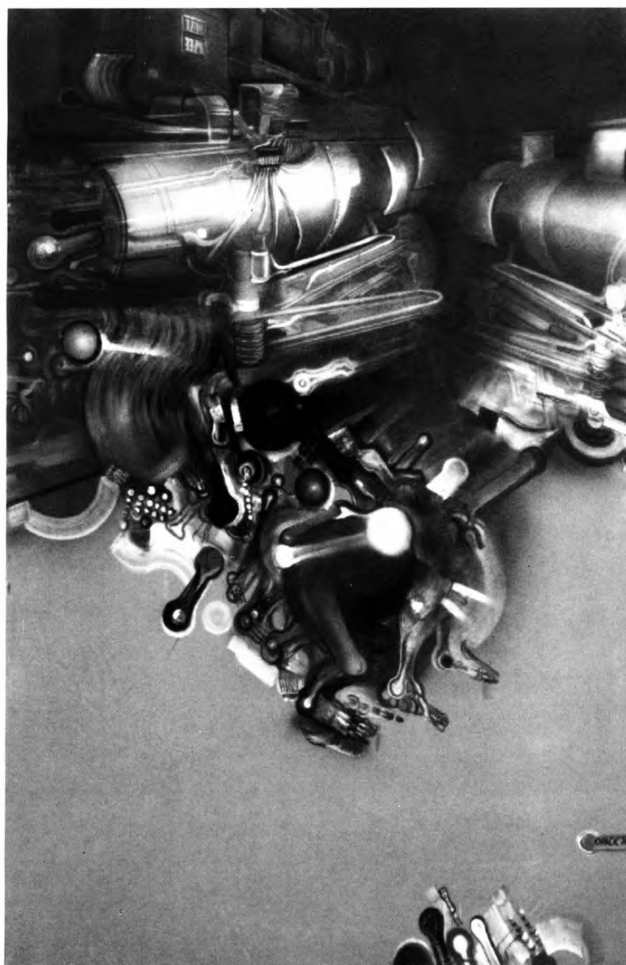
Rijeka was for a long time an important port with industrial area for its own needs. The physical appearance of a port town, with its seashore urbanism – numerous port cranes, warehouses and shipbuilding slipways, railway infrastructure, silos, oil refinery facilities and tall factory smokestacks – was for many artists the perfect polygon with all the interesting visual art motives bearing the features of the industrial landscape.

In the 19th century when the real industrial era begins with the appearance of the steam engine and other new machines with new driving power as substitutes for the labor of human hands, the demand for a more massive production resulted in an excessive use of energy sources, and their exploitation. On the other hand excessive pollution, contamination of the environment not only on the ground but also in the air, started as well. All these changes also indispensably reflected themselves on the artistic level of all modes of expression and creativity, whose scene of action was located outside of the atelier and settled in the alienated urban landscape, on the streets, in the slums and city outskirts – in an *industrial landscape*.

At the beginning of the 20th century, impressionists were fascinated by the machine and smoke of the locomotive

because of the massiveness of its physical makeup and airiness of the propelling steam. They created splendid works of art, but when the initial exaltation passed, what remained for the expressionists, especially German ones, was a ground covered with smut and sooty air. Then the futurists embraced the disunion of the depicted object with swiftness under the slogan: *dinamismo, elasticità, velocità* ... In 1917 one critic wrote: "What the artist of today seeks in the city is not to obscure its ugliness with light and color; rather they have elevated precisely this ugliness to its characteristic feature".¹ They all found their inspiration in the industrial landscapes and by-products of industry, in the motifs of machines, movement and speed that goes with them and which are a characteristic of the 20th century when this art was born.

The first half of the 20th century considerably changed the range of art motifs that artists and the public found interesting. There were also essential changes in the aestheticism of *beauty* itself, as it slid toward the aestheti-



Omer Mujadžić, *Suburb of Zagreb*, 1932 (MMSU-853, Rijeka)

cism of the *ugly*, from the domain of Sunday promenades to the ever darker depictions of cities and suburbs, industrial scenes, fringe characters, beggars and the impoverished working class. Hand in hand with the industrial landscape in the 1930s went the dismal scenes of social topics, scenes from the fringes of cities ending in gutters, among the hovels of former villages since they are turning into the dreary edge of the industrialized city.

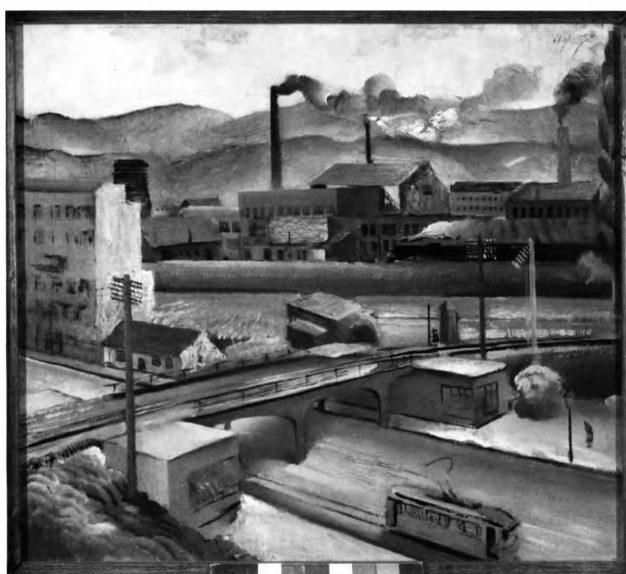
A representation of natural scenery – the landscape, as one of many visual art motifs, can be followed all the way back to the beginnings of the history of visual art. However, the growing possibilities of more comfortable travel and the abrupt development of cities and of their pollution by the growing industries during the second half of the 19th century forced the artists to better observe the cities. So, the beginning of the 20th century is the precise and actual borderline of the new comprehension, experience and creation of life and its environment. For many people the city has become the new scene of life, progress and speed, very interesting as an artistic motif. Lurking in them is the gap and depth of a disintegrated society which – creating wealth and leisure for the minority – produced and increased poverty, indigence and misery in the lives of the majority. Therefore, when observing the industrial landscape as an artistic, painters' motif, it is inevitable to be aware of the underlying social concept lurking in it. Even though it is not depicted, it is still very noticeable and readable. If one accepts the definition that an "*industry is a group of businesses that produce a similar product or provide a similar service*"² then,

in the case of Rijeka's industry and representation of its industrial scenery, one may speak of a landscape, atmosphere, appearance and localities of those production processes according to which Rijeka was once, especially at the turn of the 19th and 20th centuries, a very strong and interesting center of Croatia, sometimes even also of a much wider impact.

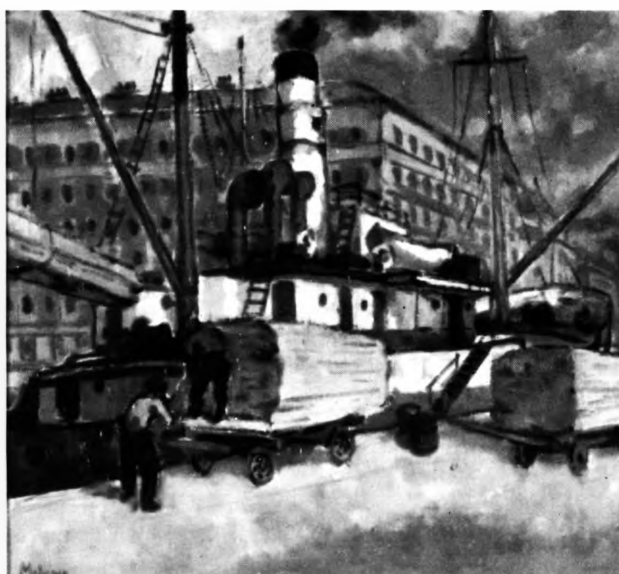
The art exhibition *Industrial Landscape* showed in the Museum of Modern & Contemporary Art in Rijeka (Croatia) in 2005 was made to focus on art works of those interesting, nowadays vanishing, scenes of the panorama and details of the industrial landscape of Rijeka port and shipyards, its railroading, oil refinery, torpedo factory, motor works, power plants, paper mill, as well as terrain communications – roads, overpasses, tunnels, viaducts, power-transmission lines – and everything else that is a component part of an industrial location. In the holdings of Rijeka museums and factories there are works that illustrate not only the mentioned themes but, to some extent, the timeline development of various activities, recording their progress in the production process and technological sense as well as the changes in accompanying activities.

One of the important thematic mainstays of the museum presentation and exhibition regarding the industrial landscape of Rijeka is shipbuilding, very inspiring because of the size and monumentality of the objects – ships on slipways – and the impressive constructions that surround them. Since Rijeka is an important and large sea-

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Miron Makanec, *Unloading of Planks in Port of Rijeka*, 1948 (MMSU-10, Rijeka)



Ljubo Škrnjug, *The Zagreb Landscape*, 1971 (MMSU-1114, Rijeka)



Nenad Opačić, *The Fall*, 1974 (MMSU-1182, Rijeka)

port and shipbuilding center, previously an exceptionally busy one, of particular interest is the picturesque waterfront ambience with the lively reloading of cargo, especially when the work was mainly done by manpower from horse-drawn carts. Today it is by means of ever larger (container) cranes, similar to giraffes. The port is tightly linked to cargo transport by railways and roadways, hence such motifs that are otherwise rather rarely depicted artistically, have been included in the exhibition.

The main protagonists in those paintings were people, mainly dockers and workers, more precisely the work of human hands and strong muscles with the use of very primitive tools and no support from machine technology. At the turn of the 19th and 20th centuries, the working population of Rijeka increased considerably and the city experienced a building boom, simply because the needs of the production methods of that time demanded many workers in manufacturing and industrial production (port and shipyards, paper mills, sugar and tobacco factories).

In the show were also presented sculptures of the museum collection, selected on the basis of the industrial raw material key. It mainly refers to the very special atmosphere that they emanate because of their sculptural material (iron, chrome, chains, nails) rather coarse artistic style, visible technique of creation (welding, soldering, forging), which reminds on iron casting shops and blacksmithing work in industrial plants, while some of the sculptors use finished (waste) industrial products as the components for their sculptures.

The dark period of industrial pollution and the iron and steel industry is mainly behind us, and every (developed) country wishes to rid itself of everything that was negatively linked to that method of production. With the new millennium most of the highly industrialized countries have switched to another kind of profitable business of

clean environment, stepping deep into the era of electronics and the sophisticated technology placed in modern buildings full of light, located in pleasant, verdant and ecological surroundings, which precisely use these parameters as a measure of their own prestige. The City of Rijeka, according to some plans, yearns for the same kind of development, but is still far from it, burdened by the presence of the heritage of an extinguished industry, in particular with the monumental buildings of industrial architecture (seaport and railway warehouses), which once were planned and built by the best and farsighted engineers of Hungary and Rijeka at the close of the 19th century. They in the process employed the state-of-the-art (iron constructions and reinforced concrete) building techniques of that time, convinced that they were building for the future, for a centennial advancement and development of the city of Rijeka, at the time still under the rule of the Hungarian crown, and in the interwar period under Italian rule.

The purpose of the exhibition was to draw attention to the selected art works from the Museum of Modern & Contemporary Art in Rijeka and other collections, in various styles of various authors to show a constant artists' interest in industrial landscape and to depict an aspect of life in Rijeka, the once very important seaside and riverside city in the Kvarner bay of the Adriatic sea, that has belonged to various administrations and states, sometimes to two at the same time, and all this just through one of its, today increasingly less visible, segments – the industrial landscape – which is nowadays in transition *from industrial territories to the cultural paysage*.

¹ E.Waldmann: Die Künstlerische Entdeckung der Grossstadt: Vossische Zeitung, 2.12.1917 Quoted from Stephanie Baron/Wolf-Dieter Dube: German Expressionism: Art & Society: Theme of the Exhibition, The Big City, catalog of the exhibition, Bompiani, Milano, 1992, p.24

² The World Book Encyclopedia, vol. 10, World Book International, London-Sydney-Tunbridge Wells-Chicago, 1994, p.230

Symbolic Enhancement of Institutional, Commercial
and Industrial Buildings of the First Czechoslovak
Republic by Motifs of Work, Trade and Industry

Lenka Popelova

Original texts regarding the meaning of architecture are usually incomplete or lost (or they have never existed). But buildings physically exist and for generations have conveyed their message via the character and quality of their architecture. Architecture could and should be understood and appreciated like other forms of art. We can use our collective sense to read their symbolic meaning and understand their beauty. We can enjoy, evaluate and interpret architecture even without the help of any ready ideological explanations or technical descriptions because architecture is a civilization tool and represents a collective language.

In this text we will look through this inborn prism at some of the institutional, commercial and industrial architecture of the First Republic. In the mapping of industrial heritage this important period has long been neglected.¹

This text is partly based on research conducted at the Research Centre for Industrial Heritage at Czech Technical University in Prague.² According to this research, in a European comparison, the Czech industrial architecture is among the examples that most clearly represent the exceptional cultural, technical and economic flourishing that occurred between the two world wars.

THE FIRST REPUBLIC AND ITS ARCHITECTURE

The name First Republic is used to distinguish the period of the Czechoslovak state existing between 1918–1938. New institutional, commercial and industrial buildings designed in this prosperous era had to manifest the new situation, including the enthusiasm and hope of the people. These buildings expressed the national identity and the democratic character of the new state. Architects of the time wanted to stress the sovereignty that our country had enjoyed for centuries before. The new state was oriented towards the representatives of western European democracy – toward Great Britain and France.

The physical appearance of institutional, commercial and industrial buildings was often not very specific to their function. Through a unified style – **traditional or modernistic** – they illustrated the order and unity of "a cooperating universe". Specific functions were often "hidden within the harmonious Great Picture".

This paper is concentrated on buildings still using the **traditionalist scheme**. Many of the First Republic insti-

tutional, commercial and industrial buildings were created in this style. They often looked like huge, symmetrical and proud palaces. The facades were enhanced by additional symbols of the state or of the specific function of the building. They tended to symbolize authority, productivity and directive power – expressing thus symbolically the basic values of democracy. Advanced technological features were also sometimes visible on these buildings, to indicate the high-tech production hidden inside.

Within this initial situation there was "invented" the modern national style called **Rondocubism**. It developed some ideas of Czech Cubism and also had something in common with the Art Deco style.³

TYPICAL SCULPTURAL DETAILS OF FACADES OF TRADITIONAL BUILDINGS. TRADITIONALISM AND CIVILISM

If we look back to the Baroque era, we find statues of saints, animated by dramatic and explanatory gestures. If we look back to the 19th century, we find sculptures that personified something of importance in civic life but still used classical models; the figures posed in contraposto were dressed in clothes of antiquity like draperies. And like statues of saints they usually held some object that identified them. In the period of the First Republic we can still find sculptures developing this **conservative scheme**.

In the era of the First Republic a new **civilism style**⁴ appeared, which was often connected with architecture. We are able to find a similar style in other countries (as part of the Art Deco). The main motif of civilism was a **human figure** – its dress and body forms are uniformly rounded. Most of these statues create the impression that the pictured people are of rather medium size. The physiognomy is simplified – the heads are a little enlarged, as is the case in children (thus evoking associations of kindness and compassion).

Civilism portrayed members of society without any pathos, doing their daily tasks. Mostly they look like city people, preoccupied with contemporary technology and equipment like the telephone or some (miniaturized) machine. An exalted dimension and eternal values of human life were missing. Everybody seemed to be contemporary beings. Looking at them, we can even feel a little bit of sadness – because of their hard work and social pressures. Civilist sculptures were a manifestation of a sober, responsible and modest kind of materialism. Also obvious in this kind of stylization is some degree of feigned clumsiness and naiveté (imitating folk art). This presumably

should add to smart and professionally executed works more spontaneity, authenticity and sincerity.⁵

Scenes of work

Surprisingly, most scenes of work are found on the facades of **financial institutions**. Banks usually approach potential customers via four basic representative figures: an industrial worker, a farmer, a blue collar worker or a soldier. These high quality sculptures sometime even "name" **particular trades**. Such pieces of artwork honour everybody, presenting all people as part of an egalitarian brotherhood of work, and showing that there is no difference between big money and small money.

In a predominantly male society, many **figures of women** are not preoccupied with ambitious modern trades. A naked female body is often used to symbolize the source of life and is a synonym of beauty. On the other hand, **male figures** are dressed for their work, holding real tools or operating modern machines. The classical way of personification is mixed with an illustration of contemporary work.

Mercury

Statues of the ancient god Mercury (Mercurius)⁶ and his attributes even decorated each facade of commercial and administrative buildings at that time. In Roman mythology he was a messenger of gods and a god of trade, profit and commerce (but on the other hand he was also a "patron" of thieves).

Coat of arms

At that time, a new supreme symbol of the state was created. Predominantly there was used the so-called small coat of arms. On the breast of the old heraldic lion of the kingdom of Bohemia was added a small scale coat of arms of Slovakia. Especially in the architectural application, the shape of the heraldic shield lost its traditional fancy and monarchical character.

SELECTED EXAMPLES OF BANKS, MINISTRIES AND OFFICE BUILDINGS:

*Komerční Banka (today, originally the Post Office Savings Bank)
Prague 1 – Václavské náměstí (Wenceslas Square)
Architect: František Roith, 1925–1931*

Sculptor (of the described sculptures): unknown

Two elegant thematic reliefs placed over the entrance consist of busts of pairs of female figures facing each other. The first composition is a personification of Bohemia – with leaves of the linden tree (the national tree).

The figure on the left holds in her right, "acting" hand the caduceus of Mercurius. This composition has a large and only partially visible heraldic lion in the background. The second scene possibly symbolizes two women holding a band of solidarity. One of them, with a gesture of sincerity (pointing to her breast), should be again Bohemia. She is assured by the other woman by a tender gesture of mutuality. At the top of this symbolic scene is the winged helmet of Mercurius.

*Palace Adria (former Riunione Adriatica di Sicurtà)
Prague 1 – Nové Město (New Town):*

Architects: Pavel Janák, Josef Zásche, 1922–1925

Sculptor (of the described sculptures): Karel Dvořák, 1923–1924

Over one of the main entrances of this Italian insurance company three sculptures are placed. The largest bust in the centre with the wide-spread blessing hands probably indicates the welcoming gesture of the institution and the opening of new and wide possibilities. On the left side of this secular portal stands a sailor – representing the original country of this company. This figure holds in his left hand a flag and over his right shoulder he puts a bag. This is possibly indicating that he is on the move (taking with him his belongings in the traditional way). There is also a small model of a steamboat, dancing on waves, thus also illustrating Italy which is a maritime country. On the opposite side is situated a female figure with a sickle and sheaf of wheat. At her legs is placed a model of a famous architectural jewel – the Prague Powder Tower. This composition symbolizes both the natural potential of village-based agriculture as well as the wealth of a city-based civilization.



Komerční banka (today) (photo: Lenka Popelova)

*Ministry of Trade and Industry
Prague 1 – Staré Město (Old Town)*

Architect: Josef Fanta, 1925–1933,

Sculptors: Čeněk Vosmik, Josef Augustin Paukert

From the facades of this huge building we have chosen only a few examples. The symbolic program includes presentation of work, science, elements of nature and even the primitive hunt. Many times there is repeated an image of the god Mercurius and surprisingly also of little putti (in the form familiar from renaissance and baroque churches), sentimentally holding miniature working tools.⁷ The coat of arms of the state is in Wagner's tradition, surrounded by a wreath of victory.

Ministry of Transport

Prague 1 – Staré Město (Old Town),

Architect: Antonín Engel, 1927–1931,

*Sculptors: Josef Mařatka, Josef V. Pekárek,
Ladislav Kofránek*

This symmetrical palace is not decorated as much as the already mentioned ministry. The roof is crowned by large winged railway wheels. On an attic stand Mercurius and workers with their working tools.

State Stamp Printers

Prague 1 – Nové Město (New Town)

*Architect, engineer: Josef Sakař, František Klokner,
1924–1928*

Sculptor: Celda Klouček

At this building are printed banknotes, postage stamps and important documents. Over the gate is placed a large female head – a personification of Bohemia. It is a poetic and city-type face with portrait-like features. There

are also two smaller statues which symbolize aspects of a precise printing. Reproduction techniques are represented by a young photographer with a camera. The printing process itself is characterized by an older man – a more experienced specialist (but he is ironically posing with a very simple press). Repetition of the following stages – "youth and mature age" symbolize continuity and heritage. More surprising are reliefs indicating the fact that there are also printed banknotes. Big containers are full of large coins and banknotes (it was difficult to express their paper character – they resemble much more some type of cloth).

*Orbis Joint-Stock Printing, Publishing and Press Company
Prague 2 – Vinohrady*

Architect: Alois Dryák, 1924–1925

Sculptor (of the described sculptures): unknown

This famous publishing company was established by the Ministry of Foreign Affairs in 1921. The gable of the build-



Komerční banka (today) (photo: Lenka Popelova)



Ministry of Trade and Industry (photo: Lenka Popelova)

ing, built in the style of geometric modernism, is decorated with a stylized image of an open book – indicating the commercial activity involved. The top part of this composition is enhanced by a progressing triangle with a sharp angle – it possibly indicates effort and progress. The multiple layers of this triangle look like the edges of a bound bunch of papers, thus indicating another aspect of the activity of this company. The spheres accenting the highest balcony symbolize wholeness and completeness (today they are missing). Also small falcons decorating the entrance hold spheres.

Telegraph and Telephon Trunk Exchange

Prague 3 – Žižkov

Architect: Bohumír Kozák, 1922–1925,

Sculptor: Ladislav Kofránek

A side entrance of this huge palace is decorated by naked old-fashioned **putties** holding a postilion trumpet or working like a real mailman. Playful and happy figures express the careless atmosphere granted by a reliable postal and telephone company. Over the doors are placed parts of wires. In the keystones of the main tympanums are placed an old postilion trumpet and a modern telephone. There are also four naked figures. Interestingly there is a woman holding a writing pad and a pencil and a man who is depicted with part of a telephone column and wire pliers.

CONCLUSION

Many of the institutional, commercial and industrial buildings of the First Republic used the human body as an

important part of its symbolic decoration or they tried to find another way to enrich the facade in a symbolic way.⁸ In conclusion we may say that especially technical and industrial structures should be also perceived as symbolic-aesthetic phenomena. This approach to perceiving and appreciating these structures should serve as a useful argument in efforts aimed at conserving them, as many of these structures are still under threat of destruction because they are often viewed as having no significance or architectural value.

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Ministry of Transport (photo: Lenka Popelova)



State Stamp Printers (photo: Lenka Popelova)



HLAVNÍ BUDOVA VE FOCHOVÉ TRIDĚ

Orbis Joint-Stock Printing, Publishing and Press Company, contemporary photograph (1931) (© author)



Telegraph and Telephone Trunk Exchange (photo: Lenka Popelova)



Telegraph and Telephone Trunk Exchange (photo: Lenka Popelova)

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¹ That it is necessary to interpret especially industrial structures from a symbolic-aesthetic perspective has also been pointed out by P. Neaverson and M. Palmer in their book *Industrial Archeology* and by other authors, such as G. Darley and B. H. Bradley.

² The project was entitled *Industrial Architecture of the Inter-war Period in Czechoslovakia and the Technological, Economic and Cultural Context* (2004–2005).

³ The tectonic scheme of a Rondocubist facade was very robust and of high relief, created with basic solids – cylinders, cubes. It was intended to indicate the character of wooden structures. The simplified geometric decoration of a vernacular house. At that time vernacular inspirations represented the foundation of our national existence.

⁴ The highest artistic achievements were represented by Otto Gutfreund, Jan Lauda, Karel Pokorný.

⁵ The character of civilist statues also has some association with the miniature figures of soldiers and craftsmen (with their weapons and tools) placed in the graves of important people in ancient Egypt. These manmade phantoms "with souls" have to forever fight and work for their lord even in the kingdom of death.

⁶ His name is related to the Latin word *merx* which means merchandise. His most significant attributes are: a caduceus – a short staff around which two serpents twine to form a double helix, and are crowned with wings, and a winged helmet which allows him a swift flight from place to place. According to mythology, he invented the wheel – on industrial buildings we can see him with cog-wheels. He is always pictured as a young man full of energy and the dynamic potential needed for good business.

⁷ Recycling and application of traditional models can be seen even in more modern art-deco stylized institutions.

⁸ In the past gods, heroes and saints were personified as idealised human figures. In the Christian era the human body was considered an image of God and the Jews saw the whole universe as a kind of body. The human body itself is a superior kind of construction, symbol of a higher content and manifestation of the exalted position of man in nature.

Motifs of Work and social Conditions in Sculpture and Reliefs in the Czech Republic

Renata Skrebska

This contribution documents the sculptures with attributes of labour from the period from the end of 19th century until the mid-20th century as the result of a research for the National Heritage Office in Ostrava. The aim of my work is to analyse the forms and styles from classical mythology allegories to modern social topics.

The pictures of work and workers were brought to the art of sculpture by the social changes at the end of 19th century. An important point was the foundation of Czechoslovakia in 1918. The young state represented itself by the development of city planning, supporting of art and the humanist ideals of the first president Tomas Garrigue Masaryk. The new built banks, administrative buildings, bridges and other utility buildings were not decorated in a traditional way with mythological and historical motifs. The newborn republic expressed itself with the pictures of labour and folk art such as city, factory, workers, suburbs, normal life showing people wearing the contemporary clothes of businessmen or factory workers. These topics are shown in a very straightforward and realistic way.

In Prague – which was the centre of so-called social civilism art – the artists did not intend social criticism, they were simply enchanted with modern times.

One of them was Karel Dvorak, who intensively worked in this style in years 1924–1926. On the two reliefs of the bank (Brno Bank) in Prague we see country life topics. On the forefront of the shopping passage in Pardubice are sculptures representing business, the textile industry, carpentry and iron industry. On the corner of the school in Vinohrady (part of Prague) he placed sculptures of a tailor, a cash desk worker, an ironworker and a news boy. Here we can see the difference – it is not Mercurio on his winged shoes any more who brings the news, now it is a news boy who shouts them on the street. Sewing machine and typewriter are the attributes of modern times. The artists show everyday life and changing lifestyles in their works.

Regional influences and social criticism begin to appear at the same time. The region where this happens is Moravia (eastern part of today's Czech Republic) with its contrast of agricultural tradition on the one hand and heavy industry in the Ostrava region (northern part of Moravia) on the other. The typical figure is a factory worker, coal miner or ironworker. In Ostrava the most important sculptor of this style was Augustin Handzel. In 1921 he placed sculptures of a worker's mother and an allegory of transport, business and industry on the façade of the

building of the Union Bank in Ostrava. Another important example of his work were the figures of coal miners and iron smelters on the front of the Elektra Palace from 1923–1924. They are people who know what hard work is about and what it is to be poor – like the sculptor Handzel himself as he lived in worker's quarters. His sculptures are examples of a deep social feeling without any illusions.

Another typical topic is country life. Artists in this field inspired themselves with folk legends and the idealistic fiction of those days. The sculptors from agricultural regions (middle and southern part of Moravia) choose figures of farmers, ploughman, sowers, haymakers and symbolic elements of the work with soil. The most typical figure is a woman symbolizing the traditional goddess Ceres or young girl symbolizing fertile land. The new trend of that time was also combining both topics – farm worker and factory worker together symbolizing the connection between agriculture and industry.

All this happened mostly in the twenties. From the year 1930 on these topics become rarer. They come back after the war, in the 1950s, but that was a completely different situation. Politically, it now was art of the Communist regime. This situation lasted for forty years and it was only at the end of the eighties when young artists bored by "the Big topics" headed back to normal people, their daily work and regional specifics. To be correct I should say also that there was a similar situation in painting.



Nachod (Czech Republic), the Societies Building, the relief symbolizing family and factory worker, sculptor Bretislav Benda, 1928–1930 (photo: Renata Skrebska)



Pardubice (Czech Republic), the shopping passage, sculptures representing business, textile industry, carpentry and iron industry, sculptor Karel Dvorak, 1924 (photo: Renata Skrebska)



Hradec Kralove (Czech Republic), the Stein palace, relief symbolizing the textile and iron industry, sculptor Karel Dvorak, 1925 (photo: Renata Skrebska)



Ostrava (Czech Republic), the Elektra palace, the figures representing coal miners and iron smelters, sculptor Augustin Handzel, 1923–1926 (photo: Renata Skrebska)



Prerov (Czech Republic), the Societies Building, the relief symbolizing a working family, sculptor Josef Kubicek, 1926 (photo: Renata Skrebska)



Prerov (Czech Republic), the Societies Building, the relief symbolizing agriculture and industry, sculptor Josef Kubicek, 1926 (photo: Renata Skrebska)



Ostrava (Czech Republic), the building of former coal company, the impressive relief is a modern allegory of coal, sculptor Karel Lauda, 1940 (photo: Renata Skrebska)



Vitkov – Podhradí (Czech Republic), the building of the water treatment plant, the relief is a modern allegory of water, sculptor Vincenc Makovsky, 1961–1967 (photo: Renata Skrebska)

A8 Railways and Harbours: Economic and Ecological Problems

Organizer: Rolf Höhmann (Germany)

Both railways and harbours see dramatic changes in ownership, organization, administration, techniques and use. In cities and regions around the world, large areas of the urban fabric become redundant and create ecological and economic problems. New redevelopment strategies and revitalization policies try to deal with these special challenges. Many buildings and structures have already been or will soon be adapted for re-use. Papers in this session should focus on projects and conservation efforts that proved to or are likely to be economically successful in the long-term.

St. Gotthard Railway Line and its Transport Route
Predecessors – A Feasibility Study for a UNESCO
World Heritage Site

Kilian T. Elsasser

INTRODUCTION

In 2008 the Albula- and Bernina Railway Line in Switzerland became a UNESCO World Heritage Site. In the same year the cantons of Uri, Ticino and Swiss Federal Railways started a feasibility study whether the St. Gotthard railway line could be a world heritage site, too.¹

The committee came to the conclusion that the St. Gotthard Railway Line and its transport route predecessors may qualify.² The committee proposed complementing the railway line with the preindustrial transport routes from the 1300s up to the building of the railway line. The comparison with the alpine railways Albula-Bernina and the Semmering show that these three railway lines are different projects each with a very specific meaning. The Albula- and Bernina Railway Line is an outstanding project of transport history which shows in an exemplary way the use of the railway to overcome the isolation of settlements in the Central Alps early in the 20th century, with a major and lasting socio-economic impact on life in the mountains. The Semmering Railway Line is the first railway line of the world crossing a mountain range by tunnel and gaining altitude by a meandering layout of the line. The St. Gotthard Railway Line and its transport predecessors are standing for an international transport route connecting Germany and Italy which is operated by Switzerland. The railway line itself stands for the most difficult transalpine railway line which was realized in the railway age until World War I.³ The longest tunnel and the access routes to the main tunnel with their helical tunnels are outstanding and unique infrastructures whose monuments still can be seen today. The Gotthard transit landscape also includes preindustrial transport routes which are well preserved at specific places. St. Gotthard Railway Line stood and still stands for a Swiss service for Europe.

OUTSTANDING UNIVERSAL VALUE

The transit landscape St. Gotthard consists of a unique succession of a long cultural and technological development which is closely connected with the national identity of Switzerland. It encompasses a period of 800 years from 1200 up to now. It exemplifies a unique interdependency of a cultural development within a natural landscape. Relevant parts of this succession of the alpine transit landscape are still visible. But these layers are witnesses of a completed development. The mule track from the 13th century is history since the opening of the road in 1830. The transalpine highway opened in 1980 and succeeded the road which was modernized up to then.

The planned start of operation of the railway base tunnel in 2017, which again will be the longest railway tunnel of the world, follows the first railway line opened in 1882. The historical railway line, the remains of the first road and the mule path with their accompanying infrastructure buildings are history and monuments of outstanding universal value and should be protected, preserved and validated.

There are transalpine crossings which date back to the Romans such as the Brenner, the Reschen and the Great St. Bernhard Pass. The Brenner Pass even does encompass a complete succession of all means of transportation from Roman times up to the highway including a planned railway base tunnel. Since the integration of Tyrol in the Habsburg Empire in the 14th century it lacks the connection of fostering a political identity. In addition it does not feature a succession of relevant historical remains from all transportation periods. In the late Middle Ages the valleys Uri and Schwyz were directly subordinated to the German Emperor. He intended to have a direct influence on the St. Gotthard pass and did not implement a reeve such as the Habsburg family, the most powerful rulers in the region at that time. In connection with the surrounding allied towns such as Lucerne, Zug, Zürich the Schwyz and Uri valley on the Gotthard Pass could form a confederation with a sense of identity which came into existence as early as in the 15th century.⁴ The running and the protection of the St. Gotthard pass was an important economic and political backbone developing a "Swiss" identity. The intention to control the Gotthard pass was supported by the lack of interest of the German Emperor and the Habsburg family. For them it was a pass of secondary importance. The German ruler preferred the easier Brenner Pass; the Habsburg family concentrated its interest on its growing main land in the east of Europe. In the second part of the 19th century Switzerland was surrounded by large nation states such as the German Empire, France, the Kingdom of Italy, and the Austrian-Hungarian Empire. The railway line through neutral Switzerland was in the interest of Germany and Italy. Switzerland got the function of a neutral transport service provider through the Alps. The St. Gotthard Railway Line, opened in 1882, very quickly became the most important transalpine crossing and the economic and political backbone of the Swiss Federal State founded in 1848. At the end of the 19th century Switzerland began to call itself the "Gotthard State".⁵ Together with the banking system the railway transit line was the most important trump card in World War II not being occupied by the Axis Powers.⁶ In order to hinder occupation the Swiss army heavily fortified

the Gotthard massif. Already few years after the opening of the railway line the Swiss army had started to build fortifications securing the railway line. The first fortification was built in 1888 near the southern tunnel portal in Airolo. Since the erection of the first fortification many such buildings followed. Each stands for a technological development. The latest fortifications built in the 1960s were constructed to withstand a presumable atomic attack.

From a technical point of view the railway line can claim several records such as having had the longest tunnel of the world (15 km) and an outstanding example of the construction of the railway ramps connecting the tunnel with the Swiss railway network. By the means of several helical tunnels the railway line could gain the necessary height reaching the main tunnel on the height of 1100 m above sea level. Other outstanding cultural highlights are the road from 1830 through the Tremola Gorge on the southern slope of the Gotthard Pass, the remains of the mule path and the 1830s road through the Schöllelen Gorge on the northern slope of the pass which was first crossed in length in the 13th century.

AUTHENTICITY AND INTEGRITY

The opening of the railway tunnel in 1882 from Göschenen to Airolo changed the transit landscape on a large scale. On the one hand the railway line was inspired but did not follow the mule path and the road. On the other hand the landscape and the transportation infrastructure between Göschenen and Airolo with the Pass on 2106 m above sea level were downgraded to local importance. The highway tunnel was built at the same place than the railway tunnel in 1980. It means that relevant parts of the mule path with its infrastructure or its remains still can be seen on the pass route between Göschenen and Airolo. There are bridges, churches, hospices and relevant parts of the path itself which were preserved. In the valleys north and south of Göschenen and Airolo the mule path mostly disappeared. It was superimposed by the 1830s road which was built on top of the mule path. Only some hospices, churches, bridges which were built in connection with the mule path still exist. The 1830s road was modernized in the 1980s. Little historical structure has been left on both slopes to Göschenen and Airolo. Only the way it is integrated in the landscape is still historical. Between Göschenen and Airolo many parts of the 1830s road is still in existence. After World War II a new road over the pass was built which did not follow the 1830s road. It means that there still are unpaved parts of the 1830s and cobble stone road from the first half of the 20th century.

Because the 1830s road between Göschenen and Airolo did not follow the mule path either, relevant parts still exist, too.

The railway line with its technical development is well preserved. It shows the original integration in the landscape of the 19th century. Tunnels, walls, avalanche protection infrastructures, railway stations, railway guard houses are mostly well preserved. This succession of the infrastructure exemplifies the railway as a machine laid out in the landscape.⁷ On this 19th century layer, as it is typical for a technical monument such as railways, several layers of a historical development can be observed.⁸ In the 1920s the line was electrified. Water power plants, overhead installations for the traction system, building for the transformation of the electric current, maintenance building for the underground telephone system were added. Between 1920 and 1970 steel bridges were changed in concrete arched bridges. After World War II the running of the line was automatized. All these measures allowed transporting a multiple of goods and people than in the 19th century. It shows that the line built in the 19th century was planned farsighted.

POTENTIAL

With the opening of the base tunnel in 2017 the first railway line will signify a completed historical development. Nevertheless the line will be kept in operation. The need of modernization will diminish strongly. It will serve Göschenen and Airolo and will be kept in running condition for the maintenance of the base tunnel. Dangerous goods will not be allowed to be transported through the new tunnel with its length of 57 km. The maintenance of the avalanche protection infrastructure will be continued because they also serve the road, the highway and the villages. A UNESCO World heritage site would help to develop the valleys as touristic sites because they loose part of their transit economy.

CHALLENGES

In 2008/2009 the committee "Transit landscape St. Gotthard" consisting of the cantons Uri, Tessin and Swiss Federal Railways assessed in a study of feasibility that it is worthwhile applying for a World Heritage Site. The Swiss federal government, represented by the Federal Office of Culture, also agrees with this conclusion but decided to wait putting the transit landscape on the Tentative List until 2014. The Federal government does not want to add sites on the list during its presence in the World

Heritage Committee. In addition the Federal Government asks Swiss Federal Railways to develop the way the railway line shall be used and simplified after the opening of the base tunnel. These possible simplifications of the infrastructure should not damage its historical value. In the meantime the cantons Uri and Tessin are obliged to implement space planning measures assuring the integrity the historical monument within the transit landscape. All these terms and conditions do no question the quality of the unique transit landscape. At the moment it lacks a leader who precedes the projects such as Rhaetien Railways did with the application of the Albula-Bernina line as a UNESCO World Heritage Site. Maybe there is a possibility finding a leading organization within the initiative San Gottardo 2020 developing the region as a touristic hot spot by the four cantons Uri, Tessin, Wallis, Graubünden engaged in.

¹ Kilian T. Elsasser. Ist die Gotthard-Bergstrecke ein Weltkulturerbe? *Industriekultur* 1/2007

² Rolf Höhmann. Internationales Vergleichsgutachten Kandidatur UNESCO-Weltkulturerbe Verkehrswege Gotthard, San Gottardo Via delle Genti, Darmstadt, 2008 (inedited)

³ ViaStoria and Kilian T. Elsasser. Der direkte Weg in den Süden. Bau und Betrieb der Gotthardbahn. Zürich, 2007

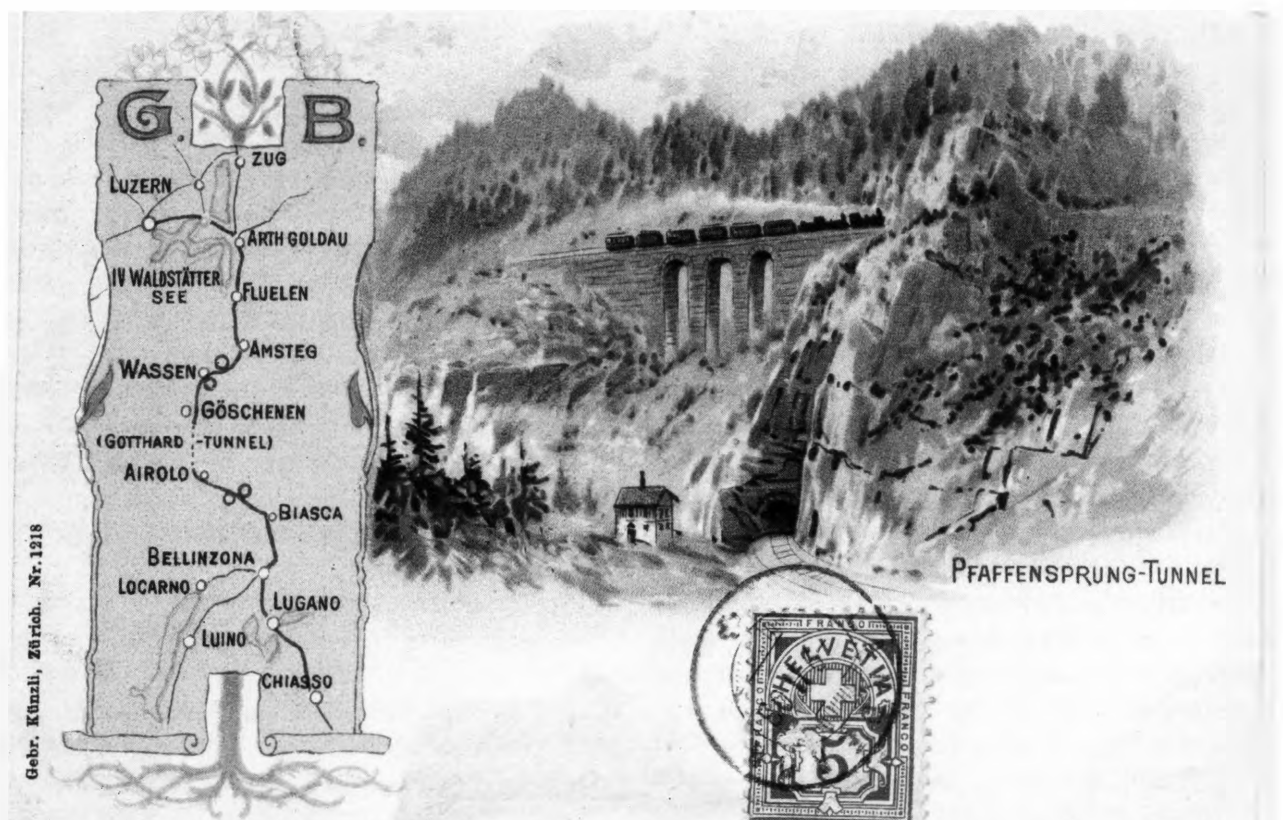
⁴ Roger Sablonier. Schweizer Eidgenossenschaft im 15. Jahrhundert. Staatlichkeit, Politik und Selbstverständnis, In: Josef Wiget (ed.) *Die Entstehung der Schweiz*. Schwyz, 1999

⁵ Guy P. Marchal and Aram Mattioli. Nationale Identität – allzu Bekanntes in neuem Licht, in: Guy P. Marchal and Aram Mattioli (ed.). *Erfundene Schweiz Konstruktionen nationaler Identität*. Luzern, 1992

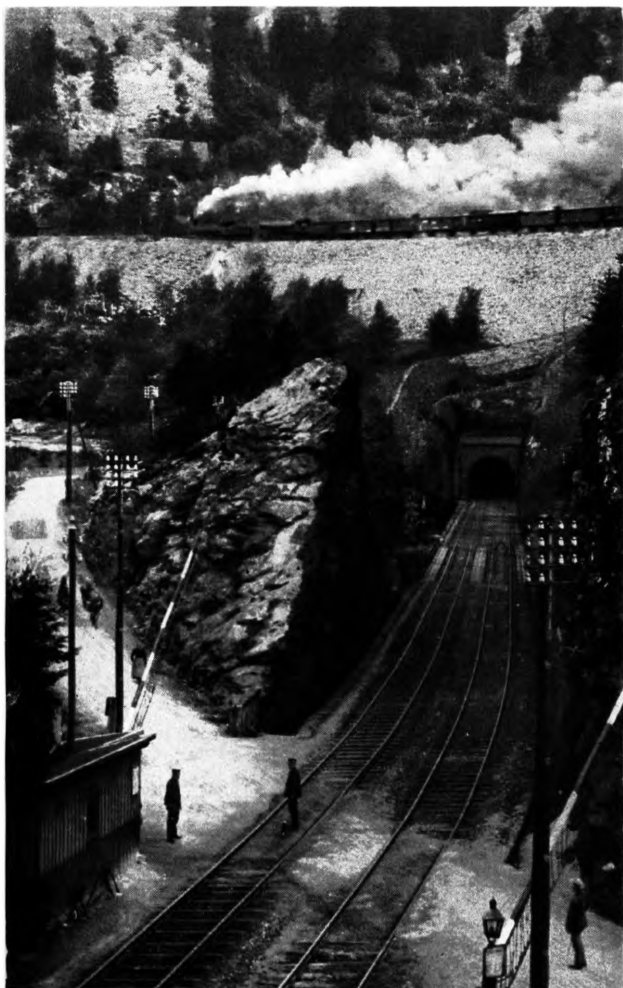
⁶ S. p. 230–242. Mario König und Bettina Zeugin. Die Schweiz, der Nationalismus und der Zweite Weltkrieg. Schlussbericht der Unabhängigen Expertenkommission Schweiz – Zweiter Weltkrieg. Zürich, 2002

⁷ Kilian T. Elsasser and Toni Häfliger. Verkehrslandschaft Gotthard, In: *Werk, Bauen, Wohnen*. 09, 2010

⁸ ICOMOS, Railway World Heritage Site Project, Summary Paper by Anthony Coulls, Institute of Railway Studies, National Railway Museum, York, November 1997.



The Gotthard railway line was planned as an international line connecting Germany and Italy. The section from Erstfeld to Biasca shall become a UNESCO World Heritage site. It is the part of the line where the railway line starts to climb to the tunnel with its helical tunnels. (photo: Roland Arnet)



With the Freggio helical tunnel on the southern slope the railway line gains around 80 m in height. The picture from around 1900 also shows the 1830s road in the foreground. (photo: Roland Arnet)



The impressive road was built through the Tremola gorge from Airolo to the Gotthard pass on the southern side of the pass. The cobble stone were added in the first half of the 20th. (photo: Kilian T. Elsasser)



The mule track from Hospental to the Gotthard pass on the northern side still had little impact on the landscape. Comparing with the Brenner Pass (1400 meter above sea level) it can be seen that passing the Gotthard with a height of 2100 meter was a challenge. (photo: Kilian T. Elsasser)

Cathedral of the Sea – A Survey of the Industrial Coastal Patrimony

Francesco Calzolaio

"The Mediterranean is a network of pathways and a space-time unit". With this definition Braudel managed to crystallise the complexity of meanings that interweave culture and environment around the *Mare Nostrum*. The coastal industrial archaeology heritage is one of the pivots of this wealth of connections, and Italy is the dynamic centre of the Mediterranean unit. Our patrimony therefore needs to be considered carefully with a multi-disciplinary approach, in order to pave the way for a new cultural network with places, activities and institutions that are rooted in our industrial archaeology heritage.

From port activities to military arsenals, from suburban to isolated industries, from mining proto industries to land reclamation, our territory has been transformed to adapt to new productions and technologies. Nowadays, what remains of these processes is waiting to become the means for a new cultural re-appropriation of the environment. In the same way the network of local, national and international connections that used to embody the industrial reason for each site to exist, has to be interpreted and re-invented.

Indeed, each artefact should be considered part of the complex system that linked the transformation processes existing in a certain area to the production of raw materials, to the technologies and machinery and also to the areas where the finished product was destined. In Italy, our coastal industrial archaeology heritage is either made up of the bulky wreckage abandoned in the weather, of exemplary models of rehabilitation resulting from creative processes of contemporary architecture, or it is threatened by a demolition fever and by careless building.

While neither wanting to be thorough, nor to make any type of classification, this analysis scrutinises some of the facts of a wide cross section, from the point of view and the professional experience of an architect and researcher who has dedicated most of his work to the subject. Venti di Cultura defined a cultural cabotage to experiment with these connections, based on previous experience of the president while working on rehabilitation projects, and as the co-ordinator of a network of institutions funded by the Culture 2000 European Community programme called "Industrial archaeology placed between land and sea for a European network of eco-museums".

The non-profit Association Venti di Cultura, established in the 2006, promotes intercultural exchanges along the European shores, supporting institutions and people aimed

to learn and teach the cultural heritage of the Mediterranean, and other internal seas:

"Sulle Ali del Leone" (On the Lion's Wings), has retraced the footsteps of the Venetian heritage in the Adriatic from Venice to Corfu.

"LagunaLonga" concerns the enhancement of a network of museums on the lagoon, dedicated to the material culture, to the production and the environment. A bilingual guide to these museums from 2009 was edited by F. Calzolaio for the Province of Venice.

"Territorial Cultural Networks for Citizens" (TECCN), is a Lifelong Learning partnership project 2009/1011, that has the aim to strengthen the learning cohesion among the institutions and the citizens interested in cultural territorial network.

"Cattedrali del Mare" (Cathedrals of the Sea), was a sequence of workshops along the Italian coasts, on the tracks of the industrial heritage, with the partnership of many Italian public learning and administrative bodies, as the Michelagnoli Foundation in Taranto, the Geomining Historical Environmental Park of Sardinia and the Provincial Administration of Macerata, Siracusa, Latina and Venezia.

The Venti di Cultura management presented all this projects in more than 60 conferences, lectures and workshop in the last three years, to an audience of citizens and stakeholders, local, national and international.

Cattedrali del Mare project is dedicated to the misused industrial patrimony, in order to rebuild a sense of belonging to the territory of the citizen, testimony of a productive age, and now facing social and economical crisis.

It is also devoted to the monitoring of the industrial archaeology heritage disseminated along the European coasts, with the aim to underline how the sea can be a common tool for the learning process and the exchange of people and culture. The project aims to learn how the coast is scattered with places where the extraordinary relationship between territory, man, production and construction technologies has crystallised. The project develops and promotes cultural exchanges between stakeholders and citizens, between local, national and international public, creating communication tools addressed to a wide range of users (citizens, professionals, young and old people, visitors, etc.)

The project output is a documentary on the industrial archaeology material and immaterial heritage, concerning misused industrial places and the memories of the people who have worked in these places. It will enhance the understanding about some emblematic examples of 'laical cathedrals of work and culture', in their delicate balance between human memories, environmental risks and patrimonies in ruin.

The project also defined a local, national, and community strategy for the revitalization of the archaeology heritage along the Italian coasts, enhancing a partnership of people working and living for the protection of the patrimony.

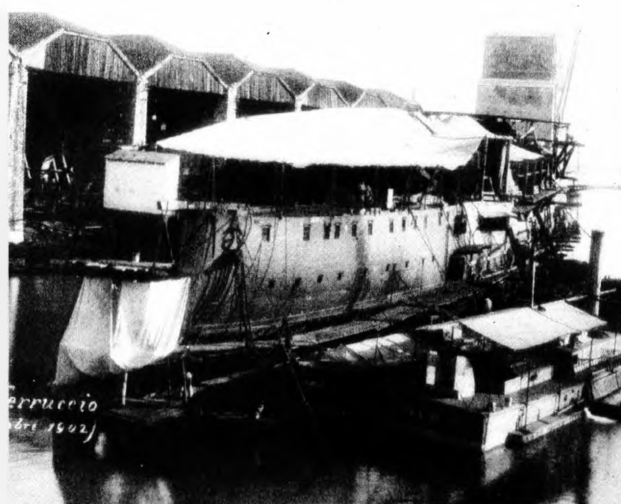
The European coastline abounds with places that reveal, as if looking through a kaleidoscope, the extraordinary integration of humankind, territory, production and building technologies. These fragile and precious landscapes, often derelict and removed from common awareness, are presented in a fascinating journey along the complex borderline between land and water. For many Italian regions we have chosen an emblematic example of the integration process, one which is caught in the fragile balance between regeneration and demolition: lay cathedrals of work and culture. We have focused on the many forgotten single buildings, but also on the network of the complex arsenals, Venice, Taranto and La Spezia, those which are still used for production and military purposes, and on two examples of best practice in the regeneration of coastal industrial sites, La Città della Scienza in Bagnoli and La Manifattura delle Anguille in Comacchio. Other sites de-

scribed are located on the waterfront and are adjacent to historical cities, similarly to the arsenals, but also like Trieste. Others were once located on the outskirts, but have now been integrated into the urban development; such is the case of Follonica, Scauri, Portorecanati and Vibo Valentia. Other lay cathedrals lie in isolated spots along the coastline and embody the numerous potential interactions between land, sea and industrial architecture: these range from the buildings constructed out at sea, such as the offshore platforms or the trabocchi, the tiny villages hidden in the cliffside, like Buggerru, Furrore and Argentiera, to hangars that dominate the sea, like the one at Augusta. Lastly several complexes remain in splendid solitude on the seashore, like Sampieri and Porto Sant'Elpidio.

The Samperi furnace near Scicli, in Sicily, and the ex-Fem fertilizer plant in Porto Sant'elpidio, Marche, are two great installations of this patrimony that embody its neglect but also its extraordinary potential. Of the furnace in Scicli only the external walls have remained; they stand out in the landscape of dunes at the furthestmost southern tip of Italy and of Europe. At the beginning of the last century, the size of the furnace was such to supply with bricks not only the hinterland of Sicily, but also northern Africa because of its central position in the Mediterranean. This is, yet once again, a case of the sea bringing distances together and in order to deliver the furnace from neglect and disuse; a new meaning should be given to the patrimony on the basis of this connection. Currently it is the object of entrepreneurial interests that should be combined with cultural requirements and international values, to ensure a future for these extraordinary ruins.



Building the hangar (1918) (© author)



Arsenal of Venice Tese Novissima (1902) (© author)

The ex-Fem also lies in a sorry abandoned state. Differently from Samperi, between the sea and the factory there is a road; however, the great part of the wooden framework and roofing has remained intact and is marked by the urban sprawl of the coastal ribbon development.

It used to be a factory of fertilizers that supplied the fertile countryside of the Marche region and the whole of Italy, by means of the nearby railway in the small village of Porto Sant'elpidio in the province of Ascoli Piceno. Despite the strong pressure by the real estate, the current neglect is due to the contradiction between rehabilitation and land reclaim. Indeed, the chemical waste was dumped *in situ* and the most polluted soil is around the main building, the only one to be under the safeguard regulations of the Superintendency of Architectural property and Heritage. These buildings are quite precious from an architectural stance and in their spatial complexity they represent a single area for size, material and conservation. Their complete restoration would not only provide evidence of the ancient peculiarities of the area but would also allow to find uses for the buildings, in keeping with their original spatial sense. Furthermore, it would be compatible with the development of tourism of the entire city and could be tied in with the interesting project for a surrounding park, promoted by the Municipal Administration.

Cattedrali del Mare implements a mechanism for sharing best practice and develop information and knowledge that can be used to influence and lobby decision makers. Our aim is to build up a synergetic and effective awareness among the many institutions that have jurisdiction over the industrial heritage, as a decisive node in the quality of the territory's historical transformation, but also as a strategic resource that starts by render-

ing disused industries functional again. Re-utilization can take various forms (e.g., for production, residential or cultural purposes), but must be capable of communicating and improving the historical stratification, and of enhancing the sense of belonging by the resident population.

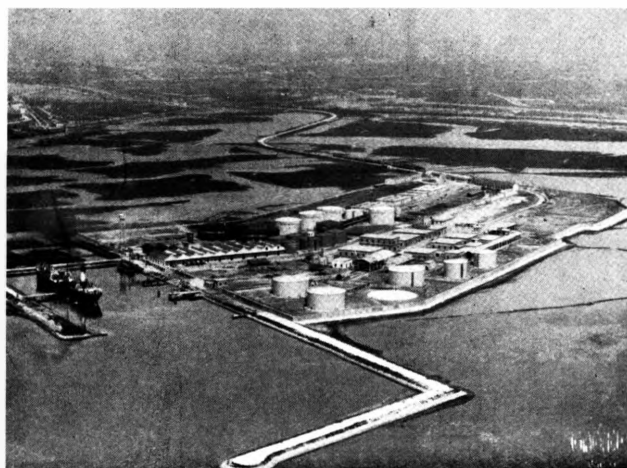
The commune framework of the industrial heritage is reinforced providing a commune vision from the sea, aboard of historical sailing boats, rented in each port, and sailed in front of the former industrial sites, during the local workshops, by learners and teachers.

The coastal cabotage promotes sustainable development of coastal territories and a new awareness in the relationships between people and cultures. The main objective is learning the industrial archaeological heritage through the analysis of case-studies selected by partners; being innovative in both, methods and contents.

1. Identification, knowledge and promotion of the industrial archaeology heritage along the European coasts;
2. Development of a 'sense of belonging' of these derelict sites as part of the public cultural heritage by both the local community and the international audience;
3. Protection: the development of a new awareness and consciousness by local administrators and policy makers for the protection of these sites and for a possible rehabilitation to new functions;
4. Cooperation among different bodies and competences on the rehabilitation process; through the active involvement of different typologies of organisations and entities (State, universities, port authorities, municipalities, citizens, etc.);



exFem Porto Sant'elpidio (1911) (© author)



Oil docks at Porto Marghera (© author)

5. Harmonisation and public participation as a fundamental element for sustainability.
6. Identifying, through cultural and technical cooperation between the partner organisations, the best practices in the regeneration process built on a bottom-up, shared and multidisciplinary methodology and approach;
7. Widen the range and typology of users of these sites, through cultural tools built on a shared process among the project participants (partners, stakeholders, identified categories, general public, etc.);
8. Consolidate the relations between the cultural and administrative institutions along the European coast.
9. Produce a full accessibility to the places and to information, towards able and disabled people.
10. Learn by the experts but also by the workers, both male and female, in order to understand not only the working processes, but also the life of the community around them.

The project and the documentary are constructed from a sequence of eight conferences in 2007. The first conference was held at the Ministry of Economic Development, with the Minister, which presented Cattedrali del Mare at the national level, and then six stages of the cabotage, from Iglesias in Sardinia to Latina in Lazio region, from Syracuse in Sicily to Taranto in Puglia, from Porto Recanati in the Marche region to Venice. The output, the documentary produced during the cabotage, was presented the first time in October 2009 in a conference at Porto Marghera, and now arrives in many conferences in Italy and in Europe, with English subtitles, in order to provoke the debate and enhance the rehabilitation of the European cathedrals of the sea, not only involving the local institution that promoted the cabotage, but also involving the stakeholders in the rehabilitation process of Porto Marghera, and all along the interregional waters of transition in the gulf of Venice.

B1 Economy and Cultural Heritage? – The Relevance of Cultural Aspects in Mining Activities

Organizer: Stefan Brüggerhoff (Germany)

Centre Historique Minier (Lewarde/ France) –
Does a Museum help to deal with Structural Change?

André Dubuc

On 21 December, 1990, the last truck of coal was brought up from the depths of the Nord-Pas-de-Calais coalfield. All the regional and national media were present to witness this event, which marked the end of 270 years of coal mining in the north of France. Stretching over almost three centuries, this industry had a profound effect not only on the region itself but on France as a whole, as coal mining was the major factor in the country's industrial and economic development.

Alongside the Ruhr, the Nord-Pas-de-Calais coalfield was one of the largest in the world, with 591 shafts that were dug producing more than two billion tonnes of coal.

It required a very large work force; when the activity was nationalised in 1946 more than 250,000 people were employed directly, and mining was indirectly responsible for more than a million jobs.

Workers came from all over the world, and twenty-nine different nationalities were represented among the miners. Around 200,000 Poles, the largest national group, came to work in the Nord-Pas-de-Calais mines between the wars, and from the 1960s 78,000 Moroccans were employed as the activity drew to a close.

THE IMPACT OF THE CLOSURE OF THE MINES

1990 was also the year that I arrived at the Mining History Centre, exactly one week before the last shaft closed. I have therefore witnessed deep changes, not only in the life of the coalfield but of the region as a whole. I have noticed that the effects of the termination of the area's main economic activity have been perceived in different, often completely opposing ways, not only within the world of the miners themselves as would be expected, but also by the major players in the political and economic arenas.

The miners fell into two categories, approximately equal in number. Firstly, there were those who were glad to see such a difficult and dangerous activity come to an end. Not only because of the accidents (the Courrières mine disaster in 1906 killed 1099 miners, and a firedamp explosion killed another 42 in 1974) but also because of silicosis, which has killed more than 50,000 miners since 1946, and continues to claim victims even now.

Others felt a degree of pride in their profession, and were conscious of the fact that their efforts and selfless dedication allowed France to become a great in-

dustrialised nation and made their compatriot's lives more comfortable. This group believed that the role they played in the country's economic development should be remembered.

Political and economic decision-makers are also divided approximately equally between those who would like to see all traces of this industrial activity disappear, and those who believe that the mining past should be preserved and promoted. The first group fears that the sombre physical and moral image linked to this aspect of history may discourage new companies from setting up in the area, whilst the second group claims that the past, where the roots of future economic development were nurtured, should be acknowledged.

At this point, it is appropriate to point out that the decision to close the coalfields was planned over a period of around thirty years, starting in the early 60s, not taken suddenly as was the case in some other countries (I can quote England as one such example) and is often still the case today. This organised end to mining activity, known as a "Reconversion Plan", involved not closing a colliery until all the staff had moved into an alternative sector or retired.

It was especially important to prepare the population for this change, because mining had created a very specific way of life for the miners and their families, where the company had enormous influence over all aspects of life, from health to leisure activities. The lifestyle of the population of the coalfield was therefore transformed. Local populations were generally supported through these changes by their councillors, particularly via ACOM, the mining communities association.

The plan also included the setting up of new nationalised or private companies, and in particular automotive manufacturers, to absorb the younger element of the workforce.

The nationalised Collieries of the Nord-Pas-de-Calais basin (H.B.N.P.C.) itself created the SAIL, the Industrial Reception and Installation Service, which aimed to provide land and financial support to new companies wishing to set up in the region.

Lastly, and this is sufficiently rare to warrant a mention, the nationalised mining company started a project to preserve the memory of the mines at a mining site, Delloye Colliery at Lewarde, as early as 1982.

The reconversion plan provided employment solutions for all staff, assisted economic redevelopment in the area and promoted the cultural history of the mines, therefore avoiding the violent shock and trauma which could have impacted the whole area.

Personally, I was naturally a whole-hearted advocate of the promotion of mining's material and cultural heritage. The three reasons I put forward for this were as follows:

- it was appropriate, firstly, to pay tribute to all the men and women who worked for the mine, from the engineers down to the women coal sorters and the young boys who worked down the pit.
- secondly, the project had great potential as a tourist and cultural attraction for a wide range of visitors
- lastly, the future tourist and cultural attraction would produce considerable economic activity.

The debate was so intense that the main regional newspaper, *La Voix du Nord*, invited contributions from both camps, those favourable to and those opposing the preservation of the mining culture.

When the film *Germinal*, directed by Claude Berri, was filmed in 1992 on the very sites that Zola studied when writing his novel, it became evident that mining was a real human epic, which would continue to interest a wide audience for a long time, even attracting people from outside the region.

And in 1995 the Mining History Centre obtained the first of the financial support necessary for its development via a three-phase programme of architectural restructuring and museum creation, implemented between 1999 and 2009.

THE ECONOMIC ROLE OF THE MINING HISTORY CENTRE IN THE NORD-PAS-DE-CALAIS REGION

Alongside the architectural restructuring and museum creation which enabled the development of its programme through permanent and temporary exhibitions, publications and international colloquiums, the Mining History Centre was able to provide the required tribute to men and women who worked in the mine, and to meet the expectations of a wide range of visitors.

The fact that visitor numbers have grown enormously, from 33,000 visitors in 1985 to 150,000 visitors today is due to the fact that the programme doesn't just correspond to the expectations of people in the region, but draws a much

wider audience, with foreign visitors to the Nord-Pas-de-Calais region representing 40% of all entries.

The Centre's own development has had considerable internal economic effects, as it now employs around one hundred people, and has a turnover of 2 million Euros, which means that the entire wage bill is paid using the Centre's internal resources.

The Mining History Centre has therefore become a medium-sized company in its own right, and is in fact one of the larger medium-sized companies. The centre notably employs young cultural mediators, who are gradually taking over from former miners as guides. Moreover, the Mining History Centre was awarded the *Regional Trophy for Professional Training* in 2009, for the quality of the training given to these young cultural mediators.

Also, the economic impact on the local area and the region as a whole, although it has yet to be quantified, is considerable. In terms of transport, for example, starting with the 1,500 buses which serve the Centre each year, but also hotels, restaurants and more.

The restructuring work, worth more than € 12,500,000, was carried out almost entirely by companies from the region, which also carry out maintenance work on the site worth around € 200,000 each year.

It is however obvious that this impact, if judged in purely economic terms, is completely insignificant compared to the impact of mining itself. We need to look further than this to find the real impact of a cultural venture such as the Mining History Centre on an area's economy. The impact is more indirect than direct.

The success of the preservation and promotion of mining culture by the Mining History Centre has in fact lead to a degree of pride among the local population, which has been reinforced by two significant current projects:

- Firstly, the candidacy of the coal fields as a UNESCO World Heritage site in the changing cultural landscapes category.

This candidacy is absolutely essential, first of all at local level, since it allows the recognition of the rich mining heritage concerning indeed four exploitation sites, 70,000 dwellings, a hundred of slag heaps as well as railways and waterways. With this candidacy, the whole coalfield is becoming a great repository of the mining culture, extending over nearly 120km.

- The second project concerns the opening of the new Louvre Museum at Lens, the heart of mining culture, planned for 2012.

These two projects will increase the impact on the regional economy significantly again, as 500,000 visitors are expected to visit the new *Louvre Lens*.

Moreover, the preservation of mining culture has made it possible to promote the regional population's strong personal and professional qualities: courage, taking the initiative, adaptability and solidarity, all values which are sought after by employers today. Consequently, in 2001 a Japanese car manufacturer seeking a site to set up a European operation chose Valenciennes, another historic mining site, and created 3,600 jobs. I personally hosted the Japanese delegation responsible for looking for a site, during its evaluation of the regional cultural life.

To sum it up, I would say that whilst the presence of a cultural venture is not a sufficient condition for the economic development of an area, it is a necessary condition, especially if this venture is directly linked to the history of the area concerned.

Development of the Coking Plant Zollverein
(Essen, Germany) – Between Brownfield
Conversion and World Heritage Aims

Hans-Peter Noll
Annika Edelmann
Donato Cristaldi

INTRODUCTION

In recent years, cultural aspects have gained growing relevance in brownfield regeneration. In this context, two different levels can be distinguished:

- First, culture events like theatre festivals, concerts and light installations, to give just a small sample out of the large variety of different sorts of events, are utilized in branding and place-making of regeneration projects. These events open up the sites, draw visitors to the former “forbidden land”, serve to raise the public interest in the sites and thus contribute to an improving image: Arts and culture instead of depression and decay.
- Second, the emerging knowledge-based economy contributes to the *Rise of the Creative Class* (Richard Florida) and breeds a wide range of creative industries which grows in economic importance (number of employees, turnovers, contribution to GDP). Creative industries' companies therefore need space to locate. Due to this they are a relevant target group for the sales departments of land developers.

For both branding and sales aspects, industrial buildings and installations are a prerequisite as they create a special setting on the sites, a certain atmosphere which makes the difference and is much sought-after by a certain clientele. This quality of place serves as a strong location argument.

However, to use buildings and installations in a context for which they have not been originally designed requires often major refurbishment. This necessary refurbishment bears potential conflicts with the protection of listed buildings and its regulation.

As a brownfield regeneration project on a site classified as UNESCO World Heritage, the coking plant Zollverein in Essen is a major example in this context. This paper shall give a brief illustration about the links and interfaces between the brownfield regeneration project and the requirements stemming from the World Heritage classification.

ABOUT THE COMPANY

The RAG Montan Immobilien GmbH is part of the RAG corporation and responsible for 13,000 ha of property, mainly located in the Ruhr area. For more than 30 years, the company has developed former industrial sites into sought-after locations.

The interdisciplinary staff of geoscientists, planners, architects, engineers, legal experts and real estate professionals – altogether more than 300 employees – is actively involved in the structural change of the Ruhr area. From green spaces through to logistic centres a large diversity of after uses are represented. Depending on the market situation the company's concepts are creating new locations for businesses, new jobs, attractive housing and exciting places of cultural and leisure encounter.

THE COMPLEX 'ZOLLVEREIN'

Location in space

The Zollverein complex is located in Essen, a city with some 600,000 inhabitants in the west of North Rhine-Westphalia, right in the middle of the Ruhr area. The Ruhr is Europe's third-largest metropolitan region with a total population of approximately 5.2 million (metropoleruhr, 2010). The region derives its name from the river Ruhr which flows from east to west near the southern border of the Ruhr area and finally ends in the river Rhine in Duisburg.

A few decades ago Essen was still dominated by coal and steel industries, just like the whole region. Today the city has become one of the biggest office locations in Germany what makes it an outstanding example for the structural change in this region. Nine of the 100 biggest German companies have their headquarters in Essen (website city of Essen, 2010). Representing the whole Ruhr, Essen was elected as European Capital of Culture 2010 together with Istanbul (Turkey) and Pécs (Hungary), not least because of Zollverein.



The Ruhr area (© author)

The Past

While the coking plant is an important part of Zollverein it is useful to picture the past of the whole complex.

In 1847 the industrialist Fritz Haniel purchased thirteen adjoining coal fields and named the pit "Zollverein". The extraction started in 1851 with a production of nearly 13,000 tons of coal. 39 years later the production increased 75 times which means 1,000,000 tons of coal a year.

In 1927, the architects Fritz Schupp and Martin Kremmer started to redesign the coal mine to achieve a much higher production than any other coal mine at that time. What they created was an architectural and technical masterpiece at the same time in the spirit of the so-called "Bauhaus Style". The whole digging process was concentrated on the new central shaft site XII. Strong building lines, the clear and clean architecture and not least the 55 m twin pithead gear were representatives for the new Zollverein.

The construction of the coking plant started in 1957 and was finished in 1961. It was directly connected to Shaft XII and also very efficient with an output of nearly 8,600 tons of coke a day.

At the end of the 1950s the coal- and steel-crisis led to the closure of many coal mines and arrived 25 years later also at Zollverein: After the final decision in 1983 the coal mine was closed down in 1986, followed by the coking plant in 1993 (Website Zollverein 2010 A).

The Present

After the closure of Zollverein the state of North Rhine Westphalia declared the complex as a historic monument, acquired the coal mine and prevented the demolition. The coking plant remained property of the RAG, but was protected as well.

Just a few months later, parts of Zollverein have been restored and premises were rented to artists and other creative people. In addition, various cultural events have taken place and opened the once "forbidden area" to the general public.

In 2001 the complex Zollverein was finally nominated as UNESCO World Heritage, the first and only in the entire Ruhr area. Because of this and great efforts of many actors, the coal mine Zollverein has today become one of the most eminent creative hubs in the region. The foundation for this development was laid with the reconstruction of the former boiler house by the famous archi-

tect Lord Norman Forster and the relocation of the "NRW centre of design" together with its "red dot museum" into this redesigned building. The former coal washing plant has also been extensively refurbished and is today home to the new "ruhr museum". The first completely new building on the World Cultural Heritage site for 50 years, the Zollverein School, is an architectural masterpiece designed by the Japanese architectural office SANAA and was finished in 2006.

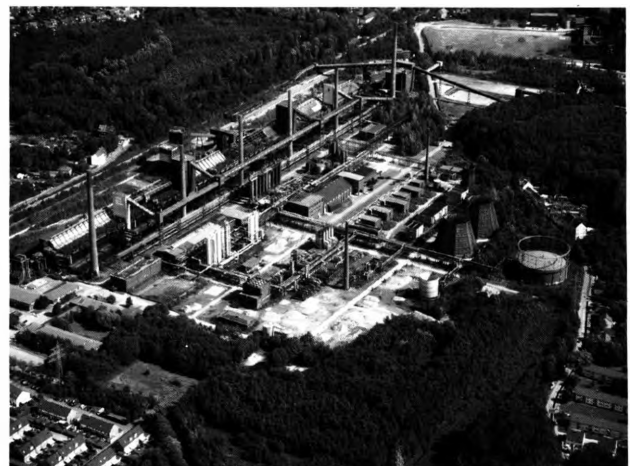
The coking plant is also opened to the public and known as a special location for events like the "Extraschicht", which celebrates the industrial heritage of the region. Together with the open air swimming pool in summer and the ice rink during winter the plant has become a living location with more than 100,000 visitors a year.

These are just a few examples of the positive development of Zollverein, on the way to a cultural and creative hub with some 170 new companies located, almost 1,000 newly created jobs and 800,000 visitors a year (Website Zollverein, 2010 B).

THE COKING PLANT ZOLLVEREIN

The development

While the coal mine is rather characterized by museums and cultural aspects, the coking plant is going to be a new business location, always in respect of its cultural heritage. The main actors of the development of the coking plant are the "Stiftung Zollverein", the "Stiftung Industriedenkmalpflege" and the "RAG Montan Immobilien".



*Aerial view of the coking plant Zollverein today
(photo: RVR)*

While in the south-western part of the site new construction areas are to be located, the existing buildings in the middle of the area are going to be reused according to the conservation guidelines. All this happens with regard to the design concept, developed by renowned planning offices, to ensure that the UNESCO requirements will be respected. According to the German planning system a land-use plan, based on the master plan and design concept, will come into force and be authoritative for the future development. Therefore the new construction areas in the south-west are limited by fixed building lines, combined with a flexible parcelling inside. The four quadrants in the middle are emanated from the existing street grid and will be supplemented by new constructions. The northern boarder of the site is marked by the coke oven battery along the "blue alley", which plays an important role as a monument and point of orientation as well.



Illustration of a new workshop (photo: Stiftung Zollverein/by ASTOC, Cologne)

Regarding the land use there is a clear preference for companies from the creative industries (design, architecture, advertising, performing arts, craftwork, arts & antiques, fashion, film & video, TV & radio, music, software, publishing & journalism). In addition, service companies, as well as undisturbing production and commerce are welcome; logistics, large retail and emitting industrial companies, however, are unrequested. The RAG Montan Immobilien GmbH will also build its new headquarter as a pioneer in the western part of the site and thus be a part of the new development.

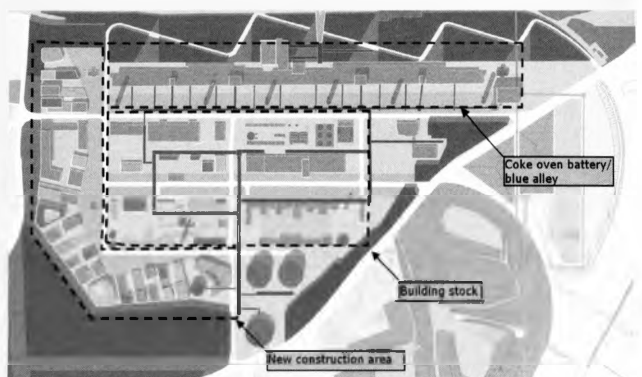
The UNESCO World Heritage status

As a part of the industrial complex Zollverein, the coking plant is also protected as UNESCO World Heritage. Therefore many requirements have to be fulfilled, like the conservation of the buildings and technical facilities, but also surfaces, streets and open spaces. Beyond that, the former production process has to remain recognizable and the overall impression of the site must be conserved.

Problems and advantages

For the development of the site the issue described above certainly implicates some problems, but also several advantages. The following examples intend to illustrate this for the coking plant.

As mentioned before, also the street grid is under protection and cannot be changed, which means that profiles and curves have to remain the way they are. Beyond that, also the surfaces and kerbstones are protected. The biggest problem in this context is that the narrow streets



Plan of site (photo: Stiftung Zollverein/by ASTOC, Cologne)

do not meet modern standards for commercial uses and thus some of them are automatically excluded. Another point is that pavements only exist on one side and private parking is not possible at all. Finally, because of the old surfaces, many road damages can be expected, too.

Due to the fact that the open space is also subject of protection, some restrictions must be respected as well. As the most important point in this context, the restricted density of development must be mentioned. As the relation between building mass to open space has to be maintained, the dimension of new construction areas is limited just as the altitude of new buildings. Furthermore the design of public open space is predetermined to maintain the specific charm of the area, characterised by grass and asphalt. In addition, private parking is only allowed within the inner courtyards, so that the impression of the plant will not be impaired.

Looking at the restrictions concerning the buildings, it is clear that the building stock must be conserved and every structural alteration needs the consent of the administration. Beyond that the architecture of new buildings has to meet the requirements of the design concept, which intends to safeguard the overall quality of the site. This concept contains guidelines concerning surfaces, paint, style of roof, material etc. That means that potential investors and users have to accept that the architecture of their buildings may not be fully tailored to their needs. This may also cause problems concerning corporate design specifications of some companies. Another point in this context is the prohibition of big flashy logos and other forms of advertising.

Although it seems that there are numerous restrictions and guidelines which have to be considered, there are significant advantages, too. For example companies locating on the site are assured that the quality of their location will not be impaired by "low standard" developments. Moreover the marketing effects for the whole site have to be pointed out. Not only the profit of touristic attractiveness, but also the increasing appeal for companies of the creative sector is a great advantage for the development of the site.

The restrictions and guidelines concerning the open space and architecture guarantee a sustainable quality and avoid conflicts concerning the monument. This quality is important to attract the preferred groups of users, who are looking for special and unique places and addresses. Problems like the narrow streets can be seen as

natural selection, while logistic companies for example are unrequested anyway.

CONCLUSIONS

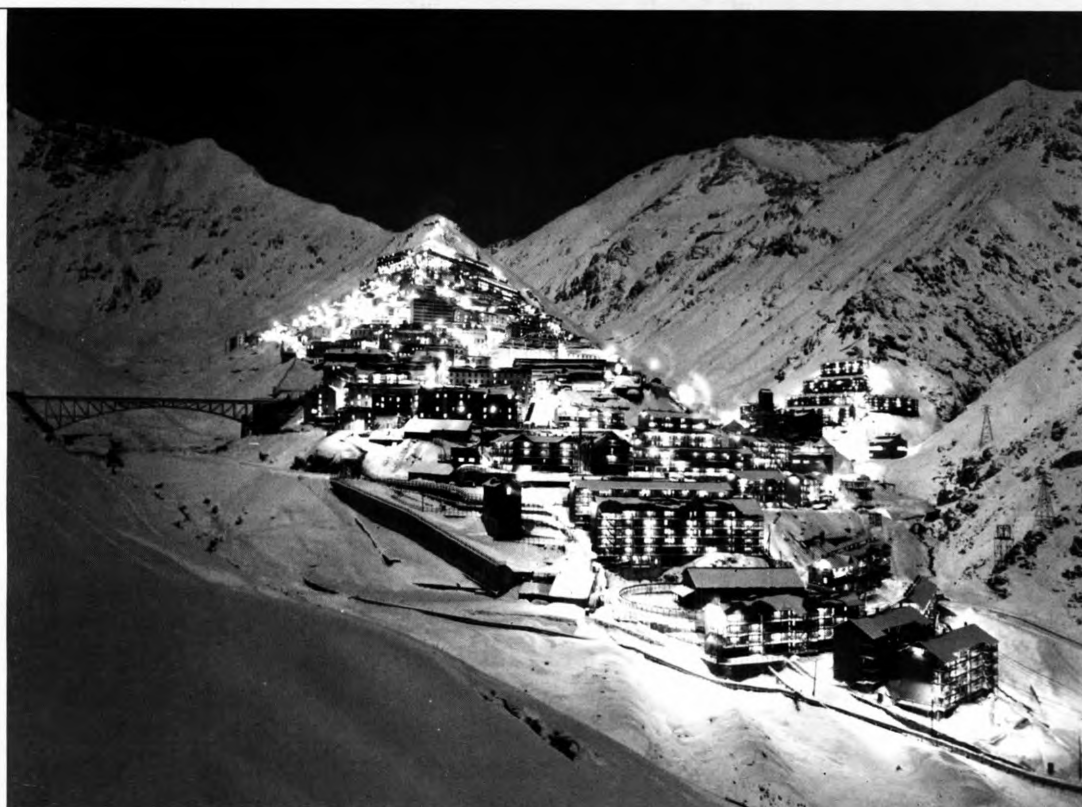
Finally one can say that a brownfield development in conjunction with UNESCO World Heritage aims must not be an antagonism. Of course, there are many conflicts, but without these conflicts, a site like Zollverein would probably have become a faceless industrial park like many others before. So the point is how to deal with restrictions and how to take advantage of the given situation. In this case not only the site must fit the user; the user must also fit the site.

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World Heritage Rescue of Sewell Mining Campsite in Chile

Felipe Ravinet de la Fuente



INTRODUCTION

Sewell is associated with "El Teniente", the world's largest underground copper mine, owned by the State and located amidst the High Andes, 150 km south of Santiago, Chile.

This settlement was born in 1905, when the north American citizen William Braden began the industrialized mining of copper, starting with a small plant able to treat 250 metric tonnes/mineral/day and a campsite for 2,500 workers, giving birth to the Copper Mining Industry in Chile.

In 1915, the "Establishment" adopted the name of Sewell in honor of the company's first chairman. In 1940 Sewell was a grown up city with 15,000 inhabitants. In the seventies sewellians were moved to Rancagua leaving an empty camp. Nowadays the built up surface is 38,000 m² in housing and 61,000 m² in industrial facilities.

In 1998, Sewell was declared National Monument and the Parliament proposed creating a Mining Museum in Sewell and taking steps for the town to be declared UNESCO World Heritage Site, which finally materialized in 2006. This distinction was recognition to the effort and ingenuity of thousands of Chileans who created this unique and emblematic settlement amidst the Andes.

Today, the town's conservation is shouldered by the Sewell Foundation which, through its Management Plan, in harmony with the El Teniente's productive operations, demonstrates that mining and conservation are perfectly possible.

BACKGROUND INFORMATION

Sewell is located in the Region of O'Higgins, at 2,200 m above sea level, 150 km south-east of Santiago and 60 km east of Rancagua. Since its foundation, the following stages in the evolution of the town are acknowledged:

1905-1910 "Foundation"

Refers to a small group of rudimentary houses and a plant for processing 250 ton/day and consisting of a mill and hydroelectric plant. These facilities so-called "Establishment" at that time was home to 2,500 persons.

1911-1916 "Spreading Town"

In 1911 a train to Rancagua was inaugurated enabling the industrial facilities to be enlarged.

Likewise in 1916 the American sector was built, as well as the first condominiums for workers, the hospital, a social center and fire station catering for the needs of 9,000 persons. However, this growth did not encompass the different areas of the town taking on the name of "dispersed town".

1917-1930 "Consolidation Town"

World War I increased the demand for copper, so from 1917 onwards, new facilities were built, an electricity substation and sheds for the railway, high-rise buildings, schools and social clubs were built in order to meet housing and urban development needs.

Successive enlargements, more buildings and the central staircase marked the boundaries and consolidated Sewell's urban structure.

1931-1968 "Grown up City"

In 1934, copper output rose to 114,715 tons representing an increase of 45% over the previous year. World War II once again meant increasing production which, by 1945 reached 149,595 tons.

By 1950, Sewell had consolidated itself as a "Quintessential Town", with a large amount of facilities and different services. Its unique urban structure fitted production facilities and housing for 15,000 persons.

1968-1980 "Operation Valley"

In 1967, Chile became the owner of 51% of the company's stock which included a plan for increasing production and reducing operational costs. This led to "Operation Valley", by which 12,000 inhabitants of Sewell were transferred to Rancagua.

In 1971, the Government of President Allende nationalized copper and so 100% of El Teniente was now owned by the State of Chile.

1998 - "Heritage Town"

In 1998, different factors culminated in a change in the somber fate Sewell was facing. The new administration of CODELCO understood the importance of its heritage and the tourist potential of the town. That same year Sewell was declared "National Monument", thus protecting the facilities that were still standing.

That led CODELCO to table a "Strategic Plan for the Conservation of Sewell" in 1999. The year 2006 saw Sewell declared as a UNESCO World Heritage Site and its pres-

ervation is guaranteed in a "Conservation Management Plan".

IMPORTANCE OF THIS HERITAGE

Mineral & Industrial

Sewell is the brainchild of a vision, will and determination of businessmen and workers to work on a large scale, under very difficult climatic conditions, with limited human and material resources, an enormous mine ensconced in the midst of the High Andes

This challenge brought about a profound significance in its heritage, not only because of the technology imported, but also as a result of the ingenuity in overcoming technical limitations, in a slow, hard process of trial and error that made this enterprise possible and later applied in other latitudes.

Urban Architectonics

Sewell is a unique and original place, unlikely ever to be replicated. The complex is organized around the grand Central Staircase, a public thoroughfare off which run numerous pedestrian side streets circumnavigating the contours of the landscape which give the town a more human face.

Sewell is unusual; a town which does not follow pre-established geometric patterns, nor does it look anything like the normal block-type town. Its urban and architectural importance lies in its response to the abrupt geography, location and rationality of its facilities, the capacity for its services to be self-sufficient, its functional design and the use of ingenious building techniques.

Cultural or Intangible

Work, houses, services and recreation in Sewell coexisted in the same isolated place generating a highly integrated settlement. Living in Sewell meant complying with the company's rules which strengthened cohesion because of its members' close labor and family relations.

The most significant values of the "Sewellian Culture" were: **Ethics** with strict rules that regulated coexistence; **Tolerance** as regards religious and political ideas so as to create harmonious relations; **Solidarity** expressed as mutual aid; **Efficiency and Success** understood as doing things well; **Security, Welfare and Rationality** as opposed to superstitions and fatalism.

PLANNING

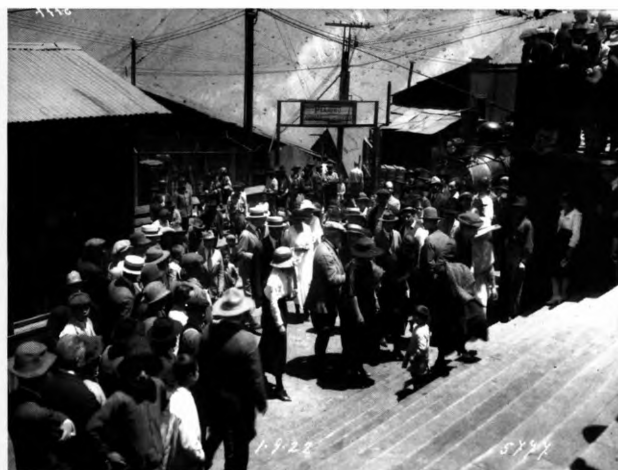
In 1998, after been declared National Monument, CODELCO prepared an Strategic Action Plan that proposed a "Management Model" that would enable the town to be conserved in sustainable terms, bearing in mind its potential for becoming a tourist and cultural attraction. Six lines of action were defined in the Plan which were carried to fruition between 1999 and 2006. Prominent among them were:

Heritage Conservation and Restoration. The objective was to undertake restoration and cleaning works and improve security. Between 1999 and 2005, the exterior of 18 buildings was restored (US\$ 1,800,000).

Disseminating the Heritage. This included actions aimed at disseminating Sewell's historic and culture importance through activities such as seminars, congresses,



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talks, exhibitions, cultural events as well as publication and distribution through the web site <http://www.sewell.cl>.

Financial Sustainability. Aimed at gradually generating the financial resources for self-sufficiency in a long term period. CODELCO has entered into contracts with tour operators, to visit Sewell and the El Teniente Mine. The revenue generated under these contracts and the marketing of souvenirs have increasingly contributed to financing its conservation.

Copper Mining Museum. Its objective is to acknowledge Sewell's role in the birth of copper mining industry and show how that this activity has contributed to the country's social and economic development. Its first stage was inaugurated in 2002 (US\$ 420,000).

Sewell's Application for UNESCO World Heritage status. The aim was to prepare and deliver, along with the National Monuments Council, back up documents about the historic importance and management behind the application.

Sewell Foundation. Bearing in mind that Codelco's primary business is mining and that as a state-owned corporation it is forbidden from harnessing financial resources beyond its main purpose, it was necessary to create a non-profit organization that would manage Sewell's assets and disseminate its heritage.

The Management Plan devoted to protecting, conserving and restoring cultural assets, proved the efficiency of the tasks and became the proper Navigation Chart to get the UNESCO nomination in 2006.

The Plan can be summarized as being **what has to be done, how and when it will be done and subsequently evaluating it.**

Having the Plan also meant complying with UNESCO's recommendations as a clear sign to abide by international standards for the conservation and management of protected properties.

Administration and Management Plan

The Sewell Foundation administrates the site and it's the driving force behind all initiatives that enable this Management Plan to be fully complied with.

Heritage Conservation and Maintenance Plan

Includes all activities that enable the assets to be planned, conserved and maintained in the long term in accordance

with their authenticity and integrity and an acknowledgement of the components and needs of the site.

Financial Sustainability Plan

Financing between 1999 and 2007 was done by CODELCO, since 2008, the Plan is being financed by the Sewell Foundation whose capital (USD\$ 2,000,000) was provided by CODELCO. On the other hand, the Foundation has increasingly been generating its own revenue stemming from tours and, at the same time, it has begun to harness its own resources coming from both public and private sources.

Safety and Environment Plan.

Its aim is to prepare and apply safety procedures and programs that effectively respond to any potential risks that could or do affect the properties at the site, persons working there as well as visitors.

Likewise, this plan is concerned with any environmental impacts affecting the conservation and sustainability of the Property arising out of environmental agents as well as persons visiting the site.

Research Plan

For this purpose, lines of research were defined in such areas as History, Archeology; the Copper Industry and Environment.

Diffusion Plan

Includes activities for the proper and periodic transmission of Sewell's importance, how far-reaching it is to conserve it, what has been done to protect it and citizen participation, for this purpose, the help of the community will be asked to conserve it and participation opportunities will be offered by the Foundation.

Museum Plan.

For this and the coming years, the following museum projects have been scheduled: Sewell Architecture and Museum Recreations on the inside of some of the buildings; Recreation of the Mine on a special room at the museum; Sewell Concentrator Site Museum and a Site Museum on the Inside of the Mine. For that there is a Co-operation Agreement between Codelco and the Deutsches Bergbau – Museum.

PARTICIPATION AND PUBLIC USAGE

From 1998 onward, Sewellians and the community have been participating in the actions aimed at conserving

Sewell, such as the support of its nomination to UNESCO World Heritage status. This participation has been formally expressed with the incorporation of one representative from the Sewellians on the board of the Sewell Foundation.

- Whilst tackling the site as a "cultural capital", the model of a tourist attraction arises based on a strategy for use in accordance with the importance of the site's heritage and all of the dimensions into which such importance can be desegregated.

MONITORING

These activities are related to measuring and controlling compliance with the objectives and actions defined in the specific management plans and programs, both with the authorities as well as with whatever targets are established. Measuring the results bore in mind previously defining quantitative and qualitative management indicators that enable the results of the management to be controlled as objectively as possible over a certain period of time.

Defining the indicators for measuring the management of the different plans was done bearing in mind those variables that could measure the management, as objectively as possible, the results obtained.

On the other hand, for the immaterial or intangible assets, the indicators are mainly qualitative and they are related to the effectiveness of any action taken that is devoted to conserving essentially cultural elements.

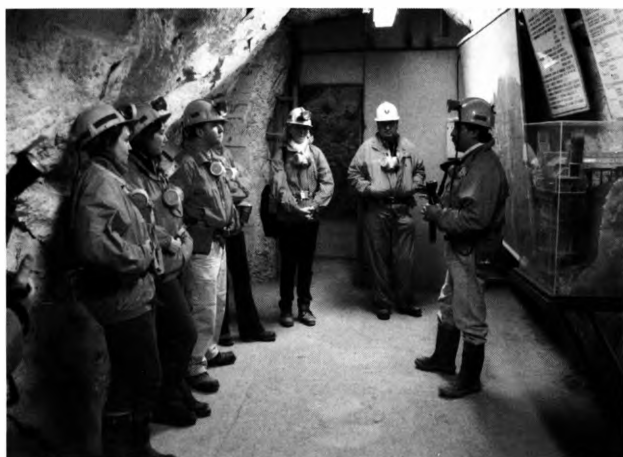
CONCLUSIONS

As regards strategy, rescuing the heritage of Sewell has fully met the Codelco Policy regarding social responsibility. At the same time it has significantly contributed toward reinforcing the identity of the regional community, such as the workers in the El Teniente Division, whose pride is heightened by belonging to a successful company rich in history that is contributing toward the development of Chile.

The main reasons for these achievements refer to the detailed preparation of the Management Plans. This is expressed in the complementary remarks made by some members of the UNESCO World Heritage Committee when Sewell was presented for nomination to the World Heritage List.

Financially speaking, the achievements are related to the start-up of the tourist business, whose revenue has increasingly contributed toward financing the costs of restoring the town.

Socially speaking, the most significant achievements are related to the participation of the former residents of Sewell through their community organizations who have been very active in rescuing the heritage and tourist operations.



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C2 1/125 of a Second –
Photography and the Industrial Heritage

Organizer: Jan af Geijerstam (Sweden)

Photography and the Industrial Heritage, a neglected Source and its Context

Jan af Geijerstam

Images, especially photographs, attract a growing interest in social sciences and the humanities, including images as a source to the past and as a way to interpret and convey history. Visual studies is a special field of study and research.

Historians in general, however, have been sceptical to the use of visual media. If photographs are used it is most often made with a minimum of analysis and contextualization. The primacy of the written word remains uncontested in academia, seldom letting images into an active dialogue with the text or the issues of research. They are reduced to decorations. This is paralleled by an all too common neglect of the archival safeguarding of photographic evidence from the past.

In spite of the central position of industrial imagery, systematic studies are scarce. Possibly the most extensive analysis of a single photographic archive that is connected to both a site and a company is "Pictures of Krupp". This impressive volume shows a number of different approaches, which a study of this kind of collection may offer.⁸

At the same time media increasingly affects our lives and the visual has become central to modern communication. It has even been described as a key to the cultural construction of social life in western society.¹ The difference between the practice of historians and the societal use of images increases.

It is necessary to bring up and emphasize the importance of images in research and interpretation of industrial heritage.² Its title, "1/125 of a second – photography and the industrial heritage", is a paraphrase of the title of an essay by the Swedish documentary photographer Sune Jonsson (1930–2009).

In an article of 1978, "Nine thoughts on the 1/125 of a second", the Swedish documentary photographer Sune Jonsson (1930–2009) stressed the importance of a deep interrelationship between image and words. They form "... a kind of contrapuntal interaction ..., which results in polyphony and at the same time creates a formal tension and plurality. Together they give the material relief, deepens the meaning and authenticity of the document."³

Two central conclusions emanate from this. Firstly the use and analysis of photographs should be an integrated part of any study of industrial history.⁴ Secondly it is of essential importance that images not only are collected, maintained and interpreted, but done so in close connection to the sites of their inception and use.

PHOTOGRAPHY AND INDUSTRY

Photography is an integral part of the history of industrial society and industry as such as well as industrial communities and its social life has been an important motive for photographers. Collections of images, in public and private or personal archives, the latter often hidden away and maybe forgotten, often offer a treasure of resources to be explored. This treasure can offer material to almost every kind of investigation.

And still, in the so-called post-industrial era, industry, its technologies, landscapes and social life continues to be important motives. Several world-renowned photographers and artists have worked extensively in this field.⁶

- Another example, of a totally different kind, is the continuous documentation of abandoned sites of industrial society made by different strands of the movement denoted *urban exploration*. Their documentary work on abandoned industrial sites exposes a sometimes existential interest in and representation of life and death, of time passing, the aesthetics of decline. Also the work of this movement deserves a deeper interest from researchers of industrial heritage.⁷
- The social documentary photographer Ian Beesley represents still another category of contemporary industrial photography. He has integrated images and writing and his method of work, an *active, participatory fieldwork*, should be especially noted. He strives to encourage the workers he portrays to *participate* and *contribute* to the projects. He stresses the importance of their active involvement in decision-making and control of a project and to establish their ownership of the documentation and of the interpretation. Beesley's work represents a democratic approach to the interpretation of industry. His work can be seen as a bridge to the second major point of this paper, the importance of safeguarding and interpreting images in the localities of their inception and use.⁹

PHOTOGRAPHY AND INDUSTRIAL COMMUNITIES

Fagersta is a steel making community in central Sweden. As in many other towns of its kind, the mill was the heart and focus around which life was lived. It became an icon of stability and the future. It dominated the physical, built layout of the community. It set the timings of daily life. Its sounds, its smells and dirt were felt in most of the town.

Today this small community is the caretaker of one of the biggest collections of photographs still safeguarded in the very place where they once were made and used. In the community archives there are at least a quarter of a million different and unique photographs, ranging from the 1880s onwards. The pictures in the collections come from many different sources, although the archive of the steel works is the most important part. The images came about for many different reasons and their motives cover all parts of society. They represent a wide array of technologies of photography, each setting its specific frames and limits to image making.

I have chosen four images from the archives. They depict shifts in a small part of the steelworks area, once the site of farming and later of the main school of Fagersta and of Steel works no. 2. In their simplicity and triviality the four images give glimpses of the passing of time and the importance of the steel works.



AN ARCHIVAL TOTALITY

The archives in Fagersta are parts of the history of the community and of the transformation of industrial society. The images are saved together with rich text based archives, placed in the former head office of steel works in the centre of the community. In image research this gives room for an analysis not only to the images as such, but for studies of what photographs do socially, in the construction of landscape, identity and place.¹⁰ They can also be used in the study of the history of photography, the shifts and changes of technology and the position of the photographic image in society in its variety of uses.

Images are split second remembrances of a part of the past, but in the present, as in the past, they are also "relational objects in the making and articulating of histories" as the social anthropologist Elisabeth Edwards has worded it.¹¹ Images are acts of communication. It is thus of immense importance

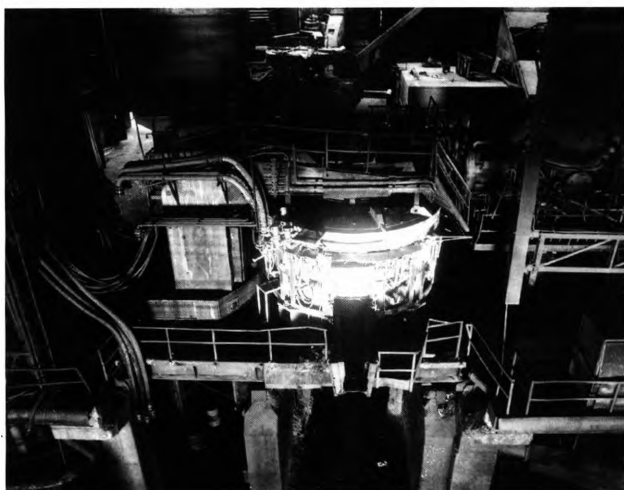
The steel works of Fagersta. Fagersta is a small steel making community in central Sweden. As in many other towns of its kind the mill was the heart and focus of life and became an icon of stability, future. An engine of development. Aerial photo 1935 showing the steel works alongside the Kolbäck River and canal. The commercial and mainly worker residential areas of the community are grouped around the steel works. The site of the schools and later Steel mill no. 2 is in the upper left, behind the smoking chimneys.

(photo: The former archives of the Fagersta combine, the community archives of Fagersta.)



The school. Regular schooling for children in Fagersta is mentioned already in 1733 and in 1853 the first school building was erected. The so-called Träskolan, "the wooden school" was built in 1882, seen in the background of this picture. In 1910 it was replaced by Stenskolan, "the stone school", here proudly presented as newly built, with a class and their teacher in the foreground. The school was just on the outer limits of the steel works, with the railroad passing close by.

(photo: The community archives of Fagersta.)



The memory of industry. Steel mill no. 2 of Fagersta was closed down in 1985, after only 15 years. The image shows the steel arc furnace in the abandoned mill. Today the steel works building is an empty shell. The equipment was sold to a South Korean company operating in Cedar Rapids in Illinois, USA, not making steel but processing other kinds of metal.

(Photo 1986 by Peter Nyblom, Fagersta.)



The teachers. Starting in mid June 1969 a new Steel works, no. 2, was constructed in the backyard of the school in Fagersta. During one full year the teachers and their pupils did their work on the fringe of a construction site. The pictures show "the colleagues, last time in the teacher's staff room". The date was June 12, 1970 just after the ceremonies ending the school year. The school was demolished during the summer.

(Photo in the community archives of Fagersta.)

that they are safeguarded in the sites where they have the strongest potential to act as relational objects.

The way in which images are classified and registered are important in determining frames of research, especially in times of extensive digitalisation of archives. The mere registration needs care, when we no longer are able to physically thumb our way through negatives and copies and it makes a big difference for the interpretation if an image is taken out of the album.¹² I would like to argue that this also applies to images being kept in their context, where they were incepted, created and used. For full and informed use of images, they to be closely linked to their "original documentary universe".

Archives are active agents in the creation and maintaining of memory and identity. They influence "fundamental ways in which society seeks evidence of what its core values are and have been." Archives are "active sites where social power is negotiated, contested, confirmed."¹³

In summary, maintaining a direct connection between images and other archives and the local society and space give the fullest possible prerequisites to a nuanced analysis. It carries the possibility of shifting the balance of power in the interpretation of archives, images, and industrial heritage through which "the past is controlled. Certain stories are privileged and other marginalized".¹⁴

¹ G. Rose (2001), *Visual methodologies: An introduction to the interpretation of visual materials*, London.

² Three papers were presented. Besides this and Howard Bossen's, David W. Lewis' "The Industrial Landscape of Memory: the Infinite Image". Lewis discussed his photos of abandoned industrial landscapes, using the early photographic process bromoil. He is photographer and artist from Montreal, Canada (<http://www.bromoil.com>) and co-author of *Corporate Wasteland – the landscape and memory of deindustrialisation* (2007).

³ Jonsson, "Nio funderingar kring 1/125-delen", in Å. Sidwall & L. Wigh, (eds.), *Tusen och en bild [A thousand and one image]*, catalogue, Stockholm Museum of Modern Art and Museum of Photography 1978, p. 9–12. Translated by J. af Geijerstam.

⁴ In my own research on early industrial iron making in India, photos by the Swedish engineer C. G. Wittenström were essential. See Jan af Geijerstam (2004), *Landscapes of Technology Transfer. Swedish Ironmakers in India 1860–1864*, Stockholm.

⁵ The multitude of technologies and social settings in which photographs are made and used calls for a wide analysis and use of images. Gillian Rose distinguishes between three sites in the interpretation of images: of production, of the image itself and of the site of the audience. G. Rose (2007), *Visual methodologies: An introduction to the interpretation of visual materials*.

⁶ See for example: Tom Paiva *Industrial night* (2002), URL: <http://www.tompaiva.com>; Naoya Hatakeyama *Lime Works* (2002) and Zeche Westfalen I/II Ahlen (2006); Edward Burtynsky, *Oil* (2009), *Quarries* (2007), *Manufactured Landscapes* (2003), URL: <http://www.edwardburtynsky.com>; Sebastião Salgado, *Workers. An Archaeology of the industrial age* (1993), Yves Marchand & Romain Meffre (2010), *The Ruins of Detroit* and Andreas Gursky. Their form of expression and their social, political agenda differ greatly, but the space allowed here cannot encompass any analysis of their work.

⁷ Innumerable websites. Ninjalicious (2005), *Access All Areas: A user's guide to the art of urban exploration*.

⁸ K. Tenfelde (ed., 2005), *Pictures of Krupp: photography and history in the industrial age*. Important are also D. Nye's study of the archives of General Electric (1985), the more general study of image use in *Image worlds*, R. Marchand (1998), *Creating the Corporate Soul* is a more general analysis American corporations using images to construct their identity. E. H. Brown (2005), *The Corporate Eye and the Rationalization of American Commercial Culture 1884–1929* studies the role of photography in American business. In *Visuele strategieën: foto's en films van fabrieksarbeiders in Nederland (1890–1919)* M. Altena (2003) makes a detailed study the images of women workers.

⁹ Ian Beesley was to participate in TICCIIH 2009, but had to withdraw. For his work, see *Shining out* (2006), *Meltdown* (2004), *Heavy metal* (2002), URL: <http://www.ianbeesley.com>.

¹⁰ J. M. Schwartz & J. R. Ryan (2003), *Picturing place. Photography and the geographical imagination*, p. 5.

¹¹ E. Edwards (2005) "Photographs and the sound of history", in *Visual Anthropology Review*, 21:1–2.

¹² J. M. Schwartz, "Coming to terms with photographs: descriptive standards, linguistic 'othering', and the margins of archivy", *Archivaria* 54 (2002): 142–171 and "More than 'competent description of an intractably empty landscape': A Strategy for Critical Engagement with Historical Photographs", *Historical Geography* 31(2003): 105–30.

¹³ T. Cook & J. M. Schwartz, "Archives, Records, and Power: From (Postmodern) Theory to (Archival) Performance", *Archival Science* 2 (2002), p. 171–185.

¹⁴ Cook & Schwartz (2002), p. 1.

World of Steel – 160 Years of Photographs

Howard Bossen

The industrial age brought modern steel production and the invention of photography. Steel made the modern world possible and photography made it understandable. *World of Steel: 160 Years of Photographs* is a world encompassing exhibition and research project. Over the last four years an intertwined history of steel and photography has been explored, a database of over 4,500 images has been created; from this a selection has been narrowed to around 200. The project, to be completed in 2013, will result in an art exhibition and a book.¹ This paper provides a background to the project and focuses on the reading of three images in the project.

The common date used for the beginning of photography is 1839 when Louis Jacques Mandé Daguerre announced the invention of his daguerreotype. The earliest photographic image found that relates to the steel industry is a daguerreotype portrait of the German industrialist Alfred Krupp, circa 1846.

During the 160 years the project covers the process of making steel, uses of steel, lives of workers and the world steel made possible have undergone incredible change. And over those years the medium of photography has undergone multiple transformations from the daguerreotype to the digital photograph.

Photographers from around the world and across the decades have created a complicated and nuanced record of steel. It is the richness of their photographic record that has guided the development of *World of Steel*. A multiplicity of themes, approaches, stories, issues and ideas emerge from their images and creates a collective photographic history of the way steel has impacted modern life. Not only did the lives of steelworkers in the mills and in their communities need to be explored, but also the photographs of steel products from cast steel cannons to stainless steel egg slicers, from bridges to skyscrapers had to be understood. Issues of industrialization, de-industrialization and even post-industrialization had to be researched. How the rise of the modern steel mill changed the landscape and the residue of the mills left toxic land that needed to be cleaned up had to be considered. In addition, a substantial and fascinating body of work emerged where photographic artists used steel as a primary component of their artistic explorations, but whose artistic concern was a form of poetic expression that transcends steel as a material.

Just as diverse topics related to the history of steel need to be considered, the evolution of the photographic me-

dium needed to be taken into account as well. With each change in photographic technology, photographers were able to explore the world of steel differently. The daguerreotype, the earliest photographic process publically announced, was a precious, non-reproducible image that required a long exposure time. Producing a daguerreotype was a slow, cumbersome process. Images were of necessity small and required the viewer to be close. They created an intimate relationship between image and viewer.

Today some photographers work completely digitally—from making the image through making the print. Many photographers have opted to make their images big—often 60x48 inches (152.4x121.9 cm) or even larger. This shift in scale creates a shift in the relationship between image and viewer. It is hard to retain any sense of intimacy when confronted with the largest image in the exhibition, a 12-foot (365.8 cm) long 21st century panorama of the Forth Bridge in Scotland.

With all these variables, from images made as pure documentation to those made as artistic expression, from images that are as small as 4x3 inches (10.2x7.6 cm) to huge digital prints and from monotone to full color it becomes important to apply appropriate analytical tools to the discussion of each image.

While some of the photographs require attention to the history of photographic technique, artistic movements, industrial and social history, others may only require attention to some of them. The trick for the historian is to understand which analytical tools work for an analysis of any particular image. The one common denominator for all the images in this project is that they fit comfortably into an art exhibition even though many of the photographs were made for some other purpose.

When we discuss photographs we always do it through the lens of today although we need to be mindful of the lens of the past. We try to understand the original context that an image was made in and need to be mindful of how values, interpretations and context all shift over time. Some images that were once made purely for purposes of industrial documentation are now considered fine art. They have a finely tuned sense of composition and of the importance of how light reveals and in its absence hide details.

Because a full discussion of the nearly 200 photographs in this project requires a book length manuscript a selection has been made to illustrate three types; an industrial

still life, a pre-conceived industrial narrative and an action shot. All three photographs were made within the first 70 years of the beginning of photography showing inventive approaches that continue to today. Space permitting other approaches and photographers would have been included, for example works by Margaret Bourke-White (1930s), W. Eugene Smith (1950s), Bernd and Hilla Becher (1980s) as well as by contemporary photographers including Terry Evans, Béatrice Helg, Václav Jirásek and Zhou Hai.

The still life, by a French photographer, was made in England in 1851. Photographers who worked for Alfred Krupp's Kruppsche Gußstahlfabrik (Krupp Cast-Steel Works) made the other two photographs, one in 1864 and the other circa 1910.

INDUSTRIAL STILL LIFE

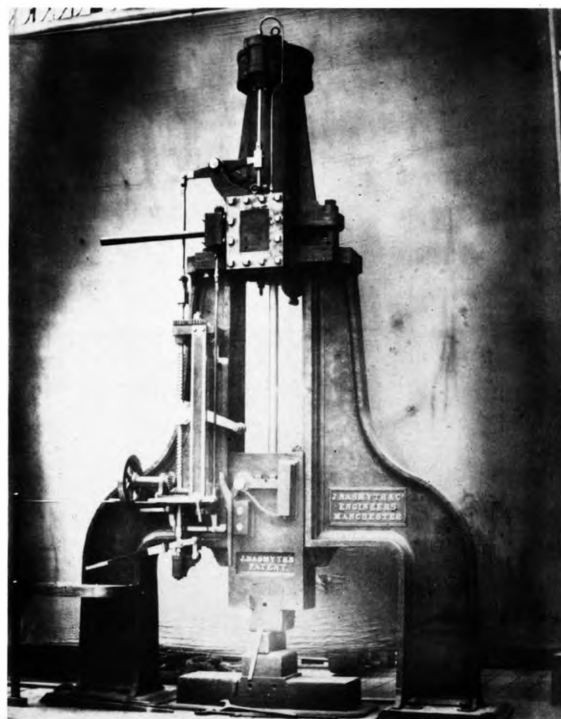
In 1851, 12 years after the invention of photography was announced and the Scotsman James Nasmyth invented the steam hammer and four years before the Bessemer Converter was invented, the first world's fair took place in Hyde Park in London. Commonly referred to as the *Crystal Palace Exhibition*, its official name was the *Exhibition of the Works of Industry of All Nations*. The exhibition included works from 28 countries and showcased everything from Nasmyth's steam hammer to machines that made lace. In the four-volume *Reports by the Juries on the subjects in the 30 classes into which the exhibition was divided* there are several pages devoted to the production of steel. These reports highlight the quality of the steel made by Alfred Krupp whose link to photography will be discussed shortly.

The *Reports* also contained a great deal of commentary by early practitioners of photography. One hundred copies of a special edition of the four-volume set of the *Reports* bound in red morocco leather were published. Each was inscribed with the name of the person on the Jury or another notable person who received the special set. In addition 15 copies were presented to William Henry Fox Talbot of Lacock Abbey, the Englishman who invented the negative-positive process of photography. In each four-volume set there were 155 calotypes – an early type of photographic print, also referred to as a salt print, invented and patented by Fox Talbot.² Each of the 155 calotypes was hand-stitched into the *Reports*.

The Nasmyth steam hammer,³ photographed by the French photographer Claude-Marie Ferrier (1811–1899), was one of those 155 calotypes. Where does it fit within

the intertwined history of steel and photography? The earliest photographers concentrated mostly on making portraits or photographing architecture and landscapes. Some of the early photographers made photographs of objects, but the making of photographs that showed the machines of the emerging industrial age were almost non-existent prior to 1851; Ferrier's photograph of Nasmyth's steam hammer may be the earliest industrial photograph related to the manufacture of steel. While the steam hammer was originally used to forge iron, after the Bessemer Converter was invented it also was employed in the forging of steel.

The image is straightforward and elegant. The steam hammer is framed in a dark shadow that makes it seem as if it is a giant sculpture on display, rather than an industrial behemoth performing the work for which it was made. It has the classic look of a still life complete with a wrench strategically placed in the center bottom of the photograph waiting for a worker to pick it up to make an adjustment that brings the machine to life. The photograph is bold, dynamic and shows all the details of the magnificent engineering that went into the invention of this machine used to make countless objects of the industrial age. Like photography whose invention reshaped our ability to visualize and record the modern world Nasmyth's steam hammer was a vital tool in creating that world.



The Nasmyth steam hammer (© author)



Kruppsche Gußstahlfabrik Essen, Innere Ansicht, October 1864, (photo: Hugo van Werden)

In addition, the *Reports by the Juries* that Nasmyth's steam hammer appears in is also important in another crucial way. While today we see countless books illustrated with photographs, this was extremely unusual in 1851. The first book to have original photographs was William Henry Fox Talbot's *Pencil of Nature* in 1844.⁴ Appearing a scant seven years after the first photograph ever appeared as a book illustration the *Reports by the Juries* was one of the earliest sets of books to have been illustrated with hand-stitched-in photographs. The historian and collector Helmut Gernsheim⁵ cites the *Reports by the Juries* as the fifth book in the literature of British photography making them, as well as Ferrier's photograph, extraordinarily important in the histories of photography, bookmaking and industry.

THE CONSTRUCTED NARRATIVE

Alfred Krupp (1812–1887) was not only one of the visionary 19th century industrialists who helped create the modern steel industry and used much of that steel to fabricate weapons, he was also one of the earliest industrialists to understand the importance of photography as a tool of commerce. He understood the power of the medium to document his constantly expanding industrial empire as well as a means to showcase the processes and products of that empire.

In 1854 Hugo van Werden (1836–1911) began his employment with Krupp. In 1861 he was sent to Hanover to learn photography.⁶ Van Werden made photographs of the Krupp family, the estate and the continually expanding industrial compound in Essen, Germany. To document the expansion of the plant van Werden in 1861 began to make periodic panoramas of the Kruppsche Gußstahlfabrik. These panoramas began modestly and ended up monumental; the one from 1861 has three panels while the one from 1867, with 11 panels, encompasses the broadest view of the expanding plant. The panorama from 1864, however, was the most conceptually ambitious.

While Ferrier's industrial still life is an expression of simplicity, the 1864 panorama⁷ is anything but; it represents a technical and conceptual tour d'force created by van Werden with direction and support of Krupp.

Today it is easy to make an intricate panorama. There are specially designed cameras as well as software packages that result in seamless panoramic photographs. Van Werden made his using the wet collodion process. This meant that for each exposure he had to coat his glass plate with light sensitive material, make the exposure and then process that glass plate while the collodion was still wet before moving on to the creation of the next panel. The process was slow and cumbersome. Van Werden had to plan his camera position and then calculate how much the camera needed to be moved to create the next panel.

Krupp needed to decide which aspects of his operation he wanted featured. The placement of the carriage wheels, cannons, trains and people all needed to be considered. Once that was determined the cast of hundreds needed to be assembled, properly placed and required to hold their positions while van Werden made each exposure.

The completed piece measures 18x133.4 inches (45.7x 338.8 cm) and has eight panels. In panels three, four and five there are more than 150 workers and while they are posed for the picture, they have been choreographed to look as if they are working. In addition, in panel five⁸ a giant cast steel cannon, steel rails and steel rail carriage wheels have all been placed to make them the focal point of the panorama. The trains bringing in supplies have also been strategically placed to maximize visual impact.

Workers were used as human props to demonstrate the manpower intensive early industrial age as well as show the size of the Krupp operation. From an historical perspective the image serves as a reminder that as steel making became more and more efficient it required fewer and fewer workers. By the early 21st century Canadian photographer Edward Burtynsky traveled to Shanghai,

China to make large scale photographs of the Bao Steel Mill. Photographed from a high angle, like van Werden's image, Burtynsky's photographs while detailing a massive and sprawling modern steel mill complex are, unlike the 19th century piece, utterly devoid of workers.⁹

ACTION SHOT

Geschuetz-Fahrversuche (Field Test),¹⁰ is a small cyanotype from circa 1910, made by an unknown photographer. The photograph, made at a Krupp product test site, shows cannons being put through a field test to ensure quality. The photograph makes the point that the test is rigorous and that if the cannon makes it through the testing process it should be able to withstand the difficulties of battle. As interesting as is the idea of applying quality control tests to the cannons, it is the technological achievement in photography that makes the image remarkable. In the early part of the 20th century film was still slow, making it extremely difficult to freeze objects in motion. Yet, in this image all the wheels are off the ground, their movement stopped in midair as the cannons seem to float just above the horizon line. The photograph is simultaneously a document of an industrial test and a surreal image. It is that striking combination that lifts this photograph out of the realm of the ordinary and places in it in the realm of the extraordinary.

The brief analysis of each of these three photographs demonstrates that the discussion of each image from a variety of perspectives creates a rich interpretive tapestry. It enables them to be viewed as historical and aesthetic objects that enrich our understanding of the intertwined world of steel and photography.

1 The research has been supported by grants from Michigan State University

2 The National Media Museum, Bradford, UK has two of the 15 presentation copies of the Reports.

3 Claude-Marie Ferrier, photographer, *Steam Hammer*, one of 155 calotypes hand-stitched into the *Exhibition of the Works of Industry of All Nations*, 1851; Reports by the Juries on the subjects in the 30 classes into which the exhibition was divided, London, (Spicer Bros) folio, 1852. Collection of the National Media Museum, Bradford, UK.

4 Helmut Gernsheim, *Incunabula of British Photographic Literature*, Scholar Press, London and Berkeley, 1984, p. 16

5 Gernsheim, p. 18

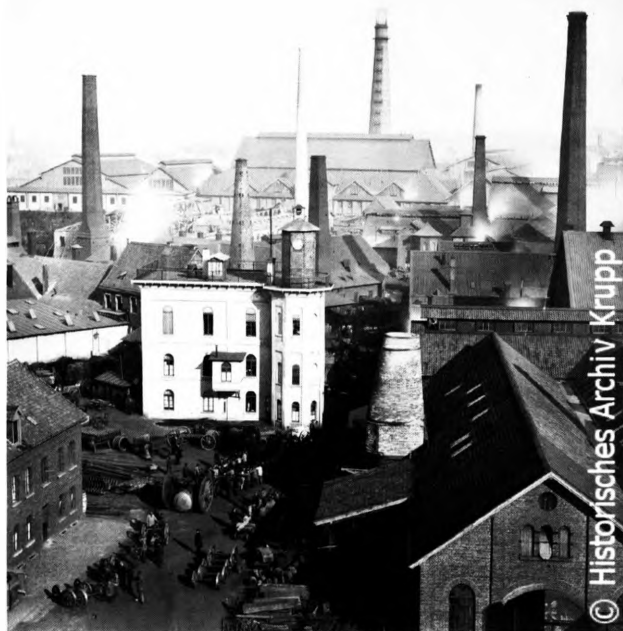
6 *Pictures of Krupp: Photography and History in the Industrial Age*, Klaus Tenfelde, editor, Philip Wilson Publishers, London (translation of German edition published in 1994). See the essay "The pictures aren't dear and I'll have lots of them taken! The story of how the Graphische Anstalt came into being" by Bodo von Dewitz, pages 41–66.

7 Hugo van Werden, photographer, *Kruppsche Gußstahlfabrik*, October 1864, *Innere Ansicht*, Essen, (panorama in eight pieces), Historisches Archiv Krupp, Essen, Germany

8 Hugo van Werden, Panel 5 of *Kruppsche Gußstahlfabrik*, October 1864, *Innere Ansicht*, Essen, Historisches Archiv Krupp, Essen, Germany.

9 To see Edward Burtynsky's photographs of Bao Steel go to <http://www.edwardburtynsky.com/> and click on the label China.

10 Unknown photographer, *Geschuetz-Fahrversuche (Field Test)*, cyanotype print, Historisches Archiv Krupp, Essen, Germany. Caption written in English on back reads: [Two field cannons in trials at Meppen pulled by locomobiles (steam driven car)]. For a fuller discussion see pages 301–302 in the essay "Works photography—an attempt at the collective view" by Reinhard Matz in *Pictures of Krupp*.



Panel 5: *Kruppsche Gußstahlfabrik Essen, Innere Ansicht*, October 1864, (photo: Hugo van Werden)



Geschuetz-Fahrversuche (Field Test), (photographer: unknown)

C3 In or out of the global Box? Industrial Heritage from different Perspectives

Organizer: Györgyi Nemeth (Hungary)

In or out of the global Box?
Industrial Heritage from different Perspectives

Györgyi Németh

In the 21st century there can be no doubt that a global perspective is needed in the study of industrialisation as well as in the conservation of its material evidence in order to understand the challenges it has brought about all over the world. However, the analysis of industrial and technical sites on the World Heritage List indicates that so far industrial heritage has been investigated mostly in the Western European framework,¹ and local and regional developments elsewhere have been taken into less consideration.

At the 14th International TICCIH Conference in Freiberg a specific session was organised so as to draw attention to some of the vast variety of local themes – primarily outside Western Europe – that should be addressed by global researchers of the industrial heritage. The following text will give also a brief summary of the main ideas presented in the session by Moulshri Joshi from India, Linda Norris, a United States Fulbright Scholar in Ukraine, Veronika Gyuricza from Belgium, Anica Tufegdžić from Serbia, and Györgyi Németh from Hungary.

INDUSTRIAL AND TECHNICAL SITES IN THE WORLD HERITAGE LIST: AN ANALYSIS

The World Heritage List was established by the UNESCO World Heritage Convention of 1972 to represent the world cultural and natural heritage of outstanding universal value. However, in contrast to the global aims, the strong predominance of European, and especially Western European sites was observed on the List in various categories as early as 1984. Therefore, the World Heritage Committee launched the Global Strategy, which was aimed to ensure that the List reflected the world's cultural and natural diversity.² Nevertheless, the study published by ICOMOS in 2005 on the implementation of the strategic aims³ disclosed that still Europe, and in particular, Western Europe had the largest number of occurrences in the World Heritage List. Indeed, Eastern Europe had only 10% of all the European occurrences from antiquity to the 18th century,⁴ while Western European countries nominated nearly three quarters of 20th century modern architectural heritage on the List.⁵

The investigation of the complete collection of industrial and technical sites in the World Heritage List, published recently by the UNESCO-ICOMOS Documentation Centre, has revealed the same imbalances.⁶ Between 1978, when the first inscription was made, and 2009, when the publication appeared, there were 51 such sites inscribed on the List. Specifying the continental location of the inscribed industrial properties for a regional analysis, *Table*

1 definitely shows the predominance of Europe. From the 24 industrial sites inscribed between 1978 and 1998, 20 (more than 18%) were nominated by European countries with the remaining four sites coming from America, the only other continent represented. Though the number of non-European industrial sites substantially increased in the last 10 years compared to the preceding two decades, European industrial heritage continued to be over-represented, although new American, one Australian and some Asian inscriptions have been made. In 2009, still 70% of the inscribed industrial properties, i.e. 36 sites were situated in Europe.

Further regional analysis of the industrial and technical sites demonstrates that European predominance, in effect, means the overrepresentation of Western European countries. According to *Table 2*, the 36 European industrial World Heritage sites come from 16 countries, out of which only four, Bosnia and Herzegovina, the Czech Republic, Poland and Slovakia can be found in the eastern part of Europe. Comparing the number of the sites inscribed from both half of the continent, the disproportion is even more obvious as 32 properties are located in Western Europe while there are only four in Eastern Europe.

Studying the four Eastern European sites in a chronological framework, another imbalance can be discovered in the World Heritage List. The inscribed properties, namely the Wieliczka salt mine in Poland, the historic mining town and the mines of Banská Štiavnica in Slovakia, the historical town centre of the mining town of Kutná Hora in the Czech Republic as well as the Mehmed Paša Sokolović bridge in Bosnia and Herzegovina bear witness to the region's mining prosperity and technological advancement from the Middle Ages to the early modern period. Although industrial development in the second half of the 20th century also had significant specificities due to the prevailing communist systems, no sites related to the modern industrial era have been inscribed on the List from Eastern Europe.

Finally, it also needs to be noted that despite the broadening geographical sphere of industrial World Heritage sites, there are still vast areas such as the Arab states as well as the whole African continent, from where no inscriptions have been made yet.

TICCIH DEVELOPING A GLOBAL PERSPECTIVE

TICCIH as the official adviser to ICOMOS on all matters of industrial and technical heritage, and in particular, the

examination of potential industrial World Heritage sites, has assumed considerable responsibility for getting the balance right on the World Heritage List in relation to industrial properties. So, the organisation has made great efforts since the 1990s to develop a truly global perspective in its various activities in order to contribute successfully to the accomplishment of this task.

Between 1996 and 2001, TICCIH prepared a series of comparative and thematic studies in the field of industry as part of the Global Strategy examining areas of the international heritage considered to be underrepresented on the World Heritage List. The studies published jointly with ICOMOS on canals, railways, bridges, workers' settlements and collieries provided a global context for evaluations.⁷ This goal was clearly formulated, for example, in the Introduction to *The International Collieries Study*.⁸

These examples have not been confined to Europe, where so many historically significant collieries with fine buildings continue to exist, but include an internationally diverse range of examples.

By defining in 2003 the basic principles which should guide the study and conservation of the industrial heritage worldwide, TICCIH became firmly committed to a global perspective also in a theoretical framework. In the Preamble of The Nizhny Tagil Charter for the Industrial Heritage it has been definitely declared that

The Industrial Revolution was the beginning of a historical phenomenon that has affected an ever-greater part of the human population, as well as all the other forms of life on our planet, and that continues to the present day.

The material evidence of these profound changes is of universal human value, and the importance of the study and conservation of this evidence must be recognised.⁹

At the practical level, the triennial as well as the intermediate conferences of TICCIH have also served the organisation to work on a global scale, continuously expanding the geographical scope of its activities. Though twelve of the fourteen triennial conferences were held in the broadly-framed Western Europe and in northern America, a region culturally belonging to Western Europe as well, recent conferences in Russia (2003) and in the former German Democratic Republic (2009) denote the efforts of the organisation for a more global operation. Since the

end of the 1990s, intermediate conferences have proved to be even more effective because they have been organised, in relatively great numbers, not only in the eastern part of Europe but also in Latin America. Moreover, industrial archaeologists gathered in Asia (Japan) and in Australia as well on one occasion respectively under the auspices of TICCIH.¹⁰

LOCAL AND REGIONAL CHALLENGES FOR THE INTERNATIONAL COMMUNITY

Aiming to develop a truly global perspective in relation to the industrial heritage, TICCIH had several initiatives at the 14th International Conference in Freiberg to broaden substantially the usual frame of congress topics. Among others, a specific session was organised, as indicated in the introduction of this paper, to encourage the study of issues associated with the conservation of local and regional industrial heritage but challenging the international community.



The remains of the chemical plant in Bhopal, India, in 2005
(© Space Matters)



Image from the proposal of Space Matters for the redevelopment of the factory site into a Memorial for the Victims of the Bhopal Gas Tragedy, 2005. (© author)

Firstly, related to ecology, one of the main topics of the conference, the physical remains of major industrial disasters, namely the Bhopal gas tragedy as well as the Chernobyl nuclear accident were put in the focus. In Bhopal, a leak of methyl isocyanate gas and other substances in the factory of the Union Carbide Corporation on December 2, 1984 resulted in the exposure and subsequent death of several thousand citizens, while the Chernobyl nuclear disaster in the spring of 1986 led to an ecological catastrophe not only in the surrounding region but endangered also the natural environment and the human population as far as Western Europe. Apparently, these local tragedies have worldwide significance. From the multitude of technical problems that impede the conservation of their material evidence, two speakers in the session, Moulshri Joshi and Veronika Gyuricza drew attention to contamination, which is undoubtedly one of the greatest of them. Caused by not only the fatal industrial accident but also the former regular activity of the chemical works, it has been a serious threat to rescue operations in Bhopal especially in the absence of reliable and precise knowledge about the chemical composition as well as the extent of pollution on the site. Lacking state-of-the-art home expertise, the transfer of international experience in decontamination would be crucial for the preservation of the factory premises as industrial heritage, emphasised Joshi.¹¹ Without precise definitions and in-depth researches made concerning the many-sided relationship of environment and industrial heritage, reintegration will be less successful on either local or global level, added Gyuricza to Joshi's statement.

Interpretation was also a major concern for the speakers regarding the Bhopal and Chernobyl sites. In her paper, published separately in this volume under the title *Interpreting Chernobyl*, Linda Norris investigated what narratives could be told at the Exclusion Zone for the local population as well as for visitors from other countries who had not been directly affected by the nuclear accident. She remarked it should also be taken into consideration that the Zone is not a heritage site yet, besides, now it can be found on the territory of Ukraine but once belonged to the Soviet Union. In the case of Bhopal, Space Matters, an innovative firm of young architects from India proposed that the factory site should be transformed into a memorial for the victims of the tragedy with new buildings and green areas created around the carefully preserved ruins to provide public spaces for the community to meet and remember. Primarily designed to help local people get over the tragic event giving due respect to the memory of the dead, the protected site could also function as a global symbol reminding the whole mankind of the ecological dangers of technological development.

In addition to the Chernobyl nuclear disaster, other themes related to the industrial heritage of post-communist countries were also focused on in the session inspired by the place of the conference, the city of Freiberg, which had been situated on the territory of the former German Democratic Republic. Anica Tufegdžić examined sugar factories and breweries, located in the region of Vojvodina, in Serbia, Norris and myself drew attention to the so-called socialist cities, a special industrial settlement type devised in the Soviet Union.

Though the frequent lack of awareness to the heritage value of industrial sites can be considered to be a global problem, its reasons have also specific characteristics besides the usual ones in Eastern Europe. According to Tufegdžić, these are mostly due to the multiple changes of the political, economic and social systems in the area. As regards Vojvodina, it became part of numerous different states during the 20th century, starting from the Austro-Hungarian Monarchy through the Kingdom of the Serbs, Croats and Slovenes then the Socialist Federal Republic of Yugoslavia, created before and after the Second World War respectively, to the present Republic of Serbia. Furthermore, it followed capitalist and communist principles alternately. As a result, in the current transitional period, it is mostly due to ownership as well as identity problems deriving from a complicated and not very distant past that the remarkable buildings of sugar factories and breweries are rarely assessed as valuable

heritage resources in the economic regeneration of the Serbian region. In order to give an adequate response to global challenges based on the proper evaluation and subsequent reuse of the industrial heritage not only in Vojvodina but also in the whole Eastern European area, these problems should be definitely addressed by integrating regional aspects into the worldwide history of industrial development.

Socialist cities have been scarcely investigated by industrial archaeologists, especially at TICCIIH conferences, though the researchers of related disciplines, like social and urban history, or cultural geography, demonstrate a growing interest in their study,¹² was the starting point of my own paper. Designed on the pattern of Magnitogorsk, they were mostly established in the heavy industrial regions of Soviet Bloc countries so as to facilitate

Table 1
Industrial and technical sites on the World Heritage List in 2009

	1978–1998	1999–2009	1978–2009
Europe	20	16	36
America	4	5	9
Asia		5	5
Australia		1	1
Total	24	27	51

(Source: *Industrial and technical heritage in the World Heritage List*. UNESCO-ICOMOS Documentation Centre, September 2009.
See http://www.international.icomos.org/centre_documentation/bib/worldheritage-industrialsites.pdf)

Table 2
Industrial and technical sites from Europe on the World Heritage List in 2009

	Historical periods until 1800	19th and 20th centuries	Total
Austria	1	1	2
Belgium	2	1	3
Bosnia and Herzegovina	1		1
Czech Republic	1		1
Finland		1	1
France	3		3
Germany	1	2	3
Italy		1	1
Italy/Switzerland		1	1
Netherlands	1	1	2
Norway	1		1
Poland	1		1
Slovakia	1		1
Spain	2	1	3
Sweden	2	1	3
Switzerland		1	1
United Kingdom	1	7	
Total	18	18	36

(Source: *Industrial and technical heritage in the World Heritage List*. UNESCO-ICOMOS Documentation Centre, September 2009.
See http://www.international.icomos.org/centre_documentation/bib/worldheritage-industrialsites.pdf)



Industrial heritage in a post-communist country. The main administration building of the ironworks from the 1940s in Ózd, a 'socialist town' in Hungary (photo: Györgyi Németh).



Industrial heritage in a post-communist country. The oldest building from 1951 at the former Technological University of Heavy Industries established to facilitate 'socialist'-type industrialisation in Miskolc, Hungary (© History Collection, University of Miskolc).

the accomplishment of the communist dream of model communities. Despite their obvious failure to achieve the original aim of the founders, socialist cities bear clear evidence of 20th century industrialisation originating in Eastern Europe, and spreading in a great part of the world. However, the preservation of socialist cities as industrial heritage sites is seriously endangered by several reasons. Identity problems prevalent in post-communist countries, as noted above, frequently lead to lack of awareness regarding the heritage value of the settlements, while the dilemma of how to accommodate conservation to the everyday needs of the citizens raises considerable technical difficulties. By all means, socialist cities in post-communist countries, meeting the criteria of outstanding universal value, or just representing a specific industrial heritage, should be even inscribed on the World Heritage List since workers' settlements as well as industrial towns from earlier historical periods or other geographical regions have already been put on the List in relatively great numbers.¹³

CONCLUSION

Based on the outcome of the discussions started at the session, speakers and participants as well as further supporters of the idea proposed to establish a new section in TICCIH at the Freiberg Conference that nurtures and welcomes local and regional initiatives for the study and preservation of the industrial heritage in a global context.¹⁴

The Global & Local Section invites industrial heritage professionals from all over the world to participate in a multidisci-

plinary network that will be ideally used for an extensive exchange of ideas and cross-country collaboration towards the better understanding of the interaction between the global and the local in the process of industrialisation.

The practical side of the Section will be encouraged through comparative projects that not only serve to create a meaningful narrative and a proper conservation policy globally but also facilitate the nomination of industrial heritage properties for a more balanced World Heritage List.

¹ Though there is a variety of definitions regarding European regions, including the one applied by UNESCO also in relation to the World Heritage List, here I will rely on the traditional approach despite its criticism because it is more relevant to the message of my paper. So, I will consider all countries Western European not belonging to the group of post-communist countries, which will be identified as Eastern European in consequence.

² Global Strategy. See <http://whc.unesco.org/en/globalstrategy> [accessed May 31, 2010]

³ The World Heritage List: Filling the Gaps – an Action Plan for the Future (An ICOMOS study compiled by Jokilehto, J., contributions from Cleere, H., Denyer, S., and Petzet, M.), Monuments and Sites XII (Paris: ICOMOS, 2005).

⁴ The World Heritage List, 2005, 68.

⁵ Jokilehto, J., 'World Heritage of the 20th Century – Having in Mind the Gaps and Risks!', in Haspel, J., Petzet, M. and Schmückle-Mollard, C. (eds.), *World Heritage Sites of the 20th Century – Gaps and Risk from a European Point of View, Beiträge zur Denkmalpflege in Berlin 30*, ICOMOS Journals of the German National Committee XLVI (Petersberg: Michael Imhof Verlag, 2008), 19.

⁶ Industrial and Technical Heritage in the World Heritage List. UNESCO-ICOMOS Documentation Centre, September 2009. See URL: http://www.international.icomos.org/centre_documentation/bib/worldheritage-industrialsites.pdf [accessed May 31, 2010]

⁷ For the text of the studies see URL: <http://www.mnactec.cat/ticcih/documentation.php> [accessed May 31, 2010]

⁸ Hughes, S., The International Collieries Study. See URL: <http://www.icomos.org/studies/collieries.htm> [accessed May 31, 2010]

⁹ 'The Nizhny Tagil Charter for the Industrial Heritage', in Németh, Gy. (ed.), *Growth, Decline, and Recovery: Heavy Industrial Regions in Transition* (Budapest: Institute of History of the Hungarian Academy of Sciences, Miskolc: University of Miskolc, 2007), 401.

¹⁰ See URL: <http://www.mnactec.cat/ticcih/congresses.php> [accessed May 31, 2010]

¹¹ On September 25, 2010, Joshi requested in a circular email the urgent help of the Global & Local TICCIH Section regarding the ongoing decontamination issue at the Union Carbide factory site at Bhopal since the home technical committee suggested removal of top soil and bringing down the factory plant immediately.

¹² See, for example, the following studies published recently: Jajesiak-Quast, D., 'In the Shadow of the Factory: Steel Towns in Postwar Eastern Europe'; Germuska, P., 'Between Theory and Practice: Planning Socialist Cities in Hungary', in Hård, M. and Misa, Th. J., (eds), *Urban machinery: inside modern European cities* (The MIT Press, 2008), 187-210, 233-256; Czepczyński, M., *Cultural landscapes of post-socialist cities: representation of powers and needs* (Aldershot: Ashgate, 2008).

¹³ For example, Falun, Goslar, New Lanark, Saltaire, Crespi d'Adda, Ouro Preto, Potosi, Sewell.

¹⁴ The establishment of the Global & Local Section was approved by the Board on 10 August, 2010 on the occasion of the joint conference of TICCIH, ICOHTEC and Worklab held in Tampere, Finland.

In or out of the Global Box: Interpreting Chernobyl

Linda Norris

Chernobyl – Everyone knows the name of this particular industrial site – it's inextricably intertwined with the world's worst nuclear accident. For Ukraine as a newly independent nation it's a part of an evolving historical narrative about Soviet past; and for all of us, it's a site that reminds us of a continuing struggle to understand the impact and threat of ever-accelerating technological innovation on humans and the environments we inhabit and shape.

This historic industrial site – as it is definitely such a thing – provides us with an opportunity to think outside of the standard box of industrial history to a broader perspective that integrates the physical structures and technology (customarily the purview of organizations such as TICCIH) with a historical narrative that can engage today's global citizens in dialogues about their own past, present and future.

Chernobyl has been studied and explored by thousands of people. A quick Google search produces more than 4 million hits. But my own experience with Chernobyl emerged during my time in Ukraine as a United States Fulbright Scholar, teaching museum studies and working with museums throughout Ukraine in spring of 2009. A Fulbright student, Michael Forster Rothbart, was undertaking photographic documentation of Chernobyl today – and I had the unexpected opportunity to work with him in creating an outdoor photo exhibition, "Inside Chernobyl" in Kiev.

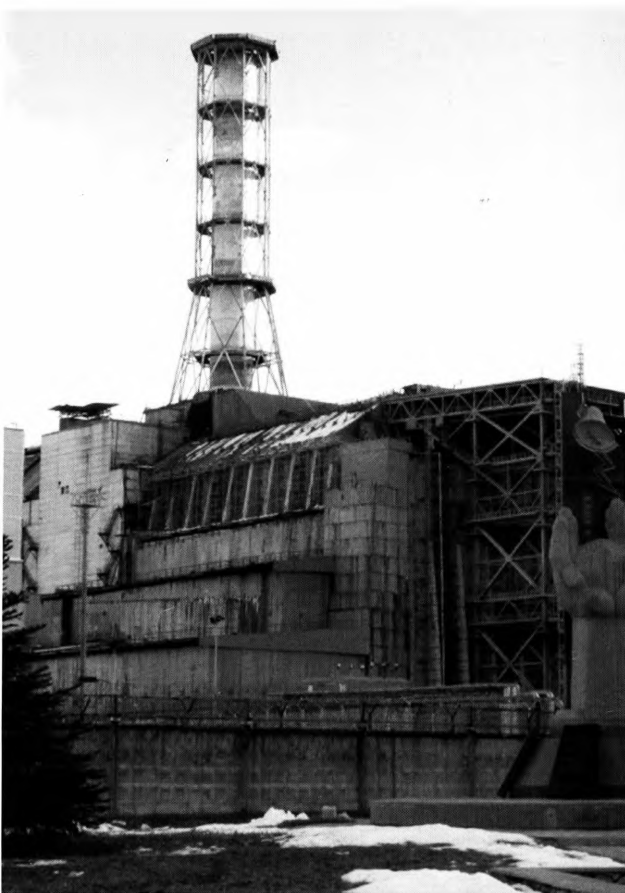
Although the name Chernobyl is familiar to many, few know much about the plant and the accident. The Chernobyl nuclear power plant is in Ukraine, which inherited the plant and its many complex problems upon the break-up of the Soviet Union. The plant is located just 110 km north of Kiev; 16 km from the border of Ukraine and Belarus. The first Soviet-built reactor at the plant was commissioned in 1977. At the time of the accident in 1986, the plant had four nuclear reactors, in total supplying about 10% of Ukraine's electricity. Two new reactors were under construction and nuclear energy was presumed to provide a bright future for the Soviet Union's citizens.

Everything changed on April 26, 1986. In brief, a test of the reactors led to a meltdown, explosion and fire that spread radioactive particles into the atmosphere. The radioactive particles were spread by the wind and first reported by a power plant in Sweden. In an instant, Chernobyl became a story for all nations, a part of our collective memory and vocabulary—far from just a story of an industrial site. But that instant took time to emerge:

it was more than two weeks until Soviet President Gorbachev admitted the accident. Many Ukrainians and others feel that the accident and cover-up were the beginning of the end for the Soviet Union.

Approximately 5,000 visitors per year enter the Chernobyl Exclusion Zone (a 30 mile radius around the plant) to view the sarcophagus covering the reactor and the abandoned city of Prypiat. The Exclusion Zone isn't a historic site you can just enter as a tourist. Advance planning, your passport, and travel with an authorized guide are all needed. In March 2009 I became a disaster tourist on a trip sponsored by Pripjat.com, a non-profit organization dedicated to the memory of Prypiat.

After entering the Exclusion Zone through a security checkpoint, the bus eventually turns a curve and ruined Reactor #4, now covered with a hastily planned sarcophagus, comes into view. As it does, many questions began to flood into my mind. On the one hand, I've visited many industrial sites, and this appears like so many others:



Reactor #4, covered by the sarcophagus, at the Chernobyl Nuclear Power Plant. The memorial, a set cupped hands arching to a bell, is at right. March 1, 2009. (photo: Linda Norris)

many buildings and equipment, a looming presence on the landscape. But it is like no other. It's a very strange thing to stop, get out, and be with other tourists taking pictures of the plant, posed in front of the memorial. I found it particularly unusual that people wanted to take pictures of their friends posing in front of the plant. Why would you want that picture? To demonstrate that you were there? But I did, I admit, also take photos. Each of us there, in front of the monument, had their own reaction, their own story to tell when they returned home. In effect, each of us was creating our own meaning for this industrial site.

After viewing the plant from a distance, the bus took us to Prypiat, the city built for the plant's workers and their families. After radiation fallout was detected in Sweden, more than 24 hours after the explosion and exposure of to high levels of radiation, the entire city of 50,000 residents was evacuated. Told it was temporary, residents were encouraged only to take enough of their belongings for a three day departure. The evacuation became permanent and today, the city stands as a sort of decaying Pompeii, a place where the activities of daily life came to a halt for all who lived there.

To me, this is where the historical narrative becomes most powerful. The story is not just about nuclear power, or the Soviet Union, it is about individual families who lived in these now abandoned apartments, went to school in the kindergarten, swam in the pool at the Palace of Sport and strolled the flower-lined streets. It requires just a small bit of imagination to re-populate this city as it once was. It is not completely Pompeii as nature's own inexorable forces are taking back Prypiat.

As I attempt to deconstruct my own visit to Chernobyl, I've found that several interpretative themes emerge: technological and industrial achievement; workplace; the power of the state; community and personal memories; the immediacy of disasters; and environmental history.

Like any other industrial facility, the nuclear plant had workers – more than 5,000 workers undertaking all kinds of jobs – from engineers and scientists to maintenance and cafeteria workers. Chernobyl is almost never, except at the Chernobyl Information Center in Slavutich (the community built to replace Prypiat), discussed in terms of a conventional workplace history. But of course, it was (and is) a place of work. At that small exhibit, rarely visited by those who visit Chernobyl, it is possible to understand the pride that workers had in their work place,

the technological future it seemed to represent and the sorrow they felt when the last reactors was decommissioned in 2000. It's not well known that there are more than 2,500 employees still working at the plant today: monitoring, cleaning, and other support activities. Their workplace story continues.

As an American, used to disaster responses that combine a patchwork of governmental and non-profit responses, the unfamiliar power and limitations of the Soviet state form a narrative that could go beyond the discussions of victims and blame. The Soviets' ability to order mass evacuations, their unsuccessful attempt to control information, and the use of more than 800,000 liquidators to clean up the site all speak to a massive ability to exercise control – but of the ultimate folly of those endeavors and lack of concern for a nation's own citizens.

Prypiat survivors and liquidators all have personal stories to tell. However history in Ukraine still emphasizes a collective narrative rather than individual stories that



Inside the Gymnasium in the abandoned town of Prypiat, March 1, 2009 (photo: Linda Norris)

enrich our understanding of broader themes. However, several efforts have been made to collect those stories (for example, in the riveting book, *Voices from Chernobyl: The Oral History of a Nuclear Disaster*, Svetlana Alexievich. Picador, 2006) but there has been no large scale organized attempt to collect these stories. One approach could be a project such as the US Library of Congress Veterans History project whose goal is to collect, preserve, and make accessible the personal accounts of American war veterans so that future generations may hear directly from veterans and better understand the realities of war." (<http://www.loc.gov/vets/>, accessed May 28, 2010). Historical research, including oral history, is still considered solely the province of intellectuals in Ukraine. A bottom-up project such as this, with students, local history organizations and others collecting material locally, depositing copies at a national library, and having all information freely accessible on the web would represent a drastic departure from the current Ukrainian practice of history.

Some of those memories are already being collected at Pripjat.com (<http://www.pripyat.com>, accessed May 28, 2010), a website and NGO started by former Pripjat residents. At the site, historic photographs and memories repopulate the abandoned city in the mind's eye. The National Chernobyl Museum in Kiev opened in 1992, after

the fall of the Soviet Union and Ukraine's independence, on the 5th anniversary of the accident. The museum functions both to provide details of the accident and clean-up and as a memorial, particularly to the workers and liquidators who lost their lives. Numerous organizations have undertaken photographic exhibits about Chernobyl in Ukraine, Western Europe and the United States. Each exhibit has developed its own perspective, but most draw upon the iconic imagery of the abandoned city of Pripjat.

But how can we, as historians and those who interpret industrial history, shape future understandings of Chernobyl and its place in history? In my own thinking, I've drawn on the work of the International Coalition of Sites of Conscience (<http://www.sitesofconscience.org>), a worldwide network of historic sites specifically dedicated to remembering past struggles for justice and addressing their legacies today. It's safe to say that the Exclusion Zone will not be an accessible museum anytime soon, but the number of tourists there may continue to grow and the opportunity exists, whether it is in Kiev or another



Visitors photographing Chernobyl on a Pripjat.com tour, March 1, 2009. (photo: Linda Norris)



Viewing the exhibit "Inside Chernobyl" at Shevchenko Park, Kiev, April 2009. (photo: Linda Norris)

location, to develop ways to create sustained dialogue around this historic site.

What kinds of questions might be considered in these dialogues? Can a state-run museum be such a place or does it always need to be independent? How can we publicly acknowledge private experiences? How can strangers understand those private experiences? What reactions might such a dialogue building effort at a Chernobyl-related site inspire: reflection, mourning, sadness, anger, curiosity, activism? Could it be a part of democracy building? The answers to those questions, I believe, will not be found by governments, or solely by outsiders, but need to be found by those in the communities affected by Chernobyl, by Ukrainians and Byelorussians in ways that do not define those affected solely as victims.

At the opening of the "Inside Chernobyl" exhibit in April 2009, I took the opportunity to conduct visitor evaluations, with volunteers asking exhibition viewers their thoughts on the meaning of Chernobyl and how that might be conveyed in the future. Before viewing the exhibit, viewers used words like these to describe Chernobyl: "Danger, The place of lost technologies, Nothing good, Ecological catastrophe, Suffering of the whole world, Ukraine is not Chernobyl." When asked what more they would like included in an exhibit, most felt it important to know all the information, that information is still hidden, and that the information is needed to, in the words of one visitor, "remind us of what we already know all the time."

The nuclear accident at Chernobyl reminded the world that despite our best efforts, technology cannot be kept in its own carefully constructed box. My own visit to Chernobyl reminded me that our interpretation of such industrial sites also cannot be kept in a narrowly defined box; that transparency, openness and sustained dialogue can be ways that the physical containers of our industrial past can be opened for all.

The issues about what stories will be told at Chernobyl suddenly have a new urgency. In December 2010, the the Emergency Situations Ministry of Ukraine announced that, in advance for the Euro 2012 soccer championship to be held in locations throughout Ukraine, official, open to the public tours to Chernobyl would begin in 2011. It's unclear why this statement was issued now as tours, like the one I took, have been regularly offered for a number of years. All trips into the Exclusion Zone are approved by Chernobyl InterInform, a government agency within

the Ministry of Emergency Measures and every visitor goes through numerous checkpoints.

Helen Clark, chief of the United Nations Development Program, recently toured the plant and commented, "Personally I think there is an opportunity to tell a story here and of course the process of telling a story, even a sad story, is something that is positive in economic terms and positive in conveying very important messages"¹ but it appears that the government wishes to control whatever story is told about Chernobyl.

¹ Kyiv Post, URL: <http://www.kyivpost.com/news/nation/detail/92772/>, accessed 12/19/2010

C6 Modern Methods of Data Capture and Knowledge Management for a fast and efficient Documentation of Industrial Heritage Objects

Organizer: Frank Boochs (Germany)

RiO: Development of Methods for Data Collection, Data Analysis and Knowledge Generation of Industrial Objects

Frank Boochs
Heinz-Jürgen Przybilla

Industrial archaeology (IA) deals with questions of industrial culture and care of monuments. The concept was stamped in 1955 in England, after the Swiss Conrad Matschoss had also expanded the history of technology to industrial monuments in 1932¹. It is seen as a research branch which deals with the capture, investigation, interpretation and the preservation of the real tradition of trade-related and industry-related artefacts, arrangements and systems in its cultural and historical context and encloses arrangements and mechanical facilities in its totality. As a field of research the IA has the purpose to show artefacts of trade, industrial and traffic development in the context of technology, science, economic and social history².

GENERAL CONDITIONS IN INDUSTRIAL ARCHAEOLOGY

The objective purpose of IA is the preservation and documentation of the industrial-cultural heritage of international importance. In case of excavations this is a task which has to be fulfilled in a race with time due to the fact, that the legal framework doesn't provide any protection for such objects or traces thereof. Thus, most findings will disappear during the ongoing conversion process, why their conservation needs efficient and fast technologies for data capturing, when at least a virtual preservation of the findings shall be envisaged. Hence, in order to avoid a complete loss of industrial-cultural testimonies a correct geometrical and visual documentation must be tried using state of the art technologies. This mostly has to be achieved under demanding conditions with respect to

- the size of the objects
- time limits for the data capture
- difficulties to access the findings
- the immediately following destruction of the objects
- and the huge costs which may originate when conventional documentation processes of archaeological findings are applied as well as any follow-up costs (e. g., from dead times).

In this context data capture has to be restricted to shortest possible stays at the object, while providing at the same time all necessary information required for the geometrical documentation and the technical and scientific analyses. This can be achieved only by a mainly image based concept which fixes all necessary information in metric images, adds other geometrical and semantic information in a common geometrical framework and permits to process all existing technical information.

Looking at the documentation methods in archaeology the degree of technology obviously varies strongly. Classical methods still widely used do the documentation process even based on analogous maps.³ With respect to existing tools, the efficiency of such methods is not given as a rule any more. Hence, the establishment of structured process chains with integrated data flow must be one of the objectives to be realized.

In addition, the complete collected information must be accessible to all involved user groups (population, planner, authorities, investors etc.), in order to support them in their individual doing or interests with respect to the objects. This would need to have instruments allowing to handle large amounts of heterogeneous data sets, which only can be realized on the base of powerful information systems.⁴ These have the potential to integrate all data available, to provide professional analysis tools, to visualize and to present everything to the user, when their structure and design is focussed on the needs of IA.

Although the technological base would support the interests of IA, there are no real solutions existing and their development is complicated due to other problems in IA, like:

- an inventory of industrial objects taking into account possible underground findings has not been performed in Germany up to now or has not been initiated,
- available archives, like existing in the large-scale industry in the Ruhr area are not accessible or prepared for a use,
- in opposition to criteria developed for relics of the rising industrial culture of the Ruhr area this is not the case for underground preserved relics whose value is to be classified as a rule work- and technology-historically,
- the size of the objects complicates a usual capture and treatment within the scope of the archaeological fieldwork and the affected object is accessible in all phases of a building process without interruptions.

A GEOGRAPHIC INFORMATION SYSTEM FOR INDUSTRIAL ARCHAEOLOGY (RIO)

General needs

Geographic information systems have proven their power and efficiency in various applications, why it would be redundant to show their potential to solve problems for IA. Nevertheless, there are several aspects which have to be followed due to the special conditions in this field of application. Chapter 2 mentioned some of them. As consequence, an overall conception (Chart of the project conception) should fulfil several needs, like:

- an inventory of industrial objects integrating the underground findings situation,
- capture of available information including archive data,
- comprise measuring techniques to entirely capture geometry and appearance within a shortest time frame,
- support technical analyses and interpretations using metrical and visual data,
- administrate all data within a uniform geometrical context,
- explore the whole potential of image information, including interactive three-dimensional analysis,⁵
- evaluate the data in a co-operative and interdisciplinary way.

Conceptual structure of RiO

The mentioned aspects have direct impact onto the structure of the information system, as it has to

- integrate large and heterogeneous data sets,
- provide completely three-dimensional data storage and query,
- support the user in his process of evaluation being based on a heterogeneous and complex data store,
- make all results and input data accessible for presentation and visualisation.

The sum of all these postulations leads to the fact, that existing GIS-tools are at their limits, when they have to support all aspects. Especially 3D-spatial queries are not far reaching integrated, the arbitrariness of mixing heterogeneous data is limited and the user support ends

with a visual presentation of concatenated or otherwise combined data. A real direct help as it might come from a proposition of interpretation variants is not available.

A profound support of all needs therefore leads to a new structure, which allows to overcome restrictions linked to conventional GI-systems, mostly based on relational data bases with a more or less three-dimensional index. Such a new structure has been developed based on the flexibility provided by the technology for knowledge management and for administration of large and hybrid data sets.⁶ It uses formal ontologies to model and structure the existing knowledge to the objects being subject of an archaeological project, binds the data to the objects, where they get accessible and can be integrated into the interpretation process in an arbitrary way, allows to implement an own and separate spatial index and provides to apply complex rules and analysis instructions (Knowledge based administration and use of data), which even may generate new results simply using the integrated knowledge by the computer itself.⁷

Data collection

The second major support for a universal solution comes from efficient, fast, accurate and flexible data acquisition techniques. They have to capture single objects, object assemblies as well as the topographic environment comprising the geometrical as the visual context. Classical archaeological surveys are too rigid and inefficient, which is why new and purely digital techniques have to be integrated.

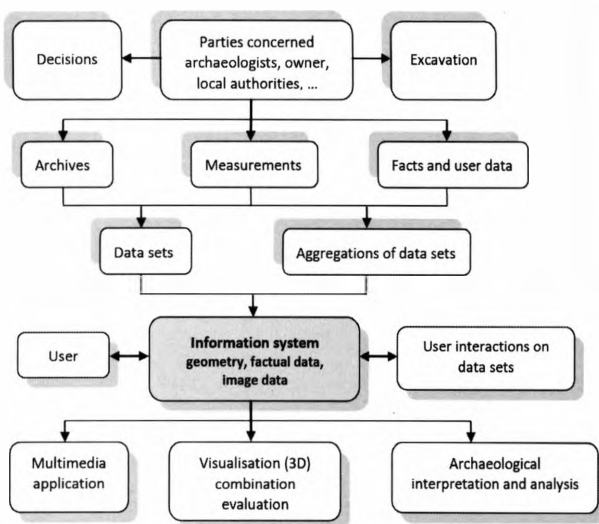
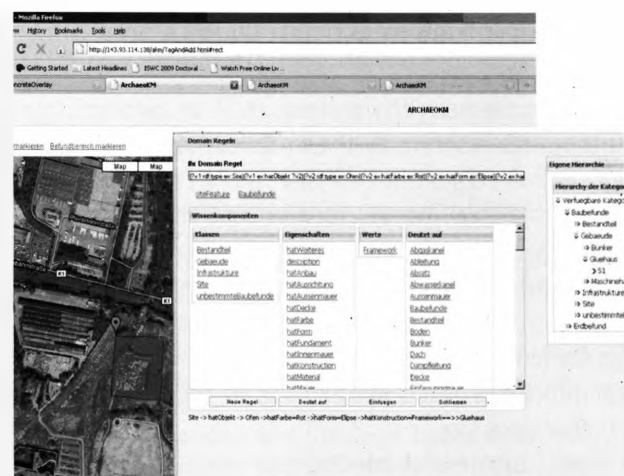


Chart of the project conception (© author)



Photogrammetry

Photogrammetric solutions have a long tradition in archaeology, meanwhile based on a complete digital process chain. Preferably they have to be captured in a way, that a geometrical processing is possible, but especially for a work under time pressure they might also be captured "free hand". This simplifies the recording and can be adapted to the object and needs of the user. Flexibility, short capture times as well as the image documentation are important arguments for the use of photogrammetry.

Besides close-range technologies a special value is introduced by low altitude aerial image measurement, here in particular for the capture of wide excavation sites. Parallel to professional airborne systems low-cost solutions have been established.⁸ They often combine light airplanes with a geo referenced digital medium format camera and can be used very well for the aerial-supported capture of smaller and middle excavation areas (some 10 ha). An upcoming technology is based upon the use of unmanned aerial vehicles.⁹

Terrestrial laser scanning (TLS)

TLS is a measurement technology which expresses objects by 3-D point clouds, consisting of up to several hundred millions of 3-D points. The process offers huge temporal advantages with the local capture of the objects compared with classical measuring methods. Nevertheless, the subsequent treatment of the measurement data within the scope of evaluation processes is complex and requires highly sophisticated technological engagement and is mostly restricted to be used by surveyors.

AN EXAMPLE: KRUPP CAST STEEL MANUFACTORY

A typical example of situations in IA as targeted from this project is shown by the so-called west city of Essen in the Ruhr region in Germany: the area of the former Krupp cast steel manufactory. In 2006 the management of ThyssenKrupp decided to build its new headquarter in Essen, the "ThyssenKrupp Quarters". The excavation of an area of 20 ha took place before the constructions could be started. From archaeological point of view the greatest difficulties at this building site are the:

- enormous size,
- great progress of construction work: up to 6500 m³ soil were moved every day,
- time-frame for capturing was very short,
- weather conditions: the summer in Germany in 2007 was very wet,
- difficult and dangerous access.

Within 60 days of work for huge construction vehicles and excavators the situation on the excavation area has changed completely: on average, 4,000 m³ of soil were moved each day, altogether about 240,000 m³.

Because of the huge dimension of permanently ongoing activities on this site a "normal" archaeological excavation is not possible.

A geodetic reference frame has been introduced, allowing to establish a net of points to be used for the different terrestrial laser scans and aerial image measurements. Some points could even be tagged in the area. Because of the dimension of this area additional GPS measurements were necessary to get the position of the relicts.

In addition, in June 2007 a well-preserved bunker had been found in the excavation area, which obviously had been used as common room for forced labourers during the 2nd world war. It is one testimony for a presumed close net of bunkers in that area. Today there is not much information left because most of them have been destroyed. As also no hints were given within the Krupp archives this finding can be seen as a surprise.

The bunker has been documented by TLS and photogrammetry. 20 scan positions were needed to capture the three rooms of this bunker completely. After the documentation of the bunker it was closed to avoid further access. Figure 4 shows a 3-D reconstruction.

CONCLUSION

This paper gives a short view into the requirements of IA aiming at the documentation, analysis and visualization of objects to be seen as witnesses of the industrial



Aerial photograph of "ThyssenKrupp Quarters", left from May 2, 2007, right from August 23, 2007 (© author)

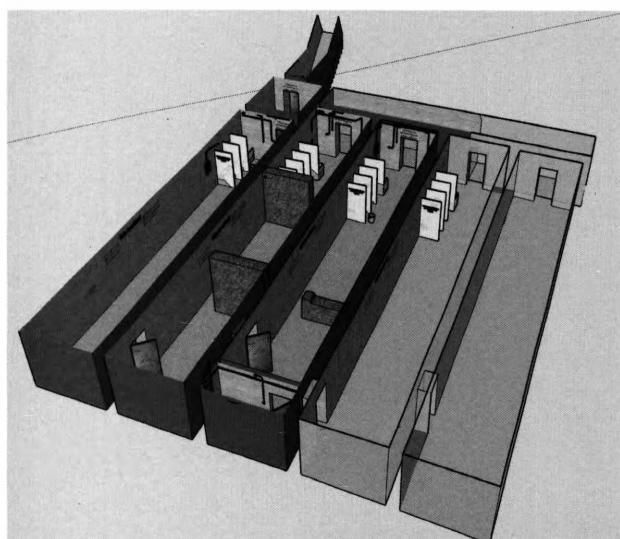
development. One main focus lies on complications arising from objects or traces thereof to be found in excavations, especially when all work suffers from an enormous time pressure typical of huge conservation processes. It is shown, that only fast measurement techniques fulfil the needs of documentation and have to be accompanied by a completely new GIS technology, allowing to efficiently manage such heterogeneous data and to integrate the computer into the process of interpretation.

ACKNOWLEDGEMENT

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3-D model of a bunker (© author)

Formal Ontology for Knowledge Management in Archaeology

Ashish Karmacharya
Christophe Cruz
Frank Boochs

INTRODUCTION

With the advancement of survey technologies, data can be collected more accurately. On the one hand, this has provided a great advantage in the analysis process as we have more and diverse data to carry out the precise analysis. On the other hand, it has created difficulties in managing data with the existing database systems. This is a problem due to their size and diversity. This issue is even more visible in an industrial archaeological project. Indeed, the excavation sites are available for very limited time and thus the data need to be collected and stored rapidly. In addition, the diversity of the data makes the management of information with the existing database systems very complex. Hence, a lot of research is undertaken in the field of data indexation and information retrieval in order to reach the level where this vast amount of information can be managed through the knowledge defined by the archaeologists. Actually, the knowledge about the objects excavated from the site can only be defined by the archaeologists. Semantics is used to focus on data integration among heterogeneous datasets as well as to build up a common language in order to develop a common framework. Consequently, data is self-describing and allows generic and automatic processes. The lack of semantic data that describes objects spatially is an issue that we address. Actually, our proposition is based on a web platform which uses semantic web technologies and knowledge management processes. Our proposition focuses on the identification process which consists in managing data generated during the excavation process. The spatial data are linked to knowledge bases acquired during the identification process. By annotating data with semantic definitions, our web platform provides a semantic view on spatial data sets.

This project is motivated by the concern to preserve knowledge on archaeological sites which will soon disappear. Consequently, it is necessary to structure data as efficiently as possible for future reuse and to facilitate the interoperability. In addition, the process of capitalization of the knowledge will identify good practices and the web platform aims at sharing these good practices. The fact that a great amount of data is collected in a very short time means that this amount of data has to be managed rapidly. The structuring and the managing of a huge amount of data define a process that should be realized by an e-Archive. For all these reasons, we have focused our research on the use of knowledge management processes including semantic technologies in order

to make it possible to realize a platform that constitutes an e-Archive.

The following section focuses on the formal ontology that is used as a semantic layer for our e-Archive. Section 3 presents the knowledge management domain. Section 4 explains how archaeology can benefit from formal ontology and KM. The last section concludes the paper.

FORMAL ONTOLOGY

The Semantic Web initiative of the World-Wide Web Consortium (W3C) was inspired by the vision of its founder, Tim Berners-Lee, of a more flexible, integrated, automatic and self-adapting web, providing a richer and more interactive experience for users. The W3C has developed a set of standards and tools to support this vision, and after several years of research and development, these are now usable and could make a real impact. These technologies benefit from more than 30 years of research in artificial intelligence and more specifically the domain of ontology. Ontology aims at representing knowledge about a specific domain that is understandable by both developers and computers. For this, ontology enumerates concepts and relations between concepts¹ and defines properties, functions, constraints and axioms.² The major issues in ontology development include ontology representation, ontology acquisition, evaluation and ontology maintenance.³ Ontology representation is the main issue in ontology development because its representation has to be understandable by computers and humans. Consequently, an ontology representation language should provide representation adequacy for humans and inference efficiency for computers. Ontology dialects based on description logic (DL) provide a frame-based knowledge representation and profit from the expressiveness of DL reasoning systems. Ontology acquisition refers to the process of the ontology creation such as concepts, relations, individuals and axioms.

KNOWLEDGE MANAGEMENT

Knowledge management (KM)⁴ is a process that helps organizations to identify, select, organize, disseminate, and transfer important information and expertise that is part of the organization's memory. It aims at exploiting an organization's intellectual assets for greater productivity, new value, and increased competitiveness. Organizations require knowledge management for users in order to help them understand the evolution of the knowledge on the organization.

When it comes time taking into account the huge quantity of documents, existing systems show some drawbacks concerning the following four points. First of all, **searching information** retrieves irrelevant and incomplete information due to the use of inappropriate words in the context of use during the keyword-based search. Secondly, **extracting information** is a human based process that is required because artificial agents fail to extract and to integrate distributed data sources. Thirdly, **maintaining unstructured information** such as texts, images, videos, scans, etc. is a tedious and a time-consuming process. It is even more tedious and time-consuming to keep these sources up to date and consistent. Fourthly, **generating automatic documents** according to the user profile through adaptive web systems is still very difficult to realize. Actually, the profile has to be defined regarding the context of use. The adaptive system has to be defined as well, and finally the semantic definition of unstructured data such as texts or images needs to be defined.

The KMS challenge is to identify and integrate the following four technologies in order to meet the KM needs of an organization. Firstly, **communication technologies** allow users to access required knowledge and to communicate with each other. This is usually materialized by a web-based application that allows all users to access all data of the platform regarding access right. Secondly, **collaboration technologies** provide the means to perform group work. The capitalization of knowledge concerns all the manners in which an organization works, and how all processes are divided and executed sequentially or at the same time. Thirdly, **multimedia storage technologies** use a database management system to capture, store and manage knowledge according to a large number of data source formats. This underlines the issue of the interoperability of the data source access which has to be dealt with by the KMS. Fourthly, semantic web technologies allow the definition of formal ontology. In this manner, a **semantic layer** is introduced in the KMS in order to create the meaning of data in order to be used by artificial agents. This is not the panacea but it improves greatly the capability of the system to search, to extract and to maintain unstructured information and to generate automatic documents regarding the requirements.

HOW ARCHAEOLOGY CAN BENEFIT FROM FORMAL ONTOLOGY AND KM

The semantics required by KM system is introduced by the semantic web technologies. Actually, all the semantic web technologies allow the definition of formal ontol-

ogy that represent knowledge useable by machines. These semantics are useful during all the cycle of knowledge management. The following figure shows this cycle and the implication of the semantics during all this cycle. The first process is the creation of knowledge. By analyzing available data, archaeologists are able to identify piece of new information that defines in its context new knowledge. The role of the experts is important because they are the only ones who are able to create knowledge at this stage. Actually, after several cycles, machines are able to extract new knowledge by using intelligent processes.⁵ In order to permit experts to capture and to refine knowledge a framework is required. The knowledge capture is undertaken with the help of a framework that defines formal ontology. The experts intervene at several levels. Firstly, they get involved at a schematic level which consists in defining categories of things and semantic relations between these categories. For instance, the semantic relation "isComposedOf" is a meronymy relationship which is transitive. If a house is composed of floors, and a floor is composed of rooms, then a house is composed of rooms, this assertion is possible because the relationship between categories of objects is transitive. Secondly, experts intervene at an individual level. This intervention consists in defining objects that are part of a category and to define their attributes and relationships. For instance, experts will define house n°1 and its associated floors and rooms. Consequently, the archaeologists are able to capture all information of an archaeological site and to define formally the knowledge about it. Refinement process consists in improving previously defined knowledge by correcting mistakes concerning the ontology consistency and satisfiability. A consistent ontology means that no axioms of the ontology can be true and false at the same time. For instance, a dog cannot be a cat at the same time. A satisfiable concept is a concept that accepts individuals. The knowledge storing process consists in storing knowledge in order to make it persistent. Usually, this is realized using a knowledge database system which permits to store but also to retrieve information. The subsequent processes are the management processing and the dissemination processing of knowledge. They are related to a common process which is the collaboration between experts. In order to make this collaboration possible, information and communication technologies are used. This collaboration is possible by using a collaborative web platform which allows the user to access, to retrieve and to manage information. Multimedia data can be also managed and can be indexed by the knowledge base with the help of the previously defined ontology. At the same time, each modification

that is made on data is accessible to all the experts that take part in the project. Consequently, they participate in the criticism of available knowledge in order to create or to update knowledge. From this point on, another cycle starts.

CONCLUSION

In this paper we have discussed briefly the use of formal ontology in knowledge management systems in order to help archaeologists to capture and manage knowledge. This is made possible by the introduction of the web semantic technologies. The principle of this process was used in the e-Archive project called ArchaeoKM in order to manage a great amount of archaeological data from an industrial site. Different sources are indexed with help of ontology and from this ontology some deductions are possible in order to find out new knowledge based on spatial data for instance.

¹ Guarino, N., Formal ontology, conceptual analysis and knowledge representation, *International Journal of Human-Computer Studies* 43, 625-640 (1995)

² Studer, R. Benjamins, R. and Fensel, D., Knowledge engineering: Principles and methods, *Data and Knowledge Engineering* 25, 161-197 (1998)

³ Zhou, L., Ontology learning: state of the art and open issues, *Information Technology and Management archive* Volume 8, Issue 3, 241-252 (2007)

⁴ D Fensel, *Ontologies: a silver bullet for knowledge management and electronic commerce*, Springer-Verlag New York, Inc, 2004

⁵ Karmacharya, A., Cruz, C., Boochs, F., Marzani, F., *ArchaeoKM: toward a better archaeological spatial datasets management*, *Computer Applications and Quantitative Methods in Archaeology (CAA)*, Williamsburg, Virginia, USA, 2009.

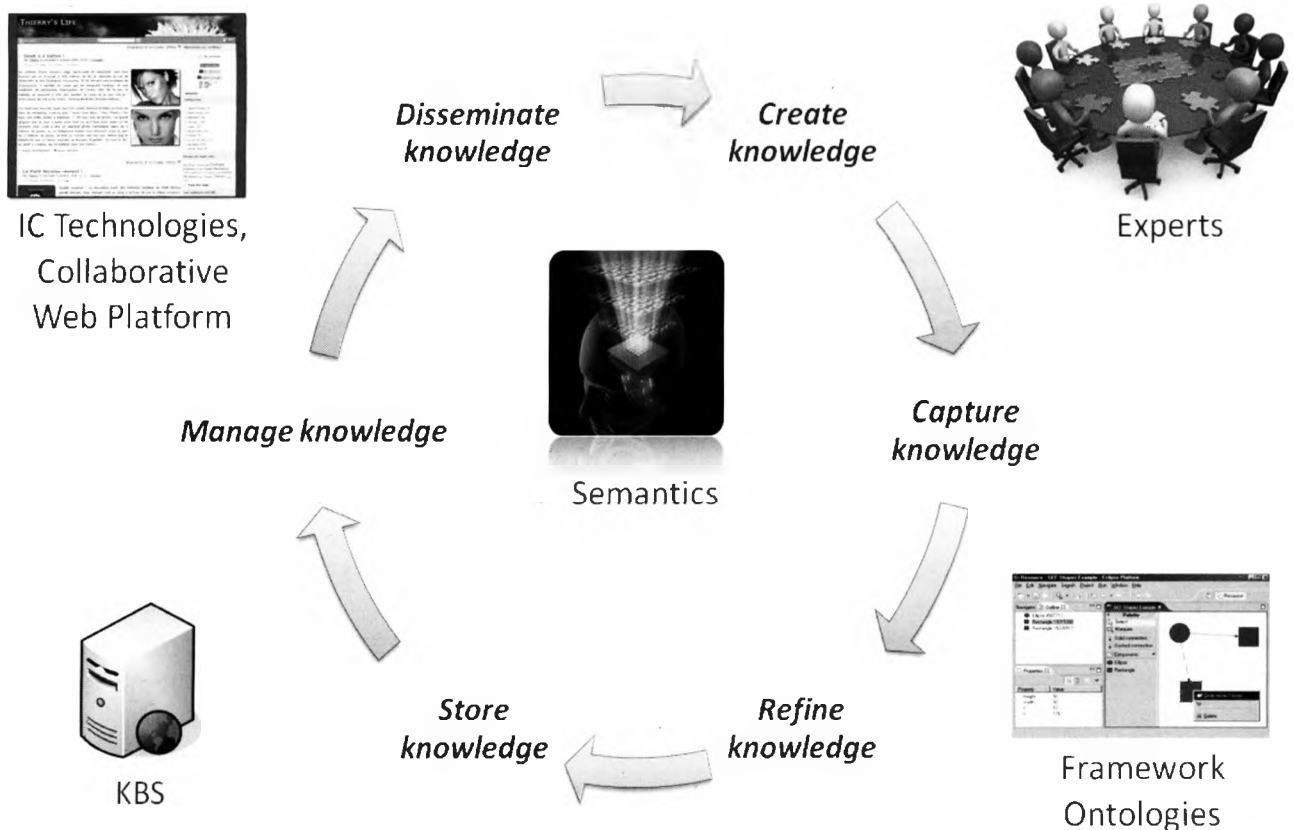


Figure 1. The Knowledge Management Cycle (© author)

ArchaeoKM: Managing Data through Knowledge in Industrial Archaeological Sites

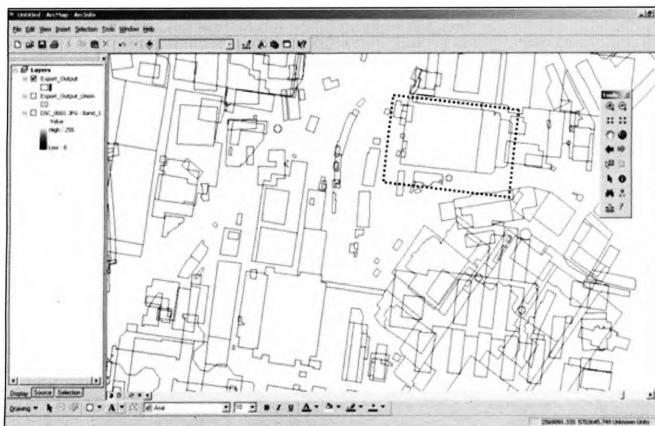
Ashish Karmacharya
Christophe Cruz
Frank Boochs
Franck Marzani

INTRODUCTION

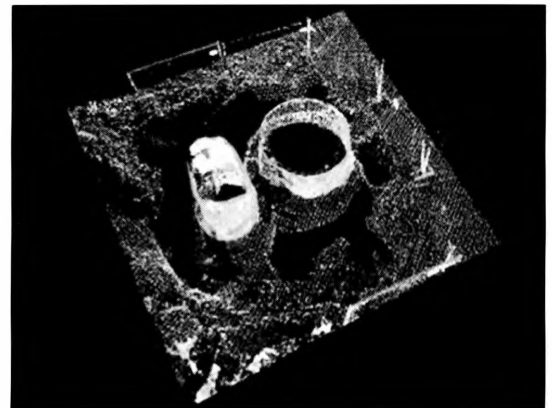
Today when the world is embracing the advancement of technology the art of data acquisition has also changed a lot. Now it is possible to collect data with very high accuracy. This has provided innumerable advantages in data manipulation but also provides challenges in managing them simply due to the size of the data. In an Industrial Archaeological project where the area for excavation is available for very small duration, this problem gets even more exaggerated. Hence, there is lots of research going on in the topics of data indexation and information retrieval so that a next level could be reached where knowledge could be used to manage the findings. This level consists in identifying knowledge and managing this knowledge on data provided by archaeological activities. Data are collected according to the requirement of the archaeologists and they are managed by themselves. *ArchaeoKM* facilitates them to manage them through

the knowledge generated by identifying the objects excavated from the site and recording it as it is. It provides the functionality of relating the object to another in a dynamic manner so that new relationships could be created at any point of time. Actually, only archaeologists are able to perform these tasks through their knowledge of the excavation sites and the objects excavated.

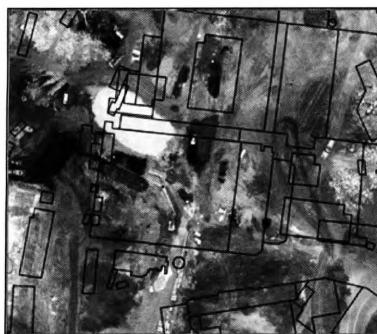
Industrial archaeology generates huge amount of data in a very short duration, the collected data are stored in a repository without any relevant structure. Once data are stored, the process of identification of industrial findings with the help of the data repository is carried out. Three major issues have to be underlined here; first most appropriate storing structure which provides easy access to the repository consisting of complex and heterogeneous data like 3D point clouds, pictures, images, videos, notes and others. Second – the most feasible process to allow archaeologists to annotate, index, search, and retrieve



[a]



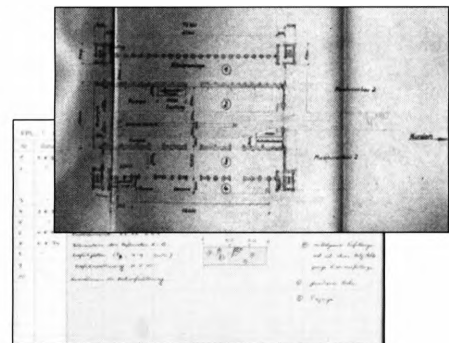
[b]



[c]



[d]



[e]

Figure 1: Heterogeneity nature of data [a] Site Plan laid out as GIS data in ArcGIS (highlighted the area of Oven) [b] Orthophoto from aerial image overlaid with the Site Plan (Oven area). [c] Point Cloud of Oven [d] Image of the oven. [e] (top) Floor Plan (down) Archaeological notes (© author)

data and documents in order to ease the identification of common archaeological findings. Third – the rules to define the object and its relationship with other objects. The rules are very important as they are the one to provide a proper knowledge base for knowledge management. These rules could be based on semantic as well as spatial relationships of the object and *ArchaeoKM* supports both.

Shifting from conventional methods, *ArchaeoKM* is a web platform based on semantic web technologies and knowledge management. It is used to store data during the excavation process and to generate knowledge during the identification process and manage the knowledge generated through the rules formulated by the archaeologists. The platform facilitates the collaborative process between archaeologists to generate knowledge from the data set. In general two distinct functionalities could be observed in *ArchaeoKM* – Knowledge Generation and Knowledge Management. The descriptions and observations of the archaeologists are managed through the domain ontology which is basically the representation of the site. The ontology gets populated by the identification process making it a knowledge base for knowledge handling.

DATA PATTERNS AND FORMATS

Industrial Archaeology is perhaps the best suited field in archaeology to carry out our research as Industrial Archaeological Sites (IASs) are available for very short duration of time.

It makes time available very short to store them which is one of the concerns we want to address here. Additionally, the amount of data that is collected in this short span is very large and diverse. *ArchaeoKM* uses the site of Krupp factory in Essen, Germany. The 200 hectares area was used for steel production during early 19th century and was destroyed in Second World War. Most of the area has never been rebuilt and thus provides an ideal site for industrial archaeological excavation. The area will be used as a park of the ThyssenKrupp main building in 2010. Actually, we are running out of time to collect data. The first challenge consists in creating a relevant data structure which helps in retrieving those data efficiently. In addition, the data which have to be collected are huge so the system should be able to handle a huge data set.

The nature of the dataset generated during the project is heterogeneous. It can be seen in Figure 1. As could be seen the acquired data ranges from scanned point cloud

from terrestrial laser scanners to the floor plans of old archive. The primary source of geometric information is provided through the point cloud. The point clouds have resolutions of 0.036 degrees and are in Gauss Krüger coordinate system (GK II). It is the main data set used for the 3D object modelling. Beside point clouds, huge amount of images are also collected during the excavation. Most of the images are taken with non calibrated digital camera so do not contain any information about the referencing system. Even though they do not contain any referencing information they possess vital semantic information and could be used for the formulation of knowledge. However, there were photogrammetric flights to acquire aerial images of the area. The aerial images were processed to generate a digital orthophoto with a resolution of 10 cm. The digital orthophoto is again in Gauss Krüger referencing system (GK II). To add on this, huge archive data have been collected. Those data contain floor plans, old pictures and other semantic information. Likewise, the notes taken by archaeologists are also important to acquire semantic information of the findings. ArcGIS databases are also available depending on the site and its nature. These databases are in the GK II reference system. For our example, this database gives an overview of the site and can be overlaid with the orthophoto in order to identify the interesting locations easily as can be seen in Figure 1 (b).

ARCHAEOKM – THE PRINCIPLE AND THE PROCESS

The primary principle within *ArchaeoKM* is the use of semantic web and knowledge management to facilitate archaeologists with handling their data. However, it does not completely bypass the conventional database system. It still uses the spatial functionalities of existing database system for its spatial rules. Details on how they are managed can be found in papers like Cruz, et al. 2010, Karmacharya, et al. 2009. It is collaborative Web platform based on semantic web technologies RDF (Group 2004), OWL (Bechhofer, et al. 2004), SPARQL (Prud'hommeaux und Seaborne 2008) and SWRL (Horrocks, et al. 2004) and knowledge management in order to handle the information provided by several archaeologists and technicians.

The Architecture

As can be seen in Figure 2, *ArchaeoKM* is a three layered architecture with the bottom layer being the Syntactic layer. Within this layer all the data and documents collected during excavation is stored in their proprietary format. The middle layer is the Semantic layer. Within this layer, the description of the excavation site is represented

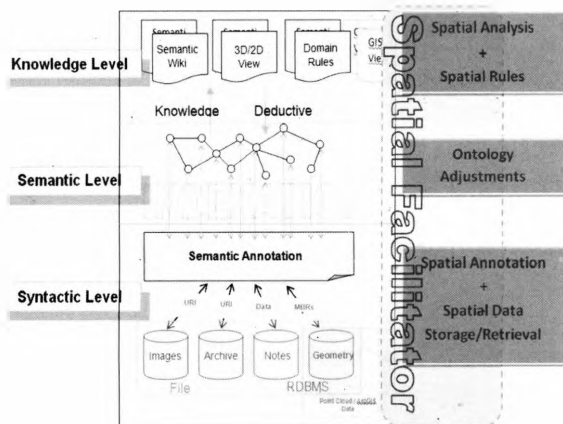


Figure 2: System Architecture (© author)



Figure 3: Identifying and Tagging Object (© author)



Figure 4: The Rule interface (© author)

in domain ontology. This can be considered as the core of *ArchaeoKM* as it controls all the knowledge generation and management process. The topmost level is the Knowledge level. This level is the face of the application and so consists of different user interfaces to visualize and interact with the knowledge. As can be seen, a parallel facilitator supports all the levels to store spatial data, retrieve and perform spatial analysis and visualize the results within all levels of *ArchaeoKM*. Details are given in A. Karmacharya, et al. 2009, A. Karmacharya, C. Cruz, et al., *ArchaeoKM: Managing Archaeological data through Archaeological Knowledge* 2010.

The Process

The initial phase of *ArchaeoKM* primarily involves designing the domain ontology which is basically a descriptive representation of the site represented in a network graph. The process within *ArchaeoKM* can be divided into two broader parts: Knowledge Generation and Knowledge Management. The first part deals with identifying objects in the excavation site and maps the related data and documents to the object. *ArchaeoKM* provides interfaces to support these tasks. As can be seen in Figure 3, the objects are identified and tagged with the polygon on the Google map provided within *ArchaeoKM* with proper names. They are mapped to relevant data and documents through the semantic annotation interfaces. This provides a common element for data integration of different data types. In this way the object is first created and populated within domain ontology.

The second part is basically managing the knowledge generated by identifying the object. *ArchaeoKM* provides two approaches. The first approach is through the interfaces to directly relate the identified objects to the corresponding related objects. This is possible when the archaeologists know exactly how they are related. The second approach is through the domain rules which archaeologists can formulate at any time. An example is provided in Figure 4. In this Figure, we can observe a rule stating that a site having an oven which is red in colour and elliptical in shape and has a framework as construction type then that site is a Glühhaus. This in fact is a very simple and fictitious rule but *ArchaeoKM* can handle more complex and real rules.

CONCLUSION

We have presented *ArchaeoKM* based on knowledge management which uses the knowledge possessed by archaeologists to manage the archaeological data. We are

currently testing a prototype with real data and real archaeological knowledge. The architecture was prototyped using JENA on PostgreSQL. To implement the framework, we are using JENA (Semantic Web Framework for Java) in order to build and to manage ontology in JAVA. JENA helps us to handle an OWL database. We use the request language of JENA to retrieve data. Possibilities of integrating the reasoning capability of OWL DL (Web Ontology Language) to generate new knowledge through the existing one are being explored.

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Possibilities of Documentation and Analysis – Need of comparative Data for Industrial Subterranean Relics

Bianca Khil
Elke Schneider

INTRODUCTION

In general the term "archaeology" signifies objects or traces within the earth, which can only be read by an excavation. The term "industrial archaeology" (IA) is used in Germany for relics above the earth, i.e. objects concerning historical monument conservation. In 2001 the urban archaeology of Essen (Western Germany) began to observe and document the first subterranean industrial relics, belonging to the former "Gussstahlfabrik Friedrich Krupp". The examinations took place during the construction works at the area and without interrupting these works. So in Essen the term "IA" was used not only for over-ground relics, but was extended by subterranean relics and archaeological monument conservation.

DOCUMENTATION OF LARGE SCALE AREAS – THE RIO PROJECT

In Essen for example the pit of Zeche Sälzer & Neuack and the building site of the so-called "Thyssen-Krupp-Quartier" could be examined – gigantically dimensioned features. First observations in Essen clearly show the special problems of subterranean industrial objects: the large scale of the industrial building sites and the fast progress of construction work contrast with the conventional archaeological documentation methods, which are very time-consuming and rather fitting for small- or medium-scale areas. The opposition between the demands of an industrial building site and the conventional archaeological documentation methods conducted to the RIO-project (Räumliches Informationssystem zur Erfassung, Dokumentation und Analyse industriearchäologischer Objekte), which is realized in cooperation of the universities of applied sciences of Bochum and Mainz (see: Boochs & Przybilla). RIO consists of testing new documentation methods and creating a new kind of data



Pit of Zeche Sälzer & Neuack, Essen: observations by urban archaeology Essen 2003 (© author)

base. The new methods had to be practical on large-scale areas, be fast and contact-free, so that the working progress would not be affected. The chosen methods were: aerial photos, terrestrial laser scans and terrestrial and aerial photogrammetry.

Archaeological methods

How do archaeologists normally work? First they excavate and document carefully all features and objects. Then they compare these new features with already known ones from other excavations, resulting in an interpretation. First they classify the features, i.e. as "post-holes". Then the excavated features – the post-holes beneath the surface – lead to the reconstruction of the former look, including walls and roof, which have not been preserved but can be developed. The basis of archaeological interpretations are carefully documented data in form of systematically positioned profiles and plana and – very important – in form of the succession of soil-layers. Profiles and plana are needed for the reconstruction of the form of the excavated feature in all three dimensions. Furthermore there has to be a data base of comparisons for a proper interpretation. These demands are not satisfied by contact-free collected data, for they are based on arbitrary positioned profiles and plana made by large excavators in places, where they are needed for the construction works. They scarcely show the succession of soil layers. A data base of comparisons concerning industrial features is still missing.

Industrial archaeological data bases

In Germany beginnings of such data bases, like inventory or catalogues, have been already developed since 1975, but only in form of books. Digital data base projects, which are open to the public and can be expanded by all interested persons, are rather rare. Such inventories include rather general material. Detailed information, especially concerning the question, what kind of archaeological features could be expected, is missing. For North Rhine-Westphalia (NRW, western province of Germany) a digital and web-based information system called "Kulturlandschaft Digital – KuLaDig" is currently worked out. Recording a large amount of information, it chiefly shows the development of a cultural landscape but can also capture single objects. These basic approaches have other main points than subterranean industrial relics and are intended for other users, not specially designed for archaeologists.

Industrial subterranean relics

All taken together, the first step – the classifying of features – is already possible, but the second step – con-

cerning look and function of the former existence – is on account of already missing comparisons for subterranean industrial relics rarely possible.

The features, which have remained are mostly foundations of different form and function. They can be classified as foundations of machines, of plants and of buildings. Foundations follow only functional criterions, but not for example aesthetical or representative ones, so the drawing of conclusions concerning the formerly existence rarely works on its own, for there are not enough clues. For example: a massive construction of wood has been observed, that can be classified as a foundation. There are archive plans of similar constructions, so it can be identified as the foundation of a large hammer. Another example: a massive construction of brick has been observed: again it can in a first step be classified as a foundation, but in this case comparisons are still missing, and so the second step is not possible yet. This means, that we do not know anything about its former function and the machine or plant belonging to it.

Comparative data – Zeche Zollern, Dortmund

All this leads to the necessity of creating a data base with comparative features, concerning especially industrial foundations. It has to include all available data taken from different sources. They can be achieved by archive research, recording of plans, excavations and registration of still standing plants. A contribution to such a data base should be the recording of foundations at Zeche Zollern in Dortmund (Western Germany).

The Maschinenhalle of Zeche Zollern was chosen to record comparative data because of its good preservation. It had been finished in 1903 to install the machine stock for the pit. In 1966 the pit had been closed and the demolition of the hall threatened, but could be averted. In 1969 this Maschinenhalle became the first industrial monument in Western Germany.

In many cases it is a problem of historical monuments, that the facade or the floor-plan has remained, but not the machines. In case of the Maschinenhalle Zeche Zollern the original machine stock is left, now partly working again. Furthermore the foundations are originally preserved, for the building has never been modified, except an extension built in 1908.

Foundations show only few distinctive features, so it is extremely important to work them out. At the Maschinenhalle there are two planes preserved: first the subterra-

nean level, that means the power-plane with foundations and second the over-ground level, i.e. the working plane with machine stock and walls. The connection of both planes is still given. The affiliation of foundations and belonging structures above ground are definite, so it is possible to record comparative data, which can be used in all cases, where the connection of both planes is no longer given, i.e. for all archaeological sites.

To collect as much data as possible, the cellar or power-plane has been scanned, photographed and described. In a next step both planes, i.e. the power-plane and the working plane, including the machine stock have been overlaid to detect the relationship between power-plane and machines. Furthermore, information like historical photos, plans and script sources concerning for example re-buildings and extensions have been used. All this provides first material for a comparative data base.

State of research – a look ahead

It is not possible to draw conclusions for special foundations yet. The material collected at the Maschinenhalle is only the beginning of a comparative data base. An extensive data-recording is necessary in co-operation with several specialists. Archaeologists are needed for they know what is necessary to draw conclusions by traces in the earth. Historical monument conservers with their experiences concerning features above ground and their point of view on construction are as important as architects and historians of technology with their knowledge about functional and technical connections.

Stated aim is the construction of a catalogue of comparative data as complete as possible – a field of work for many years and many scientists. For such a data base it is important to record different construction parts by



Zeche Zollern, Dortmund: first registered historical monument in West Germany (© author)

determined distinctive features, for example depth, form/look, combinations and traces of use. Exact questions concerning a data base of comparisons build the basis for the selection of criteria, which should be recorded there. Further questions should be gained while working.

Some questions concerning foundations

There are several distinctive features submitting the drawing of conclusions, for example the *depth of foundation*. If one foundation is deeper than another, it might belong to a supporting construction, has a higher construction above ground, is a support for a carrying overhead travelling crane, or both foundations were built at different times. Another distinctive feature might be the *form of a foundation*. Two kinds of foundations can be differentiated: strip foundations, which point for example to a wall, and isolated foundations, which might belong to a wall but also to a plant or to a machine. Having a look at plants or machines, is it possible to draw conclusions from the form of foundations? Can a certain kind of foundation be assigned to a certain kind of machine or plant? Does a certain kind of foundation belong only for example to one kind of oven or hammer? Are these conclusions also reversible? In an excavated area foundations might be found combined, so it is important to know if certain *combinations of foundations* allow conclusions. Does the combination of certain foundations show a special kind of industrial plant and another combination another working plant? In the case of a rolling mill similar rolling frames are arranged in a line. So it is also conceivable to find isolated foundations arranged in that way while excavating an area that hint to a rolling mill. Or maybe the combination of an oven and a casting pit could hint to a foundry. Last but not least and chiefly important to an archaeologist is the distinctive feature

trace of use. The use of certain machines or plants leaves traces in the surrounding area and the soil. The simplest example for this is red annealed earth, which hints to heat, and so maybe to an oven.

REFLECTIONS AND CONCLUSIONS

For this work it is important to realize, that every industrial plant is a potential future ground monument. Some industrial plants become historical monuments, some go to ruin, most turn to waste land. Some of them are rebuilt to serve their new use and the machine stock will be removed, among others for reasons of environmental protection. Most of all these activities are not observed. It is important to record all potential data and material about this "dying good" before the knowledge is lost forever and to make a stock-taking immediately after the closing of a plant. Still standing industrial sites should be documented as completely as possible, every demolition should be accompanied by archaeologists. For this one has to get legal general conditions for legal certainty. It is also important to observe as diverse and as many plants



Red annealed bricks and earth: foundation of an oven (© author)



"Dying good" in Essen (© author)

as possible – national and international – only in this way one may record comparative data for the future, otherwise the knowledge will die with the last contemporary witnesses.

In the last 50 years more and more industrial sites had been closed and torn down. In the following time this waste land will be used for building and archaeologists will find those industrial relics without knowing what they are.

ACKNOWLEDGEMENT

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URL: <http://www.industrie-kultur.de/index.php?module=htmlpages&func=display&pid=17>

D4 Planning, Evaluating and Presenting Industrial Heritage Projects

Recording and Presenting more than 1000 Years of Mining and Smelting in Marsberg

Martin Straßburger

INTRODUCTION

Marsberg on the north-eastern fringe of the Rhenish Massif is mainly seen in connection with the christianisation of the Saxons by Charlemagne or copper mining and production. Marsberg is the third biggest copper ore deposit in Germany. Mines and mining landscapes of Marsberg are complex assemblages of geological, mineralogical, ecological, archaeological and historical factors. Mining ceased in 1945, but is still remembered among the local community.

Despite its repeatedly stressed historical significance the copper mining of Marsberg has not been subject of extensive geological and archaeological research projects. Although the archaeological excavation of the deserted village Twesine pushed the beginnings of copper production back to the 8th century, there was no archaeological record of underground features. In 2007 an interdisciplinary research project in cooperation with the "Marsberger Heimatbund" began. Experts on mining archaeology, mines surveying, geology and mineral deposits, hydrogeology, geochemistry and material analyses are taking part.

RESEARCH PROJECT

An extensive research project started in May 2007 including geological, hydrological, chemical, historical and archaeological investigations. Work is conducted by several individuals of different professions in their spare time, mainly during weekends.

The archaeological documentation of mining structures on the surface is accompanied by a systematic record of underground features and the systematic recording of finds. Apart from the mines, research will focus on the connection between mining and settlement history.



Site of the villa Twesine next to the industrial estate in front of the Ohmberg with Obermarsberg in the background. (© author)

Among the historical research the analysis of old mining plans plays a crucially important part. The oldest plan up to now dates from 1785. Most of them were drawn between the end of the 19th century and 1945. Therefore the development of mines and smelting plants during that period can be traced with some detail. But the plans have also been proved to contain mistakes. A good knowledge of the old regulations for and experience in drawing of plans are essential for the analyses.

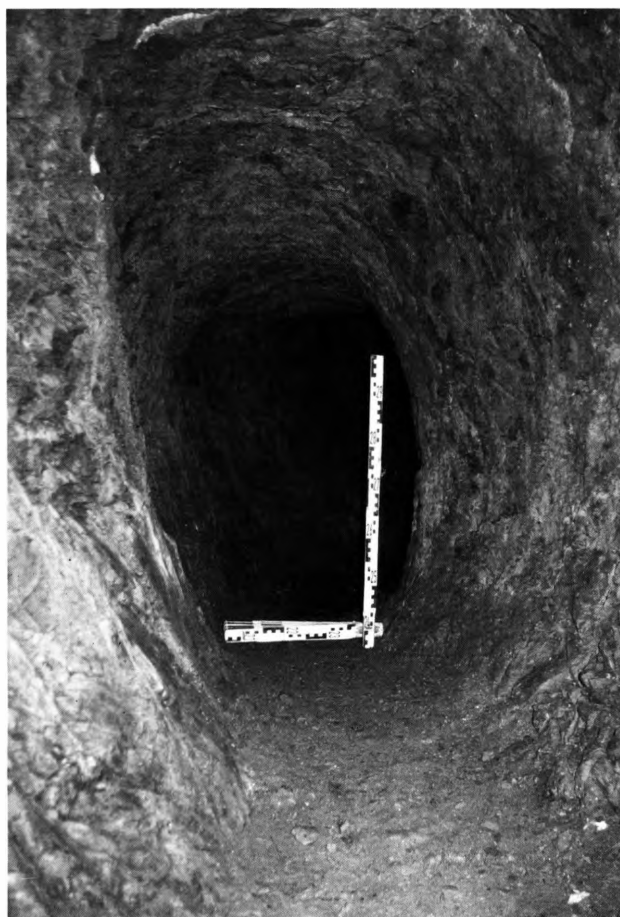
The structure of the mines is closely connected with the character of the deposit. Based on geological knowledge different aspects of the copper ore deposit, mining, ore processing and their effects on the environment are dealt with. It is intended to work out a water balance of the mines and to analyse the chemistry of the mine waters. Geochemical investigations will help to confirm old models of the ore deposit or to establish new ones, to describe and reconstruct the processes of copper production as well as to compare them with archaeological experiments.

ARCHAEOLOGY AND HISTORY OF MINING

Archaeological excavations by the river Diemel in the industrial estate Ohmberg revealed slag tips and shaft furnaces of the 8th–13th centuries. All in all 36 roasting pits and furnaces have been discovered. Probably most of the copper ores were mined in the direct surroundings south of the river. The settlement was deserted in the 14th century (Grothe 2000, p. 83).

The monastery Corvey was granted with the privilege to hold a market in Horhusen in 900. A register of abbot Erkenbert (1106–1128) mentions that Horhusen had to deliver 50 knives, razors and pliers to the monastery every year on Maundy Thursday. There is also evidence for production and sale of copper cauldrons around 1150. In that year Konrad III. granted abbot Wibald von Stablo the mining rights at Marsberg (MGH D K III Nr. 232). A document from 1192 states that Heinrich VI. transferred the rights on native and placer gold, silver and other metals to the abbot of Corvey including the royalty.¹ In 1220 the town Obermarsberg was founded resulting in the relocation of important central functions on the mountain. So far only one short adit can be dated to medieval times.

The next definite historical proofs of copper mining date from 1562 and 1596/1597 and then again from 1650 onwards including the areas "Auf der Kunst" (1650) and the



Medieval adit (© author)

Jittenberg (1660). For the later mine "Mina" new copper mines are shown on a map from 1693. A report on the state of the mines and smelting plants at Marsberg from 1729 has survived. In 1764 a new smelter was built using sulphuric acid to oxidize and wash the copper out the ores. Together with a simultaneously declining production this indicates a change in the mineralization. The rich one in the oxidation zone had been mined to a bigger extent and those with under 5% copper had to be treated differently. During the 17th and 18th centuries there were six copper smelting plants in Marsberg. The produced raw copper was worked in a hammer on the river Diemel.

After the mines had been closed in 1816 the Prussian government reopened them in 1818. 12 years later after a five-year-trial operations were terminated again. In 1832 the company Hundsicker from Altena took over as a federation and remained owner until 1839. In spite of this the "Stadtberger Gewerkschaft" also located in Altena was founded 1834. The main share holders were Chris-

tian Rhodius from Linz on the river Rhine, Friedrich Leopold and Arnold Hundsicker as well as Friedrich and Mina Thomée from Altena and Werdohl. The deep „Bilsteiner-Stollen" was driven from the valley of the Osterlinde in direction of Hesperinghausen, and the „Beuststollen" reached the claim "Friederike" starting at the river Diemel in 1838. Four years later the "Kilianstollen" developed the mine "Oskar". In 1845 the mine "Mina" was undercut with the "Friedrichstollen". From 1837 to 1839 the production rose from 21,799 to 44,139 hundredweights copper ore.²

On February 2, 1856 another federation was founded for the purpose of prospecting and working the copper ores in Stadtberge and surroundings. It did not exist long and its mines changed into the ownership of the "Stadtberger Gewerkschaft". In 1859 the whole mining region was consolidated in a "Kupfer Distrikt". After the formation of the joint stock company "Stadtberger Hütte" on October 12th, 1872 seated in Stadtberge, pilot drifts were driven in the ore bodies on the rim and the mining area was extended. The amount of sulphuric ores had risen over the years and reached 90% of the total output in 1912.

After World War I mining and smelting became more difficult. The fuel supply was critical and the existing smelting plants had not been optimised to the changed mineralization. The proportion of bornite was decreasing while that of chalcocite rose. As a consequence the old leaching process could not be applied any more. As this was a gradual change over several years the adjustment of the processing plants had been neglected and the mines were shut down on June 1, 1924. During the next months the leaching process was altered, thus making a responsible technical and economical continuation possible. While costs for payment and materials rose, the price for crude copper sank. During the inflation the joint stock company lost all of its capital reserves. Therefore a modernization was not possible. When prices for copper rose in 1927 the idea of a flotation was taken up again which had already been operated tentatively since 1924 which was given up when the prices for copper began to fall again in 1930. On July, 1 it was decided to close the mines, and the "Stadtberger Hütte" had to let them flood in April 1931. During the following years the buildings were pulled down and the machinery was sold. The remaining property of real estates was disposed of in 1934.³

Citizens founded the "Arbeitsgemeinschaft Stadtberger Kupferhütte Niedermarsberg und Umgebung e.G.m.b.H. zu Niedermarsberg" in 1935 with the aim to revive copper mining and smelting at Marsberg. The state was also

interested due to its political goal of autarky. Therefore on March 6, 1935 the V.D.M. Frankfurt concluded a contract with this group lasting for six months to analyse the possibility of reopening by intensive exploration conducted by a side branch of the V.D.M. which was converted into the "Kupferbergbau Stadtberge zu Niedermarsberg GmbH" after the investigations. Since April 1, 1936 the erection of a plant for a chlorinating roasting-leaching-process was prepared parallel to explorations in the Priesterberg and in the "Wilhelm-Stollen" as well as clearing and dewatering the mine "Mina".⁴

During World War II the number of employees declined. Therefore more and more prisoners of war and forced labourers were brought in as miners and smelters. They lived in barracks opposite the middle smelting plant. Production of the mine "Mina" went into decline in 1942 as the copper content was continuously decreasing. More and more dump ores had to be used because of the productivity of the second deep level in the mine. Two years later work had to be restricted as salt and scrap iron were not available for processing. Bomb raids on March 14, 21 and 28, 1945 caused huge damage to the loading installations of the smelting plant and on the ground of the Reichsbahn. The electrical supply cables at the "Beuststollen" were also hit, the pumps stopped and the mines started to flood. Mining operations ended with the arrival of the Americans in March 29, 1945. Prisoners of war and forced labourers destroyed parts of the smelting plants and many documents resulting in the loss of nearly all files dating from that time. Installations and other usable material were sold in the following years and the mines were flooded. In 1948 a project for reopening was given up. Only a small production of cement copper by leaching the old dumps continued until 1957. All in all about 3.23 million tons of ore with an average content of 1.6 % copper were mined. The existing reserves are estimated

at about 1 million tons of ore with an average copper content of 1.3%.

The "Marsberger Glasfabrik" took over all buildings including the ground of the upper smelting plant. Its operations began in April 1952. The middle plant had been used as a saw mill for some time by then. Grounds of the "Untere Hütte" are used by the "Landschaftsverband Westfalen-Lippe".⁵

Several features dating from the period 1925–1945 are preserved. In 1991 the slag "Kieselrot" caused a panic in Germany as it was discovered to be contaminated with dioxins. But these are set free only at temperatures above 1,000°C. The high copper content of the slag was responsible for a lack of plant cover.

PRESENTATION

Based on information from different investigations concepts for protection, reuse and development of mining



Surviving structure of the middle smelting plant. (© author)



Chimney and altered buildings of the upper smelting plant (© author)

relics at Marsberg can be worked out. Furthermore the quality of touristic offerings relating to geological features, old mining sites and landscapes can be improved or increased. Therefore a management plan and a concept have been developed for research projects as well as the treatment of the geological and mining heritage. Scientific records provide a solid data base for the understanding and presentation of the contexts.

One main point for communicating the results is the visitors mine run by the "Marsberger Heimatbund" since 1985. But there are other projects to come. Along a theme walk through and past mining relics and geological features signs on archaeology and history, geology, environmental effects and recultivation are planned. One of the most important aims is the development of an intensified awareness of the importance of the mining heritage in the cultural landscape. The new museum of Marsberg will play a key role. Two rooms with exhibitions on geology and mining have been suggested. In a yard outside early medieval copper smelting furnaces and sunken hut features are planned to visualize the early medieval settlement villa Twesine. Furthermore a small excavation site for children to learn about archaeology is considered. Another idea are special programs for schools.

CONCLUSION

Clearly the described project has to cover a lot of ground on different fields of expertise. Work is done by the different experts mainly in their spare time at weekends and would not be possible without the support of the "Marsberger Heimatbund" and its members. So far, research has shown that the copper mining district of Marsberg has important geological and archaeological features of at least national importance. Therefore more research is necessary and planned to cover the extensive mining legacy and to communicate its values.

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³ ib. p. 460.

⁴ ib. pp. 461, 482.

⁵ ib. pp. 462f.

D6 Conceptual and methodological Aspects of Evaluation and Redevelopment

CHIP: Cultural Heritage in Planning – A Danish Point of View

Mette Slyngborg

How can planners identify the most important, most representative and regionally typical environments? And how can cultural environments be documented, delimited and described, so that they both reflect a historical framework and the relationship to the natural resource base and are sufficiently homogeneous and manageable in the planning process? How should priorities be set among cultural environments?

These are the major questions in this paper where I'll explain the principles in the method CHIP (Cultural Heritage in Planning), providing guidelines on how to survey, delimit and set priorities among cultural environments for the purpose of identifying and protecting valuable cultural environments through spatial planning.

In 1997–1998, Esbjerg Museum together with the Ribe County Nature and Planning Department took part in a pilot project on the designation of features worthy of preservation in cultural environments. The Danish National Forest and Nature Agency, a department of the Danish Ministry of the Environment and Energy, initiated the project.

Behind the project was a decision taken by the Danish government in 1996 to the effect that in addition to combating pollution and preserving nature, environmental protection should incorporate a third dimension: consideration of the cultural environment. For this reason The Danish National Forest and Nature Agency initiated a development project, *Cultural history in planning*, in order to give county and local authority planners guidelines on dealing with the cultural-historic aspects of public planning. The purpose of the project was to clarify the term "cultural environment" and to recommend methods by which cultural environments could be identified, delineated, prioritised and preserved. Today the method CHIP is implemented in several Danish projects concerning analysing, delineating and prioritising cultural environments.

CHIP: PROJECT METHOD

Work on cultural history in planning is cross professional and can be divided into two main phases. In *Phase 1*, concerned mostly with the cultural-historic aspects, the work involved the charting, description and provisional designation of existing cultural-historic interests on the basis of existing knowledge in central registers, in counties and boroughs, and in local museums, supplemented by viewing. *Phase 2* is mainly concerned with planning and included the delineation and prioritising of selected

cultural environments. Objectives and methods of protecting the individual environments are presented.

PHASE 1: CHARTING CULTURAL ENVIRONMENTS

Cultural history characteristic and main landscape features A depiction of the main landscape and historical features is prepared as part of the project to provide an interpretation framework and prioritising basis for charting. The depiction covers the following elements: Topography and nature, historical development from prehistory until now. The latter element includes the significance of the area in the history of the country, special power and economic structures, and possible highlights from different periods. In addition, main trades and professions through the ages, and the traces they have left, are described. Here, the subjects can be agriculture and its associated businesses, coast-based business, trade, the crafts and industry, traffic and the infrastructure. The purpose of such a depiction is to clarify the most important elements in the development of the precise area concerned and thereby establish the essential subjects of preservation work.

Overview of charting elements

Using the depiction as a basis, an overview of the most important charting elements within the area concerned is prepared. The overview is an essential link in prioritising which cultural-historic items should receive most attention in charting. The overview is prepared using existing source material, i.e. the documentation for the work, and a reflection of where and within which subjects knowledge is especially lacking.

The overview has got three lines of approach or headings: *time* (different epochs), *topography* (types of landscapes), and *theme* (cultural-historic), which of course cannot be regarded separately. The aim with the three approaches is to ensure that all elements connected with the historical landscape are taken into account, and that attention will be given to special landscape features that distinguish a given area.

Choosing the charting elements

Based on the depiction of the landscape, the main historical features, the charting overview and visits, choices are made as to which elements shall be focused on. The criteria used in making choices revolves around what is particularly characteristic of, or unique to the areas concerned, and also pragmatic considerations to illuminate a large set of problems in a limited time. Therefore certain items that would have been logical to prioritise are omitted.

Charting cultural-historic traces and environments

Charting is divided into the above items in the respective project to cover single cultural-historic elements (such as water and windmills) and structures (such as roads, bridges and inns). It can also include whole areas/towns of cultural-historic interest, e.g. fishing villages, station towns or village property and estate ownership relationships. Charting is carried out on forms containing information on:

- Locality reference and charting item
- Time period
- Topography/landscape type
- Cultural history depiction, historical outlines and most important elements
- Preservation condition
- Vulnerability, actual dangers
- Context, relationship with other cultural environments

Each depiction refers to the sources used, e.g. conservation or regional planning, registrars, specialist literature, etc. Representatives from local archives are consulted and visits are made to relevant localities and sites. The forms are supplemented with historical maps.

Provisional selection of thematic cultural environments

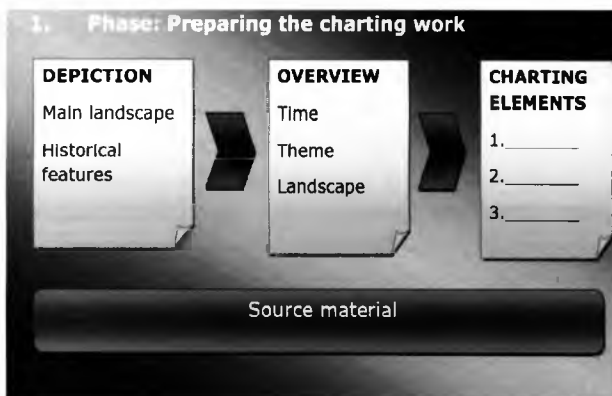
The charting work produces provisional thematic selection of cultural environments. In many cases the thematic cultural environments overlap each other when several cultural-historic themes are represented in the same geographical area. The provisional selections can be regarded as kinds of cultural-historic areas of interest that in the second phase are subject to closer analysis for the purpose of final delineation and prioritising of cultural environments.

PHASE 2: DELINEATION AND PRIORITISING OF CULTURAL ENVIRONMENTS

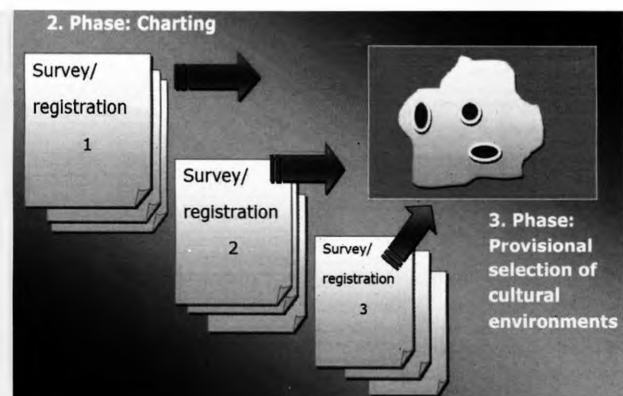
In phase 2 the provisional selection of cultural environments is more closely analysed and viewed. On this background, it is possible to arrive at the final delineation and prioritising of cultural environments that caused by their national or regional value are essential to protect in regional planning.

A vital step in delineation is to establish the cultural-historic outlines in the given area. In some cases the cultural-historic outlines associate themselves with a special historical epoch such as agricultural land and village reform and smallholder location. In other cases the outlines will reflect historical development and perhaps several themes common to the landscape. A good example might be a coastal environment which once supported fishing and agriculture, but where maritime interests, seaside activities and tourist facilities have become dominant.

Charting material and visits to the areas facilitate the evaluation (within the historical outlines) of the preservation condition, vulnerability and the need for action as important elements in delineating and prioritising cultural environments. Preservation objectives for the areas concerned can also be set. A provisionally selected cultural environment or a part of an environment might reveal such poor preservation conditions that it cannot be delineated as a valuable cultural environment, irrespective of its history and the fact that it is of extreme local interest.



Phase 1 (© author)



Phase 2 (© author)

Delineation criteria

Depending on the weight given to the different criteria (described below) delineation can be conducted in several ways. Often an area will reflect a particular epoch, historical development and several themes. Here, depending on preservation conditions or what might be called the "representative value" of the area, there exists a choice: delineation that reflects the entire historical development and several themes, or one that reflects a particular epoch or theme.

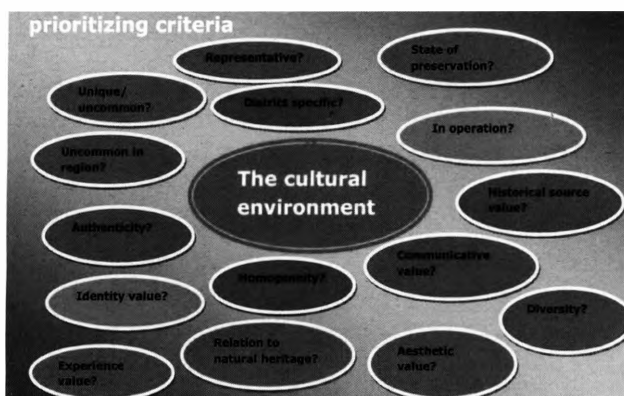
In the work the following criteria can be used for the physical delineation of cultural environments:

- Cultural outlines from a particular epoch (theme)
- Cultural outlines that reflect historical development
- Property ownership boundaries
- Agricultural systems/property conditions
- Economic/functional conditions
- Topographical conditions
- Landscape types

Prioritising criteria

Priorities have been set throughout the work, from depiction of the pilot area outlines, through choosing charting subjects, and up to the provisional selection of thematic cultural environments.

Many criteria, as described below, have to be used in any final evaluation of whether or not a cultural environment can be classified as valuable and ought to be protected in regional planning. Just choosing one or another criterion is not enough. Typically, a valuable cultural environment must fulfil several of the following criteria; good preservation conditions always being one of them.



Prioritising criteria (© author)

The following criteria are used in the final prioritising of delineated cultural environments:

Unique/uncommon: Outstanding on a national scale.

Uncommon in region: Outstanding in the region.

Representative: Typical of a theme, an epoch or the geographical area.

District specific: Specific for a district.

State of preservation: Preservation condition, that applies to both the historical structures and the physical condition of the individual elements.

In operation: In/out of function. The operation condition involves the question of whether the function is preserved. This is an important criterion for "the living environment".

Authenticity: As a combination of the physical preservation condition of the cultural environment of a certain epoch and the original function.

Historical source value: Normally associated with the above criteria and which can be defined as something of scientific value.

Identity value: Can be of a national, regional or local character.

Experience value: Will often be linked to the physical preservation condition and the aesthetic values associated with the area in which the cultural-historic whole and its context can immediately be seen and experienced.

Communicative value: Will often be associated with authenticity, representative value, preservation condition, and perhaps also diversity and time perspective. Cultural environments of high narrative value are also often valuable as historical sources.

Diversity: When an environment represents many different themes and has a considerable time perspective.

Homogeneity: This can be connected to an environment representing a particular part of history or a certain physical impression.

Relation to natural heritage: When the settlement structure and agricultural system still reflect the given natural conditions.

Aesthetic value: Which although not in itself a priority determinant in a cultural environment is still of significance to the perception value and also offers possibilities in communicating the other values associated with a given cultural environment.

In prioritising the delineated cultural environments, a scale – *high/middle/low* – is used as a basis for the considerations necessary in evaluating the value of a cultural environment, and whether the value it does have can

justify its inclusion *as a cultural environment worthy of preservation* in regional planning.

Regional planning must protect environments of national/international as well as regional significance, whereas environments of local significance are not necessarily of regional value. Even though such environments are not prioritised in a regional planning context, they can of course mean a great deal to the local community.

Cultural environments of national significance will always have high priority; those of regional significance will have high or middle priority, depending on the preservation condition, the representative value, etc. Areas not matching one or more of the above criteria, e.g. because the preservation condition, or if they are not deemed to be of regional significance, are given low priority and are not included in the final selection of valuable cultural environments.

Objectives, actions and methods

In the last phase of the work, objectives are set up for each of the selected cultural environments. The measures and subsidies in existing legislation are also evaluated to see whether they offer sufficient possibilities to ensure the preservation value of cultural environments, or whether further action is necessary.

Organisation of the work

Perhaps to a much greater extent than with other environmental interests, the safeguarding of cultural-historic interests assumes cooperation across many fields of expertise – and the understanding and participation of local communities.

Right from the start, the task should be the province of a working group consisting of representatives from counties, boroughs and local museums. A follow-up committee of representatives from local archives, conservation associations, agricultural societies and other interest groups could then be appointed to take part in the work on a regular basis.

The method Cultural Heritage in Planning (CHIP) has been developed for conditions in Denmark but can be adapted to conditions elsewhere. CHIP should therefore be seen as supplementary to InterSAVE (International Survey of Architectural Values in the Environment). The CHIP method was used to describe cultural environments in the Lancewadplan, the integrated Landscape and Cul-

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Sustainable Lime Heritage – Seeking out combined Conservation Strategies

Georgia Zacharopoulou

Challenging conceptual and methodological aspects of evaluation and redevelopment of an industrial heritage contribute to an enhancement of conservation planning. An integrated study towards a sustainable conservation strategy should embrace the following steps: A) Industrial heritage study (building/s, production process/es and product/s), B) Ecology of the production process/es and the product/s, C) Economy of the production process/es and the product/s and finally D) Searching for combined conservation strategies. In addition, the research methodology of every step must comprise the following sub-steps a) the state of the art in international experience, b) the state of the art in local experience, followed by c) their comparative assessment and finally d) conclusions and proposals. Having in mind that conservation approaches aim at preserving authenticity (depending on local diversity), and that existing sustainability approaches support small scale production (based on local resources), we conclude that locality is the key principle for both approaches.^{1,2}

INDUSTRIAL LIME HERITAGE

State of the art in (global) lime understanding

A presentation of the analytical theory, technology evolution and interpretation of building limes can be found in the author's published papers.¹⁻³

State of the art in (local) lime heritage

Lime, as a historical patrimony material and technique, has been investigated from different points of view (in situ, in the lab, and through market study).⁴ The research in situ at Asvestohori (a lime village in the vicinity of Thessaloniki, Greece) resulted in a complete inventory of lime kilns dating to the late 17th century. In conclusion, the need to preserve historical patrimony, in the form of a cultural space inspired by open-air museums, has been outlined. The updated outcome (2009) involves: a) a gradual deactivation of the quarrying area (including the kilns), b) the completion of the National Cadastre, c) the ongoing process of the general urban planning of Asvestohori and d) the critical re-design of the ring road of Thessaloniki by Egnatia A.E. With the Ephorate's efforts (2008), a modified design of the ring road may potentially preserve Asvestohori's lime heritage (which for Greek standards, it remains an ongoing decision making process). The laboratory research on lime putty product demonstrated the positive effect of the key missing link of maturation process on the service life of lime mortars.^{1-4, 5, 6, 7} The market research revealed that Greek SME's

have developed a significant local know-how in producing good quality air-hardening building lime in the form of wet slaked lime putties due to the abundant, hard and high calcium Greek limestone deposits. The know-how of the production of dry powder limes has been imported in Greece, as historical research suggests. It is likely that Greek companies will soon be absorbed by multinational companies of dry powder production. Consequently, an alternative strategy is urgently needed, on the grounds of the integrated conservation that also considers sustainability criteria.^{2,4} The meticulous investigation of existing lime production potentialities and economical viability before any unripe industrial monuments' re-uses and/or demolitions take place is, thus, imperative.

ECOLOGY OF LIME HERITAGE

Background

Until the 1990s lime was regarded redundant for modern construction, and scientific research on it was justified exclusively for conservation purposes. However, during the past decade, the sustainability of lime as a building material has been acknowledged. The advantages of this environmentally friendly building binder have been re-evaluated and its reintroduction in the new building construction is being investigated, both technically and socioeconomically. This is mainly due to the fact that knowledge deriving from the fields of conservation, material science, engineering research and life cycle assessment techniques, has influenced the way society looks at the diverse themes of sustainability of building materials.^{1,2}

Current life cycle analysis (LCA) criteria

Building materials' environmental impacts are considered from the moment raw materials are: a) extracted from earth (natural, plentiful or renewable, locally available), b) manufactured (efficient manufacturing process, including resource consumption and environmental releases to air, water, soil), and c) used (healthy, durable), at the moment the product is disposed of (reusable or recyclable). Common performance indices include embodied energy, global warming potential (CO₂), air emissions, water emissions, and solid waste. A life cycle inventory (LCI) will assist direct applications, such as product improvement (learning from the past), public policy making, marketing, etc.^{8,9} It is evident that technological values are highly potential of becoming the key values for viable development.

Is lime a sustainable/green product?

Taking sustainability as a criterion, limestone resources are widely available in vast unexhausted quantities. Lime

production is energy-efficient and capable of being fuelled with biomass – and uses about 20% less energy than the production of ordinary Portland cement (OPC). Considering building occupant comfort and environmental performance, lime is considered a green building material as it offers a much more environmentally friendly alternative to Portland cement. Properties, such as a degree of flexibility and the ability to 'heal' small cracks, make it more effective in many building applications from site preparation, through construction, and use.^{9, 10}

ECONOMY OF LIME PRODUCTION

Economy of lime (heritage)

Companies owning lime production plants are generally private, relatively small and regional or local. They may be vertically organized, integrated with limestone quarrying operations and their outputs are quicklime, hydrated lime and lately ready-made mortars.^{1, 2} Up today, commercial lime producers may have market power,¹⁰ especially when considering current economical crisis. The investigation and implementation of sustainable Best Available Techniques (BAT) will potentially lead to technologically sound and economically viable solutions.¹¹

Current market outlook

There is great difficulty in obtaining reliable lime production figures. However, a current mortar market outlook may give us relative trends that are well-matched to lime production. In Europe, conventional site-mixed mortars are being increasingly replaced by pre-mixed dry mortars. More than 50% of the dry mix mortar units' capacity is owned by the top ten producers (Germany, Spain and Italy). The global dry mix mortar production is estimated at 85 Megatons/year (and 49.4 Megatons/year in Europe). Current trends are moving towards changing construction habits by 'cashing in' on the environmental movement. As the low global substitution rate of jobsite mixtures (8–10%) shows high potentials for dry mix mortar industry,^{2, 8, 10, 12} it is apparent that local production is at a critical crossroad and its viability is at risk.

CEN/TC 51 'Cement and Building limes'. Future perspectives Standard EN 459-1: 2001 Building Lime⁸ – a representative example of modern standard – will provide economically feasible future perspectives,⁹ by producing green building products combined with environmentally friendly building technologies e.g. the production of lime-based bricks, and the addition of lime putties in concretes and soil stabilization techniques for roads construction,^{2, 4} will both minimize the cost and augment market demand.

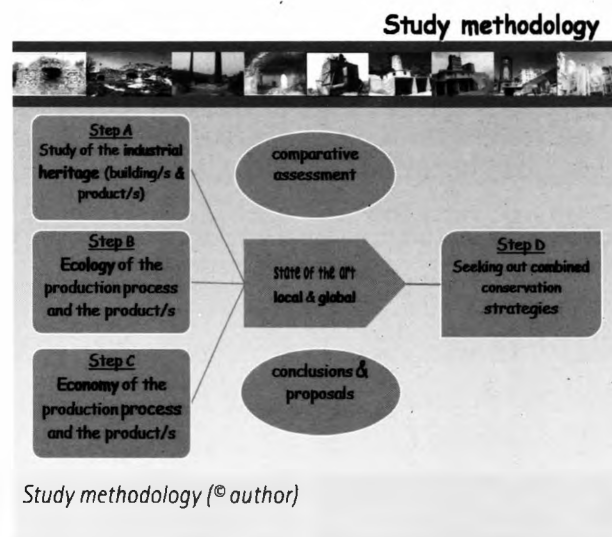
CONCLUSIONS AND PROPOSALS

Inventory of local lime heritage units

Our support to 'success stories' of lime manufacture is imperative, for reasons of authenticity, sustainability and products quality. Keeping in mind that it is difficult to prove this through an empirical investigation internationally, an inventory of the functioning traditional lime units is proposed. The inter-disciplinary methodology section incorporates a Questionnaire that may be answered by the owners, interviewers and/or in situ examinations. The methodological orientations were provided by Mr. I. Tsiakas, a financial services' consultant.² It is believed that the Questionnaire provides reliable evidence for scientific reference, while the quantitative statistical analysis of the results can be verified in the long run.

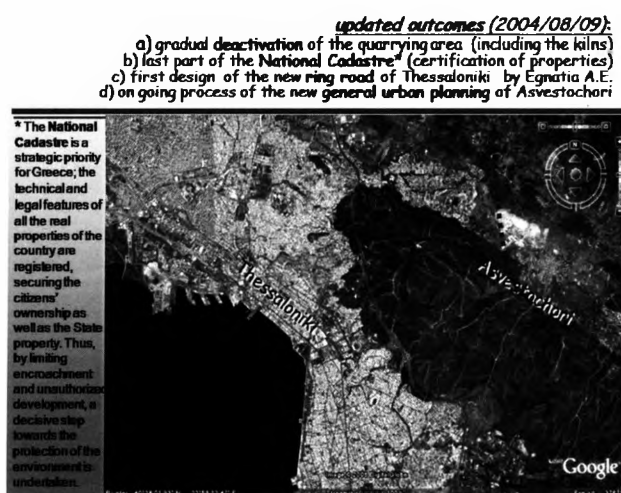
Seeking out combined conservation strategies

It is anticipated that combined conservation strategies – in terms of interdisciplinary perspective and international cooperation network – will be considered. The aim should be the establishment of an international cross-industry system, with a focus on SMEs, that may develop challenging alternative best practices and strategies, so as local raw materials, specific craftsmanship, techniques and know-how in lime production can be pointed out and gradually become competitive in construction, on the grounds of sustainable development (small scale production, authenticity and distinctiveness, product differentiation, product quality, research innovation).



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D9 Industrial Heritage Sites and their History

The Industrial Heritage of Woolsheds

Timothy Hubbard

Woolsheds, or shearing sheds, have been described recently as 'the anvils of the nation'.¹ They are the core industrial structure for the primary production of wool in Australia. With their special equipment such as wool presses, ancillary buildings and structures, the usually distant homestead or farm house and the yards surrounding them, woolsheds are of great historical, social, technical, aesthetic, artistic and even political significance. Their range of dates, forms, materials and scale is extraordinary but the industrial process of shearing – managing the sheep, the wool and the men – remains the same however humble or grand.

A woolshed's heritage is social, aesthetic and political as well as economic. Many fortunes have been made and lost in the growing of wool on the backs of the workers. It is the iconic and ironic theme for high art and satire as seen in the painting *Shearing the Rams* (1888–1890) by Tom Roberts, parodied by Michael Leunig in his cartoon *Ramming the Shears* (1984) and repainted with Aboriginal shearers by Dianne Jones in 2001. The film *Sunday Too Far Away* (1973) explored the political and social dimensions of the shearing board. The great shearers' strike of the 1890s was a turning point in Australia's political history. Michelle Grattan a respected political journalist has revisited CEW Bean's famous book *On the Wool Track* (1910). Although the most urbanised nation on earth, Australians yearn for their pastoral heritage.

The importance of pastoralism to Australia has been documented most recently by Michael Pearson and Jane Lennon, *Pastoral Australia: Fortunes, Failures and Hard Yakka, a historical overview 1788–1967*.² It provides an excellent overview but only two brief pages on the evolution of the woolshed. Research into woolsheds as a building type and as industrial structures is surprisingly limited. A broader, deeper, more analytical understanding is required.

By the 1950s Australia "rode on the sheep's back". The demand for premium wool led to a boom in production and great profit for the growers. While most properties continued to use their historic woolsheds for shearing, a small number of new woolsheds was built as a result of the boom. The new 1956 woolshed at Blackwood in Victoria's Western District, was designed by an engineer, built of timber 'balloon' framing clad with asbestos cement sheeting, housed several related functions, used time-and-motion planning and maximised the industrial process of shearing sheep. It cost £ 27,000, perhaps US\$ 1,000,000 today. The owner, pastoralist John Ritchie was a member of the CSIRO Board and used the

new woolshed experimentally.³ It was innovative in many ways, was brightly lit by a vast clerestory window and its separation of levels reinforced the efficiencies of separated functions on the floor and board.

The Blackwood woolshed was also built in extraordinary times. Soldier settlers had once again returned from a war. Two other woolsheds represent a different class and approach, a sense of making do. A one room school at Tarrayoukyan, Victoria, closed in 1914, was moved to Hill View, a nearby Soldier Settlement farm. The building was modified and stripped of much of its interior linings to convert it. There is a parallel example at Brown's Creek School, built at an abandoned gold mining township near Orange in NSW.⁴ Both are very small but still in use and adequate for their holdings. The same make-do approach appears at the early squatting run, Strathdownie. The original timber house, built as early as 1849, was converted into a woolshed when the original woolshed burnt down, with extensions and modifications. Both Strathdownie and Hill View retain their historic presses: in the former a Ferrier wool press, No 125; and in the latter a wool press called "The Triumph" manufactured by T Robinson & Co, Melbourne. And not far from humble Hill View is the famous property Nareen, the family home of Australian Prime Minister Malcolm Fraser during his term from 1975 to 1983. There, a vast pre-fabricated Nissen Hut was added to the existing woolshed to create more capacity during the post-World War Two boom. These woolsheds with just a few 'stands' couldn't be more different from the vast structures of western NSW and Queensland, some of which had a 100 stands and processed innumerable sheep.

It is remarkable that so little has been published about woolsheds in Australia. The first book, *Australian Woolsheds* (1972), more a black and white photo essay than a rigorous analysis was photographed and edited by an Englishman, Harry Sowden. It illustrates some 60 structures across five states and one territory but has just five floor plans, three of which are comparative but not named, dated or located. Heritage architect, Peter Freeman published *The Woolshed: a Riverina anthology* in 1980. It is the only typological study of woolsheds as a building type and stands out for its quality and objectivity, its sensitivity to both fabric and people and its delight in the romanticism of shearing. But it was limited by location and focused on large sheds. In 1990 the Orange Branch of the National Trust of Australia (NSW) produced a pictorial compendium of regional woolsheds, mostly utilising NTA (NSW) citations. The most recent work is by

Russell Moor, *Wool Sheds: the anvils that forged a nation* (2009) but, again, limited to the area around Orange in the central west of NSW. There are several other coffee-table books, which celebrate the industry but these are not analytical. In 2003, Ian Jack, as a member of the NSW Heritage Council and Chair of its State Heritage Register Committee called for at least a statewide comparative study of woolsheds.⁵

More research has been done on individual woolsheds, either as stand alone buildings or as elements within a homestead complex. Most are management plans, as defined and promoted by the 'Burra Charter'.⁶ This work covers the whole of Australia but, after extensive enquiries, still only represents thirty places. Other woolsheds are included briefly in area based heritage studies. The 'population' of woolsheds in Australia and their attrition rate is unknown. Freeman acknowledges that one third of the woolsheds he included no longer exist today.⁷

The variety of woolsheds across Australia is extraordinary considering their singular purpose. They vary by date over nearly two centuries. Woolmers woolshed (1819) in Tasmania is believed to be the oldest still in use in Australia.⁸ Mulgunnia Station (1840) at Bathurst claims to have the oldest in NSW. The timber slab woolshed at Kout Norien (1848), Harrow is one of the oldest in Victoria. These are very different from the vast sheds built in the Riverina and far west of NSW and on the Darlings Downs in Queensland in the late 19th century which are associated with the cathartic shearers' strikes of the 1890s. While examples from the early colonial era are of great historical interest, even woolsheds from the 1950s are important for reflecting the remarkable conditions of the post-

World War Two period when soldiers were being settled on the land, yet again, and wool was reaching its highest price ever because of the Korean War.

Woolsheds vary by location with examples found from Bothwell in southern Tasmania, an area which grows some of the finest wool in Australia, to Richmond in north-central Queensland which falls within the Tropics and from south-west Western Australia to most of New South Wales and Victoria. Location drives great variations in the materials which are used, limited sometimes by what little is available and, in more recent times, using modern mass-produced industrial materials. Sowden illustrates the woolshed at Clayton Farm (1901), Bordertown, SA which is made organically from tree trunks, vertical slabs of timber, branches and rough thatch with fieldstones as cobbles and hollowed tree trunks as feed troughs. It has just a few stands where the shearers worked. Sowden describes it as 'A mound that has grown out of the earth'.⁹ Most older woolsheds in the Western District are built from the ubiquitous basalt, the product of one of the largest lava plains in the world. In South Australia it is limestone and brick. By the late nineteenth century and into the early twentieth century, with railways providing cheap reliable transport, galvanised iron became a standard material everywhere.

The difference in scale is vast. The claim to be the largest might have been between Tinnenburra (1896), Queensland and Burrawang (pre1892) in NSW which both had 101 stands but neither survive. The claim to have a shed of one hundred stands must have assumed a mythical quality. Jondaryan Woolshed (1859) on the Darling Downs, is said to be the oldest and must be one of the largest sur-



Kinchega Woolshed (photo: courtesy of Bron Stepowski)



South Mokanger Woolshed Shearing Board (photo: courtesy of Southern Grampians Shire)

viving in Queensland but it has only 52 stands.¹⁰ Glencoe Woolshed (1863) in south-eastern SA with 36 stands is said to be one of the largest. In 1872, a woodcut was published titled 'The Largest Woolshed in Victoria' but even if the 16 stands on one side were repeated on the other they would still only total 32. But some of the smallest woolsheds can tell other significant stories.

Most woolsheds are linear in form, with access for sheep from up to three sides and egress for wool at one end. The shearing board would be along one side. This model, as Freeman and Moor show, worked well at all but the largest scale. Polygonal sheds with radiating arms were one solution to increasing access and the number of boards while retaining the functions trimming, classing, pressing and baling at one end. Deeargee woolshed at Uralla, NSW has a most unusual octagonal design rebuilt in 1869 after a fire. It is one of the largest sheds in Australia. Its three-tier roof with a clerestory of glass ventilators allows shearers to work in a well lit and ventilated environment. The shed is still in use. The enormous, prefabricated iron woolshed of Isis Downs, at Isisford in south-west Queensland is one of the most interesting non-linear woolsheds.

Some designs were repeated. Identical stone woolsheds, designed by the smart Melbourne architects Reed and Barnes were built by the Twomey family at their properties Kolor and Banemoor, near Penshurst. The Chirnside dynasty used the same basic plan, probably designed by Parlane Colquhoun, at their five Western District homesteads which was also copied by others.¹¹

This diversity gives us reason to reflect on the evolution of the Australian woolshed and its heritage. While the function of a woolshed and its various industrial sequences have barely changed, any new efficiencies and better conditions were hard won. From its origin as a remote crude timber building ruled by the squatter through the monumental stone woolsheds and prefabricated giants of the later nineteenth century to the utilitarian tin sheds of the twentieth century soldier settlers, the handling and shearing of sheep, the sorting, classing and pressing of wool, the provision of power and the welfare of the many workers combined in a complex industrial process. Shearers' accommodation and food improved. Hand shears were replaced by powered shears. Narrow blades were replaced by wide blades. Wool presses were refined.

Those heady days when wool was worth "a pound a pound" are long gone and the great woolsheds, old and

new, are largely under-used, not quite redundant but no longer places of frenetic industry. Not only was it a time of great affluence for everyone, it was also a time of deep social change. The new mobility afforded by motorised transport liberated people and widened their horizons. Indigenous Australians were increasingly acknowledged for their contribution to Aboriginal and national culture and to the workforce. But the war had also brought advances in the science of textiles. Synthetic fibres challenged the supremacy of wool. The price of wool crashed and fine wool became a luxury. Woolsheds great and small lie silent most of the year.

I believe that there should be a national audit of Australia's woolsheds as a building type, leading to a comparative analysis by municipality, region, state (or territory) and finally nationally. The ideal body to oversee this would be the Heritage Chairs and Officials of Australia and New Zealand. The tools are available, the criteria and thresholds to test significance are already resolved and much information is readily obtainable. We owe it to all those who forged the nation working in our woolsheds.

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² The book was launched at the April 2010 joint Australia ICOMOS-TICCIH conference held in Broken Hill, NSW, when one of the three themes was 'Remote Pastoralism'.

³ Founded in 1926 as CSIR, the Council for Scientific and Industrial Research, in 1949 it was renamed CSIRO, the Commonwealth Scientific and Industrial Research Organisation and expanded its research to include wool textiles.

⁴ Moor, p. 152–3.

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⁷ Pearson & Lennon, 2010, p. 49.

⁸ The Woolmers Estate, along with its neighbouring 'sister' estate, Brickendon, is pending World Heritage Listing as part of the Convict Serial Site nomination.

⁹ Sowden, p. 35. Similar woolsheds were to be found in the Wimmera district of Victoria, just across the border with South Australia. These structures represent one of the clearest expressions of vernacular architecture in Australia.

¹⁰ Jondaryan Woolshed is heavily promoted as a tourist attraction with its age and size two of its strongest claims. At Glengallan Woolshed, Warwick, also a tourist attraction two of three wings remain of what is also claimed to be the oldest surviving woolshed in Queensland.

¹¹ Pers. comm., John Grinpukel, 8/7/10.

D10 Industrial Heritage in Museums:
Projects and New Approaches of Presentation

*Born of Fire: Promoting the Art, Music and History of
America's Greatest Steel City*

Amy B. Baldonieri
Judy Linsz Ross

INTRODUCTION

Southwestern Pennsylvania was the steel making capital of the world for more than 100 years. It is a region built from pig iron and slag, steaming with blast furnaces, pump houses and rolling mills.

This is a region – and a story – that documents more than the strength of steel. This is the story of the people who lived here and raised entire communities in the steep hills that peered down into the mills. It's about entire generations of men and women whose tireless efforts literally built the nation: the Brooklyn Bridge, the Empire State Building, and the armaments that helped America Fight the evils of tyranny.

This is about a region that influenced not only the country, but also the world.

This is not a story only for the history books. It is a story that lives today – in art, on film and in song. It is a story of a shared past and a future forged from steel.

THE MUSEUM

The Westmoreland Museum of American Art once defined itself as a "little museum in Greensburg, Pennsylvania". The Museum opened its doors in 1959 to serve both rural and urban audiences from southwestern Pennsylvania. Its focus soon became the collection and exhibition of American art and, because it was affordable, the Museum also started a unique collection of art from its own region.

The Westmoreland is one of three museums of American art in Pennsylvania and our mission is to "enrich a growing public through innovative and collaborative approaches to the collection, preservation and presentation of American art".

We have a budget of \$2.1 million and serve around 23,000 visitors per year on site. Most of our funding comes from foundation grants, and we struggle, like most non-profits, to meet our operating needs. Greensburg has approximately 16,000 residents and our location 35 miles southeast of Pittsburgh has been a challenge to us. In recent years, we have received significant funding for awareness advertising in the metro area and we have begun to see our percentages of visitors from the city increase to up to 50%.

THE PROJECT

The mission of *Born of Fire* is to generate profits through products that educate and enrich the public by telling the human story of southwestern Pennsylvania's Big Steel Era through art, music, and history. *Born of Fire* is a development, distribution and promotional social enterprise that generates products and other offerings promoting southwestern Pennsylvania's industrial and cultural heritage – thereby connecting people with this legacy.

Born of Fire was inspired by the Museum's collection of industrial landscapes. The images in the collection express the immense energy, power, wonder and force of the vast industrial complex that took shape in the mid-19th through the early 20th-century, a time when Pittsburgh became the nation's foremost center of iron making and mass produced steel. These 150+ paintings have always been popular with the public and related items have been the most requested merchandise by visitors to our museum store.

While the Museum was in the midst of an initiative to transform our museum store into a social enterprise – meeting both financial and SOCIAL returns on our investment – we received a demo copy of a music CD by a local folk music group called the NewLanders.

An idea was born to produce a CD that would feature the songs of the steel era, with our paintings accompanying them. It soon grew into the large-scale product development project that we had been seeking in order to bring our retail operations and our Museum's self-sustainability to the next level.

Born of Fire also fit in with our long-range plan to focus our energies on our permanent collection by publishing catalogues about it and traveling it throughout the country. And we soon realized it was also a perfect opportunity to promote tourism – not only to the Museum, but to our entire region.

The Museum also formed a partnership with the Rivers of Steel National Heritage Area located in Homestead, Pennsylvania, and began moving forward on a collection catalogue and the CD. During that time, we were chosen to be only the second cultural organization featured on *The Visionaries*, a public television series entering its 11th season that featured nonprofit organizations. The founder/producer of the series flew to Pittsburgh to

shoot footage of the Museum's various community partnerships. We suggested he focus part of the show on our work with the NewLanders and Rivers of Steel. After the shoot he decided he wanted to make a film to accompany the project.

Shortly after, the team from the Museum met for an all-day retreat to write a business plan for the project, which had become known as *Born of Fire*.

During the business plan meeting, the team realized we could make use of a 12-week hole in our exhibition schedule the following year. We had been searching for some months for a replacement for a big exhibition that had fallen through. We realized we had never shown the entire *Born of Fire* collection before. In fact, when our director arrived at the Museum in 1993, the collection was stored in the basement due to lack of gallery space to exhibit it and because it carried reminders of the region's "dark past" which some locals had not completely assimilated. Once brought to light, it became wildly popular with the Museum's regional audience.

We now had a huge project that included a book, music CD, documentary DVD and an exhibition of all 144 works (and counting), plus artifacts from Rivers of Steel and a kiosk with the film and music.

THE EXHIBITION

Born of Fire was launched from June 10 to September 3, 2006 at The Westmoreland. Following that exhibition, 60 of these works returned to their newly renovated gallery on the Museum's first floor and 60 of them began to travel internationally.

Born of Fire made its European debut at the Rhineland Industrial Museum (now LVR-Industriemuseum) in Oberhausen, Germany from February through May 2007. From there, and with the help of LVR-Industriemuseum curator Thomas Schleper, it traveled to the Saxon Industrial Museum in Chemnitz, Germany in fall 2008. After an engagement in Spain fell through due to that venue's budget troubles, the exhibition traveled to the Coal Mining Museum in Zabrze, Poland from September through December 2009. The partnerships formed with the LVR-Industriemuseum, Chemnitz and Zabrze, in addition to contacts made in Spain and in other former European industrial centers (all through the diligence of Thomas Schleper) led to a return visit to the LVR-Industriemuse-

um in Oberhausen from July – November 2010 as part of the celebration of the Ruhr region as the 2010 European Capital of Culture. Thirty works from *Born of Fire* will be featured along with industrial landscapes from the other museums in a massive finale exhibition entitled *Feuerländer: Regions of Vulcan*. <http://www.feuerlaender.lvr.de/>

THE PRODUCTS

The very core of *Born of Fire* is the products, using them not only to earn income to support the programs of the Museum, but to educate and create awareness about the art, music and history of Big Steel in Pittsburgh.

Born of Fire became an entire branded product line – complete with a trademarked logo – and includes:

- A book, authored by Museum Curator Barbara L. Jones, with a historical essay by local professors Joel Tarr from Carnegie Mellon University and Edward Muller from the University of Pittsburgh
- A CD by the NewLanders, featuring 11 songs of the steel industry updated for modern audiences
- A 60-minute documentary film that uses art, music and history to tell the story of how Pittsburgh steel built our nation

During the twelve weeks that the exhibit was featured at The Westmoreland, we grossed nearly \$50,000 in the museum shop, breaking all prior revenue-generating records.

THE PARTNERS

We were fortunate to have dedicated partners – the NewLanders, Rivers of Steel and visionary nonprofit film producer Bill Mosher, in addition to colleagues at many Pittsburgh area organizations like the University of Pittsburgh and the Heinz History Center. We decided from the beginning of the project – and discovered this to be a very important aspect of it – that we would not interfere creatively with the partners. We felt they should be able to function independently in their areas of expertise – film and music – and that we would take the lead when it came to our collection.

We did face challenges along the way – including meeting timelines for publishing; traveling an exhibition abroad for the first time; communication with colleagues in many different countries; technology; copyrights; distribution; etc. But we found that what was crucial to the

Born of Fire model was that the exhibition drove everything (product sales, press attention, partnerships) both onsite and abroad. In addition, all the partners working together toward the same goal of raising awareness of our region's history and culture was integral to the project's success.

TOURISM

Tourism was also an important component of *Born of Fire*. The Museum had success in developing tourism packages in the past, so it made sense to create one for *Born of Fire*. It is interesting to note that this tourism package originally met with some resistance from the local visitors bureau. They had worked very hard for years to dispel the "smoky city" moniker that was so closely identified with Pittsburgh's industrial past. However, once they realized the popularity of the subject matter, they quickly came on board.

A recent research study conducted by Mandala Research for the U.S. Cultural & Heritage Tourism (USCHT) Marketing Council, in conjunction with the U.S. Department of Commerce reveals that 78% of all U.S. leisure travelers participate in cultural and/or heritage activities while traveling, translating to 118.3 million adults each year. Cultural and heritage travelers spending an average of \$994 per trip (on average 3 days) compared to average tourists spending \$429. Cultural and heritage tourists contribute more than \$192 billion annually to the U.S. economy. Top cultural and heritage activities identified by travelers include visiting historic sites (66%); attending historical re-enactments (64%); visiting art museums/galleries (54%); shopping in museum stores (32%); and exploring urban neighborhoods (30%).

The Museum used the following process to work with our partners to promote our exhibition and related heritage sites:
Assess the landscape

Ask yourself: what is it that you do best? Take an inventory of your assets. Knowing your strengths will help you identify stakeholders in your region or community. Discuss your plans with tourism leaders both regionally and nationally; other complimentary attractions; and the hospitality industry to identify potential collaboration.

Make a plan

Next you will shape your "story" involving the assets you identified. Use all the information you have collected to determine where you want to be in 3–5 years. This is creating your vision. Next write your plan and be sure to include short and long-term goals.

Get organized

Assemble the team needed to make your vision a reality. Include the stakeholders and collaborators you identified when assessing the landscape. Collaboration is tough work that requires organizations and partners willing to take responsibility. This team will also help to identify other resources.

Prepare for your visitors

Make certain your site is ready for visitors and that their experience meets your goals and exceeds their expectation. Educate staff so they know your vision and your brand. Be prepared to collect data from your visitors – at minimum collect postal codes to map where they come from and how far they travel. This information will also be helpful in evaluating marketing effectiveness.

Market for success

Create a brand for your package that will identify your organization. Make sure all details work together as you establish your brand and, finally, promote your product.

UPDATE

The *Born of Fire* exhibition will finish its tour of Europe where it started, at the LVR-Industriemuseum in Oberhausen, Germany. Although we lost a few venues along the way (due to the economy), we consider its European tour a great success not just because of the many people who have and will be able to see it (nearly 20,000 plus an estimated 13,000 expected for Feuerländer), but because of the wonderful partnerships we have formed with the venue museums and other colleagues in Europe.

A key partnership was formed with Thomas Schleper and his staff at the LVR-Industriemuseum. This partnership led not only to the final exhibition in July 2010, but also to a reciprocal exhibition at The Westmoreland in 2008 which featured paintings from Oberhausen juxtaposed against our Museum's works here in Greensburg, Pennsylvania. *From the Ruhr Valley to the Steel City* drew nearly 7,500 visitors and its weekly visitor average rivaled the 2006 *Born of Fire* exhibit. It moved on to the Grohmann Museum in Milwaukee, Wisconsin, following its debut in Greensburg.

In addition, The Westmoreland received a grant in 2009 from the American Association of Museums and the U.S. Department of State, through the Museums and Community Collaborations Abroad program to connect our local high school with three high schools in the Oberhausen area. The project utilizes technology

to allow teachers and students to communicate and work on joint projects, using their shared industrial heritage as a starting point. This project will continue through March 2011, culminating with exhibitions of the students' work in both Greensburg and Oberhausen. URL: <http://buildingatransatlanticbridge.blogspot.com/>

- To be a focused and exemplary collection of American art – our regional collection is a keystone that keeps our audiences coming back
- To be a destination for the community, region, tourists, schools and families – *Born of Fire* put us on the map regionally, nationally and internationally

Born of Fire products remain top sellers and continue to be very popular among visitors to The Westmoreland and other venues.

CONCLUSION

Perhaps the greatest contribution that *Born of Fire* has made to The Westmoreland is that it changed how we operate as an institution. During the creation of our current strategic plan, the *Born of Fire* model figured prominently in how we began to envision our organization moving forward, factoring into our long-term goals as follows:

- To increase capacity to sustain and grow the Museum
 - the *Born of Fire* model provides both financial and social returns on investment and has helped the Museum to be more self-sustainable (the exhibition and products increased our earned income to operations capacity from \$15,000 to up to \$90,000 annually)

In the next several years, as *Born of Fire* finally returns home, it will find not only a stronger institution, but also a larger one. Our 2008–2012 strategic plan has led us to begin planning for a museum expansion that will house our growing collections, increase staff, and enhance services for our growing audiences everywhere.

Born of Fire was itself born of the very essence that made southwestern Pennsylvania the towering, yet humble giant of the industrial revolution. It was born from the minds of people who live here today, without the huge furnaces, flames and smog. It was born from pride, not only in what our region accomplished in building this nation, but in the artwork, music and traditions that have allowed this legacy to live on. The Big Steel Era will live on not through the production of more steel, but through the human stories and cultural artifacts that steel left behind. To fully experience *Born of Fire*, visit <http://www.bornoffire.org>. Enjoy the journey.



(© author)



(© author)



(© author)



(© author)

Bringing the People back in

Lars K. Christensen

In May 2009, a new museum was opened to the public in a former textile mill at Brede, north of Copenhagen, Denmark. The museum, which is part of the Danish National Museum, is called "Brede Works – museum of industrial culture".

The aim of the museum is to give the audience an understanding of how industrialization have radically changed the way we live, work, think and interact with each other during the last 150 years. That is why we have deliberately chosen to call it a museum of industrial culture, not an industrial museum.

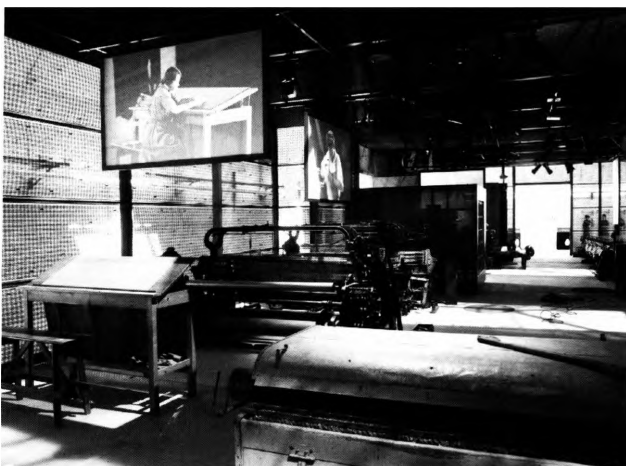
One part of the museum, called "The Factory", presents the topic of industrial work life, using the textile industry as an example. Unfortunately, no machinery was left from the original mill. However, we have been able to collect a number of machines from other sources. Thus, we are able to present some of the key elements of cloth production – carding, spinning, weaving, napping, etc. – through objects. Furthermore, we have recreated a meeting-room for the board, a supervisor's office and a small canteen.

But objects do not speak for themselves. And the story we wanted to tell the audience was in fact not as much about the machines, as it was about all that what had been going on around the machines – between the people working there.

When we started planning an exhibition on industrial work, we had the following key concepts in mind:

COMPLEXITY OF THE INDUSTRIAL WORK LIFE

In present day discussions about the so-called "post-industrial" society, the industrial society is often depicted



A part of the exhibition hall A story about people (© author)

in a very negative and simplistic way. It's a general aim of the whole museum, to give a more multifaceted, complex and thus also more realistic picture of industrial society. This, of course, also goes for the industrial work life.

An example: while we today may see traditional industrial labour as hard and tedious, it could, from the point of view of an un-educated, underprivileged young girl in the 1920s, represent the possibility of becoming economically self-sustained and live more freely.

PEOPLE AT WORK ARE SUBJECTS

In continuation of the above, we wanted to depict industrial labourers not just as objects of some abstract technical and economic structure, but as subjects in their own history: as persons, with individual thoughts and attitudes, from which they act and interact.

This is also a reflection of a general tendency in labour history of the last 10–20 years, which has moved away from primarily structural explanations towards approaches that emphasize culture and subjectivity.

CONFLICT AND COOPERATION

The previous points are not meant to conceal the fact, that industrial work is taking place in a certain framework of power. Basically, labour and capital have opposite interests, which sometimes erupt into open conflict.

On a day-to-day basis, however, both parts need to find a modus operandi that will allow the workers to earn their pay and the company to make a profit. So, even though contradictions exist, they might be expressed only indirectly and in subtle ways.

MOVIES AS INTEGRAL PART OF THE EXHIBITION

We decided to use movies as the primary means to make the exhibition "come alive". Our basic concept was the following:

- The movies should consist of scenes played by professional actors, based on workers memoirs but in a dramatized form
- They should reflect and illustrate the key points, outlined above
- The complete installation should contain some form of interactivity, requiring the public to reflect and make choices

The multimedia-company Oncotype was chosen as a partner for the project. Oncotype already had experience with interactive film production, and proved to be both sensitive to our ideas as well as pro-active in developing them further.

Through an exchange of ideas, we ended up with a decision to use six different characters. The characters are fictional, but based on elements found in memoirs and other source material. They represent six different functions in the mill – but just as importantly: they represent six different personalities:

- Mr. Larsen – supervisor: A fan of time-discipline, rationalization and new technology.
- Marie Lund – mill girl: young, outspoken and unfamiliar with the informal rules of the factory.
- Niels Rasmussen – napper: an elderly man, who is no big fan of change.
- Poul Simonsen – weaver: ambitious and self-confident. Shop steward.
- Inge Pedersen – burler: A lone mother, who takes pride in being self-sustained.
- The Director: wants to run a steady business, while he reluctantly accepts demands of a changing world ...

Before entering the exhibition, visitors are given a ticket with a barcode. At the entrance, they are asked to choose who they want to see as the main character in the exhibition. The characters are presented as life-size photos on the wall, with their name, function and a characteristic quote. The choice is made by activating a touch screen with the ticket and simply pointing to the right character.

There are eight large screens in the exhibition. Six of these are used for the interactive films, while the last two are continuously showing original films of different work processes. When a visitor stands in front of one of the screens, he or she activates a film with the ticket. The system recognises the visitor's choice of main character, and shows the corresponding scene on the screen. Thus, each character can appear on each screen.

This adds up to a total of 36 scenes. Including also loop- and bonus-scenes (explained below) there is a total of 48 scenes. The duration of each scene is approximately 1–1½ minutes.

DIALOGUE

Each character has a "home": the weaver at the power looms, the supervisor at his office, etc. If a character is

activated on the screen at his or her "home", the scene will be a presentation of this character, both as a person as well as his or her job.

But when a character appears on any other screen, he or she will enter into a dialogue with the character that "lives" on that screen. A visitor might have chosen the Director as his main character. He now activates the film by the spinning machine. Both the Director as well as Marie, the spinner, will appear on the screen, interacting in the same scene.

Let's take a closer look at this particular scene as an example:

On his daily round through the mill, the Director stops by Marie, a young girl working at the spinning machine. He picks up a bobbin, lying on the floor.

The Director (handling Marie the bobbin): You must be new here?

Marie: Oh, I'm so sorry

The Director: Be careful, we can't have this kind of mess – I didn't catch your name, miss?

Marie tells her name. The director makes a note in his notebook, as he repeats: Marie Lund?

Marie, eagerly: Yes, Supervisor Larsen is my uncle. He got me this job. But what I really want to is become a weaver, and that's why I would like to ...

The Director, interrupting her: You talk too much, young lady. Try getting some work done!

The Director moves on, shaking his head. He doesn't notice that his fountain pen drops to the floor ...



Posters and touch screens for selecting the character (© author)

In some scenes there may be hints or references to other scenes, belonging to the same main character or even to one of the other characters. E.g. in another scene, we see Marie, the girl at the spinning machine, go to the director's office to give him back the pen that he dropped there. While she's there she takes the courage to ask the director, why there is not equal pay for men and women at the mill. This is a question that she is also discussing with Inge, the burler, in another scene.

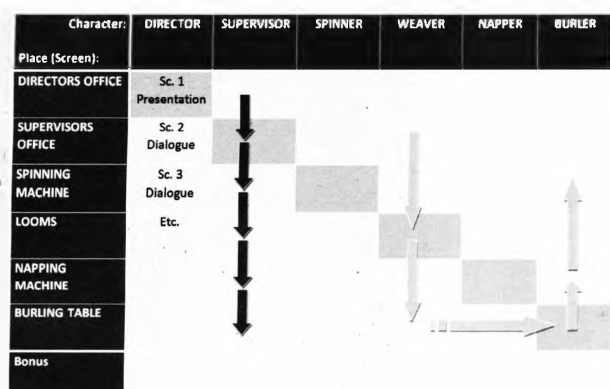
But at the same time, each scene is also a small story in its own. As a visitor, you are free to see the scenes in any order you like. The installation is designed so as to provide an interesting experience, even though you see only a few scenes. But also to tempt you to explore more, by giving you a feeling, that there is always something more going on.

The bonus-scene is a reward for the meticulous visitor: it pops up, when he or she has watched all 6 scenes belonging to a given main character, and gives a last, often humorous twist to the character. Finally, there are the loop scenes: these are simply small scenes, designed to run continuously as long as a screen is not activated.

At each screen there are two sources of sound: a directional loudspeaker for the dialogue and an ambient for the background sound. Each scene starts with a small music theme, unique for each character.

WRITING FOR THE SCREEN

A dialogue in a film is of course another type of text than the text you write about the objects in an exhibition. First



A matrix of scenes and characters. The dark arrow exemplifies a visitor who takes a linear approach, while the light arrow is a visitor who jumps between scenes – and even switches main character. (© author)

and foremost it has to be functional from the point of view of drama and performance. It has to convey feelings and even conflicts in a personalized and subjective form, which is strange to the objective form we normally strive for in museum texts.

But this is precisely the strength of the film-medium, and as a curator, you should embrace that fact – or find yourself another medium.

During the process of producing our installation, I found it invaluable to work together with experienced people from the world of movies and multimedia. Thus, the final manuscript was written by Morten Schjødt of Onco-type – based on our initial ideas and inputs and in a close dialogue. A few times I, as the curator, had to ask for changes, if I felt a certain scene would not be plausible or miss the point from a historian's point of view. But finding a balance, that was true to the media as well as to the facts we wanted to communicate proved to be neither impossible nor especially difficult.

One of the decisions we had to make at an early stage was about the main characters. We wanted different types that would appeal to different visitors. We also soon realized that in order to grab attention, the characters had to be clearly typified. In fact: our overall goal of painting a varied and complex picture of the realities of industrial work, required characters, that would stand out in relation to each other. It's not as paradoxical, as it might sound: sometimes you have to resort to simplicity in part, to show the complexity of the whole.

Apart from the content in the form of dialogue, film as a medium also requests that you think in the form of pictures, costumes and staging. All scenes are shot with one or – mostly – two actors, dressed in original costumes. Only a limited number of props have been used, mostly such that signifies the character – such as a shuttle for the weaver. The actors are filmed in a "black box" setup, in front of a projection of original films or still photos from textile mills. The actors are in colour, but the background is monochrome. Our aim has been to create a visual connotation to the phrase "coming to us out of history".

Furthermore, the original background footage of the scenes creates a visual coherence with the two screens reserved exclusively for original film – and together, they give the visitors an impression of machines running and halls filled with busy people.

REACTION AND FUTURE PLANS

The reactions from visitors so far have been generally positive. The public feels immersed in the installation, much more than in a traditional exhibition. We also observe that it tends to promote discussion and interaction between visitors. Teachers from both primary and secondary schools report that the exhibition resonate well with their pupils.

There have been some criticisms from a smaller number of visitors, who wants to know more about the specific objects and machines at display. We have deliberately refrained from having any text or other explanations of the objects in this part of the exhibitions, as we feel this would work contrary to the overall atmosphere we want to create. One visitor remarked, that we had "sacrificed" the objects for the experience.

I don't think this is right – you could just as well claim that we create an experience, which makes strange and incomprehensible objects interesting to the ordinary visitor. But on the other hand: it is understandable if those with a special interest in textile technology or those who just seek a more "classical" museum experience feel a little under-nourished. So we have decided that we will use the wall around, but outside the installation for a thematic presentation of the textile industry. We will also install a touch-screen, which will offer detailed technical explanation of each of the machines displayed – but again: placed at the perimeter of the installation.

As this is written, the new museum has been open to the public for just about a month. During this month, we have had more than 10,000 visitors. We expect the numbers of visitors to drop a bit, though, as the novelty wears off. On the other hand, we are already planning new ideas for the next season

REFERENCES

Brede Works – museum of industrial culture: bredevaerk.natmus.dk

Oncotype – the multimedia company that produced the films: <http://www.oncotype.dk>

Die Asta – general multimedia consultant for the new museum: <http://www.dieasta.dk>

Opera – exhibition designers: <http://www.opera-amsterdam.nl>



Director Morten Schjødt preparing a scene with actor Michael Hasselflug. (© author)

D10

Multiplicity as Strategy – The Brede Works Exhibition of Danish Industrial Culture

Mikkel Thelle

BREDE WORKS: THE MUSEUM'S LARGEST OBJECT

On the Mill Stream, north of Copenhagen in Denmark, we know of mechanical mill production in the mid-13th century, which places this area as one of the oldest known industrial sites. There has been changing productions here, such as copper, brass, gunpowder, paper and other products, among other things as privileged, mercantilistic production for the Danish king.

One of the sites along the stream, called Brede Works, was producing gunpowder and later copper for the roofs of the royal palaces in Copenhagen. In 1832, the mill was bought by an innovative merchant from Copenhagen, I. C. Modeweg, who founded Brede Cloth Factory. This enterprise was half a century later to become the largest textile factory in Denmark. The mill was adaptive to new technology, and in the buildings today, traces can be found from some of the first Danish sprinkler systems, steam engines, reinforced concrete and so on.

From the 1880s, the factory became the most consequent example of paternalistic production towns in Denmark. With worker's housing, dining house, school, kindergarten and other facilities, Brede was around 1900 a production community for around a 1,000 people, which is not much compared to Crespi d'Adda or other textile towns, but still the largest private textile factory in Denmark.

Along with the other mills along the Mill Stream, Brede is an industry with a long history, and even though this history is an uncommon one in a Danish context, it has a great potential for telling about the more typical elements of Danish industrial culture. In a way, it supported a form of everyday life that sheds light on both the new, urbanized world that became reality for most of the Danish population in the decades around 1900, and also on the rural world they were leaving behind. As a striking example of the late industrial development, Brede witnessed the more open trade on the international textile markets in the 1950s with distress. Textile had long been protected by Danish law, but at the challenge of globalisation, the competition became too hard, and in 1957, the factory closed. Along with other mills from the area, it was bought by the state, who in 1959 gave it to the National Museum in 1959.

THE IDEA OF AN INDUSTRIAL MUSEUM

The idea at the time was to bring the old industrial area to life through historical production in Brede and other

mills, and in the end of the 1950s, there were different thoughts about the kind of museum interpretation, the public should be able to see in Brede, among others expressed by a Danish professor and museum curator Axel Steensberg.¹ In a cross-disciplinary cooperation, Brede should be framework for both open collections, an institute for museum studies, housing for school children camps, and changing active exhibitions, where visitors could touch and feel the objects.

These were new thoughts among Danish museums, and even though the concept was never realized in this form, some elements were established, for example was the old factory school used by the Institute of Ethnology under the University of Copenhagen.

The alternative way of museum interpretation expressed by Steensberg heralded a long period of experimental exhibitions in Brede.² Thus, through the 1970s and 1980s, the industrial complex in Brede became a place where cultural history was exhibited in new ways.

In the early 1990s, Brede was planned to be a more permanent museum site, and two permanent exhibitions were established there. One of them, "The cradle of Industry", concerns Brede as factory, community and production site among the other Mill Stream industries.³ Among other elements that have survived in Brede, is Brede Manor, built in 1796 and dwelling for the changing owners and directors at Brede. The manor has been restored in- and externally, and received in 1999 the Europa Nostra Award for the restoration.



Part of Brede Works from the mid-19th century (© author)

A PROJECT COMES TO LIFE

During the end of the 1990s a general interest was taken in industrial culture by Danish museums. Across the country, different museum joined resources to gain attention around industrial culture in collaboration with the Agency for Cultural Affairs, among others.

One of the results of this movement was the Year of Industrial Culture 2007, where activities around Denmark highlighted the theme. Another was the appointment by the Cultural Agency of 25 monuments of national, industrial heritage that would be the turning point for telling about Danish industrial heritage. Among these monuments was the Mill Stream industries appointed as a "Cultural environment", especially with Brede Cloth Factory as a well preserved site.

But also the revival of Brede as a permanent exhibition site about industrial culture came out of the movement. Around 2001 the first discussions of the new project started and around 2004/2005 it became possible for the National Museum to raise the funding for the project.

ROOM FULL OF MIRRORS: MULTIPLICITY AND EVERYDAY LIFE

The starting points for Brede Works were already multiple: a unique industrial heritage site, an existing exhibition about early industry in Brede, and a tradition for rethinking the traditional exhibition style.

And as the first discussions in the working group began, there was consensus around some central points of storytelling:

- To focus on the relation between technology, society and cultural history
- To get the many different people of industrialization in front in the story
- To reflect the perspective that Danish industrialization was not a sudden and simple revolution, but a long interaction between industry, craftsmanship and agriculture
- To underline the great impact industrialization has had on our everyday life and thus to take the life of today and show it to the public as a result of this radical transformation.

One of the concepts that seemed to fit these points was multiplicity. It would not be possible to cover all these

points in one single narrative, and when working with the content, we grew more and more certain that it would not be possible to single out one or two of the points above. Also the target groups of the exhibition were multiple:

- Danish families with children between 8 and 16
- People with technical, historical or "industrial" interests, for example former industrial workers
- Danish tourists, for example with an interest in design, architecture or technology
- International tourists, among them people with interest in industrial and textile culture
- School classes and not least high school classes with a focus on technology
- Young people in general, the hardest challenge for museums
- Companies

In the process of discussing themes and target groups emerged at a certain kind of exhibition method. What we wanted to do was to take the object of interest, Danish industrial culture, and show it to the public through very different glasses. At the same time the exhibitions should reflect the visitors' own everyday life – as in a room full of mirrors.

PUTTING ON DIFFERENT GLASSES: THE USERS

The model we finally chose should thus let people experience aspects of industrial culture in three different ways. One part should be experienced intellectually, through concepts, text, objects and images. The next should be more focused on the senses, as in the cinematic or theatrical experience, and the last should let the body work and through that create the experience.

Simultaneously, there was a movement in the project that also reflected a movement in the outside museum world: the movement from visitor to user. Since maybe 2000, museums in Denmark and elsewhere have been discussing how to understand the public that used the institutions. Influenced by the use of digital media in exhibitions, among other things, some museums have tended to see their public more as active participants than just spectators. In 2006, museum users were the theme on the annual meeting for Danish museums, and since then this view has gained momentum.

The Brede Works curators were influenced by these discussions, and we worked gradually more with a view of

the public as active users, not least because it was very closely connected to one of the points we were trying to make in the content, namely that in this period, democracy and freedom of speech were central elements, so in a way the people using the museum should be able to react and interact with the content material.

THE ELEMENTS

The first part, "Industrial society", placed in production rooms from the mid-1800s, is thought as a traditional showcase exhibition, giving an overview of a Denmark becoming an industrialized culture. The exhibition uses film projections, sound installation, light and works of art as part of the content in five thematic rooms with the headlines "Industrialism", "The Factories", "The People", "A New World?" and "Goodbye to industrial Society?".

The next element, The Factory, is a theatrically inspired use of the exhibition space, where the roles are played on screens by figures that the user can choose from a kiosk at the beginning of the exhibition. The subject is industrial work, in this case textile work, and the stage set is a collection of spectacular textile machines from another Danish cloth factory. The time is between 1920 and 1950. This whole installation is working inside a large, black box placed in the beautiful dyeing building from 1936.

In the next room, an active weaving workshop is established. Here, two looms from the interwar period, like the ones that has been working in Brede, are producing different textiles. Next to the weaving workshop is the last main element, The Machine. Here, in an installation for

children and playful adults, two small factories are built. There is space for 12–16 persons around each production unit, and the production is ball bearings. The factories compete on speed, quality and adaptability – like in the real industry. In the ceiling, a World Market is changing demands due to world war, climate crisis etc.

As another element in the exhibition, a small Worker's apartment from Brede Works has been restored and furnished as it was in the 1950s. Along with the Manor, this interior is opened for guided tours every weekend. The apartment can tell about living conditions in a paternalistic production village like Brede.

AN ACTIVETICKET

To offer people an experience across the very different elements, there has been developed a digital layer which from the season 2010 will work in all of the three different main elements. It is called the ActiveTicket.

When a visitor – or user – enters the exhibition, he or she is offered a card with a pin code and a numerical code. If the user is choosing to use the ActiveTicket, a photograph is taken, and this together with the two codes is now a unique user ID in the exhibitions.

The ActiveTicket works in different ways through the exhibition. In Industrial Society, the ticket gives access for the user to see, hear and interact with multimedia stories connected to the exhibited objects in the showcases. After the visit, the users can use the numerical code to access their stories and choices at home on the Internet.



View of The Factory, placed inside a dyeing hall from 1936
(© author)



A school lass working at the production unit in The Machine
(© author)

In The Factory, the ActiveTicket works as a tool to choose between the six different characters, whose stories are a point-of-view in the experience of that exhibition. The ActiveTicket registers how the user interacts with the films in the exhibition, and back at home, the user can see his or her choices on the Internet and also get access to material that wasn't chosen in the exhibition.

At The Machine, the ActiveTicket works as a punch-clock card. Here the user checks in as a worker at the production units with the barcode. After participating, he or she receives a diploma with the results of the work, a replay of the factory's production and a filmed sequence of his or her hands working with the ball bearings.

THE SITE REVISITED: A CULTURAL ENVIRONMENT?

The term "kulturmiljø", or cultural environment has been widely discussed in Denmark, both among professionals as well as politically, as a way of talking about heritage sites that contains more than just buildings – for example landscapes, traces of communities or relations between buildings and surroundings through time – in short, a heritage site.

Brede Cloth Factory and the area around it is exactly such a phenomenon. A relative large number of well preserved buildings, that in themselves document Danish industrial architecture over 200 years. Moreover, the buildings' functions and relations and the parks, gardens, streets and squares between tell a story of a community with a very special position in Danish industrial cultural history.⁴

The outside of Brede is now a beautiful, green area for people to relax and enjoy the sights. But one of the next challenges will be to offer information and storytelling about this area that has so many stories to tell. Underground there is exciting industrial archaeology to be excavated, the gardens can be cultivated, signage can be updated, education games are already being developed and so on. And then Brede as an area will be tighter connected to its older and much bigger brother, the Open Air Museum just 100 m to the south. There is still much development to do in Brede in the coming years.

¹ Steensberg, Axel, Brede, Nationalmuseets Arbejdsmark 1959

² From 1966–1988, each year there was a large thematic exhibition in Brede, where new forms of interpretation methods were tried. See Haastrup, Lars et al., Med hilsen fra Brede: status over 20 udstillinger med 2.584.405 besøgende, Copenhagen 1989

³ Lafarque Pedersen, Lykke, Industriens vugge: Brede – et fabrikssamfund ved Mølleåen 1800–1956, Exhibition booklet, The National Museum 1993

⁴ Tønsberg, Jeppe, Brede Klædefabrik: I. C. Modeweg & Søn A/S 1810–1956 den danske klædeindustri i international belysning, Erhvervsarkivet, 2004

W1 DWhG – Workshop: Water History and Preservation of Technical Monuments

Organizer: Norman Pohl (Germany)

Conflicting Priorities – The EU Water Framework Directive and the Preservation of Historical Monuments

Manuela Armenat

INTRODUCTION

In the case of planning the restoration of bodies of water, ecology/nature conservation and the preservation of historical monuments often clash. In this, the respective specialist fields represent their own point of view without incorporating that of the other camp sufficiently (e.g. Tempel & Kierdorf 2009). Especially, it becomes difficult if a species particularly worth protecting crops up in heavily built-up sections (e.g. Wirth 2004).

Therefore it is necessary to combine the seemingly conflicting protection goals of monument preservation and ecology. This paper talks about the existing conflict between ecological goals in the European Union, the preservation of historical monuments (e.g. Charta of Venice 1964) and the optional synergies for the practical implementation of the EU Water Framework Directive ("Weimarer Erklärung" by DWhG 2003).

The Water Framework Directive, the aims of ecology and economy, as the theory goes, only seemingly contains a conflict with monument preservation and protecting hydraulic-engineering structures. In fact, according to Kangler (2005), the common purpose, which is historically adequate but not mentioned, should be emphasised more.

THE EU-WATER FRAMEWORK DIRECTIVE

The precursors for the creation of a framework for water policy measures in the European Economic Community trace back to 1988. Three years on, in 1991/1992, the Hague minister seminar declared the need for action regarding the long-term management and the protection, quality and amount of freshwater resources. As the demand for a sufficient quantity and quality of water increased in the years that followed, the pressure on the community to develop a concept mounted. In February 1996, the commission made an announcement regarding the "water policy of the European Union", which laid the foundations for a common water policy. This was a milestone in European water policy and formed the basis for the European Parliament's Water Framework Directive 2000/60/EG (Amtsblatt EG, L327).

The primary aim of the directive is "*the preservation and improvement of the aquatic environment in the community, whereby the focus is on the quality of the relevant bodies of water*". Accordingly, every member state is supposed to "at least achieve good water conditions". In the

case of bodies of water and groundwater that are already in good condition, this should be maintained, i.e. not allowed to deteriorate. Exceptions might be made if other circumstances require so (flooding, droughts, hydropower, shipping etc.). All measures should be *coordinated transnationally*. This includes the *improvement of the terrestrial ecosystems*, which are directly dependent on the water. Collectively, the idea is to guarantee *the long-term use of the water resources*.

The EU WFD, and where do differences or conflicting priorities with monument preservation arise?

Every country in the European Union determines itself how the ecological model is to be implemented. On account of the diverse interests of neighbouring countries, the responsibilities for the rivers are recorded in transnational commissions. In accordance with the WFD, the general public should especially be involved in the processes.

For the implementation, an inventory (actual state) is compared with a definition of goals (target state) to derive measures to achieve the objectives. The ecological model of today's potentially natural water status thus serves the assessment of the actual state. It is the condition of the waters in the absence of anthropogenic encroachments and disturbances (Korn 2001). Before the directive can be implemented, "an analysis of the characteristics of a catchment area and the impact of human activity, and an economic analysis of the water use" (EU WFD) is necessary.

This passage may well suggest the historico-cultural perspective of a cultural landscape with its hydraulic-engineering measures and structures, but it is considered more in terms of negative aspects, as Konold (1999) also criticises. In concrete terms, a reference to how structures worth preserving and typical cultural landscapes can be dealt with is thus lacking. Until now, important aspects, like recreation, user-friendliness and accessibility, have only played a small role in the evaluation of flowing waters, as Thiem and Kaiser (2005) pointed out. Arguments in favour of monument preservation are also not taken into consideration sufficiently, so that actions at present will be almost done "without participation of cultural experts, in consequence whole century old systems of water power utilization will be destroyed or heavily damaged" (Tempel & Kierdorf 2009). The EU Water Framework Directive thus plunges into a conflict of priorities with monument preservation. But nature conservation and ecology often use similar arguments and motives to monument preservation, they just do not show this openly.

THE RELATIONSHIP BETWEEN MONUMENT PRESERVATION AND NATURE CONSERVATION/ECOLOGY

The protection of species, biotopes and resources is part of nature and environmental conservation, and its history in Germany is closely related to the political, social and cultural changes.

Based on land improvement and habitat protection in the 19th century, nature conservation was primarily a cultural matter. Nature conservation was directly related to monument preservation, both of them having a similar goal: concern for individuality and the harmonious relationship between humans and nature (Kangler 2005, Speitkamp 1988), in parallel with nature conservation and monument preservation, natural monument preservation developed.

At the beginning of the 20th century, in the 20s and 30s to be precise, monument preservation, nature conservation and the preservation of national traditions went their separate ways (Kangler 2005, Schmoll 2004, Speitkamp 1988). The reason for this new-found independence was the processes of scientification, bureaucratisation and professionalisation since beginning of the 19th century. This triggered a split between the creative and the purely biological understanding within nature conservation (Körner et al. 2003).

During National Socialism, nature and landscape became symbols of the "German spirit". They were thus regarded as ideologically important. The primary cultural aim of nature conservation during this period became "achieving the protection and above all creation of a fertile and aesthetic landscape as a material and spiritual basis for the physical and mental 'well-being' of the German people" (Körner 2001). After 1945, however, the interests in nature conservation to protect the nationalistic and racist homeland were no longer acceptable. An objectification of nature conservation based on transparent scientific facts ensued. For example historico-cultural nature conservation motivations and creative landscape planning were rejected as being too subjective and politically non-transparent (Piechocki et al. 2003). Thus, nature conservation was restricted, which can all too often give rise to one-sided views and conflicts today.

Species conservation and resource protection began to increase in the 1970s, when natural space reached its economic and ecological "growth limits" in the social perceptions.

Today, nature conservation is based on historically adequate lines of argumentation: *species, biotope and resource conservation* on the one hand and the *preservation of the landscape and scenery* on the other. Species, biotope and resource conservation thus plays a crucial role in the Water Framework Directive.

Resource conservation contains the abiotic components of an ecologically balanced area, such as air and water, the "efficiency" and "usability" of which is to be preserved for humans (Kangler 2005). These conservation efforts are subject to a scientific approach. The "emotions of the beholder should be excluded and abstracted from the distinctiveness of the object under scrutiny" (Kangler 2005). Everything aims at preserving or reproducing the function of species, biotopes or abiotic resources. And this is the crux of the matter: in effect, ecology can describe and explain on the basis of its scientifically compiled data, but cannot provide any evidence of the value. This occurs on the cultural level (e.g. Potthast 2003). Specifically, it becomes apparent, in the Water Framework Directive time and again for instance, that nature and environmental conservation endeavours to derive planning objectives from scientific data. Kangler (2005) refers to this as a concealment of the cultural, social value by retreating to the material, scientific level.

The cultural aspects of nature conservation are more conspicuous in the preservation of the individuality, beauty and diversity of a landscape. Here, landscape is an aesthetically or teleologically perceived cultural subject. The individual element in a landscape can be united as a "whole". Monuments thus represent important elements. The historicity illustrates the character of the landscape as the culmination of a long development. Hence, nature conservation can put forward the same arguments here as monument preservation. However, nature and environmental conservation takes a back seat as regards an argumentation for beauty and individuality on account of the historical development in National Socialism (Kangler 2005).

This line of argumentation for nature conservation also often results in concealment through seemingly "objective" data and ecological studies, despite its evident proximity to historico-cultural and aesthetic aspects.

Similarities, conflicting priorities & perspectives for monument preservation and nature conservation

Nature and environmental conservation and monument preservation are seemingly extremely close on account

of their socio-cultural appreciation of elements and the condition of a landscape. However, nature conservation based on species, biotope and resource preservation is especially hard to reconcile with a monument preservation argumentation. Individual, unique and concrete remembrance is the approach to monument preservation (Thiem 2006), and the individuality, which is typical of a monument, plays a crucial role in this. This argumentation is not a far cry from the second nature-conservation-specific perspective.

A purely scientifically-based argumentation, as is often found in nature conservation, falls short and causes a vast number of conflicts with monument preservation. In practice, the various directions have to meet and decisions on data and measures for protection, maintenance or development made. In the process, however, one aspect or another often ends up at a disadvantage, as is the case with the EU WFD.

Synergies for the practical implementation of the EU WFD can be derived from their socio-cultural value, despite various reasons, and possibly also implemented. The German Water Historical Association published and distributed a statement on this.

THE WEIMAR DECLARATION

At the 7th conference of the German Water Historical Association (DWhG) on March 22 and 23, 2005 in Weimar, several people from science, practice and administration signed the "Weimar Declaration". With this declaration, which can be found on the internet (<http://www.dwhg-ev.de>), the DWhG is advocating the incorporation of historico-culturally important structures and landscapes in conjunction with the EU WFD. In doing so, it is making the case for both an ecological and historico-cultural perspective in implementing restoration measures.

This is important to:

- a) prevent valuable cultural artefacts from getting "lost",
- b) prevent non-reflective measures from influencing the cultural landscape, e.g. change in the groundwater level, vegetation or the increase in health hazards and
- c) to preserve the identification with a cultural landscape.

It is clear that not everything can be preserved everywhere. However, it would also be important to preserve smaller, less spectacular structures or transformed cultural landscapes, as they could especially be affected by a non-reflective disposal. To guarantee this, a cultural

landscape register (e.g. Thiem 2006) that includes all historico-cultural structures needs to be compiled. Only then the preservation of some "typical and outstanding individual buildings and selected typical cultural landscapes" can take place. The change in the use of areas should be included in this. A crucial second aspect for the preservation and acceptance of the measures in the course of the EU Water Framework Directive is the inclusion of the "people affected" (see also Baxmann 2004, 15). This concerns the ecological, historico-cultural and economic sectors. The decision-making process is understandable through the transparency of a process, as Grambow (2005) also pointed out. This process, coupled with posters, flyers etc., helps to re-identify with the changing cultural landscape.

CONCLUSION

The Weimar Declaration endeavours to bridge the gap between nature/environmental conservation and monument and landscape preservation. Following up the EU WFD, its strength lies in the combination of data gathered on ecology, on the cultural landscape relating to the historico-cultural, emotional perspective of the landscape. After all, they both contain the preservation or development of particular land ecosystems and bodies of water, as stipulated in the Water Framework Directive, and the aesthetic or teleological connection that any society implicitly makes through an assessment. The Weimar Declaration constitutes a crucial addition to the EU WFD in its historico-cultural, often concealed aspects. The aim is thus not to view the vital ecological requirements for the bodies of water as the sole aim, but rather to broaden the historico-cultural dimension for hydraulic-engineering measure at European bodies of water.

On the basis of the Weimar Declaration there should be a cultural landscape register compiled, which can be used as manual for the preservation of historical monuments. First steps in this direction are made by e.g. THIEM (2006) or currently by Dr Karlheinz Hintermeier (Umweltamt Sonderhausen). The permanent change in the needs of society, the use of areas and the dynamics of natural systems should be included in this catalogue.

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W3 The Industrial Districts of the post World War II Welfare State – Concepts and Approaches

Organizers: Caspar Jorgensen, Morten Pedersen (Denmark)

Post-Industrial Landscapes? Analysing the Industrial Districts of the Welfare State. Denmark 1945–2005

Caspar Jørgensen

It is now more than a decade ago Marie Nisser and Maths Isacson after reviewing the Swedish research on industrial archaeology advertised for research on contemporary developments.¹ The interest has also been underlined by the themes of the TICCIIH congresses in recent years.

It is with good reason for the majority of the industrial plants and districts ever built and laid out are in all probability established after 1945. The six decades after 1945 include a great rebuilding, and what some have characterised as deindustrialization and others as a third industrial revolution. The rebuilding was as profound as the rebuilding of rural England 1570–1640, which Hoskins has described,² or the changes following the first industrial revolution.

The theme here is industrial districts; but it should be underlined that the rebuilding included the whole built environment: infrastructure, housing, offices and not least institutions. The following is only a preliminary attempt to sketch some of the changes in the industrial landscapes in recent years focusing on the industrial districts seen in the context of the welfare state. It is not a summary of an accomplished research project. But hopefully it will be followed by more detailed studies.

LITERATURE ON INDUSTRIAL ARCHAEOLOGY

Apart from the Nordic Baltic research project on Industry and Modernism³ several studies of workplaces have been carried out in Denmark in order to document the work situation before plants were closed down.⁴ The studies document the present workplace, sketch the changes, and sometimes the building history. As a result of a special effort to promote the industrial heritage in the years 2004–2007 a popular introduction to the industrial history of Denmark based on 25 industrial landscapes covering the period 1840–1970 has been produced, and the major Danish ports from the period 1840–1970 have been investigated.⁵ Finally a small area for craft industries laid out around 1960 south of Copenhagen and the industrial districts of Aalborg 1945–1990 have been analysed.⁶

The activity has been high and the changes in the second part of the 20th century have been approached. Nevertheless it is a tiny part of the recent Danish literature on industrial archaeology and architectural history which has dealt with the areas, districts or parks planned for industry after 1945 although the majority of the new industrial buildings probably were erected in such areas.

THE CHRONOLOGY OF INDUSTRIAL DISTRICT

1890–1945

The first planned industrial district in Denmark was established in the 1890s as part of the Copenhagen Free Port which opened in 1894 and was organized as a public company owned by the municipality of Copenhagen and the Danish state. Here private firms could build facilities for storage and production on grounds leased on a long term basis and with easy access to the harbour and the railway system. Stretching the definition the Royal Naval Dockyard established in the 1550s and the private dockyard of Burmeister & Wain from 1872 has been seen as industrial districts on account of their size⁷, but had the character of a single plant or works. Apart from the Free Port several municipalities like Århus, Copenhagen, Odense, Aalborg, Frederiksberg produced plans segregating industry and dwellings and segregating different types of dwellings in the years around 1900 either based on agreements with private owners or on land owned by the municipalities.⁸

The timing is hardly a coincidence. The 1890s saw the breakthrough of the second industrial revolution in Denmark, the introduction of a paradigm using economies of scale of plant and vertical integration according to Carlota Perez⁹, or of Organized Capitalism to use the notion of the German Bielefeld School. According to the Swedish historian Rolf Torstendahl *Organized Capitalism* characterises Northern Europe in the period from around 1890 to around 1935/1945 by

- 1) new energy sources and engines and labour processes subdivided through standardization,
- 2) diminishing differences between workers, but at new growing layer of bureaucracy,
- 3) a liberal democratic interventionism organized through the state bureaucracy and a growing weight of finance capital,
- 4) workers and white-collar workers are organized and class struggle goes on in the open.¹⁰

It is the period where a wave of public welfare measures was taken.¹¹ And it is a period where planning was used to a growing extent by the private and public bureaucracies compared to the preceding period of *Classical (or Liberal) Industrial Capitalism*. The ideal became to plan the production process as well as the plant and with space reserved for later extensions, although we should not forget that it is possible to find examples from the previous period. In the public domain the first law on physical planning of urban areas was passed in 1925 and revised in 1938 to soften the strict provisions concerning compensation of private property owners.

1945–1970

According to the 1938 law it was the responsibility of the local municipalities to produce a framework plan acceptable to the Ministry of Housing for each urban area with more than 1,000 inhabitants. This meant the creation of "a planning machine", which from around 1950 started to produce framework plans. At the same time the passing of the law created a small body of planning experts employed by the Ministry of Housing and the municipalities. From this group it was suggested to begin physical planning on a national scale around 1959.¹² The formation of this planning bureaucracy not only produced an increasing number of framework plans but also a growing number of areas lay out for industrial purposes, although we do not have a detailed overview at present. This meant that there was created space for the many new single-storey industrial plants, which was now the ideal, and that the functional segregation, which had been introduced in the 1890s, was carried out more systematically and on a greater scale.

Another signs of the growing interest in planning and growth was the passing for the first time of an act of regional development in 1958.¹³ The aim was to support industrial development in areas with high unemployment outside Copenhagen, but apparently without much effect.¹⁴

That did not stop the planners from planning. But the limits of planning were carefully pointed out by Erik Ib Schmidt, the permanent undersecretary of the treasury and head of the new board on national physical planning (Landsplanudvalget), established in 1961. On the other hand Schmidt saw physical planning as a part of a more comprehensive planning that is to say economic planning.¹⁵ But Schmidt was careful to state, that the new planning ambitions did not involve a centralized plan for the location of private firms. According to Schmidt there was a tradition for a very liberal attitude towards industry in Denmark.¹⁶

According to Torstendahl the period from around 1935/1945 to around 1970 can be termed Participatory Capitalism, which is characterised by

- 1) diffusion of synthetic materials and consumer's durables and further mechanical rationalization,
- 2) unchanged division of labour, and shift between technicians and commercial men,
- 3) explicit goals of control in the in principle liberal economy and strong growth of the public sector,
- 4) weakened class struggle and agreements between government, trade unions and industry.

The dominating paradigm was mass production according to Perez. And in the same years the concept of the classic welfare state was introduced.

It is the period where the state was trying to order everything in the interest of its citizens and at the same time create the framework for an utmost efficient production, so the BNP could grow as fast as possible, so the greater wealth could be distributed among the citizens.

1970–2000

The years after 1970 are often described as a period of deindustrialization. According to a recent textbook in economic history the size of the manufacturing labour force culminated in the 1950s in the United States and Western Europe and then sank.¹⁷

But the picture is not so clear in Denmark at least. On the one hand the growth in the numbers of industrial employees, which had been growing since around 1840, stopped in 1973 and stagnated between 1970 and 2000, which can hardly be termed de-industrialization.¹⁸ For at the same time the industrial floor space appears to have expanded. From 1986 to 2006 the floor space of factories and workshops increased by 25% which was less than the 34% increase of the office space, but nevertheless still a substantial rise. On the other hand the location of industry changed. During the early industrialization and most of the high industrial period the location of industry more or less followed the pre-industrial urban system with a heavy concentration in Copenhagen. After 1945 the industry gradually concentrate in Jutland and a process of de-industrialization began in the Copenhagen area with the result that the number of industrial employees in Jutland exceeded the number in Greater Copenhagen from 1970.

The period has been characterised by Perez as the age of information and telecommunication. Therefore it is worth stressing the apparent stability of the number of industrial employees and the growth of the industrial floor space. On the other hand many of the older industrial areas along ports and railway lines have been re-developed for housing, service industries, shopping and cultural activities especially from the 1990s.

PLANNING INDUSTRIAL DISTRICTS – SOME EXAMPLES

Around 1958 the tone at the office of the city engineer in Copenhagen changed. Until the 1950s the aim was to attract as many industrial firms as possible.¹⁹ But in 1958 it was acknowledged that it would be impossible to ex-

pand the industrial districts inside the municipality. On the contrary a need for relocating industry to the Greater Copenhagen area was noted, and therefore also the need to designate a new large area at Avedøre as suggested by the private association *Dansk Arbejde*. The tendency to build single-storey plants and the growing need for parking areas was seen as partly responsible for the rise in the area needed by industry.²⁰

In one of the older industrial districts, which were designated as an industrial district in 1934, but where industries had been established since the 1890s, the firms created an association in 1942 to take care of their interests and to prepare a review of the town planning of the area. The review was carried out by the architect Peter Bredsdorff and published in 1945. Among other matters the review sketched the history of the area and mapped the residences of the workers. On this basis the review suggested different improvements including some changes of the road system and the delineation of the area, as well as building new multi-storey residential buildings for the workers in the neighbourhood, kindergartens, a community centre and a "craft house" with rooms to rent for the craft firms which were employed by firms in the industrial district.²¹

It was probably not only in Copenhagen industrial districts were laid out where industries already were established. A map from 1944 and lists of available land for industrial use in Greater Copenhagen by "*Dansk Arbejde*" show that many of the industrial districts were already designated around that time, and we know that most of the firms first moved into the area after 1945.²² The location of the districts appears to a certain degree to be random. Although it is clear that most of the districts in the municipality of Copenhagen were located near the harbour and/or the railway lines, while in Greater Copenhagen most of the districts were situated near major roads and to a certain extent near the main railway line to Roskilde.

Most of the industrial district laid out in the 1950s offered sites of different size and were characterised by a gentle curving secondary road net as a garden city inspired by Camillo Sitte.²³ The road crossings had round off corners to ease the turning of lorries. And the districts were typically segregated from neighbouring residential areas by a green belt with bushes and trees.

Most of the industrial districts seem to have been planned in isolation until the 1960s. But there was a growing in-

terest in planning larger units at least from the side of the professionals. The so called "Finger Plan" from 1947 with Bredsdorff as the driving force is well known. The main principle was to concentrate future urban growth along suburban electrified railways and motor roads in fingers stretching out from the centre so the areas between the fingers could be kept free for recreational purposes. The industrial districts should be placed along the outer ring road primary where these were crossed by the railways and roads leading in and out of the city.²⁴ The Finger Plan had an informal status, but the main principle was followed in the planning of the municipalities involved. Outside Greater Copenhagen Bredsdorff made plans for new urban areas at Nordals in South Jutland in 1959 and at Munkebo at Fyn in 1961.²⁵

The planning of the Køge Bay Area can be seen as the high point in Denmark of the physical planning of the welfare state and as an extension of the Finger Plan. It affected the largest area regulated by a detailed plan until today and involved two counties and eight municipalities. The planning was regulated by a special act passed by the Danish Parliament in 1961 and the master plan was submitted in 1966.²⁶ It was an extension of the south finger of the Finger Plan from Copenhagen to Køge. The plan was supposed to house 150,000 people in 10 urban units. The area was laid out as a ribbon town along the Køge Bay. To the west a motorway and five industrial districts were situated in the green area between the fingers. A sixth industrial district and far the largest, Avedøre Holme, was placed near the centre of Copenhagen on a land reclamation diked 1964–1966. Eighteen small districts for crafts were laid out in the new urban units.²⁷ The industrial districts in Ishøj and Hundige were developed quickly but building at Avedøre Holme was slow. Today most of the district is used for storage and service as a result of the changing pattern of industrial location.

There were plans for a refine layout of the Karlslunde industrial district. As in the urban units the traffic was suggested fully separated.²⁸ Each site should have a footpath on one side and a road on the other side. Towards the path offices, salesrooms and canteens were placed, while production, storage and parking were facing the road. In this way the surroundings of the offices, salesrooms and personnel facilities could be placed in a park-like landscape. The plan was however not realized because the municipality expected the plan would make it more difficult to sell the sites. The idea to situate production in a landscape park was later realized at the Carlsberg Brewery at Fredericia in 1979. Another example is the

Birk industrial district east of Herning. The master plan by the architects Anne Marie Rubin and Bo Jensen was passed in 1963.

ENDING

In the preceding I have briefly sketched the development of the industrial districts of the welfare state in terms of bureaucratization and techno-economic paradigms.

Although not much research has been done my suggestion is that one approach is to analyse the industrial districts as a part of the mass-producing paradigm and the associated "rational" planning, which in Denmark was introduced in the 1890s and widely spread from the 1950s.

At the same time it is tempting to see the ideas of regional and national physical planning as a part of the same paradigm as well as a part of the idea of the welfare state, which was introduced by the social democrats in the political debate during the 1950s. To what extent planning influenced the location of industry, which changed dramatically in the period, remains to be researched as well as the actors and layout of the many new industrial districts.

Finally it is worth contemplating if not the industrial districts established after 1945 constituted a change as profound as for example the diffusion of fire resistant building materials. Without the new flatscapes of the industrial district the diffusion of the mass production paradigm would probably have been restrained.

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² W.G. Hoskins: The Rebuilding of Rural England, 1570–1640. W.G. Hoskins: Provincial England. Essays in social and economic history. Macmillan & Co LTD London 1963, 131–148.

³ Industry and Modernism. Anja Kervanto Nevanlinna (ed.) Helsinki: Studia Fennica Historica. The Finnish Literature Society 2007. Industry and Rationalization. Caspar Jørgensen & Morten Pedersen (eds.) Nordjylland Historiske Museum & Kulturarvsstyrelsen, Aalborg & Copenhagen 2007.

⁴ See www/kulturarv/industri.dk.

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⁶ Kirsten Egholk: Håndværkerbyen i Greve. Fabrik og Bolig 2006, 46–68. Morten Pedersen: Velfærdsstatens Industrilandskab. Aalborg: Aalborg Universitetsforlag 2010.

⁷ Stadsingeniørens Direktorat: København som Industriby. Beretning og regnskab 1940–41. Copenhagen 1941, 5–14.

⁸ Caspar Jørgensen: Tekno-økonomiske paradigmer og industrimiljøer i Danmark 1770–1970. Den Jyske Historiker nr. 121–122, 2009, 29–30.

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¹⁰ Rolf Torstendahl: Bureaucratization in Northwestern Europe 1880–1985. Routledge London and New York 1991, 44–46.

¹¹ Klaus Petersen: Legitimität und Krise. Die politische Geschichte des dänischen Wohlfahrtsstaates 1945–1973. Nordeuropäische Studien 13. Berlin Verlag Arno Spitz GmbH. 1998. Peter Baldwin: The Politics of Social Solidarity. Class Bases of the European Welfare State 1875–1975. Cambridge University Press 1990. Niels Finn Christiansen and Klaus Petersen: The Dynamics of Social Solidarity: The Danish Welfare State, 1900–2000. Scandinavian Journal of History, 26, 200, 177–196.

¹² Knud Bidstrup and Erik Kaufmann: Danmark under forvandling. Copenhagen Danmarks Radio 1963. Arne Gaardmand: Dansk byplanlægning 1938–1992, Copenhagen Arkitektens Forlag 1993, 130–138.

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¹⁴ Peter Maskell: Industriens flugt fra storbyen. Copenhagen Nyt Nordisk Forlag Arnold Busk 1986, 279. For the development in UK see Peter Scott: British Regional Policy 1945–51: A Lost Opportunity. Twentieth Century British History, 8/3, 1997, 358–382.

¹⁵ Erik Ib Schmidt: Offentlig Administration og Planlægning. Gyldendal København 1968, 55.

¹⁶ Schmidt, 70.

¹⁷ Peter N. Stearns: The Industrial Revolution in World History. 3th. ed. Westview Press Boulder 2007. A Danish example is. Henrik Christoffersen: Danmarks økonomiske historie efter 1960. Systime Århus 1999.

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²⁴ Skitseforslag til Egnssplan for Storkøbenhavn. Udarbejdet 1947 af Egnsplankontoret. Copenhagen 1947, 49.

²⁵ Gaardmand, 140–144.

²⁶ Poul Erik Skrivers: Byerne langs Køge Bugt. Dansk Byplanlaboratoriums Skriftserie nr. 28. Dansk Byplanlaboratorium Copenhagen 1984.

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²⁸ Poul Erik Skrivers, 38.

The Industrial Landscape of the Welfare State

Morten Pedersen

It is nothing new in Denmark that the welfare state is up for debate. In particular, the classic question concerning the individual versus the state has been under constant discussion since the term "welfare state" was first coined in the 1950s¹. But it is news that in Denmark at the present time there is a discussion of how houses, districts and landscapes created by and in the welfare state should have the status of Danish cultural heritage.²

A majority of Danes would agree that the welfare state is the most important aspect of post-war developments in Danish society. But with the many opinions relating to the welfare state, the question of what should represent its heritage is not straightforward. What are the most important themes and ideas? And how can a good physical expression of them be identified? The first studies suggest, however, that it probably is important to focus on that which many people associate with the welfare state, i.e. housing, hospitals, care homes etc. – but considerations of the welfare state's heritage must begin elsewhere if the project is not to become lop-sided. Industry – in the form it took after 1945 – played a crucial role in the welfare strategy of the 1950s and 1960s. This role was so central that it is tempting to rewrite the political slogan of the time *"no growth, no welfare"* as *"no industrial district, no welfare"*.



The North Jutland Region constitutes the northern part of the Jutland peninsula. The Region's centre is the medieval town of Aalborg, which underwent massive industrialisation, beginning in the 1890s. (© author)

GROWTH, WELFARE AND INDUSTRIAL LANDSCAPES 1945–1970

This point can be clarified using examples of the relationship between idea and practice from one of the places where the welfare state heritage has already been put under the microscope; more precisely the North Jutland Region, the northernmost part of Jutland.³

The first North Jutland Regional Plan, which saw the light of day in the 1960s, had the political aim of *"giving the people of this part of the country equally favourable living conditions – in the widest sense of the word – as the population of the rest of the country"*.⁴ In other words – welfare. And it was seen as a precondition for the execution of this task that physical planning was successful in regulating and trimming industry's production landscapes. Only in this way could production run efficiently enough to create the necessary growth and thereby the economic latitude needed for creation of the desired welfare benefits. It was the same as any rationalisation of production, just on a larger scale and with a superstructure of political welfare.

The Northern Jutland planning process oriented itself accordingly, in direct continuation of the national welfare strategy which was in the process of being unfolded at the same time. The core of the welfare philosophy, as formulated by the Social Democrats, comprised virtues such as freedom, equality and security. The social provisions such as pensions, child care and the health service probably came to occupy a central position, but the welfare strategy directed itself towards a particular social architecture.⁵

It was clear that the precondition was an increase in the potential capacity of industry. *"No growth, no welfare"*, became the Danish Social Democrats' watchword during the 1950s. The common cake was to be made larger and this had to be by way of rationalisation in the form of production planning, a strategy which was officially adopted at the Social Democrats' party congress in 1957. It was necessary to take a liberal view of the fact that this could have consequences for the working conditions of the individual, including an uninspiring working day; in a concentrated form the Taylorism-inspired production principles illustrated on the factory floor by the picture of the man with a stopwatch. This was also the view in the social-democratic trade union movement, which is why the rationalisation of production was, as a rule, accepted without any great conflicts in the workplace.⁶ The carrot was the prospect of more leisure time.

For the planners and decision makers of the 1960s it was therefore reasonable to consider production planning and rationalisation as welfare-strategic tools. But how do you then trim an industrial landscape so that it can serve to realise the welfare state? Also on this point, the North Jutland example can provide some indications. It seems perhaps bizarre, seen with modern eyes, but they aligned themselves in direct continuation of the high-industrial period's general use of large scale solutions.⁷

Tangibly, North Jutland regional planning identified the necessity of a "concentration of effort", with a continued industrial and educational development of the regional centre in the medieval town of Aalborg, while the smaller market towns of Frederikshavn, Hjørring and Thisted acquired the status of growth areas. The focus was on large-scale operations, and it was seen as inappropriate to conjure something up where conditions were not already optimal. The remainder of the Region could, conversely, satisfy the great need for a recreational reserve.

Overall, the North Jutland example shows how, in the first post-war decades, it was possible to operate with a functional division of the Danish landscape that took account of the economic, spiritual and physical aspects of the welfare philosophy. Figuratively speaking, it was like the planning of any assembly line. There was a place where the production line was set up, a place where the employee could rest when he was not at his machine and a place for recreation.

The welfare citizen's desire to be a part of this system was, conversely, not questioned. In other words, the balance between deference to the efficiency of the production line and more individually oriented interests of an alternative view, was definitely weighted to the advantage of the former.

IDEAS AND PRACTICE IN THE INDUSTRIAL DISTRICT 1945-1970

In the industrial district, the North Jutland regional planning recommendations were for new coherent areas outside the old town centre, where it was possible to find level terrain which would be suited to modern, single-storey industrial buildings with a convenient location for sewerage, water, power, major transport routes and so on. A direct reference was made to the founder of the chemical company Cheminova, Gunnar Andreassen, who had published a book on national development in 1961. But the model that was described followed the general ideal

of the times for industrial building. This had been brought from the United States, and was also recommended in Danish architects' and town planners' trade literature.⁸

The model used was, in particular, the American automobile industry from the beginning of the 20th century, from where architect Preben Hansen, in the trade journal *Arkitekten* in 1946, described how mass production was the watchword. The Americans constructed, as Hansen expressed it, increasingly larger production areas for mass production's assembly lines. This required everything to be under one roof and on one level, whereas previously it had been possible to manufacture in many different larger and smaller departments. The method involved the application of the new flexible building systems using pre-fabricated concrete elements. The focus was on large-scale production, standardisation and functional division.

Already in the first post-war years, the American ideal permeated the development of the industrial landscape in Northern Jutland, where it was also, from the 1960s, used actively as a tool in the realisation of the welfare state. In the Aalborg area, an overall plan from 1948-1951 (*Dispositionsplan for Aalborgområdet*) made a cardinal point, as they say, of tidying up in the old town centre's jumbled and random character. The planning took place in an aura of optimism and liberation from that which was seen as the irrationality of earlier times. In practice, the functional division was to be achieved through the removal of industry to the new areas reserved for industrial purposes with good links to the rail network or the harbour and separated from areas of housing by green belts. This resulted in, among others, the industrial district of Søfiendal, where some of the most famous architects of the time, such as Preben Hansen and Arne Jacobsen, were allowed to express themselves.

Data from the Danish Buildings and Housing Register (BBR) show that 94% of the production buildings in the Aalborg area's new industrial district were constructed according to the ideal of the time concerning single-storey buildings.⁹ In other words, the individual factories complied with the ideal of the time concerning the needs dictated for an efficient production line. But there were also local characteristics. Contrary to the American model, the BBR shows that only very few of the buildings were constructed of concrete elements. The dominant building material continued to be brick. And when one moves around the industrial districts of the time, their architecture bears witness to the strength of the message conveyed by the industrial single-storey building.

It was not uncommon for buildings as small as 500 m² to be equipped with the readily recognisable saw-tooth shed roof elements that otherwise had been developed for much larger structures.¹⁰

The single-storey building's industrial appearance had very clearly developed into a stylistic feature which was coveted by even small tradesmen.

At any level, it is difficult to link the architecture of these industrial districts with a view of industry as some kind of necessary evil required for the creation of the welfare state's economic latitude.

That is, a place where the employee has to be compensated for spending a miserable existence in the interests of serving the common good. Instead, references to the American models more readily link these industrial buildings to a more optimistic view of industry as the way forward to progress and prosperity.

This rather lighter view of industry was at times expressed very explicitly. As was, for example, the case with city architect Rohbrandt's sharp response to Aalborg municipality's planning committee when master carpenter S. K. Sørensen in 1958, without municipal permission, had constructed a wooden building at his woodworking fac-



Engineering works C.A.C. in the industrial district of Sofiendal. Architect Arne Jacobsen (1956). (© author)



The Engineering works Desmi in the industrial district Lindholm Industripark, Architects Friis & Moltke (1975) (© author)

Material for outer walls	1950s	1960s
Wooden boarding		7%
Brick	54%	47%
Metal sheeting		3%
Concrete elements		17%
Lightweight concrete	46%	15%
Fibre cement, including asbestos		2%
Other materials		9%

Roofing	1950s	1960s
Other materials		
Built-up	8%	17%
Cement tile		
Fibre cement, including asbestos	92%	52%
Metal sheeting		2%
Roofing felt		29%
Roofing tiles		

BBR's record of production buildings in the Aalborg area's post-1945 industrial districts.

tory in the Sofiendal district in Aalborg. Rohbrandt recommended that the town planning committee should demand the removal of the building because in "a district of such high architectonic qualities" he maintained "such a selfproclaimed construction (could) not be tolerated". The Sofiendal district was, in other words, a landscape associated with prestige and high expectations for the future, the development of which could not be left to chance.

TRANSFORMATION 1970–1990

The example provided by the industrial landscape also shows how it is not unacceptable to consider the welfare state's heritage as a well-balanced entity. There is a semantic slip bound up with the terms. This is probably most clearly expressed in the value debate which really took off during the course of the 1970s. Now modernisation of production was not necessarily seen as top priority. In Northern Jutland it resulted in a real U-turn relative to the concentration endeavours of the 1960s. The requirement became instead that "businesses must move out to where the workforce lives and not the reverse", as it was expressed in the run-up to the first county regional plan in 1980.¹ It was no longer expected that the individual should sacrifice him- or herself for the common good by moving to Aalborg and reporting for duty at the city industries. In other words, welfare became linked to a much greater extent with society's consideration of special wishes in the life of the small local communities. Industries in towns like Hadsund, Aars and Pandrup were allowed to flourish, often with state support by way of national laws relating to regional development.

In the Aalborg area's new industrial districts the transformation was clearly expressed in the physical impression. Worship of the assembly line as defining the shape of the main body of the building disappeared like the morning dew in the 20 years between 1970 and 1990. Construction was still according to the American ideal, and now to a much greater extent making use of prefabricated concrete element construction systems (see table above). But the buildings were formed as anonymous cigar-box-like blocks, where production was hidden away behind low suburban house-like administration buildings.² It was almost as if industrial production were something to be ashamed of. The effect was often emphasised by the planting chosen for around the buildings, for example at the engineering works of DESMI where the factory buildings were covered in ivy as a kind of natural elimination of man-made industry. The linking of industry with welfare also seems to have vanished like the morning dew.

When the heritage of the welfare state is considered in the future, it will be necessary to include this kind of expression of change in the perception of what welfare actually is. At the same time it will add perspective to the current Danish debate concerning the welfare state, where the theme is still a very hot potato.

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¹ Klaus Petersen, 1995, pp. 25ff.; Niels Finn Christiansen & Klaus Petersen, 2003, 140–141.

² URL: <http://www.kulturarv.dk/i-fokus-nu/igangevaerende-projekter/velfaerdssamfundet/>

³ The following is largely based on Morten Pedersen, 2010.

⁴ Regionplanlægning i Nordjylland. Forslag til planlægningsprogram, 1962, p. 44.

⁵ Niels Finn Christiansen & Klaus Petersen, 2003, p. 142.

⁶ Marianne Rostgaard, 1990, p. 111ff.

⁷ Maths Isacson, 2000; 2006.

⁸ Caspar Jørgensen, 2007.

⁹ The following is based on an excerpt from the register in December 2006 which has been processed in a GIS.

¹⁰ Morten Pedersen, 2010, pp. 30–34.

¹¹ Den offentlige debat 1977–1978, pp. 46–48.

¹² Morten Pedersen, 2010, pp. 50–53.

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