

Daniel J. Waldorf

Associate Professor, Industrial and Manufacturing Engineering Department
Cal Poly State University, San Luis Obispo, CA 93407
Ph.: (805) 756-2908 Fax: (805) 756-1420 E-mail: dwaldorf@calpoly.edu

I. Background

Education

Ph.D., Industrial Engineering (1996) GPA 5.00/5.00
University of Illinois at Urbana-Champaign
Dissertation: “Shearing, Ploughing, and Wear in Orthogonal Machining”
Co-Advisors: Prof. Richard E. DeVor and Prof. Shiv G. Kapoor

M.S., Industrial Engineering (1991) GPA 4.98/5.00
University of Illinois at Urbana-Champaign
Thesis: “Automatic Recognition of Tool Wear on a Face Mill Using a
Mechanistic Model Approach”

B.S., Industrial Engineering (1989) GPA 4.76/5.00
University of Illinois at Urbana-Champaign
Senior Project: “Implementation of SPC onto Power Supply Assembly Line”

Certification or Licensing

Professional Engineer (California) – Manufacturing Engineer, License #MF 4811

- Professional Engineer (PE) exam in Manufacturing Engineering taken and passed on Oct. 25, 2002.
- Fundamentals of Engineering (FE/EIT) exam taken and passed on Oct. 27, 2001.

Academic Experience

Associate Professor (2004 – present) and Assistant Professor (1998 – 2004), Industrial and Manufacturing Engineering Dept., California Polytechnic State University

Highlights of my work *as an Assistant Professor (1998-2004)* include:

- An average “Overall Instructor” rating of 3.5 on student teacher evaluations
- Two new courses developed, two major revisions to existing courses, and seven significant revisions to additional existing courses
- Project Director for eight successful research and development grant proposals totaling \$339,163, including a \$294,000 SME Education Foundation Manufacturing Education Plan (MEP) Grant.

- Helped raise and subsequently manage over \$300,000 in cash donations for equipment, labs, recruiting, and curriculum in manufacturing engineering as part of coordinated Manufacturing Consortium project.
- Fifteen research and development proposals submitted to various funding agencies.
- Professional consulting with Genius Metal and More Diagnostics
- Thirteen professional meetings/conference attended
- Eight professional training/workshops attended
- Active department member on curriculum, recruiting, assessment, and scholarship committees, including leading the successful ABET reaccreditation for MfgE program in 2002.
- Two-year member of Academic Senate
- Active national-level participation in ASEE, ASME, and SME organizations, including paper reviews and conference involvement.
- Five research publications:
 - Waldorf, Daniel and Sema Alptekin, “A Supply Chain Management Tool for Linking Courses in Manufacturing Engineering Curriculum,” *International Journal of Engineering Education*, Vol. 20, No. 4, 2004, pp. 586-593.
 - Waldorf, Daniel, “Computer-Aided Engineering for Tool Design in Manufacturing Engineering Curriculum,” *ASEE Annual Conference & Exposition Proceedings*, 2001, and presented at the 2001 ASEE National Conference in Albuquerque, June 2001.
 - Alptekin, Sema, Pouraghabagher, Reza, McQuaid, Patricia, and Daniel Waldorf, “Teaching Factory”, *ASEE Annual Conference & Exposition Proceedings*, 2001, and presented at the 2001 ASEE National Conference in Albuquerque, June 2001.
 - Wong, Christopher, Waldorf, Daniel, and Larry Rinzel, “Plastic Solder Paste Stencil for Surface Mount Technology,” *25th IEEE/CPMT International Electronic Manufacturing Technology Symposium*, 2000, pp. 294-304.
 - Waldorf, Daniel J., DeVor, Richard E., and Shiv G. Kapoor, “Worn Tool Forces Based on Ploughing Stresses,” *Transactions of the North American Manufacturing Research Institution of SME*, Vol. 27, 1999, pp. 165-170.

Graduate Research Asst. and Post-Doctoral Research Assoc. (1989-1996), Dept. of Mechanical and Industrial Engineering, University of Illinois at Urbana-Champaign.

I worked on research projects involving fundamental machining process modeling, tool wear modeling, and issues in statistical quality control.

Publications (i.e., *prior* to coming to Cal Poly):

- “An Evaluation of Ploughing Models for Orthogonal Machining,” Waldorf, Daniel J., DeVor, Richard E., and Shiv G. Kapoor, *ASME Journal of Manufacturing Science and Engineering*, Vol. 121, No. 4, November 1999, pp. 550-558.
- “A Slip-line Field for Ploughing During Orthogonal Cutting,” Waldorf, Daniel J., DeVor, Richard E., and Shiv G. Kapoor, *ASME Journal of*

Manufacturing Science and Engineering, Vol. 120, No. 4, November 1998, pp. 693-699.

- “The Importance of Considering Size Effect Along the Cutting Edge in Predicting the Effective Lead Angle in Turning,” Endres, William J. and Daniel J. Waldorf, *Transactions of the North American Manufacturing Research Institution of SME*, Vol. 22, 1994, pp. 65-72.
- “Automatic Recognition of Tool Wear on a Face Mill Using a Mechanistic Modeling Approach,” Waldorf, Daniel J., DeVor, Richard E., and Shiv G. Kapoor, *Wear*, Vol. 157, 1992, pp. 305-323.

Other projects and Unpublished Reports:

- “Machining Process Models: Standard Calibration Procedure and Database Development,” DeVor, R.E., Kapoor, S.G., Athavale, S., Waldorf, D.J., Chandrasekharan, V., Jayaram, S., and M. Smith, final report submitted to Ford Motor Co. (1995), Ingersoll Milling Machine Co. (1995), and Caterpillar, Inc. (1994).
- “Modal Analysis of a Face Milling Workpiece,” Karvounis, E., Waldorf, D., and V. Chandrasekharan, Technical Report, UILU-ENG 92-4033, Univ. of Illinois, 1992.
- Technical Paper Reviews (1993 - 1996) - Periodically reviewed articles for the international journal *Wear*.
- Short Courses on Statistical Quality Control (1990 - 1993) - Helped present short courses and workshops on SPC and statistical methods in quality control and design for Ford Motor Co. and other local companies.

Graduate and Undergraduate Teaching Assistant (1988-1996), Dept. of Mechanical and Industrial Engineering, University of Illinois at Urbana-Champaign.

I had full responsibility for lecturing courses on Statistical Quality Control and Engineering Statistics for the MIE Department. I also regularly lectured and designed assignments and exams questions for courses in Design of Experiments and Manufacturing Processes.

I was awarded tenure and promotion to Associate Professor in 2004.

Related Professional Experience

Quality Engineer (1996 - 1998), Accurate Threaded Fasteners (ATF, Lincolnwood, IL)

I worked with manufacturing personnel and customers in solving quality-related problems occurring in cold forming, cold rolling, machining, heat treating, and plating processes and in setting up systems (including SPC) to prevent recurrence.

Regularly involved in training of both production personnel and management/engineering in statistical methods for quality improvement.

II. Teaching Related Activities (for period 2004 – 2008):

Courses and Laboratories Taught:

The following list shows all courses taught for which student teacher evaluations were collected from Fall 2003 through Winter 2008 with the Mean overall student rating of teacher performance. IME 428 was also taught during this period, but not evaluated.

Course	Term	WTU	Student Eval. Overall Rate Mean
IME 352	WI08	6 (incl. Lab)	3.93
IME 241	FA07	5 (incl. Lab)	3.83
IME 336	WI07	5 (incl. Lab)	3.89
IME 241	FA06	5 (incl. Lab)	3.45
IME 341	SP06	5 (incl. Lab)	3.77
IME 352	SP06	6 (incl. Lab)	3.71
IME 144	WI05	2 (Lab)	3.44
IME 352	FA04	6 (incl. Lab)	3.78
IME 341	SP04	5 (incl. Lab)	3.80
IME 430	WI04	4	3.60
IME 336	WI04	5 (incl Lab)	3.85
IME 241	FA03	5 (incl Lab)	3.65
IME 352	FA03	6 (incl Lab)	3.82

Over this period, evaluation results have been consistently high, averaging **3.73** for the “Overall Instructor” rating. Very similar numbers were obtained for the individual rating categories (i.e., “Instructor Prepared,” “Convey Subject,” “Office Hours Effective”).

Student written evaluation comments suggest an instructor who knows his material very well, can convey even complex topics in a very clear and organized manner, cares about the students and about learning, is demanding in terms of homework and test performance but who grades those assignments fairly.

Recent examples include:

- (IME 352, WI08) “Dan is a great instructor. The best in the Manufacturing Dept, if I may add. He was always willing to explain any questions I had and give real life examples.”
- (IME 352, WI08) “I actually learned something! Dan is an awesome guy. This class was a lot of work (project), [you] may want to trim it down.”
- (IME 352, WI08) “Great teacher. [I] always learn a lot in his classes.”
- (IME 241, FA07) “Dan is a great professor. He is enthusiastic about teaching and conveys the material extremely well. He is always willing to answer questions at office hours even if he’s extremely busy. He makes manufacturing engineering courses enjoyable.”
- (IME 241, FA07) “Prof. Waldorf is my hero.”

- (IME 241, FA07) “Great Class. Great experience in lab.”
- (IME 336, WI07) “Dan is an excellent instructor! His style of teaching promotes wanting to learn more and more. I have learn[ed] so much from Dan this quarter. He is a top-notch professor!”
- (IME 336, WI07) “Great job. Knows is stuff better than anyone. Should require 4th-axis and or live tooling project.”

My teaching (and research) performance was recognized by the College of Engineering in 2005 when I was awarded the Raytheon Excellence in Teaching and Applied Research Award.

Major Revisions and Innovations in Existing Courses

I helped to revise and add approximately 20% of the content to AERO 511 Systems Engineering II, which has become cross-listed as IME 511. My additional content covers Reliability, Maintainability, and Design for Manufacturability. I taught 2-3 weeks of this course as a guest lecturer three times during 2006 – 2008.

The content for AERO/IME 511 is part of a larger development effort in which I put together material for IME 435 Reliability Engineering. I have been so far unable, however, to teach this class.

Curriculum Development

I helped to add additional lecture content on quality control, CNC programming, and cost estimating for IME 144.

I have prepared all new lecture material for the Fall 2008 offering of IME 314.

Significant content on using and programming automated vision systems has been developed and added to IME 428 Reliability Engineering to coincide with the purchase of a new OGP Smartscope Machine Vision system.

Use of the new automated vision system and a new Brown and Sharpe coordinated measuring machine has also been added to the lab activities for IME 241.

Senior Projects or Student Research Supervised

I have averaged approximately five senior project or independent study students per quarter. I have had by far the largest load of senior project students for the Manufacturing Engineering program over the last several years.

I have supervised a total of seven undergraduates performing research (for pay or technical elective credit) on alternative-binder metal-matrix composite cutting tools as part of my ongoing research program during 2005-2008.

Student Advising

Currently academic advisor for approximately 35 undergraduates.

Served as faculty advisor to the SME student club since Fall 1999.

Nominated for Outstanding Faculty Advisor award (Cal Poly) in 2008.

Current Instruction Related Projects

I am developing content to offer IME 314 and STATS 312 in Thailand in Spring 2009 as part of the Cal Poly Quarter Abroad program via the International Education Programs office. The courses will be tailored towards the study abroad experience and include examples and considerations of engineering concerns in Thailand and Southeast Asia. As part of the effort, I will also be offering IME 400 and supervising several students through independent study projects to earn more engineering credit during that quarter.

III. Professional Growth and Development Activities (for period 2004 – 2008):

Professional Development Plan

My plan for professional development over the next five years is based on the following ongoing efforts:

1. Continue research on alternative-binder carbide cutting tools. This NSF sponsored research has brought several opportunities and has pushed me into a much greater understanding of metal-matrix composites, powder-metal processing methods, applications of different cutting tool materials, business planning and commercialization (via an NSF Small Business Innovative Research effort), as well as the nature of tool wear, it's effects, and how it is tested. I plan to continue collaborating on this effort with Dr. Scott Liu from Genius Metal, Inc. We intend to propose new research into alternative formulations and testing to national (NSF) and private (aerospace and turbine generator industries) funding agencies.
2. Expand my involvement and push the IME curriculum into team-based projects and service learning activities. After recently becoming involved with the student chapter of Engineers Without Borders (EWB, Southeast Asia group) by traveling with them and working on production and construction of new facilities in developing countries, I see how this effort can transform our effort at educating engineers, including manufacturing engineers. I intend to push more class and senior-project based efforts for our students, and I plan to join and lead more of these projects myself. I can see how everyone wins in these situations by having students intimately involved in helping others as a part of their curriculum. In addition to the EWB activities, I have also begun efforts on the RELI Center (Responding to Emergencies with Local Industry). I have supervised two student groups now who have taken on projects related to using local manufacturing capability as a means to buffer a community against the threats of natural or other disasters. This represents a radical solution to the declining interest and community support of manufacturing operations in the US, and it will engage students with the same service-learning approach.
3. Continue new development and application of reliability and maintainability knowledge. After offering two corporate training sessions and teaching these topics in AERO/IME 511, I intend to apply my knowledge to solve additional problems. One ongoing effort involves the Cal Poly SuPER project (Sustainable Power for Electrical Resources) with Jim Harris of Electrical Engineering. My part of the proposed work is to model, evaluate, and test the reliability of the new solar-powered generators being designed for use in developing countries. Of course I also hope to teach the material as a revised version of IME 435 in the future.
4. Evaluate direct methods for assessment of engineering programs via a senior exit exam. I plan to collaborate with Liz Schlemmer in IME to evaluate the reliability, validity, and practical success of the senior exam offered regularly to the graduating students in IME. The exam has tremendous potential as a direct assessment measure, but there are also many hurdles to creating an effective tool.

Scholarly Activities Completed (during 2004-2008)

Six journal/conference publications (including one in progress) and five conference presentations since promotion to Associate Professor in 2004:

Waldorf, Daniel J., “Making Just-in-Time Work for Disaster Response Professionals,” abstract accepted for publication/presentation at ASEE Annual Conference and Exposition, Austin TX, 2009.

Waldorf, Daniel J., Subramani, Mani, Suvada, Randy, and Guangming Zhang, “Innovations in Turning and Boring,” presented at the First Manufacturing Leadership Symposium at the University of Illinois, Urbana, October 2008.

Waldorf, Daniel, Liu, Scott, Stender, Michael, and Daniel Norgan, “Alternative Binder Carbide Tools for Machining Superalloys,” presented at the conference and published in *ASME Proceedings of the International Conference on Manufacturing Science and Engineering*, held Oct 7-10, 2008, Evanston, IL.

Waldorf, Daniel J., Alptekin, Sema E., and Robert Bjurman, “Plotting a Bright Future for Manufacturing Education: Results of a Brainstorming Session,” *ASEE Annual Conference & Exposition Proceedings*, 2006, and presented at the ASEE Annual conference in Chicago, June 2006. The paper was also presented at the 2006 ASEE Global Colloquium on Engineering Education in Rio de Janeiro and is published in the proceedings for that conference.

Macedo, Jose, Colvin, Kurt, and Daniel Waldorf, “Machine Vision for Manufacturing Engineering Undergraduate Students,” *Looking Forward: Innovations in Manufacturing Engineering Education, Proceedings of CIMEC 2005 and 3rd SME International Conference on Manufacturing Education*, 2005, pp. 287-295.

Waldorf, Daniel, “A Simplified Model for Ploughing Forces in Turning,” *SME Journal of Manufacturing Processes*, Vol. 8, No. 2, 2006, pp. 76-82. Also appears in *Transactions of the North American Manufacturing Research Institution of SME*, Vol. 32, 2004, pp. 447-454, and was presented at the North American Manufacturing Research Conference at UNC-Charlotte in June 2004.

Waldorf, Daniel and Sema Alptekin, “A Supply Chain Management Tool for Linking Courses in Manufacturing Engineering Curriculum,” *International Journal of Engineering Education*, Vol. 20, No. 4, 2004, pp. 586-593.

Grants Received/Research Work totaling over \$220,000 in funds:

“Competitive Carbide Cutting Tools with Alternative Binders,” with Scott Liu (Genius Metal, Inc), NSF Small Business Innovative Research (SBIR), July – December 2007, Phase I grant \$99,383 (\$29,287 for Cal Poly). Additional Phase IB

grant awarded for January - June 2008 for \$49,922 (\$16,486 for Cal Poly). I served as PI for the Cal Poly portion of the funding.

PI, “PVD/CVD Coatings for Improved Life of Nano-Grain Cutting Tool for Machining Aerospace Alloys,” Cal Poly C3RP/ONR Grant, August 2006 – July 2007, \$38,688.

PI, “Nano-Grain Cutting Tool for Machining High-Temperature Aerospace Materials,” Cal Poly C3RP/ONR Grant, August 2005 - July 2006, \$33,000.

All four of these grants dealt with development of alternative-binder metal-matrix composite cutting tools. In collaboration with Dr. Scott Liu of Genius Metal, Inc. (Monrovia, CA), I have proposed and tested various formulations for replacing the standard use of cobalt (Co) as the metal binder in tungsten carbide (WC-Co) cutting tools. The replacement metals include Re, Ni, Fe, and several other elements. The new tools have a higher hardness and better thermal resistance than the Co-only tools, thereby allowing them better wear resistance and longer tool life during cutting. By taking advantage of two recent patents by Dr. Liu, we have developed tools that last up to 150% longer than those made from the standard WC-Co formulation. Based on the patented sintering process, the tools can be produced nearly as cheaply as standard carbides. The use of CVD and PVD coatings has also been shown to further improve the lives of these alternative-binder tools. Funding from the grants has supported seven undergraduate researchers (mostly IME students) as well as faculty research and released time and various materials and outside contracting expenses.

Professional Consulting:

Developed material for and offered 4-day short course on Reliability and Maintainability Analysis in 2005 for Parker Hannifin in Irvine, CA, as part of a Boeing contract with the government of South Korea. This material was modified and used again as I worked as a paid (via Aero Dept Lockheed Martin grant) guest lecturer in the AERO 511 Systems Engineering II class offered remotely to Lockheed Martin employees during 2006 and 2007. I was again paid (via Bob Crockett’s NSF grant) to deliver a workshop on this material to industry representatives in the BASE Training seminar hosted at Cal Poly in the Summer of 2008.

Three other research/development proposals generated but not funded during 2004-2008:

“Competitive Carbide Cutting Tools,” (including Commercialization Plan) with Scott Liu (Genius Metal), proposed to National Science Foundation’s SBIR Phase II program, SBIR Phase II, January 2008, \$499,755 (\$114,674 Cal Poly subaward).

“Investigation of Binder Effect on Steel-Cutting Carbide Tools,” Daniel Waldorf, proposed to National Science Foundation’s Design, Manufacturing, and Industrial Innovation (DMII) program, February 2005, \$129,998.

“Innovations in Manufacturing Engineering Education,” Waldorf, Daniel and Sema Alptekin, proposed to NSF Eng’g Education Program (EEP), July 2004, \$61,951.

Paper refereeing

I have continued regularly reviewing paper submissions for SME’s Journal of Manufacturing Processes, ASME’s Journal of Manufacturing Science and Engineering, and ASEE’s Annual Conference and Exposition Proceedings.

Ten professional meetings/conferences attended:

First Manufacturing Leadership Symposium, Honoring the Contributions of Richard E. DeVor and Shiv G. Kapoor, at the University of Illinois, Urbana, October 2008.

ASME International Conference on Manufacturing Science and Engineering (MSEC), held at Northwestern University, Evanston, IL, October 2008

UC/CSU/CCC Sustainability Conference, Putting Sustainability to Work, held at Cal Poly San Luis Obispo, August 2008. I submitted a successful proposal to attend the conference and get additional course development funding from our department student fee committee.

Specialty Equipment Manufacturers Association (SEMA) and Automotive Aftermarket Industry Association (AAIA) trade show, held at the Las Vegas Convention Center, October 2006 and 2008.

SME Westec Machine Tool Show and Exposition, held at Los Angeles Convention Center, March 2007 and 2008. I participated in a Q & A panel on Manufacturing Education and helped with high school student visits there in 2007.

ASEE Annual Conference and Exposition, held in Chicago, June 2006. Received Best Paper award for Manufacturing Division.

ASEE Global Colloquium on Engineering Education, held in Rio de Janeiro, October 2006.

Italian Trade Commission (with SME) Manufacturing Essay Contest “Tour of Italian Machine Tool Manufacturers,” held in Milan and Bologna, Italy, September 2006. I essentially won this trip, valued at approximately \$2,600, for my continued work and collaboration with the SME Education Foundation.

CIRP International Manufacturing Education Conference and 3rd SME International Conference on Manufacturing Education, held at Cal Poly, June 2005.

SME North American Manufacturing Research Conference, UNC-Charlotte, June 04

Professional training / workshops attended:

During September 2008, I supervised and accompanied a group of four Engineers Without Borders (EWB) students on an exploratory trip to Thailand and Laos. The group learned about interlocking compressed earth block production and about using those blocks in construction of homes, schools, and other buildings. The group learned about, designed, and installed a "dry" composting toilet and researched "appropriate" technologies involved with water storage and non-asbestos roofing materials. The group lived in and toured various rural villages in both countries to survey needs for potential future EWB projects.

3-day Brown and Sharpe training on new Coordinate Measuring Machine, offered by Hexagon Metrology, August 2008.

3-day training on OGP Smartscope machine vision system, offered by Pacific Inspection, August 2006.

Industry associations:

Long term research collaboration with Genius Metal, Inc. (Monrovia, CA)

Course lab collaboration with Cornucopia Plastics (Paso Robles) for molding of student project in IME 352, 2004 – 2008.

Company visits in recent years have included Northrop Grumman, Haas Automation, C&D Aerospace, NUMMI, Ernie Ball, United Tools, Ball Plastics, Zurn, DeRoyal, Imation, Melfred Borzall, Helical, Strasbaugh, AeroMech, Paris Precision, NextIntent, Cornucopia Plastics, Alltec, Specialty Silicone Fabricators,

Participation in Professional Associations and Organizations

Member (#10661996) of the Society of Manufacturing Engineers (SME)

Member (#190712) of the American Society for Engineering Education (ASEE)

Currently serving as Faculty Advisor for student SME chapter

Honors/Awards.

Raytheon Excellence in Teaching and Applied Research Award (CENG), 2005

Nominated for Outstanding Faculty Advisor award (Cal Poly) in 2008

Best Paper Award for Manufacturing Division at the ASEE Annual Conference in 2006

IV. Service (for period 2004 – 2008):

University

Academic Senate Curriculum Committee (ASCC) 2006 – 2008, representing the College of Engineering.

Academic Senate Instruction Committee, 2005 – 2006

Status of Women Task Force, 2006 – 2007. I was recognized as an “Outstanding faculty member who played a significant role in working with Student Affairs” for my service.

College

ABET Assessment committee, 2004 – 2008.

Curriculum Committee (acted as Chair during 2005-2006), 2005 – 2008

Raytheon Teaching and Applied Research Award Committee, 2005 – 2008

Department

Recruiting Committee Chair and active participant, 2004 – 2008. I have employed and supervised IME students as well as participated myself each year in efforts to visit high schools, attend career fairs, update the IME web page and other materials, maintain records, coordinate tours, and generally help recruit more students for our department.

Assessment Committee, MfgE program Chair, 2004 – 2008. I led a second successful effort to reaccredit our Manufacturing Engineering program for the October 2008 visit. I was the primary contributor in IME for developing the Self Study document and for developing/collecting, maintaining, and posting relevant assessment materials (data, tools, outcome binders, etc.), including the current Senior Exit Exam for both IE and MfgE.

Scholarships/Awards Committee 2004 – 2005

Facilities/Equipment. I have continued to manage the funds in the Manufacturing Consortium CP Corporation account. In recent years, these funds have been used to help purchase and train faculty on the new coordinate measurement machine as well as pay for some of the facilities and moving costs for the department move into Building 41.

Community

Served on Program and Organizing Committees for the First Manufacturing Leadership Symposium, Honoring the Contributions of Richard E. DeVor and Shiv G. Kapoor, at the University of Illinois, Urbana, October 2008

Served as Conference Chair and on the Organizing and Program Committees for the CIRP International Manufacturing Education Conference and 3rd SME International Conference on Manufacturing Education, held at Cal Poly San Luis Obispo, June 2005. I also served as the lead editor for the conference proceedings (sponsored and published by SME) and on the editorial staff for a special issue of *SME Journal of Manufacturing Systems* based on the conference papers.

Served on the Research Initiation grant proposal review committee for SME for three years, held in Dearborn, MI, 2004 – 2007

Participated in SME Westec Manufacturing Challenge (2007, 2008), served on a Q & A panel in manufacturing education, and helped host high school student visits in 2007.

Served on Course, Curriculum, and Laboratory Improvement (CCLI) program grant proposal review committee for National Science Foundation, in Arlington, VA, July 2005.

Periodically refereed papers for *ASME Journal of Manufacturing Science and Engineering* (since 1996) and *SME Journal of Manufacturing Processes*. Also, provided reviews of papers for *ASEE Annual Conference and Exposition*.