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On the way to CPFR from ARS.docx

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Abstract

Stores are becoming uncommon in the manufacturing or production areas. Production units are already shifted to Just in Time (JIT). Whereas in major overhaul sections, repair sections, daily service section of the products are bound to keep the stores as per previous demands. It is challenging as the staff members gives lesser important to downsize the stock.

Introduction

Automatic Replenishment System (ARS) was introduced to have continuous flow of supply, of raw material, semi finished goods, consumables etc. in the production line without any interruption. Identification of items, the required quantities and intervals of supply for ARS was forecasted by analysing the previous consumptions but regularly amendment during the course of production and supply. Mostly fast moving items with low cost were included in the ARS but there are some slow moving items also finds place in the ARS due to the definite requirement in regular intervals. High vigilance is warranted in ARS to avoid sudden breakdowns in the production line or surplus inventory as both are affecting company’s exchequer. Due to globalization and advancement in technology ARS is giving way to Collaborate Planning Forecasting Replenishment (CPFR).

To have CPFR the company should have effective communication system stretching from the supplier to the distributor and customer. For the introduction of the CPRF the buffer-stock in each level ie. Suppliers, Production line, semi-finished goods store, finished goods store, retailers demands etc. have to be assessed as per the expected sales and transportation lags. The communication system in B2B and B2C enables to pass information to all levels once customer demands an item at a time without any time delay. It means if there is a demand of finished product from the customer, the suppliers of the raw materials to the company will be supplying materials according to the demand placed by the customer for finished goods with receiving any direction or demand from the company or production line. Such an automated system has been developed so as to reduce inventory and established JIT. In the present business scenario the goods are produced not on the basis of past sales experience or forecast but on the actual demands placed by the customer.
Inventory Management

CPFR is designed with inventory tools like Economic Order Quantity and Lead time analysis. The meaning of inventory is stock of goods or a list of goods. As per usage point of view inventory includes:-

- **Tools:** includes fixtures, dies, patterns, gauges and hand tools used with machines and operations.
- **Supplies:** these are the items such as abrasive, lubricants used to aid production but do not get into the product.
- **Raw materials:** these are commodities such as steel, lumber, fabric etc. And purchased parts such as gears, pistons etc. That go into the final product.
- **Goods in process:** these are materials that have been partly fabricated but are not yet completed.
- **Finished goods:** these are completed items ready for shipment.

The raw materials and the finished goods will come in and go out from the intermediaries of supply chain. Hence types of inventories can be

- Raw material and supplies inventory
- Finished product inventories
- Maintenance repair and operation (MRO) inventories
- In process inventories
- Production inventories
- Dealers stock
- Material on transit
- Anticipation inventories
- Fluctuation inventories
- Lot size inventories
- Transportation inventories

The main objectives of inventory management are operational and financial. The operational objectives mean that the materials and spares should be available in sufficient quantity so that the work is not disrupted for want of inventory. The financial objective mean that investment in inventories should not remain idle and minimum working capital should be locked in it.
EOQ

ECONOMIC ORDER QUANTITY (EOQ). A decision about how much to order has great significance in inventory management. The quantity to be purchased should neither be small nor big because of buying and carrying cost of materials very high. EOQ is the size of the lot to be purchased which is economically viable. The quantity of material which can be purchased at minimum cost. EOQ is the point at which inventory carrying cost are equal to order costs. In determining EOQ, it is assumed that costs of managing inventory is made up solely of two parts, i.e. Ordering cost and carrying costs.

ORDERING COST. These are the costs which are associated with the purchasing or ordering of materials. These costs include:- Costs of staff posted for ordering of goods. A purchase order is processed and then placed with suppliers the labour spent on this process is included in ordering costs. Expenses incurred on transportation of goods purchased. Inspection costs of incoming materials. When the items are purchased from outside then it will be known as buying cost. If the materials are manufactured in the same concern then these costs will be known as set-up costs. The ordering costs are totaled up for the year and then divided by the number of orders placed each year.

CARRYING COST. These are the costs for holding the inventories. These costs will not be incurred if inventories are not carried. These costs include:- The cost of capital invested in the inventories, an interest will be paid on the amount of capital locked up in inventories. Costs of storage which could have been used for other purposes. Inspection costs of incoming materials. The loss of materials due to deterioration and obsolescence. Insurance cost. Cost of spoilage in handling of materials.

Ordering cost increase as the number of orders increases. Carrying cost decreases as the number of orders increases. EOQ is that quantity where the total cost is minimum.
If annual demand of an item is 10000 lts, carrying cost is Rs.0.75 per ltr abd ordering cost is Rs. 150 then:

EOQ = Square root of \((2 \times 150 \times 10000)/0.75\) = 2000

NUMBER OF ORDERS PER YEAR = \(\frac{DEMAND}{ORDER SIZE}\)

= \(\frac{10000}{2000}\) = 5 ORDERS

ANNUAL ORDERING COST = \(150 \times 5\) = 750/-

AVERAGE INVENTORY LEVEL = \(ORDER SIZE / 2\)

= \(\frac{2000}{2}\) = 750/-

ANNUAL CARRYING COST = \(0.75 \times 2000 / 2\) = 750/-

THE TOTAL INVENTORY COST = ORDERING COST + CARRYING COST

= \(750 + 750\) = Rs.1500/-

ORDER CYCLE = \(12 / 5\) = 73 DAYS

Comparison

If this principle is applied in the repair and overhaul area of major components where the demand of items fluctuates, the organization may end up in over stock or under stock. To prevent under stock, the traditional organizations supply the goods in advance as per the previous data. This system is known as Automatic Replenishment System. In order to avoid surplus stock they were very vigilant on the previous data (the old orders), but still items were held on the stores. ARS reviews were made by classifying the stores in Fast Moving, Normal Moving, Slow Moving and Dead Moving (FNSD). Still we found that even after many reviews we used to have many dead moving items.

Challenges

CPFR in the area of major overhaul and repair is challenging as the demand of parts fluctuate from product to product. Demand of consumables and mandate replacement items can be forecasted whereas rest must be supplied as and when required.

Movement of product during overhaul

1. Receipt
2. Dismantling
3. Paint removing
4. Cleaning
5. Visual inspection,
6. Crack detection
7. Balancing
8. Pre-assembly
9. Sub-assembly
10. Final assembly
11. Testing
12. Packing
13. Dispatch

**Methodology**

1. Codification of parts.
2. Collect the requirements at the time of receipt of the major component itself.
3. Plan the lead time according to the time required to complete the different functions in the overhaul.
4. Components which required replacement must be made available when major components reaches to sub-assembly and final assembly.

**Conclusion**

Collaborate Planning Forecasting Replenishment (CPFR) made many companies to shift from Material Requirement Planning (MRP) to Manufacturing Resource planning (MRP (II)) and to Just in Time (JIT). Whereas it is still a challenge in major overhaul sections and major repair division. Dynamic self motivated team is highly essential in this are to have an integrated planning.