

Productivity Improvement through MRP in a Manufacturing Industry-A

Anuprita Girish Kasat¹, Dr. H.M. Deshmukh²

¹Anuprita Girish Kasat, Dept. of Mechanical Engineering, Prof. Ram Meghe Institute of Technology and Research

²Dr.H.M.Deshmukh, Dept. of Mechanical Engineering, Prof. Ram Meghe Institute of Technology and Research

Abstract - Material requirements planning (MRP) is a production planning, scheduling, and inventory control system used to manage manufacturing processes. Most MRP systems are software based, but it is possible to conduct MRP by hand as well. An MRP system is intended to simultaneously meet three objectives: Ensure raw materials are available for production and products are available for delivery to customers. Maintain the lowest possible material and product levels in store Plan manufacturing activities, delivery schedules and purchasing activities. Material requirements planning is very important in production process. MRP, Equator and S&OP is launched to address the issues faced and to improve the productivity. It aims at revamping the missing link between supply side (Company A) and the demand side(customers). It is to design and implement the business processes to support Closed Loop Planning which help resolve complaints about inflexibility arbitrary and capricious vendor. This creates competitive environment to become cheaper, faster, more reliable and more flexible.

Key Words: Material requirements planning, planning, scheduling, inventory control, cheaper, faster, more reliable, flexible.

1. INTRODUCTION

Material requirements planning (MRP) is a system for calculating the materials and components needed to manufacture a product. It consists of three primary steps: taking inventory of the materials and components on hand, identifying which additional ones are needed and then scheduling their production or purchase. In the manufacturing industry, technological complexity is ever increasing. Products come out a few months ago would be outdated nowadays and be replaced by another newcomer. This process repeats itself indefinitely, but every time, the product life cycle shortens. With the advance of the knowledge. Technology is also easily and quickly replicated. What one achieves right now would be matched and even be surpassed later. Complacency should not appear even for a short while, in this industry. It is in this breath-holding background that I intend to explore how a typical manufacturer and supplier serves this industry & maintains its competence, or even outperforms other suppliers. Company A is a global manufacturing corporation, with head located in US. Which specializes in designing, producing and selling a Wide variety of electronic components for the mega electronic equipment producers. A Research corporation has done a survey which found that customer from Corporation

A were extremely dissatisfied. In fact, they have suffered two allocation events which they have adopted A's products into their design but received limited cargo. Some even received nothing and were forced to redesign their products to adapt other vendors' parts. A major customer once complained: Corporation A is the most inflexible, arbitrary and capricious vendor among my supplier list. Other vendors become cheaper, faster, more reliable and more flexible.

1.1 RESULTS OF THE SURVEY

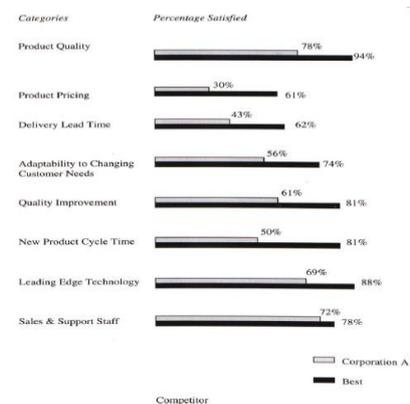


Figure 1.1 Survey Results on the performance index of Corporation A compared with the best performed company in the semiconductor industry.

Results of the survey is generalized in Figure, in comparison with the leader in this field.

1.2 SUPPLY CHAIN OPTIMIZATION

The few key components for supply chain which impact productivity. Material requirements planning (MRP) is a planning and control system for inventory, production, and scheduling. MRP converts the master schedule of production into a detailed schedule, so that you can purchase raw materials and components. Used mostly in the manufacturing and fabrication industries, this system is a push type of inventory control, meaning that organizations use forecasting to determine the customer demand for products. The manufacturing company will forecast the amount and type of products they will purchase, along with the quantity of materials to produce them. They then push the products to the consumers. This contrasts with a pull system, where the customer first places an order. The main disadvantage of a push system is its vulnerability when sales vary. In this scenario, the forecasts become inaccurate, which for manufacturing, cause either a shortage of inventory or an excess of inventory that requires storage.

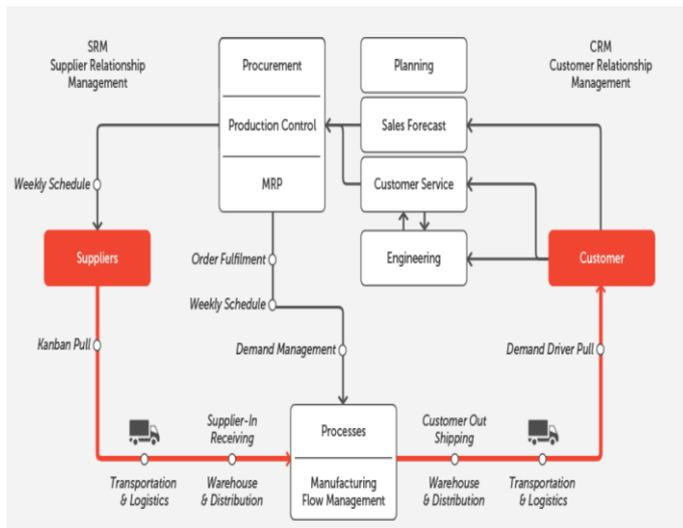


Figure 1.2 supply chain Optimization

which helps a business keep the information of all its customers, leads and prospects stored and organized in one place. In addition to this, a CRM solution allows a business to track all customer interactions.

2.1 SUPPLIER RELATIONSHIP MANAGEMENT

Supplier relationship management is the systematic, enterprise-wide assessment of suppliers’ assets and capabilities with respect to overall business strategy, determination of what activities to engage in with different suppliers, and planning and execution of all interactions with suppliers, in a coordinated fashion across the relationship life cycle, to maximize the value realized through those interactions. The focus of SRM is to develop two-way, mutually beneficial relationships with strategic supply partners to deliver greater levels of innovation and competitive advantage than could be achieved by operating independently or through a traditional, transaction purchasing arrangement. SRM necessitates a consistency of approach and a defined set of behaviors that foster trust over time. Effective SRM requires not only institutionalizing new ways of collaborating with key suppliers, but also actively dismantling existing policies and practices that can impede collaboration and limit the potential value that can be derived from key supplier relationships. At the same time, SRM should entail reciprocal changes in processes and policies at suppliers. A review approach utilizing the Materials Resource Planning (MRP), a closed loop planning system, in the corporation is expended. I will explore the constituent processes e.g., Sales & Operations Planning, Rough Cut Capacity planning, etc. in Equator. Data and information are collected from website and study material. Several milestones such as cycle time, inventory, margin parameters are set up to measure its performance. Comparisons with the past data will act as criteria to determine whether improvement or deterioration of goals against results.

2.2 Study On Implementation of Material Requirement Planning (MRP) in manufacturing and Small Sized Industries

In Today’s extremely challenging and expensive market, industries have to fulfill the customer satisfaction. One of the most significant measures of the quality of service is that the industry delivers the ordered item in time. Orders delivered after a guaranteed due date will result in lost customer goodwill and ultimately in lost market share. This is particularly true and implement for small scale industries whose business is based on producing a special product to customer specification rather than on producing standardized Parts to stock. To resolve this Material Requirement Management (MRM) played an important role in any manufacturing system. Calculations for the quantity of raw materials are to be ordered and the period of time in which to be ordered requires processing of massive amount of data needed from the various manufacturing functions.

2. CUSTOMER RELATIONSHIP MANAGEMENT

MRP synchronizes the flow of materials, components, and parts in a phased order system, considering the production schedule. It also combines and tracks hundreds of variables, including:

- Purchase orders
- Customer orders
- Expedited orders
- Due dates
- Forecasts
- Marketplace demand
- Material
- Inventory
- Bill of material

For all companies, MRP has a few goals in common. These include making sure that the inventory level is at a minimum, but high enough to provide for the customer need, and that you plan all of the activities, including delivery, purchasing, and manufacturing. CRM is an abbreviation for Customer Relationship Management. It’s a system used to build and manage customer relationships. When you hear people talk about CRM, they might refer to the overall strategy of customer relationship management. Its goal is to increase sales and profitability, create long-lasting relationships with customers, and increase customer retention. It focuses on putting the customer first and delivering a better, more personalised customer experience. On the other hand, people often use ‘CRM’ for the technology,

For the efficient functioning of the system, reliable and accurate information are necessary. Almost, all industrial organizations use materials to produce goods and services, which constitute the biggest single element of the cost. For efficient functioning, reliable and accurate information have to be made available to various departments of the industry. This can be made possible only by the use of computer based information and its systems. MRP system development in production engineering has been the area of interest in recent years. Inventories of raw materials have an important role in plant operations. The raw material is a major factor in the company to support the smooth process of production, because the raw material has a direct effect on company profits. Error in determining the amount of raw material inventory investment will press its advantage. One method in the management of inventory is Material Requirements Planning (MRP), which at first is a method of ordering material. Current MRP method has been used as a tool of planning and omission of management functions. Manufacturing industry is one industry that has its own characteristics which the material, production and production should be scheduled in a timely manner. But in reality on the ground often experienced difficulties relating to the provision of material processes. As one method of inventory planning has developed a method of Material Requirements Planning (MRP). This method has been widely used especially in the manufacturing and medium scale size industry. The research shows that there is need to collect the data and all applicable factors related to the implementation of Material Requirements Planning (MRP) in manufacturing and small industrial industries. The MRP system development is carried out for the resolve (a) To know the gross requirement (b) Determine Lot Sizes (c) Net requirement Plan (d) Planned order of a particular part (item code) in a particular period of time. The main theme of Material Requirements Planning (MRP) is getting the right materials to the right place at the right time. The factors should be carried out if the company wants to compete and can continue to improve corporate profits. In addition the company must be careful because of the decrease of these factors can lead to the implementation of Material Requirements Planning (MRP) that will hurt the company.

2.3 IMPACT OF SUPPLY CHAIN MANAGEMENT ON PRODUCTIVITY IN MANUFACTURING INDUSTRY

The most effective supply chains deliver products as fast and as cheaply as possible without sacrificing quality. Top companies accomplish this by using complicated logistics tools, such as computer algorithms that choose optimal routes for product shipping and large company databases that allow distant employees to pool order information and coordinate their efforts in real time. How Does Supply Chain Management Affect Manufacturing Companies? Supply chain management is a systematic approach to managing the distribution of goods from producers of raw materials, through manufacturers and eventually down to end users. Supply chain management affects manufacturing companies

in a variety of ways, including the availability of inputs needed for production processes, costs and profitability of manufactured items, company infrastructure and ways in which companies interact with their suppliers and customers. Understanding the ways that supply chain management affects manufacturers from both a daily operational perspective and a strategic viewpoint is Important for all managers and entrepreneurs in the industry. Supply Chain management constitutes the series of interdependent upstream, manufacturing and downstream processes targeted at transforming raw materials into products to meet customer demand

2.4 POSITIVE IMPACT OF SUPPLY CHAIN MANAGEMENT

1) Inventory Management

Management of inventory has received considerable attention over the years due to improving customer service, hedging against price changes & contingencies, achieving production, purchase & transportation economies, protecting against demand & lead time uncertainties and balancing supply & demand. Stock holding of seasonal products, which are slow moving, critical, perishable and whose peaks are relatively predictable are to be minimized, building them only during peak demand period. Fad products with highly unpredictable level of demand, high criticality and long lead times, essentially must hold high level of stocks thereby allowing safety margin for delivery, lead times and demand fluctuations.

2) Information Sharing and Technology

Adjusting to changing environmental conditions requires effective information acquisition and processing. The hard data generated by modern information technology in combination with the "qualitative" information collected by SCM provides the means for cross functional teams to respond resourcefully to the environment. Modern information systems are based on material flows and logisticians are well positioned to collect, act on and disseminate information concerning customer needs across the supply chain. Information is a driver whose importance has grown as organisations have used it to become more efficient, responsive and profitable. It serves as a connection between the various stages of supply chain allowing them to coordinate their actions and schedule daily operations. However, the choice of IT system needs to make the trade-off between the cost of information (a reduction in efficiency) and the responsiveness that information creates in the Supply Chain.

3) Quality Management

Quality is an important factor in the value adding process involved in the production and delivery of products along the supply chain. In addition, by making quality management an integral element of the supply chain, companies can avoid

being simply reactive to the requirements of their supply chain customers and can strive to meet their demands more proactively. Quality management in SC assists in building relationship with the customers for improvements in profitability, serviceability, reduced costs in the supply chain and improvement in business performance by enhancing customer satisfaction & customer loyalty.

4) Customer Satisfaction

Developing customer satisfaction with product quality is a valuable and profitable way for competitive advantage. Customer expectations have ascended to very high standards and it becomes crucial for the marketer to retain & build long term relations with customers. Companies through effective supply chain management are focusing on revenue increasing methods, cost reduction and improving customer satisfaction. The supply chain management assists in fulfilling the demand and place needs of its customers and builds relationships between channel members with focus on their long term retention.

3. CONCLUSIONS

Independent demand is demand originating outside the plant or production system, while dependent demand is demand for components. The bill of materials (BOM) specifies the relationship between the end product (independent demand) and the components (dependent demand). MRP takes as input the information contained in the BOM. The basic functions of an MRP system include: inventory control, bill of material processing, and elementary scheduling. MRP helps organizations to maintain low inventory levels. It is used to plan manufacturing, purchasing and delivering activities."Manufacturing organizations, whatever their products, face the same daily practical problem - that customers want products to be available in a shorter time than it takes to make them. This means that some level of planning is required."Companies need to control the types and quantities of materials they purchase, plan which products are to be produced and in what quantities and ensure that they are able to meet current and future customer demand, all at the lowest possible cost. Making a bad decision in any of these areas will make the company lose money. This paper drives the Productivity Improvement by using through practices and tools like MRP Implementation, S & OP and Equators. It also gives the concept guidelines to work on the same which avoid, people will apply Factory X rules when interfacing with Factory Y and hence chaos will result which will lengthen the cycle time as well as draining the resources. With the implementation of a unified standard, the procedure is drastically simplified and become more systematic. Besides, with the establishment of the S&OP meeting every month, an agreed upon set of number is presented to all parties concerned. Thus, conflicts can be resolved at an early stage and each business unit will base on one set of number to work on. Goal convergence can be

achieved. Customer needs like on time delivery, services level will meet. In case of any lead time issue can be identified and proactively communicated to customers which resulting into customer satisfaction and on time product availability. This will also support sourcing and pricing requirements. Implementing S & OP and Equators will help to carry optimum inventory which help support customer urgent needs and increase the cash flow and support organization. It also reduces down cycle time and optimize the plant capacity.

REFERENCES

- [1] Hill, Terry. Production/ Operations Management. 2nd ed. Englewood Cliffs. New Jersey: Prentice Hall, 1991 .
- [2] Williams, Glyn., and Harvey, Bruce. Manufacturing Resource Planning. The Oliver Wight Companies, 1995.
- [3] Schonsleben, P. (2004), Integral Logistics Management, The St. Lucie Press, Boca Raton
- [4] James R. Ashby Scheduling and order Release, (1995)

BIOGRAPHIES



Dr.H.M.Deshmukh

Associate professor & Dean (academics) Dept. of Mechanical Engineering, Prof. Ram Meghe Institute of Technology and Research



Anuprita Girish Kasat.
B.E in Mechanical engineering
Pursuing M.E in production technology and management