

## Overview of MRP-I and MRP-II

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**Abstract** - MRP-I is a technique that gives us the in detail requirement of the raw material and components to be used in the final product. It identifies the right quantity of each raw material and component item. In industries, the requirement of material is in large scale and it becomes difficult to keep a track of requirement and purchase. By the use of this technique, the production and delivery lead times can be reduced. The outcome of which would be realistic commitments to the customer enhancing the customer satisfaction. This can bring close the potential customers. Moreover, excess inventory wouldn't be ordered. MRP-II is a system which uses one unified database to plan and update all the activities of all systems. It can be a part of marketing or purchase information systems. It serves as a game plan for operations. It enables us to find the optimum strategy for the production. It is the impetus for a new generation of manufacturing planning and control systems.

**Key Words:** MRP-I, MRP-II, inventory, marketing, purchase.

### 1. INTRODUCTION

Material Requirements Planning (MRP) is a computer-based production planning and inventory control system. MRP is concerned with both production scheduling and inventory control. It is a material control system that attempts to keep adequate inventory levels to assure that required materials are available when needed. MRP is applicable in situations of multiple items with complex bills of materials. Although it is not common nowadays, it is possible to conduct MRP by hand as well. MRP is especially suited to manufacturing settings where the demand of many of the components and subassemblies depend on the demands of items that face external demands. MRP systems were developed to cope better with dependent demand items.

Manufacturing Resource Planning (MRP II) is an integrated information system used by businesses. Manufacturing Resource Planning (MRP II) evolved from early Materials Requirement Planning (MRP) systems by including the integration of additional data, such as employee and financial needs.

The system is designed to centralize, integrate and process information for effective decision making in scheduling, design engineering, inventory management and cost control in manufacturing. MRP II is a computer-based system that can create detail production schedules using real-time data to coordinate the arrival of component materials with machine and labor availability.

MRP II is used widely by itself, but it's also used as a module of more extensive enterprise resource planning (ERP) systems.

### 2. HISTORY AND EVOLUTION

Material requirements planning (MRP) and manufacturing resource planning (MRPII) are predecessors of enterprise resource planning (ERP), a business information integration system. The development of these manufacturing coordination and integration methods and tools made today's ERP systems possible. Both MRP and MRPII are still widely used, independently and as modules of more comprehensive ERP systems, but the original vision of integrated information systems as we know them today began with the development of MRP and MRPII in manufacturing.

MRP (and MRPII) evolved from the earliest commercial database management package developed by Gene Thomas at IBM in the 1960s. The original structure was called BOMP (bill-of-materials processor), which evolved in the next generation into a more generalized tool called DBOMP (Database Organization and Maintenance Program). These were run on mainframes, such as IBM/360.

The vision for MRP and MRPII was to centralize and integrate business information in a way that would facilitate decision making for production line managers and increase the efficiency of the production line overall. In the 1980s, manufacturers developed systems for calculating the resource requirements of a production run based on sales forecasts. In order to calculate the raw materials needed to produce products and to schedule the purchase of those materials along with the machine and labor time needed, production managers recognized that they would need to use computer and software technology to manage the information.

Originally, manufacturing operations built custom software programs that ran on mainframes.

Material requirements planning (MRP) was an early iteration of the integrated information systems vision. MRP information systems helped managers determine the quantity and timing of raw materials purchases. Information systems that would assist managers with other parts of the manufacturing process, MRPII, followed. While MRP was primarily concerned with materials, MRPII was concerned

with the integration of all aspects of the manufacturing process, including materials, finance and human resources.

Like today's ERP systems, MRPII was designed to tell us about a lot of information by way of a centralized database. However, the hardware, software, and relational database technology of the 1980s was not advanced enough to provide the speed and capacity to run these systems in real-time, and the cost of these systems was prohibitive for most businesses. Nonetheless, the vision had been established, and shifts in the underlying business processes along with rapid advances in technology led to the more affordable enterprise and application integration systems that big businesses and many medium and smaller businesses use today.

### 3. MRP-I

MRP is a tool to deal with these problems. It provides answers for several questions:

- What items are required?
- How many are required?
- When are they required?

#### 3.1 Objectives of MRP

An MRP system is intended to simultaneously meet three objectives:

- Ensure 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.

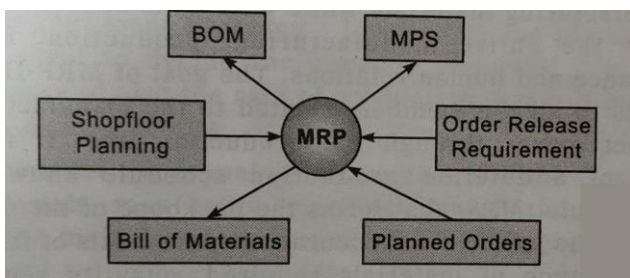


Figure -1: fields of MRP-I

#### 3.2 Benefits of MRP

- Better control of inventories
- Improved scheduling
- Productive relationships with suppliers

For design / engineering:

- Improved design control

- Better quality and quality control

For financial and costing:

- Reduced working capital for inventory
- Improved cash flow through quicker deliveries
- Accurate inventory records

### 4. MRP-II

It includes all the activities required for the manufacturing purpose. It is the method for effective planning of all the resources of the manufacturing company. Ideally, it represents operational planning in units, financial planning, and simulation capability. It is also extension of closed loop MRP.

MRP-II system is implemented in order to regulate and carry out the effective functioning of the plants and organizations as a whole. It is concerned with the integration of the aspects of manufacturing processes, including materials, finance and human relations. It gives a centralized information of all the databases and activities carried out in the organization.

The MRP-II system begins with MRP-I i.e. MRP-I is concerned primarily with the manufacturing materials while MRP-II is concerned with the coordination of the entire manufacturing, production, including the materials, finance and human relations. The goal of MRP-II is to provide consistent data to all members related to the manufacturing process as the product moves forward in the production line. It facilitates the development of a detailed production schedule known as master production schedule (MPS) that forms a backbone of the manufacturing system.

It gives the specific and accurate requirements of facilities on the shop floor, the type of materials required, quantity required on the production line, the number of labor involved for that particular product, the sequence with which it will move on the line and time required for manufacturing.

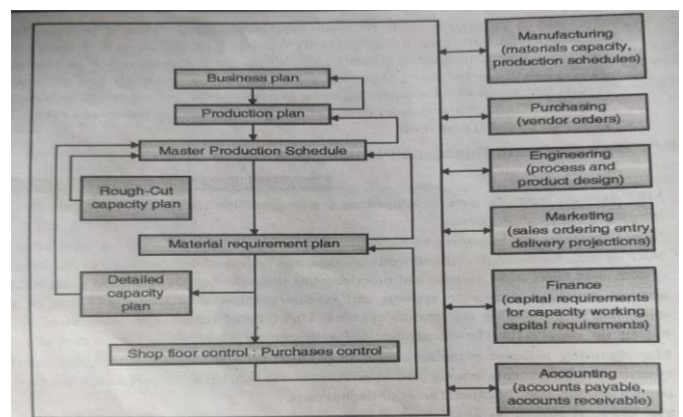


Figure -2: MRP-II an integrated system for planning and control

#### 4.1 Features of MRP-II

(1) Master Production Schedule (MPS): It provides the detailed information about the manufacturing steps to be followed for the product planned. It specifies the stages in which the parts will move on the production line.

(2) Item Master Data (Technical Data): It represents the specifications required for making the products, flow of materials on the shop floor, the plan made for its marketing at the dispatch. It also gives technical knowledge on the product mix for effective plant functioning.

(3) Bill of Materials (BOM): It provides information like the final assembly of the product, material used for making the various parts, the quantity of each part to be manufactured. It also mentions the number of parts in the final product showing specifications and quality control aspects for the various parts during assembly.

(4) Production Resources Data: It gives the procedures to be followed like type of tooling, type of tooling materials required and also machine specifications for production.

(5) Inventories and orders: It provides the statistics for inventory control management and ordering steps (duration) followed for production.

(6) Purchasing Management: It represents the planning section to plan for the purchases to be made for a particular product and quantity within which it would be profitable for the organization.

(7) Shop Floor Control: It is mainly concerned with the flow line or production line that straight away shows the status of the company at the planning stage. It is mainly required to control the quantity and quality of products during production.

(8) Capacity Requirement Planning: It specifies the planning made, for the entire plant to decide the capacity that will give process specifications and also the rate of production that will make the plant capable for making profits.

(9) Cost Management: It is mainly concerned with the financial costing of the materials, man hours, and machines, purchasing, marketing and sales. It's the main foundation upon which the manufacturing of the plant stands.

#### 4.2 Advantages of MRP-II

(1) It provides centralized information for the activities carried out in the plant.

(2) The entire product planning can be made with respect to the data given at the customer level.

(3) It receives the customer requirements right from the input data and processes the same for designing stages.

(4) It exactly plans the quantity and type of materials required during production by coordinating with purchase department.

(5) It decides the number of man-hour rates for manufacturing the product.

(6) It gives the exact period of production for complex parts, so that the maximum estimation for a particular process can be decided.

#### 4.3 Disadvantages of MRP-II

(1) Initial investment for the setup of the operational activities is costly.

(2) It is a very lengthy and time consuming process.

(3) There must be a fully dedicated staff for planning the activities and timely execution of the same.

(4) The initial processes of MRP-I must be full proof for timely execution of data.

#### 5. CONCLUSIONS

By using the Material Requirement Planning (MRP-I), it becomes feasible for the manufacturer to procure the right quantity of components on the right time thereby avoiding cost of excessive inventory. Also having the right material at right time reduces the production and delivery lead times. This in return increases the customer relations.

Manufacturing Resource Planning (MRP-II) is a game plan for operations. It provides transparency to the process. The development of the process can be checked at any stage. Moreover the reports of any stage can be generated like planned order release, delay shortages, purchase and shop ordered. It also enables us to get the revised action report on revision of activities. Both the techniques gives us the ability to be flexible around processes and revise them as per the need make it more feasible to use.

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