

**IMPLEMENTATION OF  
MANAGEMENT MODELS IN  
INFORMATION SYSTEMS**  
**MRP AND MRP II**

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There are **4 main management models**, which eventually have evolved into each other:

1. **MRP** (Material Requirements Planning)
2. **MRPII** (Manufacturing Resource Planning)
3. **ERP** (Enterprise Resource Planning)
4. **CSRP** (Customer Synchronized Resource Planning)

## ***Material Requirements Planning (MRP)***

**MRP (Material Requirements Planning) methodology** is a set of approaches to optimally regulate the supply of components in the production process.

**MRP main task** is to ensure the availability of the necessary

number of required components, materials at any time during the term planning while reducing permanent inventory warehouses and trucks.

**MRP system** is mainly used when the demand for the output material resources is highly dependent on consumer demand for final products. MRP system can work with a wide range of material resources.

The first MRP systems of inventory management evolved in the 1940s and 1950s. They used mainframe computers to explode information from a bill of materials for a certain finished product into a production and purchasing plan for components. Before long, MRP was expanded to include information feedback loops so that production personnel could change and update the inputs into the system as needed.

According to the definition of the **American researcher John Orliski**, one of the leading developers of MRP system "**MRP (system MRP)** in the narrow sense consists of a **series of logically related procedures**, decision rules and requirements that contribute to production schedule, "chain requirements", **that are synchronized in time** and planned coverage of the requirements for each of the supply of components needed to perform the schedule. The **system MRP**

**replans sequence of requirements and coverage** as a result of changes in production schedule or in the structure of reserves, or the characteristics of the product" .

**The information input into MRP systems** comes from three main sources: a bill of materials, a master schedule, and an inventory records file.

- ***The bill of materials*** is a listing of all the raw materials, component parts, subassemblies, and assemblies required to produce one unit of a specific finished product. Each different product made by a given manufacturer will have its own separate bill of materials.
- ***The master schedule*** outlines the anticipated production activities of the plant. Developed using both internal forecasts and external orders, it states the quantity of each product that will be manufactured and the time frame in which they will be needed.
- ***The inventory records file*** provides an accounting of how much inventory is already on hand or on order, and thus should be subtracted from the material requirements. The inventory records file is used to track information on the status of each item by time period. This includes gross requirements, scheduled receipts, and the expected amount on hand. It includes other details

for each item as well, like the supplier, the lead-time, and the lot size.

Demand\*  
forecast

Master\*  
production\* +  
schedule

Firm^  
orders

I

Inventory\*  
master\*  
file

MRP\*  
system

.  
"

Bill of\*  
materials-  
file

Planned\*  
order release\*  
report

Change reports\*  
exceptions reports  
etc.

Using information culled from the bill of materials, master schedule, and inventory records file, an MRP system determines the net requirements for raw materials, component parts, and subassemblies for each period on the planning horizon. MRP processing first determines gross material requirements, then subtracts out the inventory on hand and adds back in the safety stock in order to compute the net requirements.

### *Advantages of MRP*

The advantages of using MRP in manufacturing management and production planning come directly from the very nature of it:

- Availability of the right materials required for production, on time
- Little, if any, excess inventory

- Timely delivery of manufactured goods to your customers
- Optimal use of manufacturing resources
- Decrease in capital cost due to decreased inventory levels and optimal use of production resources
- Collecting the business data for analysis and better planning

### ***Disadvantages of MRP***

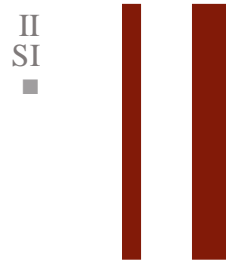
- High costs and technical complexities in implementation. In addition, organizations, which use an MRP system need to spend considerable effort on installing necessary equipment (computers), training personnel, modifying the software to serve their specific needs, validating, testing, and eliminating possible errors, and maintaining the software.
- The time required for planning and implementing an MRP system is generally very long.
- Data entry and file maintenance requires considerable inputs in the form of training and education of the personnel.
- Dependence on forecast values and estimated lead-time can sometimes be misleading.



*The implementation of an MRP system can be effective only when there is a high degree of accuracy in the organization's operations. It requires high commitment from the top management of an organization.*



# Manufacturing Resource Planning



**Manufacturing Resource Planning (MRP II)** is an integrated information system used by businesses. Manufacturing resource planning (MRP II) is defined as a method for the effective planning of all resources of a manufacturing company. It evolved from early Material Requirements Planning (MRP) systems by including the integration of additional data, such as employee and financial needs.

*MRP II Standard System contains a description of the 16*

## *groups of system functions:*

- Sales and Operation Planning,
- Demand Management,
- Master Production Scheduling.,
- Material Requirement Planning,
- Bill of Materials,
- Inventory Transaction Subsystem,
- Scheduled Receipts Subsystem,
- Shop Flow Control,
- Capacity Requirement Planning,
- Input / output control,
- Purchasing,
- Distribution Resource Planning,
- Tooling Planning and Control,
- Financial Planning,
- Simulation,
- Performance Measurement.

The aim of the information systems of class MRP II is an optimal formation of the flow of materials (raw materials), semi-

finished products (including in process) and finished products.

In the basis of the MRP II is put a hierarchy of plans. Plans for the lower levels depend on the plans of higher levels, that is top-level plan provides input data, the envisaged performance and / or any restrictive framework for lower-level plans. Furthermore, these plans are interconnected so that the results of lower level plans have an inverse effect on higher level plans.

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## **Principles of MRP II:**

In systems MRPII class has the following basic principles:

- build hierarchical IS - the division of planning at the level corresponding to the areas of responsibility of different authorities;
- Integration of IS management functions - a single information space for various activities related to

material and financial flows within the planning horizon;

- interact managerial staff for simulation management solutions in the IS.

### **Advantages of MRP II**

- fully meet consumer demand, which is achieved by reducing the length of production cycles, reduce inventory, better organization of deliveries, faster response to changes in demand;
- MRP II system provides great flexibility of planning and reduces logistics costs of inventory management.

### **Disadvantages of MRP II**

- lack of integration with the processes of financial management and personnel;
- focus on existing orders (special complex tasks with no demand forecasting);

- weak integration with design and construction (design and technological preparation of production).

In recent years, many countries have made attempts to create a combined system for mutual deficiencies inherent in each of these systems separately. Modern microprocessor technology and software is allowed to test in practice logistics system based on the scheme of MRP II, in real time, with a daily update database, which greatly increased the efficiency of planning and material management.

Some Western scholars call them **MRP III**, meaning by their system, which is a combination of systems MRP II, used for planning and demand forecasting, sales and procurement, and systems KANBAN - for operational management.