MRP I SYSTEMS AND MRP II SYSTEMS

MRP I AND MRP II SYSTEMS: RESOURCE PLANNING

For many companies, the material management used in their productive process, to produce the products it manufactures, is an important problem. We are talking about the companies that use a high number of different raw materials and components to produce the different products they manufacture.

This material management, constituting the stocks the company should manage, is a strategic factor. The company should always have the required materials and components available but it also has to try to reduce its material stock, which means:

- A strong investment on materials and components
- The need of a physical space in the plant itself or in other placements.
- Manpower costs to manage the warehouses
- Expenses due to loss, damage and obsolescence of raw materials and components.

The question, thus, is: how can we act to always have the required materials reducing, on the other hand, the stock in the raw material and component warehouses?

Planning the material requirements should be the solution to this problem.

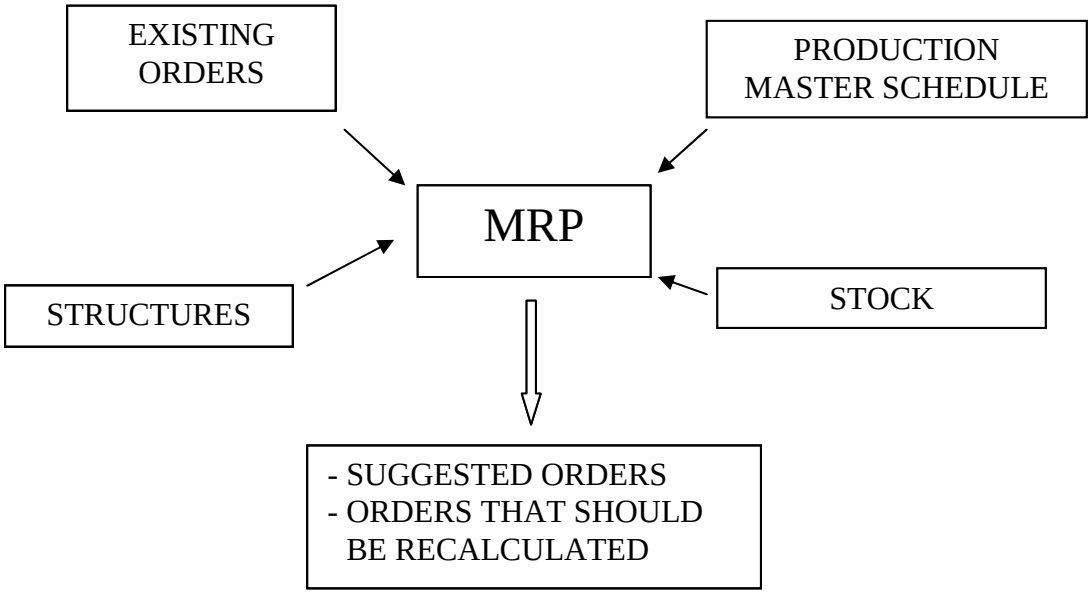
1. MATERIAL REQUIREMENT PLANNING MRP I SYSTEMS

MRP I acronym stands for Material Requirement Planning. Thus, when we talk about the MRP I systems, we are talking about computing systems which calculate the material requirements of a company at any time.

These systems appeared in the 60s, linked to the development of computing systems of industrial use and cannot be conceived without the use of computing systems including important databases.

1.1 HOW DOES A MRP I SYSTEM WORK?

Its operation is very logical:



Let us think about the information we would need to try to determine our material requirements. What inputs will the system require?

PRODUCTION MASTER SCHEDULE:

We need to know what we are going to manufacture at any time and the amount. This information is given by the production master schedule.

Our manufacturing requirements (which we will have calculated basing on sales expectations or definite orders) could be, for example:

Products\Date	01-Apr	08-Apr	15-Apr	22-Apr
Product "P1"	240 units	220 units	260 units	200 units

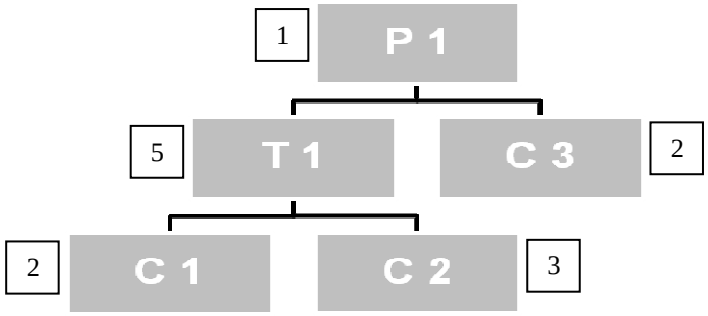
As we can see in the example, in this case, we would say that on the first week of April we need to manufacture 240 units of the product "P1", the second week 220 units, the third 260 units and the fourth 200 units.

STRUCTURES

Let us think a bit. To determine the raw materials and the components we are going to require, we need to know what the products we manufacture are made of and which components they have.

This information is the Product Structure File (Bill of Materials), where there are the links between each product and its components.

Thus, we can represent the structure of a product as shown in the diagram below:



In this case, the structure indicates that product P1 (finished product) is composed of 5 units of the subassembly T1 and 2 of the component C3. Each unit of subassembly T1 is, in turn, made of 2 units of component C1 and 3 units of component C2.

STOCK

What would happen if when calculating the material requirements we needed a material we already have in stock in our warehouse? Would we purchase more quantity?

Obviously, if our objective is to reduce the levels of raw materials and components, before purchasing a material, we will check if we have it on

stock in our warehouse. In order to that, our system should always have updated information about the stock level of each reference available in warehouse and it will also have to know, for each reference: the safety stock, the manufacture or replacement, depending on whether we manufacture or purchase the item, the percentage of faulty items we have in the operation where we manufacture this reference and the size of the manufacture lot.

PRODUCTS	SFT STOCK	MANUF TERM	% FAILURES	AVAIL STOCK	LOT
P1	5	1	0	3	M5

In this case, the product P1 has a safety stock of 5 units, a manufacturing term of 1 week, 0% failures in the manufacture process, available stock of 3 units and every time we manufacture the product P1, we will do it in multiples of 5 units.

EXISTING ORDERS

It is possible that we do not have stock of one reference in warehouse, but it is expected to have certain quantity of this reference soon (corresponding to a manufacture or purchase order that is going to be received). Logically, we should take into account if it is expected to receive a material when calculating the quantity we are going to order.

1.2 WHAT INFORMATION DOES MRP I SYSTEM OFFER US?

From what we want to manufacture (PRODUCTION MASTER SCHEDULE), the information about the materials and components that form the products we are willing to manufacture (STRUCTURES) and from the information about our stock level (STOCK and EXISTING ORDERS), MPR I system calculates when we have to make a purchase order for the materials and components we purchase from third parties and the manufacture orders for the assemblies of the final product we are manufacturing.

Next, we explain, by solving an exercise, how MRP I systems work.

1.3 BENEFITS EXPECTED FROM THE USE OF A MRP I SYSTEM

The most significant benefits are:

- Increase of the customer satisfaction, because more orders are delivered in time (there are no problems coming from unsuitable material management)
- Decrease of raw material and component stocks
- Decrease of overtime work.
- Increase of productivity
- Decrease of costs and therefore, increase of profit
- Decrease of lead time
- Quick detection of problems that could make it difficult to meet the schedule.

We have to point out that, following the quite simple logics of the MRP I systems operation, there are many standard software commercial versions that can be adapted to each company's requirements.