

MRP I SYSTEMS AND MRP II SYSTEMS

2.PLANNING THE MANUFACTURING RESOURCES. MRP II SYSTEMS

At the end of the 70s, the computing systems based on the idea that as it is possible to use computing systems to manage materials started developing, it is also possible to use them to manage other manufacturing resources.

The new systems developed to solve these problems are called MRP II, acronym that stands for Manufacturing Resources Planning.

2.1. THE SYSTEMATICS OF MRP II

The problems that try to help us manage the MRP II systems are linked with the limits of the manufacturing resources in the company (machines, tools, manpower...) to define the production capacity of our system.

Thus, one of the main features of MRP II systems is that they are aimed at determining, from data regarding the operation times we should introduce in the system, the workload the manufacture orders suggested would mean in each working centre.

This possibility allows using the MRP II systems as a simulation tool, letting the planner two possibilities of performance:

- Change the Master Schedule, delaying or anticipating some order (which would involve some changes in the possible delivery dates).
- Change the production capacity of the resources with higher workload (working overtime, working double shifts, sub-contracting some tasks...)

These two possible ways of performance correspond with what is technically called infinite capacity planning and finite capacity planning.

- Infinite capacity planning: the system calculates the loads in each working centre from the production Schedule. In the case of overloaded working centres, the planner changes "by hand" the production plan or the capacity of the centres to level the work load and the production capacity.

- Finite capacity planning: the system itself changes the production plan (depending on predetermined criteria) in order to eliminate the overloads in working centres. The clearest case is the one where we introduce the production schedule and the system calculates the delivery dates corresponding to each manufacture order.

(It is important to point out that not all the commercialised systems have this second possibility)

Following the systematics of MRP II systems, once the production schedule has been set after having fit the capacities, we proceed to the calculation of material requirements and the timing of these requirements (MRP I)

With this calculation, the computer will recommend to launch some purchase and manufacture orders, indicating the quantities and dates. If some of the calculated dates were before the current date, it is obvious that the expected delivery date cannot be met and the computer would generate a notice report. It would be the planner's work to review the production program if no corrective measures can be taken to have these materials available on the expected date (such as to contact with the supplier or make manufacture faster).

From the orders recommended by the system and if the data introduced in the system include the direct costs of each product, we can also make an estimation of the economic amount the company should have to face the established manufacture schedule. The file that includes the costs should be similar to the structures or bills of materials of the products we analysed to explain the operation of the calculation of material requirements. With this cost profile we can establish a new loop that would state a third restriction, apart from the already known of materials and resources availability: the availability or not of cash to make the manufacture schedule.

Once this process has been finished, we already have the calendar for manufacture and purchase orders to be sent to the workshop or the Purchase department to be launched at its due time.

Basing on the above, we can say that MRP II systems are a very useful tool in the planning, simulation, execution and control processes, whose main role is to have the production objectives achieved as efficaciously as possible, fitting the capacities, the manpower, the inventories, the costs and the production terms.

It is important to make it clear that the MRP II systems are closed loop systems. They should be periodically launched always taking into account the state of the purchase and manufacture orders launched before. Therefore, we have to introduce the data corresponding to the manufacture orders as they are being executed, and the data corresponding to the entries of the purchased material should be introduced into the system as they come.

The MRP II systems allow:

- An advanced management of the bills of material.
- Easy adaptation to the order changes.
- Optimizing the management of itineraries and working centres, with own calendars or group calendars.
- Great capacity to plan and simulate the productive processes
- Automatic calculations of the material product requirements
- Automatic execution of orders
- Reducing the inventory levels and the subsequent savings.
- Improvement of the customer service quality
- Reduction of the costs due to the rationalisation of purchases.
- Better and more rational decision making
- Possible savings of manufacture costs due to the rationalisation of the machines and manpower use.
- Reduction of extra working hours and temporary contracts.
- Better adaptation to the market demand.

Below, we include an example of a MRP II system operation for the calculation of workloads.

2.2 IMPLEMENTATION OF A MRP II SYSTEM.

2.2.1. INITIAL CONSIDERATIONS

It is important to take into account that:

1. MRP II systems are hierarchized systems, that is, there is a "planning" department, independent from the working centres, where the plans are executed.
2. They are highly computer-dependent systems and they require much information that has to be updated.
3. They require a different way of working by the staff.
4. They do not tolerate informal operation systems.
5. They are not useful for every company.

2.2.2. FACTORS THAT INFLUENCE THE IMPLEMENTATION SUCCESS

We can list the following.

1. The attitude of all the workers in front of a change in the way of managing the production: they are contrary, indifferent, they are happy with the change, etc.
2. Complexity of the bill of materials: the number of levels and components. The higher the number of levels, the greater the difficulty to implement a MRP II system.
3. Resource control: possibility of direct monitoring and command by the person in charge of the implementation project, at least for the resources that are considered as essential for the project success.
4. Production stages: the number of stages the products undergo in their manufacturing process should be clearly set.
5. Availability and reliability of the data.
6. Technical support by experts in this kind of systems throughout the whole implementation.