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Material requirements planning (MRP-I): An overview and methodology for successful implementation

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Abstract
Material Requirements Planning is a wide spread management tool which helps to control the inventory with the help of forward planning with the help of backward technique. MRP is production controlling technique. It is simply a computer based system of controlling inventory inflow and outflow. Material Requirements Planning help in preparing master production schedule which help in maintaining economic order quantity. It is not a onetime process but it is a continuous adjustment of raw materials requirements with the changes in production schedule. Material Resource Planning helps in reducing the wastage and it increases productivity as it follows Just in Time approach for the availability of Raw Material.

Keywords: Material Resources Planning (MRP), Master Production Schedule (MPS), Bills of Material (BOM), Economic Order Quantity (EOQ).

1. Introduction
MRP-1 (Material Requirements Planning) system combines control with production planning. MRP is a system of Planning and scheduling the time phased material requirement for production operations. It is a computerized production scheduling system which takes the foreword schedule of final product requirements (The Master Production Schedule) and translates it progressively into the number of sub-assemblies, components and raw materials required at each stage of the manufacturing cycle.
MRP is backward scheduling but based on forward planning as well as it is geared towards meeting end items input and to updates the material requirements on the regular basis, for determining materials required for find product. It works backward from planned quantities Master Production Schedule (MPS).

2. Aims/ objectives
MRP-1 system is computer based system of materials control following are some of the main aims of MRP-1 System

1. To determine for final products what should be produced and at what time?
2. To calculated the required production of sub-assemblies.
3. To determined the requirements for materials based on an up to date bills of materials(BOM)
4. To calculated inventories, work-in-progress batch sizes and manufacturing and packaging lead times.
5. To control inventory by ordering bought-in-components and raw materials in relation to the orders received or forecast rather than the more usual practice of ordering from stock-level indicators.

3. Methodology for Successful Implementation
MRP is a coordinated system integrating the activities of different departments in an organization like marketing, Production, Engineering, Inventory etc. further it is well balanced integration of people and the technology. Without system capabilities, the MRP installation is difficult rather impossible one. The installation without requisite competencies, understanding and acceptance by the people would be wasteful exercise. It demands total understanding and positive attitude of the users by whom it should be practically adopted.

MRP-1 mechanism is made of the following tools:

i) Production Engineering
Engineering department is required to decide about "functional design" and "product design" upon receipt of an order. During the designing stage, the conscious attempt of the designer should be to achieve the functional capabilities of the product at the lowest possible cost. The attempt should be either to improve the value of product without increasing the cost or reducing the cost without impairing the quality of the function.

ii) Master Production Schedule
Master production schedule is the backbone of MRP-1 system. It is built up from the inputs of marketing and production department. The MPS shows the quantity of each assembly and sub-assembly required for the end product and when each is to be produced starting and completion dates of processes. It ultimately governs the MRP-1 system recommended action and the timing of material flow and sub-component build ups which are geared to meet the MPS.

iii) Bills of Materials
Once the "product structure" is made showing different assemblies and sub-assemblies along with the tolerances and specifications that makes up the end product, the "bills of materials" is prepared which lists the different components along with their quantities. The bills of materials use the "explosion and aggregation technique" which explodes the product into different small assemblies and sub-assemblies.

iv) System capabilities
Information technology has very high profile in MRP-1 system. Without system capabilities the installation of the MRP- mechanism is impossible as timely updating is almost most difficult task. MRP-1 system uses system capabilities to plan routing & scheduling. Prepare bills of materials, maintain material record file and update material requirement which is at the heart of MRP-1 system.

v) Inventory file
Perpetual inventory also forms a part of MRP-1 mechanism which is managed by the system capability. An inventory record file is opened in the computer which is being updated after every change occurring in the production schedule. It contains information about order points for each time. Procurement lead time, stock level in store, stocks in pipeline and other information as well. It acts as a data bank, serving the information required for the system.

vi) Flow control
The jurisdiction of MRP-1 system does not end up at the determination of material requirements but it extends to the flow control. Flow of material and part is followed continuously to detect any delay in the movement of items so that alternative arrangements can be made immediately for the smooth flow of the production process.

vii) Capacity planning
The updating of MRP-1 system at each time gives rise to the question. "Whether shop capacity is sufficient to meet the new load?" The resolution to the question lies in "capacity planning". It is used to control production lead time and plan material requirements. In fact capacity planning is basic to material requirement planning and minimization of manufacturing lead time.

4. Requirements for implementation of MRP-1
Material Resources Planning is forward step to control over inventory with the help of backward planning. It requires due consideration for the implementation of this system. The successful implementation of material resource planning requires the following:

i) Component and committed people
Creating effective environment for MRP-1 system calls for introducing the system to all in the organization must be made to understand the system in terms of its benefits, requirements etc. seminars and workshops should be conducted on MRP-1 system before its actual introduction to make aware to people about the different aspects of the system and try to ensure them for its introduction to make aware to people should be taken care properly for adopting the system as it is somehow complex and it requires co-operation at all. A commitment by the part of the scheduler controllers, Managers, floor employees etc. are essential to make the system works successfully.

ii) Top management Commitment
Commitment of the total organization is essential for the success of MRP-1 system. In fact commitment by the top management is basic that can bring commitment & dedication in all other levels of the organization. Top management should demonstrate their commitment to MRP-1 system visibly and constantly, so that the remaining of the organization realizes that the top management is serious about it.

iii) Organizational integration
MRP-1 is a dynamic system responsive to new job order and current it is shops conditions as well as future expected changes taking place at different levels in the organization affecting control over operations. Control & manufacturing operations must be integrated to arrive at the timely and sound decision for effective functioning of MRP-1 system a proper network of communication which connects total organization into a single whole must be established.

iv) Information input
Information is considered to be the hub of MRP-1 system. Without necessary information the installation of MRP-1 system would be like a structure built on sand "i.e. useless. The information acts as a guide that holds together the requirements of MRP-1 system. In fact MRP-1 system needs accurate and timely information. The information system with accurate inventory control and product build up information is must for the success of MRP-1 system.

v) System chasing
Installation of MRP-1 system is not an end in itself, leaving the programme to chance would be unsound. The rationality lies in the monitoring of the system for unimpressive results, the real causes should be unveiled so that the remedial measures taken would surmount once for all ground realities.

5. Conclusion

From the above discussion one this is clear that the proper focus is to be given on the implementation and adopting MRP system. It gives so many advantages to the management, like detailed forecast of the inventory position produced on time to time, together with the planned order release entries enables further production to be planned more accurately and one can make better control over inventory. In simple terms Material Resource Planning is the system of inventory control with the help of backward planning for future master production schedule.

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