

CHAPTER – III

MATERIALS REQUIREMENT PLANNING

INTRODUCTION :

Materials Requirement Planning (MRP) is both an inventory control and a scheduling technique. It consists of a series of steps which start by determining what finished products are needed to meet the demand by time periods and are completed with a schedule of the finished product components needed at each assembly level for each time period.

Conventional Inventory Systems are based on –

1. ABC Classification
2. Reorder Models
3. Safety Stock
4. EOQ

In project situation and Batch production the demand is not uniform but discrete. As the demand is clearly known and so also the time frame, it is also known as ‘Time-phased requirements planning.’

MRP is based on concepts like,

1. Independent versus Dependent demand
2. Lumpy demand
3. Lead times
4. Common use items

The use of computer has helped MRP to gain the popularity because the numerous calculations for the product explosion are readily handled with the direct access capability of the disc systems. The on-line capabilities of computers is another reason for the increased interest in MRP.

WHERE TO USE MRP :

MRP is the most useful scheduling technique for many industries engaged in fabricating and assembling products like automobiles, tractor-trailer equipments, Rail coaches, etc., It is especially suitable for situations where one or all of the following conditions exists :

- a) The final product is complex and made up of several levels of assemblies.
- b) The final product is expensive.

- c) The lead times for components and raw materials are relatively long.
- d) The manufacturing cycle is long for the finished product.
- e) Consolidation of requirements for several products is desirable so that economic lot sizes are applicable.

The MRP seeks to achieve the following objectives in a simultaneous manner :-

- i) Ensure the availability of materials, components and products for planned production and for customer delivery.
- ii) Maintain the lowest possible levels of Inventory.
- iii) Plan manufacturing activities, delivery schedules and purchasing activities.

MRP systems are appropriate for dependent demand items. Dependent demand means the demand for an item is directly related to or the result of demand for “higher level” items. Thus, while the demand for the final product may be continuous and independent, the demand for lower-level, subordinate items composing the product tends to be discrete, derived and dependent. Dependent demand items need not be forecasted, but are calculated by the MRP system from the Master Schedule.

The key features of an MRP system are the time phasing requirements, generation of lower-level requirements, planned order releases and rescheduling capability. Planned order releases indicate when orders should be placed by purchasing and manufacturing activity. A flow diagram of how a typical MRP system may function is shown in Exhibit 4.1.

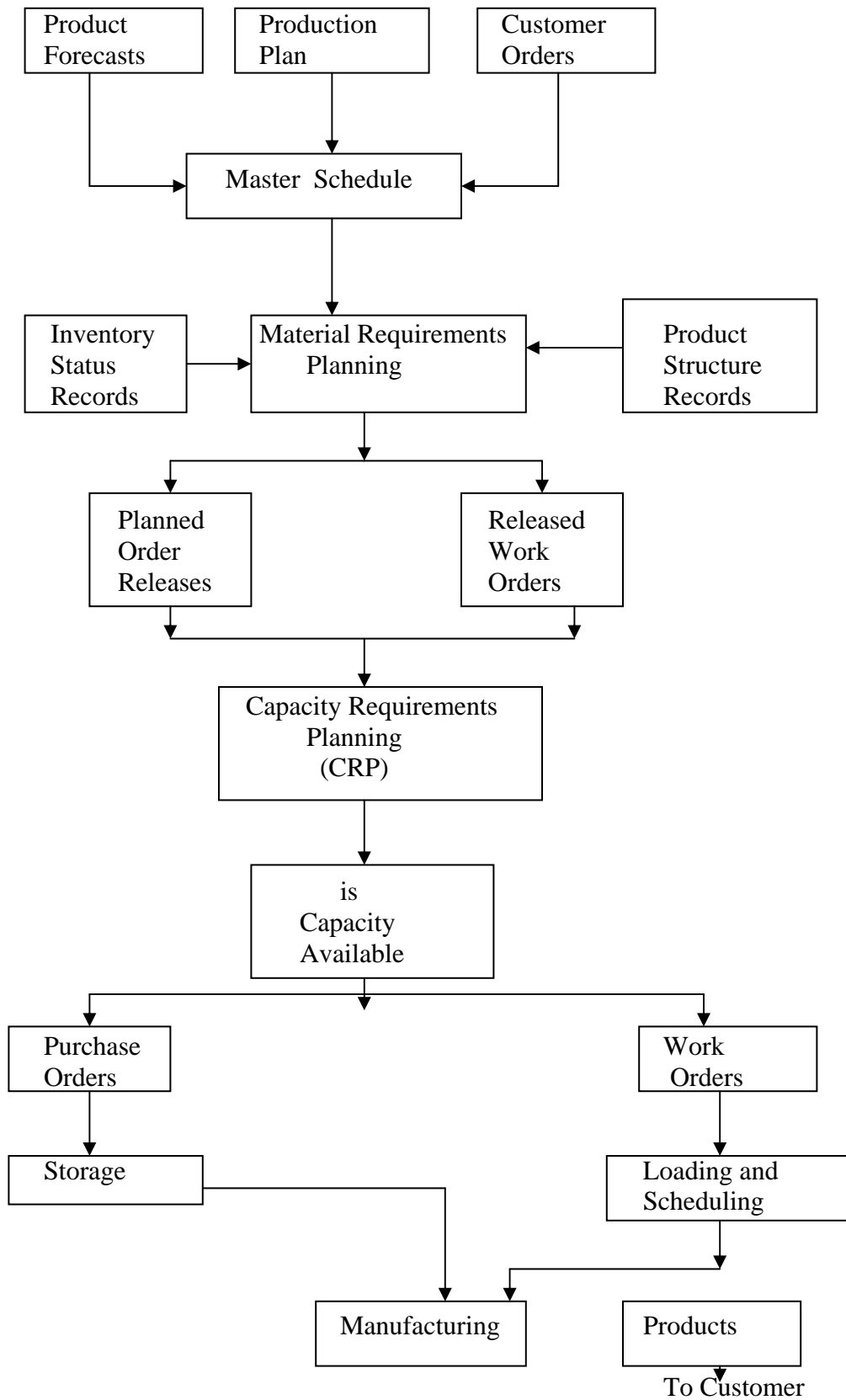


EXHIBIT 4.1 AN MRP SYSTEM

MRP INPUTS :

The three major inputs of an MRP system are the master production schedule, the inventory status records and the product structure records.

The flow diagram of MRP diagram of MRP inputs is given in Exhibit 4.2.

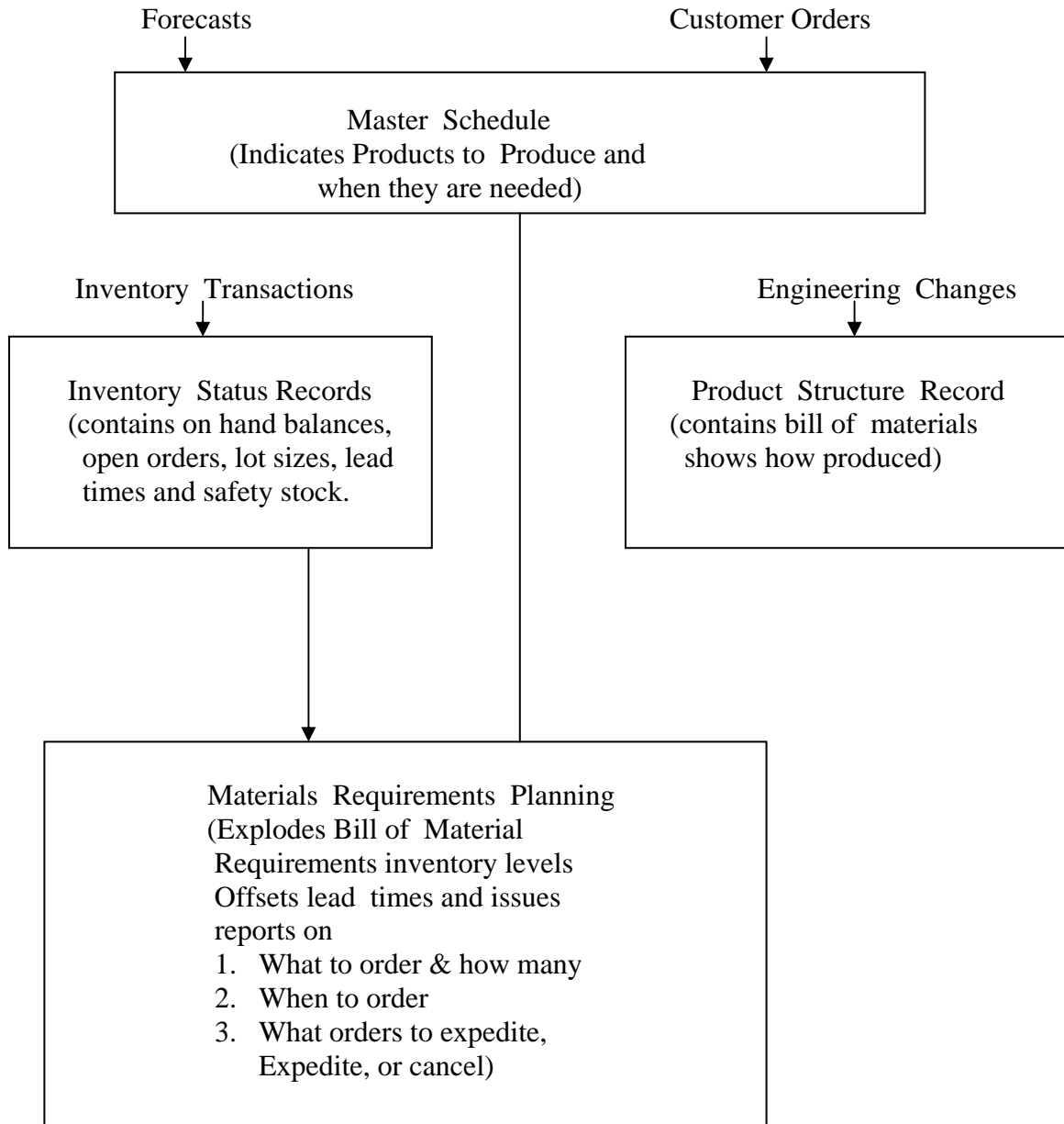


EXHIBIT 4.2 MRP INPUTS

MRP OUTPUTS :

The MRP system takes the master schedule for end items and determines the gross quantities of components required from the product structure records. Gross requirements are obtained by “exploding” the end item product structure record into its lower level requirements.

A schematic of MRP outputs is contained in Exhibit 4.3.

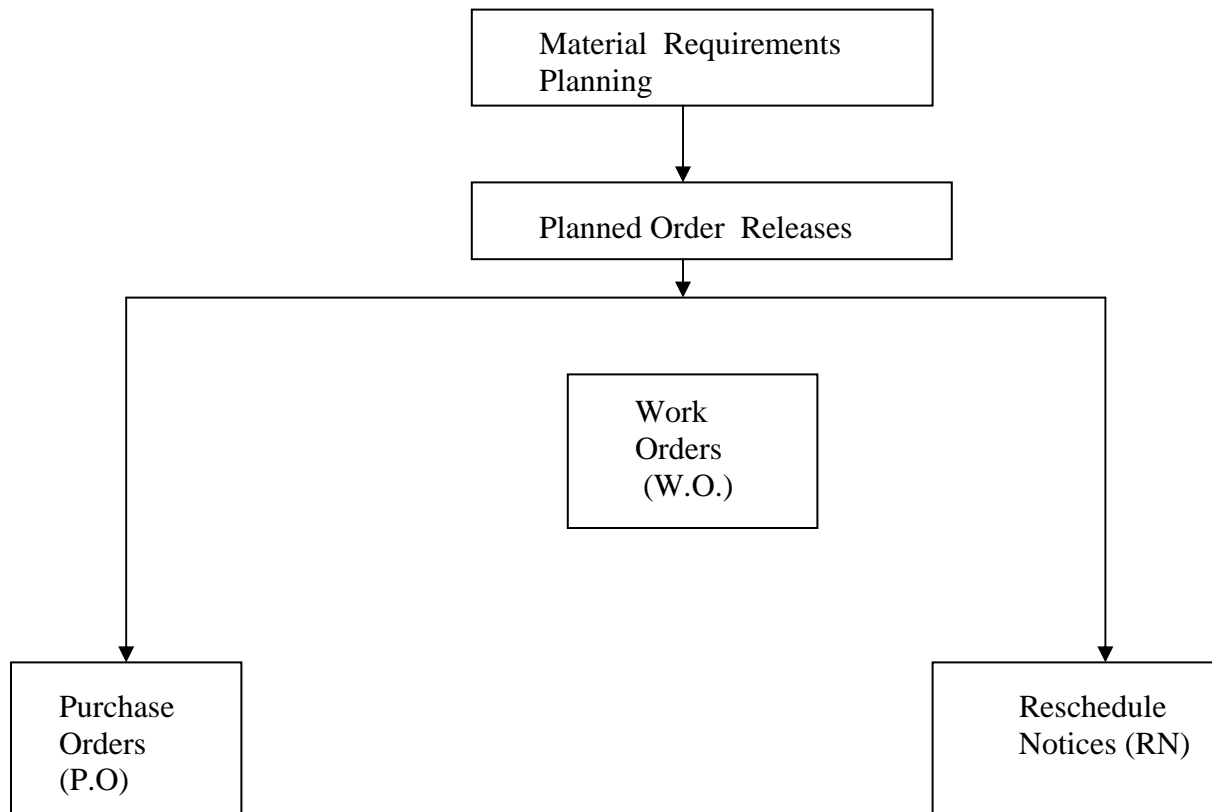


EXHIBIT 4.3 MRP OUTPUTS

Two basic purposes of planned orders are :

1. to generate the material requirement at the next lower level.
2. to project the capacity requirements.

PRODUCT STRUCTURE :

MRP is well suited for fabrication and / or assembly type operations. The term “component” in MRP refers to all items below the product level, including sub assemblies, parts, raw materials, whether they are produced internally or obtained from suppliers.

A bill of material (BOM) is a list of all items, ingredients, or materials needed to produce an end item or product. It shows how much of what materials are needed in what order to manufacture of product. It is through BOM that MRP successfully translates the master schedule into gross requirements below the end item level.

A schematic representation of a product structure is shown in Exhibit 4.4. The structure of product A defines the relationship among the various items that make up the product in terms of levels as well as parent / component relationships.

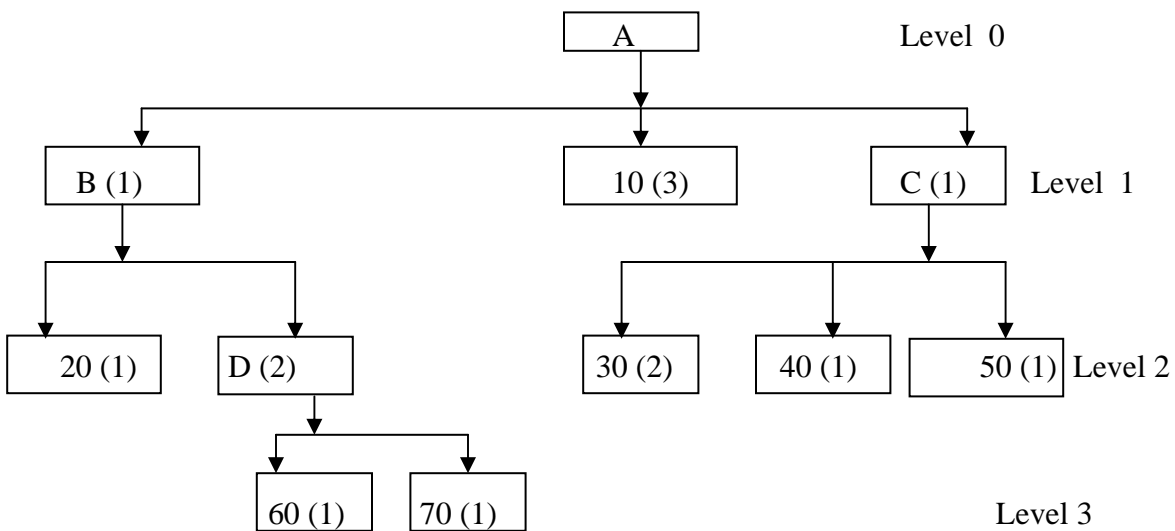


EXHIBIT 4.4 TYPICAL PRODUCT STRUCTURE

The letters represent assemblies / sub-assemblies, and the numerical represent parts. The numbers in parentheses are the quantities required.

MRP MATRIX :

Lot Size	Lead time	On hand	Safe -ty Stock	Allo- cated	Low level code	Item	Period										
							PD	1	2	3	4	5	6	7			
							Gross Reqt.										
							Scheduled Receipts										
							Projected On hand										
							Net require- ment										
							Planned Order Receipts										
							Planned order Releases										

EXHIBIT 4.5

THE STEPS OF MATERIAL REQUIREMENT PLANNING :

- STEP 1 : Determine the Gross Requirement.
- STEP 2 : Determine the Nett Requirements.

$$\text{Net Requirements} = \text{Gross requirements} - \text{Available Inventory.}$$
- STEP 3 : Develop the Master Schedule.
- STEP 4 : Explode the Bill of Materials.
- STEP 5 : Screen for ABC items.
- STEP 6 : Determine net requirements for an item.
- STEP 7 : Adjust requirements by Scrap or Shrinkage factor.
- STEP 8 : Schedule planned orders.
- STEP 9 : Explode the next level.
- STEP 10 : Aggregate Demands and Determine Order Quantity.
- STEP 11 : Write and place the planned orders.