



**INSTITUTE OF AERONAUTICAL ENGINEERING  
(AUTONOMUS)**

**Dundigal, Hyderabad - 500 043**

**POWERPOINT PRESENTATION  
ON**

**PRODUCTION AND OPERATIONS MANAGEMENT  
II SEMESTER**

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# Unit-1

# INTRODUCTION TO OPERATIONS MANAGEMENT

# OPERATIONS MANAGEMENT

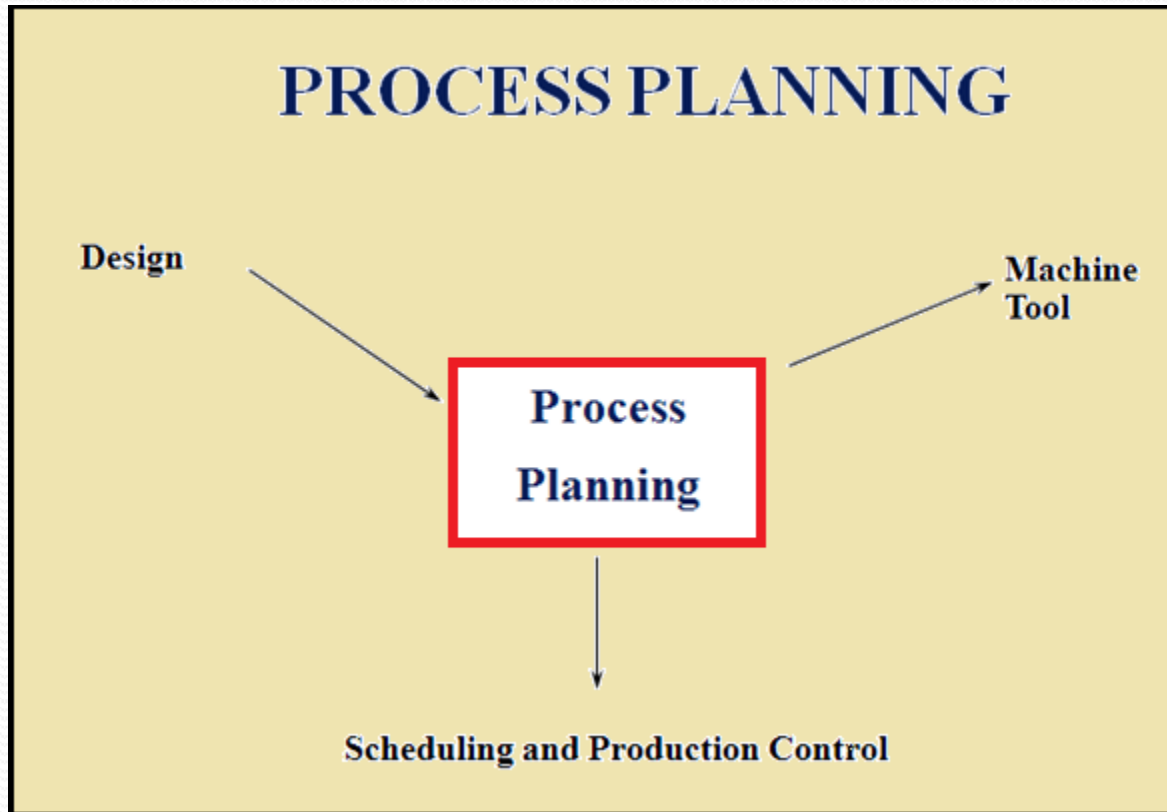
- Operation is that part of an organization, which is concerned with the transformation of a range of inputs into the required output (services) having the requisite quality level .  
Management is the process ,which combines and transforms various resources used in the operations subsystem of the organization into value added services in a controlled manner as per the policies of the organization



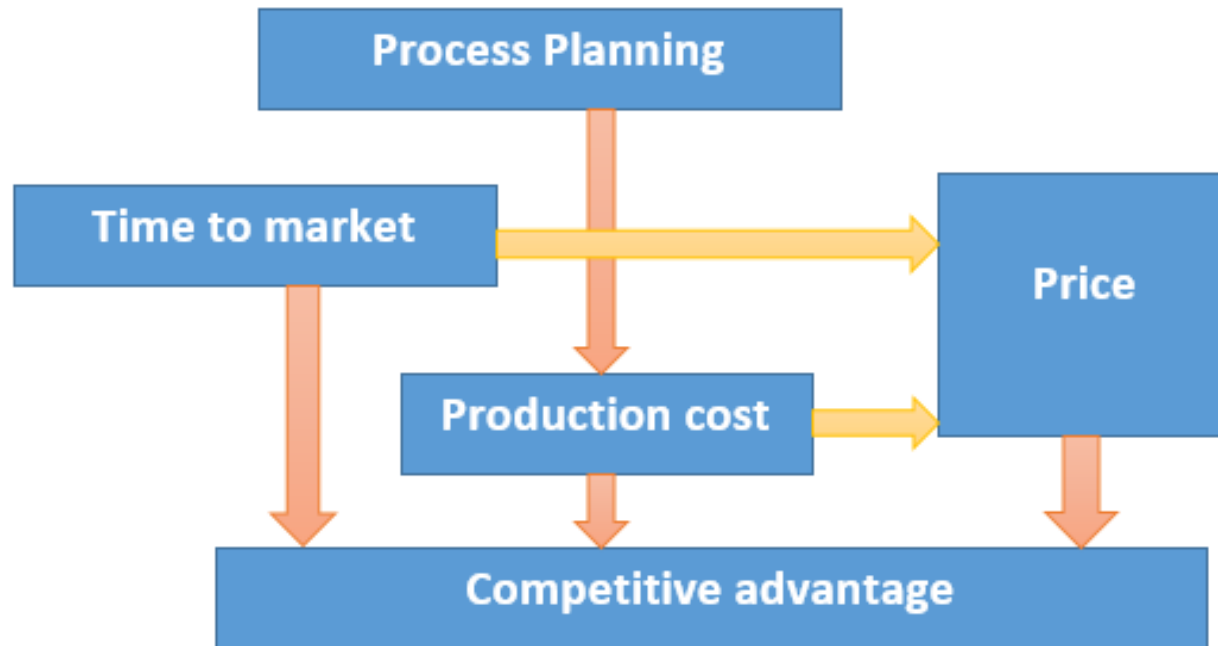
# PROCESS DESIGN

- **process design** is the design of processes for desired physical and/or chemical transformation of materials. Process design is central to chemical engineering, and it can be considered to be the summit of that field, bringing together all of the field's components.

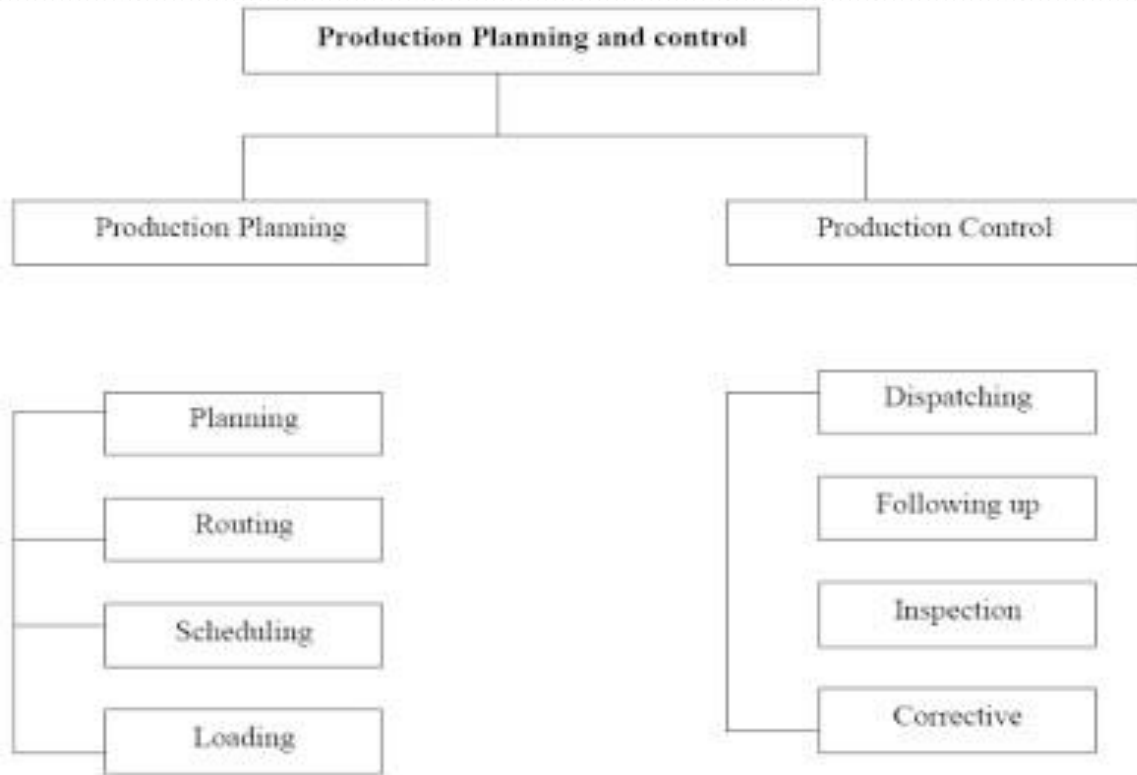
# PROCESS PLANNING



# EFFECT OF PROCESS PLANNING ON COMPETITIVE ADVANTAGE:



# PRODUCTION PLANNING AND CONTROL (PPC)





# PRODUCTION CYCLE:

## **Elements of production cycle**

Production cycle can be divided into

- Working period
- Break period



# The five key decisions in process management are:

- Process Choice
- Vertical Integration
- Resource Flexibility
- Customer Involvement
- Capital Intensity

# Types of Production Systems

They are broadly classified into three categories:

- Job shop production
- Batch production
- Mass production

# PLANNING FOR GROWTH

- Companies typically pursue four major types of growth. Going from the simpler types to the more complex, these can be summarized as follows:
- 1. Simple growth of sales volume within an existing product line and market.
- 2. Expansion of the product line within a single market, using an existing process structure (often called product proliferation).
- 3. Expansion of the process structure (usually termed vertical integration).
- 4. Expansion into new products and markets.



## **Unit-2**

# **SCHEDULING AND CONTROL OF PRODUCTION OPERATIONS**



# AGGREGATE PLANNING

- Aggregate planning is an operational activity critical to the organization as it looks to balance long-term strategic planning with short term production success

# Aggregate Planning Strategies

There are three types of aggregate planning strategies available for organization to choose from. They are as follows.

- Level Strategy
- Chase Strategy
- Hybrid Strategy

# MASTER PRODUCTION SCHEDULE (MPS)

- A Master Production Schedule (MPS) is a plan for production, staffing, inventory and resources. It is usually linked to manufacturing where the plan indicates when and how much of each product will be demanded. This plan quantifies significant processes, parts, and other resources in order to optimize production, to identify bottlenecks, and to anticipate needs and completed goods.



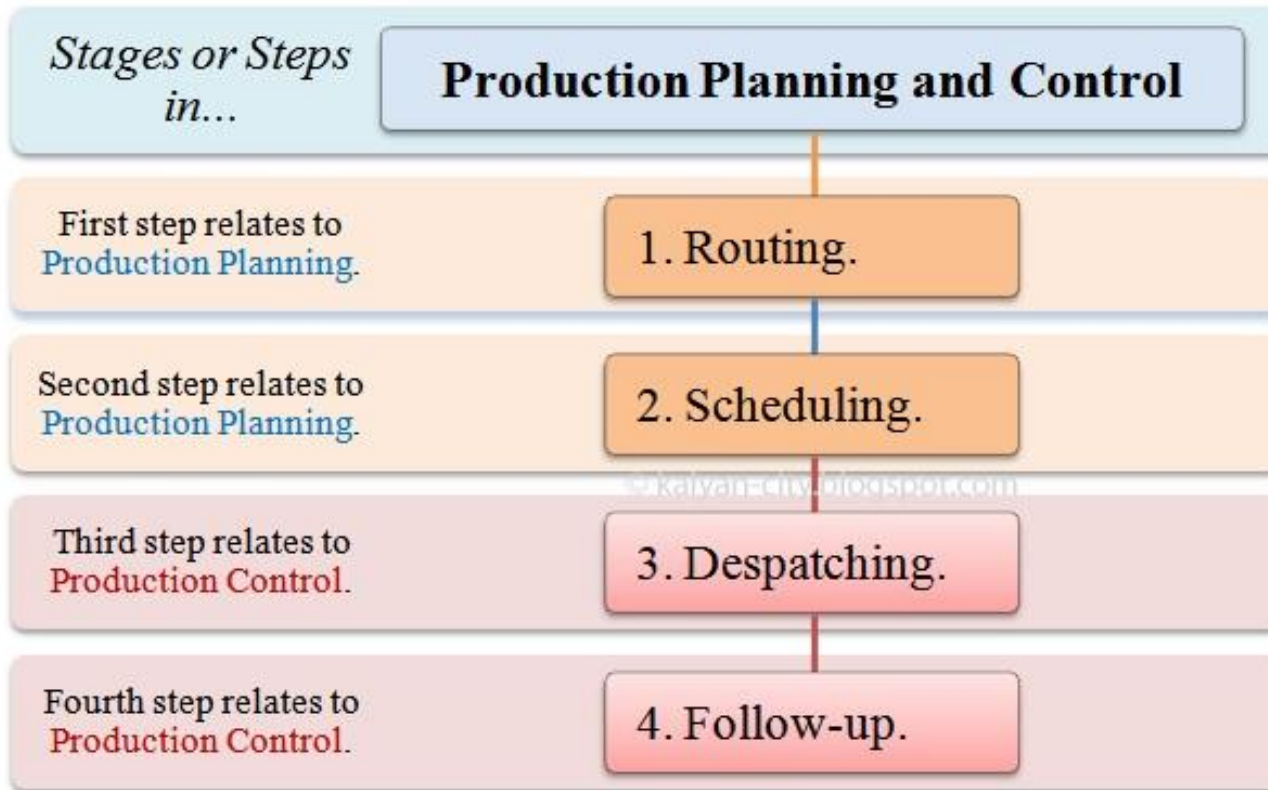
# OPERATIONS SCHEDULING

- Scheduling pertains to establishing both the timing and use of resources within an organization. Under the operations function (both manufacturing and services), scheduling relates to use of equipment and facilities, the scheduling of human activities, and receipt of materials

# SEQUENCING

- Sequencing is concerned with determining the order in which jobs are processed. Not only must the order be determined for processing jobs at work centers but also for work processed at individual work stations. When work centers are heavily loaded and lengthy jobs are involved, the situation can become complicated. The order of processing can be crucial when it comes to the cost of waiting to be processed and the cost of idle time at work centers.

# STEPS IN PRODUCTION PLANNING AND CONTROL



# MAINTENANCE MANAGEMENT

- Maintenance management is the process of overseeing maintenance resources so that the organization does not experience downtime from broken equipment or waste money on inefficient maintenance procedures. Maintenance management software programs can assist with the process. The primary objectives of maintenance management are to schedule work efficiently, control costs and ensure regulatory compliance

# TYPES OF MAINTENANCE

- Breakdown maintenance
- . Preventive maintenance ( 1951 )
  - a. Periodic maintenance ( Time based maintenance - TBM)
  - b. Predictive maintenance
- Corrective maintenance ( 1957 )
- Maintenance prevention ( 1960 )

# MAINTENANCE POLICIES

- Breakdown (repair) maintenance
- Preventive maintenance





## Preventive maintenance

- Preventive maintenance is the routine inspection and service activities designed to detect potential failure conditions and make minor adjustments or repairs that will help prevent major operating problems.





# BREAKDOWN MAINTENANCE

- Breakdown maintenance is the emergency repair and it involves higher cost of facilities and equipment that have been used until they fail to operate.



# Unit-3

# QUALITY CONTROL



# QUALITY CONTROL

- “Quality control is used to connote all those activities which are directed for defining, controlling and maintaining quality”.

# CONCEPT OF QUALITY CIRCLES (QC):

- Quality circle is a group of labour and management who belong to a single department, do same or similar work, meet periodically to discuss and analyse manufacturing problems (for about an hour per week in paid time) and find solutions to quality problems.

# QUALITY ASSURANCE

- The processes that ensure production quality meets the requirements of customers

# Total Quality Management ("TQM")

- This is a specific approach to quality assurance that aims to develop a quality culture throughout the firm. In TQM, organizations consist of 'quality chains' in which each person or team treats the receiver of their work as if they were an external customer and adopts a target of 'right first time' or zero defects

# STATISTICAL QUALITY CONTROL (SQC)

- Two basic categories:
  - I. Statistical process control (SPC): - The application of statistical techniques to determine whether a process is functioning as desired
  - II. Acceptance Sampling: - the application of statistical techniques to determine whether a population of items should be accepted or rejected based on inspection of a sample of those items.



# Quality Measurement: Attributes vs Variables

- **Attributes:**
- Characteristics that are measured as either "acceptable" or "not acceptable", thus have only discrete, binary, or integer values.
- **Variables:**
- Characteristics that are measured on a continuous scale.

# Statistical Process Control (SPC) Methods

- **Control** is maintained through the use of control charts. The charts have upper and lower control limits and the process is in control if sample measurements are between the limits.
- **Control Charts for Attributes**
- **P Charts** - measures proportion defective.
- **C Charts** - measures the number of defects/unit.
- **Control Charts for Variables**
- X bar and R charts are used together - control a process by ensuring that the sample average and range remain within limits for both.

# ACCEPTANCE SAMPLING

- Acceptance sampling involves both the producer (or supplier) of materials and the consumer(or buyer). Consumers need acceptance sampling to limit the risk of rejecting good-quality materials or accepting bad-quality materials. Consequently, the consumer, sometimes in conjunction with the producer through contractual agreements, specifies the parameters of the plan. Any company can be both a producer of goods purchased by another company and a consumer of goods or raw materials supplied by another company

# Types of Sampling Plans

- Single-Sampling Plan
- Double-Sampling Plan
- Sequential-Sampling Plan

# WORK STUDY

- Work study may be defined as the analysis of a job for the purpose of finding the preferred method of doing it and also determining the standard time to perform it by the preferred (or given) method. Work study, therefore, comprises of two areas of study: method study (motion study) and time study (work measurement).



# METHOD STUDY

- Method study can be defined as the procedure for systematic recording, analysis and critical examination of existing or proposed method of doing work for the purpose of development and application of easier and more effective method.



# Method Study Procedure

- Select the job – on which method study is to be applied.
- Obtain information and record.
- Examine the information critically.
- Develop the most practical, economical and effective method by considering real limitations of the situation.
- Install the new method as standard practice.
- Maintain the standard practice by regular follow up.



# Work Measurement

- Work measurement refers to the estimation of standard time for an activity, that is the time allowed for completing one piece of job by using the prescribed method. Standard time can be defined as the time taken by an average experienced worker for the job with provisions for delays beyond the worker's control.



# TIME STUDY

- Time study is a technique to estimate the time to be allowed to a qualified and well-trained worker working at a normal pace to complete a specified task by using specified method

# Time Study Equipment

- The following equipment is needed for time study work.
- Timing device
- Time study observation sheet
- Time study observation board
- Other equipment

# WORK SAMPLING

- Work Sampling (also sometimes called ratio delay study) is a technique of getting facts about utilization of machines or human beings through a large number of instantaneous observations taken at random time intervals.

# OC CURVE

- A common supplementary plot to standard quality control charts is the so-called *operating characteristic* or *OC curve*. One question that comes to mind when using standard variable or attribute charts is how sensitive is the current quality control procedure

# TYPE OF ALLOWANCES

- **Fixed Allowances:**
- Fixed allowances consist of the allowances given for personnel needs or desire. These personnel needs includes going for watching getting a drink etc. It is also agreed that women need more personnel time than man. The usual percentage of the personnel allowances is 5% for male workers and 7% for women.

## **Variable Allowances:**

- In calculating the relaxation allowance, variable allowances are added to the fixed allowances which are made, depending upon the circumstances of the job. Variable addition is given be improved.



# CONTINGENCY ALLOWANCES:

- It is also known as delay allowance. It accounts for some other contingencies such as unexpected work as well. “A contingency allowance is an allowances of time that is to be added in normal time or to be included in standard time to meet the legitimate and unexpected items of work or delays, the precise measurement of which is not economical due to their irregular and infrequent nature of occurrences.”

# Other and Special Allowances:

- There are some other and special allowances which are to be added for certain conditions. These allowances are provided for certain reasons and for some specific period of time.



# Unit-4

# MATERIALS MANAGEMENT



# MATERIAL MANAGEMENT

- Material management is the planning, directing, controlling and co-ordination of all those activities concerned with material and inventory requirements, from the point of their inception to their introduction into manufacturing process.”



# Functions of Material Management

- Production and Material Control
- Purchasing
- N Transportation
- on-Production Stores
- Materials Handling
- Receiving

# **(MRP) MATERIALS REQUIREMENT PLANNING**

- MRP is required to procure or produce the required quantities on time for in- house purpose or for fulfilling customer demand.

# Master Production Schedule (MPS)

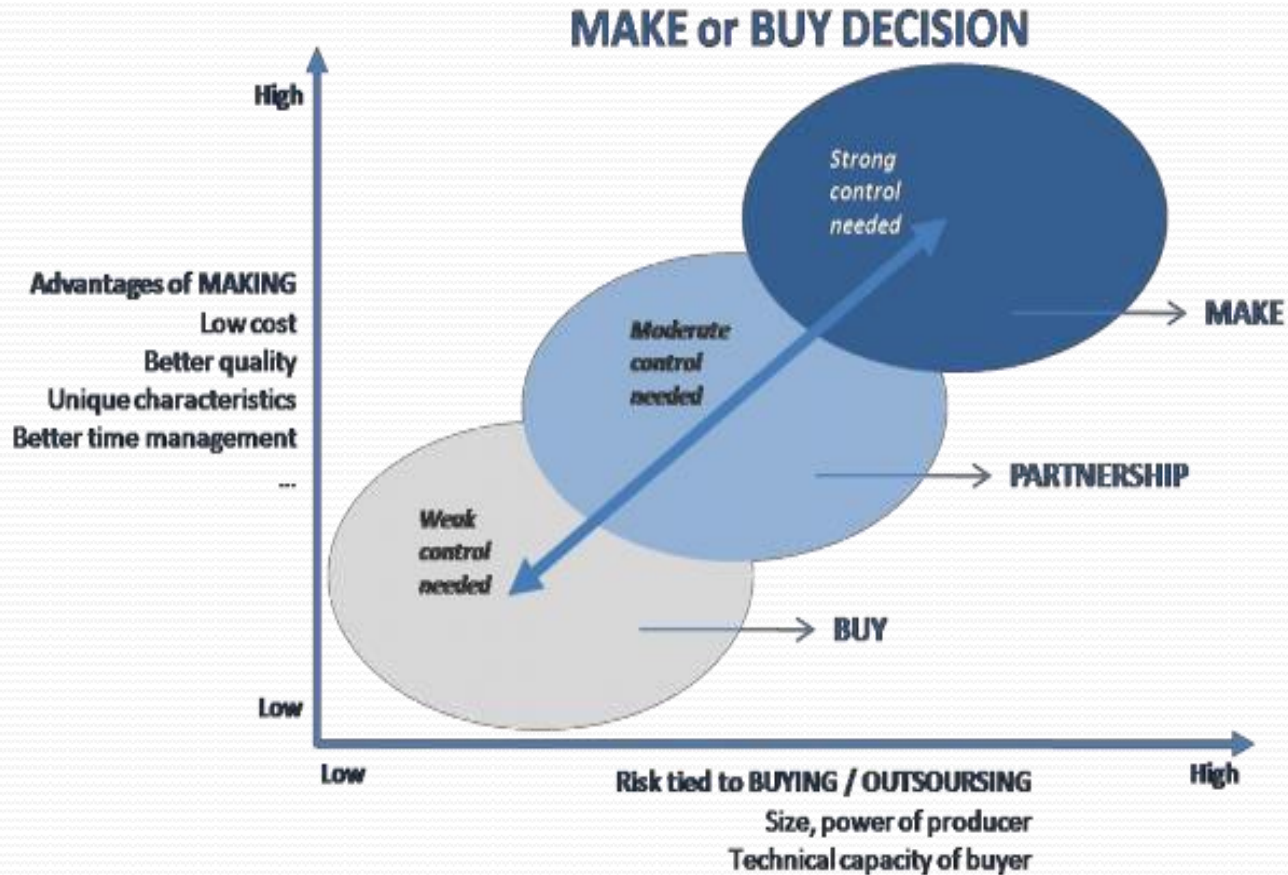
- It is used specifically for critical materials usually high valued products where you do not want changes in your production plan within planning time fence in next MPS run, and production plan gets firmed automatically as soon as it comes within planning time fence unlike MRP run.



# MATERIAL BUDGETING

- Direct materials budget is prepared after computing production requirements by preparing a production budget. *Direct materials budget or materials budgeting* details the raw materials that must be purchased to fulfill the production requirements and to provide for adequate inventories.

# MAKE-OR-BUY DECISION



# VENDOR RATING

- Vendor rating is the result of a formal vendor evaluation system. Vendors or suppliers are given standing, status, or title according to their attainment of some level of performance, such as delivery, lead time, quality, price, or some combination of variables. The motivation for the establishment of such a rating system is part of the effort of manufacturers and service firms to ensure that the desired characteristics of a purchased product or service is built in and not determined later by some after-the-fact indicator. The vendor rating may take the form of a hierarchical ranking from poor to excellent and whatever rankings the firm chooses to insert in between the two.

# WASTE MANAGEMENT

- Waste management or Waste disposal is all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc.”



# Unit-5

# STORES MANAGEMENT

# STORES

- **A professionally managed Stores has** a process and a space within, to receive the incoming materials (Receiving Bay), keep them for as long as they are not required for use (Custody) and then to move them out of stores for use



# BASIC FUNCTIONS

the basic functions , to manage a stores, carried out are:

- Receiving of incoming consignments (goods)
- Safe keeping of goods (Custody)
- Disposal of undesirable goods
- Inventory Management
- House keeping and record maintenance



# TYPES OF STORES

Generally, there are three types of stores

1. Centralized Stores
2. Decentralized Stores
3. Centralized Stores With Sub-stores

# SAFETY STOCK

- **Safety stock** (also called **buffer stock**) is a term used by logisticians to describe a level of extra stock that is maintained to mitigate risk of stockouts (shortfall in raw material or packaging) due to uncertainties in supply and demand. Adequate safety stock levels permit business operations to proceed according to their plans.<sup>[1]</sup> Safety stock is held when there is uncertainty in demand, supply, or manufacturing yield; it serves as an insurance against stockouts

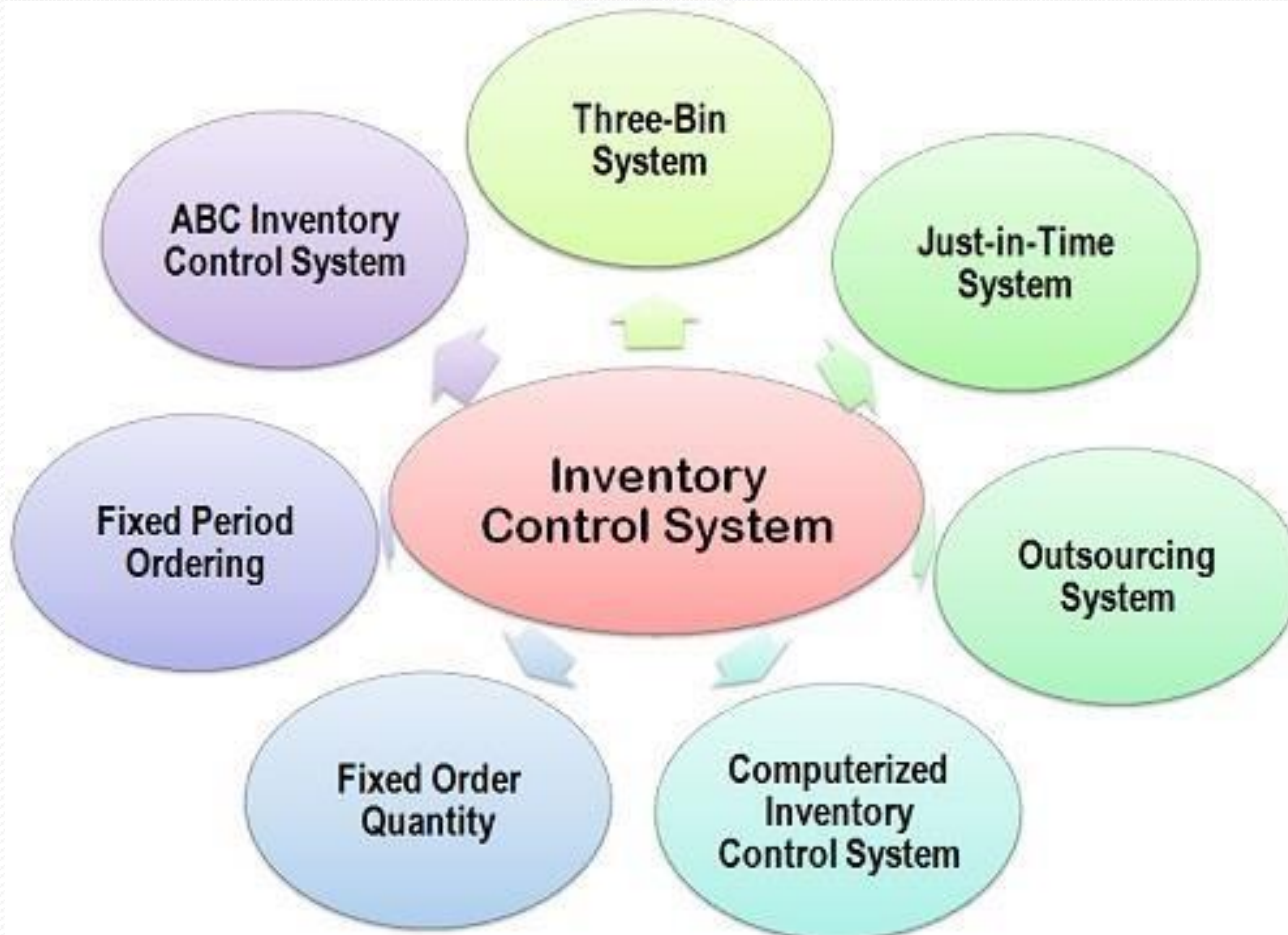
# INVENTORY CONTROL

- Inventory control is the processes employed to maximize a company's use of inventory. The goal of inventory control is to generate the maximum profit from the least amount of inventory investment without intruding upon customer satisfaction levels. Given the impact on customers and profits, inventory control is one of the chief concerns of businesses that have large inventory investments, such as retailers and distributors.

# INVENTORY CONTROL SYSTEM

- The **Inventory control system** is maintained by every firm to manage its inventories efficiently. Inventory is the stock of products that a company manufactures for sale and the components or raw materials that make up the product. Hence, an inventory comprises of the buffer of raw material, work-in-process inventories and finished goods.

# INVENTORY CONTROL SYSTEM



# COSTS SYSTEMS OF INVENTORY CONTROL

- Perpetual Inventory System
- Periodic Inventory System
- Valuation Methods
- First-in-First-Out Method (FIFO)
- Last-in-First-Out Method (LIFO)
- Average Cost Method (AVCO)



# Important Techniques of Inventory Control System

- *(a) Re-ordering level:*
- Re-order level = Maximum Rate of consumption x maximum lead time
- *(b) Maximum Level:*
- Maximum Stock level = Reordering level + Reordering quantity — (Minimum Consumption x Minimum re-ordering period)
- *(c) Minimum Level:*
- Minimum Level = Re-ordering level — (Normal rate of consumption x Normal delivery period)



- ***(d) Average Stock Level:***

- Average level =  $1/2$  (Minimum stock level + Maximum stock level)

- ***(e) Danger Level:***

- Danger Level = Average rate of consumption x Emergency supply time.

- ***(f) Economic Order Quantity (E.O.Q.):***

- $Q = \sqrt{2AS/I}$

where Q stands for quantity per order ;

A stands for annual requirements of an item in terms of rupees;

S stands for cost of placement of an order in rupees;

and

I stand for inventory carrying cost per unit per year in rupees.

# ABC analysis

- In order to exercise effective control over materials, A.B.C. (Always Better Control) method is of immense use. Under this method materials are classified into three categories in accordance with their respective values.

## VED Analysis:

- In this analysis, the items are classified on the basis of their criticality to the production process or other services. In the VED classification of materials:

V = Vital items

E = Essential items

D = Desirable items

# FNSD CLASSIFICATION

Based on the consumption pattern of the items, the FNSD classification calls for classification of items as

F = Fast moving items

N = Normal moving items

S = Slow moving items

D = Dead items or non-moving items.

# VALUE ANALYSIS

- This value creates mind space for product and services. Value analysis, therefore, is a scientific method to increase this value.

# COST REDUCTION

- Cost reduction means conducting some innovations in the way of working in a new style, so that the excess costs of production and operation could be eliminated. Cost reduction programs are directed toward specific efforts to reduce costs by improving methods work arrangements and products. Cost reduction can be made in different areas and stages of production, storing and distribution process by applying more advanced and scientific techniques of operation. So, a cost reduction program needs a research and development activity