

# LAYOUT OF MANUFACTURING / SERVICE FACILITY



Compiled By,  
Dr. Shameen Warsi

# FACILITY LAYOUT

- Facility layout refers to the way in which work stations, equipment, machinery and employees are positioned within a work facility.
- Business owners have a range of options to choose from when it comes to designing their facilities layouts, depending on the total size of the buildings, yards and other spaces they have to work with. Usually, operations managers will set up production facilities in such a way as to minimize the travel or holding time of semi-finished goods between different stations.
- As a simple example, consider a car wash and wax business. Washing cars in one building then driving them to an adjacent building for drying and waxing would waste time and require two buildings rather than one. Locating a dry and wax station immediately after the wash station in a single building would be a more efficient facility layout.



# PRODUCT LAYOUT

- If we look at the product layout meaning, it explains about various missions which work before and which work after to produce the whole product as an output. It is like the end product of the previous machine will become the source product of the next machine.
- The product layout can be defined as an arrangement or a mechanism of various machines run to produce the final product in a prescribed order.



Product  
(assembly-  
line) layout,  
Assembly  
of flat  
screen  
televisions

Assemble  
chassis



Install circuit  
board



Install flat  
screen



Inspected by



Final Assembly



Install speakers



# **CHARACTERISTICS OF PRODUCT LAYOUT**

- It involves huge equipment to produce the product.
- The machines available in the product layout are semi-skilled because each machine can perform only a certain part of the whole production.
- Sophisticated machines are used here.
- The linear arrangement of product layout may be either paced or non-paced.
- It requires huge amounts of investments to purchase machines.
- The product layouts are required more physical work than that of the technical skill.



# **ADVANTAGES OF PRODUCT LAYOUT**

The following are the advantages of product layout:

- Smooth flow of production
- Lower material handling costs
- Lesser work-in-progress
- Optimum space utilization
- Effective utilization of resources
- Effective supervision
- Production control
- Savings in time



# PROCESS LAYOUT

- In a process layout similar machines and equipment of the same functional type are arranged in one department. The processes are segregated and the machines of each process are kept together while each process is kept separately.
- For example all the milling equipment would be arranged in the milling department, all the grinding machines in the grinding department and welding machines in the welding department. It requires large amount of specially designed plant operated by a small workforce.



# PROCESS LAYOUT

- The process layout, also called the functional layout, is designed to keep everything organized in a manner so that everything has its place. Think about an auto mechanic's shop. New tires are stored in one section, whereas wrenches and other tools are stored in another section. The cans of oil are stored together, as are other groupings of supplies or power tools.
- Although this is an organized layout in which everyone always knows where all supplies and tools are located, it isn't the most efficient for production lines, where the same job is performed every single time. The process layout is effective when each job is a custom situation. The mechanic's shop illustrates this well. One customer may come in needing only an oil change, but another may come in needing the entire transmission overhauled.



# **SUITABILITY OF PROCESS LAYOUT**

- The process layout is suitable in the case of job order production, i.e., production is based on customer orders in which different varieties of goods are produced in small quantities.
- It is suitable in the case of catalytic crackers used in the refining of crude oil into petrol, kerosene, wax, rolling mills, wire drawing, chemical plants etc.



# **ADVANTAGES OF PROCESS LAYOUT**

- **Flexibility**
- **Lower investment**
- **No stoppage of production**
- **Scope for expansion**
- **Full utilization of equipment**
- **Better supervision**



# GROUP LAYOUT

- It is a combination of product and process layout. It combines the advantages of both the layout.
- It is used when same item is being manufactured in different type of sizes.
- In this, the machines are arranged in the process layout but process grouping is arranged in a sequence.
- The sequence of operation with each of the product variety however remains the same.



# GROUP LAYOUT

- Generally, a combination of the product and process layout or other combination are found, in practice, e.g. for industries involving the fabrication of parts and assembly, fabrication tends to employ the process layout, while the assembly areas often employ the product layout.
- In soap, manufacturing plant, the machinery manufacturing soap is arranged on the product line principle, but ancillary services such as heating, the manufacturing of glycerin, the power house, the water treatment plant etc. are arranged on a functional basis.



# ADVANTAGES

- Improved utilization of labour and employee morale.
- Reduced in process inventory.
- Reduced setup time and manufacturing costs.
- Reduced material handling.

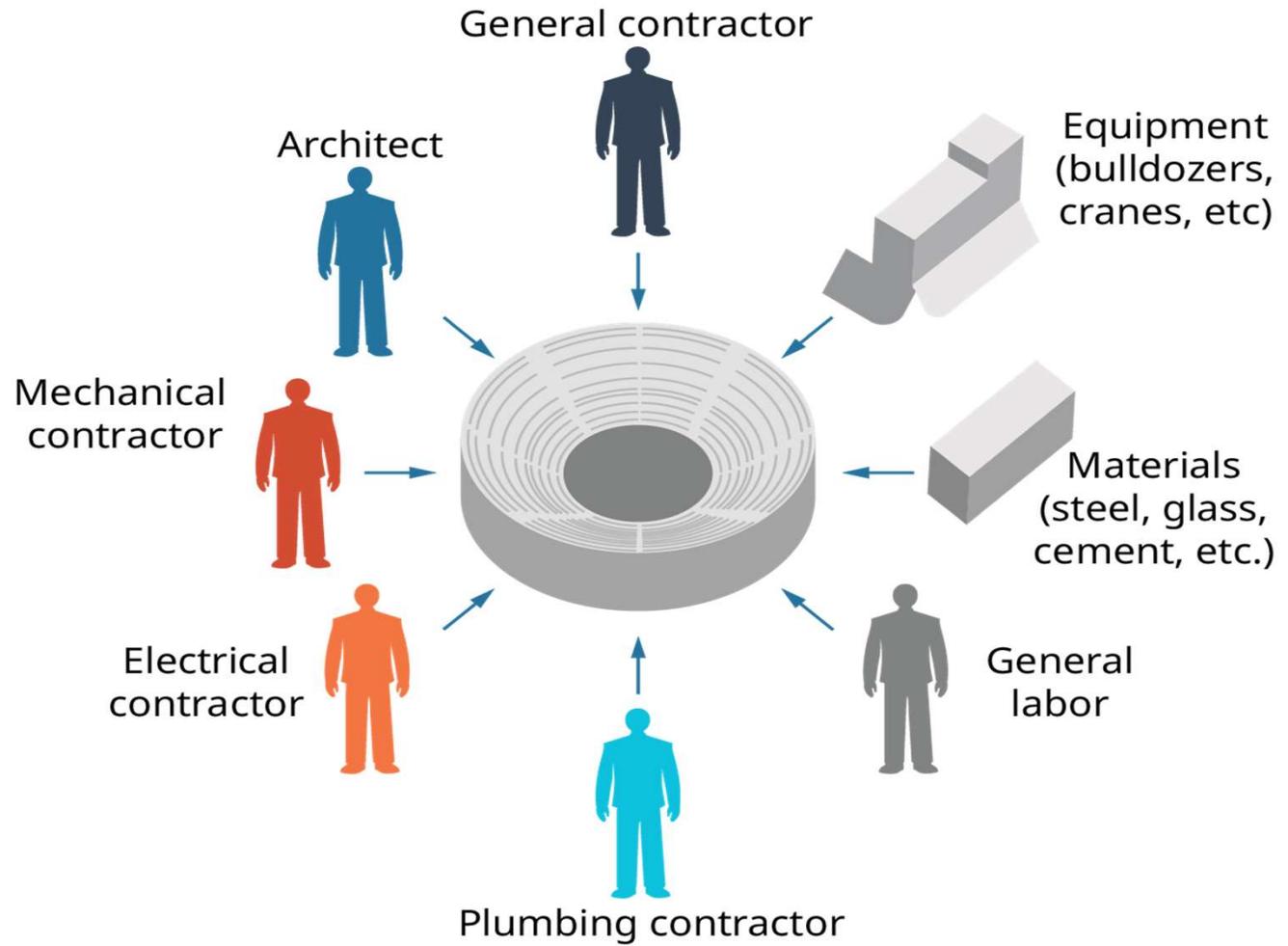


# FIXED POSITION LAYOUT

- A **fixed-position layout** lets the product stay in one place while workers and machinery move to it as needed. Products that are impossible to move—ships, airplanes, and construction projects—are typically produced using a fixed-position layout.
- Limited space at the project site often means that parts of the product must be assembled at other sites, transported to the fixed site, and then assembled.
- The fixed-position layout is also common for on-site services such as housecleaning services, pest control, and landscaping.



Fixed position layout,  
Construction of a stadium



# HOW TO CHOOSE A LAYOUT?

- The manufacturing layout will depend on business leaders determining the best process.
- Even though the functional layout requires more professional skill, automation can counter unskilled workers in the product layout. Because the process layout requires one worker or a small team to complete the entire task, the workflow is generally not as fast nor as smooth as it is with the product layout.
- However, the quality of the final product in a process layout is usually better than with the product layout.



# PRACTICE QUESTION

You are the Operations Manager for a high-end furniture manufacturer. Your marketing department has introduced a line of custom, made-to-order products that vary in style and will be sold in small quantities due to the high cost of the products. You decide to use this type of facility layout for the production:

- a) Product Layout
- b) Process Layout
- c) Fixed Position Layout



# LAYOUT DESIGN

- Layout design concerns the physical placement of resources such as equipment and storage facilities. The layout is designed to facilitate the efficient flow of customers or materials through the manufacturing or service system.
- Layout design is important because it can have a significant effect on the cost and efficiency of an operation and can entail substantial investment in time and money.
- In many operations the installation of a new layout, or redesign of an existing layout, can be difficult to alter once implemented due to the significant investment required on items such as equipment.



# MATERIAL HANDLING

- Material Handling involves the movement of material, manually or mechanically in batches or one item at a time within the plant. The movement may be horizontal, vertical or combination of horizontal or vertical.
- Material Handling is the movement, storage, control and protection of materials, goods and products throughout the process of manufacturing, distribution, consumption and disposal.
- The focus is on the methods, mechanical equipment, systems and related controls used to achieve these functions.
- Briefly, Material Handling is the moving of materials from the raw stage through production to ultimate Customer with the least expenditure of time and effort so as to produce maximum Productive Efficiency at the lowest Material Handling cost.



# DEFINITIONS

- Material Handling is a system designed in order to get the materials. At right a) place b) at right time c) in right quantity d) in good condition e) at minimum cost.

**J.R. Bright**

- It is a system of auxiliary equipment that improves flow of material which intern reduces stoppage in production machines and thus increases productivity of machine. These equipment are designed in order to supplement the production machines.

**Henry Fayol**

- It is that branch of Engineering concerned with development of special Machinery for transporting goods through various manufacturing stages to finished product stage. It is systematic physical movement of material.

**James Apple** 

# FUNCTIONS OF MATERIAL HANDLING

- 1. Moving:** It includes movement between machines or workstations, between department, between buildings, the loading and unloading of carrier's, as well as much of more handling done at work place.
- 2. Storage:** It includes storage of material and tools and supplies between and around all of the above location, including finishing good, warehousing, and the other storage related activities that lie between the producer and consumer.
- 3. Selection:**
  1. To choose production machinery and assist in plant layout so as to eliminate as far as possible the need of material handling; and
  2. To choose most appropriate material handling equipment which is safe and can fulfill material handling requirement at the minimum possible overall cost.

