PLANT LOCATION AND LAYOUT

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- Factors affecting Location Decision
- Plant layout
  - Definition
  - Importance
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- INTRODUCTION

When the Rs 1 lakh people's car Nano was launched by Ratan Tata of Tata Sons, there was widespread jubilation and anticipation of where the factory was going to come up. Various state governments offered attractive concessions to the Tatas urging them to set up the facility in their state. West Bengal was selected to house the Nano plant and work began at Singur. Not only the Tatas, but even their joint venture partners invested crores of rupees to set up their respective facilities.

- However, the location option proved to be wrong. Barely months before commercial production was to start, there were agitations by the locals at Singur against the project. The situation got so out of hand that the Tatas were forced to abandon their project at Singur and relocate to Sanand, Gujarat.

- *Facility location is the selection of suitable location or site where the factory or facility will be installed, and from where it will function.*

- There are two fundamental objectives to a facility location exercise. These are:

- Minimizing cost
- Maximizing revenue

FACTORS AFFECTING LOCATION DECISION

- Proximity to Customers (Markets)
- Proximity to Raw Materials
- Good Transportation Facilities
- Availability of Power
- Basic Amenities
- Government Policies
- Environmental and Community Considerations
- Proximity to Subcontractors
- Availability of Cheap Land
- Low Construction Costs
- Availability of Cheap, Skilled and Efficient Labour

PLANT LAYOUT

A plant layout can be defined as follows:

- Plant layout refers to the arrangement of physical facilities such as machinery, equipment, furniture etc. with in the factory building in such a manner so as to have quickest flow of material at the lowest cost and with the least amount of handling in processing the product from the receipt of material to the shipment of the finished product.

- According to Riggs, “the overall objective of plant layout is to design a physical arrangement that most economically meets the required output – quantity and quality.”

- According to J. L. Zundi, “Plant layout ideally involves allocation of space and arrangement of equipment in such a manner that overall operating costs are minimized.

ESSENTIALS

An efficient plant layout is one that can be instrumental in achieving the following objectives:

- Proper and efficient utilization of available floor space
- To ensure that work proceeds from one point to another point without any delay
- Provide enough production capacity.
- Reduce material handling costs
- Reduce hazards to personnel
- Utilise labour efficiently
- Increase employee morale
- Reduce accidents
- Provide for volume and product flexibility
- Provide ease of supervision and control
- Provide for employee safety and health
- Allow ease of maintenance
- Allow high machine or equipment utilization
- Improve productivity

TYPES OF LAYOUT

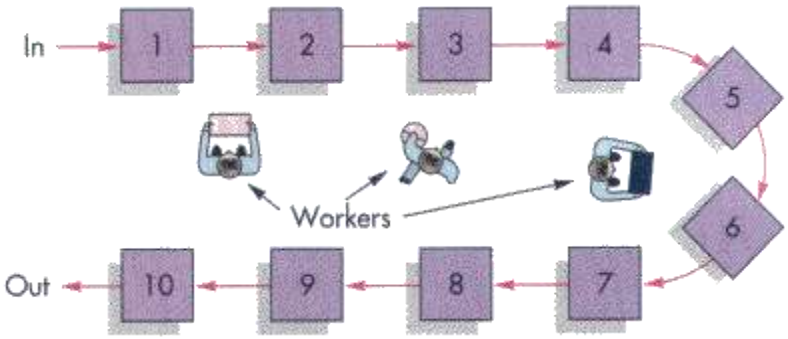
In case of manufacturing unit, plant layout may be of three types:

- Product or line layout
- Process or functional layout
- Fixed position or location layout

Product or line layout:

Under this, machines and equipments are arranged in one line depending upon the sequence of operations required for the product. The materials move form one workstation to another sequentially without any backtracking or deviation.

Product layout



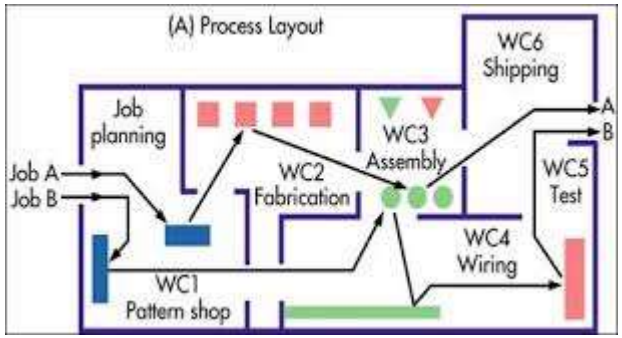
Advantages of product layout

- There is low work in process since output of one stage is automatically the input of next stage
- Material handling is less since the process is automatic.
- Labour costs are less, as there is division of labour.
- Quality control is easier to implement.
- Easy and accurate scheduling of materials is possible.
- Production control is simpler due to less product variety.

- **Disadvantages of product layout**
- It is not easy to change the product – this will involve change in the layout and this is expensive and time consuming. So this layout is not very flexible.
- If even one machine breaks down, the entire line will stop.
- Expansion of work area or insertion of any machine in between other machines is not possible or is very difficult.

Process Layout

- The layout in which all the equipment/machineries performing similar tasks are grouped together is called the **process layout** or **functional layout**; for example, the milling machines can be grouped together to form one department and the grinding machines can be grouped together to form another department.


(A) Process Layout
WC6
Shipping
Job
planning
WC3
Assembly
A
B
Job A
Job B
WC2
Fabrication
WC5
Test
WC4
Wiring
WC1
Pattern shop

Advantages of process layout

- Flexibility in adapting to changing volumes, changing varieties.
- Helps workmen learn more skills as job rotation enriches their skills.
- Problem in one machine does not affect other machines and production need not stop.
- In case of future expansion or increase in varieties, the existing set up need not be pulled out.

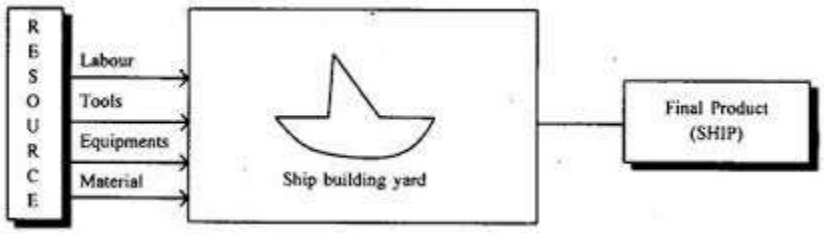
- **Disadvantages of process layout**

- Space requirement increases when the work volume increases.
- Mechanization of material handling is not possible or is very costly.
- High work in progress inventory as jobs have to queue up for each operation.
- Difficulty in scheduling work, as different jobs have different operation sequences.
- High level of supervision is required. Production Planning and Control is more difficult.

Fixed position Layout

The layout in which the production operation is performed in a fixed position is called the **project layout** or **fixed position layout**; for example, aeroplane and ship building industries use this type of layout. While making a rocket (the real ones, not fire crackers!) the workmen/scientists, machines and tools and raw materials are moved to the place of construction of the rocket. Building bridges, roads, the Metro rail etc., are all projects.

FIXED POSITION LAYOUT



Advantages of project layout

- It minimizes movement of machineries and equipment.
- Continuity in production allows several activities to take place simultaneously.
- **Disadvantages of project layout**
- Skilled and versatile workers are required. The necessary combination of skills may be difficult to find. Suitable workers would have to be paid attractive salaries.
- Once the project is over, the equipment/materials will have to be moved. Not only is this an expensive proposition but equipment utilization is also low since equipment is kept idle during the time that it is being shifted.