

PLANT LAYOUT

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Definitions

- In the words of James Lundy, 'Plant layout identically involves the allocation of space and the arrangement of equipments in such a manner that overall operating cost are minimized.'
- The disposition of the various parts of a plant along with all the equipments used is known as Plant Layout. It should be designed that the plant functions most effectively.

- A good layout results in **comforts, convenience, safety, efficiency of the plant**. A poor layout results in congestion, waste, frustration and inefficiency.
- Development of a good layout depends on a series of decisions already taken on **location, capacity, facility, manufacturing methods and material handling**.

Stages in Plant Layout

- Product demand.
- Product requirements.
- Components and parts analysis.
- Work methods and measurements.
- Machine requirements.
- Handling and movement requirements
- Space requirements.

Objectives of Plant Layout

- Economies in materials, facilitate manufacturing process and handling of semi-finished and finished goods .
- Proper and efficient utilisation of available floor space.
- To ensure that work proceeds from one point to another point inside the plant without any delay i.e. to avoid congestion and bottlenecks .
- Careful planning to avoid frequent changes in layout which may result in undue increase in cost of production .
- To provide adequate safety to the workers from the accidents .
- To meet the quality and capacity requirements in the most economical manner.
- To provide efficient material handling system .
- Provision of medical facilities and cafeteria at suitable places.

Features of a good layout

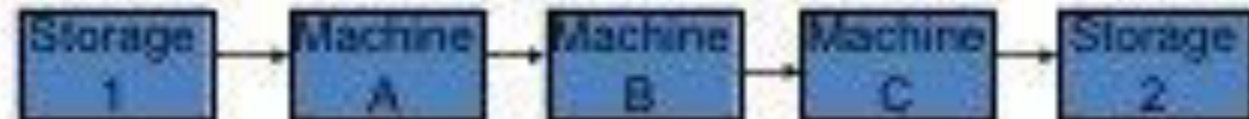
- There should be sufficient space for the workers as well as for the equipments to perform their functions .
- Must provide adequate safety to workers against injury or accidents e.g. fire fighting equipments , first aid boxes.
- Supervision , coordination and control of the activity should be effectively and easily executed.
- Their should be sufficient scope for making adjustments and modifications.

Types of Plants Layout

- **Product layout**
- **Process or functional layout**
- **Fixed layout**

Product Layout

- Here the position of a particular machine is determined at some definite stage or place where the machine is required to perform some operation from a sequence of operations designed to manufacture the product .



Advantages

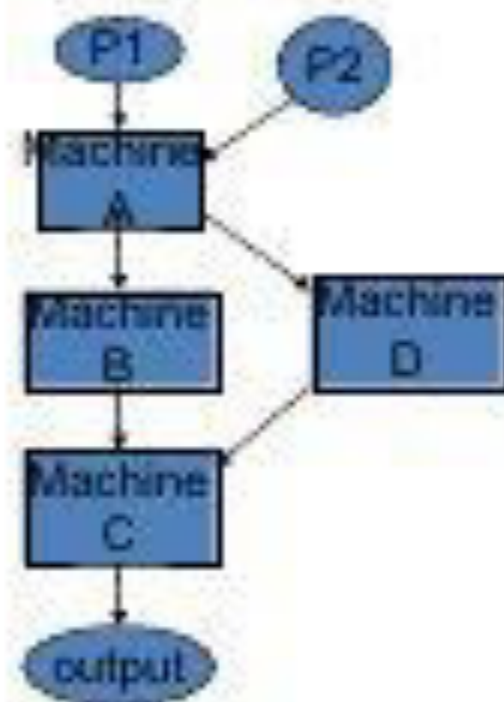
- Ensures smooth and regular flow of material and finished goods.
- Provides economy in materials and labour by minimising wastage .
- Reduces material handling.
- Low cost labour procurement and lesser training requirement .
- Lesser inspection.

Disadvantages

- **Product layout is of inflexible nature:** the facilities are designed to perform special operations. The machines cannot be inter changed either in capacity or any other operation .
- **Supervision is more difficult:** the system requires more specialized and skilled supervision .
- **Require heavy capital investment:** in this system there is unavoidable duplication of facilities, which increases capital investments and risks.

Process Layout

- In this layout more emphasis is given to specialisation or functional homogeneity on various components of the system. All operations of similar nature are grouped together in the same department. Here machines performing same type of operations are installed at one place i.e. drilling, milling, moulding, packaging.



Advantages

- **Lower capital investment:** the production facilities can be utilised to greater capacity with less duplication of machines .
- **Wide flexibility in production facilities :** the system is more flexible to adjust modifications and changes in production strategies .
- Effective supervision .
- Machine breakdown does not disrupt production schedules.

Disadvantages

- **More material handling:** here there is no definite channel through which all work can flow . There is too much movement of goods from one place to another inside the plant enhancing the chances of material waste and higher costs.
- Requires highly skilled labour creating difficulty in labour procurement.
- Inspection is more frequent and costlier.
- Machine loading is high .
- High investment in raw-materials and work in progress.

Fixed Layout

- This type of layout is used in those situations where the goods are of such a size and weight that their movement from one place to another is not possible e.g. ship-building, manufacturing of locomotives, construction of dams and bridges .

Advantages

- Layout is simple and capable of frequent adjustments both with respect to product and the process.
- Labourers and workers can be employed and remain busy throughout the process in one work.

Disadvantages

- Since machines and equipments are transferred to some particular place, heavy and sophisticated equipment cannot be used in such cases.
- Due to low efficiency of men and machines this layout is suitable only for some special type of project and for the production of smaller amount of items