Basic Workshop

 أساسيات الورش
Plant and Shop Layout

Plant layout specifies the position of the overall arrangement of the various facilities such as equipment, material, manpower, materials handling, service facilities, and passage required to facilitate efficient operation of production system of the plant within the area of the site selected previously.

Plant layout begins with the design the position of the factory building and goes up to the location of the machine. All the facilities such as equipment, raw materials, machinery, tools, fixtures, workers, etc. are given a proper place in each shop of the manufacturing plant.

In a best plant layout, material handling and transportation is minimized and efficiently controlled.
Advantages of a Good Plant Layout

1. Reduced men and machine hours per unit of production,
2. Work flow is smooth and continuous
3. Production control is better
4. Manufacturing time is less
5. Relatively less floor area is required
6. Material handling is less.
1. Fixed or Position Layout

- In this type the major part of an assembly remains at a fixed position. All material, machinery, tools required and the labor are brought to the fixed site to work.
- This layout is suitable when one or a few pieces of an item are to be manufactured and material forming requires only tools or simple machines.
- This layout is highly preferable when the cost of moving the major piece is high and the responsibility of product quality by one skilled workman or group is expected.
- This layout is mainly adopted for extremely large items manufactured in very small quantity such as ships, boilers, reactors etc.
2. Process or Functional Layout

- In this layout arrangements of similar machines, facilities and manufacturing operations are grouped together according to their functions.
- In this layout all similar operations are performed always at the same place e.g. all the lathes may be grouped together for all kinds of turning operations,
- This type is preferred for the industries involved in job order type of production and/or maintenance activities of non-repetitive type.
- This layout needs not to have to be changed every time of the product changes. the break down of any machine does not affect the production.
- This type of layout is highly suitable for batch production.
2. Process or Functional Layout

Types of Layouts
3. Line or Product Layout

- In this layout all machines are placed in a line according to the sequence of operations, i.e., each following machine or section is arranged to perform the next operation to that performed by its preceding machine or section.
- In this layout raw material starts from one end of production lines and moves from one machine to next along a sequential path.
- Line layout is advantageous in the continuous-production system where the number of end products is small and the parts are highly standardized and interchangeable.
- This layout is used for mass production and ensures smooth flow and reduced material handling.
4. Combination or Group Layout

- These days, the most of manufacturing industries have adopted this kind of layout.
- In this type of layout, a set of machinery or equipment is grouped together in a section, and so on, so that each set or group of machines or equipment is used to perform similar operations to produce a family of components.
- This layout is possible where an item is being made in different types and sizes. In such cases, equipment are arranged in a process layout but a group of number of similar machines is then arranged in a sequence to produce various types and sizes of products.
- This layout is suitable when similar activities are performed together thereby avoiding wasteful time in changing from one unrelated activity to the next.
- It is useful when a number of items are produced in same sequence but none of the items are to be produced in bulk and thus no item justifies for an individual production line.
4. Combination or Group Layout
### Comparison of Line Layout and Process Layout

<table>
<thead>
<tr>
<th>Line or Product Layout</th>
<th>Process or Functional Layout</th>
</tr>
</thead>
<tbody>
<tr>
<td>• similar machines are arranged according to the sequence of operations required.</td>
<td>• similar machines are arranged in one location for manufacturing the product.</td>
</tr>
<tr>
<td>• It is meant for mass production</td>
<td>• It is meant for moderate production</td>
</tr>
<tr>
<td>• Work flow is smooth in this layout</td>
<td>• Work flow is not smooth in this layout</td>
</tr>
<tr>
<td>• Job movement is very less.</td>
<td>• Job movement is comparatively more.</td>
</tr>
<tr>
<td>• Full automation in material handling is possible.</td>
<td>• Automation in material handling is not effective.</td>
</tr>
<tr>
<td>• Capital investment required is more.</td>
<td>• Capital investment required is comparatively less.</td>
</tr>
<tr>
<td>• Breakdown of one machine affects greatly.</td>
<td>• Breakdown of one machine does not affect.</td>
</tr>
<tr>
<td>• Production planning and control is easy.</td>
<td>• Production planning and control is difficult.</td>
</tr>
<tr>
<td>• Quality of product is not so good.</td>
<td>• Quality of product quality is better</td>
</tr>
<tr>
<td>• Work flexibility is very less in this layout</td>
<td>• Work flexibility is more in this layout</td>
</tr>
<tr>
<td>• Space required for same of production is less.</td>
<td>• Space required for same production is more.</td>
</tr>
<tr>
<td>• Time taken in completion of product is less.</td>
<td>• Time taken in completion of product is more.</td>
</tr>
<tr>
<td>• Less skilled workers are required.</td>
<td>• More skilled workers are required.</td>
</tr>
</tbody>
</table>

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