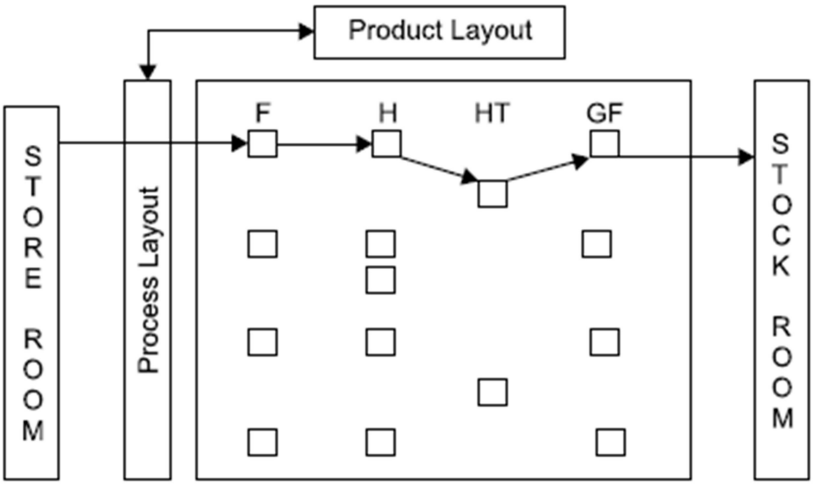
Combination Layout

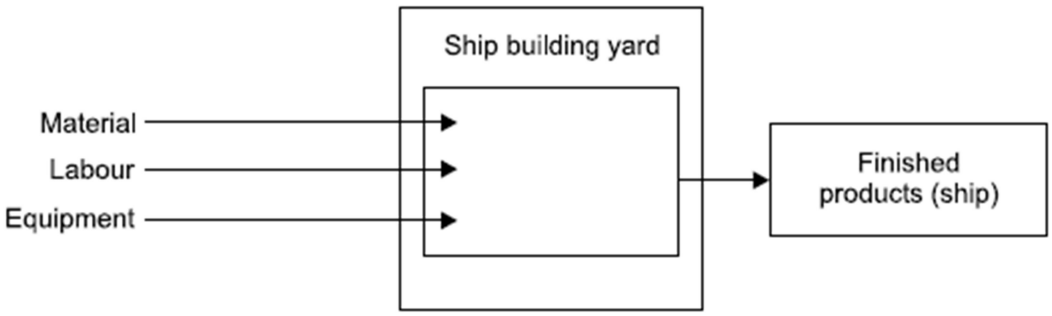
A combination of process and product layouts combines the advantages of both types of layouts. A combination layout is possible where an item is being made in different types and sizes. Here machinery is arranged in a process layout but the process grouping is then arranged in a sequence to manufacture various types and sizes of products. It is to be noted that the sequence of operations remains same with the variety of products and sizes. Figure shows a combination type of layout for manufacturing different sized gears.



Combination layout for making different types and sizes of gears

Fixed Position Layout

This is also called the **project type** of layout. In this type of layout, the material, or major components remain in a fixed location and tools, machinery, men and other materials are brought to this location. This type of layout is suitable when one or a few pieces of identical heavy products are to be manufactured and when the assembly consists of large number of heavy parts, the cost of transportation of these parts is very high.



Fixed position layout

Advantages

The major advantages of this type of layout are:

1. Helps in job enlargement and upgrades the skills of the operators.
2. The workers identify themselves with a product in which they take interest and pride in doing the job.

3. Greater flexibility with this type of layout.

4. Layout capital investment is lower.

Group Layout (or Cellular Layout)

There is a trend now to bring an element of flexibility into manufacturing system as regards to variation in batch sizes and sequence of operations. A grouping of equipment for performing a sequence of operations on family of similar components or products has become all the important.

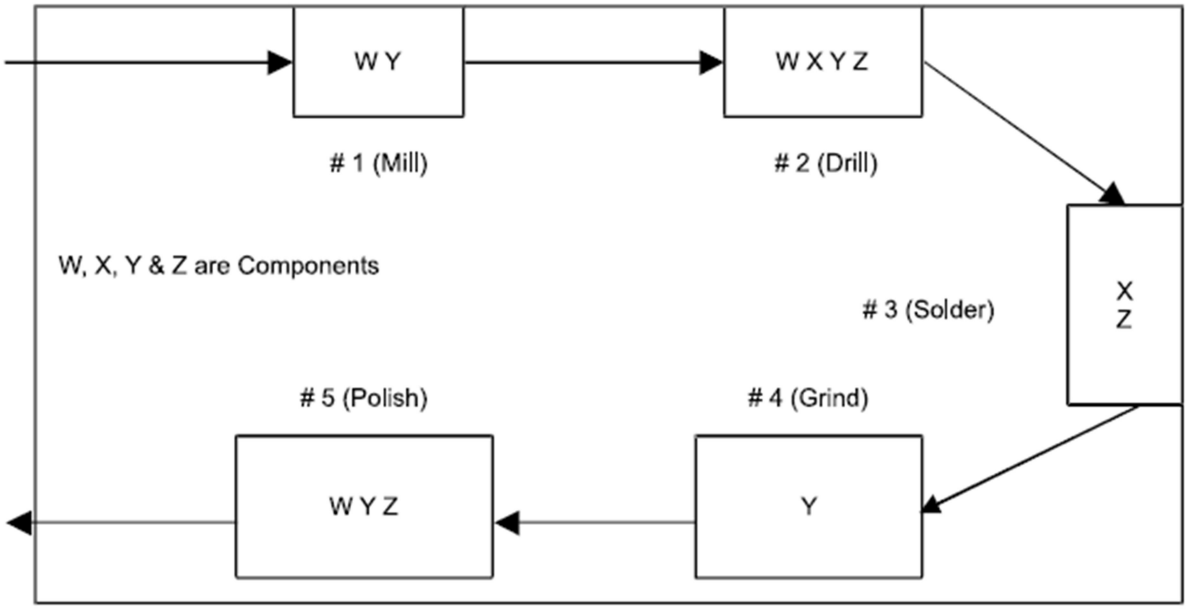
Group technology (GT) is the analysis and comparisons of items to group them into families with similar characteristics. GT can be used to develop a hybrid between pure process layout and pure flow line (product) layout. This technique is very useful for companies that produce variety of parts in small batches to enable them to take advantage and economics of flow line layout.

The application of group technology involves two basic steps; first step is to determine component families or groups. The second step in applying group technology is to arrange the plants equipment used to process a particular family of components. This represents small plants within the plants. The group technology reduces production planning time for jobs. It reduces the set-up time.

Thus **group layout** is a combination of the product layout and process layout. It combines the advantages of both layout systems. If there are *m*-machines and *n*-components, in a group layout (Group-Technology Layout), the *m*-machines and *n*-components will be divided into distinct number of machine-component cells (group) such that all the components assigned to a cell are almost processed within that cell itself. Here, the objective is to minimize the inter cell movements.

The basic aim of a group technology layout is to identify families of components that require similar of satisfying all the requirements of the machines are grouped into cells. Each cell is capable of satisfying all the requirements of the component family assigned to it.

In-group technology layout, the objective is to minimize the sum of the cost of transportation and the cost of equipments. So, this is called as multi-objective layout. A typical process layout is shown in Fig.



Group layout or Cellular layout

Advantages of Group Technology Layout

Group Technology layout can increase

1. Component standardization and rationalization.

2. Reliability of estimates.

3. Effective machine operation and productivity.

4. Customer service.

It can decrease the

1. Paper work and overall production time.

2. Work-in-progress and work movement.

3. Overall cost.

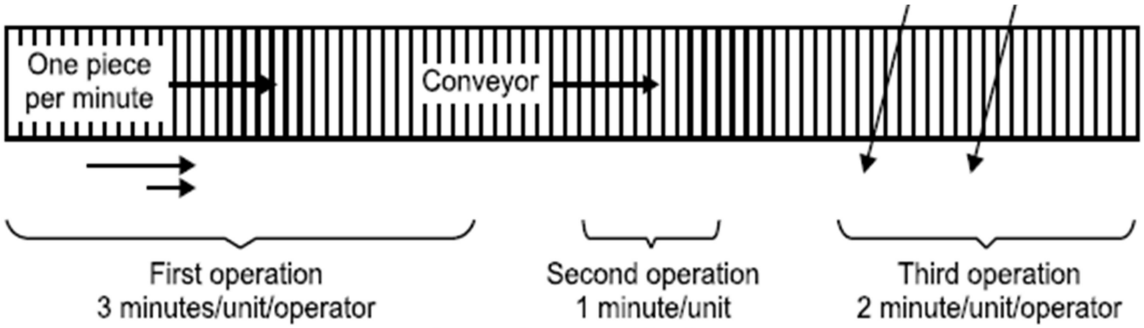
Limitations of Group Technology Layout

This type of layout may not be feasible for all situations. If the product mix is completely dissimilar, then we may not have meaningful cell formation.

DESIGN OF PRODUCT LAYOUT

In product layout, equipment or departments are dedicated to a particular product line, duplicate equipment is employed to avoid backtracking, and a straight-line flow of material movement is achievable. Adopting a product layout makes sense when the batch size of a given product or part is large relative to the number of different products or parts produced.

Assembly lines are a special case of product layout. In a general sense, the term assembly line refers to progressive assembly linked by some material-handling device.



Traditional assembly line