Rajshahi University of Engineering & Technology

Computer Science & Engineering

Assignment

Topic : Plant Layout

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PLANT LAYOUT

Introduction :

The ability to design and operate manufacturing facilities that can quickly and effectively adapt to changing technological and market requirements is becoming increasingly important to the success of any manufacturing organization. In the face of shorter product life cycles, higher product variety, increasingly unpredictable demand and shorter delivery times, manufacturing facilities dedicated to a single product line can not be cost effective any longer. Investment efficiency now requires that manufacturing facilities be able to shift quickly from one to another product line without major retooling, resource reconfiguration, or replacement of equipment. Investment efficiency also requires that manufacturing facilities be able to simultaneously make several products so that smaller volume products can be combined in a single facility and that fluctuations in product mixes and volumes can be more easily accommodated. The ~~inted~~ intended products to be manufactured influence the choice of layout.

Plant Layout:

Plant layout refers to the physical arrangement of production facilities. It is the configuration of departments, work centers and equipment in the conversion process. It is a floor plan of the physical facilities which are used in production.

According to Moore, "Plant layout is a plan of an optimum arrangement of facilities including personel, operating equipment, storage space, material handling equipment and all other supporting services along with the design of best structure to certain all these facilities."

According to James Lundy, 'Layout identically involves the allocation of space and the arrangement of equipment in such a manner that overall operating costs are minimized".

So we can say that "Plant layout is the most effective physical arrangement, either existing or in plans of industrial facilities i.e. arrangement of machines, processing equipment and service departments to achieve greatest co-ordination and efficiency of 4 M's (Men, Materials, Machines and Methods) in a plant.

Objectives of Plant Layout:

The primary goal of the plant layout is to maximize the profit by arrangement of all the plant facilities to the best advantage of total manufacturing of the product. The objectives of plant layout are:

→ Streamline the flow of materials through the plant.
→ Facilitate the manufacturing process.
→ Maintain high turnover of in-process inventory.
→ Minimize materials handling and cost.
→ Effective utilization of Men, equipment and space.
→ Flexibility of manufacturing operations.
→ Provide for employee convenience and safety.
→ Minimize investment in equipment.
→ Minimize overall production time.
→ Maintain flexibility of arrangement and operation.
→ Facilitate the organizational structure.

Principle of Plant Layout:

While designing the plant layout, the follow principles must be kept in view:

→ Integration: A good layout is one that integrates men, materials, machines and supporting services and others in order to get the optimum utilization of resources and maximum effectiveness.

→ Minimum distance: The principle is concerned with the minimum travel of man and materials.

→ Cubic space utilization: The good layout is one that utilizes both horizontal and vertical space. It is not ~~no~~ only enough if only the floor space is utilized optimally but the third dimension, i.e. the height is also to be utilized effectively.

→ Flow: A good layout is one that makes the materials to move in forward direction towards the completion stage, i.e. there should not be any backtracking.

→ Maximum flexibility: The good layout is one that can be altered without much cost and time i.e. future requirements should be taken into account while designing the present layout.

→ Minimum handling: A good layout is one that reduces the material handling to the minimum.

→ Safety, security and satisfaction: A good layout is one that gives due consideration to workers safety and satisfaction and safe-gaurds the plant and machinery against fire, theft etc.

Factors Affecting Plant Layout:

The possibility of attaining the best possible layout is directly proportional to following factors:

→ The weight, volume or mobility of the product: If the final product is quite heavy or difficult to handle involving costly material handling equipment or a large amount of labour, important consideration

will be to amount the product minimum possible e.g. boiler, turbines, locomotive industries and hip building companies etc.

→ Complexity of the final product : If the product is made up of a very large number of components and parts, i.e. large number of people may be employed for handling the movement of these parts from shop to shop or from machine to machine or one assembly point to another e.g. automobile industry.

→ The length of process in relation to handling time : If the material handling time represents an appreciable proportion of the total time of manufacturing, any reduction in handling time of the product may result in great productivity improvement of the industrial unit e.g. steam Turbine Industry.

→ The extent to which the process tends towards mass production : With the use of automatic machines industries for adapting mass production system of manufacturing the volume of production will increase.

Conclusion :

Decision about layout are made only periodically. As they have long term consequences, they must be made with careful planning. The layout design affects that the cost of producing goods delivering services for many years in future. Process layout arrange work centers according to function. Product layouts (Assemble layout) arrange work centers equipments in line to perform specialized sequence of tasks. In fixed position layout, the product remains in one location resources are brought to it. In process product layouts, the design begin with a statement of goals of facility. The layouts are designed to meet these goals. After initial designs have been developed, improved designs are sought which will be cumbersome, hence to take care of it quantitative computer based models are used.