

10. PLANT LOCATION AND LAY OUT.

When it has been decided to start a factory it is most important to select a suitable site or location to house the factory. This is not an easy problem, because of the site selected may not be proper, then all the money expended on factory building, equipments and layout etc. will go in waste. Therefore while selecting a site, owner must consider technical, commercial and financial aspects and then to select a site that will produce a maximum advantage.

This problem can be divided into two main parts:

- (a) General location of the factory.
 - (b) The selection of particular site.
- (a) For the general location of the factory following factors must be considered: -
- 1) The raw materials should be easily available at comparatively low cost and at low freight charges.
 - 2) The market should be near the factory for the quick service to the customers and easy transportation.
 - 3) There should be good transport facilities for bringing raw material and sending finished product.
 - 4) Skilled and cheap laborers should be available near the plant site.
 - 5) Availability of power and fuel were very influencing in olden days to day it has no much effect on plant site.
 - 6) Climatic and atmospheric conditions are governing factor to several chemical industries. However, air conditioning systems have changed the situation.
 - 7) All factories need soft and pure water especially in large quantities.
 - 8) Availability of capital.
 - 9) Social and recreational facilities: can be created near the factory site.

10) Banking facilities are necessary for the factories, which requires constant feeding of the working capital.

11) Existence of related factories sometimes play very important role in selection of site.

12) The factors like local byelaws, Taxes, Fire protection facilities, post and telegraph facilities should also be considered.

(b) Selection of Actual site: -The most important factors in this respect are: -

- 1) Availability of cheap land to build and expand the plant.
- 2) The cost of leveling the land and providing foundations, subsoil conditions for foundations and drainage.
- 3) The cost of bricks, sand, cement, limes, steel and other materials required for construction.
- 4) Facilities for the upkeep and general maintenance.
- 5) Facilities for transport in getting and sending materials.
- 6) Facilities for housing the workers and if necessary their transport from their place of residence to work sites.
- 7) Cost of laying the water supply and providing sewage and disposal work.
- 8) Cost of installation of electricity, gas and other facilities, etc.
- 9) Any restrictions placed by the planning department or local bye-laws be well studied.

The economic construction and efficient operation of a process unit will depend on how well the plant and equipment specified on the process flow sheet is laid out. The principal factors are considered are:

- Economic considerations: construction and operating costs.
- The process requirements.
- Convenience of operation.
- Convenience of maintenance.
- Safety.
- Future expansion.
- Modular construction.

Costs

The cost of construction can be minimized by adopting a layout that gives the shortest run of connecting pipe between equipment, and at least amount of structural steel work. However, this will not necessarily be the best arrangement for operation and maintenance.

Process requirements

An example of the need to take into account process consideration is the need to elevate the base of columns to provide the necessary net positive suction head to a pump or the operating head for a thermosyphon reboiler.

Operations

Equipment that needs to have frequent attention should be located convenient to the control room. Valves, sample points, and instruments should be located at convenient positions and heights. Sufficient working space and headroom must be provided to allow easy access to equipment.

Maintenance

Heat exchangers need to be sited so that the tube bundles can be easily withdrawn for cleaning and tube replacement. Vessels that require frequent replacement of catalyst or packing should be located on the out side of buildings. Equipment that requires

Dismantling for maintenance, such as compressors and large pumps, should be places under cover.

Safety

Blast walls may be needed to isolate potentially hazardous equipment, and confine the effects of an explosion.

At least two escape routes for operators must be provided from each level in process buildings.

Plant expansion

Equipment should be located so that it can be conveniently tied in with any future expansion of the process.

Space should be left on pipe alleys for future needs, and service pipes over-sized to allow for future requirements.

Modular construction

In recent years there has been a move to assemble sections of plant at the plant manufacturer's site. These modules will include the equipment, structural steel, piping and instrumentation. The modules are then transported to the plant site, by road or sea.

The advantages of modular construction are:

- Improved quality control.
- Reduced construction cost.
- Less need for skilled labour on site.

Some of the disadvantages are;

- Higher design costs & more structural steel work.
- More flanged constructions & Possible problems with assembly, on site.

The Plant Layout key words

1. Raw material Storage
2. Product Storage
3. Process Site
4. Laboratories
5. Workshop
6. Canteen & Change house
7. Fire Brigade
8. Central Control Room
9. Security office
10. Administrative Building
11. Site for Expansion Project.
12. Effluent treatment plant
13. Power house
14. Emergency water storage
15. Plant utilities

A detailed plant layout is drawn and submitted with this thesis report. This plant layout is just a reference plant layout. There may be a lot of changes in actual plant layout.