

PLANT LAYOUT ANALYSIS FOR EFFECTIVE PRODUCTION

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Abstract:

The facilities layout is a systematic and functional arrangement for the efficient labor utilization, manufacturing and maintenance ease, enhanced productivity and effective utilization of materials and as well the reduce in number of accidents. The various types of plant layouts are analyzed. The plant layout design, its major objectives, benefits, and the analytical calculations for the work in progress are discussed in this paper.

Keywords: plant layout type, process manufacturing, material flow flexibility, production.

INTRODUCTION

The increased global competitions have created an evolution in the manufacturing environment leading to the vast product configurations, reduced material handling time and developed a need to increase in the standards of quality at competitive rates. In parallel with a rising trend toward globalization, these manufacturing facilities must be designed to cater for new challenges to survive and grow in the marketplace. Plant layout is the arrangement of desired machinery and equipment of a plant in a way which will permit the easiest flow of materials, at the lesser cost with minimum handling, in processing the product from the raw materials to the dispatched of the finished product. Little adjustments in the position of machines and equipment in a manufacturing plant can greatly alter the easy flow of materials; this also affects the production costs and efficiency of the entire manufacturing process. The inability to get manufacturing processes right leads to delays, inflexibility, inefficiency, excess inventory, high costs, low product quality, and unhappy

customers. A good plant layout is designed to offer competitive advantage to manufacturers by enhancing the flow processes of inventory and information, thereby leading to reduction in manufacturing cost and improved productivity. [3]

Chapter-II

Need to change:-

There was developed a need to change the original plant layout due to the following reasons:-

1. Improper material flow through the shop floor i.e., the current plant layout not designed according to the process flow given by DGCA.
2. Extended transportation time for material transfer.
3. Next process not in order of production.

Constraints:-

1. Position of machine shop should not be changed.
2. Dimensions of current departments should not be changed.

Objectives:-

1. To study the current flow pattern and relation of overall plant layout and develop a new plant layout.
2. Relocating the workstations for simpler flow and reduction in check points.
3. To improve the efficiency of the plant layout.

BENEFITS

1. Reduces material handling costs.
2. Provides enough production capacity.
3. Ensures work proceeds without delay.
4. Proper and efficient utilization of the available floor space..

5. Improving productivity.
6. Ease of supervision and control.
7. Employee safety and health.

Procedure for Plant Layout Designs

The sequences of procedure following three steps were described.

1. The current plant layout was studied.
2. Records of machines are collected.
3. The process used for product manufacturing has been studied.
4. The present plant layout was analyzed to identify the problem under flow material and operation.
5. The suggestions were also collected from supervisors for their requirement.[2]

Chapter-III

Analysis of original plant layout

1. Existing layout: The area occupied by the machines, storage areas, raw material areas and finished goods area, etc. was measured .

2. Outline Process Chart:

Outline process chart (OPC) was used to get an overall picture of primary activities OPC for the studied process.

3. Flow Process Chart:

Flow Process Chart was used to document the detailed sequence of operations.

4. String Diagrams: String Diagrams were used to trace and measure the path of material. String diagrams were made both by hand and by software, MS office using Auto cad.

5. Simulation:

Time taken by each machine to process the component is collected and recorded. The standard time for each process is also recorded. These data are used in simulation in order to find out the overall utilization of the plant.[1]

Table 01. String Diagram Measurements.

PARAMETER	EXISTING LAYOUT	PROPOSED LAYOUT
Distance moved per unit Produced(in feet)	410.08	272.71
Effectiveness	64.79%	113.25%

Chapter-IV

Current Plant Layout

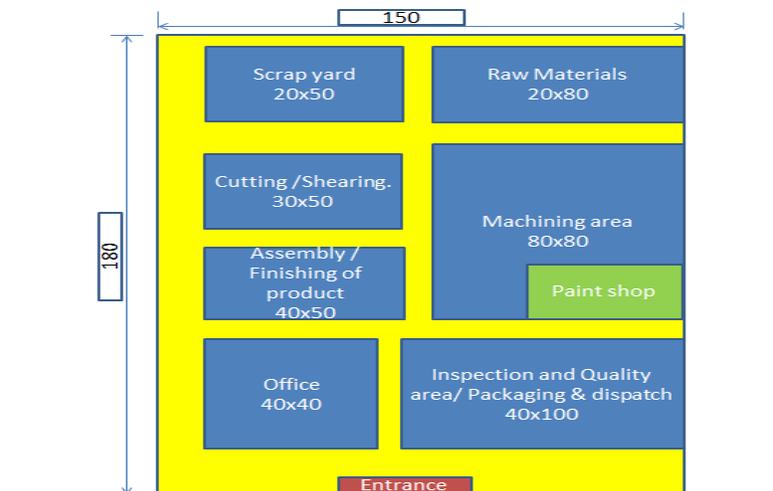


Fig 1. Current Plant layout.

$$\text{Effectiveness of current plant layout} = \frac{(\text{Prescribed Travel length})}{(\text{current travel length})} \times 100$$

$$\text{Effectiveness of current plant layout} = \frac{1500}{2315} \times 100$$

$$\text{Effectiveness of current plant layout} = 64.79\%$$

Chapter-V

Proposed Plant Layout.

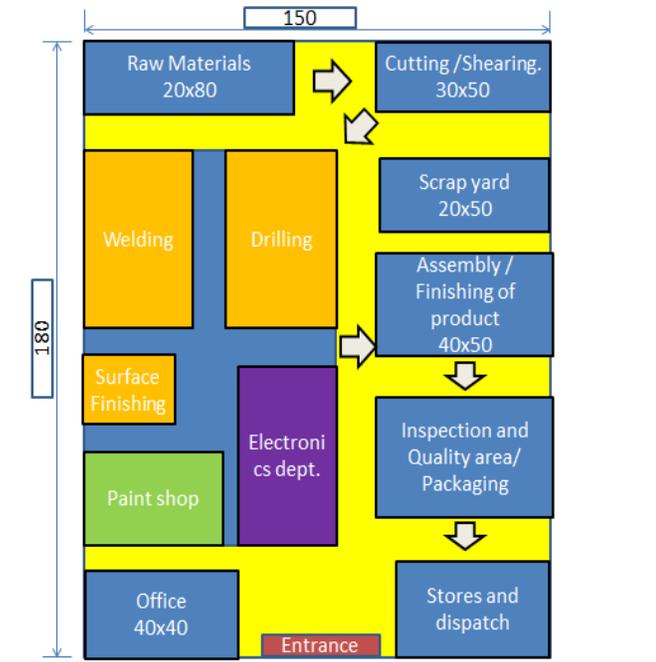


Fig 2. Proposed Plant Layout.

$$\text{Effectiveness of proposed plant layout} = \frac{(\text{Prescribed Travel length})}{(\text{current travel length})} \times 100$$

$$\text{Effectiveness of proposed plant layout} = \frac{1500}{1325} \times 100$$

$$\text{Effectiveness of proposed plant layout} = 113.25\%$$

$$\text{Improvement in the percentage} = 74.79\%$$

[1]

Chapter-VI

Conclusion

This research paper has provided a good exposure to facility planning and layout designs for the improvement of the efficiency. This decision, therefore, should not be considered lightly, but only after a thorough analysis of the operational requirements has been completed.

The plant layout has been designed as such that the total distance travelled during a single unit manufacturing is reduced, and also as there can be any changes made easily in the plant layout if there is any product change. The most common objective of layout design, that is to minimize distance travelled, is not always suitable for all

the manufacturing industries. Congestion in a specific area may have to be tolerated while maintaining minimum separation between facilities. Instead of criterion of minimizing total distance travelled, one may wish to minimize the total distance of the material travelled.[3]

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