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IMPROVEMENT IN PLANT LAYOUT BY USING SYSTEMATIC LAYOUT PLANNING FOR EFFECTIVE PRODUCTION

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ABSTRACT

The aim of this research is to improve the plant layout of Air Handling Unit manufacturing industry for increasing productivity. In this case study, amount of equipment's and tools used in production of Air Handling Unit are studied. There is many ways i.e. Quality control (QC), Total Quality Management (TQM), standard time, plant layout to solve the problems related to productivity.The detailed study of the plant layout such as operation process chart, flow of material and activity relationship chart has been investigated. The problem in term of material flow of each operation section was identified. The New Plant layout has been designed and compared with the present layout. By using SLP method, the distance of material flow is decreased significantly.

Keywords- *Systematic Layout Planning, Quality control, Material Handling, Material Flow.*

Introduction

With the rapid increasing of demand in production, industrial factories need to increase their potentials in production and effectiveness to fight against their competitors. At the same time, the production process is so planned such that the cost of production is reduced with increase in effectiveness. Therefore, the production problem should be solved quickly. There are many methods to solve the problem concerned to productivity. According to many researchers plant layout is the best way to reduce the production cost and hence increase in productivity. It is done by better work flow in production route. For example, a case study from the A.H.U manufacturing industry. The reason for the low production is ineffective material handling, large distance between various departments and improper layout. The problem was then studied from the data collected. According to these problems, an analysis is done to solve these problems to improve the plant layout. The systematic layout planning method (SLP) is applied for layout planning in which plant layout is designed according to the input data. This method provides the new plant layout in which process flow is smooth and material handling is effective so that the productivity is increased.

PROCEDURE FOR PLANT LAYOUT PLANNING

The following steps were describe the procedure of plant layout planning.

1. The complete information about the product, process, etc., collected and recorded systematically.
2. The machines and tools used in manufacturing were counted.
3. The analysis was done with the help of operation process chart, flow of material and activity relationship chart.
4. The problem of the plant layout was analyzed through SLP method.
5. The suggestions were collected to write the report and the plant layout is rearranged accordingly.

SUMMARY OF DIFFERENT SHOPS

(A) Store Department
(B) Machine Shop consisting of 2 Lathe Machines
(C) Fabrication Shop consistimg of 3 bending machines, 3 shearing machines and 2 nothching machines
(D) Coil Shop consisting of 2 Finning machine and 2 Expander machines
(E) Quality Control Deptt.
(F) Sheet Metal Shop
(G) Assembly Shop, A.H.U is completely assembled in this section.

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FACTORS AFFECTING PLANT LAYOUT

1. Type of Industry
2. Type of Production System
3. Volume of Production
4. Type of Production Facilities- Special or general purpose
5. Building Type
6. Total Area Available
7. Future Plan
8. Method of Material Handling

TOOLS AND TECHNIQUES USED

1. Process Chart
2. Travel Chart
3. Flow and String Diagrams
4. Templates
5. Scaled Models

ANALYSIS OF PLANT LAYOUT

The most important factor for the analysis and rearrangement of plant layout is the material handling cost. This case is based on a Air Handling Unit manufacturing industry Located in India. A.H.U is used for air conditioning of malls, hospitals etc. This industry has been design based on plant layout based on process layout was shown in fig. 1. Initially the raw material were moved to fabrication shop. The fins were produced in finned machines. The A.H.U is assembled in assembly shop where it was ready for dispatch. The quality inspectors check the quality of the A.H.U before dispatching. The details of each section were described as follow.

1. Fabrication shop
2. Quality control Department
3. Assembly Department
4. Sheet Metal Shop
5. Coil Shop
6. Store Department
7. Machine Shop

Table 1. Department (From-To) Distance

Department (From-To)	Distance (meter)
A-B	30
A-C	40
A-D	30
A-F	20
B-C	20
B-D	60
C-G	50
C-D	30
D-G	60
D-F	40
E-G	30
F-G	20

ANALYSIS PLANT LAYOUT BASED ON SLP

According to the theory of manufacturing process, it was seen that the long distance could be reduced for moving materials and the problem about the useless area could be solved. The SLP method was applied for improving plant layout for continuous flow by rearranging the plant layout. After collecting all the required informations , the new

plant layout design is created by setting the departments and machines systematically by using SLP method. The rearrangement of plant layout was done to increase the productivity as shown in Table 2.

Table 2. Department (From-To) Distance after rearrangement of Plant Layout

Department (From-To)	Distance (meter)
A-B	15
A-C	20
A-D	30
A-F	20
B-C	10
B-D	60
C-G	50
C-D	30
D-G	20
D-F	40
E-G	15
F-G	20

CONCLUSION

According to the analysis , it was found that the distance between finning machine and coil expander machine should be small so that material handling time was decreased. The distance between Coil Shop and Assembly Department decreased from 60m to 20m and distance between quality control department and assembly department was decreased from 30m to 15m. Also the distance between Machine shop and Fabrication shop was decreased from 20m to 10m to minimize the material handling and for smoothen the flow of material. Finally by rearranging the layout, the distance between the different shops and machines was optimized ,therefore increase in productivity was found and time consumed in material handling was also reduced. Also the accidents and material travel distance was decreased, which results in increase in productivity.

REFERENCES

[1] Y. Zhu, and F. Wang , "Study on the General Plane of Log Yards Based on Systematic Layout Planning,'' IEEE. Computer Society, vol. 4, 2009, pp. 92-95.
[2] Y. Lin, and W. Li, 'Study on the use of SLP in Planning and Designing of Steel Distribution Center," Chinese and Foreign Architecture, 2007, pp. 124-127.
[3] Law, A. and D. Kelton, Simulation Modeling and Analysis , 2/E, McGraw-Hill, New York, 1994.
[4] Tam, K.Y., "Genetic Algorithms, function optimization, and facility layout design." European
[5] R Mathur, "Systematic Layout Planning", McGraw, 1955.
[6] W. Wiyaratn and A. Watanapa, "Improvement plant layout using Systematic layout Planning (SLP) for increased productivity," in Proc World Academy of Science, Engineering and Technology, vol. 36, pp. 269-273, December 2010.