Comprehensive Survey on Optimum Plant Layout Design

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Abstract
In today's competitive environment optimal plant layout design plays a vital role in the cost reduction by improving the productivity. It has become mandatory to have efficient plant layout for well organized plant layout to utilize the basic resources within the organization. In order to obtain the maximum rate of return it is advisable the change the plant layout design to achieve the better efficiency. The objective of this paper is to review the contributions made by previous researchers in the area of facility planning and layout design.

Keywords
Plant Layout, Facility Planning, Productivity And Better Efficiency

Introduction

A facility layout is a total aggregation of the physical arrangement of departments, workstations, machines, equipments, materials, common areas etc, within a proposed industry. In general most plant layouts are designed properly for the initial conditions of the business. However these layouts provide many bottlenecks during saturation period. Hence as long as plant layout design proves to be efficient, it has to adapt the internal and external changes for which a re-layout is necessary. The reasons for a re-layout are due to changes in production volume, changes in process and technology and changes in the product. The frequency of re-layout depends upon requirement of the present situation. Hence facility layout design is a continuous iterative process based upon the changing constraints of dynamic environment. So optimization of facility layout is situation based requirement of the industry, The symptoms that allow the need for a re-layout are congestion and bad utilization of space, excess stock in process at the facility, high material handling distances , bottleneck at workstations, idle time of facilities and workers, labor anxiety and discomfort, accidents and difficulty in controlling operations and personnel.

Literature review:

S.NO	Title and Author	Methodology	Finding
1	A Heuristic procedure for the integrated facility layout design and flow assignment problem Ali Taghavi et.al	Proposed a novel integrated heuristic procedure based on a perturbation algorithm and sequential location heuristic	Performed the experimental study to assess the performance of the proposed procedure .The experimental results demonstrate that proposed heuristic procedure is both efficient and effective in Identifying quality solutions.
2	A genetic algorithm with the heuristic procedure to solve the multi-line layout problem Amir Sadrzadeh03	The paper presents a Genetic Algorithm based meta heuristic to solve FLP	The efficiency of the proposed method has been proved through solving examples and comparing results with other genetic algorithm, CRAFT algorithm
3	Using Simulation for Facility Design: A Case Study (Greasley, 2008)13	A discrete event simulation model was developed and used to estimate the storage area required for a proposed overseas textile Manufacturing facility.	It was found that the simulation was able to achieve this because of its ability to both store attribute values and to show queuing levels At an individual product level. It was also found that the process of undertaking the simulation project initiated useful discussions regarding the operation of the Facility.
4	A Study on Facility Planning in Manufacturing Process Using Witness. (Roslin *et al*, 2008)31	Comparing two alternative design of layout: U-shape and Sshape.	This paper found that U-shape flow pattern design has increase the efficiency utilization of labor, equipment, space and reduces idle Time.
5	Simulation Model for Production Line Layout. (Zuhdy *et al*,2008)18	Existing layout is evaluated by Using Pro model software by Integrating Process layout, constant period scheduling and Short Processing time.	This paper proved that the simulation model is capable to predict the capacity of initial system and test the proposed design.
6.	Layout Design in Group Technology Manufacturing (Hassan, 1994)14	Literature review	A review and consolidation of the emerging literature in the GT layout and a suggestion framework of analysis for developing the GT layout.

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Summary of Literature

Based on the literature survey as above, it is revealed that there are several studies investigated the effective design of facility planning in a production line of manufacturing process. But however there are some difficulties present in finding the solution for optimal plant layout using tabu search algorithm , genetic algorithm because it is time consuming process. Some have carried out simulation method to study the impact of plant layout and its characteristics using software's like PRO MODEL, WITNESS. Moreover the software of simulation type brings better visibility to the user in improving the efficiency of the plant layout.

Conclusion

In order to achieve maximum returns from the capacity of facilities, it is very essential to optimize plant layout for proposed units or re-layout of existing manufacturing units as per the changing market scenario. Many researchers have considered the use of algorithms to solve the plant layout problem but the common problem was long time duration to solve the optimal plant layout design. Besides simulation technique considered to be easy as compared to algorithm approach because simulation helps to analyze the possible features of plant virtually so that the various problems like flow path of raw materials, labor utilization time and plant efficiency can be tackled very easily.

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