

Productivity Improvement Through Plant Layout And Inventory Management In Small And Medium Enterprises-A Review Paper

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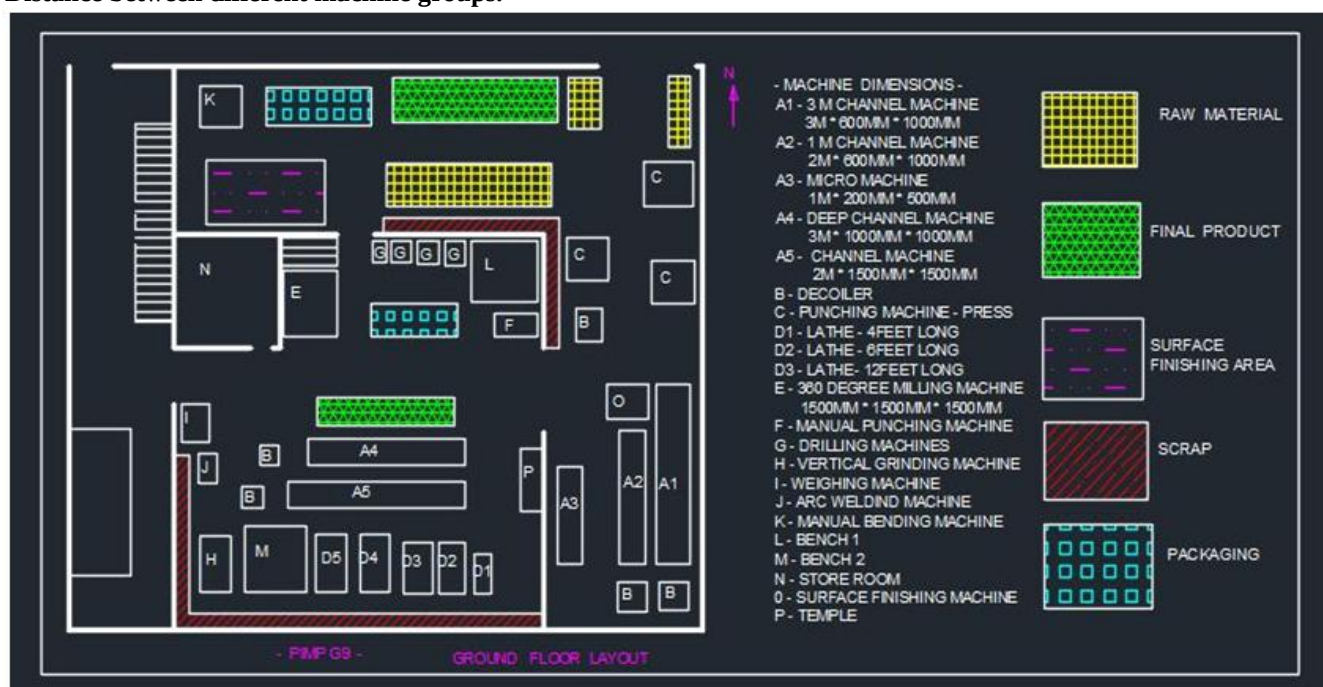
Abstract: - The objective of this project is to study plant layout of a small and medium enterprises by developing a facility plant layout which can accommodate more products by utilizing less area and also reduce time consumption problems. In this paper we are going to review about multiple published research papers which are mainly focused on "Optimization of plant layout" by using plant optimization techniques like craft, aldep, core lap, also it includes optimization by systematic layout planning(slp) and using string diagrams.

Keywords: - PIMP, Aldep, Core lap, Systematic layout Planning(slp), String diagram

I. INTRODUCTION

Our project is related to Industry Defined Problem which concern on the optimize of the plant layout. Our company layout comprehends of roll forming machines, lathe machines, drilling machines, punching machines and grinding wheels. The extensive product of the company is MCB channels. The flow of productions of MCB channels from a coil of sheet to the final exquisite product is been studied by our team. The worriment of the complications faced by the company is due to the current layout dispositioning of the machines, lack of material handling, dispatching and expediting, loading and scheduling. Our prominent concern is material handling which reckon with, the time taken for particular product, men power requirements, total material movement and the arrangement of machines. All factors mentioned above have their prominent influence on plant layout. Various research and study being done on the principles of plant layouts and types, factor affecting layouts, plant layout optimization, travel charts, flow process charts, flow diagrams, string diagrams, templates, scale model, layout drawings, analytical tools of plant layouts.

Distance between different machine groups.



II. Distance between different machine groups.

	1	2	3	4	5	6	7	8
1	0	20	40	30	35	35	70	60
2	20	0	35	25	15	25	50	45
3	25	35	0	10	45	50	65	30
4	40	20	10	0	50	25	40	45
5	50	20	45	50	0	25	40	20
6	40	25	30	20	30	0	20	25
7	70	55	55	40	30	20	0	15
8	60	45	45	45	15	25	15	0

1,4- Rolling Machines
 2- Punching Machine
 3- Lathe
 5- Raw Material Storage
 6- Drilling

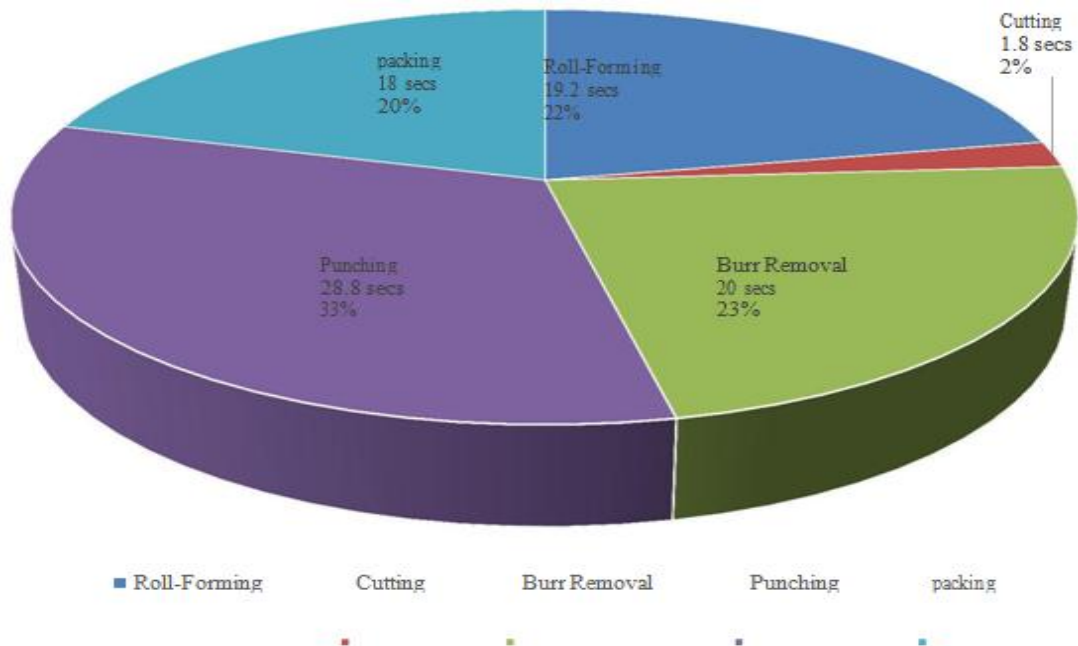
7- Packing
 8- Storage

III. TIME TAKEN FOR 1M MCB CHANNEL

Here we have observed the different machining processes of different products on particular machine. We have taken time for each and every machining process for five to six times and then consider the average timing for those particular machining processes.

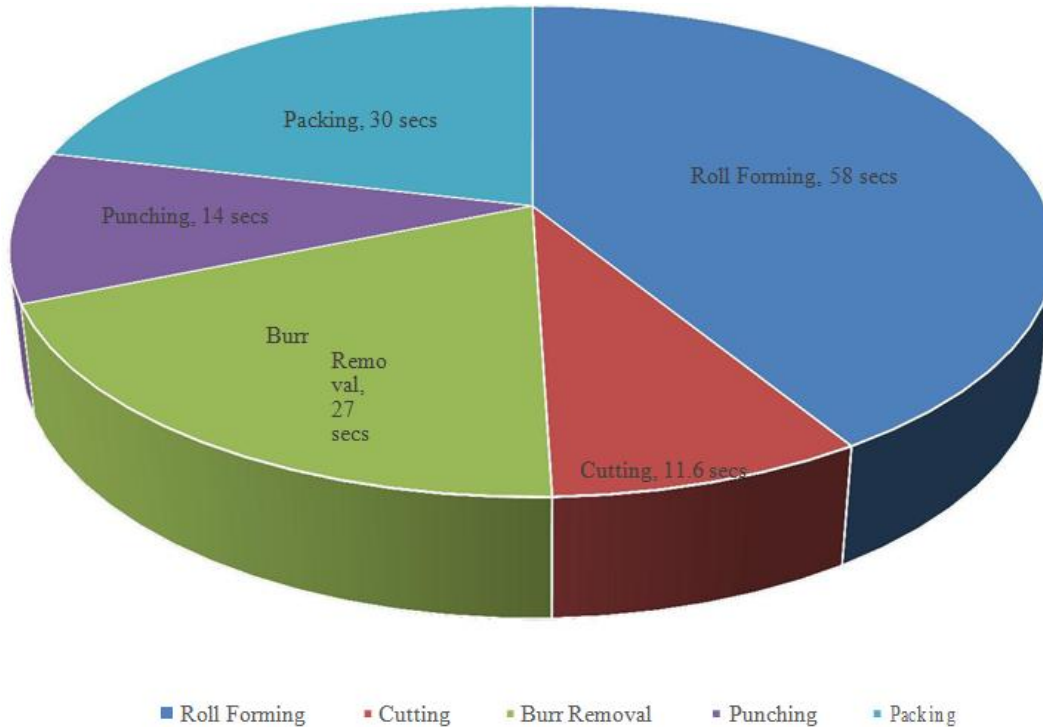
There are two main products of the company that is one-meter channel and three meter channels. The company manufactures several products but their main products include these two channels, so we calculated the time taken for each machining processes of channel and made a pie chart which shows different processing time, which is given below.

Production Timing For 1Meter Channel



IV. TIME TAKEN FOR 3M MCB CHANNEL

Production Timing For 3 Meter Channel



So after calculating this timing we can conclude that the maximum time taken is by the roll forming operation it takes 41.1% of the total operation timing for the three-meter channel. Then for the second highest time is taken by packing 21.1% and then by burr removal 19.1% punching 10% and cutting operations 8.2%.

V. LITERATURE REVIEW

- 1) **Author-Vivekanand s Gogi¹, Rohith D², Shashi Kiran K³, Suhail M Shaikh⁴** Title- Efficiency Improvement Of A Plant Layout

Journal- International Journal Of Innovative Research In Science Engineering And Technology
Published: - April 2014.

The objective of this research paper was to study the flow pattern and the relationship of overall plant layout and construct a new plant layout, To reduce the check points and relocate the work pieces, To improve the efficiency by using simulations. A major issue to be addressed in facility of plant layout decisions in manufacturing is to minimize the distance travel and it should be comfortable for future changes in product demand and product mix. Instead of minimizing total distance travel we can minimized the distance of material movement.

- 2) **Author- Parminder Singh, Manjeet Singh**

Title- Optimization Of Assembly Line And Plant Layout In A Mass Production Industry Journal- International Journal Of Engineering Science Invention

Published: - April 2015

In this paper the layout cost is calculated by taking the distance matrix and flow matrix. The distance matrix is obtained by converting the layout diagram into STEP file format which is taken as input to java program and output is obtained as distance matrix. The initial layout is now optimized in order to reduce the layout cost which is done by replacements of machine in proper sequence such that the distance matrix is altering every time and due to this the layout cost is changed.

3) Author- Bobby John¹, Jubin James², R.Mahesh Rengaraj³

Title- Analysis And Optimization Of Plant Layout Using Relative Allocation Of Facilities Technique Journal- International Journal Of Emerging Technology And Advanced Engineering

Published: - August 2013

This paper tells that the production rate and the utilization of machines depend on how well the various machines; production facilities and employee's amenities are located in the plant.

In this thesis work, a hybrid model that combines a facility allocation techniques and software analysis is done. The existing plant layout was according to craft and an improved new plant layout is proposed. So after it is implemented both the layouts are simulated using a simulation software ARENA. Results of the new plant layout and the old plant layout are compared and it is found that the utilization of the machines in the new layout is slightly increased. Re-location of the machines is done such that the flow of the material is smoother.

4) Author- Sanjay B. Naik, Dr. Shrikant kallurkar

Title- A Literature Review On Efficient Plant Layout Design

Journal- International Journal Of Industrial Engineering Research And Development

Published: - August 2016

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 developed lot of models based on heuristic and meta-heuristic approach by considering different case studies. Heuristic methods such as Tabu Search (TS), Simulated Annealing (SA), and Genetic Algorithms (GA) are common tools in optimization. Limitations of those heuristic methods are time consuming and cannot get the feel of the actual setting and actual dimension of the machine and equipment. Beside the heuristic methods, simulation technique is a powerful tool used by many researchers in creating and evaluating the proposed layout design before implementation. Simulation tools that commonly used in facility planning are Arena, QUEST, IGRIP, ProModel and Witness. Looking towards the limitations of the methods discussed so far, it is revealed that the more efficient and comprehensive method can be developed by using combination of heuristic methods and simulation technique. It is also revealed that there is a scope for developing multi-objective optimization techniques particularly for small scale sectors having few departments.

5) Author- Khusna Dwijayanti¹, Siti Zawiah Md Dawal², Jamasri³, and Hideki Aoyama⁴

Title- A Proposed Study On Facility Planning And Design In manufacturing Process Journal- International Multiconference Of Engineers And Computer Scientist Published: - March 2010

In conclusion it is found that analysis of facility design such as layout and material handling system is very important in manufacturing industry. Proper analysis of existing or previous plant layout design could improve the performance of production line. It could decrease bottleneck problems, minimize material handling problems and its cost, reduces idle time, raise the efficiency and utilization of labours, equipment and space. Heuristic methods such as Tabu search(TS), Simulated Annealing(SA), and Genetic Algorithms(GA) are common tools in optimization. Limitations of those heuristic methods are time consuming and cannot get the feel of the actual setting and actual dimension of the machine and equipment. Besides the heuristic methods, simulation techniques is a powerful tool that used by many researcher in creating and evaluating the proposed layout design before implementation.

The proposed research that will be conducted by author is evaluating existing plant layout arrangement using combinations of heuristic methods simulation technique.

VI. CONCLUSIONS

After referring to various research papers, review papers, analytical tools of plant layout we can yield the conclusion that our expectations for the optimizations of the plant layout can be enacted to achieve our goal that is to escalate the production. The above goal can be achieved by using various means and tools like time study, work measurement, method analysis, systematic layout planning, CRAFT, ALDEP, Core-lap, simulation software like arena can also be used.

VII. ACKNOWLEDGEMENT

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