Layout Designing In Manufacturing Industry

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Abstract- *This project is aimed to deal with layout modification of machine shop using the work measurement. The shop floor has CNC machine and lathe that are intended to do specific operations for specific components. The placements of machines are to be managed to reduce the unnecessary transportation waste involving in materials and also the movement of operators to carry out the job.*

The Transport waste is the most in case of improper arrangement of machines in the layout. For modifying the layout optimization can be done using ARENA 10.0 software and VIPPLANT opt software. By combining the results with the lean layout strategies of incorporating U-shaped cells were ever possible, keeping the finished goods closer to exit and also using proper 5S workplace.

The final layout thus obtained has a drastic improvement on reducing the overall transportation waste inside the shop floor. The adherence to the standard procedures is easily maintainable and improves the shop-floor material movement.

Keywords- Lean manufacturing, work measurements, layout design Machine shop, ARENA simulation.

I. INTRODUCTION

Lean manufacturing is accepted and widely used by the vast majority of the world's major manufacturers .it comes in many forms and has many names (E.g., Toyota production system, Nissan production way). The basis of lean manufacturing, however always contains the core elements that make it work lean containing five primary elements: Manufacturing facility,Organization, processcontrol, metrics and logistics.

In industry sectors, it is important to manufacture the products which have good quality products and meet customers' demand. This action could be conducted under existing resources such as employees, machines and other facilities. However, plant layout improvement, could be one of the tools to response to increasing industrial productiveness. Plant layout design has become a fundamental basis of today's industrial plants which can influence parts of work efficiency. It is needed to appropriately plan and position employees, materials, machines, equipment's, and other manufacturing supports and facilities to create the most effective plant layout.

Where The Facilities layout is a systematic and functional arrangement of different departments, machines, equipment's and services in a manufacturing industry. It is essential to have a well-developed plant layout for all the available resources in an optimum manner and get the maximum out of the capacity of the facilities. The efficiency of production depends on how well the various machines, services production facilities and employee's amenities are located in a plant.

II. IDENTIFY, RESEARCH ANDCOLLECT IDEA

This case study done being done in Shri Kannapiran Industries manufacturers of pump and spares. Shri Kannapiran manufacturing products according to the design and quality specified by the customer Monthly demand of company is to produce 2000 pieces of rotor shaft. Due to improper layout they are manufacturing only 70 piece/day, and also interruption of inner and outer plate manufacturing process (50 pieces/day) affecting the continuous flow of rotor shaft manufacturing process.So,the company manufacturing only 1680rotor shafts per month, remaining 320 materials holding at inventory, longer time Space utilization of raw material inventory increasing carrying cost.

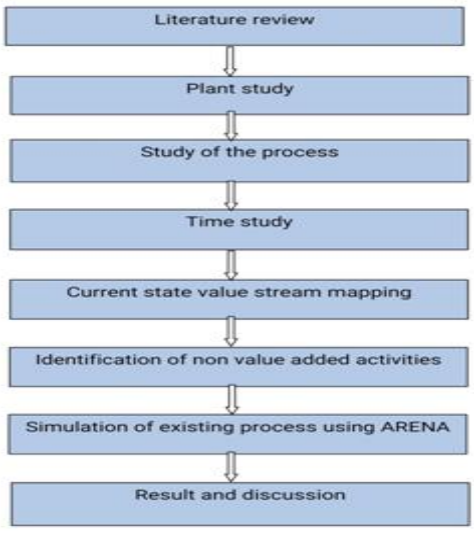

Figure 1.1 Methodology

III. OBJECTIVE OF LAYOUT STUDIESAND FINDINGS

OBJECTIVES

- To modify the machine shop layout design to reduce non value added activities.
- To obtain continuous flow in rotor shaft manufacturing process.
- To create level scheduling using the mixed model simulation for each sequential process.

PRODUCT VARIETIES

The industry manufacturing following products,

- Rotor shaft
- Inner, outer plate for 0.5 HP motor
- Cone shaft for buffing machine
- Motor flange
- Impeller for 1 HP motor

Table 1.1 Monthly Demands

SL NO	Products	Demand
1	Rotor shaft	2000 pieces
2	I/O plate	800 pieces
3	Cone shaft for buffing machine	1200 pieces
4	Impeller (1hp)	900 pieces

PLANT LAYOUT

Machines used for manufacturing process in Shri kannapiran industries are following below;

- Lathe
- CNC Machine
- Drilling Machine

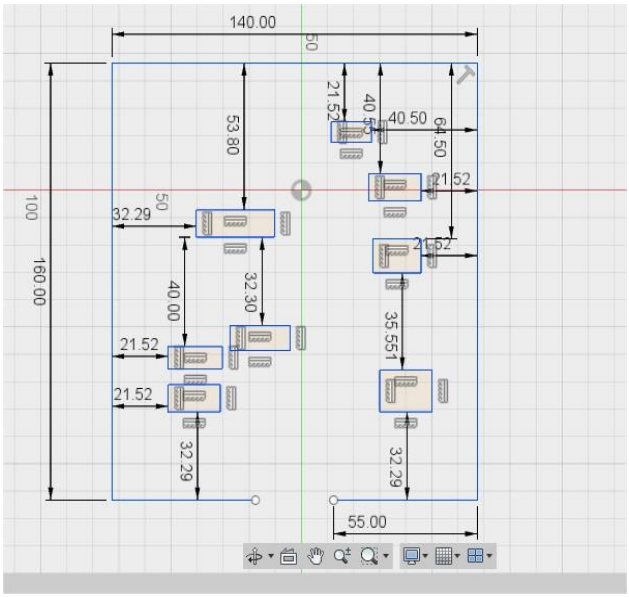

Figure 1.2 CAD model of pant layout

Represents existing flow of raw material for rotor and cone shaft manufacturing process

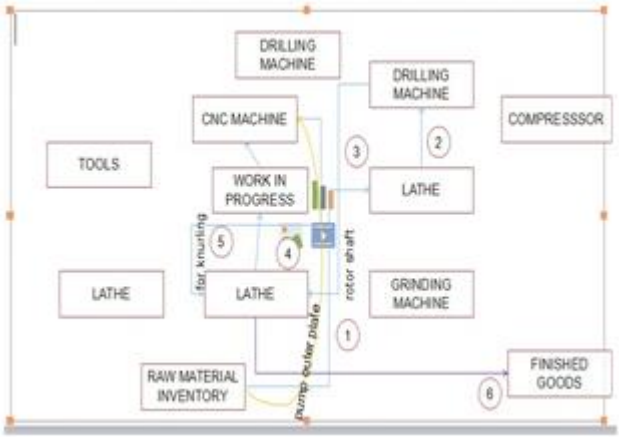

Figure 1.3 Movement of raw material

IV. CONCLUSION

RESULT AND DISCUSSION

From work measurement the current state value stream mapping is constructed and simulation done through using the ARENA 10.0 which results more Non value added activities and work in progress inventory between the machines. This can be solve by modifying the plant layout and level scheduling for the each sequential process using VIP PLANT opt and mixed model simulation using the ARENA.

The production efficiency depends on how well the various machines; production facilities and amenities are located in a plant. There should be an optimum relationship

among the output, floor area and manufacturing process. The layout modification is the main aim of this project from existing manufacturing process shouldn't meet the customer demand So the changing layout and mixed model simulation for each product should reduce non-value-added activities and work in progress inventory in future.

REFERENCES

[1] Bicheno, John (2004) The New Lean Toolbox Towards Fast Flexible Flow. Buckingham Coghlan, David and Theresa Brannick (2010) Doing Action Research in your own Organization, 3rd Edition. Sage publications .
[2] Michael L. (2003) Lean Six Sigma for Service: How to Use Lean Speed & Six Sigma Quality to Improve Services and Transactions.
[3] McGraw-Hill Hines, Peter and Nick Rich (1997) the seven value stream mapping tools. International Journal of Operations & Production Management 17(1): 46-64.
[4] Imai, Masaaki (1986) Kaizen: The Key to Japan`s Competitive Success. McGraw- Hill Publishing Company.
[5] McMahon, Tim (2009) Downtime and the Eight Wastes. http://www.aleanjourney.com/2009/10/downtime-and-eight-wastes.html (Accessed Management Systems Inc.(2006) Ishikawa(Fishbone/Cause-and-Effect)diagram. http://pdca.wordpress.com/2006/05/09/ishikawa-fishbonecause-and-effect.
[6] Shingo, Shigeo (1988) Non-Stock Production: The Shingo System for Continuous Improvement. Productivity Press, New York.
[7] Meredith, Jack (1998) Building operations management theory through case and field research. Journal of Operations Management16:441-45