

Lean Manufacturing Implementation Technique – A Review

Chetan Patel*, Satayu Travadi, Vikas Panchal

CHAMOS Matrusanstha Department of Mechanical Engineering, Charotar University of Science & Technology,
Changa, Gujarat, India

ABSTRACT

Today, Lean manufacturing Tools and Techniques are widely used for eliminating various kinds of waste and increase profit of organization by making process more efficient. Lean is about doing additional with less: Less time, inventory, space, people, and money. Lean is about speed and obtaining it right the first time. The Lean manufacturing approach is meant to transform non-value added activity into value added activity. Lean manufacturing has its impact on the employees and also the customers alike. A lean organization understands customer value and focuses its key processes to continuously increase it. The ultimate goal is to produce perfect value to the customer through an ideal value creation methodology that has zero waste. This paper provides the literature survey on lean tools and lean implementation technique of implementing lean manufacturing.

Keywords: Lean Manufacturing, Lean Tools, Lean Implementation.

I. INTRODUCTION

Lean ideas are evolved from Japanese industries particularly from Toyota. Lean manufacturing is taken to be a waste reduction technique, but in practice lean manufacturing maximize the value of Products through minimization of waste. The waste-elimination idea of Lean manufacturing contains a vital impact on numerous industries. The goals in implementing the lean manufacturing are lower production costs; increased output and shorter production lead times. Main goal of this approach is on price reduction by decreasing non-value activities. based on the Toyota Production System, lean producing tools and techniques like just-in-time, cellular manufacturing, total productive maintenance, single-minute exchange of dies, and production smoothing are systematically applied in several distinct manufacturing systems involving automotive, electronics. The paper review targeted on the implementing lean and their advantages, that is achieved through the tools of lean manufacturing.

II. LITERATURE REVIEW

Jafri Mohd Rohani et al. (2015) apply one of the most important lean producing techniques known as value Stream Mapping (VSM) to enhance the production line of a color industry as a case of study. To realize this goal,

lean basic principles was enforced to construct VSM for identification and elimination of wastes by using team formation, product selection, abstract style, and time-frame formulation through takt time calculation. Based on the future VSM, final results showed that by implementing some lean thinking methods, Production Lead time (PLT) reduced from 8.5 days to 6 days, and therefore the value added time reduced from 68 min. to 37 min. [1]

Juthamas Choomlucksana et al. (2015) explores a true work case study of the producing sheet metal stamping process to demonstrate however lean producing will help improve work efficiency. Lean and different improvement tools and techniques like visual management, Poka-Yoke, and 5s were applied to assist firm establish areas of opportunity for waste reduction and improve the efficiency of production processes. The numerous results indicate that the processing time of a polishing stage, once applying lean producing principle, was reduced from 6,582 seconds to 2,468 seconds or by 62.5%. Also non-value added activities were reduced from 1,086 activities to 261 activities, or by 66.53%. Moreover, overcome cost was reduced by 1764 dollar each year. [2]

Kashif Mahmood et al. represents the paper aims to provide better understanding of lean production

approach so as to increase productivity, reduce cost and maximize customer value whereas minimizing waste throughout the assembly processes. Lean tools focusing on the value Stream Mapping (VSM), Pull system (Kanban) and Dedicated Flow that square measure contribute to vary the method by eliminating different quite wastes (such as inventory) that slow down the method. Case from metal producing company is taken into account that target lowering down the inventory (waste) levels with the help of lean tools. Lean implementation have shown improvement by reducing WIP inventory from 1026 tons to 800 tons whereas overall inventory level has fallen down from 1845 tons to 1600 tons.[3]

Vipulkumar C. Patel et al. (2012) apply 5s methodology of lean producing to solve Problem of ceramic industry. The target of this analysis is to decrease the process waste, smooth the process flow and maintain correct quality control, improve storage facility, safety, security and method cost saving in company through case study. 5s implementation has been applied during a storage department and dielectric department. When implementing 5s within the storage department the space saving is 12.91% and also certain method waste are reduced. In insulator department the workplace became economical and effectiveness. [4]

Mayank Dev Singh et al. (2015) applied lean manufacturing tools like 5S, Kaizen and visualization in pipe producing Firm "Sandvik Asia Pvt. Ltd, Mehsana, Gujarat". Owner of firm is additionally interested to implement this concept; thus as an industrial perspective this project can provide us data that however the practical implementations of lean ideas takes place. Reduced man motion, lead time and idle time by Standardizing valves for varied operations. Searching time reduced by 6-8 min. [5]

Nikunj Patel et al. (2012) provides a roadmap and implementation of lean producing tools in producing industries. These papers represent the one case study in radiator producing company, wherever the 5S tool implemented. During this study bottleneck product was identified. Further value stream analysis tool was used for identification of wastes during a method. The importance of every kind of the error was studied and waste ranking was carried out. Current state map is

plotted to assess current status, waste elimination techniques are given and future state map is additionally preferred for improvement. The results of study shows 200th waste reduction within the area of unnecessary inventory, transportation and waiting. [6]

Neha Verma et al. (2015) represent this paper starts with the proposition of applying lean producing ideas in productive processes, and contributes plenty to show firms a lot of competitive. Focus on line balancing and lay out improvement, this work researched the lean producing application, during a manufacturing plant. Business reduce the time of pouring times through an improvement in industrial lay out and work balancing as well as worker's multi skilling training. The lean ideas, besides the auto industry, will be applied within the manufacturing plant industry, bringing advantages of higher productivity. [7]

Nurul Hayati (2012) conclude that lean implementation shows that time interval in-process and finished product inventory and additionally finished good area will definitely improve time interval reduced by 40%, in-process and finished product inventory reduced by 23-29% finished good area optimized by 4%. [8]

Summary of Literature Review and Discussion

Paper	Title	Journal	Tool applied	Benefits derived
1	Production line analysis via value stream mapping: a lean manufacturing process of color industry	Elsevier	VSM,5s	Decrease lead time, Reduced value added activity, overtime cost
2	Improving the productivity of sheet metal stamping subassembly area using the application of lean manufacturing principles	Elsevier	Kaizen, takt time, poka yoke, 5s	processing time, non value added activity and over time cost are reduced
3	Productivity improvement by implementing lean production approach	Elsevier	VSM, pull system (KANBAN), dedicated flow	Reducing overall inventory, total inventory, and work in process
4	A case study:5s implementation in ceramic manufacturing industry	BIJIEM S	5s, visual management system	improvement in space utilization, safety of the employees
5	Process flow improvement through 5s, kaizen and visualization	IJRSE T	5s, kaizen and visualization	Reduced man motion, lead time and idle time, Improved quality of workplace
6	Study and implementation of lean mfg. tools-5s'	TROI	5s	waste reduction in the area of unness

				ary inventory, transportation and waiting
7	Application of lean mfg. –A case study on Jindal steel power limited		Line balancing, assembly line	reduce the waste of time and reduce the queuing, better productivity
8	Development of Kanban System at Local Manufacturing Company in Malaysia – Case Study	Elsevier	Kanban	Reduce lead time and inventory

III. A STEP VISE APPROACH TOWARDS LEAN IMPLEMENTATION

1) 5s

5s is regarding Organize the work area: sort (eliminate that that is not needed), Set in order (organize remaining items), Shine (clean and examine work area), Standardize (write standards for above), Sustain (regularly apply the standards). It helps to Eliminates waste that results from a poorly organized work space (e.g. wasting time searching for a tool).

2) Value Stream Mapping

Value Stream Mapping is a tool used to visually map the flow of production. It shows the present and future state of processes in a very way that highlights opportunities for improvement. VSM helps to Exposes waste among the present Process and provide a roadmap for improvement through the future state.

3) Total Productive Maintenance (TPM)

Total Productive Maintenance (TPM) is a holistic approach to maintenance that focuses on proactive and

preventative maintenance to maximize the operational time of apparatus. TPM blurs the difference between maintenance and production by inserting a powerful emphasis on empowering operators to help maintain their equipment. TPM helps to Creates a shared responsibility for equipment that encourages greater involvement by plant floor employees. Within the right environment this will be very effective in rising productivity (increasing up time, reducing cycle times, and eliminating defects).

4) Kaizen (Continuous Improvement)

Kaizen (Continuous Improvement) is a strategy wherever work together proactively to attain regular, incremental enhancement in the producing process. Kaizen helps to combines the collective abilities of a firm to create an engine for regularly eliminating waste from manufacturing processes.

5) Just In Time (JIT)

JIT is Pull elements through production based on customer demand rather than pushing parts through production based on projected demand. Depends on various lean tools like Continuous Flow, production leveling, Kanban, Standardized Work and Takt Time. JIT helps to extremely effective in reducing inventory levels. Improves cash flow and reduces space requirements.

6) Inventory

Inventories are classified into raw material, work-in-process (WIP), finished product. Survey from numerous articles indicates that 60 minutes of wastes in producing system are due to inventory. As per literature survey the excess raw material is owing to poor projection of product set up, availability of raw material, defective elements, waiting for process leads to a lot of work in process, and unnecessary transportation between working stations or plants will increase work in process inventory, overproduction of elements beyond the arrange leads Inventories are reduced by rising the quality levels, rejection rates, delivery rates, delivery rates, lead time and Employee satisfaction. Raw material is controlled by ordering material against the demand. As a result producing lead time increase that is increase

the work in method. Kanban and pull system are the lean tools that are control the work in method.

7) Kanban

Kanban is a lean tool of the Lean producing system that was created to manage inventory levels, the production and provide of components. Throughout demand uncertainty, the buffer maintenance is important for smoothening production flow by Kanban System in order to lower the inventory. so Kanban system production for inventory level that are leads to less lead time in product delivery and effective utilization of resources like man, machine etc.

8) Takt time

Takt time defined as frequency of a part or element should be produced to fulfill customers demand. Takt time depends on monthly production demand, if the demand will increase the Takt time decreases, if the demand decreases the Takt time will increase that mean the output interval increases or decreases. Literature suggested that the importance of measuring Takt time due to the prices and inefficiency factors in manufacturing ahead of demand, which has Storage and finished goods.

IV. CONCLUSION

Lean manufacturing implementation is especially helpful for waste reduction, continuous improvement, method improvement and rising supplier customer relationship by reducing lead time. it is also offers numerous kinds of tools to enhance producing If lean tools and techniques are applied properly, important results will be achieved within the manufacturing method by understanding the use of 5s, VSM , JIT , performing time studies and focusing on incremental changes to the method through the utilization numerous lean tools. By utilizing the techniques of lean producing, and applying them systematically, can help any producing facility drive out the waste that is currently in their process.

V. REFERENCES

- [1]. J. M. Rohani and S. M. Zahraee, "Production Line Analysis via Value Stream Mapping: A Lean Manufacturing Process of Color Industry," *Procedia Manuf.*, vol. 2, no. February, pp. 6–10, 2015.
- [2]. J. Choomlucksana, M. Ongsaranakorn, and P. S. F., "Improving the productivity of sheet metal stamping subassembly area using the application of lean manufacturing principles," *Procedia Manuf.*, vol. 2, no. February, pp. 102–107, 2015.
- [3]. K. Mahmood, "Productivity Improvement by Implementing Lean Production Approach," pp. 183–188.
- [4]. V. C. Patel and H. Thakkar, "A Case Study: 5s Implementation in Ceramics Manufacturing Company," *Bonfring Int. J. Ind. Eng. Manag. Sci.*, vol. 4, no. 3, pp. 132–139, 2014.
- [5]. M. D. Singh, S. Singh, A. Chokshi, H. Chavan, and D. Dabhi, "Process Flow Improvement through 5S , Kaizen and Visualization," *Int. J. Innov. Res. Sci. Eng. Technol.*, vol. 4, no. 3, pp. 1103–1112, 2015.
- [6]. N. S. Patel, C. U. Patel, and P. Brahmhatt, "Study and Implementation of Lean Manufacturing," no. 4, pp. 54–59, 2015.
- [7]. N. Verma, B. Raghuvanshi, and T. Verma, "Application of Lean Manufacturing - A Case Study on Jindal Steel Power Limited," vol. 3, no. 4, pp. 446–449, 2015.
- [8]. Naufal A., Jaffar, A., Yusoff, N., & Hayati, N.(2012). Development of Kanban System at Local Manufacturing Company in Malaysia – case study. *Procedia Engineering*, 41, 1721-1726.