

ANALYSING THE EFFECT OF LEAN MANUFACTURING USING VALUE STREAM MAPPING BASED SIMULATION- A CASE STUDY AT GLASS PROCESSING UNIT

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Abstract: This research work presented the Value Stream Mapping (VSM) has successfully been used as a lean tool in manufacturing processes. Applying this tool in other areas is an interesting issue; it involves particular considerations and adaptation. In this research work explained that how the traditional style of manufacturing production system shift to the application of modern techniques of lean in one of the manufacturing industries to improve the flow of production system and demand processing by reducing line intersections with optimal usage of available facilities. value stream mapping (VSM) have been used to represent the production flow line. E draw max software has used to develop the simulation models, with applying pull system of lean tools for the modified status instead of the push system that has used in the traditional style of production. Thus, numbers of add values (AV) have been obtained over several periods of run-time for the designed simulation models. Then a future state map is drawn to show how things should work for best competitive advantage. Value Stream Mapping helps to identify the current flow of material and information in processes for a family of products, highlighting the opportunities for improvement that will most significantly impact the overall manufacturing production system of company. Value Stream Mapping (VSM) is a very comprehensive tool to that allows an organization to identify sources of waste and implements process improvements.

The present work represents a case study of a glass manufacturing unit producing glass of various thicknesses reveal that production lead time is one of the barrier in obtaining the desired production rate. The work carried out in this study optimizes the production lead time through software planning reduces the lead time. The decrease in lead time accelerates the production rate results in higher production.

Keywords: - Value stream mapping, lean manufacturing, and implementation, pull system, push system.

INTRODUCTON

Lean manufacturing is a philosophy as well as a set of tools and techniques that focus to find and eliminate entire waste from system. The term lean was preliminary vogueish after the book "the machine that changed the world".[4] as such [2]describes lean as a family of connected methodology that focus to stream line and valuable production process. In conventional sense lean can be used as an alternative way of organizing mass production. There are five principles of lean that makes lean more effective and efficient.

1> Precise specification of value by specific product

2> Recognize the value stream for every product.

- 3> Make value flow with value added and non-value added.
- 4> Let customer pull value from producer.
- 5> And continuous perfection.[7]

Lean production widely accepted in many industries and service sectors. Implementation of lean in every industries impact on various strategic factors like changes in strategies of process and working style, effects on company culture, focus on production, commitment and consistency of senior management, space and time for improving of performance. So in order to survive in cut throat competition in global market and to be need to meet customer's demand. Organization must not only design and provide services for better product but will have to change their manufacturing operations by using lean implementation it can be achieved.

Value stream mapping involves the value adding and non-value adding activities that are necessary to manufacture a product from raw material through delivery to the end user. It is simply a visual representation of material and information flow of a particular product with value adding and non-value adding processes. Value stream mapping is a very influential tool of lean manufacturing that provides a facility to user to perceive the waste in entire stream. Value stream map has two delineation named current state map and future state map.

Current state map represents the process complete the entire operation in present. it is simply a visual ground plan that recognizes value and waste throughout the manufacturing process and emboldens systematic belly up to eliminating waste.

Future state map is a sketch that represents lean flow creation. It embraces lean manufacturing techniques to eliminate waste and minutest the non-value added activities. The objective of Value stream map is to switch from batch production and move towards to one piece flow and pull through the whole value stream. The ultimate goal of lean Value stream map is to optimize the flow of the entire system from information, to material, to finished good arriving at the end user. It enable s in minimizing lead time, inventory, and overproduction and meliorate efficiency and quality. Its aim is continuous improvement in sustain manner.

Research methodology

To observe the processing activities which are performing in manufacturing shop floor, collection of data is highly required. To collect the data we can use various methods as per our convenient.

The researcher will go through indicus venture manufacturing facility and recognize each manufacturing process involved from raw materials to finished products, observed all the places where inventory is stored between the processes, and evaluate flow of the materials from one operation to another and also calculate the time used between the workstations. Collection checklist, pencil, eraser and watch as the tool to collecting data will be used by researchers from the field. One more important method to collect the data is to take direct data from manufacturing shop floor and internal company documentation, and pulled up to from company data-base. Researcher can also perform interview, Quesnairre and brain-storming with manufacturing production team, engineers, maintenance team supply chain team, purchasing team, and logistic & shipping team members of manufacturing production company worker.

Timing	Scheduled of Working Hours
09:00 – 12:45	Working hours with 10 mints including Tea Break.
12:45 – 13:30	Lunch Break.
13:30 – 17:00	Working hours with 10 mints including Tea Break.

Number of working days in a month=26

Number of shifts per day=3

Net working time available per day= 1305 min

Break in each shift=45 min

Demand for a month=30,000

Cycle time=75 sec

Takt Time calculation:-

Takt time= Net available time per day/customer demand per day

$$=1305*60/1154$$

$$=68 \text{ sec}$$

Lead time before improvement=34 sec

Production per month= $26*1305*60/(75+34.5)$

$$=18,600$$

Implementation:-The reduction in total production lead time may be attributed to the use of planning software by the planning department to release the order before 6 days results in decrease of production lead time. The quenching and cooling processes can be carried out at a single section of shop floor also results in decreased of lead time.

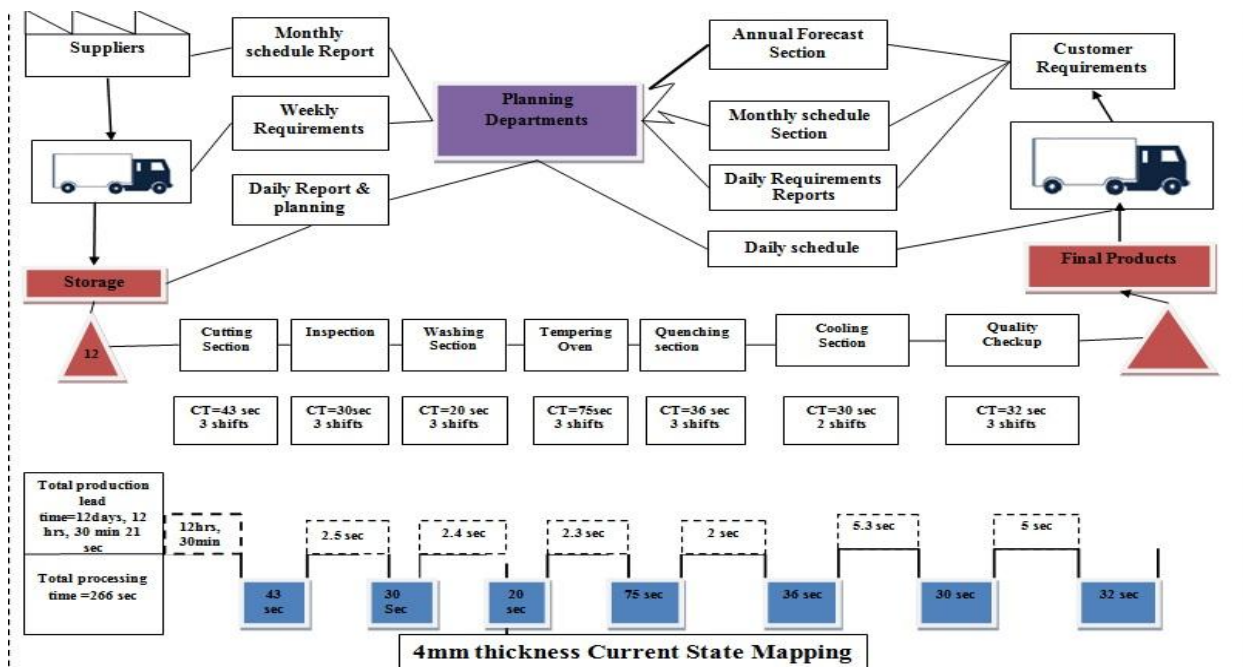
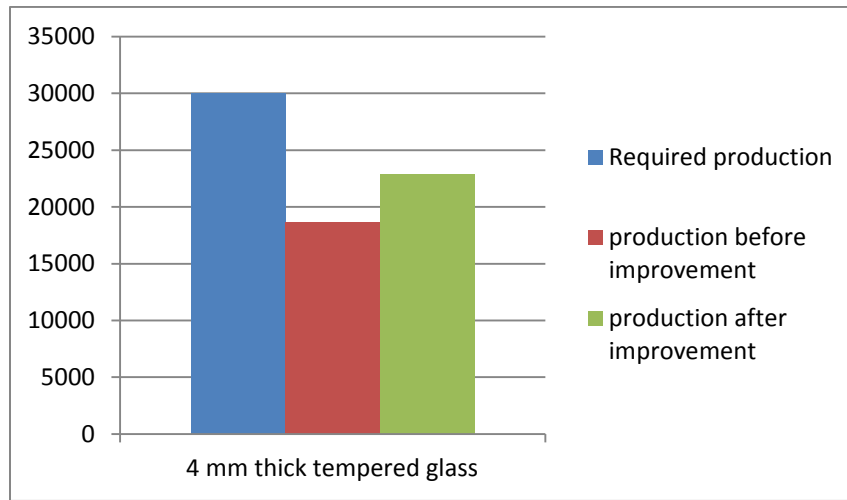
Lead time after improvement=17.2 sec

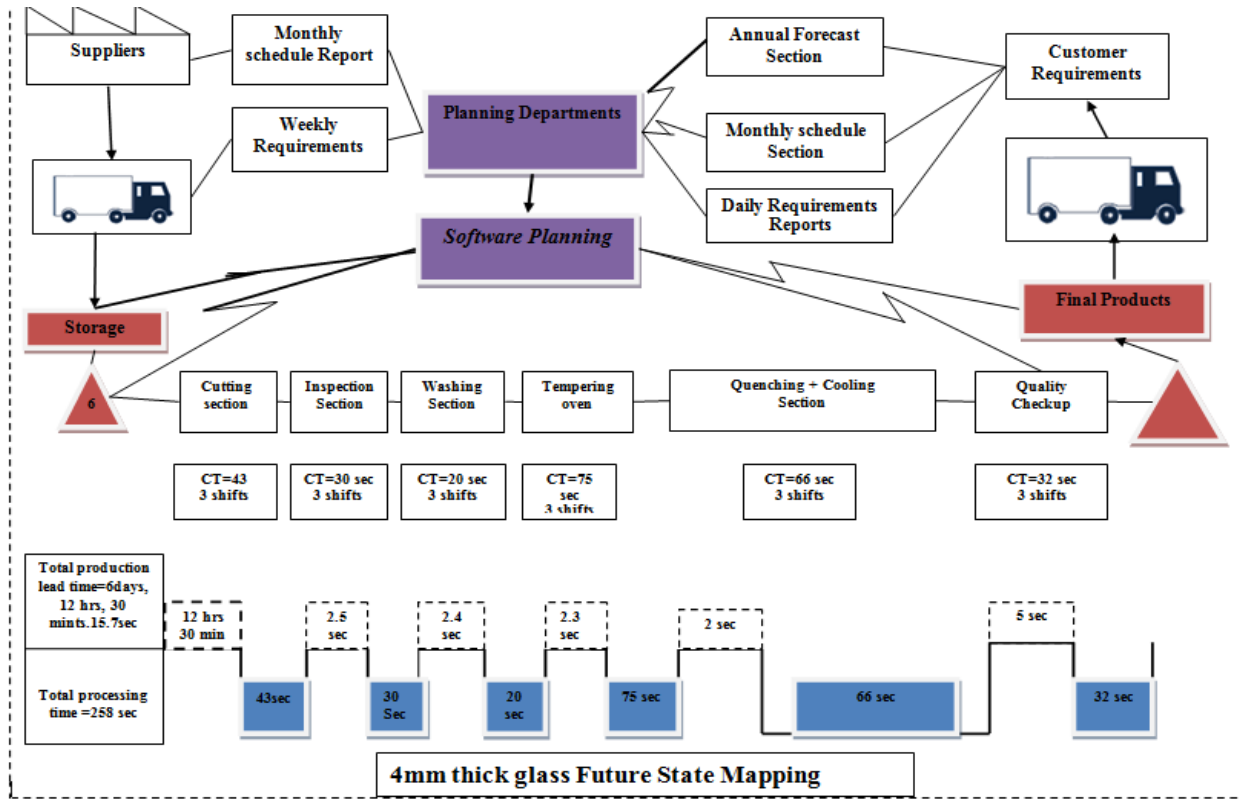
Production per month= $26*1305*60/(75+17.2)$

$$=22,850$$

% of enhancement=22.8%

Production capacity comparison before and after improvement





Result and discussion

When cycle time for each process is compared with takt time it is found that cycle time of manufacturing process exceeds the takt time so there is need to improve the process capability of manufacturing process to meet the demand of customer within their given time. So it can be improved by using various lean tools but here we are improving the cycle time of manufacturing process by introducing a new manufacturing machine process as shown in table the final improvements of work stations of the manufacturing shop floor. There is considerable improvement of 22.8% in production per day for 4mm thickness of glass, by making changes in value adding activities. The efficiency of Value Stream Mapping is disclosed when the team goes to the production level, talks to labors and observes how the product is actually made from the starting to the end. Value Stream Mapping must be drawn in such a way that can be understood by anyone: all the operational staff, the suppliers and the clients.

CSM lead time	34 sec
FSM lead time (after improvement)	17.2 sec

Conclusion

After considering many papers we get to know that Value stream mapping is the vital tool of lean manufacturing which emphasis is of gathering the information and representing it graphically right from the request made till the moment that request is fulfilled. It allowed better observation and evaluation of the processes more efficiently. This Paper aims to highlight the objectively evaluating that what adds and what does not adds value to the process. Lots of time products in production system are wasted mainly on waiting, these wastage of time can be efficiently reduced by the use of quality VSM. For the creation of more value to the customers the companies should be more value oriented and implementation of these manufacturing strategies should be done. Value Stream Mapping does not only consider the activity of the product but it also analyze the flow of information. Thus we can conclude that using VSM tool empowers and add more value to the product in lean manufacturing.

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