

Improvement in Product Manufacturing Lead Time By Eliminating Waste Through Value Stream Mapping: A Case Study

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Abstract- VSM is a tool which includes phases of production line is used to transform the raw material into the desired finished product. A VSM observed all the activities through which the material transformed into the final product. VSM use to provide the detailed representation of every process that is related to existing material and information flow. A current state map of VSM helps us to identify the areas of waste and them to improve, all the activity those are non value adding are also identified by VSM. By making the modification in current material and information flow of existing plant a Future state map shows. This map represents the improvement in identified product that is scrutinized in current state. This will only make by the reducing the lean manufacturing time, cost of the produc, reducing NVA activities in plant these factor affect the overall production efficiency. A current state map represents the existing methods and opportunities of changing or improvement. Future state map represent the changes and modification in process and overall reduction in cost.

Keywords- Value stream , production time, NVA activities, future state diagram, current state diagram

I. INTRODUCTION

A value stream mapping is a lean manufacturing technique that originated from the Toyota a Production System. It is used to analyze and design the flow of material and information required to bring a product or service to a customer.

The tool VSM includes all the facets of activities required to convert the raw material into finished good. VSM is a set of method to visually display the flow of material and information through the production process.

The fundamental aim of any organization is to minimize the waste and increase the production and quality of product continuously. This will lead organization to customer satisfaction.

This can be achieved by adopting lean manufacturing system which is more effective than a cost reduction program. Its object is to eliminating waste, which could be in the form of excess production of goods and unnecessary inventories, movement of material waiting and worker motion rework and correction. In the VSM tool by gathering all the data related to the concerning process, draw a current state map of existing process.

By the evaluation of current state map mark the prone area of wastage and non value added activities, which is further, helps us to eliminate the causesor substitutes the beneficial measure for non value added activities. With the effective implement we can draw the FSM of process this shows maximize the profit and reduce waste.

II. METHODOLOGY

VSM is an tool that help to figureout the material and information flow in process plant

The steps involved in value stream mapping in a givenbelow-

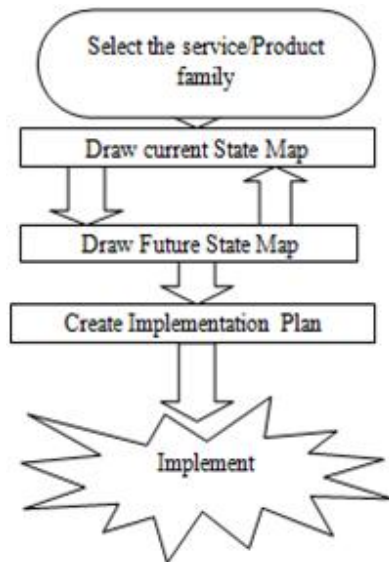
- 1) Determine the value stream to be improved. Select thepart families.
- 2) Draw a current state map
- 3) How are we doing the things currently? This foundationfor the future state.
- 4) Identifies opportunities for the elimination
- 5) Of waste and areas of improvement.
- 6) Developing a detailed plan of implementation
- 7) To support objectives.
- 8) Draw a future state map. Design a lean flow
- 9) Using lean techniques.

Steps in complete VSM

Develop action plan and implement it.

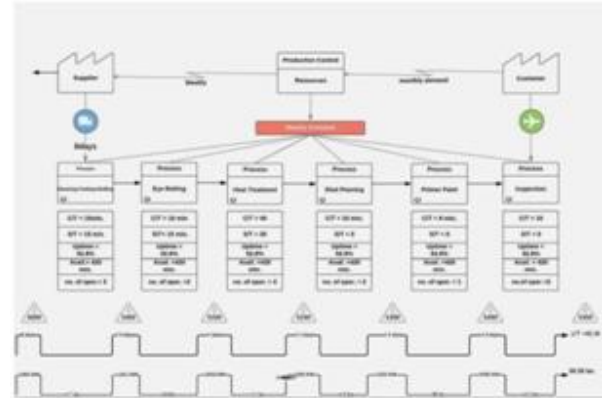
Future State Map

A future state map created by identifying the prone areas of the waste and rejection in current state map, some changes in layout of the production line also proposed to save the cost of associated failure. It is suggested that in eye forming process of leaf there is some cracks generates on the curve surfaces this could be eliminate by proper heating or continuous inspection of eye rolled leaf. Otherwise these cracks will be the reason of failure at testing.



III. CURRENT STATE MAP

A leaf spring manufac. company has a case study in this paper. This company is one of leading leaf spring manufacturing of automobile. Total assembly of suspension required twenty thousand per month approx in the company it required to produce the suspension leaf five thousand per week in firm. Total no. of working days available is 27 per monh. Availble time for shift is 7 hours, excluding 60 minutes of break. Required cycle time or associated cost to the different stages or process in manufacturing is shown in current state map. In addition there is in some process rework is required and to maintain the inventory, maintenance cost of inventory and transportation coat associated to different stages. Raw material travelled from store to finished goods inventory through the no. of process like shearing, cutting, drilling, eye rolling, heat treatment, shot penning, load testing and inspection. All the details of each process like inventory, cycle time, and total associated cost shown in current state map

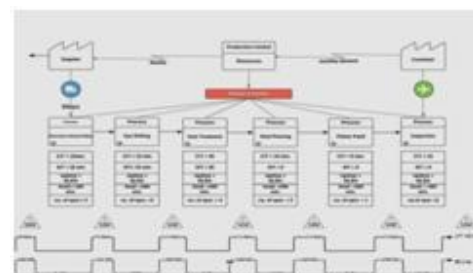


IV. FUTURE STATE MAP

A future state map created by identifying the prone areas of the waste and rejection in current state map, some changes in layout of the production line also proposed to save the cost of associated failure. It is suggested that in eye forming process of leaf there is some cracks generates on the curve surfaces this could be eliminate by proper heating or continuous inspection of eye rolled leaf. Otherwise these cracks will be the reason of failure at testing.

Some times what happened during the heat treatment process, quenching cracks will form this will Cincrease the production cost ultimately. To eliminate the cost in further process we use the SEM(Scanning Electron Microscope) technique for detecting the cracks and discard these leaves.

By changing the sequence it could be possible to save the cost associated with the primer painting. If we use the painting section after load testing of leaf than it will profitable to organization. Difference in cost seen in current and future state map.



V. RESULT AND DISCUSSION

The main goal of the paper is to create a value stream map of actual production facility by observing the production line. The results in terms of cost saving are represented in the form of changes in bar graphs before and after corrective measure. Implementation is continuous inspection,

deployment of SEM (Scanning electron microscopy) for cracks and by significant changes in layout of production line. It is observed that after applying the corrective method there is elimination of cost related to wastages. The production costs decrease from 96.5lac to 96.1lac after make a sizeable improvement.

In the future state map it is suggested that to make eye rolling process defect free, eye rolling leaf should be inspect carefully. A continuous inspection able to reduce the cost of wastage associated to cracked leaf.

Difference in cost after eliminate wastage is shown in figure.

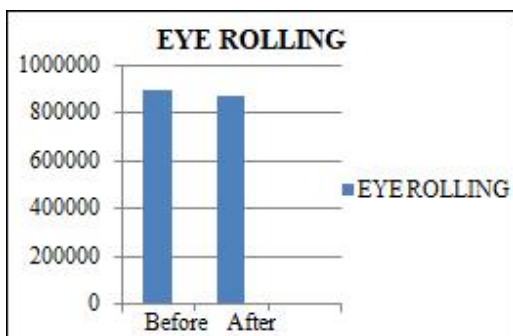


Figure 1

We Use the Scanning Electron Microscopy able to detect the inner cracks and flaws in leaf this measure helps to remove them further the total productive cost. Change in cost before and after of implement shown in figure.

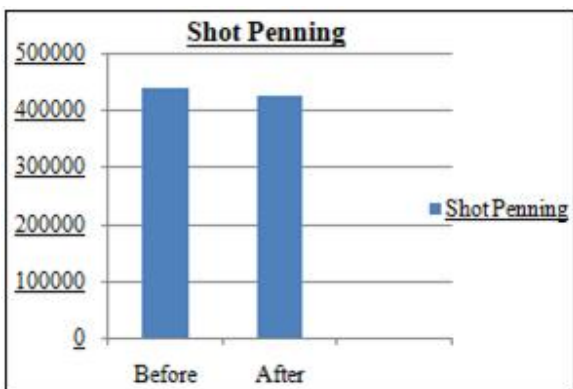


Figure 2

If the change in the existing process layout is considerable to save the total cost than it should be acceptable. By making the change in process layout it makes the possible cost saving during production-process.

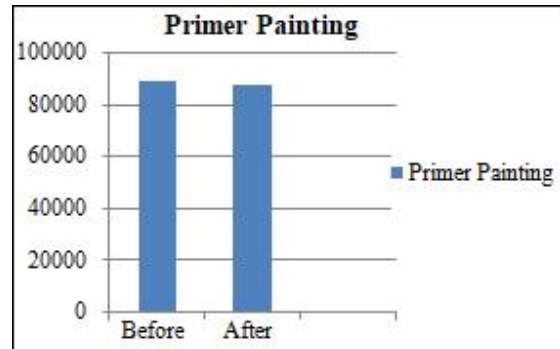


Figure 3

Productivity can be defined as to produce the desired product by the minimum resources. Reducing waste, decrease lead time, sufficient use of resources etc. are the lead factors that increase the productivity of an organization. We consider the total cost of wastage which affects the total production costs. The difference and saving in overall production cost is shown in figure.

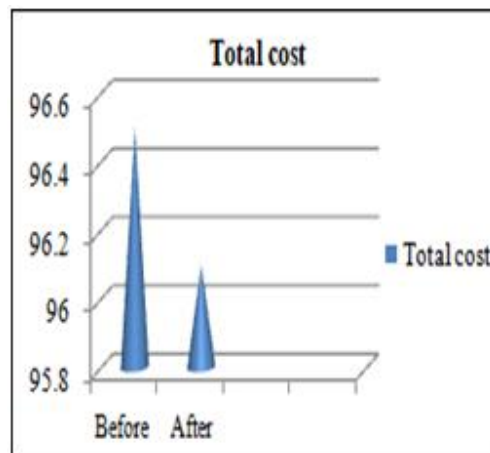


Figure 4

VI. CONCLUSION

The aim of this paper is to develop a value stream map for a leaf spring manufacturing company by observation and inspection. This will be allowing us to determine and eliminate the cost of wastages that increase the final cost. This final cost and wastage make a considerable effect on the productivity of Production facility. By implementing the technique like continuous inspection, scanning electron microscopy and change in process layout help in decrease the production cost from 96.5lac to 96.1lac. Thus a cost reduced affect the overall productivity of organization.

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