

APPLICATION OF VALUE STREAM IN AUTOMOBILE INDUSTRIES-A CASE STUDY

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ABSTRACT

Today the world is highly competitive. There is a competition in each and every field. To fulfill the demands of customer requirements the industries is trying his level best. We have applied a lean manufacturing technique in an automobile industry. The name of this technique is value stream mapping. It is a visual map of the current status of a component in any manufacturing unit. Here, we are trying to reduce waste. There are two types of activities value added activities and non value added activities. We are trying to reduce non value added activities. We have calculated lead time and cycle time. We have applied VSM in manufacturing pin. We have reduced lead time and cycle time by using lean manufacturing technique. We have studied the current value stream mapping and observed the shop floor condition. After observing these conditions, we have applied lean method to reduce waste. It is a basic technique to improve the productivity in an industry with the available resources. We have reduced the cycle time from 293 sec to 215sec. and production lead time from 7 days to 4.9 days.

Keywords: - : VSM, Lean method, CVSM, FVSM

I. INTRODUCTION

In the present era different lean methods are used in an industries. These are used to reduce the waste. To eliminate the waste is a very difficult task but only we can reduce to some extent. Now days a lot of competition is present in the market. To fulfill the requirements of the customer is a very difficult task. The product should reach to the customer in the specific time. The customer does not want to wait a single second. Moreover the customer also wants it should be according to the specification given. Value stream mapping is a technique in which we are able to see each and every minute things related to the product. First of all we draw the current value stream map for a particular product, So that we may able to know the minute details of each and everything. For example we able to know cycle time, production lead time, setup time, machining time and movement of each and every thing etc. `

Value stream mapping is a very important tool to minimize waste. Many authors have studied value stream mapping and they have said that it is very useful tool in each and every field. In 1999 Rother and Shook have identified that it is very important tool for process inefficiencies and production improvement. Hines (1999), Grewal and Singh (2009) have worked on the area identification and illumination of muda. In 2000 Brunt improved productivity in process industry. In 2002 Tapping et al has defined the visual appearance of flow of material and information in a value stream mapping technique. In 2005 Seth and Gupta have worked on productivity improvement in supplier end.

In 2008 Markus L. Stamm et al have applied value stream mapping in manufacture to order small and medium industries to reduce lead time. In 2009 Bhim singh and S K Sharma have developed roadmap to fulfill the gap between current value stream mapping and future value stream mapping. He has also explained the improvement areas very clearly, so that we can understand each and every thing. In 2010 S. Vinod et al have applied value stream mapping in camshaft manufacturing industries to enable leanness in an industry. In 2011 Ritesh bhat et al has taken the case of gear pump manufacturing industry. He applied VSM along with KANBAN and focused on productivity improvement. He was success in reducing the lead time and the numbers. In 2012 Rahani A R et al have defined value stream mapping in other words. He involves all processing steps in analyzing value added activities and non value added activities. We are able to find out the waste. In 2012 Silva et al have applied value stream mapping in Srilankan apparel industry. In 2013 Harwinder singh et al have applied value stream mapping in an automobile industries. He is able to reduce cycle time WIP & production lean time.

II. Methodology

VSM has a definite process to increase the efficiency of the company. so that the profit of the company may increase. VSM split up the value added activities and non value added activities. The process for VSM is as follows

- a) Select a product
- b) Collection of relevant data
- c) Draw current value stream map for that particular product
- d) Identify the waste present in the process
- e) Analyses the current state map
- f) Draw the future state map
- g) suggestion may be taken for improvement purpose

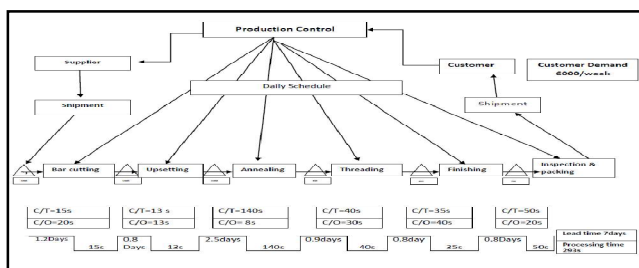
A number of strategies are used to achieve the goal of this paper. First of all we have selected product a pin. It is used in Eicher vehicles. We have studied types of waste present in manufacturing the process. The waste may be in terms of time in process, over production, large work in process inventory, uneven moments. We have tried to reduce the waste present in process. We have tried to reduce the work in process inventory. We have also tried to reduce the uneven moment present in the process. Time study was also implanted in it. We have find out the areas in which we have to do the work.

2.1 Draw of current state value stream map

The datas are to be collected regarding the pin product. We have come to know the requirement of customer, Number of shift working in the company and Raw material needed in a company weekly. Number of hours the workers are actually working in the company.

The drawing of current state value stream mapping of pin is as follow

Customer order	6000 in a week
Working hour	3 shift (one shift 8 hours)
Break	1 hour per shift
Raw material	weekly



2.2 Analysis of current value stream mapping

Lean manufacturing is a manufacturing process that does not produce waste. VSM is one important tool among various lean tools. Value stream mapping uses arrows, metrics and symbols to show and improve the flow of inventory and information required to produce a product which is delivered to a customer. It visually

represents waste and enables to identify various wastes in the production path .VSM mainly consists of two types ie, current state VSM and future state VSM. Current state VSM collects the complete data, workflow and information within a plant, whereas future state VSM improvises the current state VSM by identifying and eliminating with lean tools .The production initiates when the customer orders the requirements of the product to the production planning and control department by electronic media. Then the material moves sequentially through billet cutting, upsetting, annealing, threading, finishing, inspection and packing. After studying the manufacturing processes of the pin from the shop floor directly, noted all the activities that were involved during the production process. Then the data required for drawing Current state VSM were collected from the shop floor. The data collected includes number of operators, cycle time, set up time etc... of every process. Using these data a current state map was drawn using E-draw(software used to create VSM) which is shown in the diagram. Current requirement of the Customer is 6000 pin in a period of 1weeks. There are 3 shifts per day .The production lead time and total cycle time were calculated from the current state map and found to be 7 days and 293sec.respectively. The study of the current state map identifies that waiting time, setup time and cycle time was the major wastes in the production with 7 hours working time available for the production. The current state of the production process is not capable to meet the customer order and a better planning is required. The waiting time can be eliminated using 5S and as well as leveling the work in process in between the process. The Kanban cards system enables to produce only the required number of products, avoiding the overproduction, in addition. “Kanban is a visual signal to support flow by ‘pulling’ product through the manufacturing process as required by the customer”. The cycle time and setup time can be reduced by using the SMED technique. About 26.62% of cycle time could be reduced using the technique. Quality Circle and TPM were also proposed to reduce the wastes. Forging manipulator was suggested to reduce transport time. With these available techniques, an estimate of the future time was calculated and a future state VSM was constructed

Calculation of takt time

Weekly demand=6000unit

Available day in a week=6

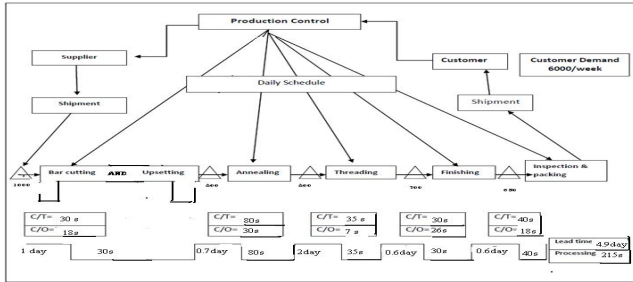
Demand per day=6000/6=1000

Takt time=net available time per day/customer demand
per day=75600/1000=75.6 sec.



2.3 Draw of a future value stream map

The drawing of a future value streaming mapping is done after implementation of different tools. We have used the technique 5s improvement. We have applied lean manufacturing technique. We have used the different Japanese philosophy for the improvement of the quality and we also reduced the cycle time and production lead time.



III. RESULT AND DISCUSSION

When we talk about the current value stream map we see that the cycle time of manufacturing a pin is 293sec. The production lead time is 7 days. After implementation of different technique we have tried to reduce cycle time from 293sec. to 215sec. We have also reduce production lead time from 7 days to 4.9 days. The table is as follows:

Time	Current state map	Future state map	% Reduction
Production lead time	7 days	4.9 days	30%
Total cycle time	293sec	215sec	26.62%

IV. CONCLUSION

In this research work we come to know that value stream mapping is an important tool . In which there is a flow of information, there is also a flow of material. Each and every waste can be seen in value stream mapping. With this technique the waste can be reduce. The measure of success of value stream mapping in this research was address on how one could reduce the waste. This technique can very useful in any manufacturing unit. The value added activities and non value added activities can be differentiate through vsm. The area of improvement can be seen in current value stream and after improvement future value stream map can be drawn.

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