Value Stream Mapping in Conforma Clad Manufacturing Plant

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Abstract- In today's highly competitive environment, manufacturing scenario has undergone a rapid change in the last two decades, more so in the last few years. Value stream Mapping (VSM) is a lean-management method for analysing the current state and designing a future state for the series of events that take a product or service from the beginning of the specific process until it reaches the customer. The purpose of this paper is to explain how value stream mapping (VSM) is helpful in lean implementation and to develop the road map to tackle improvement areas to bridge the gap between the existing state and the proposed state of a manufacturing firm. The main objective is to reduce the present manufacturing lead time in order to increase productivity and also plant sales. Finally, a number of recommendations are put forward at the end of this report.

Keywords: Lean, VAM, Waste resduction, down time

1. INTRODUCTION

This work is done with an objective of improving the process flow in conforma clad manufacturing plant by identifying and eliminating non value added activities in the chosen plant

Value stream mapping is a process to identify and remove or reduce waste in value streams, thereby increasing the efficiency of a given value stream. Waste removal is intended to increase productivity by creating leaner operations which in turn make waste and quality problems easier to identify. A value stream map is a visual tool that displays all critical steps in a specific process and quantifies easily the time and volume taken at each stage.

Value stream maps show the flow of both materials and information as they progress through the process. The difference between a value stream and a value chain is that a value stream focuses only on areas of a firm that add value to a product or service, whereas a value chain refers to all of the activities within a company.

In a build to the standard form, Shigeo Shingo suggests that the value-adding steps be drawn across the centre of the map and the non–value-adding steps be represented in vertical lines at right angles to the value stream. Thus, the activities become easily separated into the value stream, which is the focus of one type of attention, and the other type, waste steps. Value stream mapping is a recognized method used as part of Lean Six Sigma methodologies.

2. LITERATURE REVIEW

Value Stream Mapping (VSM) is a World Class Manufacturing tool that can be used to minimize waste in manufacturing. Companies are experiencing intense competitive pressure due to globalization hence they cannot afford to operate with waste in their processes.

In recent years, Value Stream Mapping (VSM) has emerged as the preferred way to support and implement the lean approach. VSM is a helpful tool to identify the waste and improvement areas. VSM enables a company to see the entire process in both its current and desired future state, and develop the road map that prioritises the projects or tasks to bridge the gap between the current state and the future (lean) state. Current state map is prepared to describe the existing position and various problem areas. Future state map is prepared to show the proposed improvement action plans.

After decades of lean principles implementation in manufacturing companies, there is no debate about its benefits on waste elimination and efficiency improvement. Service organizations, a growing stake of the global economy, are committed to achieve such improvements. Considering current economic scenario, marked by budget cuts and cost reduction, outstanding results are expected from the application of lean manufacturing into service management

For the last two decades, Lean has been primarily used to improve manufacturing processes. However, Lean is now increasingly applied to a wide range of service operations as well. This realization of Lean among service firms is an important progress, as there are potentially more benefits to be accomplished in this sector rather than in traditional manufacturing, where decades of good work have already paid off.

Nowadays, Lean manufacturing application is reported for manufacturers in global level. Those reports have exposed that this application has enabled the companies to become competitive through the elimination of wastes while producing products and offering services. Various tools like 5S, Poka Yoke, Kaizen, Kanban, JIT, etc have been used while implementing lean manufacturing model in various types of organization. Recently, both researchers and practitioners have found that Value Stream Mapping (VSM) technique serves as a powerful vehicle in enabling organizations to implement lean manufacturing model. Meanwhile, it is found that lean manufacturing model is yet to be applied in the case of certain manufacturing products.

Lean approach has been applied more than frequent in many manufacturing management floors over these few decades. Started in the automotive industry, sequential improvement initiatives were implemented to enhance the manufacturing practice changes. Value Stream Mapping (VSM) is one of the key lean tools used to identify the opportunities for various lean techniques.

Lean manufacturing initiative is being followed by various organizations in the recent years which mainly focus on improving the efficiency of operations by eliminating and reducing wastes. Value stream mapping (VSM) is a lean manufacturing technique and it has emerged as the preferred way to support and implement the lean approach.

3. METHODOLOGY:

The main goal is to identify wastes and reduce it in order to decrease the manufacturing lead time so that more products can be produced and there is an increase in sales.

The present work mainly focus on each process in the conforma clad manufacturing plant in order to make them as lean as possible. The methodology followed in the project includes selection of team members and collecting data regarding existing process and preparing process map to the present method.

Once the Process map is prepared then the using the collected data a value stream map is prepared to understand the amount of non-valued activities in the current method

The root causes for all these non-value activities are obtained by constructing cause and effect diagram for each non value added activity. After tracing all root causes which contribute the non -value added activities, the existing process is improved by using SECAR technique. The feasibility of the solution is tested by implementing the improved methods. The improved method is validated by preparing value stream mapping and the improvements are compared with the VSM before implementation.

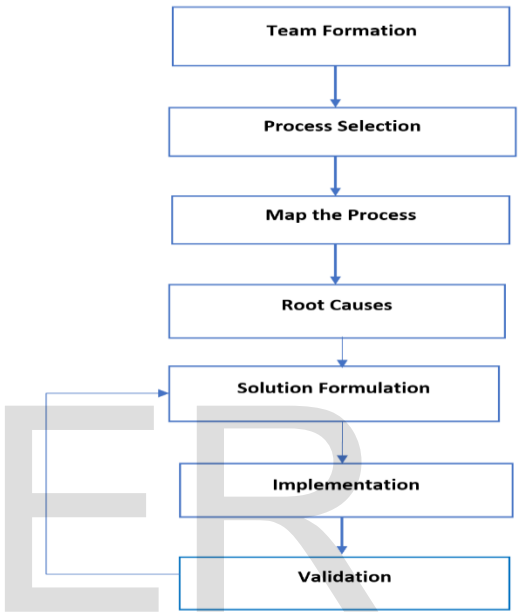

Figure.1 Methodology flow diagram

3.1 PROCESSES INVOLVED IN THE CLADDING PLANT:

The process present in the Conforma cladding manufacturing plant is as follows

1. Issue Raw Material
2. Surface Preparation – Pressure Washing
3. Surface Preparation – Grit Blasting
4. Cloth Application
5. Charge Preparation
6. Furnace Brazing
7. Stage Preparation
8. Welding and Grinding
9. Final Inspection
10. Marking, Packing and Dispatch

3.2 PRODUCT FLOW IN CLADDING PLANT:

The flow of process diagram is important tool to understand how the material and information is flowing in the given layout

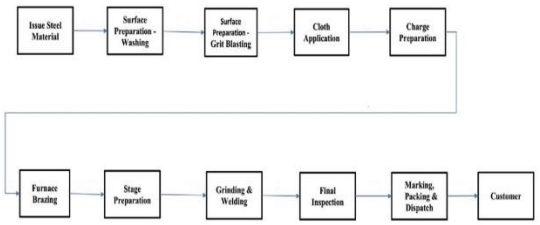

Figure.2 Product flow diagram

The above figure.2 shows the Product Flow in Conforma Cladding Plant. The required raw material is issued at the stores it is then transferred to surface preparation section where in the surface is cleaned with the pressure jet. It is then send to grit chamber here the surface is bombarded with the grit blasting

In the next step, the surface is cleaned with different grades of cloth to remove any unwanted material on the surface. Once the surface is ready then the components are joined either by using brazing, welding etc.

In the next stage any burs or sediments which are deposited due to brazing or welding are removed using grinding operation. Finally the product is inspected to confirm the required quality standards are achieved. This figure.2 indicates the actual movement of the product and also each and every process involved in the production unit.

4 DATA COLLECTION AND ANALYSIS

Data collection & Analysis is the act of collecting and transforming data with the aim of extracting useful information & facilitating conclusions.

4.1 AVERAGE TIME FOR EACH PROCESS:

Table.1 Average process times

			Average Time for Each Process		
SL No	Operation No	Operation Name	Avg Setup Time (Mins)	Avg Operation time (Mins)	Total Avg Time (Mins)
1	10	Issue Steel Material	28	17	45
2	20	Surface Preparation Washing	56	38	94
3	30	Suface Preparation - Grit Blasting	34	19	53
4	40	Cloth Application	63	7	70
5	50	Charge Preparation	20	4	24
6	60	Furnace Brazing	30	1620	1650
7	70	Stage Preparation	24	330	354
8	80	Grinding	24	20	44
9	90	Welding	26	22	48
10	100	Final Inspection	31	500	531
11	110	Marking,Packing & Dispatch	38	410	448

The above table.1 shows the Average Time taken for each process to be completed in the Conforma Cladding Plant for all products manufactured in the plant.

4.2 VALUE STREAM MAP:

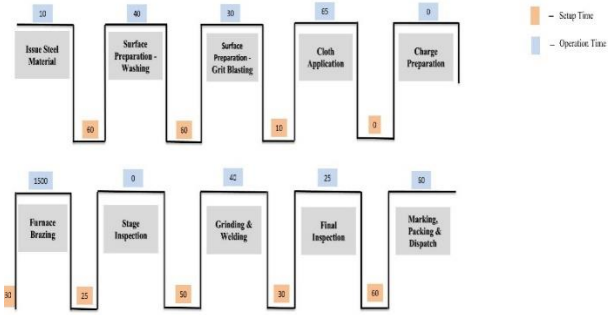

Figure.3 Value and non -value added times

The above figure.3 is a visual representation of Value Stream Map of the product in the Conforma Clad Manufacturing plant. Through direct observation at the plant, time taken for each process was systematically recorded by following certain number of processes over a period of time. The data collected was processed by classifying the time taken by various processes as setup time and operation time. The map indicates operation time and setup time taken to manufacture the product and deliver it to the customer.

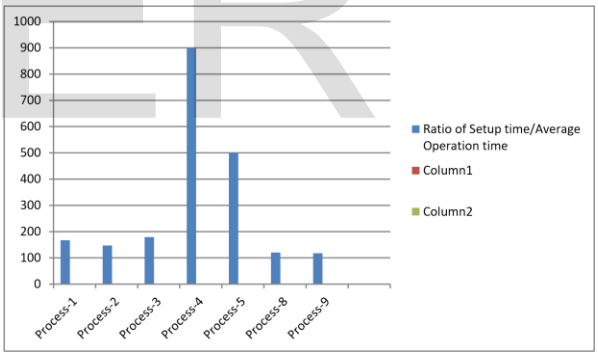

Figure.4 : Process Vs Ratio of Setup to Operation time

The figure.4 shows the ratio of setup time to operation time for various process in the cladding plant. It is observed that Process 4 i.e. Clothing application the ratio 900% it is very high compared to other process that means the non- value added time is more than actual process time. It is followed by process 5 i.e. charge preparation .it is 500%

RESULTS:

The project entitled – "Value Stream Mapping in Conforma Clad Manufacturing" was undertaken with the main objectives to understand the processes involved, time taken for each process in the plant, total time taken for production of five major products manufactured by the plant and to reduce the manufacturing lead time for production of these products.

The analysis of data was done through value stream maps showing the respective setup time and operating time of each product and these were used for the interpretation of results. The inference from the analysis are mentioned as the suggested improvements. By implementing those the production unit was benefitted as follows:

- Manufacturing Lead Time of Conforma Clad products was seven weeks against the customer expectation of 4-5 weeks. The lead time was reduced from 40 days to 32 days in order to increase plant sales.
- By improving the quality of the products a significant reduction approximately 35% in scrap and rework was achieved.

5 CONCLUSION:

The objectives of this work are achieved The Manufacturing Lead Time of the products at the plant was too high against the customer expectations. Therefore, it was the responsibility of the company to reduce the lead time in order to fulfill the customer expectations and bridge the gap. The ultimate objective of this project was to reduce the manufacturing lead time and increase the plant sales in order to keep the customer and the company satisfied.

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