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IMPLEMENTATION OF VALUE STREAM MAPPING IN AUTO ANCILLARY INDUSTRY TO REDUCE CYCLE TIME

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ABSTRACT: *Value Stream Mapping has the reputation of uncovering waste in manufacturing, production and business processes by identifying and removing or streamlining on-value-adding steps. A flow diagram showing the process is drawn to reflect the current state of the operation. The non-value actions are identified in each step and between each step by their waste of time and resources. The process is analyzed for opportunity to drastically reduce and simplify it to the fewest actions necessary. By reducing wastefulness the proportion of value adding time in the whole process rises and the process throughput speed is increased. This makes the redesigned process more effective (the right things are being done) and more efficient(needing fewer resources). The reengineered process is flowcharted in its future state with process steps and information flows redesigned, simplified and made less expensive.*

Index Terms— *Current state map, cycle time, future state map, lead time, tact time, Value Stream Mapping*

I. Introduction

The use of Value Stream Mapping (VSM) has been attributed to the cause of much of the success that Toyota of Japan has had since the 1980's. Developed during the work conducted by TaiichiOhno at Toyota in the 1960's and 70's,at its basic level VSM is a systematic methodology to identify wasted time and actions in a manufacturing process. In more recent times VSM it has been used to re-engineer businesses because it identifies unnecessary effort and resources to permit simplification and streamlining of operations processes. In TaiichiOhno's words - "All we are doing is looking at the time line from the moment the customer gives us an order to the point when we collect the cash. And we are reducing that time line by removing the non-value-added wastes."(Ohno, 1988)

It is useful to explain the meaning of several key concepts used in VSM. These are: what is meant by a process, what waste is, what is meant by 'flow', what constitutes value-adding, along with what is needless non-value-adding and what is necessary non-value-adding. A process is a series of activity steps that move inventory from one step to the nextto transform it into the intended output, as shown in. The output could be a physical item or a service. A process can be any type or size and cover any period of time. Each step in process also consists of processes within the step. VSM issued to investigate processes to identify improvement opportunities lying in their wastefulness and lack of fluidity. Value is from the customer's perspective, the customer being the person who uses the output.

Value-adding actions and resources are those which create value for the customer. Non-value-adding is everything done in the process which contributes no value for the customer but which they are forced to pay for when they buy the product or service.

Value adding activities
Machining, Processing, Painting, Assembling

Non value adding activities
Scrapping, Sorting, Storing, Counting, Moving,
Documentation etc.

A value stream map is an end-to-end collection of processes/activities that creates value for the customer. A value stream is all the actions (both value added and non-value added) currently required to bring a product through the main flows essential to every product: (a) the production flow from raw material into the hands of the customer, and (b) the design flow from concept to launch.Standard terminology, symbols, and improvement methods allows VSM to be used as a communication tool for both internal communication and sharing techniques and results with the larger lean community.VSM is the process of visually mapping the flow of information and material as they are preparing a future state map with better methods and performance. It helps to visualize the station cycle times, inventory at each stage,Manpower and information flow across the supply chain.

II. Literature Review

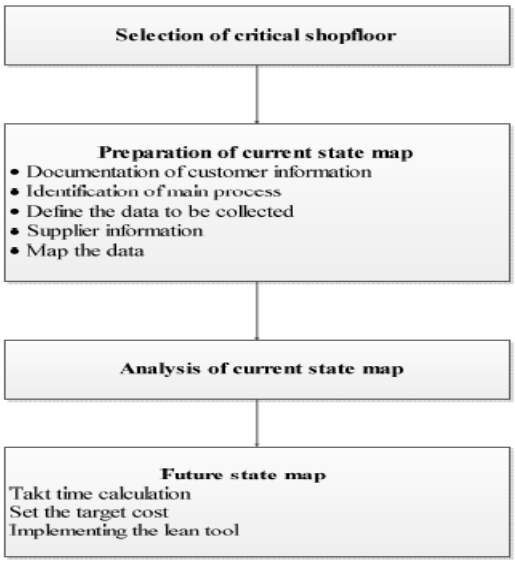
Academics such as McDonald et al. (2002), Lian andLandeghem (2002) and Abdulmalek and Rajgopal (2007)have explored the integration of VSM with simulation. Amultitude of VSM software (e.g. eVSM) is available over the internet. Such software presents the user with a dynamic view of the value stream (not static), allowing observation of the"real-time" impact of proposed improvements. Essentially it increases flexibility and information available toimprovement teams.Chitturi et al. (2007) discussed practical issues like how tocalculate Takt time, what process improvements can be doneand how to handle different process and product families while mapping job shop operations using a standard VSM andalso explained while drawing a VSM of a process, allpertinent data should be collected from first to the lastoperation with respect to it.Chandradeep Grewal (2008) has explained themethodology of lean and VSM that can be applied for a smallcompany and also stated that it is a powerful tool to identifythe inefficiencies and improvement areas.Bhimsingh (2010) implemented Lean to productionindustry.

The author highlighted the benefits from the all theareas of lead time, WIP, processing time, inventory andmanpower.Ibon (2008) is considered VSM is suitable tool forredesigning the production systems.Wong (2009) has studied on adoption of leanmanufacturing in the electrical and electronics industry inMalaysia. The author considered the areas viz., scheduling,inventory, material handling equipment, work processes,quality, employees, layout, suppliers, customers, safety andergonomics, product design, management and culture forimplementing.PetterSolding et al. (2009) have presented in their paperthat, the concept for creating dynamic value stream maps of asystem using simulation. Creating dynamic value stream mapsmakes it possible to analyze more complex systems thantraditional VSMs are able to and still visualize the results in alanguage the Lean tools.Ohno (1988) identified that the Toyota production systemhas been created on the practice and evolution of one veryuseful technique that reduces cost and time while challengesevery activity in the value stream. It is applying amethodology known as the "Five whys, "By asking why anactivity is performed and then asking why after each response,it is frequently possible to get to the origin of the problem.Understanding the root cause assists in successful redesign.

III. Objective Of Research

Today, automotive suppliers have a great concern overimproving quality and delivery and decreasing cost, whichleads to improved system productivity. In order to remaincompetitive, waste from the value stream must be identifiedand eliminated so to run system with maximum efficiencies. A Production is to order and large numbers of differentproducts are produced, each in relatively small volume. AProduction shop consists of number of machine centers, each with a fundamentally different activity.

The problems ofmachine shop are delayed deliveries, long queues, and highwork in process inventories, improper utilization. Theseproblems increase overall cost of production. The need forcustomized products/parts with reduced lead times togetherwith the requirement of global competitiveness requires thatproducts/parts be produced in small batch sizes as percustomer's requirement. The processing in small batch sizesnecessitates the adjustment in the flow of production throughdifferent processes as per their processing speeds.



VSM Implementation flowchart

In additionit requires close monitoring of processes to reduce processvariability (defect free production), efficient plannedmaintenance of all machines (for increased availability) andreduction in non value added activities such as setup times,movement of material in between the work processes andadditional processing of material. The efficient utilization ofmachines while producing in small batches reduced WIPinventories, reduced throughput times and reduction in leadtimes leads to competitive manufacturing. It is need formachine shop manufacturing system to adopt leanenvironment.

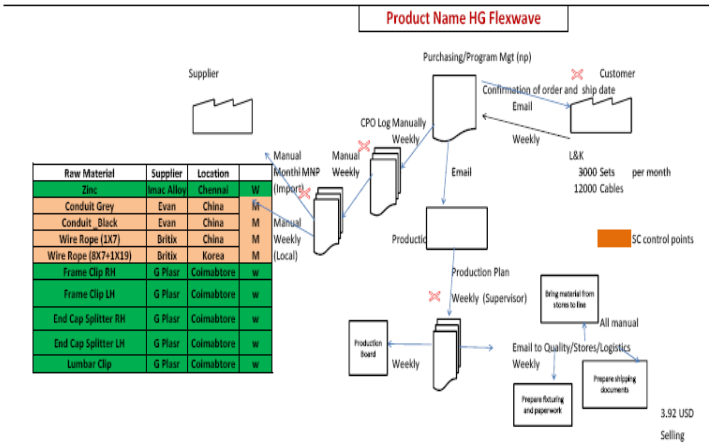
To improve productivity by identifying waste and thenremoving that by implementing lean principle in this industrywe focus our attention on VSM tool. Value Stream Mappingenables a company to identify and eliminate waste, therebystreamlining work processes, cutting lead times, reducingcosts and increasing quality and hence productivity. The goalof VSM is to identify, demonstrate and decrease waste in theprocess, highlighting the opportunities for improvement thatwill most significantly impact the overall production system.In this study lean concepts are introduced using VSM inworking environment.

IV. Vsm Methodology

To start improving productivity by identifying waste andthen removing it by implementing lean principle in theindustry there is no other tool better then VSM. The ValueStream Mapping method (VSM) is a visualization tooloriented to the Toyota version of Lean Manufacturing(Toyota Production System). It helps to understand andstreamline work processes using the tools and techniques ofLean Manufacturing. The goal of VSM is to identify,demonstrate and decrease waste in the process. Amanufacturing system operates with timing of step-by stepactivities. The various steps in implementation of VSM areshown in Figure 1 and are discussed in the following sections.Waste being any activity that does not add value to the finalproduct, often used to demonstrate and decrease the amountof `waste' in a manufacturing system. VSM can thus serve as a
blue print for Lean Manufacturing. This section presents amethodology to develop a value stream mapping to identifymaterial and information of current state.

V. . Conclusion

The actual current production= 8*150*3 = 3600/day
The Improved production after implementation of VSM =8*200*3 = 4800/day
Improvement in production = (4800-3600)/3600=.44
There is near about 44% improvement by improvement invalue adding activities.Lean production means continuous improvement, we mustkeep on changing future state into current state that will notend during our life. VSM have been proven to be a greatly useful tool to eliminate some waste in a cycle.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CPO Log Manually
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Supplier
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Zinc
Imac Alloy
Chennai
Conduit Grey
Evan
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Conduit _Black
Evan
China
Wire Rope (1X7)
Britix
China
Wire Rope (8X7+1X19)
Britix
Korea
Frame Clip RH
G Plasr
Coimabtore
Frame Clip LH
G Plasr
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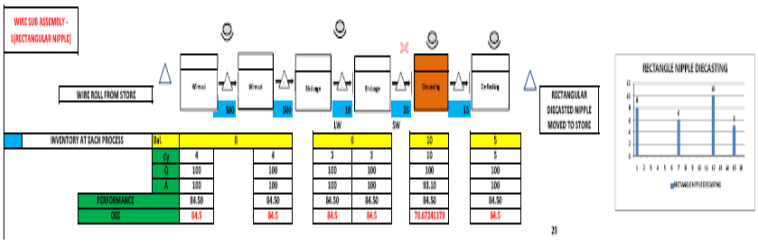
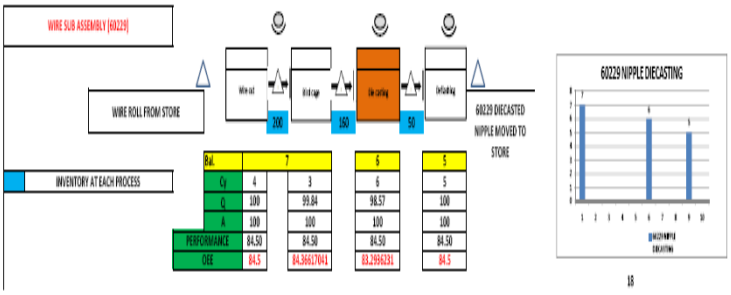

WIRE SUB ASSEMBLY - 1(RECTANGULAR NIPPLE)
WIRE ROLL FROM STORE
RECTANGULAR DIECASTED NIPPLE MOVED TO STORE
INVENTORY AT EACH PROCESS
PERFORMANCE
OEE
RECTANGLE NIPPLE DIECASTING


WIRE SUB ASSEMBLY (60229)
WIRE ROLL FROM STORE
60229 DIECASTED NIPPLE MOVED TO STORE
INVENTORY AT EACH PROCESS
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60229 NIPPLE DIECASTING

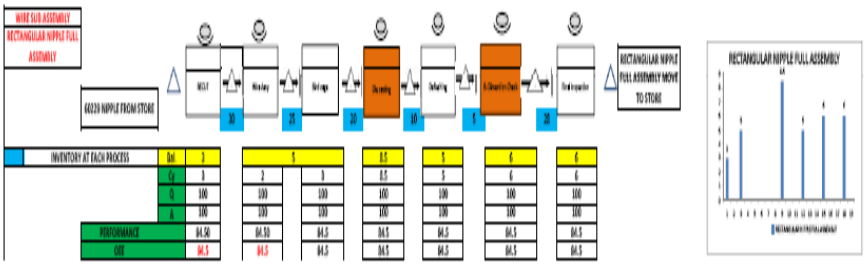

Figure 1.current state map analysis

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