Optimization of value stream mapping in production line in an automobile industry

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Abstract

Value stream provide view of working process improve work strategies and eliminating waste and delivering value. A value stream includes all activities required to transform a product from raw material into finished goods. 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 significantly impact the overall production system Value Stream Mapping is a process from start to end and a visual representation map is drawn of every process involved in the material, process flow and information flows.

The purpose of this paper is to develop a value stream map for a manufacturing company in pithampur India. The main aim is to identify and minimize waste which is known as non value added and any activity that does not add value to the final product, in the production process. In order to collect the information needed to complete the project.

Various departments of the company collect and observe information related to product families for mapping and product and process flow from start to finish. This information to visualize the current state of the process activities by mapping the material and information flow. When all the information gathered, and then utilizes these results as a plan to map the future state and implement lean manufacturing techniques. After that wastes can be eliminated, throughput increased and flow maximized.

Keywords: Lead time, task time, Value Stream Mapping Manufacturing Processes, Wastes Elimination, Current state map, cycle time, future state map,

1 INTRODUCTION

All of the action and task, both value added and non-value added required to bring an item (in idea, information, product or service) from its inception through delivery Value stream provide view of working process improve work strategies and eliminating waste and delivering value.Value stream mapping is a lean manufacturing technique used to document, analyze and improve the flow of information or flow of

material required to produce a product or service for a customer. Value stream mapping is a lean-management method for analyzing the current state and designing a future state for the series of events that take a product or service from its beginning through to the customer with reduces lean waste as compare to current map.

A value stream focuses on areas of a firm that add value to a product or service whereas a value chain refers to all of the activities within as company. Provides a visual view of work processes improves work strategies and deepens an understanding of eliminating waste and delivering value. The Value Stream Mapping method (VSM) is a visualization tool oriented to the Toyota version of Lean Manufacturing (Toyota Production System). It helps to understand and streamline work processes using the tools and techniques of Lean Manufacturing. The goal of VSM is to identify, demonstrate and decrease waste in the process. Waste being any activity that does not add value to the final product, often used to demonstrate and decrease the amount of waste in a manufacturing system. VSM can thus serve as a starting point to help management, engineers, production associates, schedulers, suppliers, and customers recognize waste and identify its causes. As a result, Value Stream Mapping is primarily a communication tool but is also used as a strategic planning tool and a change management tool.

Therefore, the main objectives of the project have been to evaluate how the VSM put into practice. Then, these projects also focus on collecting the data and analyze the current production flow. Next, the objective is to create the current state mapping and analyze that mapping. Thus, this project also focused on the proposing the improvement plan that can be done. The project is structured as follows: firstly there is the introduction of this project, secondly the literature review as the detail information about the VSM. The next is about the methodology that presented in creating the VSM process and finally the conclusion of the project are mentioned according to the activity.

1.1 Overview and issues

In analyzing value stream maps, it has occurred to me that some may have been created primarily as heuristic tools to teach lean concepts. It seemed as if the process improvement teams had focused on the method as the end, rather than how to use the method as a means to achieve an end. The detail was overwhelming. In some cases, the time spent creating the maps actually became a waste of time in itself, resulting in a negative return on the process improvement effort.

Value stream mapping is a flowchart method to illustrate, analyze and improve the steps required to deliver a product or service. A key part of lean methodology, VSM reviews the flow of process steps and information from origin to delivery to the customer. As with other types of flowcharts, it uses a system of symbols to depict various work activities and information flows. VSM is especially useful to find and eliminate waste. Items are mapped as adding value or not adding value from the customer's standpoint, with the purpose of rooting out items that don't add value.

Value Stream Mapping (VSM) is used to help understand and improve the material and/or information flow within your accounting firm. VSM captures and presents the whole process from end to end in a method that is easy to understand by those working the process – it captures the current issues and presents a realistic picture.

Often called The 'Learning to See' map, VSM is a popular and clear way to illustrate the current (and future) state of a process. The method maps information and product (or material) flow. It uses 'post it notes' of different colors, copies of documentation and sometimes photographs etc. to illustrate the process flow.

The purpose is to produce the whole process on a single sheet of paper. This will provide a pictorial and realistic representation of the 'current state'. It is a useful and effective focal point to gather around and discuss opportunities for improvement.

To develop the 'current state', it will be necessary to discuss fully each stage, possibly collect documentation and use post it notes as described earlier. The purpose of the exercise is to have an understanding of what happens now in order to look for and then introduce opportunities for improvement.

Once the 'current state' map is completed and agreed, the second stage is to develop a 'Future State Map'. The 'Future State Map' represents how the process would look in an ideal world and is based on inputs from all levels of employees. The completion of the 'Future State Map' then allows a gap analysis (between current and future state) to be undertaken and the development of an action plan.

Carrying out a value stream mapping exercise encourages a team approach and participants in the activity are encouraged to suggest improvements and contribute towards the future state map and implementation of the action plan.

1.2 Company Overview

AVTEC is one of the largest manufacturers of powertrain and engineered products in India. It is a part of CK Birla Group – a leading global business house, with over 20,000 employees and a combined turnover of USD 1.6 billion.

With years of experience in manufacturing, AVTEC delivers competency across the entire value chain of design & manufacture of engines; transmissions and high precision components like cylinder heads, cylinder blocks, crank shafts, cam shafts, cam rods and transmission gears for automobile, off-highway, Agriculture and Railway industry, in areas of both propriety products and contract manufacturing.

The company serves some of the best-known domestic and global automobile and off-highway companies, including global OEMs such as Allison, BEML, Caterpillar, Daimler, Ford, General Motors, Renault-Nissan, Tata-Jaguar and several other established brands.

AVTEC's domestic units comprise an in-house tech centre in Hosur, R&D facilities in Hosur and Pithampur, and state-of-the-art manufacturing facilities in Hosur, Chennai, and Pithampur. All its facilities are TS 16949 and QS 14001 certified, equipped with high-tech machinery, and manned by experienced personnel.

With its global R&D and manufacturing footprint includes face gear and innovative drive systems through the Switzerland-based subsidiary ASSAG, AVTEC aspires to reinforce its commitment to customers as a 'one-stop-shop' for Powertrain and Precision Engineered Products, across the globe.

With its Switzerland based Design, patenting and batch production facility ASSAG-pioneer in face gear technology, AVTEC aspires to reinforce its commitment to customers as a 'one-stop-shop' from concept to design, patenting and series production of Power train & Precision Engineered Products & services across the Globe

1.3 Problem definition

AVTEC is a manufacturing company is power unit plant they manufactured heavy vehicle and auto mobile engine. With the growing of there company product, other products they have capacity to manufacturing double production in there company but they are unable to do it the main reason in rejection of component is very huge. The company wants to implement lean flow technologies in the company so that customer demand can be met by increasing throughput and maximize capacity. It presently works on the batch processing system with longer lead time, cycle time and waiting time also.

Assumptions

1. All data is reliable and accurate.
2. The result of the study is limited to Company
3. The research is limited to one product family and focus only on main shift

1.4 Objective of research

Today, automobile suppliers have a great concern over improving quality and decreasing cost, which leads to improved system productivity. In order to remain competitive, waste from the value stream must be identified and eliminated so to run system with maximum efficiencies. A Production is to order and large numbers of different products are produced, each in relatively small volume. A Production shop consists of number of machine centres, each with a fundamentally different activity. The problems of machine shop are delayed deliveries, long queues, and high work in process inventories, improper utilization. These problems increase overall cost of production. The need for customized with reduced lead times together with the requirement of global competitiveness requires that products be produced in small batch sizes as per customer's requirement. The processing in small batch sizes necessitates the adjustment in the flow of production through different processes as per their processing speeds. In addition it requires close

monitoring of processes to reduce process variability for defect free production and efficient planned maintenance of all machines for increased availability and reduction in non value added activities such as setup times, movement of material in between the work processes and additional processing of material. The efficient utilization of machines while producing in small batches reduced WIP inventories, reduced throughput times and reduction in lead times leads to competitive manufacturing. It is need for machine shop manufacturing system to adopt lean environment.

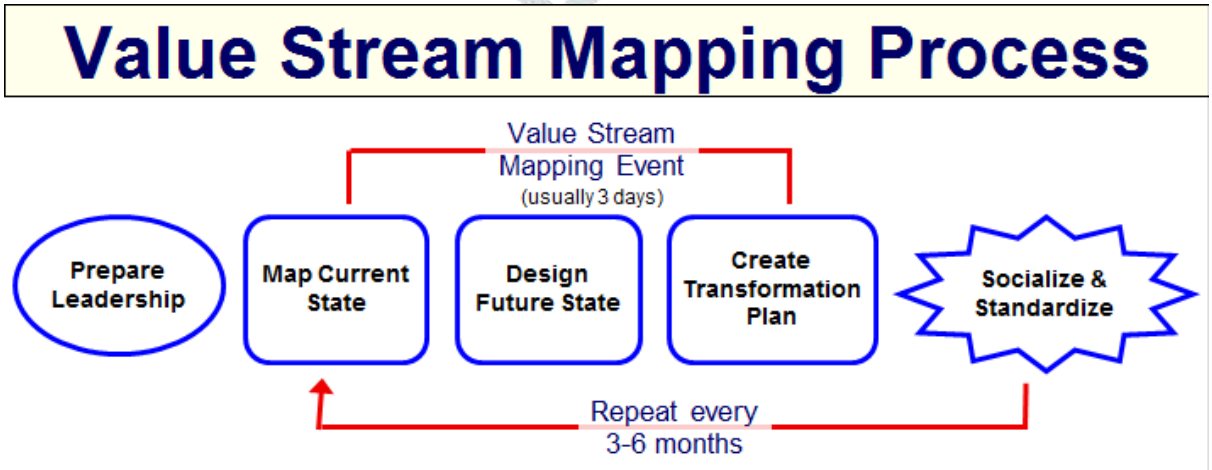
To improve productivity by identifying waste and then removing that by implementing lean principle in this industry we focus our attention on VSM tool. Value Stream Mapping enables a company to identify and eliminate waste, thereby streamlining work processes, cutting lead times, reducing costs and increasing quality and hence productivity. The goal of VSM is to identify, demonstrate and decrease waste in the process, highlighting the opportunities for improvement that will most significantly impact the overall production system.

In this study lean concepts are introduced using VSM in working environment. There are four objectives that need to be achieved in this project: 1) To collect the data and analyze the current production flow. 2) To create the current state mapping by using the VSM method. 3) To propose the improvement plan. 4) To analyze the current state mapping for creating future state mapping

1.5 Proposed Solution

The purpose of the paper is to identify waste and non-value added activities so that it can be gradually reduced and eliminated, compress production lead time, switch from big batches to small batches and one-piece flow wherever it is possible in the process flow and material flow. Aim is to introduce lean flow in the workplace of Company so that continuous improvement can be made and determine adequate inventory based on customer demand and maximize the company productivity.

The proposed salutation is the identification of losses (muda) with the help of current state map of value stream mapping in lean manufacturing and resolve that losses and minimize the non value added activities



2.METHODOLOGY

2.1 Process review and data collection

In AVTEC India limited process review in transmission block (soft line) and take observation of all process of transmission box of NALT (Nissan and Ashok Leyland Transmission) continuously observing all component of transmission box like Low main, second main, third main, top gear shaft, fifth main, cluster gear shaft, main shaft, reverse gear, low counter, second counter, third counter, fifth counter, sleeve, synchronizer.

Observing this all component process calculate all machine cycle time with help of stop watch and also observe the flow of material between the machine of all component process after complete these all the problem occurs in main shaft process because of the process of main shaft is so lengthy and the cycle time of machine in more than, getting the whole information about main shaft process like flow of material, cycle time of all machine, lead time of whole process, waiting time, takt time, up time, types of operation performed on component how much and how many problem occurs on performing operation when whole data collected then go for calculation calculate all data, takt time, and all calculation cycle time, takt time, up time, lead time.

When all calculation completed then go for draw a current state map when current state map complete then visualised the whole process and draw Complete map of current state process in which problems occur in flow of material, flow of process, flow of information and then study the complete process

2.2 VSM methodology

The Value Stream Mapping method (VSM) is a visualization tool oriented to the Toyota version of Lean Manufacturing (Toyota Production System) to start improving productivity by identifying waste and then removing it by implementing lean principle in the industry there is no other tool better than VSM. Because of Its helps to understand and streamline work processes using the tools and techniques of Lean Manufacturing. VSM can thus serve as a blue print for Lean Manufacturing. This section presents a methodology to develop a value stream mapping to identify material and information of current state. The goal of VSM is to identify, demonstrate and decrease waste in the process. Waste being any activity that does not add value to the final product, often used to demonstrate and decrease the amount of `waste' in a manufacturing system. And these method also helpful for visualization of all types of waste in process, material, and information flow.

The method of Value Stream Mapping (VSM) is a technique brought to fame by the qualitative successes of Toyota. Toyota themselves refer to the method as "Material and Information Flow Mapping". Adding importance to the oft-neglected information flow (Rother and Shook, 1999). Mapping the Value Stream is done by using pen and paper to draw a visual map of the materials and information flows from supplier to customer. These aids in viewing the whole flow instead of getting bogged down in details that in the end

might turn out be inconsequential. As a visual aid it provides an easier way to see problems than any quantitative tool could present. According to Rother and Shook (1999), the material flow will most likely travel through several different departmental bound-aries, it is important to allow the mapping process to transgress those boundaries; otherwise it is easy to lose sight of the end customer and his demands.

The workflow in creating a value stream map is described in Figure 3, interpreted from Rother and Shook (1999). First a specific product or product family needs to be selected. By actually following the product on the shop floor a current-state map is constructed, usually on a large piece of paper. Using that map as a basis for improvement, a future-state map is created. Finally a plan to reach the desired state is generated and implemented. This is a recursive process, meaning that once the plan has been implemented the future-state is now the current-state and a new future-state is created and implemented.

2.3 Steps prepare for value stream mapping

Value stream mapping is an invaluable tool used to identify waste in operations. There are steps to prepare for value stream mapping. Value stream mapping as defined by the Lean Enterprise Institute, is a simple diagram of every step involved in the material and information flows needed to bring a product from order to delivery. In other words, Value stream mapping is an invaluable tool used to identify waste in day-to-day operations to eliminate these waste we are using value stream mapping.

Together Information

Before to start value stream mapping together the following information:

- All type of production and sales history of product and product family from the previous year's.
- The volume of each product sold from the previous year how much component sales.
- Calculated all assumptions from sales and what kind of marketing strategy that will affect your sales in future.

This type of information will be useful in creating a history of product and the volume of sales for each product will helpful In most cases, you will find that 20 percent of what you build represents 80 percent of your business in a typical year.

When management looked at the sales goals for the next year, and planning for future products. Three of the base products had targeted sales numbers that varied by 7 percent and some new products with large projected sales volumes were planned for release. That why the analysis was modified so that seven out of the total number of base products amounted to 82 percent of the total business. This was the final analysis by which company management limited the scope of its value stream mapping activity like these all type of activity and collect all type of information which is helpful for the mapping.

A Product Quantity Analysis

To create a product quantity analysis, start by listing all of your customers demands and the products you build for each of them. Be sure to stick to the basics when it comes to your products. Don't get down with the various options that can be added to your base product. List your base standard products that differ in form, fit, and function and make it essential.

With the help of referencing sales from the previous year, we determine that how much amount of each product you made for customers. Calculate all the total number of Products Company made showing the how much volume of business generated from each customer to understand what your base demand was for the prior year and it is helpful for the value stream mapping.

Determine the percentage of business that each product represents from your total number of units sold, and then identify the mix of products that represents around 80 percent of your business. That mix will be what you want to value stream mapping which will allow you to begin thinking of what a model line will look like in your operation. In other words, by value stream mapping the 20 percent of the products that represent 80 percent of your business, you can identify and eliminate waste from these in-demand products so that a majority of your business becomes more efficient and our product demand also increased.

Also should start the process by making a list of all customers. Use that list to calculate the total number of finished piece parts you produced from the previous year. Then determine the percentage of business that each customer represents from the volume of parts produced. This list helpful for calculating product quantity.

Group Customers

The next step is to group customers together by the industry they represent the total number of finished piece parts along with the total percentage of finished piece parts that each industry represents.

Sort Materials

Sort out the number of material types by each industry and determine how many parts account for each type. The purpose of this exercise is to identify which product families you want to map. Many don’t know what their product families are, and if you try to map every product family at once in a environment, it will become too complicated.

Sort Product Families

The next step before VSM is to construct a process quantity routing analysis to identify product families according to a similar build sequence. With this information, you will know exactly what you are mapping through the flow of your operations.

You have to know what parts or products flow through each work centre and in what order. This helps you see which products follow the same routing sequence that logically make sense to group together. You might need to look at drawings you use to build the product to ensure you understand the routing of parts through the work centers.

Once you have this data in two distinct product families that have nearly identical build sequences which is helpful for value stream mapping.

Choose One Value Stream to Begin

Important thing is what products or piece parts comprise 80 percent of your business and which products or piece parts of that 80 percent make sense to group together as a value stream .Start by value stream mapping one value stream at a time to keep things simple. You may find that although your analysis is examining 80 percent of what you build, it might be useful to group together products or piece parts from the other 20 percent with other value streams. This could arise because they follow the same build sequence and have similar form, fit, and function.

So, when choosing a value stream to start with, considers the impact that value stream has on the business unit, such as:

- pick percent of sales volume.
- Changing in Market affecting demand of customer.
- individual product Profit margins of .
- data affecting product lines.

Make Operations Flow Chart

After all these exercise make a flow chart of all the operations in your value stream. Refer to work order routings or the bill of materials for the product value stream as needed to identify the steps and create a starting point is a sample flow chart for a value stream Notice that this flow chart uses the work centre number for each step where applicable as assigned in materials resource planning such as rather than simply Using this numerical labelling, for instance, everyone in organization will understand which one is being referenced and complete the operation flow chart point out all operation in which we make improvement .

Understand process on Shop Floor

When it's time to map the product family, needs to take a walk around the shop floor and take the all observation from shop floor. The temptation will be to gather in a meeting room staring at numbers you ran from your MRP system without ever stepping foot onto your shop floor. When observing the all operation from shop floor these is a way of visualising the all non value added time includes and how can we minimize it. That's a sure way to miss wasteful activity that the MRP system doesn't report.steps of your value stream where the work is being done. Start at the end of the process, working your way upstream to the beginning, to get a customer-supplier perspective at each step. You will be able to see any waste that's occurring and whether it is unnecessary or acceptable. Don't rationalize waste and assume it is happening only because of a new operator in training or a new product design, as you will miss identifying opportunities for improvement these is the way when minimize the non value added time .

Collect the Data from shop floor

Data collection is important, but not at the expense of taking months to get anything implemented after all data collection is the base point of value stream because when we have to mapping the current state we have to calculate the data for calculation we must have data .

The first step is to conduct time studies where applicable and review the results with the operators. If the operators and team agree with results, then use this data to fill in the gaps in data box for any process that is missing data. Operators can be the best source for information when the data is unavailable and can't conduct a time study. In time study we have to observed the time with the help of stopwatch and also calculate it.

Another option is to use data from similar jobs. The process quantity routing analysis, you should be able to identify other part numbers in value stream that are similar. Some similar data we assume with the help of quantity routine analysis

A calculation procedure for determining the operator cycle time, machine cycle time, setup time, available shift hours. Use the method like weighted average method.

Value streams are listed for each of the given metrics. The Percentage column shows the percentage you calculated in your product quantity routing analysis listing what percentage of business each value stream represents to your annual gross sales.

Remember that when you run parts through a shared resource, the product mix becomes important so that you avoid bottlenecks in your production line.

2.4 Construct the value stream mapping

Measurements: first of all take white blank paper sheet, begin constructing your value stream using symbols to indicate what is happening at each process.

At each step, be sure to measure the appropriate metrics as they apply to your process. This paints a good picture of the current condition at each process, despite what your MRP system says or what others might tell you show the all values which calculate and also shows the all observation .

Which metrics should you measure? That depends on your process. The point of Valve stream mapping is not data collection; it's to show you where the value is created and where the waste accumulates in your process all the measurements shows in the map.

Outsourcing points: On the value stream mapping a supplier truck symbol identifies where parts are outsourced. This is an important factor you need to include in your value stream mapping. All points of outsourcing in your process, whether because of capacity constraints or lack of necessary equipment, must be identified these is main point of outsourcing.

Mainly the problems occur with outsourcing fall into one of two categories: quality or delivery requirements. The data you gather should include the lead-time, lot size, and yield percentage. Filling in this data for the outsourcing supplier will show you if a kaizen event may be necessary. It shows in value stream map.

Flow of Information: A value stream mapping should show not only the flow of material, but also the flow of information. The flow of information is the way to minimize the disturbance of information flow. If you don't know how information flows to the shop floor, you run the risk of processes waiting for instruction, creating downtime. Without the flow of information we can’t focus on main point of value stream mapping you also have an incomplete picture of what you need to improve without first knowing how the flow of information will support your proposed idea.

2.5 Summarize the Data and Get current state map

When you have identified all the steps in your value stream and have filled in all the data applicable to value stream mapping it's time to put it all together. A sample value stream mapping should like when all the data has been collected. With this format, your team can stand back and look at what the data is telling you about the flow through your process, flow of material, flow of information.

Value stream mapping to see where the value is being created and identify where wasteful activity occurs. To help you find the waste, examine the process and check the all process where we have to improve to minimize the loss and maximize the production.

The list of kaizen opportunities identified in this process and begin them by level of impact an improvement will make to the flow of value stream. This will give an organized plan of action for where to start making improvements to value stream.

With your value stream mapping in hand, you are armed, ready, and well on your way to eliminating waste and learning to see the whole picture. Keep in mind that learning to see is not only the first step in creating a lean organization keep all map in mind check all opportunities in which we have to improve from these way can eliminate the non value added time from whole process.

2.6 Terminology used

Takt time

The word takt is German and literally means pace or rhythm. When we speak of takt time we're attempting to understand the rate at which we need to produce our product in order to satisfy customer demand.

To calculate takt time think touchdown, or T/D, since we simply divide the net available time by the customer demand. Takt time cannot be measured with a stop watch. It can only be calculated.

Lead time

The Lead Time represents the total time – value added and non value added – it takes a product to make it through an entire value stream.

This is often called the "call to cash" time since it helps us understand the time between taking the order and receiving payment for the delivered goods. Value stream maps are excellent tools for determining the Production Lead Time.

Non value added time

Non-value-added time or activity in a production or manufacturing process is any time spent on a step in that process that adds nothing to the finished product. This is in opposition to value-added activity, which adds some value that a customer will pay for with the finished product.

Cycle time

Cycle time is the total time from the beginning to the end of your process, as defined by you and your customer. Cycle time includes process time, during which a unit is acted upon to bring it closer to an output, and delay time, during which a unit of work is spent waiting to take the next action

Change over time

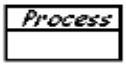
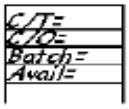
Change over time is the time it takes to set a process up for the next product type

UP time

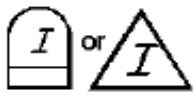
Part of active time during which an equipment, machine, or system is either fully operational or is ready to perform its intended function. Opposite of downtime.

2.7 Symbols used in value stream mapping

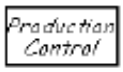
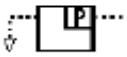
PROCESS SYMBOL

	**Customer/Supplier Icon: represents the Supplier when in the upper left, customer when in the upper right, the usual end point for material**
	**Dedicated Process flow Icon: a process, operation, machine or department, through which material flows. It represents one department with a continuous, internal fixed flow.**
	**Shared Process Icon: a process, operation, department or workcenter that other value stream families share.**
	**Data Box Icon: it goes under other icons that have significant information/data required for analyzing and observing the system.**
	**Workcell Icon: indicates that multiple processes are integrated in a manufacturing workcell.**

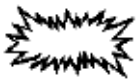
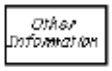
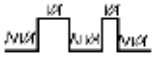
MATERIAL SYMBOL

	Inventory Icons: show inventory between two processes
 	Shipments Icon: represents movement of raw materials from suppliers to the Receiving dock/s of the factory. Or, the movement of finished goods from the Shipping dock/s of the factory to the customers Push Arrow Icon: represents the "pushing" of material from one process to the next process.
	Supermarket Icon: an inventory "supermarket" (kanban stockpoint).
	Material Pull Icon: supermarkets connect to downstream processes with this "Pull" icon that indicates physical removal.

INFORMATION SYMBOL

	Production Control Icon: This box represents a central production scheduling or control department, person or operation.
	Manual Info Icon : A straight, thin arrow shows general flow of information from memos, reports, or conversation. Frequency and other notes may be relevant.
	Electronic Info Icon : This wiggle arrow represents electronic flow such as electronic data interchange (EDI), the Internet, Intranets, LANs (local area network), WANs (wide area network). You may indicate the frequency of information/data interchange, the type of media used ex. fax, phone, etc. and the type of data exchanged.
	Production Kanban Icon : This icon triggers production of a pre-defined number of parts. It signals a supplying process to provide parts to a downstream process.
	Withdrawal Kanban Icon : This icon represents a card or device that instructs a material handler to transfer parts from a supermarket to the receiving process. The material handler (or operator) goes to the supermarket and withdraws the necessary items.

GENERAL SYMBOL

	Kaizen Burst Icon: used to highlight improvement needs and plan kaizen workshops at specific processes that are critical to achieving the Future State Map of the value stream.
	Operator Icon : represents an operator. It shows the number of operators required to process the VSM family at a particular workstation.
	Other Icon : other useful or potentially useful information.
	Timeline Icon : shows value added times (Cycle Times) and non-value added (wait) times. Use this to calculate Lead Time and Total Cycle Time.

Calculation and Analysis

3.1 Calculate Takt Time

Takt time is defined as net available time divided by customer demand. The net available time is the total operation time during a specific period, meaning the total amount of time, which adds value on value stream. Customer Demand can be determined on customer forecast or based on the currently customer order.

Available work time was determined using the following assumptions:

- Total available time per shift (8 hr.) = 480 min
- Lunch time decided by management = 30 min
- Thereby, available work time can be calculated as:

  = 480 min (8 hr. shift)

  - 30 min (lunch)

  = **450 min (7.5 hrs.)**
- Hence, available working hours per shift = 7.5 hrs.
- Per shift forecasting demand of main shaft = 74 pieces
- **Takt time = Net available Production time**

  Demand from Customers
- Takt Time = 450/74 = **6.081 min**
- takt time is 6.0.81min

  after calculate takt time of main shaft we have to minimize the cycle time as our observation all machine which is used for manufacturing main shaft have less cycle time aspect only one machine m2 which is used for rough turning second

3.2 Understand customer demand

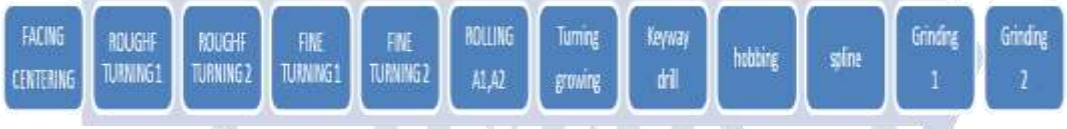
Customer demand based on monthly or weekly. Customer Demand is 3800 transmission box per month

Customer demand per day is 147

Customer demand per shift is 74

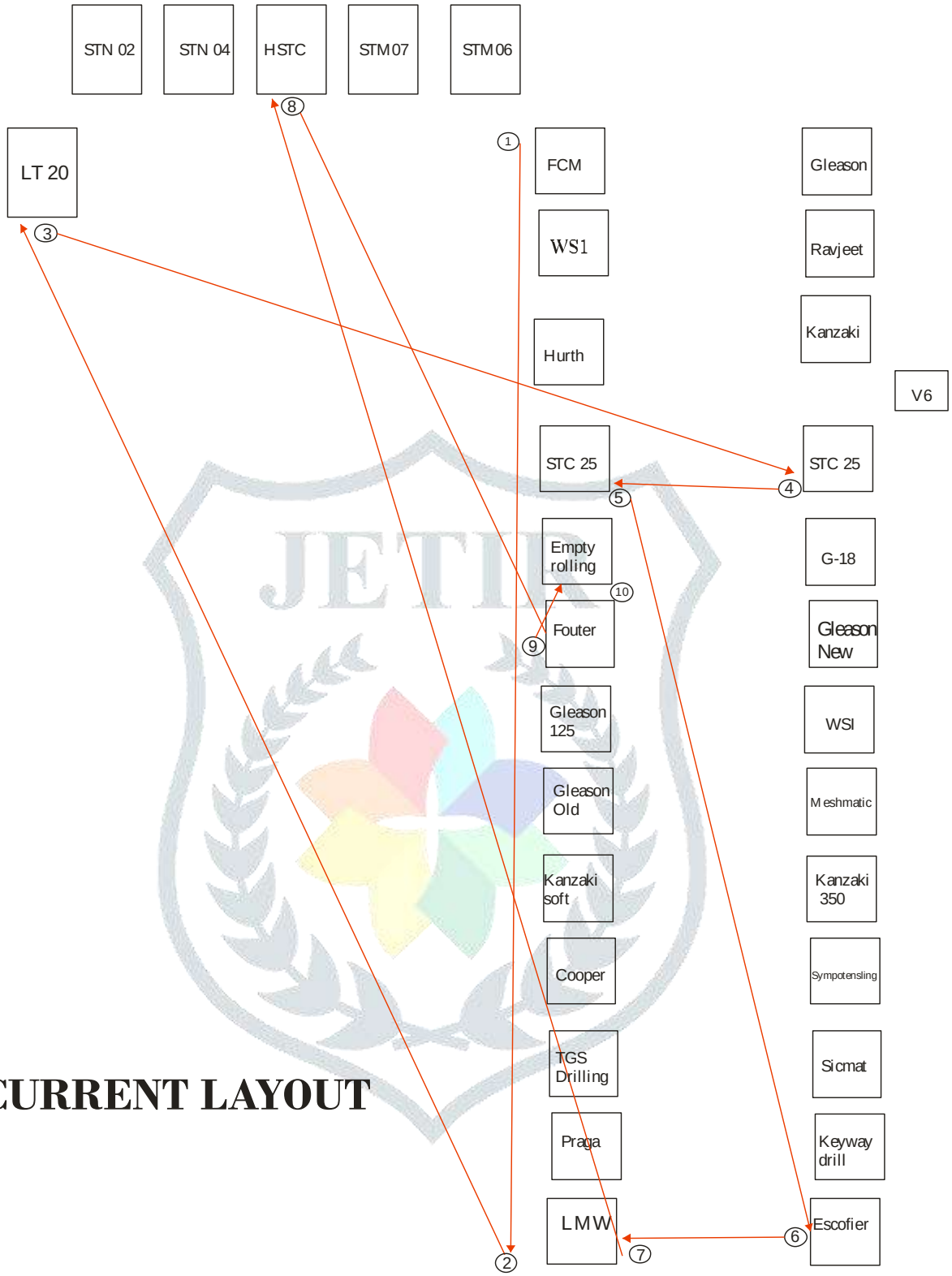
3.3 Map the process flow

This step involves various processes to complete the product. In addition, measure relevant data to put in a value stream mapping box. Moreover, see the WIP between two processes.



3.4 Map the material flow

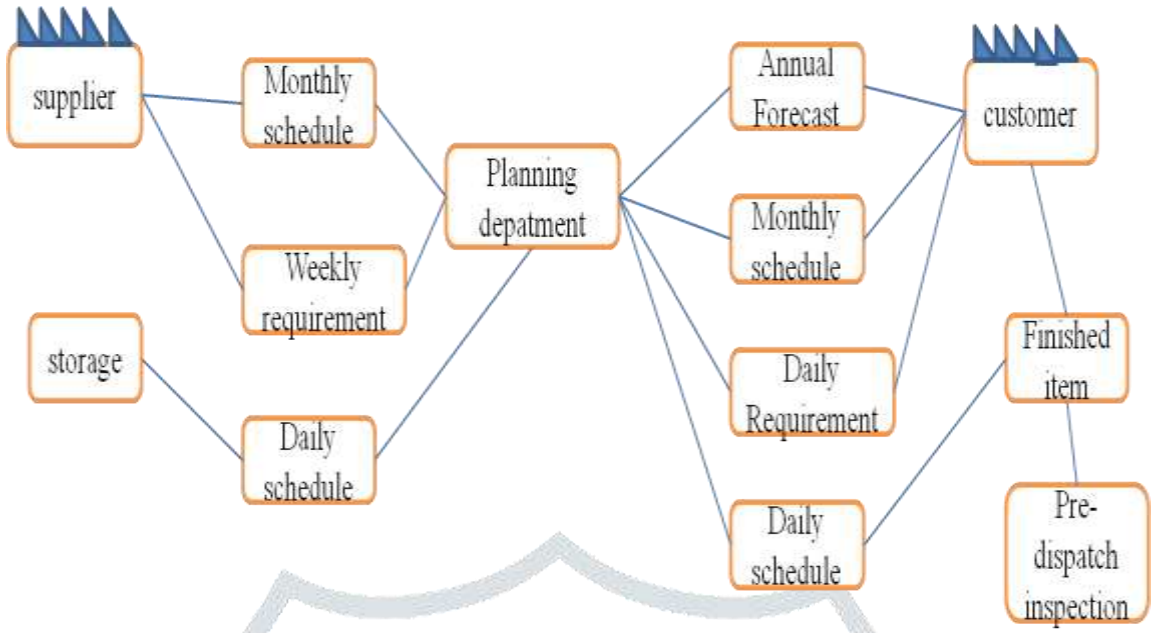
The flow of material from raw material to finished goods is given by supplier to customer. There is flow of material in shop floor are as follows in fig



CURRENT LAYOUT

3.5 Map the information flow

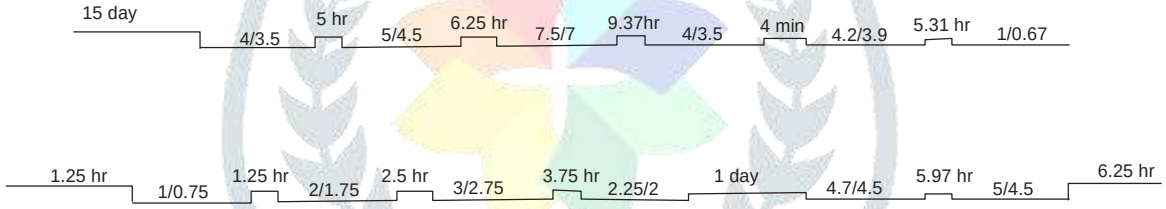
The information flow provided demand information. Information are given by electronic or manually.



3.6 Draw the Time line

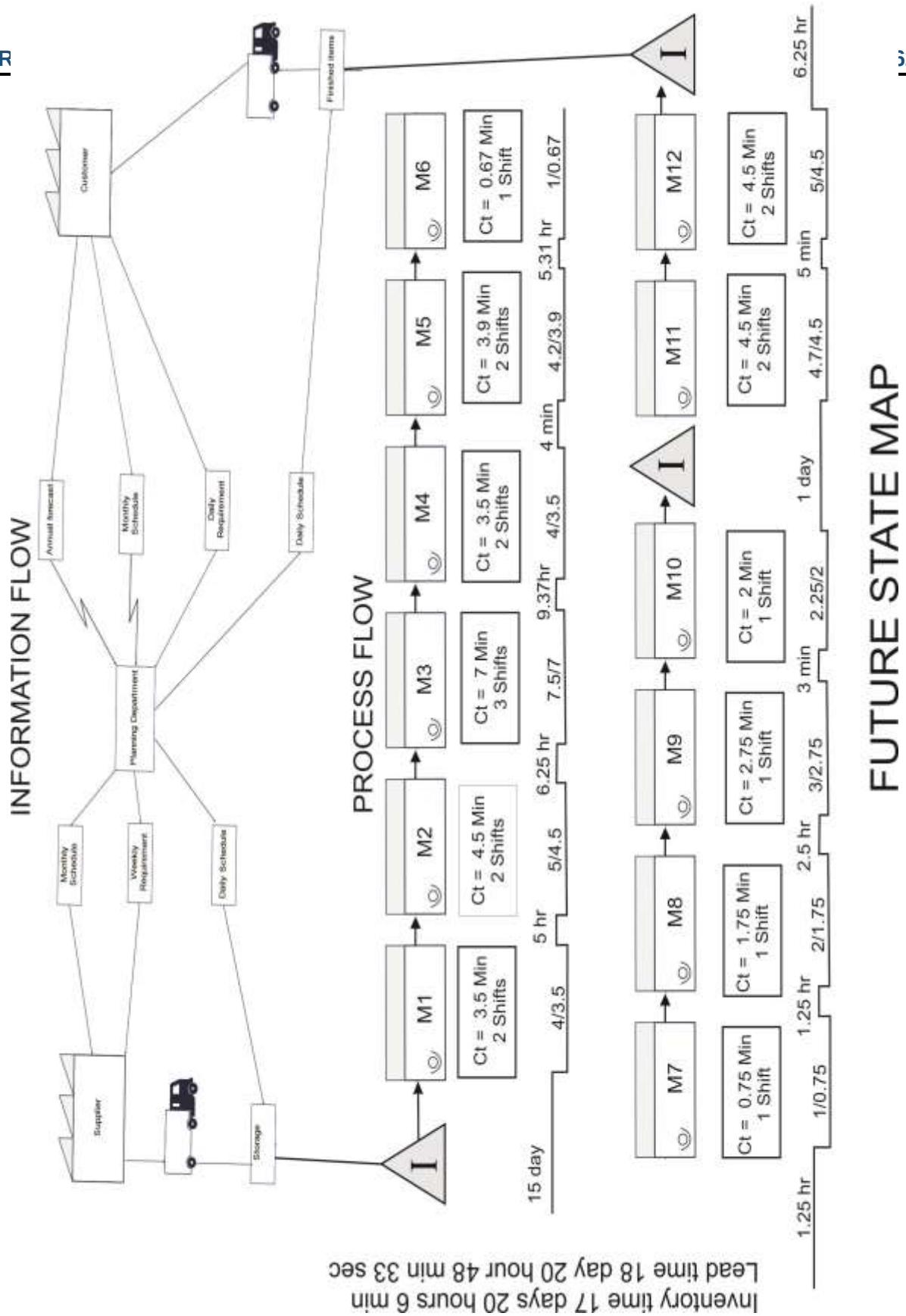
Calculate production lead times for inventory triangles by dividing quantity of inventory by the customer daily requirement.

Show in current state map



3.7 Future State Map

Analyzing the current state map, the lead time and amount of inventory are more between processes. Supermarket is used between two processes to reduce inventory wastage during process and convert the process from build to stock (push) to make to order (pull).s



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3.8

Process

step improvements suggestions

During the observation period, various possibilities to increase performance within the process steps were identified. To check the viability of the suggestions, they were discussed with different employees of the company. The main categories of improvements are:

Quality of incoming material: On a regular basis throughout the entire process incoming materials need adjusting to be usable. This is either a result of poor supplier performance or of suppliers provided with faulty order information.

Clear work instructions: Since demand for specific types of machines is low, employees encounter specific machine types irregularly. This means it takes time to remember what steps to take. Some employees keep personal work instructions, but these are not commonly shared and are often not complete. A common work instruction would decrease the time employees spend on thinking what to do next and on updating their personal work instructions.

Place parts closer to workstation: Employees need a considerable amount of time to locate and get the necessary parts. Parts are placed in a chaotic way in the production area without indications of which parts are where. Parts intended for a specific machine should be placed together on one or two carts which have clearly indicated for what orders those parts are needed. These carts should then be placed close to the workstation where they are needed. Furthermore, parts should only be released to the production area when the production of the respective machine requires them.

Workplace design: Currently workstations are not designated for a specific function within the production process. As a result, employees all have a fully equipped tool box, making it hard to find the correct tool quickly. Specific tool ‘plates’ should be designed per workstation. Furthermore, each workstation should have waste bins located closely, to reduce cleaning time.

Other: Some minor improvements, such as adding order information to each machine and removing certain parts from the bill of materials, make up the final category.

RESULT AND CONCLUSION

4.1 Result

When total cycle time(value added + non value added) for each & every process is compared with takt time it is found that cycle time of rough turning second setup process exceeds the takt time so there is need to improve the process capability of rough turning process to meet the demand of customer within the time.
So it can be improved by using various lean tools but here we are improving the cycle time of rough turning process by improving layout of soft cell and by implementation in material flow also there is reduction in lead time.

- Minimize cycle time of machine 3 (2.66%)
- Minimize total inventory time (3.63%)
- Minimize lead time (3.432%)

- Minimize flow of material(20 meter)

4.2 Conclusion

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 draw. In this research work we come to know that value.

- Improve productivity
- Need and clean shop Flore
- Reduce energy and manpower losses
- Proper and continue use of machine

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