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A total of 58 sentences were analysed. As a result **33** sentences (56.9%) were found in other documents.

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Reference documents

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16 Sentences were found in a text with the title: „***Sustainable competitive advantage by implementing lean ...3***", located at:
https://www.sciencedirect.com/science/article/pii/S2214785317315778

11 Sentences were found in a text with the title: „***Value Stream Mapping: A Case Study Of Assembly Process***", located at:
https://www.ijert.org/research/value-stream-mapping-a-case-study-of-assembly-process-IJERTV1IS8305.pdf

9 Sentences were found in a text with the title: „***20-26.pdf***", located at:
https://troindia.in/journal/ijapme/vol5iss1/20-26.pdf

8 Sentences were found in a text with the title: „***IRJET-V4I491.pdf***", located at:
https://www.irjet.net/archives/V4/i4/IRJET-V4I491.pdf

6 Sentences were found in a text with the title: „***Sustainable competitive advantage by implementing lean manufacturing ﾊﾘﾄﾀA Case study for Indian SMEﾊﾘﾄﾀ***", located at:
https://isiarticles.com/bundles/Article/pre/pdf/81685.pdf

3 Sentences were found in a text with the title: „***Value Stream Mapping for Lean Manufacturing Implementation***", located at:
https://web.wpi.edu/Pubs/E-project/Available/E-project-083107-002611/unrestricted/Valuestreammapping.pdf

3 Sentences were found in a text with the title: „***IJEDR1504071.pdf***", located at:
https://www.ijedr.org/papers/IJEDR1504071.pdf

3 Sentences were found in a text with the title: „***PRODUCTIVITY_IMPROVEMENT_IN_MODULES_PRODUCTS_THROUGH_EFFECTIVE_UTILIZATION_OF_RESOURCE_USING_VALUE_STATIC_***", located at:
http://ijariie.com/AdminUploadPdf/PRODUCTIVITY_IMPROVEMENT_IN_MODULES_PRODUCTS_THROUGH_EFFECTIVE_UTILIZATION_OF_RESOURCE_USING_VALUE_STATIC

3 Sentences were found in a text with the title: „***Ahd Menawi Hala Kharouf Safad Ishtaya***", located at:
https://eng-old.najah.edu/sites/eng-old.najah.edu/files/project-presentation.pdf

3 Sentences were found in a text with the title: „***ontime-delivery-improvement-using-leanconcepts--a-case-study-of-norglide-bearings.pdf***", located at:
http://www.rroij.com/open-access/ontime-delivery-improvement-using-leanconcepts--a-case-study-of-norglide-bearings.pdf

3 Sentences were found in a text with the title: „***Lead Time Reduction in Order Execution of Horizontal ...***", located at:
https://www.ijser.org/researchpaper/Lead-Time-Reduction-in-Order-Execution-of-Horizontal-Slurry-Pumps-Using-Lean-Concepts-for-Mining.pdf
https://www.ijser.org/paper/Lead-Time-Reduction-in-Order-Execution-of-Horizontal-Slurry-Pumps-Using-Lean-Concepts-for-Mining.html

3 Sentences were found in a text with the title: „***Production Line Analysis via Value Stream Mapping: A Lean ...124***", located at:
https://www.sciencedirect.com/science/article/pii/S2351978915000037

3 Sentences were found in a text with the title: „***researchpaper\Lead-Time-Reduction-in-Order-Executi.pdf - researchpaper\Lead-Time-Reduction-in-Order-Execution-of-Horizontal-Slurry-Pumps-Using-Lean-Concepts-for-Mining.pdf***", located at:
http://www.ijser.org/researchpaper\Lead-Time-Reduction-in-Order-Execution-of-Horizontal-Slurry-Pumps-Using-Lean-Concepts-for-Mining.pdf

3 Sentences were found in a text with the title: „***Implementation of Lean Manufacturing through Value Stream ...***", located at:
http://www.ijsrd.com/articles/IJSRDV3I50237.pdf

3 Sentences were found in a text with the title: „***Introduction - Valuestreammapping.pdf***", located at:
http://www.wpi.edu/Pubs/E-project/Available/E-project-083107-002611/unrestricted/Valuestreammapping.pdf

3 Sentences were found in a text with the title: „***JETIR1504050.pdf***", located at:
http://www.jetir.org/papers/JETIR1504050.pdf
http://www.jetir.org/view?paper=JETIR1504050

3 Sentences were found in a text with the title: „***"LEAN MANUFACTURING PROCESS OF A COLOR INDUSTRY ...***", located at:
https://electricaleye.blogspot.com/2017/07/lean-manufacturing-process-of-color.html

3 Sentences were found in a text with the title: „***Vol. 3, Issue 6, June 2014 On-Time Delivery Improvement ...***", located at:
http://www.ijirset.com/upload/2014/june/25_On-Time.pdf

3 Sentences were found in a text with the title: „***Future State Value Stream Mapping ...{Strategos}***", located at:
http://strategosinc.com/value_stream_mapping3.htm

2 Sentences were found in a text with the title: „***Sustainable competitive advantage by implementing lean ...***", located at:
https://www.researchgate.net/publication/320476136_Sustainable_competitive_advantage_by_implementing_lean_manufacturing_A_Case_study_for_Indian_SME

2 Sentences were found in a text with the title: „***09_chapter 2.pdf***", located at:
http://shodhganga.inflibnet.ac.in/bitstream/10603/27524/9/09_chapter_2.pdf

EVALUATION OF VALUE STREAM MAPPING IN SMALL SCALE INDUSTRY

[1] Neha Verma, [2]Vinay Sharma

[1]Asst.Prof, Department of Mechanical Engg. SSIPMT Raipur

[2]Professor, Department of Production Engg, BIT, Deoghar -835215, India

Abstract-**This research work presents a model of implementation of lean manufacturing for improving productivity and quality, by analyzing data of manufacturing industry. The purpose of this paper is to identify waste related problem, cause of equipment failure, bottleneck problem. The aim is to rectify these problems. The problems are analyzed and effort is also made to reduce rejection, inventory control, waiting time, set time and eliminating non added value time / activities. The complete problem is identified and depicted by value stream mapping. This paper firstly describes the current state of the component, with the help the use of value stream mapping. The waiting time will be eliminated by Kanban (pull system). These lean tools can be applied in manufacturing industries for reduction of wastage and increasing productivity.**

Index Terms— *Lean manufacturing, Value stream mapping, manufacturing industry*

INTRODUCTION

Value stream mapping, a lean manufacturing tool, which originated from the TPS, is known as "material and information flow mapping." This mapping tool uses the techniques of lean manufacturing to analyze and evaluate certain work processes in a manufacturing operation. This tool is used primarily to identify, demonstrate and decrease waste, as well as create flow in the manufacturing process.

A value stream is a collection of all actions value added as well as non-value added that are required to bring a product or a group of products that use the same resources through the main flows, from raw material to the arms of customers. These actions are those in the operation. Value stream mapping is an enterprise improvement tool

to assist in visualizing the entire production process, representing overall supply chain including both information and operation flow, which are the core of any successful lean both material and information flow.

CASE STUDY

This work is based on the production industry. The study area includes five production line namely- machining shop, hone operation and special purpose machine for burr removing. At the end of all three lines there is inspected in inspection room and final product is packing for final dispatch.

This industry manufactures – Aluminum & Zinc Alloy Pressure & Gravity Die Castings. CNC Precision Machined Components. Assemblies as per Customer Design. Surface finishing like Electroplating, Anodizing, Powder Coating etc. Product range is - Non-ferrous Pressure & Gravity Die Casting mainly of Aluminum & Zinc based alloys from casting weight ranging low as 1 Gram to 500 Grams of Aluminum Alloy and corresponding weight in Zinc and other alloys. Gauge use in this company plain plug gauge go & no go, depth gauge, plain m-pin, contour profile gauge. And Current Group Turnover INR 200 Million.

METHODOLOGY

VSMs can be created using paper and pencil and provides a blue print for implementation of lean manufacturing concepts by describing how information and material flow, identifying waste and its source and illustrate how the information and material flow.

Value stream maps are a very common technique when you're implementing a lean system.

• Identify the “present state” and “future state” of the production process

• Model the information flow, material flow, and lead time from beginning to end of the value Stream

Fig.1 Value Stream mapping symbols

Step of value stream mapping

Current State map

Step-1

Step-2

3
4

Step-3

Step-4

10
9
8

Step-5

Analysis of Current State Map

The current state map is a fancy way of saying ‘what happens now’ or the ‘as-is’ process. The current state map should show all the process steps and sufficient detail on how each step is completed and what happens to the items being processed. This will enable us to spot the causes of problems and thus the means to improving the flow, efficiency, reliability and flexibility of the process. It can be as detailed or as simple as you need and can also exist in a number of different versions for consumption by different internal or external groups.

The aim of this study is to improve the productivity and compute efficiency of a production line. The purpose of this paper is to identify waste related problem, cause of equipment failure, bottleneck problem .The aim is to rectify these problems. The above problems are analyzed and effort is also made to reduce rejection, inventory control, waiting time, set time and eliminating non added value time / activities. The complete problem is identified and depicted by value stream mapping.

FUTURE STATE MAP

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Step 7

Step 8

Analysis of Future Stream Map

In Future State Map for assembly process two processes are gathered to reduce non value added time during processes. Supermarkets are placed between processes to reduce inventory wastages during process and to turn process from build to stock to make to order. Make to order process lead to assembly of parts when order placed by customers. It results reduction in inventories. The information and communication flow between processing lines improved by scheduling pacemaker in the process as well process turned from push to pull by Kanban system. On this research we have made some sizeable improvements. Production Lead-time (PLT) has gone from 5 days and the process cycle efficiency (PCE) has gone 51%

RESULT AND DISSCUSSION

Fig. 2 bottleneck process

The bottleneck process is the operation with the longest cycle time. In the example, this is machining at 44 seconds. The bottleneck is important because it: Determines total system output. Becomes the primary scheduling point A work balance chart (above) is helpful for steps 2 and 3. Cycle time is plotted on the vertical axis for each operation.

Takt Time is the rate of a completed product needs to be finished in order to meet customer demand.

Takt Time = Available minutes for production Required unit of production

= 460min504pcs

= 55 sec

CONCLUSION

In above mentioned case study, work has been done on identifying the waste related areas as a study of lean manufacturing. It has been found that the reason for non-value added activities are wrong handling, long distance, defect and improper inventory .In the field of lean tools we concluded that the VSM is an effective tool for eliminating these wastes and study also suggested the ways to reduce non value added times in a manufacturing process. Large reductions in time consumption can be achieved by reducing the waiting time of a job during production process.

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