International Journal Of Engineering Research And Development
e- ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com
Volume 20, Issue 10 (October, 2024), PP 136-140

Production Optimization in Plastic Processing Industry Using Lean Principles

K.V.Poornachandran[1], R.Manova moses Jayakanni[2]
[1, 2] *Assistant professor, Department of Mechanical Engineering, DhanalakshmiSrinivasan College of Engineering Coimbatore – 641 105*

ABSTRACT
Lean principles are implemented in the both large and small scale industries. The present project work deals with enhancing productivity by implementing lean manufacturing principles in an plastic moulding tank industry. The Project will help in eliminating waste and will help in reducing throughput time for the given process. Value Stream Mapping is used to create a picture of information and item flow through the value stream. A current value steam map is created that reflects the current operation status. This information includes cycle time details, inventory details and process flow. The current status is analysed and value added and non-value added activities are found. From the current value stream map, all the factors affecting throughput time are identified. The current state value stream map is assessed in terms of creating flow by eliminating waste.
Kanban system is used to reduce the WIP inventory and make the process a continuous flow. Thus the necessary changes can be implemented in the organization for its profitable existence and increase customer delight. The main contribution of this project is determination of optimal inventory sizes under imperfect lead time and WIP of production systems. The main contribution of this project is to determine the various factors that are causing defects and increase lead time for the production unit.
Keywords*: Lean Manufacturing, VSM, FUZZY, FMEA*

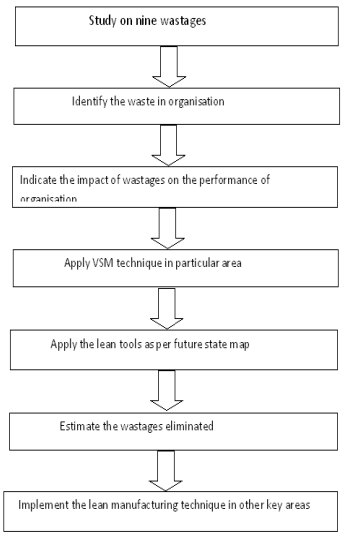
Date of Submission: 11-10-2024 Date of Acceptance: 22-10-2024

I.INTRODUCTION

Due to increasing global competition, firms have to radically change their manufacturing practices to improve their competitiveness. In pursuing this goal, all the firms have adopted a number of advanced techniques, such as just-in-time, total quality management, lean manufacturing and flexible manufacturing systems. The objectives of all these programmes have been to reduce cost, improve quality, reduce cycle time and increase flexibility on the shop floor.

Lean manufacturing is "A systematic approach in identifying and eliminating waste through continuous improvement by flowing the product at the demand of the customer."

II.METHODOLOGY



III.PROBLEM IDENTIFICATION

Problems identified from the layout in blow line plastic industry

- The major problem identified in industry is high lead time.
- The industry does not operate with standards.
- Inventory maintenance is one of major problem due to delay in production and delivery.
- They product are delivered as push production concept was the major problem.
- Due to improper demand forecast overproduction occurs .
- Underutilization of people and facilities.

IV. DATA COLLECTION

DATAS COLLECTED FROM BLOW LINE PLAST INDUSTRY SITUATED IN VIJAYAMANGALAM. Total area occupied by the company is 1.5950 HECT
Number of employees = 12
Manager = 1
Supervisor = 2
Labour = 9
In industry they manufactured the product of plastic tank and drum in various capacity sizes

Various tank sizes are

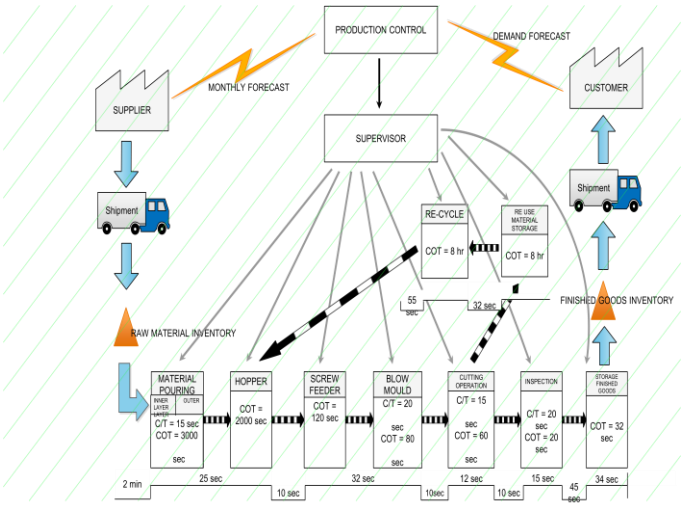
1. 300 litre-6kg-operating time at 102 sec
2. 500 litre-10kg-operating time at 170 sec
3. 1000 litre-18kg-operating time at 306 sec

Various drum sizes are

1. 250 litre- 4.5kg- operating time at 96 sec
2. 350 litre-7kg- operating time at 115 sec
3. 450 litre-9.5kg- operating time at 160 sec

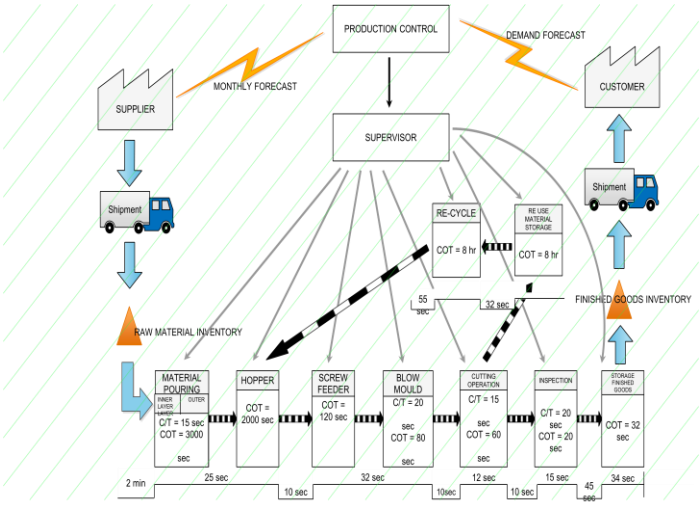
V.CALCULATION

VSM 300 LITRE CAPACITY



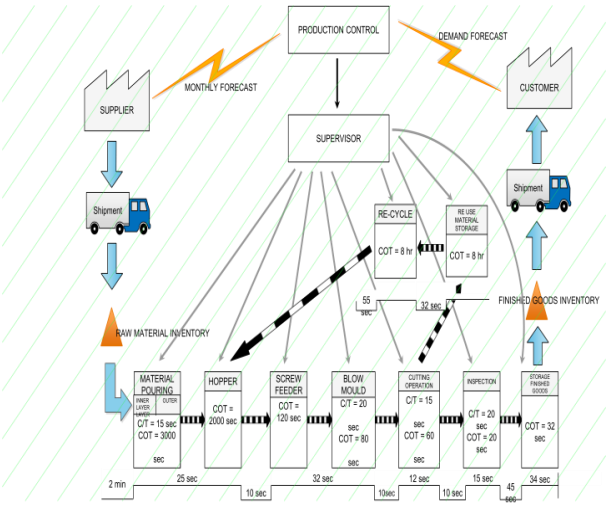
Lead time = value added time + non value added time
= 102 seconds + 280 seconds
= 382 seconds (or) 6.4 minutes

VSM 500 LITRE CAPACITY



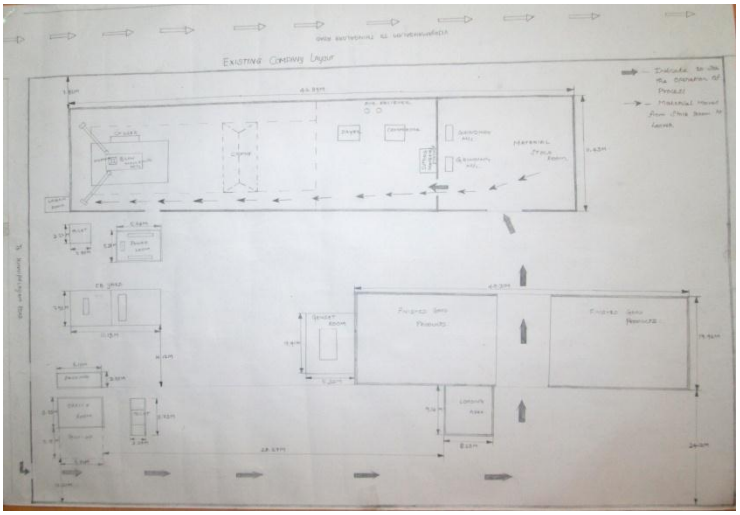
Lead time = value added time + non value added time
= 170 seconds + 340 seconds
= 510 seconds (or) 8.5 minutes
Demand rate = 1/Takt time
= 1/1.7 mins
= 0.588 mins

VSM 1000 LITRE CAPACITY

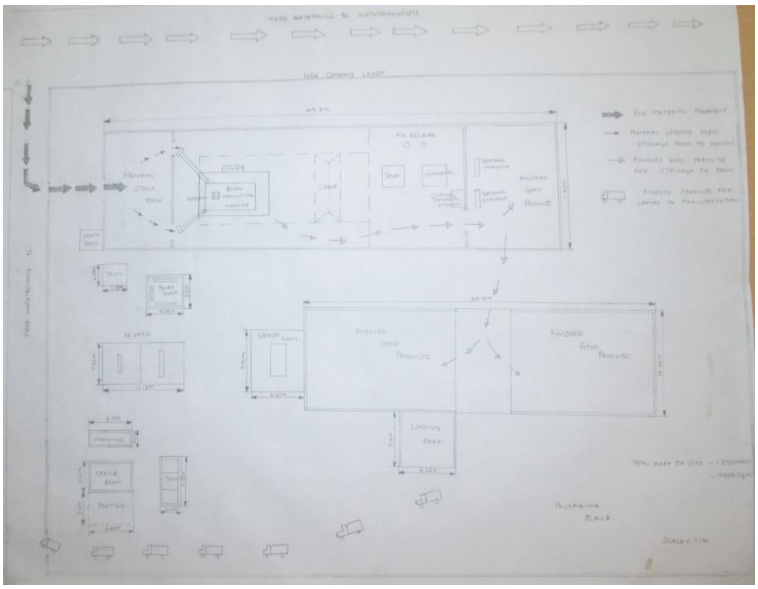


Lead time = value added time + non value added time
= 306 seconds +425 seconds
= 735 seconds (or) 12.25 minutes

COMPANY EXISTING LAYOUT



MODIFIED LAYOUT



VI. CONCLUSION

From the existing layout the problems such as unnecessary movement for searching tools and improper raw material storage were identified. Through current state VSM the process is visualized and lead time was estimated. Through FUZZY AHP the key factors which affect the industry can be optimized

VII. FUTURE WORK

In future the identified wastes will be eliminated by using lean tools and optimization technique like FMEA. For simulation purpose ARENA software is going to be used

REFERENCES

[1]. FarzadBehrouzi, Kuan Yew Wong - Lean performance evaluation of manufacturing systems: A dynamic and innovative approach, Procedia Computer Science 3 (2011) 388-395

[2]. Christian Hofer, CuneytEroglu, Adriana Rossiter Hofer – The effect of lean production on financial performance: The mediating role of inventory leanness, International journal of Production Economics 138 (2012) 242-253

[3]. Rosnah MY, Othman A – Lean Manufacturing Implementation in a Plastic Moulding Industry,AUT University (2012)

[4]. Ahmad Naufal, Ahmed Jaffar, NoriahYusoff, NurulHayati – Development of Kanban System at Local Manufacturing Company in Malaysia- Case Study, Procedia Engineering 41 (2012) 1721-1726

[5]. RavikumarMarudhamuthu, Marimuthukrishnaswamy, DamodaranMoorthyPillai – The Development and Implementation of Lean Manufacturing Techniques in Indian garment Industry, JJMIE (2011) 527-532

[6]. Hu-Chen Liu, Long Liu, Qi-HaoBian, Qin-Lian,Na Dong, Peng-Cheng Xu – Failure mode and effect analysis using fuzzy evidential reasoning approach and grey theory, Expert systems with Applications 38 (2011) 4403-4415

[7]. William G. Sullivan, Thomas N. McDonald, Eileen M.VanAken – Equipment replacement decisions and lean manufacturing, Robotics and Company Integrated Manufacturing 18 (2002) 255-265
[8]. Sanjay Bhasin – Performance of Lean in Large organisations, journal of manufacturing systems 31 (2012) 349-357
[9]. Fawaz A. Abdulmalek, JayantRajgopal – Analyzing the benefits of lean manufacturing and value stream mapping via simulation: A process sector case study, International Journal of Production Economics 107 (2007) 223-236
[10]. Krisztina Demeter, ZsoltMatyusz – The impact of lean practices on inventory turnover, International Journal Production Economics 133 (2011) 154-163