

REVIEW PAPER ON THE LEAN MANUFACTURING TOOLS¹SaurabhSingh S Thakur, ²Dr. N. H. KhandareShri Sant Gajanan Maharaj College of Engineering, Shegaon¹, Shri Sant Gajanan Maharaj College of Engineering, Shegaon²tsaurabhsingh029@gmail.com¹, nhkhandare@sngmce.ac.in²**ABSTRACT: -**

The term Lean in the manufacturing context implies identification and elimination of waste in all the processes involved. Identification of waste is critical to every organization. Lean manufacturing can apply to every process and it can bring about great results. Lean manufacture has a comprehensive set of elements, rules, and tools that focus on the elimination of waste and the creation of value. It can be used to manufacture the machines related to the Agro processing industry. Lean manufacture, also Creates speedy, smooth and economical manufacture . The main focus is to satisfy the customer demands for high quality and low cost .This technique is not only identify the reason for the waste But also helps in its removal through the market principles and guidelines. This paper focuses discussing the concept of lean manufacturing to improve the productivity, and the quality and lower the cost of product. Types of wastages are defined. The tools used to lower the waste are discussed.

Keywords use : *lean manufacturing , tools , waste*

1. INTRODUCTION

The lean manufacturing is fast growing process to improve the productivity of an industry . The lean manufacturing tools are not limited to industry but also in many areas.

In this changing business, it is important to win the hearts of customer through quality and cost of the product or service. It is also required to have a productive production with continuous improvement. The present need of the organization is to deliver high- quality product through continuous improvement. To fulfill this requirement, the 5S technique emerged for better production in the industries.

5S is a technique originated from Japan and it was first developed by Hiroyuki Hirano. It includes five words of S i.e. Seiri, Seiton, Seiso, Seiketsu and Shitsuke, which means Sort, Set in order, Shine, Standardize and Sustain respectively. The 5S technique is derived from "Kaizen" Which means "change for the better". It allows the enhancement of efficiency and productivity in the industry. The 5S technique is a program to achieve total organization cleanliness and standardization in the workplace for better productivity. The benefit of the 5S technique is an improvement in productivity, quality, health, and safety.

The term of 5S given as:

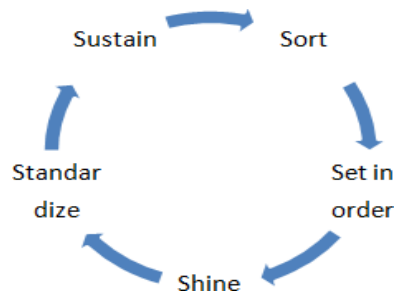
SEIRI (sort): Removal of all unwanted & unnecessary materials in the workplace.

SEITON (set in order): Putting everything in an assigned place so that it can be accessed quickly as well as returned in that same place quickly.

SEISO (shine or clean): Cleaning up the workplace and giving it a 'shine'.

SEIKETSU (standardize): Defining the standards by which one must measure and maintain cleanliness.

SHITSUKE (sustain): Maintain orderliness and to practice the first 4Son regularbasis



Types of industry

- 1) Auto mobile industry
- 2) Agricultural industry
- 3) Chemical industry
- 4) Construction
- 5) Financial services
- 6) Textile industry

Another than industry

- 1) Banking
- 2) Infrastructure
- 3) Administration
- 4) Estate
- 5) Government

The lean manufacturing is the commerce proposal to reduce waste in manufacturing goods. The fundamental plan to reduce cost scientifically, throughout the product and fabrication development by means of succession business reviews. The critical insight is that the majority of expences are assigned when the product are designed. Often an engineer will identify familiar, safe and sound materials and processes rather than cheap, competent ones. This reduces the project threat, that is, the cost of engineer increasing the economic risk and decreasing income. Good organizations expand and evaluate checklists to review manufactured goods designs. At the organization engineering rank, requirements are reviewed with advertising, marketing and customer representatives to remove costly supplies.] Lean thinking values are emerging as a method to develop the flexibility, dependability, and productivity of enterprises internationally. Lean thinking is being used to decrease setup times, group sizes, and inventories. Lean is all about removing misuse in the project. This comprises waste in time as well as cost. As project have reduced costs and improved class, the primary competitive gauge is the capability to react to the customer . This class presents an impression of lean manufacturing concepts and introduces methods and tools designed to put these concepts to work in a developed environment.

2. Types of waste

- 1) Excessive unplanned manufacturing
- 2) Unnecessary material handling
- 3) Excessive stock
- 4) Waste lead and set up time

- 5) Low maintenance
- 6) Old inspection method
- 7) Uncontrolled labour
- 8) Overproduction
- 9) Transport
- 10) Overprocessing
- 11) Waiting
- 12) Skills
- 13) Inventory
- 14) Motion

3. Objectives of lean manufacturing

- 1) Develop a lean manufacturing enterprise
- 2) Understand the lean manufacturing principles and its benefits
- 3) Apply lean in production and safe environment

4. Lean manufacturing concepts

- 1) Equipment reliability
- 2) Continuous flow
- 3) Pull production
- 4) Continuous improvement
- 5) People involvement

5. Tools used in lean manufacturing and its method

- 1) Kanban
- 2) Kaizen
- 3) Cellular manufacturing
- 4) TPM
- 5) Visual Management
- 6) 5S system
- 7) Value stream mapping
- 8) Quality at source

6. Four pillars of lean

- 1) Jit (just in time)
- 2) Supply chain integration
- 3) Cellular manufacturing
- 4) Kaizen

6.1) JIT (Just in time)

1) Just in a time inventory system that aligns the raw material orders from suppliers directly with the production schedules

2) The company employ this inventory strategy to increase efficiency and decrease waste by receiving goods only as they received from the production process.

Which reduces inventory costs.

3) This method requires producers to forecast demand accurately.

4) Just in a time manufacturing also known as Toyota production system (TPS) because car production system Toyota adopted the system in 1970s

6.2) Supply chain integration

1) The lean system can be effective only if it is executed along the production chain i.e from supplier to the customers.

2) Every link along this chain is affected if a single member does not deliver.

3) This is a long process involving several interfaces. So manufacturers have to take steps towards organizing the supplier base.

6.3) Cellular Technology

1) In traditional manufacturing system the shop floor layout is designed according to the activities.

2) In lean manufacturing it is based on the parts of the product in separate fixed areas.

3) So the layout creates a single piece floor and reduces the order floor time, work in progress, material handling costs and so on.

6.4) Kaizen

1) 'Kai' means Change and Zen means 'Good' Kaizen indicates change for a good

2) Kaizen has philosophy to improve in smaller steps always consistently at all place, by all people involved with smaller of zero investment.

3) It involves highest level to the lowest level of management.

Successful Execution of Kaizen requires

1) Employee training and discussion

2) Staff of higher level of management should motivate others

3) Quality tools to be used

4) Team work in the organization is a key to success.

5) Creative thinking, out of the box thinking is an important approach

6) Decision making tools to be used

7) Assure steadyliness in Kaizen process

Execution steps of kaizen

1) Form kaizen policy

2) Fix and locate the area zone at all levels

3) Develop kaizen structure

- a) Identify problem
 - b) Analyze using tools
 - c) Get idea suggestions
 - d) Get presented and agreement
 - e) Implemented suggestion
 - f) Document Kaizen
 - g) Review
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- 4) Training to start all activity to be given
 - 5) Design kaizen Documents/ form sheets
 - 6) Decide appreciation and reward system
 - 7) Launch programme
 - 8) Give training to all employee about kaizen policy decision /procedure
 - 9) Start kaizen as a continuity in process

Concept of poka-yoke system

- 1) Poka yoke is one of the Japanese technique with objective of 'Error proofing of parts to be supplied
- 2) It is a tool to get acceptance of minimally zero defect with aim of absolute elimination of errors.
- 3) This system uses sensors and instruments that uses to find disorders in products by using poka-yoke, human and machine errors can be minimized

Steps to apply poka yoke

- 1) Decide the process based analysis
- 2) By using 5W find probable reasons of failure
- 3) Decide proper poka-device which might be electrical, electronics, pneumatic, visual, human type, etc
- 4) Prepare the Checklist to assure all activities covered under poka-yoke

7) Kanban

Kanban is the way to visually manage the workflow at an organization. Using kanban makes it easier to stay efficient and it helps to quickly identify (and solve) problems in the workflow. It is can be shown in the large Dashboard. There production is based on the "pull" created by consumer demand, not the "push" of production planning to create inventory.

Pull means providing only what the customer wants, when he wants it. The "Customer" can be within the organisation (internal) or the end-customer (external).

Advantages

- 1) Build culture
- 2) Cleanliness maintained
- 3) Forces everyone to work
- 4) Reduced wastage time
- 5) Increase efficiency

CONCLUSION

Requirement of planning, commitment, methodology, learning and safety seems to be main obstructions which can be appeared while implementing the Lean Manufacturing. This paper explores the concepts and tools of lean manufacturing. It also emphasises to locate types of waste in an organization. The main tools of Lean manufacturing Supply chain integration, cellular technology, Just In Time and kaizen theory are discussed in brief. The objectives of lean manufacturing are clearly mentioned. Overall the paper focused on providing the guidelines and tools to explore and implement lean manufacturing concepts in an organization to improve the productivity, efficiency and quality of the product. In the mean time it ensures lower cost of the product. Thus lean manufacturing can be implemented to any organization to avoid the waste.

REFERENCES:

- [1] SIMPLIFIED LEAN MANUFACTURER: Elements, Rules, Tools, and Implementation N. Gopalakrishnan.
- [2] Nadia Bhuiyan, Amit Baghel, An overview of continuous improvement: from the past to the present, *Management Decision*, 43 (5) (2005) 761 – 77.
- [3] Graves, R., Konopka, J.M., Milne, R.J., 1995. Literature review of material flow control mechanisms. *Production Planning and Control* 6 (5), 395–403
- [4] Gopalakrishnan, N. (2010). *Simplified Lean Manufacture: Elements, Rules, Tools, and Implementation*. New Delhi: PHI Learning Private Limited.
- [5] Rajesh Kumar Mehta, Dharmendra Mehta, Naveen K Mehta, An Exploratory study employee's perception towards lean manufacturing systems, *Management & marketing*, Volume X (2012) issue 1/2) Kaizen Desk Reference standard by Raphael I. Viralo, Frank Butz, Joseph P. Vitalo.
- [6] *Lean Manufacturing Implementation* by Dennis P. Hobbs.
- [7] *Lean Thinking* James P. Womack and Daniel T. Jones
- [8] Mekong's Capital Review (2004) —Introduction to lean Manufacturing| Accessed from <http://www.lean6sigma.vn/Download-document/2-Lean-Manufacturing.html> on 12/12/2013; pp.
- [9] Pedram Mirzaei (2011) —Lean Production: Introduction and Implementation barriers with“s in Sweden|, School of Engineering in Jonkoping, Sweden.