Productivity Improvement in Small Scale Industry by Using Lean Manufacturing Tool

Chetal G. Gupta¹ S. P. Kulkarni²
¹P.G Student (Production Engineering) ²Professor
¹,²Department of Mechanical Engineering

1,2Prof. Ram Meghe Institute of Technology & Research, Badnera

Abstract—Competitive market is forcing big organizations to utilize the untapped potential of Medium Size Manufacturing Enterprises (MSME). Lean manufacturing system (LMS) is characterized by reduced product development and manufacturing lead-time, team based work organizations, low setup/changeover times, multifunctional workers and JIT deliveries from few reliable suppliers. Effective utilization of workforce is a primary objective for any manufacturing organization is no exception to this. In fact, considering the significant environmental and safety risks associated, it becomes imperative to deploy the right number of associates in the plant and at appropriate locations. It is an applied methodology of scientific, objective technique that cause work tasks in a process to be performed with a minimum of non-value adding activities resulting in greatly reduced wait time, queue time, move time, administrative time, and other delays. The prime objective is to evolve and test several strategies to eliminate waste on the shop floor.

Key words: Lean Manufacturing System, MSME, Manufacturing and Services Sector, Low Setup/Changeover Times, Multifunctional Workers

I. INTRODUCTION

Lean manufacturing is “A system through continuous improvement by flowing the product at the pull of customer in pursuit of perfection”. Lean manufacturing concepts are mostly applied in industries where more repetitive human resources are used. In these industries productivity is highly influenced by the efficiency working people with tools or operating equipments. To eliminate waste, it is important to understand exactly what it is and where it exists. The processes add either value or waste to the production of goods.

The concept of Lean manufacturing first came to be more widely known with the book ‘The Machine that changed the world’ published by Womack and later through the book ‘Lean Thinking’. The Key points of emphasis in Lean appear to be reducing process variability, reducing system cycle times, and above all, eliminating wastes in the manufacturing cycle as stated by Womack and Jones (1986). Paul and Rabindra (2006) used subjective assessment through questionnaire, direct observation method, and archival data to improve productivity, quality, increasing revenue and reducing rejection cost of the Manual Component. Insertion (MCI) lines in a printed circuit assembly (PCA) factory. Live experiments were conducted on production lines. The drawback of this work is that an experimental design could not be performed to find the best insertion sequence and component bin arrangements as there was a hindrance in conducting experiments in real-life line, i.e. the study itself might reduce line output and affect quality.
A. Problem Statement:

Lean manufacturing is one of these initiatives that focuses on cost reduction by eliminating non-value added activities. These tools and techniques of lean manufacturing have been widely used in the discrete industry. Tools including just in time, cellular manufacturing, total productive maintenance, single-minute exchange of dies, and production smoothing have been widely used in discrete parts manufacturing sectors such as automotive, electronic and appliance manufacturing.

Applications of lean manufacturing to the continuous process industry have been far fewer. In part, it has been argued that this is because such industries are inherently more efficient and present relatively less need for such improvement activities. Top management have also been hesitant to adopt lean manufacturing tools and techniques to the continuous process industry because of reasons such as high volume and low variety products, large inflexible machines, and the long setup times that characterize the process industry.

While it seems that some lean manufacturing tools are difficult to adapt in the process industry, others are not. For example, Cook and Rogowski (1996) and Billesbach (1994) used just-in-time concepts at a process facility and both reported good results. This research is driven by the fact that while researchers and practitioners have widely used lean manufacturing tools in the discrete industry, nobody has systematically investigated how to apply lean tools and techniques to a continuous process facility due to the differences exhibited between the two manufacturing environments. In order to compete in today’s global competitive market the continuous process industry also needs to look for more ways to gain a competitive edge.

B. Project Objectives:

The goal of this project is to investigate how the tools of lean manufacturing can be adapted from the discrete to the continuous manufacturing environment and to evaluate their benefits at a specific industrial concern. The research hypothesizes that there are big opportunities for improvement in the process industries if lean tools are utilized. The objective is to systematically demonstrate how lean manufacturing tools when used appropriately can help the process industry to eliminate waste, have better inventory control, better product quality, and better overall financial and operational procedures.

The prime objective of this project is to evolve and test several strategies to eliminate waste of material and idle time of machines as well as labour on the shop floor. This project focus on improving the productivity of the CNC machine shop by reducing the cycle time using lean tools. The non-value added activities which are identified in the assembly line will be eliminated using lean tools:

1) To review the literatures on CNC machine shop of material handing in machines, idle time of labour and machines and material requirements.
2) To study the existing process of the machine shop, idle time, cycle time and sequence of the operation of raw material and finished parts.
3) To identify the area of improvements and possible causes for lesser productivity.
4) To study the problem in current cycle time, process, idle time and suggesting future improvements.

II. PROJECT METHODOLOGY

In this project to implement lean principles, a task group was form with people from different parts of the organization, all having knowledge and information pertaining to process, production, equipment and planning. The methodology adopted to achieve the objectives is given in fig.

![Fig. 1: Project Methodology](image)

III. RESULT

The machine utilization is observed to be same in both the current and proposed layout but the elimination of operators has increased the labour utilization. The performance measures are Percentage of labour productivity and Percentage of machine utilization. The layout efficiency values are given in Table 1.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Current Layout</th>
<th>Proposed Layout</th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine utilization</td>
<td>57.72</td>
<td>56.90</td>
<td>No Change</td>
</tr>
<tr>
<td>Labour productivity</td>
<td>65.60</td>
<td>67.95</td>
<td>Increased by 12.35</td>
</tr>
</tbody>
</table>

Table 1: Comparison of Layout Results
IV. CONCLUSION

Figure shows the performance of current and proposed layouts. From this result, it is concluded that there is no change in the machine utilization but the labour productivity is increased by 11.95%.

Fig. 2: Comparison of Layout Efficiency

REFERENCES


[17] www.smallindustryindia.com