Implementation of 5s Methodology in a Store Room in Workshop at JIT - A Case Study

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Abstract — The research work carried out to apply the 5S methodology of lean manufacturing to solve the problems of WORKSHOP at JIT with the aim of proper space utilization and elimination of waste in the workshop. The objectives of the project are organizing the workplace, shortening of the time of seeking necessary things such as tools, equipment and stationary, safety improvement, clean workplace. Also eliminate duplication of unwanted and unneeded material. Before and after implementation picture are taken for the applying 5S methodology in a workplace. Workshop consists of Store room, Machine shop, Carpentry shop, Thermal lab, Project lab, Smithy shop and Foundry shop. 5S implementation has been carried out in Store room & Foundry shop. During 5S study many opportunities of improvement were found such as waste & unwanted scrap, improper operating conditions & arrangement of machines, tools, equipment etc. After implementing of 5S in the store room and foundry shop the workspace became efficient and effective, shortening of the time of seeking necessary things, proper space utilization, safety improvement, clean workplace, and improvement of the work environment.

Keywords— 5S, Space Utilization, Elimination of Process Waste.

I. Introduction

Lean thinking represents a set of principles and techniques for the identification and elimination of waste in manufacturing and administrative processes. 5S is a technique originated from Japan and it was first developed by Hiroyuki Hirano in 1980s. It include five Japanese words Seiri (Sort), Seiton (Set in order), Seiso (Shine), Seiketsu (Standardize) and Shitsuke (Sustain). The 5S philosophy focuses on simplification of the work environment, effective workplace organization, and reduction of waste while improving safety and quality. It allows the enhancement of efficiency and productivity. The 5S technique is a structured program to systematically achieve total organization cleanliness and standardization in the workplace. The benefit of 5S technique is improvement in productivity, quality, health and safety. Through 5S methodology, the management can create an environment where quality work is comfortable, clean and safe in the organization and it can ensure the compliance to standards and will further foster continuous improvement.

II. Literature Survey

This survey is focused on 5S rating system, which make us able to understand the improvement criteria for particular S of 5S system. Here we give total rating of 25 score, which is divided in five equal parts for each S of 5S system. We give highest 5 marks to each S. After that we will make a graph which will make us able to understand the efficiency and make able to do better improvement.

Survey of Workplace

The implementation of 5S is carried out in Jhulelal Institute of Technology, Lonara, Off Koradi Road, Nagpur. Workshop consists of Store room, Machine shop, Carpentry shop, Thermal lab, Project lab, Smithy shop and Foundry shop & build-up area is 1178.32 m².

Store Room

The store room area is 3.65 x 7.62 m². During 5S survey unnecessary items such as metal and wooden jobs, unneeded inventory such as drawers, damaged chairs and tables, empty oil cans were found. The fig no. shows the store room before implementation.

Fig -1: Store Room
Foundry Shop

The foundry shop area is 9.144 x 6.096 m². During 5S survey improper layout, space utilization, arrangement of machines, rack & almirah were found. The fig no. 2 shows the store room before implementation.

![Foundry Shop](image1)

Fig -2: Foundry Shop

III. Problem Statement

5S implementation has been carried out in Store room & Foundry shop. During 5S study many problems were found as follows:

1. Unwanted Material- During 5S study lots of unwanted scrap were found in store room, which creates trouble to sort out the needy items.
2. Improper space utilization- During 5S study arrangement of machines, tools, equipments, almirah, staff table in store room & foundry shop are not standard, which occupy unnecessary space and create obstruction in work.
3. More time to search documents, equipment & stationary- During 5S study tools, stationeries & documents are randomly arranged in almirah of store room, which results into more time to search documents, equipment & stationeries.
4. Work environment- Improper working condition due to unwanted Material, improper space utilization.

For small farmers, it is necessary to adopt this concept for small agricultural implements. Accordingly it has been adopted for several processes such as keyed bricks, wood turning, algae formation machine, fodder chopper, oilseed presser [7,10,11,12,13]. The suggestions from food grain crusher operators, working in villages and remote areas, to develop such a food grain crusher which will be cheap and independent of conventional energy sources, motivate us. If such a Food Grain Crusher is developed it will be of great help to poor people / people in villages [1], firstly because it does not need conventional energy and it may generate work for one of the family member.

A large area around the vicinity of college is a rural area and almost all rural areas in India are affected by load shedding which greatly hampers the daily needs, growth and development of these rural areas. If the institute focuses its research work on replacing the electricity driven process units by human powered flywheel motor driven process units, then it will be of great help to such rural areas for the overall growth and development. Also it can generate fund for the institute for its self-dependence through such research activities.

The basic objective of this work is to generate design data for food grain crusher using human powered flywheel motor by the way of performing extensive experimentation by varying independent variables over widest possible range and gathering the response data generated. Finally the models can be formed as per the data observations obtained from the classical approach of experimentation put forth by H. Schank Jr.

IV. Work Done

Poor workplace conditions may lead to rising of wastes such as time spent in searching for needed items or motion to avoid obstacles. It may also lead to raising an accident. Implementation can be started by establishing good workplace and housekeeping conditions. 5S is lean manufacturing tool for work place organization and it is fundamental to the implementation of lean strategies. 5S is a reference to five Japanese works which described standardized clean up.
Table -1: Overall 5S rating before implementation

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the shop</th>
<th>(S1+S2+S3+S4+S5)*100 / 25</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Fitting Shop</td>
<td>(4.733+3+5+4.24+4.25)*100 / 25</td>
<td>84.89%</td>
</tr>
<tr>
<td>02</td>
<td>Foundry Shop</td>
<td>(4+0+5+3+3)*100 / 25</td>
<td>60%</td>
</tr>
<tr>
<td>03</td>
<td>Smithy Shop</td>
<td>(5+4+5+4.66+4.66)*100 / 25</td>
<td>93.28%</td>
</tr>
<tr>
<td>04</td>
<td>Welding Shop</td>
<td>(3.76+4+0+2+1.92+1.92) *100 / 25</td>
<td>38.41%</td>
</tr>
<tr>
<td>05</td>
<td>Carpenter Shop</td>
<td>(3.8+3+3.26+3.26)*100 / 25</td>
<td>65.28%</td>
</tr>
<tr>
<td>06</td>
<td>Machine Shop</td>
<td>(5+5+5+4.64+4.67)*100 / 25</td>
<td>93.28%</td>
</tr>
<tr>
<td>07</td>
<td>Store Room</td>
<td>(1+0+0+0.33+0.34)*100 / 25</td>
<td>6.69%</td>
</tr>
</tbody>
</table>

Overall efficiency: 63.11%

Table -2: Overall 5S rating after implementation

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the shop</th>
<th>(S1+S2+S3+S4+S5)*100 / 25</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Fitting Shop</td>
<td>(4.733+3+5+4.24+4.25)*100 / 25</td>
<td>84.89%</td>
</tr>
<tr>
<td>02</td>
<td>Foundry Shop</td>
<td>(4+4+5+4.33+4.33)*100 / 25</td>
<td>86.64%</td>
</tr>
<tr>
<td>03</td>
<td>Smithy Shop</td>
<td>(5+4+5+4.66+4.66)*100 / 25</td>
<td>93.28%</td>
</tr>
<tr>
<td>04</td>
<td>Welding Shop</td>
<td>(3.76+4+0+2+1.92+1.92)*100 / 25</td>
<td>38.41%</td>
</tr>
<tr>
<td>05</td>
<td>Carpenter Shop</td>
<td>(3.8+3+3.26+3.26)*100 / 25</td>
<td>65.28%</td>
</tr>
<tr>
<td>06</td>
<td>Machine Shop</td>
<td>(5+4+5+4.64+4.67)*100 / 25</td>
<td>93.32%</td>
</tr>
<tr>
<td>07</td>
<td>Store Room</td>
<td>(4+5+5+4.67+4.67)*100 / 25</td>
<td>93.36%</td>
</tr>
</tbody>
</table>

Overall efficiency: 79.31%

V. Conclusions

5S implementation has been carried out in Store room & Foundry shop. During 5S study many problems were found such as unwanted Material, improper space utilization, more time to search documents, equipment &
stationary which result into improper working condition. The 5S implementation leads to the improvement as:

- Identify & minimize the waste.
- Better usage of working area.
- Reduce time to search documents, equipment & stationary.
- Eliminate duplication of unwanted/unneeded material.

Before implementation of 5S the efficiency of foundry shop & store room was 60 % & 6.69%, whereas overall efficiency was 63.11%. After implementation of 5S the efficiency of foundry shop & store room improves to 86.64 % & 93.36%, whereas overall efficiency is 79.31%.

References


