

Implementation of '5S' in a small scale industry: A case study

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ABSTRACT

"5S Method" of Lean Manufacturing techniques refers to five words for the basic elements of the system: Sort, Set in order, Shine, Standardize and Sustain. This research work has been carried out to understand the positive impact of the 5S methods implementation in a small scale industry over the various attributes like Labor Productivity, Floor space savings, positive work culture shift, safety & health of the workers etc. '5S' methods of Lean manufacturing techniques is a proven tool to reduce and eliminate waste and to bring Positive work culture shift in the organization. The paper presents the methodology of successfully implementing the 5S methods in a small Scale industry. Results clearly shows significant improvement in 5S Score, Labor Productivity & Floor space utilization apart from some qualitative benefits like improvement in health, safety and positive work culture shift in the organization after implementation of 5S methods.

Keywords: 5S method, Lean manufacturing, work culture, labour Productivity, Floor space utilization

I. INTRODUCTION

Today, it is increasingly recognized that 5S management techniques enhance productivity and competitiveness. In order to become a World class organization, an organization has to go through a continuous and systematic process to identify, reduce and eliminate waste, enhance teamwork and enhance operation effectiveness in a better working environment. The research study has been conducted on "Implementation of 5S method in a small scale industry- case study". "5S method" is basically one of the tools of Lean manufacturing developed by the Japanese Automotive Industry, principally Toyota, following the challenge to rebuild the Japanese economy after World War-II. The small scale industry which has been chosen for the case study is 'M/s Girmar corrugators Private limited'. The unit is located at Sanwer Road, Industrial area, Indore and is engaged in manufacturing of Paper corrugated Boxes.

1.1 History

The history of 5S System seems to go back as far as the 16th Century and Venice shipbuilders. In an effort to streamline the assembly process, workers used quality process production to build ships in hours instead of days or weeks. In the pre 20th Century, The printer Benjamin Franklin contributed greatly to waste reduction thinking. In the 1970s it was Sakichi Toyoda who developed the 5S System within the broader Total Production System (TPS).

Over the years the 5S System has spread and can be found within Total Productive Maintenance (TPM), the visual workplace, the Just- In-Time (JIT) process, and manufacturing. Basically all with the same aim: improving processes to better improve production.

1.2 Lean Manufacturing

Lean is the set of "tools" that assists in the identification and steady elimination of waste (muda). As waste is eliminated quality improves while production time and cost are reduced. Examples of such tools are Value stream Mapping, 5S, Kanban (Pull Systems), and Poke-Yoke (error-proofing). Lean Manufacturing also focuses on improving the "Flow" or smoothness of work, thereby steadily eliminating mura ("unevenness") through the system. Techniques to improve flow include Production Leveling, "pull" production (by means of Kanban) and Heijunka Box

1.3 Five Pillars of 5S

There are five 5S System phases: Translated from Japanese:

1. Seiri = sort. Sort out needed and not needed items (remove not needed)
2. Seiton = straighten. Structure; assign place and amount to needed items
3. Seiso = shine. Clean to inspect and maintain
4. Seiketsu = standardize. Set standards, agreements and visualize
5. Shitsuke = sustain. Secure for the future

II. PROBLEM FORMULATION

M/s Girnar Corrugators Private Limited, Sanwer Road, Indore is engaged in manufacturing of Paper Corrugated Boxes for various clients like TTK Prestige Limited, Bayer cropsiences, parle agro etc. As per the requirement of the client, paper corrugated boxes are manufactured in two different lines i.e. fully Automatic line and Semi-automatic line. In semi-Automatic line paper corrugated boxes are manufactured as per the client requirement by performing various operations like Semi-corrugation, Paper cutting, printing, pasting, stitching, gluing, and bundling. In the fully Automatic line all these operations are performed on fully Automatic machine. Major challenge is to improve housekeeping & efficiency, productivity and safety in the shop floor. All these changes can only be made, if the employee feels motivated and work ethics are developed between the employees and management. One of the biggest problems for implementation of 5S is the voluminous nature of work various types of resistance in the early stages. If we ignore such resistance and plow ahead with implementation, the result is likely to be nothing more than superficial improvements. Instead, we have tries to address these concerns directly and made understand everyone through trainings and interactive session that how much necessary they are

III. OBJECTIVES OF RESEARCH

The thesis addresses the application of 5S methods in the company as a Lean manufacturing technique with the following objectives.

- To study the 5S' implementation methodology in a small scale industry
- To find out the status of current base level of 5S in manufacturing Paper Corrugated Boxes.
- To evaluate the estimated benefits through '5S' that can be achieved through '5S' implementation.

IV. RESEARCH METHODOLOGY

Research methodology adopted to achieve the objectives of the project comprises of basically 05 phases and are as follows:

PHASE-1: Preparation of Diagnostic study report (DSR) To reveal the current status of waste, product quality, changeover time, delivery deadlines, safety, breakdowns, customer complaints. With the help of this DSR, we would be able to achieve the following activities.

- Mapping of Baseline of current 5S level with photographs in DSR itself.
- Estimated overall realization of benefits in Qualitative, Quantitative and in monetary terms.
- Preparation of phase wise Action Plan/Roadmap to 5S implementation to achieve the targeted benefits.

PHASE-2:

5S Training, Zone creation, Zone Leader appointment, First 5S Audit & Monthly Audit of 1S & 2S.

PHASE-3:

Initiating 3S implementation, creating cleaning standards for machines and Zones, also creating check sheet for 1S, 2S & 3S with daily check points.

PHASE-4:

Initiating 4S and continue the activities for standardized shop floor and eliminating wastages from the process.

PHASE-5:

Making Standards and SOP's. Developing regular audit and review mechanism for sustenance of 5S activities. Creating reward programme for 'Best Zone' and "5S person" award

V. DATA COLLECTION & ANALYSIS

5.1 Company Overview

M/s Girnar Corrugators Private Limited, Sanwer Road, Indore is A ISO 9001:2008 certified company established in 1993 is engaged in manufacturing of Paper Corrugated Boxes.

5.2 Data Collection

5.2.1 Before Situation (Sep-16 to Dec-16)

- Base lining of 5S level (Overall 5S score) = 20% (5/25 marks as per the activity level with respect to each 5S activities performed)
- Labor Productivity record of the unit

Month	Sales (in lakh Rs.) (1)	Salary and Wages (in lakh Rs.) (2)	Labor Prod. = (1)/(2)
Sep-16	99.03	5.26	18.79
Oct-16	90.02	5.16	17.44
Nov-16	90.28	3.92	23.00
Dec-16	89.64	4.16	21.50
		Average=	20.18

- Floor Space Availability = 30000 Sq. Ft.
 Floor Space Utilization (Rs per Sq. Ft.) = Avg. Sales/Floor Space available= 307.4394
- Pictures of unit before 5S implementation



Fig. 1 Laboratory



Fig.2 Corrugated sheets were stored over floor.



Fig. 3 Dies were stored unorganized

5.2.2 After Situation (Jan-17 to May-17)

- a) Base lining of 5S level (Overall 5S score) = 48% (12/25 marks as per the 5S activities performed)
- b) Labor Productivity record of the unit

Month	Sales (in lakh Rs.) (1)	Salary and Wages (in lakh Rs.) (2)	Labor Prod. = (1)/(2)
Jan-17	99.50	3.89	25.56
Feb-17	100.48	3.96	25.34
Mar-17	96.48	3.87	24.87
Apr-17	110.35	3.98	27.70
May-17	100.18	3.51	28.53
		Average=	26.40

- c) Floor Space savings = 2000 Sq. Ft.
 Floor Space Utilization (Rs per Sq. Ft.) = Avg. Sales/Floor Space available= 362.16

VI. RESULTS AND DISCUSSIONS

5S score of the industry has improved from Baseline level of 20% to 48%. 5S score has improved because of the activities completed as per the Action plan like Zone creation, Zone Leader appointment, training and initiation of 1S, 2S activities and partial 3S activities as follows:

- a. Segregation of Needed/Un-Needed items from the workplace.
- b. Needed items are stored in an organized manner.
- c. Creation of Red Tag Area.

- d. Creation of shadow tool boards and systematic Die Rack arrangement for storing of Dies to reduce search time.
- e. Regular cleaning of machines and work area.
- f. Regular 5S Audit of Zones.

5.3 Pictures of unit after 5S implementation



Fig. 4 Central Red Tag Area



Fig. 5 Laboratory



Fig. 6 Corrugated sheets are placed over pallets



Fig.7 Dies are kept in a Systematic Die Rack Arrangement

5.4 Average labour productivity of the industry has improved up to 30.8%.

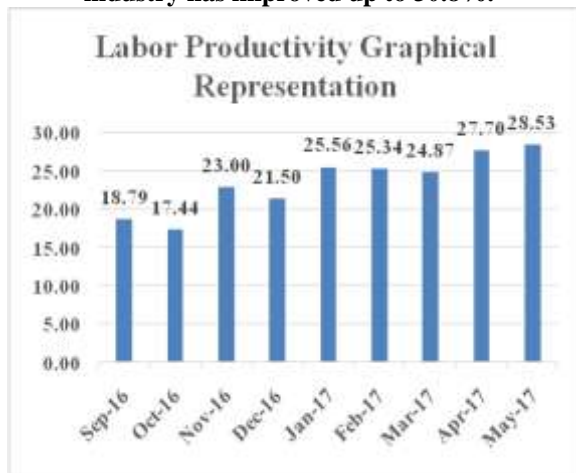


Fig.8 Labour Productivity Graph

5.4.1 Improvement in labour productivity (in %)

Table.1

Labor Productivity	Before Situation (Sep to Dec-16)	Current Situation (Jan to May-17)	Percentage of Improvement
Average	20.18	26.40	30.8%

5.4.2 Monetary benefits accrued during project implementation period.

Table.2

Monetary Benefit 5 months Jan 17 to May 17			
Labor Productivity	Salary Before (in Lakh Rs)	% improvement	Monetary benefit Annually (in Lakh Rs.)
Average	4.19	31%	6.46

5.4.3 Expected Monetary benefits for year 2017-

Table.3

Expected Monetary Benefit 12 months Jun 17 to May 18			
Labor Productivity	Salary Before (in Lakh Rs.)	% improvement	Monetary benefit Annually (in Lakh Rs.)
Average	4.19	31%	15.50

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6.3 Floor Space utilization has improved up to 15.11%.

Table. 3

Floor Space Utilization			
Floor Space	Before Situation (Sept16 to Dec 16)	Current Situation (Jan 17 to May 17)	Percentage of Improvement
Rs per Sq Ft	307.4394	362.16	15.11%

VII. CONCLUSION

The satisfactory results of implementation of 5S in the small scale industry proved that, it is indeed an effective tool of lean manufacturing to enhance the productivity of the company along with improving the working environment for the workers to work in, thus leveraging their morale. Implementation of 5S technique also helps to improve the efficiency of the workers and the whole team.

The case study presented in this paper, has shown that the implementation of only first 2S and partial 3S activities helped the industry to improve their 5S score to 48% from previous Baseline 5S score of 20%. It also helped to improve their Labour productivity up to 30.8% and floor space utilization up to 15.11%. In order to continuously improve the Productivity, safety and efficiency of the workers, it is recommended that the company should religiously follow the step by step guidelines of the 5S implementation Action plan to implement the remaining 3S of the 5S methodology. It is highly recommended that the company should strictly follow the lean sustenance (Action) plan after implementing the complete 5S activities, so as to keep on getting the benefits, accrued to the company as a result of 5S implementation.

Any problem whatsoever that may occur regarding sustaining the 5S should be addressed through proper training and participation. Understanding 5S and building a culture helps to develop 5S into a management strategy. Taking 5S to a higher level is only possible when the benefits of 5S can be fully valued and this can only be done by involving the whole team. Findings of this research can be valuable to other organizations of which hope to implement 5S technique of Lean manufacturing in the near future.

Research & Development| Vol. 3, Issue 05, 2015.

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International Journal of Engineering Research and Applications (IJERA) is **UGC approved** Journal with Sl. No. 4525, Journal no. 47088. Indexed in Cross Ref, Index Copernicus (ICV 80.82), NASA, Ads, Researcher Id Thomson Reuters, DOAJ.

Brijesh Kumar Swarnkar. "Implementation of '5S' in a small scale industry: A case study." *International Journal of Engineering Research and Applications (IJERA)* 7.7 (2017): 44-48.