



## 5 S IMPLEMENTATION IN SMALL SCALE INDUSTRY: A CASE STUDY

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### Abstract

**5S has the powerful tool of Lean manufacturing to improve the productivity in small scale industries. It may be combined with other tools such as Kanban, Kaizen, Total Preventive Maintenance and Total Quality Management in selected places. This paper presented an application of '5S' technology in small scale industry, Harsh Polymers, Kadepur, Maharashtra, which is the manufacturer of the polypropylene bags. Most of the small scale industries are unaware about the lean manufacturing tools. The main aim of this is the implementation of '5S' in the small scale industry to enhance the productivity, safety, efficiency through effective place management. The efficient implementation of 5S technique leads to subsequent improvement in productivity of the manufacturing plant.**

**Keywords: Lean Manufacturing, 5S, 5S implementation**

### I. INTRODUCTION

Energy has been universally recognized as one of the most important inputs for economic growth and human development. There is a strong two-way relationship between economic development and energy consumption. The small scale industries (SSI) constitute an important segment of the Indian economy in terms of their contribution to the country's industrial production, exports, employment and creation of an entrepreneurial base. Small manufacturing firms face huge challenges in this transforming world. Pressures to rapidly introduce new products and technology, reduce costs and increase quality leave many small firms struggling to survive. Today, many small

firms operate well below their potential for reasons that are both within and outside their control. Although the challenges are significant and the competition fierce, small firms also have significant opportunities to improve their performance base [1]. According to the industrial point of view lean manufacturing is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer and internal variability [2]. The lean Manufacturing technique has a great importance with Indian small scale Industries. In India small and medium scale industries play a very important role in Indian economy. These industries are very old and obsolete techniques of manufacturing. There is no any culture available and even they are not thinking to develop it [3]. Lean Manufacturing is a term given by James Womack, Dan Jones, and Daniel Roos in their book "The machine that changed the world", a study of the post –WW II auto industry [4].

5S Methodology is one of the basic and the most important tool to implement Lean manufacturing. It is a system to regulate the flow by systemizing the place, thus supporting the culture of continuous improvement [5]. 5-S is the acronym for five Japanese words Seiri (organization), Seiton (neatness), Seiso (cleanliness), Seiketsu (standardization) and Shitsuke (discipline) respectively. 5-S has been introduced in Japan mainly in the manufacturing and service industries. Toyota, the major car manufacturer is one of the pioneering firms who adopted the 5-s principles. The Japanese believe that 5S Principles are not only valuable at their places, but also improve their cognitive sense. Osada refers to the 5S as the five pillars to establish and maintain a total quality environment in an organization [6]. This paper

represents an application of '5S' technology in one of the small scale industry, Harsh Polymers, Kadepur, Maharashtra, which is the manufacturer of the polypropylene bags. The main aim of this is the implementation of '5S' in the small scale industry to enhance the productivity, safety, efficiency through effective place management.

## II. LITERATURE REVIEW

5S tool has undergone evolutionary growth and advancements during the last decades. As a result, many studies have been reported in the published literature. In this section, some of the 5S studies conducted over the years have been revisited, highlighting the applications and methodologies used.

Arash Ghodrati et al. [7] this study aims to review previous studies about the benefits of 5S implementation and its efficiency in organizations. Indian companies are informed about quality improvement requirements, although disciplined approach is not yet in place and improvement efforts are not enough to remove weakness in quality. The study concludes that, 5S can support the objectives of organization to achieve continuous improvement in performance and productivity. At the last barriers in 5S implementation are underlined.

Swapnil Patil et al. [8] The Paper represent that the every problem is an opportunity to improve the process and environment. In order to overcome this problem, 5s which are relatively simple and inexpensive technique. The method used in this paper is, divide each S in 5 steps having one point for each, according to the performance of each worker points has been given and analysis carried out weekly. Tagging process is used for sorting. The outcome is the execution of 5S and performance calculation of workers. The paper shows how to sustain 5S by maintaining continuity of workers.

Shraddha P. Deshpande et al. [9] Paper represented an application of '5S' technology in one of the MNC Samsonite South Asia Pvt. Ltd., Gonde-Dumala, Maharashtra, which is the leading manufacturer of the luggage bags in the world. The company was facing problems of improper utilization, storage place, Wastage of time in searching material resulting in low productivity. For implementation, organization simplified into various zones, Training

programs taken for audits is taken and overcome the problems.

R. S. Agrahar et al. [10] This paper deals with the implementation of 5S methodology in the small scale industry. By following the 5S methodology, it shows significant improvements to safety, productivity, efficiency and housekeeping. The improvements before and after 5S implementation is shown by pictures in the paper.

J. Michalska et al. [11] the main aim of this paper is showing the 5S methodology. In the frames of own research it has been analyzed and implemented the 5S rules in the production process. research clearly showed, that very essential is training of era about the 5S rules. The essential thing is to divide activities on some main steps and to maintain the continuous improvement.

Nikunj S. Patel and Chetan U. Patel [12] the paper provides a roadmap and implementation of lean manufacturing tools in manufacturing industries. By this method improving quality, reducing variation and eliminating waste in an organization. Also the paper shows results after implementation of 5S are 1.Space utilisation 2. Search times of goods reduce.

Soumya R. Purohit and V. Shantha[13] The paper states the 5S is a system to reduce waste and optimize productivity through maintaining an orderly place and using visual clues to achieve more consistent operational results. The term 5S refers to 5 pillars of visual place as mentioned. And also says it is firstly important to understand why it is necessary to implement each pillar of the 5S methodology.

The literature review shows that 5S tool can be implemented in various industries, whether it's micro, small, medium or large. It is found that 5S tool helps to improve safety, efficiency and effectiveness of place. In this, this tool implemented in Harsh Polymers.

## III. METHODOLOGY OF 5S

5S, abbreviated from the Japanese words Seiri, Seito, Seiso, Seiketsu, Shitsuke, is not just a methodology; it is a culture that has to be built into any organization which aims for spontaneous and continuous improvement in the environment and conditions. It involves everyone in the organization from the top level to the bottom. The Japanese developed this simple and easily understandable words religiously practiced the philosophy of 5S in

every aspect of their life and have made it a world-wide recognizable system. 5S are explained as follows [6]:

**Seiri:** It means sorting things that are necessary for those that are unnecessary and keeping the quantity of necessary ones minimum and at an accessible location. Red tagging is done to the items which are unnecessary. Unnecessary items are disposed of, or stored in a remote location and are redeemed if required in the future. A proper name and one-location storage should be assigned to each and every item in order to reduce confusion, resulting in maximum efficiency.

**Seiton:** It means “A place for everything and everything in its place”. It is to make the arrangement of necessary items in good order so that they can be easily picked up for use. It is a study of efficiency. It is a question of how quickly you can get the things you need and how quickly you can put those away.

**Seiso:** It means cleanliness, which should be the concern of everybody in the organization. Cleaning should be done by everyone in the organization, right from top management to the bottom. Cleaning should be done not only for the sake of cleaning, but for a purpose. To maintain a good image of cleanliness, everyone should be individually responsible for cleaning. Zone wise responsibilities should be given to the employees. Cleanliness is also helpful to notice damage to equipment. A good, neat and clean in place provides motivation for effective functioning.

**Seiketsu:** It means making the first 3s a routine practice by implementing clear procedures for Sorting, straightening and scrubbing. Regular 5s audits should be done and scores against each S should be displayed. Display through photographs should be encouraged. The emphasis is on visual management and 5s standardization.

**Shitsuke:** It means to promote, communicate and train in the 5s to ensure that it is a part of the company’s corporate culture. It is right to keep practicing 4s activities until they become habitual. This might include assigning a team to be responsible for supervising compliance with the 5s. The principles of 5s are for everybody. It is hopeless to expect subordinates to follow 5s if managers do not comply also. This process helps people to become disciplined.

TABLE 1: 5S TOOLS

Japanese	English	Translation	Meaning
Seiri	Sorting	Organize	Making a distinction between required and non-required items and removing unnecessary items
Seiton	Storing	Order	Arranging the items in a system within the reach of the user
Seiso	Shining	Clean	Cleaning the space
Seiketsu	Standardizing	Standardize	Maintain above 3s
Shitsuke	Sustaining	Personal Discipline	Make a habit to follow 4s

5S tool has been implemented in the organization in the way of improve the productivity, safety and efficiency. The 5S methodology may be applied to most place scenarios in a short period of time due to its simple nature. The before and after picture are taken for implementation of 5S methodology in a company [14]. The 5S is [15],

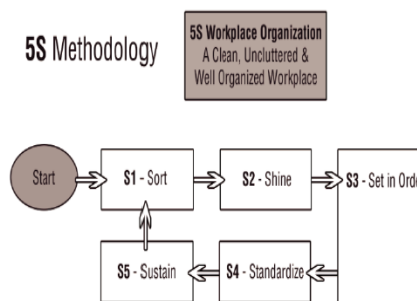


Fig. 1. The 5S system

The strategy devised by Hirano depicts that the implementation should be carried in such an order that the simpler and basic methodologies should be installed first. Hirano describes the sequence of implementation in the following fig.2 [16].

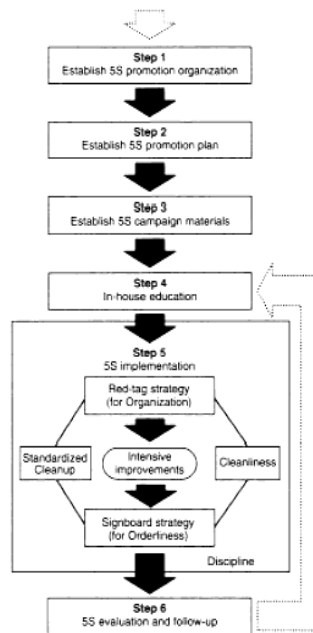


Fig. 2. Hirano's 5S Implementation Strategy

This paper presents a case study on small scale industry. This case study follows the Hirano's 5S Implementation Strategy to implementation 5S in the industry to better place environment and improve productivity and safety in industry.

#### IV. CASE STUDY

Small scale industries play an important role in Indian economic. It has emerged as a powerful tool in providing relatively larger employment next to agriculture. It contributes more than 50% of the industrial production in value addition terms and generate one third of the export revenue. Thus, for this study selected small scale industry is the Harsh Polymers, Kadepur, Maharashtra, which is the manufacturer of the Woven sacks, salt bags, packing of sugar, BOPP Bags, Loop Bags, etc. Harsh Polymers, Kadepur (India) inaugurated in 2013. Within very few times, this small scale industry became popular due to their various excellent properties of the product. After observing the current environment in the industry, we have observed some problems related to the conditions, utilization of various resources, and unawareness of employing to higher productivity, etc. This small scale industry is facing some major problems. These major problems as follows:

1. Improper utilization of storage space for raw material, bins and finished products.

2. The more time required for the search and select tools and equipment's.
3. Low productivity due to the time wastage in searching for tools, materials.
4. Improper place management.
5. Useful storage space being acquired by the unwanted materials.
6. No well-defined space for storing the unwanted or rejected material.
7. Improper communication between worker and top level management.
8. Unaware of the worker of various innovative techniques.

Before starting in Harsh polymers, we scheduled the plan for this work. So first we started with literature review within one week we completed literature review. On the basis of literature review we started searching company in which 5S can be implemented. We studied the company's layout and found out the area of implementation. Then we studied the 5S methodology and the whole study of 5S methodology was completed. Once, after studying 5S methodology we started implementing the methodology for 5S implementation. There were five stages in which first stage 1S: Seiri was implemented, 2S: Seiton was implemented, 3S:Seiso was implemented, 4S:Seiketsu was implemented followed by 5S:Shitsuke which was implemented. So to maintain the 5S audit were prepared which took around 20 days and was completed.

In Harsh polymers we started out by first surveying the company's floor where all the raw materials are kept. We surveyed the floor, communicated with the floor or plant in charge about the functioning of the plant. We also communicated with the marketing person and on the basis of his information we found out that there is a mass production in the company. Thus we started the work by following the rules of 5S with step by step.

##### A. *Sorting*

The below fig. is of the company's scraps, where all scraps are stored, but this scrap occupies the most space. The scrap items consist of cut bags, waste bobbins, broken parts, and other waste.



Fig. 3. Before sorting and order

In sorting, distinguished the useful and scrap items. Then scrap items were kept all aside at one location which is just located beside the entrance of the storeroom. We have separated the scrap and placed it besides the entrance and named it as a scrap yard. In this scrap yard we placed all the scrap at one time and some of the scraps are placed at different location due to shortage of space.



Fig. 4 After sorting and order

#### B. Set in order

After removing scrap, we set the useful materials according to order the their respective sizes. We differentiated Baskets, bobbins and loom wheels according to the sizes, and then we set fittings into their different categories.



Fig. 5 Before set order

Most of the time of worker is wasted in the tool and material sourcing and selecting. By this set in order process, we have eliminated almost 20-25 % time of the worker. We made the different arrangement for the placing for tool and raw

materials. The following fig shows the diffident arrangement of the tools and materials.



Fig.6 After set order

In the above image various types of boxes which contain no. of component has been sorted and placed in respective racks.

#### C. Cleaning

Cleaning is a third method of 5S technique; we implemented this method as we were proceeding with the sorting method. As we were proceeding the sorting, we were differentiating used & not used items and then we cleaned the whole place, then after this we reached every rack & then cleaned every rack for cleaning method. For cleaning, we removed all the items from their racks and cleaned racks. While cleaning, we also fixed the air conditioner leaked pipe. In this step, we clean all places in the industry. This step has been going to the neatness and shine in the industry.



Fig. 7 Floor cleaning

#### D. Standardize & Sustain

The fourth S stands for Seiketsu (standardize). In this step standard procedure, audit sheet and instructions are prepared to maintain 3S. Before starting to check and correct the sorted items, placing equipment's at its place and cleaning, etc. and give a proper reading on audit sheet and create awareness in employee to maintain this thing on the production line or on non-product line.



The fifth S stands for Shitsuke (sustain), Sustain is about the mental and physical disciplines required to maintain the other 4S items. It is done with the help of co - operation between employees, store keeper, engineer and manager.

*E. Methods used in the audit*

5S rating, calculates the efficiency and improvement in implementation. Simple 5S rating in this, we just list the questions related to 5S and give them a rating among 1 to 5.

	No	Check item	Description	Score				
				1	2	3	4	5
S O R T	1	Material or broken part	Include any unneeded material or broken parts?					
	2	Machines or other equipment	Are there is unused machines or equipment's?					
	3	Tools or Fixtures	Are there unused tool fixtures around?					
	4	Unneeded items	It is obvious which items have been red tag.					
			<b>Subtotal</b>					

Red tag system in this we create a one format for all types of processing it contains no. of parameters which gives an idea about what will do the next of this machine or component were the red tag is attached. We introduce these red tags to the company for their use.



Fig.7 Red tag system

**V. CONCLUSION**

By implementing 5S, improve the quality, productivity and efficiency of industrial organization. The 5S is an effectiveness to manage tools and materials which can improve housekeeping, environmental conditions and

health and safety standards and quality. This paper shows 5S implementation in the small scale industry. This implementation leads to the improvement of the productivity of the organization in many small things such as the reduction wastage; reduce production time, set standard in small scale, cleanliness, proper arrangement of the organization. This Japanese technique which is implemented in the industry creates awareness about discipline and self-responsibility among the all levels of the organization.

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