



## IMPLEMENTATION OF '5S' TECHNIQUE IN A MANUFACTURING ORGANIZATION: A CASE STUDY

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### Abstract

The paper represents an application of '5S' technology in one of the MNC Menon Piston Ltd., plant 2, Kupwad, Sangli, Maharashtra which is the leading manufacturer of Pistons and Piston Pins in the world. '5S' in simple terms is a Japanese technique consisting of five 'S' terms namely Seiri (sorting), Seiton (set in order), Seiso (shine), Seiketsu (standardize) and Shitsuke (sustain) having a deep sense for managing the work place. The aim of the implementation of '5S' in the organization is to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. The decision-making process usually comes from a dialogue about standardization, which builds understanding among employees of how they should do the work. The need for the implementation of '5S' in the organization came into existence due to unorganized work-stations, uncomfortable working environment and the excessive wastes in the company. Hence to get rid-off of the above factors, there was an urgent need for the successive implementation of '5S' in the organization. The effective following on '5S' in the organization by the various official staff and workman's strengthens the work ethic between them resulting in the motivation towards teamwork. The successive implementation of '5S' transformed the organization drastically, right from the working conditions to the employees working satisfaction.

**Keywords:** 5S, Workplace Management



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## 1. INTRODUCTION

Every organization aims for profit. In today's global market of decreasing profit margins, the profit made from the waste as well as through proper workplace management is mandatory. Thus it is directly related to the competition of the particular organization with the competitor. Hence the profit from the waste and through the proper workplace management can be made only when there will be a stringent implementation of some workplace management technique and that technique is '5S' concept.

Also the Menon Piston Ltd., Sangli aims for building it to a world-class level organization. Thus organization adopted the concept of '5S' for enhancing the profit, class of the company, working conditions, etc. and implemented the '5S' technique successfully. Also the organization have various departments such as assembly, stores, injection moulding, maintenance and tool room, administration where the implementation of '5S' would result in a huge enhancement in productivity, proper workplace condition, increased profits and motivation to employees.

### **1.1 What Is '5S'?**

'5S' is one of the Japanese techniques which was introduced by Takashi Osada in the early 1980s [2]. It is basically a workplace management methodology which helps for improving working environment, human capabilities and thereby productivity [6]. The word '5S' represents the 5 discipline for maintaining visual workplace. '5S' is workplace management to minimize the loss of time and unnecessary movements as well. It comprises 5 principles in making the organization highly efficient and effective those are:-

#### **Seiri: - (sorting)**

1. Perform sorting activity at your workplace i.e. into wanted and unwanted things.
2. Remove all the unwanted things that are at your workplace.
3. Only keep those things that you need.

#### **Seiton: - (set in order)**

1. Decide place for everything that you need.
2. Give proper identification to it for ease of search.
3. Keep everything at its defined place after use.
4. Make sure every time that everything is at its place.

#### **Seiso: - (shine)**

1. Always keep cleanliness at your workplace.
2. Keep the tools always clean after its use.
3. Areas should be properly marked or painted.

**Seiketsu: - (standardize)**

1. Define standard method/way of doing the work i.e. prepare standard operating procedure (SOP).
2. Do the work in that method/way only.
3. Maintain the discipline in your work [5].

**Shitsuke: - (sustain)**

1. Maintain consistency in the method of doing work [3].
2. Stick to the '5S' rules for proper workplace management.
3. Encourage the participation of all, for consistency in '5S' activities.
4. Perform '5S' activities periodically.

**1.2 Organization Introduction**

Menon Piston Ltd, Maharashtra, India inaugurated in 1969 MPL is a total engineering solution provider wherein the product is designed as per the customer requirements, prototype are manufactured, tested and validated before mass production.

MPL group is specialized in manufacturing of pistons, piston rings, piston pins and bearings as well. The products are manufacture at various locations depending upon the availability of skilled labours and logistics benefit.

**2. Problem Statement**

The following problems occurred before implementation of '5S' in the organization:

1. Improper utilization of storage space for raw material, bins and finished products.
2. Wastage of time in searching the raw material due to non-permanent location for storage of raw material.
3. Low productivity due to the time wastage in searching for tools, materials due to improper workplace management.
4. Presence of unwanted materials at the workplace which affects the moral of the worker while working.
5. Useful storage space being acquired by the unwanted materials.
6. More time and cost required for the inventory process of unwanted stored materials in raw material stores.
7. No well defined space for storing the unwanted or rejected material.
8. Unequal participation of officers and workers in workplace management due to non standardization.

### 3. METHODOLOGY

The following method was adopted to implement ‘5S’:

1. To create awareness among the employees for the implementation of ‘5S’, various awareness programs and presentations were undertaken by the various experts in the organization. Also the official staff visited the leading organization’s in which ‘5S’ had already being implemented successfully.
2. As the organization consist of various departments it was difficult and impossible to imply directly the ‘5S’ technique in the organization. Hence the organization was simplified into various zones consisting of specific departments along with it, the zone leaders and sub-zone leaders were also appointed. The organization was simplified as:

**Table 1:** Simplification of organization

Zones	Sub-Zones
1. Peripheri	1. Parking and Main Gate
	2. Gate House
	3. Gardening and Periphery road
2. Store Room	1. Raw material room
3. Heat Treatment	1. Vendor Section
	2. Heating and casting
	3. Inspection lab
	4. Maintnance Room
4. Machine Shop	1. Centreless Grinding machines( No. 1,2,3)
	2. CNC Section
	3. Packing Section
	4. Quality control lab
5. Office	1. Plant head office
	2. HR Office

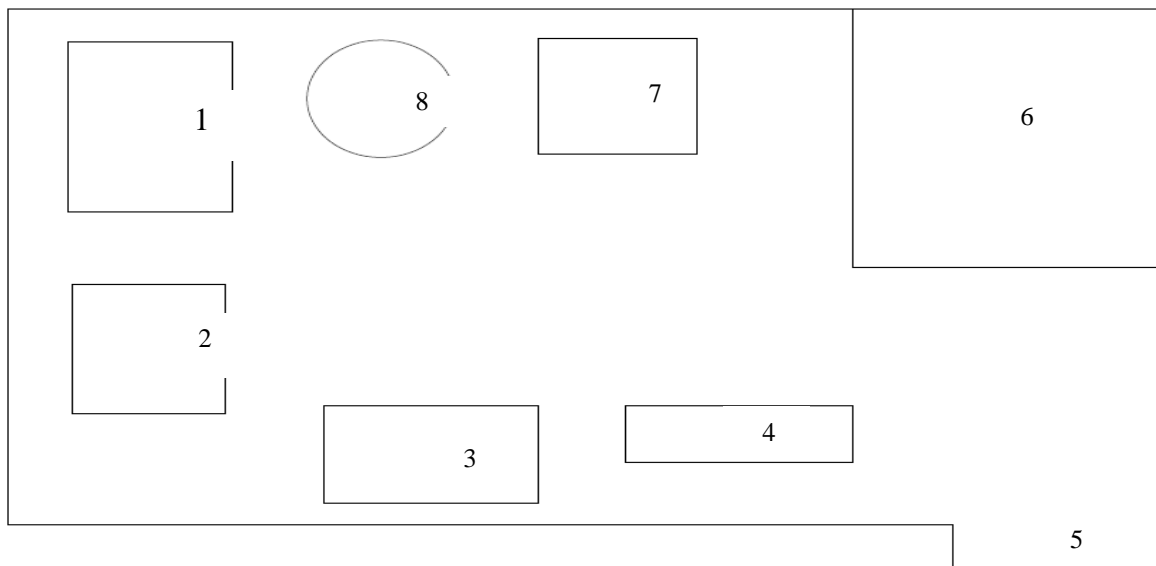
3. Now as the organization was simplified into different zones, the ‘1S’ activity was undertaken by the respective zones under the guidance of respective zone leaders.
4. After the implementation of ‘1S’ in various zones, the audit was conducted by the apex team of the organization. Then the queries raised from the audit by the apex team were taken into consideration by the respective zones and the corrective measures were taken on it.

#### 3.1 Pre-Audit report

As need for implementation of 5-S a pre-audit was conducted in foundry and checklist was prepared for concerned departments showing layout of shop, useful and unnecessary items. On the basis of pre audit, different problems are found out and necessary solutions are suggested.

**3.1.1 Maintenance department (Zone 1)**

**3.1.1 (A) Layout**



1-Maintenance rack 1, 2-Maintenance rack 2, 3-Supply panel, 4-Lockers,  
5-Entry, 6-Incharge section, 7-Maintenance Files, 8-Nut and Bolt section

**Fig 1** Layout of maintenance Department

**3.1.1 (B) Checklist for Maintenance room**

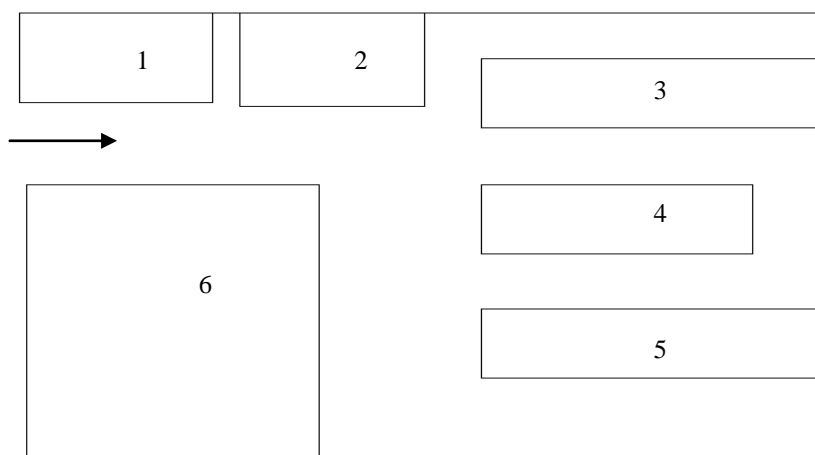
**Table 2** Checklist for Maintenance room

Sr. No.	Check list for step S1 (sorting)	Yes	No
1	Are there any useless things that can bother your work environment?	Yes	
2	Are there any useless raw materials, semi-finished products and/or waste left as is, nearby workplace?	Yes	
3	Are there any tools, spare parts, materials left on the floor, nearby equipment?	Yes	
4	Are all frequently used objects sorted, arranged, stored and labelled?		No
5	Are all measurement instruments/devices sorted, arranged, stored and labelled?		No

### 3.1.2 Purchase and store Department (Zone 2)

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#### 3.1.2 (A) Layout



1-Inspection of incoming material, 2-Supervisor Cabin, 3-4-5- Raw material, 6- Tray section

**Fig 2** Layout of purchase and store department

#### 3.1.2 (B) Checklist for purchase and store room

**Table 3** Checklist for purchase and store room

Sr. No.	Check list for step S1 (sorting)	Yes	No
1	Are there any useless things that can bother your work environment?	Yes	
2	Are there any useless raw materials, semi-finished products and/or waste left as is, nearby workplace?		No
3	Are there any tools, spare parts, materials left on the floor, nearby equipment?		No
4	Are all frequently used objects sorted, arranged, stored and labelled?		No
5	Are all measurement instruments/devices sorted, arranged, stored and labelled?		No
6	Does the inventory or in-process inventory include any unneeded materials or parts?		No
7	Are there any unused machines or other equipment around?	Yes	
8	Are there any unused jigs, tools, dies or similar items around?	Yes	
9	Is it obvious which items have been marked as unnecessary?	Yes	
10	Has establishing the 5S's left behind any useless standards?	Yes	

### **3.2 Actual Department wise implementation**

#### **3.2.1 Maintenance department (Zone 1)**

##### **3.2.1 (A) Problem Statements**

The following problems occurred before implementation of ‘5S’ in the organization:

- Wastage of time in searching the raw material due to non-permanent location for storage of raw material.
- Low productivity due to the time wastage in searching for tools, materials due to improper workplace management.
- Presence of unwanted materials at the workplace which affects the moral of the worker while working.
- Useful storage space being acquired by the unwanted materials.
- More time and cost required for the inventory process of unwanted stored materials in raw material stores.
- No well defined space for storing the unwanted or rejected material.
- Unequal participation of officers and workers in workplace management due to non standardization.

##### **3.2.1 (B) Formation of 5S Council**

Objective of this is to enhance total participation at all levels of employees and develop a continuous improvement culture and best performance spirit in the teams.

5S Council comprises the following:

- 5S Steering Committee
  - ❖ Managing Director as Advisor
  - ❖ General Manager as Chairman
  - ❖ Head of Departments as Facilitators
- 5S Training Committee
- 5S Promotion Committee
- 5S Audit Committee



**Fig 3 5S Council**

### **3.2.1 (C) Employee training**

This training programme, which is the starting point of 5S: Step-by-Step Implementation, encourages workers to become actively involved in the application exercises. This is the responsibility of the 5S Training Committee.

Once the preliminary training is completed, everyone will have the required basic knowledge, and be responsible for action in progress. Plans describing implementation of the 5S phases must be prepared and released during the 5S declaration.

The most common mistake organizations make when implementing the 5S system, is the failure to train adequately at the outset. Training should proceed as follows:

- 5S Awareness for Top Management
- 5S Awareness for Operators
- Step-by-Step 5S Implementation for Facilitators
- Step-by-Step Internal 5S Audit

We have given training of 5S to top management, lower management and workers as well.

Following are the some photographs of training programme.



**Fig 4** Vendor's training



**Fig 5** Vendor's Training



**Fig 5** Training of maintenance department employees



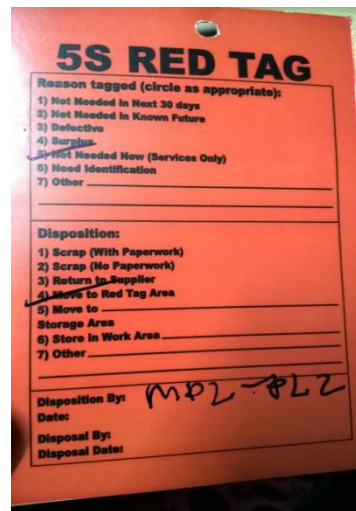
### 3.2.1 (D) Implementation of Seiri and Seiton:-

Sorting aims for removing all the unwanted materials from the workplace. After sorting the unwanted materials from the workplace, they are placed in the red tag area and the details of it are noted down on the red tag card. ( as shown in Fig 6 ) The materials noted down on the red tag card are then moved to scrap yard or located properly or rectified or segregated or returned to the supplier based on the decision of apex team and zone leader.

Set in order aims at “place for everything and everything in its place” [2]. After sorting, the specific location is defined for the useful material and located in the predefined order.



Front side



Back side

**Fig 6** Example of Red tag



**Fig 7** Red tagging to materials



**Fig 8** Red tagging to wastage

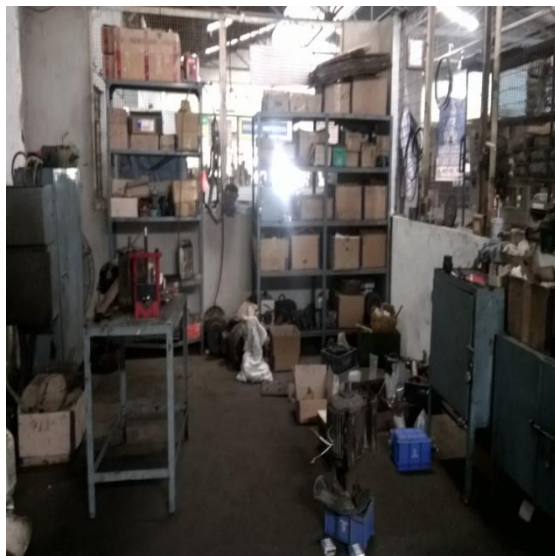
Above pictures shows red tagging to the various kinds of materials.



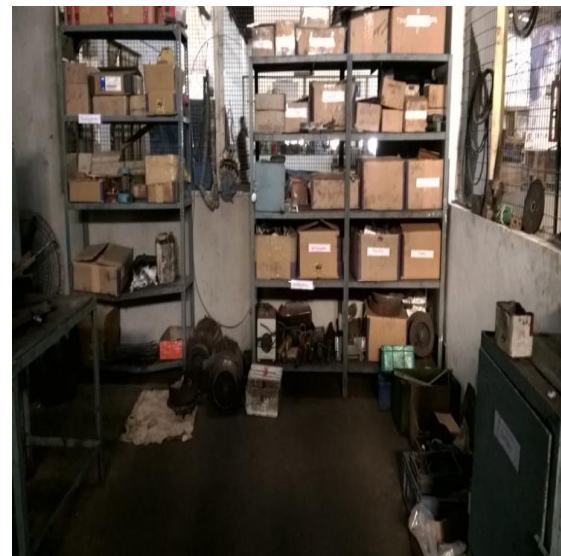
**Fig 9** Red tagging to unwanted material

After red tagging it is necessary to sort the material according to type. Because employees of the company has habit of keeping tools at random places.

Previously the cupboards, boxes and nut- bolt section were not properly sorted so we arranged those so as to remove all the junk and provide place for every component. Also care is taken to ensure that every component is in proper place.



**Fig 10** Maintenance department (Before)



**Fig 11** Maintenance department (After)



**Fig 12** Nut and bolt section (Before)



**Fig 13** Nut and bolt section (After)



**Fig 14** Table of the supervisor (Before)



**Fig 15** Table of the supervisor (After)



**Fig 16** Tool box (Before)



**Fig 17** Tool box (After)



**Fig 18** Boxes before labelling



**Fig 19** Boxes after labelling

### **3.2.1(E) Implementation of Seiso (Shine)**

Shine aims for keeping cleanliness at workplaces, workstations, offices, stores, outlet, passage ways, gangways, etc. in the organization. The workplace was untidy previously. It was excessively dusty. So we cleaned the cupboards and floor to ensure the Seiso. For implementation of Seiso worker's participation and support is most important.



**Fig 20** Worker's Participation for cleaning the floor



**Fig 21** Floor of maintenance dept. (Before)



**Fig 22** Floor of maintenance dept. (After)

### **3.2.1 (F) Implementation of Seiketsu (Standardize):**

Standardize aims for preparation of standard methods to continue to follow the first ‘3S’ effectively in the organization, thus to standardize, following activities were taken into consideration:

- We have maintained a red tag register in which we kept record of all the red tags for our reference.
- In daily routine, if workers notice unwanted thing at the workplace then a red tag is paste on it and decisions (to scrap or else) is taken.
- We used to collect that tags after every 8 days, then after 15 days, then after 1 month and maintained the record of it. Thus from the record we found out that the number of red tags decreased day by day (i.e. unwanted things vanished from the workplace).
- We have made a standard space for dustbins and material under inspection because previously shop floor was dirty.
- We also defined the standard way of stacking/storing of the material which saves the cost of storage.
- We also made the habit to conduct ‘5S’ meetings.

Following are the some examples of standardization:

Before



After



**Fig 23** Standardization for material under inspection and dust bin

For implementation of shiketsu we also prepared work instruction sheets for workers to standardise the processes.

### **3.2.2 Purchase and store room (Zone 2)**

#### **3.2.2 (A) Problem Statements**

The following problems occurred before implementation of ‘5S’ in the organization:

- Improper utilization of storage space for raw material, bins, boxes.
- Wastage of time in searching the raw material due to non-permanent location for storage of raw material.

From the Pre-audit, we came to know about the different problems which the workers face while working in this shop. We also talked to the workers working there and store head and according to that we made the 5 S sheets. Then we suggested some solutions to overcome the problem.

#### **3.2.2 (B) Implementation of Seiri and Seiton:-**

Various tools , components (pins and pistons) and store files are sorted according to their types. Now with proper sorting available space is wisely utilised for the present components and those components are sorted clearly. The compartments are labelled according to components included in it. This will lead to less time for searching the components and increase the aesthetic look of the room. Following are the some of the implemented ideas.



**Fig 24** Store room (Before)



**Fig 25** Store room (After)



**Fig 26** Semi finished piston storage (Before)



**Fig 27** Semi finished piston storage (After)

Above picture shows the proper arrangement of semi finished pistons.

### **3.2.2 (C) Implementation of Seiso (Shine)**

There was lot of dust, rust and oil fumes on the parts as well as on the floor also. So we have started to clean the compartments and floor to increase the aesthetic view. It also creates pleasant atmosphere to the workers to work there. The Fig. 28 and Fig 29 shows the need of Seiso in the Store. We completed seiso for shelf and rest was explained to the workers of Menon Piston Ltd.



**Fig 28** Semi finished piston storage (Before)





**Fig 29** Semi finished piston storage (After)

Semi finished pins were also placed at any random place and heavily dense. So we placed them to proper position and create a clean surface so workers are able to reach to required placed. Following fig shows the result of shine.



**Fig 30** Pin store room (Before)



**Fig 31** Pin store room (After)

### 3.3 Post Audit report

#### 3.3.1 Maintenance department (Zone 1)

**Table 4** Check results for Post Audit of Maintenance Room (Zone 1)

Sr. No.	Check list for step S1	Yes	No
1	Are there any useless things that can bother your work environment?		No
2	Are there any useless raw materials, semi-finished products and/or waste left as is, nearby workplace?		No
3	Are there any tools, spare parts, materials left on the floor, nearby equipment?		No
4	Are all frequently used objects sorted, arranged, stored and labelled?	Yes	
5	Are all measurement instruments/devices sorted, arranged, stored and labelled?	Yes	
6	Does the inventory or in-process inventory include any unneeded materials or parts?		No
7	Are there any unused machines or other equipment around?	Yes	
8	Are there any unused jigs, tools, dies or similar items around?		No
9	Is it obvious which items have been marked as unnecessary?	Yes	
10	Has establishing the 5S's left behind any useless standards?	Yes	
11	Is the workplace is properly cleaned?	Yes	
12	Is the procedure is standardised?	Yes	

### 3.3.2 Purchase and Store room (Zone 2)

**Table 5** Check results for Post Audit of Purchase and store room (Zone 2)

Sr. No.	Check list for step S1	Yes	No
1	Are there any useless things that can bother your work environment?		No
2	Are there any useless raw materials, semi-finished products and/or waste left as is, nearby workplace?		No
3	Are there any tools, spare parts, materials left on the floor, nearby equipment?		No
4	Are all frequently used objects sorted, arranged, stored and labelled?	Yes	
5	Are all measurement instruments/devices sorted, arranged, stored and labelled?	Yes	
6	Does the inventory or in-process inventory include any unneeded materials or parts?		No
7	Are there any unused machines or other equipment around?		No
8	Are there any unused jigs, tools, dies or similar items around?		No
9	Is it obvious which items have been marked as unnecessary?	Yes	
10	Has establishing the 5S's left behind any useless standards?	Yes	
11	Is the workplace is properly cleaned?	Yes	
12	Is the procedure is standardised?	Yes	

### 3.4 Conclusions

The most significant barrier was the poor training, awareness of 5S, lack of communication, gap between the top management and shop floor employees, consciousness of this activity amongst the staff.

Thus, the full benefits of the 5S cannot be experienced in the business sector until all the obstacles associated with implementation of the technique are recognized, fully understood and addressed. Since some critical decisions of 5S activities, including time and budget performance must approve and support by management, therefore more cooperation is recommended during implementation period. It is concluded that 5S key of success is training. 5S implementation is not possible without proper training and employees are not capable to actively standardize the 5S. Therefore, it is believed that continuous training is the key applying to change the organization culture, and assessment should focus on improvement and progress regarding all input from the organization until complete establishment of 5S system.

The efficient implementation of 5S technique leads to subsequent improvement in productivity of the manufacturing plant. The 5S improves environmental performance and thus relate primarily in reduction of wastes in manufacturing. It promotes neatness in storage of raw material and finished products. The 5S implementation leads to the improvement of the case company organization in many ways for instance.

1. Better usage of working area.
2. Work environment improvement.
3. Prevention of tools losing.
4. Reduction in pollution
5. Discipline in the employee.
6. Increasing of awareness and moral of employee.
7. Improvement in the internal communication.
8. Improvement in the internal human relation.

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