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# Implementation of 5S in the Manufacturing Industry

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**Abstract -** *5S is a quality improvement technique. The 5s technique (Seiri, Seiton, Seiso, Seiketsu, Shitsuke) would strongly support the main objective small and medium scale organization to achieve continuous improvement and higher performance. In manufacturing environment implementation of 5S can result in considerable improvement, performance besides with housekeeping and health and safety.*

***Key Words*: 5S, Seiri, Seiton, Seiso, Seiketsu, Shitsuke**

## 1. INTRODUCTION

5S is originated from japan. 5S is a part of kaizen. 5s is an effective technique of leans manufacturing.5s gets its name because of 5 activities, namely seiri, seiton, seiso, seiketsu, and shitsuke. It means to sort, set in order, shine, standardize and sustain. Sort means Determine necessary and unnecessary material. Set in order means keeping the material according to the need. Shine improves the worker attitude regarding his work which helps in increasing productivity. Standardize is a method of simplification

The main aim of this paper is to implement the 5S methodology in Toolex Engineers Pvt. Ltd. Situated at C-9 Gokul shirgaon, Kolhapur, 416234.Before implementation of 5S at Toolex Engineers Pvt. Ltd. We visited Aditech Industries situated at Uchgaon, Kolhapur. As the reference. The Aditech industries had implemented 5S technique from last 5 years. We recorded all the data from the industries and finally concluded that 5S technique is processing in which all the management level of the company should be effectively involved that is from top-level management up to the bottom level management. 5S is a continuous process which should be implemented form first day and should be carried out forever. Every employee of an organization should be involved in 5S.


**Fig. 1** Schematic Diagram of 5S

## 2. LITERATURE REVIEW

This section reviews the current literature on 5S practices it explores the concept of 5S, Basic information with all pros and cons about the 5S.

According to Shahryar Sorooshian et al. (2012) –5S is a very effective technique to manage the work environment quality.

According to Derya Sevim Korkut et al. (2009) - The clean and steady environment targeted by 5S has positive impacts on work safety, quality, efficiency, and morale.

According to J. Michalska et al. (2007) - 5S implementation results in increasing efficiency, safety, and reduction of industrial pollution.

According to Arash Ghodrati et al. (2013) - This paper is aimed to determine performance factors and characteristics in industrial organizations and identifying the effectiveness.

According to Prof. S. B. Khedkar et al. (2012) - This research effort shows significant improvements to safety, productivity, efficiency, morale, and housekeeping.

### 2.1 Lean Manufacturing

5S is one of the essential steps in motion and bring about a flourishing lean culture (Cooper et. al. 2007). 5S implementation is a simple strategy to maintain each department of the company effectively. Lean manufacturing is a method by which we can minimize the waste in a manufacturing industry without sacrificing productivity, which can cause a problem. The best method or a first step should be taken for the lean manufacturing is implementation of 5S, with all the 'S' implementation i.e. Sort, Set in Order, Shine, Standardize and Sustain improves work culture aesthetically and ergonomically, thus it improves productivity of an employee and also minimization in errors this it minimizes the total waste.

## 3. PROBLEM STATEMENT

The company we selected is small scale industry which is the manufacturing of assemblies & machined components. The problem associated with the company is due to limited space, workforce and the area covered due to non-moving material. The Non-moving material is a material in which it cannot be moved or used from the last six months. So it covers the space in the storage department and for the old and new stock. The storage department because of this non-profitable inventory gets increased and the net inventory required for an industry gets increased. Because of unorganized and non-moving material it so difficult to search any type of material or component so each rack in the industry should be organized in such a way that anyone can find the material as early as possible.

As the material is unorganized so the time required for finding material or component is increased and thus the productivity of worker decreases due to increase workload. The inward material section and outward material section should not be combined. Each section should have proper space allotted. As both departments are combined in the industry. The material was placed on the gangways because of less area and maximum jobs hence either job should be stored vertically instead of horizontal.

## 4. METHODOLOGY

Following method was adopted to implement 5s.

- To create awareness among the employees for the implementation of 5s.
- The organization was simplified into various zones consisting of various departments along with it (Example- Storage Department Zone, Machining Department Zone, Office Zone, Quality Control Zone, etc.)
- The '1S' activity undertaken by the 1st zone (storage zone) under the guidance of the zone leader.
- The audit was conducted by the apex team of an organization and the corrective measure was taken on it.
- Similarly, rest '4S' were implemented one after other successfully.

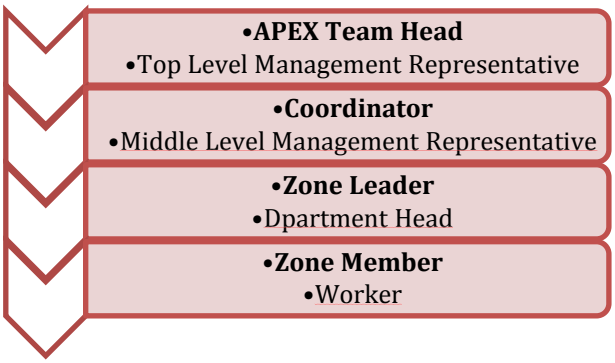



**Fig. 2** Apex team authorization chart

## 5. THE 5S STEPS

### 5.1 Sort (Sieri)

Something used once a year would not be an everyday item and we would not necessarily need all of the everyday items at once but if lost, a replacement would be necessary

Sort by the tools that are frequently used are placed within easy to reach, and those are not used are moved to the non-moving material storage department

All the items are classified in the terms of necessary items, unnecessary and may not necessary items

The goal is to eliminate non-essential items from the workplace, items are "red tagged" and stored in a local red tag area for a specific period of time.

### 5.2 Set In Order (Sieton)

The next step after identifying the unneeded item is to organize the needed item as per the specific job requirements in each station.

Organize arrange and identify everything in the work area, as well as though out facilities so that items can be

efficiently and effectively retrieved and return to their proper storage location.

The important part of inset in order is putting everything in its proper place and setting up a system so that everything can be returned to its proper place. The second step in 5S is where good labelling and identification practice are important

The types of equipment, tools, and materials used as well as a proper storage location, need to be identified and labelled.

The goal of setting in order is to create a standardize and consistent way to store and retrieve tools and materials.

### 5.3 Shine (Seiso)

Efforts to keep work area clean and orderly to ensure propose -work. This means cleaning and maintaining the newly organized workplace.

It can involve routine tasks such as mopping or reforming maintenance on machinery tools and other equipment

5S projects that are almost entirely focused on cleaning and painting, this step is needed to have the full involvement of employee to gather the data at what they feel needs to be cleaned and how often it should be cleaned.

Develop and follow a regular cleaning and maintenance schedule. Cleanliness can show the effectiveness of the workplace and workers working condition have full competence in the company also moral of the employee get increases

### 5.4 Standardize (Seiketsu)

After the cleaning activity is done in the company. Next stage is to be standardizing the process area. It is essential for maintaining the previous three S. describes the role models for adhering to the standard of the previous 3S and encourage others to follow them.

Make rules and procedures to promote a good work environment until the first 3S.

Maintain an environment where S1andS3 are implemented in the same manner throughout the company.

Checklist development and regular use of it.

### 5.5 Sustain (Shitsuke)

Every person in the industry has to follow the procedure as defined in the workplace. It must be followed by discipline and sincerity among the workplace and follow the procedure as defined.

Self-discipline is the final step in the entire 5S system but it is tough to maintain

## 6. IMPLEMENTATION OF 5S

### 6.1 Guidelines for practicing SORT

1S during 1st S, we sorted items in terms of necessary and unnecessary requirements. Then we apply the red tag on unnecessary components in the storage section.

- The necessary items are kept in the shelf according to its usage also frequently used material kept at the easily reachable position to the worker.
- Approximately 600 kg of material removed from the storage department.

**Fig. 4** Measuring a number of components

### 6.2 Guidelines for practicing SET IN ORDER

- During implementing 2nd S everything in its proper place.
- Set components as per there requirement, weight, use, and orientation.
- Assign a fixed location for each item.
- Arrange all necessary items.

**Fig. 5** after 2S Implementation

| NAME OF RACK :- TOOLEX NL PARTS<br>DATA COLLECTED DATE :-13th Jan. 2019 | | | | |
|---|---|---|---|---|
| | A | B | C | D |
| 1 | COVER (830.100.421.0043) | BUSH (M827.010.848.1006) | COVER PLATE (8-110-563-580) | DRIVE SHAFT |
| 2 | CLAMPING BOLT (8-270.1.0848.100) | PLUG (M826.100.242P024) | PLUG (8-100-533-541P0502) | LOCKING SPACER (8.306.0.630.205) |
| 3 | HOLDER (M830.103.754.905) | COVER (M10073048 / 5412275001) | CLAMP (8-301-804-094) | COVER (M830-600-213-P011) |
| 4 | HOLDER (M830.103.754.905) | RETAINING RING (830600250034) | DUPLEX SPROCKRT (830.100.419.045) | STOPPER (826100253009) |
| 5 | PLAT (5412352.001) | SPROCKET | SPINDLE (M10073182 / 5412392001) | BALL BEARING PIN (5409309.00) & PIN (5422134) |
| 6 | PIN (M10080551) | PIN (M10080626) & BALL BEARING COM (6409308) | BARTHING TERMINAL (M10071715) | SMALL ARM SPACER (M10084326) |
| 7 | YOKE SUPPORT FRICTION DISC (M10084390) | HOUSE CLAMP NUT M2.5 (M10083188) | HOUSE CLAMPING NUT (M10083223) | SPINDLE (5422006.001) |
| 8 | - | WASHER (140*130*4.5) | ADLER BALL | LEVER (80711000) |

**Fig. 6** Details of a table after implementation of 2S

### 6.3 Guidelines for practicing SHINE

- When you implement 3rd S two things will happen 1st your employees will like to come to work in a clean environment and 2nd is moral of the employees gets increases towards work.
- Clean all the machines so the life of the machines increases.
- Clean all work floor area of the industry so chances of accidents get eliminated.
- It includes a daily checklist to made sure works done as per define.

**Fig. 7** Machine after implementation of 3S

### 6.4 Guidelines for practicing STANDARDIZE

- The standardize pillar utilize a set of schedules and checklists that can be followed so each step of 5S performed exactly the same way every day.
- This stage is defined to create procedure and routines.
- The checklist is a visual signpost to ensure the daily 3S are carried out in the work area.

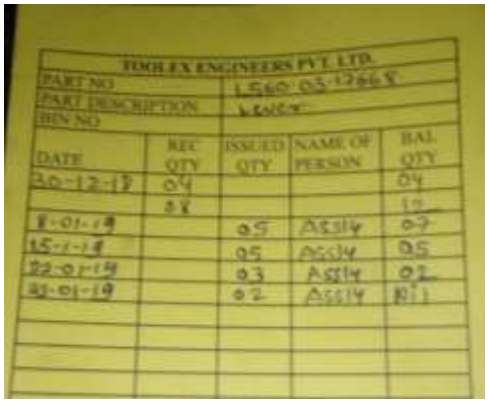
| TOOLEX ENGINEERS PVT. LTD. | | | | |
|---|---|---|---|---|
| PART NO. | | | | |
| PART DESCRIPTION | | | | |
| BIN NO. | | | | |
| DATE | REC. QTY. | ISSUED QTY. | NAME OF PERSON | BAL. QTY. |
| | | | | |
| | | | | |
| | | | | |

**Fig. 3** Bin Card Format

**Fig. 4** Bin Card Used

### 6.5 Guidelines for practicing SUSTAIN

- Every person in the industry has to follow the procedure as defined.
- It must be followed by discipline and sincerely among the workplace
- Self-discipline is the final step in the entire 5S system.



TOOLEX ENGINEERS PVT LTD

| DATE | REC QTY | ISSUED QTY | NAME OF PERSON | BAL QTY |
|---|---|---|---|---|
| 30-12-18 | 04 | | | 04 |
| | 08 | | | 12 |
| 8-01-19 | | 05 | ASSLY | 07 |
| 15-1-19 | | 05 | ASSLY | 05 |
| 22-01-19 | | 03 | ASSLY | 02 |
| 29-01-19 | | 02 | ASSLY | NIL |

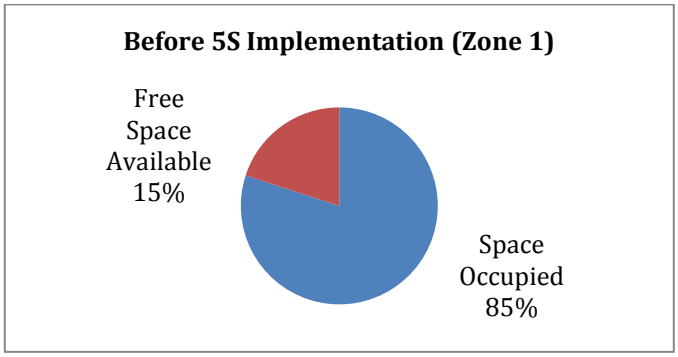
**Fig. 4** Bin Card is maintained

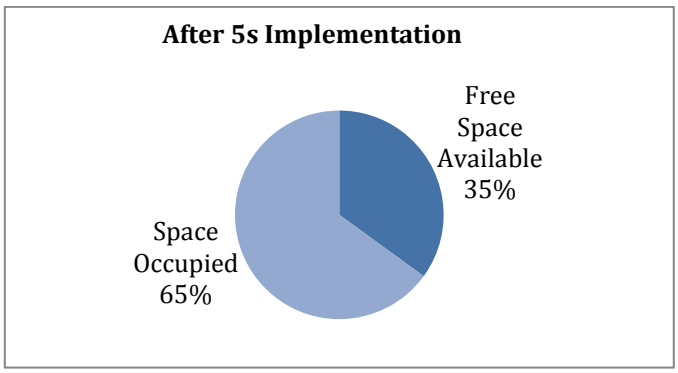
### 7. CASE STUDY

The 5s technique was introduced to the employees and awareness is created among them. In short, the technique we explained to then must be carried continuously it is a technique in which regular participation of every worker is necessary.

### 7.1 5S Approach in the Company

The result in this study, we observed 15% free space was available before implementation of 1Sand after implementing 1S it is increased to 35%.




### 1S:

- During 1S we sorted items in terms of necessary and unnecessary requirement then we applied the red tag on the unnecessary component in the storage section.
- The necessary items are kept in the shelf according to usage also frequently used material kept at the easily reachable position to the worker.
- Approximately 600 Kg of material removed from the storage section.

**2S:**

- After implementing 2S the workspace, storage department, work process is simplified.
- In short, each and every material is arranged as per orientation, use, weight, type of job.
- The visual calculation was improved as thus time consumption gets reduced.

**3S:**

- Floor space was cleaned.
- Notice board was cleaned
- All the machines were cleaned and colored

**4S:**

- The checklist process was daily carried out.
- Made rules and procedure to produce a good working environment
- Bin card system was applied in which inventory quantity is easily measured
- 1S to 3S should be implemented strictly in the organization

**5S:**

- The technique told to employees is maintained by them continuously
- It includes team co-ordination which enhances moral worker
- Bin cards were maintained properly by updating quantity, date, and material.

## 8. CONCLUSIONS

It is a relatively effective technique which can be applied in an organization with the active participation of employees and the results of it are rapidly visible. 5S is effectiveness to manage tools and materials which can improve housekeeping and environmental conditions.

- Unwanted material is removed from the workspace, (Approximately 200 different types of parts were removed).
- More space is now available for utilization.
- The time required for searching the required things are reduced up to 50% because of proper arrangements.
- As the tools are always clean and in good condition, quality of finished product is increased.
- Cost engaged with hidden scrap is saved.

After the successful implementation of our project, we conclude that 5s implementation is beneficial for all the industries whose working environment is not good or too old. It improves quality as well as work ethic in the organization.

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