

## Analysis of Productivity Improvement And Safety Measures By 5-S Technique

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### ABSTRACT:

We provided some vast literature on the implementation of 5S in any industry. This strategy involves the study and change in the work place of a manufacturing industry post implementation of 5S. This strategy helps in minimizing the time of manufacturing and also increases the area of work place. From the implementation of 5S we improve the some most useful things such as:

- Improves safety and ergonomics
- Reduces unplanned downtime
- Enhances teamwork
- Reduces inventory and space
- Instills the discipline to follow standard work
- Promotes flow
- Improve quality
- Improves productivity
- Exposes problems
- Reduces searching
- Encourages visual control
- Eliminates distractions
- Tackles waste
- Enhances self-management

The main objective of this study is to assess the implementation of 5S and development of the 5S Activity Checklist in manufacturing companies. The scope for this study covers the following areas: identifying problems, looking into critical success factors, their outcomes and recommendations. In addition, factors that may act as constraints to the implementation of the 5S activity and possible solutions for the industries are also identified through observation and evaluation of the improved environmental performance. The study is conducted using a systematic approach with specific software in order to get the most accurate results.

### I. INTRODUCTION:

This paper concentrates on the result of study carried out as part of a research project in developing and implementing the checklist for the 5S activity in a manufacturing Industry. From the study conducted, it is possible that an appropriate and simple checklist can be derived and implemented but, it has proved to be rather difficult in getting accurate results, as certain information is considered as confidential and therefore companies are not willing to release their confidential information. This paper is presented as follows: the first part discusses the concepts of the 5S, the second part presents the problems occurred in the manufacturing Industry, the third part gives a description of the methodology employed in gaining the relevant information concerning the industries studied and Finally, the conclusion and references.

The 5S Practice is a technique used to establish and maintain quality environment in an organization. The original concept was developed by Osada in the early 1980s. 5S is a strategy that delivers results by a systematic approach of planning and organizing the activities. 5S is a philosophy rooted from Japan and branched into other countries. 5S is an acronym for the following Japanese terms:

- SEIRI [Sort]
- SEIRON [Set in order]
- SEISO [Shine]
- SEIKETSU [Standardize]
- SHITSUKE [Sustain]

In a manufacturing environment, the 5S in practice can bring in results that could considerably raise the environmental performance in line with the improved housekeeping and health & safety. The 5S practice in theory involves straightforward steps which lead to continuous improvements.

### II. CONCEPT:

Modern management in the company is not only the quality management system based on the ISO series 9000:2000 standards, but pursuit to the continuous improvement, so this is the philosophy of the Total Quality Management [1]. In the frames of implementation of the Total Quality Management on the operating level more and more popular becomes the idea of so called 5S. The 5S method begins each programme of improvement. It is the tool for helping the analysis of processes running on the workplace. The 5S is the methodology of creation and maintaining well organized, clean, high effective and high quality workplace. Its result is the effective organization of the workplace, reduction of work's

environment, elimination of losses connected with failures and breaks, improvement of the quality and safety of work [2-4].

### The 5Ss

#### □ Sort (Seiri)

• No unnecessary items at the workplace: “When in doubt, throw it out!”

#### □ Set in Order (Seiton)

• Anyone can instantly find, take, and return any needed item: “A place for everything, and everything in its place”

#### □ Shine (Seiso)

• Deviations become visual by cleaning: “Cleaning = inspection; Cleaning with meaning”

#### □ Standardize (Seiketsu)

• Visualize the 5S standards in the workplace: “Make the best way the easiest way”

#### □ Sustain (Shitsuke)

• Everybody follows the standard until we have a better one: “Stick to it!”

### III. IDENTIFICATION OF PROBLEMS:

In many manufacturing industry there are so many problems related to productivity. It is major problem in industry because it affects industrial growth. In this industry there are so many problems which affect their productivity and production. The following are the problems found in that industry:-

- 3.1 *No Painting shop*: - There is no separate paint shop. Thus painting is done in free space. The paint particles get spread in all over the shop.
- 3.2 *Improper handling of material*: - In this industry improper material handling by workers take place, due to which chances of accident increases.
- 3.3 *Improper inventory of materials*: - There is no specific space for raw materials and finished products. Due to this workers face much problem to find proper material. It increases production time.
- 3.4 *Less safety measures*: - In this industry, the proper safety equipments are not available. So that it increases accidents to them.
- 3.5 *Environmental hazardous*: - In the industry some machining operation is done in open space like grinding, painting etc. Due to this particles get spread in environment because of it environment get hazard.

### IV. METHODOLOGY:

The researcher will first figure out the issues which exist and guild the personnel of the company to understand what 5S tools are, then apply 5S concepts to rearrange the items utilizing all of employees Bajaj Steel Industries Limited. The purpose of this study was to assist Bajaj Steel Industry to improve the process flow with 5S

methods in order to reduce possible wastes and enhance the efficiency of operations so that Bajaj Steel Industry can reduce costs. Since Bajaj Steel Industry has never done anything with 5S, and no one in the company knows what 5S and how it can help the company to improve the working environment, this study has provide the evidence that 5S is a great way to assist this organization. 5S provides a method to rearrange the layout and enhance the discipline. This study focused on how to use 5S in each step to help Bajaj Steel Industry manufacturing company to rearrange the workplace and improve the efficiency. So we suggest to that Industry to use 5S and we will describe each step and how 5S works entirely in the company.

### 5S Systematization:

5S states that:

- *SEIRI* (sorting and disposing the unnecessary items). Deals with sorting all the tools, materials and other equipment in the workplace. Important equipment is stored accordingly, which reduces the hazards at the work place.
- *SEITON* (everything is set in order, provide a place for everything). Identifies the need of the worker. Tools, materials and other equipment should be arranged systematically for quick access and movement.
- *SEISO* (shining, cleaning, removal of waste and dust) Point out the need and necessity of clean and neat work place. Cleaning should become a daily activity. Work place should be cleaned at regular intervals (generally at the end of the shift or once in 3hours). Every tool and equipment should be restored at their own places after their use.
- *SEIKETSU* (consistent and standardized work environment with unique rules of organization and storage along with cleanliness). Everyone should know his or her responsibility. Cleaning should become a part of regular work routines. This helps in having a good control over the production.
- *SHITSUKE* (Sustain, realization of the above set of rules in order). Maintain these standards continuously for years.

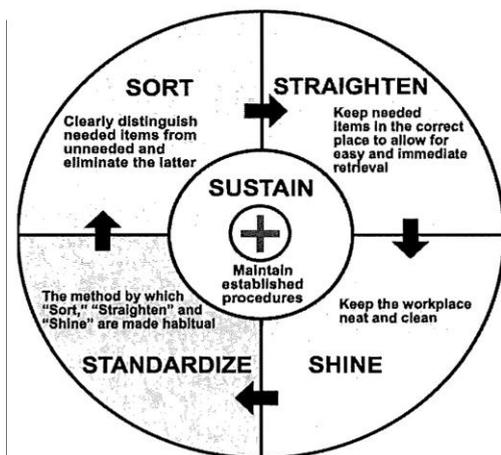


Figure 1. 5S

### Implementing 5S:

Implementing 5S should begin from educating the workers about 5S and its importance. It is mandatory that every worker should understand the need of 5S and its advantages. Workers should be provided with an example for all the 5S's, which makes it easy to understand. It is very important to understand the fact that this methodology do not refer only for the production team but also refers to stores (warehouse) and other office teams. It is better to supply a 5S pocket guide to the workers such that they could clarify their doubts by reading it.

#### 1 S – Sort:

Eliminate unnecessary materials, tools, parts, equipments. Sorting identifies necessary information for the realization of tasks. Sorting eliminates the waste raw materials, nonconforming stock, and damaged tools. Keep only necessary items and eliminate what is not required. It improves the efficiency of searching and collecting items, reduces the running time of operation. Sort is the concept helps the company to keep everything they need and throw non-use items away Based on Sort concept, a company collects all items that it has now and determines whether or not it will be used, distinguishing the items into two different categories: used and non-used. In Bajaj Steel Industry, they have several places that the owner uses for setting all welding. Grinding and painting. Yet, Industry never has a place for setting specific shop for painting and raw material is placed anywhere due to this product should be damaged. By sort step, Industry looked at each inventory place and confirmed what the company needed, then what they did not need, and what was broken.

#### Implementing 1S rule:

1) On the first stage one should be able to answer the control questions:

- Does an unnecessary thing create the problem in work area?

- Does unnecessary odds and ends of materials thrown anywhere in the work area?
  - Do tools and rest of materials of production are placed on the shop floor?
  - Are all necessary things sorted, ordered and retain at their own place?
  - Are a l measuring tools sequentially kept? On the basis of answers to the above questions it is possible for the assessment of work area in terms of the 1S rule. If any question answer is yes, it should carry out sorting of items, which are in work area.
- 2) On the second stage one should carry out the review of all things which are in the work area and arrange them. According to established sorting it should execute the elimination of items from work

area, which were unnecessary.

3) To continual usage the 1S rule is the movement of the Red Tag. It means giving red tag to items, which operator will make out as useless within his work area. At the beginning of each month, put a red tag on every item. During the month, remove the red tag when item is used. At the end of the month, decide whether the item with the tag is necessary or not.

#### 2 S – Set in order:

The important thing is visualization of work area the painting of the floor helps to identify the storage places of each material or transport ways. The place for each item should be labeled. Each tool, material, supply, or piece of equipment should be kept close to where it will be used - in other words, aligning the flow path.

#### Implementing the 2S rule:

It means items must be placed in fixed locations so that they are easily attainable and can be easily used. 2S rule proceedings:

Make sure that items can be identified by labeling them properly. Every working method has particular type of order. Identify and filter it. Use lean thinking to make things faster.

- Reduce preparation time for tool setting.
- Reduce waiting time for parts, materials, papers and files
- Reducing processing time and cycle time by Improving the plant layout of work area.
- Time and strength spent on looking for jigs, Fixture tools etc.
- Searching for files and information in computers.
- Labels are attached so that items can be recognized.
- At a glance and clear.

#### 3S – Shine

Regular cleaning permits to identify and to eliminate

sources of mess and to maintain the clean workplaces. During cleaning machine, work area and shop floor, sources of light, current information, cleanliness of path are checked. Operator should take care about personal maintenance and tidiness.

#### Implementing 3S rule:

The first step of 3S rule is improving the workplace, daily follow-up cleaning is necessary in order to sustain this improvement. Cleanliness is helpful to notice damages on equipment such as cracks, breakage and misalignment.

#### 4S – Standardize:

Standards should be worked out and implemented in the work place. Management should pass instructions in order to set the work place in order. The Instructions should be clear and easily understandable to workers. All the workers in the shop floor should be involved in this activity; the workers group knows specificity of their own activities and process of elaboration along with the usage gives them the possibility of understanding the importance of each aspect of the operation. The aim of the easy access of the obligatory standards for constant and visible places should be assured.

It should be assumed that standards are not only being implemented in typical operational processes like movement of materials, production, maintenance and sorting, but also in administrative processes like Book-keeping, HRM(human resource management), customer service and any other services.

#### 5S – Sustain:

The principle is to establish the maintenance of a clean environment as an ongoing process for ever. This increases the consciousness if the workers and decreases the number of non-confirming products and defective products. This process also increases the internal communication and human relations in the organization.

It is also essential to understand the need and importance of the inspections for 5S. The inspections are executed with the help of Check list prepared on the basis of the radar charts of 5S. This also helps in estimating the work place. The inspection of the realization of 5S standards is executed once in a month by the team.

#### 5s Approach In Industry:

The 5S methodology depends upon the capacity of creating and maintaining a well organized, clean, effective and high quality work place. Our research was carried out in a manufacturing company of the metal doors. In the first phase of research we executed the selection of things in the production process of the work place. We introduced 5S methodology to the workers on the shop floor and carried out a questionnaire

for them. After that all the 5 rules of the 5S has been implemented on the shop floor in a systematic order. We appointed one of the workers as a person responsible for the implementation of 5S for that department and so with the other departments of the industry. This resulted in great changes on the shop floor.



Fig (1): changes in the shop floor before and after

## V. SOLUTION

### 5.1) Making Separate Painting Shop

These alternatives include that to make a separate painting shop. Separate painting shop means that the suspended paint particles have no chance produce obstacles in other working shops of industry. It will provide that the machining is in machining shop, assembly in assembly shop and painting in painting shop. So those have not any effects of paint particles in machining and assembly shop. Therefore workers can work comfortably. So using this option, we are removing problems that are 1) stoppage of work 2) bad working efficiency 3) hazardous environment in machining and assembly shop. But still there is bad working condition in painting shop. The suspended particles are hazardous for workers in paint shop. This problem will solve by allowing exhaust blower at the top of paint shop. But the handling time of moving product from assembly to paint shop is increasing and again there is large investment in making separate paint shop. So try third alternative.

5.2) Making Partition for Painting Place And Allowing Exhaust Blower At The Top

In that we are making partition where the painting takes place and utilization of exhaust blower at the top of painting place to remove the suspended paint particles. So that the suspended paint particles will exhaust at a time of painting and there will be no chance to spread paint particles. Due to this we will be able to make clean whole environment of industry.

## VI. ADVANTAGES:

The advantages from implementing the 5S rules:

### 1 S:

- Process improvement by costs reduction,
- Stock decreasing,
- Better usage of the working area,
- Prevention of losing tools.

### 2 S:

- Process improvement (increasing of effectiveness and efficiency),
- shortening of the time of seeking necessary things,
- Safety improvement.

### 3 S:

- Increasing of machines efficiency,
- Maintenance the cleanness of devices,
- Maintenance and improvement of the machines efficiency,
- Maintenance the clean workplace, easy to check,
- Quick informing about damages (potential sources of damages),
- Improvement of the work environment.
- Elimination of the accidents reasons.

### 4 S:

- Safety increasing and reduction of the industry pollution,
- Working out the procedures defining the course of processes.

### 5 S:

- Increasing of the awareness and morale,
- Decreasing of mistakes quantity resulting from the inattention,
- Proceedings according to decisions,
- Improvement of the internal communication processes,
- Improvement of the inter-human relations.

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