Study of 6s Concept and its Effect on Industry

Vinodkumar S Gautam¹, Akash R Shah², Ankitkumar N Parmar³, Asso. Prof. Vijay D kedariya⁴

¹,²,³UG student, Department of Mechanical Engineering, Om Institute of Technology, Shahera/GTU, India
⁴Head of Department, Mechanical Engineering, Om Institute of Technology, Shahera/GTU, India

Abstract— Quality is never ending quest and continuous improvement process is a never ending effort to discover and eliminate the main reasons which creates problems. These are achieved by implementing one huge improvement but by using one by one improving stages for improvements. That type of improvements are achieved by various continuous improvement concepts such as Kaizen, PDCA Cycle, Quality Circle, JIT, 5S etc. From all above concepts Kaizen requires very large amount of potential steps. So it is at some degree difficult to every industry for achieving one huge improvement in one step. That is why, as a foundation of ‘Kaizen’ we study 6S concept. 6S concept is not a new concept, but is derived from 5S concept having one more “S” as “Safety” with organization, with environment and with health. After implementing 6S concept, organization/industry achieve effective organizational improving performance such as, reduced wastage, reduced defects, increase productivity, less making accidents, improve workers/employees morale for work with organization etc. As a result of that, organization/industry achieves more consistent improvement result of work place with reduced hazardous pollution for environment and reduces production cost with increased product services.

Keywords—6S, continuous improvement process, kaizen, 5S, productivity, EHS.

I. INTRODUCTION

The practice of 6S is commonly used among the industries of the world in order to enhance human capability and productivity. 6S methodology is a systematic technique used by organizations comes from 5S of five Japanese words; Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain) and the sixth S refers to ‘Safety’. As safety plays a very important role in the industry, 6S is the key to organize a workplace for efficiency and decreasing waste and optimize quality and productivity via monitoring an organized environment and keeping the environment safe from accidents. It also provides useful visual evidences to obtain more firm results.

Six Pillars of 6S are-

1. Sort: Separate what is needed in work area and eliminate the unneeded items.
2. Set-in-order: Organize the remaining needed items.
4. Safety: Create a safe place to work.
5. Standardize: Standardize the sorting, inspection, cleaning and safety practices.

Fig.1: 6S methodology cycle

Objective of The Study:

To provide a quality base product by basic knowledge of 6S concept, to establish an initial understanding of 6S in order to-
- Make quality product in proper time within improve workplace condition
- Reduce inventory
- Reduce searching time for parts/equipment’s
- Reduced accidents
- Increase discipline relation with top management to employees to workers
- Neglect the failure and breakdowns of machines or material handling equipment (MHE)
- Make safe and motivate working environment for improving the organization/industry performance.

II. LITERATURE REVIEW

Title: The 5S methodology as a tool for improving the organization (2007)
According to this paper, 5S implementation results in increasing of an efficiency, safety and reduction of the industry pollution. The proceedings to research clearly show that training of workers about the 5S rules is very essential. The important task is to divide activities on some main steps and to maintain the continuous improvement. It is also important to understand the need of executing the routine inspections of usage the 5S rule. This inspection is executed by helping of so-called check list and created on its basis the radar graph of the 5S, which serves to estimation of the workplace.

Title: The 5S strategy for continuous improvement of the manufacturing process in autocar exhausts (2008)

Author: Gheorghe DULHAI

This paper presents a continuous improvement strategy, process-oriented and aiming to improve manufacturing at auto car exhaust. The improvement of auto car exhausts quality, using the “5S” rules, is accomplished at the initiative of the inferior levels of the organization coordinated and helped by the superior management. The efficient implementation of the “5S” strategy leads to a subsequent improvement of the exhaust’s quality.

Title: Inventory Control and Spare Part Management through 5S, KANBAN and Kaizen at ABC Industry (2011)

Author: R.T. Salunkhe, G.S. Kamble, Prasad Malage

In this paper, the objective of spare part management is to ensure the availability of spares for maintenance in minimum time with the help of different management techniques like 5s system, Kanban system and different Kaizens. The 5s system helps to understand the actual condition of spares in store department. It also helps to manage the spare parts effectively giving satisfactory results. The result shows that the improvement in reduction of searching time and also control the cost of inventory significantly accomplished through 5s, Kanban and kaizen systems. The searching time is reduced from 10 - 15 min. to 6 - 8 min.

Title: Step for implementation of 5S (2012)

Author: Kaushik Kumar, Sanjeev Kumar

In this paper, the steps undertaken for the implementation of the 5S is emphasizing on the benefits to the organization.

The successful implementation of 5S requires that everyone understand why it is being used and what the expected results are, as the removal of familiar (although unneeded) items and the reorganization of processes can be extremely unsettling.

Title: Performance Improvement through 5S in Small Scale Industry: A case study (2013)

Author: P. M. Rojasra, M. N. Qureshi

This paper explains the implementation of 5S methodology in the Krishna Plastic Company, Udhyanagar, Amreli, Gujarat. Out of the available various lean manufacturing techniques, 5S offers good potential for required improvement. Ten week study is carried out in the company. The results after the 5S implementations states that production system efficiency is improved from 67% to 88.8% in the successive week.

III. METHODOLOGY

Explanation of 6S:

6S - SORT:

Sort refers to the practice of going through all materials, tools, machines etc., in work area, identifying needed and unneeded items from them and keeping only the essential/needed items. The unneeded items are then stored offsite or discarded. It helps to maintain the clean workplace and improves the efficiency of searching and receiving things. It also shortens the time of running the operation and provides easy access of needed items to workers.

Sorting is often called “red-tagging” because it calls for a simple red tag to be placed on items that are not needed for work. This is a two-part process in which employees identify what is not needed, and managers and supervisors then take responsibility for disposition of those items.

Establishing red tag criteria prevents confusion among workers and reduces wasted effort. The management should discuss and create guidelines on how to decide what stays and what goes. It, thus involves differentiation between the necessary and the un-necessary and discarding the unnecessary items.

During red tag criteria, the following questions must be asked:

- What is this?
- When did you last use it?
- Is it unique or critical for the department?
If its inventory, is this the minimal amount needed to keep up with the production schedule?

“Yellow Tag” strategy can be used at the same time red-tagging takes place to identify any Environment, Health and Safety (EHS) issues. Yellow tagging strategy identify environmental wastes, potential items, chemicals and other hazardous materials that may be harmful to human health or the environment in the work area. Four steps of yellow tagging are:

- Identify yellow tags targets and criteria.
- Make and attach yellow tag.
- Evaluate and take care of yellow tag items.
- Document and share the results.

Yellow-tagging is supplement to Red-tagging, key differences include the scope of projects, criteria used and options for disposal or reuse.

2S - SET IN ORDER:

Set-in-Order, deals with organizing the items that are needed in a way that best supports the employees doing the work. Place things in such a way that they can be easily reached whenever they are needed.

The slogan- A place for everything and everything in its place.

This is a progressive improvement where items already nearby are placed as close to the point of use as possible. In this step, regularly needed items are kept more accessible to worker while frequently needed items are kept less accessible to the workers.

Used things should always be divided as:

- In close access (1st degree sphere),
- Accessible (2nd degree sphere),
- In the range of hand (3rd degree sphere),

Set-in-Order serves the following Control Questions:

- Is position (location) of the main passages and places of storing clearly marked?
- Are tools arranged on the basis of regular use?
- Is there a proper height for the storage of all transport pallets?
- Is anything kept in the hazardous area?
- Is there any crack irregularity in floor or causes other difficulty for the operator’s movement?

2S, Set-in-Order eliminate many kind of waste such as searching waste, waste due to difficulty in using items and returning items, motion waste, waste of excess inventory, waste of defective products and waste of unsafe conditions.

3S – SHINE:

Shine step includes activities like cleaning workplace, maintaining its appearance and using preventive steps to keep workplace clean. Dirty working area containing dusts, scraps, oil etc. creates defects in product, equipment and process malfunctioning as well as safety hazards to employees. Shine identifies and removes these items, but also creates means for daily (or more frequent) removal. A checklist can be made for particular areas which are to be swept, scrubbed and sanitized on a regular basis.

Once the work area, tools, and equipment are clean, they are needed to be kept that way. For keeping the work place clean it is better to prevent things form getting dirty rather than continuous housekeeping. This can be achieved by eliminating the sources of contamination. The theme is “cleaning not for beatification alone but with a sense of purpose”.

Following problems arises in industry without Shine:

- Machines which do not receive sufficient maintenance tend to breakdown and causes defects.
- Oil and water on the floor causes slipping and injuries.
- Lack of sunlight in working area leads to poor morale and inefficient work.

4S – SAFETY:

Safety is a way of keeping the worker and workplace safe. It focuses on eliminating hazards and creating a safe working environment. It is easy to recognize potential dangers when the work place is well organized and clean. A separate “safety sweep” should be performed in order to identify, label and deal with hazards.

The workers should wear the Personal Protective Equipment (PPE) during the working conditions in order to be safe in the industry. The Personal Protective Equipment (PPE) kit includes Helmet for head protection, goggles for eye protection, ear protection, safety shoes, hand gloves etc.

First-Aid box not less than one for every 150 workers should be provided and checked every month for sufficient medicines and its expiry dates. Fire extinguisher should be provided in every department of the industry and also it expiry dates should be checked and should be replaced if expired as soon as possible.

Every employee of the organization must be given proper information about hazardous substances/process and should be informed about dangers and health hazards. Every organization must be ready with safety measures and emergency plans.
**Action steps for implementing Safety include:**
- EHS committee should be formed in hazardous industries.
- Industry should provide PPE to every employee.
- Fencing of machinery and proper maintenance of machine and equipment should be done.
- Lockout and emergency procedures should be posted and should be easily accessible.
- Safety awareness should be developed in the mind of workers by proper guiding them through safety slogans, banners and posters.

**5S – STANDARDIZE:**

Standardization is the method to maintain the first 4S. There should be proper standards to be followed for establishing improved workplace during implementation phase. The main aim of the standardization is to create best practices and to get each team member to use the established best practices the same way. Without a clear standard, there is no way to monitor the improvements. Standards should be clear and easy to understand and should be very communicative.

It is assumed that standards should not be implemented only in the typical operational processes e.g. movement maintenance, storing, production, but also in the administrative processes, like book-keeping, human resources management, customer service or secretariat service.

**Action steps for implementing Standardization include:**
- Standard operating procedures for 6S should be made by updating workplace procedures, job aids, checklists, diagrams, charts etc.
- Update documents which reflect the changes.
  The next step is to prevent:
- Accumulation of unneeded items.
- Procedures for breaking down.
- Equipment’s and materials from getting dirty.

**6S – SUSTAIN:**

Sustain asks the executives to keep everything going every day. Every worker and manager has to follow the procedures in the work place and workshop with utmost sense of discipline and sincerity in following the principles and procedures. The company should make a checklist to help the manager to make sure whether everyone follows the rule to sustain. It leads to decreasing the number of non-conforming products and processes, consciousness of staff, improvements in the internal communication, and improvement in the human relations.

The most common problem is sustaining the above 5S. The two major causes for failure are-
- Employees/workers are unable to understand that 6S is nothing but a mutual understanding so they are not involved in every steps of the process.
- It is hard for the management to assume that employees will instantly understand the value of 6S and will practice it.

**Action steps for implementing S5 – Sustain:**
- Audit should be done to ensure that processes established during standardization are maintained.
- Use displays, newsletters and other communication tools to publicize successes and reward strong efforts with recognition.
- Evaluate 6S effectiveness and continue to improve the process. Conduct regular review meetings to identify additional 6S opportunities.

Without sustain it is impossible to maintain the whole 6S concept.

**IV. BENEFITS OF 6S**

**1S – SORT:**
- It saves floor space
- Helps to get rid of obsolete items.
- Helps better utilization of existing material.
- Prevents incidence of unnecessary buying.
- Better house-keeping.

**2S – SET IN ORDER:**
- No wastage of time in searching.
- Material easily available.
- Material easily retrievable (recoverable)
- Lesser production down time.
Fig. 2 before and After Sorting and set in order

3S – SHINE:
- Work place is conductive to high productivity.
- Visual inventory level.
- Lesser production down time.
- No blockage in material flow.
- Reduction in accidents.

Fig. 3 before and After Shine

4S – SAFETY:
- Safe working environment
- Safe working conditions
- Better machine conditions.
- Prepared for facing any industrial accident

Fig. 3 Before and After Safety

5S – STANDARDIZE:
- Better process control
- Reduction of wastages of man, money, material and machine.
Fig.5 Standardization of activity & Rotation schedule

6S – SUSTAIN:
➢ Better improvement of the internal communication processes,
➢ Better improvement of the inter-human relations.

V. CONCLUSION

6S concept strongly supports the objective of organization to achieve continuous improvement and higher performance. It provides clean, well-organized, safety industrial working environment and reduces the floor space area. Our own research clearly showed that training of workers about 6S rules is very essential. Essential thing is to divide activities on some main steps and to maintain the continuous improvement. Implementation of 6S is half the battle and the other half is sustaining it.

REFERENCES