

Review of 5S in the Form of Case Study of an Indian SME

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ABSTRACT

5S not only plays a pivotal role in improving manufacturing performance, but also it is a prerequisite for quality and maintenance management initiatives like TQM, TPM, JIT, and Six Sigma. Here, in India, the execution of 5S is quite challenging for SMEs as they are working with many inherent limitations, and in addition, the work culture and their attitude towards the quality are entirely different from large-sized enterprises. This paper is intended to articulate the success story of 5S implementation in an SME in integration with comprehensive literature of 5S. The advantages with critical parameters for the successful execution of 5S are presented in the conclusion.

Keywords: 5S, critical parameter, maintenance management, SMEs

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INTRODUCTION

The conceptual evolution of 5S is rooted in Japanese cultural principles of 'Shintoism', 'Confucianism', and 'Buddhism' [1]. The principle 'Shintoism' focuses on the cleanliness, 'Confucianism' focuses on orderliness, and 'Buddhism' is deriving spiritual fortitude from self-discipline. The formations of the aforesaid values were contributed by these three principles in Japan [2]. The 5S philosophy was formally introduced at the end of the 1960s. Osada [3] and Hirano [4] had proposed the major framework and application of 5S. During the 1989–1991s, the framework based on five pillars in Japanese acronym for Seiri (Organization), Seton (Tidiness), Sesio (Cleaning), Seiketsu (Standardization), and Shitsuke (Discipline) was developed by Takasi Osada [5]. In the Western world, a common definition of 5S is

'housekeeping' [6]. 5S is one of the basic steps used for total productive maintenance (TPM) implantation [7]. If 5S is not deployed at the workplace seriously, it leads to 5D (delays, defects, dissatisfied customers, declining profits, and demoralized employees [8].

CASE STUDY

The ABC Pvt. Ltd. has shown commitment to implement 5S in Sachin (Surat) plant. The company is engaged in manufacturing of textile machines and facing the problems like limited space, improper method for storing casting and other raw material, WIP inventory was kept on the shop floor, extra longitudinal inventories were kept on the walkway, sanitation was very poor, wastage of lubricant and coolant, lack of awareness for safety measures. A road map for 3 months of execution and the next 2 months for audit was worked out.

1S-Seiri: The first ‘S’, Seiri, is for ‘Organization’, i.e. sorting or holding the essential items only at the workplace [9]. It discards irrelevant things from the workplace and hence eliminating hindrance in the workflow [10]. For executing first ‘S’, all materials/items in the plant were classified into five categories and about 3 tons of scrap, broken, and unusable items were discarded (Figure 1).

2S-Seiton: The second ‘S’, Seiton, is for developing the economical use of workspace with orderly and neat storage of items. It asks for prioritization of the necessary items/goods to allocate the location with maximum ease of utility. The key questions who, what, why, where, when, and how [11] should be asked in respect of each item/goods for allotting location [12]. This reduces the time taken in retrieving and putting back the items after use [13]. This location selection depends on the category and subcategories of item, size and shape, frequency of use, place of utility/consumption, and safety requirements (Figure 2).

For allotting designated locations, the need for racks, cupboards, and stand was worked out. The designated location was given by concerning usage frequency and ease of retrieval. All storage spaces were

labelled for particular components/items. The walkway and machine area were made free from the material.

3S-Seiso: The third ‘S’, Seiso, is related to inspection, cleanliness, and creating a faultless workplace [14]. The presence of dust, dirt, trash, or scrap at the workplace reduces work efficiency and increases the need for maintenance and repair [15]. This step includes three primary activities: workplace cleaning, maintaining its appearance and implementing preventive measures for cleanness [16]. Seiso helps in the reduction of equipment failure, improves the quality of product and safety concerns, and creates a cheerful work-environment [17].

For sweep and shine activity, the plant was divided into various zones and subzones. The area supervisors (zones and subzones) have given responsibility for cleaning. The cleaning schedule (starting point and whole sequence) is defined for two sweepers. The sweepers were provided new sweeping equipment and narrow trolley for chip collection. The numbers of dustbin were also increased. The major sources of contamination were found as mishandling of oil, coolant, paint, and metal chips. As shown in photographs, new containers with tap, bickers (with marking), and oil cuppy/canes were employed.



Fig. 1. Seri-sorting and discarding wastage.

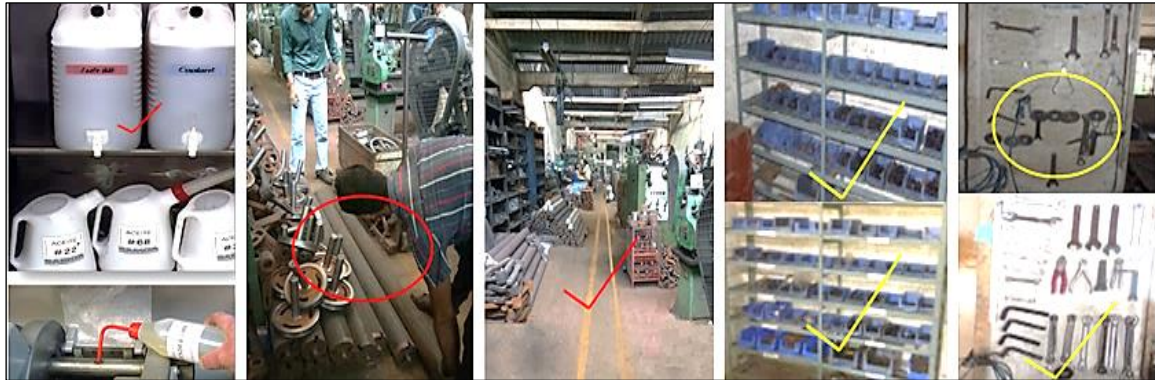


Fig. 2. Seiton–bifurcation of items and neat storage.

4S-Seiketsu: The fourth ‘S’, Seiketsu, is for adopting methods and practices to maintain the first 3S, i.e., Seiri–Seiton–Seiso [3, 18]. It involves the creation of guidelines, standardization of the first three ‘S’, and making standard visuals for them [19]. Standardization can be attained by innovation and visual management [20]. Standardization decreases the maintenance and overhead cost, and increases the process efficiency and loyalty to the organization [17].

For standardization, various formats were developed for ensuring cleaning and performing regular maintenance. The operators were trained to spend minimum time on routine cleaning and maintenance. The initial time was fixed to 15 minutes; however, it is recorded in the range of 15–20 minutes. The machine-wise schedules were prepared for preventive maintenance. The new format for data collection was given. During the starting phase (first one month), the proprietor was asked to make at least three visits in a day for inspecting the 1S and 2S activities and data collection (Figure 3).

In addition to the above, standardization was also adopted for safety, lighting, and sanitization of workplace. A sufficient number of fire extinguishers were provided all over the shop floor. Training

was given to each and every individual about how to use a fire extinguisher in case of emergency. It was ensured that all materials earlier kept on the floor and walking area was not coming back from proper place. New safety shoes were provided to all employees on the same day. The eye safety was ensured during the welding process by special emphasis. Safety instructions (pictorial) were displayed at eight strategic locations. Workers were concerned before all the major changes. Their suggestions were taken before making various charts and posters to provide involvement feeling.

5S-Shitsuke: The fifth ‘S’, Shitsuke, is for sustaining or self-discipline which was added later into the above 4S [19]. It is critical to understand and implement because it asks for the proactive changes in the behaviour of all levels of employees [14]. Here, the focus is on creating a workplace with good habits, and bad work habits are broken by teaching everyone what should be done [21].

For creating ease of work and habit, the visualization technique was employed. Various visual aids in the form of posters were pasted on the wall. The time and points of lubrication were made visible. A special hooter was employed as a signal for starting and ending maintenance work.



Fig. 3. *Seiketsu – Standardization through various formats and visual aids.*

CONCLUSION

The SMEs are working with limited financial and human resources. The implementation of 5S in SMEs is a crucial task as the proprietor/top management has multiple roles and their priority is to bring business; there is a deficiency of formal procedure and a disciplined approach; lack of concrete efforts for the development of a quality culture; lack of data recording and analysis system; lack of experience of using consultants and collaboration. The following are the critical parameters to ensure the successful execution of 5S in SMEs: (1) direct involvement of proprietor/top management; (2) allotment of financial and human resources; (3) awareness of benefits and training to all employees; and (5) adoption of visual management.

The execution of 5S provides the concrete foundation to the execution of TQM, lean manufacturing or TPM like quality improvement programmes. Seiri and Seiton facilitate clutter free workplace as they are aimed to remove unnecessary and unwanted items from the workplace. They place the necessary items in proper order at relevant areas in a well-organized way, and thus reduce the wastage of time for retrieval or repair. Seiso ensures faultless and health workplace. Seiso and Seiketsu implementation leads to autonomous maintenance. Seiketsu and Shitsuke help in establishing a quality culture. 5S also improves the safety climate and cycle time, inventory management, and floor area utilization, and thus it helps in TPM execution.

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