Research Paper Engineering

5S Strategy for Productivity Improvement: A Case Study

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ABSTRACT

In an organization the prime importance is given to the quality and productivity, which is solely, depends upon the on defects in the product, accidents, down time in the production, working conditions, housekeeping etc.
In a manufacturing environment, implementing 5S can result in considerable improvements in environmental performance besides with improved housekeeping and health and safety. The 5S is a set of straight forward steps towards continual improvement. Implementation of the 5S can improve the quality, productivity and working conditions in the organizations.

Keywords: Down time, Environmental Performance, 5S strategy

Introduction
With the changing techno-economic scenario around the entire world, the market has turned from seller to buyer type. The main objective of every organization is to satisfy the stated and implied needs of the customers. To provide quality product within stipulated time it is necessary to improve the working conditions. In order to improve the performance of employee, organization has to create interesting working environment. A pleasant condition can help improving performance and motivation on the workers [1].

5S is a system in which to reduce work and optimise productivity and quality through maintaining an orderly workplace [2].

The benefit of good workplace include the prevention of defects; prevention of accidents; and the elimination of time wasted for searching tools, documentation and other ingredients of manufacture[4]. 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, elimination of losses connected with failures and breakdowns in machines, improvement of the quality and safety of work.

The implementation of 5S is crucial as it serves as stepping stones to create a strong housekeeping culture in the organization [1].

The philosophy of the 5S has its roots in Japan. Name 5S is the acronym of five Japanese words of the following meanings:

1. Seiri (Sort),
2. Seiton (Set in order),
3. Seiso (Shine),
4. Seiketsu (Standardize),
5. Shitsuke (Sustain).

Company background
Sunmill Industries Pvt. Ltd. Shiroli M.I.D.C. Kolhapur relatively new to lean concepts. The company is engaged in manufacturing of automotive parts such as Suspension Bracket (John Deere), Steering Control Unit (Eton), Linday Housing (Dana India Pvt. Ltd.) and Header HA2 (Kirloskar Oil Engine Ltd.).

In company employees were working in uncomfortable, dirty, messy environment which was usually full of unused materials. Because of this situation, it was difficult to find the appropriate tools which were needed.

Problem statement
In Sunmill Industries, much time was wasted in set up than the machining time. Due to all the material was misplaced and most of the materials get lost. So to increase the productivity it was necessary to reduce the non productive time.

5S Strategy
5S is a strategy for attaining workplace organization and cleanliness, and it will do more for quality, productivity and morale than any other lean manufacturing improvement tactic.

The first 'S' stands for Seiri (Sort)

It is a waste reduction step; all materials are separated as necessary and unnecessary. Sorting eliminates the waste material (raw materials and materials), nonconforming products, and damaged tools. To sort out necessary and unnecessary materials red tag is used. It helps to maintain the clean workplace and improves the efficiency of searching and receiving things, shortens the time of running the operation.

Photo 1. During "Sorting of material"
The second 'S' stands for Seiton (Set in order)

The materials that were separated in earlier stage is stored orderly and labeled, so as to it will easily found whenever required. It will reduce the time required for searching the materials and tools.

Photo 2. Before "Set in Order"

Photo3. After "Set in Order"

The third 'S' stands for Seiso (shine),

It is related to the cleaning and sweeping of workplace and machinery. During shine, it is checked the cleanness of machine, workplace and floor, cleanness of air lines, hydraulic pipes, gauges, indicators, sources of light, preventive maintainenece of the machinery and equipment etc.

The fourth 'S' stands for Seiketsu (standardize), In this step standard procedure and work instructions are prepared to maintain 3S. Before starting of work, 5 minutes are invested to check and correct the sorted items, placing equipments at its place and cleaning etc.

The fifth 'S' stands for Shitsuke (sustain), Sustain is about the mental and physical disciplines required to maintain the other 4S items.

The 5S Implementation Plan

The 5S implementation requires commitment both from the top management and everyone in the organization. Entire organization is distributed in three zones. For each zone teams are formed. All the employees are distributed in to teams and one team leader for each zone. The 5S system is implemented in to these three zones.

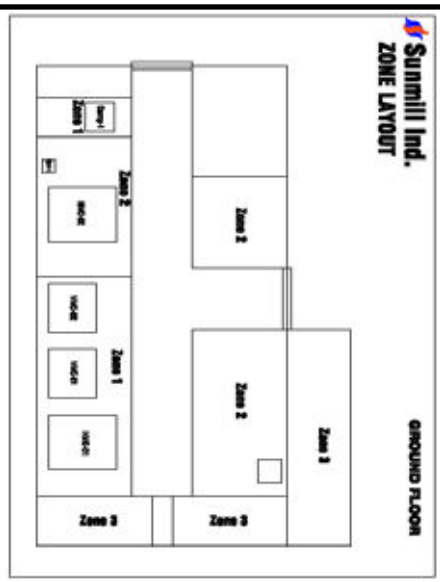

Fig.1. Zone Layout (Ground floor)

Results of 5S Implementation

Time Consuming Analysis

The Sunmill Industry produces various products and requires different sizes of drills, mills and tools and toolings. The data was collected by recording the time required for fixture set up before and after implementing 5S. Time consuming analysis is done for fixture set up of Linday Housing. Its demand is continuous. Linday housing is machined on vertical machining centre (Hartford VMC). It is a job of DANA India Pvt. Ltd. Pune.

Photo4. Hartford VMC

Fixture setting includes

1. Fixture receiving time from store to machine,
2. Other tooling like bolts, studs receiving time,
3. Fixture mounting time,
4. Table cleaning,
5. Fixture setting,
6. Offset setting,

Table 1 Before 5S implementation

Observation no.	Shift	Total time required for fixture setting
1	Day	87 min.
2	Night	110 min.
3	Day	90 min.
4	Night	105 min.
Average		98 min.

The observations were taken at 10 days interval of time.

Table 2 After 5S implementation

Observation no.	Shift	Total time required for fixture setting
1	Day	67 min.
2	Night	80 min.
3	Day	72 min.
4	Night	85 min.
Average		76 min.

The observations were taken at 10 days interval of time.

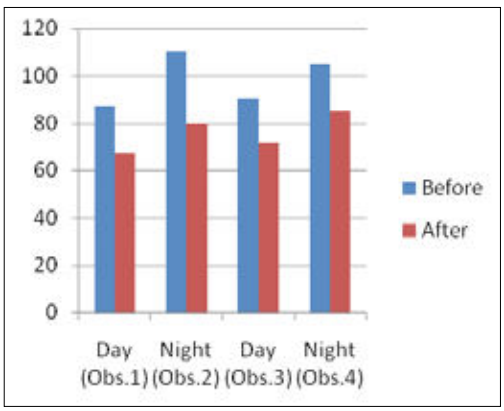

Fig. 2 Fixture setting time

Space Utilisation

In industry, lot of unwanted, scrap materials, old rejected jobs were thrown in basement room. Because of material was not stored properly that space became waste. During 5S implementation extra efforts were taken during sort out stage at basement room. And at the end of sorting stage it was observed that 250 sq.ft. space free to use.

Photo5. Basement before sorting of material

Photo5. Basement after sorting of material

Conclusion

The 5S is an effective management tool which can improve housekeeping, environmental conditions and health and safety standards. 5S sort stage eliminates unused, unwanted material from the shop floor which reduces clutter. In Sunmill Industries after sort stage 250 sq.ft. space is available for use.

Set in order allocates space for components, materials and tooling in organisation results in reduction in searching time. As searching (non productive) time reduces, productivity increases. After 5s implementation, it is observed that fixture setting time of Linday housing is reduced by 28%. Materials are stored at its allocated space so that it becomes very easy to find out material stock level.

Results of 5S are visible within short period of time. Employees in the organisation become self disciplined.

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