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Implementation of lean manufacturing tools to enhance the productivity of agro equipment industry

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ABSTRACT

5S is one of the best tools of Lean Manufacturing systems. A small-scale industry plays an important role in Indian economy. In an organization, the prime importance is given to quality and productivity. A problem comes across due to the effects in materials, downtime in production, working conditions, and housekeeping etc. This Paper deals with the 5S implementation in an industry, Implementation of 5S can result in considerable improvements in environmental performance beside with improved housekeeping and health and safety.5S can improve the quality, productivity and working conditions in organizations. The improvements before and after 5S implementation are shown by pictures in the paper. It also intends to build a stronger work ethic within the management and workers who would be expected to continue the good practices.

Keywords— *5S, Strategic planning, Down time, Change, Productivity, Lean manufacturing*

1. INTRODUCTION

In this changing business, it is important to win the hearts of customer through quality and cost of the product or service. It is also required to have a productive production with continuous improvement. The present need of the organization is to deliver high-quality product through continuous improvement. To fulfill this requirement, the 5S technique emerged for better production in the industries.

5S is a technique originated from Japan and it was first developed by Hiroyuki Hirano. It includes five words of S i.e. Seiri, Seiton, Seiso, Seiketsu and Shitsuke, which means Sort, Set in order, Shine, Standardize and Sustain respectively. The 5S technique is derived from "Kaizen" Which means "change for the better". It allows the enhancement of efficiency and productivity in the industry. The 5S technique is a program to achieve total organization cleanliness and standardization in the workplace for better productivity. The benefit of the 5S technique is an improvement in productivity, quality, health, and safety.

The term of 5S given as:
SEIRI (sort): Removal of all unwanted & unnecessary materials in the workplace.
SEITON (set in order): Putting everything in an assigned place so that it can be accessed quickly as well as returned in that same place quickly.
SEISO (shine or clean): Cleaning up the workplace and giving it a 'shine'.
SEIKETSU (standardize): Defining the standards by which one must measure and maintain cleanliness.
SHITSUKE (sustain): Maintain orderliness and to practice the first 4S on regular basis.

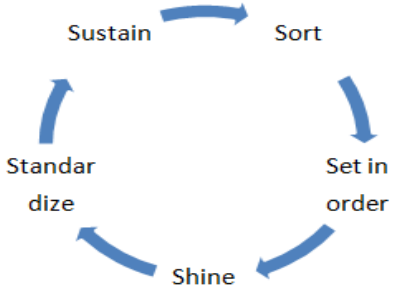

Fig. 1: 5S Cycle

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2. PROJECT PLANNING

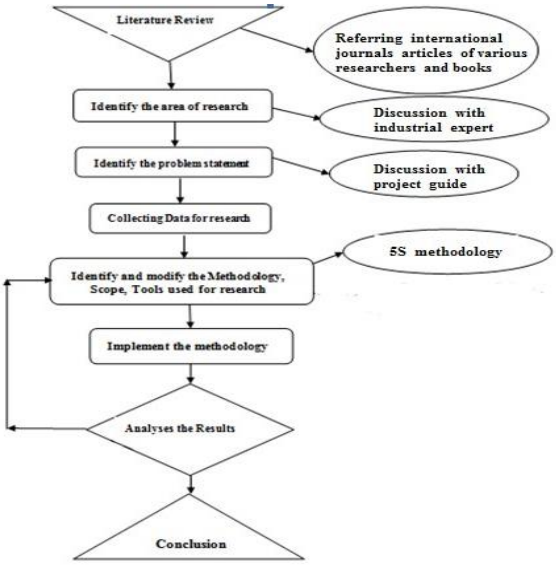

Fig. 2: Project planning

In this paper, project planning has been done by referring international journals articles of various researches and books. After referring journals and having a discussion with an industry expert, we found the area of research. Once identifying the area of the research problem was defined with the help of the project guide. After discussion, the data related to the research area was collected. By understanding the reliability process methodology, scope, tools used were identified. After this 5S methodology was implemented and the result was analyzed.

3. LITERATURE REVIEW

(10) Chakraborty et al. (2011) studied the critical problems facing by small-scale industries while selling their product. SSE (Small Scale Enterprise) is not having a huge financial backup and therefore they are depending upon the revenue earned after selling their product. The product sales can only be increased by reducing the cost of the product. (11) Upadhye et al. (2010) studied the importance of small and medium scale industries in the Indian context. Medium size manufacturing industry plays an important role in Indian economy. Their contribution to the economic development of the nation is indeed significant. But the productivity level of these industries is quite low as compared to another country. (6) P. M. Rojarsra, M. N. Qureshi, " Performance Improvement through 5S in Small Scale Industry: A Case study ", International Journal of Modern Engineering Research (IJMER), Vol.3, Issue 3, pp-1654-1660, 2013..(7) Chauhan et al. (2010) shows the problem to sustain in the global market for an organization. Lean manufacturing is a hymn of survival and success of any organization. The goal of lean manufacturing is to minimize all types of waste so the cost of the product can be reduced. (12) Hudli and Inamdar (2010) described the development of key areas which could be used to assess the adoption and implementation of lean manufacturing practice also presented some of the key areas developed to evaluate and reduce the most optimal project so as to enhance their production efficiency. (13) Lucas et al. (2010) focused on implementation of lean on small manufacturer of all 4-wheel drive vehicles, through implementation of basic lean tool, the small manufacture rapidly increase output and reduce quality defects by 80%.(14) Kumar and Kumar (16) Khedkar et al. (2012) worked on implementation of 5S on plastic molding industry. 5S is used in small (2010) described the steps undertaken for the implementation of 5S emphasizing on the benefit of an organization. Also described the initiation and benefit of implementing the 5S (15) Gheorghe (2008) presents a continuous improvement strategy aiming to improve manufacturing at Auto car Exhaust. The implementation of 5S has an immediate and significant effect on the sequence of activities in the work post, thus influencing the performance of the process in the analyzed company. Industry and also showed the advantages and benefits of 5S implementation. (17) Prashant Koli (2012) presented the methodology for calculation of each S in the 5S system.

4. COMPANY BACKGROUND

A one of the leading company in M.I.D.C Akola Maharashtra India relatively new to learn concepts. The company is engaged in manufacturing of Threshers such as Post-harvesting thresher, seed cleaning and drying machine, cotton seed dryer, dal-mill dryer, distoner etc. In company employee was working in an uncomfortable, dirty, messy environment, no rules and regulation, employee do not worry about safety storeroom were usually full of unused materials. Because of this condition, it was difficult to find the proper tools which were needed in production. [5]

5. PROBLEM STATEMENT

In that leading company, much time was wasted in set up than machining time and material and equipment handling time. So to increase the productivity, it was necessary to reduce the non-productive time on the production line and tool handling time[5].

6. 5S STRATEGY

5S is a strategy for attaining workplace organization and cleanliness, and it will improve quality, productivity and moral than any other lean manufacturing improvement.

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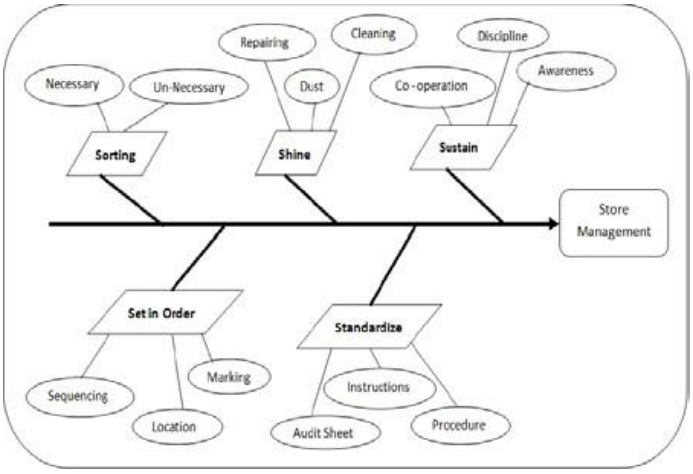

Fig. 3: Fish bone diagram

Above fishbone diagram shows various phases of 5S methodology. In each phase, we have described the problem by using this phases we have solved the store management problem.

The first 'S' stands for seiri (Sort)

It is a waste reduction step; all materials are separated as necessary and unnecessary. Sorting the elimination of waste materials (raw materials, tools, and material), and damaged tools. To sort out necessary and unnecessary materials red tag is used. Its help to maintain the clean workplace and improves the efficiency of searching and receiving things shorten the time of running the operation.[5], In sorting we distinguished the useful and scrap items. Then scrap items were kept all aside at one location and we named the location as scrap yard which is just located beside the entrance of storeroom.

Fig. 4: Scrap area and store room entrance

The above image is of the company's storeroom where we have segregated the scrap and placed it besides the entrance and named it as a scrap yard. In this scrap yard, we placed all the scrap at one time and some of the scraps are placed at a different location due to a shortage of space.

Fig. 5: Sorting before and after

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The second 'S' stands for Seiton (Set in order)

The materials that were separated in an 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.

Fig. 6: Shows orderliness of scrap material

Sorted and arranged the flanges in accordance with their sizes i.e. 20NB, 25NB, 50NB, 80NB, 65NB,100NB.

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

It is related to the cleaning, shine and sweeping of workplace and machinery. During cleaning, it is checked the cleanness of machine, workplace area, and sources of light, preventive maintenance of the machinery and equipment etc.[5], we implemented this method as we were proceeding with the sorting method. As we were proceeding the sorting, we were differentiating used & not used items and then we cleaned the whole workplace, then after this, we reached every rack and then cleaned every rack for cleaning method. For cleaning, we removed all the items from their racks and cleaned racks. While cleaning we also fixed the air conditioner leaked pipe.

Fig. 7: Removing all unnecessary things shine

The fourth 'S' stands for Seiketsu (standardize),

In this step standard procedure, audit sheet and work instructions are prepared to maintain Sieso. Before starting of work to check and correct the sorted items, placing equipment's at its place and cleaning etc. and give a proper reading on audit sheet and create awareness in employee to maintain this thing on the production line or on nonproductive line.[5]

The fifth 'S' stands for Shitsuke (sustain),

Sustain is about the mental and physical disciplines required to maintain the other Seiketsu items. It is done with help of co-operation between employees, storekeeper, engineer, and manager. [5]

7. RESULTS AND DISCUSSION

Time analysis of implementation of 5S

Time analysis or Time comparison play an important role in a company or industry to improve working and production efficiency. Time analysis nothing but comparison of operation time means how much time taken by the process, manufacturing of

product, searching of tools and materials, etc., We have implement 5S in Agricultural equipment's company, what is effectiveness after implementation of 5S we have recorded and compared it with old record, effectiveness of 5S before and after implementation is given below Table.1,Since effectiveness reading is given out of 1, for example, the effectiveness of material searching is taken 0.7 out of 1 before implementation of 5S now after it is 0.9 out of 1, similarly the effectiveness reading is given to other processes. From that comparison, we conclude that overall change is 75% means we have increased it up to 20% after implementation of 5S. Since it also increases productivity.

Table 1: Processes effectiveness after and before implementation of 5s

S. no.	Processes	Before	After
1	The special trolley is made for material handling	0.7	0.9
2	Three days Planning mention on board.	0.6	0.8
3	Direct Sticker is Stick On Specific Place	0.5	0.7
4	the shearing machine is before the bending machine	0.4	0.5
5	Hydraulic Punching machine used for Hole	0.4	0.8
6	Working Efficiency	0.6	0.7
7	Overall Change In Percentage	55%	75%

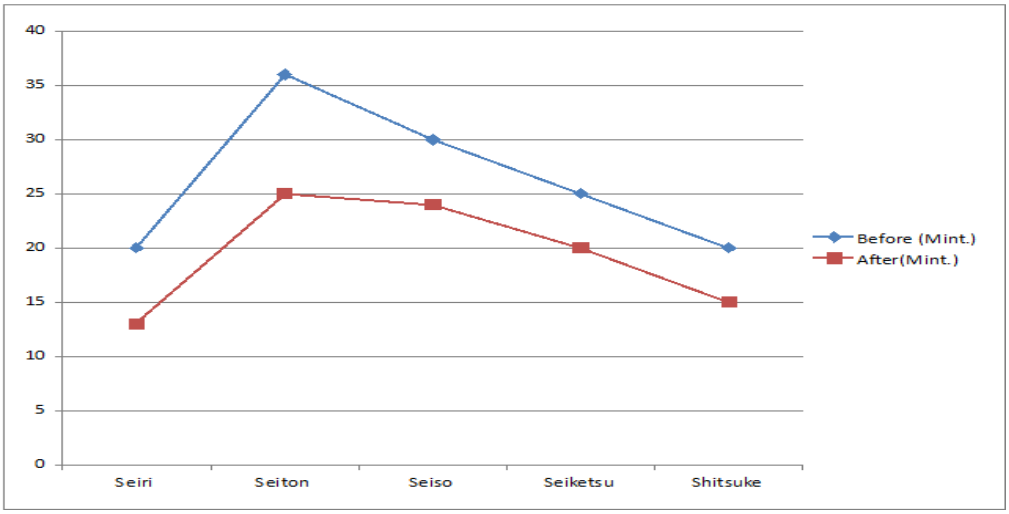

Fig. 8: Line graph

In the above Line Graph diagram, we did time comparison of industrial product "Post-harvesting thresher". Before implementation, it takes more time for production of one product. But after implementation of all phases of 5S, it takes less time for production of the thresher.

Time comparison of thrasher

Fig. 9: Thresher

8. CONCLUSION

The 5S is an effectiveness to manage tools and materials which can improve housekeeping, environmental conditions and health, and safety standards and increase productivity and quality. 5S sort stage eliminates unused, unwanted material from the storage room which reduces clutter. Set in order allocates space for components, due to this it gives more space for storing more material and tools and results in a reduction in searching time. 5S reduce the searching time and improve the production and quality of the products and employees and organization become self-disciplined.

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9. REFERENCES

[1] Aziz Wan Asri Wan Abdul, Mat Azman Che, "The Effectiveness of Implementation of 5S on Employee Motivation", Business and Social Sciences Review (BSSR), Vol. 1, No. 1, pp. 41-51, 2011.

[2] Osada T. "The 5S: Five Keys to a Total Quality Environment", Asian Productivity Organisation, Tokyo.1991

[3] Nilipour Akbar, Jamshidian Mehdi, "5S As an Environmental Organization Management Tool; Benefits and Barriers", 3rd International Management Conference, pp.1-10, 2005.

[4] Wazed M.A., Ahmed Shamsuddin, "Theory-Driven Real Time Empirical Investigation on Joint Implementation of PDCA and 5S for Performance Improvement in Plastic Moulding Industry", Australian Journal of Basic and Applied Sciences, 3(4): pp. 3825-3835, 2009.

[5] R. A. Pascale, Prof. J. S. Bagi," 5S Strategy for Productivity Improvement: A Case Study", Indian Journal Of Research, Volume: 2, Issue : 3, Issn-2250-1991, 2013.

[6] P. M. Rojarsra, M. N. Qureshi, " Performance Improvement through 5S in Small Scale Industry: A Case study", International Journal of Modern Engineering Research (IJMER), Vol. 3, Issue 3, pp-1654-1660, 2013.

[7] Chauhan et al., "Measuring the status of Lean manufacturing using AHP" International Journal of Emerging technology, vol.1 no.2, pp.115-120, 2010.

[8] Miller et al., "A case study of Lean, sustainable Manufacturing" Journal of Industrial Engineering and Management, vol.3 no.1, pp.11-32, 2010.

[9] Girish Sethi and Prosanto Pal, "Energy Efficiency in Small Scale Industries – An Indian Perspective" Tata Energy Research Institute.

[10] Chakraborty et al. "Internal obstacles to quality for small-scale enterprises"', International Journal of Exclusive management research, vol. 1, no. 1, pp. 1-9, 2011.

[11] Upadhye et al. "Lean manufacturing system for medium-size manufacturing enterprise: An Indian case", International Journal of management science and engineering management. Vol.5, no. 5, pp. 362-375, 2010.

[12] Hudli and Imandar, "Areas of Lean manufacturing for productivity improvement in a manufacturing unity", world academy of science, engineering and technology, vol. 69, 2010.

[13] Lukas et al. "Lean implementation in a low volume manufacturing environment: A case study" Proceedings Industrial Engineering Research Conference, 2010.

[14] Kumar and Kumar. "Steps for Implementation of 5S" International Journal of management. IT and Engineering. vol. 2, no.6, pp. 402-416, 2012.

[15] Gheorghe Dulhai. "The 5S strategy for continuous improvement of the manufacturing process in auto car exhausts", Management and marketing, vol. 3, no. 4, pp. 115-120, 2008.

[16] Khedkar at el. "Study of implementing 5S techniques in Plastic Moulding" International Journal of modern engineering research. vol. 2, no 5, pp.3653-3656, 2012.

[17] Prashant Koli." General Implementation and Calculation of 5S Activity in any Organization" International Journal of Science and Research, vol.1 no.3, pp.229-232, 2012.

[18] WALKER, T. Creating total quality improvement that lasts, National Productivity Review, 114, 2008, 473-478 p 2008.

[19] ANSARI, S. L., BELL, J., Target Costing: The Next Frontier in Strategic Cost Management, Irwin Professional Publishing, Chicago, IL, USA, 1997

[20] BOCA, G., 5S in practice, XXIV Micro CAD, International Scientific Conference, University of Miskolc, 29-34 p., ISBN: 978-963-661-916-3, 2010.

[21] BLACK, S., PORTER, L., Identification of the critical factors of TQM, Decision Sciences, Vol.27, N0 1,1-21 p,1996.

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