

Implementing 5S Practice in Foundry Shop

S. Elango^{1*}, D. Ajay², B. Dharsan Venkatesh³, S. N. Dinesh⁴

^{1,2,3}Student, Dept. of Mechanical Engineering, KPR Institute of Engineering and Technology, Coimbatore, India

⁴Assistant Professor, Department of Mechanical Engineering, KPR Institute of Engineering and Technology, Coimbatore, India

*Corresponding author: elclassy312@gmail.com

Abstract: Small scale industries play an important role in Indian economy. It has emerged as powerful tool in providing relatively larger employment next to agriculture. It contributes more than 50% of the industrial production in terms of value addition and generate one third of the export revenue. Global markets are continuously changing and the customers are demanding high quality products with affordable cost. Such products can be produced using lean manufacturing process, a management philosophy that aims at reducing all types of wastes (non – value added activities) to achieve higher quality products with low cost. One such Lean technique is 5S. 5S methodology a lean concept is a Japanese method of organizing the workspace in a clean, efficient and safe manner in order to achieve a productive working environment. Our project focuses on implementing 5S practice in foundry shop to enhance the safety of working environment, so that productivity and employee morale can be improved.

Keywords: 5S methodology, Enhance safety, Productive environment.

1. Introduction

Every organization aims to increase the productivity and profitability with reduced cost. In a changing business environment, organization can only be successful by delivering high quality products with reduced cost in specific time and at precise location. The productivity of the organization can be achieved by eliminating or minimizing the wastes and by the effective utilization of the available resources. To remain competitive in a global market and to adapt with a changing environment, organization should think of lean way of manufacturing instead of traditional manufacturing techniques.

5S is a systematic form of visual management utilizing everything from floor tape to operations manuals. It is a house keeping technique used to establish and maintain productive and quality environment in an organization. It is not just about cleanliness or organization, but also about maximizing efficiency and profit. 5S is a framework that emphasizes the use of a specific mind-set and tools to create efficiency and value. It involves observing, analyzing, collaborating, and searching for waste and also involves the practice of removing waste. 5S, sometimes referred to as 5s or Five S, refers to five Japanese terms used to describe the steps of the 5S system of visual management. Each term starts with an S. In Japanese, the five S's are Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. In English, the five S's are translated as Sort, set in Order, Shine,

Standardize, and Sustain.

Thus, 5S being chosen as an adequate tool for improvement of the organization processes. On implementing 5S methodology effectively in the organization which can minimize production time, minimize waste, reduce cost, increase safety and effective utilization of available resources. This thesis aims at giving insight into the practical implications connected to the deployment of 5S.

2. About the Company

Sukra Alloy Cast India Pvt. Ltd. is a small scale foundry incorporated on June 2008. The industry is situated in Kalangal, Coimbatore. The industry produces casting of metals that include finished and semi- finished castings

3. 5S Meaning

1. Seiri (sorting, organization of the workplace, elimination of unnecessary materials). Refers to the practice of sorting through all the tools, materials, etc., in the work area and keeping only essential items. Everything else is stored or discarded. This leads to fewer hazards and less clutter to interfere with productive work.
2. Seiton (set in order, place for everything). Focuses on the need for the workplace in order. Tools, equipment, and materials must be systematically arranged for the easiest and the most efficient access. There must be a place for everything, and everything must be in its place.
3. Seiso (shine, cleaning, removing of wastes, dust etc.). Indicates the need to keep the workplace clean as well as neat. Cleaning in Japanese companies is a daily activity. At the end of each shift, the work area is cleaned up and everything is restored to its place.
4. Seiketsu (standardize, constant place for things, constant rules of organization, storage and keeping cleanness). Allows for control and consistency. Basic housekeeping standards apply everywhere in the facility. Everyone knows exactly what his or her responsibilities are. Housekeeping duties are part of regular work routines.
5. Shitsuke (sustain, automatic realization of above-mentioned rules). Refers to maintaining standards and keeping the facility in safe and efficient order day after day, year after year.

A. Objectives of 5S

- Reduce: Overall Cost, Waste, Time Inventory or Stock, Industry Pollution
- Improve: Customer satisfaction, Quality, standardized work Awareness & Morale of Employees, Efficiency, Self – Discipline, Work Environment, Inter Human Relation or Team Work, Productivity, Safety

B. Importance of 5S

- A clean workplace improve quality, productivity.
- A clean workplace reduce cost.
- A clean workplace is safe for people to work.

C. Implementation of 5S

1S – Sort: Sort is the process of removing all the items that are not needed for current production from the work area [10]. Everything else is stored or removed.

Action Steps:

- Identify a 5S-project area and take "present situation" pictures.
- Review sorting criteria.
- Mark a local red tag area.
- Tag, record, and move red tagged items to their particular place.
- Take "reconstruction" pictures.

Resources required:

- Red tags.
- Red tag record forms.
- Camera for “present situation” and “reconstruction” pictures.

Target Outcomes:

- Increase in floor space utilization.
- Searching time of tools, materials, and papers is reduced.
- Inventory cost of unnecessary items is reduced.

Red Tags - A Useful Sorting Tool

- The red tag is a useful tool to help the sorting process - in the factory, warehouse, or office.
- These tags are used to identify unnecessary items that need to be thrown out, recycled, sold or relocated.

When are red tags useful?

- If you need more visual control over your sorting process.
- The area is very large.

2S – Set in order: While “SEIRI” helps us to decide the items needed, “SEITON” helps to decide the way they are to be placed so our working is smooth. Arranging items in a way that they are easy to use. Labeling them so that they are easy to find and put back.

Action Steps:

- Take “present” pictures.
- Implement workplace changes.
- Mark locations by creating addresses and applying labeling, marking, and color-coding.

- Take “reconstruction” pictures.

Resources required:

- Present plant standards for labeling, marking, and color-coding.
- Labeling supplies.
- Tape for creating borders on work surfaces and floors.
- Paint and painting supplies.

Target Outcomes:

- Take things out and put things properly back easily.
- Make less mistakes.
- Reduce search time.
- Work environment becomes safe.

Problem avoided by implementing set in order

- Motion waste, searching waste.
- The waste of human energy, defective parts, unsafe condition.

3S – Shine: Indicates the need to keep the workplace clean & neat. Cleaning in Japanese industries is a daily activity. At the end of each shift, the work area is cleaned up and everything is restored back to its place. This means removing dirt, strain, filth, soot and dust from the work.

Action Steps:

- Define "clean".
- Get clean supplies.
- Take "present" pictures.
- Cleaning of the work area.
- Identify contamination sources.
- Fix small imperfections.
- Take "reconstruction" pictures.

Resources required:

- Cleaning supplies such as brooms, dust pans, rags, degreasers, and floor cleaner.
- Personal protective equipment such as gloves and eye protection.

Target Outcomes:

- Work place becomes free of dirt and stains which will improve quality.
- Equipment lifespan will be prolonged and breakdowns will be less.
- Creates a pleasant environment
- Prevent & reduce accidents

4S – Standardize: Sort, set in order and Clean are easy to be done once, but difficult to maintain. To maintain we have to standardize the system. Seiketsu is nothing but standardization. The purpose of standardization is to make sure that everyone in the company follows the same procedure, the same names of items, the same size of signalization/floor marking, shapes, colors, etc. Standardize also helps to do the right thing the right way every time.

Action Steps:

- Brainstorm ideas for making the 5S changes standard operating procedure.
- Update documentation to reflect changes.
- Make sure all stakeholders are aware of the new standards - inform and educate.

Resources required:

- Support from those who can create documentation, job aids, and visual aids.
- Information and approval from those responsible for maintaining company procedures.

Poster-making supplies for posting new standards in work areas.

Target Outcomes:

- Activities will be simple.
- In the work practices.
- Avoid mistakes.
- Better visual and transparency management work efficiency will improve.

5S – Sustain: Sustain also means ‘Discipline’. It denotes commitment to maintain orderliness and to practice first 3S as a way of life. Sustain is the final pillar of the 5S system and its chief objective is to give your staff the commitment and motivation to follow each step, day in and day out. Every one sticks to the rule and makes it a habit.

Table 1
5S Implementation Result

BEFORE	AFTER
	
	
	
	

Action Steps:

- Monitor processes established during S4 – Standardize.
- Expand 5S efforts to other work areas.
- Evaluate 5S effectiveness and continuously improvement.
- Management audit forms.
- Resources for communication and recognition successes (newsletters, displays, awards).
- Presentation tools for sharing best practices with other work areas.
- Management commitment and focus on maintaining the new standards.

Target Outcomes:

- Promotes habit for complying with workplace rules and procedures.
- Creates healthy atmosphere and a good work place.
- Helps in develop team work.
- Provides for improving 5S.

4. Case-study of 5S

The 5S methodology relies on the creation and keeping well organized, clean, effective and high quality workplace. The 5S methodology was introduced to workers and implemented. Following is the result of the implementation. Refer Table 1.

5. Conclusion

Effective 5S implementation leads to productivity improvement in several ways for instance,

- Better usage of working area
- Minimum movement of man and materials
- Prevention of losing tools
- Effective utilization of the available resources
- Reduced searching time
- Reduced accidents

- Safety and hygienic work environment
- Increased awareness and employee morale
- Labor absenteeism was reduced
- Improvement in the internal communication

Acknowledgement

My Sincere thanks to my guide Mr. S. N. Dinesh and the Department of Mechanical Engineering in KPR Institute of Engineering and Technology for providing technical support to carry out this research work.

References

- [1] Shayam Sundar Sharma, D. D. Shukla, "Analysis of Lean Manufacturing in SMEs; A "5S" technique," 2019.
- [2] Jugraj Singh Randhawa and Inderpreet Singh Ahuja, "An Evaluation of Effectiveness of 5S Implementation initiatives in an Indian Manufacturing Enterprise," 2018.
- [3] F. C. Filip and V. Marascu-klein, "The 5S Lean Method as a Tool of Industrial Management Performances," 2015.
- [4] Kamal Singh and Akshay Deokar, "Effects of 5S Implementation On Performance of Organization," 2018.
- [5] Md. Al Amin and Sumit Joy, "Implementation of 5S in Jute Mill," 2015.
- [6] Amitkumar Dhanjibhai Makwana and Gajanan Shankarrao Patange, "Strategic Implementation of 5S and its Effect on Productivity of Plastic Machinery Manufacturing Company," 2019.
- [7] Inderpreet Singh Ahuja and Harwindar Singh, "Evaluating Effectiveness of 5S Implementation Practices in Indian Manufacturing Industry," 2018.
- [8] Ravi Chourasia, and Archana Nema, "Review on Implementation of 5s Methodology in the Service Sector," 2016.
- [9] Ravi Chourasia, Archana Nema, "Review on Implementation of 5S Methodology in the Service Sector," 2016.
- [10] Ashwin Desai, Shreedhar Shelar, "Implementation of 5S in Manufacturing Industry," 2019.
- [11] Mohd. Adzire, and F. O. Chai, "Implementation of 5S in Small and Medium Enterprises (SME)," 2019.
- [12] Mayur M Mhamunkar, and Arun Kumar, "5S Implementation in a Fasteners Manufacturing Company, 2017.
- [13] Pawal Falkowski and Przemyslaw Kitowski, "The 5S Methodology as a Tool for Improving Organization of Production," 2016.
- [14] Jugraj Sing Randhawa and I. S. Ahuja, "5S Implementation Methodologies," 2017.
- [15] Oleghe Omogbai and K Salonitis, "The Implementation of 5s Lean Tool Using System Dynamic Approach," 2017.