

# Review of Productivity Improvement in Pressure Vessel Manufacturing Industry

<sup>1</sup>Jignesh Jaysval, <sup>2</sup>Bhupesh Goyal, <sup>3</sup>Tejas Vyas

<sup>1</sup>PG Fellow, <sup>2,3</sup>Assistant Professor,

<sup>1,2,3</sup> Department of Mechanical Engineering.,

<sup>1,2,3</sup> Parul Institute of Technology, Parul University, Vadodara.

**Abstract**—The Project work carried out to apply the 5S and Kaizen Methodology of lean Manufacturing to solve the problems of a Pressure Vessel Manufacturing industry. The aim is to improve the productivity, solving several problems encountered in the production system, such as: long lead times, unnecessary motions, material handling, dead inventory and a non-standardized working environment. 5S and Kaizen is a basic lean Manufacturing Tool used for cleaning, sorting, organizing and providing necessary groundwork for work place improvement and reducing cycle time or long lead time.

**Keywords**—5S, Kaizen, Work Place Improvement S.O.P, Productivity, Reducing Lead Time;

## I. INTRODUCTION

This Paper Present The 5S Implement In Pressure Vessel manufacturing Industry. The 5S Methodology First developed in the japan. The Founder of The 5S Methodology is Hiroyuki Hirano.5S a The Five Element are As Follow:

[1] SEIRI (Sort) Means Unnecessary items Remove from the Work Place And Necessary item Are Placed to the Near Of The Work Table. Using Red Tag For Remove Item , Yellow Tag for Reworking The Job and Blue Tag are Used For Completing The Job.

[2] SEITON (set in Order) means All The Equipment, Material and Tools are arrange Such Manner It Can be easy Available And reducing Searching Time.

[3] SEISO (Shine/Cleaning) Cleaning is the Necessary because It is Reducing The Chance of Accident And Improve The Moral of The Worker. in This Step We will using The Cleaning Sheet And Give The Responsibility to the Worker.

[4] SEIKETSU (Standardize) Standard should be communicative and easy to understand in all Manufacturing Process. In This Step We Will provide The Standard Producer For every Work Process. In this Step we will Also Using The gamba chart.

[5] SHITSUKE Sustain is the last S of the 5S system which is deal with the regularity of maintaining the standard of the organization for the particular process. Sustain means Maintain All above 4s. Maintain 5S Process we will conduct the surprises Audit. In this steps also using the Audit List and Check List and Give the rating. We can also Measured the Efficiency of the 5s Process by rating Of Audit List And Check List. And Also Maintain The Cleaning Responsibility.

I will find out The Three Methodology or Tools For my Research Work **5S, Kaizen and Preventive Maintains**. This Methodology Are Used Similarly in Three Tools.

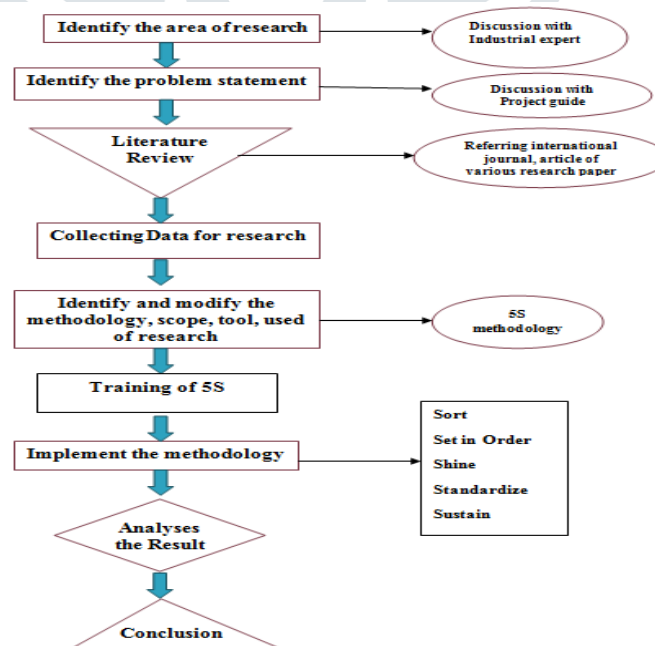


Fig 1 5S Implementation Step

## II. LITERATURE REVIEW

This literature review has been done to understand application and effectiveness of 5S And Kaizen methodology in Pressure Vessel manufacturing Industry.

Ben Ruben R et al. [1] This paper Study I did Find Out Bottle neck Operation and implement 5S in the Work place and Operating Standardize Working Process And Also Implement The Layout Configurations. This Activity We Are Achieving Cycle time of Welding Process Reducing from 500 liters Capacity 36 minutes from 48 minutes, and 220 Litter Capacity reduced to 40 minutes from 54minutes.

Kshitij Mohan Sharma et al.[2] This Paper Present The 5S Implement In Copper Wire Drawing Company. It is a universal tool which can be applied in any situation and any where starting from machine shop to the accounts department and head office. visual management system which creates a work environment that is 'self-explaining', self-ordering' and 'self-inspiring'.

Cristina vereset et al. [3] This paper I Did Observe That Positive Correlation Between 5S Evolution and Productivity in this Method which develop discipline and cleanness workplace and maximizing efficiency and ProductivityMiroslava

Míkva et al. [4] Improving standardized work is a never-ending process. It reduces the variations of the process and improves the quality of products and processes. In this contribution is described 5S method, which is used in organizations to eliminate, respectively elimination of waste in the workplace through five steps. 5S method to include in the standardization of processes and lean workplace. The aim of this paper to highlight standardization Work useful in improving the organization.

The Advantage of standardized work include documentation of the current process for all shifts, reducing the variability, easy training of new operators, reductions in injuries and strain, and a baseline for improvingactivities.

Ravi Chourasia et al. [5] After the study of This paper it is concluded that efficient use of 5S in an organization provides a safety Environment, optimal space utilization and to improve the quality. The results indicated that various service industries such as hospitals, hotels, banks and higher education have utilized the principles and tools of lean to increase their competitiveness. The 5S describes how items are stored and how the new order is maintained. It helps in increase in coordination between employees and improvement of staff productivity. It reduces the service time and increase customer satisfaction. The 5S methodology provides a basis to create an organizational culture and start working with continuous improvement criteria.

P.M .Rojasra et al [6] Krishna Plastic Company, Udhog nagar, 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 case Study of company. The results after the 5S implementations states that production system efficiency is improved from 67% to 88.8% in the successive week

R H. Sapat et al. [7] This paper represents an application of '5S' Methodology in one of the MNC Samsonite South Asia Pvt. Ltd. The aim of the implementation of '5S' in the Company is to Improve the productivity, safety, efficiency through effectively workplace management. The need of the implementation of '5S' in the Company due to unorganized work-stations, uncomfortable working environment and the excessive wastes in the company. The paper aims to implementation of '5S' in the Company which resulted in Increasing The Productivity And Working Efficiency of the Company.

Prof. Saad Shaikh.et al. [8] The Quality and Productivity is the Prime Important to the Any Industry. The Problem come across due to the defective materials, down time in production, working conditions, housekeeping etc. The 5S Implement is an effective to manage tools and materials which can improve housekeeping, environmental conditions and health and safety standards and increase productivity and quality. effectiveness of material searching is taken 0.7 out of 1 before implementation of 5S 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.

Vibhor Kakkar et al. [9] This Paper Represents the implementation of 5S in Manufacturing company and 5S rating system used to audit in all Area of the company. which Increasing the efficiency of the workers & ultimately the productivity of the company is increasing to 91 %.

HarshaLingareddy et al. [10] The 5S methodology maintaining well organized, clean, effective and high quality work place. Our research was carried out in a manufacturing company of the metal doors. There are introduced 5S methodology to the all worker on the shop floor and carried out a questionnaire for them. After that all the 5 rules of the 5S has been implemented on the

shop floor in a systematic order. There are Appointed one of the workers as a person responsible for the implementation of 5S for that Department and so with the other departments of the industry. This resulted in great changes on the shop floor.

Ajay Anantrao Joshi et al [11] 7S is the new Methodology consists of the seven phases namely Sort, Set in order, Shine, Standardize, Sustain or Self Discipline, Safety and Spirit. This paper Represent the methodology, action steps, resources required and target outcomes for the implementation of 7S as a tool of organizing workplace scenario. The 7S improves Company performance in terms of higher productivity, better quality, less accidents, clean, safe and healthier working environment.

Dr Gujar Anantkumar Jotiram et al. [12] Implementation of '5 S' We are Observed from the photographs the changes can be while the implementation work are carried out inside the company. The before and after images and standardization system techniques can be indicating the implementation work is successfully completed in the industry.

Avinaw Pratik et al. [13] This paper aims to determine performance factors and characteristics in industrial organizations and identifying the effectiveness of 5S implementation. The aim of the implementation of 5S in the organization is to Increasing the productivity, safety, efficiency through effective workplace management. During Implementation of 5-S Various Kaizen Method also being done.

Daniel Arefayne Legesse et al. [14] Traditionally operated garment industries are facing many problems. The problems are include production lead time, rework, poor line balancing, lack of standardized work process and performance measurement system for the employee, high work-in-process, low production capacity, high labor (operator) absenteeism, high fabrication waste and poor Space utilization. 5'S Implementation after The outputs have been increased to 292 pieces a day with 25 labours which was previously recorded to 250 pieces a day with 32 labour per line. Hence, after line balancing 21 labours are required to produce equal amount of pieces per line in a day.

K.Ramesh et al. [15] This paper presents an application of 5S in technology in a Hari Bio-mass processing unit. plant conditions have Need of The improvement of the manufacturing process. The Flow process of Hari Bio-Mass Processing Unit is not streamlined due to the wide variety of product specifications, the increasing demand, the push production Flow, and the nature of heavy metal and woodwork operations. As a result, the plant has turned into dirty machines and excess materials, scrap, and rework spread all over plant floor creating a plenty of flow complications and causing space and production issues.

Chetan Choudhari et al.[16] The Project work carried out to apply the 5S methodology of lean manufacturing of Workshop at JIT with the aim is the proper space utilization and Reducing waste in the workshop. The Project work is focused on 5S rating system, which make us able to understand the improvement criteria for particular S of 5S system. Here give total rating of 25 score, which is divided in five equal parts for each of 5S system. Here give highest 5 marks to each S. After that we will Creating the Effectiveness Reading Graph to understand the efficiency of 5S and make able to do better improvement.

Taieba Tuba Rahman et al.[17] This paper work carried out with the implementation of 5S methodology in apparel industry. 5S implementation has been carried out in trims store department, SQ Birichina Limited, Bangladesh. PDCA cycle has played an important role in the implementation of 5S. The problem has been identified during site assessment. That problems has been solved by using 5S concept. Case study has helped to understand the before and after implementation by Photos. The result of this project is that space utilization 27% and time saving for searching file is 82%, and Give easy Training to the Employ and New Operator.

Aman Gupta et al. [18] This Paper Represent the application of 5s and Kaizen in a small-scale manufacturing Industry. Implementation of 5s and Kaizen results in increased efficiency and effectiveness in the processes, improved visual management of the process, improved morale of the worker and safety of the employees, reduced delays and searching time. resulted in improvement in the organization. Improvement Result in Industry Tool Searching Time Reduce From 40 minutes to 5 minutes. 5S Audit regularly Conduct in the Industry '5S' audit score increased from 7 (week 1) to 56 (week 16).

Prof. Saad Shaikh, et al. [ 19] By studying the 5S methodology i will conclude that this technique is very useful and beneficial in Industrial organization Implementation of 5S we are Achieving improve the quality, productivity and efficiency of industrial organization, it also gives the positive effect on overall performance.

Sunil Mehra et al. [20] The Aim of This Research Paper to Identify the Different types of Parameter affect the Implementation of 5S in Manufacturing industry. The 5S implementation Method Depend upon Management and team of employs.

Kishore B. Lad et al [21] The objective of this study is to understand and improve the productivity by applying kaizen methodology in the industry. Plant Layout and Flow of material is Also Impact on the Production. The proposed kaizen layout is

increasing the 1,248-final output of production per year and near about more than 15% productivity with respect the old layout. The distance of the production flow can be reducing from 103.2 m to about 68.5 m. that is distance reduced by 34-35m.

Amit Shaha et al [22] In this Paper Represent the Objective discussing the implementation Kaizen in the industry. we saw that Stacking of components at pre-grinding stage consumes more manpower. Therefore, application of new process will eliminate the stacking process and no more manpower is required. As current deburring process is totally eliminated, one more manpower is saved. As of total, 10 manpower required is reduced to 6.

Pavan Kumar et al [23] Total Productive Maintenance (TPM) is an arrangement which focuses on add up to organization of everybody from top administration to all employee to actualize a far-reaching maintenance program for all equipment for the duration of its life. This Paper present the focus on the implementation TPM with the additions of Kaizen, 5s, Jishu Hozen, Planned Maintenance, Quality maintenance and Safety, Health & Environment. Overall Equipment Effectiveness has improved from 49.76% to 67.27 % indicating the improvement in productivity and improvement in quality of product.

Dr Ravi Shankar kalva et al [24] This paper proposes to bring into question the continuous improvement of the quality, productivity, profitability and speed of response to each job, processes and organizations as a whole, taking permanently into account the operational excellence, obtained by increasing the added value and by loss elimination that can be achieved by addressing the concept of Kaizen and Kaizen management as well. Kaizen management is providing a tool to adapt to the global competition by eliminating waste in the process of production, changing corporative culture and encouraging cross-functional links between the managerial staff and production workers, as well as combining between top down and bottom up management.

Rajesh Gautam et al [25] All the Industry are facing certain Some problems resulting in shortage of production and quality issues. This case study deals with the kaizen implementation in an industry in an assembly line in the manufactures front and rear axle for heavy and medium vehicles. production is improved from 210 Axle per shift to 300 Axle per shift by less 50 number of operators. One more interested thing is observed from the study that not a single operator after Kaizen reach to 90% of the Takt time. These will result in minimum cost and increase in productivity.

Vijesh Patel et al [26] The aim of this paper is to study and Thoughts About Kaizen technique for a small improvement in a manufacturing company. The paper Represent the basis definition of Kaizen philosophy and review on Kaizen concept and its implementation. This study Achieves from this literature review to different Kaizen tool apply in a different company as per necessary but Kaizen techniques, 5s and Value Stream Mapping are much effective and use full tool for the finding of waste and improvement in the process. And also, Kaizen technique is applying in any industry and development Different types of benefits.

Avinash Selot et al [27] Today Aim of the any Industry or Sector is to improve The Productivity, Quality and Working Condition. This Paper Represent the Problem occurring in the metal to metal contact of the drawbar to the bracket and Second Problem Is gasket is Missing during Operation by operator. this problem is Solved by kaizen implementation in this Process This Problem Solved by Sensor using. Total cost saved by the firm per year 17135 Rs.

### III. RESEARCH GAP

From the Study of The Research papers I did Observed That Not Only Using the 5S Technique to Improve the Productivity but It is Also Depends upon the Ergonomics Structure of The Work Place, Line Balancing, Work Force Diversity, Worker Stress, Worker Fatigue, Bottle neck And Non-Value Add Activity Adversely Effect on The Productivity. Kaizen is Also Part Of The 5S Technique and Kaizen Also Improve the Production Process.

5S Implementation in Industry Also Depend on Moral of the Worker, Awareness, knowledge, Employ Training and Main Role of involvement of Top-level Management to Bottom Level Management is necessary.

### IV. CONCLUSION

The following major conclusions are drawn from the review of application of 5S methodologies to improving manufacturing Process And Work Place Development.

- Reducing The Searching Time of Tool/ Material /Equipment.
- Improvement In Production System And Reducing Manufacturing Lead Time
- 5S Techniques using We Are Also Measured the Effectiveness of the 5S System How Work in The Industry.
- Reducing the Different Types of Waste.
- Improving Layout Of The Company.
- Increasing The Productivity in The Industry.

## REFERENCES

- [1] Ben Ruben R, Narendran SAP. Implementation Study on Applying Lean Manufacturing Principles in the Manufacturing of Pressure Vessels in an Indian Company. International Conference on Machine Learning, Electrical and Mechanical Engineering (ICMLEME'2014) Jan. 8-9, 2014 Dubai (UAE)
- [2] Kshitij Mohan Sharma, Surabhi Lata. Effectuation of
- [3] Lean Tool "5S" on Materials and Work Space Efficiency in a Copper Wire Drawing Micro-Scale Industry in India. Kshitij Mohan Sharma et al./ Materials Today: Proceedings (2018) 4678–4683.
- [4] Cristina veres, Liviu marian Case study concerning 5S method impact in an automotive company. 11th International Conference Interdisciplinarity in Engineering, INTER-ENG 2017, 5-6 October 2017, Tirgu-Mures, Romania
- [5] Miroslava Ml̄kva, Vanessa Prajova. Standardization - one of the tools of continuous improvement. International Conference on Manufacturing Engineering and Materials, ICMEM 2016, 6-10 June 2016, Nový Smokovec, Slovakia
- [6] Ravi Chourasia, Dr. Archana Nema. Review on Implementation of 5S methodology in the Services Sector. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 04 | Apr-2016
- [7] P. M. Rojasra, M. N. Qureshi Performance Improvement through 5S in Small Scale Industry: A case study International Journal of Modern Engineering Research (IJMER) www.ijmer.com Vol. 3, Issue. 3, May - June 2013 pp-1654-1660 ISSN: 2249-6645
- [8] Shraddha P. Deshpande, Vipul V. Damle Implementation of 5S Technique in a Manufacturing Organization: A Case Study IJRET: International. Journal of Research in Engineering and Technology ISSN: 2319-1163 | ISSN: 2321-7308 Volume: 04 Issue: 01 | Jan-2015, Available @ <http://www.ijret.org> 136
- [9] Prof. Saad Shaikh, Ansari Noor Alam, Khan Naseem Ahmed. Implementation of 5S Practices in a Small Scale Organization: A Case Study. ISSN (ONLINE): 2250-0758, ISSN (PRINT): 2394-6962 130 Copyright © 2011-15. Vandana Publications. All Rights Reserved. Volume-5, Issue-2, April-2015 International Journal of Engineering and Management Research Page Number: 130-135
- [10] Vibhor Kakkar, Vijay Singh Dalal. Implementation Of 5S Quality Tool In Manufacturing Company: A Case Study. INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 4, ISSUE 02, FEBRUARY 2015 ISSN 2277-8616 208 IJSTR©2015 www.ijstr.org
- [11] Harsha Lingareddy, G. Sahitya Reddy, K. Jagadeshwar. 5S AS A TOOL AND STRATEGY FOR IMPROVISING THE WORK PLACe Lingareddy International Journal of Advanced Engineering Technology E-ISSN 0976-3945 IJAET/Vol. IV/ Issue II/April-June, 2013/28-30
- [12] Ajay Anantrao Joshi A Review on Seven S (7S) as a tool of Workplace Organization International Journal of Innovations in Engineering and Technology (IJET)
- [13] Prof. (Dr.) Gujar Anantkumar Jotiram, Sawant Vikrant Sanjay. "STUDY AND IMPLEMENTATION OF '5 S' SYSTEM IN MANUFACTURING INDUSTRY" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 04 | Apr-2018 www.irjet.net p-ISSN: 2395-0072 © 2018, IRJET | Impact Factor value: 6.171 | ISO 9001:2008 Certified Journal | Page 887
- [14] Avinaw Pratik Application of 5-S Technique in Manufacturing Industries in Simple Ways: A Case Study International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online) Vol. 5, Issue 4, pp: (91-96), Month: October - December 2017, Available at: [www.researchpublish.com](http://www.researchpublish.com) Page | 91 Research Publish Journal.
- [15] Daniel Arefayne Legesse. Productivity Improvement Through Lean Manufacturing Tools: A Case Study on Ethiopian Garment Industry. International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV3IS090977 www.ijert.org .
- [16] Chetan Choudhari. Implementation of 5s Methodology in a Store Room in Workshop at JIT - A Case Study International Conference on Science and Engineering for Sustainable Development (ICSESD-2017) ([www.jit.org.in](http://www.jit.org.in)) International Journal of Advanced Engineering, Management and Science (IJAEMS)
- [17] Taieba Tuba Rahman Applying 5S Method on Trims Store's Documentation System inan Apparel Industry. Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Kuala Lumpur, Malaysia, March 8-10, 2016.
- [18] Aman Gupta An application of 5S concept to organize the workplace at a small scale manufacturing company. ISSN: 2277-9655 Scientific Journal Impact Factor: 3.449 (ISRA), Impact Factor: 2.114. [19] Prof. Saad Shaikh
- [19] Review of 5S Technique International Journal of Science, Engineering and Technology Research (IJSETR) Volume 4, Issue 4, April 2015.
- [20] Gokulanaath. S Review on Implementation and Barriers Affecting 5S Methodologies International Journal of Engineering Research & Technology (IJERT) <http://www.ijert.org> ISSN: 2278-0181 IJERTV7IS030021 Published by : www.ijert.org Vol. 7 Issue 03, March-2018
- [21] Kishore B. Lad, Dr. A. P. Kedar, Milind M. Productivity Improvement in Furniture Manufacturing Industry by Using Kaizen. ISSN: 2455-2631 © April 2016 IJSDR | Volume 1, Issue 4 IJSDR1604042 International Journal of Scientific Development and Research (IJS DR) www.ijedr.org 261.
- [22] Amit Shaha, Amit Gangaramani. Elimination and Combination of Processes Through Kaizen Practice International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 07 | July -2016 www.irjet.net p-ISSN: 2395-0072 © 2016, IRJET | Impact Factor value: 4.45 | ISO 9001:2008 Certified Journal | Page 152
- [23] Pavan Kumar, Peeyush Chauhan, Rajeev Chaudhary. Implementation 5s and kobetsu kaizen (TPM pillar) in a manufacturing organization. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056

- [24] Dr. Ravi Shankar Kalva, Dr.A.Prabhu Kumar, V.Srinivasu. Continuous Improvement through Kaizen in a Manufacturing Organisation © 2018 IJEDR | Volume 6, Issue 1 | ISSN: 2321-9939 IJEDR1801044 International Journal of Engineering Development and Research.
- [25] Rajesh Gautam, Sushil Kumar, Kaizen Implementation in an Industry in India: A Case Study. ISSN : 2249-5762 (Online) | ISSN : 2249-5770 (Print) IJRMET Vol. 2, Issue 1, April 2012
- [26] Vijesh Patel, Gajanan Patange. Review on Implementation of Kaizen Technique for Productivity Improvement in Manufacturing Organization .International Journal for Research in Applied Science &Avinaw Pratik Application of 5-S Technique in Manufacturing Industries in Simple Ways: A Case Study .International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online) Vol. 5, Issue 4, pp: (91-96), Month: October - December 2017,

