National Conference on
"Role of Engineers in Nation Building" organized by VIVA Institute of Technology, Mumbai
(6th and 7th March 2020)
International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March-2020]

Implementing 5S, Kaizen and Quality Control Tools For Quality Improvement

Henisha Raut

[1]Department of Mechanical Engineering, VIVA Institute of Technology, Virar
Email: henisharaut@viva-technology.org

Abstract*—The purpose of this research is to use 5S, Kaizen and Quality control tools to assist manufacturing organization to become more productive and more efficient by reducing waste and by improving continuously. Producing high quality of products and services is one of the key concerns in order to keep up with the competition in the global markets. The main objective of manufacturing industries today is to increase productivity through system simplification and incremental improvements. Improvement can be achieved by either better control or by raising standards. Increasing productivity and profitability are main objectives of any organization. Many tools and techniques are used to reduce rejections and defects of product. So a simple approach has been adopted to create the teams for implementing 5S, Kaizen and Quality Control tools. This system helps to organize a workplace for efficiency and decrease wasting and optimize quality and productivity via monitoring an organized environment and to find the total rejection of a component from a list of defective components so as to limit from exceeding the rejection target to avoid waste. The study highlights that there is possibility of systematic application of all of these tools in the frame of company's overall quality management system.*

Keywords—Improvement, Kaizen, Manufacturing, Quality Control Tools, 5S

I. INTRODUCTION

Improving customer service, making operation faster, more operation and reduction in costs are the challenges faced by manufacturers today and to meet these challenges many companies are searching to improve their ability to compete globally. Wastage during production process is rapidly growing day by day in industries. There are different techniques of waste reduction and performance enhancement like Kaizen and 5S and Quality Control Tools. The word KAIZEN comes from a Japanese words KAI (change) and ZEN (good) which originated in 1950. "The essence of Kaizen is simple and straight forward: Kaizen means improvement involving everyone, including both managers and workers". The Kaizen methods are internationally acknowledged as methods of continuous improvement, through small steps of the economical results of the company. The small improvements applied to key processes will generate the major multiplication of the company's profit while constituting a secure way to obtain the clients loyalty. Continuous improvement is one of the core strategies for excellence in production and is considered vital in today's competitive environment. 5S is a technique originated in Japan and it was first developed by Hiroyuki Hirano. 5S is a system in which to reduce work and optimize productivity and quality through maintaining orderly workplace. The 5S technique is included within Kaizen. It is the methodology of creation and maintaining well organized, clean, high effective and high quality workplace. 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. The Seven Basic Tools of Quality also called as 7QC Tools originated in Japan when the country was undergoing major quality revolution and had become a mandatory topic as part of Japanese's industrial training program. These tools which comprised of simple graphical and statistical techniques were helpful in solving critical quality related issues. These tools were often referred as Seven Basic Tools of Quality because these tools could be implemented by any personwith very basic training instatistics and were simple to apply to solve quality-related complex issues. The 7 QC tools are: cause and effect diagram, check sheet, control chart, histogram, pareto chart, scatter diagram and process control of flow chart.

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March-2020]

II. PROBLEM STATEMENT

The problems arising in different departments due to which the productivity is decreased are discussed as follows:

a. Purchase Department

The Purchase department keeps all the information regarding the dyes and punches which is to be used during production. There was no proper place to keep those dyes and punches. Only numbering was given to them. Because of this, whenever there would be need of those dyes and punches in the production department, there used to be a lot of problem in searching. Hence there used to be loss in time due to no proper location of it. And after the use of those dyes and punches the workers in the production department used to keep them anywhere at the workplace which caused missing of few punches and increased the chances of accidents.Hence the main problem faced by purchase department was managing those dyes and punches properly at a place. There was an urgent need to reduce this problem as it was increasing day by day due to lack of proper location which leaded to time consumption.

b. Production Department

In the production department there were few components which were consuming unnecessary space, some were kept in excess which were actually unwanted whereas some were obsolete. Due to this there was problem arising in material handling of new stock and also there was space requirement for new processed components. There was no tool board and so tools used to go missing which lead to scarcity of tools and hence tools used to kept at storage department. This used to create problem during tool requirement as workers had to run to storage department for their tools. This leaded to time loss in production.

c. Quality, Assembly and Testing department

The quality department also faced some problems as there was no specific place for tested components to be kept and problem was araising regarding spoiling of finished products and damage which was a loss to the industry.There was no tool shadowing.The main issue faced by quality department was customer complaints about the product delivered. Some of the customer complaints were:

Blow holes, Body leakage, Plunger leakage, Bottom nut leakage 29, Plunger spring damage ,Diaphragm damage , Body sit leakage, Body pin hole leakage, Internal cracks , Forging defects, Dents and Scratches

Target was to reduce these customer complaints. For achieving this, each and every complain needed to be studied by testing those components and root cause of the complaint had to be found so as to give proper explanation to the customer with the guarantee that such issues will not be rising in the future. For this proper co-ordination between workers and departments was required for total customer satisfaction.

III. METHODOLOGY

3.1 5S

TABLE 1
5S

Japanese	English	Translation	Meaning
Seiri	Sorting	Organize	Creating a difference between wanted, unwanted, obsolete items and removing unnecessary items
Seiton	Storing	Order	Arranging the items in a systematic order within the reach of the user
Seiso	Shining	Clean	Cleaning the workplace for avoiding accidents
Seiketsu	Standardizing	Standardize	Maintaining the above 3S's

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March-2020]

Shitsuke	Sustaining	Self Discipline	Making a habit of maintaining the above 4S's

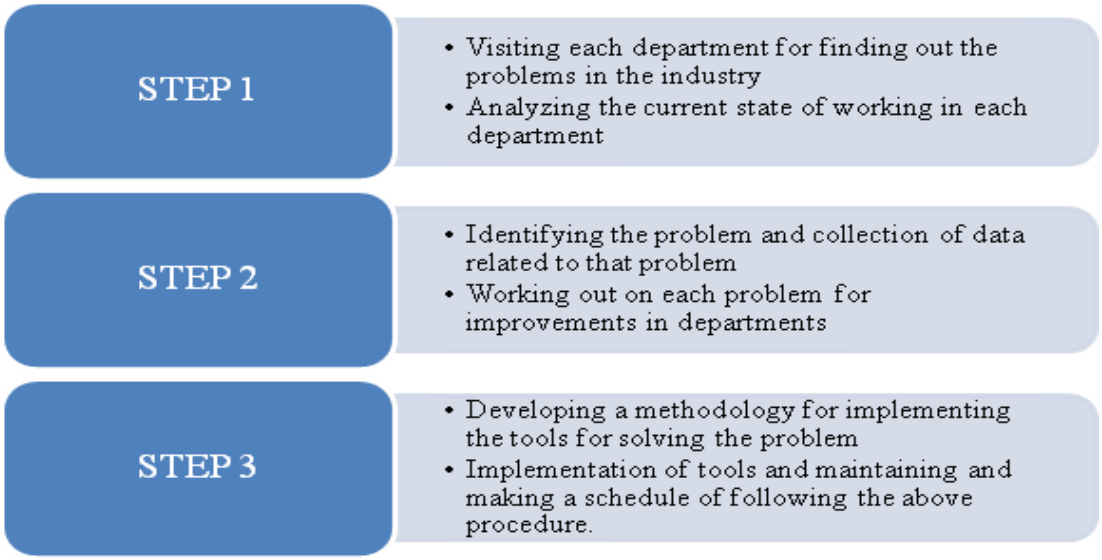

FIGURE 1: 5S implementation methodology

3.2 Kaizen

FIGURE 2: PDCA Cycle for Kaizen

3.3 Quality Control Tools

Quality control tools especially pareto analysis is done for rejection management in the quality department. When the processed components are produced from the production department then they are checked first in the quality department before packaging and dispatch to the customers. During this process, some components are found to be physically damaged, consisting of blow holes, leakages, etc which are rejected due to defects. These defective components are classified into rework and rejected

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March-2020]

components. Small defective components are stated as rework and are thrown in scrap whereas body (assembly) components if defective are classified into rejected and are sent for melting i.e. reusing the metal. The components contributing to 80% of rejection from overall rejected components are considered and pareto analysis is done to check for rejection whether crossing their target percentage. This is done on quarterly basis and the data is everytime compared to the previous rejection management analysis.

IV. IMPLEMENTATION

4.1 5S

4.1.1 Seiri (sort-1S)

Sorting aims for removing all the unwanted materials from the workplace. After sorting the unwanted materials from workplace, they are placed in the red tag area and the details are noted on the red tag card after which they are either moved to scrap yard or located properly or rectified or segregated or returned to the supplier.

FIGURE 2: Red Tag Card(front)

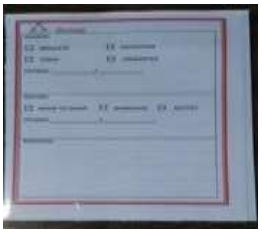

FIGURE 3: Red Tag Card(back)

4.1.2 Seiton (set in order-2S)

Set in order aims at placing everything at its place. After sorting the specific location is defined for the useful material and located in the predefined order.

FIGURE4 :Tool Shadowing in drawers

FIGURE 5:Tool Board

4.1.3 Seiso (Shine-3S)

Shine aims at keeping cleanliness at workplaces, workstations, offices, stores, passage, gangways etc in the organization.

Before After

FIGURE 6: Formation of gangway at shop floor

4.1.4 Seiketsu (Standardize-4S)

To strictly follow the first '3S' in the daily routine. Standardize aims for preparation of standard method to continue to follow the first '3S' effectively in the organisation.

National Conference on
"Role of Engineers in Nation Building" organized by VIVA Institute of Technology, Mumbai
(6th and 7th March 2020)
International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March-2020]

4.1.5Shitsuke (Sustain-5S*)*

Sustain aims for maintaining the implemented '5S' system effectively. Thus in short, sustain defines the discipline for employees to strictly follow the implemented '5S' in the organization to obtain the required result. For sustaining the '5S' technique effectively and to strictly adhere to it in the organization, internal audits as well as surprise audits are conducted perioidically.

4.2 Kaizen

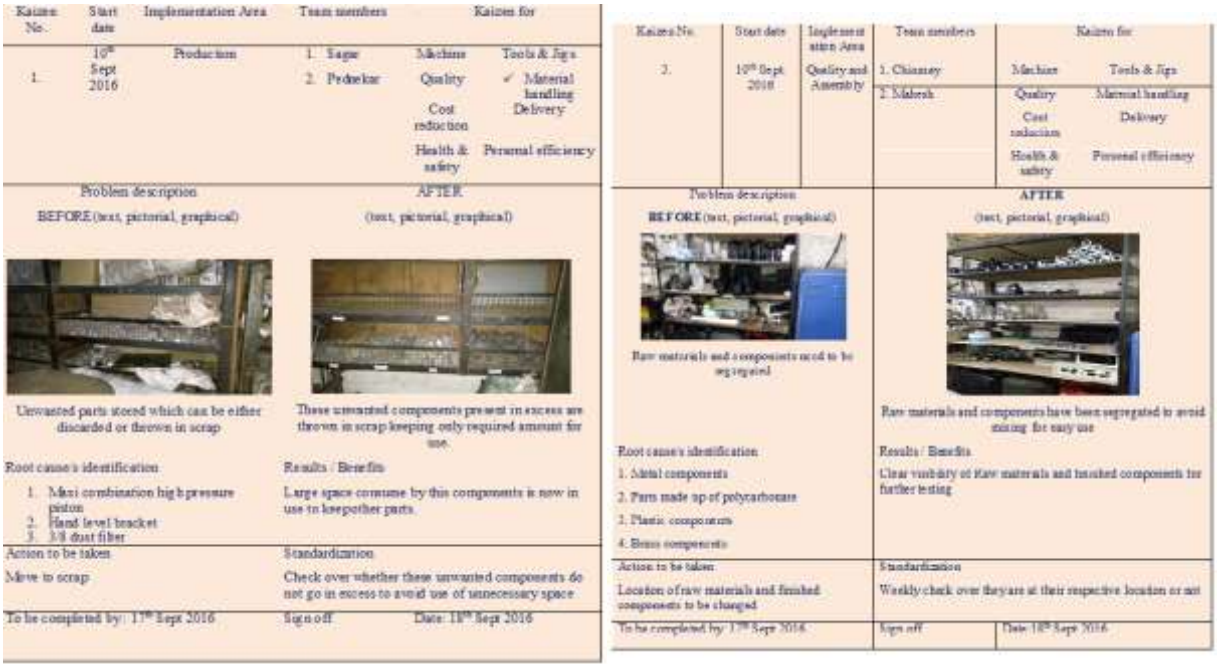

FIGURE 7: Kaizen sheet for Production and Quality

4.3 Quality Control Tools

For rejection management of 80% of defective components from total rejected components, pareto analysis is done to check the highest defective component and to check for rejection whether crossing their target percentage.For rejection management of 80% of defective components from total rejected components, pareto analysis is done to check the highest defective component and to check for rejection whether crossing their target percentage.

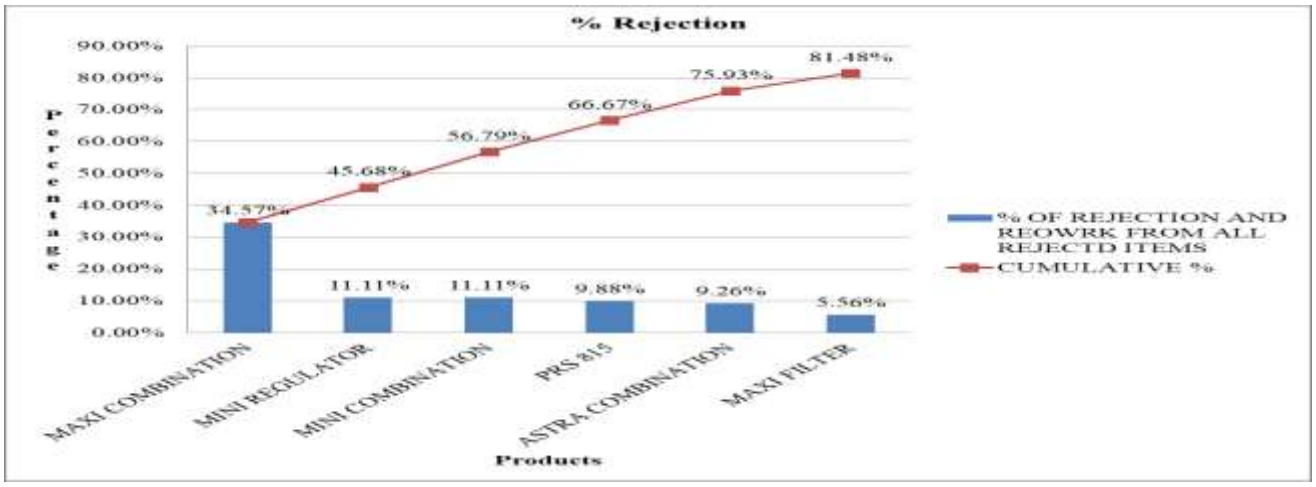

FIGURE 8: Pareto analysis on Rejected material

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March-2020]

V. CONCLUSION

Tools and techniques for eliminating waste quality improvement, helps manufacturers to improve the productivity of their enterprises by reducing defects. The manufacturing firms should develop their general plans and schedules according to the nature of their production to be able to reduce production costs. Hence by implementing Kaizen and 5S there has been a lot of improvement in the process flow due to better usage of workplace, stock confinement, prevention from losing tool, increased efficiency, process development by cost reduction, travel time of materials has been reduced, improvement in safety, improvised working conditions for workers, increase of awareness and morale, etc . So the target of implementing these tools quality improvement has been achieved in the industry by giving total customer satisfaction.

REFERENCES

[1] RaviChourasia, Dr.ArchanaNema , **"**Review on Implementation of 5S Methodology in the Service Sector", International Research Journal of Engineering and Technology, Volume 3, Issue 4 2016, pp.1245-1249

[2] Diltej Ali, Rajdeep Singh, "Critical Appraisal of 5S on Success of SMEs", Internatinonal Journal in Applied Studies And Production Management, Volume 2, Issue 3, 2016, pp.123-134

[3] Deepak, DheerajDhingra, 2016, Application Of Quality Control Tools In A Bicycle Industry: A Case Study, International Journal of Research in Engineering and Technology, Volume 5, Issue 7, pp.119-127

[4] Vipulkumar C. Patel, Dr.HemantThakkar , **"**A Case Study: 5S Implementation in Ceramics Manufacturing 0Company", Bonfring International Journal of Industrial Engineering and Management Science, Volume 4, Issue 3, 2014, pp. 132-139

[5] MariuszBednarek, JustynaScibiorek, "The Methodology of Implementation of Kaizen in Selected Polish Industrial Plants", Journal of Intercultural Management, Vol. 3, No. 1,2011, pp. 139– 147