

Implementing 5S, Gemba Walk and Why Why Analysis for Quality Improvement

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Abstract— *The purpose of this research is to use 5S, Gemba Walk and Why Why analysis to assist manufacturing organisation to become more productive and more efficient by solving customer complaints effectively. 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. Quality improvement in simple terms is anything which causes a beneficial change in quality performance. 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. Most of the rejections and defects are occurred due to improper control of quality of product. So a simple approach has been adopted to implement 5S, Gemba walk and Why Why Analysis. This system helps to organize a workplace for efficiency and decrease wasting and optimize quality and productivity via monitoring an organized environment and also to list the problems while production process, for finding root cause of customer complaints. 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— *Gemba Walk, 5s, Quality, Why Why Analysis.*

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. Success in the global market depends on quality. Companies don't design poor quality; it is usually the result of a variation in some stage of production. The concept of variation states that no two products will be perfectly identical even if extreme care is taken to make them identical in some aspect. This results in rejection of components and customer complaints. Detailed analysis of root cause will result into the permanent solution to the problem. Successful implementation of the remedies results into reduced rejection rate and quality improvement. There are different techniques of problem solving and performance enhancement like Gemba walk, Why why analysis whereas for waste reduction 5S is a technique that can be used. 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. It is the methodology of creation and maintaining well organized, clean, high effective and high quality workplace. Gemba is a Japanese term meaning " the real place". It can be any "site" such as construction site, sales floor, or whether the service provider interacts directly with the customer. The idea of gemba is that the problems are visible, and the best improvement ideas will come from going to gemba. In quality management, Gemba means the manufacturing floor and the idea is that if a problem occurs, the engineers must go there to understand the full impact of the problem, gathering data from all sources. Whereas 5 Whys is an iterative interrogative technique used to explore the cause-and-effect relationships underlying a particular problem. The primary goal of the technique is to determine the root cause of a defect or problem by repeating the question "Why?" Each question forms the basis of the next question. The 5 Whys technique is most effective when the answers come from people who have hands on experience of the process being examined. 5 Whys can be used for troubleshooting, quality improvement and problem solving, but it is most effective when used to resolve simple or moderately difficult problems.

II. PROBLEM STATEMENT

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

2.1 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 led to time consumption.

2.2 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 led to scarcity of tools and hence tools used to be kept at storage department. This used to create problem during tool requirement as workers had to run to storage department for their tools. This led to time loss in production.

2.3 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 arising 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, Plunger spring damage, Diaphragm damage, Body seat 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 complaint 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
Summary of 5S Tool

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

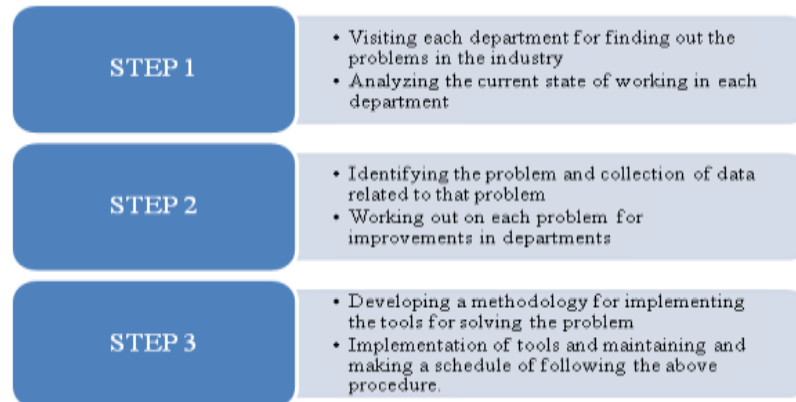


Fig. 1 5S Implementation Methodology

3.2 Gemba Walk

Gemba walk is a technique adopted by the organization in production, assembly and testing department. In this, the higher authority people, including CEO, departmental heads, etc take a quality round in the whole organization to check the problems faced by the workers, machining operations, etc visibly. This is done every morning on a regular basis. Then these problems are listed down department wise and solutions are tried to be removed on the spot or by giving a due date to the departmental heads.

3.3 Why Why Analysis

The quality department is the department which faces the main issues of customer complain. The quality department checks the raw material first and only then it is sent for further production. All the components which are finally produced by the production department are again checked by the quality department and only then the final components are packed and dispatched. Instead of all this process done before dispatching the final job, there are still customer complaints received by the organization. Hence in order to avoid this issue why why analysis is done. In why-why analysis, questions are asked as to why such a problem must have arrived and answering these questions the root cause of that problem is found out. Then a CAPA sheet is prepared by the quality head in coordination with other departments in which the corrective action and preventive action of the complain is mentioned in order to avoid these problems to rise in future.

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

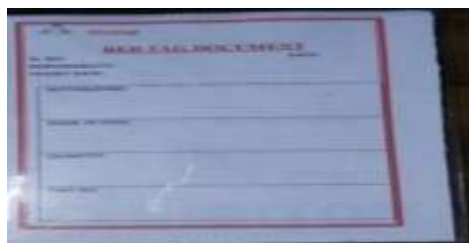


Fig. 2. Red Tag Card(Front)

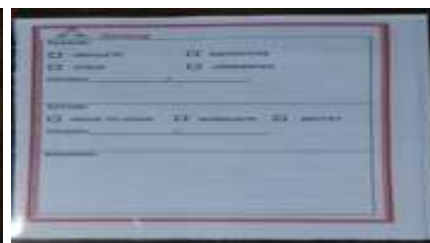


Fig. 3. Red Tag Card(Back)

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.



Fig. 4. Tool Shadowing in drawers



Fig. 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

Fig.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.

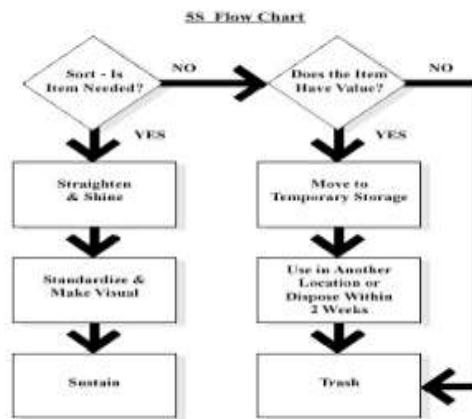


Fig. 7. Flow chart for 5S

4.1.5 Shitsuke (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 periodically.

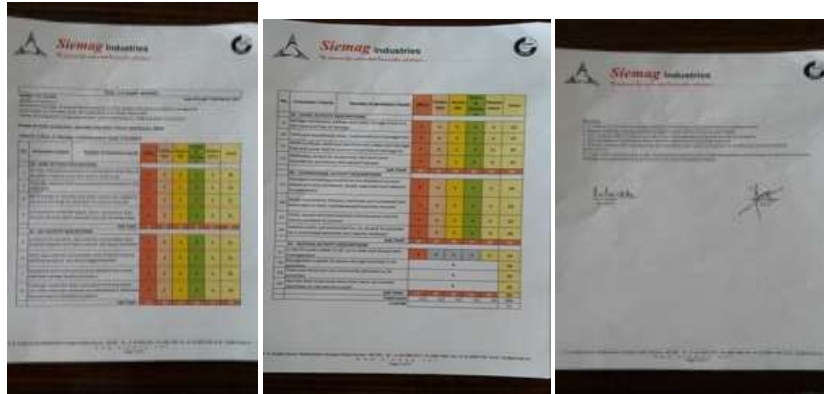


Fig. 8. Audit Sheet of 5S

4.2 Gemba Walk

For implementing gemba walk all the higher authorities like the CEO, MR and the departmental heads go on a quality round on the shopfloor to check the work in process and its maintenance. A two month program on Gemba walk is shown and the problems are listed in the following manner.

Table 2.
Showing Gemba Sheet For Production Dept

Sr. No.	Problem	Action	Supervisor
1	CNC coolant contaminated	CNC coolant should be flushed completely	Mr. Pednekar
2	The movement of the operator is obstructed by fixtures near the machines	Fixtures and clamps always kept at rack while not in use.	Mr. Pednekar
3	Errors in dimensions due to errors in Vernier.	Vernier should be calibrated annually. Non calibrated equipments are submitted at quality department.	Mr. Sagar

4.3 Why Why Analysis

In why why analysis, a single complaint is taken into account and 5Why's technique is used to solve the problem. Asking why's to the problem result into reasons due to which the problem must have arrived. A tabular form why why analysis sheet is prepared these reasons with the action plan is noted in it. After arriving to the root cause, a corrective action preventive action (CAPA) sheet is prepared.

Table 3
Showing why why analysis

Activity	PROBLEM	Why 1	Why 2	Why 3	Why 4	Why 5	Action Plan	Responsibility
Reported by customer	Cracks developed in PC bowl at locking grip	Material specs incorrect	PC thickness less/more	Irregular thickness from top to bottom	Due to change in casting dimensions		Casting is to be rectified	Mr. Mahesh
			Material quality improper					
		Design of bowl	Design validation not done				Cycling test to be carried out. 24 hrs running at 10kg/cm ² with break of 30 mts for one week	
		Gasket Oring thickness non uniform					Drg available, to check thickness in every lot	
		O ring material specs incorrect	Nitrile material specs - material grade not got checked	Material grade unknown			To get material grade and do external testing, incorporate in drawings/QA Ps	
		Extra pressure during tightening						
		Excess pressure at user place	Possible					
Solvent entry during use	Installed in chemical industry, solvent fumes come in contact							

No.: 04	CORRECTIVE ACTION & PREVENTIVE ACTION REPORT								Format No.: F/MR/015
CAPA NO.:16-17/04	NC from Audit	CC	✓	Suggestion	Internal	Management	Specif y		
Customer:	KOSO INDIA PVT. LTD.				Vendor:				
Raised By:	Customer					Remark:			
Product:	Poly Carbonate Bowl		Sub-Component:					1 No.	
Nature of Non Conformity: Cracks developed at PC bowl starting grip									
Corrective Action: Casting is to be rectified.									

Completed By:	Mr. Chinmay	Remark:								
Root Cause Analysis Required:	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Ye s</td> <td style="width: 10%; text-align: center;">√</td> <td style="width: 10%; text-align: center;">No</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> </table>	Ye s	√	No						
Ye s	√	No								
Root Cause: Due to change in casting dimensions, PC bowl had irregular thickness from top to bottom.										
Determined By:	Mr. Chinmay	Remark:								
Preventive Action: Casting to be tested before use.										
Completed By: Mr. Chinmay		Remark:								
Comments on Effectiveness of action taken: Drawing available, checking as per drawing.										
Closed Out By	Date:	Remark:								

Fig. 9. Capa Sheet

V. CONCLUSION

Tools and techniques for eliminating wastes, helps manufacturers to improve the productivity of their enterprises. 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 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. Also by implementing Gemba walk and Why why analysis important information can be obtained which helps the management to choose which quality improvement projects should be implemented. The application of the 5-whys analysis provided a fact based and structured approach to problem identification and correction that focuses on not only reducing defects but also in eliminating them.

REFERENCES

- [1] Ravi Chourasia, Dr. Archana Nema , “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] Vipulkumar C. Patel, Dr. Hemant Thakkar , “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
- [4] Prof. Saad Shaikh et al, 2015, “Review of 5S Technique”, International Journal of Science, Engineering and Technology Research, 4(4), pp. 927-931



- [5] Jayant Chandrakar, Rajesh Kumar, 2015, "Reduction Of Breakdowns In Food Processing Plants Through Failure Analysis", International Journal of Advanced Engineering Research and Studies, 4(2), pp.212-214.
- [6] Saulius Astromskis et al, 2013, "Implementing Organization-Wide Gemba Using Noninvasive Process Mining", Cutter It Journal, 23(4), pp. 32-39.