Implementation of Gemba Walk, Why Why Analysis and Quality Control Tools In Medium Scale Industry

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Abstract— The purpose of this research is to use Gemba walk, why why analysis and quality control tools to assist manufacturing organization to become more productive and more efficient qualitatively by solving customer complaints effectively 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 Gemba walk, why why analysis and quality control tools. This system helps to list the problems while production process, for finding root cause of customer complaints and to find the total rejection of a component from a list of defective components so as to limit from exceeding the rejection target. 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.

Key words: Gemba Walk, Why Why Analysis, Quality Control Tools

I. INTRODUCTION

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 and quality control tools. 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. It is designed to allow leaders to identify existing safety hazards, observe machinery and equipment conditions, ask about the practical standards, gain knowledge about the work status and build relationships with the employees. The Gemba walk affords company leaders, managers and supervisors a simple, easy means of supporting overall continuous improvement. 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 Why's can be used for troubleshooting, quality improvement and problem solving, but it is most effective when used to resolve simple or moderately difficult problems. 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 person with very basic training in statistics 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.

A. Seven Quality Control Tools

1) Cause and effect diagram

Cause and effect diagram introduced by Kaoru Ishikawa helps in identifying the various causes(or factor) leading to an effect (or problem) and also helps in deriving meaningful relationship between them. The very purpose of this diagram is to identify all root causes behind a problem. Once a quality problem is defined, the factors leading to the casual of the problem are identified. We further keep identifying the sub factors leading to the casual of the identified factors till we are able to identify the root cause of the problem. As a result we get a diagram with branches and sub branches of casual factors resembling a fishbone diagram.

2) Checksheet

A check sheet can be metrics, structured table or form for collecting data and analysing them. When the information collected is quantitative in nature, the check sheet can also be called as tally sheet. The very purpose of check sheet is to list down the important check points or events in a tabular/ metrics format and keep on updating or marking the status on their occurrence which helps in understanding the progress, defect patterns and even causes for defects.

3) Control chart

Control chart is also called as Shewhart Chart named after Walter A. Shewhart is basically a statistical chart which helps in determining if an industrial process is within control and capable to meet the customer defined specification limits. The very purpose of control chart is to determine if the process is stable and capable within current conditions.

4) Histogram

Histogram introduced by Karl Pearson is a bar graph representing the frequency distribution on each bars. The very purpose of Histogram is to study the density of data in any given distribution and understand the factors or data that repeat more often.

5) Pareto chart

Pareto chart is named after Vilfredo Pareto. It consist of both bar graphs and line graphs where individual factors are represented by a bar graph in descending order of their impact and cumulative total is shown by a line graph. The very purpose of Pareto Chart is to highlight the most important factors that is the reason for major cause of problem or failure.

6) Scatter diagram

A Scatter diagram or scatter plot is basically a statistical tool that depicts dependent variables on Y-axis and independent variables on X- axis plotted as dots on their common intersection points. Joining these dots can highlight any existing relationship among these variables. Very purpose of scatter diagram is to establish a relationship between problem and causes that are affecting. The relationship can be linear, curvilinear, exponential, logarithmic, quadratic, polynomial etc.

7) Process control chart

A flowchart is a type of diagram that represents an algorithm, workflow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows. This diagrammatic representation illustrates a solution to a given problem. Flowcharts are used in analysing, designing, documenting or managing a process or program in various fields.

II. METHODOLOGY

A. 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.

B. 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.

C. 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 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.

III. IMPLEMENTATION IN INDUSTRY

A. 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.

Sr. No.	Problem	Action	Date of Identification	Due Date	Supervisor
1.	Scratches on the product body	The worked product has to be kept inside the crate discrete from each other	17/09/2016	24/09/2016	Mr. Sagar
2.	Rework material kept lying on the table while testing	Rejected material should be kept inside yellow box for rework	01/10/2016	08/10/2016	Mr. Chinmay
3.	Air compressor overrun due to leakage	Before testing check all the leakages in pipes	22/10/2016	05/11/2016	Mr. Hemant
4.	Teflon tape residue on the gauge port and other	Teflon tape tape should be removed before dispatchi	12/11/2016	19/11/2016	Mr. Hemant

	ports	ng material to the customer.			

Table 1: Gemba Analysis In Testing Deptartment

Sr. No.	Problem	Action	Date of Identification	Due Date	Supervisor
1.	CNC coolant contaminated	CNC coolant should be flushed completely everyday	17/09/2016	18/09/2016	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.	24/09/2016	01/10/2016	Mr. Pednekar
3.	Errors in dimensions due to errors in Vernier.	Vernier should be caliberated annually. Non caliberated equipments are submitted at quality department.	08/10/2016	15/10/2016	Mr. Sagar
4.	Chips on the floor	Each lathe has to be cleaned after 4-5 hrs to keep the shop floor clean	22/10/2016	05/11/2016	Mr. Pednekar
5.	Grinding equipment safety	While grinding they have to wear safety goggles and gloves	12/11/2016	19/11/2016	Mr. Sagar

Table 2: Gemba Analysis in Production Department

B. 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.

Activity	PROBLEM	Why 1	Why 2	Why 3	Why 4	Why 5	Action Plan	Responsibility	Target Date
Reported by customer+A3A3:N10	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	From 07/01/17 to 15/01/17
			Material quality improper						
		Design of bowl	Design validation not done				Cycling test to be carried out. 24 hrs running at 10kg/cm2 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		
		Extra pressure during tightening							
		Excess pressure at user	Possible						
		Solvent entry during use	Installed in chemical industry, solvent fumes come in contact						

Table 3: Why Why Analysis

No.: 04	CORRECTIVE ACTION & PREVENTIVE ACTION REPORT						Format No.: F/MR/015
							Date: 07/01/2017
CAPA NO.:16-17/04	NC from Audit	CC	√ Suggestion	Internal	Management	Specify	
Customer:	KOSO INDIA PVT. LTD.		Vendor:			Internal:	
Raised By:	Customer		Date:	07/01/2017	Remark:		
Product:	Poly Carbonate Bowl		Sub-Component:			Quantity	1 No.
Nature of Non Conformity: Cracks developed at PC bowl starting grip							
Corrective Action: Casting is to be rectified.							
Completed By: Mr. Chinmay			Date:14/01/2017		Remark:		
Root Cause Analysis Required:	Yes √		No				
Root Cause: Due to change in casting dimmensions, PC bowl had irregular thickness from top to bottom.							
Determined By Mr. Chinmay			Date:15/01/2017		Remark:		
Preventive Action: Casting to be tested before use.							
Completed By: Mr. Chinmay			Date: 15/01/2017		Remark:		
Comments on Effectiveness of action taken:Drawing available, checking as per drawing.							
Closed Out By			Date:		Remark:		

Table 4: Capa Sheet

C. 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.

% Rejection From all Rejected Items								
SR. NO	PRODUCT	QTY CHECKED	QTY OK	REWORK	REJECT	SUM OF REOWRK AND REJECTED	% Rejection From all Rejected Items	Cumulative %
1	MAXI COMBINATION	880	617	21	248	269	57.73%	57.73%
2	MINI COMBINATION	296	265	2	29	31	6.65%	64.38%
3	ASTRA LUBRICATOR	87	66	0	22	22	4.72%	69.10%
4	MINI REGULATOR	155	134	12	9	21	4.51%	73.61%
5	MAXI REGULATOR	98	78	17	3	20	4.29%	77.90%
6	PRS 817	57	44	8	6	14	3.00%	80.90%
7	MINI REGULATOR	113	99	8	6	14	3.00%	83.91%
8	PRS 315	116	102	10	4	14	3.00%	86.91%
9	PRS 815	160	147	0	13	13	2.79%	89.70%
10	ASTRA COMBINATION	167	155	2	11	13	2.79%	92.49%
11	MAXI LUBRICATOR	105	97	7	1	8	1.72%	94.21%
12	HIFLOW FILTER	367	359	0	8	8	1.72%	95.92%
13	HIGH FLOW REGULATOR	13	9	4	2	6	1.29%	97.21%
14	STANDARD FILTER	139	134	4	1	5	1.07%	98.28%
15	FLOW CONTROL VALVE	154	149	4	1	5	1.07%	99.36%
16	NEEDLE VALVE	438	436	0	2	2	0.43%	99.79%
17	SOLONOID VALVE	197	196	0	1	1	0.21%	100.00%
18	ASTRA REGULATOR	15	15	0	0	0	0.00%	100.00%
19	MAXI FILTER	50	50	0	0	0	0.00%	100.00%
20	NON RETURN VALVE	315	315	0	0	0	0.00%	100.00%
21	PRS SS 817	6	6	0	0	0	0.00%	100.00%
22	RJK LUBRICATOR	25	25	0	0	0	0.00%	100.00%
23	SAFTY RELIEF VALVE	555	555	0	0	0	0.00%	100.00%
	Total	4508	4053	99	367	466	100.00%	

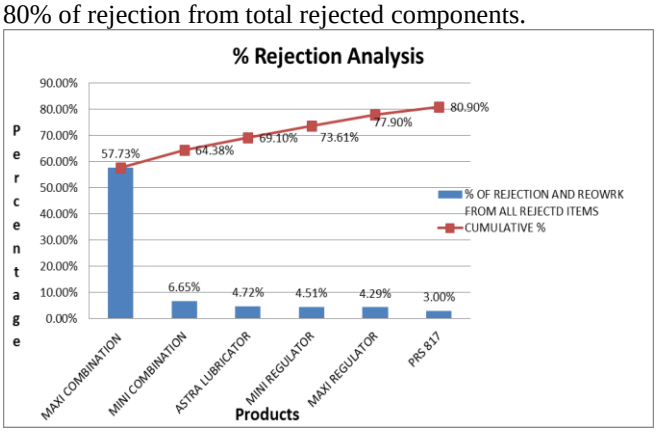
Table 5: % Rejection From All Rejected Items

% Rejection= Sum of Rework and Rejected components/ Total of sum of rework and rejected components

Rejected & Reworked Material Analysis								
SR. NO	PRODUCT	QTY CHECKED	QTY OK	REWORK	REJECT	SUM OF QTY. REJECTED AND REWORKED	% OF REJECTION AND REOWRK FROM ALL REJECTD ITEMS	CUMULATIVE %
1	MAXI COMBINATION	880	617	21	248	269	57.73%	57.73%
2	MINI COMBINATION	296	265	2	29	31	6.65%	64.38%
3	ASTRA LUBRICATOR	87	66	0	22	22	4.72%	69.10%
4	MINI REGULATOR	155	134	12	9	21	4.51%	73.61%
5	MAXI REGULATOR	98	78	17	3	20	4.29%	77.90%
6	PRS 817	57	44	8	6	14	3.00%	80.90%

Table 6: Rejected and Rework Analysis

These are the 6 rejected components which contribute to 80% of rejection from total rejected components.



Graph 1: Pareto Analysis on Rejected Material

IV. Conclusion

Tools and techniques for 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 customer complaints.

Hence by implementing Gemba walk, Why why analysis and Quality Control Tools 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. So the target of implementing these tools quality improvement has been achieved in the industry by giving total customer satisfaction.

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