



# By Applying 7 Quality Control Tools for Continual Improvement & Defect Reduction in an Automobile Lock Industry: A REVIEW

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## Abstract

*This paper includes a review on analytical approach of Seven Quality Control tools. The principal objective of this article aims to introduce seven Basic quality control tools easily and to enhance the quality level of Automobile lock Industry through application of Quality Control tools imply for Collect numbers, analyze figures, identified root causes then evaluate the outcomes. These quality tools are utilized to fix the numeric data, facts & figures. All of these tools together can provide tremendous procedure follow & investigation that can be extremely supportive for value enhancement. These tools make it simpler to recognize, use & keep pathway of quality improvement.*

**Keywords:** 7 QC Tools, Quality improvement, Defect Reduction, Root Cause Analysis, Steering Ignition Lock

## I. INTRODUCTION

The 7 QC Tools easy analytical tools used for hassle fixing. "The Quality Gurus, composed of both Deming and Juran, developed these tools in Japan or introduced them to Japan. These are the maximum priorities whenever it relates to importance. As per Kaoru Ishikawa, 95 out of every 100 problems can be solved using these 7 techniques. These tools functioned as the inspiration for Japan's incredible industrial comeback after World War II".[1] It was designed to be used for "self-study, lead engineer training staff, or in Japanese QC reading groups.".[8]

For solving good issues there are seven QC tools employed are as Pareto Chart, Histogram, Control Charts, Cause & Effect Diagram, Scatter Charts, and Flow Chart & Check Sheets. Altogether these are crucial tools used broadly at industrial units to observe the overall operation and nonstop process development. These are being used for quality improvement covering nearly all manufacturing and service organizations. Numerous researchers have successfully used those tools in their area of work. The underlying reasons of quality & the primary causes of non-conformities Problems were certain & probable cures were suggested. [1] Through Continuous improvement practices were presently used in several industries of USA. The automobile lock

industry used Tools for SPC, like cause and effect diagrams, control charts. In a study of different types of flaws in steering ignition locks of an automobile lock manufacturing unit. The quantity of rejection percentage decreases from 18% to 7% after SPC implementation. The results showed that improved production methods result in material and financial savings. [2] Products with stated flaws won't be allowed to finish the production process, and those problems will be held in a warehouse. [9]

## II. SEVEN QUALITY CONTROL TOOLS

For fixing great troubles following seven QC tools are required

1. Check Sheets.
2. Pareto Chart.
3. Fish Bone Diagram.
4. Histogram.
5. Control Chart.
6. Scatter Diagram.
7. Flowchart.

These 7 Quality control tools are highlighted by the quality guru Ishikawa in 1960. [3]

### 1. Check Sheets

The primary role of collecting data is carefully and accurately done through the check sheets by the operating person. Data should be gathered in such a way that it should be easy to understand. [1]

### 2. Pareto Chart

A Pareto chart is a tool that classifies figures from left to right, from the highest to the lowest. Pareto diagrams are commonly used to spot the most crucial issues. The Pareto diagram is constructed for both frequency and dollars. This fundamental belief that a small number of people controlled a significant amount of capital. He observed that most fields had this kind of distribution pattern. ABC analysis is used in materials management to apply the Pareto assumption, also known as the 80-20 rule. The company pays for 20% of the things at an 80% price. These develop the A elements, towards which special consciousness is provided. Juan recommend applying this fundamental to control quality standrads to distinguish a "vital few" issues to the "trivial many," which is currently referred to as the "useful many". [1].

### 3. Fish Bone Diagram

A Fishbone Diagram is a useful tool that identifies several potential causes for an impact or issue and organizes concepts into practical categories. [4] It is a useful tool for scientifically generating and expressing ideas and thoughts about the underlying causes of problems. Kouro Ishikawa developing this tool, which is also known as the root cause analysis (RCA).

#### 4. Histogram

Histograms is the graphical representation of a frequency distribution diagrams, are bar graph that display how observations are distributed in the manner of useful to determine the spread and variation of data point in graphical form.. It is helpful for evaluating distributional patterns and for visualizing procedure conclusions based on those patterns.[5]

#### 5. Control Charts

To evaluate how the process evolves over time, a control chart provides a visual representation. In which statistics projected based on observed values of a particular process characteristic overtime to determine if the process remains in statical control or not.[6]

#### 6. Scatter Diagram

The simplest technique to define a cause-and-effect connection see between both variables is to plot a scatter diagram. If a connection links, it might be up or down; it may be potent or feeble; and it might be simple or complex. Scatter Diagram is the name of a technique used to analyses the relationship between two double variables. Draw a sequence of both the variables are paired and plotted on Y-axis and X-axis to represent a large number of observations is exactly what it involves.[1]

#### 7. Flow chart

The flow of the good or service via the various processing steps is represented in the diagram. The illustration makes it simple to visualise the entire arrangement, identify possible problem areas, and pinpoint control successes. Changes, reductions, combinations, or eliminations of steps can all result in improvement. [2]

### III. LITERATURE REVIEW

The literature review includes a several publications that describe the adaptability of various Quality tools & techniques and their possibilities. I will discuss many quality tools applied in small-scale manufacturing units under this survey. In this review, various authors define the function of QC tools.

Jitendra A. Panchiwala introduced brief study and his comprehension of improving Quality and Productivity improvement in small foundry units. In this review study author discussed about previous research analysis done by numerous researchers and an effort to get minimal result for reducing number of casting defects and enhance the whole process of casting manufacturing operations. He found from many studies that the use of computational methods and current software in casting parts is a significant benefit to the industrial sector. To widespread all over world, foundry personnel have to move fast from the motto of “satisfying customer” and accept and destructive attempt of “customer

delight". 'Following customers' expectations won't satisfactory. It will be compulsory to go beyond in terms of improving production and quality. After selecting a paper he chose several tools and methods for later work like SPC are very costly to deploy in small manufacturing unit but produces superior outcomes to other ways. These methodologies can be beneficial not only to decrease the rejection rate but also in other numerous sections in productions like inventory control at many equipment in mechanical workshop to get procedure variant & classify ideal principles of limits etc. Several professors have presented studies to determine the sand procedure limits in order to produce castings of superior quality. Using the proper selection methods and factors, they have successfully decreased the casting flaws significantly, down to 6%.[7]

Shyam H. Bambharoliya introduced a number of particular elements that can lower the rejection rate in a minor machining operation by 7 Quality Control Tools. This review paper goals to categorize the issues relate to changed new products and potential solutions based on that issues. The best way to minimize product rejection and defect after analyzing the production is to use the basic tools of quality. Using the quality Tools to improve customer satisfaction in the competitive market of today is another benefit. After examining all study articles, various errors are discovered by using 7 QC methods, and each error is addressed with a likely underlying cause. Each research paper's particular difficulties are examined, and remedies are then given in accordance with the needs. Accordingly, the difficulties' impact on production is altered, leading to an improvement in productivity or a decrease in rejection rats.[7] The main methods for quality control and improvement employ statistical methodologies, such as statistical process control (SPC), as variability is frequently a significant contributor to poor quality.[16] Additionally, consistent quality improvement is essential to achieve and maintain steady economic expansion and, finally, to provide the required profit.[14] Creating a test for significant quality deviations, establishing quality standards, analysing the final product in relation to the intended quality, and developing a test for significant quality variations are all tasks that fall within the purview of the engineering department.. The Manufacturing Department controls manufacturing activities in order to generate employment that satisfy the necessary criteria.[9] Variations in the process that may have an impact on the final product's quality may be determined and improved., which reduces waste and the possibility that issues will be passed on to the customer.[12] A phrase goes, "Prevention is better than cure." to establish both a business and an industry. To prevent losses, one should heed this saying. Manufacturing losses may be divided into two categories: abnormal losses and regular losses. The word "abnormal loss" can also refer to "exceptional loss." Sometimes special losses may occur, however they can also be prevented by using various strategies. Normal losses, however, cannot be stopped. But they may be slow down on. These losses could raise the price of producing a product, which might then have an impact on its quality. [15] In order to complete assembly activities or to approve the repairing, modifying, or changing of the final product, quality acceptance criteria are not concentrated on specific procedures.[10] "Quality is the overall combination of product and service characteristics which include marketing, engineering, manufacture and maintenance through which products and services in use will be in accordance with customer expectations." Defective items are those that don't fulfill predefined quality requirements, yet they may be economically improved by

paying for repairs by incurring rework costs. [11] Three Malaysian businesses have used QC tools, and it has been examined how professionals and regulators might choose QC methodologies and work with implementation issues. [13]

#### IV SUMMARY

There are many scholars who discussed about the importance of quality. The main role to gain customer satisfaction; cost saving and better utilization of resources. Just using 7 quality control tools & techniques. On the automobile industry to eliminate these defects quality control tools are widely used to maintain minimum ppm of the company. The concept quality & by using lean tools & technique to such defects and rejection in the industry.

#### V SCOPE OF WORK

Implementing improvement programmes for defect reduction, Root Cause Analysis, Corrective action and Preventive action, kaizen, Poka Yoke, brain storming, Plan- Do -Check - Act etc. is the primary focus of 7QC Tools. This method's primary goal is to raise the product's quality.

#### VI CONCLUSION

As we know in today's world as we know the competition is enough high, every customer wants best quality product in moderate price the review shows us by implementing these 7 QC tools in a manufacturing unit helps to improve the over quality because the data comes out after implementation of these tools will identify the main defects and take the action according to the necessity we use different lean tools to eliminating the defects this will work and the aim of the manufacturing unit that satisfied customer will be achieved with the utilization of available resources with minimum rejection there is cost saving which is beneficial for any manufacturing unit.

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