MECH-ZINE 2021-22

MAHARASHTRA INSTITUTE OF TECHNOLOGY

17th Edition

Mechanical Engineering Newsletter

Forward From The Editorial Team

Mechzine is a flagship quarterly newsletter cum magazine of the Department of Mechanical Engineering. We at the editorial board are pleased to provide the readers with a diversity of articles catering to diversified fields. The dynamic accomplishments and involvement of the students have provided our writers with a wealth of interesting topics to share with you. Outside the academic realm, our students are involved in many organizations and activities.

Credits

Dr. A. J. Keche	**Patron Editor**
Prof. M. N. Farooqui	**Executive Editor**
Shaikh Sohel	**Mechzine President**
Pranav Sambarkar	**Chief Editor**
Akash More	**Creative Editor** **Typography Editor**
Harshal Oza **Pravin Nagargoje**	**Technical Editors**
Rushikesh Sable **Ayush Wadnere**	**Technical and Creative Heads**

Content

A Seminar on SEVEN QC TOOLS

INTRODUCTION

"There are seven basic quality tools, which can assist an organization for problem solving and process improvements". The first guru who proposed seven basic tools was **Dr. Kaoru Ishikawa** in 1968, by publishing a bookentitled **"Gemba no QC Shuho"** that was concerned managing quality through techniques and practices for Japanese firms. It was intended to be applied for **"self-study, training of employees by foremen or in QC reading groups in Japan"**. It is in this book that the seven basic quality control tools were first proposed valuable resource when applying the seven basic tools.

These seven basic quality control tools, which introduced by Dr.Ishikawa are:-

1)Checksheets 2)Graphs (Trend Analysis) 3)Histograms 4)Pareto-charts 5)Cause-and-effect diagrams 6)Scatter diagrams 7) Control charts.

Figure 1 indicates the relationships among these seven tools and the analysis of improvement of quality.

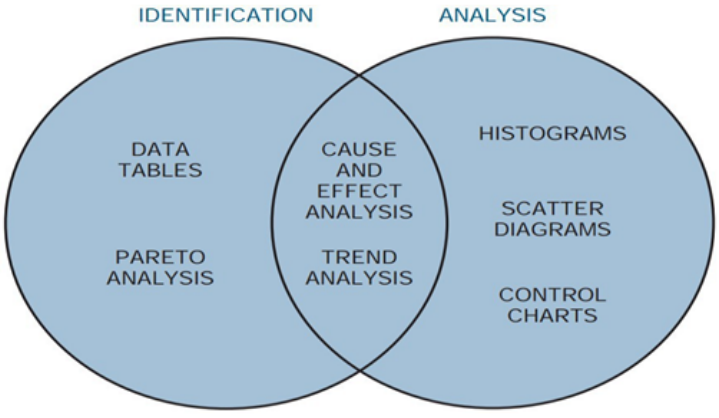


Figure1: The seven quality control tools (Kerzner, 2009).

CheckSheet

Check sheets are simple forms with certain formats that can aid the userto record data in an firm systematically. Data are "collected and tabulated" on the check sheet to record the frequency of specific events during a data collection period. They prepare a "consistent, effective,and economical approach" that can be applied in the audit in quality assurance for review to follow the steps in a particular process. Also, they help the user to arrange the data for the utilization later. The main advantages of check sheets are to be very easily to apply and understand, and it can make a clear picture of the situation and condition of the organization. They are efficient and powerful tools to identify frequently problems, but they don't have effective ability to analyze the quality problem into the workplace. The check sheets are in several, three major types are such as Defect-location check sheets; tally check sheets,and defect-cause checksheets.

Figure 2 is depicted a tally checksheet that can be used for collecting data during production process.

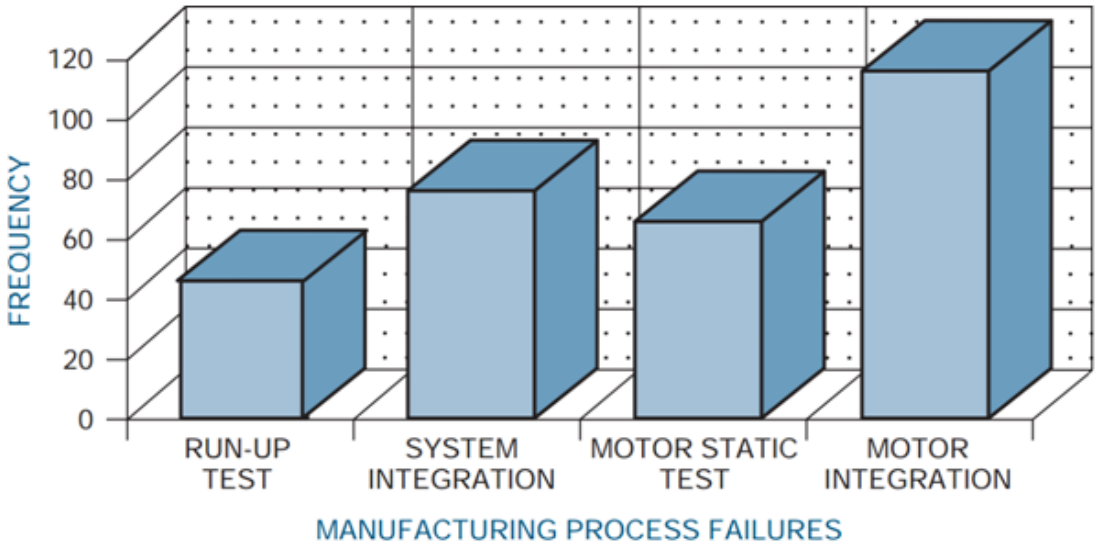
Telephone Interruptions

Reason	Day					
	Mon	Tues	Wed	Thurs	Fri	Total
Wrong number	𝍸	II	I	𝍸	𝍸 II	20
Info request	II	II	II	II	II	10
Boss	𝍸	II	𝍸 II	I	IIII	19
Total	12	6	10	8	13	49

Figure 2: Check sheet (Tally) for telephone interruptions

Histogram

Histogram is very useful tool to describe a sense of the frequency distribution of observed values of a variable. It is a type of bar chart that visualizes both attribute and variable data of a product or process, also assists users to show the distribution of data and the amount of variation within a process. It displays the different measures of central tendency(mean, mode, and average). It should be designed properly for those working into the operation process can easily utilize and understand them. Also, a histogram can be applied to investigate and identify the underlying distribution of the variable being explored. Figure 3 illustrates a histogram of the frequency ofdefects in a manufacturing process.



Pareto Analysis

It introduced by an Italian economist, named Vilfredo Pareto, who worked with income and other unequal distributions in 19th century, henoticed that 80% of the wealth was owned by only 20% of the population. later, Pareto principle was developed by Juran in 1950. A Pareto chart is a special type of histogram that can easily be apply to find and prioritize quality problems, conditions, or their causes of in the organization. On the other hand, it is a type of bar chart that shows the relative importance of variables, prioritized in descending order from left to right side of the chart. The aim of Pareto chart is to figure out the different kind of "non conformity" from data figures, maintenance data, repair data, parts scrap rates, or other sources. Also, Pareto chart can generate a mean for investigating concerning quality improvement, and improving efficiency, "material waste, energy conservation, safety issues, cost reductions", etc., as Figure 4 demonstrated concerning Pareto chart, it can able to improve the production before and after changes.

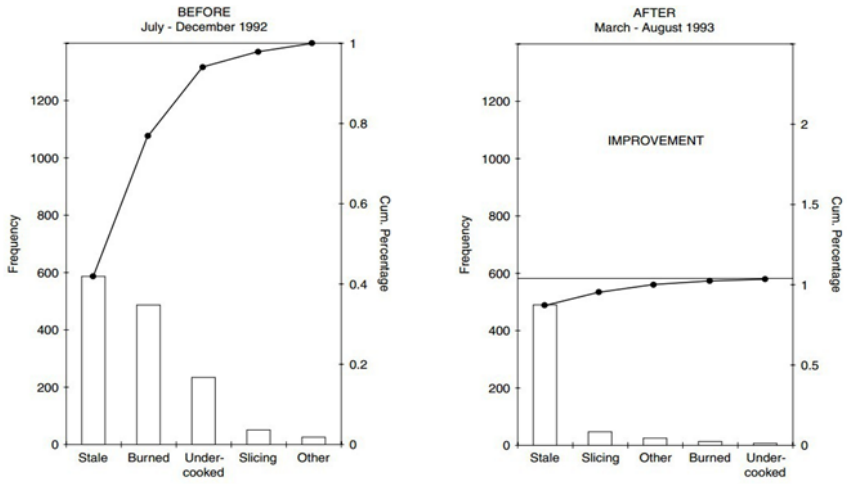


Figure 4: Pareto Charts

Fishbone Diagram

Kaoru Ishikawa is considered by many researchers to be the founder and first promoter of the 'Fishbone' diagram (or Cause-and-Effect Diagram) for root cause analysis and the concept of Quality Control (QC) circles. Cause and effect diagram was developed by Dr. Kaoru Ishikawa in 1943. It has also two other names that are Ishikawa diagram and fishbone because the shape of the diagram looks like the skeleton of a fish to identify quality problems based on their degree of importance. The cause and effect diagram is a problem-solving tool that investigates and analizes systematically all the potential or real causes that result in a single effect. On the other hand, it is an efficient tool that equips the organization's management to explore for the possible causes of a problem. This diagram can provide the problem-solving efforts by "gathering and organizing the possible causes, reaching a common understanding of the problem, exposing gaps in existing knowledge, ranking the most probable causes, and studying each cause". The generic categories of the cause and effect diagram are usually six elements (causes) such as environment, materials, machine, measurement, man, and method, as indicated in Figure 5. Furthermore, "potential causes" can be indicated by arrows entering the main cause arrow.

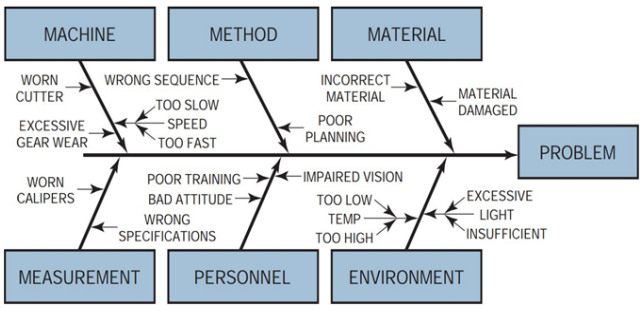


Figure 5: The cause and effect diagram (Fishbone Diagram)

Scatter Diagram

Scatter diagram is a powerful tool to draw the distribution of information in two dimensions, which helps to detect and analyze a pattern relationship between two quality and compliance variables (as an independent variableand a dependent variable), and understanding if there is a relationshipbetween them, so what kind of the relationship is (Weak or strong and positive or negative). The shape of the scatter diagram often shows the degree and direction of relationship between two variables, and the correlation may revealed the causes of a problem. Scatter diagrams are very useful in regression modeling. The scatter diagram can indicate that there is which one of these following correlation between two variables: a) Positive correlation; b) Negative correlation, and c) No correlation, as demonstrated in Figure 6.

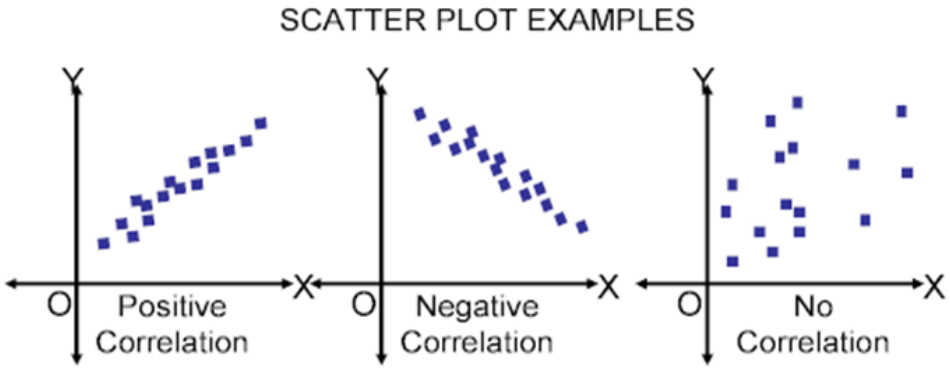
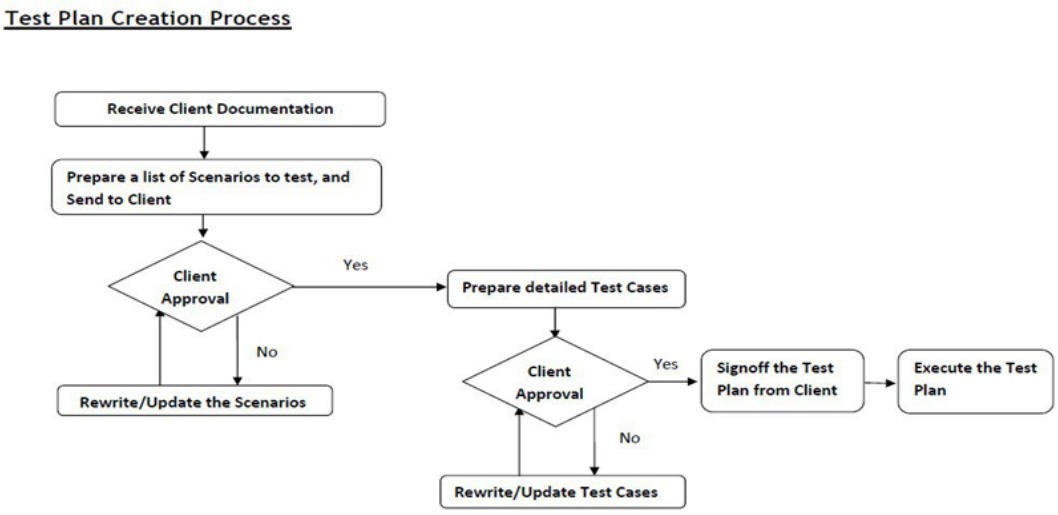


Figure 6: Scatter Diagrams

Flowchart

Flowchart presents a diagrammatic picture that indicates a series of symbols to describe the sequence of steps exist in an operation or process.On the other hand, a flowchart visualizes a picture including the inputs,activities, decision points, and outputs for using and understanding easily concerning the overall objective through process. This chart as a problem-solving tool can apply methodically to detect and analyze the areas or points of process may have had potential problems by "documenting" and explaining an operation, so it is very useful to find and improve quality into process, as shown in Figure 7.



Control Chart

Control chart or ***Shewhart control chart*** was introduced and developed by Walter A. Shewhart in the 1920s at the Bell Telephone Laboratories, and is likely the most "technically sophisticated" for quality management. Control charts is a special form of "run chart that it illustrates the amount and nature of variation in the process over time". Also, it can draw and describe what has been happening in the process. Therefore, itis very important to apply control chart, because it can observe and monitor process to study process that is in "statistical control" (No problem with quality) accordant to the samplings or samplings are between UCL and LCL (upper control limit (UCL) and the lower control limit (LCL)). "statistical control" is not between UCL and LCL, so it means the process is out of control, then control can be applied to find causes of quality problem, as shown in Figure 8 that A point is in control and B point is out of control. In addition, this chart can be utilized for estimating "the parameters" and "reducing the variability" in a process. The main aim of control chart is to prevent the defects in process. It is very essentially for different businesses and industries, the reason is that unsatisfactory products or services are more costed than spending expenses of prevention by some tools like control charts. A Control Chart is presented in the following Figure.

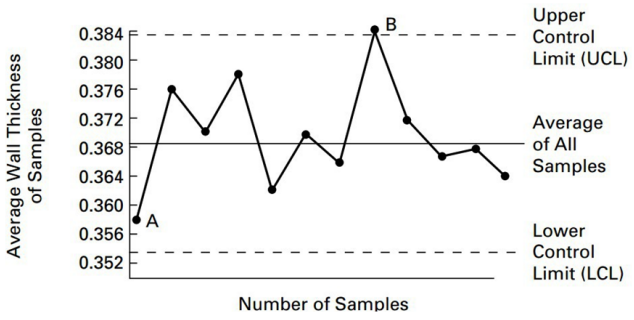


Figure 8: The Shewhart control chart

CONCLUSION

All seven QC tools for troubleshooting issues within production processes in the organizations. Doubtlessly, all of the aforementioned quality tools should be considered and used by management for identifying and solving quality problems during producing the products and services. Thus, the production processes can be affected and improved by multiple factors of these statistical QC tools. Also designed and developed an effective layout for using theseQC in the organizations based on the performance of them, in order to apply appropriately these quality tools for solving quality problems and quality improvement, as demonstrated in Figure 9. Accordingly, the following Figure interprets how the 7 QC should be employed from first step to end of production processes for identifying the problems of quality performance and controlling them.

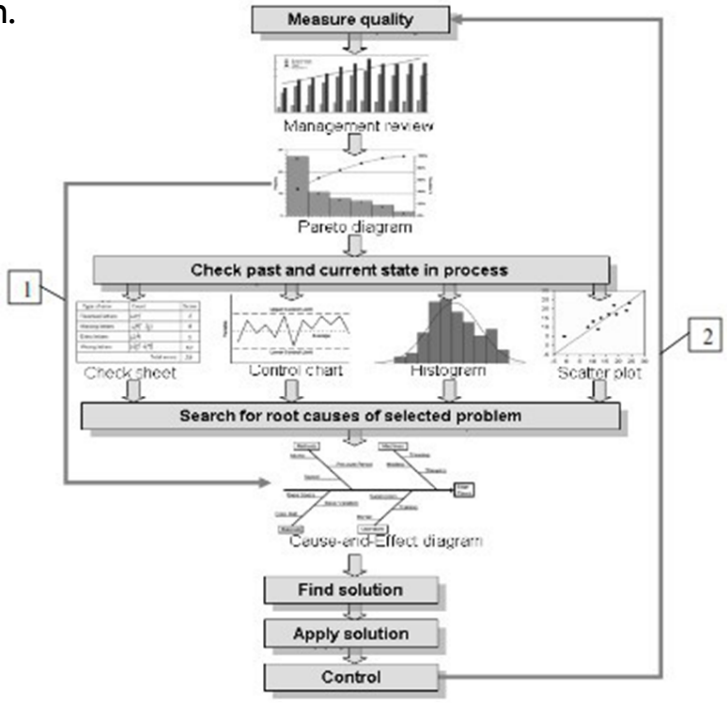


Figure 9: An appropriate layout for using 7QC tools with the aim ofimproving extremely quality performance

Two-Days Workshop on "Energy Efficient Buildings"

Two-days online workshop on "Energy Efficient Buildings" was organized by Department of Mechanical Engineering of Maharashtra Institute of Technology, Aurangabad in association with ISHRAE Students Sub Chapter Aurangabad scheduled on 17th and 18th July 2020. The programme was organised with the objective of creating awareness about energy efficient buildings and the same was reflected from the response received from the participants. The two days' workshop was held in four different sessions in which two session is on day one and remaining two session is on day two. All the sessions were hosted by organising committee members **Mr. T.P. Kulkarni** and **Mr. S.B. Charthankar**. Around **360 participants** from 6 different states across India were registered for this workshop. All the Sessions were started with formal introduction of speaker and welcome of the guest.

Day I: Session 1

Speaker for the first session of day 1 was Mr. Aashu Gupta, Managing Partner of Design2Occupancy Services LLP, Jaipur. Mr Gupta in his talk during the session told participants about the need of the implementation of 'Energy Conservation Building Code' in this era of worldwide energy crisis. Mr. Gupta elaborated the importance of applying these codes in regular practice and aware participants about the tangible and intangible benefits of the same. Session speaker also told the budding professionals about the career opportunities in this field and provided enough guidance to achieve the same. The session was largely appreciated by the participants. Around 125 participants were present for the session.

Day I: Session 2

Speaker for the second session of day 1 was Mr. Prasad Kokil, Managing Director of Sanjay Group of Companies, Aurangabad. Mr.Kokil during his speech on 'Design of commercial and industrial building in view of energy efficiency', focused on his very own idea that "Every science begins with philosophy and ends in Art". The session was very thought provoking and it gives a completely different perspective of looking towards buildings around us. The way speaker connected the ancient artistic monuments around us with science was amazing and He made participants aware that those were the Energy Efficient Buildings too! Session speaker, Mr.Kokil, connected the FIVE KPI's (Key performance index),FIVE elements of energy balance and PANCHTATVAs in such a way that it will surely be practised by the professionals and budding students in years to come. Around 110 participants were present for the session.

Day II: Session 1

Speaker of the session was Dr. Sreepathi L. K., Green Technology Consultant, Shimoga, Karnataka. Dr. Sreepathi, in his speech on 'Green Building-VIBHA, a case study' gradually engaged the participants in the success story of his own house VIBHA-The green building! During this journey speaker shared every minute details of the house. Dr. Sreepathi cleared every single doubt of participant, about 'How any building can become a GREEN BUILDING! Meticulously planned and executed VIBHA 4 was even aired on International TV channels like 'National Geography, Discovery' etc. and it is one of the places of attraction for the people!! Around 120 participants were present for the session.

Day II: Session 2

Speaker of the session was Mr.A.V.Kulkarni, a well-known industrialists from Kolhapur who is Managing partner of Anucool Engineering, Kolhapur. Mr.A.V.Kulkarni, in his technical talk on 'Vital role of cooling load estimation for integration of HVAC services in Green Building', explained the fundamental processes involved in calculating the cooling load. During his speech speaker urged the students to understand the basic concepts during learning phase as student and keep the mind and brain open for all the knowledge available around us in any form and from any source. Mr. Kulkarni underlines the importance of learning by experience or Do It yourself (DIY)to the participants. Mr. Kulkarni demonstrated the cooling load estimation with the help of inhouse built software using Lab View platform. This demonstration helped the participants to understand this cooling load estimation process thoroughly and easily. The session was very helpful and was valued by participants. Around 135 participants were present for the session.

After the end of session, Valedictory Function of the work shop started at 4.30 pm sharp. The valedictory function was attended by Dr. N. S. Bhalkikar, Dean (Admission),Vice Principal (Admin) Prof. M. S. Vaishnav, Dr.A.J.Keche Head of Mechanical Engineering Department ,Faculty members, students, participants. Participants gave their valuable live feedback about the two days online workshop. 6 participants from different institutes presented their views about the workshop. After the feedback session, Mr. Amol Gambhir, President of ISHRAE Aurangabad SCH presented the summary of the two days online workshop on 'Energy Efficient Buildings' wherein he told about the number of participants, summarized the sessions and briefly informed about the ISHRAE and benefits of ISHRAE membership. HOD, Dr.A.J. Keche lucidly delivered the concluding remarks about the two-days online workshop on 'Energy Efficient Buildings' and promised to host such type of knowledge enrichment programmes in future too! Dr.J.M. Kshirsagar, member of organising committee proposed the vote of thanks in very delightful manner. After vote of thanks the two-days online workshop on 'Energy Efficient Buildings' ended.

A Webinar on Let's Brainstorm

The webinar called ***Let's Brainstorm "journey from institute to industries"*** started with the warm welcome followed by formal introduction of speaker by **Prof. M. N. Farooqui Sir.** Chief guest of this webinar were **Dr. S. P. Bhosale Sir** (**Director, MIT**), **Dr. A. J. Keche Sir** (**HMED**) and speaker of this webinar were **Mr. Sheeban Akhtar** (**Pursuing MBA at IIM Trichy**. **Previously, Business Development Executive at Jaro**). After that Dr. A. J. Keche Sir in his inaugural address, guided and motivated all students. And Now Finally with the permission of Dr. A. J. Keche (HMED), The speaker of ceremony Mr. Sheeban Akhtar sir had started telling his experience in BAJA, Various Group Discussion (GD) and interviews he had held in their college life. They suggested so many things that each student must do in college activities. Participants asked so many questions to sir and they had also given excellent answers of each question with giving thanks for asking question in session. The webinar was very dynamic and informative. Lots of implementable ideas regarding an important and current topic was discussed. The participants really enjoyed his session. Around 50 participants were present for the webinar. The webinar was hosted by the Mr. Shaikh Mohammad Sohel, Mr. Bhushan Jadhav coordinator of the webinar proposed the vote of thanks in very delightful manner. After vote of thanks the webinar was ended.