Introduction and Definition of Quality Control

Quality

Quality has many definitions. Quality can be defined in many ways, depending on who is defining it and to what product or service it is related. The definition of quality by the American National Standards Institute (ANSI) and the American Society for Quality Control (ASQC) is "the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs."

DEFINITION OF QUALITY:

1. The meaning of "Quality" is closely allied to cost and customer needs. "Quality" may simply be defined as fitness for purpose at lowest cost.
2. The component is said to possess good quality, if it works well in the equipment for which it is meant. Quality is thus defined as fitness for purpose.
3. Quality is the 'totality of features and characteristics' both for the products and services that can satisfy both the explicit and implicit needs of the customers.
4. "Quality" of any product is regarded as the degree to which it fulfills the requirements of the customer.
5. "Quality" means degree of perfection. Quality is not absolute but it can only be judged or realized by comparing with standards. It can be determined by some characteristics namely, design, size, material, chemical composition, mechanical functioning, workmanship, finish and other properties.

Quality

The term Quality in English corresponds in Arabic to two terms: (al-naw‘iya) and (al-jawda).

In most fields such as management and engineering, the term (al-jawda) (quality) is more commonly used to express quality, whereas in statistics and other sciences, the term (al-naw‘iya) is used.

The European Organization for Quality Control defined quality as:

“The degree to which a product satisfies consumer requirements.”

It has also been defined as the conformity of a product to specifications, since the consumer is the beneficiary of the product or service.

Thus, quality can also be defined as:

“The ability of a product or service to meet or exceed customer expectations.”.

control

In English, the term Control corresponds in Arabic to three terms: (control – tahakkum – riqaba), all of which fall within a set of procedures taken to ensure that a product or service conforms to specified standards and does not exceed them in a way that may expose the consumer to risks.

Control refers to procedures that prevent deviations or the occurrence of conditions outside specifications. The term is even used in security contexts, such as checkpoints that monitor the movement of people or vehicles.

Thus, in industry, control means preventing non-conforming products from passing through the production process.

MEANING OF QUALITY CONTROL

Quality Control is a systematic control of various factors that affect the

quality of the product. The various factors include material, tools, machines,

type of labour, working conditions, measuring instruments, etc.

Quality Control can be defined as the entire collection of activities which ensures that the operation will produce the optimum Quality products at minimum cost.

Total Quality Control is: "An effective system for integrating the quality development, Quality maintenance and Quality improvement efforts of the various groups in an organization, so as to enable production and services at the most economical levels which allow full customer satisfaction"

Quality Control (QC)

Quality control is Maintaining a certain level of quality so that it remains acceptable to the consumer while minimizing production costs as much as possible.

It includes all operations, techniques, and inspections based on sampling plans and testing production samples or the final product.

Importance of Quality Control

1. Selecting appropriate raw materials and efficient manufacturing processes.
2. Improving efficiency in the use of machinery and ensuring safety.
3. Providing safe and suitable working co
4. Ensuring consistency and stability in product quality.
5. Monitoring stages of production.
6. Increasing production and improving performance.
7. Reducing quality costs.
8. Improving customer relationships.

Some Definitions of Quality

1. Gilmore (1974): The degree to which a product meets specific consumer desires.

2. ASQ (1983): The total characteristics of a product or service that enable it to satisfy specific needs.

3. Deming (1986): Meeting customer needs and expectations now and in the future.

4. Juran (1988): Fitness for use.

5. Malkin (1993): Meeting or exceeding customer expectations continuously.

6. Crosby (1995): Conformance to requirements.

7. Besterfield (2001): Quality is intangible and depends on perception.

ISO Definition:

"The degree to which a set of inherent characteristics fulfills requirements."

Quality Control in Production

Quality control in production processes refers to a set of procedures implemented to improve quality or minimize potential deviations in quality levels that may occur during the production process due to random and attributive factors that cause quality changes.

Types of Quality Control Systems

1. Control of raw materials.

2. Control of inspection and measurement devices.

3. Control of production processes.

4. Control of final product quality.

5. Control during handling and storage.

The variations in production units are due to the following:

A. The production process: Production units are exposed to different production conditions due to equipment aging, machine vibrations, and fluctuations in electrical power.

B. Raw materials: Raw materials have a significant impact on products, as their specifications vary, for example, durability, moisture content, etc.

C. Labor: Differences in worker experience, adherence to production instructions, and their psychological and physical condition may be the primary source of variation between production units.

D. Other factors: Such as humidity, temperature, light intensity, etc.

If the range of variation between production units is acceptable, the production process is qualitatively controlled and under control. However, if the variation is significant and its non-random causes can be identified, the production process is not under qualitative control. Control charts are among the most important tools for distinguishing and using variations between production units, especially when there is a deviation between the actual product and its specifications due to random or non-random causes.

The development of quality control systems;

In our modern era, quality systems began to emerge at the end of the 19th century. From a historical perspective, fundamental changes in quality control systems occur approximately every twenty years. The following is a summary of the

1. Quality control by the worker.

2. Quality control by the foreman.

3. Quality control through inspection.

4. Statistical quality control.

5. Total quality management (TQM).

Historical development of quality control:

1. Operator control: Before 1900, production was simple, and the worker performed all stages of production and oversaw the process. This type of control still exists today in some manual industries.

2. Foreman Control (1900-1920): This emerged after the diversification of products and the development of the production process, when multiple workers became responsible for the same product. This led to the emergence of the foreman hierarchy to monitor quality, with a group of workers overseeing the process.

3. Inspector Control (1920-1940): This type of control arose after the increase in the size of industrial facilities and the diversification of their products. A specialized quality control department emerged to inspect products and ensure their compliance with specific standards.

4. Statistical Quality Control (1940-1960): As a result of large-scale production, there was a need for statistical quality control methods, such as quality control charts, sampling and acceptance systems, and other methods.

5. Quality Assurance Phase (1960-1980): This phase focused on ensuring the quality of products.

6. Total Quality Management (TQM) Stage (1980-Present): This is the currently dominant stage, which has formed the basis for ISO international standards, while still utilizing statistical methods. In this stage, quality has become the quality of the organization as a whole, not just the product. The concept of quality is now based on customer needs and encompasses design, manufacturing, and post-manufacturing processes.

Fundamental factors affecting quality

1. Market: The customer wants are changing dynamically. So, it is the role of companies to identify needs and then meet it with existing technologies or by developing new technologies.

2. Money: As competition has increased, profit margins have decreased.

Companies have to spend heavily on new equipment's and processes. To absorb these costs productivity has to the increased, which means reworks and scrap has to be kept to the minimum.

3. Management

4. Men: The rapid growth in technical knowledge leads to development of human resource with different specialization.

5. Motivation: The increased complexity of the product means that every employee has to give his best if quality is to be maintained. This requires that quality realization among employees are high. This can be achieved only through continuous education and motivation of the work force.

6. Materials: Due to high material costs engineers have to constantly keep coming up with ways to bring down the cost of material used. They also need to come up with new alternate materials that can replace costlier older material. Selection of proper materials to meet the desired tolerance limit is also an important consideration.

7. Machines and mechanization: The demand to cut costs is forcing companies to use newer machines, which will deliver better quality and product using lesser cycle times.

8. Modern information methods: The modern information methods help in storing and retrieving needed data for manufacturing, marketing and servicing.

9. Mounting product requirements: Product diversification to meet customers taste leads to intricacy in design, manufacturing and quality standards. Hence, companies should plan adequate system to tackle all these requirements.

OBJECTIVES OF QUALITY CONTROL:

1. To decide about the standard of quality of a product that is easily acceptable to the customer and at the same time this standard should be economical to maintain.

2. To take different measures to improve the standard of quality of product.

3 To take various steps to solve any kind of deviations in the quality of the product during manufacturing.

FUNCTIONS OF QUALITY CONTROL DEPARTMENT :

1. Only the products of uniform and standard quality are allowed to be sold.

2. To suggest method and ways to prevent the manufacturing difficulties.

3. To reject the defective goods so that the products of poor quality may not reach to the customers.

4. To find out the points where the control is breaking down and to investigate the causes of it.

5. To correct the rejected goods, if it is possible. This procedure is known as rehabilitation of defective goods.

Benefits (Advantages) of Quality Control

1. Improving the quality of products and services.

2. Increasing the productivity of manufacturing processes.

3. Reducing manufacturing and corporate costs.

4. Determining and improving the marketability of products and services.

5. Reducing consumer prices of products and services.

6. Improving and/or assuring on time deliveries and availability.

7. Assisting in the management of an enterprise.

8. Scrap rejection and rework are minimized thus reducing wastage. So the cost of manufacturing reduces

Seven tools for quality control

The seven quality control tools are simple statistical tools used for problem solving.

The seven quality control tools are:

1. Pareto charts 2. Check sheets 3. Cause and effect diagram

4. Scatter diagrams 5. Histogram 6. Graphs or flow charts

7. Control charts

Key components of Quality Control may include:

1. Inspection: Regularly examining products, materials, or services to identify defects, non-compliance, or deviations from quality standards.

2. Testing: Conducting various tests and measurements to assess the performance, functionality, or characteristics of products or services.

3. Statistical Process Control (SPC): Employing statistical techniques to monitor and control the production processes, ensuring that they remain within acceptable quality limits.

4. Documentation and Records: Keeping detailed records of inspections, tests, and corrective actions taken to maintain traceability and accountability

5. Corrective Action: Implementing appropriate measures to address any identified quality issues and prevent their recurrence.

6. Training and Education: Providing employees with the necessary skills and knowledge to maintain quality standards effectively

7. Continuous Improvement: Constantly analyzing data and feedback to identify areas for improvement and enhancing the overall quality management system.

