

FACTFILE: GCE TECHNOLOGY & DESIGN

1.29 MANUFACTURING PRODUCTION AND QUALITY SYSTEMS: PART 2



Manufacturing Production and Quality Systems: Part 2

Learning outcomes

Students should be able to demonstrate knowledge and understanding of the use of:

- quality assurance (QA) and quality control (QC) systems;
- ISO 9001 Standards
- statistical testing methods;

Course content

What is quality assurance?

Quality assurance (QA) is a process that verifies whether a product meets a customer's expectations so that the manufacturer will retain its credibility.



It is a process with procedures so that goals will be accomplished. This process considers design, development, production, and service.

The Shewhart Cycle, developed by Dr. W. Edwards Deming consists of four steps: Plan, Do, Check, and Act (PDCA).

- **Plan:** create objectives and tests required to bring about the best results.
- **Do:** put into practice the course of action developed.
- **Check:** check and evaluate by testing the results versus the objectives set in the beginning
- **Act:** If any changes are required for improvement they are then to be applied.



The purpose is to guarantee that quality is in place for every component throughout the process. The target of quality assurance is to bypass the customers' expectations with the final product.

What is Quality Control?

Quality Control (QC) is a procedure in which quality in a product or service is guaranteed. The main aim is to make sure that the products and services meet required standards and are reliable and satisfactory.

Quality control is the examination of a product or service for certain levels of quality. The aim of a quality control team is to discover products or services that fall short of specified standards of quality.

Quality Control is regularly confused with Quality Assurance. The purpose of quality control is to decide whether the final product is satisfactory while quality assurance ensures the product or service is manufactured in the right way.



Statistical Testing Methods

Statistical Testing Methods refers to the use of statistics to generate the selection of finished products for testing.

Statistical testing methods inferences are decided about standards and quality based on chosen samples. Each item in the sample is tested for a particular quality feature.

The purpose of statistical quality control is to verify when the process has gone out of statistical control, so that a change can take place immediately in order to fix the problem.

The two principal techniques in statistical quality control are:

- Acceptance Sampling
- Control Charts

Acceptance sampling

This is when a sample is removed from a set of products. Then depending on the number of products that pass the test; the set is accepted or rejected.

Control chart

This is a simple graphical model to show and control a single feature of the process output. A control chart helps determine whether variations in your process are due to defects with the product or external circumstances, such as employee mistakes.

Using a control chart shows the effects of alterations to your process and helps you correct any errors in real time. You can also predict the range of possible future results.

A control chart has 3 horizontal lines:

- Central line shows the average of the process output.
- The upper and lower control confines point out severe statistical values of the process output.

If a value of the output is outside the upper or lower control limit then the process is out of control and needs to be assessed to determine the reason.

Purpose of Testing and Inspection

Testing is a process in which the product is observed during operation to establish if it works properly for a set period of time.

Inspection is the action of examining the product or its components to determine if they achieve the standards set at the beginning.

For example in the automotive industry there is an inspection of a vehicle's components, usually done by a certified mechanic. Vehicles will pass the inspection when the mechanic provides evidence for the proper working condition of the vehicle systems specified at the beginning.

Inspection and testing are the working parts of quality control, arguably the most important factor to the continued existence of any manufacturing company.

Quality Control helps with:

- Factors of cost;
- Productivity;
- On-time delivery; and
- Market share.

It is important that inspection and testing are carried out through each stage of the process so that the required levels of quality and design standards are high.

Other reasons why a company test and inspect products and operations are:

- To avoid expensive recalls;
- To ensure the product or components are capable of doing what they were designed to do;
- To avoid bad publicity; and
- Ensure consistency/quality of product manufacture.

ISO 9001 Standards






ISO 9001 is a standard that is used by all types of organisations and businesses. It is internationally recognised as a Quality Management Standard.

It is a standard which is used to help ensure products and/or services offered by a company are continually improved and meet customer requirements. For a company to gain ISO 9001 standard their company must be audited to ensure it meets the standards required. Only when this has been successfully completed can a company display the ISO 9001 symbol, which advertises that their product/services meet the standard for quality. The table on the next page shows how ISO 9001 can benefit a company.

We spend over 1 million hours each year improving the performance of businesses around the world

This experience allows us to see first-hand how ISO 9001 can help organizations to continually improve and deliver real benefits.



Business issue	How ISO 9001 helps	Benefits
 <p>Client expectation</p>	<ul style="list-style-type: none"> • It helps you to identify present customer needs and identify and assess future requirement • It helps you to measure client satisfaction 	<ul style="list-style-type: none"> • You focus on planning ahead to make sure you have the right resources and knowledge in your organization • Helps you to build a resilient organization for the long term • Helps you to deliver better products and services • Increase in customer satisfaction and repeat business
 <p>Compliance</p>	<ul style="list-style-type: none"> • Helps you ensure all regulatory requirements are met for your products and services • Requires you to communicate regulatory requirements to your employees and interested parties 	<ul style="list-style-type: none"> • Gives confidence to interested parties that relevant regulations and compliance obligations are being met • Protects your reputation • Reduces likelihood of fines and prosecutions which allows you to focus on winning business
 <p>Improvement</p>	<ul style="list-style-type: none"> • It makes you assess risks and identify opportunities for your business • It makes you continually examine opportunities for improvement • You need to put in place the operational controls to effectively manage and measure your performance 	<ul style="list-style-type: none"> • Lower operational costs • Reduce waste and increase efficiency • Improve your bottom line
 <p>Reputation</p>	<ul style="list-style-type: none"> • Demonstrates your commitment to quality products and services • It is the most widely recognized international management system standard • Helps safeguard the quality of your products and services 	<ul style="list-style-type: none"> • Improved reputation and stakeholder satisfaction • A competitive advantage to grow your business • Win more high-value customers, and achieve improved customer retention with better customer service
 <p>Engagement</p>	<ul style="list-style-type: none"> • Requires you to identify all internal and external stakeholders relevant to your Quality Management System and their needs • Requires you to communicate the quality policy and ensure that the workforce understands how they contribute to it • You are expected to show how you meet customer requirements and regulatory and statutory requirements 	<ul style="list-style-type: none"> • Internal and external communication is improved • Business with a motivated and engaged workforce are more likely to remain compliant and avoid penalties or fines

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Revision Questions

1 For a design and manufacturing company, testing, inspecting and quality systems are established procedures.

(i) Give **two** main reasons why it is so important for a company to test and inspect its products.

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(ii) Explain what is meant by Quality Assurance (QA) and Quality Control (QC) systems.

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2 A report focusing on a company manufacturing and assembling school lockers and filing cabinets made reference to the following terms:

- use of tolerance
- statistical testing methods

(i) Briefly explain what is meant by each of these terms.

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