

TECHNOLOGYSTUDENT

MOBILE REVISION

QUALITY SYSTEMS

This mobile revision pdf is based on detailed work found in the 'Product Design' section.

Tap on the green link button below to go to the complete website section



Tap the blue button to view all quality systems covered by this Revision PDF



QUALITY SYSTEMS

Tap on the title for information / revision.

1. QUALITY ASSURANCE AND QUALITY CONTROL

2. BRITISH STANDARDS INSTITUTE KITE MARK (BSI)

3. CONFORMITE EUROPEAN

4. TOLERANCE CHECKS

5. STANDARD COMPONENTS

6. HEALTH AND SAFETY – RISK ASSESSMENTS

7. SIX SIGMA

QUALITY ASSURANCE

Administrative system (paper work).

Includes: staff training, surveying customers regarding the quality of the product. Monitoring workers checking the quality of manufacture on the production line.

QUALITY CONTROL

Quality checks by the workers on the production line.

Testing the product to see that it works properly.

Visual checks and computer / sensor checks.

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PRODUCTS AND QUALITY STANDARDS



The following quality checks were made on the chair whilst being manufactured

Stability, must not topple over.
Joints and fixings, strong and do not break.

Quality of finish, colour is high quality and finish smooth and polished.

Paint, Covers all the frame, smooth, quality finish.

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Tap on the link buttons below, to go to detailed information and exercises on **QUALITY ASSURANCE AND QUALITY CONTROL**.
Ideal for revision.



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BRITISH STANDARDS INSTITUTE KITE MARK



Can be stamped on products tested to high British standards.

Tests carried out by the British Standards Institute (BSI)

Regarded as a Quality and Safety mark.

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HOW THE BRITISH STANDARDS KITE MARK DIFFERS FROM THE CONFORMITE EUROPEAN SYMBOL

To achieve the **British Standards** Institute Kite Mark, high standards of manufacture, safety and quality must be reached and maintained.

However, the **Conformite European Symbol** can be applied to products reaching minimum European standards.

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on **BRITISH
STANDARDS
INSTITUTE KITE MARK.**
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CONFORMITE EUROPEAN SYMBOL



Stamped on products tested to the minimum standard set by the EEC.

Applies to products in the European Community

Manufacturers must ensure that their products at least meet these minimum standards or risk having their products removed from the shelves of retailers throughout Europe.

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Tap on the link buttons below, to go to detailed information and exercises on **COMFORMITE EUROPEAN**. Ideal for revision.



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TOLERANCE

Checking that a product is manufactured within an upper and lower limit.

Example: Thousands of steel bolts are manufactured by a company. Samples are checked that they are the correct size. Each bolt must fall within a maximum and minimum length.

The tolerance of the bolt is said to be:



$$80.5\text{mm} \begin{matrix} + 0.5\text{mm} \\ - 0.5\text{mm} \end{matrix}$$

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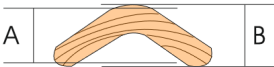
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TOLERANCE

To ensure the quality of their product, a boomerang manufacturer carries out tolerance checks.

When each boomerang is finished, it is checked to ensure that each one is as near to the 'correct' size as possible. Each boomerang must fall between two critical measurements for height and length. The height must fall within measurements 'A' and 'B' and the length within 'C' and 'D'. This is called 'tolerance'. Any boomerang falling outside either of these sets of measurements is rejected and recycled.



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WHY TOLERANCE CHECK PRODUCTS?

When a product is mass produced in thousands and hundreds of thousands, samples are regularly checked to ensure that they fall within the tolerance allowed.

This ensures:

The quality and consistency of the product.

Each copy of the product is the same and works exactly the same way.

Products that have many parts, will fit together and work in the way that they are supposed to.

Products that do not fit with the set tolerances, are rejected and do not reach the customer.

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WHAT ARE STANDARD COMPONENTS?

A standard component is usually an individual part (called a 'component'), manufactured in thousands or millions, to the same specification (such as size, weight, material etc...). A good example is a steel bolt. Bolts are available in a vast range of standard sizes. However, each size will be manufactured to an internationally accepted standard.

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For example, a M20 bolt. A typical steel M20 bolt is a specific length, diameter, quality of steel, pitch of thread etc...



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EXAMPLE TOLERANCE CHECK

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The digital vernier caliper is a very accurate measuring device. It is being used to check that the steel bolt falls within 81mm and 80mm in length. If it is outside these measurements (tolerance) it will be rejected.



The tolerance of the bolt is said to be: $80.5\text{mm} \begin{matrix} + 0.5\text{mm} \\ - 0.5\text{mm} \end{matrix}$

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WHY USE STANDARD COMPONENTS WHEN DESIGNING AND MANUFACTURING?

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In industry, very little could be manufactured by mass production, without a supply of standard components. The fact that standard components are available, means that many of the products we buy and use today, can be manufactured in their thousands / millions, ready for consumers.



DIODE



RESISTOR



LIGHT DEPENDENT
RESISTOR



CAPACITOR



TRANSISTOR

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THE CONTRUSTION INDUSTRY AND STANDARD COMPONENTS

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Buildings are usually constructed from materials supplied as standard sizes (bricks, timber, glass). It is rare for a building to be built from non-standard/individual sizes, unless it is an individual, innovative design.

The German designed and built 'Huf Haus' is an excellent example of component based house construction.



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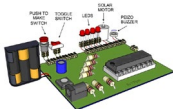


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COMPLEX STANDARD COMPONENTS

PIC microcontrollers (Programmable Interface Controllers), are pre-built electronic circuits, that can be programmed to carry out a vast range of tasks. They can be programmed to be timers or to control a production line and much more. They are found in most electronic devices such as alarm systems, computer control systems, mobile phones, in fact almost any electronic device.



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WHAT IS A RISK ASSESSMENT?



The Law states that employers must guarantee the safety of their employees, as far as it is possible.

An employer must assess the risks of injury, related to the work their employees carry out.

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A **risk assessment** is a written document that identifies hazards / dangers to employees, when they work on machines / equipment and other types of work. It clearly states how the risk of accidents and injuries can be minimised / prevented, by employees following '**control measures**' (following safety instructions).

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WHAT IS A 'HAZARD' AND A 'RISK'?



A **hazard** is an activity that is potentially dangerous.



Once an hazard has been identified in the workplace, the **risk** (or possibility) of an employee being harmed by the hazard, is worked out.

The risk is recorded as **low risk**, **medium risk** or **high risk**.

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HOW A RISK ASSESSMENT IS CARRIED OUT

A worker operates a drilling machine, to 'drill' holes in sheet steel.

1. The employer identifies a **hazard**, as sharp steel swarf being thrown towards the worker, at eye level and at high speed.

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2. The employer determines the **risk** (possibility of swarf being thrown out) as **high**.

3. Precautions (**control measures**) are introduced, to protect the employee from harm and injury. He / she is given safety goggles to wear, guards to use and safety training.

The control measures are written down clearly for employees to follow.

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Tap on the link buttons below, to go to detailed information and exercises on **HEALTH AND SAFETY** and **RISK ASSESSMENTS**. Ideal for revision.



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SIX SIGMA

Six Sigma is closely related to Quality Control / Quality Assurance. It is a 'system' that aims to remove defects from the final product or service. It is a 'philosophy' largely driven by the analysis of DATA and Statistics . Motorola, Texas Instruments and the Bank of America, claim its successful implementation, leading to overall efficiency and quality improvements.

Tap the image for further information

SIX SIGMA
6σ

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SIX SIGMA

A company that follows the six sigma philosophy, quantifies its effectiveness in eliminating defects with a sigma level. A company claiming a 6 sigma level (very high level), detects only 3 to 4 defects out of a million. This is a very high standard. It is more usual for companies to claim a 3 or 4 sigma level, detecting 70 to 300 defects per million checked.

Six sigma is based on five analytical phases:

Define
Measure
Analyse
Improve
Control

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image for
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information*



6σ

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