

Systems, control procedures and industrial practices



Quality

Quality assurance

The plans for any project must include what everyone should be doing to ensure the product is fit for purpose and is of the highest quality.



This is where a quality assurance manager comes in. The job description on the next two slides was taken from recruitment company website, www.prospects.ac.uk. It is long and complicated, but so is the whole concept of QA. The more important points are highlighted in red.

QA Manager job description - page 1

- Promoting quality achievement and performance improvement throughout the organisation
- Setting QA compliance objectives and ensuring that targets are achieved
- Maintaining awareness of the business context and company profitability, including budgetary control issues
- Assessing the product specifications of the company and its suppliers, and comparing this with customer requirements
- Working with purchasing staff to establish quality requirements from external suppliers
- Ensuring compliance with national and international standards and legislation
- Considering the application of environmental and health and safety standards
- Agreeing standards and establishing clearly defined quality methods for staff to apply
- Defining quality procedures in conjunction with operating staff
- Setting up and maintaining controls and documentation procedures

QA Manager job description - page 2

- Identifying relevant quality-related training needs and delivering training
- Collating and analysing performance data and charts, against defined parameters
- Ensuring tests and procedures are properly understood, carried out and evaluated and that product modifications are investigated if necessary
- Supervising technical staff in carrying out tests and checks
- Writing technical and management systems reports
- Bringing together staff of different disciplines and driving the group to plan, formulate and agree comprehensive quality procedures
- Persuading reluctant staff to change their way of working to incorporate quality methods
- Liaising with customers' auditors and ensuring the execution of corrective action and compliance with customers' specifications
- Establishing standards of service for customers or clients
- Preparing clear explanatory documents, such as customers' charters
- Monitoring performance by gathering relevant data and producing statistical reports

Quality assurance – scope



QA covers every aspect, from
buying the best raw materials



to
training
all the
staff



and working closely
with the client to agree
the standards.

Quality control measures

Quality control measures are built into the QA plan. They are the tests and checks that are carried out during production.

All these checks are recorded at every step so the QA manager has all the data.

Very accurate measuring equipment, such as vernier gauges and digital micrometers, are used in industry.





Visual checks and tolerances

Visual checks are also part of QC. Ensuring the colour or finish of an object looks right is very important.

Tolerance is the acceptable range of accuracy. The QA manager agrees the tolerances with the client and these are put in the plan.

$+ \textit{or} - 0.05\textit{mm}$

This means that this particular size can be no more than one twentieth of a millimetre bigger or smaller when it is measured.

$+ \textit{or} - 0.001\textit{mm}$

Tolerances in some industries, such as car engine manufacture, can be as low as one thousandth of a millimetre.

Why have tolerances?

In something as complex as a car engine, if one part is not accurate it can stop the whole engine from working and cost the company thousands of pounds.



Once it has been set, the tolerance is not flexible.

If a QC check is made and something is out of tolerance, then production must stop until the tooling is adjusted and a product is re-tested.

How often are checks carried out?

Sampling

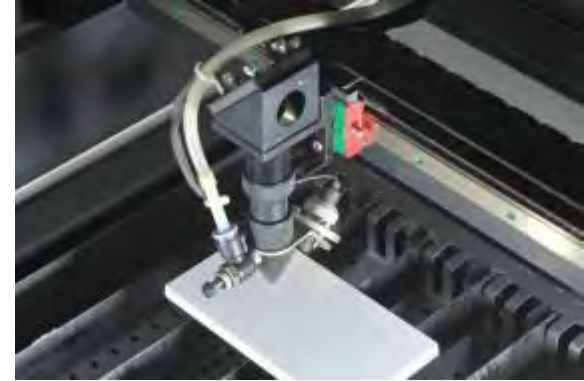
- Part of the QA plan
- Products are checked every so often
- 1 in 50 or 1 in 100
- If product is expensive such as this chest of drawers, then 1 in 100 is too few checks, so would probably be 1 in 5



Industrial practices



In school, you may make something by hand or use some CAD/CAM equipment such as this small laser cutter.



In industry, however, most things are **scaled-up**.



Industrial standard equipment is used and each process may be done by different people, with the product moving between them on a conveyor belt. This is called a production line.



The four production processes

One-off

A one-off product is made for a particular purpose or to be unique. Large sculptures or small hand-made products are both examples of this.



Batch production



Batch production is for products that may not be in demand all the time, such as this souvenir tea towel.



Batch production is also used for products where design is very important. High-end sports cars are produced in small numbers to stimulate demand and keep them exclusive.

The four production processes (cont).

Mass-produced products and continuously produced products are also made on production lines. The difference is in the amounts made.

Mass production



The washing machine is mass produced. It is a functional product with some element of design to make it stand out and attract the buyer. There is competition from different manufacturers and tens, or possibly hundreds of thousands may be made.

Continuous production



The tablet containers are a continuously produced standard product. They are made as blanks for a number of different manufacturers to add their own designs or labels at a later stage. They are purely functional and produced in millions around the world.

Just-in-time (JIT) production

This is a very simple concept. A company will only order enough raw materials or blank components for their exact needs at that time. There is nothing stored and taking up space in the warehouse, so money is saved in transport and storage costs.



Before



After