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## UNIT B: APPLICATION OF NEW TECHNOLOGY IN ENGINEERING (6258)

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### About This Unit

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The use of new technologies is an exciting and expanding part of engineering. New technologies are used in all sectors of engineering and will continue to develop in the foreseeable future. In this unit you will look at the role of new technology through the investigation of engineered products.

This unit focuses on the product and the development of the product. You will learn about new technology involved in the following areas:

- information technology
- new materials and components
- control technology.

You will investigate a product by carrying out practical activities. You will think about the new technologies involved and learn to understand their benefits. You will also learn how new technologies affect engineering companies and find out about the sectors of the engineering industry that manufacture products.

This unit links well with Foundation Unit A: *Design and graphical communication* where you will be considering new design ideas, and with Foundation Unit C: *Making engineered products* where you may use new materials and production methods.

You will have the opportunity to develop your Key Skills while working towards this unit, by the use of information technology and a variety of communication techniques.

This unit is assessed through your portfolio work and an external assessment.



### What You Need To Learn

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There are many different types of new technology used in engineering. In this unit they have been grouped into three categories. These are:

- information technology
- new materials and components
- control technology.

You must be able to identify engineering products that involve the new technologies for each of the three categories.

For the products you identify you must be able to describe which of the new technologies listed below are involved, and state if the product uses this new technology or the new technology was used to develop the product.

### **Information Technology**

- Data sources and handling, such as databases, Internet sites
- CAD (computer-aided design) techniques, such as printed circuit board layout, drafting, modelling
- CAM (computer-aided manufacture), such as used for integrated manufacturing techniques
- telecommunications technology, such as cellular phone networks.

### **New Materials and Components**

- Polymers, such as plastics, adhesive, coatings
- Modern metals and composites, such as alloys
- New computer technology, such as microprocessors, memory devices
- New electronic technology, such as integrated circuits and chips, display devices.

### **Control Technology**

- Automation, such as that used for quality monitoring, process control, computer-numerical-control (CNC) programming
- Robotics, such as that used for continuous operation, improved reproducibility, speed, work in hazardous environments.

### **Investigating New Technology Products**

You need to learn how to investigate products that involve new technology by:

- finding out information from manufacturers and suppliers
- examining individual products
- carrying out simple practical examinations of properties, such as heaviness, colour, feel of surfaces, scratch and wear resistance, areas likely to be damaged.

You must be able to use the above information, together with drawings, diagrams and sketches to describe how the new technology product works. Consider, for example:

- purpose, for example that the purpose of a CD player is to reproduce music with high quality sound
- form and structure, for example that a CD player consists of metal and electronic components in a plastic container
- new technology used, for example digital recording format gives high quality.

## **Impact of New Technology on People**

You must learn to consider the advantages and limitations that the development of new technology products bring to society. These might involve:

- new purposes
- improved costs
- improved performance, such as size and weight and ease of use.


## **Impact of New Technology on Companies**

You need to be aware of the different sectors of engineering and learn to identify which sector a particular new technology product mainly belongs. The main sectors are:

- aerospace
- automotive
- electrical and electronic
- mechanical
- telecommunications.

You will learn to identify some of the advantages and limitations that the development of new technology products have brought to a particular sector of engineering. These might include:

- efficiency, in terms of use of materials, energy consumption and time saving
- production costs, for example material costs, equipment costs and processing costs
- the type and amount of labour required
- the effects on the natural world and the working environment.

 <b>Assessment Evidence</b>		
<p><b>You need to answer test questions</b> to show how well you understand the importance of new technology in engineering.</p> <p><b>In addition, in your portfolio, you need to produce</b> information about a new technology product used in your personal life or in a job.</p> <p>The information should include:</p> <ul style="list-style-type: none"> <li>• data from manufacturers and suppliers</li> <li>• an investigation of the product</li> <li>• details of the impact this product has had on people and companies</li> </ul>		
<p><b>To achieve a portfolio Pass you must show you can:</b></p> <p>P1 use appropriate sources of information to identify and describe the types of new technologies used in the product and identify and describe the sector of engineering to which the product belongs</p> <p>P2 communicate clearly the purpose, form and structure of the product by examining and carrying out practical activities</p> <p>P3 identify the advantages and any limitations the product has for you and for the company that made it.</p>	<p><b>To achieve a portfolio Merit you must also show you can:</b></p> <p>M1 use appropriately the technical terms used to communicate the purpose, form, structure and new technology involved in the product</p> <p>M2 seek and use additional relevant information about the product and the main new technology it involves</p> <p>M3 explain the advantages and limitations the product has brought to one sector of engineering.</p>	<p><b>To achieve a portfolio Distinction you must also show you can:</b></p> <p>D1 use planning skills to show how you will investigate your new technology product and find information on new technology</p> <p>D2 understand new technology by considering the impact it may have on a sector of engineering and by suggesting how it might change in the near future.</p>



### **Teaching Strategies**

Guidance should be given when product choices are being made. It is often useful if the product both uses new technology and was made using new technology.

When students are examining an individual new technology product they should carefully take it apart, if reasonable to do so. This will not only maintain student interest but allow them to see clearly how products are structured and how they work.

As this is a Foundation unit and students only need to learn about new technology at an introductory level, it is not necessary for students to know how to use the technology at this stage.

It is important that students investigate a number of different engineered products either as a group activity or as a formal lesson before they have to choose a product for the assessment. This will help them to develop learning about purpose, form and structure, which they may find difficult.

At this level the purpose of the product should be kept simple, just stating what the products do. Similarly with form and structure.

### **Assessment Strategies**

All GNVQ students produce portfolio work as part of teaching and learning. The portfolio provides the evidence for internal assessment for most units. This unit is common to the six-unit and the Part One awards. Please note that the assessment requirements for these two qualifications are different.

Each unit in the Part One award combines portfolio evidence with a test to arrive at Pass, Merit and Distinction grades. All three compulsory units have this combination.

For grading student evidence you should consider the following general qualities that distinguish between the three grades:

- increasing depth and breadth of understanding
- increasing coherence, comparison and drawing valid conclusions
- increasing independence and originality.

For this unit you should also consider the following qualities that help distinguish between grades:

- increasing understanding of the reasons and benefits associated with new technology
- increasing skill and confidence in understanding the technologies associated with new technology products.

These qualities are typically shown by evidence similar to any examples given in the unit assessment specification or in this guidance. There is usually a variety of equivalent evidence that can also be used by assessors.

### **Pass**

The information uses labelled sketches and diagrams to show clearly the details required. The student identifies clearly where new technology plays a part in the product.

### **Merit**

The information gives a number of different new technologies applied to the product. The student shows an understanding of the new technology used and selects relevant information.

### **Distinction**

The student shows some independence of investigation by proposing methods of examining the product. The student also shows some evaluation of the information gained and of the product.

### **Resources**

It is important that the student sees a practical approach to this unit. The use of actual products is important; these could be non-functional or broken products that are freely available.

The best resources for new technology are industrial visits that give students an opportunity to see automated technology.



## Key Skills Guidance

This guidance is specific to this unit, but for planning and delivery purposes, it should be read in the context of the whole GNVQ. Please refer to the introduction to the whole qualification for further information.

The guidance has been split into two sections: keys to attainment and signposts. The two sections should be used in conjunction with each other.

The section on keys to attainment indicates the aspects of key skills that candidates are required to meet for the vocational requirements of this unit. It is expected that candidates covering the unit requirements appropriately will address these key skills.

The section on signposts indicates opportunities to use aspects of key skills that can be incorporated naturally into candidates' learning programmes. Candidates should be encouraged both to develop and to produce evidence for these aspects of the key skills. They will need to develop additional evidence elsewhere to ensure that the requirements of the key skills units are fully met.

### Signposts

<i>When candidates are:</i>	<i>They will have the opportunity to develop the following Key Skills evidence</i>
<ul style="list-style-type: none"><li>• finding out about a new technology product by talking to a professional</li><li>• collecting data from manufacturers and suppliers about a new technology product from, for example trade literature, databases, Internet sites</li><li>• presenting information about a new technology product, for example as an information pack</li></ul>	<p>C1.1 Take part in a one-to-one discussion and (a group discussion) about different, straightforward subjects.</p> <p>C1.2 Read and obtain information from two different types of documents about straightforward subjects, including at least one image.</p> <p>C1.3 Write two different types of documents about straightforward subjects. Include at least one image in one of the documents.</p>

<ul style="list-style-type: none"> <li>collecting data from manufacturers and suppliers about a new technology product from, for example trade literature, databases, Internet sites</li> <li>presenting information about a new technology product, for example as an information pack</li> </ul>	<p>IT1.1 Find, explore and develop information for two different purposes.</p> <p>IT1.2 Present information for two different purposes. Your work must include at least one example of text, one example of images and one example of numbers.</p>
<ul style="list-style-type: none"> <li>collecting data on a product</li> <li>calculating the characteristics of the product</li> <li>presenting information on the product</li> </ul>	<p>N1.1 Interpret straightforward information from two different sources. At least one source should be a table, chart, diagram or line graph.</p> <p>N1.2 Carry out straightforward calculations to do with:</p> <ol style="list-style-type: none"> <li>amounts and sizes</li> <li>scales and proportion</li> <li>handling statistics.</li> </ol> <p>N1.3 Interpret results of calculations and present findings. You must use one chart and one diagram.</p>

The wider Key Skills that can contribute to effective learning and achievement in this unit are Working with Others and Improving Own Learning and Performance. The extent to which valid Key Skills evidence is generated will depend upon individual approaches to teaching and learning. However the vocational requirements of this unit would normally result in explicit evidence being generated for:

<i>When candidates are:</i>	<i>They will have the opportunity to develop the following Key Skills evidence:</i>
<ul style="list-style-type: none"> <li>• producing information about a new technology based product used in their personal life or in a job. This could be especially so when candidates carry out their investigation of the product with support from their tutor</li> </ul>	<p>LP1.1 Confirm understanding of your short-term targets, and plan how these will be met, with the person setting them.</p> <p>LP1.2 Follow your plan, using support given by others to help meet targets.</p> <p>Improve your performance by:</p> <ul style="list-style-type: none"> <li>• studying a straightforward subject</li> <li>• learning through a straightforward practical subject.</li> </ul> <p>LP1.3 Review your progress and achievements in meeting targets, with an appropriate person.</p>
<ul style="list-style-type: none"> <li>• producing information about a new technology based product used in their personal life or in a job as part of a group or team activity</li> </ul>	<p>WO1.1 Confirm what needs to be done to achieve given objectives, including your responsibilities and working arrangements.</p> <p>WO1.2 Work with others towards achieving given objectives, carrying out tasks to meet your responsibilities.</p> <p>WO1.3 Identify progress and suggest ways of improving work with others to help achieve the given objectives.</p>