



# Specification

## **Edexcel GCSE in Engineering (Double Award) (2EG02)**

**For first teaching from 2009**

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This specification is Issue 2. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on the Edexcel website: [www.edexcel.com](http://www.edexcel.com)

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Publications Code UG030996

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# Introduction

The Edexcel GCSE in Engineering (Double Award) is designed for use in schools and colleges. It is part of a suite of GCSE qualifications offered by Edexcel.

## About this specification

Key features of this specification include:

- the qualification is broken down into three distinct units
- detailed unit content for all units
- clear assessment criteria for the internally assessed units
- one paper that targets grades A\* to G (no tiering).

## Key subject aims

The Edexcel GCSE in Engineering (Double Award) aims to enable students to:

- engage in a range of engineering processes and develop as effective and independent students
- develop a range of transferable engineering skills that will form a foundation for future learning and progression
- understand engineering and related sectors and the contribution they make to society and the economy
- develop an awareness of emerging technologies and sustainable development in the context of engineering.

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# Specification at a glance

The Edexcel GCSE in Engineering (Double Award) is comprised of three units.

## Unit 1: Engineering Design and Graphical Communication \*Unit code: 5EG01

- Internally assessed
- Availability: June
- First assessment: June 2011

**30% of  
the total  
GCSE  
(Double  
Award)**

### Overview of content

- Analysing design briefs and producing design specifications and design solutions
- Interpreting and producing engineering drawings
- Presenting design solutions

### Overview of assessment

- Students to produce a design solution for an engineered product, including interpreting and producing engineering drawings
- Controlled assessment task, set by Edexcel and internally marked by centres
- Centres can contextualise the task to suit local needs
- 23-33 hours required to complete the assessment
- A total of 50 marks available
- Task to be made available in September 2009 and reviewed every two years

**Unit 2: Engineered Products****\*Unit code: 5EG02**

- Internally assessed
- Availability: June
- First assessment: June 2011

**30% of  
the total  
GCSE  
(Double  
Award)****Overview of content**

- Interpreting product specifications and producing production plans
- Selecting and using suitable tools, components and processes to safely produce an engineered product

**Overview of assessment**

- Students to produce a final engineered product that meets design requirements
- Controlled assessment task, set by Edexcel and internally marked by centres
- Centres can contextualise the task to suit local needs
- 23-33 hours required to complete the assessment
- A total of 50 marks available
- Task to be made available in September 2009 and reviewed every two years

### Unit 3: Application of Technology in Engineering and Manufacturing

\*Unit code: 5EM03

- Externally assessed
- Availability: June
- First assessment: June 2011

**40% of  
the total  
GCSE  
(Double  
Award)**

#### Overview of content

- Investigating the use of information and communication technology (ICT), modern and smart materials and control technology in engineering
- Understanding the impact and advantages and disadvantages of using modern technology in engineering and manufacturing
- Understanding the stages involved in manufacturing a product
- Investigating an engineered or manufactured product that uses modern technology

#### Overview of assessment

- Single examination, lasting 1 hour and 30 minutes
- A mixture of short- and long-answer questions, with a total of 110 marks available
- Paper focuses on one of three chosen engineering sectors:
  - engineering fabrication
  - mechanical/automotive
  - electrical and electronic/computer/process control/telecommunications
- As this unit is shared with the Edexcel GCSE in Manufacturing (Double Award), centres can choose to take the paper that focuses on one of the three sectors within that qualification
- Paper consists of two sections – Section A is made up of general questions about the chosen sector and Section B focuses on a specific product identified in pre-release material made available each September.

\* See *Appendix 3* for a description of this code and all other codes relevant to this qualification.



# A Qualification content

## Knowledge, skills and understanding

The Edexcel GCSE in Engineering (Double Award) requires students to demonstrate knowledge and understanding of:

- the properties of engineering materials including ferrous and non-ferrous metals, polymers, ceramics and composites
- the function of a range of different mechanical components, electrical/electronic components and pneumatic/hydraulic components
- the properties and characteristics of materials that affect their ability to be shaped/formed, treated, surface finished, handled, cost and availability
- different engineering processes including material removal, shaping and manipulation, joining and assembly, heat and chemical treatment and surface finishing
- quality control techniques
- the use and impact of new technologies and modern and smart materials in the engineering industries.

Students will develop a variety of skills when designing an engineered product, including the ability to:

- analyse client design briefs for engineered products
- produce, use and modify design specifications
- create design solutions for engineered products
- read, understand and create a range of engineering drawings to industry standards
- present design solutions for an engineered product
- respond to client feedback.

Students will also gain the skills needed to engineer a product, including the ability to:

- produce and use production plans
- select and use different materials, parts, components, tools, equipment and suitable engineering processes
- apply quality control techniques
- adhere to and apply health and safety procedures
- analyse and revise completed products to see how they can be improved.

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## Unit 1: Engineering Design and Graphical Communication

### Overview

#### Content overview

In this unit students will learn about the different aspects of engineering design and produce a design solution that meets the needs of a design brief.

Students will develop an understanding of graphical communication and learn about the different engineering drawing techniques used for engineered products and their servicing. Students will learn to read and produce engineering drawings and how to interpret specific engineering sector standards. Students will learn how to choose appropriate techniques, for a given purpose or audience, in order to present their design solutions.

#### Assessment overview

This unit will be assessed through a controlled assessment task which will require approximately 23-33 hours to complete. Students will need to produce a design solution for an engineered product. They will need to carry out a series of activities, including:

- analysing the design brief
- identifying the product criteria and production constraints
- producing, selecting and testing design solutions
- interpreting and producing engineering drawings
- reviewing and modifying their design solution.

A total of 50 marks are available for the task. Student design work must be produced under controlled conditions.

The controlled assessment task will be set by Edexcel and reviewed every two years.

The preparation and production of student designs and drawings must take place under controlled conditions. Students can produce their design portfolios only during lesson time when supervised by a teacher or invigilator. Student work must be collected in at the end of each lesson and handed back at the beginning of the next lesson. Students can undertake research under limited supervision.

## Detailed unit content

### Topic 1.1: Engineering design

#### Design briefs

Before starting their design, students need to understand what the client wants. They will need to analyse a client design brief to identify the following key features:

- function – where and what the product will be used for
- quality standards – sector and/or client quality standards
- styling aesthetics – the appearance and appeal of the product
- performance – how well the product has to perform
- intended markets – who might use the product, competition with similar products, client's own customer base
- size – the approximate size in three dimensions
- maintenance – how this is planned for in the design and during product use
- production methods and materials
- cost – including design, production and material costs
- regulations – including health and safety
- scale of production – quantity required, use of mass or batch production.

## Design specification

In order to produce a design solution that meets the needs of the client, students must first analyse the design brief, and any related engineering drawings, to identify the key design features. They must then explain what is required, showing clear details and the decisions they have made about the intended product. This is called a design specification and will help them to produce their design solution.

Students must use their design specification to produce a design solution that meets client and sector requirements. In order to produce a design solution, they must learn to use the following techniques to develop their design ideas:

- research and analysis of information and data
- consideration of scientific principles, for example recognition and use of structures and how to support and reinforce them
- generation of ideas and solutions
- evaluation of ideas, solutions, testing and subsequent modifications
- 2D and 3D drawing and sketching techniques
- modelling techniques.

## Design solutions

Students must select the most appropriate design solution from their initial design ideas. To do this, they need to devise and apply tests against the design criteria at critical points in the development. Their final design solution must include:

- a justification of their final choice that refers to the key features in both the client design brief and the design specification
- details of the final design idea
- an explanation of how they met the client's requirements and complied with sector standards.

**Topic 1.2: Engineering drawings****Drawing symbols**

Students must learn to read engineering drawings and produce a selection using both manual and computer techniques.

Engineering drawings must comply with sector-specific standards and conventions, eg BS8888:2000/BS3939-1. Engineering drawings produced, using for example third-angle orthographic projection, should have a title, name block, scale and borders.

Students must be able to read electrical/electronic, pneumatic/hydraulic and mechanical engineering drawings and diagrams so that they can explain the purpose of the components and features used. They must learn to recognise a selection of appropriate standard symbols, including:

- electrical/electronic – resistors, switches, bulbs, batteries, motors, buzzers, variable resistors, diodes, capacitors, LEDs, thermistors
- mechanical features – scale, holes, screw threads (internal and external), hidden detail, surface finish/protection
- dimensions – toleranced dimensions, radii, centres, springs
- pneumatic/hydraulic pumps, motors, valves, cylinders, reservoirs, pipework, filters.

## Drawing techniques

Students must produce engineering drawings that communicate their final design solution by selecting and using the following techniques appropriately:

- freehand sketches
- isometric projection
- oblique projection
- block diagrams
- flow diagrams
- schematic diagrams
- circuit diagrams
- first-angle orthographic projection
- third-angle orthographic projection
- assembly diagrams
- exploded diagrams.

Students are not expected to become 'expert' in any of these techniques but they must learn how to produce drawings, or appropriate parts of drawings and diagrams, using both manual and computer-generated methods. Students should be able to use computer-aided design (CAD) and link this with computer-aided manufacture (CAM) where appropriate.

**Topic 1.3: Presenting engineering drawings and design solutions****Choosing engineering drawing techniques**

When students are choosing engineering drawing techniques, they must take into account the purpose of the engineering drawing and the intended audience. Their drawing may be:

- a working/engineering drawing
- a service/repair drawing
- an assembly drawing.

**Types of audience**

The types of audiences to consider are:

- service engineers
- manufacturing engineers
- technical customers.

**Presenting design solutions**

Students must communicate their final design solution to other people. Their presentation must:

- include a range of possible design solutions
- compare the advantages and disadvantages of the various design solutions
- give reasons for their final choice that refer to the key features in both the client design brief and their design specification
- show details of their final design idea
- explain how the final design solution meets the client design brief
- respond to feedback, checking against the design criteria and suitability for the user, and include modifications for the proposed design solution, if necessary.



## Assessment criteria – Unit 1

Section	Sub-section	Marks	Level of response	Mark range
<b>Investigation (12 marks)</b>	a) Analysing the brief*	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>Analysis of the brief to identify basic client needs, with identification of some key features of the engineered product. The key features identified are briefly listed, make little use of correct grammar and include frequent spelling mistakes, with incorrect or inappropriate use of terminology.</li> </ul>	1–2
			<ul style="list-style-type: none"> <li>Analysis of the brief to identify the main client needs, with a description of the key features of the engineering product. The description of key features includes a sound standard of spelling and punctuation. Terminology is mostly used appropriately.</li> </ul>	3–4
			<ul style="list-style-type: none"> <li>Analysis of the brief to explain the main client needs, with a justification of the key features of the engineering product. The analysis makes good use of accurate terminology and grammar, and few punctuation and spelling errors.</li> </ul>	5–6
	b) Details of the design criteria and production constraints*	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>Production of a design specification that identifies the basic details of the product criteria and production constraints. Design specification makes little use of correct grammar and includes frequent spelling mistakes, with incorrect or inappropriate use of terminology.</li> </ul>	1–2
			<ul style="list-style-type: none"> <li>Production of a design specification that describes some of the main details of the product criteria and production constraints. Details are presented using adequate standards of legibility, spelling and punctuation. Terminology is mostly used appropriately.</li> </ul>	3–4
			<ul style="list-style-type: none"> <li>Production of a design specification that explains the main details of the product criteria and production constraints. Grammar, punctuation and few spelling errors and there is good use of accurate terminology.</li> </ul>	5–6

Section	Sub-section	Marks	Level of response	Mark range
Design (12 marks)	c) Ideas and design solutions*	6	Level of response not worthy of credit.	0
			Generation of basic design ideas and the development of simple design solutions. Ideas and solutions include frequent errors in spelling and grammar. Terminology is not used accurately or appropriately.	1-2
			Generation of alternative design ideas and the development, in some detail, of design solutions. Ideas and solutions are presented using a sound standard of spelling and punctuation. Terminology is mostly used appropriately.	3-4
			Generation of imaginative design ideas and the development of detailed and appropriate design solutions. Few grammar, punctuation and spelling errors and there is good use of accurate terminology.	5-6
	d) Testing and selecting the final solution*	6	Level of response not worthy of credit.	0
			Present limited testing against some of the design criteria in order to select the final design solution. There is little evidence of why the final design idea was chosen. Written evidence is poorly presented with little use of appropriate terminology.	1-2
			Present a range of testing against the design criteria in order to select the final design solution. Describe, in some detail, how the final design solution meets the main design criteria. Written evidence is generally free of spelling and grammatical errors and terminology is mostly used accurately and appropriately.	3-4
			Present objective testing against the design criteria in order to select and justify the final design solution. Written evidence is clear, with consistent use of spelling, punctuation and grammar and there is good use of accurate terminology.	5-6

Section	Sub-section	Marks	Level of response	Mark range
Graphical communication (20 marks)	e) Interpreting engineering drawings and circuit diagrams	6	Level of response not worthy of credit.	0
			Read engineering drawings and circuit diagrams and name the components/features.	1–2
			Read and interpret engineering drawings and circuit diagrams and name and explain the function of some of the components/features.	3–4
			Read and interpret engineering drawings and circuit diagrams and name and explain the function of each component/feature.	5–6
	f) Selecting engineering drawing techniques	6	Level of response not worthy of credit.	0
			Selection and use of a limited range of engineering drawing techniques to communicate some aspects of the final solution. The selection of drawing techniques takes some account of the purpose of the drawing.	1–2
			Selection and use of a range of engineering drawing techniques to communicate, in some detail, the final solution. The selection of drawing techniques takes some account of the purpose of the drawing and the intended audience.	3–4
			Selection and use of an effective range of engineering drawing techniques to communicate, in detail, the final solution. The selection of drawing techniques takes considered account of the purpose of the drawing and the intended audience.	5–6
	g) Producing engineering drawings	8	Level of response not worthy of credit.	0
			Production of basic engineering drawings that show limited compliance with sector-specific standards and conventions. Drawings include the use of some relevant common standard symbols.	1–2
Production of engineering drawings that comply, in some detail, with sector-specific standards and conventions. Use of a range of relevant standard symbols for the named components.			3–5	
Production of appropriate manual and CAD engineering drawings that comply with sector-specific standards and conventions.			6–8	

Section	Sub-section	Marks	Level of response	Mark range
Presentation (6 marks)	h) Presenting and modifying the final design solution*	6	Level of response not worthy of credit.	0
			Limited description of how the final design solution meets the client design brief and design specification, identifying some relevant modifications. Written evidence is poorly presented with little use of appropriate terminology.	1–2
			Description, in some detail, of how the final design solution meets the client brief and design specification, describing relevant modifications. Written evidence is generally free of errors and terminology mostly used appropriately.	3–4
			Detailed explanation of how the final design solution meets the brief and specification, explaining relevant modifications. Written evidence is clear, with few, if any spelling or punctuation mistakes and there is good use of accurate terminology.	5–6
Total marks:		50		50

\* Opportunity for students to be assessed on quality of written communication.

## Unit 2: Engineered Products

### Overview

#### Content overview

In this unit students will develop an understanding of the processes involved in producing an engineered product. They will learn how to use a product specification and create a production plan.

They will use a variety of tools, equipment and suitable engineering processes to produce the final engineered product.

Students will learn about and apply the different health and safety procedures applicable to different engineering processes.

#### Assessment overview

This unit will be assessed through a controlled assessment task which will require approximately 23-33 hours to complete. Students will need to produce an engineered product. They will need to carry out a series of activities including:

- interpreting a product specification and engineering drawings
- producing a production plan that includes resources, processing requirements and production details and constraints
- identifying, preparing and using materials, parts and components
- selecting and using processes, tools and equipment
- producing a final engineered product
- testing and evaluating their engineered product.

A total of 50 marks are available for the task. Student work must be produced under controlled conditions.

The controlled assessment task will be set by Edexcel and reviewed every two years.

The preparation and production of student production plans, the making of an engineered product and the testing of the product through practical activities must take place under controlled conditions. Students can produce their engineered products and related portfolios only during lesson time when supervised by a teacher or invigilator. Student work must be collected in at the end of each lesson and handed back at the beginning of the next lesson. Students can undertake research under limited supervision.

## Detailed unit content

### Topic 2.1 Product specifications and production plans

#### Product specification

In order to make an engineered product, students need to know the specific requirements for all the different parts of the product. This information is in the product specification and the working drawings and/or diagrams. Students need to understand and use the information in the product specification to make decisions about the development of a product. They must learn how to use a product specification and be able to recognise the following essential information:

- size, shape, form
- materials, parts and components
- process methods, where these are specified
- quantity required, for example single unit, batch and volume production
- timescales.

#### Production planning

The production plan contains all the details required to make a product. Students must produce a production plan for their product which provides information about:

- research and analysis of information and data
- materials, parts and components to be used
- processes to be used
- tools, equipment and machinery to be used
- the sequence of production, including critical production and quality control points
- production scheduling, including realistic deadlines
- how quality will be checked and inspected
- health and safety factors.

Students must be able to modify their production plans as circumstances change.

**Topic 2.2: Producing an engineered product****Materials**

The product specification will normally identify the materials, parts and components to be used in the manufacture of the product. However, students will need to understand how the properties and characteristics of these materials, parts and components will affect the manufacturing and assembly techniques they need to use to successfully make their product. If they need to use alternative materials, parts or components they must explain why.

Materials and their properties can be considered in the following groups:

- ferrous and non-ferrous metals and alloys
- polymers, such as thermosetting polymers and thermoplastic polymers
- ceramics
- composites which combine the properties of different materials, such as bi-metal strips, carbon composites and sintered metals.

**Parts and components**

Students must learn to recognise and understand the function of parts and components. They need to select and use appropriate parts and components when developing an engineered product, for example:

- mechanical components such as nuts, bolts, screws, springs, rivets, pins, clips, keys and drive mechanisms, including gear trains
- electrical/electronic components such as resistors, capacitors, transistors, LEDs, bulbs, wire, cable, insulators, batteries, motors, buzzers, variable resistors, thermistors, diodes, and integrated circuits
- pneumatic/hydraulic components such as directional and flow control valves, cylinders, reservoirs and filters.

### Using processes

Students must be able to use the following processes and understand their importance in terms of function and aesthetics reasons:

- material removal such as turning, drilling, etching, milling, grinding
- shaping and manipulation such as hammering, forming, casting, moulding, bending
- joining and assembly such as crimping, soldering, adhesion, wiring, threaded fasteners, welding, brazing
- heat and chemical treatment such as annealing, tempering, hardening, etching, plating
- surface finishing such as polishing, coating, painting.

### Tools and equipment

Students must learn to select and use the appropriate tools and equipment, including computer-aided manufacture (CAM), needed in the production of an engineered product. Their selection should take account of availability, cost, ease of handling and the properties of materials and components.

Students must learn how to care for tools and equipment and to maintain them where appropriate. Types of tools and equipment could include:

- hand tools
- power tools
- mechanical equipment, electrical/electronic equipment, pneumatic/hydraulic equipment.



### Health and safety

Students must be aware of the health and safety issues relating to the use of materials, components, parts, tools and equipment required for their engineering activities, including:

- taking reasonable care of themselves and others in an engineering environment
- wearing appropriate clothing and using appropriate safety equipment
- carrying out risk assessments
- following health and safety procedures and instructions
- keeping a safe, clean and tidy workplace
- ensuring that tools, equipment and machinery are properly maintained and fit for use.

### Quality control techniques

Students must be able to inspect, test, measure and compare engineered products against their product specification to ensure they comply with the required standards. Important features in a product specification include:

- dimensions
- tolerances
- fit
- finish
- performance
- quality.

## Assessment criteria – Unit 2

Section	Sub-section	Marks	Level of response	Mark range
<b>Use information (6 marks)</b>	a) Read and interpret a product specification and engineering drawings/diagrams	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>With support and guidance, use of some information within a product specification and interpretation of basic details in engineering drawings and/or diagrams.</li> </ul>	1–2
			<ul style="list-style-type: none"> <li>With limited support and guidance, use of the main information within a product specification and interpretation of the main details in engineering drawings and diagrams.</li> </ul>	3–4
			<ul style="list-style-type: none"> <li>Independent and confident use of the main information within a product specification and competent interpretation of the main details in engineering drawings and diagrams.</li> </ul>	5–6

Section	Sub-section	Marks	Level of response	Mark range
<b>Plan (12 marks)</b>	b) Produce a production plan which includes information about resources and processing requirements*	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>With support and guidance, produce a production plan that identifies basic details of resources and processing requirements. Production plan includes frequent errors in spelling and grammar. Terminology is not be used accurately or appropriately.</li> </ul>	1–2
			<ul style="list-style-type: none"> <li>With limited support and guidance, produce a production plan that identifies the most important details of resources and processing requirements. Production plan is legible and includes a sound use of spelling and punctuation. Terminology is mostly used appropriately.</li> </ul>	3–4
			<ul style="list-style-type: none"> <li>Independently produce a production plan that identifies fully the main details of the resources and processing requirements. Grammar, punctuation and spelling errors are unusual and there is good use of accurate terminology.</li> </ul>	5–6
	c) Produce a production plan which includes information about production details and constraints*	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>With support and guidance, produce a production plan that identifies basic details of production requirements and constraints. Production plan includes frequent errors in spelling and grammar. Terminology is not be used accurately or appropriately.</li> </ul>	1–2
			<ul style="list-style-type: none"> <li>With limited support and guidance, produce a production plan that identifies the most important production requirements and constraints. Production plan is legible and includes a sound use of spelling and punctuation. Terminology is mostly used appropriately.</li> </ul>	3–4
			<ul style="list-style-type: none"> <li>Independently produce a production plan that identifies fully the main details of production requirements and constraints. Grammar, punctuation and spelling errors are unusual and there is good use of accurate terminology</li> </ul>	5–6

Section	Sub-section	Marks	Level of response	Mark range
<b>Make (26 marks)</b>	d) Identify, prepare and use materials	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>Identify and prepare, with guidance, some appropriate materials, using them safely with some skill to make a product.</li> </ul>	1-2
			<ul style="list-style-type: none"> <li>Identify and prepare, with limited guidance, appropriate materials, using them safely with skill to make a product.</li> </ul>	3-4
			<ul style="list-style-type: none"> <li>Identify and independently prepare appropriate materials, using them safely with skill and accuracy to make a product.</li> </ul>	5-6
	e) Identify, prepare and use parts and components	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>With guidance and support, identify and prepare some appropriate parts and components, using them safely with some skill to make a product.</li> </ul>	1-2
			<ul style="list-style-type: none"> <li>With limited guidance and support, identify and prepare appropriate parts and components, using them safely with skill to make a product.</li> </ul>	3-4
			<ul style="list-style-type: none"> <li>Independently identify and prepare appropriate parts and components, using them safely with skill and accuracy to make a product.</li> </ul>	5-6
	f) Select and use processes, tools and equipment	8	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>Select and use, with guidance, some appropriate processes, tools and equipment, using them safely, with guidance and support, and exhibiting some skill to make a product.</li> </ul>	1-2
			<ul style="list-style-type: none"> <li>Select and use, with limited guidance, appropriate processes, tools and equipment, using them safely with limited guidance and skill to make a product.</li> </ul>	3-5
			<ul style="list-style-type: none"> <li>Independently select appropriate processes, tools and equipment, using them safely with skill and accuracy to make a product.</li> </ul>	6-8

Section	Sub-section	Marks	Level of response	Mark range
	g) Produce an engineered product	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>Production of an incomplete engineered product with some skill and accuracy.</li> </ul>	1-2
			<ul style="list-style-type: none"> <li>Production of an engineered product that has been assembled and finished with skill, although there may be some aspects where accuracy or quality could still be improved upon.</li> </ul>	4-5
			<ul style="list-style-type: none"> <li>Production of a high-quality engineered product that has been assembled and finished with a high level of skill and accuracy.</li> </ul>	5-6
<b>Test (6 marks)</b>	h) Testing and evaluation*	6	<ul style="list-style-type: none"> <li>Level of response not worthy of credit.</li> </ul>	0
			<ul style="list-style-type: none"> <li>Carry out basic testing against some aspects of the product specification and demonstrate that the product has limited compliance with the required standards. Written evidence is poorly presented with little use of appropriate terminology.</li> </ul>	1-2
			<ul style="list-style-type: none"> <li>Carry out a range of testing against the product specification and demonstrate that the product complies with the main required standards. Written evidence is generally free of errors and terminology mostly used appropriately.</li> </ul>	3-4
			<ul style="list-style-type: none"> <li>Carry out objective testing against the product specification and demonstrate that the product consistently complies with the required standards. Written evidence is clear, with consistent use of spelling or punctuation and grammar and there is good use of accurate terminology.</li> </ul>	5-6
<b>Total marks:</b>		<b>50</b>		<b>50</b>

\* Opportunity for students to be assessed on quality of written communication.

## Unit 3: Application of Technology in Engineering and Manufacturing

### Overview

#### Content overview

Technology affects every stage in the design and manufacture of products. In this unit students will investigate the impact of modern technology on the design and manufacture of a range of products in different engineering and manufacturing sectors. Students will learn how new technology has helped to develop design and manufacturing processes and improve the quality of products and services offered to customers. They will also learn about the benefits and implications modern of technology has for the workforce, the wider community, the global environment and sustainability.

Students will investigate the impact of:

- information and communication technology (ICT)
- new components and a range of modern materials, including smart materials
- control technology.

This unit links with *Unit 1: Engineering Design and Graphical Communication* and *Unit 2: Engineered Products* where students will have the opportunity to use new technology and materials.

### Assessment overview

This unit will be assessed through a single examination paper that will be set and marked by Edexcel. Students must be entered for assessment in one of the following sectors:

- printing and publishing, paper and board
- food and drink, biological and chemical
- textiles and clothing
- engineering fabrication
- electrical and electronics, process control, computers, telecommunications
- mechanical, automotive.

Students will need to answer a range of questions relating to their chosen sector. The examination paper consists of two sections. In section A the questions relate to general information about the chosen sector.

Section B will refer to pre-release material that illustrates a particular product from the chosen sector and questions will relate to that product. The material will be pre-released in September for the following June's examination series and will act as a focus for research in preparation for the examination. A total of 110 marks will be available.

## Detailed unit content

### Topic 3.1: Modern technologies

#### Engineering and manufacturing sectors

Students will investigate the impact of modern technology on the design and manufacture of a range of products across different sectors. When investigating products, they must identify the sector in which the product was made. For example:

- printing and publishing, paper and board
- food and drink, biological and chemical
- textiles and clothing
- engineering fabrication
- electrical and electronics, process control, computers, telecommunications
- mechanical, automotive.

#### ICT

Students will learn about, and look at examples of how modern technology is involved in the design and manufacture of a range of products. This will include the use of information and communication technology (ICT), including:

- sourcing and handling information and data such as databases, spreadsheets and internet sites
- CAD (computer-aided design) techniques
- CAM (computer-aided manufacture)
- communications technology
- control technology.



### Modern and smart materials

Students will learn about the use of modern and smart materials and components in engineering and manufacturing, such as:

- polymers, including plastics, adhesives and coatings
- metals and composites, including shape memory alloys
- microelectronic components and parts, including integrated circuits and display devices
- thermochromic inks, phosphorescent pigments, laminates, composites, polymorph, thermoplastics
- biological, chemical and food products, modified ingredients and methods of preparation and production
- computer technology, including microprocessors and memory devices
- textile technology, including liquid crystal coated fabrics and thermochromic dyes.

### Control technology

Students will also learn about the use of systems and control technology to organise, monitor and control production, including:

- process/quality control and automation, including programmable logic controllers (PLCs) and embedded computers such as those used in both industrial and domestic appliances
- robotics, including continuous operation, improved reproducibility, increased speed, work in hazardous environments
- ICT as applied to integrated engineering systems, computer-integrated engineering (CIE), computer-integrated manufacturing (CIM) and including CAD/CAM links.

### Impact of technologies

Students must understand the impact of modern technologies on the:

- range, types and availability of products
- design and development of products
- materials and components used
- safety and efficiency of modern methods of production, in terms of materials, energy consumption and time
- improved characteristics of products, such as size, weight/density, ease of use, disposability and reclaimability
- markets for the products.

### Advantages and disadvantages

Students must also understand the advantages and disadvantages that the use of modern technology has for society including:

- changes in the type and size of the workforce
- changes in the working environment
- impact on the global environment and sustainability.

## Topic 3.2: Investigating engineered or manufactured products

### Stages in manufacturing

Making a product involves a number of important stages and activities. When looking at a product, students must be able to identify the main stages and activities involved in making that product. They also need to understand the impact of modern technology on the stages of manufacturing. These stages can be grouped generally as:

- design
- marketing
- production planning
- material supply and control
- processing and production
- assembly and finishing
- packaging and dispatch.

### Investigating products

Students will learn how to investigate products that use modern technology by:

- researching information from manufacturers and suppliers
- handling and examining individual products
- carrying out a simple assessment of properties, such as structure, heaviness, colour and feel of surfaces, scratch and wear resistance, areas likely to be damaged
- evaluating the need for the technology, materials and components used.

### Role of technology in engineering and manufacturing

When investigating modern technology in engineering and manufacturing, students should consider the:

- role that modern technology plays in the design and manufacture of the product
- technology or process it replaced
- benefits of using the modern technology
- implications of using the modern technology for the product and the manufacturer.

# B Assessment

## Assessment summary

Units 1 and 2 are assessed through controlled assessment tasks.

Unit 3 is assessed through a written examination paper.

## Summary of table of assessment

### Unit 1: Engineering Design and Graphical Communication Unit code: 5EG01

- Students to produce a design solution for an engineered product, including interpreting and producing engineering drawings
- Controlled assessment task, set by Edexcel and internally marked by centres
- Centres can contextualise the task to suit local needs
- Approximately 23-33 hours required to complete the assessment
- A total of 50 marks available
- Task to be made available in September 2009 and reviewed every two years.

### Unit 2: Engineered Products Unit code: 5EG02

- Students to produce a final engineered product that meets design requirements
- Controlled assessment task, set by Edexcel and internally marked by centres
- Centres can contextualise the task to suit local needs
- Approximately 23-33 hours required to complete the assessment
- A total of 50 marks available
- Task to be made available in September 2009 and reviewed every two years.

**Unit 3: Application of Technology in Engineering and Manufacturing**

**Unit code: 5EM03**

- Single examination, lasting 1 hour and 30 minutes
- A mixture of short- and long-answer questions, with a total of 110 marks available
- Paper focuses on one of six chosen engineering or manufacturing sectors:
  - printing and publishing, paper and board
  - food and drink, biological and chemical
  - textiles and clothing
  - engineering fabrication
  - electrical and electronic/computer/process control/telecommunications
  - mechanical/automotive
- Consists of two sections – section A is made up of general questions about the chosen sector and section B focuses on a specific product identified in pre-release material made available in September.

**Assessment Objectives and weightings**

	% in GCSE (Double Award)
AO1: Recall, select and communicate their knowledge and understanding of a range of contexts.	30%
AO2: Apply skills, knowledge and understanding, including quality standards, in a variety of contexts and to plan and carry out investigations and tasks, involving a range of tools, equipment, materials and components.	53%
AO3: Analyse and evaluate evidence, make reasoned judgements and present conclusions.	17%
<b>TOTAL</b>	<b>100%</b>

### Relationship of Assessment Objectives to units

Unit number	Assessment Objective			
	AO1	AO2	AO3	Total for AO1, AO2 and AO3
Unit 1	6%	20%	4%	30%
Unit 2	3%	24%	3%	30%
Unit 3	21%	9%	10%	40%
<b>Total for GCSE (Double Award)</b>	<b>30%</b>	<b>53%</b>	<b>17%</b>	<b>100%</b>

### Entering your students for assessment

#### Student entry

Details of how to enter students for this qualification can be found in Edexcel's *Information Manual*, a copy is sent to all examinations officers. The information can also be found on Edexcel's website: [www.edexcel.com](http://www.edexcel.com)

Students studying unitised GCSE (Double Award) qualifications are required to complete at least 40% of the overall assessment requirements as terminal assessment.

#### Forbidden combinations and classification code

Centres should be aware that students who enter for more than one GCSE qualification with the same classification code will have only one grade (the highest) counted for the purpose of the school and college performance tables.

Students should be advised that, if they take two specifications with the same classification code, schools and colleges are very likely to take the view that they have achieved only one of the two GCSEs. The same view may be taken if students take two GCSE specifications that have different classification codes but have significant overlap of content. Students who have any doubts about their subject combinations should check with the institution to which they wish to progress before embarking on their programmes.

Students entering for this qualification may not enter for:

- GCSE in Manufacturing (Double Award).

## Access arrangements and special requirements

Edexcel's policy on access arrangements and special considerations for GCE, GCSE, and Entry Level aims to enhance access to the qualifications for students with disabilities and other difficulties (as defined by the Disability Discrimination Act 1995 and the amendments to the Act) without compromising the assessment of skills, knowledge, understanding or competence.

Please see the Edexcel website ([www.edexcel.com/sfc](http://www.edexcel.com/sfc)) for:

- the JCQ policy Access Arrangements and Special Considerations, Regulations and Guidance Relating to Students who are Eligible for Adjustments in Examinations.
- the forms to submit for requests for access arrangements and special considerations
- dates for submission of the forms.

Requests for access arrangements and special considerations must be addressed to:

Special Requirements  
Edexcel  
One90 High Holborn  
London WC1V 7BH

## Disability Discrimination Act (DDA)

Please see the Edexcel website for the GCSE in Engineering Disability Discrimination Act information.

## Controlled assessment

In controlled assessments, control levels are set for three linked processes: task setting, task taking and task marking. The control levels (high, medium or limited, dependent on the subject) are set for each process so that the overall level of control secures validity and reliability, provides good manageability for all involved and allows teachers to authenticate student work confidently.

The summary of the controlled conditions for this specification are shown below.

## Summary of conditions for controlled assessment

### Task setting – high level of control

Tasks will be set by Edexcel and centres will choose from a list of tasks. Centres can contextualise the task(s) to suit their circumstances, which includes the availability of and access to resources.

### Task taking – medium level of control

All work, with the exception of research and preparation, must be carried out under informal supervision. Research and preparation may be completed under limited supervision.

### Task marking – medium level of control

Marking of the tasks will be carried out by teachers and moderated by Edexcel.

### Controlled conditions

The preparation and production of student designs, drawings and engineered products must take place under controlled conditions. Students can produce their portfolios and engineered products only during lesson time when supervised by a teacher or invigilator. Student work must be collected in at the end of each lesson and handed back at the beginning of the next lesson. Students can undertake research under limited supervision.

Teachers are allowed to provide regular, formative feedback throughout the creative design process. Demonstrations of practical activities are allowed in order to develop knowledge, understanding and skills and to identify health and safety issues relating to specific tools, equipment and processes.

Where groupwork occurs, evidence of individual contributions must be clearly identified and recorded.

## Internal standardisation

Teachers must show clearly how the marks have been awarded in relation to the assessment criteria. If more than one teacher in a centre is marking students' work, there must be a process of internal standardisation to ensure that there is consistent application of the assessment criteria.



### Authentication

All students must sign an authentication statement. Statements relating to work not sampled should be held securely in the centre. Those which relate to sampled students must be attached to the work and sent to the moderator. In accordance with a revision to the current Code of Practice, any student unable to provide an authentication statement will receive zero credit for the component. Where credit has been awarded by a centre-assessor to sampled work without an accompanying authentication statement, the moderator will inform Edexcel and the mark adjusted to zero.

### Further information

For more information on annotation, authentication, mark submission and moderation procedures, please refer to the *Edexcel GCSE in Engineering (Double Award): Instructions and administrative documentation for internally assessed units* document, which is available on the Edexcel website.

For up-to-date advice on teacher involvement, please refer to the Joint Council for Qualifications (JCQ) Instructions for conducting coursework/portfolio document on the JCQ website: [www.jcq.org.uk](http://www.jcq.org.uk)

For up-to-date advice on malpractice and plagiarism, please refer to the Joint Council for Qualifications (JCQ) *Suspected Malpractice in Examinations: Policies and Procedures and Instructions for conducting coursework/portfolio* documents on the JCQ website ([www.jcq.org.uk](http://www.jcq.org.uk)).

## Assessing your students

The first assessment opportunity for Units 1, 2 and 3 of this qualification will take place in the June 2011 series and in each following June series for the lifetime of the specification.

### Your student assessment opportunities

Unit	June 2011	June 2012	June 2013	June 2014	June 2015
Unit 1: Engineering Design and Graphical Communication	✓	✓	✓	✓	✓
Unit 2: Engineered Products	✓	✓	✓	✓	✓
Unit 3: Application of Technology in Engineering and Manufacturing	✓	✓	✓	✓	✓

## Awarding and reporting

The grading, awarding and certification of this qualification will comply with the requirements of the current GCSE/GCE Code of Practice for courses starting in September 2009, which is published by the Qualifications and Curriculum Authority (QCA). The GCSE (Double Award) qualification will be graded and certificated on a 15-grade scale from A\*A\* to GG. Individual unit results will be reported.

The first certification opportunity for the Edexcel GCSE in Engineering (Double Award) will be 2011.

Students whose level of achievement is below the minimum judged by Edexcel to be of sufficient standard to be recorded on a certificate will receive an unclassified U result.

## Unit results

The minimum uniform marks required for each grade for each unit:

### Units 1 and 2

Unit grade	<b>*A</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
Maximum uniform mark = 90	<b>81</b>	<b>72</b>	<b>63</b>	<b>54</b>	<b>45</b>	<b>36</b>	<b>27</b>	<b>18</b>

Students who do not achieve the standard required for a grade G will receive a uniform mark in the range 0–17.

### Unit 3

Unit grade	<b>*A</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
Maximum uniform mark = 120	<b>108</b>	<b>96</b>	<b>84</b>	<b>72</b>	<b>60</b>	<b>48</b>	<b>36</b>	<b>24</b>

Students who do not achieve the standard required for a grade G will receive a uniform mark in the range 0–23.

### Qualification results

The minimum uniform marks required for each grade:

#### GCSE in Engineering (Double Award) cash-in code: 2EG02

Qualification grade	<b>A* A*</b>	<b>A* A</b>	<b>A A</b>	<b>A B</b>	<b>B B</b>	<b>B C</b>	<b>C C</b>	<b>C D</b>	<b>D D</b>	<b>D E</b>	<b>E E</b>	<b>E F</b>	<b>F F</b>	<b>F G</b>	<b>G G</b>
Maximum uniform mark = 300	<b>270</b>	<b>255</b>	<b>240</b>	<b>225</b>	<b>210</b>	<b>195</b>	<b>180</b>	<b>165</b>	<b>150</b>	<b>135</b>	<b>120</b>	<b>105</b>	<b>90</b>	<b>75</b>	<b>60</b>

Students who do not achieve the standard required for a grade GG will receive a uniform mark in the range 0–59.

### Resitting of units

Students can resit a unit once before claiming certification for the qualification. For internally assessed units students will need to retake the entire assessment requirements for that unit.

At least 40 per cent of the assessment must be taken in the examination series in which certification is requested and the results from these assessments must be used. Therefore, any previous, banked results for the unit(s) that are being used to satisfy the terminal requirement cannot be used even if they are better than the results achieved in the terminal series.

Results of units held in Edexcel’s unit bank have a shelf-life limited only by the shelf-life of this specification, and subject to the terminal requirement, these unit results may be re-used after certification.

### Language of assessment

Assessment of this specification will be available in English only. Assessment materials will be published in English only and all work submitted for examination and moderation must be produced in English.

### Quality of written communication

Students will be assessed on their ability to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and complex subject matter
- organise relevant information clearly and coherently, using specialist vocabulary when appropriate.

### Stretch and challenge

Students can be stretched and challenged in all units through the use of different assessment strategies, for example:

- using a variety of stems in questions – for example analyse, evaluate, discuss, compare
- ensuring connectivity between sections of questions
- a requirement for extended writing
- use of a wider range of question types to address different skills – for example open-ended questions, case studies.

### Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the Joint Council for Qualifications *Suspected Malpractice in Examinations: Policies and Procedures* document on the JCQ website [www.jcq.org.uk](http://www.jcq.org.uk)

## Student recruitment

Edexcel's access policy concerning recruitment to our qualifications is that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all students.

## Progression

The Edexcel GCSE in Engineering (Double Award) offers opportunities for progression such as:

- related qualifications at Level 3, for example in GCE Engineering, BTEC National Certificates and Diplomas in Engineering
- employment within the engineering sector and related industries.

## Grade descriptions

<b>A</b>	<p>Candidates recall, select and communicate a detailed knowledge and thorough understanding of engineering.</p> <p>They apply relevant knowledge, understanding and skills in a range of situations to plan and carry out investigations and tasks effectively. They test their solutions, working safely and with a high degree of precision.</p> <p>They analyse and evaluate the evidence available, reviewing and adapting their methods when necessary. They present information clearly and accurately, making reasoned judgements and presenting substantiated conclusions.</p>
<b>C</b>	<p>Candidates recall, select and communicate a sound knowledge and understanding of engineering.</p> <p>They apply knowledge, understanding and skills in a range of situations to plan and carry out investigations and tasks. They test their solutions, working safely and with precision.</p> <p>They review the evidence available, analysing and evaluating some information clearly and with some accuracy. They make judgements and draw appropriate conclusions.</p>
<b>F</b>	<p>Candidates recall, select and communicate knowledge and understanding of basic aspects of engineering.</p> <p>They apply limited knowledge, understanding and skills to plan and carry out simple investigations and tasks, with an awareness of the need for safety and precision. They modify their approach in the light of progress.</p> <p>They review their evidence and draw basic conclusions.</p>

# C Resources, support and training

## Edexcel resources

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Edexcel aims to provide the most comprehensive support for our qualifications.

For up-to-date information on published resources, please visit [www.edexcel.com/gcse2009](http://www.edexcel.com/gcse2009)

## Edexcel publications

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You can order further copies of the specification and sample assessment materials (SAMs) and teacher's guide documents from:

Edexcel Publications  
Adamsway  
Mansfield  
Nottinghamshire NG18 4FN

Telephone: 01623 467467  
Fax: 01623 450481  
Email: [publications@linney.com](mailto:publications@linney.com)  
Website: [www.edexcel.com](http://www.edexcel.com)

## Endorsed resources

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Edexcel also endorses some additional materials written to support this qualification. Any resources bearing the Edexcel logo have been through a quality assurance process to ensure complete and accurate support for the specification. For up-to-date information about endorsed resources, please visit [www.edexcel.com/endorsed](http://www.edexcel.com/endorsed)

Please note that while resources are checked at the time of publication, materials may be withdrawn from circulation and website locations may change.

## Edexcel support services

Edexcel has a wide range of support services to help you implement this qualification successfully.

**ResultsPlus** — ResultsPlus is an application launched by Edexcel to help subject teachers, senior management teams, and students by providing detailed analysis of examination performance. Reports that compare performance between subjects, classes, your centre and similar centres can be generated in 'one-click'. Skills maps that show performance according to the specification topic being tested are available for some subjects. For further information about which subjects will be analysed through ResultsPlus, and for information on how to access and use the service, please visit [www.edexcel.com/resultsplus](http://www.edexcel.com/resultsplus)

**Ask the Expert** — Ask the Expert is a new service, launched in 2007, that provides direct email access to senior subject specialists who will be able to answer any questions you might have about this or any other specification. All of our specialists are senior examiners, moderators or verifiers and they will answer your email personally. You can read a biography for all of them and learn more about this unique service on our website at [www.edexcel.com/asktheexpert](http://www.edexcel.com/asktheexpert)

**Ask Edexcel** — Ask Edexcel is Edexcel's online question and answer service. You can access it at [www.edexcel.com/ask](http://www.edexcel.com/ask) or by going to the main website and selecting the Ask Edexcel menu item on the left.

The service allows you to search through a database of thousands of questions and answers on everything Edexcel offers. If you don't find an answer to your question, you can choose to submit it straight to us. One of our customer services team will log your query, find an answer and send it to you. They'll also consider adding it to the database if appropriate. This way the volume of helpful information that can be accessed via the service is growing all the time.

**Examzone** — The Examzone site is aimed at students sitting external examinations and gives information on revision, advice from examiners and guidance on results, including re-marking, resitting and progression opportunities. Further services for students – many of which will also be of interest to parents – will be available in the near future. Links to this site can be found on the main homepage at [www.examzone.co.uk](http://www.examzone.co.uk)

### Training

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A programme of professional development and training courses, covering various aspects of the specification and examination, will be arranged by Edexcel each year on a regional basis. Full details can be obtained from:

Training from Edexcel  
Edexcel Head Office  
One90 High Holborn  
London WC1V 7BH

Telephone: 0844 576 0027  
Email: [trainingbookings@edexcel.com](mailto:trainingbookings@edexcel.com)  
Website: [www.edexcel.com/training](http://www.edexcel.com/training)



# D Appendices

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## Appendix 1 Key skills

### Signposting

Key skills (Level 2)	Unit 1	Unit 2	Unit 3
<b>Application of number</b>			
N2.1	✓	✓	
N2.2	✓	✓	
N2.3			✓
<b>Communication</b>			
C2.1a	✓		
C2.1b	✓		
C2.2		✓	
C2.3	✓		
<b>Problem solving</b>			
PS2.1	✓	✓	
PS2.2	✓	✓	
PS2.3	✓		

### Development suggestions

Please refer to our website for key skills development suggestions.

**Appendix 2** Wider curriculum**Signposting**

Issue	Unit 1	Unit 2	Unit 3
Moral	✓	✓	✓
Ethical	✓	✓	✓
Social	✓	✓	✓
Cultural	✓	✓	✓
Citizenship			✓
Environmental	✓		✓
European initiatives	✓	✓	
Health and safety	✓	✓	✓

## Development suggestions

Issue	Unit	Opportunities for development or internal assessment
Moral	Unit 1	When interpreting the design brief the moral obligation to fulfil the brief (ie cheapest possible versus best option).
	Unit 2	Effective teamwork will require considering the different views and backgrounds of others.
	Unit 3	When considering the implications of technology and the impact it can have on society and the environment.
Ethical	Unit 1	When interpreting the design brief the ethical obligation to fulfil the brief (ie cheapest possible versus best option).
	Unit 2	Effective teamwork will require considering the different views and backgrounds of others.
	Unit 3	When considering the implications of technology and the impact it can have on society and the environment.
Social	Unit 1	How social issues will impact on client design briefs and how these are interpreted.
	Unit 2	Effective teamwork will require considering the different views and backgrounds of others.
	Unit 3	When considering the implications of technology and the impact it can have on society and the environment.
Cultural	Unit 1	How cultural issues will impact on client design briefs and how these are interpreted.
	Unit 2	Effective teamwork will require considering the different views and backgrounds of others.
	Unit 3	When considering the implications of technology and the impact it can have on society and the environment.
Citizenship	Unit 3	When considering the implications of technology and the impact it can have on society and the environment.
Environmental	Unit 1	Design briefs should take into account any relevant environmental issues.
	Unit 3	When considering the implications of technology and the impact it can have on society and the environment.
European initiatives	Unit 1	Design briefs will have to conform to European standards.
	Unit 2	Quality control and health, safety and hygiene will introduce European legislation.
Health and safety	Units 1, 2 and 3	Health and safety needs to be considered throughout the design and manufacture of an engineering product.

## Appendix 3 Codes

Type of code	Use of code	Code number
National classification codes	Every qualification is assigned to a national classification code indicating the subject area to which it belongs. Centres should be aware that students who enter for more than one GCSE qualification with the same classification code will have only one grade (the highest) counted for the purpose of the school and college performance tables.	0009
National Qualifications Framework (NQF) codes	Each qualification title is allocated a National Qualifications Framework (NQF) code.  The NQF code is known as a Qualification Number (QN). This is the code that features in the DfE's Sections 96 and on the LARA as being eligible for 16-18 and 19+ funding, and is to be used for all qualification funding purposes. The QN is the number that will appear on the student's final certification documentation.	The QAN for the qualification in this publication is:  GCSE (Double Award) – 500/4580/5
Unit codes	Each unit is assigned a unit code. This unit code is used as an entry code to indicate that a student wishes to take the assessment for that unit. Centres will need to use the entry codes only when entering students for their examination.	Unit 1 – 5EG01 Unit 2 – 5EG02 Unit 3 – 5EM03
Cash-in codes	The cash-in code is used as an entry code to aggregate the student's unit scores to obtain the overall grade for the qualification. Centres will need to use the entry codes only when entering students for their qualification.	GCSE (Double Award) – 2EG02
Entry codes	The entry codes are used to: <ul style="list-style-type: none"> <li>• enter a student for the assessment of a unit</li> <li>• aggregate the student's unit to obtain the overall grade for the qualification.</li> </ul>	Please refer to the <i>Edexcel Information Manual</i> , available on the Edexcel website.

## Appendix 4 Controlled assessment record sheet Unit 1



### GCSE in Engineering (Double Award) (5EG01)

	<b>Examination year</b>
<b>Centre name</b>	<b>Centre number</b>
<b>Candidate name</b>	<b>Candidate number</b>

<b>Unit 1: Engineering Design and Graphical Communication</b>	
a) Analysing the brief	/6
b) Details of the design criteria and production constraints	/6
c) Ideas and design solutions	/6
d) Testing and selecting the final solution	/6
e) Interpreting engineering drawings and circuit diagrams	/6
f) Selecting and using engineering drawing techniques	/6
g) Producing engineering drawings	/8
h) Presenting and modifying the final design solution	/6
	<b>Total/50</b>

#### Declaration of authentication

I declare that the work submitted for assessment has been carried out without assistance other than that which is acceptable under the scheme of assessment.

I also agree to the work being used to support professional development, online support and training of both centre-assessors and Edexcel moderators.

Signed (candidate): \_\_\_\_\_ Date: \_\_\_\_\_

Signed (teacher): \_\_\_\_\_ Date: \_\_\_\_\_

Name of teacher: \_\_\_\_\_

**Please attach this sheet to the student's work before submitting it to the moderator.**

## Appendix 5

## Controlled Assessment Record Sheet Unit 2



## GCSE in Engineering (Double Award) (5EG02)

	<b>Examination year</b>
<b>Centre name</b>	<b>Centre number</b>
<b>Candidate name</b>	<b>Candidate number</b>

<b>Unit 2: Engineered Products</b>	
a) Read and interpret a product specification and engineering drawings/ diagrams	/6
b) Produce a production plan which includes information about resources and processing requirements	/6
c) Produce a production plan which includes information about production and constraints	/6
d) Identify, prepare and use materials	/6
e) Identify, prepare and use parts and components	/6
f) Select and use processes, tools and equipment	/8
g) Produce an engineered product	/6
h) Testing and evaluation	/6
	<b>Total/50</b>

**Declaration of authentication**

I declare that the work submitted for assessment has been carried out without assistance other than that which is acceptable under the scheme of assessment.

I also agree to the work being used to support professional development, online support and training of both centre-assessors and Edexcel moderators.

Signed (candidate): \_\_\_\_\_ Date: \_\_\_\_\_

Signed (teacher): \_\_\_\_\_ Date: \_\_\_\_\_

Name of teacher: \_\_\_\_\_

**Please attach this sheet to the student's work before submitting it to the moderator.**

## Appendix 6 Assessment criteria descriptor guidance

This section outlines the meaning of the descriptors found within the assessment criteria for Units 1 and 2. It provides further guidance on how to confirm the level of performance when awarding marks.

Descriptor	Meaning
Basic	Essential and fundamental, likely to be in the form of a list with little description or shows little detail
Briefly	Some main points but gives no detail or reasoning
Consistent	Reliable and steady approach
Detail/Detailed	Including most features, elements or facts
Effective	Quickly, confidently
Fully	Covers all aspects
Interpret	Make sense of, or deduce from
Limited	Simple, containing some important features or facts
List	Provide the information in a list, rather than in continuous prose
Key	Features or issues that are important
Main	Features or issues that are most likely to have an impact
Most	The majority with one or two left out
Outline	Provide a clear summary including main features/general principles
Range	At least three
Several	At least three
Significant	Major and noteworthy
Simple	Not likely to contain important features or facts
Some	At least two
Support and guidance	<p>Examples might include (but are not limited to):</p> <ul style="list-style-type: none"> <li>• instructions given verbally telling learners what to do and how to do it,</li> <li>• when carrying out these tasks the learner frequently needs reminding what to do</li> <li>• repeated demonstration of what to do</li> <li>• if they were not guided through each relevant stage the learner would probably not be able to complete the task.</li> </ul>



Descriptor	Meaning
Limited support and guidance	<p>Examples might include (but are not limited to):</p> <ul style="list-style-type: none"> <li>• the tutor gives a variety of options that the learner decides upon, they discuss how to take the task forward, the learner will then confirm their approach before they commence the activity</li> <li>• after this initial support to start the processes and ensure the learner is safe to do so, the tutor is likely to only react to questions the learner asks</li> <li>• the learner checks matters of detail to ensure they are progressing as needed, possibly on a regular basis, but would be checking for confirmation that they are progressing satisfactory and doing things correctly rather than asking for assistance</li> <li>• occasionally the teacher may have to assist and intervene to ensure actions are progressing satisfactory and correctly.</li> </ul>
Independence	<p>Examples might include (but are not limited to):</p> <ul style="list-style-type: none"> <li>• initially the teacher will support the learner to ensure they are able and know what they need to do when carrying out the required tasks, although this may be more apparent during the formative assessment stages than with the summative assessment</li> <li>• the learner feels comfortable to carry out the tasks without support, the use of the documentation is done in a confident manner to produce a production plan; the materials, parts and components, tools and equipment they select and use will be those that are most suitable for the task and they will always show due regard to safety</li> <li>• the teacher will monitor and recognise that the learner can carry out the tasks but may on very few occasions have to assist</li> <li>• learners may occasionally seek confirmation that they are doing things right before they carry out stages of the tasks required.</li> </ul>