



## DESIGN TECHNOLOGY

### Engineering WJEC Level 1/2 Award

#### Why is the study of Engineering important?

Engineering will help you acquire knowledge, understanding and technical skills through work-related contexts as part of your Key Stage 4 learning. The qualification is equivalent to and complements GCSEs to help develop work-related skills in the Engineering sector. It will help broaden your experience and understanding of where your studies can take you in the future.

#### What skills will the study of Engineering teach you?

Engineering gives learners the opportunity to develop sector-specific knowledge and skills in a practical learning environment. The focus is on four areas of equal importance, which cover the:

- Development of key engineering practical and technical skills, such as research, observation, measurement, making, using computer-aided design (CAD) and disassembly
- Knowledge of key engineering sectors (mechanical, electrical/electronic and engineering design) and the interrelation of each in industry
- Knowledge of the stages involved in planning and implementing an engineering project
- Knowledge and skills involved in the investigation of solutions to engineering problems in response to a given brief.

Learners will produce solutions to problems using different combinations of engineering skills, including designing as part of the engineering design and make process. The engineering design and make process: define the problem, develop possible solutions, choose a solution, design and model the solution, evaluate outcome of project, work in a team.

- Interpreting an engineering brief, e.g. physical requirements, aesthetics, size, function, performance requirements.
- Producing initial design proposals, e.g. researching existing products, producing design sketches in 2D and 3D, using creative thinking and evaluation techniques to generate the best solution given the brief.
- Computer-aided design (CAD) drawings using drawing, editing, modification and manipulation commands to generate engineering drawings and circuit diagrams on templates to the appropriate standard.
- Generating final design solution using 2D drawing techniques and 3D models, e.g. detailed drawings, circuit diagrams, 3D printing, physical modelling.

- Making final design solution decisions, e.g. selection of materials, selection of making techniques, considering quality requirements.
- How employees work in a team and peer review during the engineering design and make process with the customer as a focus, using generic skills, e.g. behaviours, attitudes, limitations, respect for others, professionalism, working relationships, collaborative skills.

Learners will also investigate the materials, components and processes used in the production of engineered products. The engineering material categories covered are:

- Ferrous, e.g. mild steel, wrought iron, stainless steel o non-ferrous, e.g. aluminium, titanium, copper, silver, zinc
- Thermosetting polymers, e.g. phenol-formaldehyde, polyimides, polyurethane and Thermoforming polymers, e.g. polyethylene, polypropylene, acrylic.
- Properties of engineering materials, such as strength, hardness and toughness.
- Characteristics of engineering materials, such as machinability, workability and durability.
- Types of components, such as proprietary, e.g. rivet, nut and bolt, screw, key, mechanical fixings, electronic components, such as resistors, capacitors, fuses, diodes o product specific, e.g. bush, flange, printed circuit board (PCB).
- Characteristics of components, e.g. permanent/semi-permanent, sizes/dimensions, surface roughness, values, fixing methods.
- Types of engineering processes e.g. drilling, sawing, filing, shearing, turning, milling, forging, casting, extruding, moulding, folding, bending, fastening, bonding, soldering and brazing.

## Your study of Engineering

The course is split into three components;

**Unit 1: Producing Engineered Products.** The purpose of this unit is for learners to use skills developed to produce an engineered product. Through this unit, you will learn to interpret different types of engineering information in order to plan how to make engineered products. You will develop the skills needed to work safely with a range of engineering processes, equipment and tools. With these skills, you will learn to make a range of engineered processes that are fit for purpose.

**Unit 2: Engineering Design.** The purpose of this unit is for learners to analyse engineered products in order to propose design solutions to meet requirements. You will learn how to analyse a product so you can see what features make it work and how it meets certain requirements. You will learn how to take ideas from different products in order to produce a design specification for a product.

**Unit 3: Solving Engineering Problems.** The purpose of this unit is for learners to use their knowledge and understanding of engineering processes and material properties to

solve problems. You will learn about materials, processes and maths that engineers use and how they are used to solve problems. In solving problems, you will learn to follow a process and develop drawing skills to communicate your solutions.

### How can you deepen your understanding of Engineering?

- [www.technologystudent.com](http://www.technologystudent.com)
- [www.bbc.co.uk/schools/bitesize](http://www.bbc.co.uk/schools/bitesize)
- [www.engineering.com](http://www.engineering.com)
- [www.howstuffworks.com](http://www.howstuffworks.com)
- WJEC Vocational Award Engineering Level 1/2 Student Book

### Study of Engineering can lead to a wide range of careers:

- The UK is regarded as a world leader in engineering, which covers a wide range of exciting and rapidly developing areas such as renewable energy, space, low carbon, aerospace, automotive, agri-food and bioscience. People with engineering skills are always in demand. Between 2010 and 2020, engineering companies are projected to have 2.74 million job openings.
- Mechanical Engineer Electrical Engineer
- Automotive Engineer Aerospace Engineer etc

### How are you assessed in Engineering?

*There are 6 assessment points each year that we term Praising Stars®. We assess how students at their current stage of study are on track to reach their end of stage targets which are formulated on aspirational expectation from their KS2 starting points. We make an informed prediction from our holistic assessments based on our subject mapping of expectation across the Engineering curriculum.*

### Key Assessment Objectives

<b>WJEC Level 1/2 Vocational Award in Engineering (New Spec)</b>				
<b>Unit Number</b>	<b>Unit Title</b>	<b>Assessment</b>	<b>Weighting</b>	<b>GLH</b>
1	Manufacturing Engineered Products	Internal	40%	48
2	Designing Engineered Products	Internal	20%	24
3	Solving Engineering Problems	External	40%	48

<b>WJEC Level 1/Level 2 Award in Engineering Subject Overview</b>		
<b>Term</b>	<b>Year 10</b>	<b>Year 11</b>
<b>Autumn 1</b>	1.1 Understanding engineering drawings 1.2 Planning manufacturing 1.3 Using engineering tools and equipment 1.4 Implementing engineering processes	<b>Controlled assessment tasks</b> U2: Designing Engineered Products
<b>Autumn 2</b>	1.1 Understanding engineering drawings 1.2 Planning manufacturing 1.3 Using engineering tools and equipment 1.4 Implementing engineering processes	<b>Controlled assessment tasks</b> U2: Designing Engineered Products
<b>Spring 1</b>	<b>Controlled assessment tasks</b> U1: Manufacturing Engineered Products	<i>Preparation for exam</i> 3.1 Understanding the effects of engineering achievements 3.2 Understanding properties of engineering materials 3.3 Understanding methods of preparation, forming, joining and finishing of engineering materials 3.4 Solving engineering problems
<b>Spring 2</b>	<b>Controlled assessment tasks</b> U1: Manufacturing Engineered Products	<i>Preparation for exam</i> 3.1 Understanding the effects of engineering achievements 3.2 Understanding properties of engineering materials 3.3 Understanding methods of preparation, forming, joining and finishing of engineering materials 3.4 Solving engineering problems
<b>Summer 1</b>	2.1 Understanding function and meeting requirements 2.2 Proposing design solutions 2.3 Communicating an engineered design solution 2.4 Solving engineering problems	<b>External Exam</b> U3: Solving Engineering Problems
<b>Summer 2</b>	<b>Mock controlled assessment tasks</b> U2: Designing Engineered Products ----- 2.1 Understanding function and meeting requirements 2.2 Proposing design solutions 2.3 Communicating an engineered design solution 2.4 Solving engineering problems	

