

Their journey starts here

Level 3 Tech-levels
in Engineering

Find out more at:
aqa.org.uk/tech-levels

AQA 
Realising potential

Why teach our Tech-levels in Engineering?

You'll be at the cutting edge of change, engaging learners on their journey

- You'll deliver a curriculum that will transform the way learners enter the workplace.
- Our specifications will always be topical and up-to-date because of our ongoing work with industry and experts.
- Occupationally relevant content gives learners an in-depth understanding of their chosen subject and industry.

They're relevant for the modern world, helping learners achieve their destination

- Essential transferable skills ensure they go one step further in preparing learners for further study or employment.
- Your learners will have a wider and clearer choice of opportunities for progression.
- Designed to meet employers' needs, they'll prepare learners for a competitive job market.

All of our technical and vocational qualifications meet the criteria for inclusion on 2018 performance tables.

<https://www.gov.uk/government/publications/2018-performance-tables-technical-and-vocational-qualifications>

You'll be supported every step of the way, we'll help you help your learners succeed

- We've built specifications with you in mind, using a clear and easy to understand format.
- Our comprehensive package of resources and training will help you with delivery.
- Twice yearly quality assurance visits ensure you bring out the best in your learners.
- Our Tech-levels are also eligible for UCAS points, ensuring your learners will be able to progress into higher education.
- Tech-levels deliver what they say they'll deliver: learners with the right skills, attributes and attitude to add value from the day they walk through your doors and on to the next stage of their journey.

“Because Tech-level performance outcomes are mapped to relevant national occupational standards and have been developed in collaboration with employers and professional bodies such as ourselves, it means the knowledge and competencies developed by learners are relevant, transferable and up-to-date.”

Andrew Sale

Head of Centre for Business and Enterprise
Sheffield City College

An introduction to our Tech-levels in Engineering

These pioneering new qualifications offer a great alternative to the current vocational qualifications and enable learners aged 16+ to progress into employment, an apprenticeship or further study at university.

We developed them with leading employers, colleges and professional bodies, who fully endorse their credibility. This is what makes our Tech-levels in Engineering unique.

Working with employers on their design means they teach learners the transferable skills that employers and higher education providers say are critical to successful progression.

The Foundation Tech-level in Engineering requires 360 guided learning hours (GLH). This is the equivalent of one A-level. The Tech-levels in Design, Mechatronic and Power Network Engineering require 720 guided learning hours (GLH). This is the equivalent of two A-levels.

“The Institution of Engineering and Technology (IET) were delighted to have been able to contribute to the development of the specifications for the new Tech-level qualifications in Engineering. The IET represents a broad range of engineering in the UK and overseas and our members include technicians, professional engineers, business leaders, academics and opinion formers.

AQA have taken the time to consult with the engineering community and to factor these responses into the specifications, resulting in programmes of study that provide students with the skills, knowledge and inspiration to drive them forward to the next stage in their engineering careers.”

Gareth James BSc (Hons) MSc PGCE FCMI FRAS MIET

Head of Education 5-19 The Institution of Engineering and Technology (IET)

Foundation Tech-level in Engineering (360 GLH)

This qualification provides a fantastic introduction to engineering and features 50% of the units from the Mechatronics and Design Engineering Tech-levels.

Learners gain the core technical knowledge required to work in today's exciting engineering industry and cover topics such as:

- the scientific principles used to identify the most suitable materials in a given engineering context
- mechanical engineering systems and components
- the process of engineering design.

Transferable skills are valued by employers and higher education alike. The following transferable skills have been contextualised into the content of this qualification:

- communication (oral and written)
- teamwork
- problem-solving.

Upon completion, learners may choose to progress to the 720 GLH Tech-levels in Mechatronic Engineering or Design Engineering.

Foundation Engineering is highly regarded in it's own right. It can be studied alongside A-levels such as Maths, Physics and Design & Technology or other technical vocational qualifications. It also supports applications for higher education courses (HE).

Find out more

Visit [aqa.org.uk/subjects/engineering/tech-level](https://www.aqa.org.uk/subjects/engineering/tech-level)

Unit summary

This qualification comprises four of the mandatory units from the Tech-levels in Mechatronic and Design Engineering. All four must be completed to achieve the full qualification.

Unit number	Unit title	Assessment type
1	<p>Materials technology and science</p> <p>This unit will develop learner's knowledge and understanding of materials used in engineering products and the scientific principles they'll use to identify which materials are most suitable for use in a design.</p>	External examination
2	<p>Mechanical systems</p> <p>Looking at different types of individual systems and their typical applications will allow learners to grow their understanding of how these systems are designed, how they function, how they assemble and test mechanical systems and identify the preventative maintenance requirements.</p>	Externally set and marked practical assignment
3	<p>Engineering design</p> <p>Design is the most essential process of engineering, which distinguishes it from science and calls for imagination, creativity, the knowledge and application of technical and scientific skills, and use of materials. A range of industry tools and techniques will be used by learners to deliver an engineering design so that they understand the process from start to finish.</p>	Internally centre assessed
4	<p>Production and manufacturing</p> <p>Using a wide range of manufacturing processes learners will grow their understanding of how to plan and manufacture a batch of products.</p>	Internally centre assessed

Engineering: Design Engineering (720 GLH)

Design is the essential creative process of engineering which calls for imagination, creativity, the knowledge and application of technical and scientific skills and the skilful use of materials. The teaching of design has an integral place in the formation of all engineers.

Design engineers help to conceive and create everything from the latest iPhone to offshore drilling components. This qualification gives learners the opportunity to develop specialist design skills and the ability to apply them to an engineering sector of their choice.

- Modern design use of computer aided design procedures for engineering to produce 3D models and 2D drawings, including the use of rendering and animation in their designs.
- The systematic approaches to design such as design for manufacture (DFM) and design for assembly (DFA).

A career in engineering requires people to problem-solve and generate new ideas, these skills are at the heart of this qualification.

Engineering topics include:

- the process of engineering design
- the relevance and role that manufacturing processes and systems have in the production of multiple components
- how to manage industrially sourced design projects
- the use of 3D Parametric modelling software in the design process
- systematic approaches to design, includes design for manufacture (DFM) and assembly (DFA).

This qualification is approved by The Institution of Engineering and Technology (IET) on behalf of the Engineering Council as contributing to the requirements for professional registration as an Engineering Technician (EngTech).

“We have a skills gap in the field of Design Engineering; this qualification will fill that and prepare students for the workforce, or continued studies at university.”

Mike Westlake

UK and Ireland Manager
Autodesk Education



Unit summary

This qualification comprises eight mandatory units. All units must be completed to achieve the full qualification.

Unit number	Unit title	Assessment type
1	<p>Materials technology and science</p> <p>This unit will develop learner's knowledge and understanding of materials used in engineering products and the scientific principles they'll use to identify which materials are most suitable for use in a design.</p>	External examination
2	<p>Mechanical systems</p> <p>Looking at different types of individual systems and their typical applications will allow learners to grow their understanding of how these systems are designed, how they function, how they assemble and test mechanical systems and identify the preventative maintenance requirements.</p>	Externally set and marked practical assignment
3	<p>Mathematics for engineers</p> <p>Learners will develop knowledge, skills and understanding of a range of standard mathematical techniques, enabling their selection and use in practical engineering situations.</p>	External examination
4	<p>Engineering design</p> <p>Design is the most essential process of engineering, which distinguishes it from science and calls for imagination, creativity, the knowledge and application of technical and scientific skills, and use of materials. A range of industry tools and techniques will be used by learners to deliver an engineering design so that they understand the process from start to finish.</p>	Internally centre assessed
5	<p>Production and manufacturing</p> <p>Using a wide range of manufacturing processes learners will grow their understanding of how to plan and manufacture a batch of products.</p>	Internally centre assessed
6	<p>Design visualisation</p> <p>Learners follow a design brief and carry out concept development to produce design solutions, selecting and using the appropriate equipment and software to produce 3D models and 2D drawings, including the use of rendering and animation in their designs.</p>	Internally centre assessed
7	<p>Advanced design for manufacture</p> <p>It's essential for engineers to have an understanding of modern design techniques and manufacturing technologies. Learners develop a thorough understanding of engineering design and manufacturing, and apply that understanding to the design for manufacture of products at an overall and detailed level.</p>	Internally centre assessed
8	<p>Design engineer project management</p> <p>It's important that learners experience completing an industrially sourced design project for a business. They'll draw on the knowledge and expertise gained from other units to tackle a real engineering, industrial or commercial problem integrating design and engineering practice.</p>	Internally centre assessed

Engineering: Mechatronic (720 GLH)

Mechatronics represents that interface between mechanical and electrical engineering and the use of programmable computers and control systems.

This qualification provides learners with opportunity to develop and understand the technologies and core skills that underpin mechatronics. Investigation, design, construction, testing and project skills are all essential to being a mechatronics technician or engineer.

It allows learners to take a more holistic 'system' approach to engineering and not see units of learning as unconnected areas of study. They'll develop key industry competencies such as fault-finding, diagnosis and resolution, logic, computational thinking and the transferability of knowledge and understanding from system areas.

Primary learnings include:

- the interface between mechanical and electrical engineering and the use of programmable computers and control systems
- the core principles and technologies that underpin mechatronics as well as the use of programmable computers and control systems.

Our Tech-level in Mechatronic Engineering reflects the content and subject areas of the Siemens Mechatronic System Certification Program (SMSCP).

"We believe that AQA's Mechatronic Engineering qualification will provide learners with the specialist knowledge and competencies required for onward progression."

Brenda Yearsley

School and Education Development Manager
Siemens

SIEMENS

Unit summary

This qualification comprises eight mandatory units. All units must be completed to achieve the full qualification.

Unit number	Unit title	Assessment type
1	<p>Materials technology and science</p> <p>This unit will develop learner's knowledge and understanding of the materials used in engineering products and the scientific principles they'll use to identify which materials are the most suitable for use in a design.</p>	External examination
2	<p>Mechanical systems</p> <p>Looking at different types of individual systems and their typical applications will allow learners to grow their understanding of how these systems are designed, how they function, how they assemble and test mechanical systems and identify the preventative maintenance requirements.</p>	Externally set and marked practical assessment
3	<p>Mathematics for engineers</p> <p>Learners will develop knowledge, skills and understanding of a range of standard mathematical techniques, enabling their selection and use in practical engineering situations.</p>	External examination
4	<p>Engineering design</p> <p>Design is the most essential process of engineering, which distinguishes it from science and calls for imagination, creativity, the knowledge and application of technical and scientific skills and use of materials. A range of industry tools and techniques will be used by learners to deliver an engineering design so they understand the process from start to finish.</p>	Internally centre assessed
5	<p>Production and manufacturing</p> <p>Using a wide range of manufacturing processes, learners increase their understanding of how to plan and manufacture a batch of products.</p>	Internally centre assessed
6	<p>Mechatronic project management</p> <p>In this unit learners will develop and make a mechatronic system and then present their project outcomes to an audience where they'll evaluate the design as well as their own performance.</p>	Internally centre assessed
7	<p>Mechatronic control systems</p> <p>Mechatronics is the 'fusion' of mechanical and electronic elements, with computer control. Engineers need to have an understanding of control systems and how they function and operate within a mechatronic system.</p>	Internally centre assessed
8	<p>Programming for engineers</p> <p>Programmable logic controllers (PLCs) have become fundamental to all aspects of industrial control and have demonstrated their robust and dependable nature in a wide variety of industrial setting that can include hostile environments. Learners need to have an understanding of the programming techniques and hardware capabilities of PLCs to allow them to develop solutions to industrial problems.</p>	Internally centre assessed

Engineering: Power Network Engineering (720 GLH)

This qualification addresses the current job shortages within the power sector. It's been developed with the National Skills Academy for Power (part of Energy and Utility Skills) and equips learners with the core scientific and maths skills they require to problem solve and develop solutions required within the industry.

Learners develop the knowledge required to research and design power systems, manage the installation, operation and maintenance of electrical equipment, building control systems and other electrical products that's required by sector engineers, technicians, and operatives. The overview of the UK electricity industry provides an appreciation of the interconnectivity of the generation, transmissions and distribution sides, the constraints they currently operate in and an insight into future developments.

This qualification targets a large employment market with a noted skills shortage. *The UK Commission for Employment and Skills (UKCES)* report (2012) states that multi-utility skills and competencies (which this qualification will provide) are becoming increasingly important and that Level 3 qualifications continue to be important for the energy sector.

The Shortage Occupation List published by the government in April 2014 listed the different jobs as suffering from a shortage of skilled workers. These included three from the electricity transmission and distribution industry (power system engineer, control engineer, protection engineer) that this qualification is focussing on.

“This looks to be an exciting new qualification that will help build important links between schools, colleges and apprenticeships in this area.”

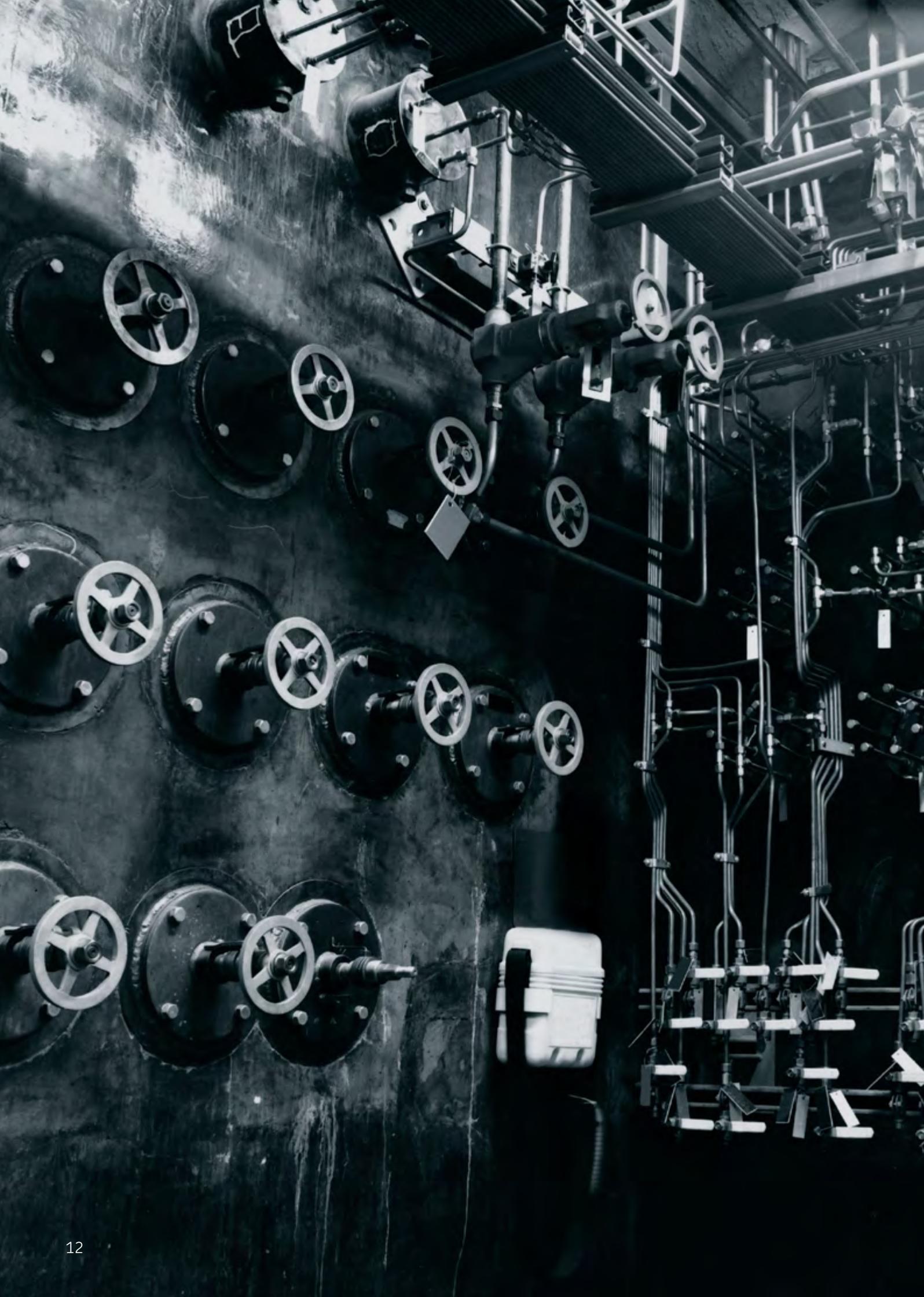


Neil Robertson
Chief Executive
Energy & Efficiency
Independent Assessment Service

Unit summary

This qualification comprises eight mandatory units. All units must be completed to achieve the full qualification.

Unit number	Unit title	Assessment type
1	<p>Materials technology and science</p> <p>This unit develops learner's knowledge and understanding of the materials used in engineering products and the scientific principles they'll use to identify which materials are the most suitable for use in a design.</p>	External examination
2	<p>Mechanical systems</p> <p>Looking at different types of individual systems and their typical applications gives learners an understanding of how these systems are designed, how they function, how they assemble and test mechanical systems and identify the preventative maintenance requirements.</p>	Externally set and marked practical assignment
3	<p>Mathematics for engineers</p> <p>Learners will develop knowledge, skills and understanding of a range of standard mathematical techniques, enabling their selection and use in practical engineering situations.</p>	External examination
4	<p>Electrical power systems</p> <p>The purpose of this unit is to give learners an understanding of the electrical components and principles relating to electrical power systems, enabling them to design one. They'll study the design of electrical systems and explore the ideas of field automation, the structure and design of circuits, electrical isolation and electrical safety.</p>	Internally centre assessed
5	<p>UK electricity industry</p> <p>This unit examines the history of the industry to ensure learners appreciate how it's evolved and the key drivers that led to these changes. They'll consider the key components of the industry and how they fit together, how the supply and demand of electricity is balanced, the impact of energy trading and future of sustainable technology within the industry.</p>	Internally centre assessed
6	<p>Electrical power – generation</p> <p>This unit aims to provide learners with an overview of the types and characteristics of plant and apparatus used in the sector and an insight into future developments.</p>	Internally centre assessed
7	<p>Electrical power – transmission networks</p> <p>Learners explore the size, structure and range of the UK's electrical power transmission network gaining an understanding of the regulatory requirements involved in the design and planning of work on the network as well as the range of plant, apparatus and materials used in the transmission of power across the UK.</p>	Internally centre assessed
8	<p>Electrical power – distribution networks</p> <p>Learners gain an understanding of the apparatus, components and characteristics of an electrical power distribution network. They'll look at the design principles involved and how the different elements combine to form a distribution network.</p>	Internally centre assessed



How are our Tech-levels delivered?

Our Tech-level specifications have been developed with you in mind, meaning that requirements are clearly presented and structured, making them straightforward to deliver to your learners.

Guided learning hours

Our Tech-levels are the equivalent of two A-levels, with 720 guided learning hours (GLH). They comprise eight mandatory units and each unit is 90 GLH. Our Foundation Tech-level in Engineering will be 360 GLH in size and upon completion, students could progress to the 720 GLH Tech-levels in Mechatronic or Design Engineering.

Employer involvement

Employer engagement not only raises the credibility of the qualification in the eyes of businesses, parents and learners, but it also encourages collaboration between business and education sectors. This all helps ensure today's learners enter the workplace with the underpinning knowledge and skills they need to add value from the day they first walk through the door.

Transferable skills

In developing our Tech-levels, we collaborated with employers and higher education to make sure transferable workplace skills were included. These 'employability skills' are key to our subject content.

- Communication
- Problem-solving
- Research
- Teamwork

We've identified the most appropriate units to include transferable skills within the subject content and these form a significant proportion of assessment.

Free support materials

We've worked closely with employers, higher education institutes and tutors to create support materials that you'll find useful and inspiring – they'll also help you hit the ground running.

Each resource will help you with a specific aspect – either planning your lessons, delivery or preparing your learners for exams or assignments.

Our free support includes:

- sample schemes of work for every unit
- sample lesson plans for every unit
- direct access to our subject and curriculum experts
- delivery models to support curriculum planning
- specimen question papers and mark schemes
- sample assignment briefs
- specific subject pages to access bespoke resources
- career guide to design engineering.

Access these support materials at [aqa.org.uk/subjects/engineering/tech-level](https://www.aqa.org.uk/subjects/engineering/tech-level)

Supporting you all the way

Our free introductory and prepare to teach events provide you an overview of the qualification and in depth training on content, delivery and assessment.

Available online or face-to-face. Book your course at [aqa.org.uk/professional-development](https://www.aqa.org.uk/professional-development)

If you have any queries email tvq@aca.org.uk or call 0800 085 0391.

Clear assessment and grading criteria

Our new qualifications are a combination of internally and externally assessed units. Internally assessed units are assessed by centre-devised tasks or assignments; externally assessed are set and marked by us.

Our qualifications are graded using very clear and unambiguous grading criteria, designed to ensure that teachers and internal assessors are confident in their judgements.

The criteria have been developed in consultation with employers, professional bodies and higher education to ensure that learners are always being assessed in a meaningful and relevant manner.

Tech-level learners receive a Skills statement and qualification certificate. This confirms the transferable skills covered in the qualification and can be used to support job or university applications.

Administration overview

Centre approval

Centre approval is free for all our technical and vocational qualifications. Please contact us at tvq@org.uk for further information and details of how to apply.

Register your learners

Register your learners on our approved system and we'll allocate an external quality assurer (EQA) to provide quality assurance advice and support to your centre.

Assessment

For externally assessed units, you can enter your learners for the next available examination session on our approved system as soon as they are ready. Results will be issued by the date

published on the Technical and Vocational examination timetable. Assessment of internally assessed units can be undertaken at a time to suit yourself and the learner. Internal quality assurance should be undertaken within the centre on an ongoing basis. Your external quality assurer will then carry out a centre visit to review your assessment and Internal quality assurer activity, provide feedback, advice and guidance on best practice, and authorise claims for certification as appropriate.

Certification

Once all units have been successfully achieved, we will issue a full qualification certificate and skills statement for each learner.

We're here to help

If you have any queries or if you'd like to become a centre, email tvq@aqa.org.uk or call 0800 085 0391.

Explore our Tech-level specifications further by visiting aqa.org.uk/tech-levels