

ENGINEERING QUALIFICATIONS

Summary Brochure

Engineering is fundamental to our modern economy and key to driving change and innovation. Our modern Engineering qualifications reflect this and provide students with a solid foundation for understanding and applying this subject in their future working lives.

WHAT'S IN THIS GUIDE?

- 3 | Pathways for Engineering**
- 4 | GCSE (9–1) Design and Technology**
- 5 | AS and A Level Design and Technology**
- 7 | Cambridge National in Engineering Design**
- 8 | Cambridge National in Engineering Manufacture**
- 9 | Cambridge National in Principles in Engineering and Engineering Business**
- 10 | Cambridge National in Systems Control in Engineering**
- 12 | Cambridge Technicals in Engineering**
- 13 | Supporting you in qualification delivery**

Qualifications for a modern world

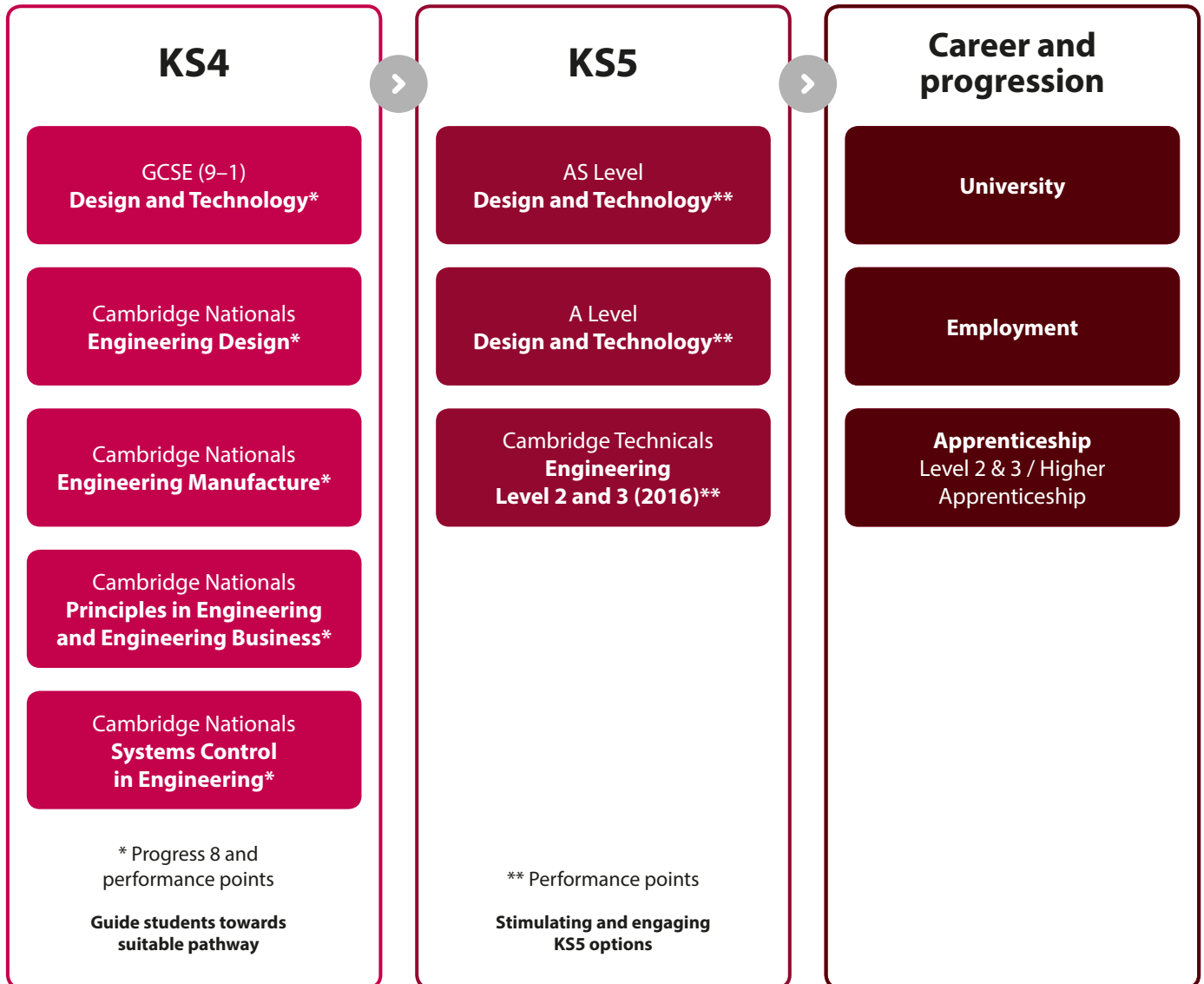
The UK is in the business of high added value, high technology, sustainable engineering and manufacturing and innovative designing. We've designed our Engineering qualifications with the workplace in mind.

Cambridge Nationals in Engineering are for students aged 14–16 years old. In creating them, we listened to, and worked closely with employers such as JCB, Siemens and Rolls-Royce, and professional bodies like the Royal Academy of Engineering, as well as the University of Northampton and teachers from schools and University Technical Colleges (UTCs). Our aim is to make sure that the next generation of young engineers is equipped with the skills demanded by employers in the engineering community. Read more about Cambridge Nationals on page 6.

Cambridge Technicals in Engineering are for students aged 16+. A high-quality alternative to A Levels, they enable you to provide qualifications that are fit for purpose, right for your student's destination, and accessible for their needs. Read more about Cambridge Technicals on page 11.

In this brochure, we've also included our Design and Technology qualifications (see page 4), because of its exciting relevance to careers in the world of Engineering.

PATHWAYS FOR ENGINEERING



GCSE (9–1) DESIGN AND TECHNOLOGY

KEY INFORMATION

SPECIFICATION CODE:

J310

IDEAL FOR:

Students who want to go on to AS or A Levels, higher education or a career choice

PROGRESS TO:

KS5 qualifications or apprenticeship schemes

FINAL AWARD:

9 (highest) to 1 (lowest)

PERFORMANCE POINTS:

Yes

THE QUALIFICATION

Learning about Design and Technology encourages your students to develop design and thinking skills that open up a world of possibility, giving them the tools to create the future.

This specification is designed to excite and engage them with contemporary topics covering the breadth of this dynamic and evolving subject.

It aims to relate authentic real-world awareness of iterative design practices and strategies used by the creative, engineering and manufacturing industries. Students use critical thinking, leading towards invention and design innovation, to design and make prototypes that solve real and relevant problems, considering their own and others' needs, wants and values.

We've drawn on the research and authentic practices of an initiative called Designing Our Tomorrow (DOT), from the University of Cambridge. Experiencing learning through practical activity (both designing and technical principles) is fundamental to the delivery of this specification, as is the importance of the contextual relevance of design and technology practice.

ASSESSMENT

There are two submission options for the non-exam assessment. These options determine the entries, but do not signify different routes through the qualification. Students must take either:

- Components 01 and 02 for the OCR Repository submission option
- or**
- Components 01 and 03 for the postal submission option

Principles of Design and Technology* (01) – written paper
50% of total GCSE (9–1)

Iterative Design Challenge* (02, 03) – non-exam assessment
50% of total GCSE (9–1)

*Indicates inclusion of synoptic assessment.

READ MORE:

ocr.org.uk/qualifications/gcse/design-and-technology-j310-from-2017



AS LEVEL DESIGN & TECHNOLOGY

KEY INFORMATION

SPECIFICATION CODE:

AS Level – H004, H005, H006

IDEAL FOR:

Students who want to go on to A Levels, higher education or a career choice

PROGRESS TO:

A Level, higher education, apprenticeships or a career in the engineering and manufacturing industries

FINAL AWARD:

A (highest) to E (lowest)

PERFORMANCE POINTS:

Yes

THE QUALIFICATION

Design and Technology strengthens learners' critical thinking and problem solving skills within a creative environment, enabling them to develop and make prototypes/products that solve real-world problems, considering their own and others' needs, wants, aspirations and values. Our qualifications require learners to identify market needs and opportunities for new products, initiate and develop design solutions, and make and test prototypes/products. Learners should acquire subject knowledge in design and technology, including how a product can be developed through the stages of prototyping, realisation and commercial manufacture.

In order to support the in-depth learning of different routes that learners may progress to, three subject endorsements are available, linked to design disciplines that reflect possible higher education routes and industry:

- Design Engineering
- Fashion and Textiles
- Product Design

ASSESSMENT

There are two submission options for the non-exam assessment. These options determine the entries, but do not signify different routes through the qualification.

AS Level

Students must take either:

- Components 01 and 02 for the OCR Repository submission option
- or
- Components 01 and 03 for the postal submission option

Principles of Design and Technology* (01) – written paper
50% of total AS Level

Product Development* (02, 03) – non-exam assessment
50% of total AS Level

A Level

Students must take either:

- Components 01, 02 and 03 for the OCR Repository submission option
- or
- Components 01, 02 and 04 for the postal submission option

Principles of Design and Technology* (01) – written paper
26.7% of total A Level

Problem Solving* (02) – written paper
23.3% of total A Level

Interactive Design Project* (03, 04) – non-examined assessment
50% of total A Level

*Indicates inclusion of synoptic assessment.

READ MORE:

ocr.org.uk/qualifications/as-and-a-level/design-and-technology-h004-h006-h404-h406-from-2017

A LEVEL DESIGN & TECHNOLOGY

KEY INFORMATION

SPECIFICATION CODE:

A Level – H404, H405, H406

IDEAL FOR:

Students who want to go on to higher education or a career choice

PROGRESS TO:

Higher education, apprenticeships or a career in the engineering and manufacturing industries

FINAL GRADING:

A* (highest) to E (lowest)

PERFORMANCE POINTS:

Yes

CAMBRIDGE NATIONALS

ABOUT CAMBRIDGE NATIONALS

Offered at Level 1/Level 2 so you don't need to close off your students' options too early, Cambridge Nationals give you a real alternative. They're designed to fit into the curriculum and to offer the same size, rigour and performance points as GCSEs. They form a key part of a student's Progress 8 and Attainment 8 approved subjects under the Technical Award category. The qualifications are recognised by Ofqual, DfE and 16–19 providers as progression to A Level, further education or on to an apprenticeship or work.

PERFORMANCE TABLES

The Department for Education has confirmed that those qualifications included in the 2020 performance tables will also be included in performance tables for 2021 and 2022.

CAMBRIDGE NATIONALS IN ENGINEERING

There are four separate GCSE-sized qualifications, in the areas of engineering design, manufacture, principles and systems control. They can be delivered separately or in any combination to suit individual student needs. Each qualification has different discount codes, so should your students take more than one Cambridge Nationals Engineering qualification from us, they'll all be recognised in the performance tables.

Each qualification in the Engineering suite has the same structure: one unit that's assessed through an exam and three further units that are centre-assessed. Your Centre decides in which order you want to deliver the four units. Students have multiple opportunities to sit the exam and centre-assessed units, providing you with a flexible delivery model to meet their needs.

READ MORE:

ocr.org.uk/cambridgenationals



CAMBRIDGE NATIONAL IN ENGINEERING DESIGN

KEY INFORMATION

SPECIFICATION CODE:

J831 (60 GLH) – Level 1 / Level 2 Cambridge National Award in Engineering Design

J841 (120 GLH) – Level 1 / Level 2 Cambridge National Certificate in Engineering Design

IDEAL FOR:

Students aged 14–16 who are seeking a more practical and hands on approach to learning

PROGRESS TO:

A Levels, apprenticeships or further advanced vocational qualifications at Level 3, such as our Cambridge Technicals

FINAL AWARD:

Level 1 – Distinction (D1), Merit (M1), Pass (P1) and Unclassified

Level 2 – Distinction* (*2), Distinction (D2), Merit (M2) and Pass (P2)

PERFORMANCE POINTS:

Yes. Each Engineering qualification is recognised and counted as a separate qualification, allowing them to be used in combination to develop a wider curriculum offer within your centre

THE QUALIFICATION

Engineering design is a process used to identify market opportunities and solve problems that contribute to the development of new products and systems. This popular course is an opportunity for your students to study the processes involved in designing new engineered products and develop a design specification.

Through research and practical activities, they understand how market requirements and opportunities inform client briefs and use practical skills such as drawing, computer modelling and model making to communicate design ideas. The qualification also encourages them to consult with a client and, with its practical focus, engages them in producing, testing and evaluating a prototype in the form of a model.

You can deliver this qualification on its own or as part of an engineering curriculum providing useful contextualisation alongside other Cambridge Nationals in Engineering and GCSE Design and Technology subjects. If your Centre has access to engineering equipment such as CAD and CNC, you could offer this qualification in association with our Cambridge Nationals in Engineering Manufacture.

ASSESSMENT

Level 1 / Level 2 Cambridge National Award in Engineering Design consists of two mandatory units:

R105: Design briefs, design specifications and user requirements

R106: Product analysis and research

Level 1 / Level 2 Cambridge National Certificate in Engineering Design consists of four mandatory units:

R105: Design briefs, design specifications and user requirements

R106: Product analysis and research

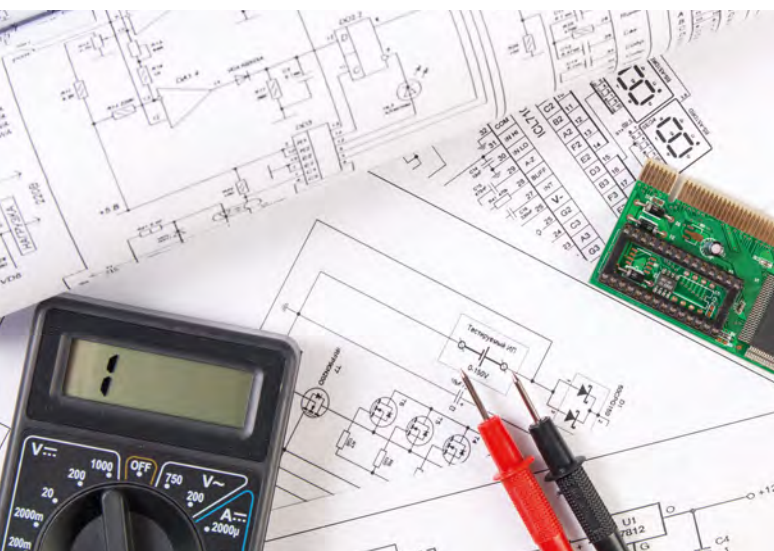
R107: Developing and presenting engineering designs

R108: 3D design realisation

R105 is a written paper that's OCR-set and marked. The other units are centre-assessed tasks that are OCR-moderated.

READ MORE:

ocr.org.uk/qualifications/cambridge-nationals/engineering-design-level-1-2-award-certificate-j831-j841



CAMBRIDGE NATIONAL IN ENGINEERING MANUFACTURE

KEY INFORMATION

SPECIFICATION CODE:

J832 (60 GLH) – Level 1 / Level 2 Cambridge National Award in Engineering Manufacture

J842 (120 GLH) – Level 1 / Level 2 Cambridge National Certificate in Engineering Manufacture

IDEAL FOR:

Students aged 14–16 who are seeking a more practical and hands on approach to learning

PROGRESS TO:

A Levels, apprenticeships or further advanced vocational qualifications at Level 3, such as our Cambridge Technicals

FINAL AWARD:

Level 1 – Distinction (D1), Merit (M1), Pass (P1) and Unclassified

Level 2 – Distinction* (*2), Distinction (D2), Merit (M2) and Pass (P2)

PERFORMANCE POINTS:

Yes. Each Engineering qualification is recognised and counted as a separate qualification, allowing them to be used in combination to develop a wider curriculum offer within your centre

THE QUALIFICATION

Engineering manufacture is a discipline of engineering dealing with different manufacturing practices and processes using the machines, tools and equipment that turn raw materials into new products. This qualification enables your students to study these processes. It also allows them to operate the tools and equipment used to make products from the requirements of a design specification, as well as use relevant computer applications such as CAD/CAM, and CNC equipment.

You can deliver the qualification on its own or as part of an engineering curriculum providing useful contextualisation alongside GCSE Design and Technology subjects as well as the application of scientific and mathematic core principles. If your Centre has access to engineering production equipment such as CAD/CAM, you could deliver this qualification in association with OCR Cambridge Nationals in Engineering Design.

To offer this qualification, your Centre will need access to engineering production equipment such as CAD and CNC.

ASSESSMENT

Level 1 / Level 2 Cambridge National Award in Engineering Manufacture is made up of two mandatory units:

R109: Engineering materials, processes and production

R110: Preparing and planning for manufacture

Level 1 / Level 2 Cambridge National Certificate in Engineering Manufacture is made up of four mandatory units:

R109: Engineering materials, processes and production

R110: Preparing and planning for manufacture

R111: Computer aided manufacturing

R112: Quality control of engineered products

Unit R109 is a written paper that's OCR-set and marked. The other units are centre-assessed tasks that are OCR-moderated.

READ MORE:

ocr.org.uk/qualifications/cambridge-nationals/engineering-manufacture-level-1-2-award-certificate-j832-j842



CAMBRIDGE NATIONAL IN PRINCIPLES IN ENGINEERING AND ENGINEERING BUSINESS

KEY INFORMATION

SPECIFICATION CODE:

J830 (60 GLH) – Level 1 / Level 2 Cambridge National Award in Principles in Engineering and Engineering Business

J840 (120 GLH) – Level 1 / Level 2 Cambridge National Certificate in Principles in Engineering and Engineering Business

IDEAL FOR:

Students aged 14–16 who are seeking a deeper understanding of the Engineering industry

PROGRESS TO:

A Levels, apprenticeships or further advanced vocational qualifications at Level 3, such as our Cambridge Technicals

FINAL AWARD:

Level 1 – Distinction (D1), Merit (M1), Pass (P1) and Unclassified

Level 2 – Distinction* (*2), Distinction (D2), Merit (M2) and Pass (P2)

PERFORMANCE POINTS:

Yes. Each Engineering qualification is recognised and counted as a separate qualification, allowing them to be used in combination to develop a wider curriculum offer within a centre

THE QUALIFICATION

Engineering is the application of scientific, economic, social and practical knowledge to design, build and maintain machines, devices, systems and structures using different materials and processes. This qualification concentrates on the wider context that underpins engineering.

Your students look at fundamental principles applied to practical applications. They also consider how businesses are structured and operate in a competitive world, manage sustainable engineering and keep products and services at their optimum performance. They study the engineering community's approaches to, and application of, responsible engineering and find out about career paths and employment opportunities.

You can deliver the qualification on its own or as part of an engineering curriculum providing useful contextualisation alongside other Cambridge Nationals in Engineering and GCSE Design and Technology subjects as well as the application of scientific and mathematic core principles.

ASSESSMENT

Level 1 / Level 2 Cambridge National Award in Principles in Engineering and Engineering Business consists of two mandatory units:

R101: Engineering principles

R102: The engineered business world

Level 1 / Level 2 Cambridge National Certificate in Principles in Engineering and Engineering Business consists of four mandatory units:

R101: Engineering principles

R102: The engineered business world

R103: Sustainable engineering

R104: Optimising performance in engineering systems and products

Unit R101 is a written paper that's OCR-set and marked. The other units are centre-assessed tasks that are OCR-moderated.

READ MORE:

ocr.org.uk/qualifications/cambridge-nationals/principles-in-engineering-and-engineering-business-level-1-2-award-certificate-j830-j840



CAMBRIDGE NATIONAL IN SYSTEMS CONTROL IN ENGINEERING

KEY INFORMATION

SPECIFICATION CODE:

J833 (60 GLH) – Level 1 / Level 2 Cambridge National Award in Systems Control in Engineering

J843 (120 GLH) – Level 1 / Level 2 Cambridge National Certificate in Systems Control in Engineering

IDEAL FOR:

Students aged 14–16 who are seeking a more practical and hands on approach to learning

PROGRESS TO:

A Levels, apprenticeships or further advanced vocational qualifications at Level 3, such as our Cambridge Technicals

FINAL AWARD:

Level 1 – Distinction (D1), Merit (M1), Pass (P1) and Unclassified

Level 2 – Distinction* (*2), Distinction (D2), Merit (M2) and Pass (P2)

PERFORMANCE POINTS:

Yes. Each Engineering qualification is recognised and counted as a separate qualification, allowing them to be used in combination to develop a wider curriculum offer within a centre

THE QUALIFICATION

Systems control in engineering is the study of microprocessor control that uses sensors, feedback and actuators that constantly adjust for a desired performance. Through this inspiring qualification, your students explore these computer and microprocessor applications.

They learn how systems are used in engineering environments such as product design, automated manufacturing, maintenance and stock control. They also take part in engaging practical tasks such as producing simple electronic circuits, testing the operation of circuits, and designing and testing a simple control system. They transfer their program to programmable devices such as programmable logic controllers (PLC) or programmable interface controllers (PIC).

This qualification can be delivered on its own or as part of an engineering curriculum providing useful contextualisation alongside other Cambridge Nationals in Engineering and GCSE Design and Technology subjects as well as the opportunity to apply scientific and mathematic core principles at Level 2.

To offer this qualification, your Centre needs access to engineering production equipment such as CAD and CNC.

ASSESSMENT

Level 1 / Level 2 Cambridge National Award in Systems Control in Engineering consists of two mandatory units:

R113: Electronic principles

R114: Simulate, construct and test electronic circuits

Level 1 / Level 2 Cambridge National Certificate in Systems Control in Engineering consists of four mandatory units:

R113: Electronic principles

R114: Simulate, construct and test electronic circuits

R115: Engineering applications of computers

R116: Process control systems

Unit R113 is a written paper that's OCR-set and marked. The other units are centre-assessed tasks that are OCR-moderated.

READ MORE:

ocr.org.uk/qualifications/cambridge-nationals/systems-control-in-engineering-level-1-2-award-certificate-j833-j843



CAMBRIDGE TECHNICALS

ABOUT CAMBRIDGE TECHNICALS

The Cambridge Technicals suite gives you the reassurance that you have the right qualifications to support your students' lifelong learning journey. Cambridge Technicals are vocational qualifications at Level 2 and Level 3 for students **aged 16+**. They're designed with the workplace in mind and provide a high-quality alternative to A Levels, with a great range of engineering approaches to choose from. Our Cambridge Technicals in Engineering have had support from a range of employers and universities.

PERFORMANCE TABLES

The Department for Education has confirmed that those qualifications included in the 2020 performance tables will also be included in performance tables for 2021 and 2022.

READ MORE:

ocr.org.uk/cambridgetechnicals

2016 SUITE

- Externally assessed content
- Eligible for Key Stage 5 performance points up to 2022
- Attracts UCAS Tariff points at Level 3
- Meaningful Employer Involvement



CAMBRIDGE TECHNICALS IN ENGINEERING

KEY INFORMATION



SPECIFICATION CODE:

LEVEL 2 CAMBRIDGE TECHNICAL IN ENGINEERING (2016)

Engineering Level 2 Certificate/Diploma – 05887, 05888

LEVEL 3 CAMBRIDGE TECHNICAL IN ENGINEERING (2016)

Engineering Level 3 Certificate/Extended Certificate/
Foundation Diploma/Diploma/Extended Diploma –
05822, 05823, 05824, 05825, 05873

IDEAL FOR:

Students aged 16+

PROGRESS TO:

Further study at KS5, apprenticeships or employment

PERFORMANCE POINTS:

The 2016 suite is eligible for Key Stage 5 performance points

UCAS POINTS:

The 2016 Level 3 qualifications receive UCAS tariff points

2016 LEVEL 2:

For these qualifications, we've designed exciting content that's engaging, fit for purpose and suitable for the needs of your students. This gives them the opportunity to develop the fundamental skills and knowledge required by the engineering industry and explore design, production or systems engineering in more detail.

The Certificate is likely to be taken alongside other programmes such as vocational qualifications or A Levels over a one-year course of study. When selected as part of a balanced curriculum, there's a clear progression route to an apprenticeship or entry level employment.

Your students would choose the Diploma if they wanted to learn about a specific sector such as Design Engineering, Production Engineering or Systems Engineering. It's likely to be taken alongside other programmes such as vocational qualifications or A Levels over a one-year course of study. The Diploma would form the substantive part of a one-year study programme.

Students taking the Diploma qualification have the choice of three pathways:

- Design Engineering Pathway
- Production Engineering Pathway
- Systems Engineering Pathway

At least one pathway must be achieved.

2016 LEVEL 3:

Our Level 3 suite has five sizes of qualification so your students can choose the one that's right for their chosen destination.

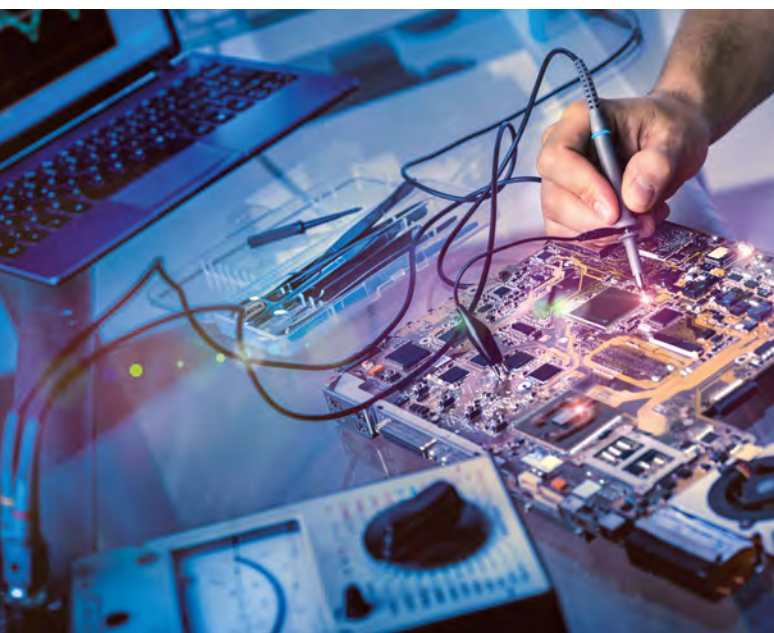
These carefully planned qualifications develop your students' understanding of the underpinning mathematics and scientific principles of engineering. They also gain practical experience in areas such as mechanical and electrical engineering, automation systems and manufacturing.

Our larger sized qualifications provide them with specialist pathways allowing them to specialise in an area of interest or prepare for their preferred career.

There's a wide range of centre-assessed units with practical and wider project-based assessment opportunities, as well as examined units on the Principles of Mechanical Engineering and Principles of Electrical and Electronic Engineering. This has created focused qualifications that, depending on the size chosen, either complement a Key Stage 5 study programme alongside A Levels, or may constitute the bulk of a two-year study programme.

READ MORE:

ocr.org.uk/qualifications/cambridge-technicals/engineering-2016-suite



SUPPORTING YOU IN QUALIFICATION DELIVERY

Our aim is to support you on your journey with us from initial enquiry right through to results. To help you get going, support you through delivery and allow you to develop professionally, we provide a massive range of support to help secure your students' futures.



SUPPORT AND RESOURCES

EXPERT SUBJECT ADVICE

Our subject advisors provide information and support to schools, including specification and non-exam assessment advice, updates on resource developments and a range of training opportunities. You can reach them through our Customer Support Centre on **01223 553998** or by email at design.technology@ocr.org.uk

You can also find teacher support at ocr.org.uk/engineering or ocr.org.uk/designandtechnology

TEACHING AND LEARNING RESOURCES

- **Lesson Elements**
Task sheets and accompanying instructions for some of the activities in the delivery guide.
- **Skills Guides**
A range of generic skills guides providing knowledge and tips covering topics such as communication, research skills and exam techniques.
- **Topic Exploration Packs**
- **Teacher and Delivery Guides**
A range of lesson ideas with associated activities that you can use with students to deliver the contents of the qualifications.
- **Transition Guides**

SAMPLE LEARNER WORK

We've created sample learner work across the majority of our qualifications that will support you in understanding the expectations of the mark schemes.

PARTNER RESOURCES AND TEXTBOOKS

Our Design and Technology qualifications are supported by endorsed textbooks and resources published by leading publishers. You can find more details about our publisher partners and the resources they're providing at ocr.org.uk/publishing-partners

ENGINEERING COMMUNITY

Join us on Twitter: [@OCR_Vocational](https://twitter.com/OCR_Vocational) or [@OCR_DesignTech](https://twitter.com/OCR_DesignTech)

BLOGS

Read our blogs and gain interesting insights from our Subject Advisors and other leading figures from the world of education.



ASSESSMENT

ACTIVE RESULTS

This is a **free** online A Level, GCSE and Cambridge Nationals results analysis service to help you review the performance of individual students or your whole school. Active Results provides access to detailed results data, enabling more comprehensive analysis of results to give you a more accurate measure of the achievements of your centre and students.

Find out more at ocr.org.uk/activeresults

ASSESSMENT MATERIALS

Sample question papers and sample candidate work.

EXAMBUILDER

A **free** online mock assessment service for Cambridge Nationals Engineering. It draws on historical past papers to simulate a real examination and gives students the opportunity to practise and build up confidence. ocr.org.uk/exambuilder

PAST PAPERS

Previous examination papers for each subject with which you and your students can practise.

PRACTICE PAPERS

Create mock exams and help students get a clearer picture of the qualification requirements. We put all our practice papers through exactly the same long and detailed processes as the live papers to ensure that they match the style and rigour of the live assessments.

CANDIDATE EXEMPLARS

A selection of candidate style answers and work with associated examiner commentary.

SET ASSIGNMENTS

Set assignments provide a scenario and set of tasks that can be modified, following the guidance provided, to enable you to assess your students against the requirements specified in the marking criteria in a flexible way that allows access to most centres, regardless of the resources they have at their disposal.

TRAINING AND PROFESSIONAL DEVELOPMENT

PROFESSIONAL DEVELOPMENT TRAINING AND EVENTS

All our qualifications are supported with comprehensive training. Check out ocr.org.uk/professionaldevelopment to find out what's available for face-to-face or online training courses.





For more information visit
ocr.org.uk/engineering
ocr.org.uk/designandtechnology

or call our Customer Support Centre on
01223 553998

Alternatively, you can email us on
design.technology@ocr.org.uk



**Cambridge
Assessment**

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Oxford Cambridge and RSA

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