OCR
Oxford Cambridge and RSA

# 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.

**ocr.org.uk/engineering**
**ocr.org.uk/designandtechnology**

# WHAT'S IN THIS GUIDE?



## *Qualifications for a modern world*

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

**Cambridge Nationals in Engineering** are for students aged 14 to 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 5.

**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 9.

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

## KS4

GCSE (9–1)
**Design and Technology***

Cambridge Nationals
**Engineering Design***

Cambridge Nationals
**Engineering Manufacture***

Cambridge Nationals
**Engineering Programmable Systems***

*Progress 8 and performance points

**Guide students towards suitable pathway**

## KS5

AS Level
**Design and Technology****

A Level
**Design and Technology****

Cambridge Technicals
**Engineering Level 2 and 3†**

**Performance points

†Performance points apply to certain qualifications

**Stimulating and engaging KS5 options**

## Career and progression

**University**

**Employment**

**Apprenticeship**
Level 2 & 3 / Higher Apprenticeship

# 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 such as Cambridge Technicals and A Level Design and Technology: Product Design, Design Engineering and Fashion and Textiles

***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**

# 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 to 19 providers as progression to A Level, further education or on to an apprenticeship or work.

### *CAMBRIDGE NATIONALS IN ENGINEERING*

There are three separate GCSE-sized qualifications, in the areas of engineering design, manufacture and programmable systems to suit individual student needs.

Each qualification in the engineering suite has the same structure: one unit that's assessed through an exam and two further units that are centre-assessed. Your centre decides in which order you want to deliver the three units.

***READ MORE:***

**ocr.org.uk/cambridgenationals**

# CAMBRIDGE NATIONAL IN ENGINEERING DESIGN

## KEY INFORMATION

***SPECIFICATION CODE:***

Level 1/Level 2 Cambridge National Certificate in Engineering Design (120 GLH) – J822

***IDEAL FOR:***

Students aged 14 to 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)

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

***PERFORMANCE POINTS:***

Included on the KS4 performance tables for England

### *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.

Our Cambridge National in Engineering Design will inspire and equip students with the confidence to use skills that are relevant to the sector and more widely. It covers the design process, types of drawings, influences on design, and the use of computer-aided design (CAD) in Engineering.

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.

### *ASSESSMENT*

Level 1/Level 2 Cambridge National in Engineering Design consists of three units:

- R038: Principles of engineering design
- R039: Communicating designs
- R040: Design, evaluation and modelling

R038 is a written paper. The other units are NEA units. There are two submission windows for the NEA (January and June in the year of certification).

***READ MORE:***

**ocr.org.uk/qualifications/cambridge-nationals/engineering-design-level-1-2-j822**

# CAMBRIDGE NATIONAL IN ENGINEERING MANUFACTURE

## KEY INFORMATION

### *SPECIFICATION CODE:*

Level 1/Level 2 Cambridge National Certificate in Engineering Manufacture (120 GLH) – J823

### *IDEAL FOR:*

Students aged 14 to 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:*

Included on the KS4 performance tables for England

### *THE QUALIFICATION*

Engineering manufacture is about different manufacturing practices and processes using 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 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.

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 in Engineering Manufacture is made up of three units:

- R014: Principles of engineering manufacture
- R015: Manufacturing a one-off product
- R016: Manufacturing in quantity

R014 is a written paper. The other units are NEA units. There are two submission windows for the NEA (January and June in the year of certification).

### *READ MORE:*

**ocr.org.uk/qualifications/cambridge-nationals/engineering-manufacture-level-1-2-j823**

# CAMBRIDGE NATIONAL IN ENGINEERING PROGRAMMABLE SYSTEMS

## KEY INFORMATION

***SPECIFICATION CODE:***

Level 1/Level 2 Cambridge National in Engineering Programmable Systems (120 GLH) – J824

***IDEAL FOR:***

Students aged 14 to 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:***

Included on the KS4 performance tables for England

### *THE QUALIFICATION*

Our Cambridge National in Engineering Programmable Systems will help students to develop a deep understanding of the key principles that underpin how electronic and programmable technologies work.

They'll learn the fundamental principles and concepts of engineering programmable systems. They'll also take part in engaging practical tasks such as constructing and testing electronic circuits for a specific purpose, using tools and equipment to assemble printed circuit boards.

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.

To offer this qualification, your centre needs access to equipment and resources to produce PCBs and programmable systems.

### *ASSESSMENT*

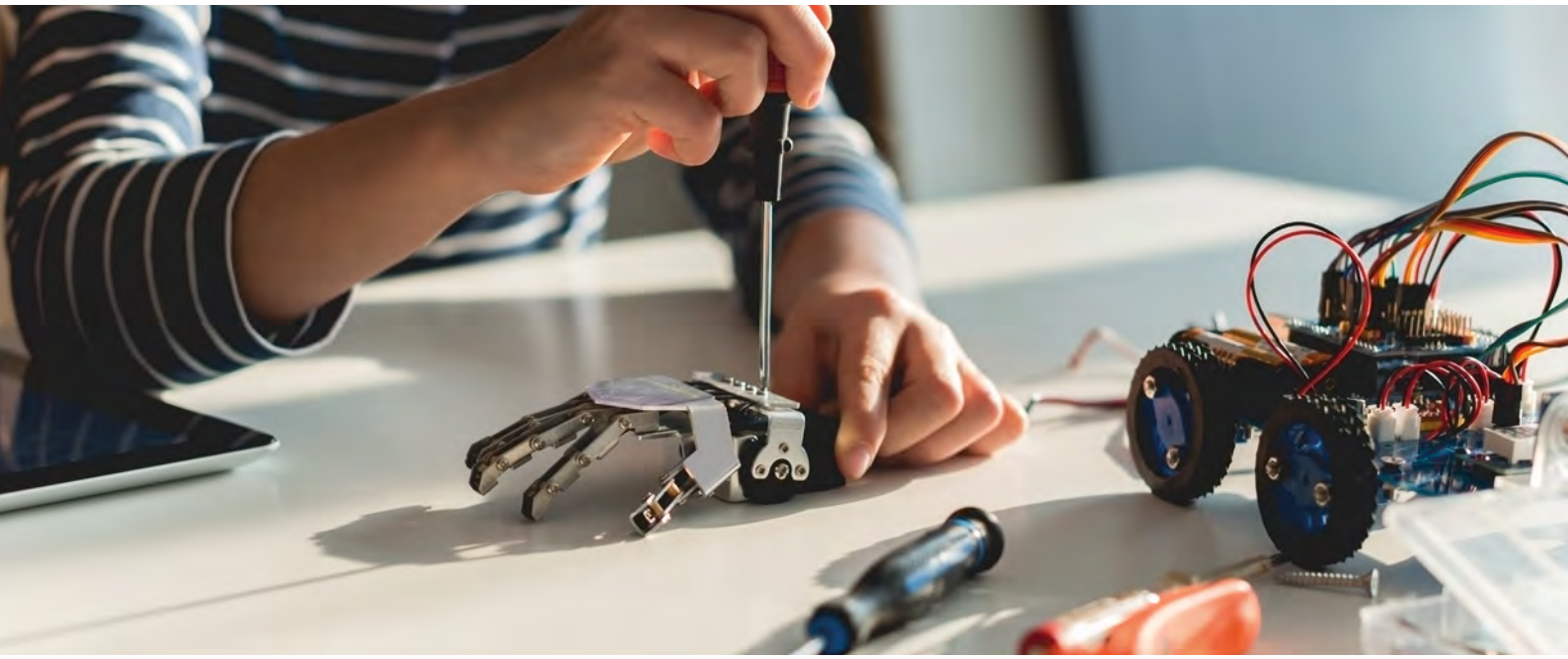
Level 1/Level 2 Cambridge National in Engineering Programmable Systems consists of three units:

- R047: Principles of electronic and programmable systems
- R048: Making and testing electronic circuits
- R049: Developing programmable systems

R047 is a written paper that makes up 40% of the qualification. The other units are NEA units. There are two submission windows for the NEA (January and June in the year of certification).

### *READ MORE:*

**ocr.org.uk/qualifications/cambridge-nationals/engineering-programmable-systems-level-1-2-j824**



# AS LEVEL DESIGN AND 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

# A LEVEL DESIGN AND 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

### *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. Students 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 students 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**

# CAMBRIDGE TECHNICALS IN ENGINEERING

CAMBRIDGE TECHNICALS

### *ABOUT CAMBRIDGE TECHNICALS*

Cambridge Technicals are vocational qualifications at Level 2 and Level 3 for students **aged 16+**. They're designed with the workplace and progression to higher education in mind and provide a high-quality alternative to A Levels at level 3. Qualifications at levels 2 and 3 have a mixture of internal and external assessments and centres are allocated a visiting moderator.

## KEY INFORMATION

***SPECIFICATION CODES:***

Engineering Level 3 (2016) Certificate/Extended Certificate/Foundation Diploma/Diploma/ Extended Diploma – 05822 to 05825, 05873. Currently, all sizes of the Cambridge Technicals Level 3 in Engineering (2016) will no longer attract funding from September 2025

***PERFORMANCE POINTS:***

All Engineering Level 3 (2016) qualifications are eligible for Key Stage 5 performance points

***IDEAL FOR:***

Students aged 16+

***PROGRESS TO:***

Higher education, apprenticeships, employment

***UCAS POINTS:***

Level 3 qualifications receive UCAS tariff points

# LEVEL 3

Our Level 3 Cambridge Technicals in Engineering qualifications help your students to achieve their potential and progress to the next stage of their lives, whether that's higher education, an apprenticeship or employment.

We have designed refreshing and exciting content that's up to date, engaging, fit for purpose and suitable for the needs of your students. To do this, we've consulted with universities, employers and industry specialists to make sure your students will gain the right combination of knowledge, understanding and skills required for the 21st century.

An extensive 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, has resulted in focussed qualifications. Depending on the size chosen, these qualifications either complement a Key Stage 5 study programme alongside other vocational qualifications or A Levels, or may make up the bulk of a two-year study programme. Our diplomas have vocational pathways within them that students can follow (one pathway must be achieved).

## KEY INFORMATION

***SPECIFICATION CODES:***

Engineering Level 2 (2016) Certificate/Diploma – 05887, 05888

***PERFORMANCE POINTS:***

The 2016 suite is eligible for Key Stage 5 performance points

***IDEAL FOR:***

Students aged 16+

***PROGRESS TO:***

Level 3, apprenticeships, employment

# LEVEL 2

Our Level 2 Cambridge Technicals in Engineering qualifications aim to develop your students' understanding, skills and knowledge of the engineering industry. Your students will gain an insight into the engineering sector as they, where applicable, learn about a specific sector such as design engineering, production engineering or systems engineering. Designed in collaboration with industry experts, the qualifications focus on the requirements that today's employers demand.

Thanks to a broad range of centre-assessed units with practical and wider project based assessment opportunities, as well as examined units on the fundamentals of mechanical, electrical/electronic and fluid power engineering and the application of engineering principles, these are focussed qualifications. There are also job role-specific pathways for your students to choose from.

***READ MORE:***

**ocr.org.uk/cambridgetechnicals**

# 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 **d&t@ocr.org.uk**

You can also find teacher support at **ocr.org.uk/engineering**, **ocr.org.uk/designandtechnology** or **@ocr_designtech**

### *TEACHING AND LEARNING RESOURCES*

- **Teach Cambridge**
  Teach Cambridge is our new personalised and secure website that provides teachers with a single point of access to all the support and resources you need to teach our qualifications.
- **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*

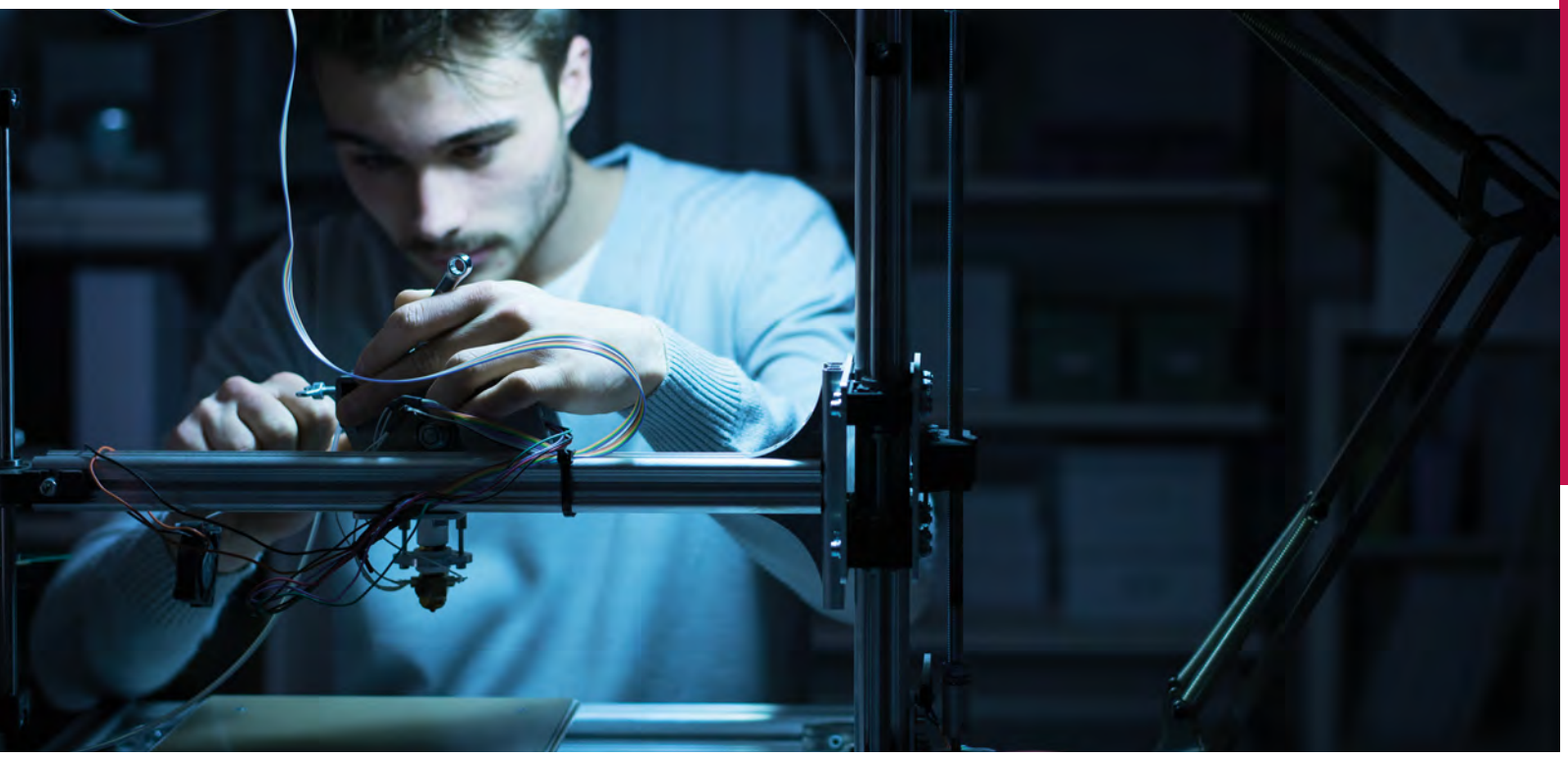
Our design and technology qualifications are supported by endorsed textbooks and resources published by leading publishers. You can find more details about our publisher partners and the resources they're providing at **ocr.org.uk/publishing-partners**

### *BLOGS*

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

### *KEEP UP TO DATE*

Sign up today at **ocr.org.uk/signup** for OCR updates including subject news, upcoming events and useful resources.



## 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 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.

# NEXT STEPS

## STEP 1

**ALREADY AN OCR CENTRE?**

GREAT, YOU'RE ALL SET.

**IF NOT, CALL OUR CUSTOMER DEVELOPMENT TEAM ON 02476 856072**

## STEP 2

**ASK** YOUR **EXAMS OFFICER** FOR **ACCESS** TO **TEACH CAMBRIDGE**

**teachcambridge.org**

## STEP 3

**DOWNLOAD**
THE **SPECIFICATION**
AND **CHECK OUT OUR**
RANGE OF **RESOURCES**

## STEP 4

**KEEP UP-TO-DATE**
BY SIGNING UP FOR
EMAIL UPDATES

## STEP 5

BOOK ONTO **PROFESSIONAL DEVELOPMENT EVENTS**
AND **TEACHER NETWORKS**

***ocr.org.uk***

For more information visit
**ocr.org.uk/engineering**
**ocr.org.uk/designandtechnology**
**facebook.com/ocrexams**
**twitter.com/ocr_designtech**
**instagram.com/ocrexaminations**
**linkedin.com/company/ocr**
**youtube.com/ocrexams**

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Alternatively, you can email us on
**d&t@ocr.org.uk**

Visit our online support centre at
**support.ocr.org.uk**

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