

**Tomorrow's  
Engineers**

**Make a difference  
to the world**



**Vocational and apprenticeship  
routes into engineering**



# Why choose engineering?

Could you see yourself working with others to:

- ⇒ Protect the environment?
- ⇒ Develop cutting edge sports equipment?
- ⇒ Improve living conditions for people around the world?
- ⇒ Manufacture the next generation of smartphones and tablets?

If so, engineering could be the career for you.

Engineering can be found everywhere – from the devices we use and the buildings we live in to the power we consume and the food we eat. Engineers use their skills to improve the design, performance and efficiency of just about everything we use today and to change the way we do things in the future.



## Five reasons to choose engineering

- 1) Engineers are in demand and they earn good money
- 2) Engineering is behind almost everything you can think of
- 3) Professionally registered engineers have a high status in society
- 4) Engineers are creative, practical and forward-thinking
- 5) Engineers make a difference to the world



## Did you know?

You can become professionally registered as an Engineering Technician (EngTech), ICT Technician (ICTech), Incorporated Engineer (IEng) or Chartered Engineer (CEng), with letters after your name, which are recognised all over the world.

# What is an engineer?

Someone who works with others to **design, create or improve a product**, a way of doing something, or part of our environment. Engineers are trained in a practical way, using **maths** and **science** to solve problems in a specific branch of engineering. They can take a **vocational, apprenticeship or academic** route into engineering, or a combination of these routes. **Engineering technicians** often work with engineers to solve practical engineering problems and are usually trained through a vocational or apprenticeship route.

- ⇒ There are many opportunities for people who want to get into engineering through practical, work-based routes. There are also other routes into engineering, which are explained on the Tomorrow's Engineers website: [www.tomorrowsengineers.org.uk](http://www.tomorrowsengineers.org.uk)

- ⇒ Have a look at the Engineering at University booklet: [www.tomorrowsengineers.org.uk/university](http://www.tomorrowsengineers.org.uk/university)

Whichever route you choose you'll find yourself being rewarded, challenged and stimulated, with highly valued, transferable skills that will equip you for the future.

**Vocational qualifications/Tech Levels** are work-related qualifications, which can be taken full-time at school or college (as a pathway to work or university) or part-time, during an apprenticeship. Vocational qualifications include: **BTEC Diplomas, City & Guilds, EAL NVQs and SVQs, HNCs, HNDs, and others.**

**Apprenticeships** combine on-the-job training with studying for vocational qualifications, or even a degree at university.

## Engineer

"The best thing about an Apprenticeship is being able to work out what your strengths are before making a formal decision on a career. I worked in eight different areas learning lots of varied skills, before making my final decision. Through my Apprenticeship, my leadership, management and communication skills increased and my confidence greatly improved. I now use these attributes in my current role."

### Jenny Westworth, 25

Manufacturing Engineer, BAE Systems

#### Completed an Advanced Aerospace Engineering Apprenticeship

Studying for a degree in Manufacturing Systems Engineering and working towards becoming a Chartered Engineer (CEng).





# Engineering industries and examples of job roles

## Aerospace

Designing and testing aviation systems, developing cutting edge defence technology and enabling space exploration.

- Aerospace Manufacturing Fitter
- Aerospace/Mechanical Engineer



## Automotive

Creating the next generation of vehicles, powered in new and efficient ways.

- Manufacturing Engineer
- Product Design and Development Technician



## Built Environment

Constructing new buildings, equipping them with the power and communications systems they need in order to become habitable.

- Construction Technician
- Civil/Building Services Engineer



## Digital Industries

Responding to cyber security issues, developing apps, installing new software.

- Cyber Intrusion Analyst
- Network Engineer



## Electrotechnical

Installing and maintaining electrotechnical systems found in power generation, buildings and infrastructure (e.g. railway tracks).

- Installation Electrician
- Electrical Engineer



## Energy Utilities

Helping power homes, offices, hospitals and schools and developing ways of generating sustainable energy.

- Renewable Energy Engineer
- Water Process Technician



## Food and Drink

Maintaining, testing and developing the machines and equipment used in food production, packaging and distributing food and drink.

- Food and Drink Maintenance Engineer
- Electronics/Manufacturing Engineer



## Land Based Engineering

Repairing and improving the mechanical equipment used in agriculture, horticulture and construction, e.g. sprayers, tractors and mini diggers.

- Land Based Engineering Technician
- Agricultural Engineer



## Life & Industrial Sciences

Working in production teams to assemble, maintain and fix the equipment used in healthcare, testing chemicals and using new processes.

- Science Manufacturing Technician
- Chemical Engineer



## Rail Design

Transforming the rail network by designing, developing and testing track, signalling, electrification, telecoms and overhead line.

- Railway Engineering Design Technician
- Electrical/Mechanical/Civil Engineer



These are some of the Government's new apprenticeship standards developed by engineering companies and professional bodies as part of the Trailblazer initiative. For a full list of apprenticeship standards, go to [www.apprenticeships.org.uk/standards](http://www.apprenticeships.org.uk/standards)



# What is an apprenticeship?

Apprenticeships are all about earning while you learn and investing in your future. Apprentices work towards nationally recognised qualifications – generally at college, but sometimes through E-learning and webinars – and spend the rest of their time developing technical skills and ‘on-the-job’ knowledge with an employer in their chosen industry.

Once you complete your apprenticeship, it is likely that you will stay with your existing employer and progress from apprentice to professional technician or engineer. The skills and qualifications you achieve during an apprenticeship are transferable and they can help you throughout your career.

You’ll be supported throughout your apprenticeship and encouraged to take on varied tasks and pick up new skills, giving you the opportunity to prove yourself to your employer. Your employer will have spent time and money training you, so they’ll want to keep you.

## Apprentice Engineer

“As an apprentice you need to be driven. You learn a lot of stuff from the ground up that you perhaps wouldn’t learn at university. There are lots of advantages to being an apprentice, for example, you get to start earning money, and your employer is paying for your education, which is great. You’re also learning the precise skills that you need for the job you’re training for, which puts you in a fantastic position.”

**Jennie Treen, 22**

Apprentice Traffic Maintenance Engineer, Transport for London  
Working towards BTEC Level 3 in Electrical and Electronic Engineering



## How long do apprenticeships last?

- Apprenticeships generally take between two and four years to complete, depending on the level, the industry and the job role.
- Higher Apprenticeships/Professional Apprenticeships usually take four to six years to complete.

## Are there different levels of apprenticeships?

**You must be at least 16 years old to apply for an apprenticeship.**

In England, Wales and Northern Ireland, apprenticeships exist at three levels:

- **Intermediate Apprenticeships (same level as GCSEs/Standard Grades):** Level 2
- **Advanced Apprenticeships (same level as A levels/IB/SB/Highers):** Level 3
- **Higher Apprenticeships (same level as HND/degrees):** Levels 4+

Higher Apprenticeships often incorporate a Foundation Degree or Bachelor’s Degree (BEng or BSc).

In Scotland, apprenticeships are known as Modern Apprenticeships, which involve training on-the-job and studying towards Scottish Vocational Qualifications (SVQs) from SCQF 5 upwards. Technical Apprenticeships (SCQF 8-9) and Professional Apprenticeships (SCQF 10-12) are also available.



## Did you know?

Registered Engineering Technicians (EngTech) earn, on average, over £25,000 more per year than the National Minimum Wage.

## How much does an apprentice earn?

Engineering employers tend to pay apprentices quite a bit more than the national minimum apprentice wage. Have a look at current apprenticeship vacancies to get an idea of typical earnings in the field you’re interested in at [www.tomorrowsengineers.org.uk/apprenticeships](http://www.tomorrowsengineers.org.uk/apprenticeships)

It’s worth remembering that your employer is investing heavily in your career development by funding your training and education. When you weigh this up against the cost of university, you can see why many people are considering the apprenticeship route.





## What qualifications does an apprentice get?

Apprenticeships incorporate **work-based qualifications** (e.g. NVQs and SVQs), **Technical Qualifications** (e.g. Diplomas), **maths, English, ICT** and other learning modules. The general term for these qualifications is **vocational** qualifications or **Tech Levels**, explained in more detail over the page.

## Where will it lead me?

Once you have completed your apprenticeship, you might decide to:

- ⇒ remain with your employer – or within the industry – as an engineering technician or engineer (depending on the level of apprenticeship you have done).
- ⇒ continue your professional development. For example, if you have just completed an Advanced (Level 3) Apprenticeship, you could progress onto a Higher/ Professional Apprenticeship, which may involve studying towards a degree.
- ⇒ work towards achieving professional registration as an **Engineering** or **ICT Technician, Incorporated Engineer** or **Chartered Engineer**.
- ⇒ or all of the above!

Registered technicians and engineers are allowed to use the globally recognised letters EngTech, ICTTech, IEng or CEng after their name. If you become professionally registered your career opportunities and earning potential can improve.

## Look out for the following logos

Find out if your apprenticeship or qualifications are approved at [www.engc.org.uk/techdb](http://www.engc.org.uk/techdb)



## How do you apply for an apprenticeship?

Applying for an apprenticeship is a lot like applying for a job. It's important to start by listing your interests and asking people who know you well to help you identify your strengths. Important factors to consider when researching apprenticeships include location, learning methods, pay, level, qualifications awarded and opportunities for progression. Find out more at [www.tomorrowsengineers.org.uk/16-19](http://www.tomorrowsengineers.org.uk/16-19)

## Search for apprenticeships

If you live in England:

[www.apprenticeships.org.uk](http://www.apprenticeships.org.uk)

If you live in Scotland:

[www.myworldofwork.co.uk/modernapprenticeships](http://www.myworldofwork.co.uk/modernapprenticeships)

If you live in Wales:

[www.careerswales.com/en](http://www.careerswales.com/en)

If you live in Northern Ireland:

[www.nidirect.gov.uk/apprenticeships](http://www.nidirect.gov.uk/apprenticeships)

You can also search for engineering apprenticeship vacancies at [www.tomorrowsengineers.org.uk/apprenticeships](http://www.tomorrowsengineers.org.uk/apprenticeships)



## Did you know?

- ⇒ Sometimes you can apply for apprenticeships directly with employers, either on their websites or through personal connections.
- ⇒ Just like applying for a job or university place, it may take a few attempts before you're shortlisted for an interview. Don't be afraid to ask for feedback to help you improve.
- ⇒ In the meantime you could apply for a full-time vocational course at a local college and progress onto an apprenticeship either during or after your course.
- ⇒ If you have your heart set on university, it's worth bearing in mind that Higher Apprenticeships often incorporate degrees.

## Engineering Employer

"Balfour Beatty really values its apprentices – from civil, mechanical and railway engineering to highways maintenance and construction operations – we give our apprentices the platform to develop their technical skills, personal learning skills, and knowledge of the industry. Apprentices are paid a competitive salary and many apprentices go on to study part-time degrees with the company and achieve higher levels of qualifications and responsibility."

Kelly Anderson, Director of Resourcing and Development, Balfour Beatty

## Traineeships

Traineeships are for young people over the age of 16 who are not yet ready to start an apprenticeship. They last between six weeks and six months and provide the young person with work preparation training, maths, English and work experience with an employer.

More information on how to search and apply for traineeships can be found at [www.apprenticeships.org.uk](http://www.apprenticeships.org.uk)





# Vocational qualifications

## ⇒ What are vocational qualifications?

Vocational qualifications, also known as Tech Levels, are work-related qualifications that prepare you for a career. Vocational qualifications link your learning to real life problems. They are well regarded by employers, who help design the qualifications, and by the engineering profession. Vocational qualifications include BTECs, EAL NVQs and SVQs and City & Guilds.

Some people take a combination of academic and vocational qualifications at school or sixth form college. Others choose to study vocational qualifications full-time – often in a further education (FE) college or a University Technical College (UTC).



## ⇒ Why choose vocational routes into engineering?

If you enjoy learning in a practical way and you have an idea of the sort of job, industry or sector you want to work in, a vocational qualification – either taken at college or as part of your apprenticeship – could be the route for you.

## What is an FE College?

Further education colleges offer a range of qualifications, including A levels, Highers, vocational qualifications and specialist work-related courses. If you're doing an apprenticeship you are likely to do the studying part of the apprenticeship at an FE college. Studying for an apprenticeship can also be done through a learning provider.

## What is a UTC?

University Technical Colleges are for 14-18 year-olds. They integrate academic, technical and practical learning and have links with local employers and a sponsor university. They are suitable for young people who want to develop the skills needed to work in science, engineering, manufacturing or technology industries.



## ⇒ Where will vocational qualifications lead me?

Whether you choose a vocational route, an academic route, or a combination of the two, you will have the same future options open to you. You might choose to apply for university, an apprenticeship, or in some cases, full-time work.

# Vocational qualifications in engineering and related subjects

## Diplomas include:

- Aircraft Maintenance
- Aeronautical Engineering
- Bench Joinery
- Blacksmithing and Metalworking
- Construction and the Built Environment
- Civil Engineering
- Engineering Design & Technology
- Environmental Sustainability
- Land Based Technology
- Professional Sound Engineering
- Refrigeration, Air Conditioning and Heat Pump Systems
- Software Development
- Vehicle Technology

## NVQs/SVQs include:

- Automotive Engineering
- Domestic Plumbing and Heating
- Electrical and Electronic Engineering
- Marine Engineering
- Materials Processing and Finishing
- Mechanical Manufacturing Engineering
- Welding

## HNCs and HNDs

Higher National Certificates (HNCs) and Higher National Diplomas (HNDs) are Level 4 and 5 vocational qualifications usually taken at a further or higher education college or whilst in employment. They can also be taken as part of an apprenticeship. HNCs and HNDs are available in different fields of engineering, including:

- Civil
- Electronic/Electrical
- Mechanical



These are just some of the many vocational qualifications available. To find out what's on offer at the schools, FE colleges and UTCs in your area have a look at [www.ucasprogress.com](http://www.ucasprogress.com) or search on the education providers' own websites.





# Choosing your options

## At 14

If you want to keep your options open for engineering, including engineering apprenticeships, then at 14 make sure you focus on maths and science – particularly physics – at GCSE. Engineers also need to be creative problem solvers with good technical skills, so subjects like design & technology and computing can also be useful.

At 14 you may choose to attend a University Technical College (UTC) or a Studio School. More information can be found at [www.utcolleges.org](http://www.utcolleges.org) and [www.studioschooltrust.org](http://www.studioschooltrust.org)

## At 18

Your options at 18 include:

- Applying for a Higher (Level 4) Apprenticeship, dependent on your grades, which may incorporate a degree or even a master's degree whilst learning on-the-job.
- Attending university full time to study a foundation degree, bachelor's degree (BEng/BSc) or master's degree (MEng/MSc) in engineering or a related subject.
- Full-time employment and studying while working.

## Apprentice Engineer

"Engineers and technicians make a difference in the sense that they build dreams! I've been interested in construction since I was ten, at about the time Canary Wharf was being built. I could see it happening from my house. I enjoy seeing how big projects come together, and watching people use them for years to come."

**Zavier Peart-Lawrence, 21**

Apprentice Civil Engineer – K10 Apprenticeships

Working for Balfour Beatty on the Olympic Park transformation project



## At 16

If you have 5 GCSEs at A\* to C (or equivalent), including maths, science – particularly physics – and English, you can:

- Take a Tech Level in engineering or a related subject. These can be combined with A levels/Highers or equivalent.
- Apply for an Advanced Apprenticeship where you are likely to study for a Tech Level whilst developing your engineering skills through work.
- Take a Diploma/A levels/Highers/IB/SB, in maths, physics or engineering if you're thinking of going on to study a degree in engineering.
- With slightly lower grades, you could apply for a traineeship, a Level 2 qualification or an Intermediate Apprenticeship.

At 16, you may choose to attend a **FE college, sixth form** or **University Technical College (UTC)**.

# What next?

## Employment, university and professional registration

### Employment

At the end of your apprenticeship you should be ready for full-time employment as a technician or engineer in your chosen field.

During your training you should get to know the industry, the companies within it and who is likely to need employees.

### University

Many apprenticeships involve working towards a higher education qualification, which effectively means you could be paid to go through university!

There are many higher education qualifications to choose from: HNCs, HNDs, Foundation Degrees; Bachelor of Science (BSc) or Bachelor of Engineering (BEng) and Master of Engineering (MEng).

Though some universities offer a degree in general engineering, most courses are in specific engineering disciplines such as civil, electrical or mechanical engineering to provide the specialist knowledge relevant to that field.

### Accredited Courses

Look out for the following logo, which shows that a degree is accredited by the Engineering Council:



Accreditation is based on the quality of the course and whether it provides the knowledge and skills needed for professional registration as:

- Incorporated Engineer (IEng)
- Chartered Engineer (CEng).

To find out more about engineering degrees, have a look at the Engineering at University booklet on the Tomorrow's Engineers website [www.tomorrowsengineers.org.uk/university](http://www.tomorrowsengineers.org.uk/university)





# Professional Engineering Institutions and professional registration

While you are an apprentice or whilst you're studying, you can become an apprentice or student member of a Professional Engineering Institution that relates to your field. These institutions offer careers advice, newsletters, technical publications and other study resources, and in some cases, a mentor. Many provide access to networks and events where you could meet future employers.

Professional Engineering Institution membership is also the first step in achieving professional registration as an Engineering Technician (EngTech), ICT Technician (ICTech), Incorporated Engineer (IEng) or Chartered Engineer (CEng).

Professional registration is recognised around the world. The letters after your name demonstrate knowledge, skills, expertise, competence developed by work place experience and commitment to your chosen career.

## Engineering Employer

"Apprentices are a vital part of our talent pipeline. Developing towards professional Engineering Technicians (EngTech), they help ensure our networks and systems continue to provide safe sustainable energy to homes and businesses."

**Tony Moloney**, Head of Education & Skills, National Grid

## Apprentice Engineer

"College is just one aspect of our ongoing training, giving us a foundation in electrical and electronic engineering. We also have specialist design courses and extra training from senior staff, who task us with finding design solutions for scenarios that have occurred in the past. This helps prepare me for the more challenging aspects of signalling, which is a prospect I relish."

**Arjun Chauhan, 27**

Apprentice Signalling Design Engineer, Siemens Rail & Automation

Working towards EngTech registration



## Useful links

[www.tomorrowsengineers.org.uk](http://www.tomorrowsengineers.org.uk)

A one-stop-shop for engineering careers information and inspiration, including case studies, route maps, careers resources, quizzes and useful links.

[www.tomorrowsengineers.org.uk/16-19](http://www.tomorrowsengineers.org.uk/16-19)

Live apprenticeship vacancies from the National Apprenticeship Service; information on different routes into engineering; updates on schemes, placements, awards, events and competitions for young people.

Find out more and apply for apprenticeship opportunities here:

If you live in England:

[www.apprenticeships.org.uk](http://www.apprenticeships.org.uk)

If you live in Scotland:

[www.myworldofwork.co.uk/modernapprenticeships](http://www.myworldofwork.co.uk/modernapprenticeships)

If you live in Wales:

[www.careerswales.com/en](http://www.careerswales.com/en)

If you live in Northern Ireland:

[www.nidirect.gov.uk/apprenticeships](http://www.nidirect.gov.uk/apprenticeships)

Explore your future career options:

[www.nationalcareersservice.direct.gov.uk](http://www.nationalcareersservice.direct.gov.uk)

Post-14 and Post-16 course search:

[www.ucasprogress.com](http://www.ucasprogress.com)



University Technical Colleges (UTCs):

[www.utcolleges.org](http://www.utcolleges.org)

Studio Schools:

[www.studioschoolstrust.org](http://www.studioschoolstrust.org)

Further Education (FE) Colleges:

[www.hotcourses.com](http://www.hotcourses.com)

Alternatives to University:

[www.notgoingtouni.com](http://www.notgoingtouni.com)

University:

[www.ucas.com](http://www.ucas.com)

[www.unistats.com](http://www.unistats.com)

[www.university.which.co.uk](http://www.university.which.co.uk)

[www.tomorrowsengineers.org.uk/university](http://www.tomorrowsengineers.org.uk/university)

More about professional engineers and technicians and registration:

[www.engc.org.uk](http://www.engc.org.uk)

[www.engtechnow.com](http://www.engtechnow.com)

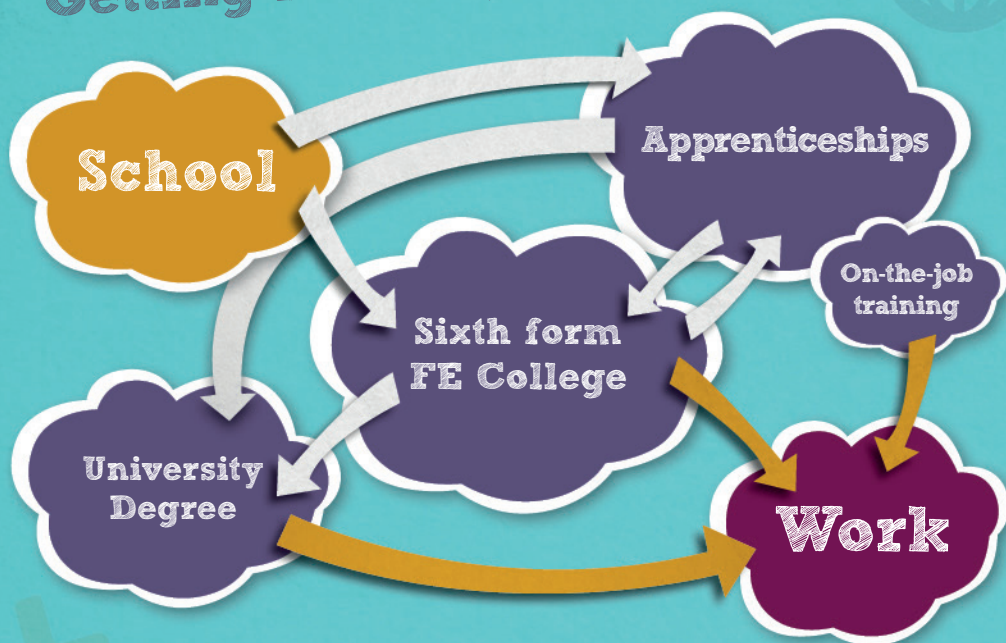
## Engineering Employer

"Royal Mail handles about 58 million mail items each day. Getting those items to your door is a huge logistical challenge, the scope and complexity of which involves using advanced technology. Engineering Technicians are vital to this process."

**James Baker MSc CEng FIET**, Head of Engineering Maintenance, Royal Mail



### Getting into engineering...



'Vocational and apprenticeship routes into engineering' was produced by EngineeringUK, The Institution of Civil Engineers, The Institution of Engineering and Technology and The Institution of Mechanical Engineers, with advice from the Engineering Council and the National Apprenticeship Service.

These organisations work in collaboration with support from the Royal Academy of Engineering, to develop engineering careers materials for the Tomorrow's Engineers programme, which exists to inspire young people to consider engineering careers.