



Spotlight on Engineering



Engineering covers anything that is built or produced. So it's a pretty vast sector made up of many different industries from aerospace to energy. Engineers work in manufacturing, transport, construction, medicine, chemicals and much more.



So what's involved?

Engineering is massive for the UK. It makes up nearly 1/5th of the UK economy and employs over 4.5 million people. As you can imagine it's vital to the health of the economy and is driving forward the UK's ever growing energy markets.

Engineering is also vital to the development of new process and material technologies, advanced manufacturing and efforts to make carbon reductions. Engineers are involved in all parts of the chain, from design to manufacture to technical support.

- There are just over 5,000 engineering and science businesses in Wales, employing around 90,200 people.
- 44,800 are employed in what's known as the mature engineering sectors (metals, metal products, mechanical equipment, electrical equipment, rubber tyres and parts of other transport equipment),
- 43,900 are employed in the leading or cutting-edge technologies (electronics, automotive, marine, aerospace and other engineering activities)
- 1,500 are employed in the science sector (research and development in natural sciences and engineering).

(Source: Wales - Sector Skills Assessment Report 2011. SEMTA)

The main areas of employment in engineering are in the aerospace, automotive and metals sectors. The UK's metals sector is large with 1 in every 8 manufacturing jobs being in this sector. It is the UK's 4th largest manufacturing exporter, exporting almost 50% of its production to around 200+ countries and is crucial to aerospace and defence, automotive components, and engineering and allied products.

(Source: Wales - Sector Skills Assessment Report 2011. SEMTA)

In Wales, 84% of engineering establishments are what's called micro-sized (employing less than 10 people) with very few companies employing 200 or more.

92% of the workforce is company-employed with only 8% self-employed.

92% are employed on a full time basis- this compares to 72% for all other sectors in Wales.
(Source: Wales - Sector Skills Assessment Report 2011. SEMTA)



What does the future hold?

Future trends in engineering are dominated by government commitments to combat the effects of climate change and at the same time meet our demand for energy.

It is widely accepted that this country will have to develop more low-carbon energy supply including nuclear and renewable energies. Engineers are central to the development of these and even newer technologies.

(Source: Engineering UK 2011 and 2012 Report)

Exciting developments that could impact on Engineering in the Energy sector could include:

- Geo-engineering e.g. solar insulation solutions and synthetic trees
- Geothermal heat mining technologies to generate electricity with virtually no emissions.



Did you know?

Only 18% of Semta's workforce in Wales is female, compared to 50% for all sectors in Wales.



Tip

- Do your research – for all levels and trades. Graduates also need to consider that with around 1 in 10 university graduates embarking upon a career in engineering each year, it's important that they are aware of the necessary skills and qualities that engineering employers are looking for to give themselves a competitive advantage over other candidates.
- GoWales www.gowales.co.uk can help with graduate work, tasters and placements plus free support for freelancers.



Useful links

www.thecareerengineer.com

www.insidecareers.co.uk

www.engc.org.uk

www.engineeringuk.com

www.discoverengineering.co.uk

targetjobs.co.uk/career-

sectors/engineering

www.tomorrowsengineers.org.uk



- Wind energy is projected to offer the largest opportunity for growth in renewable energies and in engineering jobs.
- Photovoltaics (PVs), is a process in which solar cells convert sunlight directly into electricity. Wales is home to the UK's largest solar energy plant.
(Source :Engineering UK 2011 and 2012 Report.)

Between 2010 and 2016, Semta, the Sector Skills Council has predicted that there will be an overall total requirement of about 13,400 people in Wales in their sector (1,920 per year). Higher level management, professional and associate professional/technician occupations are likely to form a greater share of total employment.
(Source: Wales - Sector Skills Assessment Report 2011. SEMTA)

It's predicted that there'll be a shortage of graduate engineers in the future. The shortage will be felt more in energy, utilities and civil engineering.
(Source: 'Engineering Graduates for Industry' (February 2010) by the Royal Academy of Engineering)

Post-recession forecasts for engineering are good.



Find out more

For more information and advice about working in Engineering:

- Talk to your Careers Adviser
- Use your school or college library
- Use your local Careers Centre library
- Ring **0800 100 900**



What jobs could I do?

Engineering is a broad career area with different levels of jobs depending on qualifications and/or experience. Those employees with few or no qualifications are most likely to work as an operative or assembler in elementary roles. Those with intermediate qualifications (NVQ level 3) in skilled trades/crafts and associate professional/technician roles. Those with higher-level skills (NVQ Level 4+) are most likely to work in professional and managerial roles, possibly as an incorporated or chartered engineer.

According to the Office for National Statistics Labour Force Survey in Wales, the top 25 jobs in the science, engineering and manufacturing sector in 2009 included metalworking production & maintenance fitter 8%, production, works & maintenance managers 5%, welding trades 5%, engineering professionals 3%, assemblers (electrical products) 3%, routine inspectors and testers 3%, general administration 3%, metalworking machine operatives 3%, electricians, electrical fitters 3%, marketing and sales managers 2%, mechanical engineers 2%, labourers, process & plant operations 2%, metal making & treating process operatives 2%, software professionals 2%, production and process engineers 2%, planning and quality control engineers 2%, plant & machinery operatives 2%, tool makers, tool fitters & markers-out 2%, metal machine setter & setter operator 1%, electrical and electronic engineer 1%, process operatives 1%, fork-lift truck drivers 1%, buyers and purchasing officers 1%, customer care 1%, electronics engineers 1%.

Areas of work in engineering include:

Aerospace	Gas
Agricultural	Highways
Automotive	Horticultural
Biomedical	Manufacturing
Building Services - lighting, heating, ventilating and refrigeration	Marine
Chemical	Mechanical
Civil and structural	Medical
Communications - telecommunications, telephone	Merchant Navy
Computer	Mining
Construction	Offshore oil and gas
Control	Production
Design	Railway
Electrical	Shipbuilding
Electronic	TV and radio



Where could I work?

Here are some examples of where you could work and companies that employ engineers:

- **Aerospace** – Some of the World's biggest aerospace and defence companies have bases in Wales including General Dynamics, Cassidian, Airbus, BAE Systems, GE Aviation and British Airways.



- **Automotive** - is dominated by global companies such as Honda, Nissan, Toyota, General Motors and BMW. Design and development roles in the UK tend to be with Bentley, McLaren and Williams. Wales is home to 35 of the top 100 global automotive suppliers, including Ford & Toyota.
- **Built environment** sector is suffering from the recession. Employment in this sector is expected to recover. Amey, Arup, Atkins and Mott MacDonald are historically big recruiters.
- **Chemical Industry** - includes petrochemicals, pharmaceuticals, fine chemicals, water organisations, engineering contractors and rapidly growing biotechnology companies. Big players include Air Products, Akzonobel and BASF.
- **Defence** - including the armed forces, BAE, Dstl and QinetiQ.
- **Electronics** - includes component manufacturers such as Intel, Wolfson Microelectronics and CSR and equipment manufacturers like Sony, Philips and Sharp. Wales has over 300 companies including Sony, Panasonic and International Rectifier.
- **Electrical sector** - covers a wide range of industries including transport, construction, telecommunications and manufacturing.
- **Energy** e.g. from large globals such as ExxonMobil and BP to smaller companies in key areas such as exploration and oil rig construction. Engineers are also needed in companies that produce nuclear, wind, hydro, tidal and solar power. Leading world companies such as RWE, npower renewables, E.On, EDF, Prenergy, Western Energy, UPM, AMEC and Sharp can be found in Wales. There tends to be smaller companies in niche areas such as solar power.
- The **railway** network. eg. Network Rail.
- **Telecoms** - eg. Nokia, Ericsson, Siemens and Vodafone. Cutting edge technological developments define this sector.
- **Utilities** sector covers electricity, gas, water and waste management and the large number of major utility companies such as npower and Scottish Power.

Engineering is a global industry and profession so there are good opportunities to work abroad.



What skills do I need?

Over the last 10 years, engineers have become more qualified and skilled. In Wales, between 2000 and 2009, those with NVQ level 4 qualifications increased from 24% of the workforce to 36%, while those with no qualifications decreased from 12% to 10%.

If you work in Engineering in Wales you are more likely to be highly qualified, with 61% having NVQ3 or above compared to 58% in all sectors.

All engineering jobs will require the following skills:

- an interest in maths, science and design and technology;
- enthusiasm to understand how things work and keep up with new developments;
- technical knowledge in solving practical problems;
- effective communication skills;
- team work;
- able to work with customers to identify needs and provide solutions;
- good colour vision for some jobs eg. electrical.

For higher level jobs, management and leadership skills are important. Incorporated engineers and engineering technicians need to have a high level of attention to detail, reasoning ability and be able to make things happen.

On the other hand, craft workers and operators will need basic mathematical ability, resilience, patience and of course, practical skills.



Skills in demand

In Wales, the main specific skills cited as lacking in employees were technical and engineering skills at all levels. The most common technical skills gaps were for Computer Aided Design (CAD), CNC machine operations, tool-making and electrical engineering.

General skills gaps highlighted include key or core personal skills, IT/computer skills, management skills and marketing or selling skills.

25 % of engineering firms in Wales reported skills gaps. This compares to 21% in the UK.

Employers have also had difficulty in getting staff with the right qualifications. In Wales, 10% of engineering employers reported problems recruiting appropriate graduates, compared to 7% in the UK.



In Wales the most difficult jobs to fill have been skilled trades (craft), process plant and machine operatives and managerial occupations. In Wales a total requirement of around 5,700 people with intermediate and higher level qualifications (NVQ level 3+ or equivalent) is expected in the engineering sector between 2010 and 2016.

(Source: Wales - Sector Skills Assessment Report 2011. SEMTA)

£ What can I earn?

Technician/Craft Level Jobs

Average annual pay for a selection of STEM (Science, Technology, Engineering and Mathematics) technician and craft careers (2010) – UK.

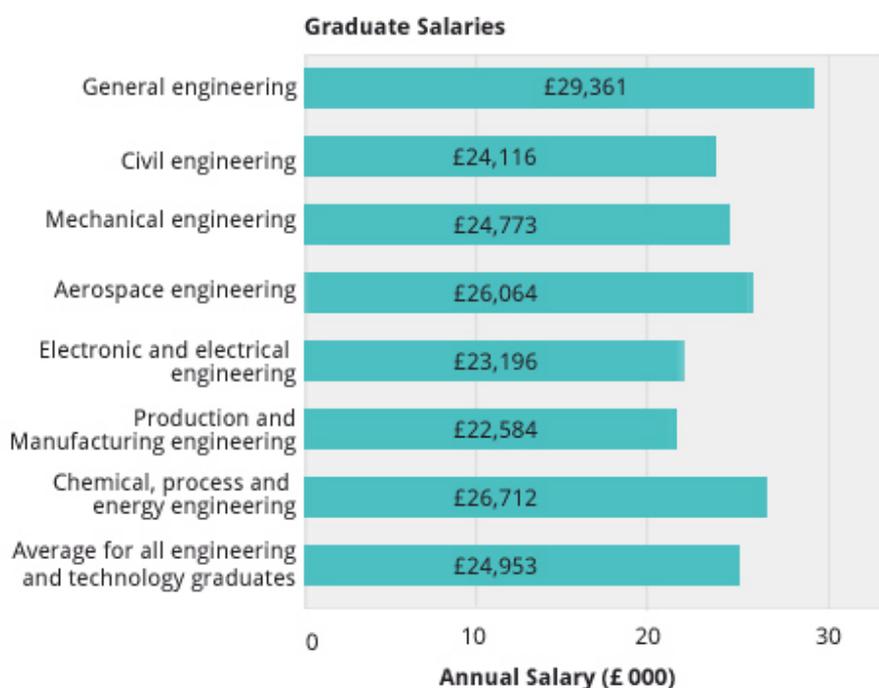
(Source: Annual Survey of Hours & Earnings 2011 Office for National Statistics)

Engineering technicians	£32,690
Electrical/electronics technicians	£31,538
Electricians, electrical fitters	£29,925
Electricians, electrical fitters	£29,200
Telecommunications engineers	£28,793
Computer engineers, installation and maintenance	£27,449
Plumbers, heating and ventilating engineers	£27,349
Chemical and related process operatives	£26,571
Building and civil engineering technicians	£26,527
Quality assurance technicians	£26,103
Tool makers, tool fitters and markers-out	£26,009
Metal making and treating process operatives	£25,612
Welding trades	£24,784
Motor mechanics, auto engineers	£24,061
Metal working machine operatives	£22,624
TV, video and audio engineers	£20,661
Assemblers and routine operatives	£17,600

Higher level jobs

The average salaries for graduates left university in 2010 and went on to become Engineering professionals was between £19,665 and £26,890 This compares really well to general occupation average of between £ 17 720 and £23 335.

(Source:HESA)





General engineering	£29,361
Civil engineering	£24,116
Mechanical engineering	£24,773
Aerospace engineering	£26,064
Electronic and electrical engineering	£23,196
Production and manufacturing engineering	£22,584
Chemical, process and energy engineering	£26,712
Average for all engineering and technology graduates	£24,953

For those at Chartered Engineer level, between 2007 and 2010, the average income rose by 10% to £55,000 and for Incorporated Engineers increased by 5% to £43,000.

(Source: Engineering UK 2011 and 2012 Report)



What do I need to do?

If you've got the right skills Engineering can be a good career option for anyone, [but if you're female find out how more girls are being encouraged to choose careers such as Engineering.](#)

From reading this, you will now know that you need to get as qualified as possible to get into this sector. Remember that it's not just university that could be an option. Apprenticeships and vocational courses could also be available. When you're ready to think about getting qualified click Courses in Wales which has links to a variety of training, work based and further education opportunities in your area. If you want to find out about apprenticeships and see what's available click on Apprenticeship Matching Service. So, take the time to research and give yourself the edge!

Research, research, research! You wouldn't download music without sampling first. One of the biggest keys to your success is to know as much as you can about the work you're interested in. Ask friends and family if they know anyone that works in Engineering and speak to them. Speaking to a careers adviser can really help, especially once you've done lots of research!

This website can really help get your research underway! Click the links under **What Jobs Could I Do** for information about getting into different jobs in this industry as well as the weblinks under **Useful Links**.

Don't forget, one of the 3 main reasons employers give for not employing applicants is lack of work experience. So, if you want to wow your employer with your knowledge and practical experience and get the advantage you need, start finding out about Work Experience opportunities.



Sources of Information

Wales - Sector Skills Assessment Report 2011. SEMTA – The Sector Skills Council for Science, Engineering and Manufacturing Technologies. www.semta.org.uk

Engineering UK 2011 and 2012 Report. www.engineeringuk.com

www.prospects.ac.uk

Office for National Statistics. Labour Force Survey 2009.

Higher Education Statistics Agency (HESA).

Wales Business Opportunity IBWales December 2010

<http://www.ibwales.com/upload/pdf/WAG10-10832>