EngineeringUK

Key facts & figures

Highlights from the 2019 update to the Engineering UK report

Introduction

The EngineeringUK 2019 Excel Resource serves as an up-to-date source of easily-accessible information on the state of engineering in the UK. It is a companion piece to the *Engineering UK: The State of Engineering* report, which provides a comprehensive account of engineering's economic contribution and the composition of its workforce, as well as the extent to which the supply through the education and training pipeline is likely to meet future needs and demand for engineering skills.

The 2019 Excel Resource draws on a wide range of data sources including the Office for National Statistics (ONS) Labour Force Survey, CBI/Pearson Education and Skills Survey, Inter Departmental Business Register, EngineeringUK Engineering Brand Monitor, HESA student record data and ONS Annual Survey of Hours and Earnings.

Here we present some key facts and figures from each chapter and we signpost readers to the Excel Resource itself, which provides far more detail, including breakdowns by sector, industry, country/region, gender, ethnicity and age.

Chapter 1 – Engineering in context

Chapter 1 draws on a range of data sources, including from the ONS, OECD and UKCES, to give an overview of the role of the engineering sector in the broader UK economy. It provides a summary of the composition of the UK workforce in terms of skills levels and the drivers and implications of skills gaps.

Key facts and figures:

- UK productivity has not recovered from the impact of the 2008 financial crisis and continues to lag behind the improvements made by other G7 nations.
- The composition of the UK workforce is changing, with continued demand for high and low skilled occupations but a notable decrease in demand for middle skilled workers, creating an hourglass shaped economy.
- There is a considerable shortage of appropriately skilled workers in the engineering sector. The top drivers of the skills gap reported by employers include strong competition for skilled candidates, a shortage of applicants with appropriate qualifications and a lack of awareness among young people of the educational routes into engineering occupations.

Chapter 2 – Engineering and its economic contributions

Drawing on Inter-departmental Business Register (IDBR) data, Chapter 2 provides detail on the economic contribution of the engineering sector, including trends in the number and distribution of engineering enterprises across the UK broken down by major industrial groupings and region. Information is included on turnover and GVA generated by the engineering sector.

Key facts and figures:

- Engineering has a key role in driving economic growth and productivity, generating 21.4% (£1.2 trillion) of the UK's £5.7 trillion turnover in 2018. However, this is down from 23.3% in 2017.

- The manufacturing sector makes a substantial economic contribution, accounting for 43.5% of the turnover generated by engineering enterprises in the UK.

- 27.0% of the 2.67 million registered enterprises in the UK in 2018 fell within the engineering footprint.

- Of the 721,940 engineering enterprises in the UK in 2018, the largest proportions were in information and communication (29.4%), construction (27.3%) and manufacturing (18.6%).

Chapter 3 – Harnessing the talent pool

This chapter provides an overview of the engineering talent pool, examining national population projections for young people. It also outlines trends in the perceptions, understanding and knowledge of engineering among young people, teachers and the general public, drawing from the EngineeringUK Engineering Brand Monitor (EBM) and examining changes over time.

Key facts and figures:

- The proportion of young people aged 11 to 14 who said they would consider a career in engineering was 54.7% in 2019.

- However, there are sizeable and persistent gender differences, with boys being far more likely to consider a career in engineering – there is a 27.5 percentage point gap among those aged 11 to 14, which falls to 22.1 percentage points for those aged 16 to 19.

- There is a clear need to strengthen knowledge of the profession: just 23.6% of young people aged 11 to 14 and 25.5% of those aged 14 to 16 reported knowing what people working in engineering do.

- Young people seek careers advice from different sources, depending on the stage in their educational career: pupils aged both 11 to 14 and 14 to 16 were most likely to seek advice from their parents/guardians (62.4% and 64.1% of pupils respectively), whereas those aged 16 to 19 were most likely to seek advice from careers advisers (62.7% of pupils).

- The proportion of school-age children who have taken part in a STEM careers activity is rising. Among young people aged 14 to 16 who completed the 2019 Engineering Brand Monitor, 32.2% had participated in a STEM careers activity in the 12 months prior to completing the survey.

Chapter 4 – Secondary education

Drawing from a range of government statistics, Chapter 4 examines trends in take-up and attainment of STEM subjects at GCSE and A level by nation and gender. It also provides analysis of STEM secondary school teacher training, recruitment and retention.

Key facts and figures:

- Science GCSEs were restructured during 2017/18, with a new combined science double award introduced to replace existing single awards. As a result, there has been a substantial increase over the past year in take-up rates for the individual sciences (a 23.0% increase in biology, a 18.6% increase in chemistry and a 17.3% increase in physics).

- After climbing year-on-year since 2011, the last 12 months has seen a notable decline in GCSE engineering entries (-29.1%) – the largest proportional decrease in take-up of all STEM subjects.

- There are striking gender differences in take-up of some GCSE STEM subjects, including engineering (10.5% female), computing (20.2% female), design and technology (32.9% female) and ICT (37.0% female).

- A level entries are on the rise for most STEM subjects, comprising 4 of the top 10 most popular subjects. Rates of take up in A level Mathematics continue to be particularly high, making up 12.0% of all entries.

- While girls are underrepresented in STEM subjects at both GCSE and A level, they tend to outperform boys in examinations at both levels of study. This is particularly apparent in GCSE design and technology, where 75.0% of girls achieved grades A*-C/7-4 compared to 55.3% of boys.

Chapter 5 – Apprenticeships and further education

This chapter provides analysis of apprenticeship starts and achievements in England, Scotland, Wales and Northern Ireland. This includes analysis by a range of characteristics, such as: type, level, sector subject area, age, ethnicity and gender. Figures on the number of further education colleges over time and certifications awarded in vocational qualifications for key STEM and engineering-related subject areas are also provided.

Key facts and figures:

- After a period of sustained increase, employer participation in apprenticeships has decreased for the second year in a row in England: 243,700 employers hired apprentices in the academic year starting 2017, a 6.8% decrease in the number who did so the previous year. This decline coincides with the introduction of the apprenticeship levy in April 2017.

- The number of apprenticeships starts in engineering-related subject areas in England decreased by 10.3% between 2016/17 and 2017/18. This, however, is not as large as the decline in starts across all subject areas over the same time period (-24.1%).

- This decline, however, was not seen across the rest of the UK: over the same period, engineering-related framework starts increased by 2.0% in Scotland and 10.0% in Northern Ireland, while in Wales there was a striking 28.8% increase in engineering-related apprenticeship starts.

- Women were acutely underrepresented among those starting engineering-related apprenticeships in the academic year 2017 to 2018. In England, just 8.8% were female and the proportion was even lower in Scotland, at 3.2%.

- There has been a notable shift away from lower level STEM and engineering vocational qualifications, particularly in Northern Ireland. While the number of level 2 certificates awarded decreased across England, Wales and Northern Ireland between 2016 and 2017, the number of level 3+ qualifications increased by 0.4% in England, 15.5% in Wales and 106.5% in Northern Ireland.

Chapter 6 – Higher education

Using HESA student record data, Chapter 6 examines trends in higher education (HE), both among engineering and technology students and more generally. It provides detailed analysis of entrant and qualifier data by various characteristics, including: age, degree level, engineering discipline, domicile, mode of study, ethnic group, disability status and gender.

Key facts and figures:

- HE student numbers have fluctuated over the past decade, partly in response to increasing tuition fees. But across a similar period, the number of engineering and technology students has followed an almost continuous upward trend, bringing the total up from 156,985 in 2009/10 to 165,155 in 2016/17.

- There are high proportions of international students studying engineering and technology in the UK, particularly at taught and research postgraduate levels (67.7% and 59.3% of entrants respectively).

- The gender gap continues into higher education. In 2016/17, women comprised just 16.1% of first degree entrants in engineering and technology, compared with 50.5% of STEM and 56.1% of first degree entrants overall. However, women were better represented in engineering and technology courses at postgraduate level, making up around a quarter of both taught and research students.

- Some engineering and technology disciplines attract higher proportions of female entrants than others. For example, 73.8% of first degree entrants into polymers and textiles and 41.1% of biotechnology entrants are women. In contrast, only 10.8% of mechanical engineering entrants are women.

- Engineering and technology is more ethnically diverse than most other subject areas. Students from BME backgrounds accounted for 31.8% of UK domiciled first degree entrants, compared with 25.6% across all subject areas. 32.7% of taught postgraduate entrants (compared with 22.5%) and 21.7% of postgraduate research entrants (compared with 16.5%) were from BME backgrounds. While this is encouraging, there is a persistent gap in degree attainment between white and BME students.

Chapter 7 – The composition of the engineering workforce

Drawing on Labour Force Survey (LFS) and Inter-departmental Business Register (IDBR) data, Chapter 7 examines population and employment trends in the UK. This includes analysis of the composition of the current engineering workforce by a range of characteristics, including industry sector, company size, region/nation, nationality, gender and ethnic group.

Key facts and figures:

- Workers within the engineering sector – including in engineering and non-engineering occupations – accounted for 19.0% of all UK employees in 2018.

- It is clear that some engineering industries are in decline. The number of workers in UK based engineering-related industries within the mining and quarrying sector, for example, decreased by 12.6% between 2017 and 2018. In contrast, construction has seen a 3.3% increase in employees over the same time period.

- A significant proportion of those working in engineering occupations do so outside of engineering industries, which suggests that engineering skills are widely required and used beyond the sector itself. There were 1.8 million workers in engineering-related roles in other sectors in 2018, constituting 43.0% of the total workforce in engineering occupations.

- There is continued gender disparity in engineering: while women comprised 47.1% of the overall UK workforce in 2018, only 12.0% of workers in engineering occupations were female. Strikingly, substantially more women (18.5%) were in an engineering role outside the engineering sector than within (9.7%).

Chapter 8 - Graduate destinations and recruitment

Using data from the Destination of Leavers from Higher Education (DLHE) survey, Chapter 8 examines trends in graduate destinations, both among engineering and technology students and more generally. This includes analysis of destinations and employment rates of those who graduated in the academic year 2016/17, with a focus on the extent to which graduates are employed in engineering occupations or the engineering sector 6 months after graduation and their mean salaries. Analysis by domicile/nationality, level of study, occupation/sector, gender, ethnicity and disability status is included.

Key facts and figures:

- UK domiciled first degree graduates who had studied engineering and technology full time fared better than average in terms of finding full-time employment – 62.2% entered full-time employment, compared with 56.5% of all graduates.

- Employment outcomes for full-time UK domiciled engineering and technology research postgraduates were better still, with 77.5% entering full-time employment compared to 69.4% of all research postgraduates. However, engineering and technology taught postgraduates were less likely to have entered full-time employment compared to those who graduated across all taught postgraduate subjects (67.2% compared to 72.3%).

- Most engineering and technology graduates go on to careers in engineering: 62.0% of full-time UK domiciled engineering and technology leavers entered an engineering occupation. Of all engineering disciplines, those studying civil engineering were most likely to do so (77.8%).

- Engineering and technology graduates who are female or from a BME background were less likely to be in engineering occupations or employed within the engineering sector than their male or white counterparts. Among engineering and technology graduates who found employment 6 months after graduation, 36.2% of BME and 34.7% of women were in roles that were neither engineering-related nor within the engineering sector. This compares to 27.2% of white and 28.5% of male engineering and technology graduates.

- Full-time UK domiciled graduates with an undergraduate degree in engineering and technology achieved a higher starting salary than graduates in most other subjects: their starting salary (£26,173) was higher than the all-subject average (£22,370).

- Across all levels of study, female engineering and technology graduates earned less than their male peers. The gender pay gap was widest among research postgraduates (13.2%) and smallest among first degree graduates (1.2%).

Chapter 9 – Employment and salary trends

This chapter provides analysis of a range of ONS data sources, including the Annual Survey of Hours and Earnings (ASHE), the Vacancy Survey and the Inter-departmental Business Register (IDBR) to provide an overview of employment and salary trends among those in core and engineering occupations. High level migration data and information on vacancies by industry are provided. The chapter also includes detailed analysis of mean salaries at the 4-digit SOC level, including by gender.

Key facts and figures:

- Job vacancy numbers recorded in June to August 2018 were the highest they have been since 2001, at 833,000.

- Some engineering related industries have seen large year-on-year changes in the number of vacancies, including transport and storage (up 36.7%), public administration and defence (up 25.0%) and information and communication (up 14.6%).

- The median salary of full-time employees working in professional engineering occupations range between £30,360 and £51,279. For example, for civil engineers it was £40,313, for mechanical engineers it was £42,230 and for electrical engineers it was £44,486.

- Although the gender pay gap across all industries has narrowed over the past decade, from 27.5% in 1997 to 18.4% in 2017, in engineering the pay difference is still stark. The median salary in annual gross pay for full time employees across all professional engineering occupations was 18.7% higher for men (£41,545 compared with £35,000 for women).

Chapter 10 – Skills supply and demand projections

This chapter outlines findings from a bespoke extension of Working Futures 2014 to 2024 undertaken by Warwick Institute for Employment Studies for EngineeringUK. It provides comparisons of the 2014 labour force to the expected composition of the 2024 labour force and the projected replacement/expansion demand and net requirement in engineering occupations and industries. Based on this demand and the supply of engineering talent coming from the educational pipeline through apprenticeships and higher education, it provides estimates of the current shortfall of engineering skills.

Key facts and figures:

- It is forecast that between 2014 and 2024, 13 million job openings will arise across the economy as a result of those who leave the labour market (replacement demand) and a further 1.8 million openings will arise as newly created jobs (expansion demand).

- Job openings in engineering will represent 17.1% of all vacancies (2.5 million), with just under 10% of these expected to be from expansion demand.

- Demand varies by industry. For example, there is expected to be strong positive expansion demand in engineering enterprises relating to electricity, gas, steam and air conditioning supply, and information and communication, where it accounts for 30.5% and 30.2%, respectively, of those industries' net requirements. In contrast, there is negative expansion demand in industries such as manufacturing – meaning that demand for jobs is expected to be a consequence of replacing those who leave the labour market rather than growth.

- Our analysis projects an annual demand for 124,000 engineers and technicians with core engineering skills across the economy, alongside an additional requirement for 79,000 "related" roles requiring a mixed application of engineering knowledge and skill alongside other skill sets.

- Considering forecasted demand against level 3+ engineering-related apprenticeship achievements and the current/potential supply of engineering skills arising from higher education, we estimate there to be a shortfall of between 37,000 and 59,000 in meeting the annual demand for core engineering roles requiring level 3+ skills. There is, however, significant uncertainty around both supply and demand figures in the face of great change – in particular, Brexit.