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Special report

RETOOLING BRITAIN'S GROWTH MACHINE

Contributing well over a quarter of GDP, the UK's engineering sector has aptly been described as the 'core of our society', but it faces a serious skills shortage that Brexit could exacerbate. The profession therefore needs to apply some of its famous ingenuity in a concerted effort to bridge the gap, leading industry experts tell *Director*

Jet reset: Airbus is one of seven corporate partners to have signed up to the Royal Academy of Engineering's Engineering Talent Project (see panel, next page)

British engineering appears to be in rude, if not positively boorish, health. The London Olympics and Crossrail 1 are just two of several huge construction programmes that have seen intense civil engineering activity in recent years. And, with contracts due to be issued shortly for key infrastructure projects such as the Hinkley Point C nuclear power station and the High Speed 2 rail link, its prospects remain robust.

Engineering in its many forms – civil, mechanical, chemical, electrical, software, biological and more – accounts for £1.2trn of the UK's turnover, 27 per cent of its GDP, about half of its exports and at least 3.6 million jobs. In February 2016 the London Stock Exchange's *1000 Companies to Inspire* report featured no fewer than 130 engineering firms.

Among them were fast-expanding businesses such as Kendal-based hydroelectric turbine specialist Gilbert Gilkes & Gordon; Skelmersdale's Erlson Precision Components; and Rock Civil Engineering in Nottingham.

Writing in the report, the former chancellor, George Osborne, described such high-growth firms as "the backbone of the British economy". As the pound has wavered, it's no wonder that foreign suitors have been circling. FTSE 250 company WS Atkins, for instance, recently accepted a £2.1bn takeover bid from Canadian rival SNC-Lavalin.

Talent gap

When it comes to securing contracts abroad, it's widely acknowledged that British engineering firms are not as competitive as their European rivals

on price, but the biggest problem facing the industry in the UK is undoubtedly its inability to recruit enough talent. This is indicative of a wider malaise – more than a third of members responding to a recent IoD survey cited skills shortages as the number-one drag on the growth of their businesses – but it's a huge problem in engineering. The industry is short of 69,000 skilled employees a year, according to EngineeringUK, a not-for-profit body working to promote the profession and inspire future generations of engineers.

Its latest report into the state of the sector, *Engineering UK 2017*, does contain positive findings, particularly concerning recent increases in the number of engineering degrees obtained and apprenticeships started. But the demand for new talent continues to

outstrip the supply. Half of all the standard roles included on the Home Office's shortage occupations list are in engineering or allied professions. Attempts to attract more women to the sector, meanwhile, have had underwhelming results: fewer than 13 per cent of UK engineering jobs are occupied by women.

It's a frustrating situation for Philip Greenish, chief executive of the Royal Academy of Engineering (RAEng). He acknowledges that, while the industry "can play a critical role in driving future UK prosperity", it faces a big challenge in engaging enough new talent. "This entails attracting a diverse range of young people to what is an undoubtedly exciting, varied and rewarding profession, as well as ensuring that they are well equipped with the

knowledge and skills needed by the industries of tomorrow, whether that's artificial intelligence, nanorobotics or the biomedical technologies that make us superhuman," he says.

Dame Judith Hackitt, an RAEng fellow and chair of manufacturing trade body EEF, agrees. "The opportunities for the UK to become a leading player in advanced manufacturing, digital technologies, medicine and many other fields should be attracting the brightest people into careers where they could use their creativity and problem-solving skills to address some of our planet's biggest challenges," she says. "But we're failing to inspire young people to take up careers in engineering."

This can change only if the profession works harder to shatter stereotypes, according to Greenish. "A Google image

search for 'engineer' will produce page after page of photographs of men in hard hats, but the profession is so much more diverse than that," he says. "Business leaders need to challenge misconceptions more concertedly and ensure that what we're saying appeals to the broadest possible range of young people – and to the parents and teachers who influence them."

Schools are the obvious place for this effort to start, but he notes that the way in which "subjects are taught, the curriculum is structured, courses are chosen and careers information is delivered means that we lose potential engineers at every possible point in the educational journey". Preventing talent from slipping away requires the help of policy-makers, adds Greenish, who suggests solutions such as "urgent

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The Engineering Talent Project

The realisation that a piecemeal approach to closing the UK’s skills gap would never be truly effective prompted the Royal Academy of Engineering to launch a package of measures aimed at ensuring a sustainable supply of talent to British engineering employers, as well as improving diversity and employment practices throughout the sector.

“Working with a range of industry partners, we’re developing a five-year marketing communications campaign that seeks to rebrand engineering for young people; a programme of work to increase the inclusiveness of engineering workplaces; and a suite of policy proposals addressing structural constraints in education to put to government,” explains Philip Greenish, the academy’s chief executive.

EngineeringUK is a major partner in this so-called Engineering Talent Project. It also has seven corporate partners: Airbus, Babcock International, BAE Systems, GKN, Jaguar Land Rover, National Grid and WS Atkins. The organisers urge any business leader who wants to get involved with the project – one that surely promises long-term benefits to a large number of British firms – to get in touch.

raeng.org.uk/education/engineering-talent-project

action” to address a national dearth of Stem teachers by, for instance, “increasing the teacher education bursary for design and technology”.

Another problem is the limited extent to which higher education courses are equipping students for working life, according to Helen Atkinson, professor of engineering at the University of Leicester. “Employers regularly report that some of their university and college graduates lack the skills needed to make a productive contribution,” she says. “For example, they really need to understand how to cost an engineering activity to assess its impact on the bottom line.”

In Hackitt’s view, improving the image of on-the-job training and education would pay huge dividends. “We need to break the outdated assumption that apprentice-trained engineers are somehow not as good as university graduates. That simply isn’t true,” she says. “University courses are too much about maths and physics, and not nearly enough about creativity and problem-solving. That’s why many employers are saying that they prefer to recruit apprentices, who are more ready for work and able to contribute.”

Hackitt argues that strengthening the relationship between business and tertiary education could improve the relevance of university and college syllabuses. “Some employers do engage in course design, give students access to their resources and provide guest lecturers, but this is limited to a few large firms at present,” she says, adding that forging more corporate links with secondary and even primary education should prove even more influential. “We need much earlier interventions that inspire and enthuse kids to see the



Digging in: Caterpillar and Rolls-Royce (below) were among the signatories of a letter to the *Daily Telegraph* in April 2016 warning of the dangers to the industry posed by a Brexit vote



industry as it is today – just as exciting and interesting as the games they play on their tablets and smartphones – rather than giving history lessons about what a great engineer Brunel was.”

The ‘B’ word

In April 2016 Airbus, Caterpillar and Rolls-Royce were among the signatories of a letter to the *Daily Telegraph* in which Naomi Climer, president of the Institution of Engineering and Technology, warned that a Brexit vote would lead to a crisis in the industry. Secession from the EU, she argued, would cut off vital research funding and make it even harder for engineering firms in the UK to recruit from abroad.

Six months later the RAEng, in partnership with the UK’s 38 professional engineering organisations,

published the findings of a consultation on the risks and opportunities created by June’s referendum decision, reporting the views of 450,000 engineers. In the online poll it conducted for that research, more than a quarter of respondents said that they were most concerned about potential post-Brexit restrictions on the movement of workers and goods. Although we have no idea of the eventual outcome, of course, any limits imposed on the inward flow of talent are likely to have serious ramifications, given that engineering departments at British universities attract a relatively high proportion of students (and academics) from other parts of the EU.

“Young people are already in short supply and the problem is going to get worse,” Hackitt warned in a speech to

the Foundation for Science and Technology in March. “The number of 15- to 19-year-olds in the UK is projected to fall from over 3.7 million in 2014 to about 3.5 million by 2019. Almost a quarter of manufacturing employers have recruited graduates from outside the EU in the past three years to fill the gaps. Even as things stand, this is not an easy process – and it’s set to become even harder as we implement Brexit and tighten our borders. We have to address the reluctance of the UK system to produce its own Stem talent from the ground up.”

Stricter immigration controls could perhaps even thwart efforts to improve diversity in the industry, according to Atkinson, who is also a fellow of the RAEng and chair of its education and skills committee. “Compared with other

countries, we are terrible at attracting young women into engineering. The UK has the lowest proportion of female engineers in its workforce in Europe – and that needs to change,” she says. “This is why the academy has been running a pilot scheme to increase diversity in higher education, working with a steering group of 13 engineering employers to engage more with women, ethnic minorities and students from disadvantaged backgrounds. Participants are offered a range of opportunities to connect with employers. These include speed-networking events, CV clinics, mock interviews and mentoring meetings. The pilot concludes in 2018, but the results to date have been positive, with three-quarters of students reporting an increased understanding of the engineering careers available to them.”

Of course, Brexit is only one of many variables to contend with when it comes to bridging the engineering skills gap. For all we know, the profession could provide the solutions itself, although the extent to which technologies such as artificial intelligence and robotics could improve the situation is also debatable. For now, though, the key measures highlighted by our experts here – reshaping the next generation’s views of engineering; revamping the profession’s relationships with education providers at every level; and removing any remaining stigma attached to on-the-job training – are all urgent and achievable.

This is, after all, no trivial matter. As Greenish puts it: “Engineering is absolutely at the core of our society. It underpins every sector, from communication and entertainment to finance and healthcare, as well as its more visible applications in construction, manufacturing and transport. It’s responsible for shaping how we live today – the alarm clock that wakes us up in the morning, the lights we switch on, the hot shower we get into, the mobile phone we check and the train we take to work. It’s all been made possible by engineering.”

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