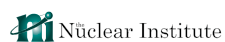


Engineering UK 2009/10

Executive Summary and Conclusions

We gratefully acknowledge contributions from



Engineering UK 2009/10

Executive Summary



The current economic climate has highlighted the importance of the engineering and manufacturing sectors to the UK. It has also led to wider political, media and public awareness of engineering as a means of rebalancing the economy. Yet, in order to fulfill the popular refrain of 'less financial engineering, more real engineering', and turn the UK into a prosperous, high value manufacturing nation, a number of issues need to be urgently addressed. This report examines the current state of the engineering sector in the UK, the changing face of UK manufacturing, and the challenges and opportunities which lie ahead.

Our report identifies tremendous new opportunities for UK manufacturing in green technologies, reducing waste and hence cost in manufacturing. It also highlights the need for skills training to replenish an ageing skills base which, if left unchecked, will put significant pressure on Further Education (FE) where lecturers are in short supply. By 2017, 587,000 new workers will need to be recruited into the manufacturing sector. In addition the public attitude to engineers is changing for the better, creating a platform for potential public policy changes.

How important is engineering and manufacturing in the UK?

- Based on EngineeringUK's definition of the engineering sector, VAT-registered engineering enterprises had a total turnover in 2008, of £799 billion: an increase of 11.6% on the previous year.
- The UK is the world's sixth largest manufacturer. Manufacturing generated £150 billion for the UK economy in 2008. It accounted for 55% of all exports, 75% of industrial research and development (£22.5 billion) and employed three million people.
- Engineering and technology has been the subject of a number of Government policy initiatives in acknowledgement of the importance of these sectors to the country's economic future – especially during a recession. In particular, the sector looks set to benefit from Government support for power generation, low carbon technologies and other advanced engineering projects.
- In April 2009, the Department of Business, Enterprise and Regulatory Reform (BERR) published *Building Britain's Future: New Industry, New Jobs*, in which it identified several key technologies that should play a larger role in the economy in the future:
 - Advanced engineering
 - Electronics
 - Biosciences
 - Low-carbon technologies
- The engineering research base, which will help drive technological change, appears to be thriving within our Higher Education Institutions. Within the engineering subject area, 59% to 71% of research assessed for the sub-disciplines was classed as being internationally excellent.

What has been the impact of the recession for engineers?

- There has been a short term fall in the overall number of graduate vacancies in the UK, according to the AGR Summer review, with the engineering and industrial sector experiencing a fall of 40.5%. However, the medium to long term projections for graduate level roles remain high.
- Engineers' salaries still compare favourably with pay for other graduate jobs according to the CBI's Education and Skills Survey 2009, with the median salary of a graduate engineer being £22,500.

What is the future for UK manufacturing?

- Currently green technologies are worth £3 trillion to the world economy. There are opportunities to develop global, leadership in this sector creating jobs and wealth for the UK. If we do not develop our own domestic industrial capacity we will risk having to buy in solutions from abroad.
- If the UK is to de-carbonise its energy production then nuclear generated electricity will have a role to play. Building a new wave of nuclear power plants would have considerable economic benefit for the UK.
- 80% of the construction of a nuclear power plant (NPP) utilises conventional construction technology. It is predicted that 70–80% of the construction of NPPs could be sourced in the UK. Building a new generation of NPPs could act as a springboard for UK companies to enter the global supply chain – an opportunity that could be worth £30 billion to the UK economy.
- For innovative companies there are opportunities for major resource savings in manufacturing processes. On average over 90% of the materials used in production are not included in the final product. Companies spend up to 5% of their annual turnover on waste, including unused materials, defects, energy and water. Engineering solutions to these problems could potentially generate a share of £6.4 billion a year in savings through enabling organisations to use resources more efficiently.
- UK manufacturers no longer compete only on price or volume, focusing instead on a broad range of value-adding strategies using intangibles such as branding, customisation, service policies and customer training to add value to the manufacturing process and enable manufacturers to differentiate themselves in a crowded market place.
- Government policy could be adapted to support more SMEs to bid for Government contracts and to incentivise them to invest in technology, research and the workforce. Denmark, Spain and Germany have all pulled ahead of the UK in onshore wind farm technology as a result of providing a long term investment environment which mitigates risk for companies.

What skills will be required to make this happen?

- Working Future III (WFIll) predicts changes in employment for the period 2007–2017. It estimates that, over this period, there will be a net requirement for 587,000 people working in manufacturing. Work by A|D|S predicts that in the aerospace and defence industry, over the next 20 years, close to 60% of the workforce will retire creating a demand for new workers to enter the sector.
- According to WFIll the manufacturing sector is projected to expand over the period 2007–2017 in output terms; however in parallel, efficiency is projected to increase at a faster rate.
- The profile of employees working in manufacturing will change, with significant growth in staff employed as managers/senior officials, in professional occupations and associate professional/technical occupations. At the same time, a fall is forecast in the number of people working in skilled trades and elementary occupations, as well as among machine and transport operatives. Overall there will be a need to recruit new workers at all levels but the proportion of workers at higher levels will increase. Almost 47% of all employees in 2017 will be at associate professional level or higher, compared with just over 32% in 1987.

Is the UK on course to supply these needs?

- Across the science, technology, engineering and maths (STEM) disciplines, 57% to 89% of A level entrants achieved a grade C or above in 2009. Since 2004, this proportion has increased in all subjects, though this year's levels were, for most subjects, consistent with 2008.
- Lifelong Learning UK (LLUK) (2009), with various caveats, reported that there were more than 1.5 million individual learners in the FE sector in engineering-related fields (at all levels) in 2006/07.
- Analysis of LSC data indicates that engineering and technology starts accounted for around a quarter of all apprenticeship starts, with some 35,400 (provisional) starts in engineering and technology sectors, from 1 August 2008 to 31 January 2009. This is out of a total of 140,500 starts across all frameworks and at all levels.
- Only a minority of women gain N/SVQ awards in Engineering and Manufacturing Technologies (EMT) or Construction, Planning & the Built Environment (CP&BE). The gender split for Information and Communications Technology (ICT) N/SVQ awards is more balanced. However, not all these awards will be for ICT *practitioner* skills; many may be for ICT *user* skills.
- Higher Education (HE) applicant numbers are up for most engineering disciplines, with the exception of production and manufacturing engineering, where they continue to fall, by 17% this year.
- STEM degrees account for a quarter of all first degrees achieved: although the number of students enrolling on STEM courses is rising, it is slower than the growth for all first degrees.
- The Destination of Leavers of Higher Education (DLHE) data for 2007/08 shows that 59% of engineering and technology graduates leaving education that year entered full-time paid employment, compared to 55% for all subjects.

What are the challenges ahead for UK engineering and manufacturing?

- According to the Government Actuary's Department the number of 15–24-year-olds is predicted to decline by 8% over the next ten years. In addition it is predicted that by 2010 there will be one million 16–24-year-olds who are not in education, employment or training (NEET).
- Despite the positive results for A levels, it should be noted that currently over half of students with seven GCSEs do not continue their studies.
- In *Engineering UK 2008* detailed analysis showed that the UK economy has a skills shortage of level 3 engineers. Research by Lifelong Learning UK (LLUK) has raised the potential issue that construction and Engineering, Manufacturing and Technology (EMT) have the highest levels of hard to fill vacancies for staff to teach in the whole FE sector. EMT covers a wide range of specialist provision, so it is unlikely that there is a general shortage in this area, however there are likely to be shortages in certain specialist areas.
- Women remain under-represented in the engineering sector. Analysis of new registered engineers and technicians shows that only 11.6% of registrants, in 2008, were female. In 2007, the Equality and Human Rights Commission (EHRC) and the Apprenticeship Ambassadors Network emphasised that (still); "only 2% of engineering apprentices are female, only 4% are from ethnic minority communities and 6% have a learning difficulty, disability or health problem," (EHRC 2007:3).
- Significant numbers of Chartered Engineers and Incorporated Engineers are retiring or approaching retirement and this is reflected in the decline in total registrants in recent years. However, numbers of Engineering Technicians continues to increase, albeit from a lower base.

Changes in perception of engineering

- The Engineers and Engineering Brand Monitor (EEBM) run by the Engineering and Technology Board (now EngineeringUK) has shown a positive shift in public perceptions of engineering between 2008 and 2009. 85% of respondents from the general public stated that they would recommend a career in engineering to their children, friends or family, compared with only 66% in the initial pilot survey in 2008. In addition a higher proportion of the general public now view engineering as a well respected profession (78%), which makes a good contribution to society (86%) and will have a positive impact on our future (91%).
- However despite these positive changes 7-16-year-olds have the least positive opinion of engineering. Art and design was the most popular subject choice among 7-11-year-olds, with design and technology third. However, this group does not tend to associate being an engineer with the designing and creating that they enjoy so much in the classroom.



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Conclusions



The engineering and manufacturing sectors are key economic and social drivers for the UK. They contribute £799 billion to the economy and must be well placed to meet the future global technological challenges that lie ahead, such as climate change, low carbon economy, clean water and population growth.

The UK will need to recruit 587,000 new workers into manufacturing over the period 2007–2017. However the profile of workers is predicted to change. Overall, almost 47% of all employees in 2017 will be at associate professional level or higher, compared with just over 32% in 1987. At the same time changing demographics mean the number of 15–24-year-olds will drop by 8% over the next ten years. When coupled with the fact, that by 2010, one million 16–24-year-olds will not be in education, employment or training and that half of students getting seven GCSEs do not continue their studies, there is a clear duty for engineering employers, Government and the education sector to work together to enthuse, train and upskill the future UK workforce while ensuring that a broader pool of talent, particularly women, is also recruited into engineering and manufacturing.

If we are to maintain an adequate future supply of suitably skilled people, the perception of engineering amongst 7–16-year-olds needs to be improved, in line with improvements for older age groups. Specifically we need to link popular school subjects and activities such as art and design to engineering. Crucially the Government, supported by the engineering community, also needs to ensure that there is a core underpinning resource of good quality careers information about the possible qualification routes and opportunities in engineering and technology for young people and those who influence and advise them.

LLUK identified possible lecturing staff skills shortages at Further Education (FE) level in construction and engineering, manufacturing and technology (EMT). The skills shortages within EMT are likely to be in niche areas rather than being generic. However there is a substantial risk that this may affect the ability for colleges to train new EMT students resulting in successful businesses being held back by their inability to recruit adequately trained new staff.

The green economy is currently worth £3 trillion a year and clearly has the potential to generate considerable wealth and employment for the UK economy. For example it is estimated that a new build of nuclear power stations in the UK could be worth £30 billion pounds to the UK economy. At the same time over 90% of the materials used to make a product never make it to the finished article and companies spend 5% of their annual turnover on handling waste products. The sector is currently missing out on a share of £6.4 billion a year in potential savings from using resources more efficiently. In order to realise these opportunities business and government will need to work together. These new opportunities must be pursued in parallel to the existing civil, mechanical and structural engineering where the UK is already globally competitive.

As 58% of VAT-registered engineering enterprises in the UK have fewer than 250 employees, the SME sector is particularly important to the UK economy. Government policy needs to be adapted to support more SMEs to bid for public sector contracts and to incentivise them to invest in new technology, research and their workforce. Additionally all businesses need to invest more in developing and exploiting intangible benefits, such as branding and customisation, to enable them to compete effectively in a crowded market place.