

18 March 2008

Engineering Skills – A Business Perspective

Introduction

1. The Association for Consultancy and Engineering (ACE) welcomes the opportunity to submit evidence to the committee. Given the inquiry's engineering skills remit, this submission will focus on why the supply of highly-skilled engineers in the UK is diminishing, what effect this is having on UK engineering companies and what can be done to reverse this trend.
2. ACE regularly carries out industry surveys, producing annual *State of Business* reports, as well as a recent *Skills Shortages and Recruitment Agency Behaviours* survey which analysed exactly how acute the engineering skills shortages are in the UK. This submission draws heavily on these surveys.
3. Also included here is a statement from Stephen Bailey, from ACE member firm Grontmij, who provide engineering expertise to a range of clients across the water, energy, systems, building, environment and transportation industries and are experts in nuclear decommissioning, on the issue of engineering in the nuclear power sector.
4. ACE believes this inquiry must have at its heart an understanding of the needs of the companies who employ the engineers themselves. Whilst UK firms are world leaders in engineering innovation at present, the lack of sufficient numbers of engineers threatens this position. Providing a highly skilled pool of qualified professionals to meet the present and future demands of UK engineering firms must be a fundamental aim.
5. ACE represents the business interests of the consultancy and engineering industry in the UK. We are the leading business association in this field, counting around 800 firms – large and small, operating across many disciplines – as our members, with a combined turnover of approximately £4.5bn and employing about 75,000 staff.
6. We believe our participation in this inquiry is critical. In advance of what we hope will be an invitation to give oral evidence to the committee, we trust the information provided and ideas advanced below will aid in your inquiry.

Executive Summary

The challenge

7. Domestic demand for consultancy and engineering services is outstripping the supply of highly-skilled engineers. Consultancy and engineering firms, while undoubtedly enjoying a period of sustained growth, are finding it increasingly difficult to attract the staff needed to complete their work programmes.



8. A recent ACE industry study, *Skills Shortages and Recruitment Agency Behaviours*, revealed that there are at present 20,000 unfilled vacancies in the consultancy and engineering sector. This astonishing figure is the manifestation of a far deeper crisis affecting engineering as a skill in the UK.
9. Compounding this is the constant process of osmosis away from the engineering profession. The number of engineering graduates entering the construction industry is falling, graduates preferring subjects such as finance, economics, law and business that lead into careers with higher earning-potential and prestige.
10. Of those that *do* study engineering, many decide upon graduation not to enter the engineering profession – their problem solving and numerical skills being highly attractive to financial organisations and other businesses. Many of those that begin a career in engineering do not remain in the profession for their entire working life, again being attracted to other careers.
11. This process is exacerbated by the lack of professional recognition of engineers in society, which contributes to comparatively low earning potential. Unless a significant shift is made at every level, from how engineering is communicated to schoolchildren and the wider public through to in-house professional development opportunities for experienced engineers and changes to work permit regulations, engineering skills will continue to diminish in the UK.

The solution

12. Engineers are essential to the health of UK society and its economy and a comprehensive solution needs to be found. ACE believes this is only possible through government, parliament and all industry representatives working as one to design and implement a comprehensive strategy.
13. ACE is recommending a multi-layered approach as the only solution that will meet present demands whilst also securing a sufficient engineering skills base for the future. This approach consists of:
 - Increased investment in developing engineering as a subject and career of choice, including government- and industry-backed financial incentives for engineering students and for graduates who remain in the industry post-qualification. These could include tuition fee waivers. The aim should be for the UK to be self-sufficient in engineers in the long-term.
 - Relaxing of work-permit controls for non-EU engineers, especially the extension of the national shortage occupation list to include civil, structural, building services, mechanical and electrical engineering disciplines, sectors which UK engineering firms have highlighted as having a significant shortage. This is a short to medium term solution, planned to ensure sufficient engineering talent exists in the UK whilst other initiatives are developing home-grown engineers.
 - Grandstanding and building upon the efforts being made in the engineering community to increase diversity in the industry, making an engineering career a more attractive option for under-represented groups.
 - Co-operation between industry and government to better communicate the true value of engineering to the UK's economy and society, providing suitably qualified practitioners



with the same levels of professional respect as is afforded doctors, lawyers and accountants, raising the value of engineering services into line with these comparable professional services.

14. From ACE's experiences in this area, the above is not a wish-list but an essential and achievable plan of action. ACE is working closely with government and other industry representatives to bring these actions into being, but as time passes the urgency for change increases dramatically. ACE warmly welcomes this inquiry and fully supports the efforts of the innovation, universities and skills committee to tackle this complex issue.

Numbers of engineers decreasing as workload increases

15. ACE's recent *Skills Shortages and Recruitment Agency Behaviours* survey found that there are currently 20,000 unfilled jobs in the consultancy and engineering sector. Given that there are around 150,000 staff in the industry, this translates to 13% of all current jobs.
16. This survey also found that 24,000 professional vacancies are expected to be needed to be filled in the next 12 months.
17. ACE's *2007 State of Business Report* found that the majority of consultancy and engineering firms expect to see significant growth in the demand for consultancy and engineering services in the coming years. The UK's future work programme includes:
 - London 2012 Olympics
 - Crossrail
 - New build in the City of London, including the Shard of Glass, Heron Tower, The Pinnacle, The Cheese Grater and The Walkie Talkie, these five buildings alone having a combined projected cost of well over £2.5 billion
 - The £45 billion Building Schools for the Future programme
 - Plans for an additional 240,000 homes per year across the UK up to 2016
 - Repairing, updating and expanding the UK's transport networks, including rail, road, airports and ports.
 - New nuclear power stations, decommissioning of existing nuclear power facilities and nuclear waste disposal
 - Development of the UK's general energy generation infrastructure, including renewable energy projects
 - Mitigation of the effects of climate change, especially building of flood defences
18. ACE's *2007 State of Business Report* found respondents are also expecting increased global demand for consultancy and engineering services, especially in the Middle East, India and China. Whilst many of the engineers working for UK companies in these countries are indigenous, many others are expatriates from the UK, resulting in a reduction of the UK's skills base.

Making engineering a subject of choice

19. ACE believes financial incentives to attract university students onto engineering courses will be necessary. Tuition fees for engineering subjects should be waived. ACE is in the process of internally agreeing proposals for exactly how these incentives should be structured but we will be happy to provide the committee with these at a later date.



20. ACE is committed to increasing the number of engineering students going into universities and graduates beginning engineering careers. To this end ACE will look at establishing a web-based resource of scholarships and graduate schemes offered by member firms to make the process of matching the right person with the right career easier.
21. The UK should aim to be self-sufficient in engineers, producing enough graduates from its own education system to fill all vacancies in UK engineering firms. The example of healthcare professionals is instructive. On 6 February the Secretary of State for Health Alan Johnson stated that from 2009 only doctors graduated from UK or EU medical schools will be able to apply for training jobs:

“Doctors from overseas have played an invaluable role in the NHS for many years and will continue to do so. They have helped us fill key skill-shortage areas such as psychiatry, obstetrics, gynaecology and paediatrics. But as the number of UK medical school graduates expands, there should be less need to rely on overseas doctors for these specialties.”
22. This is a position the National Health Service has reached after 50 years of reliance on doctors from non-EU countries, particularly India and Pakistan. It is only now, after great investment in the UK’s medical schools that we can realistically talk of self-sufficiency in this profession. Engineering should both heed this warning and follow this example. Government needs to increase investment in the provision of high-quality engineering education.
23. Whilst at present the number of UK engineering undergraduates is remaining static, the numbers of non-EU students is increasing, effectively reducing the size of the UK pool.
24. The education system needs significant investment to ensure the supply of UK engineering graduates increases, especially to ensure more pupils studying A-Levels in physics and mathematics – the gateway subjects to engineering.
25. The example of teaching is also instructive. ‘Golden hellos’, offered to teachers 12 months after competing their induction year of between £2,500 and £5,000, are paid to incentivise a teaching career.

Filling the engineering gap now – work permits

26. ACE believes that civil, structural, building services, mechanical and electrical engineering disciplines must be added to the government’s national shortages occupation list as soon as possible.
27. There will be a time-lag between putting in place the changes to the education system and increased numbers of engineers being produced by the education system. The skills shortages already exist, so a short to medium term solution is required. ACE believes the only way to meet this immediate demand is to increase the numbers of engineering disciplines which are included on the UK’s national shortage occupation list, making it easier for UK firms to hire high-calibre engineers from non-EU countries.
28. ACE’s *Skills Shortages and Recruitment Agency Behaviours* survey found that, already, a significant proportion of fee-earning staff in the firms surveyed hold work permits. Of the total number of civil engineers working in the UK, 24% have been recruited from overseas. For



structural engineers this figure increases to 27%. Overall, 88% of companies recruit non-UK nationals to fee-earning posts at present.

29. 14% of the total number of civil engineering roles is currently unfilled. This compares to 15% for electrical engineering, 12% for mechanical engineering and 11% for both structural and building services engineering. These are large numbers, overall equating to 20,000 current vacancies in the industry. As noted above, this is set to increase year on year.

Increasing diversity

30. ACE believes that the diversity within the engineering sector needs to be improved and is dedicated to working towards this end.
31. ACE is currently carrying out a survey into the diversity of the workforce in the consultancy and engineering industry. This is in response to government calls for more exact measurement of diversity within the sector. ACE will provide the committee with the results of its survey when they are available.
32. Relaxation of the work permits national shortage occupation list for engineers will also improve the diversity within the engineering industry.

Perceptions of engineering

33. ACE believes the long-standing failure of government to protect the status of the professional title of 'engineer' has diluted and damaged the UK's engineering heritage. With the term now used by a wide range of semi-skilled trades the attractiveness of engineering as a career choice has lessened, the image and recognition on offer in other professions catching the imagination of those beginning university.
34. ACE believes that government needs to visibly show its support for professional engineers and to acknowledge the importance of these engineers to the UK economy. The public perception of engineers is at odds with that in other countries, which is partly a result of the higher levels of protection and recognition given in these countries – in Europe the title 'engineer' carries the same weight as that of Dr.
35. Such visible support could come in the form of an advice note sent to all public sector clients, especially their media departments, from the Prime Minister, the Department for Business, Enterprise and Regulatory Reform (BERR), plus the sponsoring department calling for increased media attention to be given to the work of engineers in the construction process.
36. As a key part of the strategy to solve the engineering skills shortages crisis, ACE believes the government should be working closely with industry to improve the image and standing of engineers in UK society. Whilst the other recommendations outlined here deal with the micro-level, the broader need to develop and highlight the professional status of engineers is imperative. This is a 'soft' approach as opposed to the more direct actions outlined above, and would have no cost to the taxpayer.

Engineering Case Study: Nuclear Engineering



Stephen Bailey – Operations Director, Grontmij

37. I am an engineer by background and now work with engineering and environmental consultancy and ACE member firm Grontmij. Grontmij is working with the Nuclear Decommissioning Authority (NDA) and the UK Atomic Energy Authority (UKAEA), providing a complete range of engineering services civil, process, mechanical and electrical, to help support the clean up of nuclear waste.
38. I began my career in engineering in the 1980s with the strong belief that I was embarking upon a career rather than just taking on a job. Over time I became frustrated by the poor training and mentoring offered to me. I felt my creative and innovative skill sets – the core skills on which engineering is founded – were not being developed as they should be¹. I became disillusioned with my chosen career path and made the difficult choice to transfer to the corporate finance sector where more appeared to be on offer.
39. Whilst the financial rewards were significantly greater there, after a time I began to doubt the move I had made. Happily, I was offered the opportunity to move back into engineering, where I worked with individuals who allowed me to develop my skills in ways that were not offered in my formative years.
40. I now take a great deal of pride in my belief that engineering is a career and not just a job. I advocate the importance of making a difference, and engineering allows you to do this both for the present and for the future. This is especially true for nuclear engineering, where the effects will be felt hundreds of years from now.
41. The UK has the engineering capacity to build both a new generation of nuclear power stations, irrespective of the source of particular technology², and deal with waste arising from designing with decommissioning in mind (the end state).
42. This capacity is defined not by the pool of available expert *nuclear* engineers, but by the total number of engineers working in the UK. Nuclear engineering should be defined as the application of core skills in civil and structural and mechanical and electrical engineering disciplines into the nuclear industry.
43. For example, the Dragon and SGHWR nuclear reactors at UKAEA's Winfrith site were both experimental reactors, never intended for commercial use. The information available on these reactors is much less than would be expected for a commercial reactor. The key engineering skills required here are problem-solving and developing innovative ideas for decommissioning to overcome this lack of information. In my own engineering training it was the understanding of fundamental engineering principles, problem-solving skills and the ability to think creatively that has underpinned all of my work.

¹ I now realise that the conditions I experienced when I began my career are not those experienced by engineers today, who are offered excellent in-house training and personal development programmes.

² The availability of the necessary components for these facilities will be the major factor if the UK fails to meet its nuclear power building programme, for example the number of reactor manufacturers is in very short supply when compared to the huge and growing demand for reactors across the world.



44. This committee should concentrate on the broader engineering skills issues as are outlined in ACE's main statement. The recommendations outlined, when taken together, will increase the size of the UK's engineering pool, and therefore increase the number of potential engineers available to design, build and decommission our nuclear power stations of the future.

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