

Skills & Demand in Industry

2015 Survey



Engineering and Technology
Skills and Demand in Industry

Overview of issues and trends
from 2015 survey

www.theiet.org/skills



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This year, our research has been supplemented by in-depth email interviews with 10 individual organisations undertaken in August 2015. Despite having geographically robust sample sizes, no trends or significant differences have emerged between regions. This report therefore presents a comprehensive UK-wide picture. The findings are based on telephone interviews with over 400 employers of engineering and technology staff drawn from across the United Kingdom undertaken in June 2015.

These employers represent a range of engineering sectors and sizes

Figures are rounded and do not always add to 100%, multiple choice questions add to more than 100%, means and averages are calculated in the data tables and do not always add to 100%, Sample size 400 data accuracy is $\pm 4\%$ or 0.2 on a scales of 1 to 5. Different organisations are surveyed each year.

FOREWORD

Welcome to the 10th *Engineering and Technology Skills and Demand in Industry* report produced by the Institution of Engineering and Technology (IET) – our annual review of issues facing UK employers of engineering and IT staff.

This year marks a decade of the IET's Skills and Demand in Industry report, one of the first reports of its kind to measure employer perceptions of engineering skills and the engineering job market.

Our report adds to other recent national discussion about skills. The Report On Jobs found that the most sought-after roles in June 2015 included Engineering (No.1) and IT and Computing (No.4), yet hiring activity is being constrained by a lack of candidates. British Chambers of Commerce research revealed that soft skills are at the top of employers' wish lists, but also found that only half of employers offer work experience, despite 76% of them citing it as a key reason in explaining why young people are unprepared for work.

During 2015 the IET has also carried out research with parents and children – 'Inspiring the Next Generation of Engineers' – which found that most parents, particularly those with daughters, are simply not aware of the wide range of creative and interesting engineering jobs on offer.

The good news is that all this activity to showcase the issues behind the skills shortage is contributing to a significant increase in focus recently from government, industry and academia on how to address some of the concerns.

Despite these efforts, some of the statistics highlighted in the IET's report have not changed significantly since 2005. For example, the number of women in engineering has remained under 10 per cent of the total engineering workforce in the UK; the gender balance in the profession remains one of the worst in Europe.

It is clear that the need for government, employers, educators and the profession to work together on the engineering skills issues we face for the good of the UK economy remains a high priority for us all.

This report identifies ongoing high demand for engineers, with jobs on the increase this year in many sectors, and businesses generally reporting increased confidence in their ability to recruit the numbers of employees they need.

However, crucially, more than half of employers surveyed say that recruits don't reach the expected standard and nearly two thirds think skills gaps are a threat to their business.

There is evidence that there are challenges we must tackle. Problems recruiting senior experienced staff are reported widely, but at the same time organisations are investing more time and money upskilling staff and recruiting greater numbers of school leavers and apprentices.

The role of education comes under the spotlight. Two thirds of employers express concern that the education system will struggle to keep up with the skills required for technological change. The need for schools to promote the opportunities available in engineering and IT careers to pupils from an early age, the relationships between university courses and industry demands, and the need for greater input from industry into policy and curriculum are all highlighted in this report.

It is also clear that employers need to explore all avenues available for recruiting the talent they need, not least among groups which traditionally do not consider careers in engineering and technology. Positive developments around the recruitment of female employees, gender, ethnic and wider diversity initiatives are highlighted, but our report finds that much more needs to be done to change and increase the available talent pool.

Our aim with this report is to highlight how together we can develop the next generation of engineering and IT employees – but also, critically, how employers can ensure their experienced staff increase and retain their skills – and address these gaps in partnership with education institutions and with government.

Professor John Perkins,
Chairman,
IET Education and Skills Policy Panel

Nigel Fine,
Chief Executive,
The Institution of Engineering and Technology (IET)

EXECUTIVE SUMMARY

The IET carries out an annual survey of engineering employers to gauge the state of skills in the engineering and technology sector. The survey covers current and planned levels of engineering recruitment, difficulties in recruiting engineers, and employer perceptions of the engineering skills gap, as well as diversity issues.

The main findings presented in this report are:

Recruitment trends and skills shortages

- 1 UK firms report a strong demand for new engineering and technology staff – 53% of employers are currently seeking new recruits compared to 51% in 2014 – but 12% fewer companies say they are planning to recruit new roles within the next 12 months compared to last year (down from 63% to 51% in 2015).
- 2 The aerospace, computing and IT, construction, electrical, electronics, and transport sectors are the biggest recruiters of new engineering and technology staff – companies specialising in pharma and health technologies, broadcast and media, and energy have lower than average recruitment levels.
- 3 Organisations are showing greater optimism in recruiting the employees they do need – 68% report that they are ‘confident’ compared to 63% in 2014 – but at the same time 64% of employers express concern that a shortage of engineers in the UK is a threat to their business.
- 4 Businesses have the greatest difficulty recruiting senior engineers with 5-10 years’ experience – but there are significantly more skills gaps across all types of recruits than in previous years and there are particular challenges in sourcing suitably-qualified and skilled graduates.
- 5 Employers are broadening their recruitment pool – the over-arching trend in previous years for more experienced staff to be recruited is changing: employers are recruiting more school leavers and apprentices this year and some are looking overseas.

Filling the gaps – the role of education

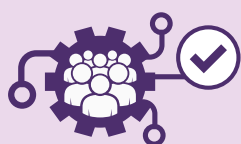
- 1 Some 53% employers say that a typical new recruit does not meet their ‘reasonable expectations’ – and year-on-year data shows that employers are growing more and more concerned that recruits do not meet their expectations. Nearly two thirds report that graduates are the biggest challenge and a similar percentage is concerned that the education system will struggle to keep up with the skills required for technological change.
- 2 Employers say the main skills gaps across all candidates are business acumen, practical experience and leadership and management skills – and, more generally, the ‘soft’ and ‘work ready’ skills.
- 3 Many organisations point to a problem with education and the relevance of qualifications and training: 28% of organisations do not feel that degrees meet their needs, with claims that technical degrees do not develop practical skills, have insufficient depth, and are not up to date.
- 4 Others say schools should do more to promote the career opportunities available in engineering and IT to pupils from an early age - and there is a need to overcome poor perceptions of these professions: 10% of organisations believe that greater encouragement is needed to promote the sector to young people.
- 5 Industry must step up its input to education: government, professional bodies and education institutions should collectively forge stronger links with businesses to ensure policy and curriculum reflect modern-day skills needs.

Expanding and investing in the workforce

- 1 Although there is clearly a need for education to equip students with work-ready skills, employers acknowledge they have a responsibility to explore all avenues of recruitment to fill their posts, especially among groups which traditionally do not consider careers in engineering and technology.
- 2 Females account for only 9% of all engineering and technology employees, so gender diversity remains a big challenge for the sector.
- 3 More than half of businesses (57%) surveyed do not have gender diversity initiatives and 75% do not have LGBT (lesbian, gay, bisexual, transgender) and ethnic diversity initiatives in place: 41% of businesses acknowledge they could still do more to recruit staff from diverse backgrounds.
- 4 Some 94% of businesses recognise they have a responsibility to support the transition from education and training to the workplace to give them access to more ‘eligible staff’. Training budgets appear to be on the increase – but organisations are seeking more external funding to support development.
- 5 Half of organisations expect to take on more technical apprentices over the next five years – but awareness of the government’s apprenticeships policy is low and less than half (47%) believe the process is straightforward.

WHAT EMPLOYERS ARE REPORTING

Facts and figures about engineering employers in the UK



53%

Are **currently recruiting** for new engineering and technology staff

66%

Are concerned that the **education system will struggle to keep up with the skills required** for technological change



61%

Are **most concerned about graduate skills** (of all types of engineering recruit)

9%

Of engineering and technology staff are **female**



57%

Don't have gender diversity initiatives in place

57%

Claim technical degrees **don't develop practical skills**



42%

Aren't aware of the **government's apprenticeship policy**



64%

Say a **shortage of engineers in the UK** is a threat to their business

53%

Find a typical new engineering recruit **does not meet employers' reasonable expectations**



68%

Have **difficulty recruiting senior engineers** with 5-10 years' experience

69%

Of graduate employers say there is a **lack of available graduates**



75%

Don't have LGBT/ethnic diversity initiatives in place

28%

Feel that engineering and technology degrees **do not meet industry needs**



53%

Feel the **current process** for recruiting apprentices is **not straightforward**



1. RECRUITMENT TRENDS AND SKILLS SHORTAGES

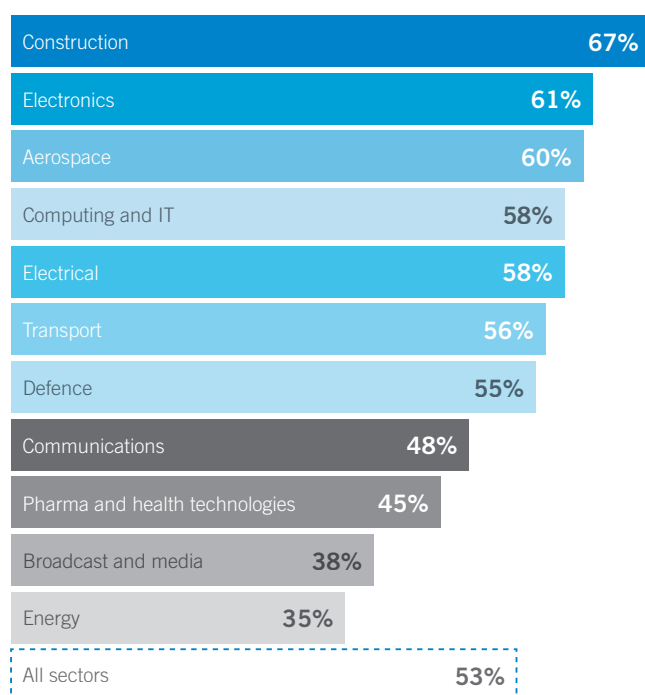
In this section we explore:

- Recruitment trends among UK employers of engineering and technology staff.
- The make-up of the existing workforce.
- Anticipated recruitment needs over the next 12 months.
- Issues with recruiting senior experienced staff.
- Moves to broaden the recruitment pool – within the UK and internationally.

1.1 Confidence in recruitment

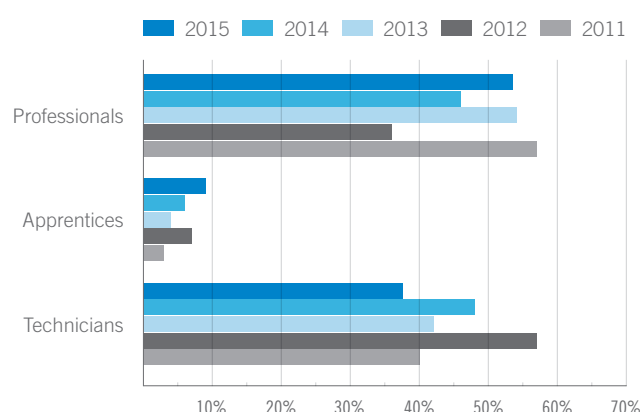
The latest recruitment trends among UK employers of engineering and technology staff show that 53% are currently seeking new engineering and technology staff – a minor (2%) increase on 2014 but generally rising since 2011 when 47% were recruiting. Companies specialising in aerospace, computing and IT, construction, electrical, electronics, and transport are experiencing higher than average recruitment levels.

Current recruitment activity (by sector)



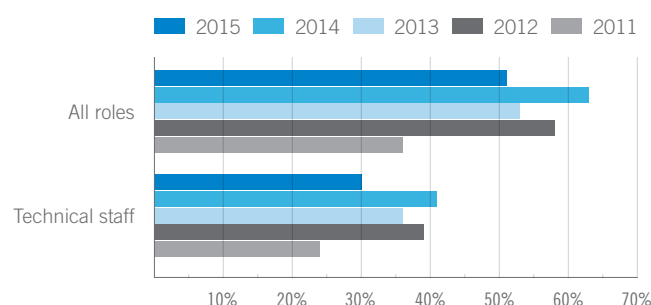
The make-up of the existing workforce shows that more than half the current UK engineering and technology workforce are experienced professionals. The proportion of engineering and technology professionals in the workforce has increased by 7.5% compared to 12 months ago, the proportion of apprentices has risen by 3%, but the proportion of technicians has dropped by 10.5% (from 48% in 2014 to 37.5% in 2015).

Current UK engineering and technology workforce



Although these figures have fluctuated annually over the past five years, the percentage of employers who say they are currently planning to recruit new roles within the next 12 months has dropped from 63% in 2014 to 51% this year. Linked to this, the proportion of recruitment dedicated specifically to technical roles has fallen considerably. Just 30% of companies currently plan to recruit for such roles within the next 12 months (down from 41% in 2014).

Recruitment plans in the next 12 months

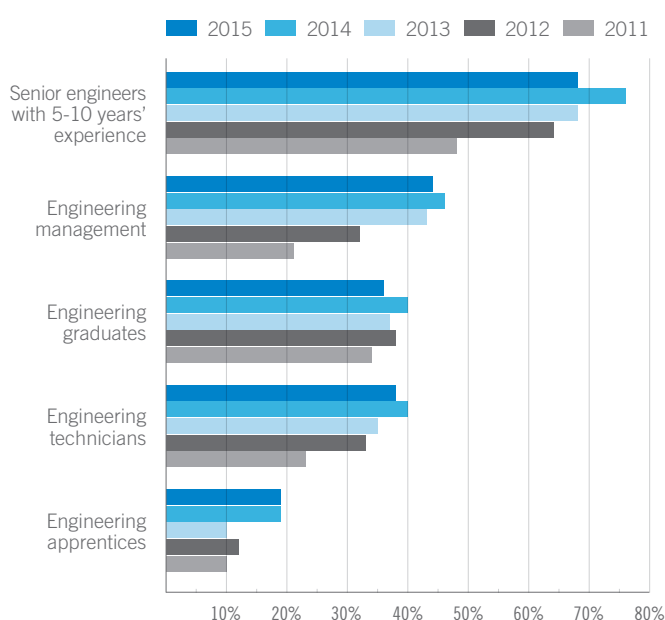


Overall, 68% of businesses who are planning to recruit in the next 12 months say they are 'confident' of recruiting the staff they need, compared to 63% in 2014. However, there are some fundamental recruitment challenges (many of which are historical or industry-specific) in finding the right staff and 64% of employers remain concerned that a shortage of engineers in the UK is a threat to their business.

1.2 The ‘dearth’ of senior engineers

UK employers still have the greatest difficulty recruiting senior engineers with 5-10 years’ experience. Despite this challenge, 59% of recruits for new engineering and technology roles over the next 12 months are expected to come through appointing experienced staff.

Issues with recruiting staff



Tom Gray, Chief Technology Officer at international software company Kainos, says the survey findings reflect the challenges in his organisation:

“While there is a significant number of recent entrants into the industry, there is a dearth of experienced engineers who are both exceptional practitioners and can build a delivery team and the next generation of the industry.

There are a number of reasons for this trend – but I would observe that really experienced and capable technologists can move into non-practitioner roles because there can be both greater rewards and a clearer progression path. In the IT industry, the concept of an accredited professional has little value. Whether this has any impact on the development and retention of technical practitioners, I’m not sure.”

Gordon Duff, F-35 Engineering Planning and Change Manager at BAE Systems, agrees that “experience in related industries” is the missing piece among both current and potential employees:

“We have many routes to fill vacancies (apprenticeships, graduate scheme, internal transfers and external advertising) but struggle to attract quality people from similar industries. For example, a high percentage of my job is directly related to commercial aviation roles with similar practices, yet the majority of the workforce are either ex-military personnel or long-term company employees with no ‘real world’ experience beyond BAE Systems.”

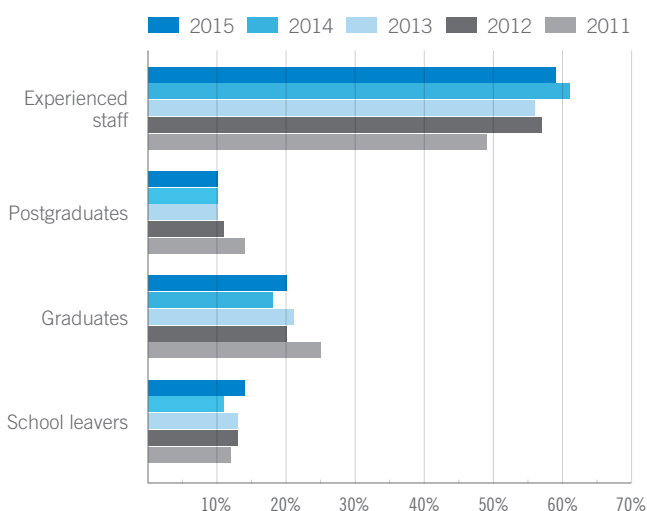
Tata Steel Long Products is exploring alternative routes to filling what might be traditionally billed as ‘senior’ roles.

“Mechanical, civil and structural engineering recruitment used to be less challenging, but it is definitely proving more difficult recently to attract the right candidates in these disciplines. We are considering accepting less than the finished article and training and developing even mature professional engineers and metallurgists into the roles,”

says Technical Engineering Services Manager, **Keith Joughlin**.

1.3 Identifying the next generation

Composition of UK engineering and technology workforce



Respondents to the survey say they are making efforts to look beyond experienced staff to fill their roles and are broadening their recruitment pool. Over the next 12 months, 20% of new recruits are expected to be graduates and 14% will be school leavers/apprentices.

Technical recruitment in the next 12 months

“We have just taken on two graduates, one to fill a project engineer role and one a support role,” says **Graham Pearl**, Engineering Director at dB Broadcast, experts in broadcast design and installation.

“We chose graduates rather than experienced engineers on the basis of their up-to-date knowledge, fresh ideas, and being more cost effective once trained and experienced.”

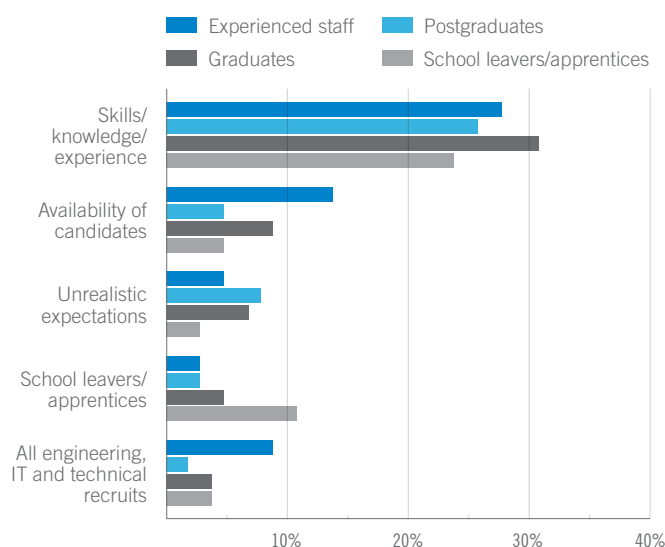
Paul Caple, Engineering Manager at global mass media and entertainment company Discovery Communications (International Division), adds: “We are moving in an environment of huge technological changes – we still need old broadcast skills but we now need our engineers to have significant TCP/IP and network expertise as well. These skills are rarely combined in the current workforce pool.”

However, 69% of employers say the biggest problem they face when recruiting graduates, specifically, is a lack of available candidates. A further 21% feel that those graduates who are available lack the skills and experience or simply don't know how to apply the knowledge they have acquired in practice.

“Generally, we are having difficulty finding sufficient enthusiastic graduates, with knowledge of our industry, our company and sound knowledge of the associated technology,” says dB Broadcast's **Pearl**.

“There is a particular weakness in understanding the fundamentals and nature of projects. We had a graduate in media technology in for an interview who, once he understood the role, was asked if this was something he would be interested in. He replied, ‘this looks like hard work!’ Another graduate mentioned that in five years’ time he wanted to progress to become a project manager. ‘Great’, we said, ‘and what do you think the key roles of a PM would be?’ This was met with a prolonged silence.”

Biggest concern with new candidates

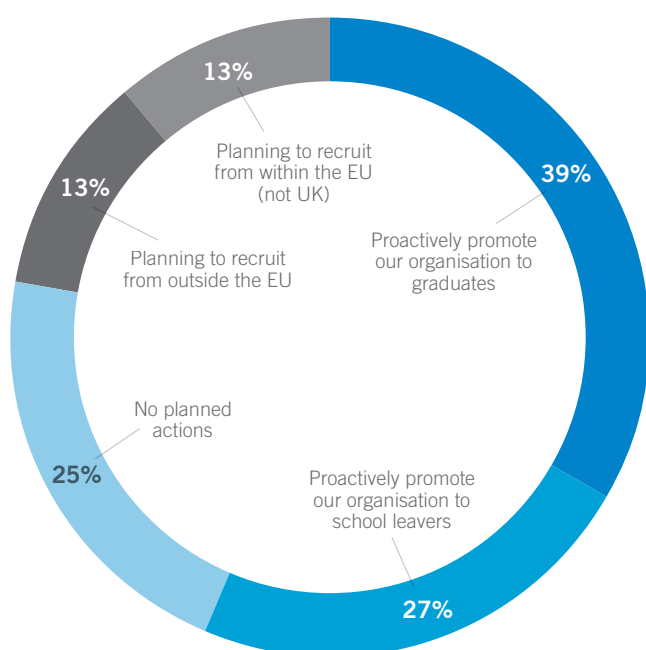


1.4 Beyond the UK

Given the challenges recruiting senior experienced staff and work-ready graduates, more organisations are looking beyond the UK for employees to help fulfil their recruitment needs given the lack of home-grown candidates.

Three quarters of businesses surveyed have plans in place for recruiting sufficient staff in the long term and, as well as greater promotion to graduates and school leavers, international recruitment forms part of these plans.

Actions planned to recruit staff in the next five years



Kevin Payne, Electrical Engineering Graduate Training Sponsor at London Underground, says he faces 'UK' challenges in recruiting both graduates and fully qualified engineers:

"In the case of newly-qualified graduates there are two key problems: an overall shortage of candidates who have both a degree that focuses on heavy electrical or power engineering, and a pre-existing right to work in the UK.

With already qualified and experienced candidates, many of those who apply are either weak on 'broader skills' (effective communication; ability to play an effective part in a multi-disciplinary team etc), or are weak in the application of first-principles engineering to practical challenges.

We are refining our attempts to recruit by using the IET Power Academy scheme to 'hook and hold' potential candidates for graduate training before they complete their degrees – and widening the net to attract applications from other EU countries. We've had notable successes with Greek, Italian and Spanish candidates."

TNEI Services, a specialist energy and environmental consultancy business, is also recruiting from further afield.

"We need specialist skills which are on the national shortage list so we often have to look to international candidates to fill vacancies," says TNEI Managing Director, **Rachel Hodges**.

"We find this a burden from the cost of visas and professional fees but we also find that it helps to add to the diversity in our offices, so there are pros and cons. With overseas candidates, we do have to work on communication skills but we find these an issue with some of our UK engineering graduates too."

1.5 In summary

- UK organisations report a strong demand for new engineering and technology staff compared to 12 months ago.
- Aerospace, computing and IT, construction, electrical, electronics, and transport organisations are the biggest recruiters.
- Businesses express greater confidence in recruiting the employees they need but at the same time two thirds are increasingly concerned that a shortage of engineers in the UK is a threat to their businesses.
- Senior experienced roles are the most difficult to recruit for – employers are bringing in less experienced people and training them up.
- Employers are seeking to recruit greater numbers of school leavers and apprentices, whilst some are also looking beyond the UK.





2. FILLING THE GAPS — THE ROLE OF EDUCATORS

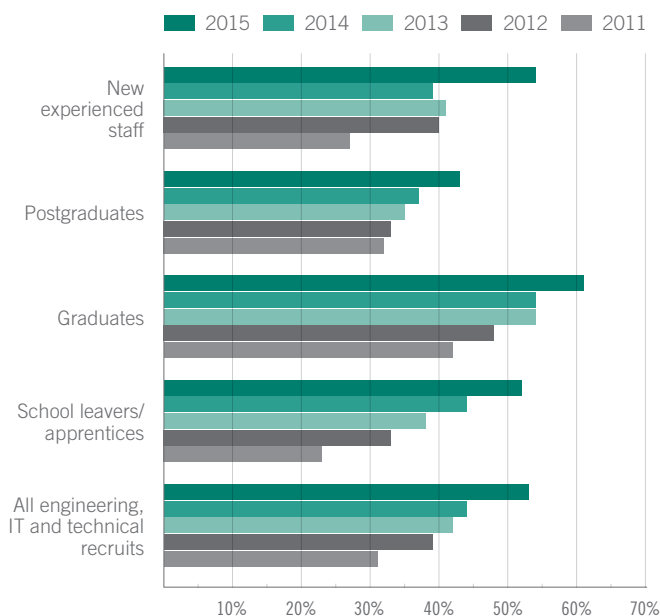
In this section we explore:

- Employer expectations around new recruits.
- The perceived skills gaps among school leavers, apprentices and graduates (as well as experienced staff already working in industry).
- The extent to which universities are equipping students with the required skills.
- The role of schools in promoting engineering and technology at an early age.
- Industry voice in shaping developments in education.

2.1 Employer expectations

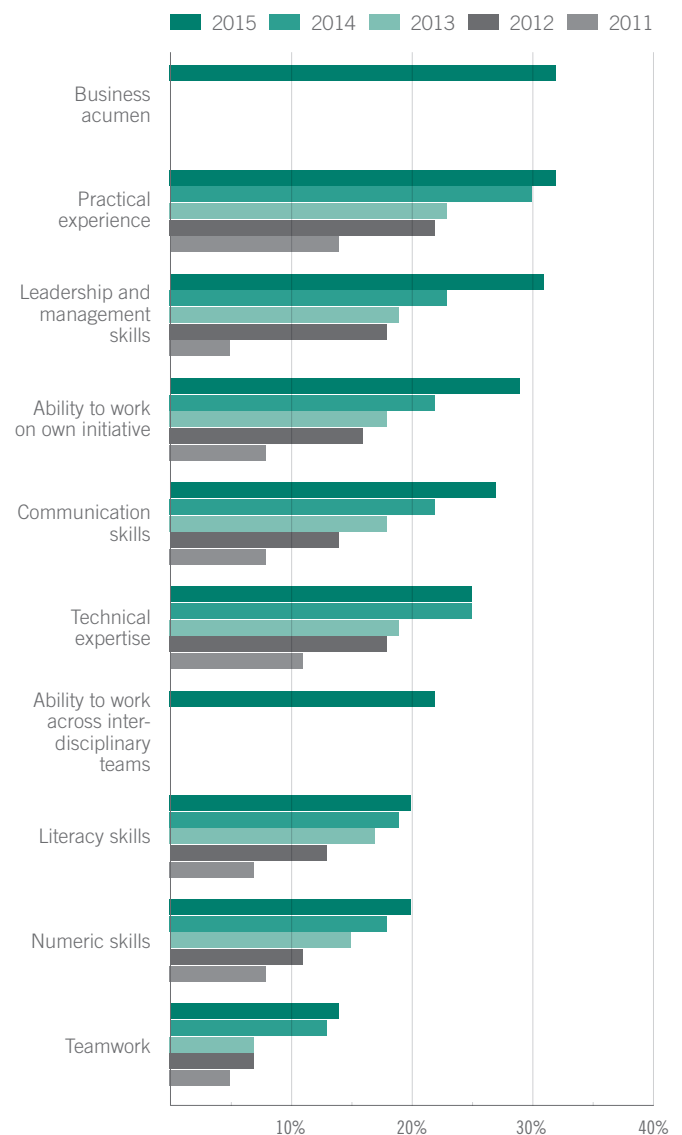
More than half of organisations say that a typical new recruit does not meet their 'reasonable expectations'. Graduates (61%) are deemed to be the biggest concern, followed by experienced staff and school leavers (54% and 52% respectively). And year-on-year data shows that employers are growing increasingly concerned that recruits do not meet their expectations, with two thirds of companies believing that the education system will struggle to keep up with the skills required for technological change.

Do you find that the typical recruit does not meet your reasonable expectations?

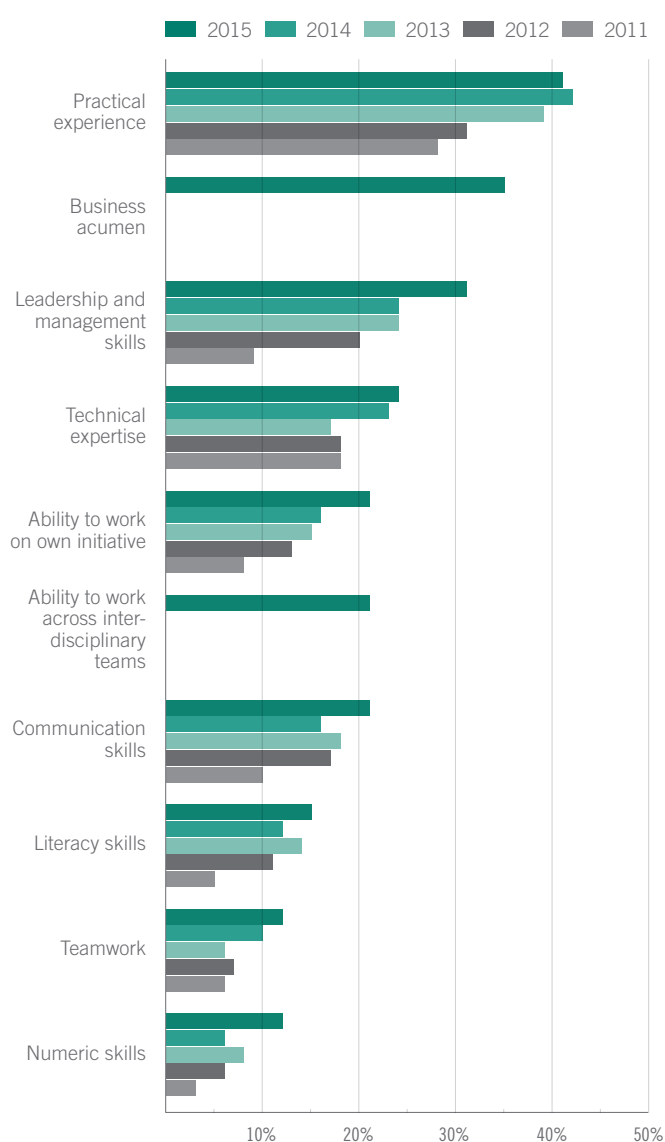


So what are 'reasonable expectations' of employers? Across all candidates the main perceived skills gaps are thought to be business acumen, practical experience and leadership and management skills. But are these, actually, 'reasonable expectations'?

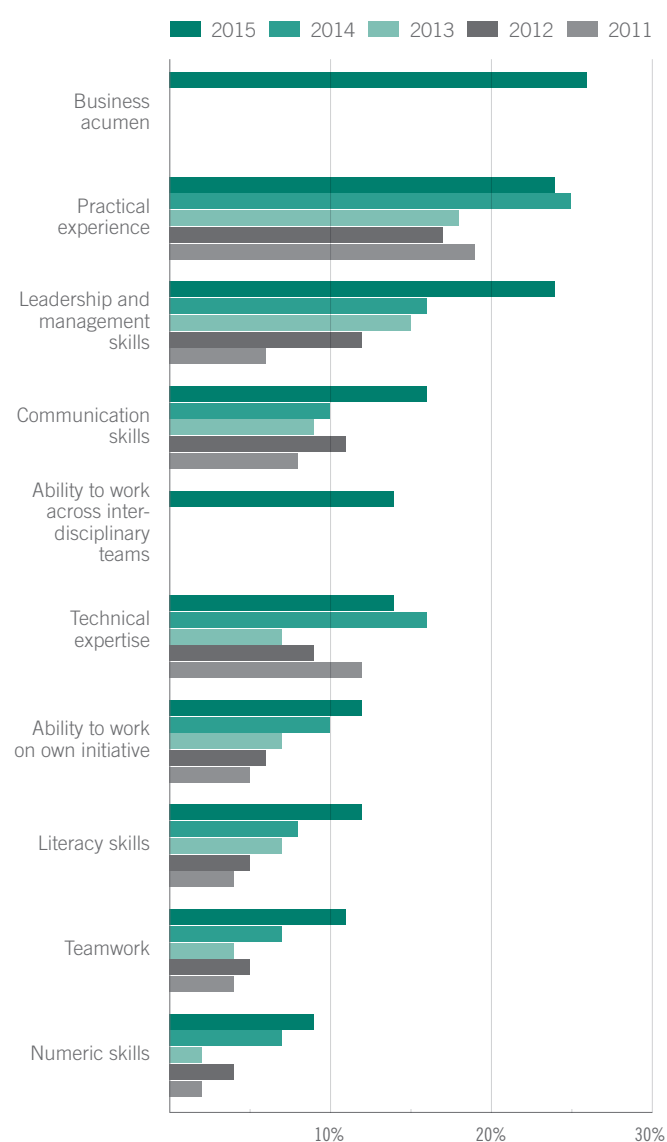
Skills gaps in recruits – school leavers/apprentices



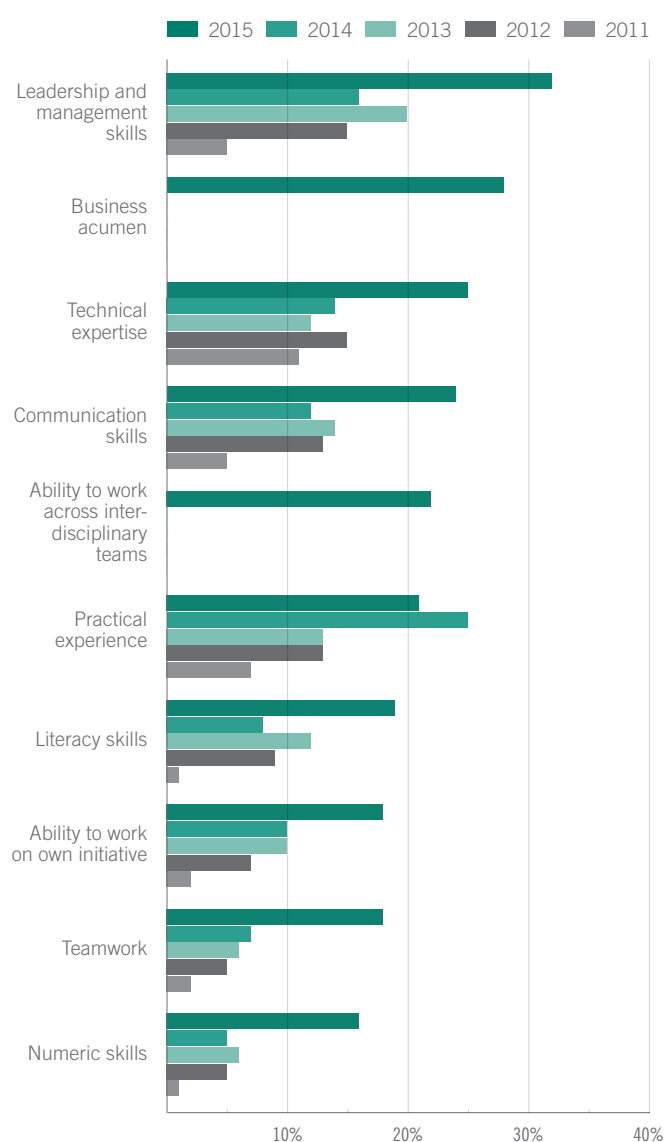
Skills gaps in recruits – graduates



Skills gaps in recruits – postgraduates



Skills gaps in recruits – new experienced staff



Interviews subsequently undertaken with employers highlighted a 'realism' about what school leavers and apprentices would bring to their organisation initially.

■ For school leavers:

employers talked about "reasonable standards of English, Maths and Science to A-level", "good IT skills", as well as attributes such as "quick to learn", "keen to establish relationships", and "having a self-starter personality".

■ For apprentices:

here expectations were a little greater. "Good practical skills", "a level of interpersonal skills", "willingness to learn and be flexible", "more maturity and confidence in front of small groups", and "ability to challenge the status quo in a department" are the qualities that employers are seeking.

■ For university graduates:

employers still expect "enthusiasm and willingness to learn", but naturally there is a sense that 'higher' technical and interpersonal skills will be presented. "Good level of subject knowledge", "specific industry awareness", "practical experience", "the ability to work in a team and absorb quickly," "confident communications", "problem-solving skills", and ultimately "the ability to hit the ground running" are all on employer checklists. "Commercial awareness", in terms of understanding the importance of their own contribution to the success of the business, was also picked out.



Keith Joughlin, Technical Engineering Services Manager at Tata Steel Long Products, says beyond the obvious technical requirements around qualifications there was some commonality in expectation:

“At all levels we are looking for five behavioural attributes: interpersonal skills; customer first; drive for results; problem-solving/decision-making; learning, innovation and excellence. We need to define the acceptable behavioural attribute targets for each level of recruitment from apprentices to mature professionals.”

London Underground's Electrical Engineering Graduate Training Sponsor, **Kevin Payne**, agrees:

“We look for high standards in literacy and numeracy, evidenced by qualifications, but the differentiators are around communication skills (written and face-to-face), positive team-working behaviours, self-motivation and enthusiasm, and clear potential/desire for self-development. Even at 18, an individual should be able to evidence this through a combination of school-based and outside of school experiences.”

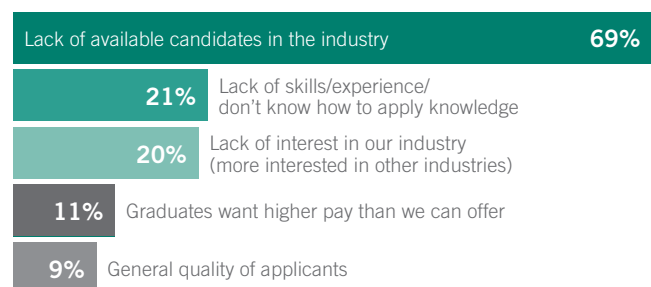
2.2 Work-ready graduates

Businesses believe the main factors behind the engineering recruitment issues are lack of awareness, interest in and attitude towards the engineering industry (22%), poor perceptions of engineering as a career (20%), and low availability of quality applicants (17%). A further 9% of employers feel there is a problem with education and 8% claim that qualifications and training are not relevant. So are education institutions doing enough to support industry, and ultimately providing work-ready graduates?

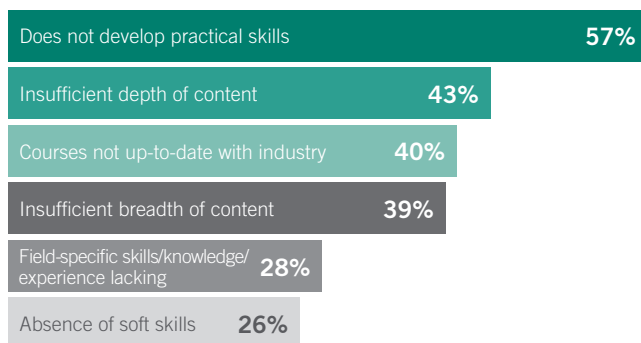
The role of higher education was identified as one of the main factors for the gap in capacity and capability facing industry. Many businesses feel that technical degrees do not develop practical skills, have insufficient depth, and are not up-to-date.

As a result, the biggest problem for organisations in recruiting graduates is the lack of available candidates for roles (69%). Others point to a lack of skills and experience, that candidates don't know how to apply the knowledge they have acquired, and also a general lack of interest in the engineering sector.

Problems faced when recruiting graduates



Reasons technical degrees don't suit needs



Paul Caple, Engineering Manager at Discovery Communications (International Division), says there is a “huge gulf” between the world of work and that of higher education:

“Graduates somehow do not have that sense of autonomy and responsibility that businesses require and these take a long time to develop, apart from any thought about specific skill-sets.

UK universities simply don't produce enough graduates in power engineering who have UK working rights in order to meet the needs of UK industry. Whether this is because they don't receive sufficient applications, or because they are incentivised to accept a high proportion of non-EU students, I don't know.

There is also a noticeable difference in quality between graduates from different universities. A high proportion of candidates from the less well-known institutions appear to be ‘rote learners’ and have fewer or weaker extra-curricular experiences to build upon when evidencing team-working, communication skills etc.”

Tata's **Joughlin** voices similar concerns: “We are not convinced that universities are focused on preparing their students for the workplace. They have become funding-driven, not outcome-driven, and seem to have lost the will to link the teaching of STEM subjects to industry requirements.

Universities appear to be more research-focused (as a revenue stream) rather than concentrating on the primary teaching function. In electrical engineering, we have noticed a trend towards focusing on electronics rather than power engineering – is this because it is ‘cheap’ to provide students with printed circuit boards and a box full of resistors and capacitors, rather than need to give practical experience on large motors, generators and switchgear?”

Others have established more successful partnerships with universities. Force and torque testing equipment specialists Mecmesin takes on students/graduates via an internship programme, as well as apprentices linked with local colleges. HR Manager **Angela Rabone** says: “We've found that students gain good experience working here and we intentionally use our programme as a ‘talent pipeline’, offering jobs at the end of internships where we have felt we had a committed employee.”

Rachel Hodges, Managing Director at TNEI Services, adds: “We mostly target graduates from ‘Power Academy’ universities to ensure they have the level of knowledge that we require in the fields we operate in, but we've also taken graduates with alternative degrees and found they are just as capable and able to pick up the fundamentals quickly.”

2.3 Early years' encouragement

Interviewees for this report felt that the onus should not solely be on higher education to build the engineering talent pipeline.

Schools should play a more prominent role in pupils' 'career' development, says **Nigel Smith**, Manufacturing Engineering Manager at Rolls-Royce:

“*The biggest gaps are in the technical skills that demand a good knowledge of the sciences. School pupils tend to want to avoid the difficult topics and probably perceive engineering to be one of the less well-rewarded professions.*”

Martin Jeffs, Senior Operations Manager at GE Aviation, whose organisation has links with many local schools, says he would love schools to be able to include more structure to their work experience, asking local firms what they are looking for and what makes a candidate successful at a job interview.

Looking to the future, 10% of businesses surveyed believe that greater encouragement is needed to promote the sector to young people.

Sheila Brown, Director at South Midlands Communications, a specialist in radio, broadcast and communications products, says:

“A whole generation has focused too much on the service industry instead of manufacturing, and now productivity, which has led to a gap that the next generation of school leavers need to fill.”

Mathew Nicholson, Engineering Competence Team Leader at Cristal, global leaders in the production of titanium dioxide, echoed this need:

“The biggest issue with regards to skills is young people who want to start in manufacturing. I've been into a number of schools and the current opportunities available to individuals who want to follow a career in manufacturing are not being transferred into school leavers”.

dB Broadcast's **Pearl** adds that schools could do more to highlight the good work that engineers do in society and to make careers look exciting, interesting and full of variety and challenges.

2.4 Industry voice

Whilst acknowledging that more is needed from education institutions to equip students with their required skills for the workplace, are organisations directly inputting enough to education initiatives, either at curriculum or policy level?

“Essentially, no,” says Kainos' **Gray**. “From an IT industry perspective, I don't believe that we have done enough to articulate the nature, impact and importance of an IT career.”

“*There is a stereotype, reinforced by the media, which is inaccurate and discourages students from pursuing an IT career – one which is lucrative, rewarding and provides great opportunities for development, travel and social contribution. Industry needs to address this.*”



Kanos's **Grey** continues, "Likewise, while organisations try to engage with teachers and kids and provide tools to help teaching, these laudable initiatives are counter-productive as they only serve to confuse an already confused cohort of teachers. They just provide more choices to individuals who are not equipped to make those choices. Industry needs to engage with education with a single unified voice and work with education to reduce the complexity of the skills development opportunities."

Kainos has created digiskillsNI (a collaboration between industry, education and government) to specifically help address this issue in Northern Ireland.

London Underground's **Payne** agrees there is a fundamental challenge around children being 'blind' to engineering as a career, unless it is in software or civil engineering:

"This problem is particularly acute in power engineering – what child has even heard of it? – and particularly acute with girls.

Primary and secondary education, and our broader culture, do not place a strong emphasis on practical engineering questions, and my perception is that 90%+ of teachers have only the flimsiest grasp of what engineering really is.

There is a crying need to pump really constructive, positive messages about engineering at multiple levels, to get strong role models in front of children, and to inculcate in children the joy of taking things to pieces to find out how they really work."

In shaping approaches to skills development, Tata's **Joughlin** said government, professional institutions and educational establishments needed to coordinate with industrial organisations to forge strong links to ensure full alignment.

"This initiative probably needs government or the professional institutions to facilitate," he concludes.

2.5 In summary

- More than half of employers say that a typical new recruit does not meet their 'reasonable expectations' – with two thirds of companies concerned that the education system will struggle to keep up with the skills required for technological change.
- Common expectations primarily focused on the prevalence of 'soft' and 'work ready' skills, as opposed to technical requirements.
- Many feel there is disconnect between university courses and industry demands, leaving significant gaps in graduate capability.
- Schools should do more to promote the opportunities available in engineering and IT careers to pupils from an early age.
- Government, professional bodies and education institutions should collectively forge stronger links with industry to ensure curriculum and policy align to skills needs.





3.

EXPANDING AND INVESTING IN THE WORKFORCE

In this section we explore:

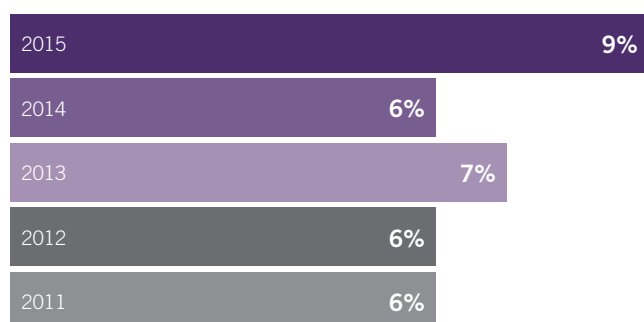
- Recruitment and development of female employees.
- The prevalence of gender, ethnic and wider diversity programmes and best practice.
- Organisational appetite for supporting the transition from education to the workplace.
- Academic support for employees and the role of apprenticeships.
- Funding these initiatives.

3.1 Female recruitment and support

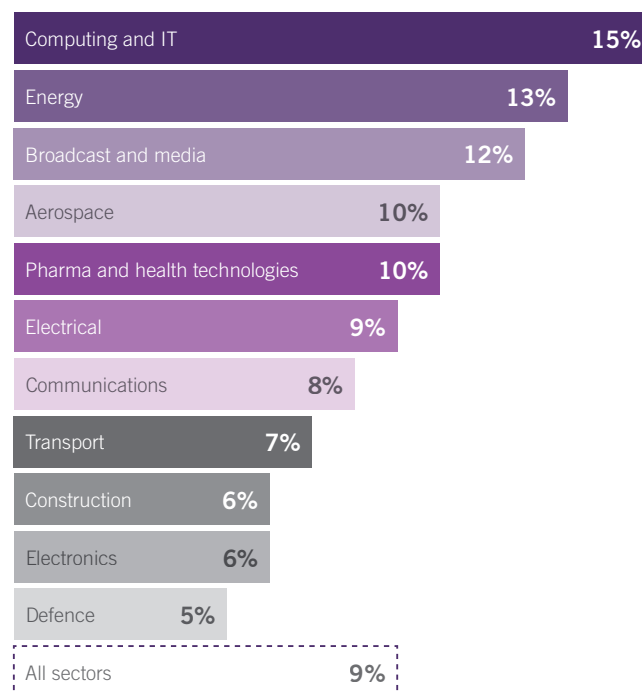
Although there is clearly a role for schools, colleges and universities in equipping students with the skills they need before they enter the world of work, employers also acknowledge their responsibility to explore all avenues for recruitment, not least among groups which traditionally do not consider careers in engineering and technology.

Females account for only 9% of all engineering and technology employees, so gender diversity remains a big challenge for the sector.

Current female engineering workforce (all staff)

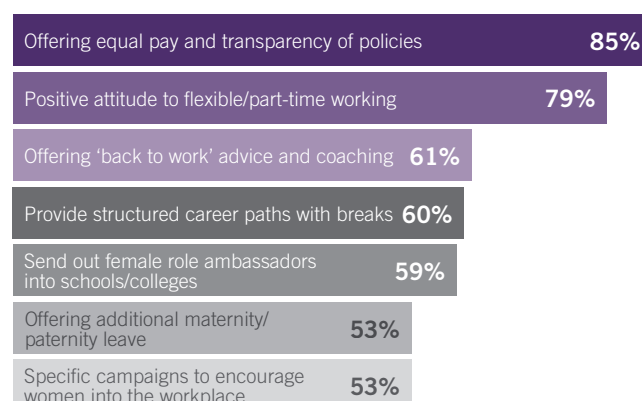


Current female engineering workforce (by sector)



So what, if anything, is changing to ensure that more females are being recruited? Some 57% of businesses surveyed do not have gender diversity initiatives in place, while just over a third (37%) said they did. Where they are in place, they consist mainly of equal pay policies and positive attitudes towards flexible and part-time working.

Actions taken to improve gender diversity



Multinational companies appear to be championing gender diversity better than most.

“GE, being a worldwide company, embraces the diversity of its employees,” explains **Martin Jeffs**, Senior Operations Manager at GE Aviation. “Personnel all sign up to our ‘Spirit and the Letter’ policy which sets out our expectations on such matters. We have many groups set up to support ethnicity and these include everything from gay/transgender, to the very successful Women’s Network and cultural groups within each country.”

Nigel Smith, Manufacturing Engineering Manager at Rolls-Royce adds: “My organisation must be one of the most diverse in this country, if not the world. We are multi-cultural and women have equal opportunities to men. There are no boundaries in terms of race or gender.”

However, businesses still recognise there are historical or sector-specific issues to overcome. **Paul Caple**, Engineering Manager at Discovery Communications (International Division), says:

“Discovery has one of the best diversity programmes in business according to recent reports, but internal diversity seems to me more a consequence of the nature of its business being a media company. Women are often not well represented more broadly across engineering at Discovery, but I think this is due to a lack of women in this workforce pool generally. Ethnicity and gender identity is more balanced.”

Graham Pearl, Engineering Director at dB Broadcast, admits he would like to see more women in his business:

“We approach recruitment with an open mind and we would love to see more females in our industry. Technology-based courses do not appear to be favoured by females. We recently had one female applicant for our graduate positions out of 50 applicants – this is an industry-wide issue and in the niche broadcast technology sector it is completely male dominated.”

BEST PRACTICE CASE STUDY:

Women into Engineering at Kainos

Kainos supports an ‘everyone is equal’ environment and gender, sexual orientation and ethnic diversity are not differentiated. Although corporate initiatives are not specifically created to target diversity, Kainos supports staff who want to get involved within diversity initiatives or form their own communities. Some examples of our support include:

Women Who Code – sponsoring the creation of the Women Who Code UK branch through time investment from our people, financial support, hosting events on our premises and access to the company’s resources.

Girl Guides Tech Adventure – supporting the nurturing of young girls in IT by assigning time for our engineers to create and deliver a programme for the girl guiding organisation resulting in a TechAdventure badge in the UK.

Women’s workshops – hosting events targeted at women on our premises in Gdansk, Poland, for women across the industry to learn and work through practical exercises in various subjects.

Leadership events – presenting at Women in Leadership events. Kainos has purchased corporate membership of the Women in Business group for our staff to use.

k a i n o s®

Tom Gray, Group Technology Officer
(with supporting information from
Colette Kidd, Head of Talent
Development),
Kainos

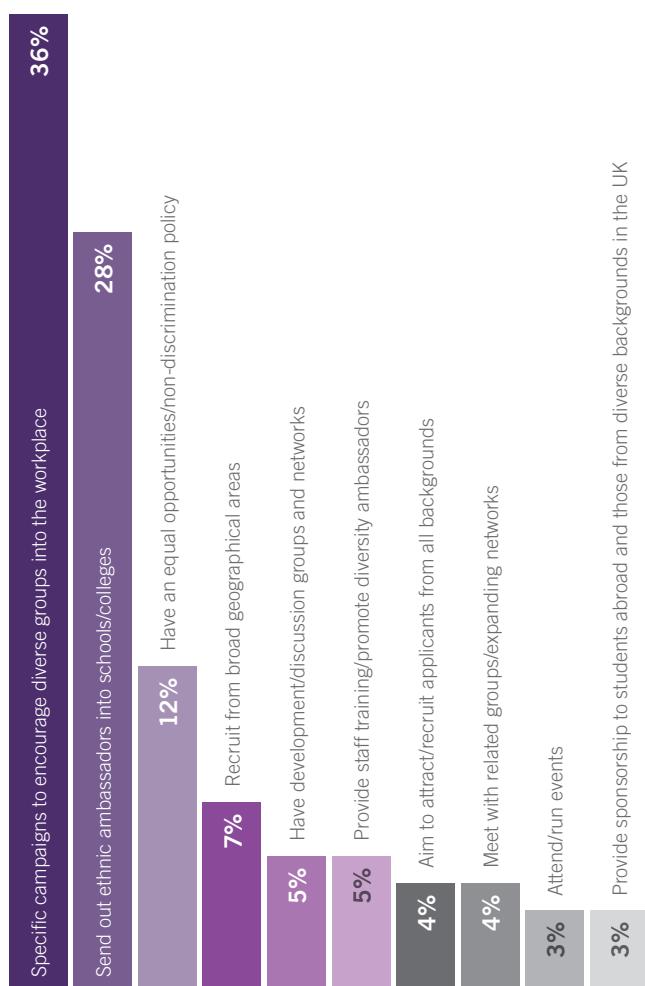
Keith Joughlin, Technical Engineering Services Manager, at Tata Steel Long Products, adds:

“We are conscious that, historically, plant operations in an integrated steelworks is male-dominated. However, we have managed to increase our female apprentice population to 16%.”

3.2 Ethnic diversity initiatives

While 19% of firms surveyed currently have LGBT (lesbian, gay, bisexual, and transgender) or ethnic diversity initiatives in place, the vast majority – three quarters in total – say they do not. Where efforts are being made, these tend to be specific campaigns to encourage diverse groups into the workplace and sending ambassadors to education institutions.

Actions taken to improve LGBT/ethnic diversity



Interviewees for this report highlighted some examples of best practice. TNEI Services' Managing Director **Rachel Hodges** said:

"We do not have any formal positive discrimination diversity policies but we do not need them – we have 34 professional engineers and from them we have 11 females (including three within the senior management team of six), 18 from outside of the UK and a wide range of personal circumstances. We celebrate these through initiatives like an annual international food festival, religious and cultural celebrations and flexible working structures."

BAE Systems is an active supporter of LGBT issues and has a visible presence annually at the PRIDE events, whilst London Underground's supporting diversity initiatives are highlighted below.

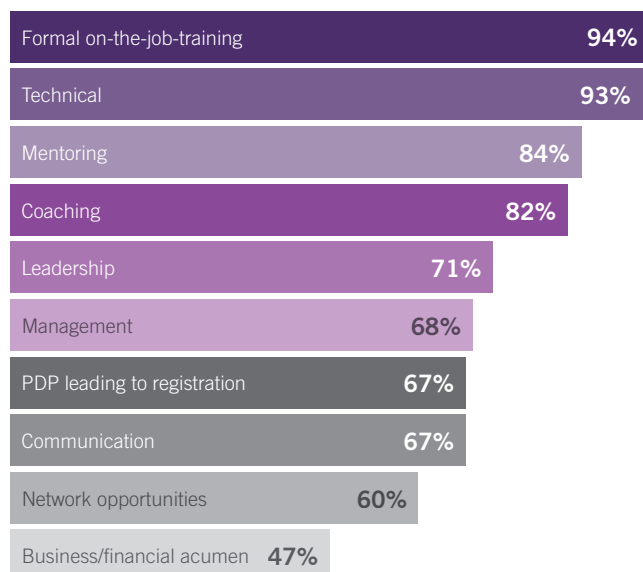
3.3 In-house development

Employers surveyed by the IET perceive that to address the overall recruitment challenges they face there is a need to access more 'eligible staff', and that education, training, and staff with relevant skills and experience will solve these problems. Senior experienced staff, for example, are felt to typically lack leadership and management skills, business acumen and technical experience. So are businesses taking the initiative and doing enough to support the transition from education to the workplace?

The 'will' appears to be there. 94% of businesses recognise they have a responsibility to support the transition from education and training to the workplace – and 87% are proud of their current approach to development.

Formal on-the-job training, technical training, and mentoring continue to be the most common methods of development on offer to staff as firms seek to increase retention and development. Business acumen is provided least by companies, despite this being identified as one of the main skills shortages across all types of recruits.

Training and development provided to technical staff



Again, within multinational organisations, there appears to be a significant commitment to training and development.

“It is a fine line between bringing in new talent and developing the people we retain,” says GE Aviation’s **Jeffs**. “I believe we strike a good balance here and managers are always working with staff to identify ways to enrich their current roles and develop them to meet the future needs of the business. Training and R&D are two of our biggest budgets and we are proud of our staff retention figures, with many people introducing new generations of their family to the fold.”

Kainos invests £1 million per annum in staff training, Tata Steel Long Products has increased its technical training budget by 30%, whilst “significant training budgets” are available at Rolls-Royce.

BEST PRACTICE CASE STUDY:

Diversity initiatives at London Underground

At London Underground we have three key planks for supporting diversity in the workplace:

- Very strong advocacy of a code of five, simple, positive behaviours, one of which is fairness and consistency. Exemplars of positively inclusive behaviour are overtly praised, e.g. through our company ‘Thanks to You’ scheme, while poor conduct is dealt with, by disciplinary action in extreme cases.
- Positive portrayal of the benefits of diversity and inclusiveness in company communications such as the staff magazine, which goes to everyone’s home address.
- Overt, and heavily publicised, support for various groups (LGBT, women, carers, black, Asian and minority ethnic etc) through ‘Staff Networks’, which are company-supported networks that meet face to face to provide mutual support and sharing of experiences. In some cases, these networks have ‘spun off’ to become self-sustaining social organisations.



Kevin Payne, Sponsor, Electrical Engineering Graduate Training, London Underground

“Everybody, shopfloor and office, has a skills matrix which defines the minimum level of training to perform their individual role,” says Manufacturing Engineering Manager, **Nigel Smith**. “A massive number of training courses are available to enhance individual skill sets. Everyone in an office-based role is encouraged to have an individual development plan, whether it be to enable them to progress upwards through the organisation or simply to give them a greater skill level in their existing role.”

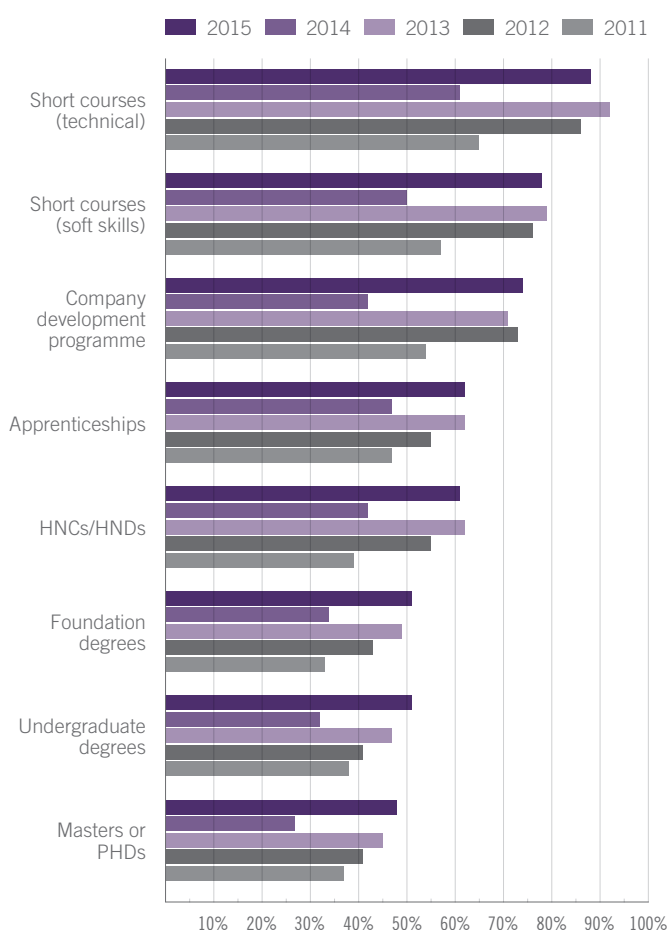
In-house training and development programmes are deemed particularly important for small or specialist firms.

TNEI Services’ **Hodges** explains: “At the mid- and high-level of experience we find it incredibly difficult to attract or find suitable candidates as they have quickly moved away from technical fields and so have not got the specialist skills that we are looking for – we are better to train them in house. We therefore use a combination of in-house one-to-one training and mentoring, lessons learnt and lunchtime training seminars with external training courses on technical and professional topics. We find that external training courses can be extremely expensive and are often targeted at large corporates with large budgets or are either too in-depth or too ‘fuzzy’ in their content.”

3.4 Academic support for employees

The amount of academic support provided by employers across the board in 2015 has returned to the levels in 2013 (2014 was lower). Short courses (technical and soft skills) and company development programmes are the most commonly provided support.

Support provided to technical staff



Apprenticeships have increased (especially among Level 3 apprenticeships) – and 50% of organisations expect to take on more technical apprentices over the next five years. However, only 58% of organisations are aware of the government's apprenticeship policy – of those, 82% understand the changes, 71% believe apprenticeships are affordable methods of gaining the required skills, and 68% welcome the increased control the changes provide. But only 47% believe that the current process is straightforward.

Many organisations are benefitting from taking on apprentices. The approach at Mecmesin, according to HR Manager, **Angela Rabone**, is to 'grow their own':

"We like to see staff develop and get promoted. We take on students if we feel they can learn and contribute to the organisation, whatever their nationality. We currently have three apprentices – one in his third year and two just starting college – and usually take two engineering interns. Most applicants are foreign students – last year we had students from Sri Lanka and Vietnam, this year from Cyprus."

Businesses are, however, seeking more external support for training and development.

"Where a company can actively demonstrate that it is already investing heavily in training and recruitment, the government should provide additional help and funding. This funding should not necessarily be targeted at those companies with nothing in place," says Rolls-Royce's **Smith**.

Funding remains one of the biggest challenges for organisations, big or small, who want to invest in developing their employees. South Midlands Communications cited that as an SME they would like "more access to funding and less emphasis on documentation – very extensive and time consuming." As well as apprenticeships, Discovery Communications suggested the government could help firms de-risk their training strategies with backstop funding vocational postgraduate training programmes.

BEST PRACTICE CASE STUDY:

People development at BAE Systems

Staff development is strongly encouraged within the company, and BAE Systems are staunch supporters of upskilling staff members. As a recent and personal example, I have just completed a distance learning BSc (Hons) degree in Aircraft Engineering that was paid for in full by the company (annual fees, car hire, accommodation, and all reasonable expenses whilst away). I was one of three BAE employees on the course this year, and a number of others have had MBAs paid for. None of this has been bonded by the company. Also, we have a dedicated learning library and e-learning website with a selection of free and funded training courses for everything ranging from basic health and safety, through to product specific training programmes and foreign language courses.

BAE SYSTEMS

I N S P I R E D W O R K

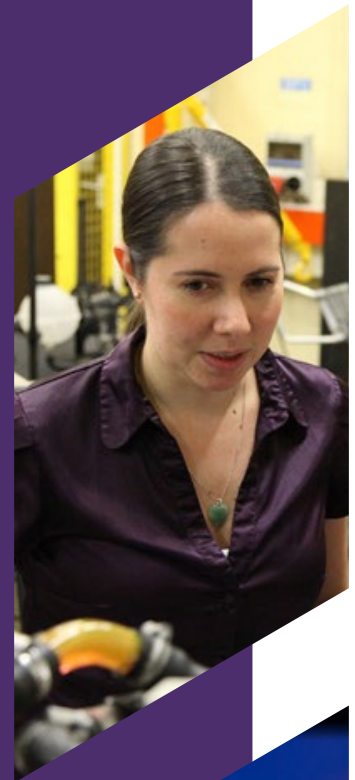
Gordon Duff, F-35 Engineering
Planning and Change
Manager, BAE
Systems

Cristal invests over £500,000 in training and development every year as well as on-site, free training. However, the company faces a fundamental challenge, according to Engineering Competence Team Leader, **Mathew Nicholson**:

"Our main skills shortages revolve around Chemical Engineers, Electrical Instrumentation Engineers and Inspection Engineers. We have great difficulty in recruiting those people and retaining them within our business. We are developing internal programmes to try to develop our current Cristal employees and provide them with the skills to be able to fill these high priority roles. However, because we are classified as a large company we are unable to access any government-supported funding which would help us to expand our business more rapidly."

3.5 In summary

- Employers should explore all avenues available to recruitment, not least among groups which traditionally do not consider careers in engineering and technology.
- Females account for only 9% of all engineering and technology employees, so gender diversity remains a big challenge for the sector.
- Large proportions of businesses do not yet have initiatives in place to ensure gender, ethnic and wider diversity in the workforce.
- The majority of businesses recognise they have a responsibility to support the transition from education to the workplace.
- Staff training budgets are on the increase – but more businesses are seeking more external funding to support development.



CONCLUSION

This report highlights the continuing challenge that more needs to be done to deliver a sustainable and diverse engineering and technology workforce.

Whatever the extent of UK organisations' recruitment plans in the current or any future economic climate, the issue remains that businesses are having difficulty recruiting the skilled employees they need – particularly senior engineers with 5-10 years' experience.

That all types of recruits – from school leavers to experienced staff – are perceived by employers to have significantly more skills shortages than in previous years is a concern when greater succession planning is clearly needed.

It is encouraging that employers are broadening their recruitment pool, but with many seemingly turning their attentions to overseas candidates due to the national skills shortage, we urgently need to develop home-grown engineering and technology talent and ensure that candidates are attracted and ultimately retained.

We therefore call on industry to work even more closely with government, professional bodies and education institutions to address the gaps and shortages identified in this report – and, in collaboration, overcome myths about careers in engineering and technology and move towards a sustainable and diverse workforce.

The IET believes that there are three engineering myths we must dispel to make a change:

Firstly, that engineering is a male profession. The sector's gender disparity, which is historical, needs to be fixed. While it is encouraging that this report shows a very small rise in female employment and apprenticeships, there is still a long way to go. A third of organisations we surveyed may have gender diversity initiatives in place but we now need to encourage the other two thirds to do the same. This is absolutely critical for UK businesses.

Secondly, that engineering is not open to everyone. Whilst over a third have gender diversity initiatives and one in five have LGBT/ethnic diversity initiatives in place – this isn't anywhere

near enough when you consider wider society demographics. Businesses must move with the times and reach out proactively to groups where the talent potential is huge but untapped.

Thirdly, the perception that engineering is somehow 'unexciting'. We need to convey the excitement, creativity and fun of engineering and show how it can lead to an international career and the chance to solve some of the world's biggest challenges. We must reach, and influence, young people more effectively – and this must be done from an early age.

There is an ongoing discussion around the role of education. How schools, colleges and universities can equip students with work-ready skills and make it easier for employers to find suitable candidates. Industry needs to have a greater voice at the top table and ensure that it is communicating and engaging with education policy-makers around exactly what is required from school leavers, apprentices and graduates – and that this is ultimately reflected in what, and how, this is taught.

At the same time there is a need for employers themselves to do everything they can to recognise and develop talent in their organisation. The appetite seems to be there, but this report again reinforces that more needs to be done.

And, of course, the IET and other professional engineering institutions have an important role to play in facilitating greater collaboration between government, industry and educators.

Actions around these issues will be key to the IET's campaigns over the next 12-18 months.

Stephanie Fernandes,
Principal Policy Advisor,
The Institution of Engineering and Technology (IET)

IET recommendations

- Employers should have long-term plans and continually review how best to develop the skills of their workers to meet the growing and changing demands of industry.
- To bridge the gap between employer expectations and what the education system delivers, stronger and deeper collaboration is needed between all parties (including government policy-makers) to agree practical steps to ensure that young people are suitably prepared both academically and practically. These practical steps could include, for example, more work experience programmes and internships.
- To help business and teachers to work more closely together. Teachers could be supported and encouraged to spend time in industry.
- Employers need to recognise the need for workforce diversity and do more to attract recruits from a wider talent pool. This might include looking at other professions, such as medicine and accountancy, that have been more successful attracting a diverse workforce.
- The engineering community should work with parents to promote engineering as a creative, rewarding and exciting profession for their daughters, as well as sons.



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BAE Systems

Gordon Duff,
F-35 Engineering Planning and Change Manager

Cristal

Mathew Nicholson,
Engineering Competence Team Leader

dB Broadcast

Graham Pearl,
Engineering Director

Discovery Communications

Paul Caple,
Engineering Manager, International Division

GE Aviation

Martin Jeffs,
Senior Operations Manager

Kainos

Tom Gray,
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London Underground

Kevin Payne, *Sponsor,*
Electrical Engineering Graduate Training

Mecmesin

Angela Rabone,
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