Collective **inspiration**

Engineering and Technology **Skills & Demand in Industry**

Annual Survey 2009

www.**theiet**.org

1. Content

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Abbreviations:

CPD Continuing professional development
ETB Engineering and Technology Board
HESA Higher Education Statistics Agency
ICT Information and Communication Technologies
IET Institution of Engineering and Technology
IT Information technology
R&D Research and development

2. Foreword

“The challenges of tomorrow require investment in skills today”

The global economic challenges facing the UK emphasise the vital role that engineering and technology has to play in ensuring the UK’s long-term prosperity. The breakthroughs that emerge from innovation and the exploitation of new technologies will depend on highly talented people with a diverse range of skills. Those organisations that nurture and develop the skills of their engineers and technicians will emerge from the tough economic conditions highly competitive and well placed to play a major role in economic recovery.

The 2009 IET Skills Survey clearly shows the impact of the current recession, with a fall in recruitment and an easing of engineering skills shortages. But this is not the time to take our eyes off the ball. The recession raises many important questions relating to the retention and training of the UK skills base.

Government and organisations must focus on making the most of the skills available and plan ahead. Retraining and professional development will be needed to re-engage the skilled engineers lost to the profession during the recession. Without a concerted effort now, it is likely that the UK will quickly experience a greater shortage of engineering skills than before the recession and be unable to take full advantage of the recovery when it comes.

Nigel Fine BSc MBA CEng MICE FIET
Chief Executive & Secretary
The IET

3. Executive summary

3.1. Introduction to the survey

This is the fourth *Engineering and technology skills & demand in industry survey* undertaken by the IET. The research was carried out by the independent research agency 2Europe Limited.

As in 2008, the information was collected through telephone interviews with 400 companies. The interviews took place in April 2009 using a ten minute questionnaire.

3.2. Key findings

The impact of the economic recession was evident in the survey:

- Only 31% of companies surveyed were planning to recruit staff, compared to 63% in 2008.
- 40% of companies were concerned that they would lose their skill base due to restructuring. This was a particular concern in the transport industry.
- Far fewer companies were experiencing problems recruiting suitable engineering staff than in 2008 and many more were confident that they will be able to fulfil their future recruitment needs in the short term.
- A third of those companies not recruiting this year cited financial constraints as the main reason, however only 12% thought that this would be a problem in 2 to 3 years time.

Of those organisations who were recruiting:

- Companies are recruiting people who can make an immediate contribution, with 45% looking to employ experienced engineers - an increase on 2008,
- Fewer were looking to recruit postgraduate engineers than in 2008.
- The percentage looking to recruit graduates and school leavers remained constant, although the overall numbers recruited are down,
- Business expansion was the most frequent reason given for recruitment (66%) and
- Business diversification was a recruitment driver for only 30% of companies.

The survey showed that the engineering workforce:

- Is not ageing,
- Continues to be male dominated in all industries and
- Generally has the necessary skills; however school leavers were again identified by companies as lacking skills and practical experience. The recently introduced Engineering Diploma qualifications should provide students with a better understanding of industry.

3.3. About the IET

The IET is a world leading professional society for the engineering and technology community. It has 150,000 members in 127 countries and offices in Europe, North America and Asia-Pacific. The IET provides a global knowledge network to facilitate the exchange of ideas and promote the positive role of science, engineering and technology in the world.

3.4. Key trends

Based on 2009 sample of 400 companies

	2009	2008
Current technical workforce (average number of employees)		
■ Professional engineers employed	203	192
■ IT professionals employed	136	102
■ Technicians employed	160	144
Women in the workforce (share of workforce)		
■ Women in the workforce (total workforce)*	26%	20%
■ Women in Technical workforce	7%	6%
■ Female professional engineers	5%	5%
■ Female IT professionals	10%	7%
■ Female technicians	6%	5%
Skills shortfalls experienced among recruited staff		
■ Experienced staff	16%	27%
■ Postgraduates	32%	38%
■ Graduates	43%	44%
■ School leavers	53%	46%
Concerns about loss of knowledge/skills base because of the economic downturn	40%	No data
Recruitment plans		
■ Proportion of companies planning to recruit over the next 12 months	31%	63%
■ Proportion of companies planning to recruit for technical staff	22%	No data
Planning to recruit over the next 12 months		
■ Proportion of those intending to recruit experienced staff	45%	32%
■ Proportion of those intending to recruit postgraduates	12%	24%
■ Proportion of those intending to recruit graduates	26%	28%
■ Proportion of those intending to recruit school leavers	17%	16%
Reasons for recruitment of engineering and technology staff		
■ Business expansion	66%	62%
■ Retirement	41%	27%
■ Staff turnover	47%	46%
■ Diversification	30%	35%
The proportion of those recruiting who experience recruitment challenges concerning		
■ Senior engineers	22%	49%
■ Graduate engineers	16%	33%
■ Technicians	11%	31%

NOTE: Percentages relate to the total number of surveyed companies.
*: part of increase in 2009 explained by changes in sample composition

4. The engineering employment market today

4.1. Current employment locations

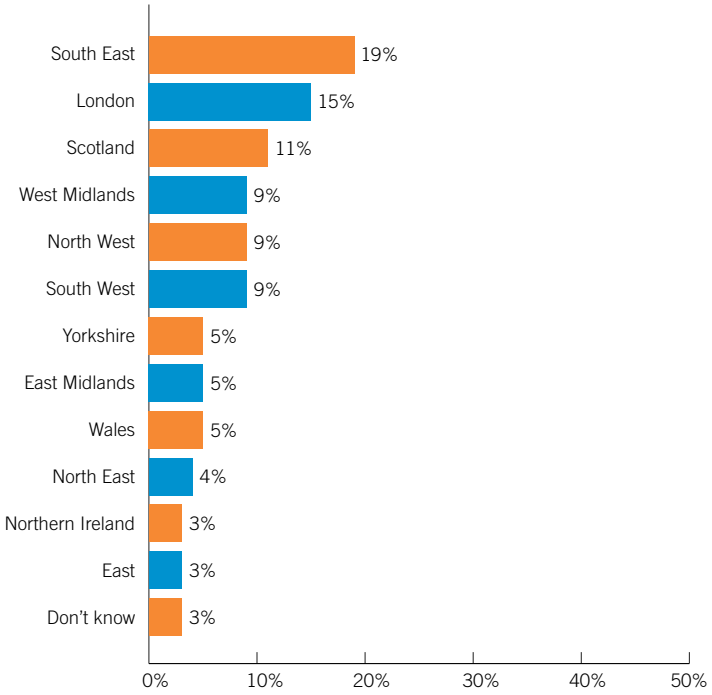

Chart 1: Distribution of main employment areas for engineers in the UK.

Many engineering companies have several sites. In this study each company was asked to identify the area where most of its engineers are employed. As shown in Chart 1, the areas where most engineers are based are the South (including the South East (19%), London (15%), South West (9%)) and Scotland (11%).

- A large percentage of engineers live in London and the South East
- Scotland still has a significant engineering base
- There is engineering related industry in all parts of the UK

4.2. Current workforce

On average, companies in this survey employ 203 professional engineers, 136 IT professionals, 160 technicians and 22 apprentices. Technical and engineering staff represent around 21% of the workforce, with the largest group being professional engineers at 8%. The importance of highly skilled workers is reflected in the large proportion of professional engineers employed as working environments become increasingly specialised.

Chart 2 shows the distribution of apprentices, technicians, IT professionals and professional engineers within different industry sectors. Defence/ aerospace has the largest number of employees, with an average of 7,800 engineering staff, followed by the energy sector with an average of 6,600 employees. ICT employs the largest proportion of technical staff (50%), followed by R&D, design, consultants (41%) and defence/aerospace (29%).

The defence/aerospace sector employs a higher proportion of technicians than the other sectors. While defence/aerospace employs more apprentices than the other sectors, the absolute proportion of apprentices is low across all sectors.

The data suggests that the energy and R&D, design and consultants sectors employ the highest proportion of professional engineers. This result conforms to expectations for R&D, design and consultants, as work falling into these categories is highly specialised.

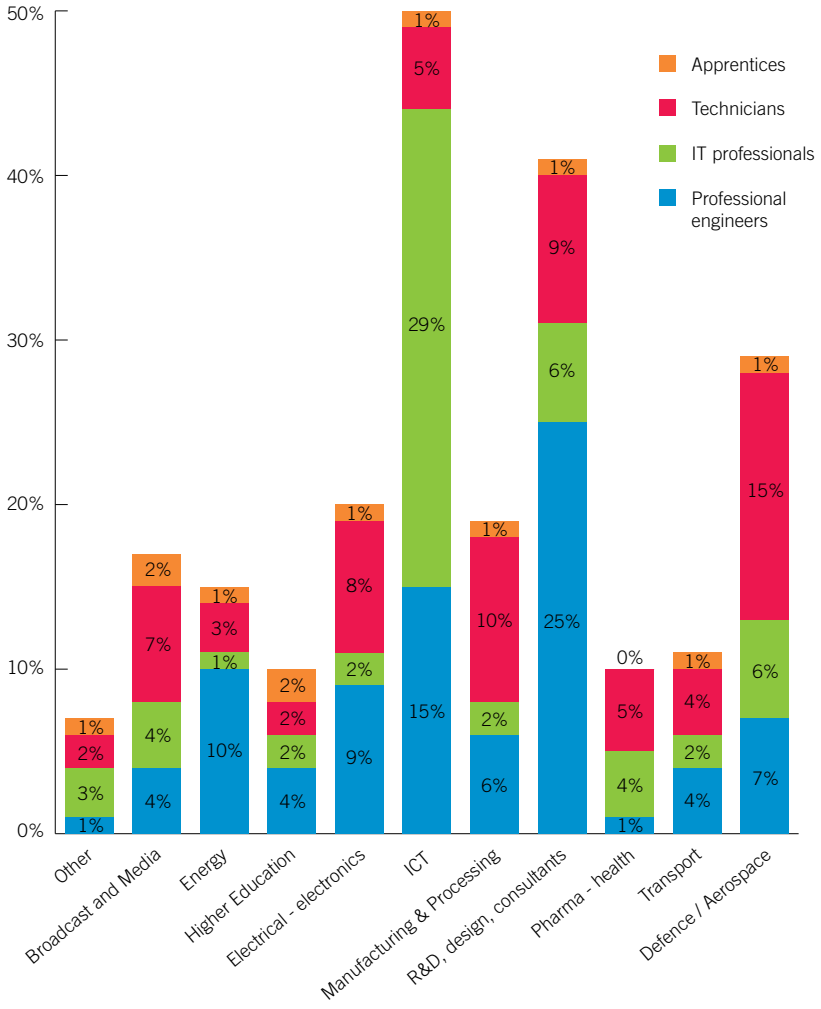

Chart 2: Mean proportion of technical staff employed by industry sector.

> *"The engineering sector is very highly skilled. A transition towards a highly skilled workforce is evident across many sectors of the UK economy."*
>
> Andrew Mill, Chief Executive of NaREC

- Companies employ more professional engineers and fewer technicians
- There are few apprentices

4.3. Age profile of the workforce

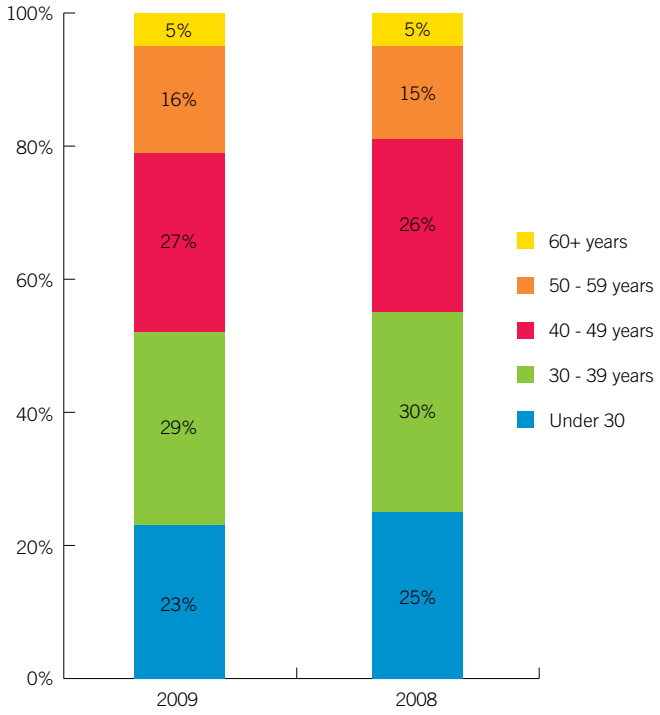

Chart 3: Age distribution of employees in technical and engineering positions.

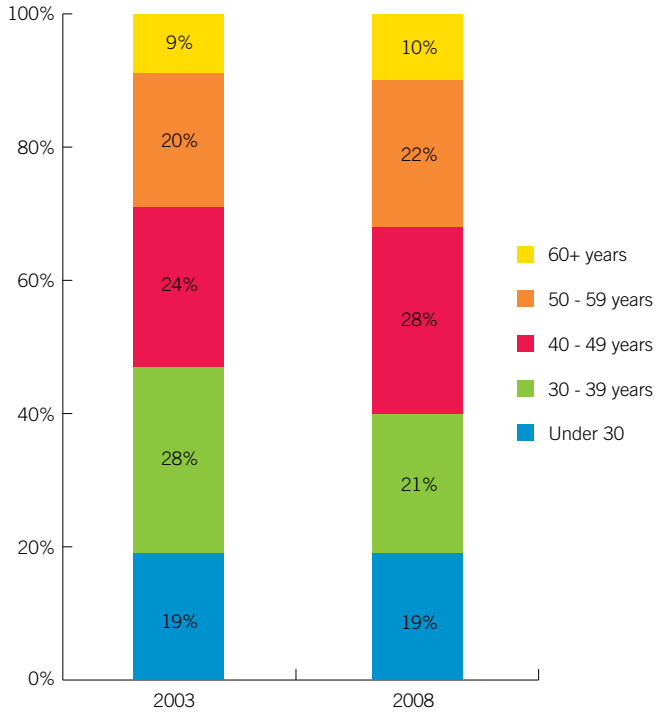

Chart 4: Age profile of the IET membership 2003 and 2008.

There is a common perception that much of the engineering workforce is ageing and approaching retirement.

Analysis of IET membership data shows only a slight increase, but data regarding the age profile of the engineering and technical workforce in the companies surveyed shows a very different picture.

The survey shows that there has been a reasonably stable and even distribution of employee ages over the last two years.

The average age of the workforce is 41 years, with 23% of engineers being under 30 years of age.

■ The engineering workforce is not ageing

4.4. Women in the workforce

Surveyed companies employ a lower proportion of women in engineering and IT positions than they do in other areas of their company. While women account for 26% of the total workforce, they account for only 7% of the technical workforce (5% of professional engineers, 10% of IT professionals, 6% of technicians and 5% of apprentices).

Furthermore, while the proportion of women in the surveyed companies' total workforce slightly increased between 2008 and 2009 (some of this increase being due to sample changes between the years), the proportion of women in technical roles remained constant. The only exception is in IT roles, where the proportion of women increased from 7% in 2008 to 10% in 2009.

These findings are mirrored by data from the Higher Education Statistics Agency (HESA). HESA found that in 2007/2008 only 15% of undergraduates studying engineering and technology courses were women.[1] Also, the Engineering and Technology Board reported that, of the women who graduate with a first degree in science, engineering or technology (SET), only 27% actually pursue a SET career compared with 54% of men.[2]

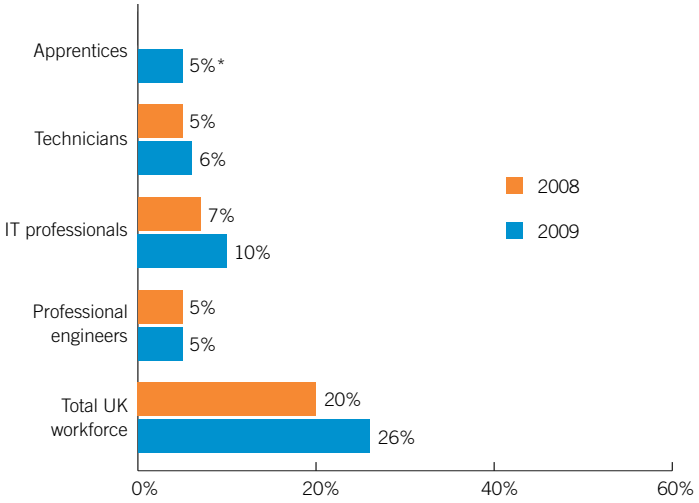

Chart 5: Mean percentage of technical staff employed who are female by year. NOTE: in 2008 the number of female apprentices was not recorded.

> *"IT is an attractive career for both men and women. It involves a lot of interaction with customers and the users of IT systems, it is usually office based rather than factory based, and it pays well. It is encouraging to see the increase in female professional IT staff and I hope that the trend continues until we reach 50%."*
>
> Martyn Thomas CBE, Martyn Thomas Associates

[1]HESA (2008) Student and Qualifiers Data Tables
http://www.hesa.ac.uk/index.php?option=com_datatables&Itemid=121&task=show_category&catdex=3

[2]ETB (2008) Engineering UK 2008
http://www.etechb.co.uk/_db/_documents/5831_EngUK08_LORES_20090401010212.pdf

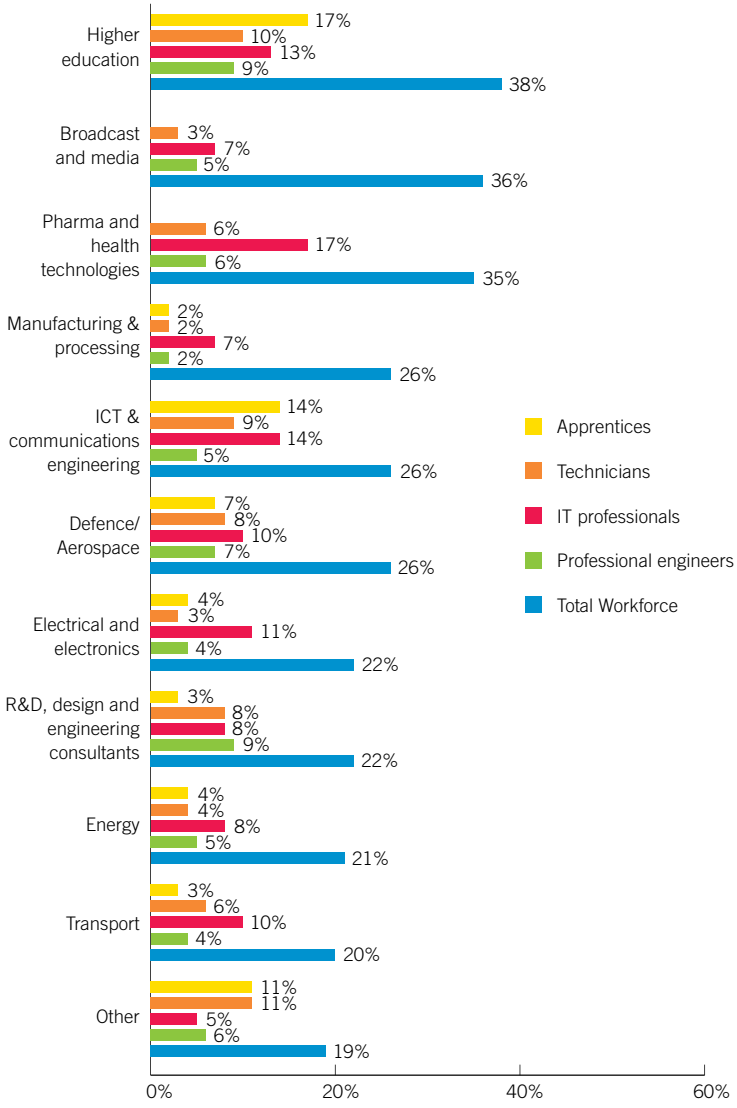

Chart 6: Mean percentage of technical staff employed who are female by industry sector.

"The engineering community has made considerable efforts to increase female participation in the sector, so it is disappointing that numbers remain static. Current trends need to be understood better so that future efforts can be refocussed and then redoubled. In that way we can be more innovative in our approach to attracting women into the sector."

David Howard, from the Department of Electronics at the University of York

Our survey shows that, despite efforts by government and others, there has been little or no increase in the number of women pursuing careers in engineering. More has to be done to attract women to take up engineering careers.

It should be noted that, whilst the number of women employed in engineering has stayed fairly static, this is not always the perception amongst those in the sector. When asked if the proportion of female employees has increased, decreased or stayed the same over the last 4 to 5 years, 25% of respondents believed it to have increased. Compared to 2008, the perception of the number of women in engineering has become more realistic. When asked in 2008, 40% of respondents thought that the number of women was increasing.

■ Women remain underrepresented in engineering and technology industries

4.5. Recruitment challenges

As would be expected in a recession, companies reported fewer difficulties recruiting suitable staff than in 2008. The largest challenge remained recruiting senior engineers, with 22% of companies who are recruiting finding this difficult. Only 16% of companies reported problems recruiting graduate engineers and 11% experienced difficulties recruiting technicians.

The reduced difficulties in recruiting is likely to be caused by more people competing for job vacancies, making recruiting highly skilled staff easier.

> *"Whilst skills shortages this year are not as acute as has been the case in previous years, these figures show that some organisations still face difficulties when looking to bolster their staff, particularly at the level of senior engineers. This shows the importance of ensuring there is a stream of high quality engineers rising to senior levels."*

Claire Donovan, Skills Policy Advisor at Semta

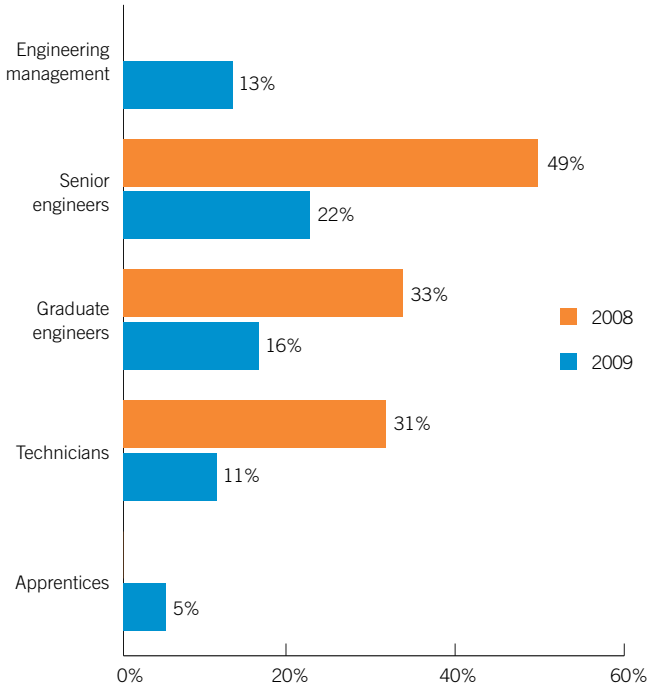

Chart 7: Proportion of organisations experiencing recruitment challenges for engineering and technical staff by year. NOTE: in 2008 the numbers for engineering management and apprentices were not recorded.

■ Demand for engineers has fallen but there is still a need for experienced staff

5. Skills and training

5.1. Skills shortfalls

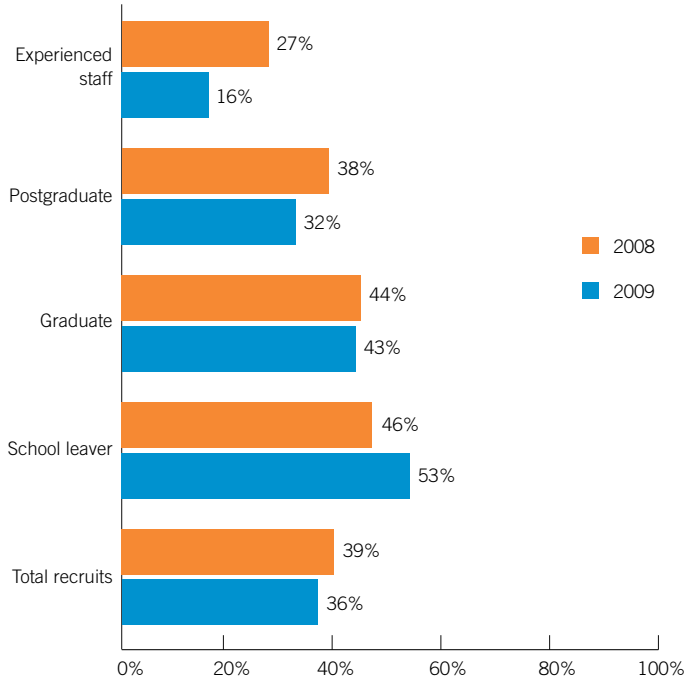

Chart 8: Proportion of organisations who consider they have shortfalls in expectations from new recruits by year. NOTE: The data is derived by subtracting those who have no shortfalls or who do not recruit that category of employee from 100%.

The survey explored the skills level of new recruits. This year 36% of companies stated that there were shortfalls in skills levels across all new recruits, compared to 39% last year. Experienced staff continued to show the lowest levels of skills shortfalls, and the biggest improvement from last year with a decrease from 27% to 16% in shortfalls. This could indicate that it is easier to recruit experienced staff than last year.

> *"The drop in recruitment of postgraduates is bad news for the UK because postgraduates are the main vehicle for technology transfer from universities to industry and this feeds innovation in products and services."*
>
> Martyn Thomas CBE, Martyn Thomas Associates

"Skills shortages exist at all levels, but particularly amongst school leavers. To address this we need to continue to make improvements throughout the education system, but particularly at primary level. At secondary level, I am very pleased about the introduction of the new Engineering Diploma for 14 to 19 year olds. This will teach young people the skills that are required by the sector and could result in a step change in the numbers seeking employment in engineering."

Dr Sue Dale Tunnicliffe, Lecturer in Education and Research Associate at the Institute of Education

Shortfalls are mainly associated with school leavers who lack practical experience (31%) and technical expertise (24%). Lack of practical experience is also the main shortfall amongst graduates (25%) and postgraduates (17%). This emphasises the importance of internships and placement years while studying for degrees.

At the IET we believe it is important to bring together universities and industry to make degrees relevant to industry requirements. The UK's leading power sector companies in conjunction with seven of the top universities have, under the IET's management, formed the Power Academy, which provides engineering scholarships to fund outstanding students throughout their studies.[3]

- More practical experience is needed for school leavers and graduates

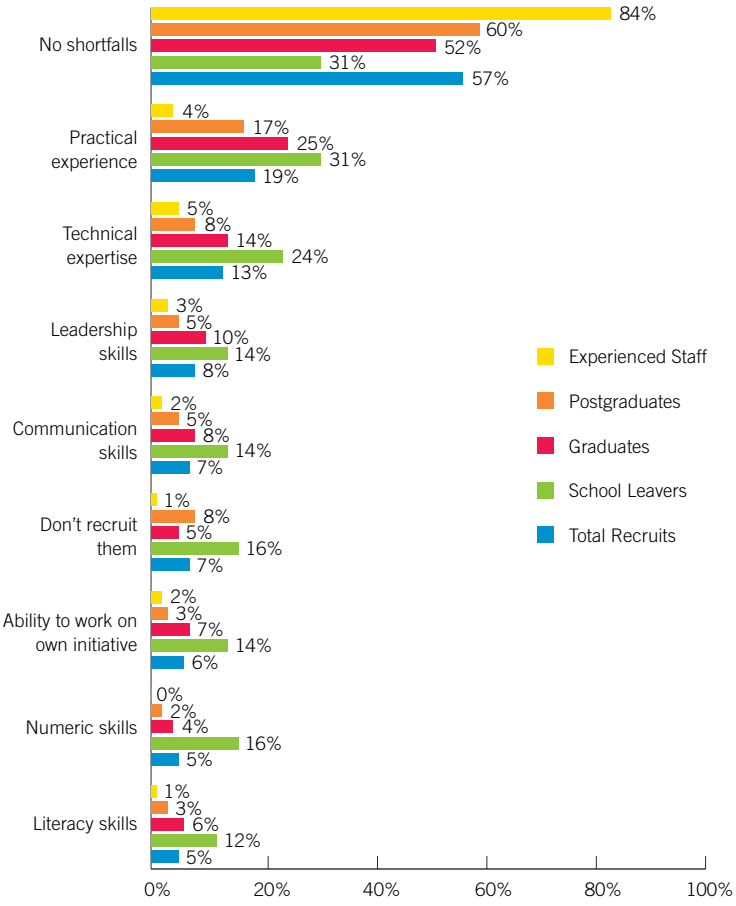

Chart 9: The chart shows perceived shortfalls in skills from new recruits.

[3]IET Power Academy
http://www.theiet.org/about/scholarships-awards/power-academy

5.2. Overcoming the skills shortage

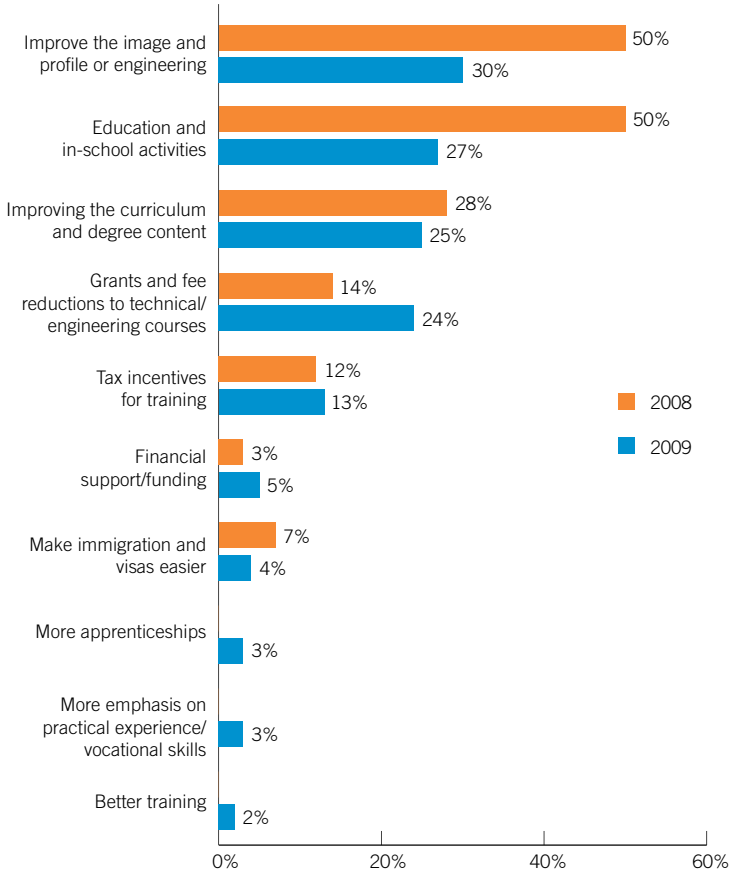

Chart 10: Respondent's views on the actions required from engineering institutions, Government, employers and other bodies to help resolve the skills shortage.

Companies were asked to identify areas requiring action from institutions, government and employers to tackle skills shortages. The top three were the same in both 2008 and 2009:

- Improve the image and profile of engineering
- Improve education and in-school activities regarding engineering
- Improve the curriculum and degree content

This year, companies appear to put increased emphasis on external funding and incentives. This may be indicative of companies being more aware of the limitations in their budgets.

> *"It seems that the effort that the IET and RAEng have put into improving the image of engineering is paying off, in that significantly fewer companies now see this as a priority. Nevertheless, the effort must continue because engineering is the way that scientific progress gets translated into jobs, wealth, and a better quality of life."*
>
> Martyn Thomas CBE, Martyn Thomas Associates

- The image of engineers and engineering is still seen as a major obstacle to recruitment
- Companies do not see a major role for themselves in solving this problem

5.3. Concerns about the loss of skills

The economic downturn had forced a number of companies to restructure their business. This can lead to a loss of employees and their skills and knowledge. Industry sectors that are particularly concerned about losing their skills base are:

- Transport (59%)
- R&D, design and engineering consultants (48%)
- ICT (47%)
- Defence/aerospace (44%)
- Electrical and electronics (42%)

Interestingly, the level of concern seems to correlate closely to how much continuing professional development (CPD) those companies offer their staff. The energy sector, which is least concerned about losing expertise, offers most CPD for employees.

■ Companies see the recession as endangering their skills base

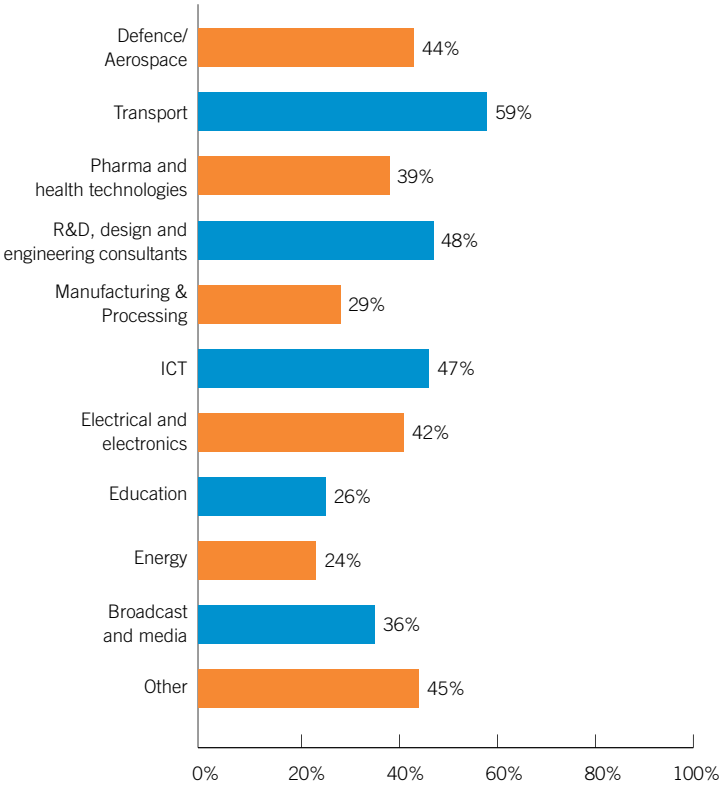

Chart 11: Percentage of employers who are concerned about loss of skills and knowledge due to possibilities of restructuring as a result of the current economic climate.

5.4. Training and professional development

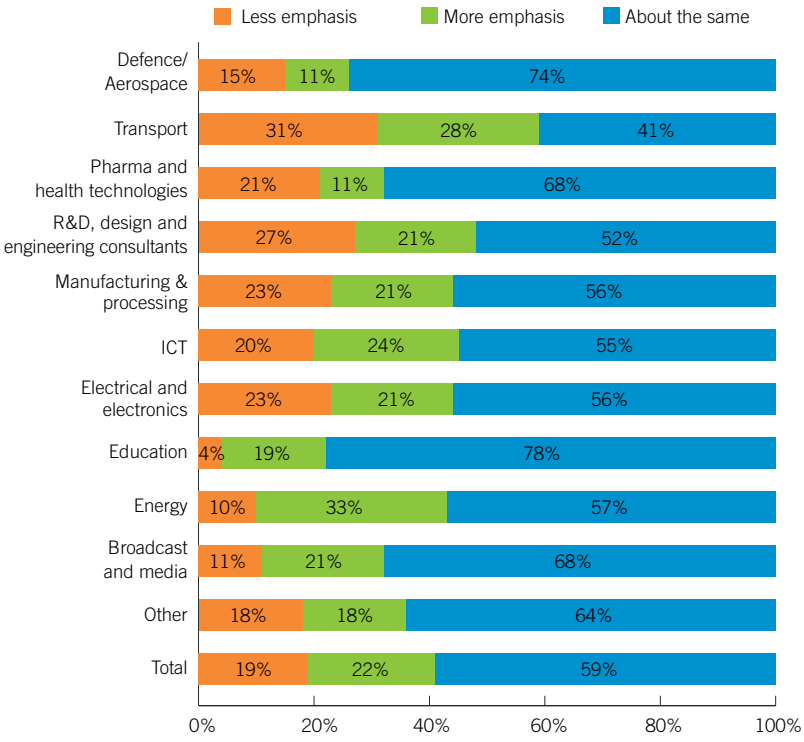

Chart 12: Impact of the economic climate on the provision of training for engineering and technical roles.

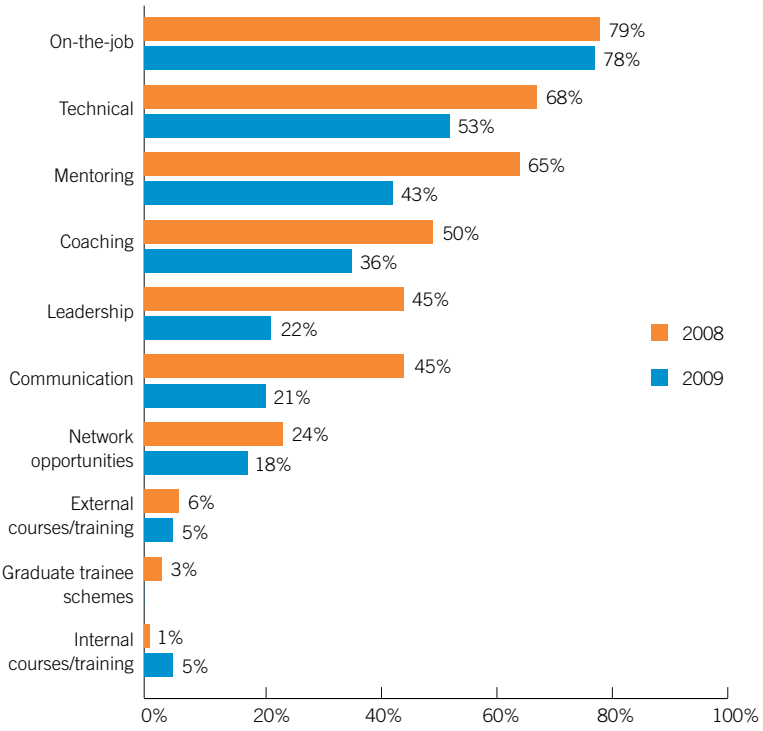

Chart 13: Type of training and development provided by employers.

Only 2% of companies reported that they do not provide any training and the majority of companies (59%) claimed that the economic climate has had no impact on their training and development initiatives.

With the exception of 'on-the-job' training, a large number of companies are undertaking fewer specific types of training, with the largest cuts being made in leadership and communication training. However, the relative importance of the various types of training remains unchanged from the prior year.

- No "train to gain" amongst the majority of companies
- Companies claim no change in emphasis whilst cutting back in all training areas

6. Looking to the future

6.1. Recruitment plans over the next 12 months

The IET found that 31% of companies are planning to recruit staff over the next 12 months and 22% of companies want to recruit for engineering and technical roles. Only 4% of companies are planning to recruit apprentices for technical roles.

This is a significant change from last year's figures in which 63% of companies were planning to recruit. This shows the impact of the economic downturn on recruitment.

The survey has shown that few companies are planning to recruit apprentices in the short term. The defence/aerospace sector employs most apprentices.

- There are still employment opportunities within the engineering sector
- No rise in apprentice numbers

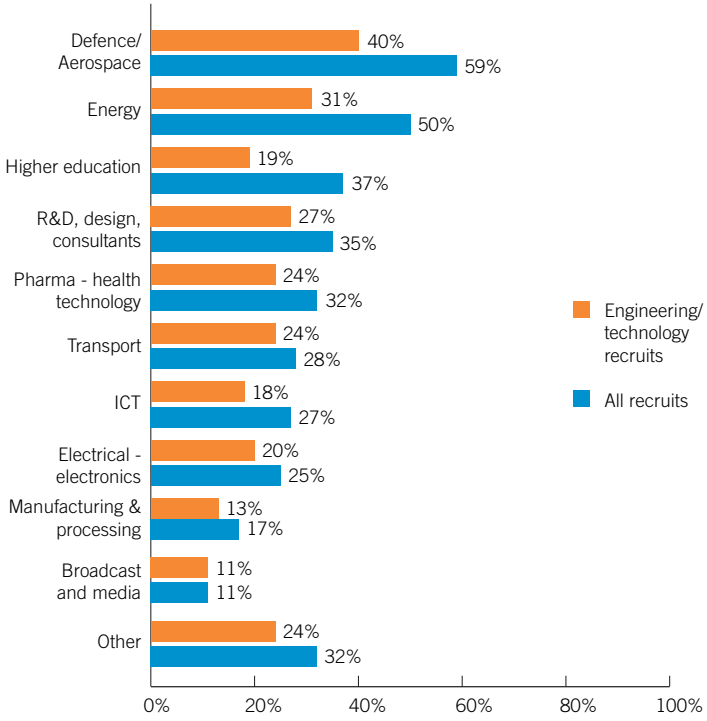

Chart 14: Proportion of organisations planning to recruit staff and engineering and technology roles over the next 12 months by industry sector.

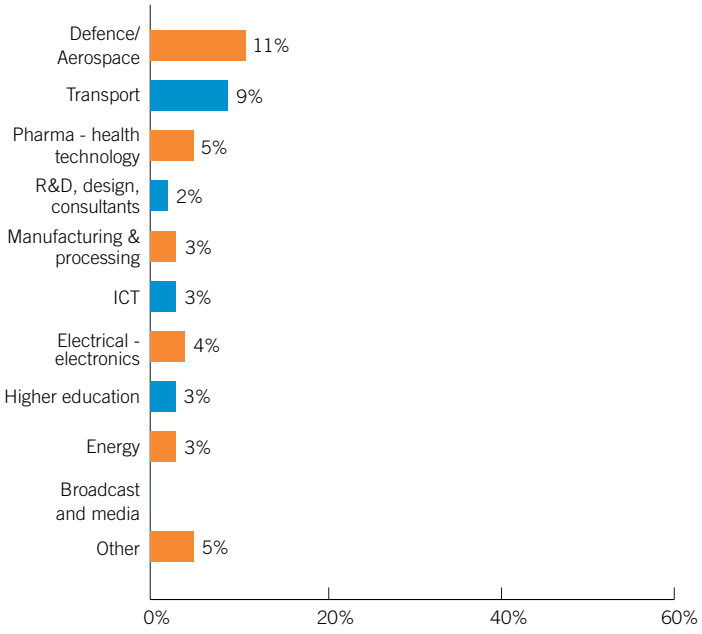

Chart 15: Proportion of organisations planning to recruit apprentices for engineering and technology roles over the next 12 months by industry sector.

6.2. Anticipated recruitment levels

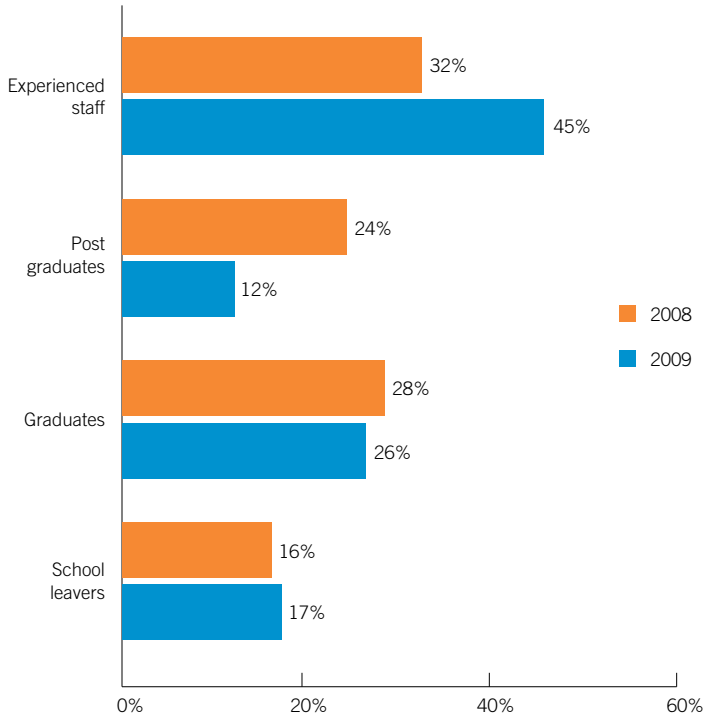

Chart 16: Percentage of companies planning to recruit experienced staff, postgraduates, graduates and school leavers. Multiple responses were provided and these have been weighted so they add to 100%.

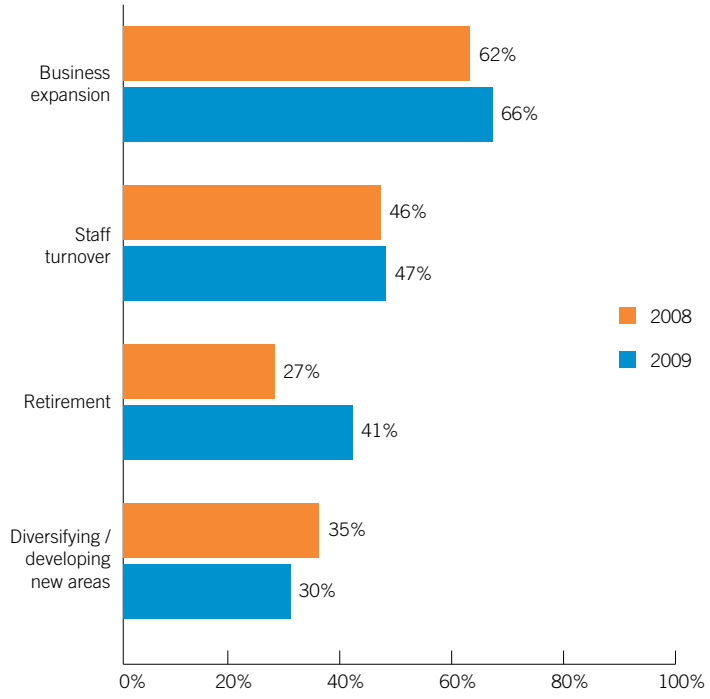

Chart 17: Reason for recruiting new engineering and technical roles.

In both 2008 and 2009 those companies who were recruiting for engineering and technology roles were mostly recruiting experienced staff (45%), followed by graduates (26%).

This year, the proportion of companies recruiting postgraduates has dropped dramatically from 24% to 12%. This could be an indication that companies are cutting back on their R&D.

Companies' key drivers in new recruitment for engineering and technology roles are business expansion (66%) and staff turnover (47%), whilst diversifying/developing new areas of business accounts for 30% of recruitment. This means companies mostly recruit for existing posts or to expand their business. Less than 10% of surveyed companies are recruiting for new areas of their business.

> *"These figures indicate that fewer companies than last year are diversifying their business or developing into new areas. This is unsurprising given the recession, and is not necessarily indicative of a long term trend."*
>
> Jeremy Watson, Director of Global Research at Arup.

- Companies plan for expansion rather than diversification
- Companies expect more engineers to retire

6.3. Recruitment challenges

A greater proportion of organisations are confident they will be able to recruit this year (50%) than in 2008 (18%). The increase in confidence may in part be due to the recession, which is resulting in increased numbers of unemployed individuals with technical skills looking for work. Nearly one in five companies think that they will not be able to recruit suitable candidates this year (19%), 16% over the next 2-3 years and 14% over the next 4-5 years.

> *"This survey illustrates the danger, always inherent in a recession, of cutting back too far on recruitment of apprentices and graduates/post graduates. The assumption that someone else can bear the cost of training and that trained/ skilled staff can always be recruited later is unlikely to hold true."*
>
> Prof Jim Norton, Chair IET IT Sector Panel

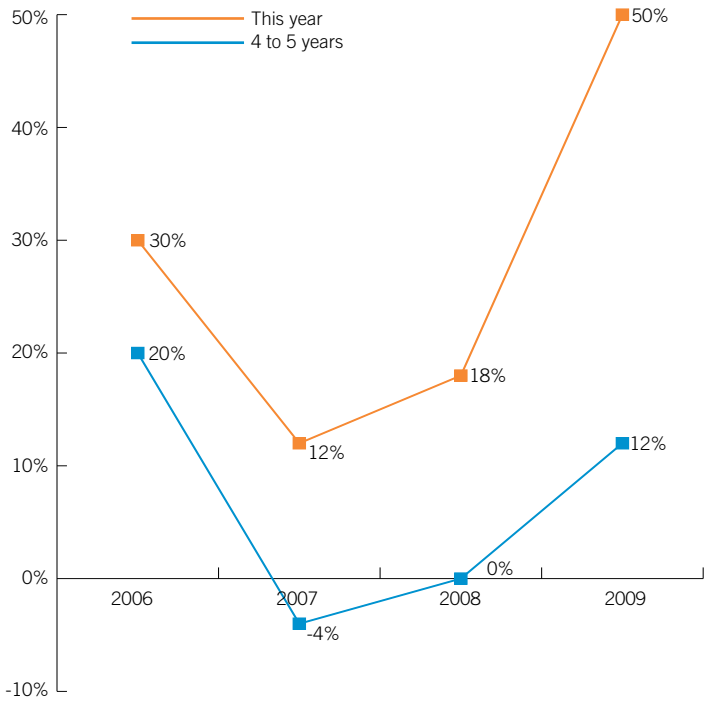

Chart 18: How confident companies are that they will be able to recruit this year and over the next four to five years. NOTE: The confidence factor is derived by subtracting the percentage of companies who are not confident or do not know if they will be able to recruit suitable staff from those companies who are confident that they are able to recruit suitable staff.

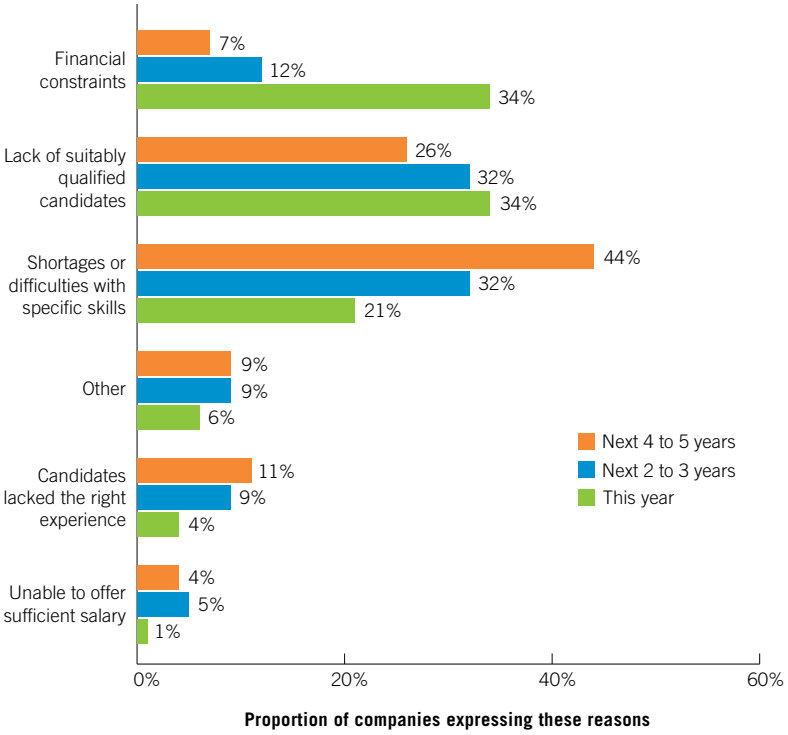

Chart 19: Reasons companies give for thinking they might not be able to recruit suitably qualified engineers and technicians this year.

When those companies who anticipate difficulties recruiting were asked for the reasons, they cited financial constraints and lack of suitably qualified candidates (both at 34%). However, most companies do not anticipate that financial constraints will continue to be a barrier beyond 2 to 3 years. This is a positive indication that industry expects the economic recession to be relatively short-lived.

Another barrier to recruitment is a shortage of, or difficulties with, specific skills (21%) and this is expected to increase sharply as a recruitment barrier over the next 2 to 3 (32%) and 4 to 5 years (44%).

> *"The IET's survey suggests that many engineering companies anticipate that the recession will be relatively short-lived. They expect financial constraints to reduce over the next few years."*
>
> Venture capitalist Christopher van Essen

- Employers are more confident now that they will be able to recruit the engineers they need than at any time over the past four years

7. Survey methodology and profiles

Consistent with 2008, the information was collected by telephone from 400 companies. The interviews took place in April 2009 using a 10 minute questionnaire.

Interviews were conducted with those within the company responsible for the recruitment of engineers and other technology staff; in most cases these were Engineering Managers/Directors or HR Managers/Directors.

7.1. Our sample

Charts 20 to 22 show the distribution of the sample by industry sector, company size and turnover amongst participating companies.

The survey was established using a quota so that a minimum of 25 interviews were conducted in each industry sector. In some cases industry sectors were combined in order to ensure this criterion was met, specifically:

- Defence and aerospace were combined
- Other, construction and utilities were combined and labelled as other.

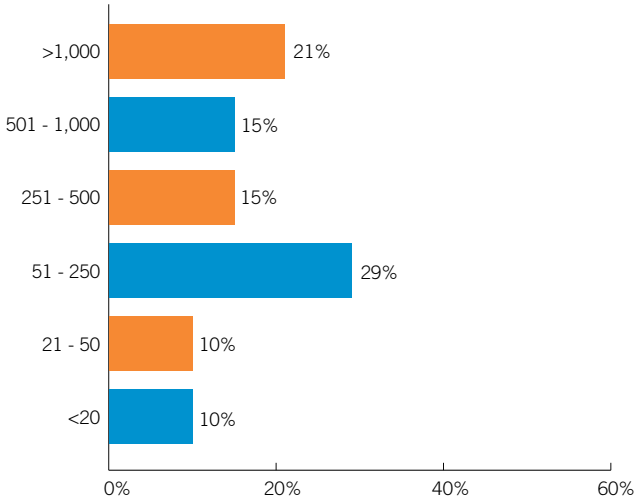

Chart 21: Size distribution of companies interviewed for this survey.

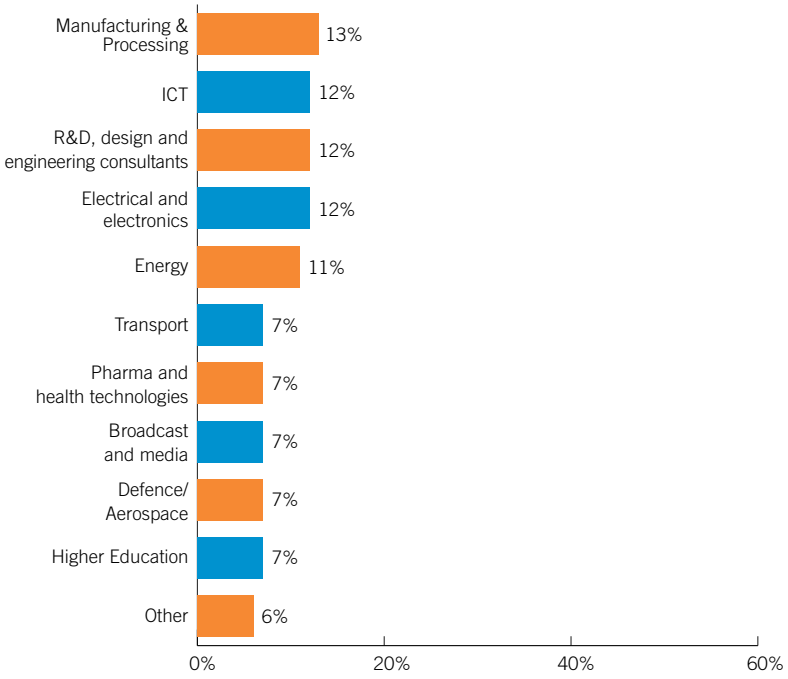

Chart 20: Distribution of the sample included in this survey by industry sectors

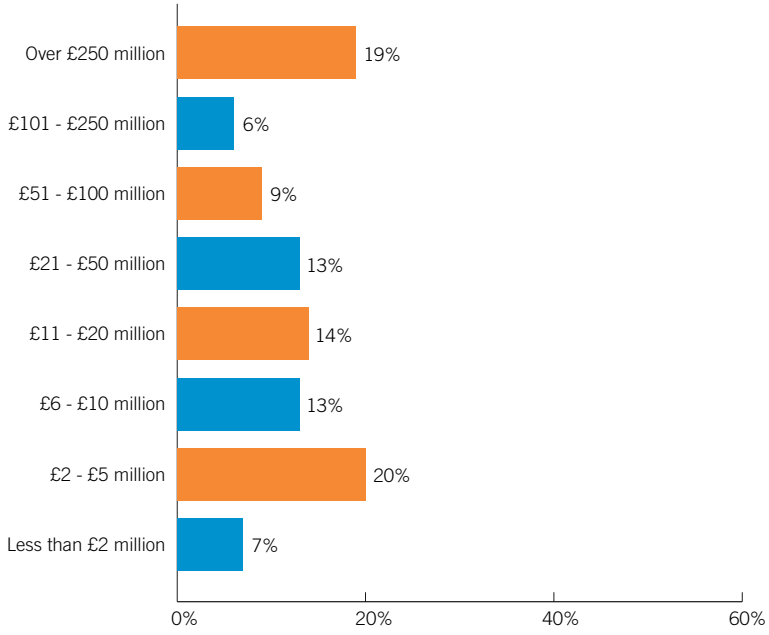

Chart 22: Turnover of companies interviewed in this survey.

Notes

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