

THE UK MANUFACTURING SECTOR NEEDS TO BE PLACED AT THE VERY HEART OF OUR ECONOMY AND ENCOURAGED TO THRIVE.

PHILIPPA OLDHAM
CENG MIMECHE
HEAD OF
MANUFACTURING
INSTITUTION OF
MECHANICAL ENGINEERS

This is the third year of the Institution's *Engineered in Britain* campaign, which aims to promote the value of engineering and manufacturing to the health and wealth of the UK's economy.

This report builds on the results of the 2011 and 2012 surveys, and aims to ascertain the perceptions of manufacturers and the public towards the value, role and input of Government in the growth of this valuable economic sector.

This report has been produced in the context of the Institution's strategic themes of energy, environment, education, manufacturing, transport and its vision of 'Improving the world through engineering'.

Published May 2013. **Design**: teamkaroshi.com

CONTENTS

02

FOREWORD

03

EXECUTIVE SUMMARY

05

CULTURE

13

SKILLS

23

INNOVATION

26

GLOBALISATION & COMPETITIVENESS

37

CONTRIBUTORS AND REFERENCES



FOREWORD

At the end of 2012, the UK's deficit on trade in goods was £106.3 billion, the highest ever recorded^[1]. To reduce this deficit, there needs to be a significant increase in the production of goods that have been commercialised, designed, developed, manufactured and supplied by UK-based companies onto the global marketplace.

UK manufacturers are beginning to recognise the importance and necessity of exporting more of their products and opening up their potential customer base to ensure future survival and profitability. However, in the coming decades manufacturers will also begin to see changes to the way we conduct business, with UK-produced goods becoming more bespoke to customers living in a wider range of countries.

At this time, the UK Government is championing High-Value Manufacturing (HVM), with innovative and high-value processes requiring highly skilled engineers and technicians, leading-edge technical knowledge and expertise to create new products and improve current production processes and their associated services. [2] Advanced manufacturing is knowledge-intensive and dependent upon higher levels of innovation that must be encouraged and nurtured if the UK is to become a globally competitive manufacturing nation.

The Institution's *Engineered in Britain* campaign was established in 2009, after the global economy suffered one of the biggest economic downturns in recent history. Although many governments around the world helped stem the recession with the use of innovative economic measures, many countries, including the UK, continue to remain in the economic doldrums. Signs of economic slowdown within the BRIC nations, directly related to the sharp downturn within Europe, will increase anxiety that this recession is far from over. Indeed, the economic progress of the UK since the 2012 survey shows we have experienced next to no growth.

Many within the Institution of Mechanical Engineers believe that manufacturing and engineering remains the best way to help create and build a stronger economic model for the UK over the coming decades. The recent growing interest by the main political parties in developing the UK's manufacturing and engineering sector is welcomed. However, visits to factories and warm words of encouragement are not enough. Government must gain cross-party support and industrial agreement on a clear, long-term industrial strategy. This strategy must address the engineering skills shortage, invest in new process and business model development, and provide greater access to sufficient capital investment for companies to develop new products and manufacturing processes.

The following *Engineered in Britain* survey is based on two sets of research conducted in April 2013. The first survey was conducted by MSS Research and focused on the views of 1,000 senior professional engineers working within the UK's manufacturing sector. The second survey was conducted by ICM Research and focused on the views of 1,000 members of the general population on issues surrounding the UK's manufacturing sector.

Philippa Oldham CEng MIMechE





The health of manufacturing in the UK has been assessed from four perspectives:

- Culture: how much status and value are we giving to manufacturing?
- Skills: do we have the right people, now and in the future, to support the sector?
- Innovation: how much is this a part of our thinking in how we compete?
- Globalisation and Competitiveness: where do we stand against other nations?

From all perspectives, actions are proposed based on the survey data obtained.

Culture

The 2013 Engineered in Britain survey results indicate that both manufacturers and the general population still continue to believe that Government does not recognise the potential in the UK's manufacturing sector. Both groups (85% of manufacturers and 51% of the public), said that the Coalition remains more focused on the country's financial and service sectors.

The recently launched Industrial Strategy by the Department for Business, Innovation & Skills has clearly not yet affected business enough to change perceptions. The trend since 2011 remains in the wrong direction.

The Government needs to invest in public communication in parallel with its business support in order to deliver the UK industrial strategy effectively.

Skills

When asked how Government was performing on a range of policy areas, education and skills saw the most marked improvement with a 39% approval rate from manufacturers, up from 13% in 2011. Other policy areas were not as positively received, especially manufacturing policy, which only achieved a 17% (manufacturers) and 21% (public) approval rating.

On careers advice, 73% of manufacturers and 55% of the public said that Government is still not doing enough to promote science, engineering and manufacturing in schools. This is at a time when it is widely acknowledged that we need to double the current output in these subjects to cover for 'baby boom' retirement as well as provide for new business development.

Employers need to co-ordinate with each other and engage more actively with Government and all agencies involved in demonstrating the opportunities for employment arising from studying science and engineering subjects at school.

Innovation

Among manufacturers, innovation remains a challenge, with only 45% of manufacturers even aware of how much of their turnover is directly related to new product introduction. 4% of businesses admitted to not investing anything in research & development, and a further 63% either didn't know, or invested at a minimal rate.

The survey also reveals a 14% drop in the number of companies currently recruiting, which is disappointing. The biggest challenge in 60% of cases was a shortage of design engineers.

The importance of new product development to economic growth still has insufficient public profile. The Institution of Mechanical Engineers aims to redouble its work with others on business improvement and to raise awareness through the public celebration of success in prizes and awards.

Globalisation and Competitiveness

Results from the survey showed that 28% of manufacturers are continuing to offshore (moving their manufacturing abroad usually to reduce unit costs) compared to just 20% that are reshoring (moving their manufacturing back to the UK). Maximising the value added in the UK through reshoring is clearly an important part of reducing our trade deficit. Of those that are reshoring, the main reason was the need to improve manufacturing quality. Control of intellectual property, rising offshore and shipping costs also all came above exchange rates and the taxation system as reasons to bring work back to the UK. Despite this, Government needs to encourage as much reshoring as it can, as a key part of delivering its industrial strategy.

Government needs to reinforce the technical benefits (of increased product quality and intellectual property control) of localised manufacturing. A simplified UK fiscal policy is also essential to compete internationally.

6677

AN EFFECTIVE INDUSTRIAL STRATEGY RELIES ON COMMUNICATION AND COMMITMENT AS MUCH AS CONTENT.



CULTURE

Government Focus

The UK manufacturing sector needs to be placed at the very heart of our economy and encouraged to thrive. The Engineered in Britain 2013 survey results continue to show that there is still little confidence that Government is doing enough to make this happen (Q1). Respondents overwhelmingly responded (86% of manufacturers and 51% of the public) that the UK Government still remains far too committed to the financial sector (Q3) when it should be looking to the potential of manufacturing to spearhead economic recovery and lead the country towards growth.

Perceptions of Manufacturing

Many individuals have grown up in a culture believing that the UK no longer 'makes anything'. For many, there is still a lack of real understanding of what it means to be a manufacturer. The UK's economy is a long way from the 1850s, when 40% of the national workforce (5.6m against a population of 27m, compared with today's figures of 2.5m against a population of 62m) worked in manufacturing. With the steady decline of the manufacturing sector, especially from the 1960s to 1990s, the public perception of what manufacturing is has eroded.

The 2013 results suggest that manufacturers and the public believe that Government is still not doing enough to promote UK manufacturing (Q2). The results show that only 26% of manufacturers believe Government policies are helping them. Question four included a sub-section on how Government was performing on education and skills. This saw a remarkable improvement, with 39% of manufacturers believing that they were doing well, compared with the figure from two years ago of 13%. This is an encouraging trend that the Institution hopes will continue in the near future. With the need to double the number of engineers and technicians within the next ten years[3], the Institution welcomes the many initiatives coming from the Department of Business, Innovation & Skills (BIS) at this time, especially in the area of apprenticeships and onthe-job training.

In other areas of policy, 61% of respondents said Government is performing badly on manufacturing policy, with just 17% of those polled saying Government is performing well (Q4). Although this is hardly an encouraging result, the Institution interprets this to be down to the lack of a well-communicated national industrial strategy, with current focus on developing ad hoc strategies for specific industries (real or perceived).

A Manufacturing Nation?

Finally, on **question five**, 35% of respondents stated that they are less confident about the future of UK manufacturing – compared with 23% last year.

Overall, it remains clear from these findings that the majority of people, whether they work in manufacturing or not, believe that the Government is not doing enough to promote, help and support UK manufacturing.

However, the responsibility does not lie just with Government but also with educators, parents and the media, who all have a role to play in communicating that manufacturing needs intelligent individuals with ambition and drive, who are innovators and aspire to achieve. Manufacturers deliver changes by improving the world in which they live today, as well as the world of future generations.

The Culture of Siemens

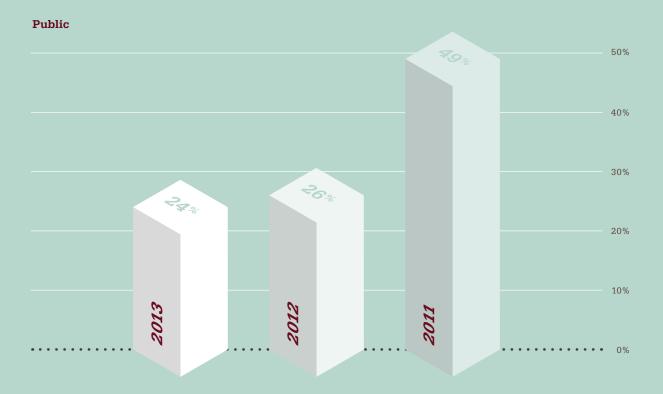
Year-on-year productivity savings are a testament to the culture found at Siemens Congleton. The site is considered unique for its community atmosphere and continuous improvement culture; improvements are considered 'business as usual'. The employee engagement on site is at a record high, with 100% response rate for its recent performance culture survey.

The purpose of the survey was to understand the performance culture at each Siemens Drive Technologies plant, and in particular to understand how LEAN, Diversity, KPIs, Communication, Strategy etc were understood at all levels in each plant. The Congleton facility scored the highest in many of these categories and now acts as a benchmark for other Siemens businesses. The Siemens annual employee survey shows that the Congleton facility had the highest response rates across all global plants within the industry sector, at an impressive 89.7%, with an excellent Employee Engagement score of 92%.

Siemens annual staff survey results show that:

- 91% of employees are proud to tell others that they work for Siemens.
- 95% of employees are willing to put in a great deal of effort beyond what is normally expected to help Siemens succeed.
- 96% of employees fully support the Siemens values.
- 93% of employees strongly believe in the goals and objectives of Siemens.

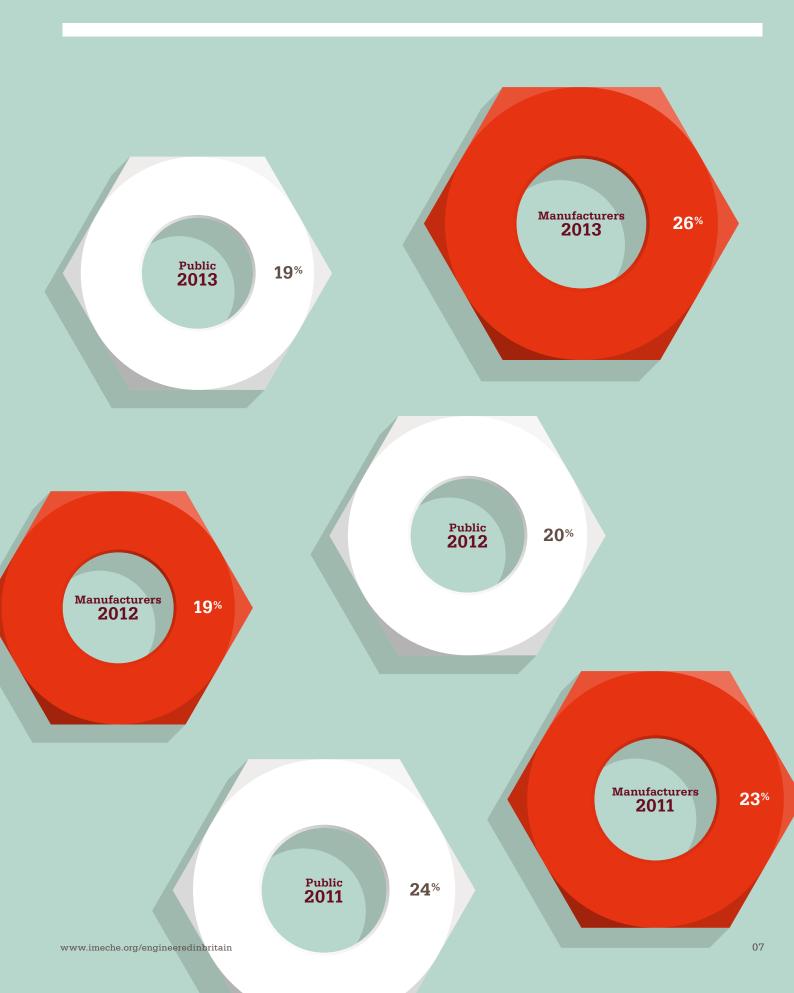
The Coalition is committed to creating a more balanced economy by growing UK manufacturing?



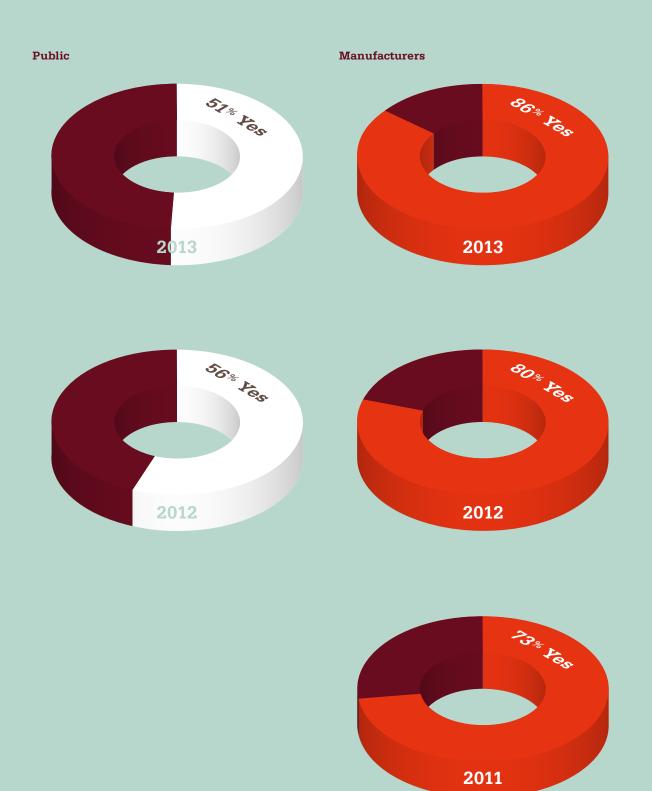
Manufacturers



The Coalition policies are helping UK manufacturers?



The Coalition is more committed to the financial sector than to manufacturing?

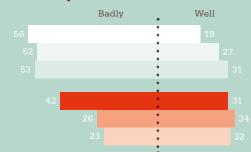


How is the Government performing in the following policy areas?

Education and skills



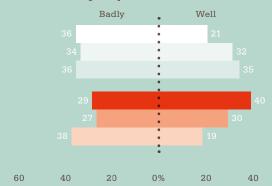
The economy



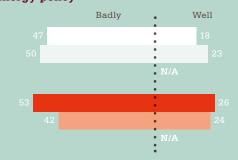
Manufacturing policy



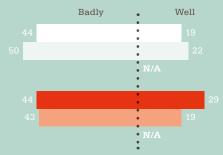
Environmental policy



Energy policy



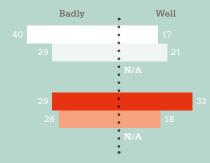
Transport policy



Taxation

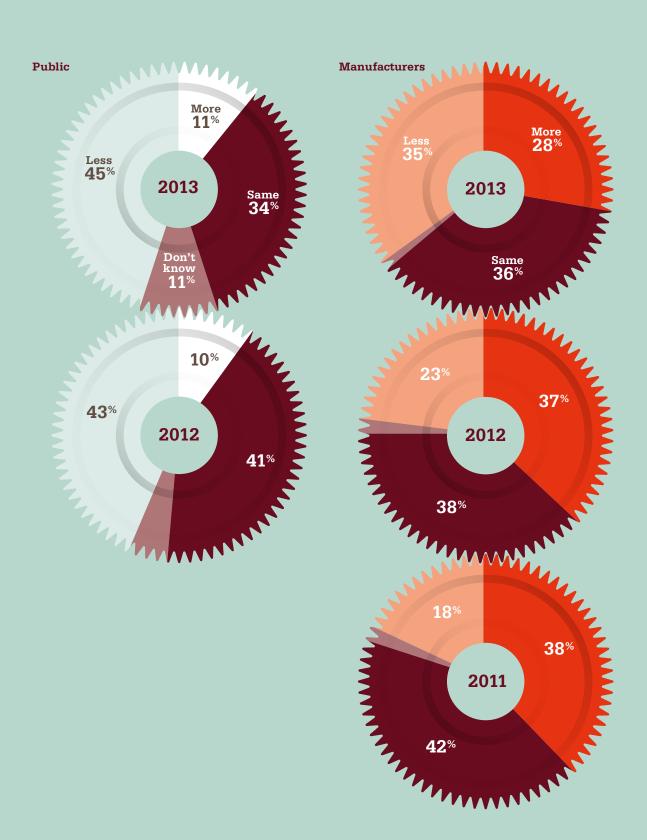


Regulation





Are you more or less confident about the future of manufacturing since the Coalition came to power?



RECRUITMENT
INTO THE SECTOR
CONTINUES TO BE A
PROBLEM HIGHLIGHTED
IN THE SURVEY.





SKILLS

The UK manufacturing sector employs 2.5 million people, contributing 20% more per employee to the economy than the average job.^[7] However, this sector faces a serious challenge of an ageing workforce, with 14% of employees being 60 or older.^[5]

Recruitment into the sector continues to be a problem highlighted in the survey. Of the manufacturers surveyed, 73% said Government is not doing enough with careers advice to promote science, engineering and manufacturing in schools, with 55% of the public agreeing (Q6). Today, even with high levels of unemployment, there are estimated to be, globally, ten million manufacturing jobs that have not been filled. [6]

This statistic is echoed by the results of **question seven**, which show that 62% of manufacturers surveyed are actively recruiting. However, with the recent push on apprentices and technicians, it seems that 60% of manufacturers are struggling to find skilled design engineers or engineers with management skills (**Q8**).

More needs to be done by industry in terms of reskilling (providing new skills and techniques to employees to meet the current and future engineering needs of their organisation) and upskilling (upgrading the skills and techniques of employees to meet the current and future needs of their organisation).

Upskilling and reskilling generally take less time (between six and nine months) compared to the three to five years for a full apprenticeship or degree. However, as a professional development organisation, the Institution believes that the best companies should have a programme of continuous professional development for all their employees.

This year's survey reinforces what the Institution hears regularly: that manufacturers are finding it hard to recruit people with the right skills. The Department for Education (DfE) and the Department for Business, Innovation & Skills (BIS) need better links with industry, to ensure that UK universities and technical colleges are developing people with the right skills. This has never been more important as the UK focuses and invests in High-Value Manufacturing (HVM) technologies, such as Additive Manufacturing (3D printing), which change both the principles of design and the materials used.

Industry needs to work with schools and universities to offer more industrial placements to students undertaking sandwich courses, and more holiday work placements for students in full-time education, helping them gain the right skills mix for future industrial careers.

There needs to be excellence in the teaching of STEM (science, technology, engineering and maths) skills as well as the execution of them.

The Institution has long advocated the need for Government to seize the opportunity and invest in manufacturing to help redress the imbalance in the economy.

Manufacturers said that the skills missing from their recruits include management (71%) and leadership (53%) skills (Q11). Given the enormous challenge of reducing the UK's deficit, many more people not currently employed in the drive to manufacture for export, need to be attracted into, or attracted back into, employment in this sector. These transformations are vital to enable the UK to successfully compete in the rapidly changing global marketplace.

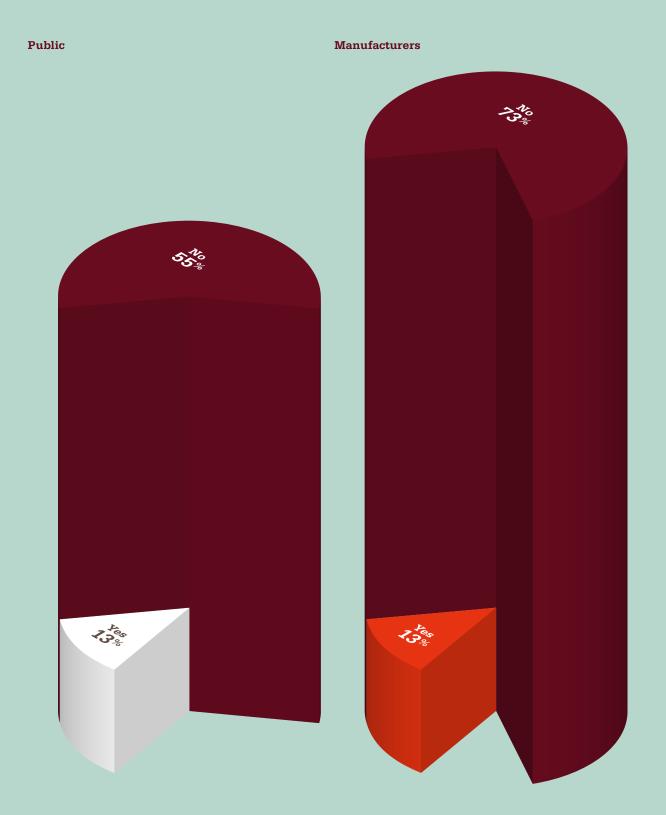
According to the survey, manufacturers depend on their brand image for recruitment of the best professional engineers and technicians (60% and 67% respectively) (Q10a and 10b). This reiterates the importance of manufacturers working within their communities, with universities and technical colleges for research & development, and providing employment.

Nationwide, SMEs account for 65% of total manufacturing employment; however these manufacturers can often lack resources when it comes to providing further training for their employees.[6] There is therefore an opportunity for larger organisations, technology innovation centres (Catapults), and skills academies to provide support. BIS has sponsored several Local Enterprise Partnerships (LEPs), which promote apprenticeships and collaboration with universities and colleges, to develop the teaching of skills more in line with industrial needs. [6] An example of this is BAE Systems, where the company has received funding to set up its own academy to train apprentices not only for its own business but also for that of its supply chain.

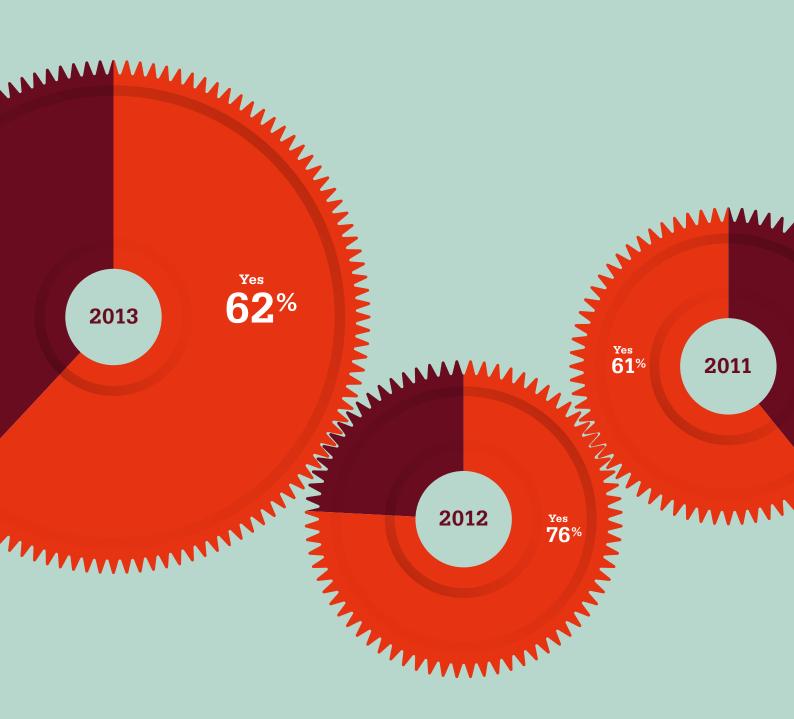
To meet the demands of manufacturers, we need children to be encouraged at both home and school to study STEM subjects that demonstrate practical applications, which both support and challenge them to ask, "What can I achieve?" The Institution of Mechanical Engineers is committed to helping inspire the next generation of engineers through apprenticeships, colleges or universities. For example, approving and accrediting engineering courses and through professional registration.

Some are already taking steps in this direction. Rolls-Royce, for example, is doubling the capacity of its apprentice training academy in Derby to take on about 200 staff selected from companies in its supply chain. The speed of change is increasing and forcing supply chains to become more like supply networks, requiring a high level of agility, flexibility and with a broader set of soft skills across the workforce.

Do you think the current Coalition is doing enough with careers advice to promote science, engineering and manufacturing in schools?

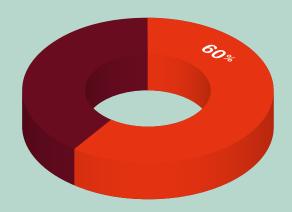


Is your company currently recruiting? Manufacturers only

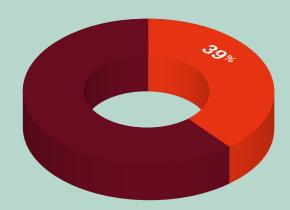


What roles are you finding difficult to recruit? Manufacturers only

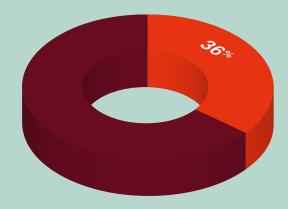
Design engineers



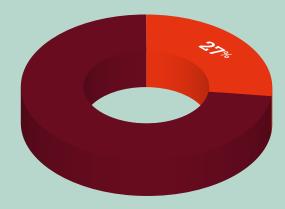
Production engineers



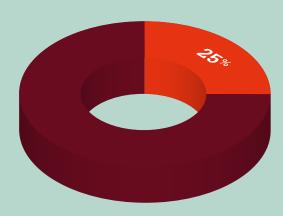
New product specialists



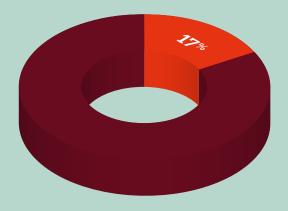
Technicians



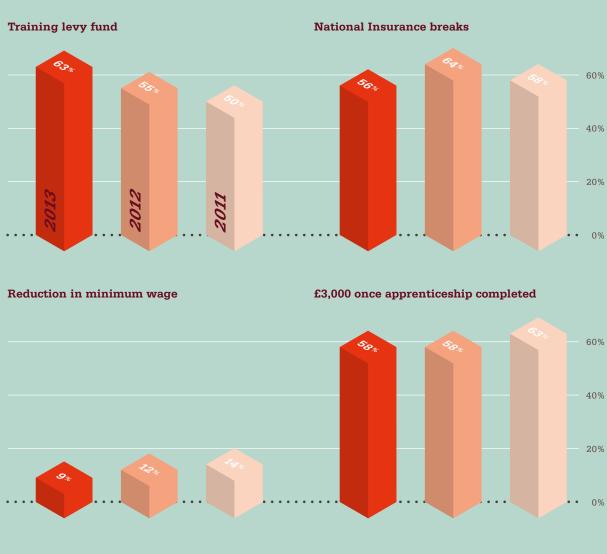
Management

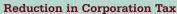


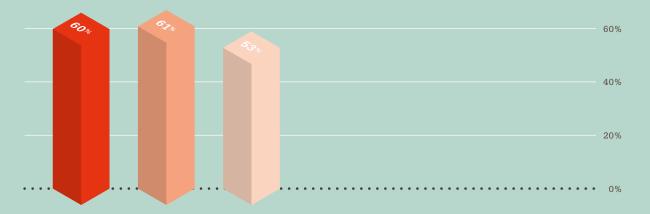
Technical sales



Which of the following would incentivise you to take on an apprentice? Manufacturers only

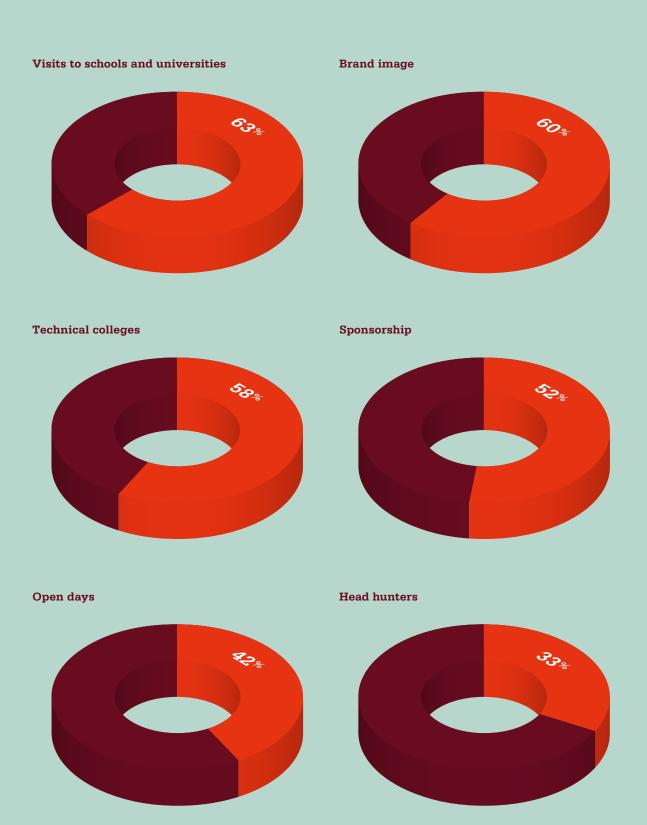






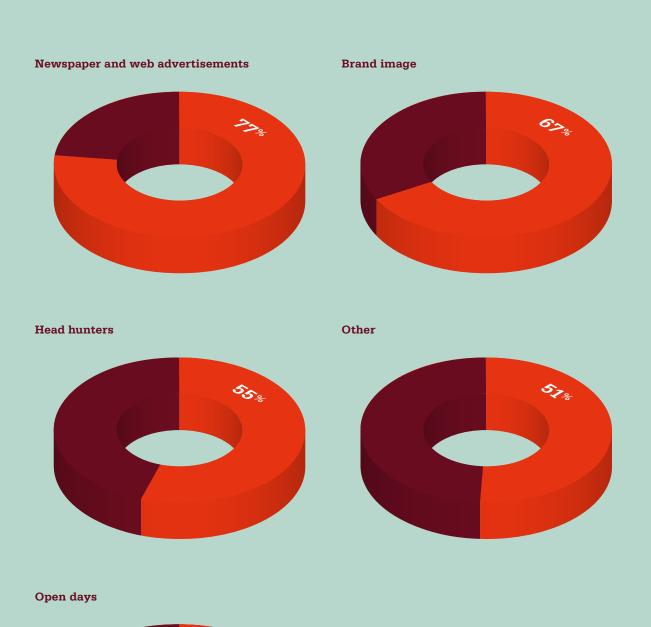
10a

Which, if any, of the following does your company use to attract the best technicians and apprentices to your company? Manufacturers only

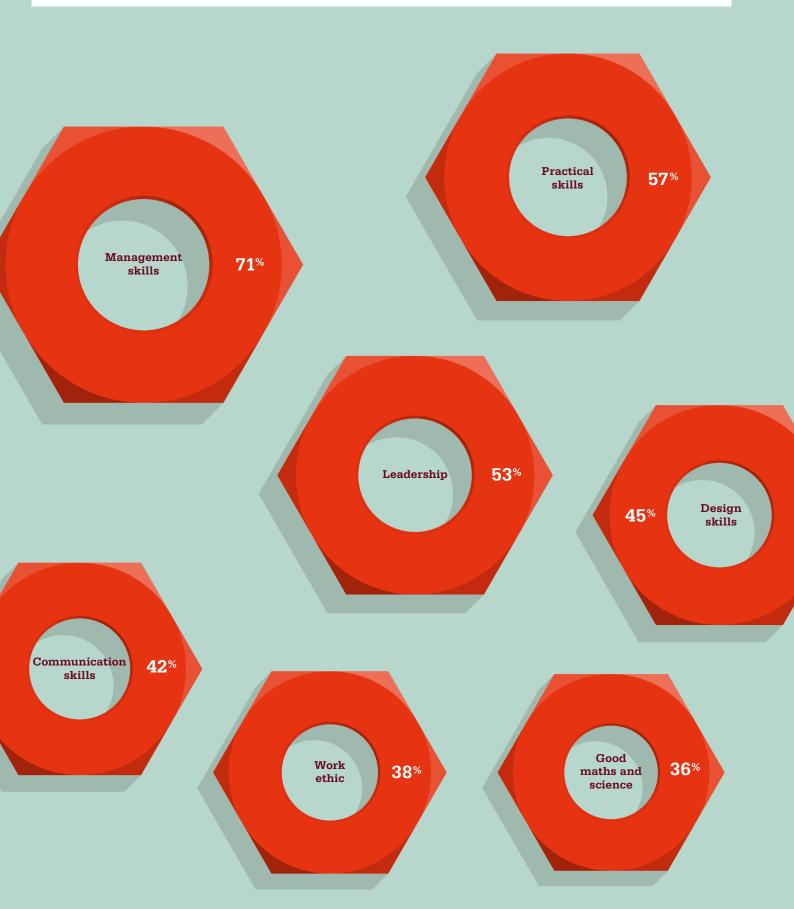


10b

Which, if any, of the following does your company use to attract professional engineers and managers to your company? Manufacturers only



In your experience, do you find that apprentices, graduates and new recruits lack any of the following skills? Manufacturers only



SUCCESSFUL INNOVATION REQUIRES SKILLS LINKED TO THE MERGING AND ADAPTATION OF TECHNOLOGIES.





INNOVATION

High-Value Manufacturing (HVM)

The UK has the opportunity to take advantage of technological advances that are being made in High-Value Manufacturing (HVM), by developing products for alternative markets around the world.

Of the manufacturers surveyed, 45% said they were either not aware of any investment, or that no investment was made by their company in innovation and research & development (Q12). Innovation commonly occurs at an interface between technologies and processes. Successful innovation requires skills linked to the merging and adaptation of technologies.^[7]

To ensure that the UK has a future in manufacturing, we must nurture SMEs – which make up the majority of the UK's manufacturing sector. Successful SMEs are often then bought up by larger companies as a way of capturing their intellectual property.

UK manufacturers have used a number of innovative techniques and practices to see them through the recession, such as scenario planning, rescaling manufacturing, reworking their cash and working capital, or improvements to their supply chains.

By adopting such tactics and having a long-term vision, many have experienced growth with innovative products and services. [8] Companies involved in HVM need to act now to ensure that they are equipped to develop and manufacture products across an extended, more flexible and more collaborative supply chain.

The Institution has a role to play in ensuring that best practice in innovation is disseminated by working with our members and industrial partners.

High-Value Manufacturing (HVM) Catapult

The HVM Catapult, which comprises seven centres of innovation excellence, has a key role to play in advancing the UK's manufacturing industry. The investment being made into the HVM Catapult, however, needs to flow down into SMEs so that they too have an opportunity to explore and innovate using these new technologies and techniques.

The HVM Catapult also needs to be at the forefront of developing new business models. Through the execution and uptake of best operating practices, the UK has the opportunity to lead the rest of the world. The UK has a reputation as an innovation powerhouse. However, the UK needs to accelerate the commercialisation of innovation into saleable products. Currently many feel that Government is too focused on technical innovation, which does not necessarily bring in big returns to UK plc. [2]

New Product Development and Profit

In this year's survey, just 45% of manufacturers were aware of how much of their company turnover came from new products introduced in the last three years (Q13). Businesses need to invest more in product development if the UK is to rebalance its economy. Manufacturers need to be encouraged to develop more products and to sell these into new markets. If manufacturers want to improve their productivity and efficiency, they must also make more investment in highly automated, efficient and flexible plant machinery.

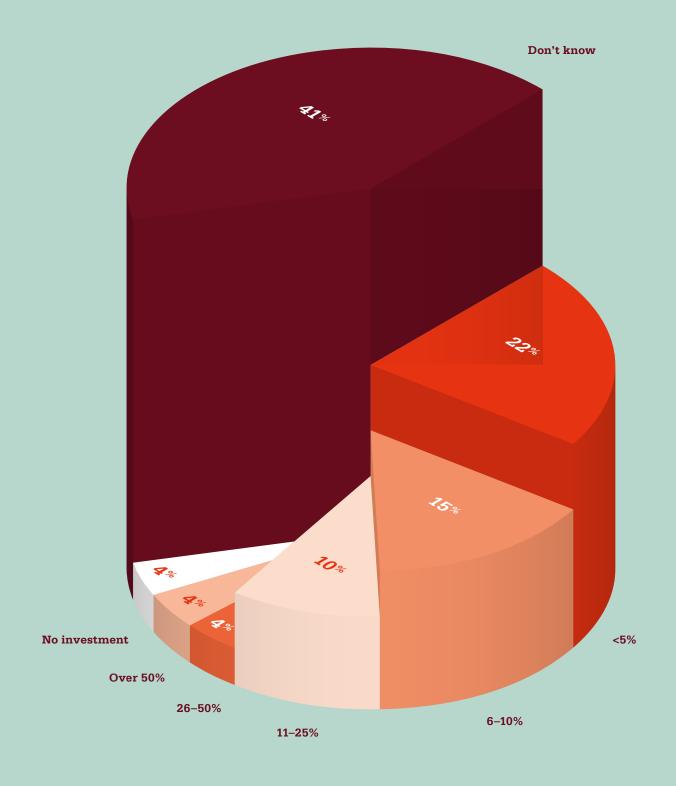
More knowledge is needed in our investor base, in terms of an understanding of engineering, manufacturing and the businesses in which they are investing. Sensible investment can be seen where the investors go and find the manufacturers. Making strides forward can be as simple as investment in metrology equipment, as the quality control of the parts will be improved and thereby the investment rewarded.

Manufacturers should also view asset finance as an option for funding new plant machinery, where the risk of ownership is shared between the funder and the manufacturer.

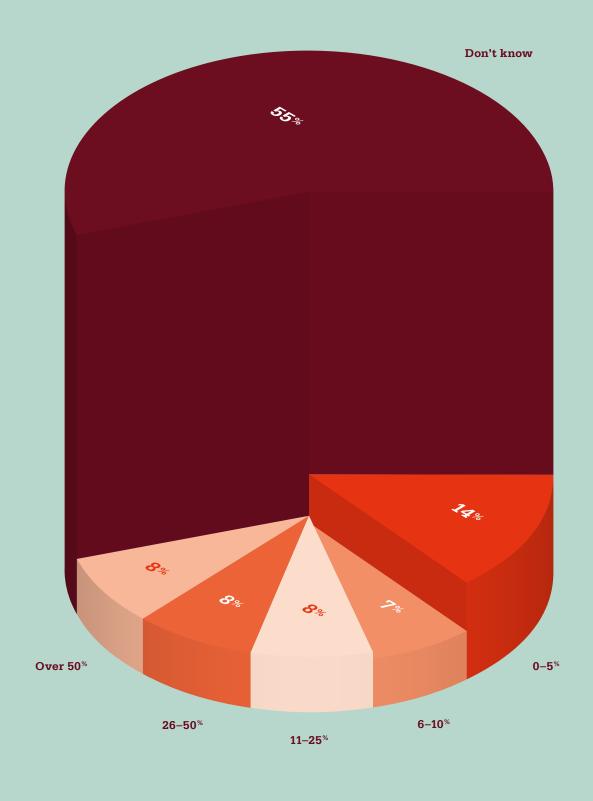
Asset Finance

Asset Finance is a form of funding that can offer significant operational, strategic and financial benefits such as providing flexibility and freeing up capital. By way of an example, using Asset Finance can give a business the option of either funding the whole or a proportion of the asset's total cost. Choosing the latter reduces monthly repayments, allowing the difference to go to other projects. It also defers the decision to purchase the asset until three, four or five years later, perhaps after a contract renewal, or increased certainty in the marketplace. The default is that the asset is automatically taken back by the funder at no extra cost.

What percentage of your company's annual turnover is re-invested in innovation and research & development? Manufacturers only



What is the percentage of annual turnover generated from new products launched in the last three years? Manufacturers only



GLOBALISATION AND COMPETITIVENESS

UK Manufacturing and the World

In 2012, the global manufacturing economy was estimated to be worth £6.5 trillion.^[3] To capture more of this market in the future, UK manufacturers need to expand their product development activities, and innovate existing products by improving manufacturing efficiency, performance and productivity.

In this year's survey, 53% of the public vote said that uncertainty over the UK's future in the EU is negatively affecting UK manufacturing, and only 19% believed the Coalition policies are helping UK manufacturers (Q14).

Out of the manufacturers polled, 43% said that their company exported over 50% of their products (Q15). However, of these, only 18% had ever taken part in a UKTI trade mission (Q17).

Germany

How to achieve low direct labour costs^[10] Germany has heavily invested in high levels of automation, which fundamentally differentiates its manufacturing sector from the UK.

This automation enables skilled labour resources to be largely utilised in the development of new products and processes, rather than in dull repetitive work.

This means a more satisfied and fulfilled workforce as well as more successful businesses.

High levels of automation demand high levels of training.

China is now one of the main export markets for German manufactured products; but Germany is also investing heavily in manufacturing capacity in China.

Reshoring and Offshoring

Reshoring (where companies bring their manufacturing back to the UK) is a topic of interest if manufacturers are looking to improve competitiveness. However, this year's survey highlighted that offshoring still continued with many companies (Q18). Of those manufacturers who said they were reshoring, 52% claimed it was due to the quality of manufacturing (Q19). This can be referred to as the 'cost of quality', which is defined, NOT as the cost of achieving a quality product or service, but as the cost of NOT achieving a quality product or service. This is a key factor for UK manufacturers as every time work is redone, the cost of quality increases. When a product needs to be returned to its source, this can be very costly to the owning organisation. In other words, any cost that would not have been expended if quality were 100%, contributes to the cost of quality.

Of those manufacturers that said their company was offshoring, 49% stated that maintaining the unit cost of their products was the reason for this decision. (Q20)

Maintaining unit cost can carry a general perception that the cost of direct labour in the UK is high and needs to be lower to enable companies to be competitive in the global market. However, data gathered from the Institution of Mechanical Engineers Manufacturing Excellence Awards run in both the UK and Germany, indicates that successful companies over a wide spectrum of industries now have direct labour cost at under 12% of total costs.

Manufacturers adopt a business model that manages and uses the Total Cost of Ownership (TCO) approach. This takes a holistic approach of total cost, incorporating development, design, transport, training, installation, maintenance and spares throughout the plant's entire lifecycle. Such a methodology allows analysis of costs over the expected operating life of the new plant, providing better information to assess the return on the investment.

Companies can persuade plant suppliers to guarantee more acceptable levels of availability of their equipment. This strategy not only calls for a greater level of commitment and responsibility from suppliers of capital equipment, but also from the owner, who needs to ensure correct operation, adherence to maintenance procedures and schedules.

The UK's deficit can only be reduced by delivering a broadened, updated range of exportable, UK goods and services. The key to this is the development of more high-tech goods and services. Encouraging more start-ups to export their manufactured products will make their goods more appealing and increase the proportion of domicile ownership of UK plc. These start-ups could be located in former UK manufacturing regions to create high-level jobs and reduce regional unemployment. An unprecedented UK drive is now needed to identify and nurture those with the skills needed to start up viable UK-domiciled manufacturing goods or services for export firms.

Uncertainties in the supply chain lead manufacturing corporations to rethink and remodel their production and organisational structures, which may stretch skills. The speed of change is increasing, which is forcing supply chains to become more like supply networks, with parallel processes rather than being sequential. This requires higher levels of flexibility, agility and a broader range of soft skills across the workforce, including interpersonal and communication skills. Higher levels of employee responsibility, autonomy and managerial delegation are required at all levels in the organisation. [7]

Fiscally, the UK is still behind countries such as Germany, which has much greater R&D tax credits and capital allowances. Additionally, the ongoing reduction in UK corporation tax promotes only foreign investment and not self-investment. The current review by Government does suggest realigning the taxation system to make self-investment more beneficial to resolve this. [9]

There needs to be a clearer route to access finance, and manufacturers believe the Government should create a single point for access for all finance interventions for businesses. Pulling all the Government's current schemes under one banner and giving a single organisation the necessary marketing budget would enhance communication of what is available to businesses. [8] Supporting investment through the tax system, as well as encouraging capital investment that would otherwise not occur, is a significant uplift in the main capital allowance rate.

Government needs to commit to help UK-based companies win orders by being more transparent about its future needs, by working more interactively with potential suppliers and by simplifying its processes.^[8]

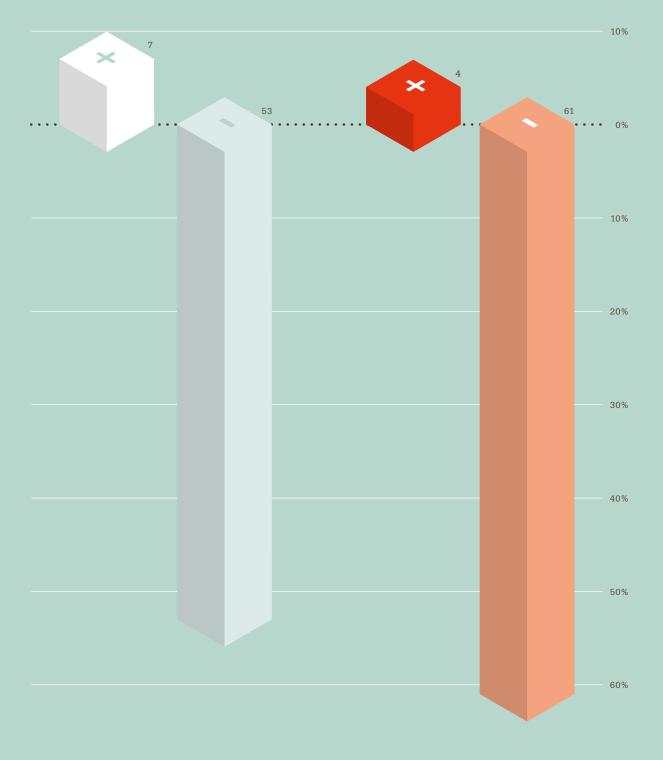


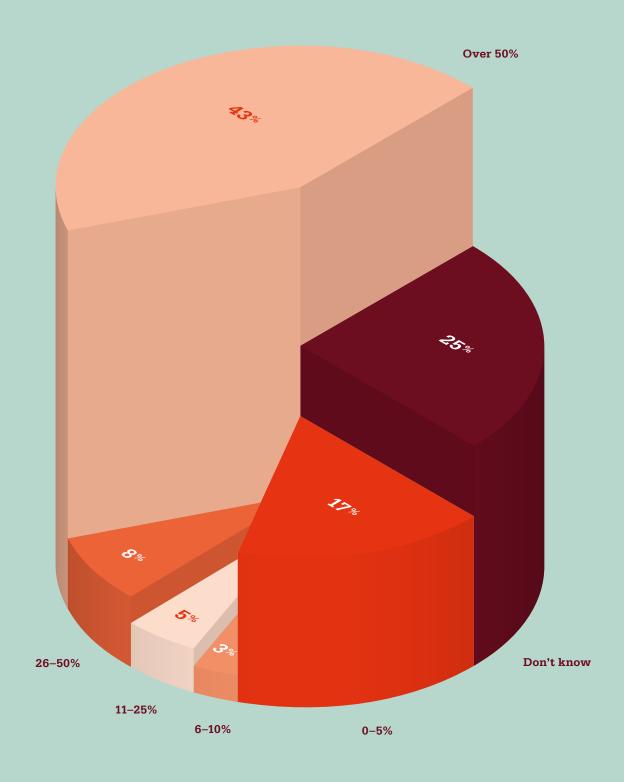
GOVERNMENT NEEDS TO SIMPLIFY ITS PROCESSES TO BE MORE ACCESSIBLE TO BUSINESS.



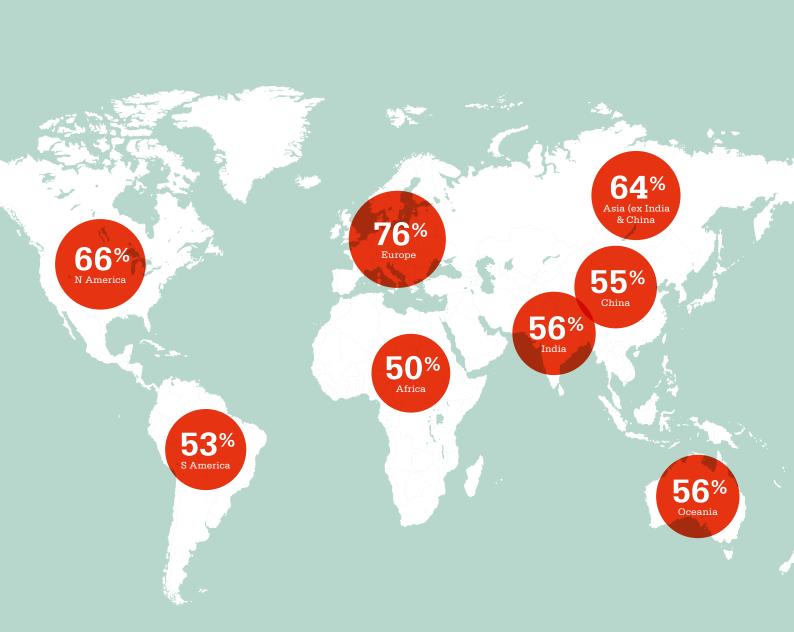
Do you think the uncertainty surrounding the UK's future in the EU is having a positive or negative effect on UK manufacturing?

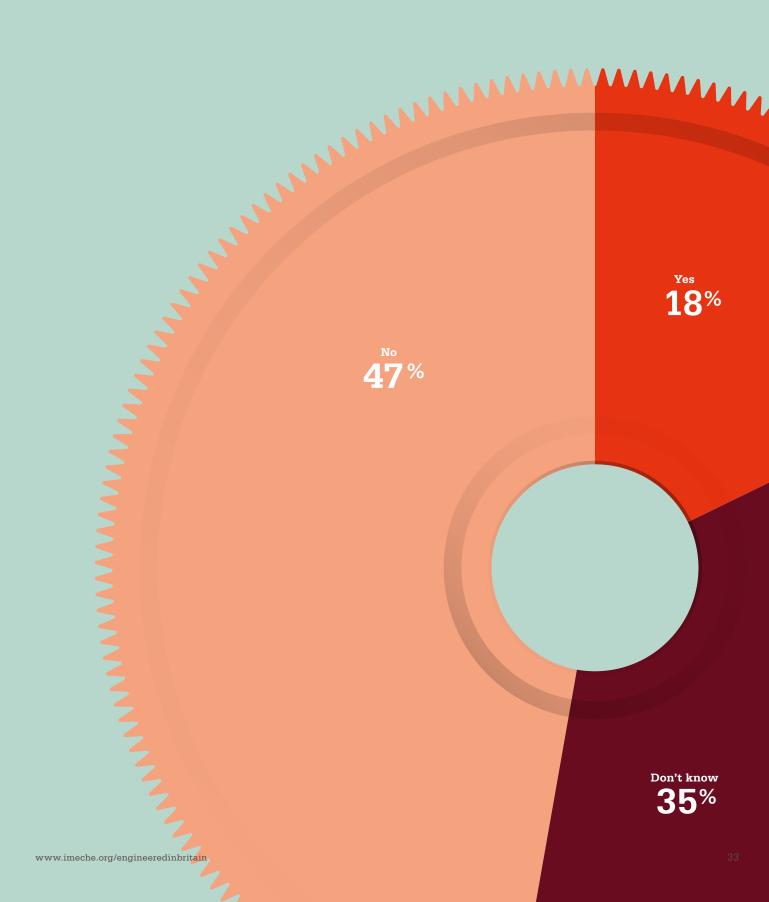
Public Manufacturers

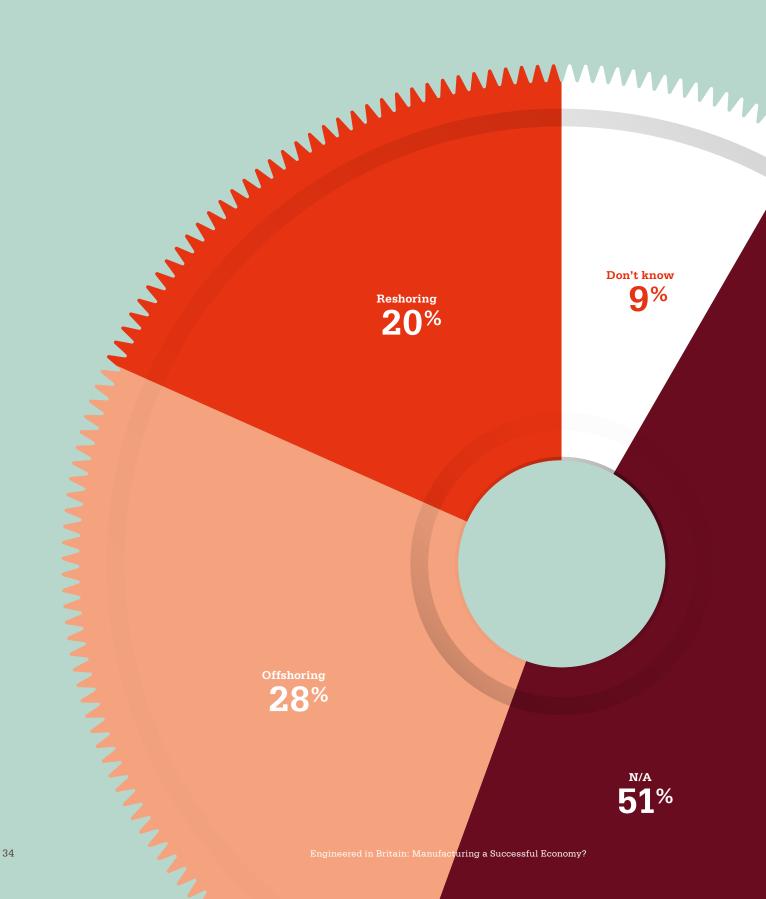




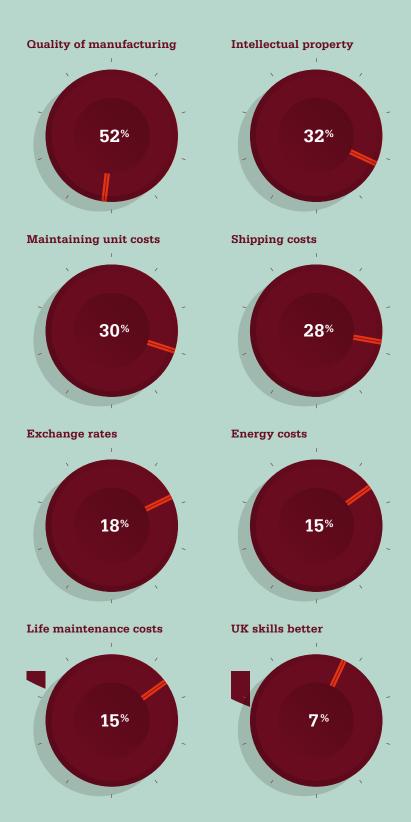
Which regions of the world does your company export to? Manufacturers only



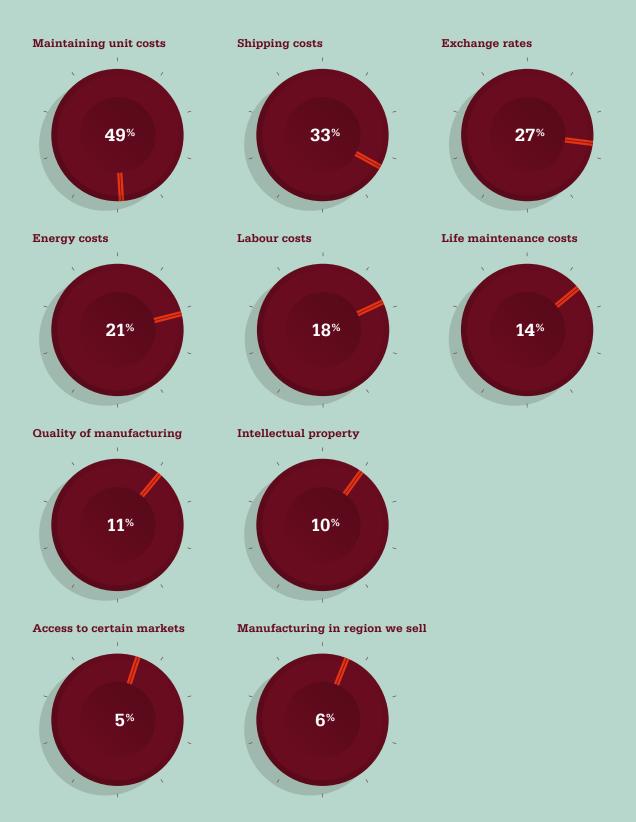




If reshoring, why is your company reshoring its manufacturing capability? Manufacturers only



If offshoring, why is your company offshoring its manufacturing capability? Manufacturers only



CONTRIBUTORS AND REFERENCES

References

- ONS Statistical Bulletin: Balance of Payments. Q4 2012, 27 March 2013
- A landscape for the future of high value manufacturing in the UK, TSB, February 2012
- Engineering UK 2013: The state of engineering, 3 December 2012
- 4. RBS The Future of UK High Value Engineering An insight into the future of the UK HVE segment – www.rbs.co.uk/futureofukhve
- Bawden, T. Global skills gap 'threatens UK growth', April 2012
- ⁶ Davis, C. Sector Skills Insights: Advanced Manufacturing, July 2012
- 7. UKCES Sector Skills Insights: Advanced Manufacturing, July 2012
- EEF, The Route to Growth, An Industrial Strategy for a stronger, better balanced economy
- 9. No Stone Unturned in the pursuit of growth, The Rt Hon the Lord Heseltine of Thenford CH, October 2012
- The German Sparkassen (Savings Bank), CIViTAS, Simpson, CVJ Simpson Associates, January 2013

Biography

The German Sparkassen (Savings Bank), CIViTAS, Simpson, CVJ Simpson Associates, January 2013

 $\ensuremath{\mathsf{BIS}}-\ensuremath{\mathsf{Manufacturing}}$ in the UK: An economic analysis of the sector, Dec 2010

Green, AE. Leveraging training skills development in SMEs: An analysis of the West Midlands, May 2011

BIS, Advanced Manufacturing Supply Chain Initiative, February 2012

PWC, 2010: Assembling value: Fourth quarter 2010 industrial manufacturers mergers and acquisitions $\,$

PWC, 2012: From crisis to growth: UK manufacturing outsmarts the recession

 $\ensuremath{\mathsf{CBI}} - \ensuremath{\mathsf{A}}$ vision for rebalancing the economy, a new approach to growth

CBI – The UK's growth landscape, harnessing private sector potential across the country

RBS – The Future of UK High Value Engineering – An insight into the future of the UK HVE segment – www.rbs.co.uk/futureofukhve

Contributors

The Institution of Mechanical Engineers would like to thank the following people for their assistance in developing this report: $\frac{1}{2} \int_{\mathbb{R}^n} \frac{1}{2} \int_{\mathbb{R}$

Paul Addison

David Askew CEng MIMechE

Richard Campbell

Eunice Cinnamon CEng MIMechE

John Collins CEng MIMechE

Janet Godsell CEng MIMechE

Daniel Hearn

Erica Herrero-Martinez

Kate Hevwood

Eur Ing Dr Clive Hickman CEng FIMechE

Elliot Hirst CEng MIMechE

Dr John Liverton CEng FIMechE

Neil Llovd

Alan Loy CEng FIMechE

Gordon Macrae

Eur Ing Paul Merrick CEng FIMechE

James Miller CEng FIMechE

Lisa Norcross CEng FIMechE

Philippa Oldham CEng MIMechE

Professor Duc Pham CEng FIMechE FIET

Paul Pitcher AMIMechE

Christopher Rowlands CEng MIMechE

Paul Senior AMIMechE

Christopher Simpson CEng FIMechE

Steve Wainwright CEng MIMechE

Image credits

Cover: © quietrevolution; Page 04: © Getty Images/Laurie Noble; Page 11 Getty Images/Echo; Page 12: © The Big Bang UK Young Scientists & Engineers Fair; Page 21: © Econolyst; Page 22: © MINI; Pages 28–29: Bloomberg via Getty Images.

Institution of Mechanical Engineers

1 Birdcage Walk Westminster London SW1H 9JJ

T +44 (0)20 7304 6862 F +44 (0)20 7222 8553

enquiries@imeche.org www.imeche.org