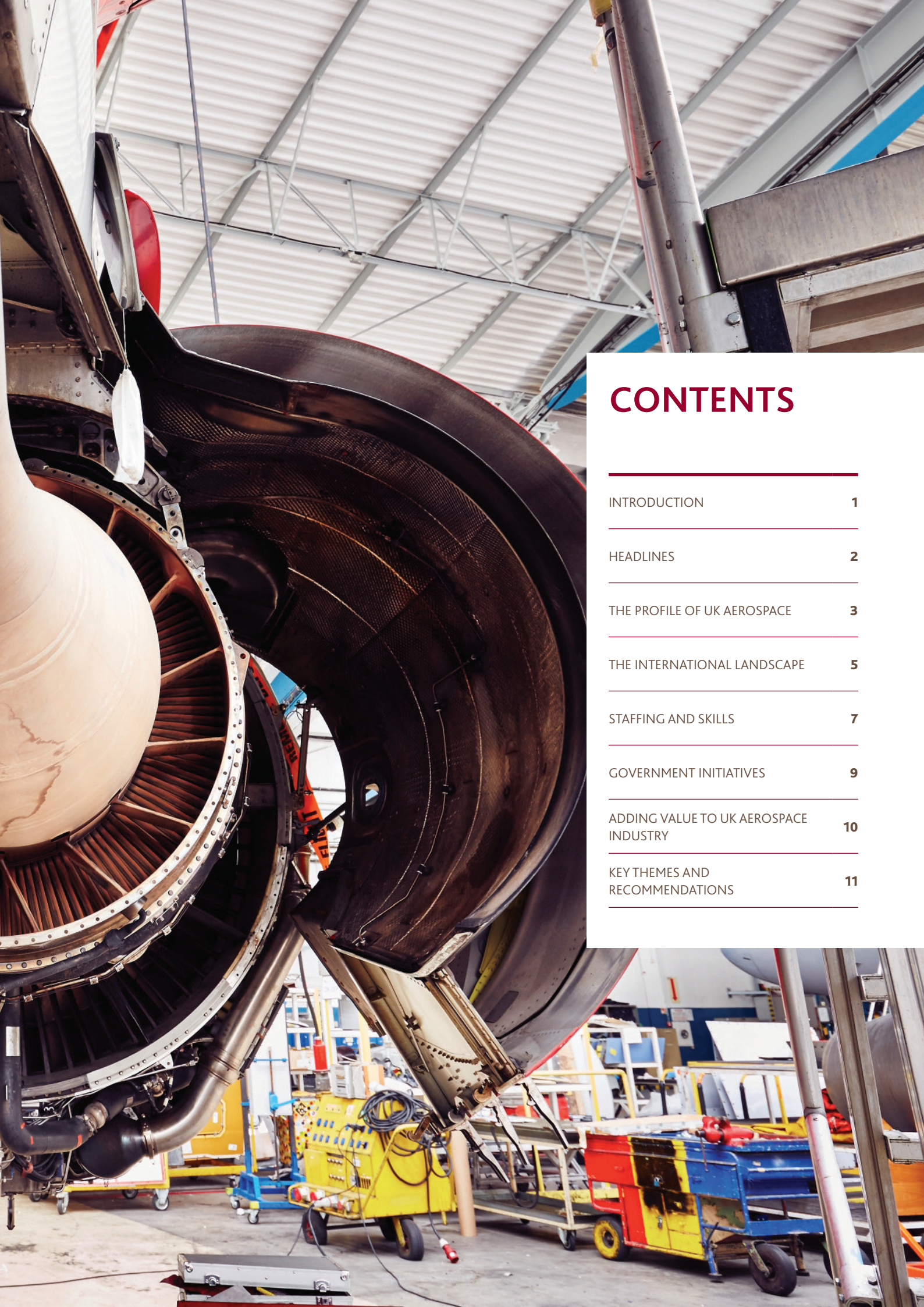
THE AEROSPACE REPORT

July 2015

Institution of MECHANICAL ENGINEERS

IMechE Services Ltd

BDO



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INTRODUCTION

This report by BDO, in association with the Institution of Mechanical Engineers (IMechE), analyses the sentiment, challenges and changing macro landscape for UK companies supplying products and services to the fast growing and increasingly demanding global aerospace sector.

The international air travel and civil aerospace sector has been flying high for several years with Airbus predicting annual air traffic growth of 4.7% over the next 20 years. This will require more than 29,000 new passenger and freight aircraft valued at nearly $4.4tn, set against a reality of an increasing backlog of commercial fixed wing aircraft.

To pick up the pace, demands on productivity are being ramped up. Airbus in the UK has increased production rates for A320 wing sets to 42 per month from 35 a few years ago with a target of 50 per month by 2018. How UK suppliers to these companies respond to new technologies will be crucial to their future success.

The established order of the 'happy duopolies' of Airbus, Boeing, GE-Pratt & Whitney and Rolls-Royce is also under threat from China which will develop domestic competitors as it is already doing in the automotive sector.

It is encouraging to see the survey revealing strong positive sentiment in the aerospace sector, but the bald numbers belie some serious concerns about the UK's continuing position as the world's second biggest source of aerospace equipment after the US. Issues with long term agreements, productivity levels, availability of correctly skilled people and the rise of Asia as an aerospace powerhouse, conspire to negate any complacency.

The UK does have the right tools to remain an aerospace superpower – flexible labour market, strong skills base, a willingness to seek and invest in new technologies and a supportive Government. It is how it applies these skills to the rapidly changing world market that will dictate its success.

We are thankful to all those who shared their thoughts and experiences – we hope you find this an interesting report.

TOM LAWTON
Head of BDO Manufacturing

HEADLINES

Statistics from our survey respondents

>62%
OF COMPANIES HAVE AN ISSUE WITH PRODUCTIVITY, WHETHER LABOUR, CAPITAL EQUIPMENT OR PROCESSES

62%
OF COMPANIES ARE SETTING UP FACILITIES OVERSEAS

OF THOSE COMPANIES SETTING UP OVERSEAS,
35%
ARE DOING SO IN CHINA

63%
THINK THE UK SHOULD INVEST STRATEGICALLY IN THROUGH-LIFE ENGINEERING SERVICES AND PRODUCT-SERVICE SYSTEMS

15%
SAY THAT LOCAL INCENTIVES THAT DE-RISK AN OVERSEAS INVESTMENT MAKE IT MUCH EASIER TO CREATE A FOREIGN BASE

63%
BELIEVE THE UK NEEDS MORE HOME GROWN, MID-SIZED COMPANIES TO STRENGTHEN THE UK'S AEROSPACE SECTOR

THE PROFILE OF UK AEROSPACE

In spite of the challenges from new global markets and a range of more prosaic reasons, business sentiment in the UK aero sector is positive. 64% of those surveyed were either positive or very positive about the prospects for their civil aerospace order book in the next five years (see Figure 1). There was very little change of sentiment between a five-year and 10-year horizon, with a slight dip in very positive sentiment from 33% to 27% for the 10-year view.

There is a mixed spread of concerns about companies' prospects in the next five years, which did not reveal a strong pattern but instead served to reinforce the complexity of factors at work in aerospace (see Figure 2). The need to invest in research and development to remain competitive and to fulfil the new, higher production rates required by prime contractors were the joint highest concerns, at 17% each, of those who responded (see Figure 3).

Only 4% of responses said that being paid within contract terms was a concern and 11% said managing the business between

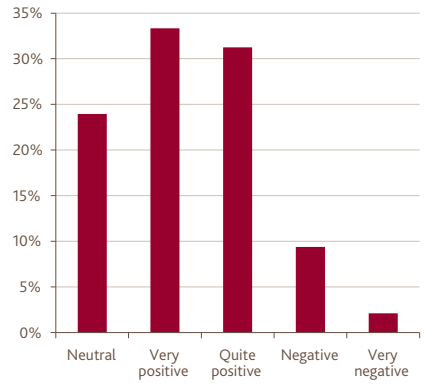


FIGURE 1: How positive do you feel about the future order book of your organisation for civil aerospace products over the next five years?

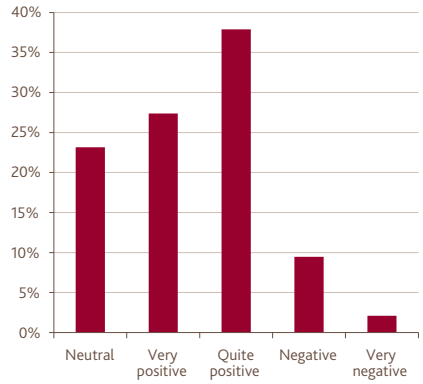
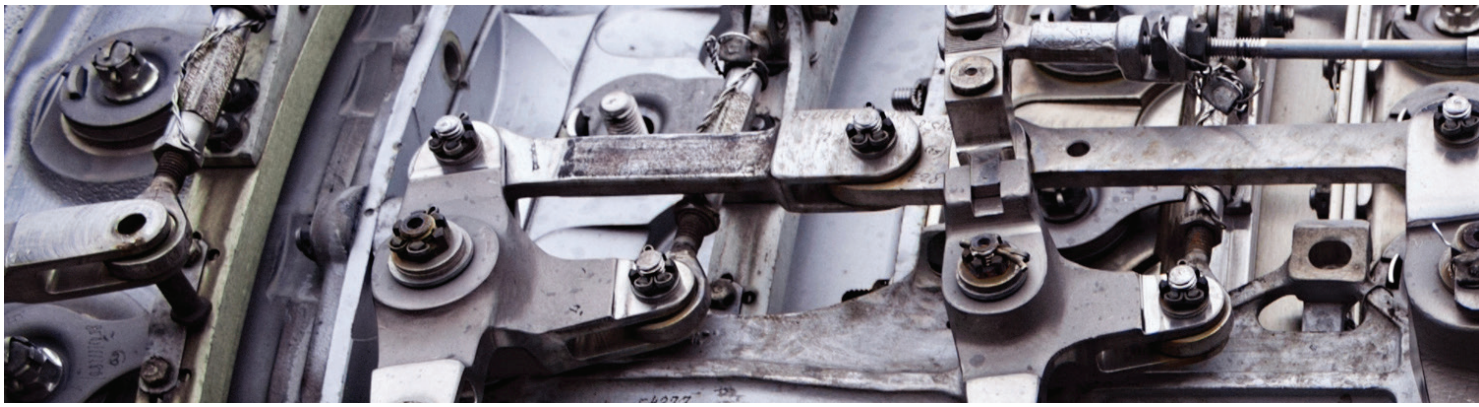


FIGURE 2: Long term: How positive do you feel about the future order book of your organisation for civil aerospace products over the next ten years?

very different work cycles required by different sectors was its main concern. It is likely that a larger proportion of smaller firms in this survey would have highlighted problems with payment and managing different industry cycles. It is well-known that late payments and cash-flow is a big issue for SMEs dealing with global OEMs, where payment terms can often be 120 days. In fact, the survey had a high proportion (60%) of responses from large companies over £500m turnover.

The specific concerns cited by the sample were interesting. The availability of skills at all levels, often blamed as the greatest barrier for UK manufacturing, was cited only once. This might reflect the popularity of aerospace versus non-aerospace sector careers in engineering. A frequently occurring concern was both the lack of tendering for new business contracts and the lack of new aircraft programmes. One commentator said "The super-cycle of new product introduction (NPI) is ending.



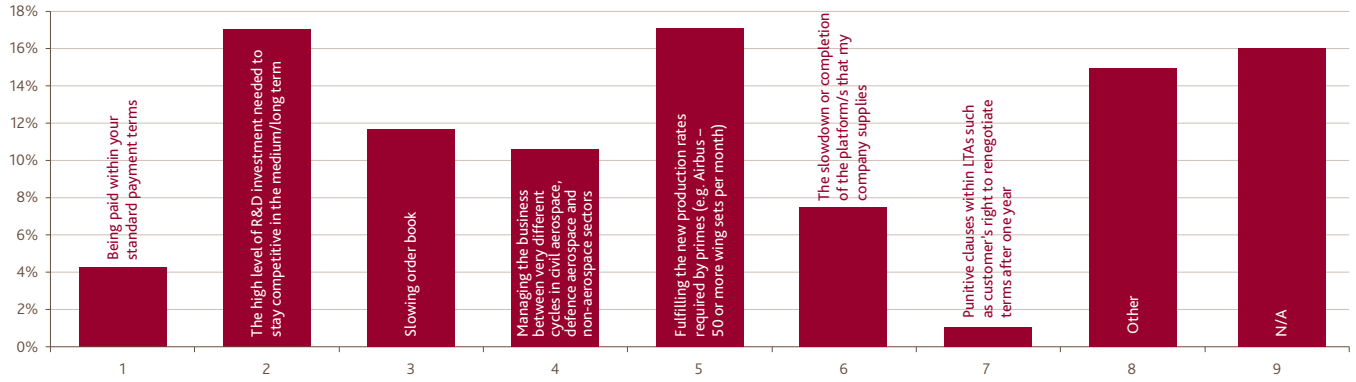


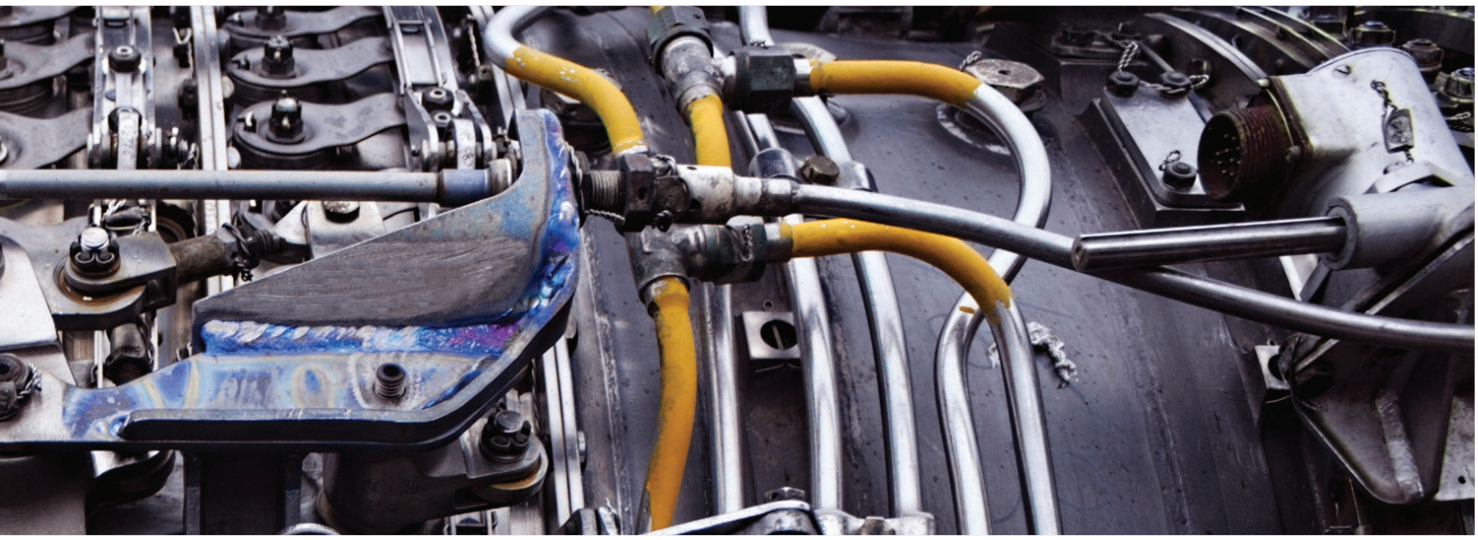
FIGURE 3: If you have concerns about the prospects for your organisation over the next five years, what is the biggest factor of concern?

A large number of engine and airframe development programs are reaching their natural conclusion as the next generation of civil airliners come into service."

Political considerations, presumably in the work-share between European countries for Airbus and EADS contracts, and parent company re-structuring/consolidation were also concerns. One company attributed the "major cutback in engineering design support" as a hindrance. The Transatlantic Trade and Investment Partnership (TTIP) was cited by one respondent as an issue, feeling the TTIP would benefit US aero industry suppliers more than UK firms.

Critical mass in the supply chain is a key aspect of British industry and the ability of companies to win orders. A substantial 63% of those who responded said that the UK needs more home-grown, mid-sized companies to strengthen the domestic sector and prevent further hollowing out.

The implication is that only companies of a certain size have the capacity to win certain contracts. Only 10% said that having more mid-sized firms does not matter and 13% thought that UK SMEs were sufficiently nimble and capable of coping with the demands of global OEMs. Anecdotally, some respondents commented that there is a tendency for UK SMEs to sell-up to larger competitors rather than go through another growth cycle to become true mid-cap companies.



THE INTERNATIONAL LANDSCAPE

Britain's civil and military aerospace industry is the largest in Europe and second only in the world after the USA. According to UK Trade and Investment (UKTI), it supports 230,000 jobs, creates revenues of approximately £27bn and exports around £25bn a year[1]. Yet civil aerospace today is a more international industry than it has ever been.

Firstly, prime contractors have taken plant and maintenance, repair and overhaul (MRO) facilities to countries with growing air transportation – some of the biggest growth in air travel per capita is in China, India and the rest of Asia. The backlog of commercial fixed wing aircraft in 2015 in China is 439 and in India is 400 aircraft – compare this with an order book of 48 in France. Secondly, the skills and knowhow for aero engineering and maintenance in these countries has improved.

Asia, including China and India, will represent 55% of the growth in the global industry in the next two years, this survey sample believes (see Figure 4). Within that, China is 14% and India about 10% with 'Asia-unspecified' the remainder. Next comes the USA (18%), Europe as a bloc (16%) and Latin America (10%). Incentives for companies to move to these new jurisdictions are generous. Singapore offers foreign companies zero business rates and other tax concessions in return for developing a manufacturing site here. In Mexico the incentives are even greater, with the Government underwriting some of the risk for new businesses to establish joint ventures there.

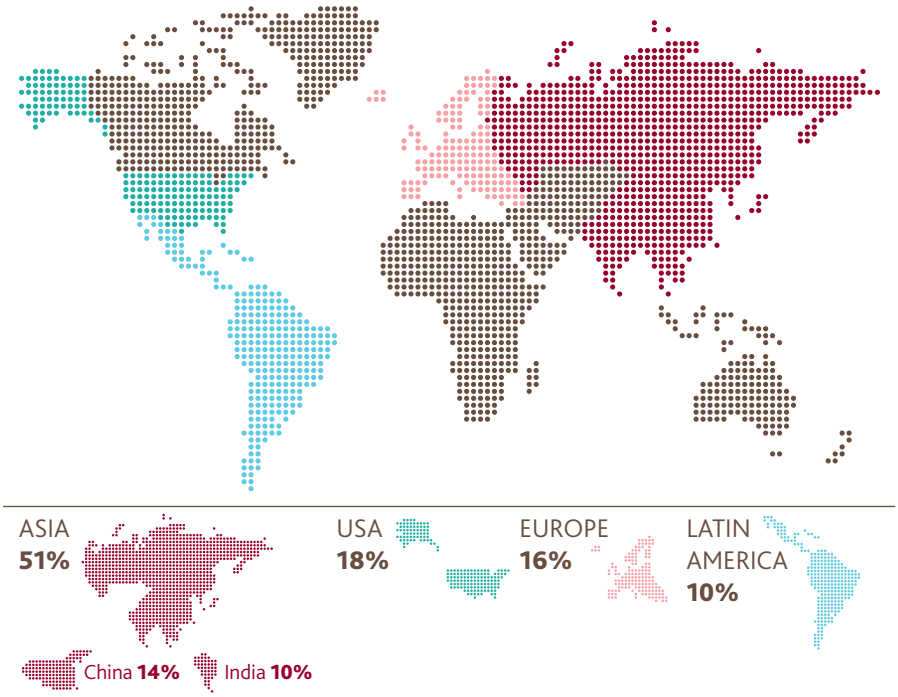


FIGURE 4: Worldwide growth in the global industry in the next two years

Around two thirds of the companies surveyed are in the process of creating an overseas facility. Of this group, 34% required an overseas base to better access the new or developing markets, as per the previous paragraph. This is a high percentage of firms expanding abroad, but given the high proportion (nearly 60%) of respondents from companies over £500m sales, this merely demonstrates that tier one companies need to follow the primes and airlines.

2/3rd

of respondents are in the process of creating an overseas facility

[1] *Global Aerospace Outlook 2015*

Of those expanding abroad, more than 15% said that local incentives that de-risk the investment make it much easier to create a foreign base. A significant 6% of UK companies expressed the Catch 22 position that local incentives are not adequate but they cannot afford not to expand abroad.

On a macro-level there is a lot of activity in Asia. Of the companies who are establishing overseas facilities, 49% are going to Asia (excluding China) and 34% are building a base in China, meaning that several companies are developing bases in China and other Asian countries (see Figure 5). New US plants are in development for more than a quarter of respondents.

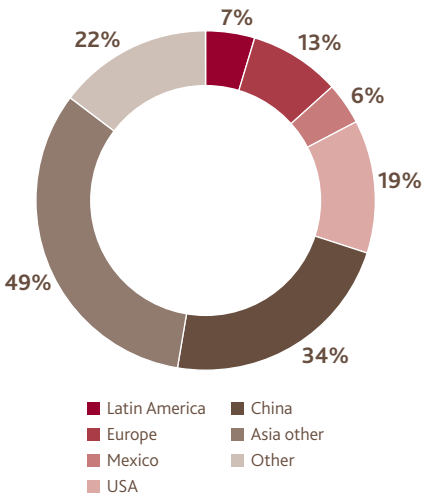


FIGURE 5: Where will you set up overseas facilities?

There is a trend from globalisation of companies towards regionalisation. Cost is a huge factor in prime contracting, but following the interruption to automotive supply chains from the Japanese tsunami and other geopolitical supply risks, aerospace primes are increasingly sensitive to global single sourcing. "For several years the drive has been towards a regionalisation of supply, still at globally competitive prices, but proximal to final assembly lines. Many primes are now considering a European/ American/ Asian segmentation pattern," said one respondent from a mid-sized company.

> "China is moving to be a creator of IP: The old image of the Chinese being excellent copyists making liberal use of others' IP is changing fast."
>
> SURVEY RESPONDENT

STAFFING AND SKILLS

The lack of technical skills and the high displacement of trained personnel from SMEs to bigger companies is frequently cited as one of the most common inhibitor to manufacturing growth.

Although overall not a main concern, the survey showed that 53% of companies experience difficulty with recruiting people trained in the disciplines they need. Half of the sample is high but perhaps lower than the UK engineering skills crisis can imply, suggesting that aerospace, while having challenges, is a sector that technically qualified people still gravitate to.

53%

COMPANIES EXPERIENCE **DIFFICULTY WITH RECRUITING PEOPLE** TRAINED IN THE DISCIPLINES THEY NEED

62%

OF THE SAMPLE HAD AN **ISSUE WITH PRODUCTIVITY**

Tellingly, more than 71% of the sample had an issue with productivity. For many UK factories making aero components, productivity was 'best in class' until recently. Production rate ramp-up on some new aircraft platforms has changed that. Airbus at Broughton, for example, is running a programme called Single Aisle Step Change, which uses more automated manufacturing processes to take the production rate from 42 wing sets per month today to 50 per month by Q1 2017.

For the specific jobs companies need, mechanical (70%) and aeronautical engineers (53%) were in greatest demand. Other jobs which companies need are software engineers, systems integration engineers and experienced machine tool operators. Interestingly, 21% said they needed more engineers with an understanding of through-life engineering, showing that design for repair is not disposal and that it is seeing a market pull, which perhaps the engineering education sector needs to heed.

On apprenticeships, of those who responded 20% do not have an apprentice scheme and 10% said a scheme was not cost-effective. But 42% of firms in this survey have taken on 50 or more apprentices in the last two years, demonstrating what a substantial proportion of the total headcount of larger aerospace firms' apprentices are.

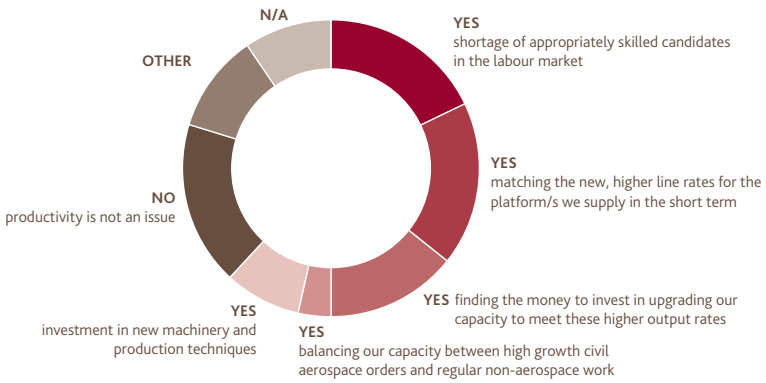


FIGURE 6: Is productivity an issue for your organisation and, if 'yes', what is the single biggest issue?

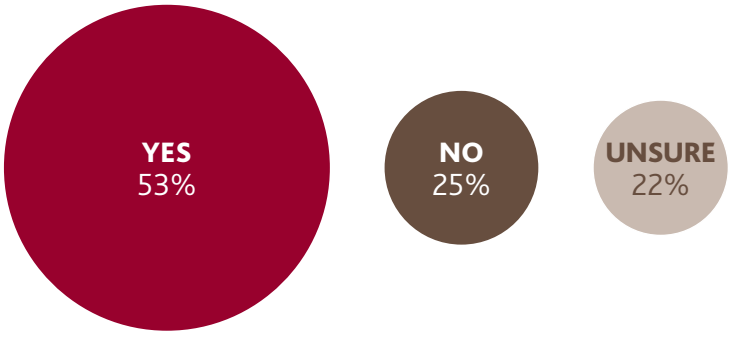


FIGURE 7: Is your organisation experiencing difficulties in recruiting the skills and people it requires?

Looking globally and to the future, organisations like the Aerospace Defence Security Group (ADS), the Engineering and Physical Sciences Research Council (EPSRC) and the ESPRC Centre in Through-life Services say that the global MRO market is set to take off. Local skilled labour costs in India and China are much lower than in Europe, the US and even Singapore. The UK needs to fight hard to retain and win MRO services here which will mean better training coupled with a greater understanding of data – understanding Big Data, the Internet of Things and how companies use the immense volumes of data they generate.

> “We're seeing a rapid reduction in the amount of NPI opportunity and the primes are beginning to shed engineers from R&D roles while recruiting for the ramp-up into production.”

SURVEY RESPONDENT

GOVERNMENT INITIATIVES

By any measure, the amount of Government support for the UK aerospace industry since the 2008/9 financial crisis has been generous.

There is an unequivocal, cross-party acknowledgement that aerospace is of national strategic importance to Britain. Several big, well-funded and often industry match-funded programmes support this sector – Aerospace Growth Partnership, the principle vehicle to implement the Aerospace Industrial Strategy, The Advanced Manufacturing Supply Chain Initiative (AMSCI), the Aerospace Technology Institute, the National Aerospace Technology Programme, Supply Chain 21 operated by trade group ADS, the National Composites Centre, other Catapult centres and more.

It can be easy to assume that big, multi-programme strategies are reaching the entire supply chain they are designed to benefit. The survey asked companies if these initiatives had made much difference to them. While only about half of those surveyed responded to the question, 18% of those said they were unaware of most of these programmes. However, precisely one third were receiving benefits from most of them, and 22% said they received benefit from some of them – so more than half receive some or many benefits.

Another 22% said they were aware of the programmes but had received little tangible benefit from them thus far.

25% said Government activities helped them with innovation and R&D. Just 4% said the Government programmes helped them access the supply chains of big companies, questioning the efficacy of the AMSCI initiative, at least for aerospace companies where the IMechE have members.

Where Government is addressing the skills gap in aerospace, despite the slew of new training programmes such as the Aerospace Technology Institute and Aeronautical Masters programme, and the aspirational status of the sector to work in, nearly a quarter of the sample said these activities would probably not address their company's recruitment issues in the next ten years. This is surprisingly high given the amount of money pumped into this agenda. However 31% said these activities probably would help their HR needs, 7% said they definitely would help and 31% were unsure.

In which areas do companies want more government support? While additional tax breaks and more funding for Catapult centres was less popular, the following areas got the biggest response: more funding for apprentice schemes (25%), channelled support for smaller companies (23%) and a government-funded strategic productivity review in aerospace (20%).

While the High Value Manufacturing Catapult centres did not get high votes, these innovation centres are vital to realising productivity gains in aerospace.

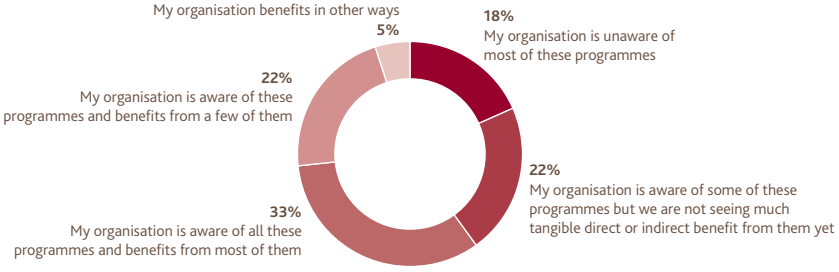
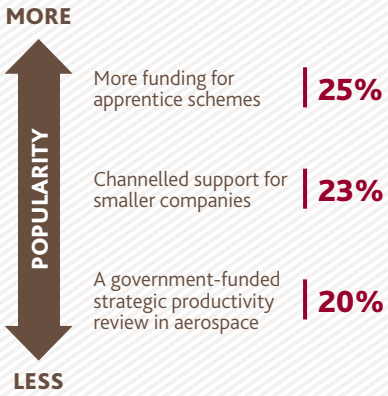


FIGURE 8: Awareness of UK Government aerospace programmes

IN WHICH AREAS DO COMPANIES WANT MORE GOVERNMENT SUPPORT?



For example, working with the EPRSC Centres for Innovative Manufacturing in Intelligent Automation at Loughborough, the Manufacturing Technology Centre is researching optimum methods to combine human and robot-performed operations for making a range of aerospace products. Airbus Broughton has a Factory of the Future plan that will deploy some of these techniques. 23% of respondents wanted more channelled support for SMEs. There are several references from organisations that the Catapult centres don't do enough to engage or help SMEs. This result may be seen as a call to divert more of the Catapult's budget to specifically access SMEs.

23%

OF RESPONDENTS WANT **MORE CHANNELLED SUPPORT FOR SMES**

ADDING VALUE TO THE UK AEROSPACE INDUSTRY

As with other industries, the aerospace manufacturing industry is becoming increasingly servitised. Customers buy availability contracts and service from suppliers, sometimes whole-life service contracts, rather than buying big assets outright where they retain the sole risk of ownership.

In 2014 revenues in the entire UK MRO market were £13bn (from the top 15 companies) and will grow to £18bn by 2025[2]. Rolls-Royce's main product-service package is called Total Care. The company has managed to convert 92% of sales to Total Care in recent years[3]. The value of the whole support and service sector in the UK, aerospace and non-aerospace, will be over £35bn by 2025 and exports will be over 65%.

The importance of services is reflected in this survey, where 69% of those who responded are involved in MRO, and a further 6% were moving into product-service systems. Interestingly, there is evidence that servitisation is trickling down from primes and tier ones to smaller companies. More than one fifth said that SMEs now sell the 'service of the product' to customers, rather than the product alone. 37% said aerospace SMEs still just sell products with normal guarantees. Perhaps tellingly, over 42% said that SMEs sell products but offer more whole-life servicing in the package. It appears that even for simple components rather than big assemblies, firms will find it harder to merely sell a product and walk away from the sense of ownership, and risk, it carries.

In manufacturing, a new term can become a buzzword before there is hard evidence of a true trend. The survey suggests this cannot be said for whole-life engineering, where prolonged asset lifespans and sustainability are also the drivers. 63% thought the industry should invest in 'through-life engineering services' (TES) and that a more sustainable industry was the only future for aerospace. A further 20% thought the UK should invest in TES because competitors are doing so and it creates new revenue streams. Cumulatively, over 80% of the respondents thought TES needed more investment.

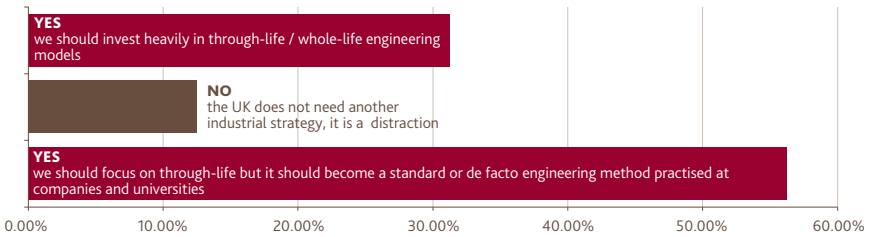


FIGURE 9: If the further 'servitisation' of aerospace (availability contracts, 'power by the hour') is the main future business model for aerospace, should the UK develop a National Strategy to make the UK a global centre of excellence for through-life engineering?

80%

OF THE RESPONDENTS THOUGHT **TES NEEDED MORE INVESTMENT**

Despite the presence of other strategies, 87% of those surveyed said that as the global aerospace industry continues to servitise, the UK should develop a National Strategy in through-life engineering to create a global centre of excellence for TES in the UK. Within this pool, 56% said TES should become a standard mode of engineering practised at universities and companies. One respondent that 'TES-like' practises should be taught at schools, universities and companies to instil a more sustainable approach to engineering. 12.5% said that Britain does not need another industry strategy and that a TES strategy would be a distraction.

According to the EPSRC Centre in through-life engineering services, the global MRO market has great potential for the UK, but it needs to present a compelling offer. Asian MRO suppliers are being squeezed due to shortages of skilled labour and wage inflation. This will result in more heavy check airframe maintenance remaining in the US. But out to 2025, while the total addressable global support and services market (all industry sectors) will grow from £490bn to £710bn, the UK share of the market is predicted to fall from 5.1% to 4.8%, due to foreign competition.

£18bn

SIZE OF THE **MRO MARKET IN THE UK** BY **2018**

"Understanding and manipulating data will be a discriminator. The ability to process data will accelerate the servitisation of our sector introducing a plethora of new challenges and opportunities."

SURVEY RESPONDENT

[2] *UK Support and Service industry a high value employer and a net exporter*, Raj Mehta
[3] *MRO Network July 2013*, Alex Derber

KEY THEMES ANDS RECOMMENDATIONS

Several observations can be taken from this survey by BDO and the Institution of Mechanical Engineers:

01

GLOBALISATION VIA REGIONALISATION –

Recognise the changing regional hub pattern of global aerospace, with manufacture and MRO services following these hubs in Singapore, China, Mexico and the US.

Government needs to better understand what the UK can successfully compete for in this new world order, so that the UK can pick our battles for new business with the most available intelligence.

02

THE IMPORTANCE OF BRITISH MID-SIZED COMPANIES TO RETAIN DOMESTIC UK CAPABILITY OF DESIGNING AND SUPPLYING KEY COMPONENTS IN BIG AERO PROGRAMMES

So that when a new aero-platform is devised or an existing one is modified, British companies as well as UK-based divisions of foreign companies can bid for the work on par.

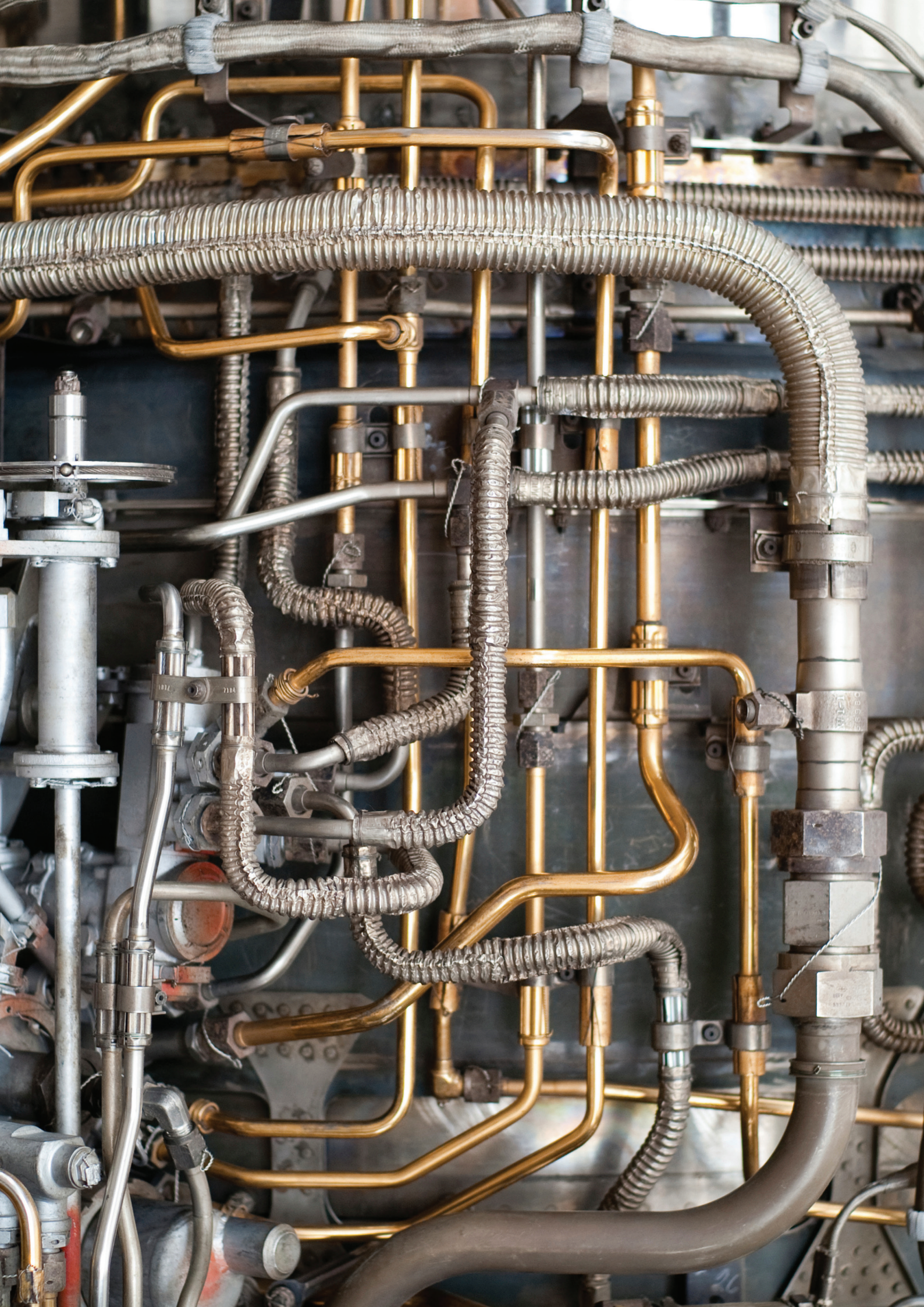
Consider specific help for mid-sized companies with the ambition to expand overseas, such as higher investment tax relief for the first two years.

03

LISTEN TO THE CASE FOR A NATIONAL STRATEGY IN THROUGH-LIFE ENGINEERING SERVICES

Proposed by the EPSRC Centre in TES led by Cranfield University.

The evidence is building that with the right steps, the UK can develop a strong comparative advantage in providing MRO services, a growing global market, that has three key side-benefits: supports industrial sustainability, provides high value jobs and GDP and will enable a more multi-skilled workforce, fluent in Big Data techniques, to be adaptable to both manufacturing and service-sector jobs.



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