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Raytheon UK

MAKE uk Defence

DEFENCE: OPPORTUNITY, RESILIENCE AND PROSPERITY

MakeUK.org

FOREWORD

Summer 2021 once again saw defence geopolitics and operations in all their grave complexity at the very top of news feeds and political agendas across the world.

It is evident that in the coming years we will continue to see a reshaping of the global policy landscape. Challenges, whether they be security, public health or environmental will become increasingly interconnected.

At the heart of such a challenging environment, the UK's defence sector remains amongst the most dynamic in the world. Our defence firms create an economic bridge from international relations to a domestic success story, accounting for almost 5% of the manufacturing industry's total output and representing over £20 billion of defence expenditure in 2019/20.

Defence is a serious business dealing with serious issues, and in launching this report, there is much to be proud of in our UK defence sector and in the globally recognised expertise of our workforce.

Our research reveals a sector where the use of technology is not just cutting edge but world leading and led by an outstanding workforce, who in turn enjoy exceptional career prospects and significantly above average salaries. That's not just good news for defence but for a whole supply chain that brings benefits across the UK and beyond.

Our purpose here was to examine how the UK can maximise such positive benefits to the wider supply chain and provide recommendations on how we work together to achieve this.

The data collected and roundtables conducted provided us with much optimism, revealing an industry alert to modern industrial issues, embracing diversity, and responding to climate change, with social values now high up the agenda.

Hostile states and actors represent an increasingly sophisticated and rapidly growing offensive cyber threat – the UK cyber security sector remains vibrant and on high alert.

Our call to Government is to now work more closely with the defence sector to multiply success through opportunities from the new trade agenda.

Far too many firms told us they struggle to explore new markets, representing a currently untapped economic arena, which if effectively exploited will not only further boost the performance of the sector but provide prosperity for every UK region.

My thanks to all those who contributed the rich pool of information compiled here. I hope you find the report interesting and will join us in driving further success.

Andrew Kinniburgh
Director-General, Make UK Defence

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PART 1: EXECUTIVE SUMMARY

INTRODUCTION

This report sets out how the UK can maximise the economic, skills and manufacturing benefits that the defence sector creates. It provides recommendations for how the defence sector can work with Government and SMEs to achieve this.

Defence manufacturers have a key role to play in delivering the Government's Plan for Growth, whether this is accelerating the pace of digital adoption, developing new and more sustainable products, or tapping into new trade markets to secure a truly global Britain.

Through this research, speaking to dozens of defence manufacturers, we have also identified a number of areas where reform is needed in order to support these ambitions.

These include ensuring a laser focus on talent attraction and opening the doors to new trade markets, whilst providing support to compete in new and existing export markets. Freedom of action for the UK's Armed Forces together with the identification of vulnerabilities in the UK's supply chain should continue to drive the supply chain resilience agenda for Government with the development and retention of key UK sovereign capabilities.

Work on these issues will benefit not just the defence sector but crucially, support the wider economy and will help Britain to recover from the pandemic, further developing the UK's long-term future prosperity and our international competitiveness.

THE ECONOMIC CONTRIBUTION

The defence sector makes a significant contribution to the UK economy. In fact, the manufacturers within the defence sector account for a crucial £12 billion of Gross Value Add (GVA) in the UK.

Moreover, the sector accounts for almost 5% of the manufacturing industry's total output and saw £20.3 billion of expenditure from the Ministry of Defence (MOD) in 2019/20, with a further £85 billion worth of investment expected in equipment and support over the next four years.

When it comes to exports, the defence sector leads the way. Many defence companies are developing the state-of-the-art innovation sought by nations across the globe. As a result, the UK is the second largest exporter of defence equipment globally and the tenth largest importer. The quality of defence exports produced by UK manufacturers is recognised across the world, in part because of the stringent assessment of equipment by the MOD.

Yet the industry's total contribution to prosperity is much greater than this due to the wider benefits it provides the economy. This includes the high wages employers in the sector pay to their highly skilled employees.

The defence and aerospace sector pays workers **£45,594** on average, which is **27%** higher than the average annual manufacturing salary.

Defence is also a key contributor to local economies and communities throughout the UK's regions and nations. For example, paying average wages 48% higher than the region's average manufacturing wage in the East Midlands. This highlights the concentration of highly skilled workers within the industry. On top of this, activity in this sector supports 207,000 workers in the UK both directly and indirectly.

UK INNOVATION

The defence sector is highly efficient in generating innovation and adopting high-tech processes to stay ahead of the international competition.

Defence firms are the second most intensive manufacturers in terms of research and development (R&D), generating more than £1.9 billion of R&D annually, making them vital to maintaining the UK's global reputation as an innovator.

This R&D capacity is heavily supported by Government through the Ministry of Defence (MoD) with the UK second only to the USA in R&D budget allocation, among NATO members, with organisations like the Defence and Security Accelerator (DASA) and Defence Scientific and Technology Laboratory (DSTL) being especially important funders of R&D in the Defence SME community.

Digital adoption is now the norm and accelerating fast. Two-thirds of defence manufacturers say digital adoption is already a reality in their business with seven in ten having

invested in digital technologies in the last two years. Plans are in place to accelerate further with defence manufacturers citing autonomous robotics and vehicles, Artificial Intelligence (AI) Virtual Reality (VR) and Augmented Reality (AR) as opportunity areas in the next five years.

WORKFORCE

The defence sector recruits, trains and retains a globally competitive workforce, offering unrivalled career prospects. Investment in people is second to none with two-thirds having invested in apprenticeships and nine in ten investing in wider training programmes.

Such bold action ensures the sector has the niche and specialist skills it needs to deliver world-leading technologies and manufacturing techniques. This is good news, not just for the defence sector, but for our supply chain which can benefit from the skills and expertise of those working in the sector.

However, 65% of manufacturers who operate in defence still say they struggle to recruit new talent and there is a need for a wider marketing campaign that will attract young people; showcasing how innovative, dynamic, cutting-edge, and vibrant manufacturing is in the UK. This was a common theme in our discussions with defence manufacturers and a challenge we must tackle head on.

The apprenticeship route is one channel to bring in this new talent and is being widely used by defence manufacturers. Two-thirds of companies we surveyed had invested in apprenticeships in the past two years. However, challenges remain around accessing the provision manufacturers need, whilst navigating the complex apprenticeship levy system.

RESPONSIBLE BUSINESSES

As we look ahead, we see a sector increasingly modern in its outlook, embracing diversity and inclusion and adopting new technologies that help us respond to climate change and the move to net zero.

Corporate Social Responsibility (CSR) is not new to the sector with programmes contributing great results to communities across the UK. But the sector acknowledges that there is also there still much more to do.

The introduction of social values in competitive public procurement, including defence, is a welcome step. This means manufacturers wanting to pre-qualify or to win MOD contracts will have to provide evidence about what their business is doing to tackle economic inequalities, fight climate change and provide equal opportunities to all. Seizing these does not hamper our sector but drives further innovation and opportunity, helping it reach its full potential and to remain globally competitive.

Our conversations confirmed that nothing is taken more seriously by the sector than its security. Cyber-crime is an ever-present threat and at the forefront of minds across defence manufacturers. Most important is that we maintain a world-class solution to this challenge, matching the innovation we see in other areas.

GLOBAL BRITAIN

Trading with new countries has been identified as a key opportunity area but can only be fully realised if we support defence manufacturers to export more of their products into these new markets.

Perhaps the starkest figure from our survey is the 86% of defence manufacturers saying they find it difficult to export into new markets. We know this can be improved including a reinstated Trade Access Programme (TAP) or credible alternative, a well-funded and resourced UK Defence and Security Exports (UKDSO) team within DIT, the development of UK manufacturing hubs and continued support for and from the Defence Primes and wider government.

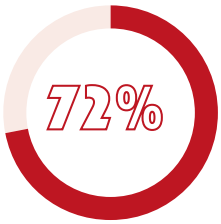
Once an export market has been identified by a UK Defence company, overcoming the financial and commercial risks and pressures in the early years of developing that market can be very challenging. We call on the Government to continue to support and fully fund the Export Control Joint Unit, with better coordination between Government trade missions and subsequent granting of export licences. We also call on the Government to continue to encourage the commercial banking sector to support defence businesses in their export ambitions and to continue to support and improve schemes like the Export Credit Guarantee scheme.

More broadly, Government will need to continue to work closely with defence manufacturers to rapidly address challenges facing those companies who want to seize export opportunities, ensuring they have access to a skills and training system fit for purpose and to build greater supply chain resilience. The UK DSO Export Faculty is an encouraging development.

There are exciting times ahead for defence manufacturers who have set solid foundations for the sector. We now see an opportunity for a closer, more collaborative relationship with Government to maximise the economic gain across UK regions, achieved through a thriving and prosperous defence sector, fully able to exploit global markets.

PART 2: DELIVERING ON THE GOVERNMENT'S PLAN FOR GROWTH AND SOCIAL VALUES

The Government's Plan for Growth is targeted at building on the UK's strengths and addressing weaknesses to boost economic growth and employment. The Government wants the benefits of growth to be spread to all corners of the UK, driving growth that delivers on its priorities: levelling up; net zero and a Global Britain. The findings of our report show the sector has a key role to play.



OF DEFENCE COMPANIES BELIEVE THE SECTOR WILL PLAY A KEY ROLE IN SUPPORTING THE GOVERNMENT'S LEVELLING-UP AGENDA.

In addition, the Government's renewed emphasis on social values in competitive public procurements (including defence) means that defence manufacturers wanting to win MOD contracts will have to provide evidence on what their business is doing around three key themes:

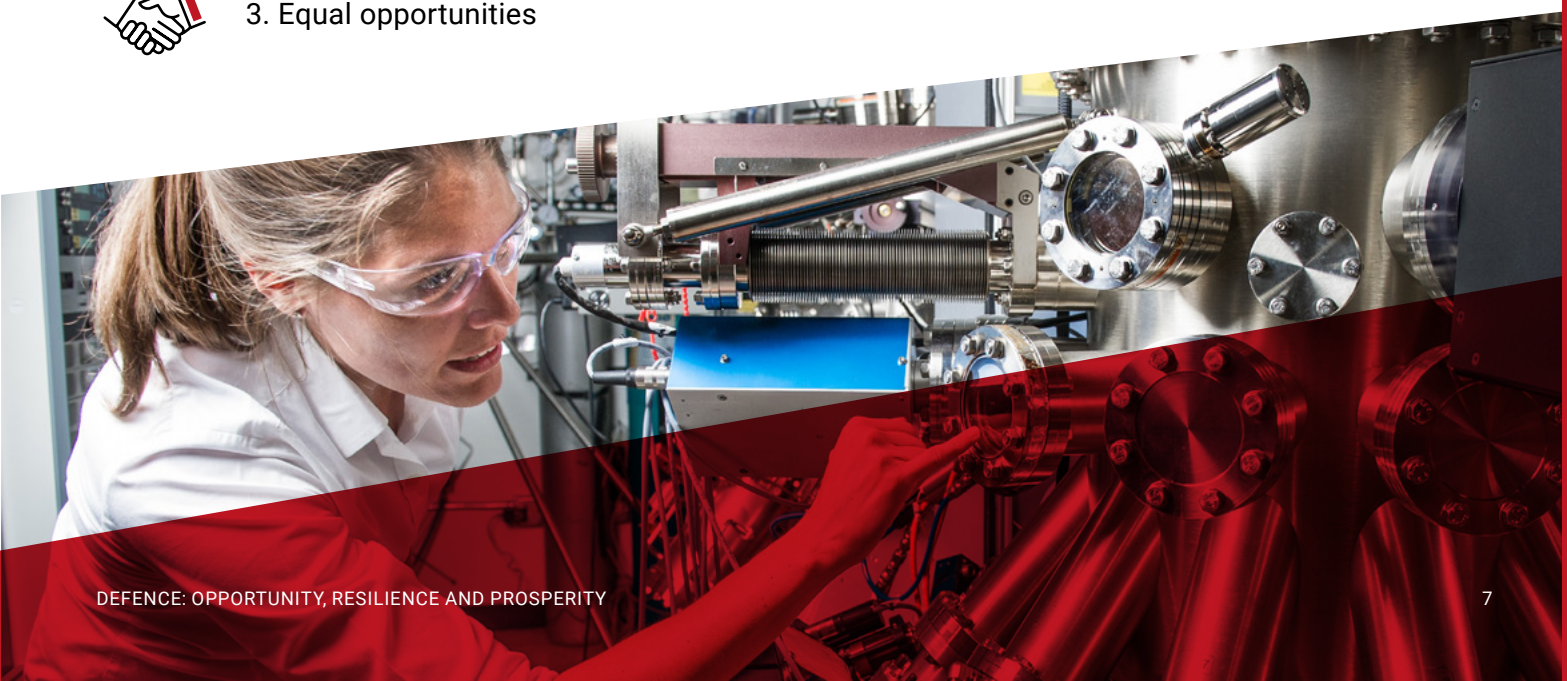
1. Tackling economic inequalities

2. Fighting climate change

3. Equal opportunities

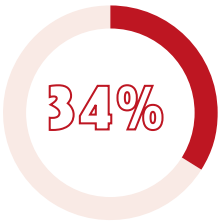
Furthermore, the Defence and Security Industrial Strategy (DSIS) has specified that for military equipment the highest-priority social value objectives will be about creating new businesses, skills and jobs, increasing the diversity and resilience of the supply chain – all under tackling economic inequalities.

This is an opportunity for the sector to drive up its world-class standards even further. Companies that embed these values into their business will find themselves better able to win public procurement contracts, as well as reap the benefits that instilling these values in their business will bring. This will not just start and end with the Primes, as social values are expected to be flowed down from the MOD to the Prime Contractors and throughout the supply chain. The MOD believes that the implementation of social values within the procurement process will enable the defence sector to grow and address some of the issues the sector is facing. Taking these changes as an opportunity can only be a win–win for the sector and secure long-term prosperity.



SUPPORTING DEFENCE MANUFACTURERS TO EVIDENCE SOCIAL VALUES IN THEIR BUSINESS

There is a need to make more companies aware of the new social value requirements.



OF DEFENCE MANUFACTURERS ARE UNAWARE OF THE SOCIAL VALUE REQUIREMENTS IN DEFENCE PROCURement

OF COMPANIES ARE FULLY AWARE OF THE SOCIAL VALUE REQUIREMENTS AND THE REMAINDER SOMEWHAT AWARE

Given the current lack of awareness, it is unsurprising that one-third of companies said they are not doing anything in response to the requirements.

SIX IN TEN COMPANIES SAID THEY UNDERSTAND WHAT THE SOCIAL VALUE REQUIREMENTS MEAN FOR THEIR BUSINESS

ONE IN FIVE COMPANIES UNDERSTAND WHAT THEY MEAN FOR THEIR SUPPLIERS

Only one in ten (9%) are embedding social values within their business already, with just 3% looking at how these are embedded within the supply chain. It is somewhat unsurprising, then, that just 8% of companies said they would not be interested in training and support in this area.

That said, what we have found in our survey and in our qualitative research is that defence manufacturers are already meeting many of these requirements; the action required will be providing evidence of this during the procurement process.

For example, our survey found that three-quarters of defence manufacturers agree that their business is taking action to ensure their workforce is both diverse and inclusive. Such action results in major gains for a business, as our previous work, *Manufacturing Our Recovery Through Inclusion*, found. But defence companies now have even more to gain, as successful bidders for defence equipment and services will need to have equality, diversity, and inclusion (ED&I) embedded in the heart of their businesses in order to pre-qualify and compete for defence work.

As with other sectors in manufacturing, the defence sector is a contributor of greenhouse gas emissions and this will also need to be factored in, given the focus on fighting climate change within the social value requirements, as well as the Plan for Growth's focus on net zero. Specifically, the MOD has introduced 'Stewardship of the environment' into Defence Procurement. Therefore, companies that have the environment and net zero at the heart of their business will be at a competitive advantage.

As we explore later in this report, defence manufacturers are investing in green technologies; however, not all are embedding net zero into their business strategies. Nevertheless, looking ahead, the industry's commitment to innovation incorporates its potential to find solutions to reduce its negative impact on the climate.

INDUSTRY CALL TO ACTION:

The introduction of social values within procurement contracts is an opportunity for defence manufacturers to do even more on embedding diversity, inclusion, equalities in their business and helping fight climate change. Organisations like Make UK Defence can support defence manufacturers to understand what social values mean to their business and their supply chain by providing information, advice, and training. Some 38% of defence manufacturers said they would welcome training on social values and a further 55% said they might be interested in training.

PART 3: OPPORTUNITIES FOR THE SME SUPPLY CHAIN

Many industries across the UK saw revenues fall substantially during 2020 as a result of the Covid-19 pandemic. Aerospace manufacturers faltered as a result of the shutdown of air travel and the collapse of demand for new aircraft and the maintenance, repair, and overhaul of in-service aircraft, as the world's fleets were grounded. However, defence manufacturers largely continued, with major programmes continuing and a steady stream of R&D investments and equipment use remaining at pre-pandemic levels.

The defence sector will be key to the UK's economic recovery post-pandemic, as the UK is well known for high-quality defence and aerospace capabilities, such as BAE Systems' Type 26 Global Combat Ship, Supacat's Special Forces High Mobility Recce Vehicles, Leonardo Helicopter's multi-role Wildcat and Merlin families of aircraft and Raytheon UK's special mission aircraft such as the Shadow and its anti-jamming product, Landshield.

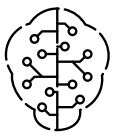
These companies will play a key role in the UK's long-term prosperity as well as in the aftermath of the pandemic.

Take, for example, digital adoption and innovation. The defence sector is leading the march on digitalisation and innovating state-of-the-art technologies. It is one of the most R&D intensive sectors and contributes significantly to technological advancement. In some cases, past defence innovations have been overlooked or forgotten, such as the Liquid Crystal Displays (LCD), the internet (developed for military communications), GPS and even the microwave oven have been integrated into our daily lives and in some cases transformed our well-being.[1]

AUTONOMOUS ROBOTICS AND VEHICLES

There are a multitude of opportunities for big and small companies alike in the coming years. The defence sector has always been a trailblazer for new technology, and that will continue in the coming years. More recently, the sector has driven forward technology for the control of uncrewed or autonomous vehicles in the Land, Sea and Air domains, contributing to technology including household robots and self-driving vehicles. More than one-third (35%) of defence manufacturers exploring autonomy currently feel it will provide new opportunities over the next five years. Globally, huge progress has been made in the field of alternative power and propulsion, and in the coming five years huge strides will be made led in many areas by the defence sector.

Defence faces some unique challenges when looking at alternative propulsion systems. Adding batteries and electric motors to a passenger car is all very well, but adding them to a 40-tonne armoured vehicle is an altogether greater challenge and one that will likely see the internal combustion engine survive much longer in the military than in the civil automotive sector. However, certain subsectors in defence, such as long-range, lightweight recce vehicles and uncrewed land, sea, and air systems, will certainly move forward at pace and may well overtake their civilian counterparts.



ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) and autonomous and semi-autonomous robotics (AG) are growing areas of importance, but there is still a feeling that the true potential is only beginning to be unlocked, with almost one in five (18%) of defence companies identifying AI and AG as the biggest opportunities for the sector to explore. Autonomous artificial intelligence is an emerging technology cluster shaping the 2040's battlefield. The increasing maturity and use of AI throughout the defence sector will continue to enhance the ability to address complex situations and asymmetric and unfamiliar data.

Furthermore, with the adoption of AGI (artificial general intelligence) set to be integrated by the 2040s, this could provide strategic advantages, including but not limited to enhanced information control and data access management, increased speed, stealth, and accuracy of battlefield decision-making, through the rapid data processing of AI and increased security protection for cyber-attacks.

[1]Growing the Contribution of Defence to UK Prosperity, 2018.

ADDITIVE MANUFACTURING

Along with autonomous vehicles and alternate power, additive manufacturing is another opportunity identified by defence companies with 12% stating that it will be one of the biggest opportunities for their business in the coming years. Additive manufacturing, also known as 3D printing, allows companies to produce lighter and stronger parts and systems at scale and is transforming not only the defence sector but the manufacturing sector as a whole. As an essentially low volume, specialist sector, Defence would at first glance be an obvious and potentially heavy user of additive manufacturing. However, tricky requirements like low electronic signature materials or the huge stresses placed on a combat aircraft's structure or engines require further research before additive manufacturing can become commonplace.

In spite of this, additive manufacturing has the ability to unlock the true potential of a business, utilising the digital transformation that many businesses have gone through in the past decade. Using data computer-aided-design (CAD) software or 3D object scanners to direct hardware in a precise manner which entails depositing material, layer upon layer. Each successive layer bonds to the preceding layer of melted or partially melted material. In contrast, creating a product using traditional means would usually require milling, shaping, carving or other means to perfect the product. Additive manufacturing can be precise and eliminate the need for any of the aforementioned steps thus making it far more efficient. The technology is still somewhat in its infancy but in the coming years more and more defence manufacturers will utilise this new technology and this will have an impact on a company's overall productivity.

CLEAN ENERGY

More than a quarter (26%) of defence companies feel clean energy is where the new opportunities will arise from in the next five years. This could be mainly through fuel switching, e.g. electrification, provided the cost of electricity is improved versus gas, either by ensuring the electricity supplier is of renewable energy guaranteed origin (REGO) and/or through on-site generation through solar PV or wind power. Compressors being a significant cause of waste, it is recommended to install ultrasonic air leak detectors or to check them very regularly. The switch to (blue or green) hydrogen is difficult as the processes are fixed and cannot be changed easily. In addition, there are major uncertainties around the infrastructure being available for its wider supply to dispersed sites. This would be the same for electricity generated from nuclear power, and small modular reactors would not be available within five years.

Regarding future market opportunities for clean energy in the medium term, hydrogen will be relevant for air systems and sustainable biofuels for vehicles.

ONE IN FOUR DEFENCE MANUFACTURERS SEE CLEAN ENERGY AS A MAJOR OPPORTUNITY IN THE NEXT FIVE YEARS

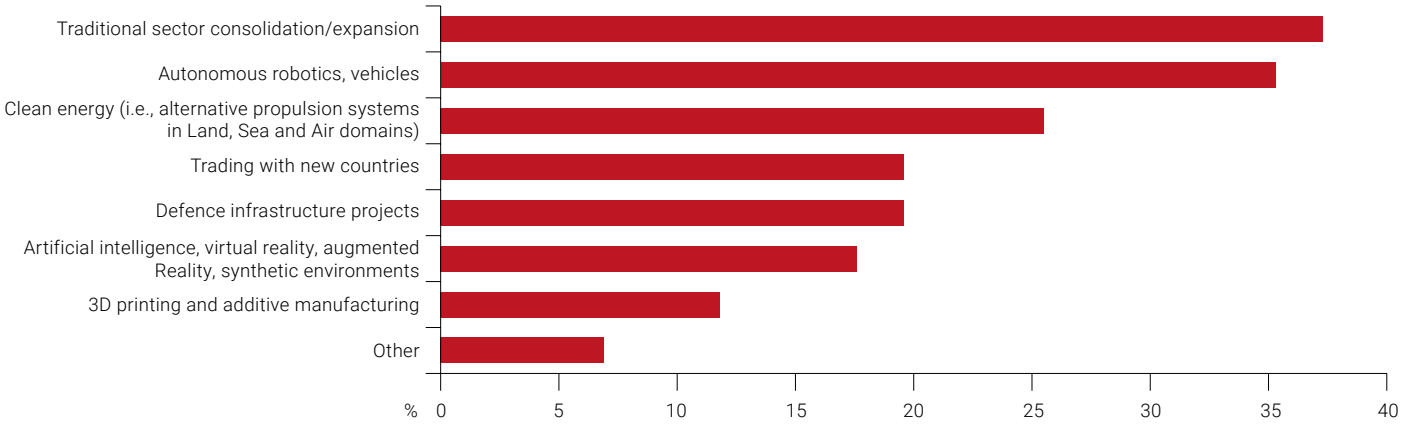
The MOD's Climate Change and Sustainability Strategic Approach highlights the need for development of an energy and fuels strategy – with the aim of transitioning away from fossil fuels and obtaining more resilient, sustainable, deployable energy systems. Furthermore, it underpins and commits to the sector's role in response to the emerging geopolitical and conflict-related threats exacerbated by climate change. There is no doubt about climate change and the impact it has on our world is of increasing importance to defence manufacturers. Ricardo plc, a legendary UK automotive innovator believes that the internal combustion engine in defence will take many years to be matched by alternative power sources. For that reason, they are advocating the rapid development of carbon neutral man-made hydrocarbons or 'e-fuels'.

"Primes are more interested if SMEs are 'being green'."

SME defence manufacturer

Chart 1: There are many opportunities for defence manufacturers in the coming years

% companies citing opportunities for defence manufacturers in the next five years

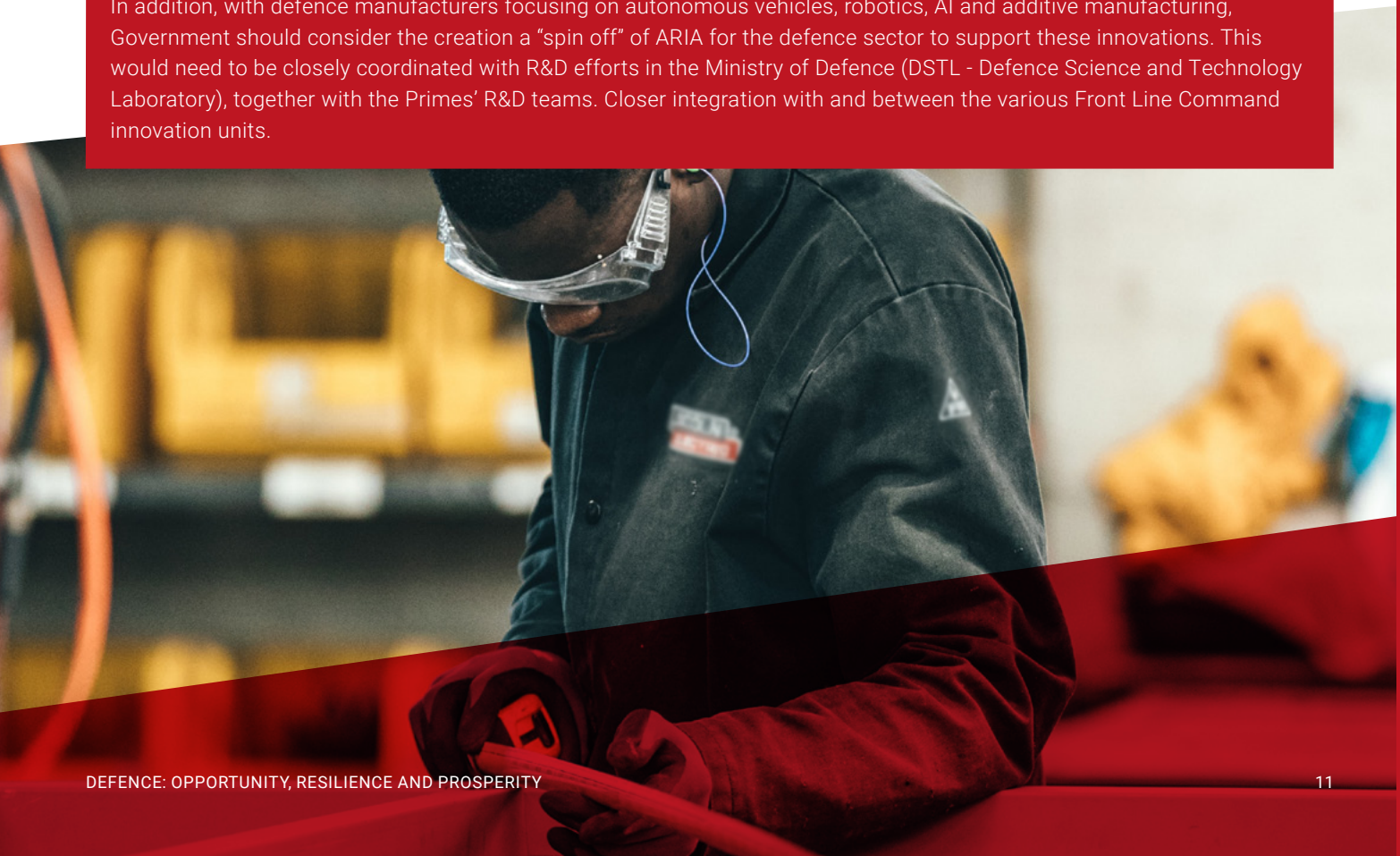


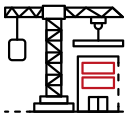
Source: Make UK Defence Survey 2021

POLICY RECOMMENDATION: CREATE AN ARIA "SPIN OFF" FOR THE DEFENCE SECTOR

In February, the UK Government launched the Advanced Research and Invention Agency (ARIA), modelled on the approach taken in the US. While the focus of the agency remains supporting the Government to meet its 2.4% R&D target by 2027, there is a clear opportunity to provide a defence focus for the agency. Given the Ministry of Defence's experience and skill in fostering innovation, the Government should, where practicable, incorporate the defence side of innovation as it sets out its ARIA plans.

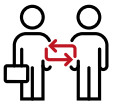
In addition, with defence manufacturers focusing on autonomous vehicles, robotics, AI and additive manufacturing, Government should consider the creation a "spin off" of ARIA for the defence sector to support these innovations. This would need to be closely coordinated with R&D efforts in the Ministry of Defence (DSTL - Defence Science and Technology Laboratory), together with the Primes' R&D teams. Closer integration with and between the various Front Line Command innovation units.





GLOBAL PROGRAMMES

Along with the new technologies highlighted above, there will be plenty of opportunity for other projects, be that large UK defence infrastructure projects or working with allies globally. An example of this collaboration is Australia and the United Kingdom signing an agreement in late 2020 to collaborate on BAE Systems' Type 31 General Purpose Frigate (GPF) programme, building nine Hunter-class frigates for the Royal Australian Navy and further vessels of the same type for the Royal Canadian Navy. A further example is Raytheon Technologies global supply chain programme, with Raytheon UK's global factory concept delivering over £1bn in exports in 10 years from its manufacturing HQ in Scotland. This demonstrates not only the opportunity for large projects delivering new opportunities but also the potential to export to a global market and be part of a global supply chain network.



TRADING WITH NEW COUNTRIES

The UK will continue to be a world leader from a defence export standpoint. It currently has a large export footprint. The Middle East remains the primary UK export destination, followed by North America, which accounts for almost one-fifth of total UK defence exports by customer destination. Europe and the Asia–Pacific were the next most important regional markets for the UK in this period.[2]

In addition, the combat air systems sector accounted for almost two-thirds of all defence exports by value. This is unsurprising given the high purchase and running costs of most types of military aircraft. The land sector accounted for almost a quarter of all defence exports globally.[3]

ONE IN FIVE COMPANIES SEE TRADING WITH NEW COUNTRIES A KEY OPPORTUNITY IN THE NEXT FIVE YEARS

But there are more opportunities to be had. Indeed, one in five of the respondents to our survey still feels the potential to export to new markets is one of the biggest opportunities facing the sector in the coming five years. There is no question that defence exports will continue to play an important role for UK prosperity.

EXPANSION AND CONSOLIDATION

Over one-third (37%) of defence manufacturers believe that the main opportunities will come from the natural expansion and further consolidation of the sector. The defence spending review – one of many reviews underpinning the Plan for Growth work – committed the UK Government to increase it spend on defence over the next four years.

The nature of complex defence equipment means that R&D work needs to be started 10 or 15 years in advance of the equipment actually entering service. Today work is accelerating on the TEMPEST 6th generation combat aircraft due in service in 2035 and concept work has begun on a replacement for the Type 45 Destroyer, due in service in the late 2030s.

Recent very large programmes like the new aircraft carriers HMS *Queen Elizabeth* and her sister HMS *Prince of Wales*, and the current roll-out of the F35 Lightning Joint Strike Fighter, whilst relatively few and far between, are always at various stages of development which will help the sector to grow in the coming years.

The MOD's relatively generous 4 year settlement will largely be spent on the UK's nuclear deterrent and existing programmes already committed to. However, there will also be increases in cyber, space and other R&D spending.

It is clear there are many opportunities for defence manufacturers in the coming years. Established suppliers will be well placed to take advantage of these opportunities, others, perhaps new to defence, may need some additional support to successfully take advantage of them. Stripping away the current barriers to entry for new suppliers into defence is essential and we are call for the removal of many of the barriers to entry, especially for the SME Community. Addressing the many other challenges faced by defence manufacturers will be critical, as we explore later in this report.

[2]Department for International Trade, UK Defence and Security Exports, 2010–2019
[3]Department for International Trade, UK Defence and Security Exports, 2010–2019

PART 4: BOOSTING SKILLS, PRODUCTIVITY, AND BUILDING RESILIENCE

To ensure that defence manufacturers can take advantage of the opportunities in the coming years, they are acting now to boost skills, drive productivity through investment in digital technology and build resilience through green technologies and supply chain monitoring.

INVESTING IN PEOPLE THROUGH APPRENTICESHIPS AND TRAINING

Defence manufacturers are raising the bar when it comes to investing in their people.

TWO THIRDS OF DEFENCE MANUFACTURERS HAVE INVESTED IN APPRENTICESHIPS

Using apprenticeship programmes ensures that defence manufacturers have access to a steady flow of talent into the industry, which, as our survey suggests, can be difficult. Apprenticeships are already a well-established and successful route in the Armed Forces, with circa 20,000 military and MOD civil service apprentices at any one time employed in roles ranging from engineering and construction, to hospitality, animal care and digital information.[4]

Whilst the use of apprenticeships are widespread across the defence sector, our survey suggests that micro-businesses (less than ten employees) are unlikely to offer apprenticeships. Indeed just 8% of companies this size have invested in apprenticeships in the past two years, compared to 71% of those companies with between 10 and 249 employees. This is likely due to the large-scale investment required in both time and financial resource.

There are further frustrations from both defence manufacturers and the wider industry in smaller companies' ability to find talent (as we discuss in the next section of this report) and the training market not delivering the provision businesses need. Small businesses in particular struggle to access local, relevant training provision and do not have the advantages of economies of scale, often wanting to recruit just one or two apprentices a year. Larger businesses on the other hand are in a better position to work with their local college or training provider to articulate the provision they need and the apprenticeship standards they want delivered. There is a potential role for Primes to be working with their supply chain to deliver skills and training at scale by articulating what is needed on behalf of the SME community. When speaking to defence manufacturers about the apprenticeship system many point towards the limitations of the apprenticeship levy. This is not unique to manufacturers in the defence sector but a frustration that is consistently raised within the sector.

For manufacturers, including those in defence, the apprenticeship levy remains far too prescriptive. Companies in scope of the apprenticeship levy find themselves unable to spend their funds due to the restrictive nature of what the funds can be spent on, how the funds can be spent and when the funds need to be spent by. Make UK together with other business groups, trade associations and unions have called on Government to reform the apprenticeship levy to help companies

[4]Ministry of Defence, Apprenticeship opportunities in the Ministry of Defence, 2017, https://www.gov.uk/guidance/apprenticeship-opportunities-in-the-ministry-of-defence

POLICY RECOMMENDATION: REFORM THE APPRENTICESHIP SYSTEM SO IT IS FIT FOR PURPOSE

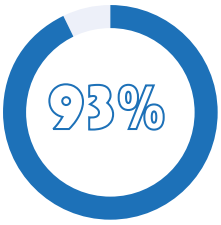
While the apprenticeship programme is widely used amongst defence manufacturers, it is not without its limits. The sector would benefit from a stronger pipeline of talent if the apprenticeship system (including the funding model and provision) is to better meet the needs of defence manufacturers.

Our recommendation is to help reform the apprenticeship levy by:

i) Allowing employers to use part of their levy funds on wages which would support the retention of current apprentices
ii) Allowing employers to use part of their levy funds on overhead/capital expenditure costs to encourage employers to recruit more apprentices.
iii) Doubling the current incentive payment of £3,000 to recruit apprentices for SMEs not in scope of the apprenticeship levy.

retain the apprentices they have and to recruit more in the future. Reforms to the apprenticeship system would also support defence manufacturers.

Investment in training is not centred solely on apprenticeships.



OF MANUFACTURERS HAVE INVESTED IN TRAINING IN THE PAST TWO YEARS

This commitment is likely to reflect the need for highly skilled employees within the sector, who may require specialist and niche skill sets. Offering specialist training allows employers to train for business-specific requirements, often on site.

While micro-businesses may be less likely to offer apprenticeships, they are just as likely to invest in wider training programmes for their employees. Our survey found that six in ten micro-businesses had invested in training over the past two years, increasing to 97% for companies with 10-249 employees and all companies with over 250 employees stating they had invested in training.

Training employees is seen as vital to defence manufacturers, not just upon entry into the business, but continuously throughout an employee's career within the company. Through reskilling businesses to ensure the skills of the workforce are kept up-to-date and can meet the needs of the business and commitment to adoption of digital technologies and take advantage of the opportunities we have outlined previously.

Companies we spoke to as part of the roundtables were keen to take advantage of the government schemes on offer, but there was also a lack of awareness on what support is available with the skills system deemed complex and difficult to navigate.

"Skills boot camps are a government scheme … it is an employer-led cluster training people in skills boot camp – it is an eight-week programme getting students or unemployed individuals ready for the shop floor."

Roundtable attendee

GOVERNMENT INITIATIVES TO SUPPORT BUSINESSES TO RECRUIT AND RETAIN PEOPLE AND TALENT

To support businesses and the labour market throughout the pandemic, the Government has launched a range of initiatives to support companies to recruit and retain people. Such measures could be taken up by more defence manufacturers to help build their talent pipeline:

Kick Start: These are six-month placements, with the Government paying the learners' wages for 25 hours a week plus employer NICs and pensions. Make UK is a gateway for Kick Start placements to support employers to recruit Kick Starters.

Apprenticeship incentives: Incentive payments of £3,000 are available for each new apprentice hired.

Traineeships: These are courses which include work to get someone ready for work or an apprenticeship. They can last from six weeks up to one year, though most traineeships last for less than six months.

Sector-based work academies: These can last up to six weeks and have three main components:

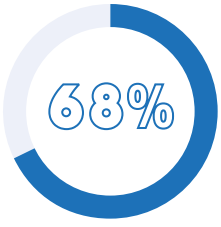
1. pre-employment training – matched to the needs of a companies' sector
2. work experience placement – an opportunity for a business to identify talent and for the individual to cement their knowledge and understanding of the required role
3. a guaranteed job interview or help with an employer's recruitment process

Lifetime Skills Guarantee: Those aged 19 and over and do not already have a Level 3 qualification can undertake a course for free. Several manufacturing courses are included within the list.

Skills Bootcamps: Skills Bootcamps offer free, flexible courses of up to 16 weeks for adults aged 19 or over and who are either in work or recently unemployed.

INVESTING IN DIGITAL TECHNOLOGIES

People are also needed to ensure that investment in technology can take place. Seven in ten defence companies have invested in digital technologies in the past two years and as our survey has shown, this is a growth opportunity for defence manufacturers who will benefit greatly from the emerging technologies of autonomous systems, robotics and cobotics, AI and machine learning and other technological advances for land, sea, air, and space environments.



OF DEFENCE MANUFACTURERS SAY THAT THE ADOPTION OF DIGITAL TECHNOLOGY IS ALREADY A REALITY IN THEIR BUSINESS

As we discussed previously, digital technologies, including artificial intelligence (AI), augmented reality (AR) and virtual reality (VR), are seen as real opportunities and growth areas for defence manufacturers. Such investments can lead to increased productivity, greater resilience, and better-quality products. The latter is important given the large number of defence manufacturers that are investing in new product development as a key growth strategy.

However, there are barriers to further digital adoption and this came out strongly during our roundtables with members. The main focus was around accessing the funding to take advantage of these opportunities and accessing the right skills (which tend to be higher level and in scarce supply) to adopt these technologies. Whilst there are funding streams available to support digital adoption, previous Make UK research has shown that there is often low awareness, in the same way as the support available on training and skills.

What defence manufacturers are aware of is the R&D tax relief scheme which is widely used particularly by R&D intensive companies such as those in defence. New product development was cited by almost three-quarters (72%) of defence manufacturers as growth opportunity in the next five years, but this ambition will only be realised with further investment in R&D which can be costly. The Government has recently consulted on the R&D tax relief scheme including expanding what is within the qualifying expenditure. An expansion of the system would benefit those within the defence sector.

"We looked into additive manufacturing … the main observation is the most active companies in our membership are adopting additive very widely … familiarising themselves with the technology and understanding it in areas where they can apply it … giving them a better understanding of product quality control."

Defence and aerospace trade association

The innovation and specialised technologies found within defence manufacturers filter into their requirements for labour, often including high-skilled engineering and more recently an emphasis on data analysis and software. By investing in both people and technology, the defence sector is significantly adding to the UK's skills base by creating much-needed high-skilled, high-wages jobs and will indirectly benefit manufacturers in other industries from transferable skill sets, thus helping to boost overall prosperity throughout the economy and country. Yet access to skills comes up as a barrier even when talking about digital adoption and there remains a gap in the support available to help fill this void.

Make UK's *Innovation Monitor: Bouncing Back Smarter*[5] found that access to finance is also a key barrier to digital adoption. However, there are a range of programmes and initiatives available to companies, including SME such as Made Smarter.

MAKE SMARTER

Made Smarter connects UK manufacturing industries to the digital tools, leadership, and skills they need to drive sustainable growth. The programme amplifies the cutting-edge UK expertise in innovation & technology to transform the face of UK business operations every day.

ENSURING CYBER SECURITY ROBUSTNESS

As defence manufacturers adopt new digital technologies, the need for cyber security increases and this is demonstrated by the fact that more than three-quarters (78%) of defence manufacturers are investing in cyber security. As well as ensuring that their own businesses are cyber secure, the supply chain and MOD and Prime customers are increasingly asking for companies to demonstrate their supply chain robustness, including cyber security. Almost all MOD contracts and suppliers now require adherence to the basic Cyber Essentials standard or to more onerous and externally assessed Cyber Essentials+. Non-compliant businesses will increasingly fail to win tenders from the MOD or the Primes.

In the coming years, the real and rapidly changing threats that industry face, especially those that have specialist, often classified product data or valuable Intellectual Property, such as those in the defence sector, will face an increasing threat from hostile actors. This truly is the new battlefield, so ensuring businesses are well equipped to fight off any cyber-attacks from international/foreign powers is business critical and essential for the UK's national security.

Cyber security has shot to the forefront of the minds of many companies over the past few years owing to more and more high-profile cyber-attacks hitting the mainstream news – 47% of the wider manufacturing sector have faced a cyber-attack in the past 12 months. Of those companies that have experienced an attack, 63% said it cost them up to £5,000 while almost a quarter (22%) revealed a cost to their business of between £5,000 and 25,000. This demonstrates the growing threat cyber security is having upon businesses. To help mitigate this, 61% of businesses now have a board director responsible for cyber.[6]

But it is vitally important, indeed business critical, for defence companies to ensure their cyber security is fit for the job. The cost of cyber products remains the biggest barrier manufacturers cited to being cyber secure (59%). For defence companies to enter domestic supply chains, they will need to demonstrate their cyber robustness, and the need is only heightened if companies want to export and/or collaborate internationally. Cyber threats are only increasing, so the need for good-quality cyber security is imperative.

"Cyber security is becoming even more important when looking to export."

Roundtable attendee

[5]Make UK, (2020) Bouncing Back Smarter
[6]Make UK (2020) Cyber Security The Last Line of Defence

CYBER SECURITY PRESENTS A UNIQUE CHALLENGE AND OPPORTUNITY FOR DEFENCE SECTOR BUSINESSES

To continue to compete, defence businesses are continually developing new products, with 72% seeing new products as a way to future-proof their business. Many new products are targeted at today's emerging threats, often coming from cyberspace. With a growing number of hostile foreign/international actors facing businesses, it is now more important than ever to ensure that businesses are cyber secure.

This is a new market for defence businesses to explore and in which to create products. The transition from a more conventional land, sea, air, and space warfare mentality to one more focused on the cyberspace domain has already begun. This new cyber battlefront values speed and guile over the more conventional defence advantages of size, firepower and budget. Those UK Cyber businesses that are actively developing innovative products in cyber have the potential to grow exponentially.

INVESTING IN GREEN TECHNOLOGIES

Looking ahead to the industry's transition to net zero, almost half (46%) have invested in green technologies. This investment will be vital if the defence sector is to meet the UK Government's target of net zero by 2050. For the manufacturing industry, including the defence sector, this means cutting emissions in half within the next decade. Embedding a net zero strategy in a business is the first step, and it is positive to see that 13% of defence manufacturers have both developed a net zero strategy and begun to implement it, with a further 6% having developed one but not yet progressed to implementation. For the most part (50%), defence manufacturers are currently evaluating options prior to developing a net zero strategy.

"Becoming greener can be an opportunity (winning new contracts) along with a barrier (cost associated)."

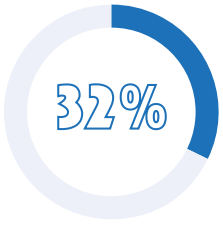
Roundtable attendee

The Defence and Security Industrial Strategy states that the sector will remain reactive to the technological developments, so understandably manufacturers don't have a real direction. However, as discussed earlier, one of three social values that the MOD is prioritising in competitive tendering is stewardship of the environment. In Defence this means that MOD and the Primes and sub-Primes procurement organisations will very soon be requiring evidence of manufacturers' efforts to reduce emissions. Failure to do so will mean that those companies will simply not pre-qualify for work or be scored lower than their green competitors. Establishing a baseline for their emissions is the logical first step for defence manufacturers; to do this, they should measure their direct (Scope 1, generated by their operations) and indirect (Scope 2, from purchased energy) emissions. In addition, they could also introduce low-cost energy and process efficiency measures, such as automatic door closers, variable speed drives, LED lighting with motion sensors and small process changes (e.g., programming temperature controls).

"Clean energy and becoming green will be a challenge – Primes are more interested in working with SMEs that are green."

Roundtable attendee

Digitalisation, including installing half-hour electricity meters, to enable reliable measurement and robust data collection and analysis is the key to the journey to net zero.



OF DEFENCE MANUFACTURERS HAVE NOT YET CONSIDERED THE IMPACT OF NET ZERO ON THEIR BUSINESS

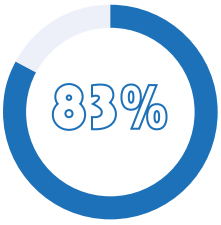
In addition, engaging with the value chain is of utmost importance. Major customers, who will themselves have made net zero commitments and made changes to their own operations towards their own net zero goal, will be relying on their value chain data to inform their own Scope 3 emissions. So, for those supplying these key customers, being able to respond to their requests for information will be key to maintaining their competitivity. Overall, 20% of manufacturers have already been prompted by their value chain to provide

their own carbon footprint, and this is likely to happen more quickly within the defence sector given the prevalence of procurement schemes.

The defence sector is undeniably intertwined with climate change, in both needing to address its contribution to the problem – current estimates show the sector accounts for 50% of the UK central Government's emissions – and in adapting to the emerging geopolitical threats climate change will bring. Despite the defence sector's sustainability efforts to date, these will fail to have a significant effect without major changes in the UK's policies surrounding the green military agenda.

GROWING AND FUTURE-PROOFING BUSINESS

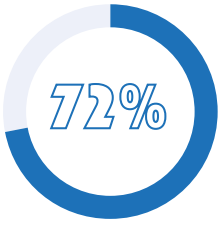
The defence sector is always evolving, not only to provide better and more effective systems and sub-systems within the UK's strong domestic market, but also to remain ahead on the global stage, as an expanding number of countries try to build up their own domestic defence industries rather than relying on imports. To help future-proof the sector, UK defence companies are deploying a range of strategies and tactics to ensure they remain globally competitive.



OF DEFENCE COMPANIES HAVE INVESTED IN NEW PLANT OR MACHINERY IN THE PAST TWO YEARS

This is allowing companies to become more productive and efficient, which should naturally lead them to becoming more competitive.

As mentioned earlier in the paper, defence companies have identified new digital technology, including autonomous tech or AI and AG, as potential new opportunities. Equally, this is a way of staying competitive in an ever-increasing competitive space, domestically and internationally.



OF COMPANIES ARE INVESTING IN NEW PRODUCT DEVELOPMENT

This will aid companies in remaining ahead of the curve domestically and internationally by improving productivity, which has long been a challenge not just for the defence sector but also for wider manufacturing.

As companies continue to invest in digital technologies and new machinery and to explore alternate power, existing more traditional production lines will be challenged to improve their productivity and efficiency. So, whilst new product introductions and adoption of the latest manufacturing technology is a potential game changer, businesses must also work hard to improve their existing capabilities and competitiveness.

However, to ensure firms have confidence to invest – collaboration is key to the future prosperity of the sector, together with ongoing commitment from Government to support and prioritise defence.

HOW DEFENCE MANUFACTURERS CAN BEGIN THEIR NET ZERO JOURNEY:

In its first phase to help the UK deliver the net zero target, the Government is now requiring as a condition of eligibility, that bids for major (over £5M) government contracts include carbon reduction plans. Suppliers must now commit to achieving net zero by 2050 and set out the environmental management measures they have put in place and that will be utilised during the performance of the contract.

They are required to provide their company's baseline emissions, including a subset of their scope 3 emissions covering upstream and downstream transportation and distribution, waste generated in operations, business travel and employee commuting. They will need to not only show a statement of Commitment to Net Zero, but also share their current emission reduction targets and progress against these targets and describe their (completed and planned) carbon reduction projects. This means that suppliers and buyers along the defence supply chain will start to be asked for their own carbon emissions by the companies applying for these contracts.

The first step for each company in the supply chain is to measure their carbon footprint. Without this they will rapidly find themselves, at best marked down and at worst side lined in competitive pre-qualifications and tenders. A key element of this is transparency and the sooner companies engage with their suppliers (if they are the bidder) or their customers to understand what they are doing in respect of curbing their carbon emissions, the more credibility they will gain on the journey.

BUILDING SUPPLY CHAIN RESILIENCE

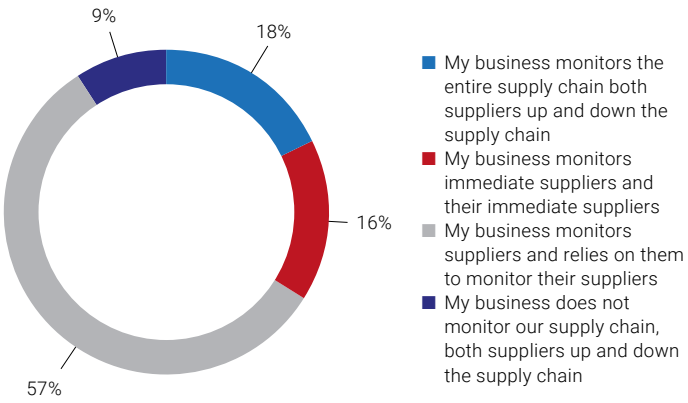
The pandemic has without doubt influenced how manufacturing supply chains operate and how they will evolve. Advances in technology, information systems and the Fourth Industrial Revolution have meant many companies are either moving towards, actively adopting or are even already part of digital supply networks (DSN). DSN give manufacturers end-to-end visibility, encourage greater collaboration among suppliers, and allow defence manufacturers to be much more responsive to changes in demand and supply.

For example, the Industrial Internet of Things and latest data science techniques give defence manufacturers the power to understand, plan and refine supply chains and production processes. They also reflect the complexity of global defence manufacturing products. However, our research shows that, despite this technology being at their disposal, less than one-fifth of defence manufacturers monitor their supply chain in its entirety. The majority (57%) only monitor their immediate supplier and rely on their suppliers to monitor their supply chains. This not only dramatically reduces defence manufacturers' supply chain visibility, but it also reduces their resilience and their ability to mitigate external shocks.

This perhaps highlights the complexity of sometimes many layered defence programmes. For example, a major international programme like the 8-wheel drive BOXER Mechanised Infantry Vehicle includes several procuring organisations including MOD, OCCAR (NATO's procurement organisation), the ARTEC consortium owned by the two International Primes (KMW GmbH and Rheinmetall GmbH), their wholly UK registered subsidiaries, then sub-primes and lower tier sub system suppliers. All of these organisations will have their own supply chains.

Chart 2: Defence manufacturers are monitoring their supply chains

% companies reporting how they monitor their supply chains



Source: Make UK Defence Survey 2021

Connected and agile supply chains rely on good data. However, the opportunity to increase resilience by implementing data-driven supply chains is being missed by some manufacturers. This is part of a wider trend we are seeing from manufacturers, where there is a realisation that introducing the right technologies can increase resilience, yet companies struggle to prioritise this investment, especially during difficult times. But evidence shows that prioritising connectivity and diversification can help to reduce risks for defence manufacturers.

PART 5: OVERCOMING CHALLENGES THROUGH COLLABORATION

Defence companies, like those from most other sectors, face many common challenges from access to finance and the right skills to uncontrollable factors such as a pandemic or a dramatic shift in the exporting and importing environment. However, defence manufacturers are also quite unique and therefore so are the challenges they face.

Defence manufacturers face a different regulatory environment when under the scope of international competition law and have other barriers to consider when looking to export. For example, the 1977 US legislation known as the Foreign and Corrupt Practices Act (FCPA) applies globally to defence suppliers who are active in the US market. The UK was late to the party with regard to anti bribery, passing the UK Bribery Law in 2010.

Additionally, the incorporation of social value contributions to be a part of the Government procurement process for UK defence manufacturers will require companies to evidence the action they are taking on social issues. However, many of these challenges can be overcome with collaboration between Government, Primes, the supply chain and wider stakeholders and partners.

More than 60% of defence manufacturers indicated the biggest challenge faced by the sector over the next five years is the increasing dominance of the big Primes, potentially reducing market access for SMEs and mid-tiers. This was also a common theme of discussion at our roundtables with defence manufacturers. Primes and sub-primes are of course a significant source of contracts and opportunities for SME firms across the UK. Indeed, large programmes require the programme management, systems integration skills and sheer weight of Balance Sheet in many cases of a major Prime, but programmes will normally be delivered in conjunction with the wider SME defence supply chain, which in many cases delivers greater speed, agility, and rapid R&D capabilities than the Primes.

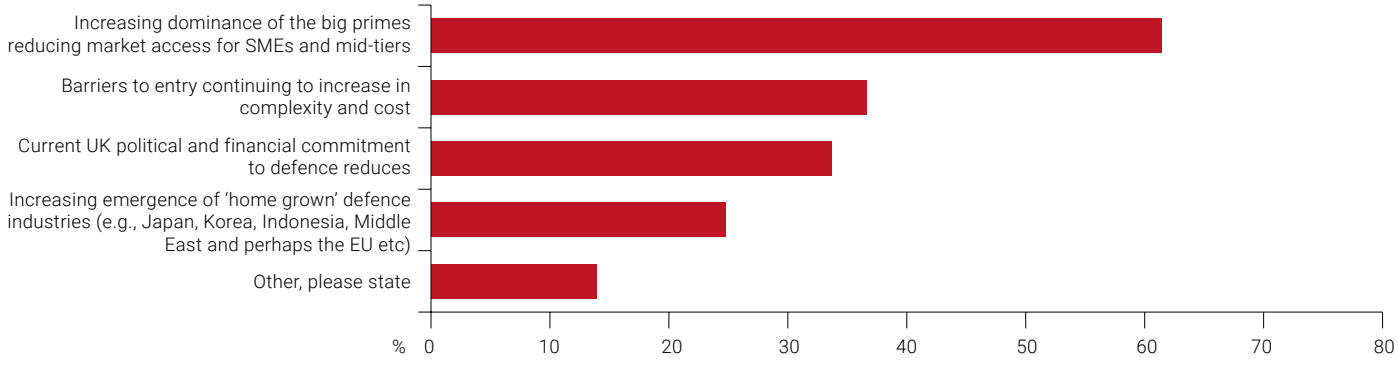
There are opportunities for SMEs to expand through greater integration with Primes, but Primes have a key role to play to make this happen.

INDUSTRY CALL TO ACTION:

Primes should build on the relationships they have with the wider SME defence community and help market access. This should include providing greater visibility in how to get involved in contracts and opportunities. Options currently being considered include the use of MOD's Defence Sourcing Portal as a central resource for all MOD and Prime opportunities.

Chart 3: Barriers to entry remains one of the top challenges for defence manufacturers

% companies citing main barriers in next five years



Source: Make UK Defence Survey 2021

SIX IN TEN DEFENCE MANUFACTURERS SAID THE BIGGEST CHALLENGE FACING THEIR BUSINESS IN THE NEXT FIVE YEARS IS THE DOMINANCE OF PRIMES

PRIMES AND THE MOD ARE TAKING STEPS TO SUPPORT SMES

Both Primes and the Ministry of Defence (MOD) are taking steps that will help reduce barriers to entry such as reducing requirements to retain intellectual property (IP). Half of the respondents to our survey said this would reduce barriers to entry as well as bringing further benefits including greater potential to exploit IP in the civil market, increased opportunities for exporting and encouraging greater investment in R&D. All of this in turn would support growth among existing SMEs as well as open access to entry among other small businesses.

Moreover, two-fifths of defence manufacturers said that the reduction of limits of liability via MOD's Defence Terms and Conditions (DEFCONs) would reduce barriers to entry, as well as reducing commercial risk and having a greater selection of suppliers in the supply chain. The recent establishment of a working group focused on SMEs in MOD is welcomed, as is the personal commitment of MOD's Director General Commercial, Andrew Forzani, the MOD's SME Champion.

An example of how Raytheon UK has tackled SME concerns around IP has been its SpaRK programme. "SME Partnerships Advancing Raytheon Knowledge "research and development competition, better known as SpaRk.

The competition each year is designed to foster innovation through collaborative relationships with UK based small to medium-sized enterprises, academia, and the supply chain to bolster Raytheon UK's growth in key areas of interest such as Space, Intelligence and Security, Power and Defence generally. Launched in 2013 the programme enables SMEs to hold onto their IP and receive funding from Raytheon UK to undertake a three-month technological research project aligned with Raytheon UK's principle business areas, with the potential opportunity for future funding to complete a longer, second-stage project.

SUPPORT FOR EXPORT

A quarter of firms indicated that the increasing emergence of "home-grown" defence industries in traditional UK suppliers' export markets presents a challenge going forward with overseas government procurement organisations likely to favour home based providers over exporters from the UK.

Winning work in Defence Export markets can take many years of work and relationship building before contract award, sometimes never succeeding, despite committing huge effort and resources. Successful exporting requires close collaboration with Government and industry during the whole lengthy export sales cycle. This may include 'soft power' initiatives like training overseas military and defence staff in the UK's world-class defence education establishments and Officer Training Academies, through to responsible export licence controls and establishing win–win political relationships with our defence allies.

Those defence manufacturers that indicated other challenges reported on issues such as "post-pandemic-Brexit impact reducing defence budgets in foreign nations", "availability of skills" "banking compliance excluding defence" and even "inflation". Though there was no clear leader, the issues highlighted make clear that defence manufacturers face a diverse range of challenges that include both internal and external factors.

WIDER CHALLENGES THAT WE SEE ACROSS UK MANUFACTURING

Manufacturers operating in the defence sector are just as exposed to the challenges many manufacturers face in terms of recruiting and retaining talent, accessing finance, winning procurement contracts and exporting into new markets. Given our findings on the latter, we explore exporting in the next section of this report.

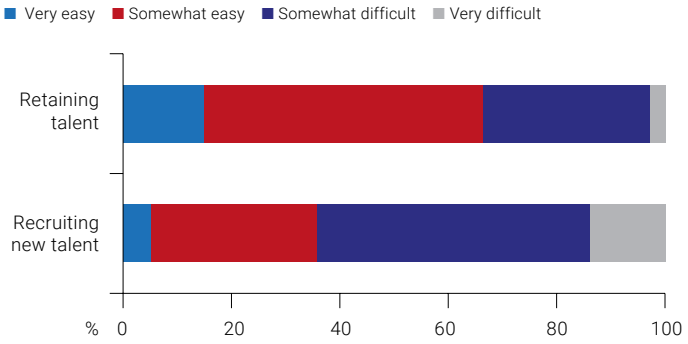
1) Recruiting and retaining talent

When it comes to attracting and recruiting new talent, almost two-thirds (65%) of companies said they find this either somewhat or very difficult. Access to skills has always been the manufacturing industry's Everest and for those operating in defence, this challenge is just as acute. Moreover, the nature of the work of defence manufacturers tends to be mid to highly skilled and these skills are more difficult to source and a reason why wages in this subsector are higher again. The requirement for many defence personnel to be Security Cleared means that unlike most mainstream UK manufacturers, it is sometimes not possible to employ non-UK citizens. Previous Make UK research found that manufacturers operating in the defence sector were more likely to cite job roles with a qualification Level of 4 or 5 above, again indicating the need for more mid- to high-level skills. Level 6 roles (e.g., graduates and degree apprentices) are also in demand and are a common theme of frustration for the companies we spoke to who struggle to create a pipeline of talent to meet the industry's needs.

Attracting talent into the manufacturing industry has always been challenging, with the perception of the industry seen as a major barrier, particularly when it comes to recruiting a diverse range of talent. Small and medium sized manufacturers we spoke to as part of this research made many references to the difficulties of engaging with schools, colleges, and universities – all of which are the main channels for prospective talent. Frustrations around a lack of understanding of the vital role that the sector plays, the heritage behind the defence sector and not being seen as a vibrant, dynamic and innovative sector were common themes of discussion.

Chart 4: Recruiting and retaining talent is a challenge

% companies reporting the extent to which they find it easy to recruit and retain talent



Source: Make UK Defence Survey 2021

"The UK Government investing into technology always sounds good, but the skills don't come through."

Roundtable attendee

"We can't always finance to bring in new people… funding for this is a huge problem."

Roundtable attendee

INDUSTRY CALL TO ACTION: UTILISING GAME-BASED LEARNING TO ATTRACT FUTURE TALENT:

Sector skills councils and other employer-led skills organisations can help broker the relationship between defence manufacturers and the next generation. Enginuity for example, has been exploring the opportunity and impact that game-based learning can make in terms of educating young people about different parts of the sector, using, for example, the popular Minecraft game as a tool to showcase the aerospace industry covering both civilian and defence. The Skills Miner games could also form part of a pilot to investigate how games could be used to both attract and assess potential new entrants to the defence sector.

APPRENTICESHIPS IN DEFENCE MANUFACTURING

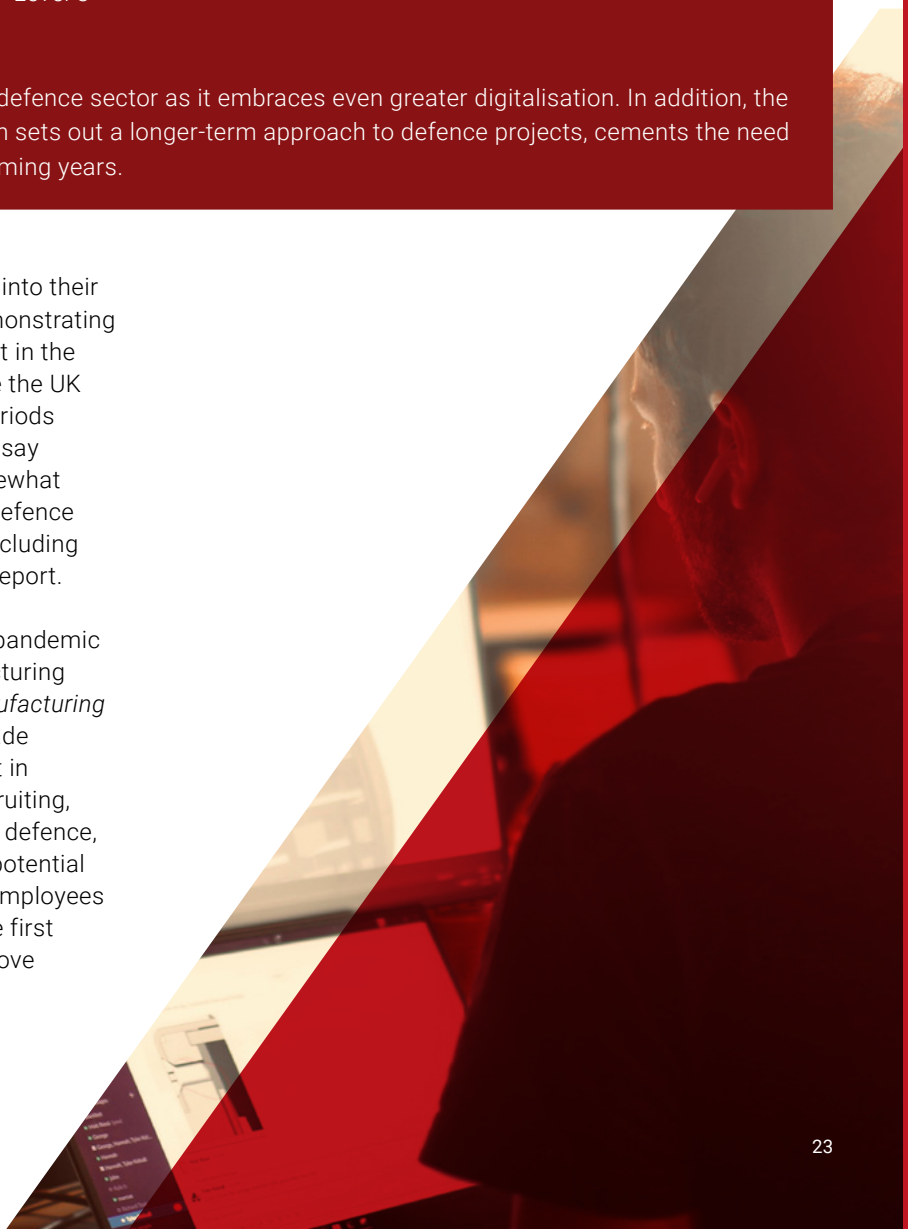
Apprenticeship opportunities within the defence sector vary, ranging from Level 2 to Level 6, and across difference areas, including:

- Core manufacturing apprenticeships – Level 3
- Technical manufacturing and engineering apprenticeships – Levels 2 and 3
- Business and administration apprenticeships – Level 3
- Cyber security apprenticeships – Level 4

This reflects the wide-ranging skills needs of the defence sector as it embraces even greater digitalisation. In addition, the Government's recent defence sector review, which sets out a longer-term approach to defence projects, cements the need for a strong yet steady pipeline of talent in the coming years.

Once defence manufacturers have recruited people into their business, they find retaining them much easier, demonstrating the value and opportunities afforded by employment in the sector. With salaries in the defence sector far above the UK average and employees typically staying for long periods of time, it is somewhat unsurprising that two-thirds say that retaining existing talent and staff is either somewhat or very easy. The key challenge, then, is to ensure defence manufacturers have access to the talent pipeline, including apprentices, which we have explored earlier in this report.

One of the many unfortunate consequences of the pandemic has been large-scale redundancies among manufacturing businesses. Last summer, Make UK's *Covid-19 Manufacturing Monitor* reported that half of manufacturers had made redundancies, with up to a quarter of staff being cut in some cases. Retaining talent is critical because recruiting, particularly in mid- to high-skilled roles as we see in defence, can be both costly and time consuming. There are potential opportunities to be had here in terms of recruiting employees from other sectors of industry into defence, with the first step being to adopt a common skills language to move employees across sectors.



INDUSTRY CALL TO ACTION: ADOPTING A COMMON SKILLS LANGUAGE TO MOVE EMPLOYEES ACROSS SECTORS:

Enginuity has been developing what it calls "the common skills language" as a way of being able to translate skills. Transferable skills and routes between roles and sectors are often not recognised by employers or individuals because of differences in terminology and historic "silos", which make it difficult for those who have lost a role in another sector to be easily recognisable as suitable within the defence sector. This process is powered by data science, which means that if a skill is described one way in civil aviation but in a different way in defence, the model can strip this away and still provide matches. This allows for greater transferability of skills, a strong supply chain and a more dynamic workforce with more opportunities, as well as the ability to retain talent within the engineering and manufacturing sector. The common skills language would allow the often-complex skills taxonomy used within defence to be compared and translated to civilian sectors and language.

Enginuity has recently used data science to help the Cell and Gene Catapult showcase the roles and skills required to work in vaccine manufacture. It has also worked with an individual employer to identify the skills required for two new roles (Fuel Cell Engineer and Aero Thermo Stress Engineer), gaps for upskilling/retraining existing workforce, and which other industries would have similar skills. The potential to use data science and machine learning to attract and retain talent within the defence sector is huge and should be further explored.

2) Access to finance

Appropriate access to finance is instrumental in the ability of defence manufacturers to both meet operational commitments and fund growth through research and new product development. The need for robust financing options for defence manufacturing businesses is increasingly critical as both the global and domestic economy bounce back from the throes of the pandemic.

Demand is growing at pace within industry as customers resume programmes that had been waylaid among successive lockdowns in the UK and abroad Manufacturers are emerging from this crisis with their cashflows having endured an assault throughout the majority of 2020, so now, as their order books swell, it's paramount that defence manufacturers have the required long-term capital to hand to maximise their recovery potential.

ONE IN TWO MANUFACTURERS HAVE ACCESSED FURTHER FINANCE IN THE PAST TWO YEARS

Further exacerbating pressures on firms' balance sheets is the severely accelerating rate of input price inflation being experienced in industry, most prominently observed within the metals market, which is a key raw input of the defence sector. The UK Steel market is a long-term strategic supplier to the UK defence sector and any instability of this defence-critical industry can cause a ripple effect throughout the sector and supply chains. Government support of critical industries such as steel is therefore vital to ensure a stable production capability, as well as to avoid national security implications.

The research shows that the majority (52%) of the industry have accessed further finance in the past two years. This planned activity reflects the capital-intensive activities that manufacturers have had in their pipeline as the pace of industry increases in the coming months and years.

Despite the evident demand for finance in the defence manufacturing sector, our research shows that almost half of the industry experience difficulty in securing appropriate finance, with 45% of firms reporting that they find accessing finance difficult to some degree. The ideal case, those manufacturers who find it very easy to access finance, only represents 12% of the sector, with the rest of those in industry who do not find accessing finance difficult but report it to be 'somewhat' easy at 43%.

Enabling greater access to finance, with fewer pitfalls, will be an important lever with which the industry will be able to maximise its recovery potential in the post-pandemic environment, allowing it the breathing space to expand

investment in research and product development alongside accelerating commercial performance. Defence is a long-cycle business, and to be successful, access to long-term patient capital is vital.

3) Winning procurement contracts

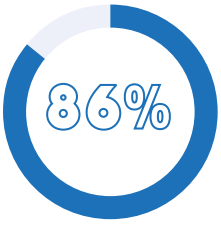
Many defence manufacturers, particularly SMEs, see the procurement tendering process as increasingly complicated, time consuming and therefore expensive. This is borne out in our research with 85% of defence manufacturers saying winning procurement contracts is either somewhat or very difficult. This is consistent across manufacturers, with businesses continuing to tell us that winning contracts in their respective regions is difficult. Government's proposals to comprehensively streamline and simplify the complex framework of regulations that currently govern public procurement is therefore welcome news but must include defence procurement.

If changes to public procurement are to have significant positive impact on UK manufacturing, then the culture must change from one focused on short term costs to one that takes a complete life cycle or whole life costing approach, including social and environmental considerations. UK registered suppliers must form the backbone of UK Defence procurement just like they do in many leading nations in NATO, including France, USA, and Germany. The introduction of social values within MoD contracts goes some way to achieving this with the next stage of development for the defence sector being the embedding of social values within their business. Only those that can demonstrate that they are addressing each of the three themes will find themselves successful. This may prove challenging for some businesses, but those that take these values seriously will reap benefits.

PART 6: SECURING A GLOBAL BRITAIN THROUGH TRADE

One of the starkest findings from our survey has been the vast majority (86%) of defence manufacturers saying it is either somewhat or very difficult to export into new markets (53% and 33% respectively).

The UK Government's ambition is to create a Global Britain with a vision to export more of the UK's goods and services across the globe. Yet our findings, both from our survey and through our roundtables with business leaders, shows that this vision is some way off a reality.



OF COMPANIES SAID EXPORTING INTO NEW MARKETS IS DIFFICULT

More than two-fifths (42%) of defence manufacturers cited delays or frustrations with the current UK Government Export Control approval process as a major barrier to tapping into new export markets. This was also borne out in our discussions with manufacturers. The problem seems particularly acute for small businesses, who do not have the time or resources to undertake what can be a lengthy and costly process.

"There are admin barriers and too much paperwork for an SME."

Roundtable attendee speaking about exporting

Another barrier (cited by 38% of respondents) is the introduction and/or imposition of non-UK standards and regulations on the UK defence supply chain by overseas Primes and buying organisations such as NATO's OCCAR. The Ministry of Defence must become more sensitive to decisions it makes that will disproportionately disadvantage or increase SMEs costs. A recent programme saw the issuing of engineering drawings and technical specifications in German language because translation costs were not included in the contract from MOD. This has cost each SME wanting to bid for work on the programme thousands of pounds each. Defence sector exports are notoriously changeable if viewed on an annual basis, and so providing effective commentary analysis across an extended timeline is required. For example, while in one year, the UK's share of the global defence market was estimated to be 12.8%, around £7.7 billion in value terms. However, a year later, the share had fallen dramatically to 9%, with the 2016 export value declining to just £5.9 billion.

UK defence export sales performance has also demonstrated a "clustering" effect around defence sales and programmes in a few global regions, typically the Middle East, Europe, and Asia–Pacific. The commercial activity in these regions is further increased if sales through collaboration partners such as America are considered in the data.

Moreover, UK defence exporters face significant competition across all the world's regions. With the UK being a high-income, high-technology defence exporter, commercial challenges are faced from competitor products from America, France, Israel, and Russia in key markets. A rapidly emerging new competitor is China, which has become a prolific defence arms exporter, providing accessible and acceptable-quality and increasingly high-tech systems to buyers.

"Barriers do come up with export, but SMEs just need help and guidance as it is not as big a challenge as it seems."

Roundtable attendee

The UK must remain competitive, continuously investing in product and process technologies to refresh export capabilities and evolve dynamic comparative advantages. Yet costly investment into research and development is not easy when margins are under pressure and long-term market conditions are uncertain. Beyond these economic pressures, common to all exporters are three other key factors that differentiate defence from more open civil markets:

"The Government has now stopped TAP [Trade Access Programme] funding which supported companies visiting overseas tradeshows."

Roundtable attendee

Many defence manufacturers we spoke to during our roundtables cited barriers to exporting into new markets, such as a lack of export knowledge and understanding of the new market opportunities available to them as well as a lack of funding.

A number of attendees highlighted their frustrations at the decision to remove the Trade Access Programme (TAP). This was a package of support that provided help to SMEs to encourage and aid them to export. As part of the Government's Industrial Strategy, there was a stated aim to increase the value of exports from the current 30% GDP to 35%. However, with the Industrial Strategy now abandoned and replaced with the Plan for Growth, TAP has gone with it – a move that defence manufacturers want to see reversed.

Recent dialogue with the Department for International Trade's UK Defence and Security Exports Team (UKDSE) suggests that an alternative to the TAP programme was being actively developed with the Prime contractors funding a scheme for SME's attending overseas trade shows.

Defence manufacturers also want to see the UK Government drive further integration of the National Technology and Industrial Base Integration (NTIB) in Britain and enable manufacturers to work with UK and US Government departments to enhance cooperation and build on existing exporting relationships.

However, perhaps the most important consideration is the acceptance by Whitehall that defence exports represent the culmination of years, and sometimes decades, of political and military relationships, corporate marketing, development, and technology efforts. It is therefore imperative that the UK's soft power diplomacy, which has traditionally and should continue to include defence sales, is viewed as a strategic policy tool to gain competitive advantage with friendly foreign states.

Finally, Government should support the further development of UK manufacturing hubs that are enabled to play a crucial part in the global factory model, and at the same time increase export volume potential to trusted partners.

POLICY RECOMMENDATIONS: GOVERNMENT SHOULD TAKE BOLDER STEPS TO SUPPORT EXPORTS

The UK Government can support defence exporters through interventions in related defence export activities including:

- Minimising delivery risk and defining key roles for defence contractors in international defence collaboration programmes
- Maximising value for money (for UK taxpayers) via enhanced training and through-life government-to-government contracts
- Reinstating the Trade Access Programme (TAP) to support SMEs or develop a funded and credible alternative
- Supporting the development of UK manufacturing hubs
- Driving further integration of the National Technology and Industrial Base Integration

PART 7: OVERVIEW OF RECOMMENDATIONS

Our report has shown that the defence sector is innovative and diverse and it delivers many of the Government's ambitions in terms of exporting, creating good jobs and transitioning to net zero. The sector's dynamic manufacturers could grow and prosper even more with the right policy levers pulled by Government. Below is an overview of the policy recommendations to Government and industry calls to action made in this report:

POLICY RECOMMENDATIONS FOR GOVERNMENT:

1. Reform the apprenticeship system for more opportunity

While the apprenticeship programme is widely used among defence manufacturers, it is not without its restrictions. The sector would benefit from a stronger pipeline of talent if the apprenticeship system (including the funding model and provision) better meets the needs of defence manufacturers. Government should reform the apprenticeship levy by:

- Allowing employers to use part of their levy funds on wages which would support the retention of current apprentices
- Allowing employers to use part of their levy funds on overhead/capital expenditure costs to encourage employers to recruit more apprentices.
- Doubling the current incentive payment of £3,000 to recruit apprentices for SMEs not in scope of the apprenticeship levy.

2. Take bolder action to support exports

The UK Government can support defence exporters through interventions in related defence export activities including:

- Minimising delivery risk and defining key roles for UK defence contractors in international defence collaboration programmes
- Maximising value for money (for UK taxpayers) via enhanced training and through-life government-to-government contracts to UK registered businesses that create wealth and jobs for the UK economy
- Reinstating the Trade Access Programme (TAP) or providing a credible alternative to support SMEs
- Supporting the development of UK manufacturing hubs
- Driving further integration of the National Technology and Industrial Base Integration
- Commitment to the Defence Solutions Centre which is focused on long-term defence market intelligence and a fully funded and growing UK Defence and Security Exports Team in DIT.

3. Create an ARIA "spin off" for the defence sector

In February, the UK Government launched the Advanced Research and Invention Agency (ARIA), modelled on the approach taken in the US. Given the Ministry of Defence's experience and skill in fostering innovation, the Government should incorporate the defence side of innovation as it sets out its ARIA plans.

In addition, with defence manufacturers focusing on autonomous vehicles, robotics, AI and additive manufacturing, Government should create a "spin off" of ARIA for the defence sector to support these innovations. The Government should also work on creating a more cohesive and simplified 'pan-domain R&D strategy led by DSTL and encompassing DASA and all the Front-Line Commands' Innovation hubs. For SMEs with limited resources the bewildering array of differently named innovation hubs (Navy X, RAF Rapid Capabilities Office etc) is confusing does not encourage innovative business to step forward.

CALLS TO ACTION FOR INDUSTRY:

1. Raising awareness of social values:

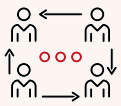
The introduction of social values within procurement contracts is an opportunity for defence manufacturers to do even more in embedding diversity, inclusion, equality in their businesses and helping fight climate change. Organisations like Make UK Defence can support defence manufacturers to understand what social values mean to their business and their supply chain by providing information, advice, and training. Some 38% of defence manufacturers said they would welcome training on social values and a further 55% said they might be interested in training.

2. Utilise game-based learning to attract future talent:

Sector skills councils and other employer-led skills organisations can help broker the relationship between defence manufacturers and the next generation. Enginuity for example, has been exploring the opportunity and impact that game-based learning can make in terms of educating young people about different parts of the sector, using, for example, the popular Minecraft game as a tool to showcase the aerospace industry covering both civilian and defence. The Skills Miner games could also form part of a pilot to investigate how games could be used to both attract and assess potential new entrants to the defence sector.

3. Adopt a common skills language to move employees across sectors:

Enginuity has been developing what it calls “the common skills language” as a way of being able to translate skills. Transferable skills and routes between roles and sectors are often not recognised by employers or individuals because of differences in terminology and historic “silos”, which make it difficult for those who have lost a role in another sector to be easily recognisable as suitable within the defence sector. The common skills language would allow the often-complex skills taxonomy used within defence to be compared and translated to civilian sectors and language.



4. Primes can support the SME community to engage with procurement opportunities with greater visibility:

Primes and the MOD must build on the relationships they have with the wider SME defence community to reduce barriers to market access by opening the sector up to non-defence players. This should include providing much greater visibility in how to get involved in contracts and opportunities and ideally an accessible and visible central repository for those opportunities.

METHODOLOGY

In the UK, the majority of the defence manufacturing industry lies within the SIC code class 30, Other Transport. The Other Transport SIC classification contains within it the aerospace, nautical and rail industries as the main sectors. There is no explicit SIC classification for defence manufacturing; rather, lower-level codes for more-specific types of activity within the industry. The statistics used therefore relate to this SIC code.

We surveyed 102 manufacturers operating within the defence sector. The majority (79%) were SMEs, which we define as having fewer than 250 employees. As part of this research, we also held focus groups with almost 100 manufacturers working in the defence sector. During these discussions we explored the key challenges and opportunities facing the sector in the coming years. We also spoke in detail about the barriers that defence manufacturers face, particularly when exporting.

Make UK Defence is a national not-for-profit, member owned defence trade association, part of Make UK – the manufacturers' organisation.

We champion and support the UK's innovative and diverse defence manufacturers and the wider defence supply chain.

Guided by our member Advisory Board, our mission is simple;

- to have a deep understanding of our members and their challenges, within the context of the domestic and global defence industry;
- to celebrate and amplify the success of the UK defence supply chain, whilst ensuring our members' challenges and concerns are clearly heard and acted upon in Government and the defence primes;
- to help our members grow through networking and Meet the Buyer opportunities
- to provide our members with true competitive advantage through our business and people development programmes.

Together, we are helping to build an innovative, forward looking, internationally competitive UK defence supply chain.

www.makeuk.org/about/make-uk-defence
@makeukdefence

For more information, please contact:

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Raytheon UK is committed to investing in Britain's future. Through long-term investments in research, training and technological innovation, Raytheon UK is helping to build a more agile & inclusive workforce, and a resilient economy that delivers prosperity to all corners of the country.

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