

# UK AEROSPACE: THE IMPACT OF BREXIT

Institution of  
**MECHANICAL  
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**The UK aerospace industry is the second largest aerospace industry in the world, and is one of the traditional economic backbones of the UK economy. As a multibillion-pound industry, its influence has a global impact. With the UK currently negotiating amendments to the agreement in principle (dated November 2018), including a contingency plan for a 'no deal' scenario, there are industry-wide concerns about the effect it will have on the UK aerospace sector, particularly the UK's ability to maintain its global position.**

The Institution of Mechanical Engineers recommends:

- 1. The UK Government negotiates a Brexit deal that maintains the strategic partnership with the EU and the status quo.** This will ensure that the UK continues to utilise the supply chain footprint and to have access to the skilled workforce. This in turn, will guarantee that the UK maintains the steady influx of investments in capital, skilled labour and EU students who study and undertake research to improve upon the UK's scientific knowledge. Access to current markets would also be guaranteed through continued membership of the European Aviation Safety Agency (EASA). Due to the niche nature of the industry, there are negligible benefits in pursuing individual regulations and trade agreements with other countries at the expense of compromising our global position.
- 2. The UK Government invests in RDI projects that focus on improving battery technology and the electrification of aircraft propulsion, due to the significant upscale and potential of these areas to make the UK a world leader.**
- 3. The UK Government increases the availability of funds, in the form of grants for UK SMEs to invest in digital and automated manufacturing machinery and training, in order to improve output and quality.** This will significantly increase the productivity and, in turn, the competitiveness of the UK manufacturing workforce.

# BREXIT AND THE UK AEROSPACE INDUSTRY

## INTRODUCTION

The big UK companies such as Rolls-Royce and BAE Systems, which manufacture both civil and military applications, regularly feature in the top ten of aerospace companies in the world. Other top ten companies such as Boeing, Airbus, United Technologies and Safran, are regular players in the UK aerospace sector. They have made significant investments to increase the manufacturing capabilities and skilled workforce in the UK. The industry is successful partly due to its specialist nature, which necessitates the need for collaboration between companies to share the risks and rewards, especially in the research, development and innovation (RDI) of new technologies. With future advancements, which are aimed at improving efficiency and reducing greenhouse gas (GHG) emissions, the UK is well placed to play a major role in the overall technological development. These include the digitisation of activities and electric propulsion of the next-generation aircraft. Therefore, as part of the UK's wider post-Brexit industrial strategy, it is imperative for the UK Government to ensure that any exit deal with the EU includes a binding agreement to maintain the current relationship.

## THE UK AEROSPACE INDUSTRY AND ITS INFLUENCE IN EUROPE AND THE WIDER WORLD

The UK aerospace industry has been at the forefront of aircraft design, development and manufacture ever since the first airships were constructed in the mid-1800s<sup>[1]</sup>. The advancement in aerospace technology has seen the UK contribute towards many firsts such as the Avro Type F, the first production aircraft with enclosed cabin; the Gloster Meteor, the first jet aircraft used by the Allies in the Second World War; the de Havilland Comet, the first commercial aircraft to enter service; Concorde, the first supersonic-speed commercial aircraft; the Hawker Siddeley Harrier, the first fixed-wing vertical/short take-off and landing military aircraft; and the Airbus A380, the largest commercial aircraft<sup>[2,3,4,5,6,7,8,9]</sup>. Some of these firsts have been as a result of the long-standing strategic partnership between the UK and other EU countries. As the demand for commercial travel continues to soar, so does the level of technological improvements demanded and the need for low carbon and efficient aircraft. Only a handful of companies are able to meet this challenge. Such is the UK's influence, it is common that at every major airport in the world, travellers will board aircraft made up of systems designed, developed and manufactured in the UK. Emerging industrial trends include drones and unmanned air vehicles (UAVs), which have gained traction for commercial and military use. They enable photographic and motion capture, surveillance, payload delivery, and atmospheric research and development activities.

Furthermore, the development of hypersonic and space applications for flight and space access is a growing area within the sector. This has seen an increased niche demand as technologists explore the possibilities of reducing flight times, and improving the economics of launching new satellites and communication technologies into space orbit. In terms of the military applications, the UK has contributed to the design, development, operation and continued airworthiness of aircraft such as the Panavia Tornado, the Eurofighter Typhoon and the Airbus A400M. These aircraft have been involved in wartime and peacekeeping missions all over the world.

As at 2017, the UK aerospace industry generated £35bn in turnover, £30bn in revenue from exports with a growth of 39% between 2012 and 2017. The sector directly employed 123,000 people and 3,900 apprentices<sup>[10]</sup>. When combined within the overall umbrella of aerospace, defence, security and space, the total turnover was £74bn, of which £41bn was generated from exports, and 380,000 people and 12,000 apprentices<sup>[10]</sup> were directly employed.

## THE EU AEROSPACE POLICY

The EU commercial aerospace sector had a turnover of €140bn (£127bn) as at 2013 and has a trade surplus, as the products are exported all over the world<sup>[11]</sup>. The EU implemented a number of policy actions to address key issues. This are summarised as follows<sup>[11]</sup>:

- **Competitiveness:** promoting sustainable competitiveness
- **Trade:** market access outside the EU by opening up trading opportunities for commercial applications and representation in disputes involving trade barriers, eg competitor subsidies
- **Research:** investment in RDI to promote competition. The RDI expenditures represent 10% of the industry's turnover, with the public sector providing one third of the finance. Strategically, the roadmap for RDI is developed through the Advisory Council for Aeronautics Research in Europe (ACARE). The EU is currently supporting RDI through programmes such as Horizon 2020, Clean Sky and the Single European Sky ATM Research (SESAR) programmes
- **Environmental Action:** to "mitigate the growing impact of aviation on the environment"<sup>[11]</sup>
- **Air Transport:** a common EU aviation policy to boost Europe's economic industrial base and the reinforcement of its global position. In addition, other policies have been developed to promote a single market and a co-ordinated external aviation policy and Single European Sky

The UK is a significant player within the EU, along with France, Germany, Italy, Spain, Poland and Sweden.

## THE SUPPLY CHAIN AND MOVEMENT OF SKILLED PERSONNEL

A study conducted in 2016<sup>[12]</sup> concluded that while the UK aerospace industry is growing in terms of procurement spend, it is not keeping up with the procurement spend observed for the rest of the world. This indicated that the UK is losing market share to overseas suppliers. The same study also concluded that there is a shortage of skilled manufacturing and advanced technology personnel, which reflected the poor provision and negative perception of such jobs. Areas where the UK lacks the necessary expertise, include capabilities in aerospace standards specific to processes and materials such as surface treatment of parts, specialist metal machining and hybrid composite material technology. The UK aerospace supply chain network also suffers from poor productivity levels<sup>[12]</sup>. A lack of streamlined manufacturing processes and advanced supply chain management is judged to restrict the UK from competing with other low-cost emerging markets<sup>[12]</sup>.

However, the study did highlight that the UK's competitive advantage is in propulsive systems and aero-structure manufacturing capabilities<sup>[12]</sup>. This means that the UK depends on the expertise from other countries for processes and materials, systems and equipment, testing capabilities and some supply of skilled workforce to manufacture the sub-assemblies and components and test components and systems. These are important prerequisites prior to manufacturing and assembling the larger assemblies and final products in the UK.

With the UK fully integrated into the EU supply chain within the pan-European footprint, it enables better synergies, which allows the UK to focus on its expertise. In a situation where the UK left the EU without the necessary agreements in place, it is judged that this would mean a lot of the components and sub-assemblies that are supplied, will be subjected to tariffs or restrictions when sent from the EU. Multinational companies with operations in both the UK and EU depend on the movement of their workforce, just like the components and sub-assemblies. Any restrictions placed on movement will result in logistical problems due to lack of readiness, additional administrative controls and checks, additional procurement and immigration paperwork. These factors will increase the time it takes to manufacture products, and will increase the cost of manufacture.

## STRATEGIC PARTNERSHIP

In addition to our default partnership with the EU, several aerospace-focused partnerships exist, such as the European Aerospace Cluster Partnership (EACP). The EACP enables collaboration between countries for the purpose of exchanging experiences, supporting the implementation of concrete pilot programmes and sharing of strategic ideas<sup>[13]</sup>. The EACP is one of the EU's founding partnerships and is fundamental to the improvement of the EU's aerospace global competitiveness, through the support of a pan-European collaboration, and the implementation of joint strategies for penetrating new markets outside the EU<sup>[13]</sup>. The UK currently has four cluster groups located in Wales, Midlands, the Northwest and the West of the UK.

In addition, strategic partnerships have easily supported the design and development of military applications. An example is the A400M Airbus military heavy lifter transport aircraft. The majority of its design and development was carried by the EU member states, which included the UK, France, Germany, Spain and Italy. The strategic partnership has allowed companies to set up manufacturing facilities across the continent at locations that harness the knowledge sharing, local supply chain and skills capabilities. Without the strategic partnership between the UK and EU, it is expected that there will be no protection of companies that have facilities in the UK. Potentially, UK-based facilities will not be entitled to the benefits of sustainable competition provided to all EU manufacturers. This may result in marginalisation and sell-off of assets, and a potential relocation of operations to mainland EU. In such a scenario, UK sites may become lower-tier suppliers rather than being part of their founding organisations, and will suffer due to unfavourable trading and unsustainable competitive conditions.

## INVESTMENT IN THE UK

The commercial global outlook for the aviation sector is forecast to have a market value of US\$6.3trn (£5trn) by 2037<sup>[14]</sup>. Currently, the UK receives investments through the strategic partnership with the EU, with recent notable investments in UK facilities around 2015 totalling £667m. One thing to note is that the UK is not always guaranteed to receive foreign direct investments (FDI), because it has to compete with other nations. Furthermore, investments from the UK Government are not sufficient to sustain the sector. The investment criteria that favour EU membership include<sup>[15]</sup>:

- Mobility of established engineering skills base; access to pan-European skills base to complement shortages and encourage growth and fluidity across the EU supply chain, and an established manufacturing footprint
- Influence in defining and amending global standards through EU membership as well as demonstration of compliance with these standards
- Free trade atmosphere with absence of tariffs, other taxation and administrative burdens, and trade agreements with developing markets
- Political and economic stability based on a well-developed political, legal and financial system

On the other hand, criteria that are neutral to EU membership include<sup>[15]</sup>:

- Excellent research universities with modern industrial strategies and support provided in exports, next-generation technologies and productive growth
- Investment costs suggest that the UK is competitive on high-value activities, with favourable tax and investment regimes
- Established infrastructure network
- The UK is not linked to the euro, thereby limiting currency risks

Investment decisions with regard to the UK are linked to large complicated platforms, systems and services, which require a long lead-time approach and extended timeframes to evaluate return on investment. A key survey of investors conducted prior to the 2016 referendum, concluded that EU membership was a positive, with non-EU membership posing a risk of uncertainty in the post-EU climate<sup>[15]</sup>. Factors that were given include the importance of movement of skilled workers, access to engineering resources and the freedom to trade with customers, group companies and suppliers across the EU. At every level of the decision-making process, the ability to influence EU decisions about standards, which impacted the global aerospace industry, was also considered. The effect of Brexit and a 'no deal' scenario would be felt in the long run and would impact future investment decisions. While there are important factors of relevance, which are not reliant on the UK being in the EU, it is difficult to see the enhancements of an investment in the UK without EU membership. The view is that as a global industry, the UK would still need to comply with all the regulations in the different markets to which it wishes to export its products.

## **INFLUENCE THROUGH ACADEMIA AND RESEARCH, DEVELOPMENT AND INNOVATION**

With a sizeable supply of specialist undergraduate and postgraduate aerospace degrees being offered at UK universities, the UK offers attractive prospects for graduate entrants to the UK aerospace industry. A high percentage of graduates from UK universities that studied aerospace-theme degrees, expect to become employed in the industry within the first year of finishing their studies. UK universities also attract EU students through exchange programmes, with the EU students expected to pay the same fees as home students. Students who study in the UK and end up working in the UK, influence the strategic knowledge of the UK. However, if the conditions post-Brexit do not support EU migrants who study here, their skills and the strategic knowledge will be lost to other countries.

With regard to RDI, the UK space and aerospace sectors are closely interwoven with the EU and international initiatives. Projects such as the Galileo satellite navigation programme and Clean Sky are undertaken by academia in the UK. The research capabilities are boosted through research frameworks that are supported by the universities. The National Aerospace Research Consortium (NARC) is one of such communities of leading UK universities, which aims to create a UK-wide infrastructure of accessible and integrated world-class facilities, to support key areas such as future aircraft and propulsion<sup>[16]</sup>. Such initiatives are driven by the challenges of global warming, with aviation accounting for 3% of the EU's total GHG emissions<sup>[17]</sup>.

The influence of RDI is also fundamental to the UK's military capability in maintaining its fast jet fleet. Delays to the F35 programme paved the way for academic studies to be conducted on existing fleets, originally designed for the European theatre. Due to delays in the F35 programme, the study looked at the effects of operating these fleets in the hot and harsh environments in the Middle East<sup>[18]</sup>. Such capabilities require a flow of students and funding to maintain the UK military's competitive edge. There has been a significant reduction of EU students coming to study in the UK since the referendum results were announced. The impact of this is that the academic sector is 40% bigger than the UK needs. It is also anticipated that funding for UK universities will significantly reduce, and access to shared knowledge would cease if the UK left the EU without any arrangements in place.

## MARKET ACCESS AND COMPETITIVENESS

Market access for EU members is seamless, with trade agreements in place between the EU and other countries. There are three main types of agreement that the EU currently utilises<sup>[19]</sup>:

- Customs Unions: the purpose is to eliminate customs duties through bilateral trade and to establish joint customs tariffs for foreign importers
- Agreements: these take various forms such as association, stabilisation, deep and comprehensive free trade agreements and economic partnerships. Their purpose is to remove or reduce customs tariffs in bilateral trade
- Partnerships and Co-operation Agreements: these provide a generic framework for bilateral economic relations and ensure that custom tariffs are not subject to fluctuation

To date, the EU has agreements with<sup>[19]</sup>:

- 35 countries in place and
- 47 countries partly in place

To date, the EU also has<sup>[19]</sup>:

- Agreements pending with 22 countries
- Agreements with five countries currently being amended and
- Negotiations with 21 countries, which include the Transatlantic Trade and Investment Partnership (TTIP) with the US. It is also worth noting that six countries from the Gulf region have been involved in negotiations with the EU since 1990. These have proved unsuccessful, due to negotiations being suspended since 2008.

The EU regulatory commission, the European Aviation Safety Agency (EASA), has Bilateral Aviation Safety Agreements (BASA) with countries such as the US, Canada and Brazil. Access to these markets is guaranteed through membership with the EASA. The UK Government commissioned a study<sup>[20]</sup>, which evaluated the impact of Brexit on the aerospace sector. The conclusion is that the globalisation of regulations means that there is negligible gain for the UK to pursue separate regulations. A 'no deal' scenario is judged to have a significant cost-bearing outcome, with the potential for excess disruption to the UK aerospace industry. In terms of competitiveness, the UK stands to benefit from growth of the sector, but will not benefit from free trade deals in a 'no deal' scenario, thereby diminishing the ability of UK-based companies to compete globally. The combination of all of the aforementioned factors in a 'no deal' scenario will leave the UK significantly weak, thereby exacerbating the impact further.

To assess the level of competitiveness of the UK aerospace sector, it is worth understanding that competitiveness is reflected in the price-cost factors. These include company efficiency (productivity and lean manufacturing), achieving economies of scale, the scope of involvement and the ability to learn from experience. The non-price factors include RDI, development and delivery schedules, export finance, reliability and through-life support. A quick assessment of the industry shows a very high level of global export shares and a very high percentage of exports (90%). This indicates that the UK aerospace industry is very competitive. However, there are imperfections in the industry and the use of Porter's five competitive forces technique shows that the UK has three intense competitive forces, namely powerful buyers in both military (Government) and civil markets (prime contractors), fierce competitive rivalry from the US, EU and Asia, and substitute products from the US and EU. This suggests that the UK aerospace sector has few firms that are very profitable for long periods.

To further evaluate, productivity can be used as a measure to determine competitiveness. Although the UK's professional scientific and technical industries had shown improvements in productivity of about 1.79%, compared with Germany (-0.35%) and France (-1.56%) as per data published in 2017, the UK lagged behind by about 44% and 41% in comparison to the other two countries respectively<sup>[21]</sup>. A 'no deal' scenario may force the big profitable firms to move manufacturing away from the UK and take advantage of the alternative and economically sustainable market conditions in the EU.

In addition, lower-tier UK suppliers will not be supported by the sustained levels of competition afforded by EU membership, hampering their global competitiveness. In addition, the UK companies do not have the same productivity output, efficiency and skilled workforce relating to component and sub-assembly manufacture and test. The advantages of the EU will be a significant cost incentive for the big original equipment manufacturers (OEMs), which will increase the amount of investments in EU member states, at the expense of the UK aerospace sector.

## RECOMMENDATIONS

The Institution of Mechanical Engineers recommends:

- 1. The UK Government negotiates a Brexit deal that maintains the strategic partnership with the EU and the status quo.** This will ensure that the UK continues to utilise the supply chain footprint and to have access to the skilled workforce. This in turn, will guarantee that the UK maintains the steady influx of investments in capital, skilled labour and EU students who study and undertake research to improve upon the UK's scientific knowledge. Access to current markets would also be guaranteed through continued membership of the European Aviation Safety Agency (EASA). Due to the niche nature of the industry, there are negligible benefits in pursuing individual regulations and trade agreements with other countries at the expense of compromising our global position.
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