

Aerospace

A growing necessity



Key Highlights	The Current Situation	Innovative Technologies	European Space sector	Sustainable Manufacturing
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Introduction Statement

When hearing the term aerospace in June 2022, one might be forgiven for immediately thinking of two current and ongoing crises. In the first instance, the commercial airline crisis sweeping Europe, whereby numerous flights are cancelled by flight operators on a daily basis, delays are rife, and reports are becoming increasingly common of a sector in peril.

The second, more grave association, is of course the ongoing war in the Ukraine, where questions of defence measures, and particularly the provision of aviation have become a pressing topic at the forefront of European leaders' agenda. In this paper, we do not of course, seek to provide a solution to either of these crises. In the first instance, the reason being that the commercial airline problems are largely driven by operational or human-centred factors, which this paper, as a manufacturing outlook does not focus on.

In the second instance, we focus mainly on civil or commercial aerospace, as opposed to the manufacture of military or defence units. We thus present a snapshot of the current European aerospace manufacturing industry, a vital industry within the region in terms of competitiveness, growth, employment, innovation, and of course, mobility.

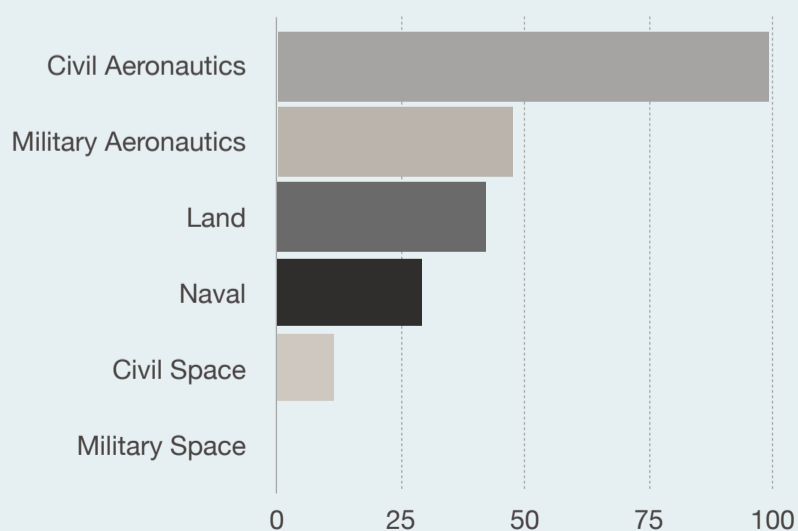
The Current Situation

In 2020 and 2021, global aerospace supply chains were significantly affected both by demand-side shocks and supply-side disruptions, as a result of the Covid-19 pandemic. The aviation sector particularly, was hit hard when international air travel broke down, with the peak of the crisis seeing flights reduced by 90%. Airline fleets were grounded, causing a spill-over of effects across the entire civil aviation value chain. Consequentially, civil aeronautical sales decreased by almost a quarter, with European exports plummeting by as much as 19% when compared with the 2019 figures.

The European aerospace manufacturing industry is characterised by a high level of activity and investment in research and development, which generally drives the industry. In 2020, the R&D expenditure in the combined aerospace and defence industry from both governments and industry was estimated at around €18 billion, with a 40% of this spending allocated to civil activities, and 60% allocated to military activities.

With this industry characterised by the fast-changing, global innovation race, worries arise around the ability of the EU industry to maintain pace with the U.S. When it comes to aerospace related research and development investment, a large gap exists. In 2019 alone, the investments of the U.S. from both industry and governments were over four times higher than those made across the whole of the EU, with this situation remaining constant throughout the Covid-19 pandemic³. Should this investment gap persist between Europe and other regions, then it may be difficult for Europe to maintain its competitiveness and leadership in Aerospace manufacturing.

Major Trends in the EU Aerospace and Defence Industry : Turnover 2020 (€ Billions)



Case Example

UK Aerospace

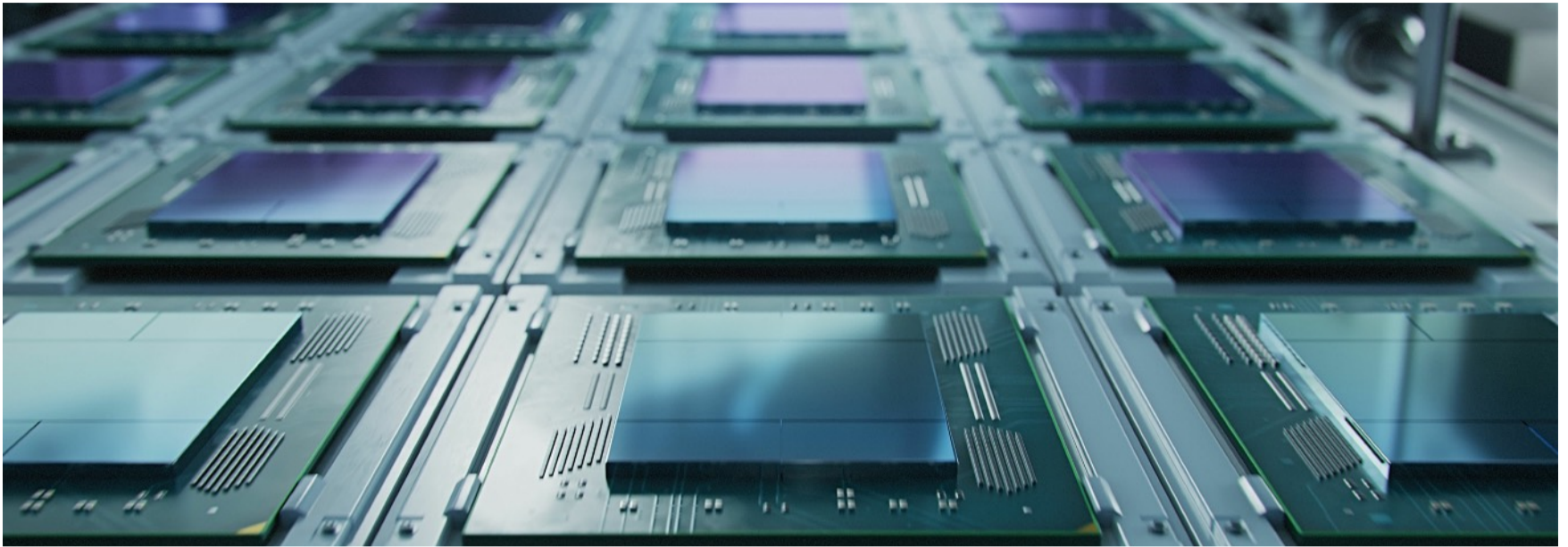
More than 3000 aerospace companies operate within the UK, and the aerospace sector within the country has the largest number of SMEs in Europe, directly and indirectly providing employment for over 282,000 individuals. The UK aerospace industry is the second largest in the world, behind only the U.S., with civil aerospace turnover totalling \$34.8 billion in 2020, and occupying a 16% global market share¹.

Present opportunities in the market are those associated with the manufacture of new engine or aircraft models, as well as for companies employing the latest Industry 4.0 technology, such as additive manufacturing or composites. Additionally, the increasing use of cloud computing platforms allows for innovation in integrated solutions.

The UK government is currently demonstrating a marked interest in developing and increasing the domestic supply chain of aerospace manufacturing, with the Aerospace Growth Partnership (AGP) developing initiatives to encourage cooperation between UK companies, address problems and gaps in the sector, boost high value jobs and UK exports, and counter the barriers to growth.

This is compounded by the fact that while UK aerospace manufacturers currently possess a record-breaking backlog of equipment orders for wide- and narrow-body aircraft, the delivery of these orders presents an increasing challenge within the UK supply chain. The result of this is an increase in UK companies seeking new alliances to create extra capacity.

Innovative Technologies



The combination of significant disruptions in the aerospace industry over the past 2-years, coupled with the increasing geopolitical uncertainty in Europe, means that manufacturers within this industry require agile and flexible systems that can allow for the self-optimisation of performance over a wide network, self-adaptation, learning from new conditions in real time, and even the autonomous running of some production processes. A recent Deloitte report notes that the innovative deployment of digital thread and smart factory will drive efficiency and be crucial for aerospace manufacturers to remain agile. For manufacturers that adopt digital thread, it will be possible to:

Leverage data aggregation technologies with predictive analytics, cognitive and machine learning capabilities, which will subsequently improve predictive modelling and the accuracy of forecasting



Link all commercial aspects of commercial defence, aerospace and space products to a chain of custody, addressing variant manufacturing and product specifications, and unlocking supply chain transparency.



Utilise real-time intelligence to make more informed decisions regarding product design, performance and value



Connect the consumer back to the design of the product, reducing waste, excess-production and the carbon footprint associated with the manufacturing process



Assess the performance of products in the marketplace



In a similar vein, building and scaling smart factory networks by connecting machines, data, value chains and people, will allow manufacturers to accelerate operational improvements as production levels begin to return to pre-pandemic levels. Manufacturers that already run or invest in smart factory technologies are predicted to yield increased business value from smart factory initiatives in 2022.

Case Example

European Satellite Manufacturing and Launch Systems Market

Europe is one of the largest markets for satellites in the world, with a cumulative public space budget that is the second largest in the world. At present, numerous manufacturing facilities exist spanning different European countries, alongside active research and development programmes. The growth of the satellite market in Europe is propelled by several factors:



The existence of a growing number of satellite manufacturers locally, allowing European customers to launch their satellites at a cheaper cost. Some European end users have developed manufacturing capabilities, which can further reduce project costs



Increasing budgets for research and development, particularly in materials and manufacturing technology



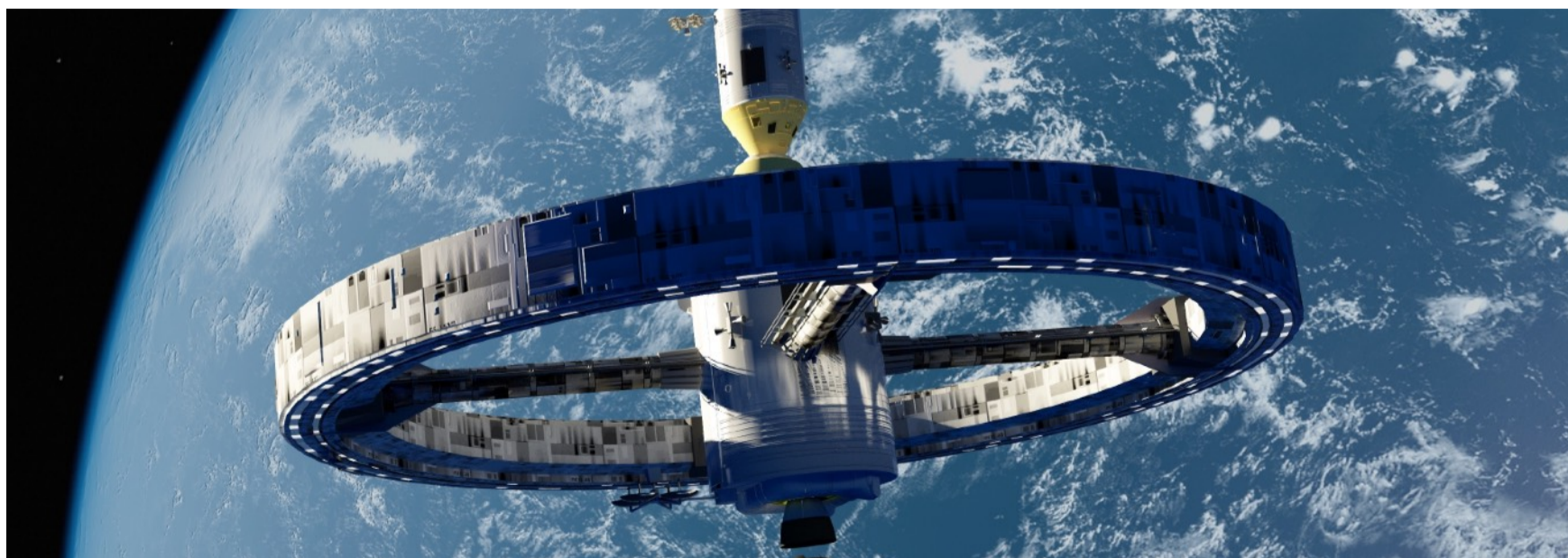
Continued growth in the demand for small satellites and the arrival of reusable launch vehicles.

Case Example

European Space Sector

Since 2010, space has become an increasingly important economic sector, for both established and emerging markets. The EU economy and society is increasingly reliant on space infrastructure, services and data. One of the main goals of EU space policy is harnessing space services and investments to address key political priorities, such as the Digital Decade and the European Green Deal.

There is increasing evidence of the growing importance of private investment in space to scale-up SMEs and support the creation of start-ups. With the EU calling for the development of EU autonomy within the space sector, and a new industrial strategy that promotes the competitiveness of European space industries in general, investors might consider investing in this growing sector.



Sustainable Manufacturing

Another trend likely to be evident within the aerospace industry is the shift towards sustainable manufacturing. Since 2020, increasing public pressure has been directed towards the industry to design and implement environmentally friendly, sustainable manufacturing practices, and make concrete efforts towards reducing carbon emissions. Although the industry has been proactive in its adoption of advanced manufacturing technologies aimed at increasing fuel efficiencies, there is increasing demand for the industry to go one step further and leverage Industry 4.0 technologies to drive innovation towards addressing the sustainability challenge. Operational and technological improvements are called for, as well as the development of new systems and jet fuel alternatives as a strategy to significantly decrease the emissions generated from this industry. To enact measurable improvements across the value chain within this industry, Deloitte recommend that:

Manufacturers ethically select and source sustainable, alternative materials

Smart technologies and green energy are combined to forge the factory of the future

Manufacturers reconfigure supply chains and rationalise trade routes to streamline distribution and shipping processes

Manufacturers utilise advanced technologies such as rapid prototyping, digital twin and additive manufacturing to improve product design and engineering.



Summary

Faced with significant disruption since the onslaught of the Covid-19 pandemic, European aerospace manufacturing has managed to come back and rebuild production. One key example of this is the UK space industry, which continues to grow at an unprecedented rate, both in terms of size and importance in the region. As the industry continues to recover and rise to the challenges presented by the current uncertainty, it is important that manufacturers continue to invest in digital initiatives, to ensure that the technologies used for production achieve competitive edge and efficient processes. Such technologies will greatly aid the industry to meet the ever-increasing sustainability needs of the 21st century. All of this of course does come with a caveat- whilst governments are a key investor in the aerospace industry, it is important that the potential of the industry is recognised by private investment in manufacturing processes, particularly in the EU-27 region, where aerospace forms a key part of industrial policy.

The Snapshot

The European aerospace manufacturing industry is characterised by a high level of activity and investment in research and development, which generally drives the industry.

The combination of significant disruptions in the aerospace industry over the past 2-years, coupled with the increasing geopolitical uncertainty in Europe, means that manufacturers within this industry require agile and flexible systems that can allow for the self-optimisation of performance over a wide network

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