The German aerospace industry has enjoyed unprecedented success over the last two decades. Since the mid-90’s, industry revenues have more than quadrupled – to over EUR 37 billion in 2016. During the same period, the sector has recorded annual average growth of more than seven percent. Employing a workforce of over 108 thousand (of which more than 50 percent are engineers or highly qualified professionals), the aerospace sector spent around 11 percent of 2016 turnover (EUR 4 billion) on R&D – making it one of the country’s most innovative industries.

Enormous Market Growth
Industry analysts forecast that around 30 to 35 thousand new aircraft will be put into service in the next 20 years to meet increasing global aviation demand – leading to a new golden age of aviation. The main factors for the forecast market growth are rapidly growing passenger volumes and the increasing need to replace old and low-efficient aircraft.

Internationalization and New Markets
This substantial demand further opens up supply chains and sees a continued shift from regional to global sourcing. Internationalization helps to mitigate currency exchange risks, facilitates market access, and enables OEMs and suppliers to use competitive advantages. Germany, as a strong manufacturing base and home to major aircraft OEMs and suppliers, is at the center of the industry supply chain transformation process and offers multiple opportunities for international investors.

Global Aviation Manufacturing Hub
As a global aerospace hub, Germany is home to leading players from all civil and defense aviation market segments. In 2016, more than 1,700 passenger aircraft were manufactured worldwide. Companies from Germany were involved in the production of all of these aircraft, meaning that German technology can be found in all passenger aircraft built today. Around 300 aircraft were finished in Germany – this is equivalent to 17 percent of total international aircraft production.

Leading Technology for Eco-Efficient Flying
Specific location strengths are seen in energy efficiency-related technologies including the development and production of lightweight materials and engine efficiency optimization. Germany is home to numerous companies active in the field of additive manufacturing or 3D printing (companies that likewise benefit from the country’s extensive energy efficiency R&D activities). These activities take place within the framework of the country’s ambitious Energiewende (“Energy Transition”) project. This enables the country’s industrial players to develop cutting-edge technologies that perfectly address the aerospace industry trend towards “ecological air travel.”
A number of significant developments are driving opportunities in Germany’s domestic aerospace sector. Thanks to globalization the world has become smaller; creating increased demand for new and environmentally friendly aircraft. Industry supply chains have been radically transformed, with technological advances being made by initiatives like Germany’s landmark INDUSTRIE 4.0 project set to change aerospace operations and production.

**Growing Global Demand**
Passenger aviation is an industry in demand. Over the next 20 years, forecasts predict demand for between 30 to 35 thousand new civil aircraft worldwide – worth more than USD 5 trillion. According to one major aircraft OEM, the greatest demand exists for single aisle airplanes (70 percent). Civil aviation is set to grow steadily, with aviation experts forecasting annual international airline traffic growth of around five percent. Current market developments are also being triggered by the need to replace large parts in airplanes still in service. Airplane operating costs are significantly affected by aircraft fuel consumption levels. Of the 30 to 35 thousand new aircraft forecast over the next two decades, around 15 thousand units will replace older and less efficient airplanes.

**Eco-Efficient Air Travel**
Alongside technological advances made in aircraft engine design, new materials and composites – as well as changes to overall aircraft design (e.g. retrofit with winglets) – are helping increase fuel efficiency levels through reduced weight and improved aerodynamics. Innovative aircraft interiors are also helping pave the way towards more ecological and comfortable modes of air travel. These and other measures all contribute to ambitious climate protection goals enshrined in Europe’s “Flightpath 2050” aviation strategy. Europe’s “Horizon 2020” research framework program also offers promising R&D support for the development of more sustainable, safer and integrated mobility solutions.

**Global Marketplace**
Over the last two decades, the aerospace industry has undergone a significant shift from regional to global sourcing; a trend which is set to continue in the years ahead. The ongoing process of internationalization helps to mitigate currency exchange risks, facilitates market access and also enables OEMs and suppliers to use competitive advantages available in certain countries and world regions. Suppliers from more far-flung geographical regions have the chance to broaden their customer portfolio and reduce their customer dependency. At the same time, suppliers have the chance to increase their technological know-how by establishing contact to new industrial players and networks.

**Supply Chain Transformation**
Notwithstanding the fact that OEMs are also considering suppliers from other world regions, their traditional role as vertically integrated players is changing. In addition to their customer interface role, OEMs are increasingly focusing their attention on their function as system architects and integrators. Ongoing technological specialization leads to the outsourcing of systems – such as aviation electronics – and the design and production of aircraft structures. The increased importance of system and module suppliers means that OEMs require major suppliers to enter into risk-sharing partnerships with suppliers who are prepared to undertake technological and commercial risks. Globalization and outsourcing developments are also visible further upstream on the value chain.

**INDUSTRIE 4.0 and Digitalization**
From smart manufacturing (“INDUSTRIE 4.0”) to the airline planning cycle revolution and the dawn of in-flight connectivity – the digital revolution is having a significant effect on the aerospace industry. IT solutions utilizing big data will penetrate all aspects of aircraft production and operation (including maintenance and engineering, ground, and in-flight operations). Sophisticated production systems and software will help to manage the required significant increase in the aerospace industry’s production output.

Real-time data enables quick reaction times to operational environment changes like weather conditions and airport traffic congestion. At the same time, ground operations can be accelerated and predicted maintenance becomes a reality – thereby increasing airplane utilization times.

Growing passenger dependence on personal electronic devices may even allow airlines to replace costly and heavy in-flight entertainment systems with streamed content. Potential areas of application are numerous and provide an opportunity to further improve production, operational and maintenance efficiency, customer satisfaction, and safety.
Location Advantages

The advantages available to international investors seeking to enter the German aerospace market are many and varied. Whether seeking to enter into production, licensing, joint venture partnership or research and development, Germany’s highly differentiated aerospace infrastructure ensures that investors have quick and direct access to all of the necessary resources.

Powerful Manufacturing Base
Germany hosts leading players from all business segments – from equipment manufacturers, material and component suppliers to engine producers and whole system integrators. The high concentration of aerospace-related manufacturing and assembly – as well as R&D, design, recycling and supply – facilities enables companies to successfully partner across the whole value chain. This environment offers numerous business opportunities across multiple technology segments for international investors. Particular location strengths are seen, for example, in the aircraft interior and aerospace energy-efficiency (including lightweight construction and new material development) segments. The in-situ workforce has also grown incrementally as a result of increased demand for German-made aerospace solutions.

Networks and Clusters
Industry stakeholders are organized in multiple regional aerospace clusters such as bavAIRia e.V., HAMBURG AVIATION e.V. and Hessen Aviation. The country’s particular strength in the development and manufacturing of lightweight solutions is also illustrated by the existence of specialized lightweight clusters. Lightweight clusters relevant for aerospace solutions are particularly related to carbon materials such as CFKValley Stade or Carbon Composites e.V., which again clusters multiple players within its regional branches (e.g. Carbon Composites East or Carbon Composites South-West).

World Class Aviation R&D
Companies active in the German aerospace industry invest heavily in R&D, with the industry recording one of the country’s highest R&D spending levels relative to overall turnover. Strong industry investment levels are enabled and accompanied by the presence of an excellent public R&D landscape with dedicated government R&D support for aeronautics and space. The German Aerospace Center (DLR), Germany’s central aerospace research body, employs approximately eight thousand people at 39 institutes across 20 locations. A number of institutes belonging to the renowned Fraunhofer-Gesellschaft, Max Planck Society and Leibniz Association also conduct aerospace-related research activities. Universities with highly specialized aviation programs and research institutions promote industry-specific innovation.

Public Incentives and R&D Programs
Germany offers numerous incentives for all investors – regardless of country of provenance. There is a large selection of programs designed to support a wide variety of business activities at different stages of the investment process. These range from cash incentives for the reimbursement of direct investment costs to support for research and development and labor incentives. Thanks to its strong innovation dynamic, the aerospace industry is part of Germany’s High-Tech Strategy which is complemented by other government R&D support programs. Subject to the technology readiness level (TRL), the federal government makes two R&D support programs which provide public payments – either as a reimbursable advance or in the form of a non-refundable cash grant – available.

The Luftfahrtforschungsprogramm ("Aerospace Research Program") supports companies, research institutes and academics during the early technology development stage (TRL 1 to 6). This program provides non-refundable cash grants of around EUR 150 million each year. The Luftfahrzeugausrüstungsprogramm ("Aerospace Equipment Program"), supports more advanced product and technology development (TRL 7 to 9) and incentivizes companies using reimbursable advances – repayment being subject to the success of the product (“deliveries”) – of around EUR 600 million for the period up to 2019.

German Aerospace Industry Workforce

<table>
<thead>
<tr>
<th>Year</th>
<th>Workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>68,000</td>
</tr>
<tr>
<td>2000</td>
<td>70,000</td>
</tr>
<tr>
<td>2005</td>
<td>81,300</td>
</tr>
<tr>
<td>2010</td>
<td>95,400</td>
</tr>
<tr>
<td>2016</td>
<td>108,000</td>
</tr>
</tbody>
</table>

Source: BDLI 2017
Germany Trade & Invest (GTAI) helps international investors realize their objectives at all stages of the business location process — from the provision of initial tax and legal advisory services to site visits, contact initiation and local support. GTAI provides up-to-date market and industry information, allowing foreign investors to identify the most suitable options for their prospective investment projects.

GTAI Best Practice: Web Industries Inc.
Founded in 1969 in Marlborough, Massachusetts, Web Industries Inc. is a leading contract manufacturing provider of flexible material converting, process design, and material/supply chain management services to the aerospace sector. The company, looking to set up a production and processing facility, had initial exploratory talks with GTAI at a solar trade show. Contact to GTAI was reestablished the following year at the successor event, with concrete interest in a “clean slitting room” investment project expressed in June 2011. In November of the same year a meeting was set up with the investor and GTAI in Berlin, with a further follow-up meeting with the economic development agency of Lower Saxony. Having provided a range of services (including incentives and credit information, tax and legal services, and personnel recruitment support), GTAI successfully handed the project over to Lower Saxony in December of the same year.

Germany’s Aerospace Technology Strategy
The aerospace industry has defined the central fields of innovation, key competences and industrial focal points as part of its technology strategy. The technology strategy combines key technology segments (aircraft, drive technologies, systems, cabins, INDUSTRIE 4.0, and aviation) with concrete research requirement and technological innovation positions. For example, drive technology measures and research requirements are being defined that will allow the commercialization of efficient hybrid and electric aircraft concepts in the medium term. A number of partnerships (e.g. Airbus and Siemens) have been formed within the German industry in recent years to realize these objectives.

Germany is a highly attractive foreign direct investment (FDI) location for companies in the aerospace sector. Within Europe, Germany is one of the most attractive FDI destination nations.

<table>
<thead>
<tr>
<th>Company</th>
<th>Web Industries Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country of Origin</td>
<td>USA</td>
</tr>
<tr>
<td>Industry</td>
<td>Precision converting and contract manufacturing</td>
</tr>
<tr>
<td>Company Objective</td>
<td>Production and processing facilities providing prepreg composite formatting in an EN9100C certified environment to support next-generation commercial aerospace development.</td>
</tr>
<tr>
<td>Investment Location Criteria</td>
<td>Clean room slitting operation with sales and distribution site and partners. Proximity of composite formatting operation to prepreg material production site resulting in increased manufacturing efficiencies and enhanced supply chain operations.</td>
</tr>
<tr>
<td>Selected Location</td>
<td>Stade, Lower Saxony</td>
</tr>
<tr>
<td>Investment Volume</td>
<td>EUR 10 million</td>
</tr>
<tr>
<td>GTAI Support</td>
<td>Incentives and low-interest loans information; personnel recruitment support; tax and legal advisory services</td>
</tr>
<tr>
<td>Project Handover</td>
<td>Lower Saxony economic development agency</td>
</tr>
</tbody>
</table>

Contact us to explore the individual investment opportunities available to your business in Germany’s thriving aerospace sector: stefan.dibitonto@gtai.com
About Us

Germany Trade & Invest (GTAI) is the foreign trade and inward investment agency of the Federal Republic of Germany. The organization advises and supports foreign companies planning to expand into the German market and assists German companies seeking to enter foreign markets.

Investment Location Germany

GTAI provides close-to-market information to international companies looking to enter German markets. Our specialist industry teams prepare all of the relevant information essential to business success in Germany. GTAI's comprehensive range of information services includes:

- Market and industry reports
- Market entry analyses
- Business and tax law information
- Business and labor law information
- Funding and financing information

Business Location Services

GTAI supports international companies from market entry to business start-up in Germany. Expert project teams advise and assist in the business establishment phase. GTAI's range of free services includes:

- Legal and tax-related project support
- Funding and financing advisory services
- Site visit organization
- Local partner and network matchmaking
- Public and private partner coordination

All investment-related services are provided entirely free of charge. Our specialist industry teams have hands-on experience in their respective industries and treat all investor enquiries with the utmost confidentiality.

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