



2016 Top Markets Report **Aircraft Parts**

Overview and Key Findings

According to United Nations data,ⁱ the value of U.S. exports of aircraft parts (measured in current dollars, that is, not adjusted for inflation) rose moderately over the decade ending in 2014. These exports reached a record amount in 2014 - \$56.2 billion. This was an increase of 10.6 percent from the prior year's value of U.S. exports of aircraft parts. By comparison, U.S. exports of all goods increased by 2.6 percent from 2013 to 2014, according to data from the U.S. Department of Commerce, Census Bureau.

Aircraft parts are an important element in U.S. international trade of aerospace products, accounting for 46 percent of all U.S. aerospace exports in 2014. The 2014 figure is at the low end of this proportion during the decade ending in 2014, when the percentage of total U.S. aerospace exports that were aircraft parts ranged from 45 to 54 percent.

The dramatic decline in the price of oil that began in

the summer of 2014 and continued throughout 2015 has significantly reduced the export revenues of oil-producing countries, such as those of the Middle East, dampening those governments' future ability to purchase aircraft parts (and goods and services in general). Countries in the Middle East and elsewhere, for which oil accounts for 80 percent

or more of their total exports, may be particularly affected. These countries include Algeria, Azerbaijan, Brunei Darussalam, Iraq, Kuwait, Libya, Oman, Nigeria, Qatar, Saudi Arabia, Sudan and Venezuela, according to one scholar.ⁱⁱ

Key Findings: Top Markets and Methodology

The 2016 ranking of top markets for U.S. exports of aircraft parts is in Figure 2 below. The 2016 rankings show little variance from the 2015 rankings. In the top ten markets, the two changes are that (a) Germany moved from rank #5 to #4 (changing places with Canada) and that (b) the Netherlands moved from rank #11 to #10. Similarly, the countries in



ranks #11-30 showed little movement between the 2015 and 2016 reports. A full listing of our 2016 ranking of top markets is in Appendix 1.

The essence of our methodology used in assessing priority markets for U.S. exports of aircraft parts was to (a) select factors that, in our view, represent favorable conditions for increased exports of aircraft parts, (b) assign a relative value to each of the factors, and (c) aggregate the weighted values of the factors to assign a single numerical score to each country market.

We identified 13 factors. While many are specific to the aerospace industry, such as whether a given foreign country has a Bilateral Aviation Safety Agreement with the United States, other factors relate to U.S. exports in general, such as the World Bank measure of ease of doing business, which includes the number of documents required for import transactions.

In some cases, we were not able to include a desired factor of interest to us due to lack of data. For example, one indication of the demand for aircraft parts is the extent to which maintenance, repair and overhaul (MRO) facilities are present in any given market. In accordance with the countries' national laws, MRO facilities overseas may be approved by the local civil aeronautical authority (CAA), the U.S. CAA (the FAA), the European CAA, or the CAA of other countries. Because the only data readily available about MROs is that of FAA-approved facilities, we used that as our factor (rather than the more expansive undertaking of all CAA-approved MROs).

Four of the 13 factors concern trade data:

- the value of a country's average annual imports of aircraft parts from the United States,
- the value of a country's average annual

imports of aircraft parts from all its trading partners,

- the proportion of a country's total aerospace imports from the United States that are aircraft parts, and
- the proportion of a country's total imports of aircraft parts that are from the United States.

In the 2015 study, we used United Nations data for these four factors that covered the ten year period ending in 2013. For the present (2016) report, we have updated the values for these factors using UN data for the ten year period ending in 2014. We did not revise the values used in the other nine factors. The natures of many of these nine factors lend themselves to having largely static values. For example, the list of countries that are signatories to the WTO Agreement on Trade in Civil Aircraft or a Free Trade Agreement with the United States did not change between 2015 and 2016.

Further details of our methodology can be found with the factors in Appendix 2 and their weights in Appendix 3.

Industry Overview and Competitiveness

The U.S. aerospace industry, including manufacturers of aircraft parts, plays an important role in the U.S. government's efforts to boost job growth through increased exports. American aerospace manufacturers produce the highest trade surplus of all manufacturing sectors, account for more American jobs tied to exports than any other industry, and provide high-tech and higher than average wages for the manufacturing sector in general. Increasing exports in the sector is therefore a priority for the U.S. Government, with several agencies supporting a broad portfolio of activities in support of export competitiveness.

The aerospace manufacturing industry is comprised

Figure 2: Projected Top Markets for Aircraft Parts Exports (2016)

1	France	7	China	13	Norway	19	Israel	25	New Zealand
2	Singapore	8	Australia	14	India	20	Sweden	26	Ireland
3	United Kingdom	9	Qatar	15	Malaysia	21	Panama	27	Denmark
4	Germany	10	Netherlands	16	Poland	22	Italy	28	Costa Rica
5	Canada	11	Brazil	17	Mexico	23	Indonesia	29	Spain
6	Japan	12	Korea	18	Saudi Arabia	24	Belgium	30	UAE

of companies that produce complete aircraft and spacecraft, satellites, rockets and missiles, and parts of the aforementioned products. More broadly defined, it includes products used in air traffic control and at airports, as well as in aircraft MRO facilities.

This report focuses on one aspect of the aerospace industry: parts of aircraft, including both civil and military aircraft, whether fixed-wing or helicopters. Aircraft parts include, but are not limited to, the following:

- different types of fasteners; and
- small aircraft engines, including piston engine and turbo-propellers.

Complete jet engines are not included because the market dynamics for jet engines closely parallel those of jetliners, while the same is not true for other aircraft parts. Components of all aircraft engines, including jet engines, are included. (See Appendix 4 for the six-digit Harmonized System codes and product descriptions of the aircraft parts covered in this report.)

Why a Focus on Aircraft Parts?

Manufacturers of complete aircraft, rockets and missiles are principally large corporations. Such companies frequently have well-staffed international marketing departments.

In contrast, most manufacturers of aircraft parts are small and medium-size enterprises (SMEs) with as few as half a dozen employees, representing an important customer base for both ITA and other export promotion agencies. By focusing on aircraft parts, this study provides helpful market information specifically related to the kinds of companies that are identified as strategically important to economic growth and export competitiveness.

Aircraft parts represent an important segment of total U.S. aerospace exports. In 2008, the last year for which detailed U.S. aerospace export data was made available, the value of U.S. exports of aircraft parts was greater than the value of U.S. exports of business jets and general aviation aircraft, military fixed aircraft, military helicopters and civil helicopters combined. Moreover, in contrast to other aerospace industry segments, such as military and civil helicopters that experienced virtually no

- avionics;
- aircraft interiors;
- wings;
- fuselages;
- nose and tail sections;
- bulkheads;
- aircraft wiring;
- wheels and brakes;
- windows;
- passenger entertainment systems;

growth in U.S. exports, exports of U.S. aircraft parts have experienced steady and strong growth (See Appendix 5.)

Global Industry Landscape

Foreign customers of U.S. suppliers of aircraft parts can be categorized into three broad groups: manufacturers overseas of complete aircraft and complete, large aircraft jet engines that source components from U.S. suppliers; first tier manufacturers overseas of parts used in complete aircraft or complete large, aircraft engines that source second tier components from U.S. suppliers; and airlines and other aircraft operators, MRO shops, and aircraft completion centers overseas seeking components to maintain, repair and/or refurbish aircraft.

There are three primary overseas manufacturers of large civil aircraft and regional jets: Airbus (based in Europe), Bombardier (based in Canada) and Embraer (based in Brazil). According to various reports, the U.S. content of parts used in the production of these manufacturers' aircraft is significant: about 40 percent for Airbus, 53 percent for the Bombardier "CSeries" jetliner, and 70 percent for Embraer regional jets.

The cost of research and development required to launch new models of large aircraft can reach many billions of dollars. Some airframe manufacturers seek to reduce the extent to which they must shoulder all of these R&D expenses by contracting with "risk-sharing" suppliers, especially companies that agree to design aircraft components, as well as produce them. A "risk-sharing" supplier agrees to assume some of the risk in bringing a new product to market. Under this arrangement, a supplier commits to designing and manufacturing a given aircraft

component with the understanding that it will be repaid as each aircraft is delivered (that is, a certain percentage of each sale will be provided to the supplier). Suppliers will only recoup their expenses and begin to make a profit when the number of sales of a particular aircraft are sufficient to reach a break-even point.

First tier manufacturers of aircraft parts that wish to export to airframe and aircraft engines manufacturers overseas may need to consider their willingness to enter into a “risk-sharing” relationship. Second and third tier suppliers of aircraft parts, including those whose customers are U.S.-based, may also be asked to assume engineering/design functions and a “risk-sharing” role given that some first tier suppliers “flow-down” the “risk-sharing” requirement from their customers.

It is difficult to judge the extent to which U.S. exports of aircraft parts are used in MRO shops and the like. Analysts of global MRO activity frequently cite figures related to industry trends, but these figures focus on the totality of the industry (where value added includes a service component, as well as products) and not aircraft parts per se. At the same time, the dramatic decline in oil prices (and, consequently, the price of jet fuel) may lead some airlines to retain aging, less fuel efficient jetliners in lieu of acquiring more recent—and more expensive—fuel efficient jetliners. To the extent that this is the case, those airlines may have an increased demand for MRO services, including the parts necessary to perform those services.

Challenges and Barriers

Overseas challenges to the competitiveness of U.S. manufacturers of civil aircraft parts include:

- subsidies,
- “localization” requirements, and
- questionable airworthiness approval procedures.

In addition, aviation is an emerging industry in many countries. Even countries with world-class airlines may not have much domestic maintenance capacity. Developing countries may require a higher degree of technical assistance than is usually offered by an SME manufacturer.

Some competitors of U.S. civil aircraft parts manufacturers are subsidized. For example, the

federal government of Belgium, in coordination with Belgium’s three regional governments, subsidizes Belgian manufacturers that supply parts to Airbus. The French government, through OSEO (the state-backed company that provides financial support to innovative SMEs), provides “reimbursable advances” to assist French manufacturers.

In 2010, OSEO announced €80 million (\$91 million using a March 2016 exchange rate), in reimbursable advances over two years for French SME sub-contractors and suppliers of large aerospace firms. Zodiac Aerospace received €230 million (\$260 million) in reimbursable advances during the August 2008 to August 2009 period. In 2009, Latécoère received €50.4 million (\$57 million) in reimbursable advances. In 2011, Figeac Aero received €10 million (\$11 million), and Slicom received €1 million (\$1.1 million).ⁱⁱⁱ

Several governments have formal policies aimed at the creation of a vibrant, domestic aerospace manufacturing industry. When purchasing major aerospace products, such as large civil aircraft to be operated by state-owned or state-controlled airlines, these governments may seek to encourage foreign airframe and aircraft engine manufacturers to establish in-country manufacturing sites, purchase aircraft and engine components from in-country suppliers, or transfer technology to in-country organizations. Such measures may or may not be explicit.

The most explicit of such measures, government mandated offset requirements have been applied to military aircraft procurement for decades. It appears there may be interest by some governments to apply offset requirements to civil aircraft purchases, with the effect of requiring airframe manufacturers to source components from in-country suppliers and not U.S. suppliers.

Taken as a whole, the European Union (EU) is the largest export market for U.S. suppliers of aircraft parts. The most important regulatory hurdles facing U.S. aircraft parts exporters concern the European Aviation Safety Agency (EASA), the pan-European counterpart to the U.S. Federal Aviation Administration (FAA). There are two concerns with how EASA provides airworthiness approval for U.S. civil aircraft parts.

First, in at least one case, it appeared that EASA may have deliberately delayed the granting of approval for U.S. parts intended to be used on an American-made aircraft while speeding approval for the same U.S. part to be installed on a competitive European-aircraft. This provides a market advantage to sellers of the European aircraft.

Second, the level of fees charged by EASA to validate the FAA's original airworthiness certification discourages small and medium-size U.S. manufacturers from pursuing entry into the European market. The basis for the fees is questionable because EASA charges almost the same amount of fees to validate the FAA's airworthiness approval of a U.S. aircraft part as it does to provide original airworthiness approval for a European aircraft part. The resources required for validation, however, are substantially fewer because the FAA has already completed the work necessary to provide airworthiness approval (for the U.S. aircraft part), and under a bilateral aviation agreement, EASA in large part is merely verifying that the applicant has satisfied airworthiness standards that the FAA and EASA have harmonized.

European aircraft parts manufacturers have another advantage over U.S. competitors with respect to export certificates of airworthiness. (For U.S. exporters, the certificate is FAA Form 8130-3.) Many U.S. manufacturers have been compelled to pay a fee (often in the range of \$200 to \$600) to FAA-designated representatives to obtain a certificate because the FAA lacks the resources to issue the certificates required for exports. Separate certificates are required for each shipment of a part. In contrast, European manufacturers are permitted to issue certificates of airworthiness on their own authority and are not required to make any payment to an EASA-authorized representative. (See changes discussed below under "Opportunities".)

The value of the U.S. dollar has appreciated markedly against major foreign currencies, with the effect that purchasers abroad of U.S. aircraft parts (and other U.S. goods and services) face higher prices when converting their currencies to import from a U.S. supplier. Some U.S. parts manufacturers seek to ameliorate this disadvantage by offering increased service (e.g., guaranteed delivery dates) or improvements in the quality of their products.

Opportunities

There are several bright spots on the horizon with respect to the challenges previously mentioned. In regard to EASA fees, the FAA concluded an agreement with European authorities on March 2, 2016 concerning aircraft parts the airworthiness approval of which is granted by the FAA through a "Technical Standard Order Authorization," or TSOA (and by EASA through a European Technical Standard Order Authorization, or ETSOA).^{iv} The thrust of the agreement is that EASA now accepts all U.S. TSOA aircraft parts without any further review by EASA. Consequently, U.S. exporters will no longer have to pay any fee to EASA for the validation of TSOA parts. This change is especially meaningful because in the most recent revision to EASA fees from March 2014, the fees related to TSOA parts were significantly raised – on the order of 300 to 500 percent – in contrast to other types of aircraft parts.

Regarding export certificates of airworthiness, on October 1, 2015, the FAA published a final rule in the *Federal Register* that permits Production Approval Holders (PAHs) to sign copies of FAA Form 8130-3 on their own authority, effective March 29, 2016.^v This places U.S. manufacturers of aircraft parts that have an FAA PAH certificate on an equal footing with their European competitors. Manufacturers with a PAH include companies that manufacture aircraft parts under these FAA authorities: Parts Manufacturer Approval (PMA), Supplemental Type Certificate (STC) and TSOA.^{vi}

In addition to these changes, the regulatory environment benefits U.S. exporters of aircraft parts in several other ways:

- Duties - The EU and the United States are both bound to provide duty-free entry to some 250 specified civil aircraft parts under the WTO Agreement on Trade in Civil Aircraft. In addition, the EU provides duty-free entry of other aircraft parts under an EU temporary duty suspension that took effect in 2002. It appears that there are no plans to end the suspension. Other signatories to the WTO Agreement on Trade in Civil Aircraft that provide duty-free access to their markets include Japan and Canada.
- Bilateral Aviation Safety Agreement (BASA) - While there are certain difficulties

associated with EASA approval of U.S. aircraft parts (noted above), the implementation in 2009 of the U.S.-EU BASA institutionalizes transatlantic efforts to harmonize aircraft safety standards with the goal of reducing the need for duplicative regulatory oversight. Under the BASA, certain aircraft parts (i.e., TSOA and non-critical PMA parts) approved by the FAA may be exported to Europe with no EASA approval required. The BASA provides a vehicle for continued cooperation between the FAA and EASA with the prospect of additional regulatory liberalization in the future.

- “Parts Manufacturer Approval” parts - The United States is unique in allowing the production of aircraft parts under an FAA authority known as “Parts Manufacturer Approval,” or PMA. In connection with after-market use, PMA parts can provide significant advantages over original equipment manufacturers (OEM) parts to aircraft operators and MRO shops. Manufacturers of PMA parts may offer customers significant price discounts. Because other countries do not offer this

type of airworthiness approval, U.S. PMA producers often have an advantage in foreign markets.

- Stringent standards - The FAA’s rigor in ensuring the airworthiness of U.S. aircraft and parts is second to none in the world. Whereas the quality of aircraft parts manufactured in some countries could be held in question, customers around the globe readily accept U.S. aircraft parts knowing that they have been approved by the FAA.

In addition to these regulatory advantages, U.S. aircraft parts manufactures also benefit from a strong domestic customer base that generates demand for parts related to a wide variety of aeronautical applications. U.S. aircraft parts manufacturers therefore have the experience and technology to satisfy a broad range of demanding requirements in contrast to manufacturers in other countries with less of an aerospace legacy. Advanced manufacturing technology in the private sector will be complemented by the establishment of a U.S. network of public-private manufacturing innovation institutes, such as the Lightweight and Modern Metals Manufacturing Innovation Institute.

ⁱ UN trade data has several drawbacks, including countries that have questionably reported “0” as the value of their aircraft parts imports from the United States for particular years and/or reported no data at all for such imports. UN trade data, and not Commerce Department data, is used because beginning in 2009 the Commerce Department no longer reported U.S. exports of aerospace products at a granular level, i.e., such that aircraft parts could be segregated from other aerospace products.

ⁱⁱ Dr. Marek Dabrowski, Non-Resident Scholar at Bruegel and Professor at the Higher School of Economics in Moscow. Website accessed on February 22, 2016.

ⁱⁱⁱ *2013 National Trade Estimates Report on Foreign Trade Barriers*, p. 159, issued by the Office of the U.S. Trade Representative

^{iv} Unlike other aircraft parts, TSOA parts are manufactured to design standards promulgated by the FAA. An FAA approval for a TSOA application is still needed because manufacturers have some discretion in the design of some of the specifications of the part.

^v Production Approval Holders do not include manufacturers of aircraft parts who produce them on a “build-to-print” basis specified by another company, such as the holder of an FAA Type Certificate that is producing complete aircraft. Such aircraft parts manufacturers lack FAA approval to offer their parts directly to the public, including airlines and MRO shops.

^{vi} The change in FAA rule has an additional benefit for U.S. manufacturers. Some U.S. customers of aircraft parts request that U.S. suppliers of aircraft parts provide an FAA Form 8130-3 with their shipments, believing that this adds further authenticity to the parts’ airworthiness approval. For such shipments, PAHs no longer need to seek a signature from the FAA or an FAA authorized representative.