



# WASHINGTON STATE

AEROSPACE

2019-2020 SECTOR STRATEGY



Department of Commerce

## OVERVIEW

Washington State is home to the largest and most developed aerospace industry in the U.S., placing it at the top of the list as the most competitive state for global aerospace manufacturing.

More than 250,000 jobs can be directly and indirectly attributed to the aerospace industry, exceeding jobs in other large aerospace states including California and Texas; both with significantly larger populations than Washington. The state has the third highest density of aerospace workers in the United States.

The large number of workers and companies certainly helps put Washington number one. However, in evaluating labor costs, the efficiency and productivity of the Washington workforce far outrank other locales. Washington workers produce more aerospace output per dollar cost of labor than any other state.

Additional factors driving the growth of aerospace jobs in Washington is the presence of other aerospace-related industries such as space, electric-powered aircraft, unmanned systems, and next-generation air cargo. Significant efforts are occurring in these industry clusters, including the establishment of working groups focused on research and development, legislation, and workforce.



# INDUSTRY OUTLOOK

Washington has the third-fastest per capita GDP growth since 2013, with the third highest number of patents per capita and the fifth highest rate of private R&D investment. More than \$50 billion of Washington aerospace and defense products are exported annually.

## AEROSPACE

Two new reports on the U.S. aerospace industry were published in 2018, one by the Teal Group and Olympia Analytics, the other by PriceWaterhouseCoopers. Both reports independently verified that Washington is the most attractive state for aerospace production, with the U.S. leading the rest of the world.

While the global impact of aerospace is estimated to be \$838 billion, production values as of 2017 were \$180 billion, matching deliveries for the previous three years. The lack of substantial growth is due in large part to the difficulty of getting new products launched. Next generation civilian and military programs have not progressed as quickly as once predicted. As a result, aircraft deliveries for civil markets reflect a 3.7% CAGR with military markets coming in at a 2% rate.

Consolidation continues to affect the industry. Airbus acquired Bombardier's C Series jet and Boeing entered into a joint venture with Embraer for their E-Jet series. Both companies are important to the Washington aerospace industry as many in the Boeing supply chain are diversifying their work programs by engaging Airbus. New players such as the Mitsubishi Regional Jet may capture some orders from these industry giants, but this may create new opportunities for the state's supply chain.

More than 1,400 companies in Washington's extensive aerospace supply chain have expertise in aerostructures, airframes, composites, advanced materials, aircraft interiors, engineering and tooling, avionics, IT, R&D, unmanned aerial systems, entertainment and navigation systems, and commercial space.

The Boeing Company is by far the largest aerospace employer in the state with 84,000+ workers. Over the last century, suppliers have sited their operations near Boeing's factories, including those companies drawn to Washington from other states that want to be part of this robust supply chain.

Aerospace manufacturing as a whole is changing rapidly. With its close proximity to a robust technology industry, aircraft production in Washington State, as well as the

aircraft themselves, are undergoing historic transformations. Augmented, virtual, and mixed reality are being integrated into training programs to improve skills transfer and knowledge retention. Artificial intelligence is automating the process of testing and analysis, driving innovation in autonomous platforms, drone detection, language guidance, and autonomous flight controls for the aircraft of the future. Robots have been used on the production floor for some time, but collaborative robots, or cobots, are being integrated into the workflow to provide the benefits of both machine and human learning while taking on repetitive tasks such as palletizing and machine tending.

## RECOMMENDATIONS:

- Continue to invest in a comprehensive aerospace workforce development strategy including working with new technologies like cobots and AR, VR, MR, XR, etc.
- Retain all aerospace incentives.
- Ensure that Washington has the appropriate regulatory environment that will enhance the growth and retention of existing companies, and attract new companies to the state.

## COMMERCIAL SPACE

While the space cluster may seem a relatively recent endeavor, space companies have been developing spacecraft systems in Washington for more than six decades, from rockets and satellites to orbital and sub-orbital vehicles.

There are almost a dozen education, non-profit, and science-related institutions dedicated to space exploration and more than two dozen companies that are NASA suppliers, including Janicki Industries and Systema Technologies. Aerojet Rocketdyne, Esterline, and others have established strong space businesses in the Puget Sound area.

This industry is estimated to have a \$1.8 billion economic impact and supports more than 6,200 jobs in Washington. The workforce will continue to be a struggle for space companies as it is for other industries that require highly skilled workers. The U.S. space industry is valued at \$360 billion in 2018. It is projected to grow annually by 5.6%, reaching \$558 billion in 2026.

# INDUSTRY OUTLOOK CONTINUED,

## RECOMMENDATIONS:

- Support state tax credits for spacecraft and satellite manufacturing by extending current aerospace incentives to this subsector.
- Assist with access to capital for small to large space companies.
- Develop space startup accelerator to include access to consulting and tailored facilities.
- Connect tiered supply chain throughout Washington state to support space-related companies.
- Support STEM education and training programs to accelerate workforce needs for the industry.

## UNMANNED SYSTEMS

Washington is at the leading edge of unmanned aircraft systems. Drones, also known as unmanned aircraft systems or UAS, will have a significant impact on fields ranging from package delivery to agriculture, media production, and public safety. Nationwide, the UAS industry is expected to create 100,000 jobs and add more than \$82 billion to the U.S. economy over the decade ahead.

The synergy around drones and other unmanned aerial vehicles has fostered the formation of the Unmanned Systems Industry Council (USIC) in Washington. Not only are there unmanned vehicle companies growing here, but the technology companies that capture and process the information are flourishing as well.

Several Washington companies are leaders in UAS. Amazon is working on its drone-based delivery system and Insitu, a Boeing subsidiary, builds fixed-wing drones for the U.S. military. Other parties include Applewhite Aero for intermediate-scale UAS engineering, Freely Systems, which is building high-end drones as well as image stabilization hardware for cinematography, and researchers at the University of Washington's Applied Physics Laboratory who are working on autonomous underwater vehicles.

## RECOMMENDATIONS:

- Support state tax credits for unmanned systems research, development, and manufacturing by extending current aerospace incentives to this subsector.
- Continue to invest in a comprehensive workforce development strategy.
- Ensure that Washington has the appropriate regulatory environment that will enhance the growth and retention of existing companies and attract new companies to the state.

## SUPER/HYPERSONIC

Hypersonic speeds correspond to very high supersonic speeds, typically at Mach 5 or above, or five times the speed of sound, i.e., 3,806 mph (6,125 km/h) at sea level. In 2018, Boeing announced research into a hypersonic that could have "military or commercial applications."

Typically classified as exceeding Mach 1, development of supersonic aircraft in the past has been stymied by noise (sonic booms) and environmental pollution issues as well as operational challenges. Advances in propulsion and aeronautics may solve these issues and several companies, such as Aerion and Boom, are developing supersonic aircraft prototypes for civil and charter use. Boom hopes to have its demonstrator fly by the end of 2019.

An important element for this subsector will be integration with subsonic jet flight operations. The FAA is currently working on rulemaking, but issues exist with noise certification over land.

## RECOMMENDATIONS:

- Support state tax credits for super- and hyper-sonic research, development and manufacturing by extending current aerospace incentives to this subsector.
- Continue to invest in a comprehensive aerospace workforce development strategy.
- Ensure that Washington has the appropriate regulatory environment that will enhance the growth and retention of existing companies and attract new companies to the state.

# INDUSTRY OUTLOOK CONTINUED,

## ELECTRIC AIRCRAFT

The first electric and hybrid-electric powered aircraft could make their first flight in the next five years. While lower operational and maintenance costs make these aircraft attractive, there are technological hurdles to overcome, namely battery weight/lifespan and flight characteristics. Additionally, airports will need to be redesigned to accommodate chargeable aircraft and state revenues from the sale of aviation fuels may decrease if widely adopted. Companies such as Kirkland-based Zunum Aero are already working on prototypes.

### RECOMMENDATIONS:

- Create public-private partnerships that support infrastructure investments and provide incentives for companies to relocate or grow in Washington.
- Enhance funding to airports to support electric aircraft infrastructure.
- Support state tax credits for electric and hybrid-electric aircraft research, development, and manufacturing by ensuring that existing aerospace incentives apply to this subsector.
- Partner with other industries that are developing advancements in battery technologies.
- Continue to invest in a comprehensive aerospace workforce development strategy that recognizes this subsector and focuses on support, maintenance, and pilot education.
- Ensure that Washington has the appropriate regulatory environment that will enhance the growth and retention of existing companies and attract new companies to the state.
- Request a budget proviso of \$250,000 to \$350,000 for a consultant/university-led study.
- Partner with ACRP – Airport Cooperative Research Program – to develop a guidebook for this shift in powering aircraft.

## AIR CARGO

Washington State airports handled \$47.6 billion in freight in 2015. It is estimated that the value of air cargo will grow at 4.4% per year through 2045, which is faster than the overall state economy.

Sea-Tac, King County, and Spokane International Airports are the heavy hitters in air cargo. Sea-Tac and King County have an 85% share of the total air cargo market in the state. In 2017, these airports accommodated 46.9 million air passengers (up 2.67% from 2016) and processed 425,856 metric tons of air cargo (up 16.2% from the previous year). Spokane is third, with an 11% share. Other non-hub and small commercial passenger airports account for only 4% of the total air cargo volumes moved in 2016.


A 10-year tonnage forecast for cargo demand in Washington State, created as a part of this study, anticipates air cargo will grow at a compounded annual average growth rate of 4.4%, resulting in 870,000 annual metric tons of air cargo in 2026, which is a 304,000 metric ton increase compared to 2016. Such an increase without corresponding improvements in infrastructure may create an economic bottleneck at major cargo terminals.

### RECOMMENDATIONS:

- Create an Air Cargo Development Program.
- Hire a program specialist to report to the Department of Commerce or Transportation.
- Convene an Air Cargo Development Group.
- Implement a Cargo Community System, collect air cargo statistics for analysis, develop additional facilities and service capacity, improve airport logistics, expand/build distribution centers.



**Department of Commerce**



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Before joining the Department of Commerce in 2018 as the Director of Economic Development for the Aerospace Sector, Robin was the Vice President, Business Development, for Greater Spokane Inc., Spokane County's Associate Development Organization. During her thirteen plus years with GSI, Robin worked with more than 100 companies that selected the Spokane region for their corporate relocation or expansion projects. These projects created an economic impact of more than \$1 billion to the area, and the companies created almost 10,000 jobs. She also served the City of Spokane as a project manager, working on the Spokane University District formation and an award-winning EPA brownfields cleanup of a former railroad site. Robin's experience also included positions as the marketing and communications director for information technology companies like Ciena, Alcatel, and Itron.

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