

WASHINGTON STATE

AEROSPACE INDUSTRY STRATEGY



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Department of Commerce
Innovation is in our nature.

Special thanks to Washington State Aerospace Industry Strategy 2014 Update photo contributors:

The Boeing Company, Aerojet Rocketdyne, Electroimpact, Washington State University, Toray Composites America, and Port of Moses Lake

Special accommodations

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Introduction

For nearly 100 years, Washington has been at the forefront of the global aerospace industry. It began in 1916 with a single red barn in Seattle and has grown to the largest and most robust aerospace cluster in the world, employing more than 132,500 people working in more than 1,350 establishments in 35 of the state's 39 counties.¹ The industry as a whole supported \$76 billion in economic activity and paid wages totaling \$11.5 billion, representing 11% of all wages earned in the state in 2012.

Dozens of entities, programs and efforts have developed in the state to form a support chain for the industry. There are enormous opportunities for growth in aerospace in the coming decades. This Washington Aerospace Industry Strategy is a summary of our work over the past year and an updated game plan for the next five years to sustain and grow the state's global leadership in this industry through the next century.

A Soaring Industry

The outlook for the aerospace industry in Washington is as strong as ever. In 2013, Boeing booked more than 1,300 commercial airplane orders, up from just over 1,200 in 2012.² These orders contributed to the largest backlog ever to be held by the company, currently at 5,080

commercial planes, valued at \$374 billion.³ Production across each of its assembly lines continues to ramp up at extraordinary rates, most dramatically at the Boeing Renton plant, where workers now produce 42 airplanes per month, with planned increases to 47 per month in 2017⁴ and 52, possibly, by 2019⁵. Suppliers around the state contribute parts to these planes, as well as to Airbus, Bombardier, Embraer, COMAC, and Mitsubishi Aircraft Company. In fact, Washington is second only to California in terms of the number of companies that supply parts to Airbus, and the European aerospace giant is looking to grow its procurement in the state dramatically in the coming years⁶.



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By 2019, Boeing will have embarked upon its second century of aerospace leadership. Hundreds of the world's first composite commercial airliner, the 787 Dreamliner, will be crisscrossing the sky on a daily basis delivering passengers from point to point around the globe. The 737 MAX will be delivered to its first customers and the U.S. Air Force will have received its first KC-46A



aerial refueling tankers. The 777X will be in initial production in Everett and approaching its first deliveries the following year.

Advances in new technologies will have brought significant opportunities to further diversify the industry in unmanned systems, space exploration and other emergent subsectors. Technological advances and market forces will enable a commercially viable aviation biofuels industry that will reduce the environmental impact of air travel. Supporting growth in these areas will help diversify Washington's aerospace cluster.

Worldwide Competition

Washington's place in the aerospace industry has not gone unnoticed and our ability to realize the benefits of these opportunities is not without risk. States around the U.S. have demonstrated the ability to perform the complex work necessary to assemble a commercial airliner. In 2013, Airbus broke ground on a new \$600 million production line for its successful

single-aisle challenger to the 737, the A320, in Alabama. Boeing itself continues to invest in its North Charleston, South Carolina, production facility and it is expected that a growing share of the company's final aircraft assembly will take place there in the coming years. These and other states are working aggressively to attract aerospace suppliers, including those located in Washington. This intense competition will force Washington to work even harder and with greater strategic focus if it is to maintain its world-leading position.

Washington's Response

If Washington is to maintain and grow its market share in the aerospace industry, it will need to act aggressively and strategically. By working together across the state in pursuit of the potential before it and striving to implement the initiatives outlined in this Washington Aerospace Industry Strategy, Washington will be able to maintain and strengthen its position as the recognized worldwide leader in aerospace innovation, design and manufacturing.

The sheer size and scope of the opportunity, as well as the breadth and depth of the industry, require a clear, concise strategy to protect and grow Washington's world-leading position in aerospace. Building off the good work of the Washington Council on Aerospace and the State Department of Commerce in recent years, in collaboration with many other education, labor, economic development, business organizations, private companies and individuals around the state; and with the steadfast support and encouragement of Washington State's federal delegation, members of the state legislature, local elected officials across the state have developed this Washington Aerospace Industry Strategy to provide marching orders for the next five years.

Given the broad spectrum of partners, this is by necessity a common ground strategy. There will be issues, priorities and approaches to the goals and tactics outlined in this document that will differ among some stakeholders. There will be roles for all to play in the implementation and advocacy of these efforts, as well as other individual priorities not discussed here.



This Washington Aerospace Industry Strategy is a living document with annual updates reporting progress. This is the first update of the strategy. A status report on progress in 2013, as well as a list of future action items are presented on the following pages.

Strategic Flight Plan

Washington is in the enviable position of leading the world in a highly valuable and sought after growth industry. Production of the 777X and its associated carbon fiber wing in Washington ensures that the state will be at the forefront of commercial aerospace manufacturing. We must leverage this opportunity and act in a strategic, orchestrated and sustained way to hold off competition from around the United States and the entire world. We must diversify the cluster to reduce our economic dependence on a single employer and protect against future work placement decisions and the inevitable cyclical downturns of the commercial airplane industry. By working together to implement the goals and specific strategies outlined in this document, we will protect and grow the aerospace industry in Washington, ensuring our place as the global aerospace leader today and for the next century.

The Washington Aerospace Industry Strategy is organized in four sections, establishing a Flight Plan to success:

- **Growing and Diversifying Washington’s Aerospace Cluster** —strategies to build upon our strengths, allowing our existing companies to thrive, attracting new investments, and diversifying the aerospace industry in Washington.
- **Cultivating a Deep and Talented Aerospace Workforce**—developing a robust pipeline of aerospace workers, from inspiring our youngest children to pursue educational pathways that enable aerospace careers, to producing skilled laborers to work on the factory floors, to educating high quality engineers, designers, and researchers.
- **Fostering a Culture of Aerospace Innovation**—building upon our wealth of existing resources to facilitate the discovery of new technologies and bring them to market, so that we are not only building the best airplanes in the world today, but the manned and unmanned air and space vehicles that may come next.
- **Strengthening Washington’s Aerospace Support Chain** – how we organize ourselves and work together across the state to support the Washington aerospace industry, while making sure that we are providing the infrastructure, tax policies and regulatory framework that provide for a high quality of life for all of Washington’s residents.

¹(Nov, 2013) *Washington State Aerospace Economic Impact Study – Community Attributes, Inc.*

²(Feb 6, 2014) <http://active.boeing.com/commercial/orders/index.cfm?content=displaystandardreport.cfm&optReportType=AnnOrd>

³(Feb 6, 2014) <http://boeing.mediaroom.com/2014-01-29-Boeing-Reports-Record-2013-Revenue-EPS-and-Backlog-and-Provides-2014-Guidance>

⁴(Feb 12, 2014) <http://boeing.mediaroom.com/2014-02-04-Boeing-to-Start-Building-First-Next-Generation-737-at-Increased-Production-Rate>

⁵(Feb 12, 2014) <http://www.kansas.com/2014/02/04/3267368/boeing-begins-737-production-at.html>

⁶(June 2014) <http://www.bizjournals.com/seattle/news/2013/02/15/airbus-could-double-washington-state.html>



Progress Report on 2013 Action Items

GROWING AND DIVERSIFYING WASHINGTON'S AEROSPACE CLUSTER



Work with The Boeing Company to anticipate what may be necessary and implement strategies to ensure that the 777X and as many of its components as possible are built in Washington State.

LEAD: Office of Aerospace

- Developed 777X Action Plan, governor appointed 777X Permit Streamlining Task Force, and called special legislative session. State legislature passed 777X incentive package. Received commitment from the Boeing Company that the 777X assembly and wing manufacturing will take place in the Puget Sound region.

MOVING FORWARD: Ensure the smooth expansion of Boeing facilities to support 777X and composite wing final assembly by working in conjunction with local jurisdictions.



Identify, assist and attract Boeing suppliers, particularly in new programs such as the 737 MAX, KC-46A tanker, and 777X, in expansion and/or establishment of facilities in Washington.

LEADS: Department of Commerce, Associate Development Organizations (ADOs)

- Supported 5 corporate expansions and 1 new recruitment anticipated to result in \$11.7 million in capital investment and 240 additional jobs
- Identified 32 business recruitment leads and an additional 20 Washington companies considering expansion.

MOVING FORWARD: Continue this effort, particularly focused on the 777X supply chain.



Develop economic, educational, and cultural initiatives with the United Arab Emirates.

LEADS: Office of Aerospace, Trade Development Alliance of Greater Seattle

- Participated in Aerospace Business Development Mission in March 2013 with Trade Development Alliance
- Attended Dubai Air Show in November 2013.
- Working with University of Washington and Port of Seattle to establish formal collaborations with UAE partners.
- Working to recruit Strata and other UAE-based aerospace companies to establish Washington facilities.

MOVING FORWARD: Continue work with the Trade Development Alliance of Greater Seattle and Boeing to consummate these and identify additional opportunities.



Expand Washington’s presence at the 2013 Paris International Air Show.

LEADS: *Dept. of Commerce, Washington Aerospace Partnership*

- Largest ever delegation from Washington, with 51 members, representing 22 aerospace companies, 5 ADOs, 4 educational institutions, and 2 industry organizations.
- Partnered with the Seattle Metropolitan Chamber of Commerce and Trade Development Alliance of Greater Seattle, and their delegation of more than of more than 60 businesses and civic leaders, and hosted combined events.
- Hosted state’s largest ever booth at the show.
- Hosted pre-show reception that included other Washington companies present at the show but not a part of the official delegation.
- Washington delegates reported \$35+ million as of May 2014 in actual sales booked since the show.

MOVING FORWARD: Build on this momentum at the 2014 Farnborough International Air Show and other international aerospace industry events.



Create an online database of Washington suppliers to assist original equipment manufacturers (OEMs) in identifying and partnering with capable supply chain partners.

LEAD: *Dept. of Commerce*

- Worked with Aerospace Vendors to create www.aerospacevendors.com, an online searchable database of Washington suppliers. There are currently over 1,000 companies listed.

MOVING FORWARD: Work with Aerospace Vendors to expand the database and encourage its use.



Ensure initial KC-46A Pegasus aerial refueling tankers are stationed at Fairchild Air Force Base.

LEAD(S): *Forward Fairchild, WAP*

- Despite significant efforts, the Air Force selected McConnell Air Force Base in Kansas as the Pegasus’ first Main Operating Base.

MOVING FORWARD: Working with federal delegation, Greater Spokane, Inc., and Forward Fairchild to position Fairchild to receive tankers as the second Main Operating Base.



Support amendments to Washington State tax policy to remove barriers to the maintenance, repair, and overhaul (MRO), completion and storage of non-resident-owned private aircraft.

LEADS: *Aerospace Futures Alliance (AFA)*

- 2013 legislature approved ESSB 5882, which: exempts non-resident owned aircraft weighing more than 41,000 pounds (Boeing 737s and larger) from sales and use
- tax; exempts large aircraft in long-term storage from property tax.
- Legislation gave Aviation Technical Services confidence to expand at Grant County International Airport.
- Allowed Greenpoint Technologies to bring several VIP 787 aircraft and additional work to Moses Lake for completion.

MOVING FORWARD: Explore possibility of extending additional tax incentives to support MRO expansion in Washington. Encourage large international MROs and completion centers to consider locating operations in Washington.

CULTIVATING A DEEP AND TALENTED AEROSPACE WORKFORCE



Build capacity for STEM education in preschool through 12th grade.

LEADS: *Office of the Superintendent of Public Instruction (OSPI), Washington STEM*

- Legislation passed in 2013 (ESSHB 1872) creates better coordination, innovation and accountability around STEM education in the K-12 system, while spreading best practices across the state.
- Adopted Next Generation Science Standards, making Washington only the 8th state in the nation to embrace these more rigorous requirements for instruction of science related coursework.

MOVING FORWARD: Continue to look for opportunities to build capacity for STEM education.



Establish National Career Readiness Certification (NCRC) testing for high school graduates with an interest in pursuing careers in aerospace.

LEADS: *OSPI, Center of Excellence for Aerospace & Advanced Manufacturing (COE)*

- The Center of Excellence for Aerospace & Advanced Manufacturing is working with a statewide consortium and ACT, the developer of the NCRC, to designate Washington as an ACT WorkReady Community.

MOVING FORWARD: Support this consortium's effort to expand access to NCRC testing throughout Washington.



Support the strategic and targeted expansion of workforce training provided by community and technical colleges, as well as apprenticeship and short-term industry programs, in high demand fields.

LEADS: *Pipeline Committee, State Board of Community & Technical Colleges (SBCTC)*

- 2013 legislature provided funding for 1,000 FTE in high-demand aerospace fields.
- 2013 legislature provided funding to develop a specialized carbon fiber wing fabrication training program associated with the 777X.

MOVING FORWARD: Work through the Pipeline Committee and the SBCTC to ensure student slots are directed to programs most in need by the industry. Assist the Washington Aerospace Training & Research (WATR) Center to establish its carbon fiber wing training program. Work with the Washington State Legislature to preserve funding for these programs as long as there is a demonstrated need.





Establish and promote a clear point of entry for students and jobseekers to navigate their way through training programs to careers in aerospace.

LEADS: *Center of Excellence for Aerospace & Advanced Manufacturing (COE)*

- 2013 legislature provided \$200,000 to the Center of Excellence for Aerospace & Advanced Manufacturing to increase staffing and update website.

MOVING FORWARD: Support the COE's efforts to expand and collect data on its successes.



Develop a multi-institutional, multi-level aerospace training center located in the central Puget Sound region.

LEADS: *WMATI, City of Renton, Renton Technical College*

- Secured additional \$10 million from 2013 legislature to allow design and construction of the Washington Manufacturing Advanced Training Institute (WMATI) Facility in Renton to commence.

MOVING FORWARD: Work with the City, Aerospace Futures Alliance and other partners to develop a business plan for operations of the WMATI.



FOSTERING A CULTURE OF AEROSPACE INNOVATION



Support the Joint Center for Aerospace Technology Innovation (JCATI) in its efforts to connect industry problems with technological advances developed by research university brain power and facilities.

LEAD: JCATI

- In its first year of operations, the JCATI has awarded 34 grants with a total value of \$2.64 million.
- 2013 legislature extended the sunset date for the JCATI from 2016 to 2021 and funded the program at \$3 million for the 2013/15 biennium.

MOVING FORWARD: Continue to support the JCATI in future rounds of grant funding and increase awareness of the Center across the industry.



Secure Federal Aviation Administration (FAA) designation as a national test site for unmanned aircraft systems/ vehicles (UAS/UAV).

LEADS: Innovate Washington, Pacific Northwest National Laboratory (PNNL), University of Washington (UW), WSU

- Worked with a statewide consortium led by Innovate Washington, PNNL, and the Port of Moses Lake to develop a proposal for the Pacific Northwest Unmanned Aerial Systems Flight Center (PNUASFC) and submitted to the FAA for consideration.
- FAA did not select Washington as one of the six test sites.

MOVING FORWARD: Support the University of Washington in its efforts to co-lead the FAA Center of Excellence for Unmanned Aircraft Systems and develop other initiatives to support the UAS industry.



Pursue establishment of an FAA Center of Excellence for Alternative Jet Fuels and Environment at WSU.

LEAD: WSU

- WSU and MIT selected to lead 16-university consortium in new FAA Center of Excellence for Alternative Jet Fuels and the Environment.

MOVING FORWARD: Support efforts at WSU to organize the COE.

STRENGTHENING WASHINGTON'S AEROSPACE SUPPLY CHAIN



Prioritize funding for key transportation improvements that enable the efficient movement of employees, parts, and finished products to and from aerospace manufacturing sites.

LEADS: Office of Aerospace, WAP, Department of Transportation

- Transportation Revenue Package considered by the legislature contained significant funding for projects that will benefit the aerospace industry across the state.

MOVING FORWARD: Continue to educate the legislature and the general public about the need for transportation improvements across the state.



Work with Washington's federal delegation to encourage reforms at the FAA to ease burdens and allow Washington companies to be more competitive.

LEAD: Office of Aerospace

- Worked with U.S. Senator Maria Cantwell and Representative Rick Larsen to support inquiries and congressional hearings exploring FAA certification practices and procedures.
- Supported efforts by Impact Washington and the Aerospace Futures Alliance to normalize FAA certification practices.

MOVING FORWARD: Continue these efforts.



Develop a set of outcomes-based metrics to measure the effectiveness and impact of investments in aerospace-related economic development and the programs they support.

LEAD: Office of Aerospace

- Defined "aerospace" and "aerospace-related" industries in Washington using NAICS codes to allow tracking of industry growth over time.

MOVING FORWARD: Work with the Dept. of Commerce to establish metrics and measure progress through Results Commerce and Results Washington.



Analyze the economic impact of the aerospace industry in Washington State.

LEAD: Office of Aerospace

- Completed - Study found \$76 billion economic activity generated by the aerospace industry in Washington in 2012.



2014-15 Action Items

The following efforts are considered high priority for action over the next two years.

Growing and Diversifying Washington's Aerospace Cluster

Strategy	Lead(s)
Work with The Boeing Company and local jurisdictions to ensure the smooth ramp up to the 737MAX and 777X programs.	<i>Office of Aerospace</i>
Develop and execute a targeted marketing campaign to build on the 777X siting decision by identifying and recruiting international companies to Washington state and assisting existing companies to secure work in the Boeing supply chain.	<i>Office of Aerospace, Dept. of Commerce, WAP, ADOs</i>
Build on efforts to coalesce companies in Washington engaged in space exploration.	<i>Office of Aerospace, WAP</i>
Identify and recruit international maintenance, repair and overhaul (MRO) companies to Washington.	<i>Office of Aerospace, Dept. of Commerce</i>
Assist Greater Spokane Inc.(GSI), Spokane International Airport (SIA), and the city and county of Spokane to position the West Plains for large scale aerospace manufacturing.	<i>Office of Aerospace, Dept. of Commerce, GSI, SIA</i>

Cultivating a Deep and Talented Aerospace Workforce

Strategy	Lead(s)
Develop a curriculum and facilities to support a carbon fiber wing training program for the 777X.	<i>WATR Center</i>
Ensure that investments in community and technology college aerospace training programs are directed to programs most in need by the industry.	<i>Pipeline Committee, SBCTC</i>
Develop an operations plan and organizational structure for the Washington Manufacturing Advanced Training Institute (WMATI) in Renton.	<i>WMATI, City of Renton, AFA</i>

Fostering a Culture of Aerospace Innovation

Strategy	Lead(s)
Develop a business and operations plan and secure funding for an advanced materials innovation institute in Washington.	<i>Advanced Composites Center consortium, Dept. of Commerce</i>
Secure re-designation of the UW's FAA Center of Excellence for Advanced Materials in Transportation Aircraft Structures.	<i>UW</i>
Pursue designation as co-lead of the FAA's new Center of Excellence for Unmanned Aircraft Systems.	<i>UW</i>
Develop a strategy to leverage existing facilities and capabilities of Grant County International Airport to provide training, testing, certification, and research operations for a variety of aircraft types (fixed wing, rotorcraft, and unmanned aircraft).	<i>Port of Moses Lake, Office of Aerospace, UW, WSU</i>

Strengthening Washington's Aerospace Support Chain

Strategy	Lead(s)
Fully fund the Washington State Department of Commerce and ADOs to continue aerospace recruitment and expansion and trade development programs.	<i>WAP</i>
Continue to push the Washington State Legislature to pass a significant funding package for key transportation improvements that enable the efficient movement of employees, parts, and finished products to and from aerospace manufacturing sites.	<i>WAP</i>
Pursue expansion of the aerospace product development business and occupation tax credit currently available to companies engaged in commercial airplane activities to all sectors of the aerospace industry.	<i>WAP</i>
Leverage the U.S. Department of Commerce designation of the I-5 and I-90 aerospace corridors as one of 12 national Manufacturing Communities to secure federal grants to fund key Washington Aerospace Strategy projects.	<i>Puget Sound Regional Council</i>

The Washington Aerospace Industry

Overview

Washington is home to 175 firms working directly in aerospace manufacturing, employing 94,200 people in 2012. Including sectors closely tied to aerospace adds an additional 38,300 jobs to the aerospace cluster as a whole, encompassing 1,350 firms employing 132,500 people in the state.⁷ As of December 2013, The Boeing Company alone employed nearly 82,000 in Washington.⁸ In 2012, the company paid more than \$4.6 billion to its 2,042 unique suppliers in the state.⁹

Top 10 Trading Partners for Aerospace Products 2013 (Billions)

1.	China	\$8.1
2.	United Arab Emirates	\$3.7
3.	Japan	\$3.3
4.	Qatar	\$2.2
5.	Hong Kong	\$2.1
6.	United Kingdom	\$1.9
7.	India	\$1.9
8.	Indonesia	\$1.8
9.	Germany	\$1.5
10.	Saudi Arabia	\$1.5

This cluster consists not just of aerospace manufacturing firms, but also comprises a wide range of supplier and related industries. These include machine shops, industrial machinery and equipment manufacturers, and companies engaged in the production of instrumentation and measurement equipment. This industry has a huge impact on the state's economy, paying out \$11.5 billion in wages in 2012.¹⁰ According to recent data from the Washington State Department of Commerce, aerospace exports accounted for 53% of all Washington State exports in 2013, totaling \$43.6 billion, a 61% increase since 2011.

Recent Developments

Washington has made tremendous progress in recent years to shore up its aerospace industry. The hard-won decisions to build both Boeing's KC-46A aerial refueling tanker for the U.S. Air Force and the 737 MAX in Washington are resulting in thousands of new jobs. Despite announcements to reposition engineers to locations around the country, overall Boeing employment was more than 12% higher as of May 2014 than it was in 2010. The decision to assemble the 777X and build its carbon fiber wing in the Puget Sound region ensures that Washington will continue to be at the forefront of aerospace manufacturing technology.

2013 was a year of aerospace investment for Washington. With less than a week's notice, Governor Jay Inslee called a special legislative session to consider a package of incentives to secure production of the 777X for the state. On a near unanimous vote, the legislature adopted a package that will not only strengthen the 777X program, but strengthen Washington's overall position in the industry. The package included deep investments in workforce training, adding training slots for aerospace fields, investments in facilities, and specialized funding

⁷(Nov, 2013) *Washington State Aerospace Economic Impact Study – Community Attributes, Inc.*

⁸(Jan 29, 2014) http://www.boeing.com/boeing/aboutus/employment/employment_table.page?

⁹(Jan 29, 2014) http://www.boeing.com/assets/pdf/aboutus/govt_ops/state_cards/card_WA.pdf

¹⁰(Nov, 2013) *Washington State Aerospace Economic Impact Study – Community Attributes, Inc.*

to train workers on carbon fiber wing fabrication. In addition, existing aerospace tax credits were extended to 2040 and funding was allocated to assist local communities to do advanced environmental planning on large-scale potential manufacturing sites to help them be ready for aerospace-related development projects.

Airbus held a first-of-its-kind supplier recruitment event in Washington in partnership with the Pacific Northwest Aerospace Alliance. In an effort to execute on its publicly stated goal of increasing its annual U.S. procurement spent from \$13 billion to \$20 billion, the company has identified Washington’s supply chain as fertile ground, even hosting a Department of Commerce business development manager at its U.S. headquarters in Virginia to provide training on its procurement processes.

Beyond commercial airplane production, the Federal Aviation Administration selected Washington State University, along with the Massachusetts Institute of Technology, to co-lead a 16-university consortium in a new Center of Excellence for Alternative Jet Fuels and the Environment. The successes of 2013 have created a strong base for Washington build on in 2014 and beyond.

WASHINGTON AEROSPACE

\$76B DIRECT, INDIRECT, & INDUCED
IMPACT SALES, 2012

BOEING COMMERCIAL

 **\$476M** IN STATE
TAX REVENUES

REVENUE TO THE STATE ECONOMY = **\$70B**
(11% OF STATEWIDE GROSS BUSINESS INCOMES)

#WAAero INDUSTRY | \$4 BILLION IN STATE REVENUE SINCE 2004

132,500  **\$11.5B**
JOBS  WAGES FOR THE INDUSTRY*
(11% OF ALL WAGES EARNED STATEWIDE)
AT **1,350** ESTABLISHMENTS
ACROSS THE STATE

Boeing Programs in Washington

737/737 MAX

In March 2014, Boeing began producing its 737 Next Generation single-aisle aircraft at a rate of 42 per month, while announcing plans for a further increase to 47 in 2017.¹¹ Meanwhile, Boeing is currently developing a new derivative of the 737, the 737 MAX. Scheduled for first flight in 2016 and delivery the following year, the more fuel-efficient, single-aisle jet will be built in Renton as well. The company has already booked orders for more than 2,000 aircraft as of May 2014.¹²

P-8 Poseidon

The Renton-built P-8A Poseidon entered full production in 2014, following a \$2.4 billion contract award from the U.S. Navy for 16 additional aircraft. Based on Boeing's Next-Generation 737-800 commercial airplane, the P-8A will enhance the service's anti-submarine, anti-surface warfare and intelligence, surveillance and reconnaissance capabilities. Overall, the Navy plans to purchase 117 P-8As to replace its P-3 fleet. The Indian government has also ordered eight P-8s and other nations, including Australia and Italy, are expected to follow.

747-8

With just 54 unfilled orders as of April 2014 on the books between the passenger and freighter versions and a production rate of 1.5 per month, it is widely anticipated that the "Queen of the Skies" is winding down its storied 40+ year history. It is likely that production will continue, even if at a minimal level, until the U.S. government awards a contract for a new Air Force One presidential aircraft sometime around the turn of the next decade.

767/KC-46A Pegasus

With approximately 40 remaining unfilled orders for the 767-300ER Freighter, the focus on this program is on the U.S. Air Force's aerial refueling tanker, dubbed the KC-46A Pegasus. The first flight of an Engineering and Manufacturing Development test aircraft, without its aerial refueling systems, will take place in mid-2014, followed by the first flight of a KC-46A tanker in early 2015. The first delivery of a production aircraft to the Air Force is planned for early 2016. Boeing expects to build 179 tankers by 2027 if all options under the contract are exercised. The tankers will be assembled in Everett with additional equipment installation at Boeing Field in Tukwila.

777/777X

Over the 20 years since its first flight in 1994, the twin-aisle, twin-engine 777 is poised to become the best-selling wide body aircraft in commercial aviation history. Currently, Boeing is producing 8.3 airplanes per month at the Everett plant. Meanwhile, a new, more fuel-efficient version of the 777 is under development. The 777X was launched in November 2013 at the Dubai Air Show with a record-setting 259 orders and commitments. Production of the 777X is scheduled to begin in 2017 and first delivery is targeted for 2020. Final assembly and fabrication of the 777X's carbon fiber wing will take place in Everett and the tail will be manufactured in Frederickson.

787 Dreamliner

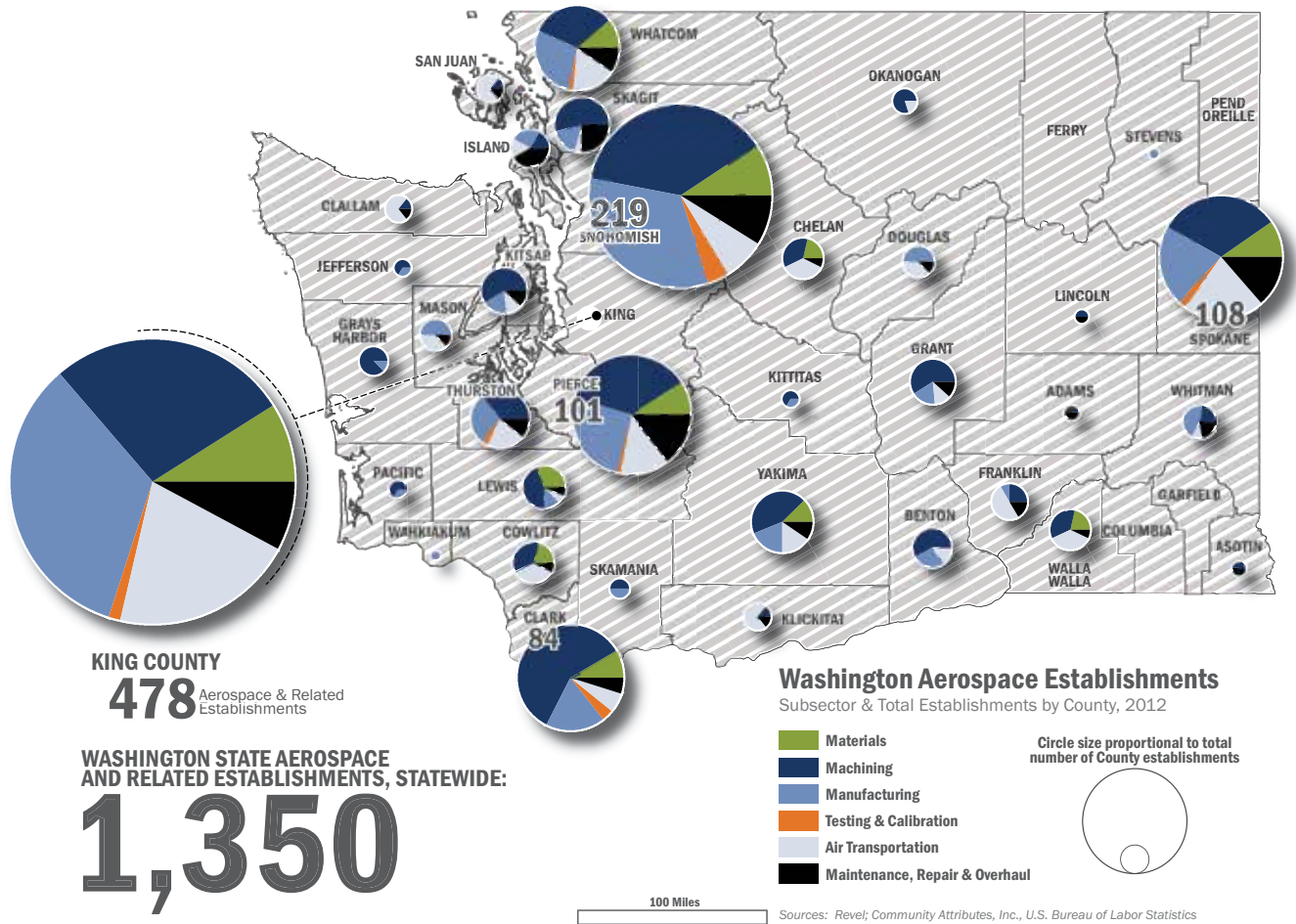
Currently, the 787 is being built on two assembly lines in Everett and one in North Charleston, South Carolina. Recent plans show Boeing doubling the size of the North Charleston plant, creating a second 787 line. Despite reports of production delays and quality concerns, future 787 production may shift away from Everett. In addition, production of the larger 787-10 may occur solely in North Charleston due to the size of the fuselage, which is produced nearby and cannot be transported in the converted 747 large-capacity freighter, the Dreamlifter, to Everett.

Future Programs

While many suggest that Boeing has its hands full with the development of the 737 MAX, the Pegasus, 777X, and 787-9 and -10, speculation continues about potential replacements for the 757 and an all-new single-aisle (NSA) airplane to replace the 737 family. Boeing has made no official announcements about either potential program. However, there is a gap in the 190- to 250-seat segment in Boeing's current and planned offerings that could be filled by a 757 replacement. Some analysts predict that a new program such as this could be launched as early as 2018. A new, all-carbon fiber NSA is considered possible in the mid-2020s. Others have suggested that these two market segments could be combined into one all-new program with multiple capacity variants.

¹¹<http://boeing.mediaroom.com/2014-03-20-Boeing-Rolls-Out-First-Next-Generation-737-at-Increased-Production-Rate>

¹²<http://boeing.mediaroom.com/2014-05-20-Boeing-737-MAX-Surpasses-2-000-Orders>



A Statewide Industry:

While there are companies working directly and supporting aerospace in 35 of Washington’s 39 counties, the industry is clustered in four regions across the state each with different characteristics and strengths.

Puget Sound

- Global headquarters of three of The Boeing Company’s five major business units (Boeing Commercial Airplanes, Shared Services Group, and Boeing Capital Corporation).
- Final assembly locations for all of Boeing’s current commercial jet families: 737 NG (future 737 MAX), 747-8, 767/KC-46A, 777 (future 777X), and 787. Large Boeing Fabrication Division plants in Auburn and Frederickson, and research and development Developmental Center in Tukwila.
- Composite and advanced materials manufacturing cluster, including the Boeing Composite Manufacturing Center and Toray Composites (America), Inc. in Frederickson.
- Sea-Tac International Airport is the 15th busiest airport in the U.S., providing service to more than 34 million passengers in 2013.¹³
- The combined ability and capacity of the ports of Everett, Seattle and Tacoma provide unique advantages in terms of logistics capability for aerospace freight.
- The University of Washington is one of the leading public research universities in the U.S.

- Headquarters for the Federal Aviation Administration's Northwest Mountain Region, one of nine regions nationally, are located in Renton.
- Joint Base Lewis-McChord employs more than 63,000 military personnel and civilian workers.¹⁴
- Home to significant U.S. Navy installations at Bremerton, Bangor, Everett, Marysville, and Oak Harbor and to a number of supportive defense contractors.
- Washington State University is expanding its engineering programs in Everett as it assumes management of the University Center of North Puget Sound.

Northwest Washington

- Composite and advanced materials manufacturing cluster.
- A global leader in the design and engineering of advanced composites, exotic materials and aircraft interiors.
- Established engineering technician and new engineering programs at Western Washington University.
- Composite and manufacturing programs at universities, and community and technical colleges.
- International gateway to markets with direct access to Canadian customers and suppliers.

Southwest Washington

- Provides support to industry in metal finishing, plastics and electronics.
- Home of Insitu (a wholly owned subsidiary of Boeing) and an emergent unmanned aerial vehicle/systems (UAV/UAS) cluster, including manufacturing, software development, engineering and design.
- Proximity to the Portland, Oregon, metropolitan area, deep water ports, an international airport, and Boeing operations located in Gresham, OR.

Central/Eastern Washington

- The state's second largest and strongest aerospace region, with an established and growing cluster of suppliers.
- Grant County and Spokane International Airports both offer large available development opportunities for aerospace manufacturing, expanded aviation services operations (maintenance, repair and overhaul) and carbon fiber production.
- Fairchild Air Force Base in Spokane has an annual economic impact of nearly \$425 million, supporting 17,000 military pensioners.¹⁵
- Washington State University, the state's land grant institution that is performing world-leading research in areas such as aviation biofuels, is located in Pullman.
- Pacific Northwest National Laboratory (PNNL) presents significant research and development capabilities in its facilities in the Tri-Cities.

¹³(Jun, 2014) <http://www.portseattle.org/About/Publications/Statistics/Airport-Statistics/Pages/default.aspx>

¹⁴(2013) *Retaining and Expanding Military Missions – Washington Military Alliance*

¹⁵(Jan 29, 2014) <http://www.greaterspokane.org/forward-fairchild.html>



Growing and Diversifying Washington's Aerospace Cluster

GOALS

- Leverage the new investments being made in production of the 777X and its composite wing to attract new aerospace and advanced materials companies
- Help existing Washington aerospace businesses thrive and expand
- Work to ensure that new work by existing companies is located in the state
- Attract new companies from around the world to locate here
- Reduce reliance on a single employer by diversifying the industry within and beyond commercial airplane production

Throughout the century of Washington's history in aerospace, employment in the sector has been dominated by Boeing commercial airplane manufacturing. Washington has one of the largest concentrations of aerospace manufacturing in the world some 15 times that of the U.S. as a whole.¹⁶ State-by-state, Washington is also the largest U.S. exporter of aerospace products, manufacturing more than 25% of the national total in 2010.¹⁷ This is more than three times the export level of California, which ranked #2.

Sea-Tac airport is a major hub for international air travel, hosting nearly 35 million passengers in 2013 from all over the world. International travel has increased 59% since 2004, and twelve new international flights have been added since 2007.¹⁸ In 2014, new and updated international routes are already planned. Delta Airlines has designated Seattle as its international hub on the west coast, announcing routes to Hong Kong, Seoul and London, while simultaneously dramatically increasing its U.S. domestic service as a feeder. In addition, Hainan Airlines will begin using Boeing's 787 for its flights to Beijing. In response, Sea-Tac Airport is currently building a new International Arrivals Facility to accommodate these travelers, with a planned opening in 2018. Alaska

Airlines Group, headquartered in Seattle, is sharply increasing domestic service to-and-from Seattle, its largest hub.

The aerospace industry will see significant changes in the coming years, creating market opportunities for Washington companies. The Next Generation Air Transportation System ("NextGen") will transform the National Airspace System (NAS). The final flight of the Space Shuttle Atlantis in 2011 marked the end of NASA's dominance of manned spaceflight, forcing new interest and demand for commercial space missions. The use of new composite materials will continue to be adopted by the industry, as well as the need to develop new methods of repair, maintenance, recycling and disposing of the materials. In addition, the industry will continue to pursue cost and environmental impact reductions through advancements such as the use of aviation biofuels.

¹⁶(Feb 4, 2014) NAICS 336411: Aerospace Manufacturing U.S. DOL, WA ESD, June 2013

¹⁷http://www.aia-aerospace.org/assets/deloitte_study_2012.pdf

¹⁸<http://www.portseattle.org/Business/Construction-Projects/Airport-Projects/Pages/IAF.aspx>



RECENT SUCCESS: Paris Air Show 2013

- Largest delegation from Washington, with 51 members, representing 22 aerospace companies, five local economic development organizations, four educational institutions, and two industry groups.
- Partnered with the Seattle Metropolitan Chamber of Commerce and Trade Development Alliance of Greater Seattle, with an additional delegation of more than of more than 60 businesses and civic leaders, and hosted combined events.
- Hosted state's largest ever booth at the show
- Hosted pre-show reception that included other Washington companies present at the show but not a part of the official delegation.
- Washington delegates reported \$35+ million in actual sales booked since the show and forecast another \$49 million

Washington is well positioned to capitalize on these opportunities. The strategies detailed below aim to build upon Washington's strengths in key subsectors.

Strategies

Commercial Airplanes

Employment and economic activity in Washington's aerospace industry is dominated by Boeing Commercial Airplanes and its significant supply chain. However, many of these companies provide parts and equipment to other original equipment manufacturers around the world, including Airbus, Bombardier, Mitsubishi Aircraft Company and Embraer.

- Strengthen the existing aerospace supply chain by enticing companies located around the U.S. and in other countries to set up facilities in Washington and by helping existing Washington suppliers connect with Boeing, Airbus and other original equipment manufacturers (OEMs):
 - Expand use of the online database of Washington suppliers, AerospaceVendors.com, to assist OEMs in identifying and partnering with capable supply chain partners.
 - Identify gaps in the Boeing supply chain, particularly in the 737 MAX, KC-46A tanker and 777X programs, where there may be opportunities to attract investment in facilities and employees in relative proximity to key manufacturing and assembly sites in Renton, Everett, Tukwila, Auburn and Frederickson.
 - Continue to develop the relationship with Airbus and provide additional opportunities for Washington companies to access its supply chain and those of other international OEMs.
 - Identify opportunities and aggressively pursue other aerospace business recruitment targets.
 - Work to restore funding for the U.S. Small Business Administration's State Trade & Export Promotion (STEP) grant program to assist Washington's suppliers market and export products abroad and encourage Congress to support its continued funding.

- Improve the visibility of the Washington aerospace industry by hosting and/or supporting supplier fairs and trade shows, such as the Aerospace & Defense Supplier Summit which returned to Seattle in March 2014, and attending international trade events, such as the Paris and Farnborough International Air Shows and Aeromart Toulouse on an annual basis.
- Organize an annual familiarization (“FAM”) tour for national aerospace site selectors to help make them aware of development opportunities.
- Recognize the important role the Middle East region is playing in the aerospace industry and build upon recent trade missions to the United Arab Emirates to develop economic, educational, and cultural initiatives to better connect the state with the country.

General Aviation Manufacturing

While nowhere near the scale of the commercial aviation sector, Washington is home to a number of premier general aviation (GA) manufacturers, including Cub Crafters (Yakima), Glasair (Arlington), and Rocket Engineering (Spokane) that produce and deliver completed aircraft, aircraft kits and parts around the world. Many other companies provide parts and services to the larger GA manufacturers, such as Bombardier, Gulfstream and Cessna.

- Develop strategies to support existing companies and recruit additional employers engaged in the General Aviation sector.
- Explore establishing a Washington state presence at the annual National Business Aviation Association Convention and Exposition.

Emergent Subsectors

Technological and market developments will change the future of the aerospace industry. Demands for more efficiency are driving alternative sources of fuel and materials and system advances. In addition, new markets for space technology and unmanned flight will

create opportunities for Washington companies.

Advanced Materials:

- Leverage the presence of SGL/BMW’s carbon fiber production facility in Moses Lake and the production of the 777X’s carbon fiber wing, as well as Boeing’s Composite Manufacturing Center in Frederickson and the innovative Composite Materials Research Laboratory at Toray Composites (America), Inc. to attract additional research and development and production activity related to composites and other advanced materials to Washington.
- Assist the University of Washington in securing re-designation of the FAA’s Center of Excellence for Advanced Materials in Transportation Aircraft Structures.
- Support efforts by a variety of stakeholders to establish an advanced materials innovation institute to conduct research and development and product development in aerospace and other industries that utilize composites and other advanced materials.

Unmanned Aerial Vehicles and Systems (UAV/UAS):

- Support efforts by the University of Washington (UW) to co-lead the FAA’s new Center of Excellence for UAV/UAS.
- Advocate for more local use of UAVs, including roles in wildlife and utilities management, and wildfire and tsunami debris monitoring.
- Support expansion of UAS-specific worker training programs, such as those soon-to-be established at Green River Community College and existing programs at Clark College. Provide additional programs in closer geographic proximity to the Southwest Washington UAS cluster to meet the needs of the industry.
- Explore opportunities and initiatives to support and grow the nexus between Washington’s UAS and agriculture industries.

Green Aviation:

- Aviation Biofuels:
 - Support efforts and recommendations of the Sustainable Aviation Biofuels Working Group, including:¹⁹
 - » Align state tax policies to support the development of aviation biofuels.
 - » Stabilize the demand for aviation biofuels in Washington by establishing clean/renewable fuel standards that allow for the aviation sector to participate on a voluntary basis.
 - » Support research and development to build the aviation biofuels industry.
 - » Develop public-private partnerships to leverage preferential financing options for developing biofuels facilities.
 - Leverage research underway at UW, WSU and PNNL that includes two \$40 million U.S. Department of Agriculture and \$2.5 million U.S. Department of Energy grant-funded projects to develop a commercially viable biofuels industry anchored in Washington.
 - Support WSU as co-lead of and UW's participation in the FAA's ASCENT Center of Excellence for Alternative Jet Fuels and Environment.
 - Collaborate with the U.S. Department of Defense and Washington's Navy, Army and Air Force installations to foster local production, use and demand of aviation biofuels.
- Build upon the work of Sea-Tac International Airport, Alaska Airlines and The Boeing Company's Greener Skies Over Seattle initiative and Boeing's ecoDemonstrator to advance technologies that reduce the environmental impact of air travel.



RECENT SUCCESS:

Washington State Space Consortium

- Created the Washington State Space Consortium to support the space exploration industry in Washington State
- Developed action items necessary to support and grow the space sector in Washington (See page 26)

¹⁹<http://www.innovatewashington.org/sites/default/files/Aviation%20Biofuels%20Work%20Group%202013%20Update.pdf>

Space:

- Utilize the Washington State Space Consortium to inform the governor, legislature, and Washington’s federal delegation on issues critical to the space industry.
- Inventory existing physical infrastructure in Washington, such as the U.S. Electrodynamics Comsat Earth Station near Brewster, and develop strategies to leverage their presence to support the space industry.
- Inventory existing capabilities of companies located in Washington.
- Assist Washington companies in their efforts to market technologies to U.S. and foreign space agencies, including the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the National Reconnaissance Office (NRO), the National Security Agency (NSA), the Defense Advanced Research Projects Agency (DARPA), Air Force and Navy.

Software & Systems:

- Build upon the state’s assets in computer science research (including UW, WSU, PNNL, and Microsoft Research), the presence of The Boeing Company and regional headquarters of the Federal Aviation Administration, as well as the national leadership already underway by Sea-Tac International Airport and Alaska Airlines, to establish a leading role in the development of NextGen Air Traffic Control.
- Leverage the University of Washington—Tacoma Institute of Technology and the Washington State National Guard’s 262nd Network Warfare Squadron at Camp Murray for the development of information assurance and cyber defense programming as it relates to military aircraft production.
- Develop opportunities to further the expansion of companies working in avionics, and other aerospace-related software and systems development.

- Promote interest in and development of new aerospace-related software by partnering with others to host an annual aerospace-related “Hackathon.”

Military

Direct military employment and military contractors represent a significant element of Washington’s economy. Continued alignment between the state’s aerospace industry and the military’s needs will sustain significant economic activity.

- Working with the federal delegation, Greater Spokane, Inc., and Forward Fairchild to position Fairchild to be designated as the second Main Operating Base for KC46-A Pegasus aerial refueling tankers.
- Support efforts of the Washington State Department of Commerce’s Military and Defense Sector Lead to sustain the state’s military bases.
- Develop a deeper understanding of aerospace-related military products designed and built in Washington and support companies in winning future procurement contracts.
- Support Joint Base Lewis-McChord, Fairchild Air Force Base and Naval Air Station Whidbey Island’s continued air and aircraft operations by encouraging local governments to consider protective land use approaches.
- Pursue and develop opportunities for U.S. Military and National Guard aviation-related facilities and operations, including maintenance and repair.



The Washington State Space Industry Strategy

Space:

Washington is home to many new and established space companies. These companies bring a wealth of expertise and high-paying technical jobs to the state. Private space activities are enjoying a period of high growth and investment and Washington's space companies are at the forefront of this new wave. Washington's space companies are building capabilities ranging from human spaceflight, to space mining, to lunar elevators, to satellites, to the components and parts necessary to make all these spacecraft operate.

To build on the exciting momentum in the space business, Washington is focused on: growing established space companies; creating an environment for the creation of new space companies; and developing, educating and retaining a workforce that will enable Washington's leadership in space. Increasing the connections between space-related industries in Washington and between these industries and its universities will further foster business growth.

General:

- Utilize the Washington State Space Consortium to inform the governor, legislature, and Washington's federal delegation on issues critical to the space industry.
- Inventory existing physical infrastructure in Washington, such as the U.S. Electrodynamic Comsat Earth Station near Brewster, and develop strategies to leverage their presence to support the space industry.
- Inventory existing capabilities of companies located in Washington.

Support Growth of Established Space Companies:

- Assist Washington companies in their efforts to market technologies to commercial space users, as well as U.S. and foreign space agencies, including the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the National Reconnaissance Office (NRO), the National Security Agency (NSA), the Defense Advanced Research Projects Agency (DARPA), Air Force and Navy.
- Expand current aerospace tax preferences to include space exploration companies.

Foster Creation of New Space Companies:

- Increase opportunities for small business and university collaboration.
- Develop a program to attract small companies to Washington by leveraging federal contracts, such as the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.

Develop, Educate and Retain a Space Workforce:

- Develop additional opportunities for Washington students to participate in real-world industry projects in their education programs by:
 - Expanding access for state high school and college students to participate in internships with Washington-located space companies.
 - Increasing research and project connections between industry and the state's universities.

Aviation Services

- Build upon the passage of ESSB 5882 in 2013, which exempted maintenance, repair, and overhaul (MRO) of non-resident-owned private aircraft from state sales and use tax, to expand MRO and aircraft completion activities in Washington.
- Pursue additional strategies to support the growth of existing and attract new commercial and GA MRO facilities.
- Support the emergence of Washington as a global center for aviation maintenance technician (AMT) training by:
 - Pursuing the ability for Washington-trained AMTs to receive European Aviation Safety Agency (EASA) certification; and
 - Securing FAA approval for flexible AMT training programs.
- Pursue recruitment of contract engineering firms and other engaged in design, testing and certification.

RECENT SUCCESS:

ATS/Greenpoint investment at Moses Lake

- **2013 legislature approved ESSB 5882, which: exempts non-resident owned aircraft weighing more than 41,000 pounds (Boeing 737s and larger) from sales and use tax and exempts large aircraft in long-term storage from property tax.**
- **Bill gave Aviation Technical Services confidence to expand at Grant County International Airport.**
- **Allowed Greenpoint Technologies to bring two VIP 787 aircraft and additional work to Moses Lake for completion, supporting more than 100 jobs.**
- **Greenpoint was acquired in May 2014 by the French aerospace conglomerate Zodiac Aerospace, which is committed to growing and expanding the company's Washington operations.**

Cultivating a Deep and Talented Aerospace Workforce

GOALS

Meet the industry's significant workforce demand across all levels of the workforce by:

- Better coordinating, promoting, and measuring outcomes of workforce training and education programs.
- Improving the quality and expanding the capacity of training and workforce development programs in high demand fields.
- Improving the quality and expanding the capacity of engineering programs at Washington's public research and comprehensive universities.
- Inspiring students to pursue aerospace career-enabling educational pathways.

Washington's existing aerospace workforce is both highly skilled and highly concentrated. According to the U.S. Department of Labor's Bureau of Labor Statistics, the state's location quotient for aerospace engineers is the nation's highest at 4.70. This means that for every aerospace engineering job in the U.S., Washington has nearly five, accounting for more than 8,000 aerospace engineers employed locally.²⁰ There are significantly more engineers of all types employed in the aerospace sector in Washington, including mechanical, electrical, and others. However, the workforce demands of the industry, immediately as well as those anticipated in the future, suggest the need not only for more engineers, but many additional workers possessing a broad array of aerospace-related skills. According to the Aerospace Manufacturing Skills 2013 Annual Report, Washington aerospace firms are having challenges filling vacancies for engineers, machinists, CNC programmer/operators, quality assurance/inspectors and assemblers.²¹

The education and training of a qualified workforce is a challenge to the future health of the aerospace industry both nationwide and in Washington. The importance of this issue will be exacerbated dramatically in future years by the increasing demand for workers as the industry expands. The

Boeing Company forecasts that global demand for new commercial jetliners will exceed 35,000 through both replacement and fleet expansion, with an estimated value of \$4.8 trillion over the next 20 years.²² While not quite as optimistic, Airbus also projects a healthy market for new aircraft over the next two decades (29,220 aircraft valued at \$4.4 billion between 2013 and 2032).²³ Tens of thousands of workers will be needed to build, fly, and maintain these planes. The 2013 Boeing Commercial Market Outlook also predicts a need for more than 1 million additional commercial airline pilots and maintenance personnel worldwide by 2032.²⁴ Yet, Boeing's workforce, and that of the entire aerospace industry, is rapidly aging. According to Boeing, 50% of its U.S. based workforce will be eligible to retire by 2016.²⁵

²⁰(Feb 4, 2014) <http://www.bls.gov/oes/current/oes172011.htm> - Data for May 2012

²¹(April 9, 2014) <http://wtb.wa.gov/Documents/AerospaceReport2013.pdf>

²²(Feb 4, 2014) <http://www.boeing.com/commercial/cmo/>

²³(June 3, 2014) <http://www.airbus.com/company/market/forecast/>

²⁴(Feb 4, 2014) http://www.boeing.com/commercial/cmo/pilot_technician_outlook.html

²⁵(April 9, 2014) <http://www.blsCourierherald.com/news/216027081.html>



Strategies

General

- Expand the representation and role of the Washington Aerospace & Advanced Materials Workforce Pipeline Advisory Committee to include the full continuum of aerospace-career enabling education, from preschool through graduate school, and workforce development councils representing areas with significant aerospace presence.
- Establish and promote the Center of Excellence for Aerospace & Advanced Manufacturing as the central point of entry for students and jobseekers to navigate their way through training programs to careers in aerospace.
- Collect and publish data tracking the transition from education to employment as well as the outlook for employment in private companies, to provide students and their families with the confidence that their social investments will pay off, help direct future program prioritization, and justify the expenditure of public resources to the legislature and other key funders.
- Develop additional opportunities for Washington students to participate in real-world industry projects in their education programs by:
 - Expanding access for state high school and college students to participate in internships with Washington companies.
 - Increasing research and project connections between State industry and universities.
- Increase opportunities for teachers of students at all levels to experience cutting edge technologies and manufacturing processes through externships and other programs.
- Develop a marketing program targeting aerospace-related students and graduates of top-ranked engineering universities and career and technical colleges around the country informing them of aerospace career opportunities in Washington.
- Consider incentives, such as tax credits, benefitting companies that donate time/resources for education programs and/or host interns.

Preschool -12th Grade

- Support the work of Washington STEM and other organizations to build capacity for and acceptance of STEM education at elementary, middle and high school levels.
- Utilizing the successful models established by Aviation High School, Delta High School, Riverpoint Academy, the Technology Access Foundation Academy, and others, support the establishment of STEM-focused magnet high schools around the state.
- Continue to invest in high school-level career and vocational training, such as the programs offered by the Pierce County Skills Center in Puyallup, which provide access job training and career options to students from nine area school districts.
- Support the expansion of the Washington Aerospace Scholars Program at the Museum of Flight.
- Work with the Museum of Flight, Pacific Science Center, Future of Flight Aviation Center, Mobius and other science-themed education facilities and non-profit organizations around the state to expose children to the magic of flight and space travel and the science behind it.
- Develop Washington aerospace-themed STEM curricula for the elementary and middle school ages.
- Expand offerings of hands-on, applied STEM courses, such as those provided in the Project Lead the Way engineering series and machining technology courses in high schools and skills centers.
- Support aerospace-themed, STEM-based extracurricular activities, such as FIRST Robotics and Team America Rocketry Challenge, as a way to further inspire children to pursue STEM-enabling educational pathways.

RECENT SUCCESS:

Alaska Airlines Aerospace Education Center at the Museum of Flight

Alaska Airlines announced it will fund an education center at the Museum of Flight in Seattle with a \$2.5 million gift. The Alaska Airlines Aerospace Education Center will feature state-of-the-art technology resources designed to help students, teachers and parents explore science, technology, engineering, and math (STEM) careers in the aviation industry. Construction of the Center will begin in September 2014, with completion expected in 2015.

- Support and encourage stronger connections between state universities and K-12 STEM education efforts.
- Support expansion of the Core+ Curriculum, which is currently being utilized in more than 30 schools across the state, to expose and better prepare students for manufacturing and manufacturing trades coursework at the secondary level.

Skilled Labor

- Support the strategic and targeted expansion of workforce training provided by community and technical colleges, as well as apprenticeship, short-term industry programs, and workforce development councils, in high demand fields, such as:
 - Composites materials manufacturing and repair
 - Machine maintenance and tooling
 - Quality assurance
 - Pre-engineering
 - Specific needs of the unmanned aerial systems industry cluster
- Expand access to National Career Readiness and National Association of Manufacturers certifications for high school and training program graduates.

- Support the establishment of the Washington Manufacturing Advanced Training Institute (WMATI) in Renton.
- Recognize the cost differential between technical and general education training programs and redirect funding in a way that supports additional technical training capacity.
- Supporting the development and expansion of pre-employment/pre-apprenticeship programs across the state.
- Develop programs to train aviation maintenance technicians (AMT) to European Aviation Safety Administration (EASA) specifications to establish an internationally literate aerospace workforce.

Veterans and National Guard Personnel

- Work with the Department of Veterans Affairs, Center for Advanced Manufacturing Puget Sound (CAMPS), AJAC, U.S. Military, National Guard, and private employers to support programs that put veterans and guardsmen/women to work in aerospace-related careers.

Engineering

- Increase the number of engineering and other STEM-related graduates at universities across the state.
- Support the establishment of a new WSU School of Aerospace & Advanced Manufacturing at Everett.
- Invest in the colleges of engineering at University of Washington, Washington State University, and Western Washington University in ways that improve their standing in the U.S. News and World Report engineering rankings. Specifically, target investments that support programs developing the future workforce in aerospace engineering.
- Support the expansion of pre-engineering programs at community and technical colleges across the state.

- Explore the establishment of a private aerospace academy, such as Embry-Riddle, to augment the state's publicly funded engineering programs.
- Establish a network to link and reposition experienced professional engineers who choose to remain in the area when their jobs relocate out of state to local job opportunities.

Unemployed professionals from other industries

- Partner with workforce development councils across the state to develop programs to train unemployed workers from other industries with compatible skills for aerospace-related jobs.

RECENT SUCCESS:

The 777X Investment Package

The investments from the 777X special session package of incentives to secure production of the 777X in Washington significantly expand aerospace training programs in Washington. In November 2013, in a near unanimous vote, the legislature adopted the package, which extended existing tax incentives beyond their 2024 sunset date to 2040, but also included:

- Funding for 1,000 additional student slots in for community and technical college training in high-demand aerospace fields;
- Funding to develop a specialized carbon fiber wing fabrication training program;
- Additional funding to allow the full build out of the Central Sound Aerospace Training Facility in Renton; and
- Funding to assist local communities do advanced environmental planning on large-scale potential manufacturing sites to help them be ready for aerospace related development projects.

Fostering a Culture of Aerospace Innovation

GOALS

- Better connect activities at public research facilities with the aerospace industry
- Aggressively pursue federal grant programs that will result in investment in research and development capacity in Washington

RECENT SUCCESS:

Joint Center for Aerospace Technology Innovation (JCATI)

In first two grant cycles, JCATI has awarded \$2.64 million to 34 individual projects from a wide variety of industries.

- In its first year of operations, the JCATI has awarded 34 grants with a total value of \$2.64 million.
- 2013 legislature extended the sunset date for the JCATI from 2016 to 2021 and funded the program at \$3 million for the 2013/15 biennium.

Washington is a global leader in aerospace research and development. Activities at the University of Washington, Washington State University, Pacific Northwest National Laboratory (PNNL), Boeing Research and Technology combined with the state's large information and technology industry, feed into the state's innovation ecosystem. While aerospace companies are expected to continue to invest heavily in research and development activities, many are moving this work offshore to take advantage of tax incentives and low-cost engineering talent. In fact, The Boeing Company announced in 2013 its intention to relocate potentially several thousand engineers in its Research & Technology and Commercial Aviation Services divisions to new centers of excellence located around the country.²⁶

The Joint Center for Aerospace Technology Innovation was established in 2012 to better align university research to aerospace industry needs in technology, manufacturing and materials. The state also has a number of Aerospace Innovation Partnership Zones (IPZs) - an effort that has the potential to concentrate and incentivize research in specific geographic areas to promote collaboration that leads to new technologies.

Washington has had tremendous success over the years building entire industries through innovation. Literally, hundreds of companies have spun out of Microsoft since it was established. While not as prolific, ideas and technologies that were first sparked and developed at

The Boeing Company have resulted in stand-alone, successful and mature companies in their own right.

By fostering a culture of aerospace innovation, Washington will not only be in a position to protect its position in the global aerospace industry of today, it will be at the forefront of developing the technologies and the industries of the future.

²⁶(Feb 12, 2014) http://seattletimes.com/html/boeingaerospace/2022451885_boeingresearchxml.html

Strategies

- Expand awareness of and funding for the Joint Center for Aerospace Technology Innovation and its ability to connect industry problems with technological advances developed by research university brain power and facilities.
- Given the long lead-time necessary for researching and commercializing new technologies and the need for companies to be able to amortize their R&D investments over a long period, expand the existing aerospace product development tax credit currently available to commercial airplane activities to all segments of the aerospace industry.
- Work with stakeholders to develop a business plan and secure funding for an advanced materials innovation institute in Washington.
- Leverage federal support to develop resources to help translate research to commercialized products:
 - Support WSU as co-lead of the FAA’s ASCENT Center of Excellence for Alternative Jet Fuels and the Environment.
 - Support the UW’s efforts to co-lead the FAA Center of Excellence for Unmanned Aerial Systems.
 - Develop a program to attract small companies to Washington by leveraging federal contracts, such as the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.
- Develop strategies to establish Grant County International Airport as a center for testing, training, certification and research. Use Research Airport Braunschweig and The Boeing Company’s Glasgow, Montana test site as potential models.



RECENT SUCCESS:

FAA Center of Excellence for Alternative Jet Fuels—ASCENT

- WSU and MIT selected to lead 16-university consortium in new FAA Center of Excellence for Alternative Jet Fuels and the Environment
- Focusing on meeting the environmental and energy goals of the Next Generation Air Transportation System, including reducing noise, improving air quality, reducing climate impacts, and energy efficiency.
- Support the Aerospace Innovation Partnership Zones (IPZ) by creating additional incentives and funding for implementation.

Growing Washington's Aerospace Support Chain

Despite leading the world in the aerospace for nearly a century, it was not until relatively recently that there have been organized efforts to support the industry in Washington. Decisions by The Boeing Company to move its corporate headquarters to Chicago in 2001, the establishment of a second assembly site for the 787 in South Carolina in 2009, as well as the recent intense competition to land the 777X, has focused attention on the need to develop strategies to protect and grow the industry. Just as a supply chain has developed around Boeing,

dozens of entities, programs, and efforts have emerged in recent years to form a “support chain” for the Washington aerospace industry.

In 2012, the Governor’s Office of Aerospace was established to coordinate the various state agency efforts to support the Washington’s aerospace industry.²⁷ While it was first coalesced in 2009, the Washington Aerospace Partnership formally incorporated in 2012, with a focus on convening leaders from business, labor and local government to work together to support and grow the aerospace cluster in Washington through the implementation of this statewide aerospace strategy.

Several other organizations are important to the implementation of this strategy. The Aerospace Futures Alliance of Washington seeks to represent the needs and concerns of the industry and advocates on its behalf in Olympia and in Washington, DC. The Pacific Northwest Aerospace Alliance promotes the growth industry, primarily in Washington State, but also has membership in Oregon and British Columbia, by providing education and access to business opportunities. The Inland Northwest Aerospace Consortium is a regional alliance of advanced manufacturers, service providers, and affiliates that work in concert to support the growth and success of the eastern Washington and north Idaho aerospace clusters.

The combined success of these organizations was recently recognized by the U.S. Economic Development Administration when it designated the Washington Aerospace Manufacturing Community as one of only 12 regions nationwide through its Investing in Manufacturing Communities Partnership.²⁸ The designation gives key aerospace projects preference for over \$1.3 billion in federal grants.

GOALS

- Ensure adequate funding to implement this strategy.
- Measure the effectiveness of our efforts.
- Ensure that Washington is a competitive place for aerospace business activity by providing:
 - Freight and passenger mobility infrastructure (ports, rail, and highway transportation corridors)
 - Tax policies
 - Stable and competitive labor costs
 - Streamlined, predictable and reasonable regulatory framework
- Support for aerospace-related policies at the national level.

²⁷<http://governor.wa.gov/news/news-view.asp?pressRelease=1875&newsType=1>

²⁸<http://www.eda.gov/challenges/imcp/>



In recent years, Washington has made significant investments to keep its competitive edge in the aerospace industry. A preferential business and occupation (B&O) tax rate for aerospace companies has been adopted, in addition to credits for product development and technologies supporting manufacturing. Aerospace tax advantages were extended by the state legislature during its November 2013 special session until 2040. Reforms to the State's unemployment and workers' compensation insurance programs adopted by the governor and legislature in 2011 working administratively to further reduce workers compensation costs.

Future success of the aerospace industry in Washington depends on maintaining a strong support chain, and a competitive tax and regulatory environment. These efforts must focus both on supporting existing commercial aerospace businesses as well as emerging industry subsectors. Adequate infrastructure to effectively move goods and workers is crucial, as aerospace companies face increasing challenges moving parts and delivering finished products throughout the region.

Strategies

Organize to Ensure Washington's Competitiveness

- Work with the state legislature, federal delegation, and other entities to fully fund the implementation of this strategy.

- Work with public and private stakeholders to adequately fund the Washington Aerospace Partnership in its efforts to augment the state's ability to provide support for the aerospace industry.
- Fully fund the Washington State Department of Commerce and ADOs to continue aerospace recruitment and expansion and trade development programs.



- Continue to monitor the efforts of others, including U.S. states and international regions, to ensure Washington remains competitive.

Invest in Strategic Infrastructure

- Support the passage of a transportation revenue package by the state legislature that enables the efficient movement of employees, parts, and finished products to and from aerospace manufacturing sites.
- Work with Sound Transit and other transit agencies to ensure that the movement of employees to and from existing transit infrastructure and manufacturing employment centers is included in future transit funding packages.
- Support investments in maintenance and strategic expansion of airport facilities that enable aerospace manufacturing such as King County International Airport/Boeing Field, Paine Field, Spokane International Airport, and Renton Municipal Airport.
- Recognize the critical role commercial airports play in both stimulating the economies of their local communities and the international aerospace supply chain by supporting:
 - A sustainable system of local and federal funding to ensure facilities are well maintained and able to support commercial passenger service; and
 - Investments in maintenance and strategic expansion of airports that enable aerospace manufacturing, including King County International Airport/Boeing Field, Paine Field, Spokane International Airport, Grant County International Airport, and Renton Municipal Airport.
- Identify rail and port infrastructure necessary to support the expansion of aerospace activities around the state and pursue strategies for investment.

Maintain a Competitive Business Climate

- Ensure the state's ability to provide government services that support a high quality of life for all of Washington's residents through tax policies that also allow the aerospace industry to compete and prosper in both existing and emergent subsectors.
- Foster relationships in which organized labor and management can work together to develop and achieve mutual goals.
- Provide a balanced and predictable regulatory environment.
- Protect our state's unique environment and the health of the public while avoiding high-cost, low-impact regulatory requirements that negatively impact the aerospace industry.
- Work with local, state and federal regulators to ensure streamlined and predictable environmental and land-use permitting processes.

Advocate on Behalf of the Industry

- Work with Washington's federal delegation to encourage reforms at the FAA to ease burdens and allow Washington companies to be more competitive.
- Monitor and advocate for policies at the federal level that support the aerospace industry exports, including international trade, the Export-Import Bank, intellectual property (IP) protections, etc.
- Increase awareness of and appreciation for the importance of the aerospace industry by the general public.
- Execute a robust media relations effort to maintain awareness of the value of the aerospace industry in Washington.
- Work with the Museum of Flight and others to plan for the 2016 celebration of Boeing's centennial.





Department of Commerce
Innovation is in our nature.