



# CHOOSE **Washington**

New Mid-Market Airplane Council

## Aerospace Workforce Development Strategy & Recommendations

November 2018

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# Training the workforce of the future

Governor Inslee's Choose Washington New Mid-Market Airplane (NMA) Council recognizes that a deep pool of highly skilled talent is essential to remaining competitive in a rapidly evolving global economy.

A skilled aerospace workforce takes generations, and we have invested in ours for over 100 years. Today, Washington has the largest concentration of experienced aerospace and advanced manufacturing workers in the world! But competition for this talent is fierce and looming retirements and gaps in the supply of qualified workers threaten our state's lead.

That's why, as one of our first priorities, the NMA Council formed a Workforce Development Work Group representing 25 diverse industry, education, government, labor and training partners from all across Washington to help us maintain our edge.



## Work Group Mission

The Choose Washington New Mid-Market Airplane (NMA) Council formed a Workforce Development Work Group to help win NMA work for the state and serve the larger needs of our workforce and our communities.

It was tasked to:

- Evaluate the current education and workforce development system supporting career pathways into and within aerospace.
- Propose strategies and policies that meet the workforce needs of the aerospace industry in a rapidly evolving technological environment.

The Work Group met nine times since March 2018 to carry out its mission, reviewing the state's existing, expansive workforce and education system and developing an inventory of aerospace supportive programs available throughout the pipeline. From this review, a forward looking and comprehensive strategy to support the needs of Washington workers and aerospace and related employers was developed.

The strategy calls on state public and private leaders to:

- **Engage & Inspire K-12 Students in Aerospace** - develop early interest in aerospace careers and offer youth the chance to demonstrate transferable skills to employers.
- **Modernize & Expand Aerospace Community & Technical College (CTC) Programs** - upgrade equipment to meet emerging technology trends and increase output of students with in-demand skills.
- **Increase Apprenticeships & Career Connected Learning** - open the pipeline of on-the-job-training to more students across the state, especially in aerospace.
- **Expand Research & Development and 4-year Degree Programs** - meet demand for technology transfer, multi-sector innovation and engineering skills at our universities.
- **Enhance Workforce System Data & Coordination** - increase accountability, coordination and outcomes of training programs serving the aerospace industry.
- **Extend Incumbent Worker Training** - help the existing aerospace workforce meet the changing skill needs associated with anticipated airplane programs.

Investing in education and workforce training is a "win-win" for Washington. The Work Group's recommendations, when fully implemented, will prepare our state's workers for meaningful, living wage jobs and provide all employers - not just those in aerospace - with a better trained, highly skilled and innovative talent pool.

We invite you to join us on the NMA Home Team,

Dr. Noel Schulz  
NMA Council Co-Chair

Rick Bender  
NMA Council Co-Chair



Source: Teal Group; 2018

## Washington's Aerospace Supercluster

**1,400+**  
aircraft & unmanned  
aerial systems  
produced annually

**136,100**  
highly skilled  
aerospace workers  
in the state

**714**  
commercial aircraft  
produced in 2017 - 15x as  
many as other states

Source: Commerce

# A Century of Know-How: Washington's Workforce Advantage

Business, labor and government leaders in Washington have long recognized the importance of investing in education and workforce training to support the aerospace industry. All have dedicated significant resources to STEM and aerospace and advanced manufacturing programs at the K-12, technical and apprenticeship and four-year degree levels.

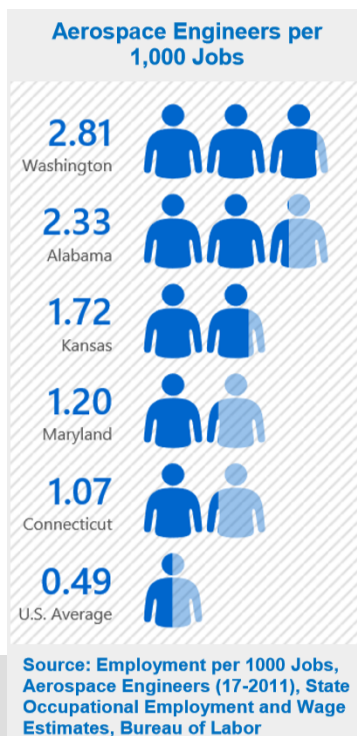
As a result, Washington hosts a dense supercluster of skilled advanced manufacturing and aerospace workers - both in the Puget Sound region and around the state. These workers help Washington's aerospace industry produce more revenue, exports and profits than any other state in the nation, according to the Teal Group's Aerospace Competitive Economics Study published in June 2018.

**#1** Density of Aerospace Engineers  
*Teal Group, 2018*

**#2** Aerospace Production Workers  
*share of total hours worked; Teal Group, 2018*

**#2** Engineering Undergraduate Degrees  
*percent of degrees among the working age population; Teal Group, 2018*

The state is also home to America's largest number of aerospace workers, highest density of aerospace engineers, second highest density of aerospace production workers and fourth lowest unit labor costs (every dollar paid to aerospace workers generates \$11 in revenue). Washington's tech economy has been fueled by these assets. Today's aerospace industry also supports innovation in information & communication technology (ICT), life sciences, clean tech, space travel, maritime and autonomous systems.

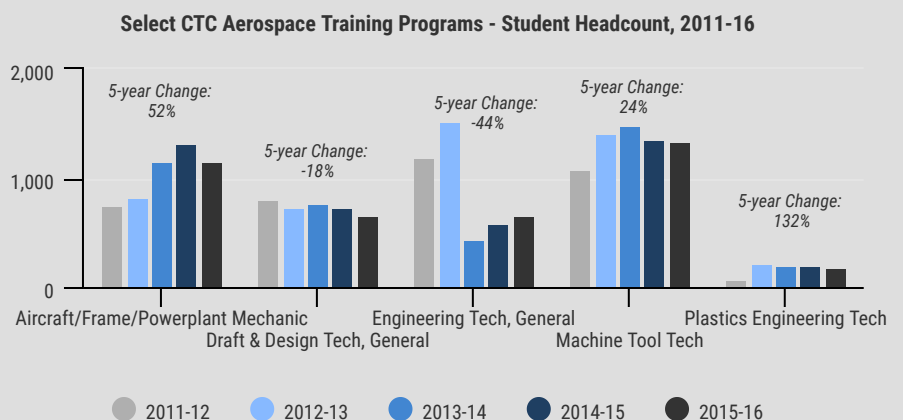


The Teal Group's report found:

- **Washington ranks second in the labor and education category**, which measures the availability of aerospace workers, the population's level of educational attainment and a state's spending on K-12 education.
- **Washington has the second fastest growing per pupil spending (K-12)** in the nation over the last five years.
- **One out of every twenty-nine Washingtonians holds an engineering degree**, the second highest rate in the nation.
- **Washington state employs aerospace engineers at 5.7 times the national average** and has the highest density of aerospace engineers in the nation.
- **Washington state aerospace production workers log the second-highest number of hours**, as a percentage of total hours worked, of any state's production workers.

"Our state has more individuals training in the aerospace sector than most states have working in their entire aerospace industry. Machinists and engineers here are very efficient and productive, producing more aerospace output per dollar cost of labor than almost anywhere else."

- Jon Holden, President - IAM 751



Source: Workforce Training & Education Coordinating Board (WTB); Aerospace Skills Annual Report, 2017



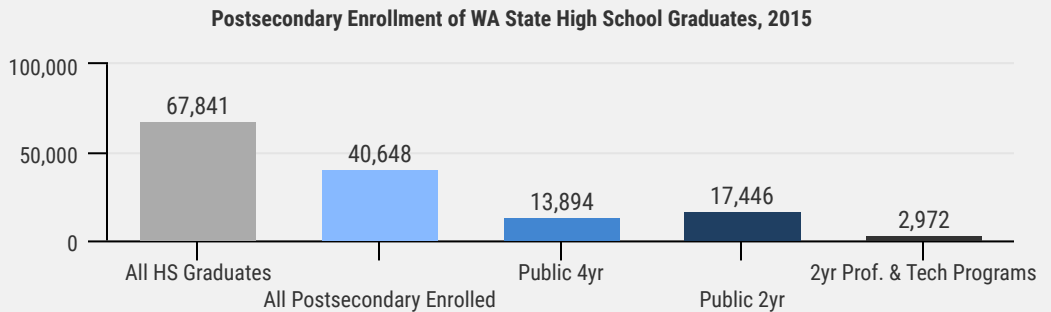
# Looking Ahead: Washington's Workforce Challenge

Aerospace skills mean meaningful and rewarding jobs for Washingtonians - across sectors.

Now more than ever, the core competencies demanded of aerospace workers are shared by other advanced manufacturing and high tech industries. Today's aerospace workers are leading advancements in emerging technologies including avionics, mechatronics, artificial intelligence, virtual reality, biotech, unmanned aerial systems, biofuels and space travel.

As a result, competition for a finite supply of aerospace workers is fierce. Looming retirements and changing production systems are demanding new skills and new workers from our training pipeline. Inability to meet demand threatens our entire economy's competitive edge.

Today's aerospace jobs are high-tech and marketable, but youth and parents still do not perceive touch labor jobs as a viable career path. In 2015, only 4.4% of the state's high school graduates enrolled in professional or technical education programs at CTCs compared to the 60% of students who pursued postsecondary education.



Source: OSPI, Postsecondary Enrollment Performance Indicators; 2015

Aerospace skills strengthen other industries, but employers must increasingly compete with the entire economy for talent.

**41%**

of students completing aerospace CTC programs work in the aerospace industry after graduation.

**59%**

of students completing aerospace CTC programs work in non-aerospace industries after graduation.

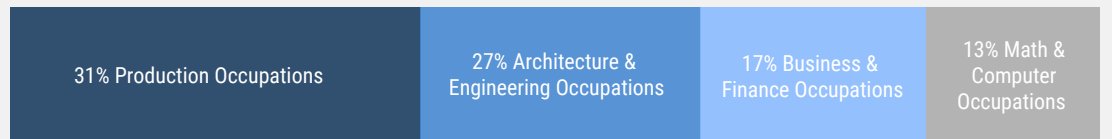
"As Boeing moves into new high-tech areas such as autonomous vehicles, artificial intelligence and additive manufacturing, Muilenburg sees it **competing not just with Airbus but with companies like Amazon and Microsoft** that have attracted hordes of digital talent and innovative thinkers to Seattle."

- Seattle Times, Jan. 22, 2018

Source: WTB, Aerospace Skills Annual Report; 2017

Future aerospace jobs may be more technical - and potentially higher paying - but workers will be in-demand by many industries. 69% of occupations in aerospace are also highly sought after by other sectors, including ICT.

## Occupational Makeup of WA Aerospace Sector, NAICS 3364



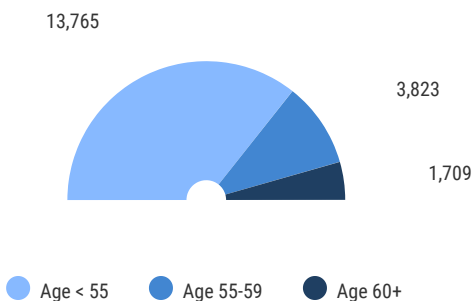
**Top Aerospace Occupations In-Demand Across Sectors**

- Machinists
- Inspectors, Testers
- First-Line Supervisors
- Assemblers
- Mechanical Engineers
- Electrical Engineers
- Industrial Engineers
- All Other Engineers
- Business Operations Specialists
- Management Analysts
- Buyers & Purchasing Agents
- Software Developers, Apps
- Computer Systems Analysts
- Software Developers, Systems
- Computer Network Architects

Source: Employment Security Department/WITS; June 2018

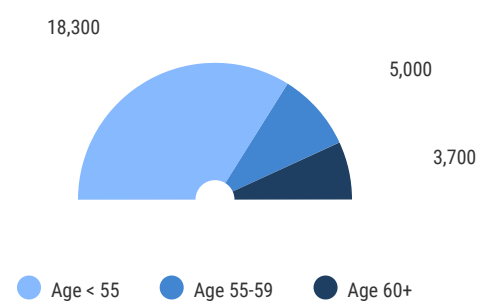
Nearly one-third of Washington's union labor will be eligible for retirement within five years. A total of 5,525 SPEEA technicians and engineers and 8,700 machinists with IAM 751 were age 55 and over in 2018.

### SPEEA Engineers & Technicians, Jan 2018



Source: SPEEA; January 2018

### IAM 751 Machinists, Jan 2018



Source: IAM 751; January 2018

# \$15

Return on every one dollar invested in aerospace and related training by the state

WTB, Aerospace Skills Annual Report, 2017

# Washington's Workforce Infrastructure

Washington's skilled aerospace workforce is critical to maintaining a competitive advantage in the global market, for many sectors. Highlighted in this asset inventory are the many unique and substantial investments made in the state's aerospace training pipeline.

This investment is why, according to the Teal Group's study, Washington state has the deepest talent pool and most competitive aerospace sector in the nation. These assets form a strong foundation to meet future workforce demands.

## K-12

**Core Plus** – Core Plus provides a manufacturing and aerospace curriculum developed in partnership with The Boeing Company and the Manufacturing Industry Council. The first 540 hours of instruction relate to general manufacturing while the following 540 hours are specific to aerospace manufacturing. OSPI provided \$495,000 in 2017-18 to support Core Plus classrooms through grants for equipment and professional development.

**CTE and Skill Centers** – Fundamental manufacturing and aerospace programs are available in the K-12 system via career and technical education (CTE) programming with instruction in grade levels 7-12. For example, Core Plus aerospace programs are offered in 38 comprehensive high schools and 14 skill centers around the state. Annual state grants are available for start-up, expansion or maintenance of existing programs in aerospace and manufacturing.

**Aerospace Assembler Competitions** – SkillsUSA WA offers over 2,500 students the opportunity to participate in Aerospace Assembler Competitions across the state. Strong competitors at the first Skills WA state-level aerospace assemblers competition hosted by Boeing were offered jobs at the company.

**Robotics Competitions** – Students in Washington have opportunities to engage in hands-on and mentor-based learning and competition through programs such as Washington FIRST Robotics, Mobile Robotics competitions through SkillsUSA and VEX Robotics competitions through involvement in the Technology Student Association.

## Apprenticeship, including Youth Apprenticeship

**Aerospace Joint Apprenticeship Committee (AJAC)** – Between 2012 and 2017, 954 apprentices were served in 9 aerospace occupations. AJAC apprentices earned an estimated \$65 million in wages while in training. In 2017-18, 75 youth registered as apprentices, 170 college credits were earned, over 15,500 on-the-job hours were clocked and over \$200,000 was earned in wages.

## Community & Technical Colleges and Related Programs

**22 Community & Technical Colleges statewide provide aerospace related training** - in machining, electronics, engineering, material science, aviation/aerospace, composites, design, mechanical and manufacturing, including Everett Community College's Advanced Manufacturing Training & Education Center (AMTEC).

**\$8 million awarded annually by the state to fund 1,000 FTEs for high-demand aerospace programs** - Students in these programs are highly sought after to fill jobs in many other industries in addition to aerospace.

**Washington Aerospace Training & Research (WATR) Center** – Since 2010, 1,000 WATR Center graduates of short-term training were hired by Boeing, over 540 grads were hired by 110 other suppliers and over 600 incumbent workers received training.

**Aerospace Loan Program (WA Student Achievement Council)** – Since 2011, 482 applicants have been funded to receive a low interest loan for short-term training in aerospace.

**MechaWA Partnership Project** – Federally funded in 2016, the project includes 5 CTCs and 7 industry partners. The MechaWA grant helps CTCs adapt and implement competency-based Mechatronics Associate degrees.

**Air Washington** – A consortium of 11 Washington CTCs received \$20 million in federal funding to strengthen aerospace workforce training; between 2011-2015, 3,806 individuals were trained.

**Center of Excellence for Aerospace and Advanced Manufacturing (SBCTC)** – 1 of 10 centers across the state, it serves as a statewide link between business, industry, labor and education to create a highly skilled and readily available workforce.

**Aerospace & Advanced Manufacturing Pipeline Committee (SBCTC)** – Industry-driven, it studies skills needed for aerospace, guides investments in CTC training programs and evaluates programs for completion and job placement rates.

## Four-Year Universities

The University of Washington (UW), Washington State University (WSU), Western Washington University (WWU), Central Washington University and Eastern Washington University have numerous degree programs supporting the aerospace industry. They include, among others, engineering, business, accounting, science, advanced materials, aviation and information technology.

The Boeing Company has also invested substantially in these institutions via endowments, mentorship programs, facility expansions, curriculum development and other sources of support. Boeing currently employs an estimated 7,000 UW alumni, 2,500 WSU alumni and 1,300 WWU alumni. Between 2011 and 2015, undergraduate degree completions statewide grew by 72% in computer and information sciences and 30% in engineering and related fields. One-third of the state's aerospace jobs are in these fields.

Recent aerospace-related initiatives at state universities include:

**Joint Center for Aerospace Technology Innovation (JCATI)** – In the 2015-17 biennium, JCATI received \$3 million in state funding to support joint industry-university research projects. Thirty projects were funded at 4-year universities across the state, 135 students participated and 12 aerospace companies partnered with JCATI for the first time.

**UW Boeing Advanced Research Center (BARC)** – BARC focuses lab research on automation, robotics, mechanic assist tools and sensors and data analytics. Boeing-employed affiliate instructors work in the lab full-time with faculty and students on joint research projects.

**WSU Everett** – Since opening in 2014, WSU Everett offers BA degrees in aerospace-related fields that include mechanical engineering, electrical and software engineering, data analytics and integrated strategic communications. A new 95,000-square foot building, including the company-supported **Boeing Design Studio**, opened in 2017.

## Collectively Bargained Incumbent Worker Training

Together, the International Association of Machinists (IAM) Aerospace Workers District Lodge 751 and the Society of Professional Engineering Employees in Aerospace (SPEEA) IFPTE Local 2001 represent over 45,000 Boeing employees in the state of Washington, as well as at other aerospace employers and other Boeing facilities outside of the state.

Negotiated in their respective contracts via the collective bargaining process are programs co-directed by the unions and Boeing to provide training and education to incumbent workers represented by IAM and SPEEA.

**IAM/Boeing Joint Programs** – Joint Programs is an IAM/Boeing partnership dedicated to improving the health, safety and educational opportunities for IAM-represented Boeing employees in the Puget Sound area and in Portland, Oregon. Services for IAM members include education assistance, career planning and advising, training development and delivery, vocational rehabilitation services, an apprenticeship program and continuous productivity improvement investments.

**SPEEA/Boeing Ed Wells Partnership** – The Ed Wells Partnership is a joint training initiative between SPEEA and Boeing which provides technical and professional/business skills training to SPEEA represented engineers and technical employees.

The Ed Wells Partnership provides over 500 individual learning events each year to over 18,000 employees. Many of the Technical Skill classes are developed and taught by Boeing subject matter experts, allowing for knowledge sharing across generations.

"We have an exceptional education system producing innovative and collaborative students ready to problem-solve the aerospace industry's biggest questions."

- Dr. Noel Schulz, WSU Professor and NMA Council Co-Chair



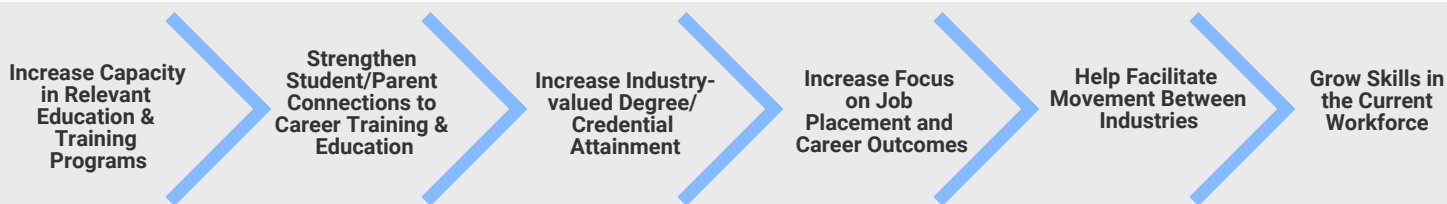
WSU Everett Engineering Students placed second in The Mars Society's 2016 University Rover Challenge - considered the world's premier robotics competition for college students.

# Keeping Our Workforce Advantage

The Workforce Development Work Group was tasked to develop strategies and policies that meet the workforce needs of the aerospace industry that, while helping to win NMA work for the state, also serve the larger needs of our workers, related sectors and our communities. The Governor's *Career Connect Washington* Task Force is coordinating a complementary effort to connect 100,000 Washington youth during the next five years with career-connected learning opportunities that prepare them for high-demand, high wage jobs - in aerospace and other industries.

Outreach to stakeholders throughout the aerospace sector - including K-12, labor, industry and supply-chain, apprenticeship and training programs and higher education - generated over 70+ strategy and policy ideas, each addressing one or more broad improvement areas identified during review of the existing training system (Appendix A).

These ideas were refined into a high-level, comprehensive strategy to build upon Washington's education and workforce strengths in support of aerospace, advanced manufacturing, and industries with shared competencies. Specific recommendations to achieve these strategies will be presented to public policy makers during the 2019 Legislative Session and to public and private partners for action. Additional recommendations to implement this strategy are included in Appendix B.



## CAPACITY: Increase Capacity in Relevant Education & Training Programs

- **Expand high-demand degrees, including engineering**, and the facilities to increase high-demand degree production at the state's 4-year universities
- **Expand Community & Technical College programs via enrollment (FTEs) and non-enrollment driven investments** (facilities, professional development, etc.) in new and existing CTC programs supporting the aerospace industry
- **Expand the state's Skill Centers and other aerospace pathways for high school students**

- **Grow Core Plus (K-12/industry partnership)**: increase allocation for manufacturing equipment and professional development grants and dedicated OSPI staff to serve as aerospace lead
- **Support the efforts of the Governor's Career Connect Washington Initiative** to expand, in partnership with current education and training providers, labor, employers and the apprenticeship community, entry into registered apprenticeships and other career-connected learning for high school students and young adults

- **Expand research and paid internship opportunities via the Joint Center for Aerospace Technology Innovation (JCATI)**, providing university grants for students to research and develop technologies in direct partnership with aerospace companies
- **Expand research capabilities in aerospace** via programs like the Boeing Advanced Research Center (UW), the envisioned Washington Center for Advanced Manufacturing Innovation (WSU) and others
- **Ease movement from industry into education** for potential instructors

## CONNECTIONS: Strengthen Student/Parent Connections to Career Training & Education

- **Fund the 'Awareness Campaign for Career and Technical Education'** to promote CTE among parents, teachers, counselors, school administration and the public (RCW 28A.700.080)
- **Expand Washington MESA** (Math, Engineering, Science Achievement), **focused on building diversity, inclusion and retention in STEM fields** via outreach to the K-12 and CTC system in partnership with universities

- **Expand organized visits by K-12 students** to CTC campuses and support continued CTC outreach to K-12 schools
- **Encourage industry involvement in the classroom** (like the Microsoft TEALS and Aerospace Core Plus programs at the K-12 level), **and industry tours for students**
- **Support current university outreach to the K-12 system** via university student clubs, engineering ambassador programs and engineering days on university campuses

- **Expand access to aerospace assembler competitions through SkillsUSA**, by supporting increased resources to Career and Technical Student Organizations
- **Ensure K-12 credit requirements and professional development resources provided to teachers include career readiness skills**
- **Support Career Connect Washington** and other organizational efforts that facilitate the development and expansion of career-connected learning in aerospace (see *Capacity*)



## ATTAINMENT: Increase Industry-valued Degree/Credential Attainment

- **Enhance dual credits, articulation agreements and credit transferability** (between K-12, youth apprenticeships, CTCs and 4-year universities) where they serve a purpose in advancing a student's career outcomes
- Per above, **develop a statewide articulation agreement to recognize aerospace-related Core Plus credits** toward CTC completion from aerospace-related programs
- **Increase engagement with industry to affirm the value of curriculum and credentials** for their respective hiring needs
- **Work with industry to reinforce degree and credential attainment** for students hired into industry from aerospace-related training prior to completion and encourage apprenticeship program completion
- **Include aerospace/advanced manufacturing as qualifying field to receive *Washington State Opportunity Scholarships***, a public-private partnership program to help students from low- and middle-income households attain degrees and technical training in high-demand fields
- Streamline discretionary Workforce Innovation and Opportunity Act (WIOA) funding, or provide another funding source, to **allow for childcare, transportation and other "wrap-around" support** while in training
- **Increase capacity in education and training programs** (see *Capacity*)
- **Build awareness of and "connections" to career training and education opportunities** (see *Connections*)

## PLACEMENT: Increase Focus on Job Placement and Career Outcomes

- **Grow paid internship opportunities in partnership with industry groups** – possible platforms include JCATI at the university level and the paid internship model included in the MechaWA grant for CTCs
- **Support Career Connect Washington and other organizational efforts** to foster employment relationships via career-connected learning (see *Capacity*)
- **Develop recognition of the Core Plus certificate, registered apprenticeship for youth and other work-based training and credentials** among aerospace suppliers
- **Improve tracking and analysis of education to workforce outcomes from aerospace-related programs** – to serve as a model that will better inform students, workers, industry, education/training providers and policymakers across industries

## MOVEMENT: Help Facilitate Movement Between Industries

- Via multi-stakeholder approach, **invest in studying and better understanding the movement of workers among aerospace and other high-growth sectors**, with particular attention to portable skills and credentials obtained by workers and valued by industry
- **Improve tracking, analysis and accountability of education to workforce outcomes**, to better understand where skills currently are in the workforce (see *Placement*)
- **Enhance industry-valued degree and credential attainment** (see *Attainment*)

## GROW SKILLS: Grow Skills in the Current Workforce

- **Work with industry to reinforce degree and credential completion** for incumbent workers (see *Attainment*)
- **Expand on-the-job training programs for incumbent workers**, including existing models provided by CTCs and apprenticeship programs, as well as utilizing university professional certificate and degree programs for career development

**"We are dedicated to being part of the Washington aerospace community. 80% of our workforce is in Washington state and we are very proud of that."**

- Bob Smith, CEO of Blue Origin



# Workforce Development Agenda: Looking to the future, leveraging strengths



Boeing Everett

"Boeing was once a startup, and as we enter our second century, we are going to act like a startup again as we embrace the challenge of disruption and continue changing the world."

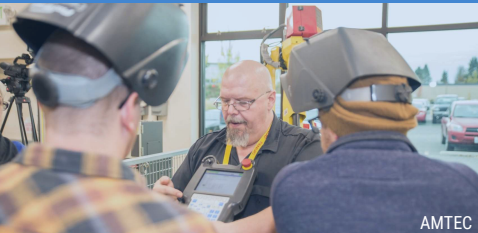
GREG HYSLOP  
Boeing Chief Technology Officer  
Senior Vice President, Engineering, Test & Technology



Dassault Systèmes

"Successful educational institutions will leverage the leading experience-driven technologies and strategies to expose students to realistic collaborative multidisciplinary projects and build unique digital skills that industry leaders seek among new hires."

GREG BRUNO LATCHAGUE  
SR. Executive Vice President, Global Field Operations,  
Dassault Systèmes



AMTEC

"Washington engineers and machinists are pioneers and leaders in aerospace innovation. Investing in aerospace training keeps our workers and our state's industry at the forefront and ensures customers have the most advanced products in the world."

JOEL FUNFAR  
President, Society of Professional Engineering  
Employees in Aerospace

## Aerospace skills mean meaningful and rewarding jobs for Washingtonians

Washington's century of know-how in aerospace continues to drive new business in other fields. Across the economy, some 250,000 jobs and \$94 billion in business revenues are tied to aerospace in our state. It's Boeing and more: Our innovative aerospace talent creates jobs around the state.

But global competition is fierce. We must continue critical investments in our aerospace training pipeline if we are to maintain our competitive edge.

Recommendations of the Governor's Choose Washington NMA Council would propel existing training programs and pathways to:

- Secure design, production and fabrication of the proposed NMA in Washington
- Grow and support Washington's aerospace and advanced manufacturing sector
- Promote job opportunities and career advancement for aerospace workers
- Develop strategic partnerships and data-driven initiatives to serve a wide range of industries

## 21st Century Skills: Keeping up with industry's innovation

The future workforce needs of the aerospace industry, including space and unmanned systems, are going to resemble more than ever the workforce needs in other advanced manufacturing industries. In-demand skills gained in aerospace programs are shared by the state's other major industries:

- Life sciences
- Advanced logistics and transportation
- Data analytics
- Communication and information technology
- Automation and artificial intelligence
- Other emerging and growing sectors (space travel/electric aircraft)

Skills will center around innovation, adaption, precision and development of complex systems and technologies. Industries will benefit from building these skills across sectors and across the state. Our workforce system must do the same.

## Investing in our Workers: Keeping our competitive edge

A successful and rewarding career in aerospace, and other growing and emerging industries, should be attainable across regions, ages and demographics. Opportunity is fostered by a life cycle of investments in the individual worker. It includes investments to ensure:

- Awareness about career opportunities
- Access to education and training
- Skill development that's relevant across industries
- Exposure to jobs, career-connected learning and on-the-job training
- Lifelong education and training

Career development begins at the K-12 level, continues through post-secondary education and training and follows into the launch of a career. The cycle restarts for individuals as technology evolves, skill needs adapt and personal and family dynamics change. The workforce development system should be calibrated to support lifelong career growth in aerospace and other high-demand areas.

# Workforce Development Agenda: Recommendations for Action - 2019

## K-12

Awareness about career pathways and career readiness skills are fostered at the K-12 level. Specific career and technical instruction, in aerospace and other fields, is provided in grade levels 7-12. Core Plus, for example, provides aerospace and advanced manufacturing curriculum designed in partnership with Boeing and is offered in 38 comprehensive high schools and 14 skill centers.

## Apprenticeships & Career Connected Learning

Between 2012-2017, 954 apprentices were served in 9 aerospace occupations via AJAC. Career Connect Washington will help students pursue good-paying jobs, in aerospace and other sectors.

## Community & Technical College (CTC) System

22 CTCs statewide provide aerospace-related training in machining, electronics, engineering, material science, aviation/aerospace, composites, design, mechanical, and manufacturing. \$8 million is awarded annually by the state to fund 1000 full-time equivalent (FTE) student slots in high-demand aerospace programs. Students in these programs go on to fill jobs in many other industries in addition to aerospace.

## 4-Year Programs

The state's universities have numerous degree programs supporting the aerospace industry and other industries experiencing rapid technology-based transformation. Skills are sought from engineering, business, accounting, science, advanced materials, aviation, information technology and other undergraduate and graduate programs. In response, between 2011-2015, undergraduate degree completions statewide grew by 72% in computer and information sciences and 30% in engineering and related fields.

## Workforce System Data & Coordination

Comprehensive information about our robust network of aerospace education and workforce development programs is not readily available. Improved tracking of career outcomes and mapping of transferable skills between aerospace and other industries would help businesses, students, recruiters and policy makers.

- **Develop the K-12 Awareness Campaign for Career & Technical Education** (\$250,000 annually)
- **Expand Core Plus for Aerospace & Advanced Manufacturing** by adding an Aerospace Lead at OSPI (+1 FTE) & increasing equipment and program development investments (\$1.5 million annually)
- **Expand SkillsUSA Aerospace Assembler Competitions Statewide** (\$300,000 annually)
- **Ease Attainment of College Aerospace Credit for High School Students** through a Statewide Articulation Agreement between CTCs and Core Plus Programs (\$50,000 one-time)
- **Continue & Grow Aerospace Joint Apprenticeship Committee (AJAC) Opportunities for Youth** (\$750,000 / biennium)
- **SUPPORT - Develop Career Connect Washington Policies in Support of High-Demand Industries** (TBD)
- **SUPPORT - Expand FTE Capacity (2,500) in CTC Programs Supporting High-Demand Sectors** (\$35 million [approx. \$7 million for aerospace & advanced manufacturing] / biennium)
- **Modernize Equipment & Technology in Aerospace-Related CTC Programs** Across the State (\$11 million one-time competitive grant funding)
- **SUPPORT - Increase Awareness and Enrollment (2,000 FTEs) in CTC Programs** via the SBCTC Outreach and Partnership Program (\$6 million annually)
- **Extend Specialized Incumbent Worker Training for Boeing and Suppliers at the Washington Aerospace Training and Research (WATR) Center** (\$1.7 million annually)
- **Develop the Washington Center for Advanced Manufacturing Innovation (WACAMI)** to collaborate multi-sector research between universities, industry and federal R&D centers (\$500,000 one-time)
- **Reauthorize & Expand University-Industry Research & Technology Transfer Internships at the Joint Center for Aerospace Technology Innovation (JCATI)** (\$6 million / biennium)
- **Increase Engineering & High Demand Degrees (130 undergraduate / 60 graduate) at Washington State University** (\$4 million annually)
- **SUPPORT - Increase Engineering & High-Demand Degrees (200 undergraduate / 100 graduate) at the University of Washington** (\$6 million annually)
- **SUPPORT - Improve College of Engineering Facilities at the University of Washington** (\$5 million one-time for capital design funding)
- **Develop an Annual Catalog of Education & Workforce Development Programs Supporting Aerospace for use by the Business Community** (*Commerce Leading*)
- **Launch an Enhanced Data Pilot Project on Skills Mapping & Training and Education Outcomes in Aerospace** (\$1.85 million / 5 years, led by the Washington State Workforce Training and Education Coordinating Board)

**SUPPORT** = advocacy for a recommended action is being led by a public or private partner

## **Appendix A**

### **IMPROVEMENT AREAS CONSIDERED BY THE NMA COUNCIL WORKFORCE DEVELOPMENT WORK GROUP**

- #1: Expanding interest and experience in aerospace and advanced manufacturing at the K-12 level
- #2: Building and sustaining capacity in post-secondary education and training and K-12 career and technical education that successfully supports aerospace employers and workers
- #3: Creating interest and actively connecting prospective students (K-12, unemployed, underemployed/incumbent) to available training/education programs that successfully support aerospace employers and workers
- #4: Providing greater opportunities for on-the-job learning in aerospace training and education programs
- #5: Facilitating successful connections between qualified, available workers (new and incumbent) and open aerospace job opportunities
- #6: Growing diversity and equity within aerospace and advanced manufacturing
- #7: Improving outcome data and education to workforce tracking and analysis within aerospace and related industries and occupations
- #8: Greater coordination of programs, agencies and providers of aerospace-related training and education
- #9: Increasing degree and credential attainment (e.g., articulation agreements, dual credit programs, work experience) from effective aerospace-related training and education programs
- #10: Identifying skills and credentials that can move among other industries and the aerospace industry
- #11: Developing strategies that proactively address innovation changes in aerospace
- #12: Addressing barriers to entry into aerospace training, including necessary wraparound services (e.g., childcare, transportation)

## Appendix B

### OTHER VALUABLE POLICIES AND PROGRAMS

The Choose Washington NMA Council Workforce Development Work Group identified additional recommendations as valuable to the state's competitive edge in aerospace and advanced manufacturing workforce development. These recommendations may be further developed into a specific recommendation for action.

Additional recommendations that build into a comprehensive workforce development strategy include:

- **Enhance dual credits, articulation agreements and credit transfer** (between K-12, youth apprenticeships, CTCs and 4-year universities) where they serve a purpose in advancing a student's career outcomes
- **Work with industry to reinforce degree and credential attainment** for students hired into industry from aerospace-related training prior to completion and encourage the completion of apprenticeship programs
- **Increase engagement with industry to affirm the value of curriculum and credentials** for their respective hiring needs
- **Expand the state's Skill Centers and other aerospace pathways for high school students**
- **Expand research capabilities in aerospace** via programs like the Boeing Advanced Research Center (UW), the envisioned Washington Center for Advanced Manufacturing Innovation (WSU) and others
- **Expand Washington MESA** (Math, Engineering, Science Achievement), focused on building diversity, inclusion and retention in STEM fields via outreach to the K-12 and CTC system in partnership with universities
- **Encourage industry involvement in the classroom** (like the Microsoft TEALS and Aerospace Core Plus programs at the K-12 level) **and industry tours for students**
- **Support current university outreach to the K-12 system** via university student clubs, engineering ambassador programs and engineering days on university campuses
- **Include aerospace/advanced manufacturing as a qualifying field to receive Washington State Opportunity Scholarships**, a public-private partnership program to help students from low- and middle-income households attain degrees and technical training in high-demand fields
- Streamline discretionary Workforce Innovation and Opportunity Act (WIOA) funding, or provide another funding source, to **allow for childcare, transportation and other "wrap-around" support** while in training
- **Expand on-the-job training programs for incumbent workers**, including existing models provided by CTCs and apprenticeship programs, as well as utilizing university professional certificate and degree programs for career development

The NMA Council thanks the many work group members involved in developing this strategy:

## Workforce Development Work Group

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