

CTE: THE KEY TO ECONOMIC DEVELOPMENT

U.S. aerospace and defense:

Generated **\$865B**
in economic output in 2017¹

Provides direct and indirect employment to
2.4M people²

Pays wages that are almost **2X**
the national average³

What is the pathway to these fulfilling and essential careers?

Career and Technical Education!



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Aerospace & Defense

The aerospace and defense sector:

- includes manufacturing, engineering, IT and other services for aircraft, space systems, unmanned systems, armaments and more⁴
- plays a critical role in the economy of several states
- requires highly skilled workers

What jobs are available in aerospace and defense?

The U.S. commercial aerospace industry is going strong, with growth in both civil aircraft and space systems.⁵ In addition, the federal government increased defense funding for Fiscal Years 2018 and 2019, including investments in personnel, aircraft and equipment.⁶

The aerospace and defense workforce in 2017 included 843,000 direct jobs and 1.6 million indirect jobs in the sector across manufacturing, testing, logistics, IT and engineering.⁷ However, 75 percent of aerospace and defense CEOs are concerned about workforce skills.⁸ For instance, IT experts are needed to develop, maintain and protect national security and commercial systems. This includes jobs for information security analysts, which are projected to grow by 28 percent through 2026.⁹ More than 60,000 jobs are expected by 2036 in large unmanned systems, including passenger travel, cargo transport, high-altitude WiFi systems and remote firefighting and rescue.¹⁰ In addition, workers are needed with expertise in additive manufacturing, also known as 3D printing, a process that has been embraced by the aerospace and defense industry.¹¹

Careers in this sector pay extremely well: 81 percent above the national average.¹² Technicians who support aerospace engineering and operations can earn more than \$67,000 a year with an associate degree, while information security analysts can earn more than \$95,500 annually.¹³ Aerospace manufacturing also provides jobs that pay family-sustaining wages.

Occupations in aerospace and defense typically require postsecondary education. In addition, many of these jobs require government clearances, protecting them from outsourcing.¹⁴ Workers in aerospace and defense use technical, academic and employability skills to design, build, operate, maintain and support aircraft, spacecraft and missiles as well as search, detection, navigation and guidance systems. What follows is a small sampling of jobs in aerospace and defense:

- aerospace engineering and operations technicians
- network administrators
- unmanned systems operators
- production managers
- aircraft machinists
- field service representatives
- government employees and defense contractors in these and other roles

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How does CTE prepare the aerospace and defense workforce?

Career and technical education prepares high school, postsecondary and adult students for careers in aerospace and defense through:

- the National Career Clusters® Framework—including Career Clusters and pathways in STEM; manufacturing; transportation, distribution and logistics; and IT—which outlines course progressions that help students explore career options and prepare for college and career success
- CTE courses in aerospace engineering, aerospace technology, computer integrated manufacturing, cybersecurity, aviation and more, all integrated with rigorous academics
- work-based learning experiences, such as the pre-apprenticeship program from South Seattle College and the Aerospace Joint Apprenticeship Committee, one of only 12 officially recognized pre-apprenticeships in Washington, which leads to apprenticeship or further education in the community and technical college system¹⁵
- career and technical student organization experiences, such as Technology Student Association and SkillsUSA competitions in engineering, cybersecurity, computer integrated manufacturing and flight endurance for model aircraft¹⁶
- Reserve Officer Training Corps (ROTC) and Junior ROTC programs, including Air Force programs that educate students on aerospace technology¹⁷
- opportunities to earn stackable credentials, such as the Southwest Aerospace and Manufacturing Strategic Workforce Initiative among Iron County School District, Southwest Technical College, Southern Utah University and MSC Aerospace, which extends the Utah Aerospace Pathways program and provides multiple on- and off-ramps from high school to a bachelor's degree¹⁸

What are promising programs in aerospace and defense?

Opportunities abound in the aerospace industry in Washington, with 1,400 aerospace-related companies in the state.¹⁹ At **Green River College**, students can earn postsecondary certificates in advanced manufacturing tailored to the aerospace sector after 20 weeks, or 400 hours of training, in one of three programs: precision machining, machine maintenance, or quality assurance and inspection.²⁰ Boeing and several other industry partners have provided input to and approval of the curriculum. Students learn in a facility equipped with state-of-the-art computer numerical control machines and pneumatic and hydraulic training stations. Green River is one of several postsecondary institutions around the state preparing the future aerospace workforce; others include the Center of Excellence for Aerospace and Advanced Manufacturing at Everett Community College and Edmonds Community College's Washington Aerospace Training and Research Center.

At the **Aviation and Aerospace Academy at B.C. Rain High School** in Mobile, Alabama, students participate in a project-based curriculum in aerospace technology and aerospace, aeronautics and astronautics engineering that integrates technical, academic and employability skills. Hands-on learning is facilitated by equipment such as a flight simulator, drone and U.S. Navy trainer aircraft, and during summer 2018, students began a year-long project to build a two-seater plane.²¹ Among the academy's business and education partners are Airbus; ST Aerospace, which has provided internships to students in aircraft maintenance; and Alabama Aviation College at Ozark. The school is also home to a U.S. Army JROTC program that supports and collaborates with the academy. The Aviation and Aerospace Academy has been credited with helping increase the school's overall graduation rate to 92 percent in 2017.²² Academy students are embarking on a pathway to a fulfilling career with the more than 300 aerospace firms in the state.²³ Alabama is also home to NASA's Marshall Space Flight Center and to Army aviation centers at Fort Rucker and Redstone Arsenal.²⁴