

# CTE: THE KEY TO ECONOMIC DEVELOPMENT

## Aerospace and defense:

Account for **\$909 billion** in revenue<sup>1</sup>

Produce jobs for nearly **2.2 million** people<sup>2</sup>

Pay almost **50% more** in wages and benefits than the national average<sup>3</sup>

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 precision and additive manufacturing, engineering, IT, computer software and other services for aircraft, space systems, unmanned systems, armaments and more
- plays a critical role in the economy of a number of states
- requires highly skilled workers

## What jobs are available in aerospace and defense?

The U.S. aerospace and defense industry is a global leader in the development and operation of air, space and defense systems, creating products and services that support commercial businesses and the Armed Forces. This sector grew consistently for more than a decade up to 2019, when about 2.2 million individuals worked in aerospace and defense-related manufacturing; cyber; and air, space, land and sea systems.<sup>4</sup> While the sector saw reduced revenues and job losses in 2020 resulting from the COVID-19 pandemic, aerospace and defense is beginning to recover as travel rebounds and American Rescue Plan funds are invested into the aerospace manufacturing workforce.<sup>5</sup>

In particular, 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.<sup>6</sup> The Federal Aviation Administration (FAA) projects that remote pilots will outnumber traditional instrument-rated pilots in the next few years.<sup>7</sup> Also needed are IT experts to develop, maintain and protect national security and commercial systems, along with workers with expertise in additive manufacturing—3D printing—a process that has been embraced by the aerospace and defense industry.<sup>8</sup> In addition, jobs will be opening for aviation maintenance technicians as the current workforce retires.<sup>9</sup>

Occupations in aerospace and defense typically require postsecondary education, such as a postsecondary certificate or degree. Many also require licenses, industry certifications and/or government clearances. Aerospace and defense careers pay almost \$103,000, on average, in wages and benefits, including high-paying jobs for individuals with less than a bachelor's degree.<sup>10</sup> For instance, technicians with an associate degree who support aerospace engineering and operations earn more than \$68,500 a year, on average, while avionics technicians with the same level of education earn about \$67,000.<sup>11</sup>

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 aircraft systems (UAS) operators
- precision machinists
- production technicians
- aviation maintenance technicians
- 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, precision machining, cybersecurity, aviation maintenance and more, all integrated with rigorous academics
- work-based learning experiences, such as the Brooke Owens Fellowship, which matches undergraduate women and other minority students with paid internships at leading aerospace firms and with senior and executive-level mentors<sup>12</sup>
- leadership, competitive and project-based experiences, such as Technology Student Association and SkillsUSA competitions in aviation maintenance technology, commercial drones, cybersecurity, robotics, computer integrated manufacturing and flight endurance for model aircraft as well NASA HUNCH, which engages high school students in designing and fabricating real-world products for NASA<sup>13</sup>
- Reserve Officers' Training Corps (ROTC) and Junior ROTC programs, including Air Force programs that educate students on aerospace technology
- opportunities to earn industry-recognized credentials, such as the Utah Aerospace Pathways certificate, which guarantees recipients a job interview with participating employers and can lead to further educational opportunities<sup>14</sup>

## What are promising programs in aerospace and defense?

The state of Washington is a hub for aerospace and defense, accounting for 15% of all U.S. sales in the sector.<sup>15</sup> To develop the aerospace and defense workforce in the region, Boeing created and deployed the **Core Plus Aerospace** and advanced manufacturing curriculum and currently partners with 50+ high schools and skills centers across the state.<sup>16</sup> This two-year, hands-on curriculum begins with foundational manufacturing skills common across sectors, such as materials science, precision measurement, shop safety and the use of hand and power tools. In the second year, students take aerospace-related courses such as fiber optics, advanced composites and robotics. Core Plus Aerospace also provides students with opportunities to participate in organizations like SkillsUSA and FIRST Robotics and receive an industry-backed certificate of competency. Each year, Boeing hosts a paid summer internship for Core Plus Aerospace students and, since 2015, has hired more than 700 Core Plus Aerospace graduates.

**Mountain Empire Community College (MECC)** in Big Stone Gap, Virginia, began offering a UAS program in 2015 to develop the workforce for 94 aviation-related companies in the region.<sup>17</sup> The program has grown to include a Small UAS Operations Technical Studies associate degree program and two Career Studies certificate programs in the field of smart farming, which explores how drones and other technologies can tackle agricultural challenges. Coursework addresses topics such as photogrammetry, mapping, infrastructure inspection, thermal plant health and yield studies along with automated plant seeding and spraying. The MECC UAS program has a 94% pass rate for the FAA Small Pilot Certificate, which is required to operate drones for commercial purposes, and is an FAA-approved UAS-Collegiate Training Program.<sup>18</sup> This designation recognizes institutions with UAS programs that lead to credentials and incorporate curriculum addressing hands-on flight practice, maintenance, uses, applications, privacy concerns, safety and federal UAS policies.



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