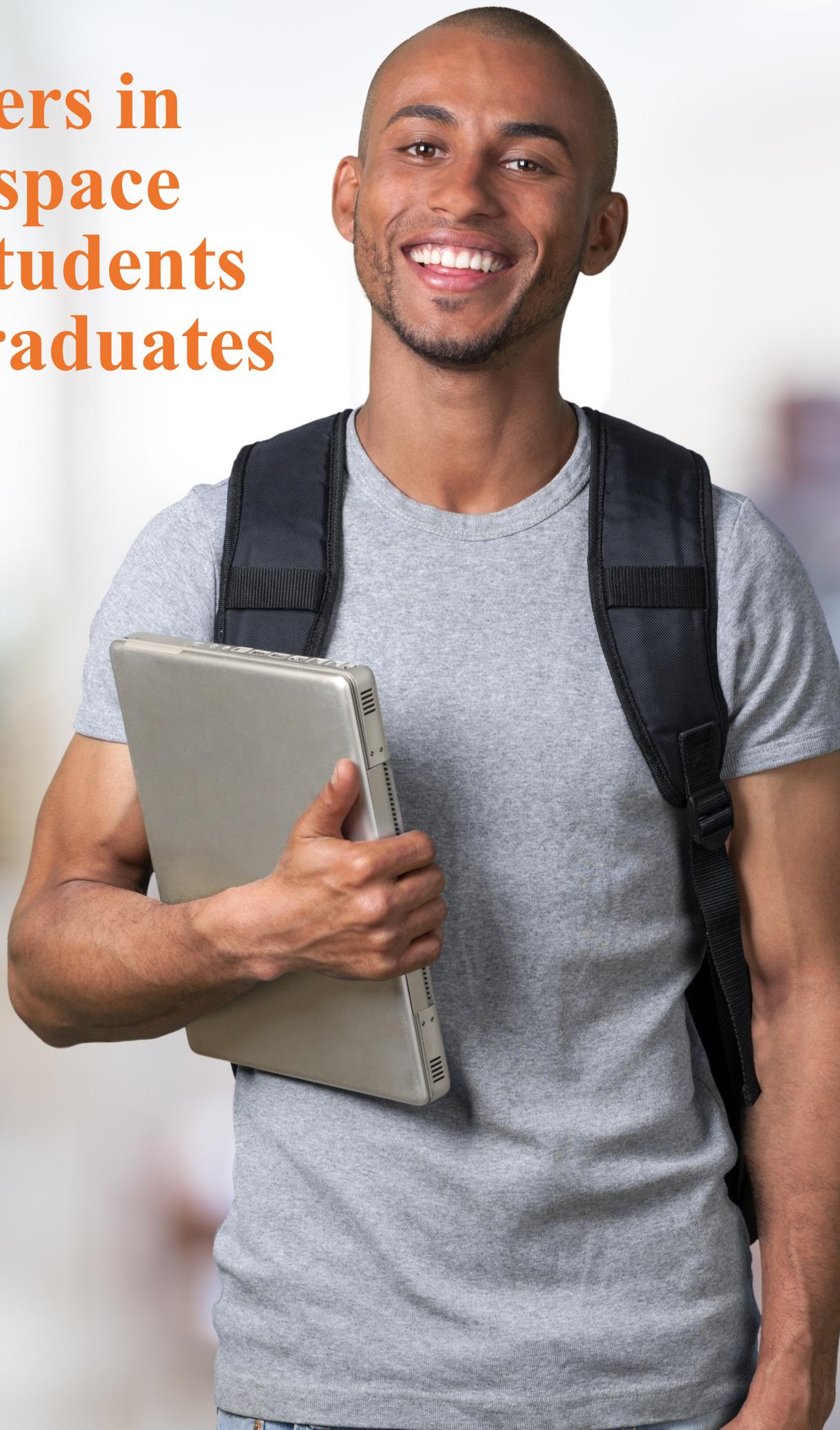


Careers in Aerospace for Students & Graduates



Take Flight in the Aerospace Industry

Perhaps you were that kid building spacecraft and planes out of Lego bricks for hours or the one fascinated by all things *Star Wars*. Maybe you built a model rocket for a science project and got hooked. Maybe you watched launches of space shuttles, visited Cape Canaveral or just got to see inside the cockpit on your first airplane ride and you got bitten by the aviation and space bugs.

Or have you never thought much about air and space before but are looking for a dynamic industry in which to start your career or to pursue education? Whether your interest in aerospace is long-held or just beginning, the aerospace industry can be a great fit for you with ample opportunities.

The aerospace and aviation industries are experiencing a shortage of workers for jobs requiring STEM skills – those in science, technology, engineering, and math. Only 1.5 percent of those ages 25 to 34 in the United States have a science degree. These skilled workers are the backbone of an aerospace industrial base and are crucial to providing sustained innovation, economic growth, global competitiveness and even national security.

In other words, **if you have the right skills, you can be an essential part of the aerospace industry**, but 39 percent of aerospace companies predict the lack of skilled workers and the skills gap that exists will have an “extreme” impact on business growth. Each unfilled position can mean a loss of \$14,000. Meanwhile, skilled trades workers are retiring in large numbers with few ready to step into their spots. If you have the skills or work to get them, a job in the aerospace industry is ready and waiting.



The **three pillars of the aerospace industry are commercial and general aviation, military aircraft, and space systems.** Companies that design, manufacture, and service commercial aircraft, business jets, helicopters, personal aircraft, unmanned aerial vehicles, and the subsystems and components, make up commercial and general aviation. More than 23,000 supplier companies, mostly small and medium businesses, create the industry's supply chain.

The military segment of the industry encompasses the manufacture of combat and non-combat aircraft and systems. The space component is the third pillar of the industry with its space launch vehicles, satellites, spacecraft, and ground systems for both commercial and government use. It is a key factor in the nation's security and a driver of the modern economy.

With its abundance of career possibilities, those who desire to enter the aerospace and aviation industries could find themselves doing anything from becoming pilots to air traffic control to making the aircraft down to manufacturing the pieces and parts that go into aircraft. **Acutec Precision Aerospace**, as an example, boils this concept down to a phrase they use over and over: "We make the stuff that goes into other things."

Those who work in the aerospace industry make up 1.6 percent of the nation's total employment base and 13 percent of the nation's manufacturing workforce. Aerospace and defense supported 2.4 million American jobs in 2016.

Commercial aerospace supported 490,000 direct jobs in the design and manufacturing of civil aircraft, helicopters, and spacecraft in 2016, according to the Aerospace Industries Association. In general, aviation, which is all aviation other than military and scheduled commercial airlines, supported 1.1 million in total jobs, according to the General Aviation Manufacturers Association. General aviation has seen tremendous growth in the last decade, and it isn't expected to slow down any time soon.

Manufacturing is a key component of the aerospace and aviation industries and in making it a thriving sector of American industry. In 2016, aerospace and defense generated \$872 billion in sales and \$466 billion in exports and is a leading net exporting industry. As the industry grows, so does the potential for manufacturing jobs within it. The industry is one of the largest contributors to employment and wages in the nation's economy and is a pillar of manufacturing strength.

These **high-skilled manufacturing jobs have a strong job outlook** because of the numbers of openings resulting from large numbers of workers retiring. In fact, companies often do not have enough qualified applicants to fill openings. Most of these jobs are in small shops or firms that produce durable goods, including metalworking and industrial machinery, aircraft, or motor vehicles. Over the next decade, nearly 3.5 million manufacturing jobs will be needed with 2 million expected to go unfilled due to skills gaps. Reports indicate 80 percent of manufacturers report a “moderate or serious” shortfall of skilled applicants.



Your Skills at Work in Aerospace Manufacturing

The job outlook for aerospace engineers, as one example, is expected to have a **6 percent growth through 2026**. Aerospace engineers had a median pay of \$109,690 a year in 2016 or \$52.72 per hour. To be an engineer, one must obtain a bachelor's degree in aerospace engineering or another field of engineering or science related to aerospace systems. Aerospace engineers design aircraft, spacecraft, satellites, and missiles, and create and test prototypes to make sure they function as designed. They work for industries whose workers design or build aircraft or spacecraft, primarily in manufacturing, analysis and design, research and development, or the federal government.

Aerospace engineers usually specialize in aeronautical aircraft, which operate within the earth's atmosphere and astronomical spacecraft, which operate within and outside the earth's atmosphere.

Aerospace engineers will direct and coordinate design, manufacturing, and testing of aircraft and aerospace products. In addition, they determine if project proposals are feasible financially and technically and if they will be safe and meet goals. Engineers evaluate designs, develop criteria for design methods, and make sure the projects meet quality standards as well as inspect manufacturing. Engineers also work to develop new technology to use in aviation and aerospace.

The job outlook for aerospace engineering is strong. Aircraft are now being designed to cause less noise pollution and achieve better fuel efficiency, which will help keep demand for research and development high. In addition, as international governments refocus their space exploration endeavors and new companies emerge providing access to space, more opportunities are arising all the time.

In 2016, aerospace engineers held 69,600 jobs, 38 percent of which were in product and parts manufacturing, according to the Bureau of Labor Statistics.

In addition to an engineering degree, engineers need to have the ability to use sophisticated computer equipment and software development tools, modeling, and simulators. They need to work well with others in a team striving toward a common goal and have strong communication skills.

You do not need to become an engineer to have a rewarding career in aerospace manufacturing, though.

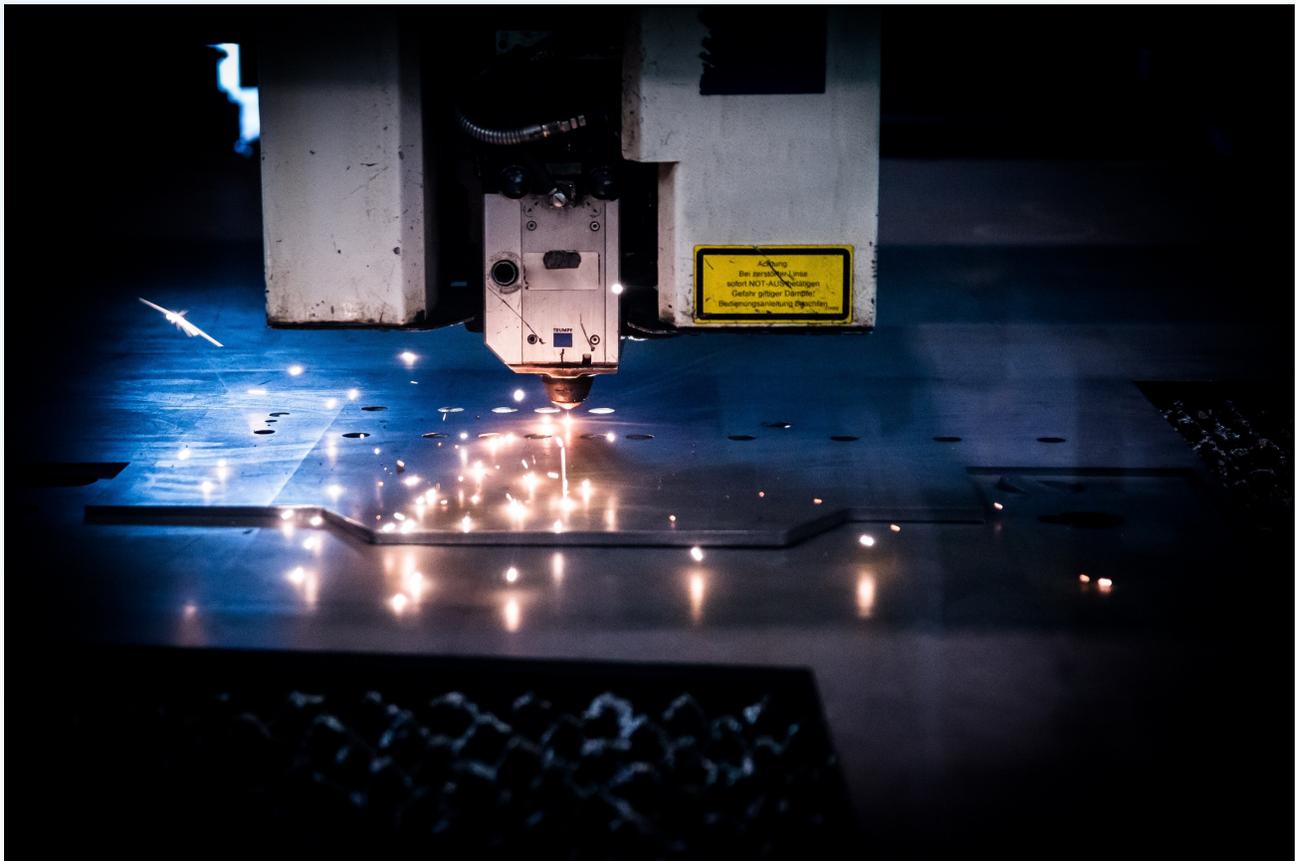


An Array of Opportunities Are in Demand

Traditional manufacturing jobs, such as machinists, are, of course, in great demand within the aerospace industry but so are a number of other specialties. Some entry-level aerospace manufacturing jobs might include manufacturing technician, CNC (Computer Numerically Controlled) programmer, aerospace machine operator, aerospace mechanical assembly, structural analyst, aircraft painter, fabricator, grinder, quality control, and more.

Of these **Aerospace CNC Machinists are among the most sought after.** Aerospace CNC operators or machinists working in aerospace, implement the plans created by a CNC programmer for computer numerically controlled machine. Duties include setting the machine, loading it with the right cutting tools, and operating the machine to produce specific parts used in a wide variety of industries. As an aerospace CNC machinist, the parts created would be used specifically within the aerospace industry. CNC machinists control the cutting tool and speed and do all necessary cuts. The machinist determines the path, speed, and feed rate by programming instructions into the machine.

They also can work making repairs and new parts for machinery. A CNC machinist has sometimes been described as a “jack-of-all-trades,” because they need to be computer literate, understand basic electronics and have a knowledge of basic physics.



A High Degree of Skill and Rewards

Education opportunities for this field are available at vocational programs, technical colleges, community colleges, or through apprenticeships and on-the-job training. Apprenticeship programs can be paid training programs with a firm that last several years.

Essential skills needed are mechanical aptitude, knowledge of computers, ability to troubleshoot, and problem-solving. Blueprint reading skills also are beneficial. Additional qualities that are important are analytical skills, manual dexterity, mechanical skills, physical stamina, and technical skills dealing with computerized measuring machines and metalworking processes.

A post-high school degree or certification is not mandatory, but it will allow applicants to get their foot in the door more quickly. Often, employers will fund further education. Formal training can include one-year certifications and associate degrees in areas such as mathematics, physics, blueprint reading, mechanical drawing, and shop practices. Many training facilities and colleges are adopting national skills standards created by the National Institute of Metalworking. Having these credentials can lead to advancement and confirmation of skills during the job search.

Similar jobs to machinist are toolmaker and millwright. A toolmaker uses a computer-aided design program to create tools. A millwright takes apart, maintains and puts together complex industrial machinery.

According to the Bureau of Labor Statistics, **machinists and tool and die makers had a median pay of \$43,160 in 2016, or \$20.75 an hour.** Job growth is expected to remain steady with a projected 1 percent change. CNC operators working with metal and plastics can expect a faster-than-average growth rate through 2024.

A machinist will usually have a high school diploma or equivalent, while a tool and die worker may need more advanced education. High school students interested in the field will find courses in math, blueprint reading, metalworking, and drafting useful.

High school students who do not desire to attend traditional four-year college can find that aerospace manufacturing jobs are a good option for them. With the cost of traditional college soaring, these types of jobs with on-the-job training can mean graduates can get right to work earning a paycheck while at the same time leaving the door open for future education either through the trades or the traditional college route.



These are not the old stereotype jobs for high school dropouts. There has been a resurgence of trade jobs and a second-wind given to the industry through the development of new technology. A recent *New York Times* article even wrote in depth about the trend of white-collar workers tiring of their cubicle jobs and changing career paths to enter the skilled trades field. Even students who intend to pursue an advanced engineering degree can get their start with machining as a stepping stone in their career. Some firms will even help pay tuition.

There are 12.5 million manufacturing workers in the United States accounting for 8.5 percent of the workforce. Since the end of the Great Recession, manufacturers have hired more than 1 million workers. In 2016, the average manufacturing worker earned \$82,023 annually in pay and benefits.

The benefits can be substantial. Manufacturers also have the highest percentage of workers, **92 percent, eligible for health benefits**, an important consideration when looking for a full-time job. There is an 84 percent participation rate. Only government and trade, communications and utility workers have a higher participation rate in their health benefit programs.



The Varied Rewards of Working in Aerospace Manufacturing

While many have dreamed of being pilots or astronauts, the reality is that a rewarding aerospace career can take place right here on the ground. After all, people cannot fly or travel to space without the aircraft and spaceships to get them there. Information cannot be transmitted via satellite without the equipment to do so. A nation's military cannot mount a successful air defense without the missiles and aircraft. New scientific discoveries about space cannot be made without the scientists and engineers. And nothing can be manufactured without the pieces and parts.

Those who pursue a career in aerospace engineering or manufacturing can look up with wonder at how satellites, airplanes, helicopters, and rockets can travel into the earth's atmosphere and beyond and know they played a key role in making flight happen.





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