All the information in this section is provided by the Florida Department of Education's website provided by the Bridges' Corporation and can be found at http://florida.echoices.com .

Aerospace / Aeronautical Engineer

Description

Performs a variety of engineering tasks in designing, constructing, and testing aircraft, missiles, and spacecraft. May conduct basic and applied research to evaluate suitability of materials and equipment for aircraft manufacture. Uses computers to record and analyze data. May use computer-aided design systems to produce and analyze designs.

Typical Tasks

• Develops the design, testing, production methods, and quality standards for aeronautical or aerospace products and systems.
• Analyzes project requests and engineering data to determine feasibility, cost, and production time of aerospace or aeronautical products or systems.
• Designs products and systems to meet customer's specific requirements, according to engineering principles and quality standards.
• Uses mathematical models and computer analysis to develop, evaluate, and modify designs.
• Plans and conducts experimental, operational, and stress tests on models and prototypes.
• Coordinates the activities of engineering and technical staff in fabricating, modifying, and testing aircraft or aerospace products.
• Directs research and development programs to improve technology and production methods.
• Reviews reports from customers and field engineers.
• Evaluates and approves the selection of vendors who supply parts and equipment.

Field of Work

A field of work represents a broad, general area of work activity. Occupations that have similar types of work are assigned to the same field.

• **Architecture and Engineering Occupations**

Occupations that include activities such as designing machines, processes, systems, and structures such as buildings.

Career Pathways

Occupations have been organized into Career Pathways to help students with high school course planning.

- **Engineering and Industrial Technologies**

Occupations related to the technologies necessary to design, develop, install, or maintain physical systems. These may include engineering, manufacturing, construction, service and related technologies.

Career Clusters

The U.S. Department of Education has established 16 broad Career Clusters that contain all entry-level through professional-level occupations in a broad industry area. Clusters consist of grouped career areas with similar skill and education requirements.

- **Scientific Research, Engineering & Technical Services**

Occupations that include activities such as planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.

Specialties and Similar Occupations

Other occupations that are more detailed or similar to this broad occupation. DOT codes are from the Dictionary of Occupational Titles.

• Aerodynamicist (DOT 002.061-010)

Plans and conducts analysis of aerodynamic, thermodynamic, aerothermodynamic, and aerophysics concepts, systems, and designs to resolve problems and determine suitability and application to aircraft and aerospace products.

• Aeronautical Project Engineer (DOT 002.167-018)

Directs and coordinates activities of personnel engaged in designing mechanisms, structures, systems, and equipment for aeronautical or aerospace products, applying knowledge of engineering theory and technology.

• Aeronautical Test Engineer (DOT 002.061-018)

Conducts testing activities on aerospace and aircraft products, performing duties as described under TEST ENGINEER (profess. & kin.) Master Title.

• Aeronautical-Design Engineer (DOT 002.061-022)

Develops basic design concepts used in design, development, and production of aeronautical and aerospace products and systems, performing duties as described under DESIGN ENGINEER, PRODUCTS (profess. & kin.) Master Title.

• Aeronautical-Research Engineer (DOT 002.061-026)

Conducts research in field of aeronautics, performing duties as described under RESEARCH ENGINEER (profess. & kin.) Master Title.

• Field-Service Engineer (DOT 002.167-014)

Plans and coordinates activities concerned with investigating and resolving customer reports of technical problems with aircraft or aerospace vehicles and eliminating future operational or service difficulties.

• Stress Analyst (DOT 002.061-030)

Conducts stress analyses on designs of experimental, prototype, or production aircraft, space vehicles, surface effect vehicles, missiles, and related components to evaluate ability to withstand stresses imposed during flight or ground operations.

For More Information

The following organization(s) may provide additional information about this occupation.

American Institute of Aeronautics and Astronautics
Student Programs
1801 Alexander Bell Dr., Suite 500
Reston, VA 20191-4344

Web Sites

• American Institute of Aeronautics and Astronautics www.aiaa.org

Related Resources

• O*NET-SOC occupation: 17-2011.00 Aerospace Engineers

• SOC occupation: 17-2011 Aerospace Engineers

• Occupational Outlook Handbook (2002/2003) page 106

• Military Careers (2001 edition) page 245

Education, Training and Work Experience

Education, training, and experience are required at different levels for success in different occupations. The education level for this occupation:

• **Bachelor's degree**

Requires graduation from a 4-year college or university. Some work experience may also be required.

National information:
A bachelor's degree in engineering is required for almost all entry-level engineering jobs. College graduates with a degree in a physical science or mathematics occasionally may qualify for some engineering jobs, especially in specialties in high demand. Engineers trained in one branch may work in related branches. Graduate training is essential for engineering faculty positions and many research and development programs, but is not required for the majority of entry-level engineering jobs.

Related Education Programs and Notes (CIP codes shown with programs):
• Aerospace, Aeronautical and Astronautical Engineering (14.0201)

Licensure/Certification Information:
Many states require engineers to be licensed.

Transferable Work Content Skills

Skills used in this occupation that are used in other occupations:

- **Operating computers to record and analyze engineering data (high level)**
- **Operating computers to create engineering designs (high level)**
- **Directing an engineering design team (high level)**
- **Designing machinery, equipment, and products (high level)**
- **Creating engineering concepts (high level)**
- **Creating design concepts for machines and equipment (high level)**
- **Researching physical sciences (high level)**
- **Analyzing and testing engineering plans (high level)**

Basic Skills / Basic SCANS Skills

Basic Skills information comes from O*NET. Basic skills provide the foundation for learning other types of material. Many of these skills are related to SCANS Skills. For each skill, the level needed to perform the occupation is shown. Skills important to the occupation are checked.

Important Skills

- Reading comprehension 
- Active listening 
- Writing 
- Speaking 
- Mathematics 
- Science 
- Critical thinking 
- Active learning 
- Learning strategies 
- Monitoring 

General Workplace Skills

Information for General Workplace Skills comes from O*NET (Cross Functional Skills). General Workplace Skills are practiced activities that help workers achieve success in various occupations. The significant skills for this occupation are:

Social Skills

- Coordination ... (high level)

Adjusting actions in relation to others' actions.

Complex Problem Solving Skills

- Problem identification ... (medium level)

Identifying the nature of problems.

- Information gathering ... (medium level)

Knowing how to find information and identify essential information.

- Information organization ... (medium level)

Finding ways to structure or classify different pieces of information.

- Synthesis/reorganization ... (medium level)

Reorganizing information to get a better approach to problems or tasks.

• Idea generation ... (medium level)

Generating a number of different approaches to problems.

• Idea evaluation ... (medium level)

Evaluating the likely success of an idea in relation to the demands of the situation.

• Implementation planning ... (medium level)

Developing approaches for implementing an idea.

• Solution appraisal ... (medium level)

Checking the results of a solution to see what needs to be done next.

Technical Skills

• Operations analysis ... (medium level)

Analyzing needs and product requirements to create a design.

• Technology design ... (high level)

Generating or adapting equipment and technology to serve user needs.

• Equipment selection ... (medium level)

Determining the kind of tools and equipment needed to do a job.

• Programming ... (medium level)

Writing computer programs for various purposes.

• Testing ... (high level)

Conducting tests to determine whether equipment, software, or procedures are operating as expected.

• Operation monitoring ... (medium level)

Watching gauges, dials, or other indicators to make sure a machine is working properly.

• Operation and control ... (medium level)

Controlling operations of equipment or systems.

• Product inspection ... (medium level)

Inspecting and evaluating the quality of products.

• Troubleshooting ... (high level)

Determining what is causing an operating error and deciding what to do about it.

Systems Skills

• Visioning ... (medium level)

Developing an image of how a system should work under ideal conditions.

• Systems perception ... (medium level)

Determining when important changes have occurred in a system or are likely to occur.

• Identifying downstream consequences ... (medium level)

Determining the long-term outcomes of a change in operations.

• Identification of key causes ... (medium level)

Identifying the things that must be changed to achieve a goal.

• Judgment and decision making ... (medium level)

Weighing the relative costs and benefits of a potential action.

• Systems evaluation ... (medium level)

Checking the accuracy of system performance indicators.

Resource Management Skills

• Time management ... (medium level)

Managing one's own time and the time of others.

• Management of personnel resources ... (medium level)

Motivating, developing, and directing people as they work, identifying the best people for the job.

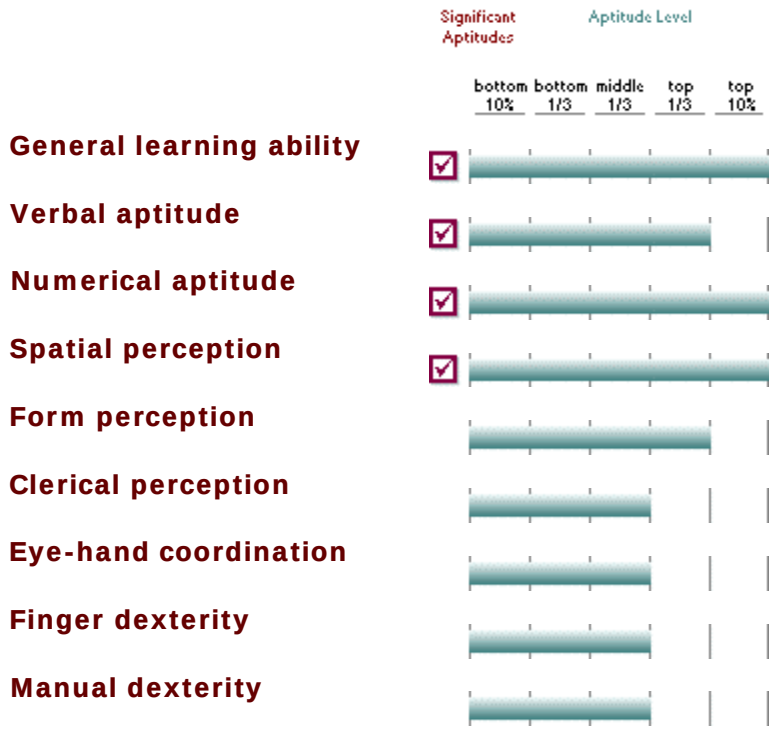
Suggested School Courses

A course plan is available for the Career Pathway listed below:

• **Engineering and Industrial Technologies**

Aptitudes

Aptitudes reflect a person's ability to acquire skills and knowledge. Significant aptitudes for this occupation are checked.



Career Areas and GOE

Career Areas relate to basic types of interests that people have.

• **Mechanical ... (Career Area 05)**

Here workers use tools and machines, or apply the ideas and principles of machines and tools in their work. Their jobs are in many settings, but not factories. People

with this interest are in a wide range of occupations. They range from highly skilled engineers to operators of simple machines.

- **Engineering ... (GOE 05.01)**

Engineering is the use of science and mathematics to solve problems in construction, manufacturing, and other industries.

Work Values

Work values may be thought of as aspects of work that are satisfying to you. It is important to remember that a specific job with a particular employer may not support the work value to the same degree as for the occupation in general. Work value information is obtained from O*NET.

- **Achievement ... (extremely characteristic of this occupation)**

Occupations with this work value satisfy the need to use your best abilities, see the results of your work, and get a feeling of accomplishment.

- **Independence ... (usually characteristic of this occupation)**

Occupations with this work value satisfy the need to let you make decisions on your own, try out your own ideas, and work with little supervision.

Interests

O*NET uses six categories to describe work environments and interests (compatible with Holland's Model). The following codes reflect the categories which best describe this occupation:

- **Investigative**

You are a "thinker". You like to analyze situations and work with ideas to find creative solutions. You prefer to work on your own and usually don't like having to persuade other people to accept your ideas.

- **Realistic**

You are a "doer".You usually prefer physical activities, games and projects rather than socializing. You like to find concrete solutions to problems by trying out various possibilities. You often avoid situations that involve a lot of discussion with other people, and you usually want to go further than working out a problem in theory - you want to see how your solutions work.

Myers-Briggs Types

The MBTI uses four letters to represent how people like to look at things and how they like to go about deciding things. **E** Extraversion or **I** Introversion, **S** Sensing or **N** Intuition, **T** Thinking or **F** Feeling, and **J** Judging or **P** Perceiving. This occupation is

part of the career field:

• **Applied Science & Technology -- Engineering**

in which the type assessment was done. Types commonly found in this field are:

• **INTP**

Characteristics frequently associated with INTP (Introversion/Intuition/Thinking/Perceptive): Seek to develop logical explanations for everything that interests them. Theoretical and abstract, interested more in ideas than in social interaction. Quiet, contained, flexible, and adaptable. Have unusual ability to focus in depth to solve problems in their area of interest. Skeptical, sometimes critical, always analytical.

• **ESTJ**

Characteristics frequently associated with ESTJ (Extraversion/Sensing/Thinking/Judging): Practical, realistic, matter-of-fact. Decisive, quickly move to implement decisions. Organize projects and people to get things done, focus on getting results in the most efficient way possible. Take care of routine details. Have a clear set of logical standards, systematically follow them and want others to also. Forceful in implementing their plans.

• **ENFP**

Characteristics frequently associated with ENFP (Extraversion/Intuition/Feeling/Perceptive): Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency.

National Employment and Outlook

Annual number of job openings (2000 to 2010): Very Small.

Job Openings	very small number	A total of 2,000 average annual job openings is expected for this occupation between 2000 and 2010. (The National average for all occupations is 8,371 openings.)
Outlook	stable	The employment change from 2000 to 2010 is estimated to be +13.9%. (The National average for all occupations is +13.6%.)
Employment	small occupation	This was a small occupation in the United States, employing 50,434 workers in 2000. (The National average for all occupations is 209,487 workers.)
Industries	Large concentrations of this occupation are found in these industries:	

	• Aircraft and parts (SIC 372) (33%) • Federal government, except Postal Service (SIC 910) (15%) • Guided missiles, space vehicles, and parts (SIC 376) (15%) • Search and navigation equipment (SIC 381) (13%) • Transportation by air (SIC 450) (11%)
Non-traditional occupation	This is a non-traditional occupation for women. In 2000, 10% of the people employed in this occupation were women.
OES Occupation	1720110133 Aerospace engineers

Average growth. An expected rise in defense expenditures may result in employment increases. Most openings will result from a need to replace workers who retire or leave the occupation permanently for other reasons.

Florida Employment and Outlook

	2002 to 2010 Outlook	2002 Employment	Average Annual Growth Rate	Average Annual Openings due to Growth	Average Annual Openings due to Separations
Florida Statewide	• Stable	3,150	2.03%	64	89

In Florida, large concentrations of this occupation are found in these industries:

• Personnel Supply Services (22.77%)

• Air Transporation, Scheduled (21.44%)

• Federal Government (15.78%)

Military Career Opportunities

Aerospace Engineers (Officer)

Opportunities: The services have about 1,600 aerospace engineers. Each year they need new aerospace engineers due to changes in personnel and the demands of the field. Newly commissioned aerospace engineers are usually assigned to engineering research and development units or laboratories. They work under the direction of experienced officers conducting research. With experience, they may serve as research and development managers or laboratory managers. To inquire about opportunities with the National Guard and Reserves, click on the hyperlink below.

Training Provided: A 4-year college degree in aeronautical, astronautical, or mechanical engineering is required to enter this occupation. No initial military job training is provided to officers in this occupation.

Earnings: Officers in the military can progress through ten officer pay grades during

their careers. Pay grade and length of service determine an officer's pay. Most newly commissioned officers begin at pay grade O-1 ($23,118/year basic pay in 2000). With certain professional qualifications, officers may enter at a higher pay grade. After two years, officers generally move up to O-2 ($29,077/year basic pay in 2000). After an additional two years, the military generally promotes officers to O-3 ($40,378/year basic pay in 2000) if job performance and other requirements are met. Cost-of-living increases usually occur once a year. Many officers and their families live free of charge in military housing on the base where they are assigned. Those living off base receive a housing allowance in addition to their basic pay. Officers also receive a monthly food allowance. These allowances, and associated tax savings, are substantial additions to basic pay. Other employment benefits for military officers include free health care, 30 days paid vacation each year, legal assistance, education assistance, military store privileges, and an excellent retirement program.

Services offering this occupation

- Air Force
- Coast Guard
- Marines
- Navy

The National Guard and Reserves may have opportunities in this career field as well. Click on the hyperlink below to connect to their web sites for further information.

Military Career Opportunities Web Sites www.bridges.com/mcows/military.htm

Other military websites: http://www.todaysmilitary.com or http://www.careersinthemilitary.com

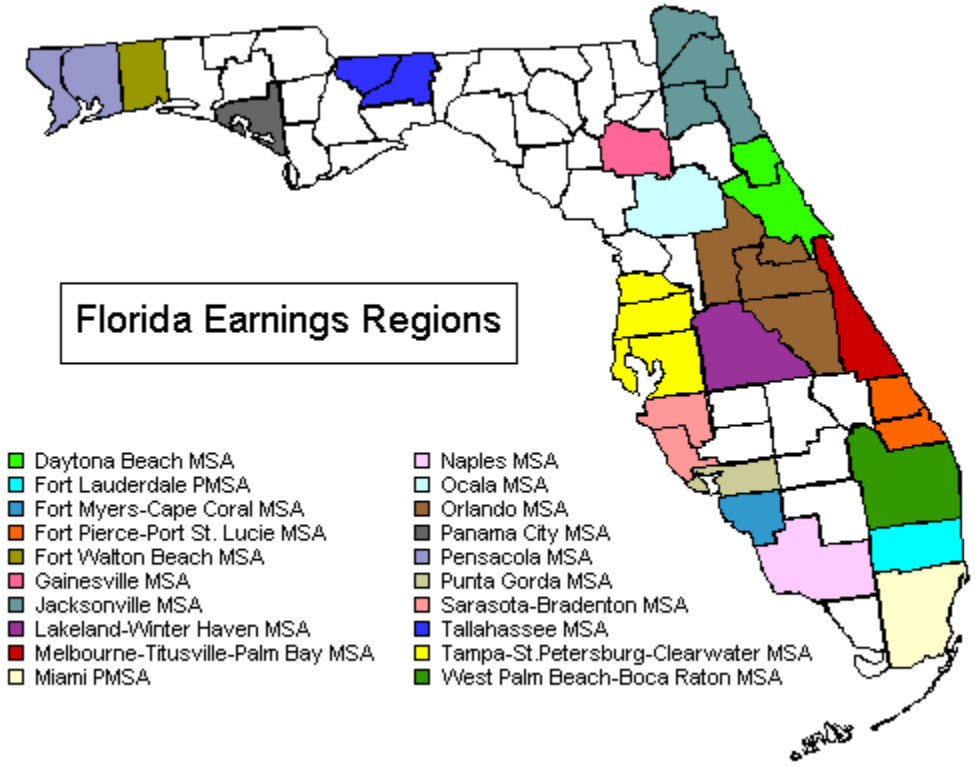
National Earnings: 2001 National average annual earnings for the middle 50% of all workers in this occupation **— $60,000 to $90,000.**

Annual earnings range for middle 50% of all workers in this occupation ... (all information from 2001 OES survey)	$57,803 to $85,384
Average annual earnings	$71,380
Average hourly earnings	$34.32

Florida Earnings

(2003) Statewide average annual earnings	$69,326
(2003) Statewide average hourly earnings	$33.33
(2003) Statewide entry level annual earnings	$47,923
(2003) Statewide entry level hourly earnings	$23.04
(2003) Statewide experienced level annual earnings	$84,282

(2003) Statewide experienced level hourly earnings	$40.52		
Florida Major City Pay By the Year	2003 Average Annual Earnings	2003 Entry Level Annual Earnings	2003 Experienced Level Annual Earnings
Fort Lauderdale PMSA	$63,544	$55,370	$61,776
Fort Walton Beach MSA	$67,850	$54,766	$77,168
Jacksonville MSA	$64,355	$54,434	$71,698
Miami PMSA	$72,467	$42,120	$107,349
Orlando MSA	$74,589	$50,211	$100,464
Tampa - St. Petersburg - Clearwater MSA	$68,016	$49,525	$81,890
West Palm Beach - Boca Raton MSA	$67,226	$50,544	$76,835
Florida Major City Pay By the Hour	2003 Average Hourly Earnings	2003 Entry Level Hourly Earnings	2003 Experienced Level Hourly Earnings
Fort Lauderdale PMSA	$30.55	$26.62	$29.70
Fort Walton Beach MSA	$32.62	$26.33	$37.10
Jacksonville MSA	$30.94	$26.17	$34.47
Miami PMSA	$34.84	$20.25	$51.61
Orlando MSA	$35.86	$24.14	$48.30
Tampa - St. Petersburg - Clearwater MSA	$32.70	$23.81	$39.37
West Palm Beach - Boca Raton MSA	$32.32	$24.30	$36.94



Physical Demands

Physical Demands reflect the overall strength generally needed to work in this occupation.

- **Light (10 lbs to 20 lbs)**

You would often handle loads up to 10 lbs., sometimes up to 20 lbs. You might do a lot of walking or standing or you might sit but use your arms and legs to control machines, equipment or tools.

Physical Abilities

Physical Abilities information comes from O*NET. Only those factors that are a significant part of the occupation are listed.

- **Near vision ... (medium level)**

Seeing clearly up close.

Work Conditions

Work conditions are taken from O*NET and refer to characteristics of the physical environment for an occupation. The following factors are frequently found in the

work setting for this occupation:

- **No uncomfortable, potentially hazardous, or unusual work conditions**

Work Hours and Travel

- Regular working hours and limited travel

The work is primarily done within a regular work day and work week, with little overnight travel.

The following information is a list of Florida and other US Post-Secondary Schools that offer Aeronautical Engineering educational programs.

Your selected program, **Aerospace, Aeronautical, & Astronautical Engineering**, is being used as a search topic.

80 schools match ALL of your search topics

Brevard Community College (2YR) Cocoa, FL
California Institute of Technology (4YR) Pasadena, CA
California Polytechnic State University, San Luis Obispo (4YR) San Luis Obispo, CA
California State Polytechnic University, Pomona (4YR) Pomona, CA
California State University, Long Beach (4YR) Long Beach, CA
California State University, Northridge (4YR) Northridge, CA
Embry Riddle Aeronautical University (4YR) Daytona Beach, FL
Georgia Institute of Technology (4YR) Atlanta, GA
Mississippi State University (4YR) Mississippi State, MS
North Carolina State University (4YR) Raleigh, NC
San Diego State University (4YR) San Diego, CA
San Jose State University (4YR) San Jose, CA
Tuskegee University (4YR) Tuskegee, AL
United States Air Force Academy (4YR) USAF Academy, CO
United States Military Academy (4YR) West Point, NY
United States Naval Academy (4YR) Annapolis, MD
University of Alabama (4YR) Tuscaloosa, AL
University of California, Davis (4YR) Davis, CA
University of California, Los Angeles (4YR) Los Angeles, CA
University of California, San Diego (4YR) La Jolla, CA
University of Central Florida (4YR) Ft. Lauderdale, FL
University of Florida (4YR) Gainesville, FL
University of Miami (4YR) Coral Gables, FL
University of Southern California (4YR) Los Angeles, CA
University of Tennessee (4YR) Knoxville, TN
Webster University, Merritt Island (4YR) Merritt Island, FL

AEROSPACE ENGINEER CAREER INFORMATION

Civilian aerospace engineers usually work in the aircraft manufacturing industry. Some work for the Department of Defense, the National Aeronautics and Space Administration (NASA), and other government agencies. As in the military, civilian aerospace engineers may specialize in one type of aerospace product, such as aircraft, missiles, or space vehicles. They may also specialize in engineering specialties such as product design, testing, or production research. Depending on their specialty, they may be called aeronautical engineers, aeronautical test engineers, or stress analysts.