**Mechanical Engineer**

Mechanical engineering is a branch of engineering that applies the principles of Mechanics and Materials science for analysis, design, manufacturing, and maintenance of mechanical systems. It involves the production and usage of heat and mechanical power for the design, production, and operation of machines and tools. They can vary from building a rocket ship all the way down to a modern car. It is one of the oldest and broadest engineering disciplines.

**Education**

Mechanical engineers need a bachelor's degree. Most have mechanical engineering degrees.

Mechanical engineers work in all areas of manufacturing industries. They can work in production operations, maintenance, management, as well as research and development. Some provide engineering services as consultants in research, design, or testing of technologies. The environment and hours they work will vary with the job.

**Skills**

You could be a Mechanical Engineer, if you:

* Are good at analysis and logical problem solving
* Like to work independently
* Like to learn new things
* Are realistic about how to get things done
* Are good with mechanical things and spatial relationships
* Can explain things so other will pay attention and understand them

**Examples**

* Design “smart” toys for kids
* Develop cars that are more fuel efficient
* Produce hypoallergenic air conditioning for hospital operating rooms<
* Create prosthetic hands that allow a person to type and write
* Build aerospace vehicles to trek across planets and moons, collecting samples

**Mechanical engineers typically do the following:**

* Analyze problems to see how a mechanical device might help solve the problem
* Design or redesign mechanical devices, creating blueprints so the device can be built
* Develop a prototype of the device and test the prototype
* Analyze the test results and change the design as needed
* Oversee the manufacturing process
* Mechanical engineers use many types of tools, engines, and machines. Examples include the following:
  + Power-producing machines such as electric generators, internal combustion engines, and steam and gas turbines
  + Power-using machines, such as refrigeration and air-conditioning
  + Industrial production equipment, including robots used in manufacturing
  + Other machines inside buildings, such as elevators and escalators
  + Machine tools and tools for other engineers
  + Material-handling systems, such as conveyor systems and automated transfer stations

Like other engineers, mechanical engineers use computers extensively. Computers help mechanical engineers to produce and analyze designs, simulate and test how a machine is likely to work, generate specifications for parts, monitor the quality of products, and control manufacturing and production.

Mechanical engineers are the second largest engineering occupation. They work mostly in engineering services, research and development, manufacturing industries, and the federal government. The rest are employed in general-purpose machinery manufacturing, automotive parts manufacturing, management of other companies, and testing laboratories.

Mechanical engineers generally work in professional office settings. They may occasionally visit work sites where a problem or piece of equipment needs their personal attention. Most mechanical engineers work full time, with some working as many as 60 hours or more per week.

**What makes a good mechanical engineer?**

A good mechanical engineer is an innovator at heart, and truly enjoys complex problem solving. They have excellent communication skills (both oral and written) and enjoy working with others as a team player. They are excited to be on the edge of technology, learning how to make things work more efficiently. They feel a sense of accomplishment when turning their ideas into reality and solving problems that better society. Mechanical engineers are naturally curious, innovative, creative, and practical, and have a desire to help people and the world around them.

**What is it like being a mechanical engineer?**

Depending on what field of work you go into will depend on what your job will be like. Mechanical engineering is a broad career that deals with mechanical issues, and engineers typically work with mechanical physics, vibrations, forces, rotation, and velocity on a daily basis.

In today's world, computers have changed how mechanical engineers do their job, allowing complex analyses to be completed in a matter of seconds versus the days or weeks of hand calculations that were once the norm.

**Careers**

* Aerospace industry – researches, designs, manufactures, operates and maintains aircraft
* Automotive industry – designs, manufactures, distributes and markets motor vehicles
* Chemical industry – covers oil companies, chemicals manufacturers and the businesses that support them (eg to build new plants or develop new process technologies)
* Construction industry – designs and builds infrastructure, buildings and buildings services (eg heating and ventilation)
* Defense industry – provides equipment, support and services for the armed forces and national security
* Electronics industry – designs and manufactures components and complete equipment for sectors from automotive to medicine and the military
* Fast moving consumer goods industry – manufactures products such as household cleaning items, personal hygiene goods and convenience foods
* Marine industry – develops and helps operate vessels
* Materials and metals industry – activities include developing new materials and manufacturing components or end products
* Pharmaceuticals industry – develops and manufactures drugs
* Rail industry – designs, constructs, manages and maintains rail system components from trains and tracks to electrical power systems and train control systems
* Utilities industry – helps supply power, water, waste management and telecoms.
* What precisely would my job as a mechanical engineering graduate be?
* In many roles you will remain as a mechanical engineering specialist, applying your skills and knowledge to those specific aspects of your employers’ technical operations that call for this skill set. However, engineering careers in some areas involve becoming more of a generalist, drawing on or developing knowledge of other engineering disciplines and perhaps doing the same job as a fellow engineer with a different degree background.

**Industrial Engineering**

Industrial engineers (IEs) apply science, mathematics, and engineering methods to complex system integration and operations. Because these systems are so large and complex, IEs need to have knowledge and skills in a wide variety of disciplines, the ability to work well with people, and a broad, systems perspective. Industrial engineers use their knowledge and skills to improve systematic processes through the use of statistical analysis, interpersonal communication, design, planning, quality control, operations management, computer simulation, and problem solving.

As systems integrators, industrial engineers analyze and design facilities (buildings, rooms, equipment, infrastructures, etc.), material handling systems, manufacturing and production systems, information systems and individual and group workplaces. In the operations realm, IEs analyze, design, and manage manufacturing and service processes, production systems planning and control, resource allocation and scheduling, personnel assignment and scheduling, quality assurance, inventory control and system and personnel safety.

**What Do Industrial Engineers Do?**

Industrial engineers figure out ways to do things better. They engineer processes and systems that improve quality and productivity. IE’s make significant contributions to their employers by saving money while making the workplace better for fellow workers. In addition to manufacturing, industrial engineers apply their skills in a variety of settings.

Here are a few examples:

* As a management engineer in a hospital, an IE may help doctors and nurses make the best use of their time in treating patients.
* As an ergonomist in a television manufacturing plant, an IE may change the tools workers use to assemble televisions to reduce the risk of repetitive stress injuries.
* As an operations analyst for an airline, an IE may design a bar coding system for identifying and transporting passengers luggage to ensure that it does not get lost.
* As a quality engineer for a public gas and electric company, an IE may improve customer satisfaction by designing a process to schedule service calls around the availability of the customer.
* Manufacturing firms and service industries hire a significant number of IE’s. Today, more and more businesses hire IE’s in areas like sales and marketing, finance, information systems, and personnel. Other industries employing IE’s are hospitals, airlines, banks, railroads, and social services. Industrial engineering has provided a systematic approach to streamline and improve productivity and efficiency in the business world.
* IE’s provide leaner, more efficient, and more profitable business practices while increasing customer service and quality.
* IE’s make the work environment safer, faster, easier, and more rewarding.
* They provide a method by which businesses can analyze their processes and try to make improvements to them. Staying focused on optimization ‐ doing more with less ‐ which helps to reduce waste in society.
* IE’s help reduce costs associated with new technologies, thus allowing more of the population to better their lives by being able to afford these advances.

**Where Do Industrial Engineers Work?**

Manufacturing firms and service industries hire a significant number of IE’s. Today, more and more businesses hire IE’s in areas like sales and marketing, finance, information systems, and personnel. Other industries employing IE’s are hospitals, airlines, banks, railroads, and social services. Industrial & Enterprise Systems Engineering www.ise.illinois.edu University of Illinois

**Electrical Engineering**

Electrical engineering is a field of engineering that generally deals with the study and application of electricity, electronics, and electromagnetism.

Electrical engineering has now subdivided into a wide range of subfields including electronics, digital computers, power engineering, telecommunications, control systems, radio-frequency engineering, signal processing, instrumentation, and microelectronics. The subject of electronic engineering is often treated as its own subfield but it intersects with all the other subfields, including the power electronics of power engineering.

Electrical engineers typically hold a degree in electrical engineering or electronic engineering. An electrical engineer is someone who designs and develops new electrical equipment, solves problems and tests equipment. They work with all kinds of electronic devices, from the smallest pocket devices to large supercomputers.

Electrical engineers may work on a diverse range of technologies, from the design of household appliances, lighting and wiring of buildings, telecommunication systems, electrical power stations and satellite communications. They may plan their designs using computer-aided software or they may also sketch ideas by hand.

**What does an Electrical Engineer do?**

Electrical engineers work on a variety of projects, such as computers, robots, cell phones, cards, radars, navigation systems, wiring and lighting in buildings and other kinds of electrical systems.

Electrical engineers start out a project by defining what a new electronics should be able to do. They will then design the circuits and parts of the electronics using a computer. They will create a prototype and test the product to improve it. Most products do not work initially or have some bugs that need to be fixed. The electrical engineer needs to figure out the problem and make the product work.

There are many sub-disciplines of electrical engineering. Some electrical engineers specialize exclusively in one sub-discipline, while others specialize in a combination of sub-disciplines. The most popular sub-disciplines are:

* Electronic Engineer
  + deals with electronic circuits such as resistors, capacitors, inductors, transistors and diodes
* Microelectronics Engineer
  + deals with design and micro-fabrication of tiny electronic circuit components
* Signal Processing Engineer
  + deals with signals, such as analog or digital signals
* Power Engineer
  + deals with electricity and design of related electrical devices such as transformers, generators, motors and power electronics
* Control Engineer
  + deals with design of controllers that cause systems to behave in a certain way, using micro-controllers, programmable logic controllers, digital signal processors and electrical circuits
* Telecommunications Engineer
  + deals with transmission of information via a cable or optical fiber
* Instrumentation Engineer
  + deals with the design of measuring devices for pressure, flow and temperature. This involves a deep understanding of physics
* Computer Engineer
  + deals with the design of computers and computer hardware

**What is the workplace of an Electrical Engineer like?**

Electrical engineers usually work in a lab, an office, a mine or in industrial plants. An electrical engineer usually can pursue a technical career in any industry. They usually supervise computer programmers, electricians, scientists and other engineers. A typical work week is composed of 40 hours although there might be some overtime to meet deadlines.

An electrical engineer also spends a lot of time doing project management, such as meeting with clients, determining budgets and preparing project schedules. Engineering projects usually require written documentation, so strong writing and communication skills are important.

**What is the difference between an electrical engineer and a computer engineer?**

Both electrical engineers and computer engineers are involved in developing and enhancing nearly every aspect of our lives, and are in demand by a wide range of industries. Electrical and computer engineering are very close, and are built around the same core subjects. Each major represents an area of study, and these areas overlap - there is no finite end of electrical engineering and start of computer engineering, or vice-versa.

Electrical engineering students have required courses, such as power systems and energy conversion, semiconductor devices and circuits, and electromagnetic fields and waves. Computer engineering students have required courses in software systems and software engineering, digital system design, and microprocessor interfacing.

**Where can an electrical engineer work?**

An electrical engineer can work in a variety of engineering industries: Aerospace, Automotive, Chemical, Construction, Defence, Electronics, Consumer Goods, Marine, Materials & Metals, Oil & Gas, Pharmaceuticals, Power Generation, Rail, Telecoms, and Utilities. Electrical engineers can work for corporations, non-profit organizations, or government agencies. They can also become managers, patent attorneys, professors, or work in the financial sector.

**Can an electrical engineer become a good programmer?**

Electrical engineers are exposed to computer programming early on, as they need to take introductory programming coursework as part of their electrical engineering curriculum. An electrical engineer has the choice of avoiding all but the introductory programming courses if learning how to code is not something that is of interest. But some students decide to double major in electrical engineering and computer engineering, as many of the courses are the same. If programming is pursued, one of the biggest advantages an electrical engineer has is his/her hardware background, which gives the engineer a clear understanding of what the computer is capable of doing.

**Civil Engineers**

Civil engineers design and supervise the construction of infrastructure such as roads, buildings, tunnels, airports, dams, bridges, and water supply and sewage systems. One of the oldest of the engineering disciplines, civil engineering encompasses many specialties, including structural, water resources, environmental, construction, transportation and geotechnical engineering.

A civil engineering degree program applies mathematics and physical science to solve specific, real-world problems in commerce and industry. A strong civil engineering program typically emphasizes the practical use of geometry, trigonometry, and calculus in conjunction with physics, material science, and chemistry. Online degree programs in civil engineering, primarily available at the master's level, allow experienced students and professionals to learn advanced theory.

Civil engineers work as part of a team with a wide range of backgrounds and often use theory and models to predict how a design will perform. They generally test ideas in the field using scale mockups, so they can prove new design theories without endangering lives or jeopardizing project budgets.

**Civil Engineering Careers**

Firms providing engineering consulting services, primarily developing designs for new construction projects, employ a little over half of civil engineers Almost a third of work in federal, state, and local government agencies. The construction and manufacturing industries accounts for most of the remaining employment. Approximately 12,000 civil engineers are self-employed, many as consultants.

Due to general population growth and an expanding economy, more civil engineers will be needed to design and construct higher-capacity transportation, water supply, pollution control systems, and large buildings and building complexes. They will also be needed to repair or replace existing roads, bridges, and other public structures. There may be additional opportunities within non-civil engineering firms, such as management consulting or computer services firms.

**Jobs for Civil Engineers**

Civil engineers are employed primarily by government departments, utilities, architectural firms, builders, and engineering firms. There are also career options available in education and consulting. Civil engineering is far from your average desk job. Engineers are often on the move, working outdoors at construction sites, sometimes in offices, and sometimes in research labs.

Civil engineers work in all parts of the country, and some spend their entire careers traveling and working on different projects. About half of civil engineers work for public authorities. In the private sector, civil engineers can work not only for traditional engineering firms, but also for telecommunication businesses, consulting firms, or even toy and athletic equipment manufacturers. A variety of engineering specialties are open to qualified graduates:

* **Transportation engineers** work with local and regional planning boards to identify areas of growth and development. They also look for opportunities to alleviate traffic snarls. Once they understand the needs of drivers in a region, they design plans and develop cost estimates for construction projects.
* **Structural engineers** work with architects and builders to assure that steel and other material used in construction projects exceeds the needs of a given project. With advances in technology and an abundance of creative new building materials, today's structural engineers work on a wider variety of projects than ever before.
* **Geo-technical engineers** help builders excavate underground projects and work with experts who manage challenging land renewal projects. When cities want to expand their underground mass transit systems, they call in geo-technical engineers to oversee the tunneling. As more developers erect skyscrapers and other large buildings in urban centers, geo-technical engineers assure that the bedrock can safely sustain the pressure of new structures and the people they will support.
* **Hydraulic/Hydrology/Water Resource engineers** redirect water to benefit residents and businesses in a community. They construct canals to speed up shipping while preserving the natural flow of wild fish through a region, and build dams that generate vital electricity while opening up potential new parcels of land for development. Some hydraulic engineers design pipelines that safely transfer fresh water to remote areas, allowing new communities to thrive.
* **Wastewater engineers** help improve both our environment and our economy by helping communities and businesses dispose of waste without polluting natural water sources. Until very recently, factories and refineries dumped their industrial waste into rivers and streams (some still do, though it's now illegal).Today, wastewater engineers develop sewage treatment plants that can remove waste products from water, returning pure water to streams and reservoirs.
* **Environmental engineers** are in astonishingly high demand as developed countries finally address the climate change crisis. Environmental engineers work closely with business leaders and government officials to institute new air pollution standards that reduce harmful emissions from factories without negatively impacting industrial output. Environmental engineers also examine the quality of our soil, ensuring that harmful toxins do not seep up through the ground and contaminate crops, animals, businesses and homes.
* **Compliance officers** work in both corporate and government settings to ensure that local and federal laws are observed in the construction, maintenance, and operation of all kinds of facilities. Compliance officers working in the private sector help their employers prepare for upcoming inspections by anticipating and eliminating sources of pollution or substandard construction. In-house compliance officers simulate visits from official inspectors, saving their companies significant amounts of money through their proactive approach.
* **Construction managers** use their engineering and leadership skills to ensure that building projects are completed on time and under budget. Construction managers must coordinate the efforts of teams of engineers and laborers to meet tight production schedules. They are often the most visible hub of connection between architects, developers, and construction specialists.
* **Government and urban planning** engineers often use a combination of skills and specialties to coordinate public works and private construction in their communities. Traditionally, government planning engineers forged relationships with state agencies that would provide funding or construction of major projects. Local planning engineers would help residents understand the potential environmental impact of new highways or infrastructure projects.

More recently, local governments across the country have strengthened their internal planning systems and hired more engineers. By creating comprehensive land development plans as part of their long-range strategies, cities and towns can position themselves to benefit from explosive growth without succumbing to overwhelming demands on water systems or roads. When residents manage engineering issues internally, they retain more control over the shape and the scope of development in their communities.

**Chemical Engineer**

Chemical engineers use chemistry, physics, and math along with engineering tools to solve problems relating to the production and use of chemicals. This includes things like refining gasoline and other fuels from petroleum, purifying of drinking water, treating waste, recovering raw materials, and producing and processing food. They can work in chemical manufacturing, electronics, pollution control, even medicine and food processing.

**Education**

Chemical engineers need a four-year college degree. Most have degrees in chemical engineering, although some have specialized degrees in biochemical, petroleum, metallurgical, or sanitation engineering.

**Lifestyle**

Most chemical engineers work in manufacturing industries, in research and development labs, productions plants, or management. Some provide engineering services as consultants in research and testing, design, or policy. The environment and hours that they work varies with the industry and kind of job.

**Skills**

You can be a Chemical Engineer, if you:

* Want to keep getting better at things
* Can think creatively
* Can work on a team or alone
* Can be focused and patient
* Enjoy big challenges
* Can use and remember important facts and details
* Are interested in computer modeling

**A Chemical Engineer could…**

* Design environmentally friendly cleaning products
* Develop chemotherapy that has fewer side effects
* Turn seawater into drinking water
* Develop ways of mass producing vaccines to ward off epidemics
* Reduce pollution by developing cleaner sources of energy
* Create chemicals which help preserve the shelf life of food and drink
* Identify ways in which oil, petrol and other fuels are refined in order to reduce pollution
* Work with communities to make unclean water safe for human consumption
* Generate material coloring agents which can be used in the production of clothing
* Help electrical engineers to seek new ways of generating energy
* Work with pharmaceutical companies to develop new drugs
* Support the IT hardware industry to develop processor chips
* Develop materials for use in the off-shore industry.
* Develop new products for use in the pest control to prevent the spread of disease
* Get involved in the creation of domestic products such as cleaning materials.

**Chemical Engineers solve challenges like…**

* How to prevent the spread of disease in remote parts of the world
* How to ensure that food remains fresh for longer
* Those in the fire service by creating clothing with heat resistant properties
* Environmental challenges such as transforming light in to solar energy
* Worthy challenges of making plastic bags biodegradable
* Landfill issues and ways to transform waste into reusable energy
* How vehicle manufacturers can produce more fuel efficient and less polluting vehicles
* Utilizing varied chemical compositions to create cheaper and more effective drugs
* Creating cleaning agents which are less toxic and hazardous to the health
* Making food colorings which are natural in their composition and therefore healthier for consumers

**Chemical Engineers apply the principles of…**

* Mathematics
* Algebra
* Physics
* Chemistry
* Biology
* Production
* Material Sciences
* Aerodynamics
* Mechanical engineering
* Electrical engineering

**Types of Jobs**

**Analytical Chemist**

An Analytical Chemist investigates substances and materials to identify their chemical properties and what they can be used for within the manufacturing process. Example roles might include drugs manufacture and toxicology.

**Energy Manager**

An Energy Manager would be responsible for reviewing different types of energy production to identify issues such as efficiency and cost effectiveness. This may help to reduce carbon emissions and other pollutants.

**Manufacturing Engineers**

Manufacturing Engineers are integral in the supply chain and manage different stages of the production process. It is important to have an understanding of how chemical engineering fits with manufacturing processes.

**Materials Engineer**

A materials engineer is responsible for investigating and testing the properties of a variety of materials for use in the manufacturing process. Materials might include metals, ceramics and wood.

**Mining Engineers**

There are opportunities for chemical engineers to move into mining engineering. In this sector engineers are responsible for understanding the practical implications in locating mines in various regions.

**Production Manager**

A skill set in chemical engineering may result in a career in production management. Candidates are responsible for ensuring the continued production in a factory environment.

**Quality Manger**

With high level analytical skills chemical engineers may choose to follow a quality management route. This type of role would involve inspecting products as they leave the factory to ensure they meet required standards.

**Petroleum Engineer**

A Petroleum engineer is involved in a range of projects along the petroleum supply chain. Whilst ensuring that environmental impacts are low the main aim is to maximize hydrocarbon recovery at minimum cost.

**Process Engineer**

Chemical engineers are employed in process engineering to maximize the potential outputs from a production line and the quality of the end product. They investigate production methods to ensure that they complement the chemical components of products.

**Aerospace Engineer**

An aerospace (or aeronautical) engineer, is someone who designs aircraft, spacecraft, satellites, missiles, and systems for national defense. In addition, they test prototypes to make sure they function according to design. They are employed primarily in analysis and design, manufacturing, industries that perform research and development, and the federal government.

**What does an Aerospace Engineer do?**

An aerospace engineer typically does the following:

* Directs and coordinates the design, manufacture, and testing of aircraft and aerospace products
* Assesses proposals for projects to determine if they are technically and financially feasible
* Determines if proposed projects will result in safe aircraft and parts
* Evaluates designs to see that the products meet engineering principles, customer requirements, and environmental challenges
* Develops acceptance criteria for design methods, quality standards, sustainment after delivery, and completion dates
* Ensures that projects meet quality standards
* Inspects malfunctioning or damaged products to identify sources of problems and possible solutions

An aerospace engineer may develop new technologies for use in aviation, defense systems, and spacecraft. They often specialize in areas such as aerodynamic fluid flow; structural design; guidance, navigation, and control; instrumentation and communication; robotics; or propulsion and combustion.

They can specialize in designing different types of aerospace products, such as commercial and military airplanes and helicopters; remotely piloted aircraft and rotorcraft; spacecraft, including launch vehicles and satellites; and military missiles and rockets. They often become experts in one or more related fields: aerodynamics, thermodynamics, celestial mechanics, flight mechanics, propulsion, acoustics, and guidance and control systems.

**What is the workplace of an Aerospace Engineer like?**

Aerospace engineers work in offices, laboratories, or manufacturing environments for either private companies or the federal government.

The always-evolving field of aerospace engineering is one of the most challenging career paths in the world. Technology is advancing at a rate unparalleled since the Industrial Revolution. Aerospace engineers are at the forefront of that expansion, as they research, design, and develop high-speed transportation vehicles, such as:

* Aircraft
* Spacecraft
* Missiles
* Space stations
* Lunar vehicles

Aerospace engineering majors learn about the analysis, synthesis, and design of aeronautical and aerospace vehicles. Students can specialize in either aeronautics (aircraft design) or aerospace (spacecraft design) at an undergraduate level.

One of NASA's top female aerospace engineers took time to answer questions from students on the NASA website. She explains some of the benefits of her exciting career:

*"My work is different every day, and changes from year to year. This is necessary for me since I get bored easily. The work is challenging (which keeps boredom away). You get to work on things that really make a difference to people; it might be a space instrument to measure atmospheric pollution or an improvement to an aircraft that might ultimately allow the price of an airline ticket to go down.*

*As a NASA aerospace engineer, I get to work on all kinds of projects that are in the news, like shuttle and space station, and everyone on my street wants to know about what I'm doing at work. It is really nice to work on things that people have an interest in, and to work on things that even kids think are interesting (no offense, but high school students are pretty tough critics!)."*

- Jill Marlowe, Head of NASA's Mechanical Design Branch

**Types of Aerospace Engineers**

**Commercial Aerospace Engineers -** A quick check of any travel website will prove that the airline business remains one of America's most competitive industries. With rising fuel costs, increased pressure to reduce CO2 emissions, and growing passenger demand for improved amenities, airlines rely on commercial aerospace engineers to develop innovative, efficient new forms of air travel.

Although many commercial aerospace engineers build aircraft that can stand the test of time, the threat of climate change and increased delay at airports (both problems stemming from too many planes in the sky) are forcing designers back to the drawing board. Therefore, expert design firms invest significant resources into developing new aircraft that meet these needs while allowing for creative repurposing in the future.

**Military Aerospace Engineers –** Military aerospace engineers work hard to develop innovative new tools to combat enemies effectively while minimizing civilian casualties.

In recent years, military aerospace engineers have developed astonishing devices like remote control surveillance aircraft and laser-guided weapons systems. Tools like these allow soldiers to fight wars with less collateral damage on both sides of a conflict.

**Spacecraft Designers -** Job opportunities in this field used to be limited to a handful of potential employers. But advances in technology and worldwide competitions like the X-Prize have revolutionized the space industry. More than ever before, private companies are making plans to send tourists, researchers, and business professionals into space - even if the flights only last a few hours.

Companies like Virgin Atlantic and dozens of smaller countries just launching their own space exploration programs demand more qualified aerospace engineers to (literally) help their ideas get off the ground. Because of the tremendous risks involved, many spacecraft designers spend most of their time working on supercomputer simulations. This new technology significantly reduces expenses for their employers, while assuring the safety for a craft's eventual passengers.

**Engineering, Science and Data Processing Managers -** As aerospace engineering shifts more of its research and development to simulations running on supercomputers, a new breed of data processing managers has emerged to make these simulations more efficient and more effective. By analyzing data flow and deploying state-of-the-art solutions, these specialists can help significantly reduce the amount of time it takes for a new product to reach the market.

In addition, many data processing managers serve as another fail-safe system in major manufacturing operations. They can monitor and report on data that indicate problems with a project, and their background in aerospace engineering provides the skill to participate in the search for effective solutions.

**Inspectors and Compliance Officers -** The safety of passengers and people on the ground depends on the quality work of aerospace engineers and their teams. Therefore, many experienced aerospace engineers serve as inspectors and compliance officers, who enforce a wide range of laws and regulations.

Inspectors work for government safety boards as well as for private companies. In fact, aerospace manufacturers employ many in-house inspectors in order to detect potential faults or violations before an official inspection takes place. A growing number of inspectors work as consultants for smaller companies who want to spread their innovation to the public, but have not yet grown the resources to maintain large, in-house compliance staffs.

**Mechanical Engineers -** Mechanical engineers design, research, and develop tools, engines, and machines, including many of the main and peripheral systems used in aerospace engineering. These systems can be as enormous as a rocket propulsion engine or as small as a warning sensor in a space shuttle.

**Drafters -** Drafters prepare the technical drawings and specification sheets that are used by production and manufacturing personnel to build spacecraft, aircraft, and more. These drawings must be incredibly detailed, encompassing every facet of the craft and including views from all sides.