

DESIGNING THE FUTURE : THE CHALLENGE & EXCITEMENT OF ENGINEERING

What is engineering?

The short answer is that engineering is problem solving. Engineers use their training and experience to find new ways to meet emerging requirements in virtually every field of human endeavor. Engineers build structures, manufacture products, develop new processes and protect the environment. While science is the study of the physical universe, engineering is the application or use of scientific knowledge. Engineers serve society by providing technical ways to meet changing conditions, to accomplish tasks, and to help ensure the public safety. Engineers work in almost every industry. If you travel on it, eat it, wear it, or use it, an engineer was probably involved with making it possible.



CIBA Vision of Duluth, Ga. uses innovative Lighstream Technology™ to manufacture comfortable and affordable disposable soft contact lenses. Ultraviolet light passes through quartz molds to cure a special liquid polymer. Chemical engineers were key to developing the process and to maintaining the high product quality.

Are there different types of engineers?

There are many types of engineers. Engineers usually focus their studies on a particular field of engineering and concentrate in that specialty.

- ✱ Civil engineers work with large structures such as highways, bridges, railroad lines, water and gas pipelines, dams, flood control and irrigation systems, electric power transmission lines, and large buildings.
- ✱ Mechanical engineers work with machines and mechanical parts, mechanical power transmission, compressed air, hydraulic power, manufacturing processes, building structures, heating and ventilation systems, and most of the products that people use every day.



Mines and quarries supply materials used in all modern construction, as well as many everyday products. Mining engineers develop the plans that manage mineral reserves and allow for extraction in a socially and environmentally sensitive manner. Pictured is Vulcan Materials Company's granite quarry in Norcross, Georgia.

- ✱ Electrical engineers work with electricity, electrical power transmission, electrical circuits, electronic communication, process controls, and electronic devices
- ✱ Chemical engineers work with chemicals and with tanks, piping, reaction vessels, machines and structures to carry out chemical processes on a large industrial scale. These chemical processes use heat, mechanical treatment, and chemical reactions to change the properties of materials, to separate substances or to make new products. Many chemical engineers work in the petroleum, plastics, drug, food, fertilizer, metal, mining, and power generation industries.



Georgia Power's Plant Bowen, located near Cartersville, Ga., is one of the country's top electricity-producing power plants. The four coal-fired units supply power to Georgia over 500kv high-voltage transmission lines like shown here.

- ✱ Industrial engineers work with organizing people, information, activities, plants and warehouses, work processes, and capital investments to complete tasks efficiently, economically, and safely, with the desired level of quality.
- ✱ Nuclear engineers work with radioactive substances and processes. Nuclear engineers are employed in the power generation, medical, and environmental fields.



Biomedical engineer tests new heart valve surgical product using a machine to simulate the heart beating at 25 times normal rate. CryoLife, Inc., Kennesaw, Ga.

- ✱ Manufacturing engineers plan, manage, and maintain production methods and processes in many different industries. These professional men and women apply organizational principles and wide ranging cross-discipline manufacturing know-how. They select the suitable processes for cost effective manufacturing and to solve day-to-day problems.
- ✱ Agricultural engineers work to improve the production of crops and livestock.
- ✱ Environmental engineers bring together skills from many facets of engineering to protect public health by designing and building facilities to remove and treat pollutants in the environment or to prevent the discharge of harmful substances into the land, air, and water.



This 83 per minute poultry cutup machine was designed by a team of American and Dutch Mechanical Engineers. Used worldwide, these machines are manufactured by Stork PMT in Holland & Stork Gamco Inc. of Gainesville, Ga

- ✱ Computer and software engineers develop computers systems and programs to gather, analyze and present data, and to control processes.
- ✱ Aeronautical engineers work with aircraft and spacecraft.
- ✱ Metallurgical, ceramic, and material engineers work with the formulation and properties of metal, non-metal, and composite materials.
- ✱ Biomedical engineering is the relatively new discipline of developing devices and methods for the medical field.

There are many other engineering specialties.



Mechanical and Electrical engineers developed this high-speed soft drink 3-liter bottle-filling machine, Atlanta, Ga.

Can you match the type of engineer with its common abbreviation?

Mechanical Engineer	_____	CE
Electrical Engineer	_____	EE
Civil Engineer	_____	ME
Industrial Engineer	_____	AgE
Agricultural Engineer	_____	ChE
Chemical Engineer	_____	IE



Aeronautical Engineers design aircraft and oversee the fabrication and assembly. 400 engineers and 1,600 other Lockheed Martin employees in Marietta, Ga. build twelve C130 military cargo planes per year.

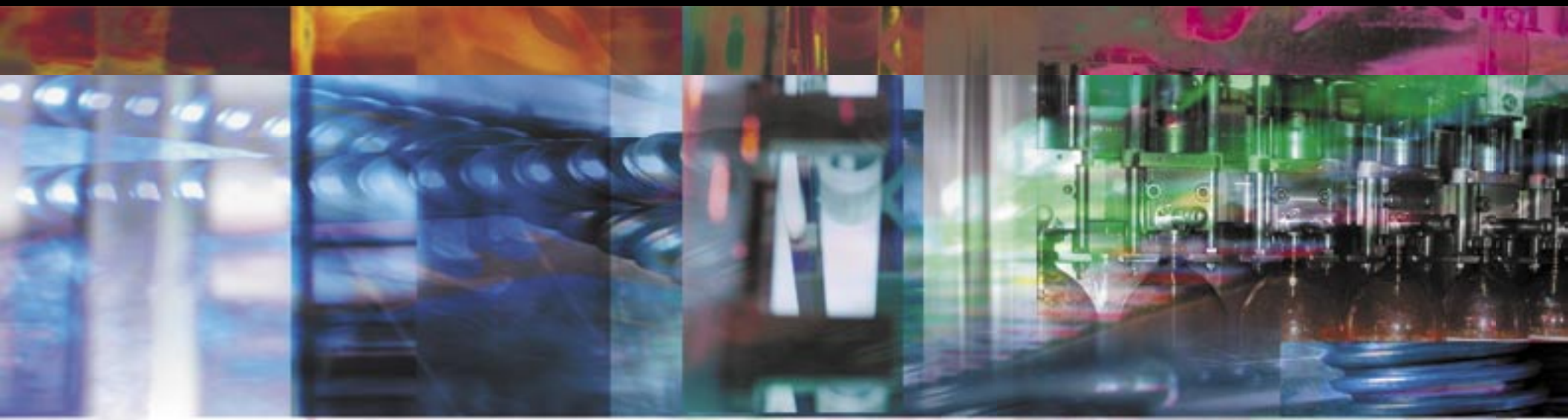
What do engineers do?

Many engineers design things such as bridges, machines, and the things you buy. Other engineers develop the methods for constructing and manufacturing those things. Many engineers work in sales. Engineering training can be applied to managing manufacturing processes and managing companies. Most engineers work for companies. Some engineers work as consultants, supplying engineering services.



Sparks fly as Industrial and Manufacturing Engineers set up an automatic computer controlled welding robot at General Motors Assembly Plant, Doraville, Ga

THE FUTURE



ENGINEERING

Is engineering a good profession?

Engineers are professionals. For many men and women, engineering is an honorable, challenging, rewarding, and satisfying career. Engineers are also well paid.



Biomedical Engineers develop materials and methods and also train surgeons to perform knee injury arthroscopic repair. CryoLife, Inc., Kennesaw, Ga.



Electronic Engineers help make Motorola a leader in portable energy systems for critical applications and for products such as your cell phone. Motorola, Lawrenceville, Ga

What does it take to be an engineer?

Engineers must be logical thinkers and problem solvers. Engineers typically go to college for four years to earn a Bachelor of Science degree in an engineering discipline. The subjects include mathematics, sciences, engineering courses, and how to apply these to find solutions.



Operators man Georgia Power's Plant Vogtle nuclear power plant control room around the clock. The 2,320 megawatts capacity nuclear power plant is located near Waynesboro, Ga.



Mechanical Engineers designed the machinery, Electronic Engineers designed the circuits to control each bag's weight, and Industrial Engineers designed the machine placement and the product flow to package Cheetos® at more than 1,800 pounds per hour. Frito-Lay Corporation, Dallas, Tx.

What is a professional engineer?

Professional Engineers are licensed by a state board. To be licensed as an engineer, you typically must complete an accredited engineering degree, have four years of engineering experience, pass two eight-hour long tests on engineering principles, and complete continuing education each year. Professional engineers are required to work to a high standard of competency, responsibility, and ethical behavior. Engineers willing to meet these standards are permitted to say they are a "Professional Engineer" or a "Registered Professional Engineer." They may use the letters PE after their name.

Why is this important?

To ensure the public's safety, every state has a state board that regulates the engineering profession. Engineering is a complex technical field. It is important that engineers be well trained and perform their work in a highly professional, ethical manner. Only Registered Professional Engineers are allowed to advertise or present themselves to the public as engineers. Many engineering projects require that the work be performed under the supervision of a Registered Professional Engineer. This is to ensure that poor engineering will not cause injury or death. Your life and safety have depended on it. Every time you rode in a vehicle, crossed a bridge, entered a building with many other people, been in traffic, used medicines, brushed your teeth, or eaten from a container an engineer made it possible. Think on it, that's how important the work of engineers is to society.



The Sidney Lanier Bridge near Brunswick, Ga., one of America's ten largest bridges, has 485-ft towers and 7,781-ft. total length. This cable-stayed design bridge is an architectural masterpiece of Structural Engineering. It was jointly funded by the State of Georgia and the U.S. Coast Guard.



Industrial Engineers are instrumental in setting up industrial processes, the work steps and facilities to assure efficient and cost effective operations. Parcel hub, UPS, Atlanta, Ga.



Civil Engineers design structures to prevent problems such as this, seen near Atlanta, Ga. Courtesy of Rufus O. Terrill, PE, Terrill Technologies, Inc., Atlanta, Ga



How can I find more information?

To find more information, check with your school adviser or visit the following Web sites:

National Society of Professional Engineers
<http://www.nspe.org/home.asp>

Ga. State Board of Engineers & Land Surveyors
<http://www.sos.state.ga.us/plb/pels/>

For a list of engineering societies
[http://www.sos.state.ga.us/plb/pels/links.htm#Engineering-Related Organizations](http://www.sos.state.ga.us/plb/pels/links.htm#Engineering-Related%20Organizations)
 Institute Of Industrial Engineers <http://www.iienet.org>

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