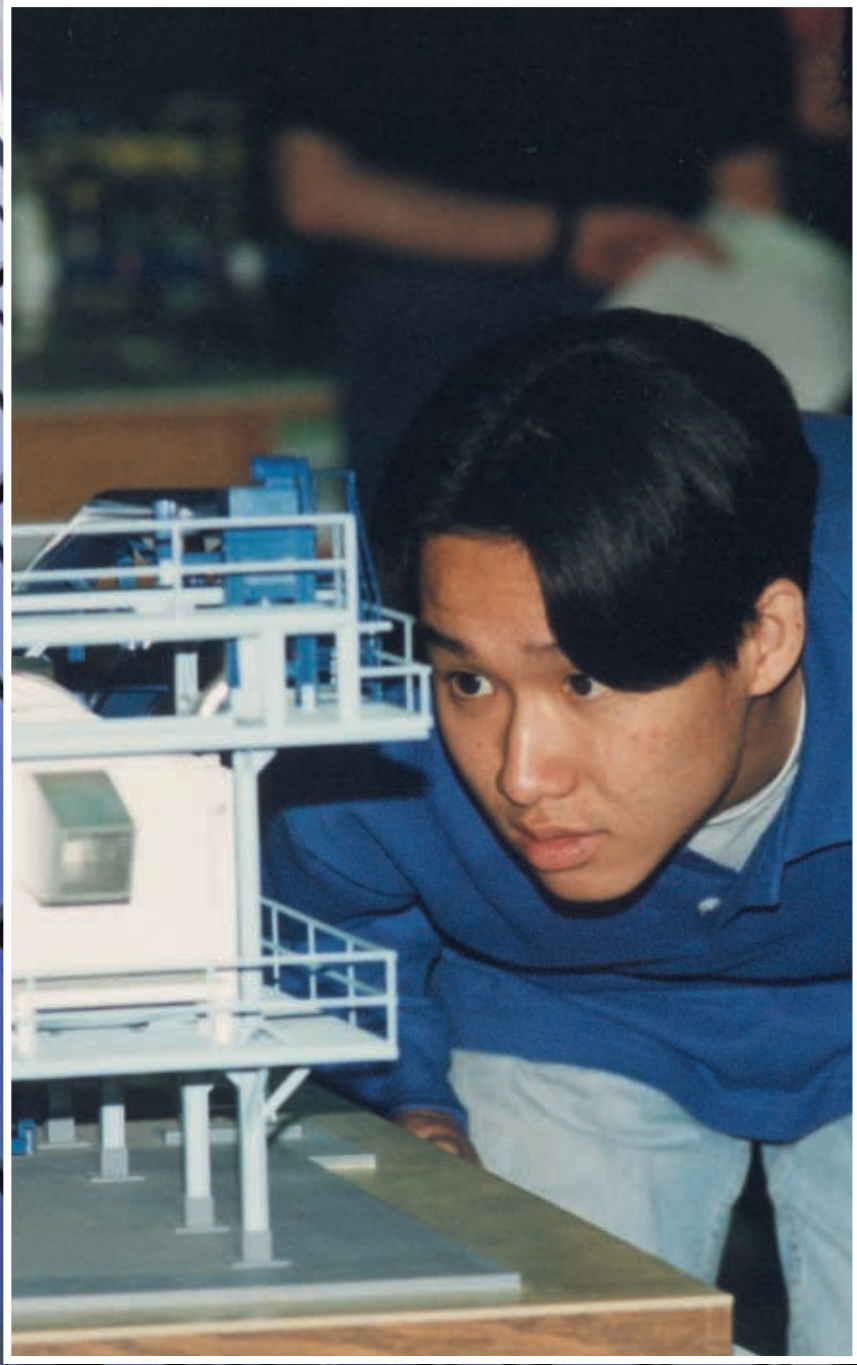


ENGINEERING YOUR FUTURE

a career planning guide in engineering

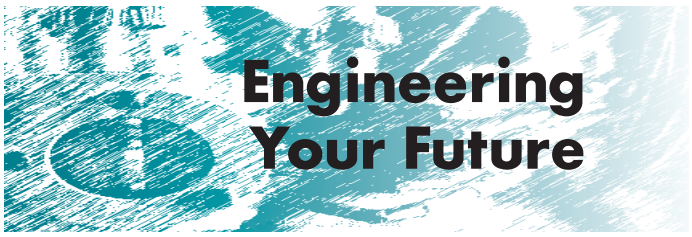


Table of Contents

Engineers make a world of difference

Engineers apply science and math to solve problems creatively.

Without engineers, our modern way of life would not be very modern at all - no television, microwaves, or computers; no sanitation systems, communication systems, or water systems; and no planes, trains, or automobiles.

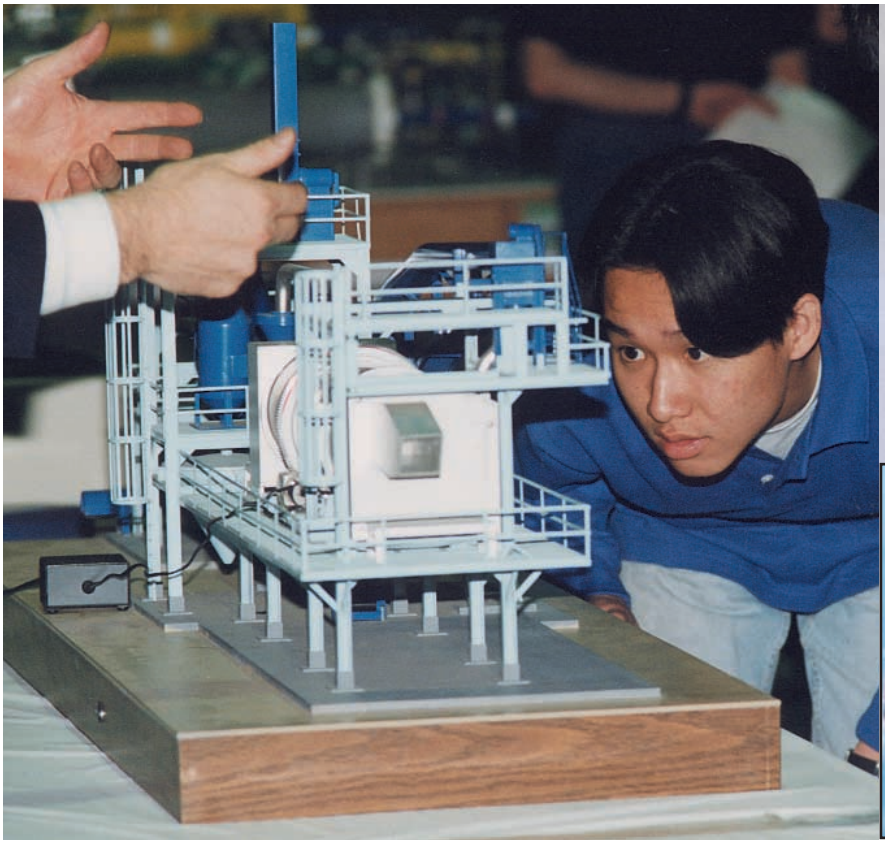
From the clothes we wear to the houses we live in, engineering plays an important part in almost every facet of our lives.

Electrical engineers design audio equipment such as CD players and communications equipment such as cellular phones. The rapid transit systems in our cities are constructed by civil engineers. Mechanical and naval architectural engineers design deep sea submarines. Chemical engineers develop fertilizer for our gardens and farms, and give us the colourful clothes we wear. There are dozens of other types of engineers who contribute to developing and maintaining the technology that supports our daily lives.

Engineering is an occupation that traces its roots to the beginning of recorded history. Engineers created the pyramids of Egypt, and the network of roads and aqueducts of ancient Rome. The sailing ships that explored the four corners of the world were designed by engineers. In war times, military engineers built fortresses, roads and bridges.

Today and tomorrow

As technology and science have advanced over the centuries, so have the branches of engineering. Now there are dozens of specialty areas in engineering - something for every interest. Some engineers search for new sources of energy, some design artificial limbs, while others work to protect our environment. Engineers design everything from toys to sophisticated medical diagnostic equipment. New specialty areas are emerging every day to meet the specific demands of industry.



Engineers direct the forces and resources of nature to create better goods and services. They work to make life better; to create a world that is cleaner, safer and healthier.

Engineers are needed all over the world, and as global markets expand and many developing countries move toward industrialization, the demand for engineers will increase.

The right stuff

Engineers solve problems. They direct the forces and resources of nature to create better goods and services. They work to make life better; to create a world that is cleaner, safer and healthier.

Many people think of engineering as numbers and logic, but engineering is an art as well as a science. Engineers need to have a strong aptitude for math and sciences but they must also be creative.

Apart from technical abilities, engineers must have good communication skills, as they are often part of a team or work with other professionals and non-technical staff. Many engineers also require project management skills to ensure staff are supervised effectively and the project is completed on time and within the budget.

Engineers use their imaginations as well as their technical expertise to solve problems. They must be patient, determined individuals with a capacity for details. Engineers must be able to work with people - other engineers on their team, other professions, and people in the community.

The way the engineering team functions has changed, managers are looking for people with ideas, people who can think on their feet. And clients are interested in hearing from the project engineers, not just the senior managers. People skills and communication skills are very important to have.

Jack Fujino, P.Eng.
Vice-President, Stanley Associates Engineering Ltd.

Engineering is an occupation that traces its roots to the beginning of recorded history. Engineers created the pyramids of Egypt, and the network of roads and aqueducts of ancient Rome. The sailing ships that explored the four corners of the world were designed by engineers.

The benefits

The demand for skilled, applied scientists such as engineers, is increasing. In fact, Canada has fallen behind in meeting the world demand for such professionals. Although engineering can suffer as much as any other profession from economic cycles, it is perhaps less vulnerable because it provides a wide range of skills and knowledge.

Engineering offers numerous opportunities to travel around the world, to experience new cultures and meet new challenges. In recent years for example, engineers in many specialty areas were needed to build the tunnel under the English Channel, to deal with the fires that were the aftermath of the war in Kuwait, to develop a goldmine in South America, and to measure the impact of the Aswan Dam on the river Nile. More often these days, engineers can work on international projects from their home or office thanks to advanced technology.

Starting salaries for engineers are similar to other professions such as lawyers, accountants and architects. With additional training and increased years of experience, engineers can be among the most highly paid professionals.

Planning your future

This booklet is designed to show you the many possibilities a career in engineering can offer, and to help you plan that career. Detailed information is presented on the various disciplines within engineering.

To be admitted to engineering faculties at most universities across Canada and the United States, you require a high school diploma that includes:

English 30	Math 30 and 31
Chemistry 30	Physics 30

Engineers solve problems. They go directly to the bottom line to find out what they have to do to solve the problem. To succeed as an engineer you must be logical in your thinking. You must be able to deduce things from basic principles, to find solutions.

Hassan Hamza, P.Eng., PhD Chemical Engineering, Research Manager, Natural Resources Canada (federal government)

A minimum entrance grade point average of 70 per cent is required by most schools of engineering. However, that may vary from school to school. Further, engineering is a highly competitive field of study. Competition for entrance and limited enrolments usually require a higher average. Once accepted into a university, programs of study in engineering are demanding and require a commitment to hard work. In most cases, university first-year programs are general study courses. You do not have to decide on your area of specialization until the second year.

This booklet provides information on traditional engineering programs - chemical, mechanical, civil, and electrical - as well as specialized or emerging disciplines such as computer, environmental and biomedical engineering. Many of the specialized disciplines are not entered through specific undergraduate programs but rather through work experience or a combination of work experience and post graduate training. Pursuing a career in one of the "big four" or traditional disciplines is not limiting and in fact can open doors to other specialized fields.

In Canada, geography also plays a role in planning for your engineering career. In various regions you'll find an emphasis on different engineering disciplines. For example, in Alberta, oil and gas, soil, mining, and chemical engineers are needed, as well as engineers in expanding electronics and manufacturing sectors. In Central and Eastern Canada, there's a large manufacturing industry, so mechanical and industrial engineers are needed.

Information on accreditated engineering programs is listed in the back of this booklet. College transfer information is listed separately in the back of the booklet as well. If you wish to attend universities in other provinces, check directly with them for detailed requirements.

Read on and consider the world of possibilities in engineering.

Aerospace Engineers

What do aerospace engineers do?

Aerospace engineers are involved in the research, design and production of aircraft, spacecraft and aerospace equipment, satellites, and missiles.

The work done by aerospace engineers has resulted in improvements in performance for commercial and military aircraft, the development of robotic systems in spacecraft such as the Canadarm on the space shuttle, and advances in communications and broadcasting. There are at least twenty branches of engineering involved in the aerospace industry.

Aerospace engineers may have training in mechanical, metallurgical/materials, electrical, computer or other disciplines as well as post graduate training.

Aerospace engineers work in one or more of a number of engineering specialty areas:

- Aerodynamics engineers. These engineers work with the forces that affect flight vehicles in motion. Using computers and wind tunnels, they develop and design spacecraft, rockets and aircraft.
- Design engineers. Working with aerodynamics engineers and other specialties, design engineers study propulsion systems, analyze stability, structure and materials and design new aircraft and spacecraft. The designs are translated into detailed drawings, specifications, and standards with the help of computer design systems.
- Experimental engineers. These specialists work with prototypes, or models, and test the performance of proposed designs under a variety of conditions.

There are at least twenty branches of engineering involved in the aerospace industry.

- Materials engineers. Here, engineers select materials to be used in manufacturing all parts of aircraft and spacecraft. They look at high strength-to-weight properties and resistance to heat and cold. They advise on the application, salvage and substitution of materials.

A career in aerospace engineering

Opportunities exist in the commercial sector in designing new aircraft, communications equipment, and aerospace products as well as with the Department of National Defense and National Research Council. With continuing developments in space flight, the demand for space flight and advanced technology aircraft will continue to grow. The passage of the North America Free Trade Agreement may mean increased opportunities as new industries develop.

The work done by aerospace engineers has resulted in improvements in performance for commercial and military aircraft, the development of robotic systems in spacecraft such as the Canadarm on the space shuttle, and advances in communications and broadcasting.

Agricultural Engineers

Agricultural engineers look for solutions to problems involving utilization of plants and animals and the natural environment. Agricultural and bioresource engineers integrate conventional engineering topics, engineering design, and applied biological sciences in their work.

Historically, agricultural engineers have provided engineering for crop and animal production on the farm. That continues, but the scope of practise is widening to include land and resource management, environmental issues, machinery for non-traditional crops, bio-energy development, and value-added processing of biological materials.

What do agricultural engineers do?

Agricultural engineers work in laboratories, offices and may travel to farming areas. Their work may include:

- Soil and water conservation
- Power supplies
- Farm machinery design, testing machines and equipment
- Layout and design of agricultural buildings and utilities
- Developing drainage and irrigation systems
- Designing food processing plants

A career in agricultural engineering

With the increasing global awareness of meeting critical human needs in agricultural, food, biological and environmental systems, opportunities will be available designing environmental control systems, land management alternatives, buildings and environment control for plants and animals.

Agricultural engineering covers crop and animal production, land and resource management, environmental issues, machinery for non-traditional crops, bio-energy development, and value-added processing of biological materials.

Biomechanical Engineers

For those who are interested in the application of engineering and the human body, a career in biomechanical engineering may be of interest.

Biomechanical engineers work in a variety of areas ranging from the design of mobility devices to improving athletic performance. Biomechanical engineers also work with scientists, researchers, physicians, and other professionals to develop better diagnoses and treatments for medical conditions. For example, they may work with orthopaedic surgeons to study spinal and joint injury, or study movement and loading of the human body to improve shoe design.

What do biomechanical engineers do?

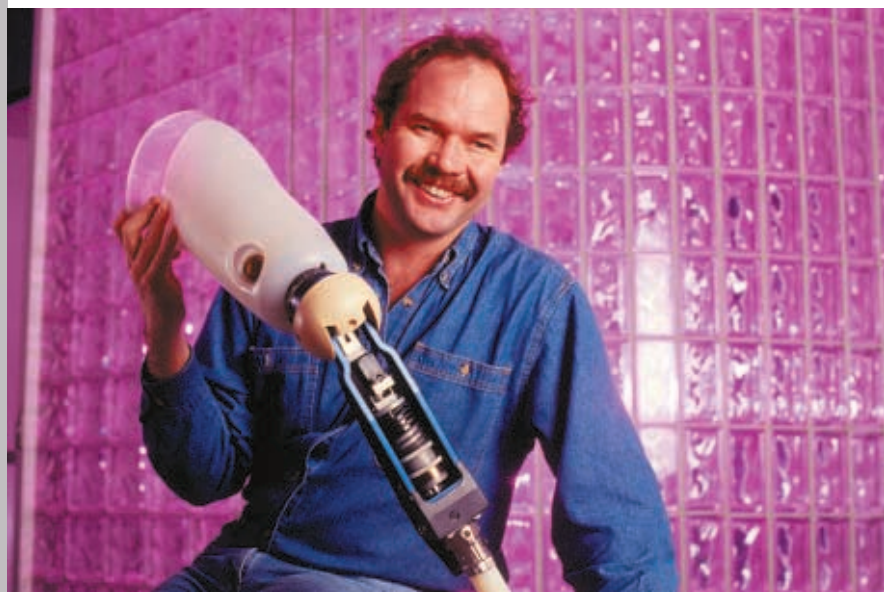
Biomechanical engineering combines the discipline of mechanical engineering with human anatomy and physiology. Work in this area may involve designing prosthesis such as artificial limbs using computer aided design and manufacturing (CAD/CAM) techniques, development of techniques to assess and understand the biomechanical mechanisms of bone, muscle and joint injuries, development of movement systems for people with spinal injuries, ergonomic design and production of equipment for safety and comfort, or development of improved athletic techniques and equipment for high performance sports. Biomechanical engineers were involved in the design of special incubators used to safely transport premature infants to hospital in the middle of winter.

A career in biomechanical engineering

Biomechanical engineering is one of three specialty areas within biomedical engineering. The other two are biochemical (artificial organs, effects of disease on bodily processes) and bioelectrical (diagnostic equipment, signal processing). Biomedical engineers may have undergraduate degrees in mechanical, chemical, computer, electrical, or other degrees as well as post-graduate training in biomedical engineering.

This field of engineering involves multidisciplinary interactions between medical and sports sciences. Biomechanical engineering is emerging as one which may offer many possibilities for the future graduate. These engineers work as designers, researchers, managers, in health care, government, and colleges and universities.

Biomechanical engineering combines the discipline of mechanical engineering with human anatomy and physiology. Work in this area may involve designing prosthesis such as artificial limbs using computer aided design and manufacturing (CAD/CAM) techniques.



Chemical Engineers

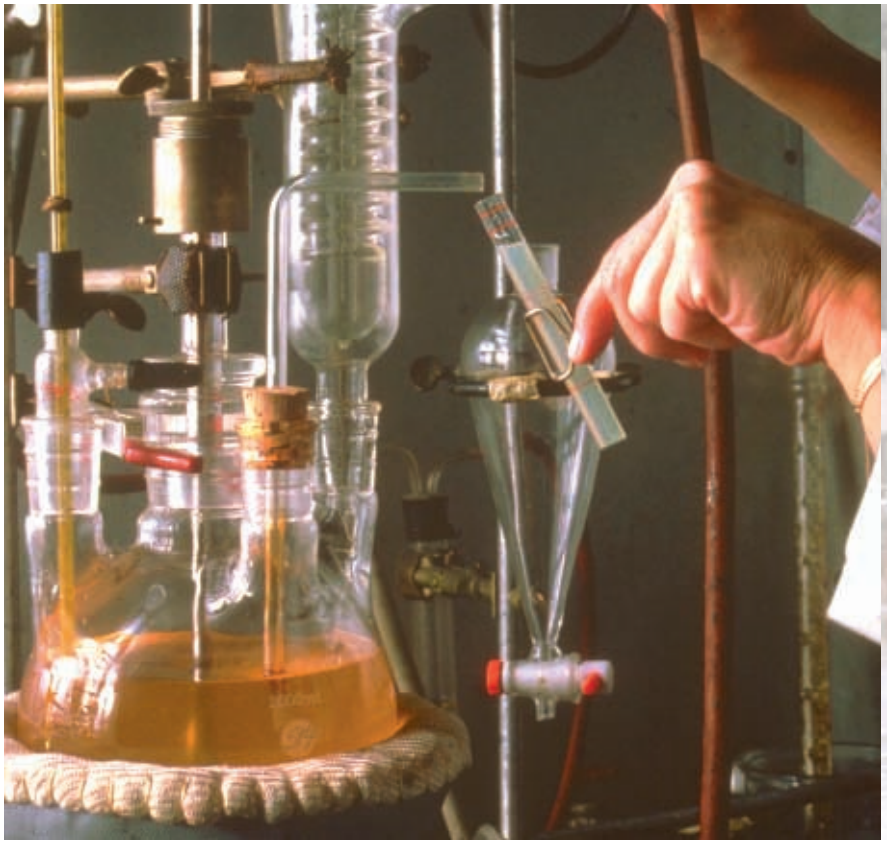
What do chemical engineers do?

Chemical engineers apply principles of chemistry, mathematics, physics, and economics to the design and operation of industrial equipment and methods to manufacture chemical products.

They work wherever industrial chemical transformations occur — industries which produce oil and gas, nuclear energy, biotechnology, synthetic materials, food processing, and environmental protection. The fibres in clothing, dyes that colour the cloth, soaps and detergents, dry-cleaning chemicals, leather, paints and varnishes, paper pigments, pharmaceuticals, fertilizers, refined petroleum products, pesticides, plastics, and even semi-conductor chips are designed and produced by chemical engineers.

Chemical engineers convert laboratory experiments into full scale industrial operations capable of producing tonnes of material on a daily basis. There are five areas in the production of chemical products where chemical engineers provide significant contributions:

- Process Research. In this area the chemical engineer conducts experiments, compiles data, and consults with scientists and other specialists regarding new developments and improvements in the production of chemical products.
- Process development. Here, pilot plants are used to test the technical potential of new processes and concepts. In the pilot plants, chemical engineers work toward improving methods and equipment by analyzing ways of minimizing time, cost, hazards and environmental impact. They also conduct process modelling to trouble shoot problems.
- Design engineering. In this specialty, engineers design equipment and processes. Chemical engineers in this area are concerned with the implications of the processes they develop, the safety of the staff, and the



The growing complexity and automation of chemical processes and the greater demand for chemical products, will increase the need for chemical engineers to design, build, maintain and manage the necessary plants.

preservation of the environment, while attempting to manufacture the product as economically as possible.

- Plant operations. Here, the chemical engineer supports the work of the technical staff who operate the equipment and machinery. They supervise the industrial processing and ensure standards for testing, inspection, efficiency, safety, production and environmental safety are maintained.
- Biochemical engineering. This specialty deals with the application of chemical engineering principles (thermodynamics, transport phenomena, and reaction kinetics) to biological processes. Such processes utilize enzymes or micro-organisms to produce a wide variety of useful products including biopharmaceuticals. The biochemical engineer is involved in the design and operation of suitable fermenters/bioreactors as well as downstream processing (product purification).

Chemical engineers may also specialize in advanced materials process and process control, engineering management, environmental engineering, petroleum and natural gas, or polymers.

A career in chemical engineering

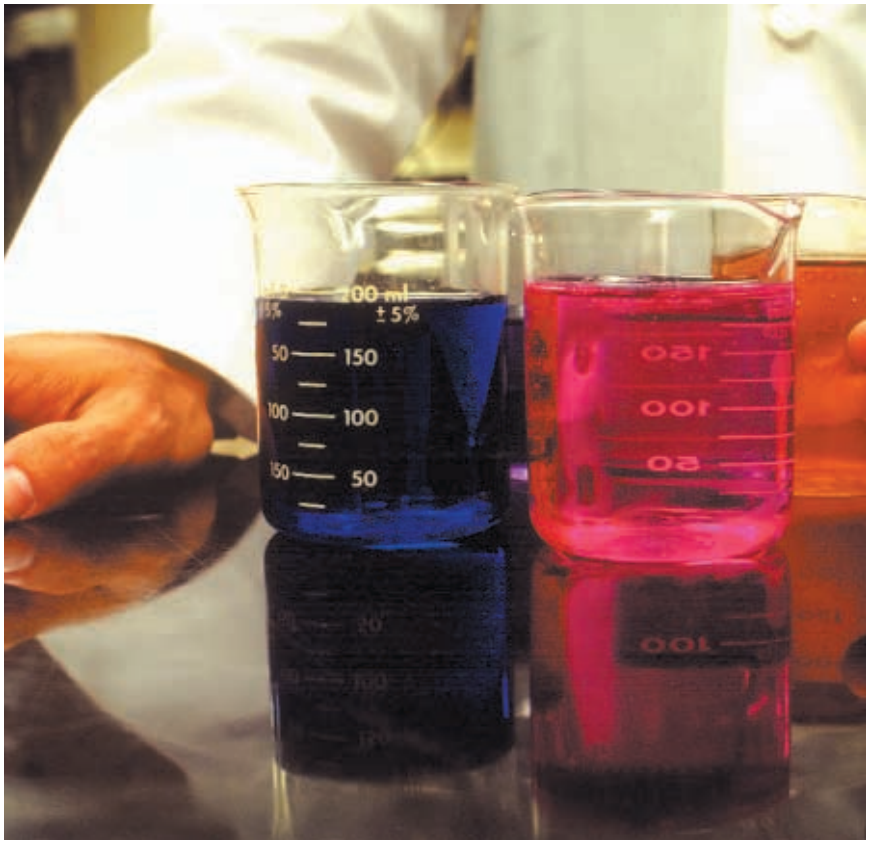
The growing complexity and automation of chemical processes and the greater demand for chemical products, will increase the need for chemical engineers to design, build, maintain and manage the necessary plants.

Chemical engineers are generalists in a specialized field. Their training enables them to feel at ease wherever their work takes them — to refineries, pharmaceutical and plastics plants or pulp and paper mills.

It is also a changing profession. Chemical engineering is expanding, incorporating aspects of the sciences of biology, computer science, electronics and botany.

Chemical engineering is one of the most versatile of the engineering disciplines because it covers so many areas. You can work in mining, municipalities, chemical plants, anywhere. Engineering is very exciting. You see the results of your work materialize almost immediately. You don't get that in many professions.

Hassan Hamza, P.Eng., PhD Chemical Engineering, Research Manager, Natural Resources Canada (federal government)



Civil Engineers

What do civil engineers do?

Civil engineers use principles of materials science, structures, water resources engineering, geotechnical engineering, transportation planning, and solid mechanics to create structures and systems.

Civil engineers are involved in the design, construction, and management of highways, railways and transit systems, airports, harbours, bridges, tunnels, canals, irrigation schemes, and buildings. Civil engineers also ensure the availability of high quality water supplies and sewage treatment facilities.

Some of the specialty fields of study in civil engineering are:

- Water resources engineering. This area of expertise is concerned with solving problems associated with the control and safe, sustainable use of water.
- Structural engineering. As the name implies, structural engineers plan and design all kinds of structures including bridges, buildings, containment facilities and towers. Analyzing the forces that each structure must resist, these engineers work to produce a safe and economical structure.
- Transportation engineering. These engineers plan, design, construct and operate street systems, highways, railroads, airports, and harbours.
- Geotechnical engineering. The properties of soil and rock are the province of these engineering specialists. They evaluate the potential settlements of buildings, the stability of slopes and fill areas and analyze landslides, seepage of groundwater and the effects of earthquakes. Working with structural engineers, geotechnical engineers help in the construction of dams, tunnels and the foundations of buildings.

Soil is a really interesting material to be working with because it is so variable. Different soils behave in different ways – some carry loads very easily while others don't. In my career I also get to interact with other engineering and science disciplines to create solutions to problems.

Sue Evison, P.Eng.
Sr. Geotechnical Engineer, Jacques Whitford and Associates Ltd.

- Construction engineering. Construction engineers are team leaders who ensure that projects are completed safely, on time and within budget. They use their knowledge of engineering and management to plan and execute projects.
- Municipal engineering. These engineers specialize in systems that support urban centres; designing and building power grids, water treatment and waste management systems, and transportation networks.

A career in civil engineering

In Canada, civil engineers form the largest proportion of the engineering workforce. This discipline offers a virtually unlimited range of career opportunities in construction and material management to satisfy individual interests, aptitudes and goals. It may also serve as a transition to other fields like surveying (geomatics), mining, or environmental engineering. A career in civil engineering may involve teaching, research, consulting, contracting, and management.

A career in research provides the civil engineer with the opportunity to examine a vast spectrum of problems ranging from geo-environmental engineering to material science. Recent developments in modern methods of designing civil engineering structures have spurred a growth in computer use. In this area, a career in civil engineering may lead to prominent fields such as computer aided design and computational mechanics.

Work in this field may take you around the corner or around the world.

In Canada, civil engineers form the largest proportion of the engineering workforce. This discipline offers a virtually unlimited range of career opportunities.

Computer Engineers

What do computer engineers do?

Using their knowledge of computer software programs and hardware, these engineering specialists design, develop and maintain computer systems.

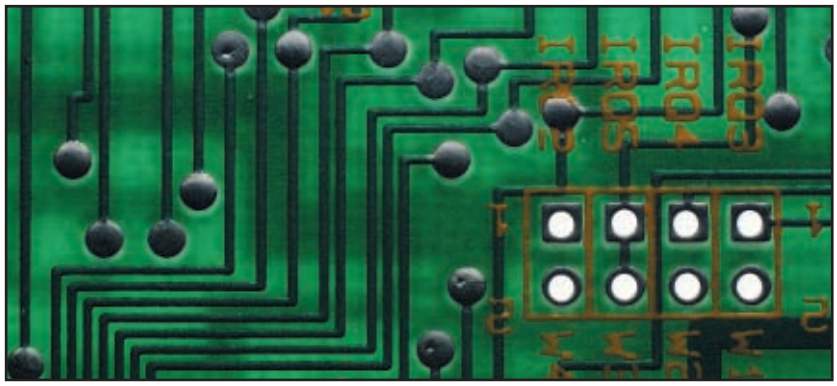
Computer engineers work in a wide variety of areas such as software applications, microelectronics, hardware applications, telecommunications, digital signal processing, power systems and instrumentation.

Computer engineers may be responsible for:

- Analyzing user needs and recommending appropriate computer systems.
- Analyzing operating system problems and making modifications.
- Developing "embedded" products, that is, computer technology that is part of a larger project.
- Implementing information technology to support business enterprises.

Although computer engineers make decisions based on their knowledge of both hardware and software, they may specialize in one area or the other. Software engineers write programs, modify existing programs to correct errors, adapt programs to new hardware, and create programs to increase performance. They test and validate programs and install and maintain them.

Hardware engineers develop design specifications for computer systems. They assemble and test equipment for specific functions. Hardware engineers also build prototypes of products including logic and digital circuit designs.



A career in computing engineering

Computers are part of almost every industry and service sector, and computer engineers are employed to design, test, program and maintain those computers. They may work in telecommunications, research, consulting, governments, hospitals, and manufacturing.

A degree in computer engineering is only the beginning for those who choose this exciting field. Computer technology is developing at a rapid rate, and engineers must constantly update their skills to keep up with the increasing advancements in computer technology.

Electrical Engineers

What do electrical engineers do?

Electrical engineers direct electrical phenomena to useful purposes.

Electricity lights our homes, helps us to cook our food, and powers the many household appliances we use to make our lives easier. Electricity also powers our factories and refineries. Electrical engineers are involved in every stage of generation or production, transmission, distribution and the application of that electrical energy. They also work in the area of low power electricity that is the basis for telecommunications, television, and computer technology.

They may specialize in power systems, electronics, telecommunications, analog and digital signal processing, integrated circuits, microwaves, fibre optics, computers, lasers, microprocessors, radio astronomy, and biomedical engineering. Within each of these specialty areas, electrical engineers could be involved in:

- Research. Studying electrically-related problems and conducting experiments on various electrical events. They evaluate the results to resolve practical problems and real situations. For example, experiments in the use of lasers have led to advances in laser surgery in medicine and dentistry.
- Application design and technical sales. Electrical engineers use processes and components that are already available to develop new products to meet individual client needs.

Electrical engineers may specialize in power systems, electronics, telecommunications, analog and digital signal processing, integrated circuits, microwaves, fibre optics, computers, lasers, microprocessors, radio astronomy, and biomedical engineering.

- Production and manufacturing. Electrical engineers working in this area determine appropriate methods, materials, and equipment. They test procedures to be used in the production of safe, economical and high performance electrical products and services.
- Systems analysis and design. Using computers, electrical engineers design electrical generation and transmission systems. They create and maintain systems that transmit data over long distances. They work to improve telephone and telecommunications systems using advances in solid state, microwave, fibre optic and satellite technology.

A career in electrical engineering

Electrical engineering is one of the larger specialties in engineering, offering a wide range of options for employment. Engineers may work in power supply industries developing such things as hydroelectric power stations. They may create systems for buildings that control lighting, power, communications, security, heating and ventilation. They may design diagnostic imaging equipment or work in telecommunications, aeronautics, computer applications, space technology, automation, or electronics. From microwatts to megawatts, electrical engineers have a world of careers to choose from.

Environmental Engineers

Environmental engineering is an emerging specialty area that has grown in the past few years as the importance of protecting the environment increases. Environmental engineers develop technically and economically feasible solutions to environmental problems. They work to prevent pollution of the environment by designing systems for air and water quality control, vibration and noise reduction, and hazardous waste disposal.

What do environmental engineers do?

A broad range of engineering disciplines come together in this specialized field including civil, chemical, hydrogeological and mining. Individuals currently pursuing environmental engineering are usually trained in one of these areas, followed by additional post secondary or specialized training. Their responsibilities may include: assessing industrial sites to determine if the area is environmentally safe; controlling damage from leaking contaminants; assessing environmental impacts of engineered projects, and researching and developing methods for reducing pollution.

Environmental engineering is concerned with the relationship between organisms and their environment, and designing processes and systems that influence, control and utilize biological material and organisms to minimize environmental impact.

Another aspect of environmental engineering is concerned with the management of water supplies, the best use of groundwater reservoirs, the impact of industrial projects on water systems, and the development of methods to minimize or eliminate pollution. They manage waste treatment and control pollution. For example, they may utilize bacteria to clean up oil spills. Biological engineering can be a platform for study in other specialty areas.

A career in environmental engineering

This is an area of engineering specialization that is likely to expand in the future. Environmental engineers may work in government departments of public works, transportation, or energy, consulting engineering firms, manufacturing industries, oil and gas industries, and research. They may be involved in everything from providing expert testimony in environmental lawsuits to developing a water purification system. Environmental engineers must work closely with many other science professionals. The emphasis is on communication and teamwork.

I lean heavily on my biology background when working on environmental projects, and on hazard and operability assessments I look to my chemical engineering expertise. I studied engineering because it gave me the opportunity to work in areas of interest I otherwise would not have had the chance to.

Nina Novak, P.Eng., B.Biol., an environmental engineer who has dual degrees in engineering and biology

Geological Engineers

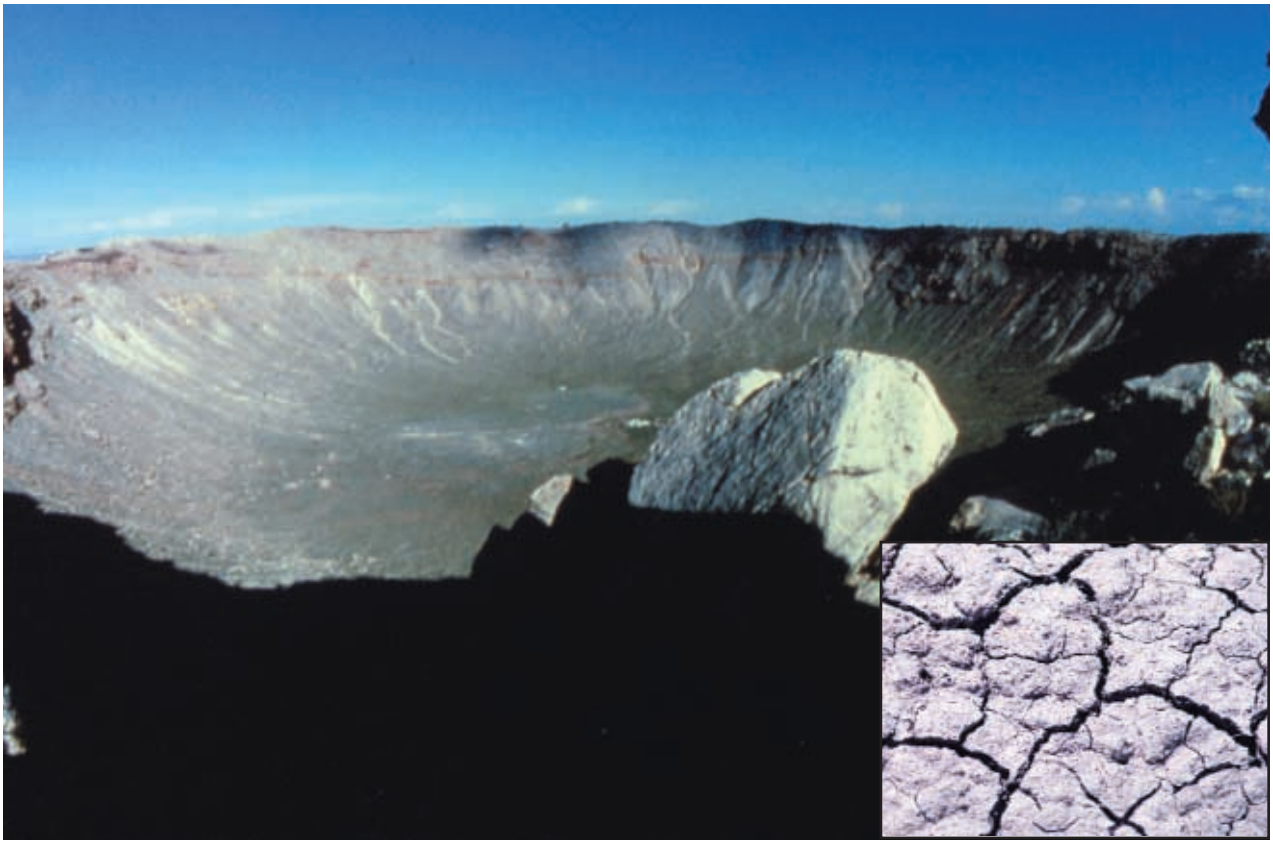
What do geological engineers do?

Geological engineers are civil engineers who apply geological data, techniques and principles to the study of rock, soil, and ground water. They determine the suitability of various locations for buildings, dams, highways, airfields, pipelines and tunnels. Information on settlements of buildings, stability of slopes and fills, analysis of land slides, seepage of groundwater and the effects of earthquakes is also used for the planning, design, construction and operation of these structures.

Geological engineers may specialize in the petroleum and natural gas industries, assisting in the discovery, appraisal, and development of oil and natural gas reserves. They may also specialize in the exploration, discovery and exploitation of mineral resources.

A career in geological engineering

Geological engineers may work in construction, government, research, mining, and oil and gas exploration, including oil sands development, environmental assessment and environmental clean-ups. There is also a growing interest in problems related to permafrost (which affects more than half of Canada's land mass). The demand for geological engineers is considered high and there are a small number of graduates in this field in Canada.



Geomatics (Surveying) Engineers

What do geomatics engineers do?

Geomatics engineers collect and display data about the earth's surface and its gravity fields for such uses as mapping, legal boundary delineation, navigation, positioning industrial sites, and monitoring environmental concerns. Much of their information comes from the complex system of satellites orbiting the earth.

Geomatics engineers help airlines navigate, position offshore rigs, and help to align high precision industrial machinery. Global (satellite) positioning systems have assisted in environmental and seismic research particularly in California.

Specialized areas in surveying engineering include:

- Geodesic engineers or global surveyors, who establish a global net of reference points, determine basic reference surface for heights, and measure variations in the earth's gravity field.
- Land surveyors, who are concerned with boundaries. They survey land which could be a single lot, a municipal subdivision, or an aboriginal land claim.
- Precision survey engineers, who determine the exact survey controls for construction of bridges, highways, dams, and mines. They also conduct precise surveys for placement and alignment of industrial machinery.
- Photogrammetry and remote sensing engineers, who undertake overall planning and mapping projects using aerial photography and other digital remote-sensing techniques.
- Spacial information engineers, who create databases that provide different types of information for use in urban planning, land use studies, or resource exploration.

A career in geomatics engineering

More than two-thirds of geomatics engineers work in such areas as computer-based information systems, navigation and positioning, mapping, digital imaging, and oil exploration. Others pursue careers in land surveying, research, or teaching. Employment opportunities exist world-wide for geomatics engineers. Graduates of this program also have strong computer skills which provides flexibility in career choices.

Geomatics is a science you can visualize. It involves math and computers and you can see its application in the community.

Elizabeth Cannon, P.Eng., PhD, The University of Calgary

Industrial/ Manufacturing Engineers

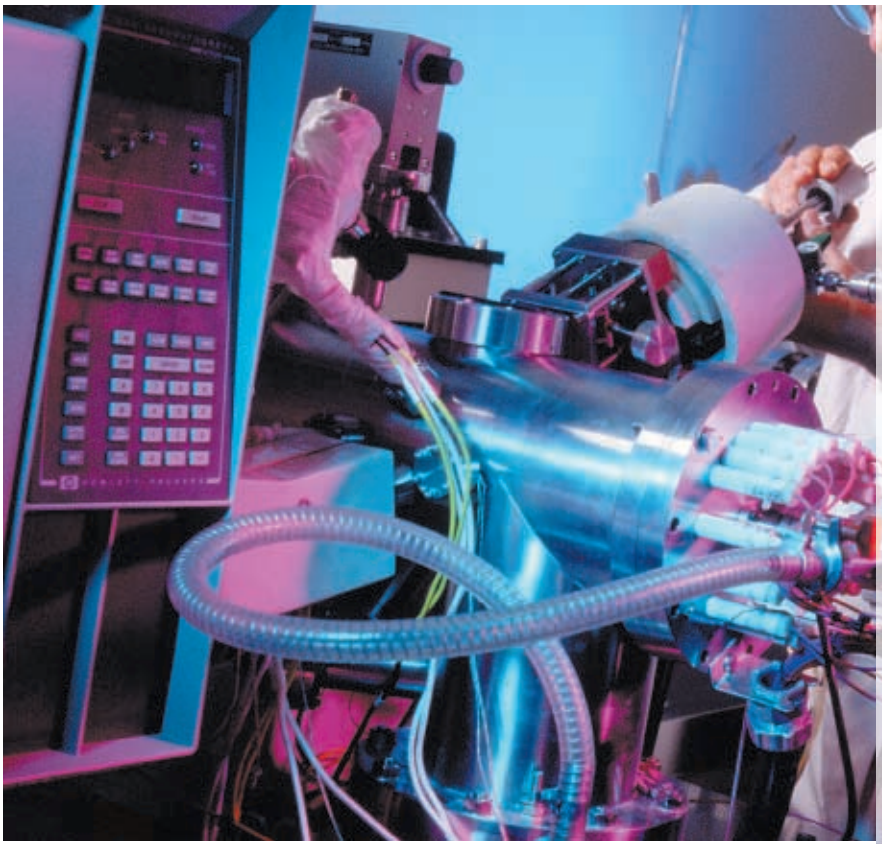
Industrial/manufacturing engineers use their expertise in equipment, materials, procedures, human resources, and production methods to assist organizations to improve their efficiency, effectiveness, and productivity.

Industrial/manufacturing engineering is a very broad field, encompassing wide-ranging skills and knowledge. All of the factors involved in production - economic, environmental, psychological, social and technological - are integrated to address problems in business organizations. Industrial engineers are concerned with the management side of operations while manufacturing engineers focus on the manufacturing process.

What do industrial/ manufacturing engineers do?

The specialty areas within industrial/manufacturing engineering are:

- Facility layout and design. These engineering specialists are concerned with the suitability of proposed sites for facilities in terms of availability of staff, transportation systems, water supplies, and costs. These sites may be new or existing facilities. As the name implies, they also advise on interior layout, placing of equipment, creating work stations, and shipping and receiving.
- Production planning. These specialists work with equipment, work methods, and production systems to improve the production capacity of a plant. They collect and analyze information, develop, compare and test alternatives, and recommend which methods or equipment should be used, to improve productivity and efficiency.

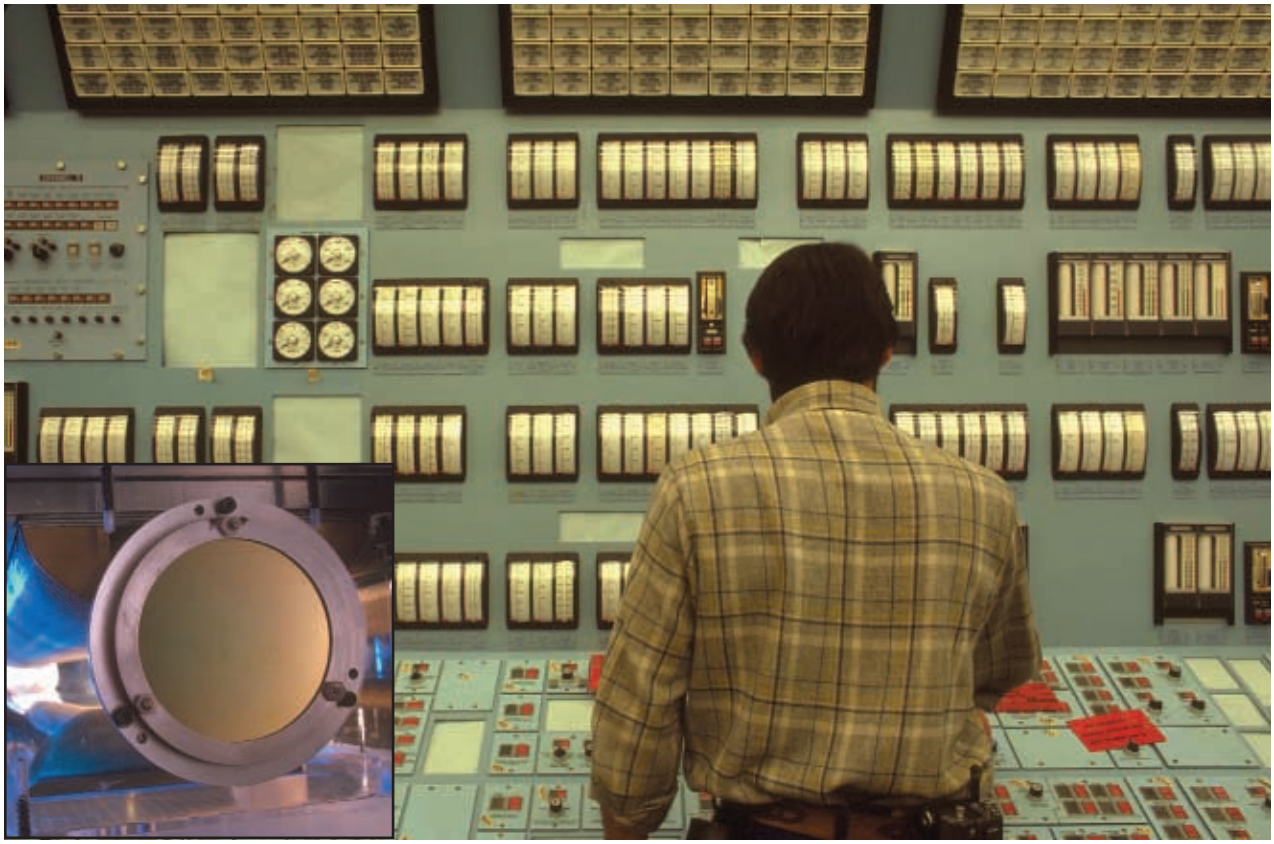


Because the field of industrial/ manufacturing engineering is so broad, industrial engineers may work in almost any industry; for example, in management consulting firms, food processing plants, health care facilities, auto manufacturers, or banks.

- Logistics systems. These specialists study the flow of production from the purchase of raw materials to the final product. They are involved in such tasks as inventory development, transportation systems, and facility planning.
- Management and operations. These engineers focus on work flow patterns, material flow, paper work and quality assurance. Their interest is in all components of production - labour, equipment, information and materials. An increasingly important component of this area of specialization is business and economic studies with an understanding of supply and demand.

A career in industrial/ manufacturing engineering

Because the field of industrial/manufacturing engineering is so broad, industrial engineers may work in almost any industry; for example, in management consulting firms, food processing plants, health care facilities, auto manufacturers, or banks. These engineering specialists play a key role in keeping companies competitive. They also play a role in introducing new technologies, materials, and methods to industry. With the ongoing advances in automation and the need for companies to keep their costs in line, the demand for industrial/manufacturing engineers will likely increase.



Mechanical Engineers

Mechanical engineers use the principles of mathematics, material science, physics, and economics to design, manufacture, and maintain mechanical equipment.

The products of mechanical engineers surround us and provide many of the comforts in our lives. Our household appliances, heating systems, cars, ships and airplanes have been designed, tested and manufactured by mechanical engineers.

Mechanical engineers design machinery and production equipment, develop new manufacturing processes, analyze the dynamics and vibrations of mechanical systems and structures, plan and manage projects, and design heating, ventilation and air-conditioning systems. More specialized areas of work include acoustics, aerodynamics, combustion, energy conservation, environmental engineering, biomechanical engineering, materials science, and robotics.

What do mechanical engineers do?

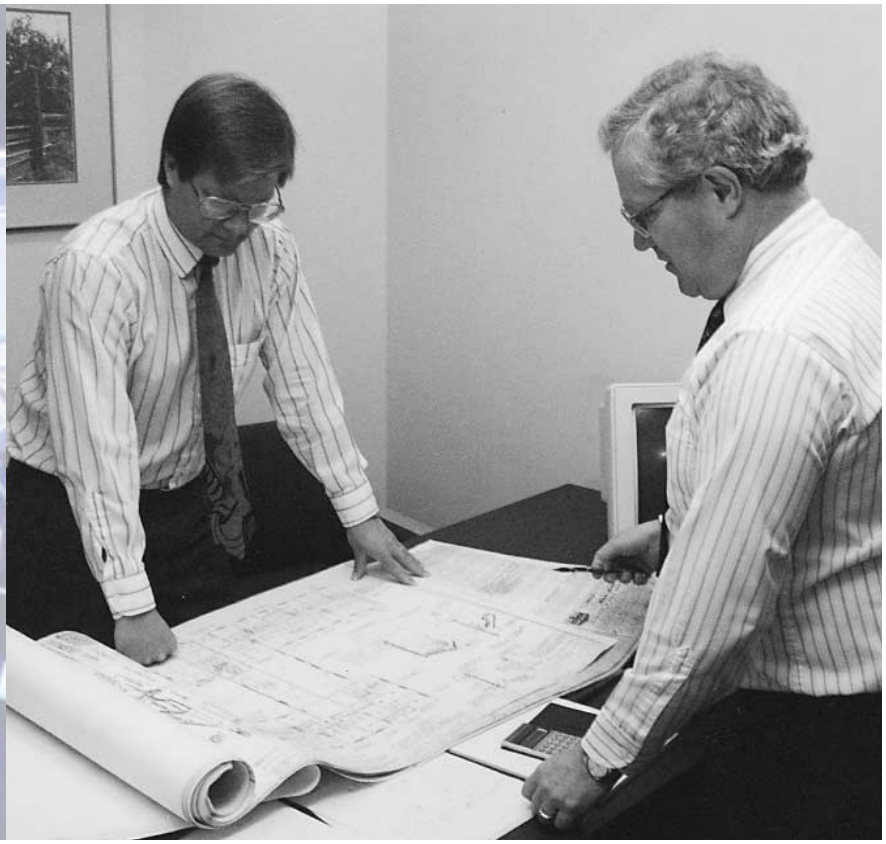
There are three main areas of focus in mechanical engineering:

- Applied mechanics and strength of materials. This area evaluates the effect of applied forces on an object. The affected object may move (statics and dynamics), vibrate (vibrations), transfer energy, deform permanently (plasticity), or deform temporarily (elasticity).
- Thermoscience. Thermoscience is based on the principles of fluid mechanics (the motion of gases and liquids under the action of applied forces) and heat transfer. Mechanical engineers use these principles to design mechanisms that add or remove energy from fluids and gases, such as compressors, engines, pumps, heaters, and fans.

Applied mechanics and strength of materials evaluates the effect of applied forces on an object. The affected object may move, vibrate, transfer energy, deform permanently, or deform temporarily.

The mechanical side of engineering has changed more and become more demanding than any other aspect of building engineering. Just to stay on top of what is happening with new equipment and new ways of doing things is one of the challenges of engineering today.

Greg McPhee, P.Eng., Mechanical Engineer, Associate, Cheriton Engineering Inc.



- Mechanical design. This area uses the principles of applied mechanics, strength of materials and thermoscience to design mechanical systems, equipment, products, and components. The design process would include mechanical analysis (vibration, stability, etc.), and testing and development.

Mechanical engineers may work in research, developing new engineering principles and applications. They may be design engineers who create new machines and instruments, or development engineers who test and improve products. Mechanical engineers may focus on manufacturing, planning and developing the processes to produce quality products economically. They may also focus on technical sales, or management.

A career in mechanical engineering

Mechanical engineering is one of the broadest fields of engineering, providing many opportunities for employment.

Mechanical engineers have been involved in projects in outer space (the Canadarm) and in the ocean depths (deep sea submarines). From the extremely high temperatures of the steel blast furnaces in Hamilton to the offshore drilling in the Beaufort Sea, the designs of mechanical engineers must be efficient, safe, and reliable.

Some mechanical engineers work in the oil and gas industry as drilling, reservoir or pipeline engineers. Others have chosen careers in manufacturing or environmental engineering. In addition, new fields are emerging such as robotics, waste management, and biomechanics.

Metallurgical/ Materials Engineers

What do metallurgical/ materials engineers do?

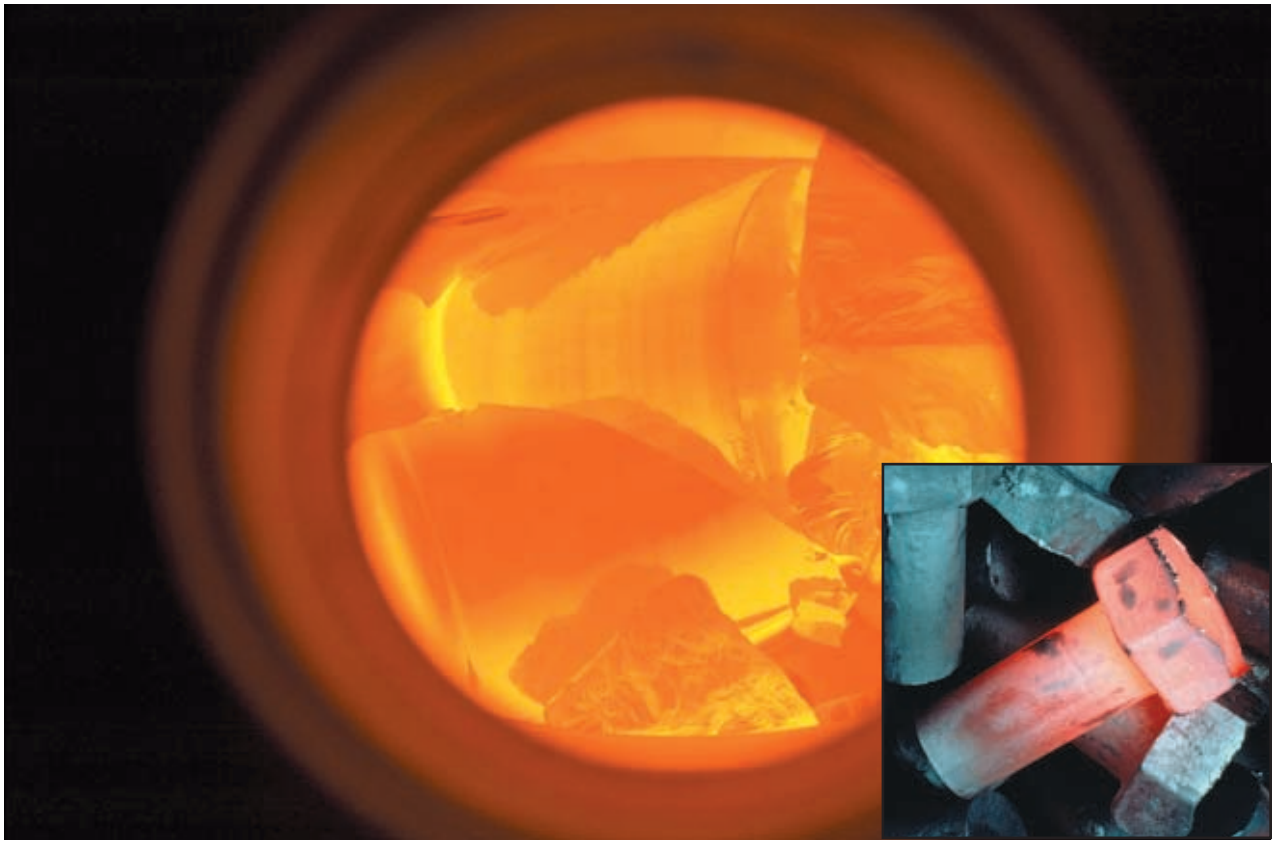
Metallurgical engineers study the properties and characteristics of metals and other materials. They research, develop and monitor the processes for extracting metals from ores, develop new alloys and metals to meet specific requirements, and produce metal and non-metal products. They resolve problems such as the interaction of molten metal with brick furnaces, or the failure of thin-film circuit elements in microelectronic components.

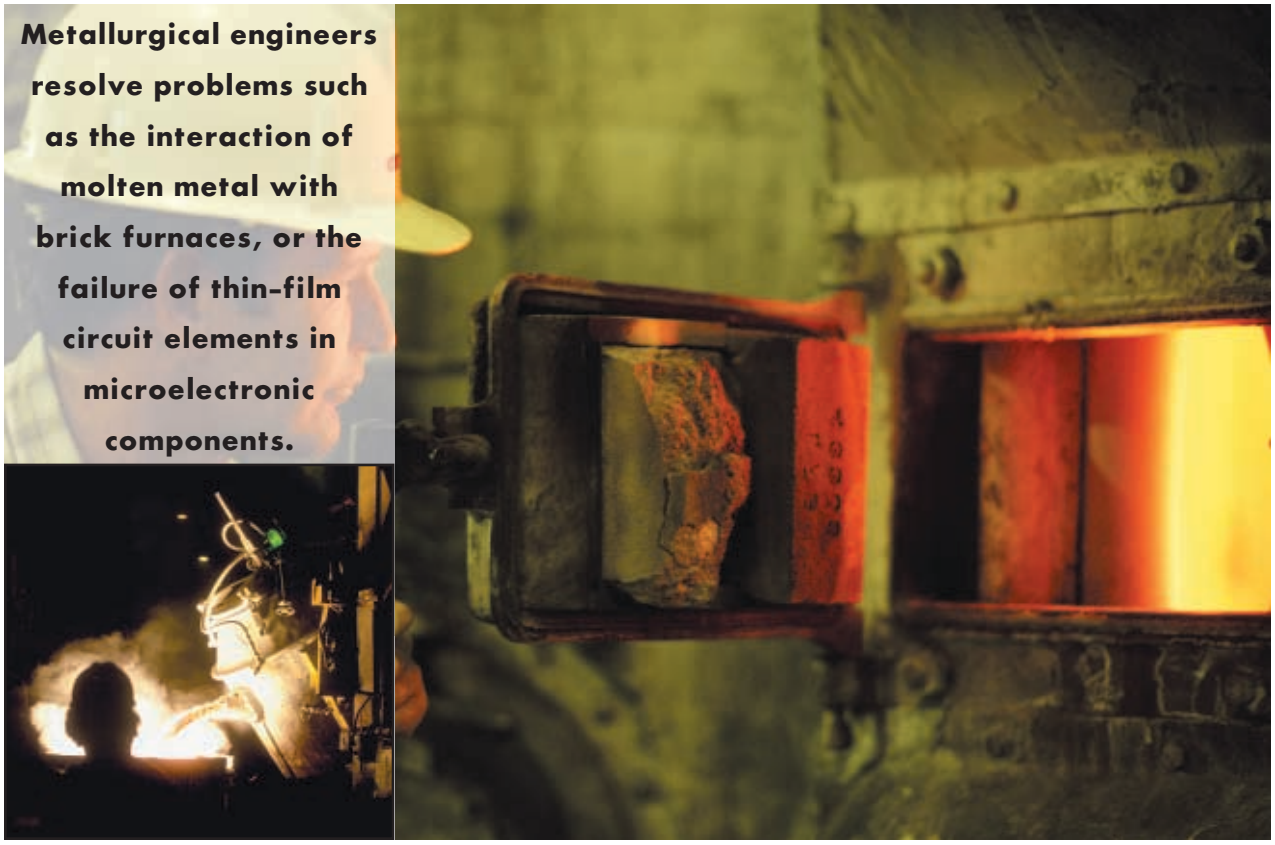
Materials engineering is the study of non-metallic materials (semiconductors, synthetic organic polymers, ceramics, and composites). Also known as fuels and materials engineering, this branch of specialization takes scientific principles established in mathematics, physics and chemistry and applies them to various problems or needs in society. For example, materials engineers developed industrial ceramics such as Korel and Pyrex, and the protective coating on the space shuttle.

In addition to courses found in most chemical engineering programs such as fluid flow, heat and mass transfer, and chemical processes, this specialization has courses relating to materials, organic chemistry, fuels, combustion processes, conversion of fuels into thermal or electrical energy, electrochemical and nuclear processes.

There are three types of metallurgical and materials engineers:

- Extractive engineers, who obtain pure metals through various extractive and smelting.
- Physical engineers, who are specialists in the nature, structure and physical properties of metals and alloys.





Metallurgical engineers resolve problems such as the interaction of molten metal with brick furnaces, or the failure of thin-film circuit elements in microelectronic components.

- Materials engineers, who evaluate technical and economic factors to determine which of the many metals, plastics, ceramics or other materials is best suited to a particular need.

A career in metallurgical/ materials engineering

Metallurgical engineers work for primary metal producers, large fabricators of metal, research bodies, aircraft manufacturers, or business and engineering consulting firms. They may also be employed by petroleum, chemical and manufacturing industries.

Materials engineers work with raw materials such as metallic ores and ceramic powders, converting them into substances that have useful properties. They work with polymers that are used in plastics, rubber, fibres, films and composites.

This occupation is considered to be very sensitive to changing economic conditions. However, the search for new metals and new uses for present materials can result in growth in the demand for metallurgical engineers. Further, metallurgical engineers may find opportunities to transfer from one field to another throughout their careers.

Mining Engineers

What do mining engineers do?

Mining engineers discover, extract, and prepare minerals from the earth's crust to be used by manufacturing and energy industries. This involves exploration, testing, mine design and construction, equipment, operations and management.

Areas of study in mining engineering include surface and underground mining, materials handling, blasting ventilation, rock mechanics, mineral processing and mining economics. In their work, mining engineers may ascertain the size of ore beds and determine if the ore can be extracted economically, develop plans for the location of shafts, tunnels and chambers, plan underground openings, open-pit layouts, mine ventilation systems and drainage systems, supervise mine workers and ensure adherence to safety rules.

A career in mining engineering

Mining engineers find employment in all phases of mine operations as well as technical sales, teaching, and research. They may work for governments, equipment manufacturers, mining companies, consulting companies or engineering contractors.

Mining is a cyclical industry and the demand for mining engineers varies to a degree on the availability of natural resources and the price of these and other resources world-wide. For example, the opportunities in industries will be affected by the price and availability of natural gas or nuclear energy versus coal. The demand for mining engineers is also affected by new discoveries. As new alloys are discovered and new uses for metals increase so will the demand for mining engineers.

In their work, mining engineers may determine if the ore can be extracted economically, develop plans for the location of shafts, tunnels and chambers, mine ventilation systems and ensure adherence to safety rules.

Petroleum Engineers

What do petroleum engineers do?

Petroleum engineers work in the exploration, recovery, development and processing of oil and gas. Their skills cover an array of disciplines including geology, chemical, mechanical and civil engineering.

Petroleum engineers are involved in:

- Determining the best location for drilling new wells.
- Determining the economic feasibility of developing new oil and gas fields.
- Assessing development costs.
- Operating oil and gas facilities.
- Monitoring and forecasting reservoir performance.
- Utilizing enhanced oil recovery techniques (eg. steam, water, gas, miscible solvents, chemical additives, and fire flooding), that extend the economic life of wells.

These specialized engineers work in conventional oil recovery, heavy oil recovery, oil sands mining, and arctic and offshore exploration.

A career in petroleum engineering

Employment for petroleum engineers exists wherever oil and gas is found, as well as in many urban financial institutions. Many graduates find employment in Alberta while others look overseas for jobs - particularly in the Middle East and Asia Pacific. Petroleum engineers work for major and small oil companies, production and service companies, engineering consulting firms, banks and government agencies.

The opportunity for employment for this field directly depends on the world price for oil and gas and fluctuates with the cyclical nature of this industry. It is possible that the number of opportunities may increase because of increased activity and new and innovative applications in this area.

Petroleum engineers work in conventional oil recovery, heavy oil recovery, oil sands mining, and arctic and offshore exploration.

Other Engineering Disciplines

The field of engineering includes many other specialty areas in addition to those listed on the previous pages. Some of these disciplines are studied at an undergraduate level, while others are at a post-graduate level. They tend to represent highly specialized fields of study and because of that, enrolment is limited and competitive.

The engineering specialties described here are only some of the many options available. Students of engineering may select other avenues of specialization by choosing options in their areas of interest once they have completed required courses, and through varied experience.

Engineering Physics

Engineering physics is a specialization for those who wish to acquire a more extensive background in mathematics and physics. Students must have a high standing in these subjects.

Building on courses in basic sciences and electrical engineering, the program moves into a more intensive study in specialized areas of electrical engineering. Elective courses include lasers, plasma technology, microelectronics and electromagnetics, microwave, and high vacuum. Graduates of this program are well positioned to move on to post-graduate studies.

Naval Architectural Engineers

Naval architectural engineers conceive, design and construct ships, offshore structures and other marine vehicles.

The specialty of naval architectural engineering has evolved from an art to an interdisciplinary approach covering a number of high technology sciences. Naval architectural engineers have knowledge of several disciplines and expertise in one of the basic areas of structural, hydrodynamic, or marine systems design.

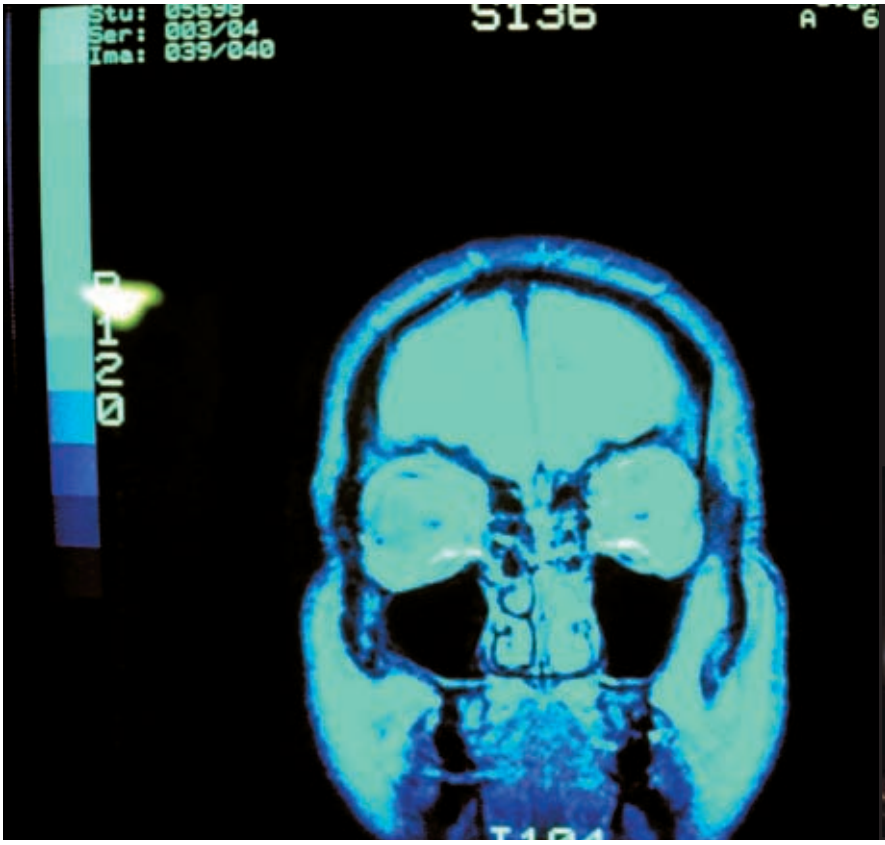
Naval architectural engineers work in wide variety of fields covering the many aspects of marine services. They may work in design, shipbuilding, boatbuilding, research, fisheries, transportation, national defense, or the oil and gas industry.

Engineering Science

Graduates of engineering science develop skills in systems design along with a high level of scientific knowledge. The goal of this program is to have innovative engineer scientists who have entrepreneurial skills and attitudes, and are attuned to new technologies. Students follow the same program for two years then chose an option of electrical, computer, systems, or engineering physics.

Careers for engineering scientists include designing and integrating computer controlled machines and devices, designing and analyzing audio and video systems, developing novel electronic systems and devices, designing hardware and software for the computer industry, and medical instrumentation design and analysis.

This is a demanding program aimed at students who prefer theoretical to applied studies.



"The investigative end of Forensic Engineering is really interesting. It's Sherlock Holmes in an engineering context."

Cliff Anderson, P.Eng., Anderson Associates Consulting Engineers Inc.

Forensic Engineers

Forensic engineers examine the mechanical remains from motor vehicle accidents, plane crashes, or train derailments to determine the cause of the incident, prepare evidence for inquiries, and present evidence in court. They study the multiple factors leading up to incidents, and may look at such things as product liability, road design, and vehicle dynamics. Forensic engineers are part detective, engineer, and communicator.

There are no programs of study for this engineering specialty. Rather, it is based on knowledge from a number of engineering specialties such as materials, mechanical, electrical, chemical, and metallurgical engineering, as well as an accumulation of experience. To be successful in this field an individual must have a highly developed sense of curiosity, the ability to think in non-linear terms, and excellent verbal and written communication skills.

Robotics Engineers

Robotics engineers are involved with the design, production, installation and sales of automated systems. These systems are used in a variety of industries such as manufacturing, national defense, and health care. Robotics engineers design systems to accomplish specific tasks. They also purchase off-the-shelf systems, define the task to be done, and match the systems with the needs of manufacturers.

Students of robotics engineering study advanced geometry, control systems, sensing systems, and the social implications of robotics. Robotics engineering is a multi-disciplinary field that requires an undergraduate degree and a firm grasp of electrical, mechanical engineering, and computing science. Individuals who do well in this field must be attentive to detail. They must be creative, tenacious, and patient.

Currently, the only mature market for robotics is manufacturing. Other markets for robotics are still being defined and developed, such as the use of remote control vehicles for military purposes and mining. A few companies conceptualize and design robots for indoor applications such as medical and pharmaceutical cart dispensing systems in hospitals. Research is also being done on using robotics for surgical procedures.

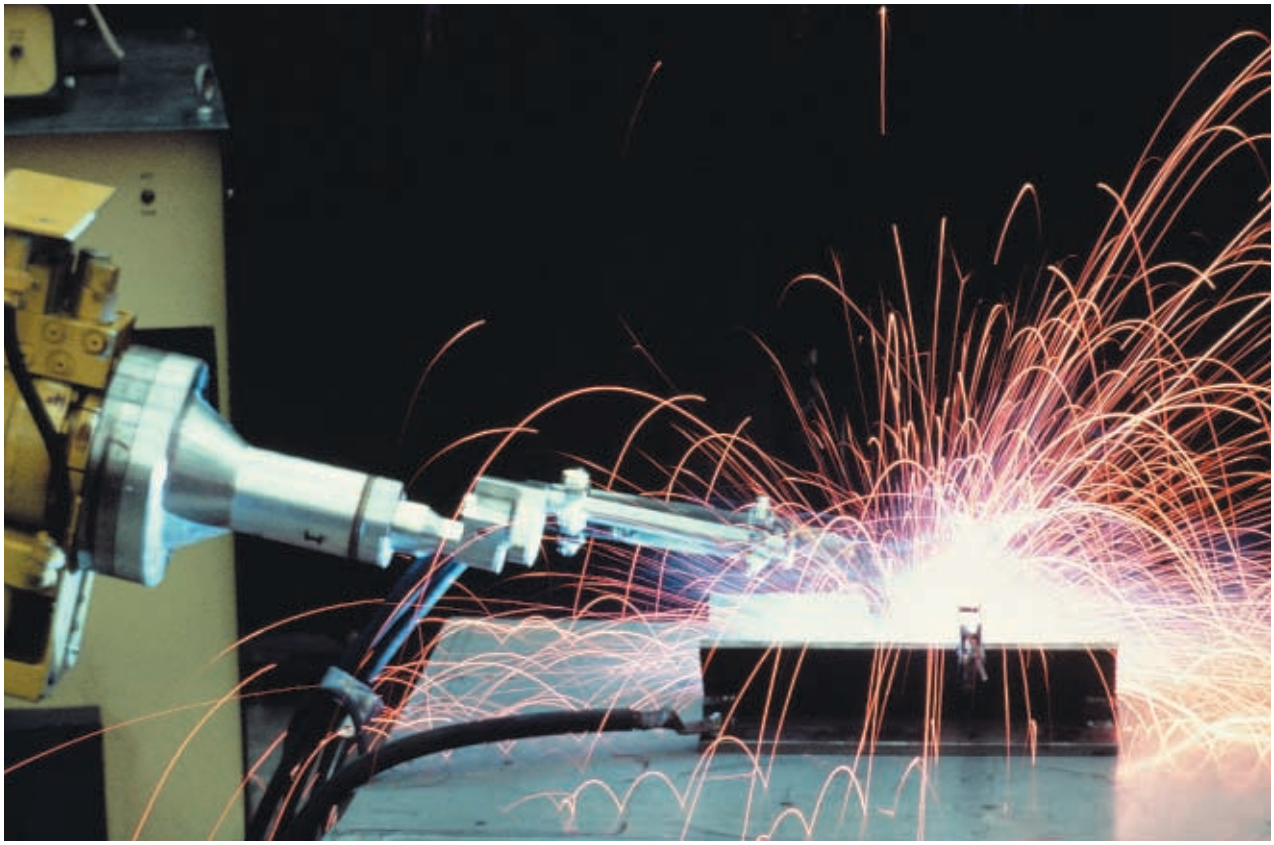


Photo credit: Winspear Centre - Edmonton, Alberta

" The science of acoustics has been around for a very long time. Only recently has acoustics become an engineering science. It crosses over many disciplines and works closely with other professions."

Gene Bolstad, P.Eng., acoustic engineering consultant

Acoustic Engineers

Acoustic engineers study the physics of sound transmission; how it is generated, transmitted, received and perceived. The science of acoustics has been around for a long time, but has only recently become an engineering specialty.

Acoustic engineers work to control noise in the environment, protect against hearing loss, develop special sound systems for the hearing impaired, assess the impact of vibrations from heavy traffic on buildings, work with the Department of Defense in underwater acoustics, study whale calls, and prevent sound penetration in apartments and hotels. Acoustical engineers use sound to offset or cancel other sounds, for example in aircraft or heavy equipment. Some may even design concert halls.

A broad range of disciplines come into play in the study of acoustics: mathematics; physics; structural, electrical and mechanical engineering; architecture; and psychology. Acoustic engineers come into contact with a wide variety of other professionals in their work.

Forestry Engineers

Forestry engineering is a broad field covering the many phases and aspects of harvesting trees and creating products. Forestry engineers work to plan road layouts to get the logging equipment into the forested areas. They plan the logging landings where felled logs are collected. They are familiar with all types of logging equipment and machinery, and some are involved in the design of that equipment.

Some forestry engineers may work in the area of forest products, designing and creating systems to manufacture such things as laminated beams from wood chips. They may also look at what types of wood are best suited for different products. Forestry engineers also look at environmental impact. For example, waste material going into water systems; its impact on the land and wildlife. The economic feasibility and sustainable development of particular logging operations is also determined by forestry engineers.

Those wishing to become forestry engineers must enjoy working outdoors. They must be able to work cooperatively with many other disciplines. Increasingly, forestry engineers must have well developed communication skills to deal with the many environmental groups interested in logging, to negotiate with aboriginal peoples regarding land rights, and to participate in public hearings on new operations.

The APEGGA Connection

Do you have questions about the information contained in this booklet? Are you interested in speaking to an engineer first hand to find out more about this interesting and diverse profession? Perhaps you'd like to know more about activities sponsored by the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA). To find out more, call or e-mail us per the contact information shown below.

We're connected ...

Like doctors, accountants and lawyers, engineers and geoscientists are licensed professionals. They are employed by industry, government or educational institutions, and others provide services directly to the public. There are more than 42,000 professional engineers, geologists and geophysicists licensed by APEGGA working as designers, administrators, project managers and consultants in industries like oil and gas, telecommunications, construction, transportation, forestry, and the environment.

Established in 1920, APEGGA is responsible for licensing these professionals, establishing and maintaining practice standards, developing Codes of Professional Conduct and Ethics which govern relations with the general public, and disciplining its members when they do not uphold these professional standards.

Apart from its regulatory role, the Association also promotes awareness of the valuable role science, particularly engineering, plays in our lives. APEGGA has become acknowledged by educators and students as one of the most proactive professional organizations in the province. Our Outreach volunteers keep young people informed of opportunities in science and technology, with an emphasis on how the APEGGA professions impact their lives. Hundreds of volunteers are involved in classroom visits, judging at science fairs, and other programs. The Association sponsors local science competitions, provides awards and scholarships for students (high school through graduate study levels), honours excellence in science and math education through the annual Teacher Awards program, and works to ensure Alberta's science and math curricula meets the highest standards.

Make the APEGGA connection

If you'd like information on any of these activities, or would like to speak to someone about your career decisions, contact our Outreach staff or visit our website. We'd be pleased to help you make the APEGGA connection.

1500 Scotia One
10060 Jasper Avenue NW
EDMONTON AB T5J 4A2
Tel. (780) 426-3990
Toll Free (in North America):
1-800-661-7020

2200 Scotia Centre
700 – 2 Street SW
CALGARY AB T2P 2W1
Tel. (403) 262-7714

Email: email@apegga.org
Website: www.apegga.org

Updated July 2005

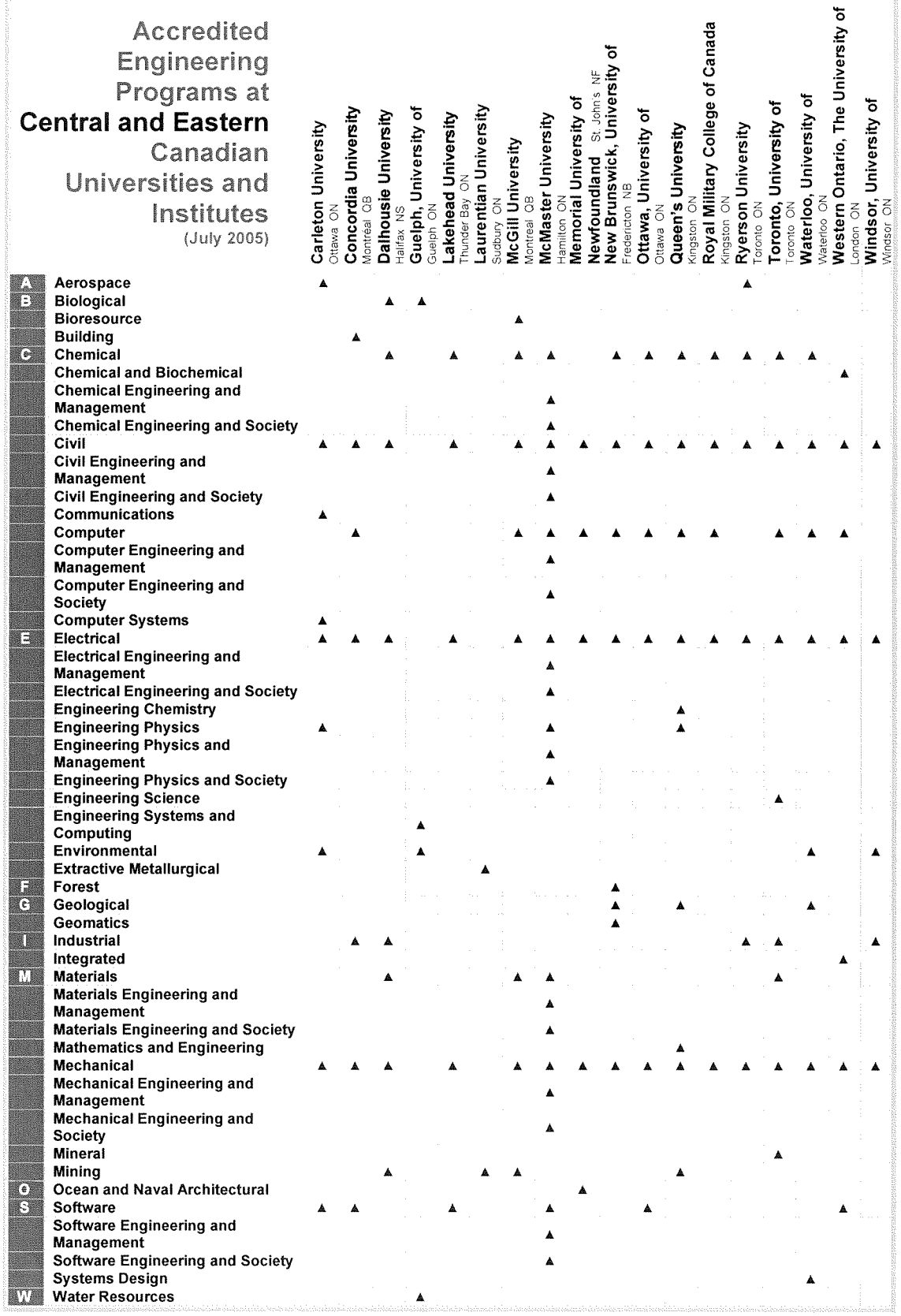
Accredited Engineering Programs at **Western** Canadian Universities and Institutes

(July 2005)

		Alberta, University of Edmonton AB	British Columbia, University of Vancouver BC	Calgary, The University of Calgary AB	Manitoba, The University of Winnipeg MB	Regina, University of Regina SK	Saskatchewan, University of Saskatoon SK	Simon Fraser University Burnaby BC	Victoria, University of Victoria BC
A	Agricultural and Bioresource						▲		
B	Biosystems				▲				
C	Chemical	▲	▲	▲			▲		
	Chemical and Biological		▲						
	Civil	▲	▲	▲	▲		▲		
	Computer	▲	▲	▲	▲				▲
E	Electrical	▲	▲	▲	▲		▲		▲
	Electronic Systems					▲			
	Engineering Physics	▲	▲				▲		
	Engineering Science							▲	
	Environmental Systems					▲			
G	Geological		▲				▲		
	Geomatics			▲					
I	Industrial Systems					▲			
	Integrated		▲						
M	Manufacturing			▲	▲				
	Materials	▲							
	Mechanical	▲	▲	▲	▲		▲		▲
	Metals & Materials		▲						
	Mining	▲	▲						
O	Oil and Gas			▲					
P	Petroleum	▲							
	Petroleum Systems					▲			
S	Software			▲					

Accredited Engineering Programs at **Central and Eastern** Canadian Universities and Institutes

(July 2005)



Accredited Engineering Programs at Canadian **French Speaking** Universities and Institutes
(July 2005)

		École de Technologie Supérieure Montréal QC	Laval, Université Québec QC	Moncton, Université de Moncton NB	Polytechnique, École Montreal QC	Québec en Abitibi-Témiscamingue, Université du Rouyn-Noranda QC	Québec à Chicoutimi, Université du Chicoutimi QC	Québec en Outaouais, Université du Hull QC	Québec à Rimouski, Université du Rimouski QC	Québec à Trois-Rivières, Université du Trois-Rivières QC	Sherbrooke, Université de Sherbrooke QC
A	agroenvironnemental		▲								
	alimentaire		▲								
B	du bois		▲								
C	chimique		▲		▲					▲	▲
	civil		▲	▲	▲						▲
	de la construction	▲									
E	électrique	▲	▲	▲	▲		▲			▲	▲
	électromécanique					▲					
G	géologique		▲		▲		▲				
I	industriel			▲	▲					▲	
	informatique		▲		▲		▲	▲			▲
L	logiciel	▲									
M	des matériaux				▲						
	des matériaux et de la métallurgie		▲								
	mécanique	▲	▲	▲	▲		▲			▲	
	des mines				▲						
	des mines et de la mineralurgie		▲								
P	physique		▲		▲						
	de la production automatisée	▲									
R	rural		▲								
S	des systèmes électromécaniques								▲		
U	unifié						▲				

Canadian Universities and Institutes Offering Accredited Engineering Programs

July 2005

Alberta, University of
Faculty of Engineering
E6-050 Engineering Teaching &
Learning Complex (ETLC)
EDMONTON AB T6G 2V4
Website: http://www.engineering.ualberta.ca

British Columbia, University of
Faculty of Applied Science
CEME Building
#2006 - 2324 Main Mall
VANCOUVER BC V6T 1Z4
Website: http://www.apsc.ubc.ca

Calgary, The University of
Schulich School of Engineering
ENC202, 2500 University Drive N.W.
CALGARY AB T2N 1N4
Website: http://www.eng.ucalgary.ca

Carleton University
Faculty of Engineering and Design
1125 Colonel By Drive
OTTAWA ON K1S 5B6
Website: http://www.eng.carleton.ca

Concordia University
Faculty of Engineering & Computer Science
1455, de Maisonneuve Boulevard West
LB-1000
MONTRÉAL QC H3G 1M8
Website: http://www.encs.concordia.ca

Dalhousie University
(formerly known as TUNS)
Faculty of Engineering
1360 Barrington Street
HALIFAX NS B3J 1Z1
Website: http://engineering.dal.ca/index.htm

École de Technologie Supérieure
1100, rue Notre-Dame ouest
MONTRÉAL QC H3C 1K3
Website :
http://www.etsmtl.ca/zone2/programmes/1er_cycle/baccalaureat/index.html

Guelph, University of
School of Engineering
Albert Thornbrough Building
GUELPH ON N1G 2W1
Website: http://www.soe.uoguelph.ca

Lakehead University
Faculty of Engineering
955 Oliver Road
THUNDER BAY ON P7B 5E1
Website: http://engineering.lakeheadu.ca

Laurentian University
School of Engineering
935 Ramsey Lake Road
SUDBURY ON P3E 2C6
Website: http://laurentian.ca/engr/index.htm

Laval, Université
Faculté des sciences et de génie
Cité universitaire
Pavillon Alexandre-Vachon, local 1033
QUÉBEC QC G1K 7P4
Website:
http://www.fsg.ulaval.ca/accueil.aspx?tabindex=0&tabid=49

Manitoba, The University of
Faculty of Engineering
350 Engineering Building
WINNIPEG MB R3T 5V6
Website:
http://www.umanitoba.ca/faculties/engineering/

McGill University
Faculty of Engineering
Macdonald Engineering Building
817 Sherbrooke Street W
MONTRÉAL QC H3A 2K6
Website: http://www.mcgill.ca/engineering

McMaster University
Faculty of Engineering
1280 Main Street West
HAMILTON ON L8S 4L7
Website: http://www.eng.mcmaster.ca

Memorial University of Newfoundland
Faculty of Engineering and Applied Science
S.J. Carew Building
ST. JOHN'S NF A1B 3X5
Website: http://www.engr.mun.ca

Moncton, Université de
Faculté d'ingénierie
Centre universitaire de Moncton
MONCTON NB E1A 3E9
Website: http://www.umoncton.ca/genie

New Brunswick, University of
Faculty of Engineering
P.O. Box 4400
FREDERICTON NB E3B 5A3
Website: http://www.unb.ca/eng

Ottawa, University of
Faculty of Engineering
161 Louis Pasteur, Room A306
P.O. Box 450, Station "A"
OTTAWA ON K1N 6N5
Website: http://www.eng.uottawa.ca

Polytechnique, École
C.P. 6079, succ. Centre-ville
MONTRÉAL QC H3C 3A7
Website:
http://www.polymtl.ca/rensgen/repertoires/departements.php

Québec en Abitibi-Témiscamingue, Université du
Unité d'enseignement et de recherche en sciences appliquées
445, boulevard de l'Université
ROUYN-NORANDA QC J9X 5E4
Website:
http://www.uqat.uquebec.savoir/uer01.htm

Québec à Chicoutimi, Université du
Département des sciences appliquées
555, boulevard de l'Université
CHICOUTIMI QC G7H 2B1
Website: http://wwwdsa.uqac.uquebec.ca

Québec en Outaouais, Université du
Module de génie
C.P. 1250, Succursale B
HULL QC J8X 3X7
Website: http://www.uqo.ca

Québec à Rimouski, Université du
Module de génie
300, allée des Ursulines
RIMOUSKI QC G5L 3A1
Website:
http://www.uqar.uquebec.ca/uqar/info/7001.htm

Québec à Trois-Rivières, Université du
École d'ingénierie
3351, boulevard des Forges
C.P. 500
TROIS-RIVIERES QC G9A 5H7
Website: http://ecoleing.uqtr.uquebec.ca

Queen's University
Faculty of Applied Science
Ellis Hall
KINGSTON ON K7L 3N6
Website: http://appsci.queensu.ca

Regina, University of
Faculty of Engineering
Room 409, Education Building
REGINA SK S4S 0A2
Website: http://www.uregina.ca/engg/page.html

Royal Military College of Canada
Engineering Division
P.O. Box 17000, STN FORCES
KINGSTON ON K7K 7B4
Website:
http://www.rmc.ca/academic/engineering_e.html

Ryerson University
Faculty of Engineering and Applied Science
350 Victoria Street
TORONTO ON M5B 2K3
Website: http://www.feas.ryerson.ca

Saskatchewan, University of
College of Engineering
3B48 Engineering Building
57 Campus Drive
SASKATOON SK S7N 5A9
Website: http://www.engr.usask.ca

Sherbrooke, Université de
Faculté de génie
2500, boulevard de l'Université
SHERBROOKE QC J1K 2R1
Website: http://www.usherbrooke.ca/genie/

Simon Fraser University
School of Engineering Science
8888 University Drive
BURNABY BC V5A 1S6
Website: http://www.ensc.sfu.ca

Toronto, University of
Faculty of Applied Science and Engineering
35 St. George Street
TORONTO ON M5S 1A4
Website:
http://www.engineering.utoronto.ca/scripts/index_.asp

Victoria, University of
Faculty of Engineering
P.O. Box 3055
VICTORIA BC V8W 3P6
Website: http://www.engr.uvic.ca

Waterloo, University of
Faculty of Engineering
200 University Avenue West
WATERLOO ON N2L 3G1
Website: http://www.eng.uwaterloo.ca

Western Ontario, The University of
Faculty of Engineering
Engineering Building
LONDON ON N6A 5B9
Website: http://www.engga.uwo.ca

Windsor, University of
Faculty of Engineering
401 Sunset Avenue
WINDSOR ON N9B 3P4
Website: http://cronus.uwindsor.ca/engineering