

Engineer

Nature of Work

Engineers in construction are involved in planning, design, construction, operation, and management of engineering and engineering-construction projects. They are problem solvers, and must be concerned with both the detail and general applications and problems of their work in relation to the overall construction project. Engineers in construction may specialize in several engineering fields such as architectural, civil (including structural engineering), electrical, mechanical, and environmental engineering.

Architectural Engineer

The architectural engineer (AE) is involved with the design of the building, and/or the estimating and supervision of the project. Initial emphasis is on building construction materials, principles, practices, and methods. An AE can specialize in structural design or in building environmental system design of heating, ventilating, and air conditioning; fire safety systems; plumbing; or lighting/illumination. In college, the AE program is clearly focused on the building industry.

Civil Engineer

Civil engineers work with structures. They design and monitor the construction of roads, airports, tunnels, bridges, dams, harbors, irrigation systems, water treatment and distribution facilities, and sewage collection and treatment systems. Civil engineers are technical problem solvers. They incorporate the principles of science and mathematics into the cost-effective design of permanent and temporary structures. The development of detailed plans and specifications is a major aspect of their work. Civil engineering is the oldest and broadest of the engineering professions. "Civils" can concentrate their work in technical specialties such as structural engineering and transportation engineering.

Structural Engineer

Structural engineering is a specialized field of work falling within the civil engineering discipline. Structural engineers are planners and designers of buildings of all types: bridges, dams, power plants, supports for equipment, special structures for offshore projects, transmission towers, and many other kinds of projects. They are experts in analyzing the forces that a structure must resist (its own weight, wind, water, temperatures, earthquakes, and other forces), and incorporate appropriate materials (steel, concrete, timber, plastic) into a design that will resist these forces and carry the total load of the structure.

Electrical Engineer

Electrical and electronics engineers design, develop, test, and supervise the manufacture and sometimes installation of electrical equipment. Such equipment includes the power generating and transmission equipment of electric utility companies, and the electric motors, machinery controls, and lighting and



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wiring used in buildings. Electronic equipment used in automobiles, aircraft, computers, and communications equipment is also designed by electrical engineers. The work involves writing equipment performance requirements, developing maintenance schedules, solving operating problems, and estimating the time and cost of electrical engineering projects.

Mechanical Engineer

Mechanical engineers are concerned with the production, transmission, and use of mechanical power and heat. They study the behavior of materials when forces are applied to them—such as the motion of solids, liquids, and gasses—and the heating and cooling of objects and machines. Mechanical engineers design and develop manufacturing equipment and technologies, and supervise installation of refrigeration and air conditioning equipment, materials handling systems, automatic control systems, noise control and acoustics, machine tools, internal combustion engines, solar energy systems, and rail transportation equipment.

Environmental Engineer

Environmental engineers design, plan, or perform engineering duties in the prevention, control, and remediation of environmental health hazards utilizing various engineering disciplines. Work may include waste treatment, site remediation, or pollution control technology.

Education and Training

Construction-oriented positions in modern engineering range from those requiring a baccalaureate degree to those requiring a master's degree. University entrance requirements are generally those which a high school college preparatory program provides. Interested individuals should contact the admissions office at their selected college for specific details. Seek a school accredited for the specific type of engineering program desired. Good SAT or ACT scores are important, as well as good grades in junior high school and senior high school. Students with an aptitude for engineering are probably earning above average grades in mathematics and science. Above all, they should enjoy these subjects, and like to study and to achieve. Engineering students should have common sense, patience, and a strong sense of curiosity.

Advancement Potential

There is a place for engineers of many kinds of interests and abilities within the construction industry. Many engineering graduates begin as assistants to supervisors, office managers, or company executives. All have the potential to move into top management positions. Many construction firm owners began their careers as design engineers.

Wages (Average, State of Oregon, 2013)

- **Civil:** Hourly: \$38.64; Annual: \$80,374
- **Electrical:** Hourly: \$45.49; Annual: \$95,619
- **Mechanical:** Hourly: \$40.07; Annual: \$83,340
- **Environmental:** Hourly: \$39.73; Annual: \$82,652

