

Employment

Mechanical engineers held about 221,000 jobs in 2000. More than 1 out of 2 jobs were in manufacturing—mostly in machinery, transportation equipment, electrical equipment, instruments, and fabricated metal products industries. Engineering and management services, business services, and the Federal Government provided most of the remaining jobs.

Job Outlook

Employment of mechanical engineers is projected to grow about as fast as the average for all occupations through 2010. Although overall manufacturing employment is expected to grow slowly, employment of mechanical engineers in manufacturing should increase more rapidly as the demand for improved machinery and machine tools grows and industrial machinery and processes become increasingly complex. Also, emerging technologies in information technology, biotechnology, and nanotechnology will create new job opportunities for mechanical engineers.

Employment of mechanical engineers in business and engineering services firms is expected to grow faster than average as other industries in the economy increasingly contract out to these firms to solve engineering problems. In addition to job openings from growth, many openings should result from the need to replace workers who transfer to other occupations or leave the labor force.

Earnings

Median annual earnings of mechanical engineers were \$58,710 in 2000. The middle 50 percent earned between \$47,600 and \$72,850. The lowest 10 percent earned less than \$38,770, and the highest 10 percent earned more than \$88,610. Median annual earnings in the industries employing the largest numbers of mechanical engineers in 2000 were:

Personnel supply services	\$81,080
Federal government	66,320
Engineering and architectural services	59,800
Motor vehicles and equipment	59,400
Construction and related machinery	54,480

According to a 2001 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in mechanical engineering received starting offers averaging \$48,426 a year, master's degree candidates had offers averaging \$55,994, and Ph.D. candidates were initially offered \$72,096.

Sources of Additional Information

Further information about mechanical engineers is available from:
 ► The American Society of Mechanical Engineers, Three Park Ave., New York, NY 10016. Internet: <http://www.asme.org>

(See introduction to the section on engineers for information on working conditions, training requirements, and other sources of additional information.)

Mining and Geological Engineers, Including Mining Safety Engineers

(O*NET 17-2151.00)

Nature of the Work

Mining and geological engineers find, extract, and prepare coal, metals, and minerals for use by manufacturing industries and utilities.



Mining engineers work with geologists to discuss plans for further mine excavation.

They design open pit and underground mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants. Mining engineers are responsible for the safe, economical, and environmentally sound operation of mines. Some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment or direct mineral processing operations to separate minerals from the dirt, rock, and other materials with which they are mixed. Mining engineers frequently specialize in the mining of one mineral or metal, such as coal or gold. With increased emphasis on protecting the environment, many mining engineers work to solve problems related to land reclamation and water and air pollution.

Mining safety engineers use their knowledge of mine design and practices to ensure the safety of workers and to comply with State and Federal safety regulations. They inspect walls and roof surfaces, test air samples, and examine mining equipment for compliance with safety practices.

Employment

Mining and geological engineers, including mining safety engineers, held about 6,500 jobs in 2000. While one-half worked in the mining industry, other mining engineers worked in government agencies or engineering consulting firms.

Mining engineers usually are employed at the location of natural deposits, often near small communities, and sometimes outside the United States. Those in research and development, management, consulting, or sales, however, often are located in metropolitan areas.

Job Outlook

Employment of mining and geological engineers, including mining safety engineers, is expected to decline through 2010. Most of the industries in which mining engineers are concentrated—such as coal, metal, and mineral mining, as well as stone, clay, and glass products manufacturing—are expected to experience declines in employment.

Although no job openings are expected to result from employment growth, there should be openings resulting from the need to replace mining engineers who transfer to other occupations or leave the labor force. A large number of mining engineers currently

employed are approaching retirement age. In addition, relatively few schools offer mining engineering programs, and the small number of graduates is not expected to increase.

Mining operations around the world recruit graduates of U.S. mining engineering programs. Consequently, job opportunities may be better worldwide than within the United States. As a result, graduates should be prepared for the possibility of frequent travel or even living abroad.

Earnings

Median annual earnings of mining and geological engineers, including mining safety engineers, were \$60,820 in 2000. The middle 50 percent earned between \$47,320 and \$78,720. The lowest 10 percent earned less than \$36,070, and the highest 10 percent earned more than \$100,050.

According to a 2001 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in mining engineering received starting offers averaging \$42,507 a year and master's degree candidates, on average, were offered \$54,038.

Sources of Additional Information

For general information about mining engineers, contact:

► The Society for Mining, Metallurgy, and Exploration, Inc., P.O. Box 625002, Littleton, CO 80162-5002. Internet: <http://www.smenet.org>

(See introduction to the section on engineers for information on working conditions, training requirements, and other sources of additional information.)

Nuclear Engineers

(O*NET 17-2161.00)

Nature of the Work

Nuclear engineers research and develop the processes, instruments, and systems used to derive benefits from nuclear energy and radiation. They design, develop, monitor, and operate nuclear plants used to generate power. They may work on the nuclear fuel cycle—the production, handling, and use of nuclear fuel and the safe disposal of waste produced by nuclear energy—or on fusion energy. Some specialize in the development of nuclear power sources for spacecraft; others find industrial and medical uses for radioactive materials, such as equipment to diagnose and treat medical problems.

Employment

Nuclear engineers held about 14,000 jobs in 2000. About 58 percent were in utilities, 26 percent in engineering consulting firms, and 14 percent in the Federal Government. More than half of all federally employed nuclear engineers were civilian employees of the Navy, and most of the rest worked for the Department of Energy. Most nonfederally employed nuclear engineers worked for public utilities or engineering consulting companies. Some worked for defense manufacturers or manufacturers of nuclear power equipment.

Job Outlook

Good opportunities should exist for nuclear engineers because the small number of nuclear engineering graduates is likely to be in rough balance with the number of job openings. Because this is a small occupation, projected job growth will generate few openings; consequently, most openings will result from the need to replace



Nuclear engineers design, develop, monitor, and operate nuclear plants used to generate power.

nuclear engineers who transfer to other occupations or leave the labor force.

Little or no change in employment of nuclear engineers is expected through 2010. Due to public concerns over the cost and safety of nuclear power, no commercial nuclear power plants are under construction in the United States. Nevertheless, nuclear engineers will be needed to operate existing plants. In addition, nuclear engineers will be needed to work in defense-related areas, to develop nuclear medical technology, and to improve and enforce waste management and safety standards.

Earnings

Median annual earnings of nuclear engineers were \$79,360 in 2000. The middle 50 percent earned between \$67,590 and \$89,310. The lowest 10 percent earned less than \$58,030, and the highest 10 percent earned more than \$105,930. In 2000, the median annual earnings of nuclear engineers in electric services were \$77,890. In the Federal Government, nuclear engineers in supervisory, nonsupervisory, and management positions earned an average of \$71,700 a year in 2001.

According to a 2001 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in nuclear engineering received starting offers averaging \$49,609 a year and master's degree candidates, on average, were offered \$56,299.