Electrical and Electronics Engineers

(0*NET 17-2071.00, 17-2072.00)

Nature of the Work

From the global positioning system that can continuously provide the location of a vehicle to giant electric power generators, electrical and electronics engineers are responsible for a wide range of technologies. Electrical and electronics engineers design, develop, test, and supervise the manufacture of electrical and electronic equipment. Some of this equipment includes broadcast and communications systems; electric motors, machinery controls, lighting, and wiring in buildings, automobiles, aircraft, and radar and navigation systems; and power generating, controlling, and transmission devices used by electric utilities. Many electrical and electronics engineers also work in areas closely related to computers. However, engineers whose work is related exclusively to computer hardware are considered computer hardware engineers, another engineering specialty covered elsewhere in the *Handbook.*

Electrical and electronics engineers specialize in different areas such as power generation, transmission, and distribution; communications; and electrical equipment manufacturing, or a specialty within one of these areas—industrial robot control systems or aviation electronics, for example. Electrical and electronics engineers design new products, write performance requirements, and develop maintenance schedules. They also test equipment, solve operating problems, and estimate the time and cost of engineering projects.

Employment

Electrical and electronics engineers held about 292,000 jobs in 2002, making up the largest branch of engineering. Most jobs were in professional, scientific, and technical services firms, government agencies, and manufacturers of computer and electronic products and machinery. Wholesale trade, communications, and utilities firms accounted for most of the remaining jobs.

Job Outlook

Electrical and electronics engineering graduates should have favorable employment opportunities. The number of job openings resulting from employment growth and the need to replace electrical engineers who transfer to other occupations or leave the labor force is expected to be in rough balance with the supply of graduates.

Employment of electrical and electronics engineers is expected to increase more slowly than the average for all occupations through 2012. Although rising demand for electrical and electronic goods, including advanced communications equipment, defense-related electronic equipment, and consumer electronics products should increase, foreign competition for electronic products and increasing use of engineering services performed in other countries will act to limit employment growth Job growth is expected to be fastest in services industries—particularly consulting firms that provide electronic engineering expertise.

Continuing education is important for electrical and electronics engineers. Engineers who fail to keep up with the rapid changes in technology risk becoming more susceptible to layoffs or, at a minimum, more likely to be passed over for advancement.

Earnings

Median annual earnings of electrical engineers were $68,180 in 2002. The middle 50 percent earned between $54,550 and $84,670. The lowest 10 percent earned less than $44,780, and the highest 10 percent earned more than $100,980. Median annual earnings in the industries employing the largest numbers of electrical engineers in 2002 were:

Scientific research and development services	$77,410
Semiconductor and other electronic component manufacturing	72,670
Electric power generation, transmission, and distribution	71,640
Navigational, measuring, electromedical, and control instruments manufacturing	70,430
Architectural, engineering, and related services	66,980

Median annual earnings of electronics engineers, except computer, were $69,930 in 2002. The middle 50 percent earned between $55,930 and $85,980. The lowest 10 percent earned less than $46,310, and the highest 10 percent earned more than $103,860. Median annual earnings in the industries employing the largest numbers of electronics engineers in 2002 were:

Federal government	$78,830
Architectural, engineering, and related services	72,850
Navigational, measuring, electromedical, and control instruments manufacturing	70,950
Semiconductor and other electronic component manufacturing	70,800
Wired telecommunications carriers	62,670

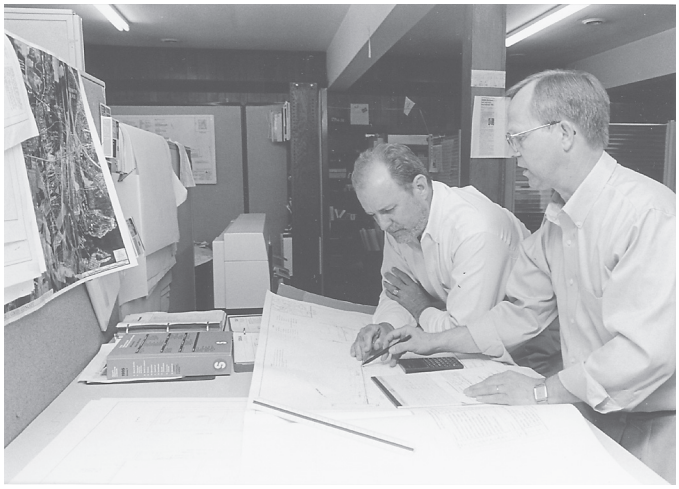
According to a 2003 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in electrical/electronics and communications engineering received starting offers averaging $49,794 a year; master's degree candidates averaged $64,556; and Ph.D. candidates averaged $74,283.

Sources of Additional Information

Information on careers and employment, education, publications, and conferences related to electrical and electronics engineers is available from:

➤ Institute of Electrical and Electronics Engineers, 445 Hoes Lane, Piscataway, NJ 08855-1331. Internet: **http://www.ieee.org**

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



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