

# Engineering technologist

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(Redirected from State-certified Engineer BVT)

An **engineering technologist**, also called **engologist** or **ingologist**, is a specialist devoted to the implementation and extension of existing technology within a field of engineering. In the western model, Technologists often support engineers in a wide variety of projects by applying basic engineering principles and technical skills. In the United Kingdom model, the Engineering Technologist operates autonomously and directs activities independently.<sup>[1]</sup> They do not need to support engineers because they are acknowledged as full Engineers.<sup>[2]</sup> The US and UK have competing ideologies governing the autonomous roles for Engineering Technologists. The work of technologists is usually focused on the portion of the technological spectrum closest to product improvement, manufacturing, construction, and engineering operational functions.

Internationally, the Sydney Accord is an agreement signed in 2001 acknowledging the academic equivalence of accredited engineering technology programs in the signatory nations. In some countries, only individuals who have graduated from an accredited curriculum in engineering technology and have a significant amount of work experience in their field may become registered technologists. A technologist's recognition may be in the form of a certification or a professional registration.

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## Nature of work

Technologists are employed in a large and wide-array of industries including: manufacturing, construction, industrial, maintenance, and even management. They may be hired as technology/technical managers, depending on the technologist's educational emphasis on management preparation. Entry-level positions such as product design, testing, development, systems engineering, field engineering, technical operations, and quality control are all common positions for engineering technology graduates.

In general, the work of engineering technologists focuses on the relatively practical application of engineering principles, whereas the work of engineers emphasizes the theoretical aspects of mathematical, scientific and engineering principles. The National Society of Professional Engineers describes the difference between engineering and engineering technology:

"The distinction between engineering and engineering technology emanates primarily from differences in their educational programs. Engineering programs are geared toward development of conceptual skills, and consist of a sequence of engineering fundamentals and design courses, built on a foundation of complex mathematics and science courses. Engineering technology programs are oriented toward application, and provide their students introductory mathematics and science courses, and only a qualitative introduction to engineering fundamentals. Thus, engineering programs provide their graduates a breadth and depth of knowledge that allows them to function as designers. Engineering technology programs prepare their graduates to apply others' designs."<sup>[3]</sup>

The Accreditation Board for Engineering and Technology describes the difference between engineering and engineering technology as: "Engineering and technology are separate, but intimately related professions. Here are some of the ways they differ:

- Engineering undergraduate programs include more mathematics work and higher level mathematics than technology programs.
- Engineering undergraduate programs often focus on theory, while technology programs usually focus on application.
- Once they enter the workforce, engineering graduates typically spend their time planning, while engineering technology graduates spend their time making plans work.
- At ABET, engineering and engineering technology programs are evaluated and accredited by two separate accreditation commissions using two separate sets of accreditation criteria.
- Graduates from engineering programs are called engineers, while

- graduates of technology programs are often called technologists.
- Graduates from engineering technology programs are often hired as engineers.
  - Some U.S. state boards of professional engineering licensure will allow only graduates of engineering programs—not engineering technology programs—to become licensed engineers.<sup>[4]</sup>

The engineering graduate typically requires a period of 'internship' since engineering programs stress fundamentals. The engineering technology graduate, however, is prepared to immediately begin technical assignments since technology programs stress current industrial practices and design procedures.<sup>[5]</sup>

## Education and accreditation

Beginning in the 1950s and 1960s, some post-secondary institutions began offering degrees in engineering technology. This was to address a need within the scientific, manufacturing, and engineering communities, as well as other industries, for professionals with hands-on and applications-based engineering knowledge. Depending on the institution, associate and/or bachelor degrees are offered, with some institutions also offering advanced degrees in technology.

In general, an engineering technologist receives a broad range of applied science and applied mathematics training, as well as the fundamentals of engineering in the student's area of focus. Engineering Technology programs typically include instruction in various engineering support functions for research, production, and operations, and applications to specific engineering specialties.<sup>[6][7]</sup> Information technology is primarily involved with the management, operation, and maintenance of computer systems and networks, along with an application of technology in diverse fields such as architecture, engineering, graphic design, telecommunications, computer science and network security. A technologist is also expected to have had some coursework in ethics.

International technology organizations from eight nations have signed a mutual recognition agreement called the Sydney Accord. The Sydney Accord represents an understanding that the academic awards of technologists can be recognized in all signatory states. The recognition of the Sydney Accord for technologists can be compared to the Washington Accord for engineers and the Dublin Accord for engineering technicians. The Engineering Technologist Mobility Forum is an international forum held by signatories of the Sydney Accord to explore mutual recognition for experienced engineering technologists and to remove artificial barriers to the free movement and practice of engineering technologists amongst their countries.

Graduates acquiring an associate's degree or lower typically find careers as engineering technicians. According to the United States Bureau of Labor Statistics:

"Many 4-year colleges offer bachelor's degrees in engineering technology, but graduates of these programs often are hired to work as technologists or applied engineers, not technicians."<sup>[8]</sup> Technicians typically hold a two year associates degree, while technologists usually hold bachelors degrees.

## Canada

In Canada, the new occupational category of Technologist was established in the 1960s in conjunction with an emerging system of community colleges and technical institutes. It was designed to effectively bridge the gap between the increasingly theoretical nature of engineering degrees and the predominately practical approach of technician and trades programs. Provincial associations may certify individuals as Certified Engineering Technologist (C.E.T.), Registered Engineering Technologist, Applied Science Technologist (AScT) or Technologue Professionel [T.P.]. These provincial associations also are constituent members of the Canadian Council of Technicians and Technologists (CCTT) which nationally accredits technology programs across Canada through its Canadian Technology Accreditation Board (CTAB). Nationally accredited Engineering Technology programs range from 2 to 3 years in length, depending on province, with 2 year programs leading to a C.Tech. certification and 3 year programs usually leading to a AScT, CET or RET certification.

## United States

In the United States, Engineering Technology programs are accredited through the Technology Accreditation Commission (TAC) of ABET (formerly the Accreditation Board for Engineering and Technology) or via The Association of Technology, Management, and Applied Engineering (ATMAE). ABET has been accrediting Engineering Technology programs in the United States since 1946, with a current total of over 600 programs at over 230 institutions. In response to heavy demand, ABET began accrediting Engineering Technology programs internationally in 2007. Depending on the institution, associate and/or bachelor degrees are offered, with a few institutions also offering advanced degrees. The type, length, and quality of education offered can vary greatly depending on the educational institution and the specialty pursued within Engineering Technology. ATMAE programs in Engineering Technology require a management core.

In the United States the hierarchy of educational structure and acknowledgement start at the US Department of Education or The Council for Higher Education Accreditation (CHEA). The U.S Department of Education acknowledges regional and national accreditations and CHEA recognizes specialty accreditations. Two technology accreditations are currently recognized by CHEA: The Association of Technology, Management, and Applied Engineering (ATMAE) and the Accreditation Board for Engineering and Technology (ABET). Specifically CHEA recognizes ABET internationally and in the U.S. for accrediting engineering

technology programs at the associate and baccalaureate level and it recognizes ATMAE in the U.S. only for accrediting non-engineering (i.e. engineering technology, engineering management, applied engineering, operations management, technology management, and specialized technology/technical degrees) associate, baccalaureate and master's level degree programs in industrial technology.

The Technology Accreditation Commission (TAC) of Accreditation Board for Engineering and Technology was admitted as a provisional member of International Technology Accords in 2007, and it signed the Sydney Accord in 2009.

## Certification

Professional certification is the registration of engineering technologists to assure their qualification within their countries or territories. The Sydney Accord and the Engineering Technologist Mobility Forum (ETMF) are two international efforts to improve cross border recognition for technologists.

A certified engineering technologist is usually required apprentice for a term before being able to apply for certification through a local governing body. In that time the technologist must have completed tasks which directly apply to their area of study.

## North America

In Canada, the regulated title for technologists is called Certified Engineering Technologist. Technology program certification is done through the Canadian Technology Accreditation Board (CTAB), often in conjunction with provincial associations that are affiliated with the Canadian Council of Technicians and Technologists. Graduated technologists are certified by their provincial bodies.

In the United States, technologist certification requires a bachelor's degree in an engineering technology program accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). One may also obtain a degree from an institution accredited through The Association of Technology, Management, and Applied Engineering (formerly known as the National Association of Industrial Technology). Technologist registration in the United States is conducted by many independent societies and organizations. The lack of a unified registration for Technologist has left the profession in disarray. A government sponsored registration is opposed by the NCEES and NSPE. As a result, a true technologist registration has been prevented from maturing and the profession is often not seen as an independent field separate from design engineering. However, this status could change in the future now that the United States' ABET accreditation signed the Sydney Accord in June 2007. Sydney Accord nations have a distinct role for Technologist that is separate from the

status of Technician or design engineering.

The National Institute for Certification in Engineering Technologies (NICET) awards certification at two levels depending on work experience: the Associate Engineering Technologist (AT) and the Certified Engineering Technologist (CT). The Association of Technology, Management, and Applied Engineering (ATMAE) awards two levels of certification in Technology Management: (1) Certified Technology Manager (CTM) and (2) Certified Senior Technology Manager (CSTM). ATMAE also awards two levels of certification in Manufacturing Specialist: (1) Certified Manufacturing Specialist (CMS) and (2) Certified Senior Manufacturing Specialist (CSMS). While the CTM and CMS certification are obtained through examination, the CSTM and CSMS require industry experience and continuous improvement via the obtainment of professional development units (PDUs).

## **Incorporated Engineer (UK)**

In the United Kingdom, an Incorporated Engineer is professionally registered by the Engineering Council. The title Incorporated Engineer (IEng) is protected by civil law. Incorporated Engineers are recognized internationally through the Sydney Accord academic agreement as Engineering Technologists.<sup>[9]</sup><sup>[10]</sup><sup>[11]</sup> One of the professional titles for engineers in the United Kingdom is recognized in the Washington Accord as the Chartered Engineer. The Incorporated Engineer is a Professional Engineer as declared by the Engineering Council of the United Kingdom and the European definition as demonstrated by the prescribed title under 2005/36/EC as an "Engineer."<sup>[12]</sup>

The Incorporated Engineering is therefore a Professional Engineer as it is designated independent of the Washington Accord. This means that the European community has more than one definition for the term Professional Engineer than that which is demonstrated by participation in the Washington Accord. The Sydney Accord and the Washington Accord both represent Professional Engineers from the European perspective but they are acknowledged with separate designations. The Sydney Accord does not represent a Professional Engineer from the western perspective.

This means that the Incorporated Engineer is a Professional Engineer in the United Kingdom but not in the United States. The United States has a single engineering registration system with the title of "Professional Engineer." The one dimensional engineering system can not acknowledge multiple titles or differences in concepts because it does not have the structure to incorporate the recognition into its framework. This is especially true if the definition of that alternative concept does not match the exact specifications of the one-dimensional ideology. The single engineering registration of the United State's system does not permit the acknowledgment of more than one type of engineering qualification.

The Charter Engineer and Incorporated Engineer are recognized as equivalent in stature but with separate functions. The Charter and Incorporated Engineer are placed under the same directive 2005/36/EC for this reason. The Incorporated Engineer practices autonomously without the oversight of a Charter Engineer. The Incorporated Engineer is at the final stage of engineering development. This concept is unique to the United Kingdom's definition and is in conflict with the U.S. role of the Engineering Technologist as an engineering assistant. The Incorporated Engineer is therefore an analog of the model espoused by The Association of Technology, Management, and Applied Engineering (ATMAE) rather than that which is represented by The Accreditation Board for Engineering and Technology (ABET) in matters that address autonomous practice. This autonomy is applicable to practice in areas that are not directly pertaining to Civil Engineering concepts in the western model but may apply to Civil Engineering concepts in the United Kingdom model.

Incorporated Engineers currently require an IEng accredited Bachelors or honours degree in engineering or technology, or a Higher National Certificate or Diploma or a Foundation Degree in engineering or technology, plus appropriate further learning to degree level or an NVQ4 or SVQ4 which has been approved for the purpose by a licensed engineering institution. The academic requirements must be accompanied by the appropriate experience in employment. In addition to the experience and academic requirements, the engineering candidate must have three references that vouch for the performance of the individual being considered for professional recognition. There are a number of alternative ways to achieve I Eng status for those that do not have the necessary qualifications for applicants that can clearly show they have achieved the same level as those with qualifications. These ways include:

- Writing a technical report, based upon their experience, and demonstrate their knowledge and understanding of engineering principles.
- Taking Engineering Council examinations through the City and Guilds of London Institute.
- Following a work-based learning programme
- Taking an academic programme specified by the institution to which they are applying.

## Europe

The State-Certified Engineer BVT is a European Union certificate for professional Technologist. It is granted by a German organisation, the *Bundesverband höherer Berufe der Technik, Wirtschaft und Gestaltung e.V.* ("Federal Association of higher professions for technology economy and design") or BVT. As of November 2006 the BVT has about 19,000 members in several countries.

A member of the BVT is entitled to use the initials BVT after his name. To achieve

this certification a completed apprenticeship program (3.5 years) and a 2 year college diploma in engineering technology with two years relevant experience is needed.

## See also

- Applied Science Technologist
- Association of Certified Engineering Technicians and Technologists of Prince Edward Island
- Association of Science and Engineering Technology Professionals of Alberta (ASET)
- Association of Technology, Management, and Applied Engineering
- Canadian Council of Technicians and Technologists
- Certified Engineering Technologist
- National Institute for Certification in Engineering Technologies

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