

Gleanings from the Softer Side of a Profession: An Engineer's Alphabet (Excerpts From)

by Dr. Henry Petroski, P.E., New York Xi '63

This abecedarian is one engineer's collection of thoughts, quotations, anecdotes, facts, trivia, arca-
cana, and miscellanea relating to the practice, history, culture, and traditions of his profession. The entries, which represent the distillation of decades of reading, writing, talking, and thinking about engineers and engineering, range from brief essays on concepts and practices that are central to the profession to lists of its great achievements. This book is at the same time an anthology, a commonplace book, and a reference volume.

A "alphabet of the engineer." In his autobiography, James Nasmyth (1808–1890), the Scottish engineer and inventor of the steam hammer, wrote often of his learning to draw and of its importance for the practice of engineering. According to Nasmyth: "Mechanical drawing is the alphabet of the engineer. Without this the workman is merely 'a hand.' With it he indicates the possession of 'a head.'" Using mechanical drawing figuratively as well as literally, Nasmyth allowed for it to represent the ability of the creative engineer to conceptualize and communicate ideas, and thereby lead technological innovations and enterprises. Engineers cannot easily be leaders beyond the technical sphere without also having a sense of their own profession's culture and traditions, and it is in this sense that Nasmyth's phrase

has been adopted as the title of this book. *An Engineer's Alphabet* is meant to call attention to the importance of putting the quantitative engineer in touch with qualitative language and thought, emphasizing the importance of both sides of the brain to truly creative engineering. See *James Nasmyth, Engineer: An Autobiography, new edition*, Samuel Smiles, ed. (London: John Murray, 1885).

The alphabet metaphor was also used by Robert Fulton (1765–1815), who is perhaps best known for his work on the steamboat. Before devoting himself full time to engineering and inventing, Fulton worked as a portrait painter, first in Philadelphia

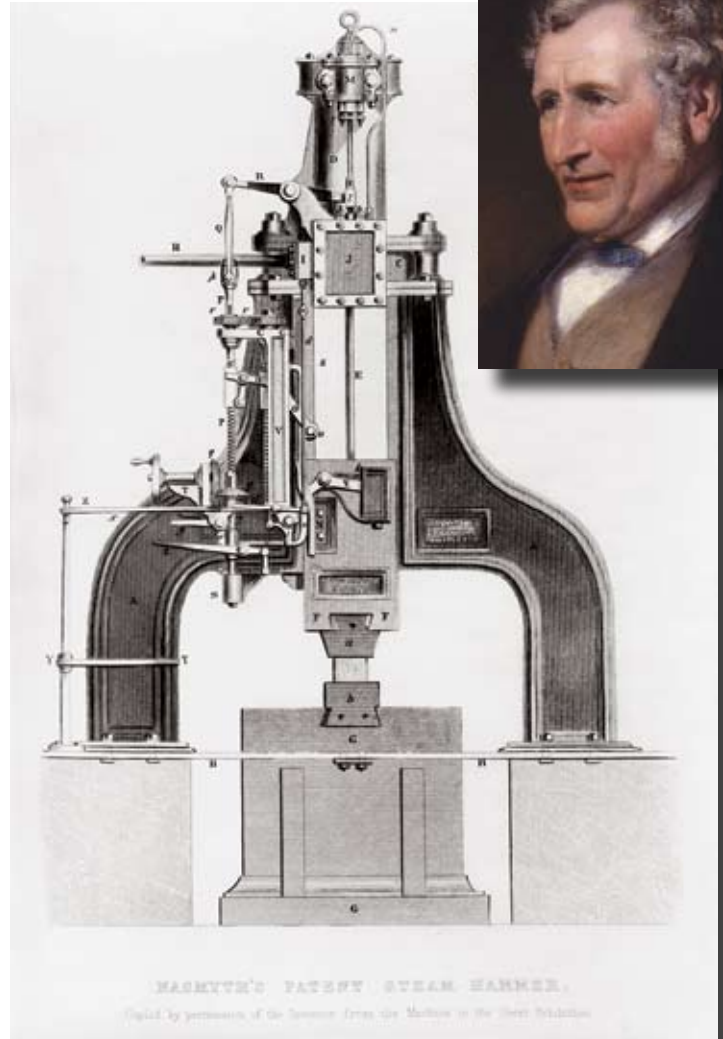
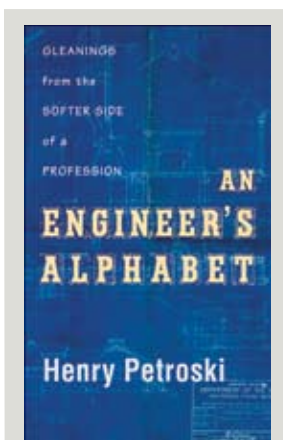


Diagram of a steam hammer patented by Scottish engineer James Nasmyth (1808–90) (Inset). Illustration in: *Cyclopædia of useful arts, mechanical and chemical, manufactures, mining, and engineering*, ed. by Charles Tomlinson, London: New York, G. Virtue & Co., 1854.

and later in England. It was while he was abroad that he published *A Treatise on the Improvement of Canal Navigation* (London: I. and J. Taylor, 1796), on whose title page he is identified as "R. Fulton, civil engineer," the relatively new designation for the profession that distinguished its practitioners not from the yet-to-be-coined "mechanical engineer" but from the military engineers who had traditionally been responsible for large projects. In the preface



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to the book, Fulton reflected on the concepts of invention and improvement, observing that “the component parts of all new machines may be said to be old.” It is in this context that he wrote that “the mechanic should sit down among levers, screws, wedges, wheels, & c. like a poet among the letters of the alphabet, considering them as the exhibition of his thoughts; in which a new arrangement transmits a new idea to the world.” When that new arrangement produces a “new and desired effect” Fulton notes, its creator possesses that quality “which is usually dignified with the term Genius.” . . .

B
badges of engineering societies. Also known as pins, badges of distinction were once worn on watch chains but now are often worn on the lapel of a jacket to identify members of a society and to distinguish members of different grades. Among the oldest badges is that of Phi Beta Kappa. The society’s famous key, which evolved from the original square badge, did not come into use until decades after the society’s founding in 1776. (For more on keys, see keys of honor societies.)

The idea of a badge to be worn by members of the American Society of Civil Engineers was proposed in the late nineteenth century because, as the society had grown, the secretary could not know every member personally. To save everyone the embarrassment of having to ask individuals whether they were members, they were expected to wear their badges when traveling to or participating in national meetings. The first design for an ASCE badge was adopted in 1884. It consisted of the letters *ASCE*, the society’s founding date of 1852, and a depiction of the engineer’s surveying instrument known as a wye level, all on a blue shield. This design was not universally popular among members, however, because lay people did not recognize the level and mistook it for all sorts of irrelevant devices. . . .

C
Centennial of Engineering. The one-hundredth anniversary of engineering in America was celebrated in 1952 to coincide with the centennial of the American Society of Civil Engineers, the country’s first permanent national professional engineering organization. At the time of the society’s founding, the term “civil engineer” included all engineers who were not military engineers, and so the organization welcomed those practicing the rudiments of what would later come to be called mining, mechanical, and other forms of engineering. In time, there were formed specialized societies for mining engineers, mechanical engineers, and others. A three-cent U.S. postage stamp—then sufficient to mail a first-class letter across the country—was issued to commemorate the Centennial of Engineering.

D
Dilbert. This cartoon-character engineer began to gain prominence in the early 1990s in the syndicated comic



The fob-mounted Tau Beta Pi and Phi Beta Kappa keys of **Harry R. Lee**, *Pennsylvania Alpha '06*, first Editor-in-Chief of *THE BENT* in 1906. They were received from him in November 1967 and are on display at Headquarters in Knoxville, TN.

strip of the same name. The strip, drawn by Scott Adams, who worked with engineers before beginning to caricature them, developed a devoted readership that followed the daily office activities of Dilbert and his co-workers. Dilbert has been described as “a nerdy but lovable engineer” and as “Everyengineer,” although I am not sure that his short-sleeved shirt and curling tie is the image of themselves that engineers wish to have propagated. The comic strip is in fact more often about the sociology and psychology of the workplace than about engineers and engineering. . . .

E
“electronic engineer.” When the American Institute of Electrical Engineers (founded in 1884) and the Institute of Radio Engineers (1912) decided to merge, it was at first thought that the name of the new organization would be the Institute of Electrical Engineers. Dropping the word “American” was consistent with the aspiration to become a truly international organization. However, the abbreviation IEE was already taken, by the long-established British society known as the Institution of Electrical Engineers. Furthermore, although the AIEE had already included electronics as a subdivision, some IRE members wished to recognize the growing field more explicitly. There still ensued some debate as to whether the singular or plural form of electronic should be used; that is, whether the new society should be called the Institute of Electrical and Electronic Engineers or the Institute of Electrical and Electronics Engineers. While the merger became effective on January



This stamp was issued in September 1967 by the United States Post Office, commemorating the 1965 space walk by **Lt. Col. Edward H. White II**, *MI G '52*, (right) the first-ever by an American. The issue was eight months after he and two other astronauts—**Virgil I. Grissom**, *INA '50*, and **Roger B. Chaffee**, *INA '57*—were killed during a prelaunch test for the first manned Apollo mission. It was the first time in USPO history that the design was actually spread over two stamps (one which featured White, the other his Gemini capsule—the two connected by a tether), which was considered befitting the twins aspect of the Gemini mission.



1, 1963, the final form of the name was not decided until February of that year. Those who favored the singular form were advised that an “electronic engineer could only be a robot, operating by internal tubes or transistors.” Since the new IEEE wished its members to be dues-paying flesh-and-blood engineers, the singularists relented, and the society’s name included the plural, “electronics engineers.”

F
father-and-son engineers. Among notable father-and-son pairs in the history of engineering have been the British civil engineers John Rennie, the elder (1761–1821) and the younger (1794–1874), who were responsible for several London bridges; the British pioneering railroad engineers, George Stephenson (1781–1848) and Robert Stephenson (1803–59); Marc Isambard Brunel (1769–1849) and Isambard Kingdom Brunel (1806–59), the former a French-born engineer who practiced in America before settling in England, and the latter considered by some to be among the most heroic of the Victorian engineers; John Augustus Roebling (1806–69) and Washington Augustus Roebling (1837–1926), the American bridge engineers whose masterpiece was the Brooklyn Bridge; and Elmer A. Sperry [*NJ A '21*] (1860–1930), the mechanical and electrical engineer who developed a practical gyroscope, and Lawrence B. Sperry (1892–1923), whose aeronautical achievements included an automatic aircraft stabilizer. . . .

G
glass half full. Someone who sees a partially filled glass as half full is an often-cited definition of an optimist. Someone who sees the same glass as half empty is taken to be a pessimist. It has been said that someone who sees the glass as poorly designed, because it is twice as large as it needs to be, is surely an engineer.

H
honor societies. Tau Beta Pi was founded in 1885 at Lehigh University as an engineering alternative to the humanities honor society Phi Beta Kappa. Students in any field of engineering can be initiated into Tau Beta Pi; however, most engineering fields also have their own specific honor society. . . .

I
iron ring. A ring of iron, steel, or similar metal is worn by some engineers on the little finger of their working hand to serve as a reminder of their responsibility to society and to symbolize their membership in and commitment to the principles of their profession. The presence of such a ring used to be an almost sure sign that its wearer was an engineer who was educated in Canada. Although the tradition of wearing an iron ring is still most often associated with Canadian engineers, Scandinavian and other European engineers have had similar traditions, and stainless-steel rings began to be worn by some engineers in the United States in the 1970s. . . .

K
keys of honor societies. Traditionally, a key is a charm worn by a member of an honor society to signify membership. (In contrast, professional society insignia have tended to be in the form of badges and lapel pins.) As late as the middle of the twentieth century, when engineering was still almost exclusively a male profession, it was common for engineers to wear one or more keys and badges suspended from a watch-, key-, or tie-clip chain. By the end of the century, only the oldest generation of engineers followed this practice, and the insignia that professional and honor societies still offered their members increasingly took the form of cuff links, tie tacks, pendants, earrings, and lapel pins, as well as keys.

The term key came to be applied to the older piece of society jewelry first in the nineteenth century, when pocket watches were common and were connected to men's vests by watch chains, which also served to hold small winding keys. Some members of America's oldest academic honor society, Phi Beta Kappa, which predated engineering and scientific honor societies by more than a century, altered their society badges by attaching the steel shank of a watch key to them. (Keys were necessary because the winding stem was not introduced in America until later in the nineteenth century. These watch keys were smaller versions of those used to wind grandfather clocks and spring-driven toys.) The modern honor-society key evolved from these early functional ones. . . .

L
liberal education. According to the *Encyclopaedia Britannica* (15th edition), "by integrating the study of the humanities, social sciences, mathematics, physical sciences, and technology and by providing experience in analysis, synthesis, and experimentation, the undergraduate engineering program offers a modern liberal education." Increasingly, the engineering curriculum has been said to constitute the liberal education of the twenty-first century, in that engineers are expected to take courses in the humanities and social sciences as well as in the sciences, mathematics, and, of course, engineering. The typical liberal arts curriculum, on the other hand, rarely requires much exposure to science or mathematics, let alone engineering or technology courses. . . .

M
movies about engineers and engineering. There are more movies about engineers and engineering than is commonly acknowledged. Indeed, it has been estimated that during the 1920s there were on the order of 50 feature films with an engineer in the male lead. In keeping with the popularity of westerns and the image of the engineer working outdoors, most of these films had a frontier setting. . . .

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EXECUTIVE COUNCIL MEETING

The Executive Council met in Orlando, FL, on August 6, 2011.

The Council reviewed and accepted the Membership Study Report for 2010-11 indicating that a significant number of engineering students continue to seem uninterested in TBEI membership. The Council accepted the report and recommendations of the Distinguished Alumnus Selection Committee, modified the TBEI Distinguished Alumnus Program nomination procedure, and set a limit of five awards per year.

A.J. Flowerday was appointed to the District Program Planning Committee to a term ending in June 2013. The Council appointed District 8 Director Bruce A. DeVantier, *IL E '77*, and District 12 Director Gregory M. Newcomb, *CO B '06*, to terms ending June 30, 2014. The Council voted Distinguished Service awards to retiring District Directors C.D. Gomulinski and P.D. Homen and reviewed plans for the June 9, 2012, meeting of national officers and directors.

Councillor Norman Pih reported on the planned meeting of the TBEI Engineering Futures Planning Committee in Knoxville, TN, on September 3.

Councillor J.F.K. Earle, Ph.D., P.E., reported on recent progress in the TBEI K-12 MindSET Program, the development of four basic modules available for training teachers and parents and presenting lab sessions for students, the new MindSET website, and a successful training session for 21 teachers conducted by the Florida Alpha Chapter on June 13. Informational material had been sent again to all alumnus chapters in July.

The Council reviewed and modified plans for the 2011 Convention to be held in Indianapolis, IN, on October 27-29. A proposal to modify the postponement process of electees who fail to attend initiations was reviewed and will be sent to the Convention. The Council policy on professionalism will be reviewed by the Convention.

A chapter proposal for a Greater Interest in Government project grant was declined because it did not meet the guidelines.

President Larry A. Simonson, Ph.D., P.E., reported on the discussions of the Vision Development Group at its meeting in New York City on July 14. Councillor Pih summarized the discussions and decisions of the Trust Advisory Committee at its meeting on July 14 in New York City. James W. Johnson Jr., *NC A '77*, was re-appointed to the TAC to a term ending June 30, 2017.

Executive Director J.D. Froula reported on the status of the 2011 Alumnus Giving Program and the AGP Multi-State Registration Project. His preliminary fourth-quarter report of the fiscal year had been sent to the Council and was reviewed and received, and his annual report was received. A bequest payment of \$10,000 was received from the estate of C.O. Forge, *CA I '56*, and the Council allocated it to the Engineering Futures Fund.