A Brief History of Engineering

Engineering has been studied since ancient times. The first engineer known by name and achievement was Imhotep, designer of the stepped pyramid at Saqqara near Memphis, Circa 2550 BC. Because the separation of classes during the agricultural era, and because only the rich could afford to educate their children, all education was directed toward intellectual pursuits. Engineering was regarded as a practical pursuit and was not a part of any formal schooling. The apprenticeship system was used exclusively in the study of engineering.

The industrial revolution, by most accounts, began in England in about 1750. Surprisingly, England is not where the study of engineering first became formalized. The fruits of the earlier scientific revolution had resulted in the improvement of weapons and artillery by the late 1600's and early 1700's. This created a demand for knowledgeable officers to use the new weapons to advantage. Military engineering was taught at several schools in France as early as 1689. The French government also recognized the need for similar engineering skills for civilian pursuits. Louis XV appointed Jean Rodolphe Perronet chief engineer for bridges and highways with authority to establish a school. The Corps des Ponts et Chaussees was opened in 1747. This is recognized as the first engineering school in the world and as a result Perronet is often referred to as the father of engineering education (Grayson, 1993, pp15-16).

In America, the need for military and civil engineers during the Revolution became acute. General Washington called for the formation of engineering schools on several occasions. Because of his background in surveying (civil engineering), he recognized the value of engineers and is regarded as an engineer by today's engineering professionals. The military academy at West point included an engineering school as early as the 1780's. Alden Partridge was the first person in the US to hold the title of "Professor of Engineering." This title was awarded in 1813 at West Point. In the years prior to the Civil War, land expansion and the growth of railroads fueled the gradual growth of engineers. During this period, several types of engineering schools were established. A notable event occurred in 1849 in the evolution of engineering education. The new president of Rensselaer Polytecnic Institute, Benjamin Green, proposed a curriculum featuring parallel studies in the humanities, mathematics, physical sciences as well as technical subjects. This is essentially the form of engineering education today, quite different than the technical specialist of the past (Grayson, 1993, pp. 17-33).

This material is based upon work supported by the National Science Foundation under Grant No. 0402616. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation (NSF).

From the time of the Civil War to 1900 there were at least two major influences affecting the profession of engineering. These were the continued economic boom and the passage of the Morrill Land Act of 1862. The act provided public lands to support colleges in each state. The Act specified a practical education for the masses which translated quite directly into engineering schools of the type envisioned by Green. This period also marked the coming of several engineering societies justifying the term "profession" (Grayson, 1993, pp39-55).

In the early 1900's the automobile and two world wars demanded large numbers of quality engineers. The cutoff of European scientific knowledge at the beginning of World War II exposed weaknesses in both science and engineering education, particularly those areas affected by electronics. As a result of this and the later cold war with Russia, greater emphasis was placed on science in engineering (Grayson, 1992, pp. 119-217).

Today engineering is a respected profession with over 2 million members practicing in the United States. Engineering is second in size only to the teaching profession.

What does it take to be an Engineer?

Early in the century there were only a few branches pf engineering represented by a professional society. These were known as the "founding societies." Some of the first branches were civil engineering, mechanical engineering, mining engineering, electrical engineering, and agricultural engineering. Today most sources list two to three dozen major branches and over a hundred specialties, with the number growing constantly. The American Society for Engineering Education website has a list of about twenty major branches or disciplines of engineering. Visit http://www.asee.org/precollege/html/e_alphabet.htm to view the wide variety of engineering options.

Celeste Baine in her 1998 book "Is there an Engineer Inside You?" neither minimizes nor magnifies the challenges of becoming an engineer. Following are a few pieces of advice she offers.

This material is based upon work supported by the National Science Foundation under Grant No. 0402616. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation (NSF).

"engineering is one of the most progressive, challenging, and rewarding fields that cane studied today. Many people want to be an engineer. Almost everyone has the ability, but few posses the drive and perseverance. You might be asking yourself, "How do I get drive and perseverance?" Simply stated, you have to know what you are getting into and have a clear idea about what you want" (Baine, 1998 p13).

"The engineering field is made up of men and women from every different culture who wants to help solve the world's problems. The only element that all engineers have in common is a desire to make the world a better place? (Baine, 1998, p. 16).

"Right now, you need t begin reading everything you can find about engineering and talk to every engineer or engineering student whom you know about the challenges ahead and how to prepare for them. Try attending a summer camp or any programs pertaining to engineering at your school. Obtaining this information now may save you lots of heartache if you decide later that you are on the wrong path. Academic preparation is also essential to exploring engineering as a career. In addition, getting involved in extracurricular activities pertaining to engineering can give you invaluable exposure. In high school, classes in algebra I and II, trigonometry, biology, physics, calculus chemistry computer programming or computer applications can tell if you have the aptitude and determination to study engineering. All of the above courses are not required to get into every engineering school, but early preparation can mean the difference between spending four or six years in college. Some universities also require two or three classes in a foreign language for admission. Check into the programs that interest you and begin to fulfill their requirements. Advance Placement or Honors courses are recommended as well as an ACT score of 20 or SAT of 1000" (Baine, 1998, pp. 18-19).

"Once you are in engineering school, there are tools you need to be successful. Engineering is a rigorous and demanding major. Students must be self-disciplined and manage their time effectively. In college courses, the "real" learning often

This material is based upon work supported by the National Science Foundation under Grant No. 0402616. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation (NSF).

> takes place outside the classroom and less time is now spent in the classroom. A general rule says that, for every hour spent in the classroom, engineering students can expect to spend three hours outside the classroom as compared with two hours for non-technical majors. A good time management system also allows most students to participate in extracurricular activities which broaden experience and are of interest to potential employers" (Baine, 1998, p.29).

The information cited above from the Baine book barely touches the surface of what is available on engineering as a profession. The American Society for Engineering Education offers ten good reasons to study engineering as well as many other resources and links relating to engineering. The ten reasons are listed below but a visit to the website will reveal more details on each reason (http://wwwasee.org/precollege/html/why_engineering_.htm -1).

Ten Reasons to Study Engineering

1. Job Satisfaction
2. Variety of Career Opportunities
3. Challenging Work
4. Intellectual Development
5. Benefit Society
6. Financial Security
7. Prestige
8. Professional Environment
9. Technological and Scientific Discovery
10. Creative Thinking

This reading assignment is based on materials produced by Valley City State University

1. Add graphics or other content to help make it more aesthetically pleasing to the reader.

This material is based upon work supported by the National Science Foundation under Grant No. 0402616. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation (NSF).