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wisconsin engineer

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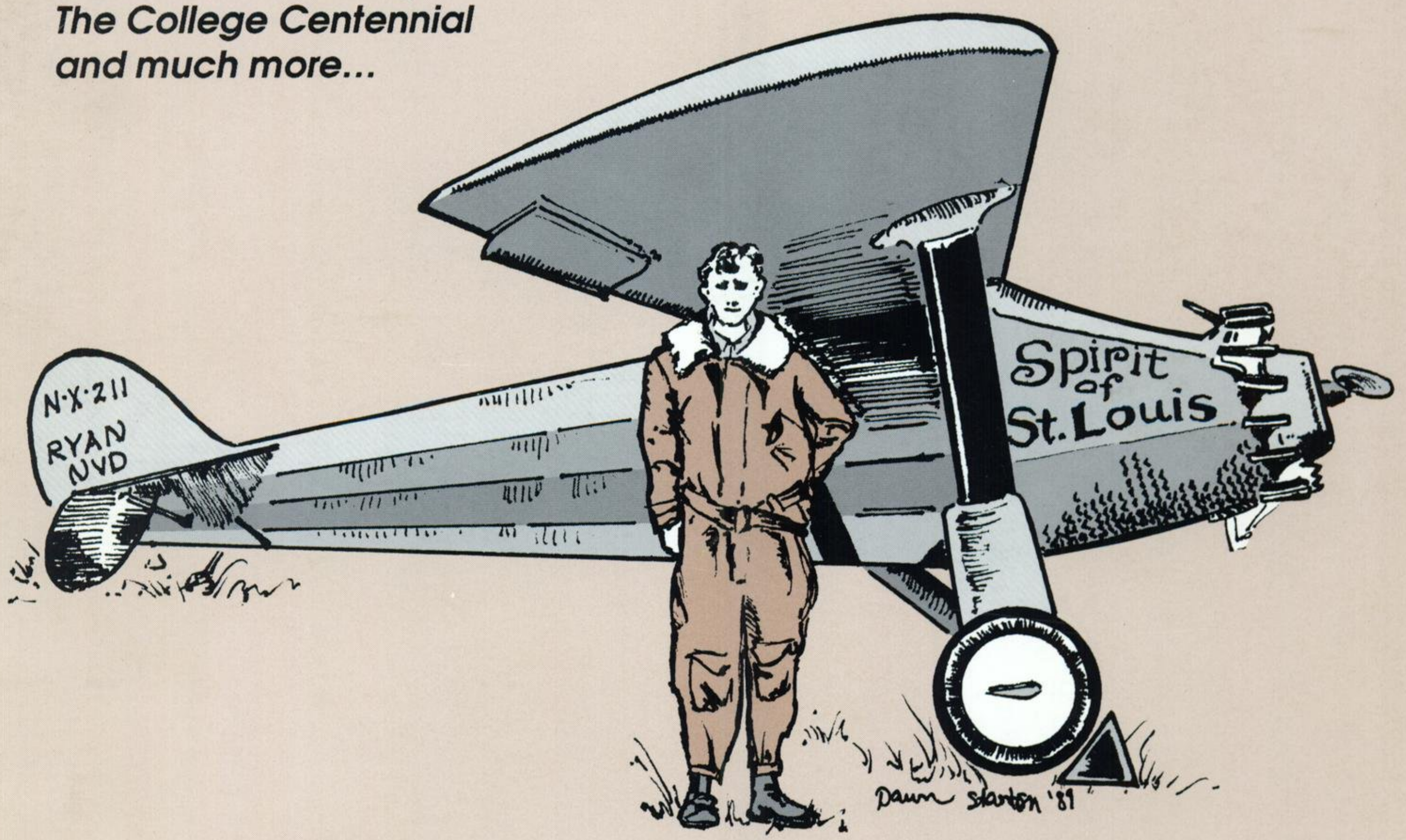

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wisconsin engineer

PUBLISHED BY THE STUDENTS OF THE UNIVERSITY OF WISCONSIN-MADISON, MAY 1989

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A Separate Engineering Graduation

Editorial

In a large university like UW-Madison many aspects of a student's interactions with the college are impersonal. The registration process and large lectures are two examples. The commencement ceremony for undergraduates is a third very important example.

Many of my engineering friends have told me that they don't plan to attend the graduation ceremony. They say it's too long, it's too big, and too many people will be there. I tend to agree, after I sat through a past ceremony and thought it would never end. Others say they don't want to go, but their parents will kill them if they don't.

Comments like this make me think that the spirit of commencement has been lost somewhere. Some engineering students feel alienated by the huge ceremony. It doesn't seem to represent the hard work and experiences they've gone through.

Commencement should not be just for relatives and parents, but a celebration for the students and a send-off into the world. It's a pat on the back that says congratulations, it was tough, but you made it. Now, go out and do some good. The ceremony should honor the accomplishments of students and give encouragement for their bright futures ahead.

Instead, the ceremony tries to represent the whole univeristy at one time, leaving out the special features of each college. It honors only a few students in each college, when many students have worked incredibly hard to gain distinction.

The College of Engineering makes up approximately one tenth of the University's population and a separate commencement for the college would make the ceremony more personal, and more engineering students might feel comfortable in participating. The value of a separate ceremony would be in truly representing the students of the college and the accomplishments they've made.

The selection of speakers that better represents the College of Engineering would give engineering students a perspective on what to expect in the real world for their respective disciplines. The ceremony could honor and recognize more engineers in front of their peers and classmates.

Several factors discourage the UW from having a separate graduation for engineers. Cost to the UW can be a prohibiting factor to having many ceremonies and instead Chancellor Donna Shalala advocates informal receptions after the commencement ceremony for each discipline. This would be a good idea if more of the engineering departments actually followed through and did it.

Another objection posed by Associate Dean Dietmeyer is that a university-wide commencement attracts superior speakers. The speakers that an engineering graduation would attract may be less famous, but if they have a technical background students could relate to them better and the speeches may have greater impact.

To conclude, commencement is a wonderful tradition that all students should enjoy. A separate ceremony for the engineering college would allow more engineering students to be recognized and honored for completing a rigorous education.

Barbara Angermann
Co-Editor

Dean's Corner

For Our Graduates

As you prepare to celebrate the completion of your degree requirements, I would like to offer some thoughts on your future. First of all, a fundamental goal of our faculty has been to provide you with a technical education that will be a sound foundation for your professional career. Education, however, does not end at commencement. You will continue to learn in your first job and throughout every job thereafter. There will be times when on-the-job training is not sufficient and you will find the need to understand new concepts and master new skills. The process is called life-long learning and I hope you will make a commitment to practice it during the many careers you may have.

Second, you have been part of an educational program that is fundamentally committed to upholding high ethical standards, to eliminating discrimination, and to encouraging the use of science and technology for the benefit of society.

The Industrial Revolution brought with it an awareness of the enormous social ramifications of technology. Today, we see clearly how advances made by engineers can drive economic systems, impact health globally, create imbalances in political power, and change social behavior. We invent technologies that can, if society does not fully understand them and use them to benefit mankind, promote greed and corruption beyond the scope of our imaginations. It is the responsibility of all engineers to recognize the impact of their creations and to educate society on all aspects of these technological advances. Inside the back cover of this issue you will find a Code of Ethics of Engineers published by the Engineers Council for Professional Development. Study it before you go to Commencement.

We live in a nation that stands for freedom and opportunity. But if we are to remain free, we must recognize the diversity of our human resources and provide equal opportunities for all, regardless of their race or national origin, their sex or age, the religious beliefs they hold, or their disabilities. We must learn to live and work together, as well as respect and trust each other. This respect and trust will result only when we recognize and accept human diversity and when our actions are carefully considered and based on fairness and impartiality.

Third, I wish all of this graduating class the best of good fortune. I have found that the best definition of "luck" is tenacity of purpose. Most of you have probably developed a keen sense of tenacity of purpose through your studies and activities; it will prove to be one of your most valuable assets.

John G. Bollinger, Dean
College of Engineering

STATISTICAL PROCESS CONTROL: THE NEW INDUSTRIAL REVOLUTION

Since its reintroduction to the United States in 1981, Statistical Process Control (SPC), a highly effective quality improvement strategy, has spread rapidly through American industry. According to Professor Donald Ermer of the UW-Madison Mechanical Engineering Department, SPC makes obsolete the idea of "quality control" as the person at the end of the production line who throws away the faulty items. "Instead, by using statistical data to understand, correct and prevent problems in the manufacturing process," says Ermer, "companies can realistically expect to produce zero defective products."

Although the method did not become known as SPC until the early 1980s, says Ermer, the concept goes back over 60 years. Walter Shewhart, an engineer at Bell Telephone Laboratory, began working with what he called "control charts" in the early 1920s to improve the quality of the telephones Bell manufactured. Shewhart decided that uniformity of component parts was the key to quality. For each telephone to work as designed, every part must conform as closely as possible to the original specifications. For example, a spacer inside a telephone could be designed to be one inch thick. If the spacer-manufacturing processes were too variable and produced some 1.1 inch spacers and others that were 0.9 inches thick, the difference from one spacer to another could prevent the parts of the telephone from fitting together well. To clearly identify the aspects of the manufacturing process that were causing variation, Shewhart devised control charts (see figures 1 and 2).

According to Ermer, choosing the factors in the process that should be sampled and the best method of measurements is difficult work. Once that data is provided, however, control charts are relatively simple to calculate and construct. "When done correctly," he says, "the charts provide an accurate statistical model of the manufacturing process. The model reveals process weaknesses and therefore allows managers and engineers to make decisions for improvement on the basis of proper statistical data."

Many companies used control charts during World War II, says Ermer, because the government insisted on consistently uniform parts to make and repair equipment for the war effort. However, because of the high demand for American products after the war, companies had no reason to continue scrupulous quality control. According to Ermer, management realized they could still sell their product without the hard work of maintaining control charts and following up on the information for improvement, and the charts fell completely out of use.

But other countries that wanted to create a demand for their products turned to SPC. In 1971, a year after becoming a professor of Mechanical Engineering at UW-Madison, Ermer was approached by a visiting Singapore government official. With the help of the United Nations Industrial Development Organization (UNIDO), Singapore hoped to set up a quality certification program for its local industries that would raise the quality of their export products to internationally competitive levels. During his involvement with UNIDO in 1972, Ermer traveled to different Singapore industries and taught managers

ERMER HELPS JUDGE NATIONAL

On November 14, 1988, at a White House ceremony which Ermer attended, President Reagan addressed the first three companies to win the newly created Malcolm Baldrige National Quality Awards. "The one trait that characterizes these winners is that they realize that quality improvement is a never-ending process, a company-wide effort in which every worker plays a critical part," said Reagan..."[They] know that America's economic strength and future depend more and more upon the quality of its products."

After a luncheon later that day, Secretary of Commerce C. William Verity congratulated Ermer and the other examiners who, in just one year, had helped set up the award process and select the winning companies. Verity presented each examiner with a certificate "for outstanding service to the Nation as a member of the first Malcolm Baldrige National Quality Award Board of Examiners."

Ermer's role in the quality award process began late in 1987, when he heard about the Baldrige awards at a quality improvement conference. A 1987 act of Congress had established the award and named it in honor of a former U.S. Secretary of Commerce, stating that "improved management understanding of the factory floor, worker involvement in quality, and greater emphasis on statistical process control can lead to how to assess the effectiveness of their production processes. During follow-up visits in 1975 and 1982, says Ermer, he saw gradual but definite progress in their quality improvement methods and industry in general.

SPC Returns to the U.S.

The idea lay dormant in the United States until 1981, when NBC interviewed a man named Edward Deming about the quality control strategy he called "statistical process control." Deming had taken SPC to the Japanese in the 1950s after trying and failing to sell his ideas to U.S. industry. As history demonstrates, Japanese adopted it with great success. Shortly after the interview was broadcast, the CEO of Ford Motor Company contacted Deming and asked him to act as a quality improvement consultant. Says Ermer, "That was the beginning of a revolution that's been going on in the U.S. for the last eight years."

According to Ermer, "Deming said he wanted to work for Ford so that he could start a brush fire that would become a grass fire that would become a prairie fire." His strategy worked. "Ford also realized that the quality of its own products depended on the quality of the parts and raw materials it bought," says Ermer. "The company began to insist that all its suppliers use SPC and become certified suppliers."

After a Ford employee participated in an industrial short course that Ermer helped teach, one division of the Ford Motor Company hired Ermer and two of his colleagues in 1981 to help implement SPC. "We taught people at all levels in the division, including some personnel and finance people," says Ermer.

General Motors, which also hired Ermer to assist in implementing quality improvement ideas, and Chrysler have joined Ford in having their suppliers certified. Other large companies to adopt SPC methods include Caterpillar, John Deere and Campbell's Soup. "But after all this time," says Ermer, "we've still only seen the tip of the iceberg regarding the improvements that could be made throughout industry."

The concept has also spread to areas outside of industry. For example, five years after he initiated a quality and productivity program for the city of Madison based on Deming's philosophy, former mayor Joseph Sensenbrenner received one of *Quality Review* magazine's "1988 Ten Most Influential People in Quality Improvement" awards for recognizing that quality and productivity methods in manufacturing can also be used in a government agency.

Implications for Engineers

According to Ermer, Deming pointed out and emphasized one of the key concepts of quality improvement: that there are two causes of variation. "Special causes" are the responsibility of production line operators and their direct supervisors. However, Deming's principle states that these workers can eliminate, at most, 15 percent of the quality problems. More than 85 percent
(continued on page 7)

COMPETITION

dramatic improvements in the cost and quality of manufactured products...."

Ermer applied to be an examiner and was notified early in 1988 of his selection as one of a diverse group from universities, industry, and government to help choose the winners of the Baldrige award. He and the other selected examiners attended a training course, where they worked to achieve uniformity in scoring criteria — "a very good idea, especially since we were judging companies on reducing variability," says Ermer.

The National Institute of Standards and Technology, part of the Bureau of Commerce, sent approximately 10,000
(continued on page 7)

Professor Ermer receives a certificate of appreciation from C. William Verity, Secretary of Commerce, for "Outstanding Service to the nation as a member of the first Malcolm Baldrige National Quality Award Board of Examiners."

Control Charts: The Heart of SPC

When constructing control charts, engineers ignore the specifications that the process designers have set and work strictly with measurements of the manufacturing process. Thus the charts do not show what should happen; instead, they show exactly what does happen. Control charts for sample averages and ranges consist of two graphs:

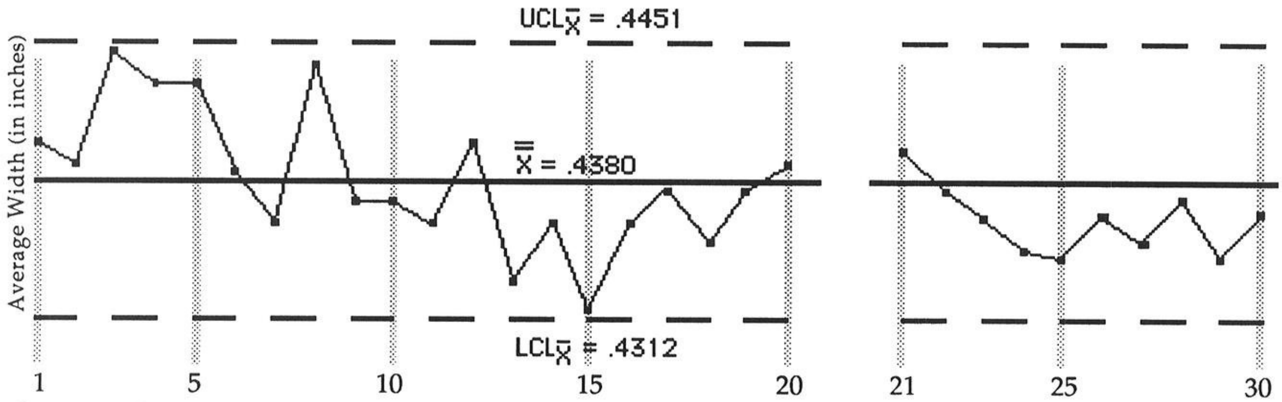


FIGURE 1: Sample averages

Each point in this graph represents the average thickness of a sample of five spacers that came off the production line in sequence. In the left section of the graph, which plots 20 samples produced during the first shift, $\bar{\bar{X}}$ is the grand average (i.e. average of the average) value of these points and represents the process mean. UCL$_{\bar{X}}$ is the upper control limit, and LCL$_{\bar{X}}$ is the lower control limit. The limits, based on the variability of the process as measured by the sample ranges charted in the second graph, are set at plus or minus three standard deviations of the averages. All points should vary in a random manner within these limits if the process is stable.

When the chart is continued on the right with the first 10 samples from the second shift, we see that most of the points fall below the previously calculated grand average value. This decline shows the process is unstable and the average thickness of the spacers is decreasing.

One of the most important uses of a control chart is to predict when changes in the process are taking place. For example, in the X-chart in Figure 1, if the fourth, fifth and fifteenth points had been circled based on pattern analysis rules they would have showed that a downward trend occurred even before the decrease became obvious in the second shift.

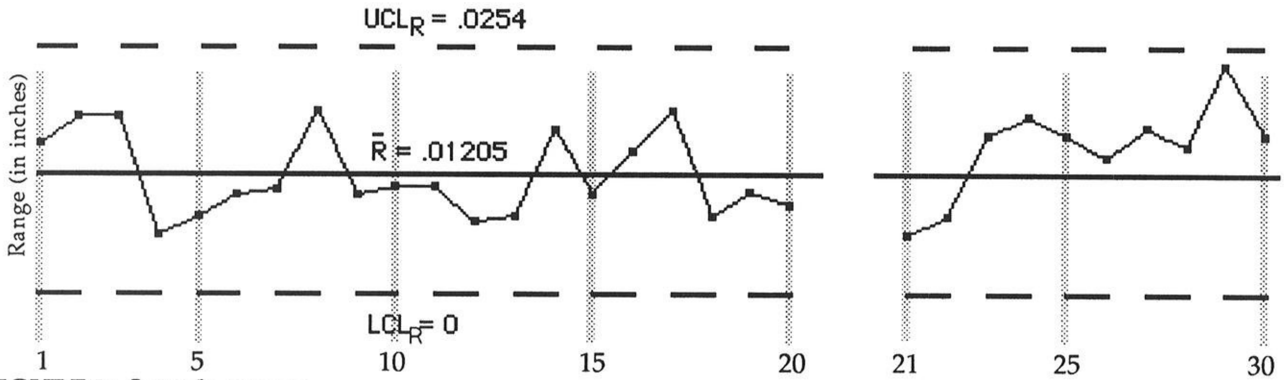


FIGURE 2: Sample ranges

Each point in the second graph represents the range between the highest and lowest measurements among the five spacers in each sample. The average, $\bar{R}$, represents the process variation and is used to set the control limits on both the X-chart and its own chart. For the R-chart the LCL$_R$ is zero (SPC theory sets the LCL at zero for sample sizes less than seven), and the UCL$_R$ is the expected largest variation in sample ranges.

Observing the graph of the second shift, we see that the points fall consistently above the average line. The process is unstable, and variation is increasing. This could be caused by several factors; for example, maybe an inexperienced worker took over at the shift change.

These two control charts, when analyzed together, reveal a risk to quality. With the process mean decreasing and the process variation increasing, the process may start producing spacers whose measurements will fall below the lower specification limit and, by definition, will be defective.

of defective products result from faults in the system, called "common causes," that have to be corrected by management. "Thus, although the production line people want to improve quality," says Ermer, "they can only control a small part of the process. Therefore they must have management's total support, and management must use engineers' expertise to plan, build and maintain a system that produces quality products."

Deming recommended first using control charts to identify and eliminate special causes. Faults in the production system itself cause the variation that remains. Once these faults are identified with statistical methods, management must see that the necessary changes are made to reduce common-cause variation. Deming promotes a goal of "never-ending improvement" to continuously reduce variation.

Ermer predicts that, as greater numbers of managers learn that the system causes more variation than the people operating it, they will enable engineers to do a better job. "Many system problems occur because management did not give engineers enough time to plan an efficient system and test it thoroughly," says Ermer. "In the past there always seemed to be time to do a job over again. SPC encourages taking the time to do it right in the first place."

Ermer also predicts that more long-term planning by management will lead to increased and more effective research and development efforts, where engineers can use new design techniques to improve the product and the process that manufactures it. In addition, Ermer says, engineers need to have a better understanding of specifications relative to variation in the process, and that in some cases tolerances can be increased without reducing the quality of the product.

Deming also believed that quality improvement cannot be solely the responsibility of a quality control department. Employees at all levels of responsibility have to know what control charts mean and be involved in implementing productivity improvements. To achieve that end, Deming encourages management to reward teamwork, not competition, between departments. He believed this will help employees focus on company-wide goals instead of individual department objectives.

One way to promote teamwork, Deming believed, was to encourage individuals in every department to think about their customers within the company. For example, says Ermer, "Manufacturing engineers can identify their customers as the people who will operate the production systems they design. By interacting with the operators, engineers can use the operators' input to create a system that is more effective and ensures uniform operating results."

Interested?

If you'd like to learn more about Statistical Process Control and other quality improvement methods, Professor Ermer teaches the following courses:

ME/IE 512	**Statistical Process Control**
ME/Statistics 242	**Statistical Experimental Design**
ME/Statistics 426	**Engineering Reliability**

Ermer also has a new graduate course,* ME 712, Quality Product and Process Design, *which covers the proper application of Taguchi's techniques for robust design of products and processes. His current research interests are in the critical interface between design and manufacturing in producing a quality product.

AUTHOR

Lisa Peschel, a 6-year undergrad, is very happy to be graduating this May. She takes her favorite quote from John Lennon. "Life is what happens to you while you're making other plans."

applications to companies that requested them. Of these companies, 66 returned completed applications. Three examiners reviewed each application and, after consulting with a senior examiner and the nine-member Board of Judges, groups of examiners visited selected sites for a few days. With the examiners' final report , the Board of Judges considered the remaining companies for six awards: two for small businesses, two for large manufacturing companies or their subsidiaries, and two for companies which primarily provide services.

The judges found three candidates qualified to receive the first Malcolm Baldrige National Quality Awards. Motorola, Inc., the communications giant whose products include semiconductors and two-ways radios, and the Commercial Nuclear Fuels Division of Westinghouse won the two large company awards. The small business prize went to Globe Metallurgical, a company of 210 employees.

Globe's story is particularly outstanding. In 1985, when many U.S. makers of iron-based metals were closing plants, Globe had its managers trained in statistical process control and initiated a company-wide quality improvement program. Since that time, amounts of metal returned for replacement fell from 49,000 pounds in 1985 to none in 1987. Their reputation abroad demonstrates their success; when European traders place orders for metals, many specify that the material must be "Globe quality."

The winners received an opportunity to serve as role models for other U.S. companies by presenting their quality control programs at a Washington conference this April. In Reagan's words, the first Baldrige awards fulfilled their purpose: to "offer companies a standard with which to compare their own progress to that of the country's very best."

100 Years of Change:
A History of the College of Engineering

A century ago, upon establishing the college of engineering at the University of Wisconsin, what would the "founding fathers" have thought of the magnitude of change in the last 100 years? Would they be shocked at all the changes, good and bad? In all probability, they would be proud that they helped to create a college that, a century after its establishment, has become one of the top engineering colleges in America. How exactly has the college changed since the time of its foundation?

Surprisingly to some, the college began as a military program. In 1857, the college of engineering began as the Department of Theoretical and Practical Engineering. The department was appropriately named "theoretical." The University, only seven years old at this time, did not have sufficient funds to hire a teacher. Thus, it remained a dormant department until 1867 when through the Morrill Act, the Regents were able to obtain funding to provide teachers through the military. This was the establishment of the Department of Engineering and Military Tactics. As the name suggests, the department was structured as preparation for the military. All male students in the program were required to participate in the Army Reserve. Basically, the freshman and sophomore years of this program consisted of military training, while the junior and senior years were reserved for civil engineering.

Soon after its establishment, the four year military program was ended. In 1869, a law was passed that confined military education to only the freshman and sophomore years. At this time, a separate course of study in civil engineering was formed under the College of Arts and Sciences. Many saw this as not only an opportunity to continue the civil engineering program, but to also liberate the program from the military.

The newly liberated program slowly and steadily grew. As more teachers were provided, more courses of study were started. In 1871, the college saw the emergence of the department of Mining and Metallurgy under the direction of R.D. Irving, and in 1875, the department of Mechanical Engineering was introduced under Major Nicodemus.

By 1889,the college had grown significantly, and the college of engineering was formally established under the name of the College of Mechanics and Engineering, thus liberating it from the College of Arts and Sciences. It is the anniversary of this formation that we are celebrating this year.

In 1890, the Civil Engineering Department split into two departments: Railroad Engineering, and Bridge and Hydraulic Engineering. This was just the beginning of the vast number of changes that would occur within the college of engineering. Between 1890 and 1946, the college underwent numerous curriculum changes in order to specialize and accommodate the rapid changes in technology brought about by the advent of the first and second industrial revolution. New departments were created and merged with existing departments. This resulted in the following:

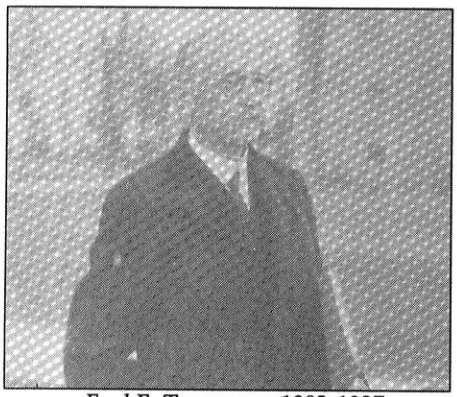
-A mechanical engineering department that incorporated such things as machine design, mechanical drawing, and steam and gas engineering.

-A civil engineering department that incorporated railway engineering, structural engineering, and the merging of sanitary and hydraulic engineering.

-The splitting of the electrical engineering department in 1899, with one part eventually becoming the department of chemical engineering (under the name of applied electrochemical engineering), and the other remaining electrical engineering.

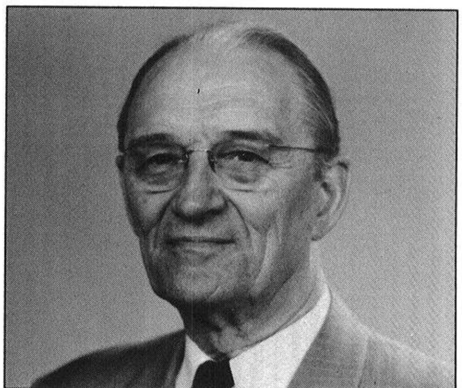
-The establishment of the chemical engineering department in 1905.

The curriculum was not the only thing to change in the college of engineering through the years. There seemed to



Fred E. Turneaure 1902-1937

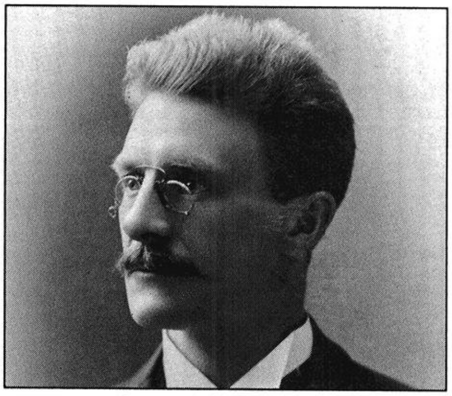
A.V. Millar 1937-38



Morton O. Whithey 1946-1953

State Historical Society of Wisconsin

William Nicodemus 1857-1889



Storm Bull 1889-1899

John Johnson 1899-1902

be an emergence of interest in engineering. Not only did the faculty grow from the original eight in 1889 to ninety five in 1946, but the student enrollment increased twenty fold. With the increased faculty and student interest, the college was able to initiate summer school courses, improve the undergraduate school, and initiate graduate level education. The years between 1890 and 1946 were basically the foundation years of the college of engineering.

By 1946, society had undergone a vast number of changes since 1890. With the advent of the Civil War, Industrialization, World War I, the Great Depression, and World War II, science and technology had advanced appreciably. Engineering also underwent many changes. Most notedly, it became more a practical science than a theoretical application, and the curriculum and departments at the UW reflected this. The college evolved as technology evolved.

Since the "switchover" in 1946, many "non-traditional" and interdisciplinary departments have developed. Their formation usually reflected the time period in which they were established. For example, a Nuclear Engineering Program was established in 1957, after the release of the H-Bombs in Hiroshima and Nagasaki. Atomic weapons had become a popular topic, and by 1963, nuclear engineering had gained enough interest to become a department in the college of engineering. There are many other examples of "non-traditional" departments being incorporated into the college because of "fads in science," such as the establishment of Engineering Mechanics in 1959, and the formation of a graduate program in Space Engineering and Science in 1964. It can be said that almost anything "non-traditional" became the traditional curricula of today.

By the late sixties, technology had opened many doors to the natural and man made world. In 1968 and 1969 the college saw the emergence of biomedical engineering, agricultural engineering, oceanography and limnology, and the Industrial Engineering Department.

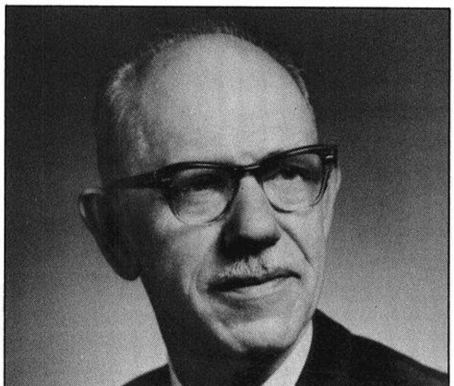
The early seventies seemed to be a time for reorganization and further development of inter-disciplinary programs. In 1970, graduate programs in water chemistry and materials science were established. That same year, the Professional Development Degree was established, which continued engineering education beyond the classroom. Also in 1970, the departments of electrical and civil engineering were changed to electrical and computer, and civil and environmental engineering, to broaden the scopes of their curricula. In 1971, the department of Engineering Graphics became the department of General Engineering with the purpose of developing more interdisciplinary courses between society and technology.

The College still has not reached its peak, and it's doubtful it ever will. The college is still undergoing changes. For instance, in the past year, the department of Metallurgical Engineering has become the department of Materials Science and Engineering. In fact, in the next few years, we will be seeing the incorporation of the department of General Engineering into the Engineering Professional Development department.

Future changes in the college of engineering are as inevitable as the evolution of the fax machine. The college will keep developing as long as there are things that still need developing. Who knows what could be written about the college 100 years from now? ▮▮▮

AUTHOR

Sharon Chen, a freshman in Chemical Engineering, noticed "There's no bigger an attention getter than a nice gib mistake."



Kurt F. Wendt 1953-1971

W. Robert Marshall 1971-1981

John G. Bollinger 1981-present

MORE THAN MONEY: WHAT MAKES A GOOD JOB OFFER?

Graduating seniors are contemplating the future. The job offers have been pouring in for a couple of months now and it's time to accept one and decline the others. But these seniors, who for the last four or more years dreamed of that "perfect job" have an awful lot to consider now.

How does a student, who more than likely has not had a lot of work experience, aside from summer jobs and perhaps a co-op term or two, decide which offer is the best offer?

Money. As poor college students, we struggle through a few years with dollar signs dancing in our heads, hardly waiting to move on to the "real world" and earn some money.

As engineers, we realize that our entry level positions pay fairly well. According to the College Placement Council (CPC) Salary Survey, entry level engineers are offered more than their counterparts in most other fields, including broadcasting, economics, accounting, and most sciences. UW Engineering statistics compare well (see graph). So it's no secret that engineers have fairly high salaries. But should the salary offer be the most important consideration?

Absolutely not. Many other factors should play more important roles in a career decision. But students who have been looking through gold-plated glasses for the last few years may fail to seriously consider the other factors. Perhaps this is a result of competition among classmates. Who can receive the highest offer? A senior pointed out that it is embarrassing when your friends are receiving $300 or $400 more a month than you are. But having the highest offer is not the same as having the best offer.

Consider too, why the offers are lower. Some students have co-op experience. Others have great GPAs. Some disciplines receive lower offers simply because of the types of jobs they do. For example, civil engineers tend to work for local and state governments, who undoubtedly pay less than the large research and development companies that hire chemical engineers. Whether or not the offers are the highest in the class, the student still needs to choose the **best** offer.

The best offer will be different for every student. The student must decide what type of industry to work for, what kind of job to perform, where to live, and what kind of company environment is the most desirable. Chances are, the best offers come from the best companies. So now the question becomes–what are the best companies?

Location

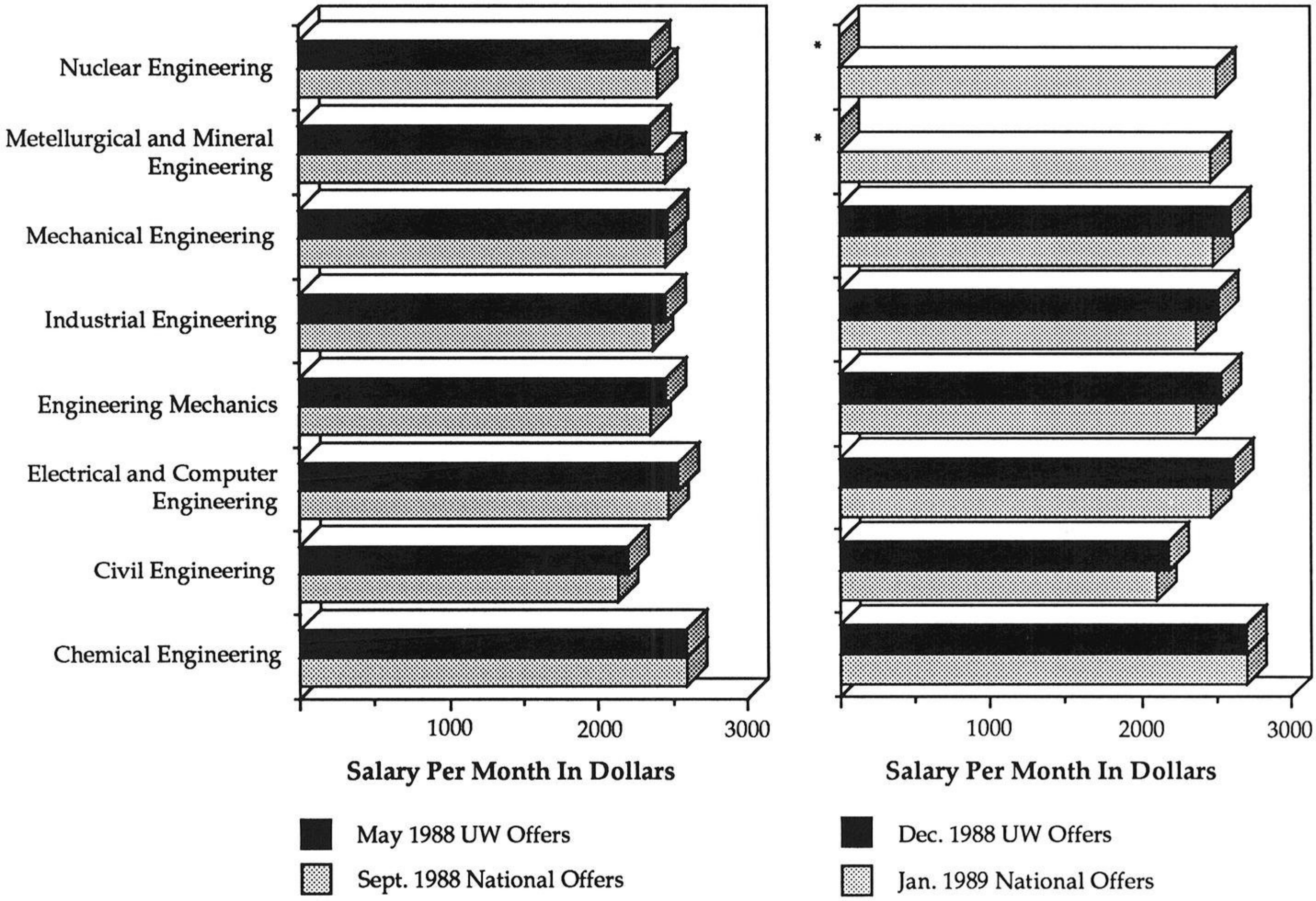
Geographical preferences often influence a student's job hunt. If the company has facilities located across the country, a student should question the possibility of a transfer or extensive travel. Often, a company will assign a trainee to one location then transfer the individual at the end of the training period.

Even though you don't have the highest offer, you may have the best offer

But students are not always familiar with many different cities. An excellent resource is the *Places Rated Almanac*, a Rand McNally catalog by Richard Boyer and David Savageau that describes 329 metropolitan areas. Boyer and Savageau rank the areas for climate, housing, health, crime, transportation, education, the arts, recreation, and economic outlook.

Students should not have a "Who cares?" attitude about the city they will live in. For those with families, educa-

Engineering Salary Statistics



** UW data from Career Planning and Placement
National data from CPC Salary Survey

* Data not available

tion, housing, and recreation are important considerations.

The cost of living is perhaps the most important aspect of a location. A high salary in Milwaukee will not be a very high salary in southern California, although southern California may otherwise be rather appealing.

The Company

The company itself is the most important consideration. But again, what makes a good company? Naturally, the answer is a matter of personal judgement. Hopefully, a young engineer researches a company before the first interview and begins to decide if the company offers the desired experience and atmosphere. It may take more than the first interview to make a final decision.

A decision does not need to be based on only the type of work that the engineer does, but also on the beliefs and practices of the company. *Rating America's Corporate Conscience* serves as an excellent guide of the social and ethical practices of many top companies. The guide, written by Steven D. Lydenberg, Alice Tepper Marlin, Sean O'Brien Strub, and the Council on Economic Priorities, describes companies with reference to charitable contributions, representation of women and minorities among top corporate officials, disclosure of social information, involvement in South Africa, and conventional weapons and nuclear weapons contracting. Certainly not all engineers want to design missiles or research the possibility of Star Wars. Some engineers will not work for companies that accept defense contracts. Individuals should follow their beliefs and consider the beliefs of a company before accepting a job.

Another important consideration is the size of the company. The lure of a large company is often strong but not always sincere. In *Great First Job Traps* (The Wall Street Journal-Managing Your Career, Spring 1989), Jack Falvey, a management consultant and college speaker, compares career opportunities in small and large companies. Many students are drawn to the status and recognition of larger companies. But the student doesn't realize that large companies often bury the entry level worker. Falvey claims that at small or medium companies, the new employee sets his own pace and creates the action. An employee get more exposure and more responsibilities than she may get at a large company. Falvey points out that "in the 15 million companies in the U.S. that aren't in the Fortune 500, there are some great entry level opportunities."

The overall working environment plays a major role in any job. We spend quite a bit of time at work and need to enjoy the atmosphere as well as the particular job. Tim Engelien, an Engineering Mechanics senior who just

Students should not have a "Who Cares?" attitude about the city in which they live

accepted his job, said that a salary won't get him out of bed and make him go to work every morning. He needs to know that he'll get to work and enjoy his job and his co-workers.

In *Super Workplaces* (The Wall Street Journal-Managing Your Career, Spring 1989), Robert Levering, co-author of *The 100 Best Companies to Work for in America,* defines a great company. He states that there should be a sense of partnership between the company and the employees. Levering describes three areas where the company can go beyond the traditional time-for-work exchange:

(1) *Giving people responsibility for their jobs* - This includes allowing people to have input on how their jobs should be done, promotion from within the company, and strong training programs. Strong training programs indicate that the company wants the employee to grow as it does.

(2) *Rewards* - A salary or wage alone does not recognize a person's contributions. Rewards could be profit sharing, stock options, or recognition for a job well done.

(3) *Rights* - All companies have written or assumed policies and practices that determine how people are treated by their superiors and co-workers.

Major problems that can arise in companies relate to the power of the organization over the individual employees. People in management are often treated as first-class citizens while others are treated as second-class. Good companies will try to reduce class distinctions.

The most important aspects of a company deal with the employees. The people who work for a company **are** the company and should be treated well.

Levering, along with Milton Moskowitz and Michael Katz, researched the human conditions inside companies and reported their findings in *The 100 Best Companies to Work for in America.* Many of these companies are not in the Fortune 500. And many are small, often unheard of companies that really emphasize the individual employee. The companies are rated in five categories: pay, benefits, job security, chance for advancement, and ambience.

The people who work for a company are the company and should be treated well

A strong benefit plan can outweigh a high salary. Insurance policies will include family members. The company will offer profit sharing and discounted stocks. Some companies have health clubs and medical programs. Good benefits and special perks can make a low salary better than a high salary with few benefits.

Job security assures employees that there is little chance for lay-offs. Companies often have "no lay-off" policies. As mentioned earlier, promotion from within the company and chance for advancement bring the employees closer to the company, rather than humiliating them by hiring an outsider.

Ambience is the special or unique nature of the company that makes it more enjoyable to work for.

The authors of *100 Best Companies* researched individual companies based on previous findings and suggestions from other people. Most of the research, however, focused on the actual employees. They found that the companies that didn't want to participate in the research probably would have had negative reports from its employees. Also, the best companies were those where the employees wanted to tell all they could about how much they loved their jobs.

The seniors who are considering their offers and the underclassmen who are looking to the future have a lot to think about. Accepting an offer shouldn't be as easy as accepting the most money. A career deals with much more than just the salary. The location, size of the company, type of company, and working environment can be so much more important. Careful research and educated decision making will result in the best job choice.

AUTHOR

Shelly Hoffland is a sophomore in the Mechanical Engineering Department. She listens to Sly in the Morning just to hear him say, "...Where we don't talk over your favorite rock-n-roll."

Sources and suggested readings:

The Wall Street Journal- Managing Your Career, Spring 1989

Rating America's Corporate Conscience, The Council on Economic Priorities, 1986

The 100 Best Companies to Work for in America, Levering, Moskowitz, and Katz, 1985

Manufacturing Systems Engineering

UW-Madison's six-year-old Manufacturing Systems Engineering (MSE) program is supplying U.S. industries with needed experts knowledgeable in recent dynamic changes in manufacturing. "Industries need the experts that the MSE program produces who know the entire manufacturing process from beginning to end," said MSE Program Assistant Sue Helmich.

Graduates in the program are in great demand, according to Helmich. Students who enter the program under company sponsorship are being offered positions of increased responsibility when they return to their respective companies. Also, graduate students are receiving offers in the mid-to-upper thirty thousand dollar level upon completion of the MSE graduate degree.

"People in this country are waking up to the fact that manufacturing matters to the health of the country," said Professor Marvin F. DeVries, director of the program.

DeVries cited the roughly one-third of the U.S. GNP (Gross National Product) as evidence of the vitality of manufacturing. "It's the principal source of a generation of new wealth," he said.

The Master of Science degree program in MSE was created in 1983 in response to industry's need for knowledgeable personnel who understand new technology and its potential impact on increasing productivity, according to a paper written by DeVries in 1986. In the early 1980's, manufacturing technologies captured the interest and commitment of industry leaders around the world. For the first time, American manufacturing managers found themselves at a competitive loss due to a shortage of manufacturing-educated personnel.

"The history of American industrialization has never witnessed the widespread interest for implementing change from top management to the shop floor as is seen today," DeVries wrote in his 1986 *Academe's Response to Industry's Need for the Manufacturing Engineer of the Future.* The MSE program is an interdisciplinary program that shows graduates how to apply new technologies to improve manufacturing productivity by exposing them to a broad systems perspective of the technical and managerial issues.

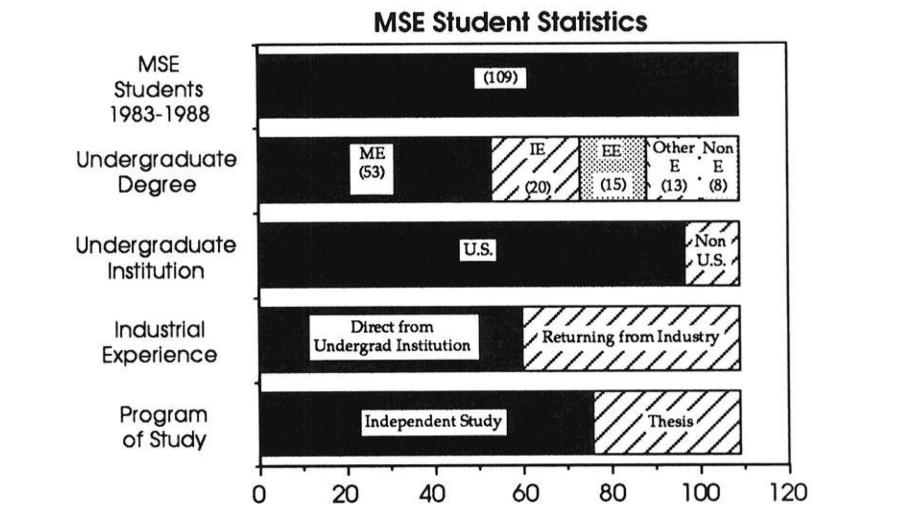
One example of this broad, hi-tech knowledge at work is the flexible manufacturing system (FMS) that produces 180 different parts over a wide range of sizes at Manak machine tool facility in Florence, Kentucky. This example, highlighted in DeVries' report, requires two persons for operation and will allow Manak to reduce the common six-month delivery schedule for machine tools by about 80 percent.

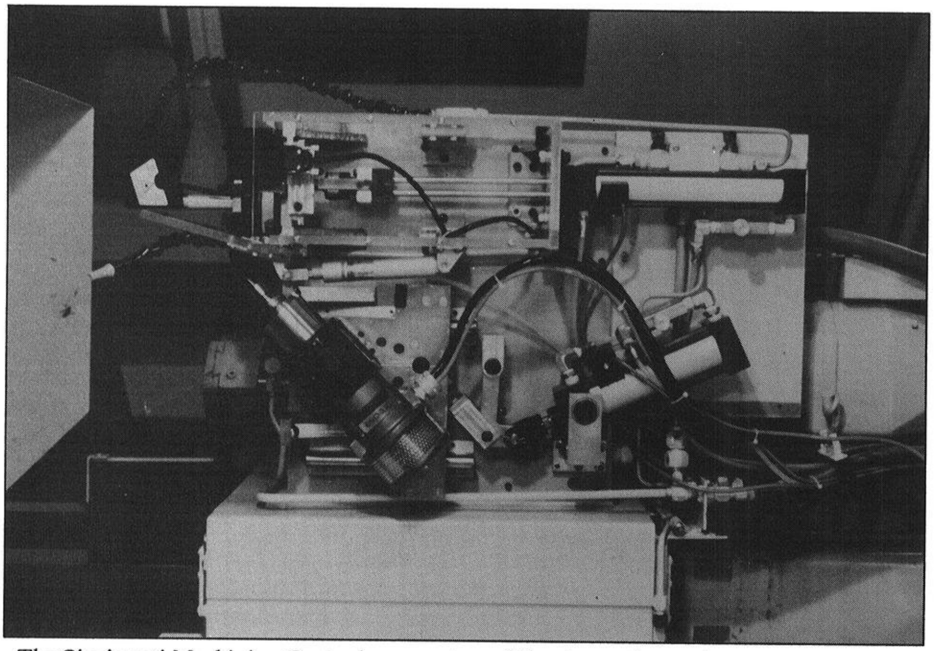
Another example DeVries cited was the FMS at a recently modernized General Electric Company plant in Erie, Pennsylvania that reduced machining time from 16 days to 16 hours.

Graduate students focusing on manufacturing used to focus primarily on one type of manufacturing system, Sue Helmich said. Their broad base of general engineering classes was the base of the students' "pyramid" of knowledge and their focus was its peak. "We're trying to turn that pyramid around so graduates have more of a systems education," Helmich said.

The multidisciplinary MSE program's curriculum inverts this pyramid of manufacturing knowledge in part by requiring each student to take at least one graduate level course in three core areas: Manufacturing Processes and Control, Design and Operation of Manufacturing Systems, and Managerial Aspects.

All MSE students must also participate in the manufacturing systems engineering capstone seminar course. The Manufacturing Systems Engineering Curriculum Committee designed the seminar that exposes students to





The Cincinnati Machining Center incorporates milling, inspecting and grinding in one machine

1) practical case studies offered via guest industry speakers, 2) participation in a 4-5 member industry-based group project, and 3) modern design and analysis lectures.

"The industry-based study is the single most important part of the seminar," according to Professor Jerry Sanders, Industrial Engineering. The course, taught by Sanders and Professor Rajan Suri, Industrial Engineering, "gives students a chance to work with a team on a real problem where the results will most likely be used," Sanders said.

Nearly 50 faculty in the College of Engineering, School of Business as well as in the Departments of Computer Science and Anthropology are involved with the program. Students can complete the MSE program as a 24 credit thesis program or a 30 credit independent study (non-thesis) program. A third curriculum option is a 30 credit Engineering Management Specialization program.

This last option was created in response to the strong demand for courses in the School of Business from students with prior industrial experience. This program option requires students to take three courses in the School of Business in accounting and finance, organizational behavior and general interest as well as the Business School course "Managing Technological Change in Manufacturing Systems."

The program is "the most rapidly growing graduate-type manufacturing program in the United States," DeVries said. There are at least 50 universities that offer similar programs in the form of degrees, formal options or a certificate. Most of these universities support a lot of research in their engineering school, according to DeVries.

DeVries compared the development of MSE programs to the post-World War II development of industrial engineering programs. "The ability of people without a formal education to handle new technologies is becoming less feasible with each advance in increasingly complex industrial technology," he said.

The MSE program was designed to grow to a level of forty students over a four-year period. It did so in less than two years and has maintained this enrollment to date, DeVries said.
(continued on page 15)

The industry-based study that students must complete in a seminar central to the Manufacturing Systems Engineering (MSE) graduate degree program gives students an opportunity to gain important practical experience, according to Professor Sanders.

"Students do what they'll do in the real world," Sanders said. He and Professor Suri teach the manufacturing systems engineering capstone seminar that Sanders considers "absolutely critical" to the MSE program.

MSE student David Van Zoest agreed that the biggest advantage of the study "is being able to work on a real-life problem at a local industry." Van Zoest said he and other students in his Spring 1988 seminar welcomed this alternative to solving problems in text books.

Van Zoest and four students in his seminar evaluated plans for a new manufacturing facility at RTE Distribution, Waukesha, WI. RTE Distribution manufactures transformers, the devices seen on telephone poles that change currents of electricity coming from a primary circuit into currents and voltage that go to a secondary circuit.

Each team went to its respective industry in the beginning of the semester to assess the industry-proposed problem and determine how much could be accomplished over the course of the semester-long seminar.

The system Van Zoest's team evaluated implements Just In Time (JIT), a philosophy of manufacturing that minimizes the number of parts in the system waiting to move on to the next step in the process. Van Zoest, Masami Shimizu, Pat Austin, Mike Tomsicek, and Sid Dharni told RTE Distribution that they would establish whether the manufacturing system to be installed would produce the target number of transformers.

The team put the layout of the system in MANUPLAN, a software package that simulates manufacturing systems. The data they input was information including machine capability, part dimensions and routing, machine cycle times and machine set-up times.

"The software ran parts through the factory and determined where the bottlenecks in the system were," Van Zoest said. The information MANUPLAN provided told the team which machines were over-utilized, or producing more than the machine can handle. Over-utilization leads to problems like bottlenecks.

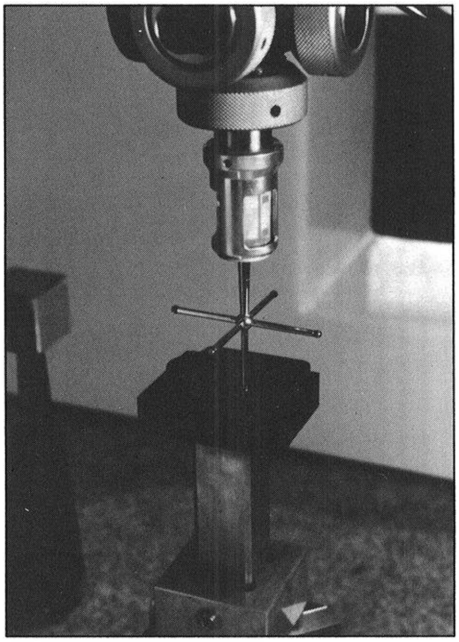
The team animated the facility and ran the factory on a computer screen for RTE representatives in a half-hour presentation at the end of the semester as did the rest of the teams in the seminar.

"Simulating the factory running before and after our recommendations were implemented showed RTE representatives how the team's changes would improve their system at the lowest cost," Van Zoest said.

One example of these recommendations was "a simple case of balancing lines," according to Van Zoest.

Two sets of machines in the system called winders wrap wire in a helical fashion. One set of four machines wrapped large wire while the other set of four winders wrapped smaller wire.

The machines wrapping the small wire were wrapping more wire than the other group. One machine in particular, one closest to the incoming line, was being over-utilized. The team recommended that RTE use five machines to wrap large wire and three to wrap small wire. The MANUPLAN simulation demonstrated the increased fluidity it would produce.



A milling machine, part of the "Lights Out Factory" at Expo 89, cuts a graphite electrode

This level of enrollment allows for a viable program that emphasizes a rapport between the students and teamwork on projects, DeVries said. This gives students experience they can apply in the work place.

Manufacturing research, made possible by MSE funding, has developed rapidly over the program's six years. DeVries said the "Lights Out Factory" at the 1989 Engineering Exposition, a display of a factory void of human workers, is representative of this research.

Funding of the MSE program began with a 1982 IBM initiative. Curriculum grants of approximately two million dollars each were awarded by IBM to the UW-Madison, Georgia Institute of Technology, Lehigh University, Rensselaer Polytechnic Institute and Stanford University.

These five educational institutions were chosen from among 150 schools who submitted proposals seeking IBM's support in establishing MSE curricula.

Financial support from industries and the state has had a significant impact upon improving research facilities, according to DeVries. This enables the MSE program to attract dedicated students because they can expect to work with state-of-the-art equipment. Research grants are more attainable and substantial due to UW-Madison's outstanding facilities, according to DeVries.

Industries' involvement goes beyond supplying funds and equipment. IBM-Rochester's Al Jones worked with the Computer Aided Engineering (CAE) Center to implement software in the CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) laboratories, according to DeVries.

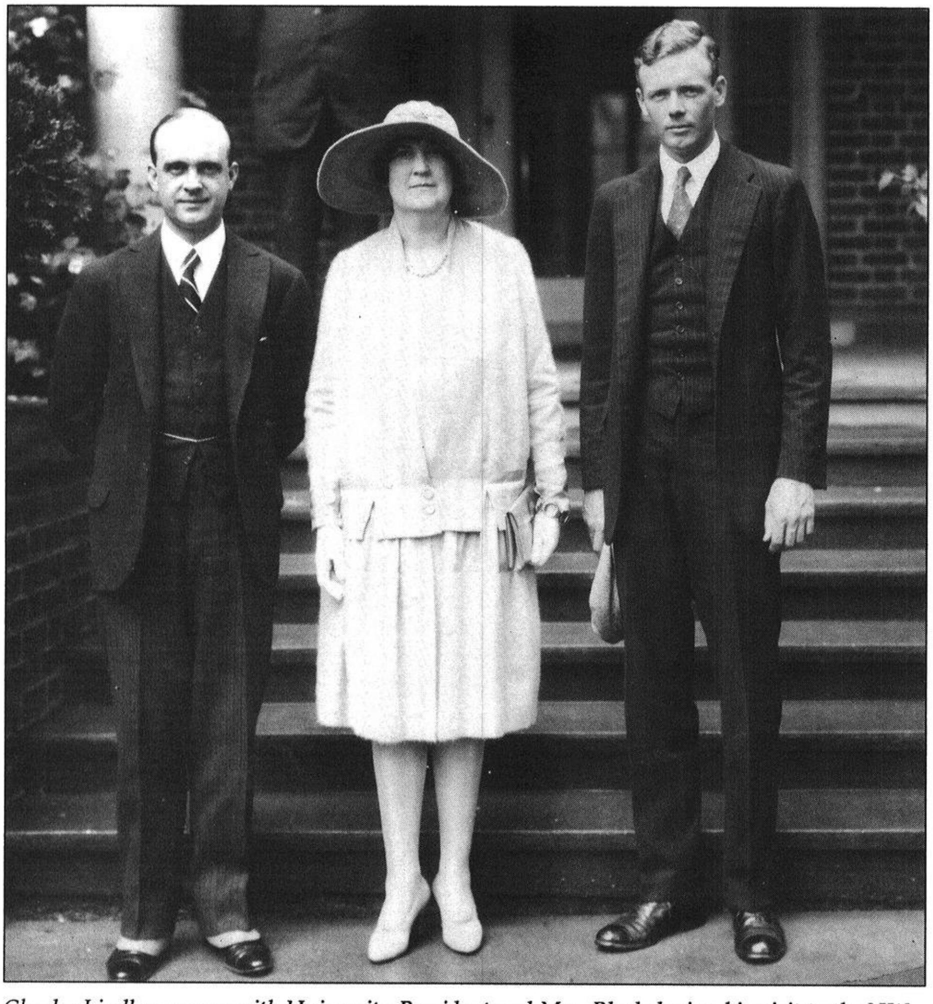
"Jones also helped us teach an intro course on CAD and CAM," DeVries said. "Other industries, including IBM, helped us identify speakers and issues to incorporate in the program."

The MSE faculty is pushing for manufacturing excellence and they've been recognized for this by the national Society of Manufacturing Engineers. UW-Madison was recognized as having the best computer integrated manufacturing program when it received the 1988 LEAD (Leadership in Excellence in the Application and Development of Computer Integrated Manufacturing) award.

AUTHOR

Rebecca Cors is a senior majoring in journalism. Rebecca will graduate in May, but at this point, she has no comment.

Lucky Lindy Was Not Lucky as an Engineer



Charles Lindberg poses with University President and Mrs. Black during his visit to the UW campus, when he received an honarary degree.

It has now been 60 years since young Charles Lindbergh's historic non-stop transatlantic flight, yet the world still refuses to forget him. Upon landing in Paris, he simply remarked "I am Charles Lindbergh" and etched his name into the hearts of people of every generation as well as their history books. Perhaps no U.W. Engineer has ever captured the world's imagination for such a long time.

Lindbergh's flight so moved people that Will Roger's, a newspaper columnist of his day, wrote "No attempts at jokes today" and explained the seriousness of Lindbergh's flight. Prior to the heavy-weight boxing bout at Yankee Stadium, Joe Humphries, the announcer, asked the

Perhaps no UW engineer has ever captured the world's imagination for such a long time

crowd to rise and say a prayer for the 25 year old mail pilot. But the excitement was not just in America. It spread to observers in Ireland, England, and eventually to the more than 100,000 people at Paris' LeBourget Airport that welcomed him. Many of them understood the significance of Lindbergh's flight to the future of commercial aviation.

Although successful at flying, Lindbergh's early years as an engineer were a failure. In the fall of 1920 he rode his Excelsior motorcycle from his hometown of Little Falls, Minnesota to Madison to begin college. However, he never became as good at Mechanical Engineering as he was at flying. He spent one and one half years living at 35 North Mills Street, Madison, studying engineering before being expelled for poor grades.

The school of engineering then was very different school from that of today. The 1920 graduating class had only 20 mechanical engineers, and report cards were sent to the students' parents. Mrs. Lindbergh received this report card after his third semester:

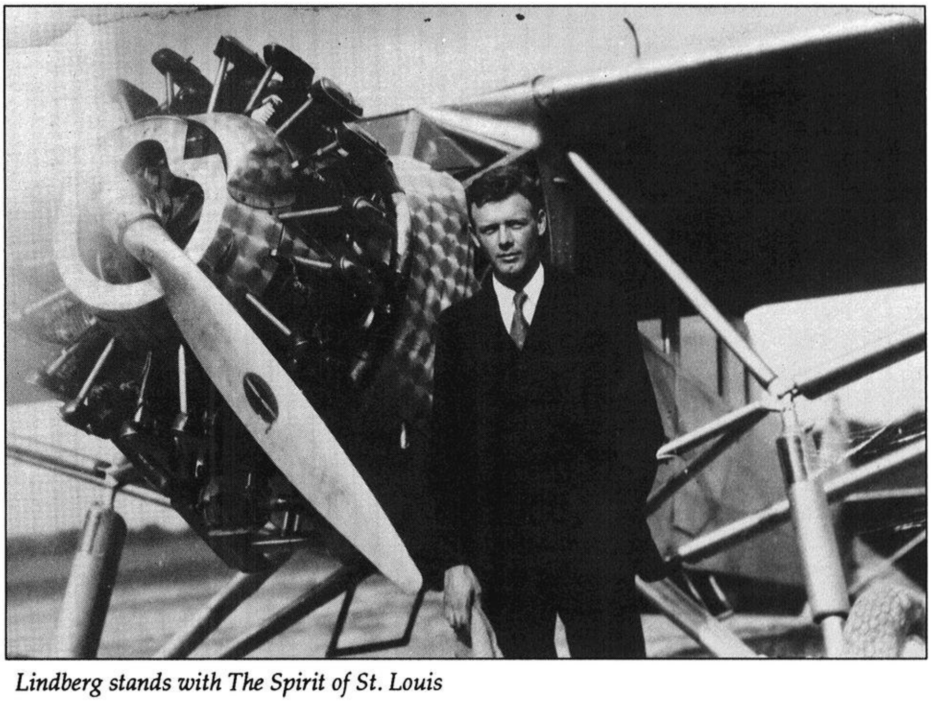
> "My dear Madam: The record made by Carl (sic) during the first semester is very discouraging. Machine Design I, Failure. Mathematics 52, Failure. Physics 51, Incomplete. Shop 6, 88. Shop 13, 88.
>
> It seems to me that Carl is quite immature and that a boy of his temperament might do better in some less technical course than engineering. In my conversation with him during the semester he seemed to agree with me on that point.
>
> On account of the above poor record the Sophmore Adviser Committee decided February 2 that Carl should be dropped from the University.
>
> Yours very truly, P.H. Hyland, Adviser."

Lindbergh missed many of his classes, which professors mistakenly assumed to be health related problems. On December 7, 1920, one of them wrote "Has he been ill? Absent since Nov. 5th." Lindbergh himself admitted that he went to the University of Wisconsin more because of the lakes than its good reputation as an engineering school.

After leaving the University, Lindbergh became a successful pilot. He took flying lessons in Lincoln, Nebraska, and barnstormed in the Midwest. In 1924 he entered the Army Flying School at San Antonio, Texas, where he graduated at the top of his class. He was commissioned as a Second Lieutenant in the reserves in 1925.

The race to cross the Atlantic nonstop carried as much emotional fervor in the 1920s as the space race did in the 1960s. Raymond Orteig offered a $25,000 prize for the first nonstop New York-Paris flight, spurring the competition between British, French, and American pilots. Six pilots died in the attempt before Lindbergh was to succeed.

To cross the ocean required a plane with a considerably longer range than any plane of the era. Lindbergh had limited personal funds to finance a plane, and no government or industry support. Instead he took $2,000 of his own, bought a suit in order to make himself presentable, and convinced a few other individuals to invest in him. With less than $15,000, he worked with Ryan Aircraft to make his all silver plane: the "Spirit of St. Louis." The special design carried so much fuel that there was no room for a windshield. A periscope provided the only forward visibility. For its day the Ryan Monoplane was a very advanced design. In fact, it was given the "monoplane" designation to distinguish it from a standard airplane, which back then was a biplane.



Lindberg stands with The Spirit of St. Louis

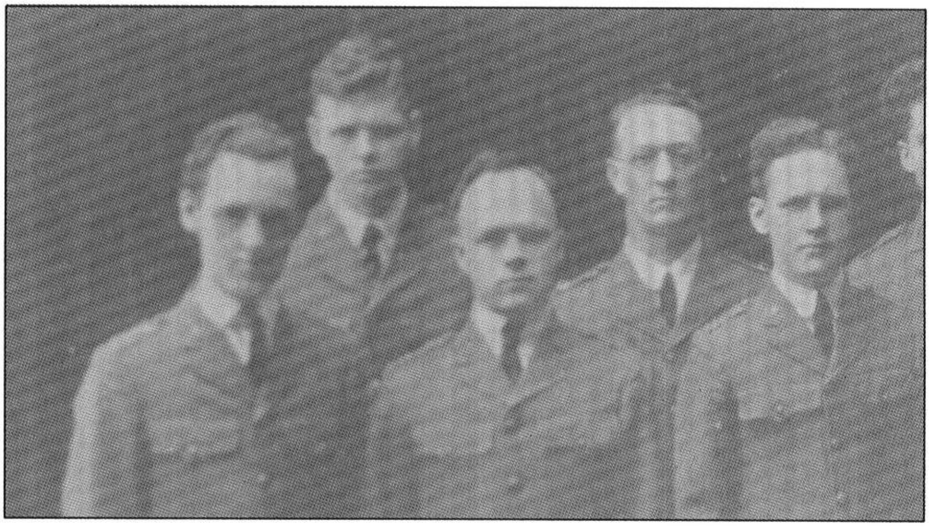
The flight itself took 33 1/2 hours at a cruising speed of 105 miles per hour. Staying awake, avoiding ice buildup on the wings, and staying on course were constant battles for the fatigued pilot. At one time he dropped down to a 50 foot altitude, trying to ask people on a small boat for the direction to Ireland by yelling out the window. Observers in

"If I had to choose, I would rather have birds than airplanes."

Charles A. Lindbergh

Ireland reported his progress, and eventually the crowd at LeBourget heard him circle twice and land before they surrounded the plane in the middle of the runway. In case of trouble, he would have had enough fuel to make it to Rome.

Lindbergh was what some people describe as the "perfect hero" or "last great hero." His personality was refered to as modest, and his manners polite. The mood of the public was such that he became a much bigger hero than people who have performed similar feats, such as astronaut John Glenn or aviators Dick Rutan and Jeanna Yeager. Lindbergh resisted publicity and turned down promotional offers worth millions of dollars. People just praised him all the more.



Lindbergh, left in rear, was a member of the rifle club, as seen in this 1923 yearbook photo

With less than $15,000, he worked with Ryan Aircraft to make his all silver plane: the "Spirit of St. Louis"

On August 22, 1927, just three months after the flight, Lindbergh returned to Madison to a big victory celebration. He finally received that which eluded him the first time: a degree. This time it was an honorary degree ,though, presented to him by President Glenn Frank in front of a standing room only crowd at Camp Randall Stadium. This marked Lindbergh's last affiliation with the University of Wisconsin.

Later in life Lindbergh faced many hardships, including the kidnapping and murder of his first son, and the highly publicized trial that resulted in the execution of Bruno Richard Hauptmann. During the early stages of world war II, Lindbergh drew heavy criticism for his admiration of the German war machine, and his acceptance of a medal from the Lutwaffe leader, Hermann Goering. Ironically, his fame started from a takeoff at Roosevelt Field, New York, and Franklin Roosevelt became one of his biggest critics over his German ties. It was because of this criticism that Lindbergh resigned from the military as a general. However, he still found his way into the war effort. Although just a civilian technician assigned to flight testing aircraft, he flew 50 combat missions over the Pacific, and shot down at least two Japanese planes.

During his later years, Lindbergh retreated even further from the press, and spent a lot of time pushing conservation efforts. He once said, "If I had to choose, I would rather have birds than airplanes."

Charles Augustus Lindbergh died from cancer in Hawaii on August 26, 1974, at the age of 72.

In the Pre-Engineering office an Adviser Record Card still exists on Lindbergh. It contains handwritten records of his grades and notes from professors about him. That which is most interesting, however, is scratched in the corners of the 6"x4" card. It describes the difference in success he had between his first visit to Madison and the second. In one corner it says, "Feb. 2, 1922: Dropped." On another it is updated as follows: "May 18, 1927: Will attempt New York to Paris flight in his monoplane. May 21, 1927: Flew from N.Y. to Paris in 33 1/2 hrs. June 18, 1928: Granted honorary degree." ▮▮▮

AUTHOR

Chris Lindell is a graduating mechanical engineer after 5 years of college life and will be entering Air Force flight school. He'd like to remind us that, "He was all Mach and no compass heading."

Sources: UW Archives and the General Engineering Department
Photos courtesy of UW Archives

Professor Emeritus Ben Elliot Celebrates Centennial

As UW-Madison's College of Engineering celebrates its 100th birthday this year, so does Benjamin George Elliott, Professor Emeritus of Mechanical Engineering, who has been with the college since 1912.

Elliott began working in Madison under a fellowship in 1912. He taught as a professor in mechanical engineering and served as chairman of the Mechanical Engineering Department until his retirement in 1959. Elliott currently holds the title of Professor Emeritus at the college and although he no longer teaches, he does come into his office on the third floor of the Mechanical Engineering building at least once a week.

Elliott is from North Platte, a small town in central Nebraska, which he fondly refers to as the "wild and wooly west." Elliott is the youngest child and only survivor in a family of five children, with three brothers and one sister. Elliott only knew his eldest brother, as his other siblings died of measles before he was born. Elliott's eldest brother, Edward C. Elliott was a chemist and served as president of Purdue University.

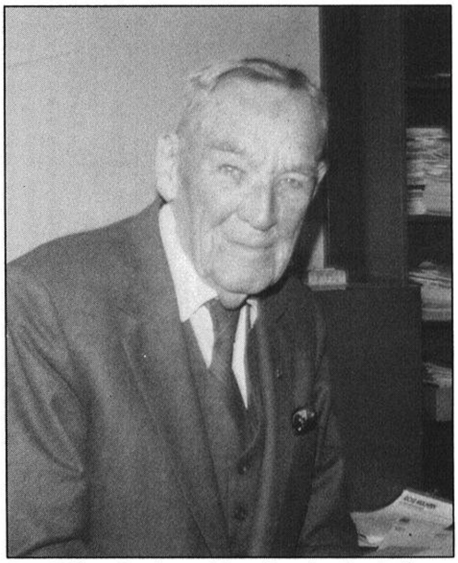
Elliott attended the Rose Polytechnic Institute (now the Rose Hulman Institute) in Terre Haute, Indiana where he received his bachelors degree in 1910 and his masters degree in 1911, both in Mechanical Engineering. He then came to UW-Madison where he received a Mechanical Engineering degree (which is no longer a degree in itself) in 1913.

Following this, he maintained a professorship here until 1914 when he received an offer to teach at the University of Nebraska in Lincoln. Wanting to work in his home state with people he knew and lured by the reputation of a good football team, he accepted the position and left for Nebraska where he stayed until 1915 when he accepted Madison's offer asking him to return.

"There was more personal contact than there is now. I can remember when I had students running out to my house every night."

While at Madison, Elliott taught mechanical engineering courses such as thermodynamics, heat power, and power plants. He worked closely with the extension office and served as chairman of the Mechanical Engineering Department from 1947-1959.

When comparing past and present engineering students, Elliott remarked, "Back then the students were skilled mechanically. Some of the present day graduates don't meet that requirement." Thinking back, Elliott stated that he never taught with a



Ben Elliot, Professor Emeritus in the College of Engineering, celebrated his 100th birthday this year.

While a professor at Madison, Elliot taught Mechanical Engineering courses.

Railroad. During his employment at the McKeen Motor Car Co., Elliott helped in the development of a single car transportation vehicle that ran on rails and was designed to hold 90 passengers. In 1912 he accepted a fellowship teaching power plant engineering at UW-Madison.

Elliott met his wife Georgia in Oshkosh, WI and married her in 1915. They had two daughters, both of whom pursued bachelors and masters degrees. Presently, one lives in Midland, Michigan and the other in Milwaukee. Elliott has five grandchildren, three of whom are chemical engineers. Describing the family's standards, Elliott declared that the grandchildren come from "the kind of family where any grade below an A

How's his health? "Doctor says to come back next year."

teaching assistant, nor was he ever a student of one. "Teaching operations were always under the control of the professor. No TA's."

"There was more personal contact than we have now. I can remember when I had students running out to my house every night," said Elliott. He also noted that there was "less emphasis on mathematics in the past and it takes better preparation on the part of the students to go into engineering nowadays." Elliott was a part of the college when the engineering school resided on Bascom Hill in the current Education Building and was here when the Mechanical Engineering building was constructed. Summing up his experiences, regardless of the time frame, Elliott confidently declared, "The students were always good."

Thinking back to his own college days, Elliott explained that he attended a school with a reputation for being a "man-killer." He had classes from 7:00 am until 6:00 pm and was required to take a minimum of 22 credits. When asked if he had done well in school, Elliott said with a smile, "I had to. I was built that way."

During his school years, Elliott also worked. In the summers of 1906-1909 he served as an apprentice with the Union Pacific Railroad and during the latter part of 1910 served as a special apprentice with Allis-Chalmers Manufacturing Company in Milwaukee. Before coming to Madison, from 1911-1912, he served as a special apprentice, machinist, and engineer with the McKeen Motor Car Company in Omaha, Nebraska which was a division of the Union Pacific

was a failure." Elliott noted that he doesn't have any great-grandchildren yet because the grandchildren are working and are not married.

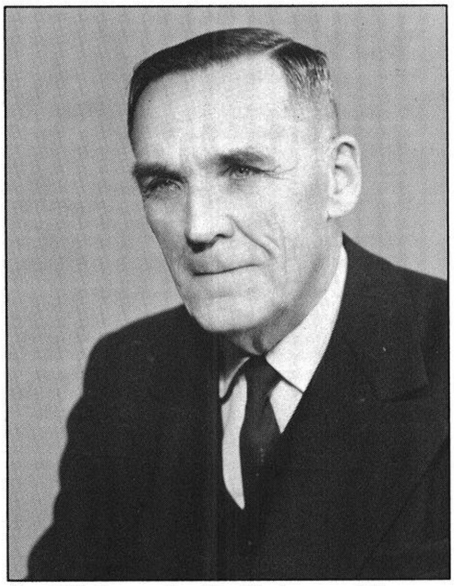
Elliott currently lives alone here in Madison. His wife Georgia died eight years ago at the age of 89. Elliott finds no problems filling his time though and actually remarked that he spends his days "just trying to catch up." As mentioned earlier, he still puts in time at the UW as an emeritus professor. However, he is active in several organizations including the American Society of Mechanical Engineers (ASME), the Circus Fans Association, and the Lincoln Fellowship of Wisconsin, to name a few. Elliott also travels extensively, visiting his children, attending conventions, and relaxing periodically on vacations. During his career, Elliott was instrumental in establishing organizations such as the Wisconsin Society of Professional Engineers, the Technical Club of Madison, the American Power Conference, and Madison's own Engineering Expo, a biennial event begun here in the early 1940's.

Elliott has never regretted his choice of becoming an engineer and when asked what his favorite part was, he said simply, "Just being one." Elliott explained that he grew up on railroad and it seems as if he had always wanted to be an engineer. Recalling his childhood, he described one of his favorite activities, getting the engineers of the trains to let him and his friends try to run the train and wear the engineer's hat.

Another fond memory of the railroad was the "Railroad World Series." Elliott explained that two railroad companies, the Union Pacific and the Burlington Line would compete for the mail contract from Chicago to Denver. Elliott used to wait at the telegraph office with the rest of the town's people to hear the latest progress in the race just as today fans listen to the radio or watch television to find the latest play by play events of the Baseball World Series. Elliott loved the west of his boyhood and said that the only occupation other than engineering that interested him was "being a cowboy."

As a boy, one of Elliott's favorite past times was camping with his family. Every summer they'd go up to a special spot in the Canadian Rockies. Elliott boasted that he has visited every national park in the U.S. and in Canada, as well as several state parks.

A memory Elliott will never forget of his boyhood was his thrilling encounter with Buffalo Bill. Elliott remembered clearly the very first time he met Buffalo Bill, "It was the 13th of



Ben Elliot served as the Chairman of the Mechanical Engineering Department from 1947 until his retirement in 1959.

October 1896, a Sunday afternoon." Elliott explained how he and his friends used to "hold his horses for him when he went into the post office. We'd do it every time we got a chance!"

Elliott held that childhood memory close at hand and as the years progressed and as he traveled more he began to develop a rich reservoir of legends and lore surrounding Buffalo Bill and began giving his "Buffalo Bill Talk" complete with an authentic film strip made by Thomas Edison. Elliott guessed that he had made this presentation over 100 times. Now, however, due to lack of time, Elliott has given up his talks and donated his filmstrip to the State Historical Society which now shows it to the public at the Circus World Museum in Baraboo, Wisconsin. The circus was another favorite of Elliott's and he claimed that he was at the very first Great Circus Parade in Chicago and has only missed one or two since.

Along with this record of circus parade loyalty, Elliott also is an avid football fan. He has attended almost every Badger home football game since his arrival in Madison in 1912. He loves the game; however, when asked if he ever played in high school, he admitted that he was too small to play. He talked about his high school, from which he graduated in 1906. He still maintains contact with his high school and faithfully attends the reunions but he noted that now he's "even outliving the children of his classmates from high school."

Elliott still has a couple other impressive experiences to share including the time he met Theodore Roosevelt in North Platte when he was running for Vice President and the time Elliott had dinner at the White House with President Herbert Hoover. There are plenty more where these stories came from and Elliott ascertained "it would take days to tell about them all."

Elliott has lived a full and happy life, and he's not about to quit yet. When asked how his health was faring, he grinned and said, "Doctor says to come back next year." So this year, as we say Happy Centennial to the College of Engineering, we also say Happy Centennial to Benjamin Elliott and wish him many more happy birthdays.

AUTHOR

As a freshman in Electrical Engineering, Nancy Hromadka believes that, "Faith is the substance of things hoped for, the evidence of things not seen." Let's hope she still has that attitude as a senior in EE.

Former Dean Kurt F. Wendt Honored for Achievements

Kurt F. Wendt. ***Does that name rings a bell? Wait, that's the name of the College of Engineering library, right?***

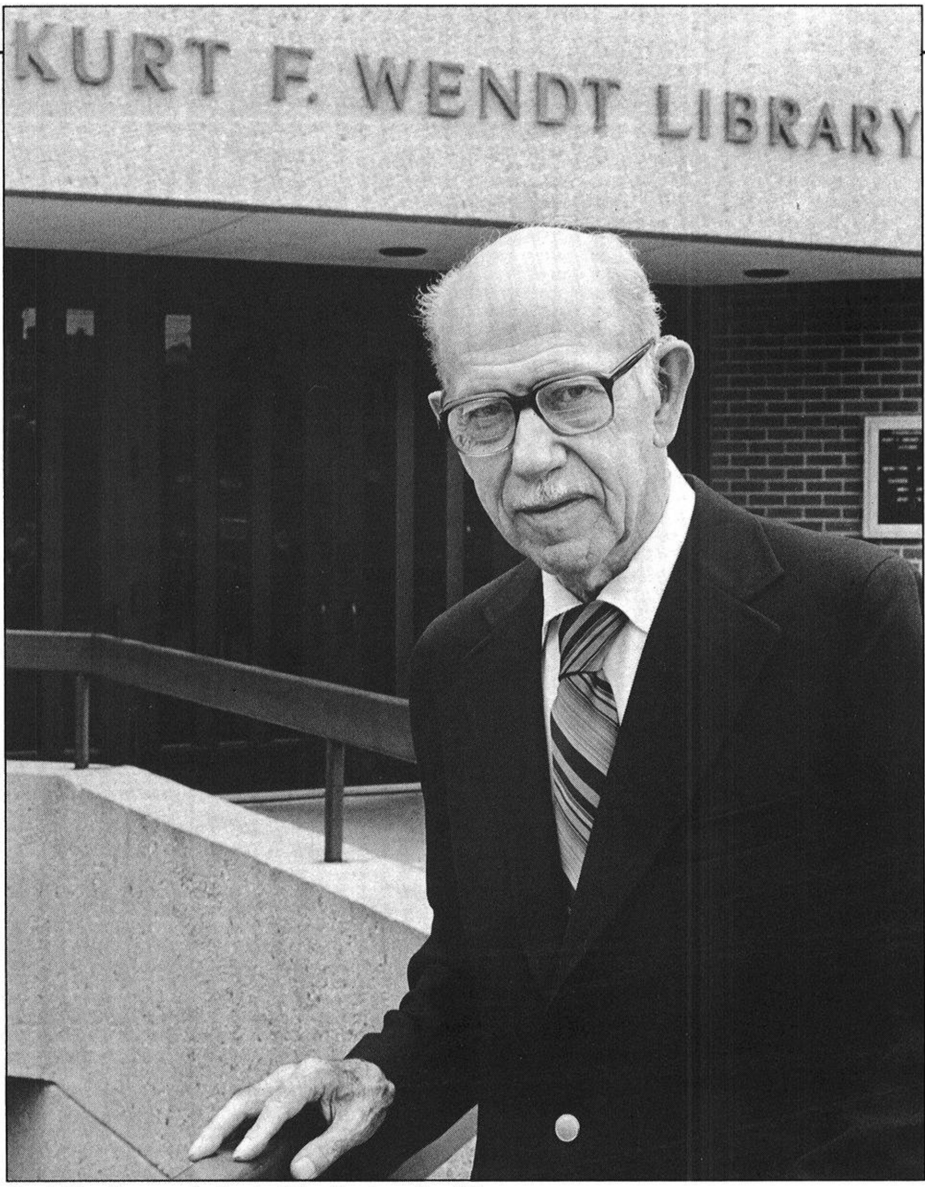
Kurt F. Wendt served as Dean of the College of Engineering

Correct. However, how many people realize that it was named after a former dean of the College of Engineering? And how many realize the breadth of his accomplishments during his term served as dean? Every now and then, a person comes along who is liked and respected by everyone. To those who knew him, Kurt F. Wendt was that sort of a person.

As described by those who knew him, Wendt possessed a sort of authoritative, diplomatic manner that only comes with a certain inner strength and confidence. To those that did not know him, Wendt was the typical overachiever. He not only participated in almost everything of interest to him, but he also achieved status in whatever he did.

Born in 1906, Wendt was a native of Milwaukee. While in high school, he had considered a major in chemistry. However, during his senior year he became interested in engineering and decided to pursue it as a career. He majored in civil engineering at the University of Wisconsin, and upon his graduation in 1927, he married his sweetheart, Adelaide R. Jandre. Following his marriage, Wendt became an instructor of stress analysis at the UW .

Wendt became well respected in his field, consulting such organizations as the National Science Foundation, the U.S. Forest Products Laboratory, and the National Highway Research Board. In addition to teaching, and consulting,



Kurt Wendt poses in front of the Engineering Library

Wendt also became very involved with research and development at the UW. He was placed in charge of the Materials Testing Laboratory in 1935, and the Engineering Experiment Station in 1953. Developing a high profile at the UW, Wendt served on such committees as the University's Athletic Board in 1950, and was chosen Big Ten faculty representative in 1951. In 1953, Wendt was appointed Dean of the College of Engineering. This was just the beginning of a list of achievements and honors that would fill several pages.

Wendt gained a reputation for being a get-it-done diplomat. As dean, he helped to develop and fund close to 100 buildings at the UW, thus making him a key component in making the UW what it is today. Under Wendt, the college of engineering saw the expansion of the present day Engineering Building, and the development of the Engineering Research Building.

Wendt also helped to develop and enhance the curricula and student opportunities at the college of engineering. During his term, the UW saw the emergence of the Engineering Mechanics, Nuclear Engineering, Industrial Engineering, and Bio-engineering programs. Wendt also helped to develop the Superior Student Program under which outstanding students in pursuit of an engineering education are aided by industry. In addition, Wendt helped initiate foreign engineering education-research projects with colleges in Mexico, India, and Singapore. Under the program, teachers and students would be exchanged and trained.

Also very active in the community, Wendt became president and trustee of the University YMCA and president of the Madison United Community Chest. He was also a member of the governor's Commission on Traffic Safety and the Madison Mayor's Advisory Committee.

Surprisingly, Wendt never received a Ph.D. In fact, Wendt was not technically a doctor until 1964 when he was granted an honorary degree in science from the West Virginia Institute of Technology. The year before, Wendt was named Wisconsin's "Engineer of the Year" by the Wisconsin Society of Professional Engineers.

As dean, he helped to develop and fund close to 100 buildings at the UW, thus making him a key component in making the UW what is is today

Even after his retirement from his position as dean in 1971, Wendt remained very active. He continued to publish papers, and remained chairman of the University Planning Committee until 1978. In 1976, the new engineering library at UW-Madison was named after Wendt in honor of his numerous achievements. A leader in the community, research, and the University, Wendt remained quite active until his death in 1982.

Not many people could achieve in two lifetimes what Wendt did in one. Wendt was not just the dean of the College of Engineering, but an integral part in the making of the University of Wisconsin what it is today.

AUTHOR

Sharon Chen is a sophomore with intentions of majoring in Chemical Engineering. Lately though, Sharon has been wondering, "How many licks does it take to get to the center of a Tootsie Pop?"

F. E. TURNEAURE
AN EVERYTHING ENGINEER

Born on a farm near Freeport, Illinois on July 30, 1866, Frederick Eugene Turneaure was destined to change the history of engineering and the history of the University of Wisconsin-Madison. With an overflowing biographical history, Dean Emeritus Turneaure of the College of Engineering is to be admired for his creative work and for his loyal service to this University.

The only existing photo of Turneaure is this photo from a 1923 yearbook.

Turneaure's long career began when he received a degree in civil engineering from Cornell University in 1889. After spending a year in railway engineering work, he went to Washington University as an instructor of civil engineering. In 1892 he came to the University of Wisconsin as professor of bridge and hydraulic engineering. He was appointed Acting Dean in 1902 and Dean of the College of Mechanics and Engineering in 1904. He held this position for nearly a third of a century until his retirement in 1937.

This veteran dean, throughout the years, contributed extensively to the advancement of the engineering profession and engineering education. An early expert on bridge building and reinforced concrete construction, he pioneered research in the areas of impact and stress loading on bridges and steel columns. He co-authored three innovative technical books: *Theory and Practice of Modern Framed Structures* in 1893, *Public Water Supplies* in 1900, and *Principles of Reinforced Concrete Construction* in 1907, all of which were used quite extensively.

Dean Turneaure played an active role in and received numerous awards from the many professional societies to which he belonged: the Western Society of Engineers (who awarded him the Octave Chanute Medal in 1907); the American Society for Testing Materials; the American Railway Engineering Association; the Wisconsin Engineering Society (of which he was president in 1909); the American Association for the Advancement of Science; the American Society for the Promotion of Engineering Education (of which he was president in 1908 and the 1937 recipient of their prized Benjamin Carver Lamme Medal, awarded for excellence in engineering teaching); the American Concrete Institute (who awarded him the Henry C. Turner Gold Medal for "distinguished service in formulating sound principles of reinforced concrete design" in 1930); and the American Society of Civil Engineers (who made him an honorary member in 1933). The dean won international acclaim for these and yet one more distinguishing position: the University of Illinois granted him an honorary Doctor of Engineering degree in 1905 — only sixteen years after he graduated from college.

Also an authority in the field of water supply, Turneaure served as city engineer of Madison from 1902 to 1904, and built the first modern sewage disposal plant in the city. As a member of the Wisconsin Highway Commission from 1911 until it was discontinued in 1929, he played a major role in developing sound policies of highway construction in the state. Some 15,000 miles of road were laid out under his administration. In appreciation of his eighteen years of work with the commission, Turneaure received commendation from Governor Kohler and other members of the board. In 1936, Governor LaFollette paid high tribute to Dean Turneaure for his devoted service to the commonwealth of the state.

Dean Turneaure died on March 31, 1951, at the age of 84, ending a lengthy and notable career of untiring service to the University and to the public at large. His generosity and sense of social responsibility resulted in cooperation and recognition from his students, his associates, the state and the world. It is careers like this that command respect and admiration within the field of engineering and beyond.

AUTHOR

Julie Nickchen is a senior majoring in journalism. Julie believes that, "There are no rules until they are broken."

ENGINEERING BRIEFS

STUDY SHOWS ENGINEERING TOPS WITH SMARTEST HIGH SCHOOL STUDENTS

A study of 1986 ACT data by two Iowa State researchers has revealed that high school students who rank highest on standardized tests are most likely to choose engineering as a career.

Nicholas Colangelo and Barbara Kerr analyzed data on over 75,000 students. They found that students scoring in the top 1% were more likely to choose engineering than any other career. Students scoring in the top 5% also chose engineering most often. However, students who scored only in the top 20% preferred business and commerce to engineering as a career.

Besides preferring engineering, the very top students also showed a pronounced interest in extracurricular activities, honors programs and special programs to help with occupational and educational goals.

The results were published in a recent isue of the *Journal of Counseling and Development*.

APOLOGY

The staff of the Wisconsin Engineer extends its apologies to Oscar Mayer for our carelessness in the creation of the Oscar Mayer advertisement and the deletion of the copyright symbol in our March, 1989 issue. We realize that Oscar Mayer extends a great deal of support to our publication and to the community as well.

THINK CO-OP ONE SEMESTER AHEAD

Sign-up for Co-op is Aug. 28 - Sept. 13, 1989. At this time you will become a candidate for a January 1990 work term. This could lead into a job for summer 1990. Think ahead and beat the rush for summer jobs. Co-op students are first in line for summer jobs offered by engineering employers. Don't forget.

THE 1989 ECMA CONVENTION

Members of the staff of the Wisconsin Engineer attended the Engineering College Magazines Associated (ECMA) convention at Howard University in Washington D.C. on April 13-16.

The Wisconsin Engineer received three awards: 3rd place for best layout all issues, 2nd place for best article - general science background (see Lisa Peschel's article, "Working in Space: Astrobotics," in the December, 1988 issue), and 2nd place for best single issue (see the October, 1988 issue).

The Minnesota Technolog received 1st place honors for best all-around issue.

C0-0P AND CAREER CONNECTION

If you would like to help plan a faculty-student-employer dinner to be held on Wed., Sept. 20, the first night of Career Connection, contact Keith Forrest, President of the Co-op Assoc. at 257-8843 or Marion Beachley, Co-op Director, at 262-8883.

EIT/PE EXAM REGISTRATION INFO

The EIT/PE Exam will be given in Madison on Oct. 13-14, 1989. The registration deadline is Sept. 15, 1989. Seniors are strongly encouraged to take these exams while they are still in school. Informational meetings, sponsored by WSPE-Student Chapter, will be held during the first week of classes, and review sessions will be held in October. Look for signs with more information when you return in the fall.

Financial Planning: Why You May Be Interested

From the first pay check forward, whether the business card says it or not, the engineer is a manager. Not only does the engineer manage at work, but just as importantly, the engineer must manage at home. However, instead of people, it is personal assets and money that need to be managed.

Financial planner Jane Godfroy, District Manager of a Milwaukee office of Waddell and Reed, and Peter Passell, New York Times financial writer and author of "Where to put your money" deal with money on a regular basis.

How a Financial Planner Can Help

It is doubtful that anyone has ever become "rich" purely from managing personal assets, but properly planning personal finances has probably helped many people adjust spending to optimize a salary.

Personal finances should be treated in the same manner as business finances. Individuals should look at rate of return on personal finances, even though that rate of return may be purely pleasure. This makes personal finances more difficult. Only a personal budget can forecast if the pleasure, however great it may be, is affordable. One other important point, the company you might work for may not necessarily have the insurance, retirement, or investment plan that is right for you. This is where financial planners step in.

Financial planning is literally planning how income and assets are managed, spent, or invested based on an individual's wants or needs. For instance, an individual may not have an enormous income, but if he properly allocates financial resources, he could live as well as someone with a larger, but poorly managed income. A financial plan will help a person invest money for future needs or wants. In this manner, an individual not only controls savings, but more importantly, the amount of income for general free spending is clearly defined.

The best investments in the world are useless if an individual has not properly budgeted any money...

Some financial planners are designated as certified financial planners. A certified financial planner (CFP) is a person who has demonstrated competence in analyzing and developing personal and business financial plans by completing a series of six difficult financial planning exams. The planner analyzes a financial situation and then develops alternative strategies and recommends possible courses of action. The planner may or may not promote specific financial products.

A planner helps an individual invest money. They provide individuals with information such as what investments to make, why to make those investments and how to make them. The planner can also offer suggestions on tax saving strategies.

Before visiting a planner, an individual must examine his goals and objectives. Only when these goals are clear can the planner advise and help implement the chosen plan of action. These goals would include "big ticket" items such as cars, homes and weddings or even computers. Retirement goals are looked at and what type of salary the individual hopes to earn in the future. Finally, the planner will also want to know what type of financial assets he already owns. For a graduating student, education is probably the largest financial asset since most students do not own homes or expensive cars.

From this information, the planner will help the individual develop a plan. This plan will include how much money needs to be saved to reach the goals and perhaps several different ways to invest the money. With this information in mind, the planner and the individual will have to sit down and form a budget.

The budget is a critical part of any financial planning. The best investments in the world are useless if an individual has not properly budgeted any money to invest. The planner can recommend a budget, but it is up to the individual to muster the discipline to adhere to the budget and follow through with the goals.

A good planner can assist an individual in developing a budget which meets fixed expenses such as rent and food. An individual's lifestyle determines how much money is needed for general spending. Of course, the larger the savings goals, the smaller the remainder will be for general spending and vice-versa. Also, the good planner can point out where the goals set may be too rigorous and cause failure of the plan.

What You Should Expect as a Graduating Student

Godfroy recommends that graduating students form a budget as soon as possible. This budget should include about 10% of the students total yearly income for deferred savings.
Deferred savings are savings that are set aside for future use such as retirement or a down payment on a home, or a specific goal. Depending on where you want to put money and how much risk you are willing to assume, deferred savings can be invested in any number of different investment vehicles, or types of investments.

Two common forms of savings are the money market mutual funds and the 401 (k), or salary reduction plan. Mutual funds are literally funds set up for people to invest money which in turn is invested by the fund in many different financial vehicles. Money market funds are available through brokers or directly through the mutual fund and typically offer a few percentage points higher yield than savings accounts with only slightly reduced accessibility, or the ability to take the money out on short notice. Money market funds are appropriate for short term savings goals. Many companies offer a salary reduction plan which is often referred to as a 401 (k). This is a retirement plan where money can accumulate free of taxes. The catch is that the money cannot be withdrawn before age 59 1/2 and withdrawals must begin by age 70 1/2 or the government will take some of that money. One of the most attractive parts of the 401(k) is that many companies will put in some percentage of a dollar for every dollar you put in.

Since many financial planners work with insurance in addition to invest-

Serious Errors With Your Money

1. Failure to define and set goals.

Decide on reasonable future purchases or expenditures.

2. Failure to follow through with goals.

Goals cannot be achieved without setting aside money.

3. Failure to keep and maintain records.

Good records allow you to know your financial position in order to take advantage of new tax and investment strategies.

4. Failure to understand tax avoidance.

Tax avoidance does not necessarily mean higher rate of return, especially when you are in the lower tax brackets.

5. Failure to get advice from properly qualified people.

This applies to nearly everything you do.

6. Failure to keep knowledge of your investments up to date.

Times change, and last years investment may not be as good as a newer one.

7. Failure to develop a diverse portfolio.

Don't put all your money in one investment. Use several different types of investments to spread the risk.

November 1981, Money Magazine, Stephen W. Lewis

ments, Godfroy also recommends additional insurance beyond what the company offers for starting engineers.

Financial planners suggest private disability insurance for people with jobs. The reason is twofold. First, statistics show that one in three workers will become disabled at some point in time before age 65, and second, many companies have inadequate policies making a private disability insurance a good idea.

Auto insurance becomes substantially more important once an individual has some assets. For most students, a lawsuit from an accident would not set you back very far since you have little to

Financial Planning is not an exact science and is open to the opinion of the planner

be sued for. However, when you have financial responsibilities as well as assets, a lawsuit due to an auto accident could be devastating. Therefore, you should expand your coverage to protect yourself.

Since graduating seniors typically do not have a spouse, most company offered life insurance policies will be acceptable. The individual may want to expand coverage and should purchase personal life insurance when a family is involved, since many companies provide policies for the employee only.

On a final insurance note, health insurance coverage varies widely so take a look at the company's health insurance. You should look for insurance which furnishes coverage for big, catastrophic situations and offers $100,000 coverage or more. This kind of coverage is not excessive, and is often company paid.

Typical Yearly Budget:

$30,000	Gross Income
4,250	Federal Taxes(assuming a 28% tax bracket)
1,300	State taxes (assuming a 5% tax)
2,250	FICA (Federal Insurance Contribution Acct.) (alias, Social Security)
22,200	Take home pay

Typical Monthly budget:

$1,850.00	Take home pay
360.00	Savings (as always, pay yourself first)
450.00	Rent
50.00	Utilities
130.00	Food
130.00	Entertainment
250.00	Automobile
150.00	Auto expense (fuel, insurance, etc.)
150.00	Clothes/furniture
30.00	Disability insurance
50.00	Student loan
100.00	Miscellaneous

A common rule of thumb is to put 1/2 of all pay raises into savings and the other 1/2 into spending.

Note that these figures are only approximate and based on 1988 tax laws. Actual figures may vary.

Don't worry about buying a home too quickly. Although it is nice to build equity in a home, the tax advantage is not that great when you're in the 28% tax bracket. It would be better to set aside money in savings for a down payment before rushing into a home.

Many students rush out and buy expensive items right away. Good advice is to stay away from debt as much as possible, especially credit card debt. Credit card debt is very expensive, typically running 18% nominally or more, and rather unnecessary. Although it is nearly impossible to avoid debt when buying a car or home, it is not terribly difficult to avoid debt for lower cost items such as furniture. Certainly, it would be great to have a completely furnished apartment with the best quality leather within the first two weeks on the job, but you probably would be able to survive several months with garage sale decor while you save enough money to avoid debt.

An often overlooked part of financial future is a will. You may work for many years without a will; however, when the inevitable comes, it is too late. Since you cannot predict fate, it is best to be prepared for it. Without a will, your assets will be distributed under the inheritance laws of the state you reside in. Avoid that scenario by getting a will and updating it whenever your circumstances change. If you are really lucky, the company you work for may have lawyers for this purpose. If it doesn't, hire a lawyer and have it done correctly. You probably would not want to decipher a will that was written on the back of a cereal box when you were listed as a beneficiary. It may not fare very well in court.

After all this, you are probably wondering, "Why should I bother with a financial planner now; I have a pretty good idea of what to do." Believe it or not, you may be right. Most single, starting engineers do not have a very complicated situation, and they could easily find out what they need to know. However, after you change jobs in the next few years, and most of you will, the financial picture starts to change. As your assets have grown, and you may have a pension distribution which may have substantial tax implications that are difficult to understand. This is the kind of situation in which a financial planner becomes very important.

The idea is to start young. Meet with several financial planners and find one that you like well enough to deal with in a very open manner for many years; if you don't like the planner now, you most likely won't later. Down the road, if you meet and work with several different planners, the picture could become a mess. Financial planning is not an exact science and is open to the opinion of the planner. No two planners are going to be exactly the same. Therefore, each planner will recommend different investments, making it important that you deal with only one planner.

From that first paycheck, the actions you take and the investments you pursue will determine how far your earnings can take you. If you do not plan carefully, your future could be as dark as the ink on this page. ■

AUTHOR

Peter Holmi graduates from the Mechanical Engineering department this semester. He feels he has overstayed his welcome here and is very much looking forward to his new job.

Bad Rep. for Engineers?

"What?"

"Electrical Engineering."

"Oh."

A blank look stared back at me. Amidst the bustle at the Rathskellar, declaring my engineering major to the Letters and Science student across from me seemed close to a "cardinal" sin.

I had to know what he was thinking. Did visions of pocket protectors, and glasses with tape fill his head? Probably. Did he think I might curl up with a Macintosh on Friday nights? An urge to climb up on the table and ask everybody in the room whether they even knew there were **two** student unions on campus nearly overcame me.

I admit, I almost panicked when most L&S students I knew were aware only that the engineering campus was "somewhere near the football stadium," but there was hope...at least they knew it existed, right? I mean, could it be that we really are...NERDS?! I was shocked.

The prospect of the entire engineering campus losing sleep over this unsettling realization worried me. Should we break the news and risk widespread disaster, or find the facts and hope for a sliver of evidence that engineering students may actually be normal? A poll emerged and was diligently distributed by staff members. The results follow:

Where do you think most engineering students lie on the political spectrum?

Answers ranged from moderate to reactionary, with the general consensus that all engineering students rush to the polls to vote for any party starting with an "R." Some comments included:

"In order to survive they must accept military research dollars, and in order to remain sane they must reconcile their profession with their political position." -Accounting

"...$ minded Republicans..." -Undecided

"Engineers seem to understand mathematics and graphs more than political problems." -Elementary Education

"I think engineers are mostly 'square.' So, whatever they believe in, they stick to it." -Physical Therapy

"Many of my fellow students don't seem to be too concerned about things such as society, ecology, humanity. They are self-serving money-grubs." -Electrical Engineering major who "finds that ECE is not the sole end and purpose to life."

What would you guess is the female/male ratio on the UW-Engineering campus?

Responses averaged around 1:12 with estimates as high as 1:100. In actuality, the ratio is 1:6 according to the Dean of Students Office. No wonder the women's bathrooms at Union South are so clean.

Please give three words that come to mind when you hear the word "engineering."

Most commonly, words like "math", "science", "money", and "nerd" were the response. Others chose to elaborate.

"Excited!...As a profession engineering is good and very useful. Unfortunately it attracts the most reactionary and conceited elements of American society." -Environmental Studies

"The ability to get a well paying job after only 4-5 years of college..." -Journalism

"Brains...geeks...wimpy..." -Business

"...very smart students." -Communication Arts

A UW Student Survey

"...study-head, nerd, geek...always involved in studies... dress like Eskimos." -English

"Enginerd..." -Business

"...too much homework" -Communication Arts

"S—tloads of homework (Is s—tload one word or two?)..." -Anthropology

"...smart, nice, good looking (girls/ boys)..." -A completely unbiased Industrial Engineering major

What would you guess is the minority student percentage at UW-Madison College of Engineering?

Most answered with an average landing 50%, some as low as less than one percent, to as high as 85%. In actuality, the minority percentage is 8.5% (0.3% Native Americans, 1.3% Hispanics, 1.9% African-Americans, and 5.0% Asians).

How would you rank most engineering students on the "social" scale? (One being reminiscent of our friends from the "Revenge of the Nerds" and Ten being as "groovie" as Marcia Brady.)

Well, the engineering students earned a whopping four and a half as an average. Here are some of the comments:

"Most/many engineering students view the world through 'scientific colored glasses', and that perspective is reflected in their conversation and interests." - Electrical Engineering

"They are some of the most open minded, fun loving people..." -Zoology

"I find them boring, narrow-minded and out of touch with reality." -Undeclared

"...most engineers I know 'work hard and play hard' (sorry for sounding like a bad beer commercial). I'd give 'em a 7." - French

Impressions of engineers?

"Great group of people who know how to have a good time." -Molecular Biology

"Uncreative...everyone wants to make $$$..." - Undecided

"They talk too much about their major. When a simple question is asked, the explanation can be so in depth that I begin to think they will never shut up." -Communication Arts

"No, I don't have any favorable biases toward engineers-they have taught me a lot of creative things to do with dry ice and beer though." -Psychology

"Yes. The math brains in my Calculus 222 class raise the curve." -Business

"First look...nerdy." -Physical Therapy

Well, there you have it. I encourage all engineering students to evaluate these severe implications. Then again don't.

Once again, thanks to all the participants in the survey.

AUTHOR

Deniz Ayaz is a freshman majoring in Electrical Engineering whose quote for personal inspiration in life is, "Beep, beep, nbeep, beep, yeah!"- The Beatles

Just One More

FOUNTAIN OF YOUTH DISCOVERED IN D.C.

The group posed for this photograph on a Washington D.C. street corner. Woolston is the man in the center of the back row.

After the reflection pool mishap, the group posed again, this time in front of Lincoln. Woolston is the child in the front row.

BIZARRE REFLECTION POOL ACCIDENT LEADS COLLEGE DEAN TO FOUNTAIN OF YOUTH

Scientists around the world buzzed with excitement last week over news of the discovery of the "Fountain of Youth" in Washington, D.C.

The center of attention is Donald C. Woolston, Assistant Dean of Pre-Engineering and faculty advisor to the Wisconsin Engineer magazine at the University of Wisconsin-Madison.

According to Woolston, he and members of the Wisconsin Engineer were in Washington, D.C. for the National ECMA (Engineering College Magazines Associated) Convention and happened to have some spare time. Said Woolston, "We were taking a stroll near the Lincoln Memorial when I slipped on the wet ground and fell into the reflection pool."

Said Wisconsin Engineer business manager, John Stangler, "Don just lost his balance suddenly, and sploosh! In he went! I went to help him right away, but when I got there all I found was this little tyke wearing Don's clothes."

The effect reversed itself after Woolston slept for a night.

The staff is home again in Madison, but researchers are keeping a close watch over Woolston. Perhaps he is the only one who knows the secret of youth.❑

CODE OF ETHICS OF ENGINEERS

THE FUNDAMENTAL PRINCIPLES

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

I. using their knowledge and skill for the enhancement of human welfare;

II. being honest and impartial, and serving with fidelity the public, their employers and clients;

III. striving to increase the competence and prestige of the engineering profession; and

IV. supporting the professional and technical societies of their disciplines.

THE FUNDAMENTAL CANONS

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.

2. Engineers shall perform services only in the areas of their competence.

3. Engineers shall issue public statements only in an objective and truthful manner.

4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.

5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.

6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.

7. Engineers shall continue their professional develpment throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT
ECPD

Approved by the Board of Directors, October 5, 1977