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WISCONSIN ENGINEER

Year End Issue

APRIL 1998 VOLUME 102, NUMBER 3

Model 4654 The Philco 'Pedestal', 1958 Analog Television

High Definition TELEVISION IS HERE

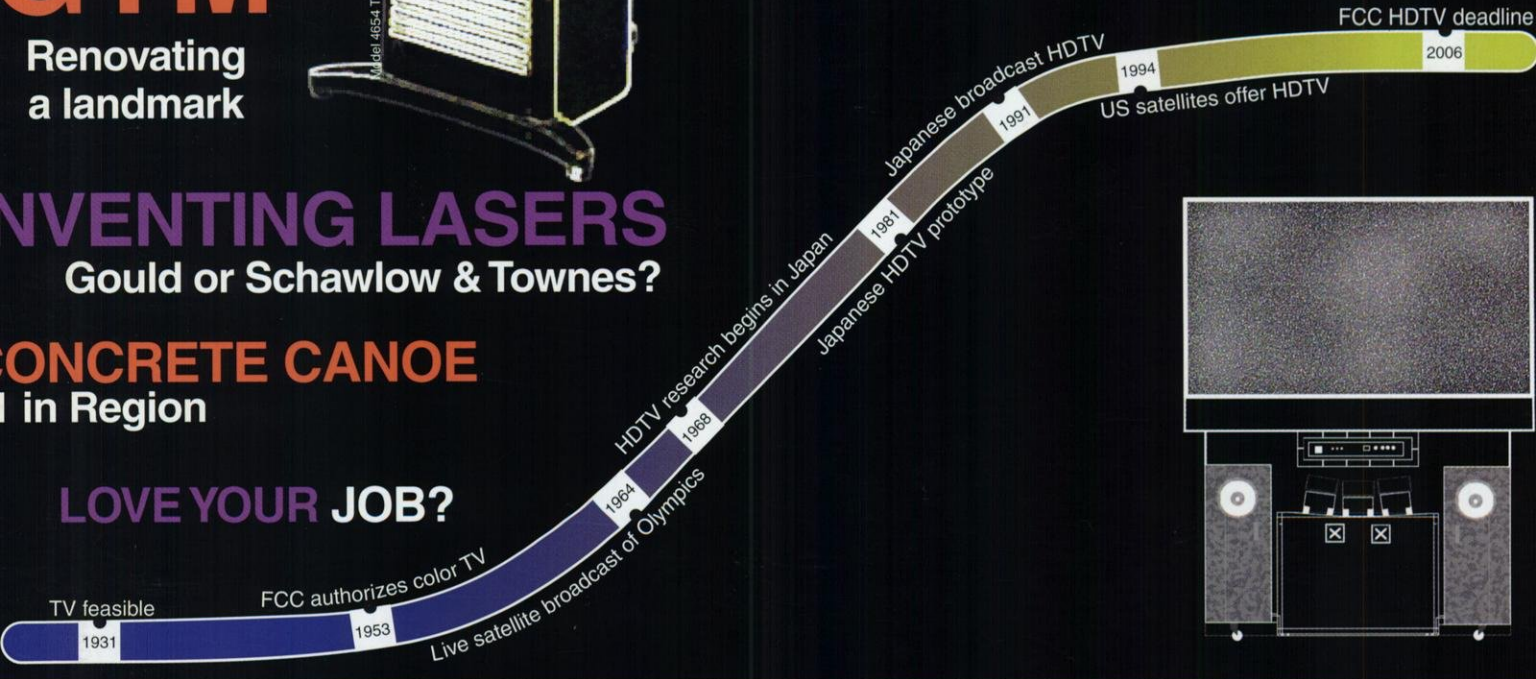
ERRORIST CAR BOMBS:
Can buildings be saved?

RED GYM
Renovating a landmark

NVENTING LASERS
Gould or Schawlow & Townes?

ONCRETE CANOE
1 in Region

LOVE YOUR JOB?



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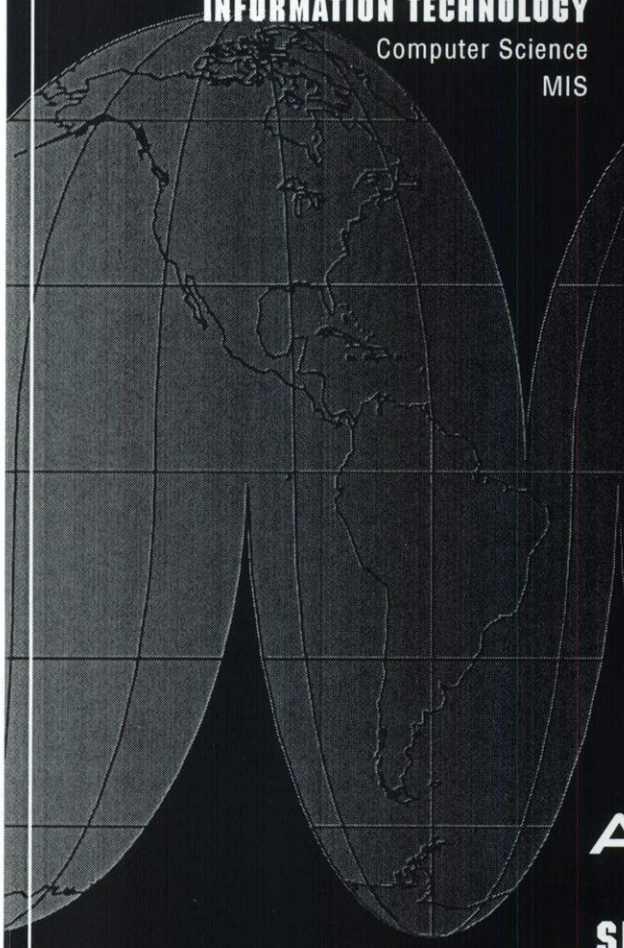

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VOLUME 102, NUMBER 3

APRIL 1998

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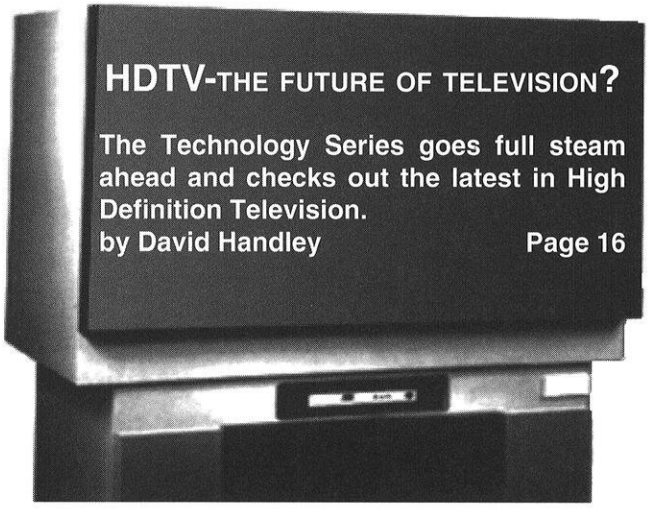

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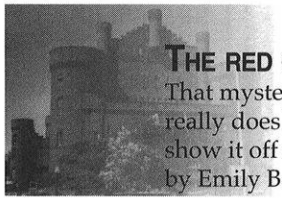

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Embracing Change

I simply don't see what it is good for." — Engineer's internal memo at IBM's Advanced Computing Systems Division commenting on the invention of the microchip in 1968.

"There is no reason anyone would want or need a computer in [his] home." — Ken Olson, President and CEO of Digital Equipment Corp., 1977.

"A cookie store is a terrible idea. Besides, all the market research done shows America likes crispy cookies, not soft and chewy cookies like you make." — A written response by a baking company turning down a proposal by Mrs. Fields, who went on six months later to found "Mrs. Field's Cookies."

Will it work? Can we trust this model? Are you sure this product will sell? It is natural to feel skeptical of a new idea: especially when we panic and get swept away by underlying fears and doubts. As the pioneers of forward thinking, engineers are trained to lead the nation in new technological ideas. By listening and abiding by these innate risk-taking behaviors, the possibilities of discovery and advancement are endless.

This past year, many changes have occurred in the engineering side of campus at UW-Madison. The two biggest changes that stick out in my mind are the alterations of the CAE lab and the reorganization of Career Services. Many complaints and snide remarks have been made concerning these revisions. Will the new systems fly or flop? Should we have gotten rid of so many Macintosh computers at the CAE lab? Should we trust Career Services new way of compiling resumes over the Internet? Right now, all of this change is unfamiliar and scary. But how can we make a technological step forward if we don't want to take risks. Maybe some changes will result in "failures." The question is, if a newly implemented system fails, is it really a defeat? Instead, I believe we should just write it off as a good learning experience.

In this issue, you will read an article about newly developed High Definition Television(HDTV) which is on the cutting edge of technology. Another article discusses how improved methods of reorganizing a company can achieve the well respected title of being an ISO 9000 company. From the articles about remodeling the Red Gym and the civil engineers' concrete canoe competition, you will see how taking risks and experimenting with new ideas gain benefits. Even more astounding is the article about how former sex symbol actress, Hedy Lamarr, was also the inventor of frequency hopping. All of these stories demonstrate how taking chances is the is the key to success.

Students often become accustom to a certain method or form of studying. It works, it's comfortable, so why should it be modified? But suppose a peer or professor discovers an even more efficient way for you to study. Instead of ignoring the new idea, students should try it on for size. Are you a student who hates when teachers make you interact in class? Interaction in large classrooms is a new idea which many professors use. Instead of fighting and complaining, partake in the new way of learning. As the saying goes, "practice makes perfect." Exercise those apprehensive worries in your brain and they will soon transform into insightful, innovating thoughts.

We, the open-minded and brilliant engineering students at UW-Madison, are ready and willing to confront the unknown. When innovation stares us in the face, we will accept and embrace it instead of mock and reject it. Our creativity and experimentation will bring modernization. Wouldn't it have been nice to discover the microchip or Mrs. Field's cookie? One day, it will be one of us who uncovers a new concept or idea that will change this world forever.

Shana Gadlin

The College of Engineering University of Wisconsin-Madison
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INSIDE PAGES 50% RECYCLED 15% POST-CONSUMER

The *Wisconsin Engineer* magazine, a charter member of the Engineering College Magazines Associated, is published by and for engineering students at UW-Madison. Philosophies and opinions expressed in this magazine do not necessarily reflect those of the College of Engineering and its management. All interested students have an equal opportunity to contribute to this publication.
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Sandra Shaw Courter

Dedicated to Helping Engineers Become Effective Communicators

by Jennifer Schultz

Sandra Shaw Courter is an educator, through and through. She loves teaching. Among a long list of prestigious faculty who teach here in the College of Engineering, Courter is one of the few who is not an engineer. Courter teaches classes in the Technical Communications Certificate (TCC) program. She has long recognized the need for engineers to be effective technical communicators and is dedicated to helping engineering students at UW-Madison gain that edge.

Courter is originally from southern Ohio. She transferred to UW-Madison from Ohio State University and finished her undergraduate degree in English education. After teaching in the Madison public schools for seven years, Courter went back to school to become a principal. However, she was offered a job with UW-Extension working in an administrative role and teaching workshops for practicing engineers. When Courter found out about a teaching position in the General Engineering department (this later became the department of Engineering Professional Development (EPD)), she took the position.

Courter enjoys teaching technical communication courses because the courses try to teach students skills that they will need in the workplace. "There is so much value in effective communication skills. I like to see the light bulb go on when the students see how it will help in the workplace," stated Courter.

Courter helped design the Technical Communications Certificate (TCC) program. The TCC is a unique program. Engineering students often wonder why they take special communications course such as Technical Presentation (EPD 275) and Technical Writing (EPD 397) when many other majors take Communication Arts classes. Courter explains, "We can focus more on the kinds of writing that will be in their workplace such as memos, manuals and technical reports. The examples are more real to the students in that they target a specific audience and purpose."

Presentations are a big part of an engineer's job. Whether the presentation is for your boss, a client or fellow staff members at a meeting, an engineer needs to know how to communicate effectively. There are two main parts everyone thinks of when they have to give a presentation: what to say and what visuals to use. Courter, who is one of the instructors for Technical Presentations (EPD 275), gave some advice on this topic. "It is still you, the message and the audience that are the most important. Visuals only support. Visuals help people remember, but you have to be careful not to use all the bells and whistles to which you have access." Courter likes to use the mottos, "Keep it simple. Less is more."

The old stereotype of the engineer is of the engineer sitting alone in his or her cubicle busy working on drawings or calculations. Communication skills, team work and interpersonal relationships were not emphasized.

"Sharing my education background with engineering is a challenging and unique experience"

The perceived role of the engineer today is drastically different. Courter commented, "The perspectives of engineers are needed by all the other professions. Engineers need to be willing to step in and give their expertise. Too often, engineers have taken the back seat. We need logical and skilled people such as engineers in all areas."

Courter has won three awards recently for her teaching. She was one of the professors honored by Polygon, the College of Engineering's student council. She received the Bollinger Academic Staff Award. "Both were real honors to get, since they both come from students and colleagues." Being part of the academic staff, Courter is here to teach. She is not required to do research. The last award that Courter won was a nomination as a fellow in the Teaching Academy, which is for professors across the campus who are really interested in learning and teaching.

Source: Engineering Communications

Sandra Shaw Courter

Courter's Ph.D. research was on the assessment of a curricular innovation, specifically looking at teaching in engineering. "We realize the way we used to do things may not be the way it should be done now. Assessment is a part of education, but it hasn't been taken so seriously until the last five years." One of Courter's first projects was the assessment of EPD 160, an introductory design class for freshman engineering students. Assessment of the course was done by interviewing students, faculty and the senior assistants involved in the class. From these interviews, lessons were learned and the improvements were made. Results of these interviews and surveys showed that the students valued the small teams, the faculty teaching the course and the hands-on work to aid learning. The faculty learned that freshman can do design work and handle real-world projects, which was the intent of the course. "The assessment of EPD 160 was the first major attempt at assessment within the College. Since then, departments are doing their own surveys and evaluating individual courses, in an effort to improve curricula." Courter said.

Besides teaching and working with assessment, Courter is Co-Director of the En gineering Learning Center (ELC). The Learning Center helps coordinate faculty de-

see *Courter* on page 5

Structural Designs to Reduce the Effects of Terrorist Car Bombs on Buildings

by Lori Schueffner

On April 19, 1995, in a time span of about three seconds, an 1800 kg car bomb blew up the Alfred P. Murrah Federal Building in Oklahoma City. The bombing resulted in the death of 168 people and hundreds of injuries. Even though this bomb was placed three to five meters away from the building, one side of the building collapsed (see Figure 1). This collapse, not the blast, caused 80% of the deaths in the bombing [Prendergast, 1995]. Bombings have accounted for 46% of all international terrorist attacks since 1968 [Briggs, 1995] Statistics from recent bombings show that the number of deaths have not been related to the size of the bomb as much as they have been related to the structural integrity of the building and whether the building was designed against blast effects. Building designers need to consider the effects a car bomb would have on their buildings. Building design decisions should be guided by assessment of the risk a building has for being attacked and by information about how structural designs can mitigate the effects of a bomb.

The level of risk that a building has for being attacked by a car bomb is assessed by considering who or what the threat is, whether a bomb is a possible choice of weapon and what scenarios for introducing a bomb into or near a building are likely. Based on the risk assessment, a building is assigned a security level ranging from facilities with minimum security needs such as military recruiting offices or small post offices (level 1) to buildings with high security needs such as the Pentagon or CIA headquarters (level 5) [Prendergast, 1995]. Higher security level buildings require more safety measures than lower level buildings.

There are three main structural designs that can be used to mitigate the blast effects of a car bomb. All three systems are adaptations of military technologies to civilian applications. These three systems are keep-out zones, design redundancies and modifications to the exterior facade of the building.

Keep-out zones have been proven to be the most effective means of protecting a structure against car bomb attacks [Rittenhouse, 1995]. Keep-out zones create a maximum distance between the building and the explosion. A keep-out zone is typically created by the use of courtyards and plazas (see Figure 2). Placed within these courtyards and plazas are perimeter bollards, planters, fountains and other barriers that cannot be compromised by ramming with a vehicle. These features insure that a vehicle with a bomb inside will not be able to drive up to the building and park there.

Design redundancies are structural modifications that help limit building failure and guard against catastrophic collapse of a building. Design redundancies include proper design of beams, girders and columns, limiting use of transfer girders and creation of back-up utility feeds. When beams, girders and columns are properly designed, they are capable of carrying the additional loads imposed upon them after a bomb attack. If the Murrah building had been properly designed, it would have resisted collapse. The failure would have been limited to local failure instead of global failure, and lives would have been spared. When the World Trade Center was designed, it was designed to structurally withstand the effects of a bomb in order to ensure that progressive collapse would not take place. It was designed to withstand 150 mile per hour winds, the loss of perimeter columns by sabotage and the impact of a Boeing 707 aircraft [Briggs, 1995]. However, the building still failed the survivors inside after it was bombed. All of the communications, electrical and mechanical systems were cut off. Power to the whole building was lost. This loss of power made it very difficult for any rescue effort to take place. If back-up utility feeds had been included in the building design, the bomb could have destroyed one set of utility feeds and others would have still been functioning and available for rescue efforts.

Bombings have accounted for 46% of all international terrorist attacks since 1968

Modifications made to the exterior facade of a building are the occupants' last form of protection in the event of a car bomb attack. The facade consists of two elements: the structural skin and the windows. Some actions can be taken in order to make these elements bomb resistant. First, durable and ductile, or elastic, materials can be used in building construction. The elastic properties of building materials reduce the effects of the dynamic loading that would be caused by a bomb. Rigid building materials fail because they are not capable of withstanding dynamic loading. Windows shatter because glass is not a very ductile material. 75% of injuries caused by a bombing are the result of flying glass [Mays, 1995]. The easiest way to eliminate flying glass is to limit the use of windows. However, limiting the use of windows not an aesthetically appealing method. An alternative modification is to use windows that are chemically treated in order to resist shattering.

The decision as to which system to use must be made by the building designer. Every building is different and has different needs and design solutions. Designers need to consider the risk a building has for being bombed and incorporate the appropriate structural designs into the building to ensure occupants' safety.

Keep-out zones prevent a car bomb from ever coming near a building and are the most widely used and most inexpensive form of blast resistant design. Keep-out zones also tend to enhance the beauty of the building and it is not difficult to make an existing plaza into a keep-out zone. Design redundancies are effective in preventing progressive collapse of a building and increasing the chances for an efficient and safe rescue effort. Design redundancies are the next least expensive method of structural design against the blast effects, but they are still expensive to incorporate into a building. In

order to properly design and detail the structural members of a system, stronger building materials are needed. Stronger building materials are more expensive than normal building materials. Proper detailing also requires longer design and building time which increases the cost of the building. Modifications to the exterior facade of a building are very expensive. The special glazings put on windows to make them shatter-proof is very expensive. These special glazings also need special care and maintenance which increases the up-keep costs of the building.

The goal of blast resistant design is to protect the occupants inside a building. Proper building design can prevent many injuries and deaths in the event of a car bomb attack. It is vital that blast resistant structural designs be incorporated into buildings.

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Author Bio: Lori Schueffner is a senior in Civil and Environmental Engineering at the University of Wisconsin-Madison.

Undergraduate Engineering Review

The Undergraduate Engineering Review is a journal that has two primary goals. The first is to provide undergraduate engineering students with a forum for presenting their views on current engineering problems. The second goal is to set a standard of writing excellence for the undergraduate engineering community. The articles in this journal's site were written, edited, formatted, and placed on the world wide web by students in the College of Engineering at the University of Wisconsin at Madison. Another edition, edited by Christine Moore, exists at the University of Texas (see link below). Given the success we've had in using this kind of publication in our classes, we encourage other engineering colleges to create similar on-line publications and to mail us the links.

At the University of Wisconsin, all submissions are solicited from several sections of a technical writing course. At the beginning of the course, students are asked by acquisition editors (teachers in the course) to submit proposals on their semester research. For this proposal, students follow guidelines in the Request for proposals. Also available to the students are sample proposals. After the students receive comments on their proposals, they continue their research for the semester.

Each student's research culminates in a formal report. The acquisition editors then choose the best reports and submit those to a technical editing class that edits and formats the documents for the journal. The style of documents for the Undergraduate Engineering Review follows advice given in The Craft of Scientific Writing.

Founding Editor
Michael Alley, University of Wisconsin

Acquisition Editors
Professor Michael Alley, University of Wisconsin-Madison
Professor Laura Grossenbacher, University of Wisconsin-Madison
Professor Gisela Kutzbach, University of Wisconsin-Madison

If you have comments, suggestions, or questions, please direct them to Michael Alley.
http://www.engr.wisc.edu/epd/uer/

Courter

velopment and Teaching Assistant (TA) training, assessment and cross-disciplinary courses. Three years ago, Courter started the TA Fellow Program. The latest project was a course portfolio in which TAs document how they teach their class. This helps create more continuity each year as new TAs are hired. The ELC also tries to help students directly by setting up small groups of students in learning communities, which is especially helpful to freshmen.

A new project that the Engineering Learning Center is working on is developing a new course for graduate students on how to teach in engineering. Many graduate students who have goals to become professors receive all the training in their technical expertise but have no instruction on how to be a good teacher. This class hopes to fill that void. The ELC just received approval to work with others across campus to develop a certificate program for graduate students on teaching in higher education. Courter is pleased that she can give her perspective on being a teacher in a technical field. "Sharing my education background with engineering is a challenging and unique experience."

Courter is a teacher and an administrator, two jobs that alone would be enough for one person to handle. How does Courter manage? "It's a continual challenge. People are the heart of what you do. If I lose the connection with the students, faculty or TAs, I need to go back and fix that."

Author Bio: Jennifer Schultz is a junior in geological engineering/geology and Editor-in-Chief of the Wisconsin Engineer. She is also pursuing the TCC in hopes to be an engineer who can communicate effectively.

When I Grow Up, I Wanna Be A Racecar Engineer:

The Story of Scott Ahlman and *Team Rahal*

by Mike Moyer

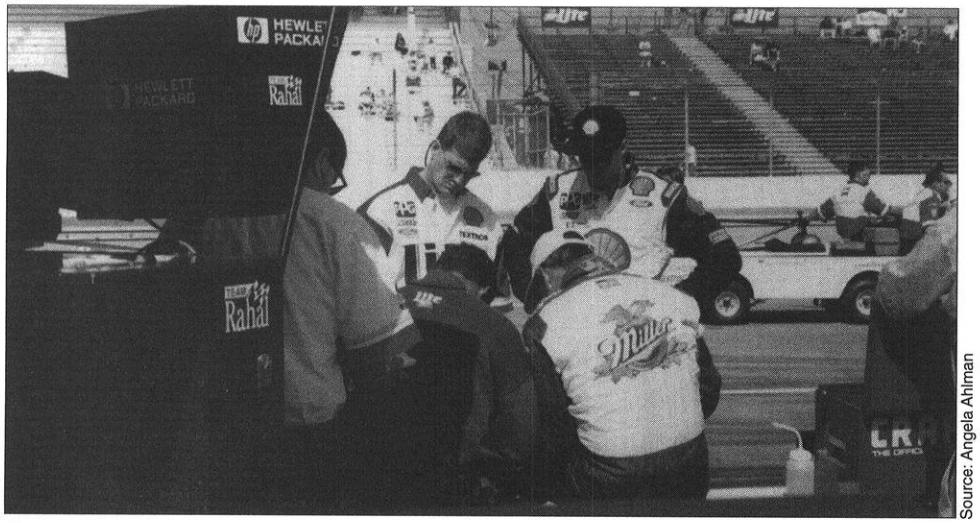
From the time that Scott Ahlman was 8 years old, he had dreams of racing his own go-kart. At age 12, he actually designed, built and raced his first go-kart for fun. Then in 8th grade, a class project required him to give a speech about his dream career. Citing his love for racing, and cars in general, Scott proclaimed before his audience that he wanted to become a mechanical engineer.

Source: David Gaylor

Scott Ahlman enjoys karting in his spare time at the track in Circleville, OH.

When it came time for Scott to go off to college, he made the choice to attend the UW-Madison. He made this choice for several reasons: First, he knew that UW - Madison had an excellent reputation and the engineering school is one of the best in the country. Second, many of his friends from high school were planning on attending Madison as well. Third, since he was paying his own way through school, he couldn't afford to attend a private or out-of-state school. Last, but certainly not least, Scott loved the city of Madison. During his 5-1/2 years at the University, Scott had ample opportunity to excel at what he loved best - engineering. He held a co-op at the Oscar Mayer Company doing machine design for two semesters, which was a perfect outlet to hone his engineering/racing skills. In 1993 as Team Leader, he guided the Wisconsin Formula Racing team to a very respectable finish at the national competition in Pontiac, Michigan. His Former Racing team experience at the University was probably the largest factor to where he resides today.

Upon his graduation from the UW in December of 1993, he accepted a position in the Ford College Graduate (FCG) program at Ford Motor Company in Dearborn, Michigan. This program allowed him to rotate work assignments every 3-8 months. Scott's first assignment was in the Ford Light Truck Advanced Chassis division. This assignment allowed him to work on the Craftsman Truck Series of NASCAR; his dream to become a race engineer had finally come true. Currently, Scott works in the Ford Motorsports Technology Department and is the resident Vehicle Dynamics Engineer for CART Indy team, *Team Rahal*. At this position, his daily tasks include analysis, modeling and simulation of Bobby Rahals' 200+ mph Indy car. Scott admits that sometimes his days run a little long; his average work day is anywhere from 10 to 16 hours. He also travels with the team on race weekends to exotic places within the United States and around the world. Scott's work situation is definitely not the norm; many of his fellow engineers work the standard 40 hour work week. He doesn't complain, though. Those long hours spent testing cars at the track are sure to beat sitting in a stuffy office on a beautiful day. In fact, he's pleased with Ford, in general. Scott says that he chose Ford because he has always liked their products. People also told him that Ford "was a good company to work for". Ford also recruits heavily from the UW-Madison and is quite interested in continuing their employees' educations.



Source: Angela Ahlman

Scott Ahlman and Team Rahal are hard at work on the race track in Miliwaukee.

Scott believes the education that he received at the UW prepared him well for life in the real world. Of course, all work and no play makes Scott a dull boy. In his free time, Scott

enjoys racing his own sprint kart, playing ice hockey and woodworking. His advice for students who want to pursue a career in motorsports engineering is to attend a college with a good engineering program, keep the grades up (didn't your parents tell you that?) and get involved with the automotive projects at school. He also states that if you really want to get into the racing scene, join your local or regional sports car club (SCCA, USAC, etc.). If you want to be a racecar engineer, you have to race!

Author Bio: Mike Moyer is the 1997-98 Team Leader of the UW-Madison Formula Racing Team. After his long-awaited graduation this May, he plans to take the world of motorsports by storm and beat out the likes of Michael Schumacher, Juan Fangio, and others to become the undisputed king of racing!

Source: Dennis Ahlman

Scott Ahlman and the 1993 University of Wisconsin Formula SAE racecar.

Project BEST

"When I Grow Up, I Wanna Be A Racecar Engineer: The Story of Scott Ahlman and Team Rahal" is just one of the many diverse profiles that will be featured in BEST (Brochure for Engineering Students of Tomorrow). BEST will be a 20 – 30 page full color brochure that will provide high school students with a better understanding of what an engineer does. We want students, teachers, and parents to page through BEST and say, "Wow! I didn't know engineers did all that!"

This valuable resource is a national project of NAESC (National Association of Engineering Student Councils), and students at the University of Wisconsin – Madison are leading the production of it. Engineering students across the nation are working together to make BEST a reality by conducting interviews and writing profiles similar to the one above. The vision is to distribute BEST to every high school in the nation. If you would like to become a part of BEST contact Julie Kavan at jakavan@students.wisc.edu or 608-238-8280.

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Remember the People Behind the Numbers

by Robert Strand

An event occurred on November 25th, 1997 that changed me for ever and has prompted me to write this piece. A close lifelong friend was killed in a preventable "industrial accident" while working at a manufacturing site of a subsidiary of a Menard's subsidiary in Eau Claire, Wisconsin. The chain has since been investigated and cited for numerous saftey violations. This tragic event has caused me to question many aspects of my life, including my role in society as an engineer.

My point is basic: we need to ensure that the legacy we leave behind as engineers is positive. Consider the tremendous influence that corporations exert on a global basis. Keep in mind that we, as engineers, will work for these corporations. In time, we will control many of them. Therefore, we are in a position to influence these corporations and help monitor the impact they have on the lives of innumerable people. We have control over whether that impact is ultimately a positive or a negative one. Engineers are in the privileged position to affect change for the better.

Robert Strand with friend Jesse Brone

I hope that, in the process of becoming leaders in industry, we do not forget one very basic, important fact: corporations are more than just entities whose identities come solely from a corporate logo. Corporations are made of a series of individuals and prosper only with the collected efforts of each individual. Obviously, companies thrive not only due to the work of higher-level engineers, but also because of the efforts of the individuals who work directly on the products we design or processes we implement. As engineers, we should not and cannot reduce these people as simply inputs for the product or as numbers in the process. We must remember that these links in the process are people, individuals with lives and concerns.

I am under the impression that my friend was regarded merely as input. He could not have been a person in the mind of the workload analyst or site manager who failed to ensure proper training and working conditions that he or she knew should have been in place to protect my friend. Rather, he was regarded simply as a number. Sadly, this manner of abstracting human beings away to numbers appears to be prevalent among the world's corporations. A spreadsheet full of workload numbers possesses a dehumanizing power and creates a trap easy to fall into. It is a trap, however, that we must avoid. We must all make sure that we are sensitive to the needs and concerns of all whom we work with and all whose work we may affect. The fact that we do not always see the faces of the victims of our negligence does not reduce our responsibility in the tragedy that follows.

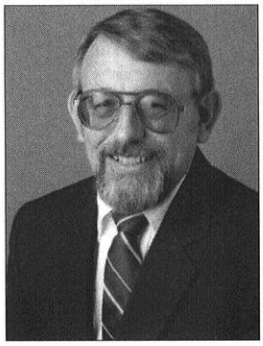
We may not see the people we impact on an everyday basis in the way, for example, educators and health care workers do. We do, however, play an important, but often overlooked, role in the well being of our corporations' workers that is crucial to so many lives. Our contributions to workers' lives and society in general, however, should not simply be a by-product of our work. We must make them a focus. I propose that at each step, at every level, we treat the human element of our work as if it were our dearest friend. Would I allow this plan to be implemented if my friend were working on the job site? Would I design the product as such if my friend were using it in his car? What safety measures would I require if my friend worked in this plant?

My friend's death could have been avoided had the corporation for which he worked been more concerned about him as an individual. His was an extreme case of a corporation failing to accommodate the needs of its workers. Employee #53773 may seem easy to replace when thought of simply as a unit in the production process, but my friend's life cannot be replaced. As engineers, we owe it to society to remember the individuals behind the numbers. We have the power to make our impact on their lives a positive one. If we as engineers can learn something about remembering the individuals we affect within the corporations of which we are or will become a part of, perhaps my friend's death was not in vain.

There is a hole left in my heart after my friend's life was stolen. Let us use our talents as engineers and our compassion as human beings to not let this happen again.

Author Bio: Robert Strand is a senior industrial engineer at UW-Madison.

George Maxwell



Source: Engineering Communications

Emeritus Professor George Maxwell passed away February 19, 1998.

Maxwell served four years in the U.S. Air Force as an electronics instructor before earning a BS in metallurgical engineering from the Montana School of Mines in 1959. He received an MS and PhD in materials science from Syracuse University in 1963 and 1965 respectively. He was a postdoctoral fellow in chemistry at Syracuse from 1965-1966.

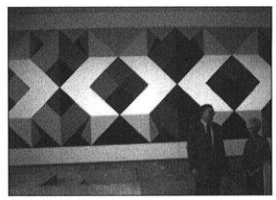
Maxwell joined the faculty at the College of Engineering as an assistant professor in metallurgical engineering in 1966. He was voted Outstanding Professor in the Department of Metallurgical and Mineral Engineering twice during the 1970s. He coauthored a text and initiated a materials science course for non-engineers. Maxwell also served as associate dean for pre-engineering where he advised over 5000 students.

Maxwell was also the director of the Pre-College Outreach Office. He received several grants from the National Science Foundation to introduce engineering concepts to teachers and gifted students in predominantly minority schools. In an effort to increase enrollment in the 1970s, he traveled to high schools throughout the state to present a "materials magic show". In an effort to help under-represented groups in engineering, Maxwell was also involved with the Chancellor's Scholar Program, summer programs for young women, and the Academic Industrial Teacher's Internship program.

In the early 1990s, Maxwell initiated ESTEAM (Engineering Saturdays for Tomorrow's Engineers at Madison) which invites top Wisconsin high school students to attend special engineering activities on campus. For the past several years, Maxwell traveled throughout the state to advise potential transfer students from the University of Wisconsin System and private colleges.

George Maxwell made countless contributions to students and the College of Engineering. As a student that has worked with George on many occasions, I will also remember him for his endless smiles and the supply of sweets that he added to my diet throughout the last four years.

Mechanical Engineering



The Mechanical Engineering Building's lobby has a totally new look, thanks to financial contributions from the late Professor Edward F. Obert.

Obert, who died in 1993 at the age of 83, had a special regard for undergraduate students and specifically wanted to upgrade their study place in the ME building. He also bequeathed funds for a scholarship, magazine and newspaper subscriptions, honorary society program fees, student tutoring programs, and local and regional functions for the students.

Obert retired in 1976, after having served as ME department chair from 1963 to 1967. He was best known by his students and colleagues as a teacher who had high standards and principles, according to ME lecturer Frederick T. Elder, who as a graduate student worked with Obert. "He was a champion of undergraduate education and a mentor to many students," Elder added.

Marko Spalatin created two large and striking murals that have been installed at each end of the study area. The murals are a special gift of Whitman-Obert to enhance the other interior work funded by the professor's legacy.

Artist Spalatin's murals are the newest of several he has done on the UW campus, including one hanging in the UW-Foundation building on University Avenue. Based in Blue Mounds, Wisconsin, Spalatin has an international reputation and clientele. Ms. Whitman-Obert commissioned him for the ME work after admiring his geometric and colorful earlier canvases.

Other changes to the ME building include moving vending machines to a separate room; updating furniture, carpeting, and lighting; and adding additional study lounge spaces and study carrels with computers.

The Caterpillar Corporation also donated a large forklift to the Mechanical Engineering Department during the past month.

Web Excellence Award

http://www.cae.wisc.edu/wiscengr/award

The first recipients of the awards are:

Mike Berg	http://www.cae.wisc.edu/~bergm
UW-Madison Concrete Canoe	http://www.cae.wisc.edu/~canoe
Institute of Industrial Engineers	http://www.cae.wisc.edu/~iie
UW-Madison ASCE Chapter	http://www.cae.wisc.edu/~asce
Four Seasons in Madison	http://www.cae.wisc.edu/~chun-hsi
Welcome to Steve's Site	http://www.cae.wisc.edu/~ebling

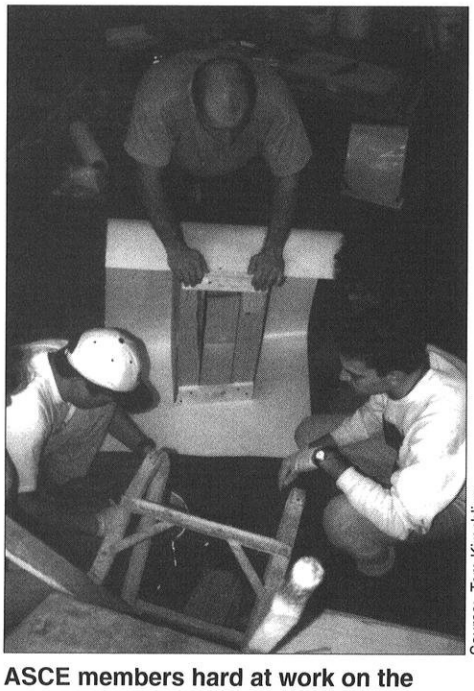
Sailing Away in a Concrete Canoe

by Robin Gigot

Little kids learn early that a rubber ducky floats in water because it is light, while a baseball sinks because it is heavy. If everyone knows this, why are UW-Madison's civil engineers trying so hard to create a concrete canoe that floats?

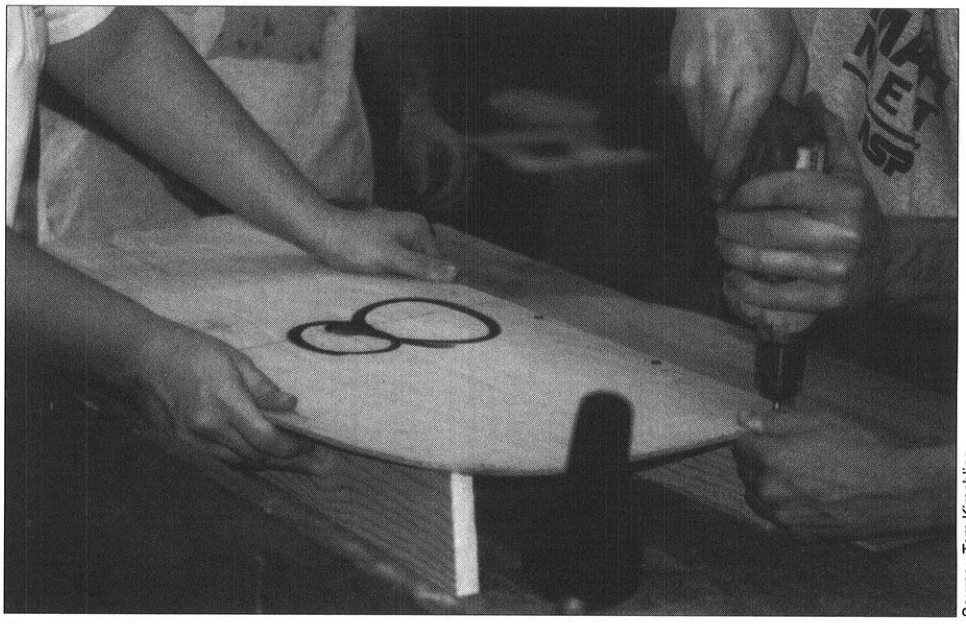
They do it for the challenge, of course. UW-Madison's chapter of the American Society of Civil Engineers (ASCE) enters the Great Lakes Regional Competition each spring with the glimmer of smooth concrete canoes in their eyes. This year, on April 25th, the Phiberous Phantom will take to the water at the University of Illinois at Urbana-Champaign.

The concrete used in the canoe-building process is not the normal concrete on sidewalks; it is a mixture of Portland cement and aggregates that make it lighter. Ordinary concrete weighs about 150 pounds per cubic foot, while the "special recipe" concrete weighs 48 pounds per cubic foot. However, the Portland cement has about half the strength of ordinary concrete and only one-third the weight. This ratio is the advantage.



Source: Tom Kirschling

ASCE members hard at work on the mold to make the actual concrete canoe.



Source: Tom Kirschling

A real hands on project! Members of the concrete canoe team work hard to make piece of the mold that will go into making the body of the canoe.

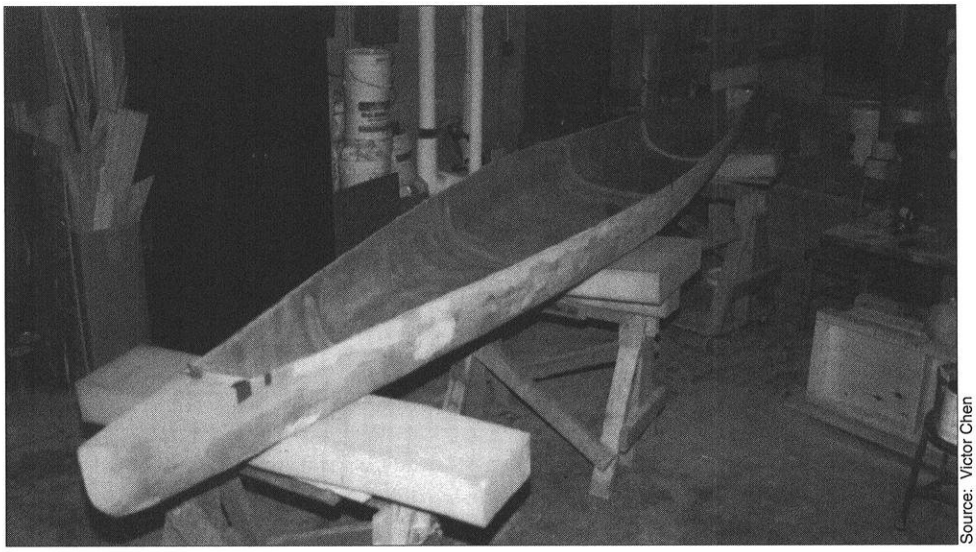
In order to build a perfect canoe, the ASCE members usually start the fall before the competition. According to co-chair Tony Walls, a process of trial and error is used to find the perfect mixture of water, Portland cement, lightweight aggregate, microsilica, fibers, latex and super plasticizer. Although, from past experience, the members have some rough ideas of the composition of the mix, they still need to work to find the perfect combination. The ratio of water to concrete is especially important. If the ratio is high, the canoe will float easily, but it might lack some strength. Walls explained that if the ratio is too low, the canoe will be too heavy.

The rules of the competition state that the concrete must be at least 75% binder, which consists of Portland cement, microsilica and flyash. The other 25% can be any combination of aggregates and extras. Different mixtures are made into plates and put through a battery of tests to determine their durability and flexibility.

When making a mix, they aim for one that is lightweight, durable and flexible. If the plates crack or crumble, the combination is not good. The plates are two thin layers of concrete with a poly mesh that helps add flexibility sandwiched between them. The team also mixes the concrete and extras in a five-gallon pail with a dremmel to make it lighter.

UW-Madison's team has swept first place at the regional competition the past three years

After the secret mixture has been perfected, the process of physically building the canoe takes about two months. Each year the team starts from scratch with their canoe and the design. When this design is set, the team has



Source: Victor Chen

A final look at the Phiborous Phantom before it heads off to competition this April 25th. Good Luck!

to create a mold of the canoe out of expandable foam and sand and smooth the mold. Once the mold is made, they pour the concrete over the mold and let it cure for two to four weeks.

Once the mold is pulled off, the most time consuming and labor intensive step begins. The rough concrete canoe has to be sanded until, "...it looks like the finish on a car," said ASCE member and former co-chair Bob Gardener. This process takes anywhere from 400 to 500 hours of work. The canoe is painted and finishing touches are made. This finish counts for 15% of the team's total points and reflects all of the hard work from the past year.

"It doesn't look like it is made out of concrete; it looks like fiberglass. It's neat," said member Melissa Kleist.

Simultaneously, ASCE members are working on other important components of the competition that make up their score at the competition. Five canoe races, which constitutes 40% of the team's score, tests the physical skills of the members: both men's and women's long distance, men's and women's sprints and a co-ed race. Teams are made up of two people and, according to Kleist, these teams start training vigorously for those races in February.

For another 20% of their points, each team must write a paper to accompany their canoe. This technical paper describes how the team designed and created their canoe and discusses how well the team met their goals.

A presentation, which counts 15%, is also a required element at the competition. The presentation can be technical or focus on marketing the canoe. Also, a display of photos, charts and graphs about the canoe and its design count for 10% of the total points. The display and the painting of the canoe is centered around a theme. This years canoe is the Phiberous Phantom, painted a deep purple in front with a fade to black.

Another important activity ASCE must do is raise funds in order to take as many of its members to regionals and nationals as possible. Fundraising is an important part of their job. "We don't want to have members pay their own way to see the competition," said Kleist. Some of the money for the competition comes from the national chapter of ASCE and the College of Engineering.

Supplies are also an expense for the team, but many of the materials are donated. A Portland cement dealer in Milwaukee donated their product. ASCE also gets sponsorship from local engineering firms, who in exchange get advertisement space on the team's t-shirts. Not all of the products are donated; one box of aggregate the canoe needed was about $250 for a 60 pound box.

After the canoe has been perfected, the team should have some time left to savor their creation. The canoe will hit the water a couple of weeks before the regional competition, but the racing team usually practices with a fiberglass boat.

UW-Madison's team has swept first place at the regional competition the past three years and their performance at nationals each of those years has improved each time. Gardener expects stiff competition from the University of Illinois at Chicago and University of Illinois at Urbana-Champaign this year, but the team "...hopes to improve on last year's ninth place finish at nationals."

Author Bio: Robin Gigot is amazed a concrete canoe can float, and she hopes the team goes to nationals again.

Contact ASCE at phone (608) 262-1671 or email asce@cae.wisc.edu or web site at http://www.cae.wisc.edu/~asce/
Concrete canoe email: canoe@cae.wisc.edu
Steel Bridge: bridge@cae.wisc.edu

Show me the Money!

At the national level of the Concrete Canoe Competition, There are awards given for the top three finishing teams. A total of $9,000 is awarded to the undergraduate civil engineering programs of the top three teams. The awards are given by Master Builders,Inc.

1st place overall	*$5,000 scholarship and trophey*
2nd place overall	*$2,500 scholarship and trophey*
3rd place overall	*$1,500 scholarship and trophey*

In addition the teams with the best time in the co-ed sprint are givena special plaque in honor of the efforts of R. John Craig, who kept the annual concrete canoe competition going. Recognition plaques are also given for best finished canoe, best oral presentation, best acedemic paper, the winning teams in men's and women's distance race, men's and women's sprint race and the recently added Spirit of Competition Award.
Visit their homepage at **http://www.masterbuilder.com/canoe**
-compiled from the ASCE National Concrete Canoe Competition press release

Human Factors and Ergonomics Society

HFES is the largest student affiliate chapter of the national Human Factors and Ergonomics Society. The student chapter is dedicated to educating both undergraduate and graduate students from a variety of disciplines in human factors and ergonomics issues (e.g., job design, organizational design and management, workplace safety, information systems, universal design, biomechanics). Our members include students and faculty from Industrial, Manufacturing Systems, Mechanical, Electrical and Biomedical Engineering, Psychology, Nursing, Occupational Therapy and Project design. We are indeed a diverse group of people, dedicated to a systems perspective and engineering systems solutions. We sponsor a speaker series, plant trips, special events, outreach and social activities. Check us out at **http://www.cae.wisc.edu~hfes**

For further information, please contact any one of our officers:
President-Marla Haims
(mchaims@students.wisc.edu)
President-Elect-Michelle Rogers
(rogersm@cae.wisc.edu)
Membership Director-Jason Pionek
(jcpionek@students.wisc.edu)
Treasurer-Francisco Moro
(fbmoro@students.wisc.edu)
Web Page Dude-G.J. Marmet
(gjmarmet@students.wisc.edu)

Institiute of Electrical and Electronic Engineers

What is IEEE at the University if Wisconsin-Madison?

The Institute of Electrical and Electronics Engineers (IEEE) is a group of more than 300,000 professionals and students from more than 150 countries. IEEE was founded in 1884 and is the largest professional association in the world. It is the best source of electrotechnology publications in the world and accounts for more than 30 percent of the total publications. At the local level, we are an organization of about 220 members. We have at least one plant tour a semester and plan regular meetings once a month. During the meetings, we have companies or distinguished speakers do presentations for our group. We also have social activities such as a barbecue, bowling and volleyball.

What are benefits of joining IEEE?
All IEEE members receive a personal subscription to the IEEE Spectrum magazine. With this, IEEE members gain an edge with the best technical information on electrical and computer engineering in the world. Even UW-Madison professors have written for IEEE Spectrum. IEEE is a great opportunity to network with other students and industry. It is time to get involved so pick up an application!

Itinerary for IEEE this April
Friday, April 17th - IEEE Grill Out
Thursday, April 30th - Chapter Meeting with an ISP and the Madison Professional IEEE Section

If you have any more questions or comments, please email **ieee@cae.wisc.edu** and we will address them.

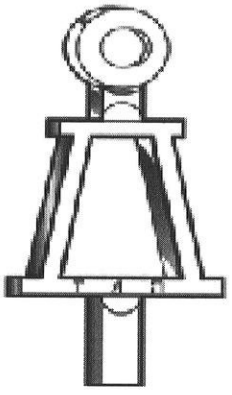
Tau Beta Pi

Tau Beta Pi is an Engineering Honors Society that prides themselves on the importance of liberal culture and integrity. As an organization, Tau Beta Pi does many service projects in the area including decorating the children's wing of University Hospital, hanging Holiday lights on the trees of Engineering Mall, Wisconsin Public Television Telethon, and tutoring at area elementary schools. Tau Beta Pi is also proud to announce that it will be hosting the 1999 National Convention in October of 1999.

To become a member of Tau Beta Pi you must rank in the top eigth of your junior class or top fifth of your senior class. All engineering disciplines are accepted. Initiation occurs in the fall and spring semesters. To get involved in these and many other activities contact Tau Beta Pi at **tbp@cae.wisc.edu**

Taue Beta Pi would like to take this opportunity to congratulate the Spring 1998 Initiates. Welcome and congratulations on job well done!

Tom Austin
Chip McCann
Sianny Christanti
Chris Paulik
Rachel Clark
Sudibyo Pradono
Raquel D'onghia
Jason Rymer
Chad Fischer
Ali Senn
Greg Ingersoll
Kevin Spredemann
Eron Jacobson
Matt Starzewski
Tejas Karkhanis
Ijen Suhendra
Farhan Khatri
Denny Supranata
Amy Knollenberg
Budi Wahyudi
Yuliana Kuswandi
Derik Ward
Chris Kyte



American Institute of Chemical Engineers

AIChE is a studetnt organization that is comitted to giving undergraduate chemical engineering students the opportunity to learn more about chemical engineers in industry and to give them a chance to interact with other chemical engineering students. It also given the students a chance to learn by competing in events such as Engineering Expo, the Rube Goldberg Competition, and the Reactor Design Competition.

AIChE also supports the GUTS tutoring program and has tutors availiable at Union South. See the TITU for location and times or contact the AIChE office.

Contact us at aiche@cae.wisc.edu or visit our web site at www.cae.wisc.edu/~aiche

Meetings and events that are scheduled for the remainder of the `98 semester are:
April 24 - Plant trip to Cargill
End of April - Election of Fall Officers. Look for signs indicating the exact time, day and location!
May 17 Graduation Banquet

Institute of Industrial Engineers

Are you an IE? Do you like having fun? Do you want to become an IE? Do you know what an IE is? If you answered yes to any of these questions, then the Institute of Industrial Engineers (IIE) is for you. IIE has the ability to introduce IE students to each other and create social interaction within the department. As an engineering student organization we offer students many different opportunities to advance as an IE. We provide networking opportunities with industry, fellow IEís at other universities, faculty and many more. Another advantage to IIE is the opportunity to gain leadership experience. All employers are looking for leadership. IIE will give you the opportunity to develop your personal leadership skills and gain practical experience.

IIE is making its presence known. On March 21, the UW-Madison chapter walked into the IIE Regional chapter development meeting with one intent ñ To get the regional conference to Madison in 2000. After talking about what could be improved for next yearís conference, it was time to vote for the host of the 2000 conference. After showing that we were capable of hosting such an event, the ballots were collected and counted. UW-Madison is ringing in the new millennium with the 2000 IIE Regional Conference! As the meeting progressed, we discussed chapter development. UW-Madison was surly the leader of this discussion. After the meeting, a couple schools even approached us for further information.

In addition to the Conference, IIE has also been making a difference on the Engineering Campus. We are currently working with the IE department to address several student issues including new class offerings; ìreal worldî work experience on campus; and increased student faculty interaction to name a few.

Keep in mind that we also have fun. On May 1st we are going on the annual Miller Brewery, Milwaukee Brewer Plant Trip / Social. This trip has been great in the past, and we expect the same this year. Also, we will be hosting a student-faculty sporting event on April 18th, all are welcome to attend.

None of our changes could have taken place without the complete dedication of the Restructuring Committee. A bunch of people with good ideas is only that, a bunch of people - unless people volunteer to develop these dreams into reality. Special thanks goes out all the new members that are making our dreams come true.

As an organization we learn a lot, get stuff done, but more importantly we also have fun when we are doing it.

For instance, on March 21, the UW-Madison chapter walked into the IIE Regional chapter development meeting with one intent ñ To get the regional conference to Madison in 2000. After talking about what could be improved for next yearís conference, it was time to vote for the host of the 2000 conference. After showing that we were capable of hosting such an event, the ballots were collected and counted. UW-Madison is ringing in the new millennium with the 2000 IIE Regional Conference! As the meeting progressed, we discussed chapter development. UW-Madison was surly the leader of this discussion. After the meeting, a couple schools even approached us for further information.

EET Internship Opportunity

Are you still looking for a summer internship? Are you concerned about the environment and want to work for an environmentally conscience company? Engineers for Environment and Technology has an answer for you. We recently started an internship program in coordination with the Federation of Environmental Technologists and need students like you to help. If you are interested in this opportunity, check out the EET board in the Mechanical Engineering lobby or the ECS board in Engineering Hall to see the Internship listings. Oh, and don't for get to drop off a current copy of your resume in the EET mailbox, also in the ME lobby, so we can send it out to interested companies.

If you have any questions or concerns please e-mail Ramona at ramona@cae.wisc.edu or you can reach EET at **eet@cae.wisc.edu**.

Hedy Lamarr - A Woman Before Her Time

"Any girl can be glamorous. All she has to do is stand still and look stupid"
- Hedy Lamarr

by Susan Last

What would you think if I told you that Geena Davis was the inventor of high definition television (HDTV), or that Meg Ryan and Helen Hunt cloned sheep in their spare time? You'd probably think I was kidding. But there is a woman who was not only a beautiful actress but also an inventor during the 1930s and 1940s. Her name is Hedy Lamarr.

Hedy Lamarr invented the electronics design called "spread spectrum" in the early 1940s. Although the United State's military badly needed this technology, it could not be put into production and used at that time. The associated electronics needed were not yet envisioned, much less in existence. We are now, however, able to use her invention in cellular phones, wireless Internet connections and military defense systems. Sadly, she is not able to benefit from her work.

Movie star or inventor?

The thought of crediting Hedy Lamarr with the discovery of anything electronic would be comparable to giving the movie stars of our age recognition for inventing new technological devices. Hedy Lamarr was a sex symbol movie star of the 1930s and 1940s. She was considered by many to be the most beautiful woman in the world. She was the kind of girl who was on thousands of pin-up pictures in men's lockers. Hedy Lamarr was certainly not considered an inventor.

Hedy Lamarr recieved no royalties on an invention that is the underlying patent for frequency changing technology...

"Frequency Hopping" and the Second World War

During World War II, naval attack ships commonly wasted many torpedoes on a single target. This was, needless to say, a great expense for military budgets. The unpredictability of the ocean currents and the evasive actions taken by the enemy target ships were the primary causes of wasted torpedoes. What the military needed was a tracking device that would direct the torpedo to its target. A solution was to radio-control the torpedoes. It was a good idea, but radio waves were soon found to be easily jammed by enemy technology. The torpedoes still missed their mark.

One solution was to obstruct the enemy radio signal. An unlikely pair of inventors, actress Hedy Lamarr and the American film score composer, George Antheil, devised a system that circumvented the jamming signals. This system was called spread spectrum, or "frequency hopping." It is a communication system in which the transmitter and receiver jump in synchrony from frequency to frequency. The transmitter sends a message with the same frequency as the receiver's frequency hopping pattern. The signal cannot be successfully jammed by the enemy because the enemy isn't able to understand the signal being sent to the receiver. Frequency hopping is so effective that it is still the principal anti-jamming device used in the United State's government Milstar defense communications satellite system.

Unfortunately, the patent wasn't implemented for use during World War II. The technology to physically implement the frequency hopping system wasn't invented in time to use it! The currently ubiquitous transistor was the missing link. The transistor wasn't perfected for use until the 1960s. Frequency hopping was eventually used in 1962 on ships that blockaded Cuba.

Who really was Hedy Lamarr?

Hedy Lamarr was born Hedwig Eva Marie Kiesler in Vienna, Austria, in 1913. She dropped out of school to become an actress. One her earliest movies was called "Ecstasy" (1933). "Ecstasy" became a worldwide scandal. It, ironically, propelled her to fame because she appeared nude in the film. As a result, she became the biggest sex symbol of her time. Not surprisingly, "Ecstasy" was banned by the United States Customs because of the nude scene (although you could probably find a copy of it now). The movie continued to have a negative effect on her future career in the cinema.

In 1933, she married her first husband, Friedrich Mandl, a Viennese munitions tycoon and Nazi sympathizer. Mandl wanted Lamarr always by his side, so she was present and listened to her husband's dinner table discussions with arms developers, builders and buyers. Mandl and his muni-

Clark Gable and Hedy Lamarr in *Comrade X* (1940).

tions customers had become Lamarr's inadvertent teachers of defense technology. She learned the engineering principles directly from the makers of military weaponry during WWII.

The "place of women" in European culture during the early part of this century was very explicit. Women were expected to be only child bearers and housewives. Hedy Lamarr was not the type of woman who wanted to hold this constricting spot in German society. She was too smart, and she wanted more from her life. She needs to be remembered as a courageous, intelligent woman.

Fortunately, she managed to escape from her husband and his Nazi munitions customers and made her way to London where she was discovered by MGM's Louis B. Mayer. She changed her name from Hedwig Eva Marie Kiesler to Hedy Lamarr and signed a movie contract with MGM in the United States. Ms. Lamarr adopted the United States as her own and wanted to make a strong show of patriotism for her new homeland. She carried to this country not only a hatred for the Nazis, but also a knowledge of German weaponry she gained while at the side of her ex-husband and Nazi sympathizer, Friedrich Mandl.

Even if we don't understand or can't think of a good use for an invention, it is still very important for these inventions to be studied and developed for the use in future inventions

Designing the invention

Lamarr's contributions to the United States' war effort weren't just movies, pin up girl pictures and selling war bonds. She learned engineering principles from the munitions experts of the World War II era. While listening and watching munitions customers at her ex-husband's side, she had devised a method of blocking the signal jamming signals used by the German army against the American radio-controlled missiles.

In 1941, she met the unusual composer George Antheil. He composed avant-garde, mechanistic symphonies. His composition, "Ballet Mecanique" (1926), was scored for sixteen synchronized player pianos, two electronically driven airplane propellers, four xylophones, four bass drums and a siren. It was said that, "When the first notes were struck, the wind from the propellers nearly blew listeners out of their seats." This was a man of unusual intellect and imagination necessary to help her design the technology she had imagined in her mind.

Hedy Lamarr provided the plan for her idea of an anti-jamming device for use with radio-controlled torpedoes. As one of her sons recalls, "(She and Antheil) were sitting at the piano one day and he was hitting some keys and she was following him, and she said 'Hey, look, we're talking to each other and we're changing all the time.'" A signal hopping from frequency to frequency at split-second intervals would sound like a meaningless series of blips. But if the receiver was also hopping at the same frequency pattern, the signal could be understood.

Antheil applied his concept of synchronizing 16 player pianos to Lamarr's frequency hopping circuitry. Since the transistor wasn't invented yet, another means of synchronizing the transmitting and receiving signals was needed. Antheil had synchronized player pianos in his unusual music compositions. He used this same general concept to synchonize the jumps in frequency from the transmitter to the receiver.

A simple radio signal would be easy for the enemy to block. However, if the signal hopped from one frequency to the next and the transmitter and the receiver were set to the same frequency, it would be impossible to completely block the signal. If the enemy wanted to listen to the message, it would sound like random noise.

The result was patent number 2,292,387 "Secret Communication System" awarded to H.K. Markey (Hedy Lamarr) and George Antheil. (She was married to Gene Markey at the time.)

What is she doing now?

By the time her idea could have be utilized, the patent for Lamarr's invention expired. The transistor wasn't perfected for use until the 1960s. A good patent lawyer would have proposed that she patent improvements to the system to extend the patent expiration date. Instead, the patent was left to expire just a few years before it would have started paying royalties. So Hedy Lamarr received no royalties on an invention that is the underlying patent for frequency changing technology such as cellular phones, wireless Internet transmission lines and military defense systems.

see *Lamar* on page 23

In 1950, Hedy Lamarr played the part of an illegal immigrant smuggled from Havana to Florida in the movie *Lady Without a Passport.*

Viewing the Future:

by Dave Handley

British author George Orwell once claimed than humans are doomed to be only as good as their technical developments allow them to be. According to this theory, social changes must be preceded by technological advancements. High Definition Television (HDTV), poised to stretch the limitations of the communications, computer, electronics and entertainment industry, could prove to be a defining social development for the turn of the millennium. If scientific advancement has in fact been a driving force behind mankind's social and cultural advancements, as Orwell might have claimed, HDTV's mass introduction may be analogous to the proliferation of the world wide web or perhaps even to the invention of television itself.

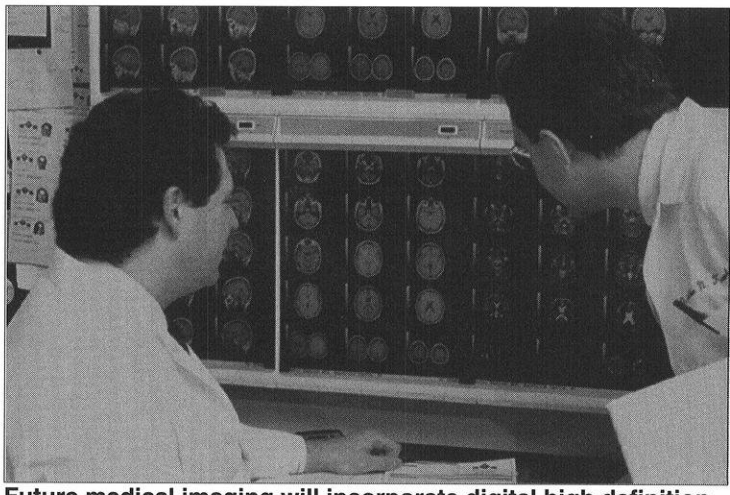
What is HDTV?

HDTV is not a new idea. The Japanese have been tinkering with high definition technology since 1968 and are now part of a worldwide effort to bolster digital transmission and reception technology. Analog HDTV broadcasts have been present in Japan since 1991. Digital television, a concept often used interchangeably and confused with HDTV, has been a part of American TV entertainment since 1994 when DSS, DirecTV and PrimeStar hit the market. HDTV is a different type of reception that utilizes special digital electronic signals to produce a viewing experience that has astounded virtually everyone who has had the opportunity to experience it.

HDTV's mass introduction may be analogous to the proliferation of the world wide web or perhaps even to the invention of television itself

The television we currently use to catch up on daily newsworthy events or to soak up yet another Seinfeld re-run is limited in its ability to accurately transmit to our visual and auditory senses what actually occurred at the origination of the television signal. A standard analog television operates at approximately 30 frames per second, has around 350 thousand pixels (a pixel is the smallest image-forming unit of a visual display) and an aspect ratio of 4:3 (3 high to 4 wide). Unless you are wearing blinders, life does not occur with an aspect ratio. We have all experienced the limitations of analog television picture quality — ghosts from unwanted signal reception, snow on weak channels and false or artificial colors on detailed patterns.

So HDTV, with greater than two million pixels, a 60 frame per second refresh rate, five channel CD quality sound, twice the scanning lines and a 16:9 aspect ratio should significantly improve the overall television experience. A wide movie theater style screen seems intuitive when one considers that people's eyes are mounted on a horizontal axis; we are intended to have peripheral vision. Stimulating both the central and peripheral portions of the visual senses creates an intensified illusion of reality for the viewer. If a Sony PlayStation or Nintendo 64 keeps us addicted now, imagine the frightening power of future gaming systems. Another fault of analog transmission is that it does not lend itself to bandwidth compression, which means there is no extra space within the typical 6 MHz horizontal scanning frequency for extra data. For the next decade or so, as the nation's broadcasters convert from analog to digital format, a Zenith developed product called digital vestigial sideband (VSB) demodulators will reduce digital interference into terrestrial analog signals. VSB also ensures a broad HDTV coverage area and prevents interference into the digital signal.



Future medical imaging will incorporate digital high definition displays, leaving the x-ray films of today in the past

This past January at the Las Vegas International Consumer Electronics Show, DirecTV and Thomson Consumer Electronics combined efforts to demonstrate HDTV while broadcasting, for the first time in history, digital HDTV programming from a satellite. Those in attendance were able to watch special live programming for the event that clearly impressed viewers with amazing picture quality.

As high definition technology creeps into the marketplace for both broadcasters and consumers, digital HDTV programming will slowly take over the now analog dominated television spectrum. By 2006, all broadcasters are expected to conform to new Federal Communication Commission (FCC) standards that require adopting the new technology. Once in full swing, digital HDTV programming will be transmitted by cable, satellite and terrestrially.

We have all experienced the limitations of analog television picture quality

Beyond Home Television

Perhaps the real story behind HDTV technology will not be the ability to make out the individual beads of sweat falling off your favorite football player's brow, but rather what will be done with the extra room available in the broadcast spectrum because of digital compression technology. This previously unavailable space within the electromagnetic spectrum, used to carry extra bit streams of digital information along with digitized video and audio, represents perhaps the most impressive potential of HDTV. This capability will allow perience profound advancements in their capabilities. For example, combining computer workstation and HDTV

HDTV

Sector	Application
Education	Teaching &Training
Advertising and Promotion	Electronic Billboards, Catalogs
Recorded Media	Disks and Tapes
Motion Pictures	Film &Theater
Industrial Uses	Surveillance, Transport, Inspection
Electronic Filing	Museums & Libraries
Video	High Resolution
Conferencing	Multiple Windows
Medicine	Pictures for Surgery & Diagnosis
Aeronautical	Radar, Simulators
Military	Aeronautical Uses, Surveillance
Computer Uses	Computer Graphics, Home Interactive Video Terminals, Image Simulation Multimedia
Printing	Graphics, Still Pictures
Photography	Still Images
Scientific	Microscopy, Astronomy

HDTV broadcasting applications are certain to be monumental for entertainment and related industries

technology will revolutionize real time user video interactions. Enhanced special effects technology is expected from the movie industry, as HDTV may be used to assist in integrating computer and film technology. Movie theaters are expected to eventually switch to an electronic display format instead of film. The HRI landscape, mapped out by HDTV inspired hardware, may prove to be quite extensive as it expands to include medical imagery, museum artifact databases and improved educational displays. The size and larger viewing angles of the new televisions alone may influence the interior design of the archetypal 21st century home.

The Price Of Viewing The Future

The RCA 61' high definition projection television demonstrated at the International Consumer Electronics Show will be available this fall with a price tag of around $7 thousand. Considering the $28 thousand tag on the first sets sold in Japan, $7 thousand is not a terrible introductory price. Eventually, as broadcasters are able to foot the conversion bill and more programming becomes available, high definition televisions will fall in price to match approximately what consumers pay today for a high quality display. Thomson has agreed to manufacture 34' and 38' models with built-in DSS decoding capability, bringing HDTV technology to 48 states. Cost estimates for broadcasters' conversions have ranged from around one million dollars to the tens of millions of dollars, depending upon the type and extent of original programming.

Two Beginnings

From the opening ceremonies of the 1939 World's Fair held in New York to the closing of the millennium, television has been a loved and hated facet of the American persona. When the National Broadcasting Company delivered those first fuzzy black and white images to the 100 or so receivers in homes scattered throughout the New York metro area, how many people would have predicted it would be the picture tube that inspired a vast realm of culture defining technology? Perhaps this past International Consumer Electronics Show was the engineers' World Fair, ringing in the technology that will shape portions of our world during the next century. Even if Orwell's somewhat gloomy theory is true, the fire of advancement has been set, and we have yet to realize the cutural implications.

Author Bio: Dave Handley is a junior majoring in Industrial Engineering.

HDTV Chronology

1897 First cathode ray tube scanning device constructed by German scientist, Karl Ferdinand Braun.

1927 Philo Farnsworth applies for patent on electronic television. Bell Telephone Laboratories demonstrated wireless TV between Whippany, NJ and New York.

1928 First experimental TV station permits issued by federal government. First successful trial of video delivery through telephone lines; motion pictures sent from Chicago to New York by AT&T.

1939 TV introduced at New York World's Fair. First television sets offered for sale in U.S. by RCA, GE, DuMont, Philco, and two other companies.

1948 TV set sales increase more than 500 percent over the 1947 level.

1950 Cable TV introduced.

1960 First rectangular screen TV introduced . First battery-operated transistorized TV for sale.

1984 Multi-channel TV sound broadcast authorized by FCC; first stereo TV broadcasts begin. Sales of stereo color TV receivers and adapters begin. First color TVs with all-digital signal circuitry marketed.

1986 Scrambling of satellite-fed cable TV programming starts; sale of decoders and program subscriptions to home dish owners begins. Stereo-sound in television broadcasting available in all major U.S. population centers.

1988 First Improved Definition Television (IDTV) receivers marketed.

1990 Production of giant-screen (over 27-inch) color TV picture tubes starts in U.S. All-digital high definition television (HDTV) system proposed; FCC sets testing schedule.

1991 U.S. testing of HDTV systems begins.

1993 16:9 Aspect Ratio (widescreen) television sets marketed in U.S.

1995 First television program (Computer Chronicles) delivered via the Internet. First television station (KOLD 13) uses a networked digital video server in its daily on-air operations. Flat-screen plasma display TVs introduced.

1996 HDTV is broadcast and received live at commercial station WHD-TV in Washington, D.C. Zenith introduces the U.S. market's first HDTV-compatible front projector TV. Agreement between broadcasters, TV manufacturers and PC makers sets inter-industry standard for digital HDTV. HDTV sets to hit shelves in 1998.

1997 FCC assigns digital spectrum to broadcasters and sets schedule for digital broadcasts.

The Red Gym
Built in 1894, Reopens in 1998

by Emily Bauer

Whether it is called the Red Gym, the Armory, or the castle next to the Memorial Union, every student to come through the UW-Madison has seen the brick landmark on Langdon Street. Yet because the building has not been heavily used in decades, only a few of the students from recent classes have ever been in the building, or know anything about its history. This will soon change.

For the past ten years, Dean of Students Mary Rouse has led the campaign to make the Red Gym a place for the university's visitors, students and prospective students. The renovated building will house student services such as admissions, student orientation programs and campus assistance. According to Assistant Dean of Students Steve Saffian, the goal of the project is to bring those services together, to make the building a gateway to the university.

Taking a building like this, one that everyone relates to, and making it something that is a welcoming facility for the University is a great use for that building

The original construction of the Red Gym began in 1892 and was completed in 1894. At that time, the cost of construction was slightly over $122 thousand. The 1997-98 renovation will cost over $11 million. Although some changes were made to the building throughout its lifetime, the majority of the building is the same steel, wood and bricks put there more than 100 years ago.

The company that participated in the original construction of the Red Gym is now leading the gym's rejuvenation. John H. Findorff built the original woodwork and cabinetry for the building. More than a century later, his company, J.H. Findorff & Son, Inc. of Madison is the general contractor for the renovation project.

Source: Findorff Construction

The Red Gym, built in 1894.

"We're proud of the fact that we are able to carry on the history and the tradition of working on such a classic structure," said Richard Lynch, Executive Vice President of J.H. Findorff & Son. "Taking a building like this, one that everyone relates to, and converting it into something that is a welcoming facility for the University is a great use for this building. They're getting multiple uses out of the building while being sensitive to the original design."

The project involves converting the open space into offices and student centers, while keeping all of the original structural elements. According to Saffian, because the Red Gym second floor, carrying the third floor, are all steel with wood crossbracing, which is not seen in modern structures, either.

The project also includes much custom work, such as the sandstone around the base of the building that must match the original stone. More than 260 of the original windows were taken out, stripped of their lead paint, repaired and reinstalled. The first floor swimming pool was surrounded by four-foot-thick concrete walls that had to be removed and backfilled to the floor level. All of these aspects and more have led to a unique project that combines modern construction techniques with those of the 1890s.

The Red Gym is one of the nation's earliest and best examples of cavity wall construction. With this type of construction, two parallel brick walls create air pockets that conduct moisture into the ground and away from the masonry. The moisture conducted by the cavity wall is the condensation of humid air as a result of the difference in temperatures between the inside of the building and the outside. This air space between the two walls also serves as insulation.

For years, the building resembled pictures of East Coast Ivy League schools, with vines winding up the brick and around the towers. Just as the Ivy League schools have had to do, the ivy was stripped off the building a few years ago because the tendrils were pushing into the cracks in the mortar. The

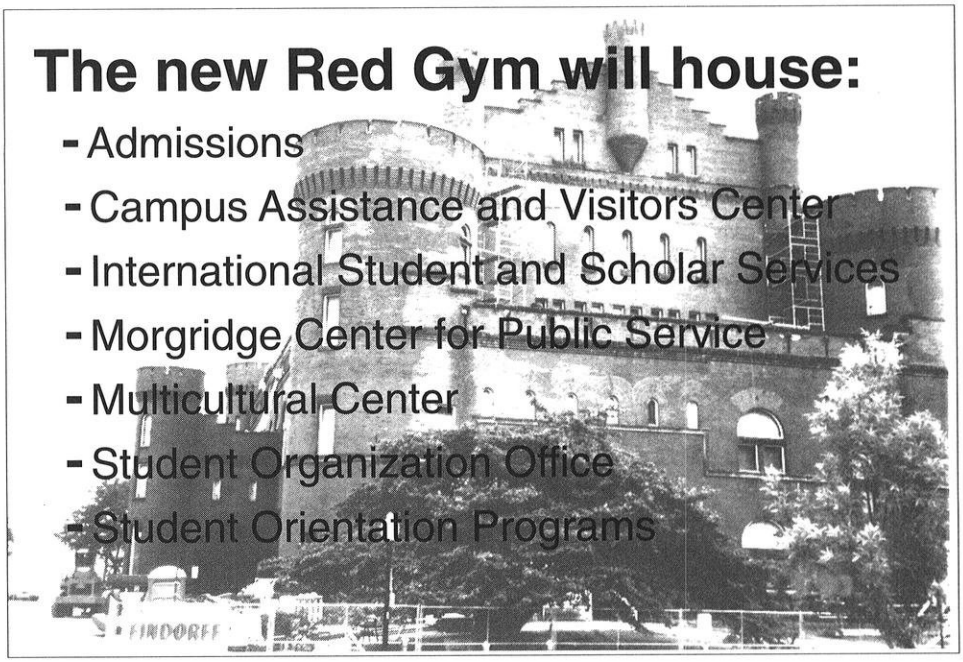
water in the tendrils then froze and expanded, leading to the deterioration of the bricks and mortar.

A chemical cleaning process was used last fall to clean the brick, and was repeated this spring to make the brick a shade closer to its original color. However, if the brick were completely cleaned and restored to its original color, the Red Gym would become the Orange Gym.

Since its creation over a century ago, the building has served as a military training facility, gymnasium, infirmary, art exhibition space and convention hall. The Red Gym was built to replace a smaller gym that burned down in 1891. The intent was to build a combination gym and armory to provide military training to male students.

The last UW-Madison men's basketball game played in the Red Gym was in 1930. The team then relocated to the Field House, where they remained for 68 years before recently moving to the Kohl Center.

By the mid-50s, the gym no longer satisfied the demands of the rapidly growing campus. It was scheduled to be torn down as soon as a replacement could be built. However, when the Natatorium was built in 1967 on the west side of campus, office and meeting space was in great demand on campus and several groups were competing for control of the Red Gym. The facility then became a home for a random mix of groups, from academic to athletic.



An anonymous war protester firebombed the Red Gym in 1970. The target was the ROTC in the southwest corner of the building. Instead, the bomb damaged the Water Resources Management Program area in the southeast tower. Firefighters took seven hours to control the blaze. Because of funding difficulties, repairs to that area were minimal, and the section was simply blocked off from use. The charred bricks and wooden beams remained untouched until the renovation began last summer.

The gym was used for student registration until 1983, and has since gone basically unused except for a few physical education classes and clubs. Several members of the administration knew the building had more potential for students on the basis that it is at a central area of campus and is also a well-known landmark.

Dean Rouse began the move more than ten years ago to preserve and restore the building. Appointed by then Chancellor Donna Shalala, Rouse and Professor Bruce Murray co-chaired the committee that recommended the Red Gym be recognized as the front door to the University Since then, Rouse has led the movement to raise funds, awareness and interest in the restoration.

The project is expected to be completed in the fall of 1998. When the building is open, students will appreciate the centralized student services and the grand student center overlooking Lake Mendota from one of the first buildings on this campus.

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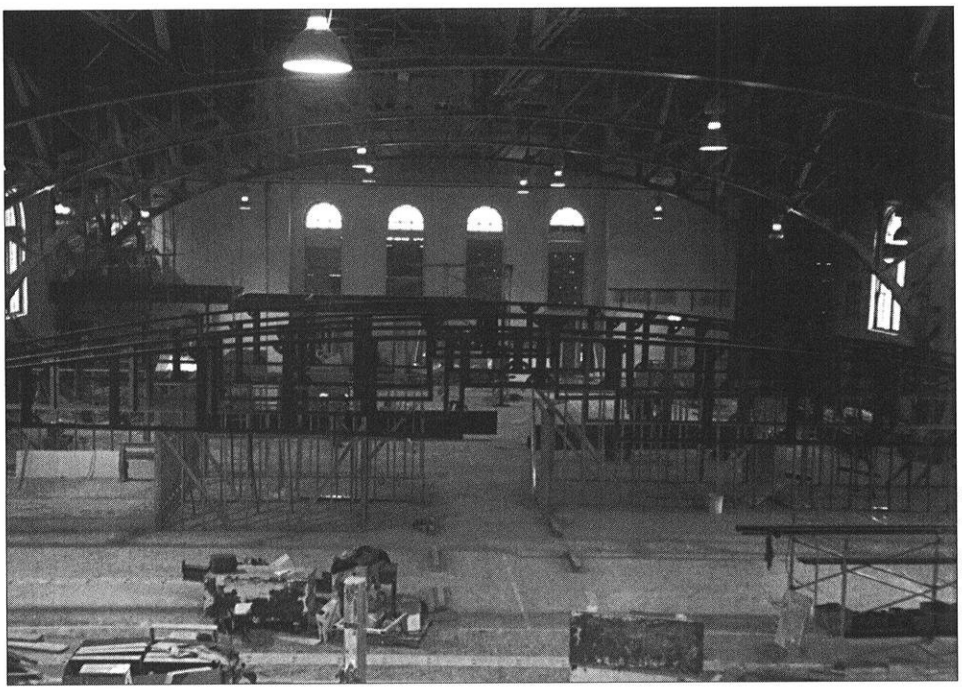


Source: Findorff Construction

The second floor of the Red Gym is being converted to offices and a student mezzanine.

Dean to retire June 30, '99

Dean Bollinger has decided to retire on June 30, 1999. A search committee will be established this fall to locate and hire a new dean for the College of Engineering. Dean Bollinger has expressed the intent to remain active in the construction and fund raising of the Engineering Centers Building after he retires. Additionally, the Dean has plans to teach via the internet and work on revisions to his book.

The Dean also reports that the College nuclear reactor will be decommissioned in the year 2003. Future uses of that area of the Mechanical Engineering Building are being discussed.

Lot 17, or the parking lot located between Camp Randall, Engineering Hall, and the Mechanical Engineering Building, will be converted into a parking ramp. Construction will begin in August, 1998. The main enterance to the Engineering Campus will be moved from access off Randal Avenue, to the area of the auto garage and access University Avenue.

Biomedical Engineering program receives Whitaker grant

The Whitaker Foundation has awarded UW-Madison $1 million to accelerate expansion of its undergraduate and graduate programs in biomedical engineering.

The grant will enable the university to hire two new faculty members, attract top graduate students with fellowships, equip a new biomedical engineering teaching laboratory and stimulate new research through seed grants.

In addition to the current master's-degree program, the university will implement new undergraduate and doctoral degrees. Program leaders anticipate enrolling sophomores and doctoral students in the fall 1998 semester.

The new undergraduate degree emphasizes engineering design in preparation for employment in biomedical industries and for graduate study. The program responds to the great demand for biomedical engineering among the university's students. At this time, no other public institution in Wisconsin offers such a degree. The graduate degree emphasizes research in such medical technologies as laparoscopic surgery, localized drug delivery, specialized biosensors, and stereotactic radiosurgery and biopsy, Radwin said. The grant was made under the Whitaker Foundation's program of Special Opportunity Awards in Biomedical Engineering. These awards of up to $1 million are designed to enhance the field of biomedical engineering through permanent, high-quality programs that will have a lasting, beneficial effect. The foundation is the nation's largest private sponsor of biomedical engineering research and education. It supports more than 400 research projects, 140 graduate fellows and 100 education and internship programs at colleges and universities.

The Biomedical Engineering Program, as well as the Trace Center, will have offices in the new Engineering Centers Building.

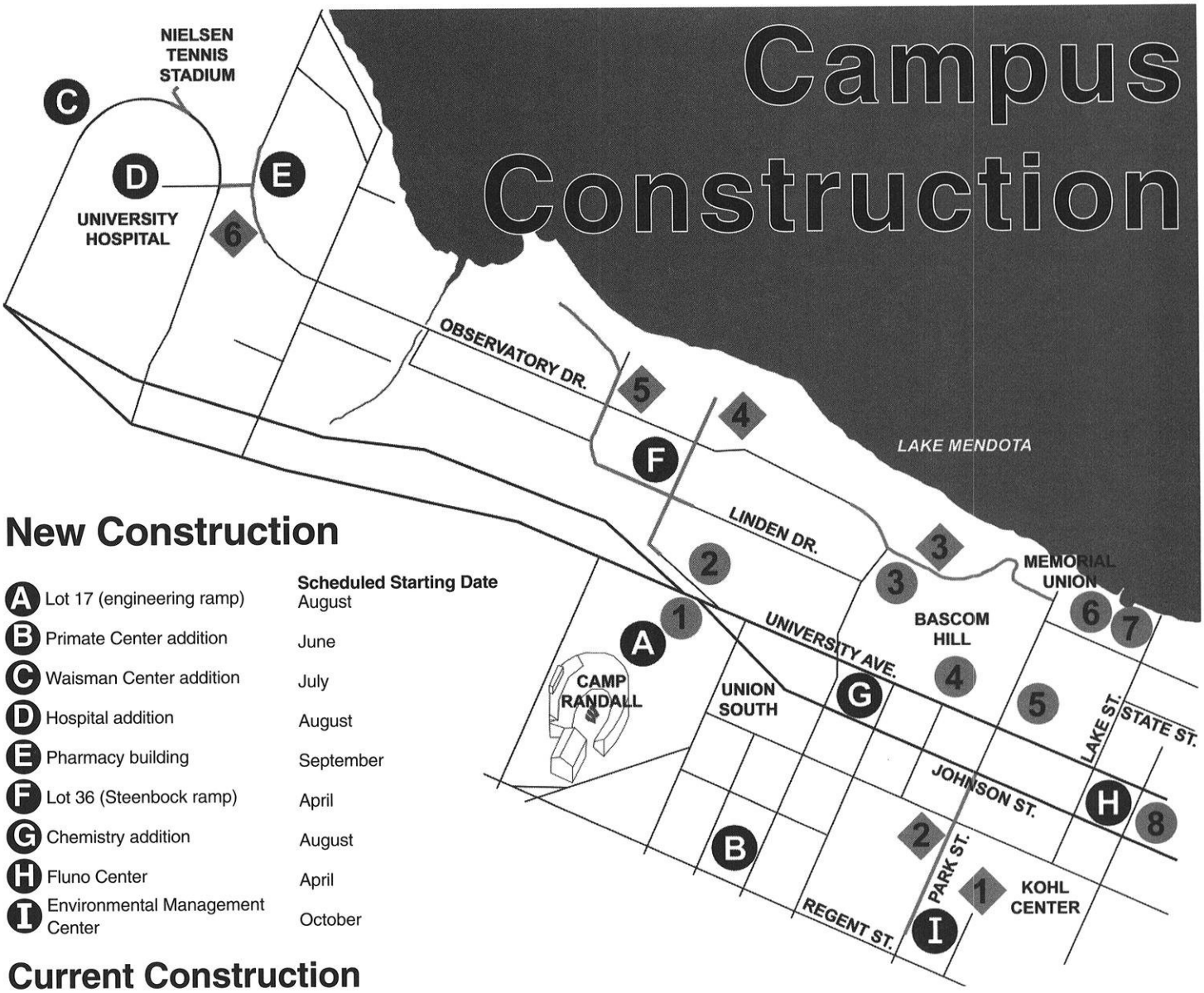
For more information about the UW-Madison Biomedical Engineering Program, visit
http://www.engr.wisc.edu/interd/bme/

1998 Steuber Prize Awards

1st Prize: Gregory B. Ingersoll
2nd Prize: Laura Clavette
3rd Prize: Mark Grubis
Honorable Mention: Saray Diny

Since 1992, the Steuber Prize for Excellence in Writing has honored undergraduate writers in the College of Engineering at the University of Wisconsin-Madison. The contest is open to all kinds of writing: expressive, informative, and persuasive. In this year's contest, there were forty-one entries. From these entries, five students have been selected as finalists. Winners will be announced at this spring's Polygon Banquet. The Steuber Prize is made possible by the generous donation of William Steuber, who attended the College of Engineering in the 1920s. William Steuber served at the Assistant Engineer for the Wisconsin Department of Transportation. He has authored three books, including The Landlooker, which received critical acclaim from The New York Times.

Campus Construction



New Construction

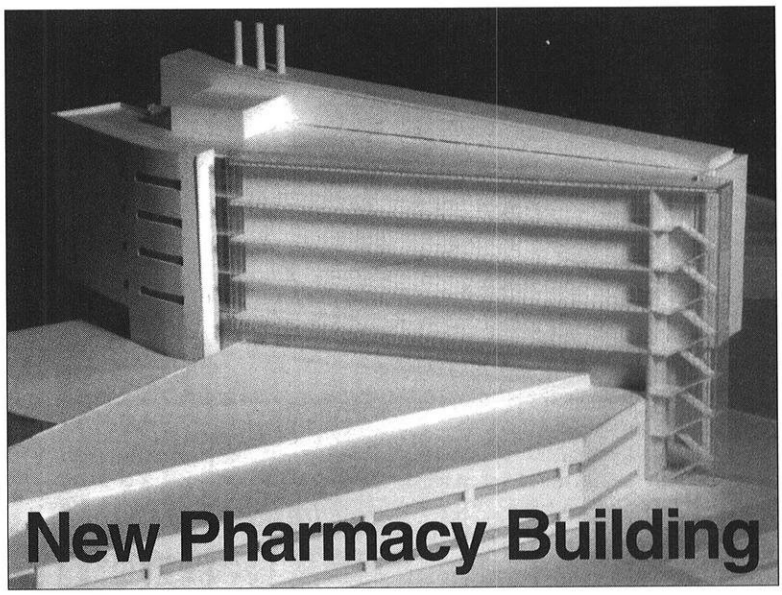
		Scheduled Starting Date
A	Lot 17 (engineering ramp)	August
B	Primate Center addition	June
C	Waisman Center addition	July
D	Hospital addition	August
E	Pharmacy building	September
F	Lot 36 (Steenbock ramp)	April
G	Chemistry addition	August
H	Fluno Center	April
I	Environmental Management Center	October

Current Construction

		Scheduled Completion Date
1	Material Science & Engineering Renovation	July
2	Biochemistry addition	June
3	Van Vleck remodeling	August
4	Lathrop Hall remodeling	December
5	Humanities remodeling	August
6	Red Gym renovation	August
7	Wisconsin Center addition	October
8	Southeast Ramp addition	March

Roads Affected

1. Murray Street underpass
2. Park Street
3. Observatory Drive
4. Babcock Drive
5. Lakeshore path, Linden Drive
6. Pharmacy and new road



New Pharmacy Building

The Patent Dispute Regarding the Invention of the Laser

by Todd Fronek

The laser has become a major techno logical factor in today's fast paced world. CD-ROM, laser printers and even eye surgery all involve using a laser. In 1960, Theodore Maiman produced the first working laser [Bromberg, 1988]. The discovery marked the zenith of many years of research, and also the beginning of numerous technological breakthroughs. Because many parties in addition to Maiman contributed substantial research to the invention of the laser, a dispute arose over who should receive the patent for the invention of the laser.

LASER is an acronym for "light amplification by stimulated emission of radiation." A laser produces a thin beam of light that is monochromatic and coherent, meaning that the beam is one color and each wave of lighttravels in step. The laser process begins when energy enters and begins to strike the atoms in a system. The stimulated atoms give off energy in the form of light. This emitted light reflects back and forth between the ends of a cylinder, one end being a fully reflecting mirror and one end being a partially reflecting mirror. The light continues to excite more and more atoms, and finally the atoms contain enough energy to burst through the partially reflecting mirror in a beam of light. This beam of light has a variety of applications. For instance, it is able, in some cases, to drill tiny holes in diamonds within minutes (conventional methods take days to produce the same holes).

Albert Einstein discovered a process called stimulated emission involving the interaction between electromagnetic radiation and atomic energy states

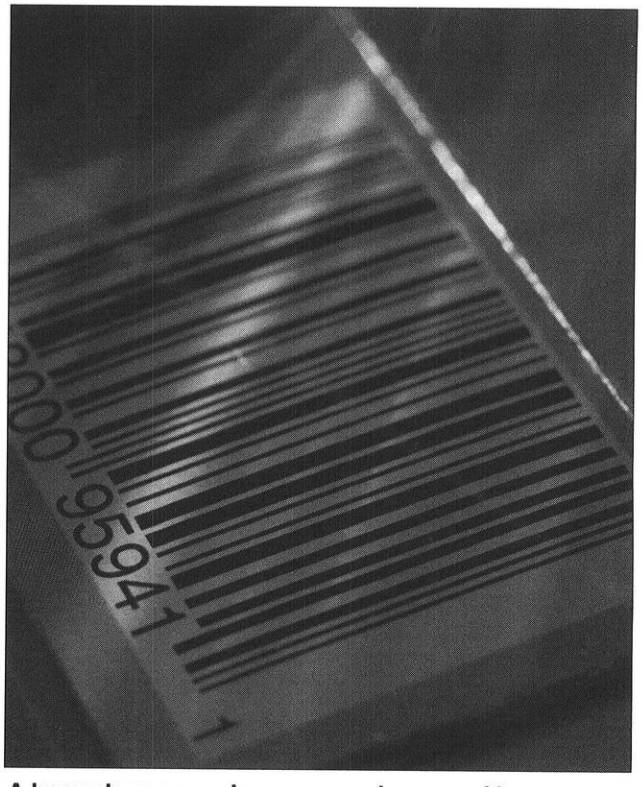
The History of Laser

The laser's history can be divided into the pre-maser period, the maser period and the laser period. The basics involving the pre-maser period begin at the atomic level. In 1916, Albert Einstein discovered a process called stimulated emission involving the interaction between electromagnetic radiation and atomic energy states [Lengyel, 1966]. Charles Townes produced the first maser and asked Albert Schawlow to help in his progress towards the laser in October of 1957. Gordon Gould was also intrigued by the idea of the laser [Bromberg, 1991]. At Columbia University, and later at Technical Research Group (TRG), Gould had the chance to develop and extend his ideas about the laser and its capabilities. In November of 1957, he had his now famous notebooknotarized containing his initial ideas for the laser.

Townes and Schawlow had astounding careers in physics, both winning Nobel prizes. Two documents give a solid representation of their research. The first was a paper titled "Infrared and Optical Masers," published by the Physical Review in 1958 [Schawlow and Townes, 1958], and the latter was the patent granted to them in 1960 titled "Maser and Maser Communications System" [Schawlow and Townes, 1960]. Schawlow and Townes challenged themselves to reduce the laser to practice and knew of the difficulties of such a task.

Schawlow and Townes presented many ideas towards laser technology. Their research allowed for a well deserved patent in 1960. Their patent claims surround a communications system involved in operating masers at optical frequencies [Schawlow and Townes, 1960]. When used for communication purposes, the laser has to have a relatively low energy output. This useconstrained the patent granted to Schawlow and Townes. Even though the laser is often used in communication, other applications for which the laser is used require higher outputs. One example is the laser cutting of materials. Schawlow and Townes did not account for this kind of use in their patent, and doubts arose as to the patent's validity. The U.S. Patent Office ruled in 1973 that the patent did not supply enough information to make certain key parts ["A Laser," 1977]. Furthermore, the patent was too general and provided a disparity in interpretations, leading to many legal disputes.

Similar to Schawlow and Townes's deduction, Gould figured that sodium vapor would provide an excellent excitable medium to produce stimulated emission of light [Lengyel, 1966]. However, Gould's work addressed the higher output capabil-



A barcode scanner is one everyday use of laser technology.

ity of the laser and its possible applications at these levels.

The Patent Fight of Gordon Gould

Arthur Schawlow and Charles Townes received the first patent on the laser in 1960. This awarding of the patent came after Gould had submitted his application and been denied. Gould was not satisfied with this ruling, however, and fought for his patent rights. His notarized notebook came in handy at this time. Gould desperately fought the decision with appeals and with court cases both in America and internationally ["A Laser," 1977]. A major blow came in 1966 when the US Court of Customs & Patent Appeals denied his request for a patent. Gould altogether spent nearly $100,000 of his own money, and TRG supported him with $250,000. Still, Gould fought and won minor battles on the way in Canada and Britain.

In 1973, the same U.S. Court of Customs & Patent Appeals made a decision that gave Gould a window of opportunity to renew his quest for a patent [Hecht, 1994]. The court ruled that much of the Schawlow-Townes patent did not accurately describe part of the process for creating a laser. This ruling made much of the Schawlow-Townes patent obsolete ["A Laser," 1977]. Gould saw his opportunity and brought on Refac Technology Development Corporation to help in his fight. Little attention was given by the laser industry to Gould's new quest for a patent.

This lack of attention changed, however, when the U.S. Patent Office granted Gould the patent rights to the laser. Refac soon began to collect fees, and Gould's work had finally paid off. He continued to apply for more patents, and Gould received his fourth and final patent
on lasers in 1988.

Gould's quest for the patent on the laser was long and difficult. In reality, Schawlow, Townes and Gould all made contributions toward the development of the laser. It is unfortunate that sometimes credit has to be placed upon one individual. Each man gave his talents to the laser industry, and without any of them, the laser probably would not have affected the world the way that it continues to do today.

Author Bio: Todd Fronek is a senior in Industrial Engineering at the University of Wisconsin. After completing his degrees, he intends to go to law school.

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From the
Undergraduate Engineering Review
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Lamar

But she isn't a reclusive retired movie star. She still socializes with friends and contemporaries. She also enjoys watching movies on her VCR. She recently won the Electronic Frontier Foundation's Pioneer Award at its San Francisco convention for her invention of frequency hopping.

In another era, it's a good bet that Hedy Lamarr could have been an MIT graduate. She is a woman with an intelligent, inquiring mind and an interest in engineering. Her frequency hopping invention would have faired much better in a later era. The necessary technology would have been available to make the idea useful and profitable.

The importance of research even if we don't know what it leads to Hedy Lamarr's invention of frequency hopping was not usable because the associated technology didn't catch up with it until the 1960s. Industry and the military couldn't use it, even though they needed it, because it couldn't be implemented with the electronic hardware available in the 1940s. Even if we don't understand or can't think of a use for an invention (such as the early versions of the transistor), it is still very important for these inventions to be studied and developed for the use in future inventions. Both Hedy Lamarr and her invention of frequency hopping were victims of being ahead of their time.

Author Bio:Susan M. Last is a fifth year senior majoring in Biological Systems Engineering. She hasn't patented anything, ...yet. If any of you resourceful engineers have any patentable ideas, be sure to get a good attorney. If you don't have any patentable ideas, you can still tell me what you think of this article. Just e-mail me at smlast@students.wisc.edu.

Hedy Lamarr didn't just make "Ecstasy." Some of her other films included:

Comrade X (1940)
H. M. Pulham, Esq. (1941)
Ziegfield Girl (1941)
White Cargo (1942)
Experiment Perilous (1944)
Her Highness and the Bellboy (1945)
Dishonored Lady (1947)
Copper Canyon (1950)
Lady Without a Passport (1950)
The Story of Mankind (1957)
The Female Animal (1957)
Check your favorite video store.

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A Big Step Toward Loving Your Job

A Look at Work Environments

by Diana Zeller

No matter where you work or what career you choose, the most important aspects of your job are not going to be the number of vacation days you get or the length of your lunch break. It may not even be the type of work that you do. The most important aspect of your job could be something that many people forget to think about when interviewing. This is the work environment, or the "corporate culture."

A recent graduate of mechanical engineering at UW-Madison said, "A good match between one's personality and the corporate culture is by far the most important factor in determining job satisfaction." He has had five engineering jobs and experienced five different working environments. He felt that although no two companies will have the same working environment, the cultures themselves can be grouped into two basic categories: the big company atmosphere and the small company atmosphere.

Big Companies

The mechanical engineering graduate described the big company atmosphere as being competitive and professional. It was everyone for themselves rather than a team feeling. However, a large company offers tremendous resources. If employees want information, they talk to a specialist within the company. Because of the large number of people working within one building, no one knows everyone. In order for the employees to communicate daily with people they have never met, it is important to maintain a high level of professionalism.

Small Companies

He went on to describe the small company atmosphere as offering the opportunity to form a family away from home. The people can become closer to each other personally and through their work, which can lead to a more relaxed atmosphere with a lower level of professionalism needed. However, it is possible that someone will not fit in to the atmosphere of a certain small company. This can pose a big problem both for the individual and the rest of the company.

A recent graduate in civil engineering at UW-Madison said that he did not agree that the working environment is the most important factor. He found the type of work to be more important. However, he has never worked in an environment that he did not like. If he was to look into the future, he realized that the atmosphere might become more important. If he worked at a company where he enjoyed the family-type atmosphere, but not the type of work, this would be the type of job he could not do permanently.

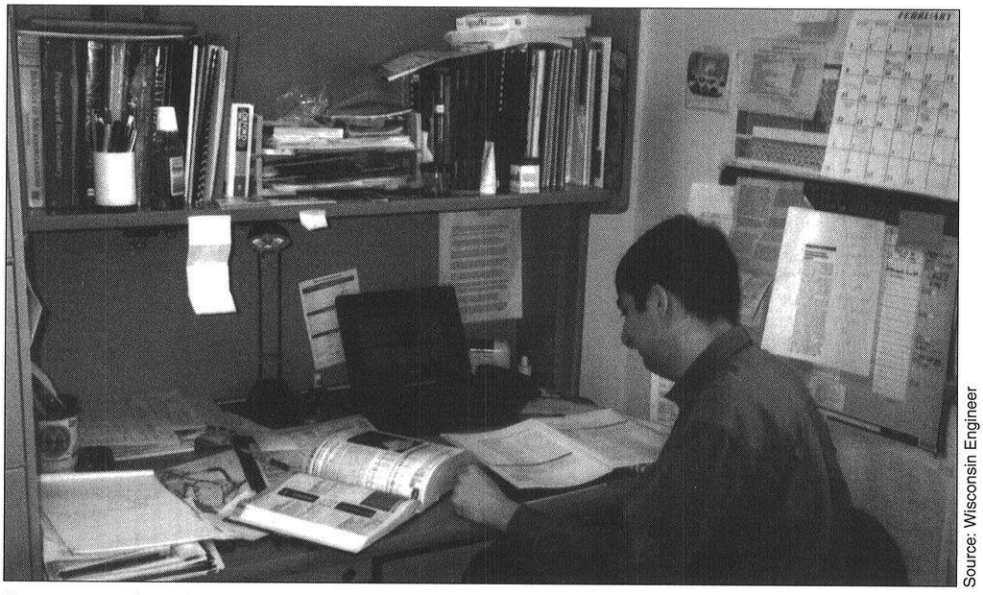
"A good match between one's personality and the corporate culture is by far the most important factor in determining job satisfaction"

He also mentioned that having a flexible schedule was nice. If he was working on a project one day, he would like to stay until he completed it. In return, he liked to have that time off on a different day. He felt that many engineering careers could lend themselves to this type of schedule, which is a benefit of the type of work we do.

I have worked in environments where I fit in and ones that I did not. One atmosphere was so relaxed that people usually talked through the whole day and thought it odd that I was quiet most of the time. I was surprised to see that there was an atmosphere too informal for me. I am rather serious about my work, but I also like to have some informal time where I can get to know my co-workers a little better. Another one of my jobs fit this very well. The people were more dedicated to their work, and yet still made time for a little chit-chat here and there. Neither environment was "good" or "bad," but I learned a lot about myself and what types of environments I would enjoy in the future from these experiences.

Personality Testing

Employers can ensure a good work environment by including a personality check in the interview. A boss at a trust company used this technique when interviewing candidates which resulted in a very close-knit depart-



Source: Wisconsin Engineer

A company's culture can affect every aspect of an employee's job.

ment. Many department heads have to spend time listening to people argue during meetings simply because they do not get along. However, this department spent its meetings breezing through their topics with smiles and laughter. If they found errors, they did not ask who was to blame, but instead took the challenge of solving the problem as a team.

If you think work environment is important to you, ask questions about it

Does the work get done?

I wondered if there might be an atmosphere so stressful that the quality or amount of work suffered, or if there was an atmosphere so relaxed that people socialized rather than worked. Neither of the two graduates I talked to or I felt that the work environment directly affected the amount of work people did. The mechanical engineering graduate said that in one company, everyone was extremely stressed out all the time. They ran around a lot, and seemed to always be in a hurry. Another place had a very informal and social atmosphere where people took time out to talk. Although the ease at which they got the work done was very different, they got the same amount of work done. The civil engineering graduate agreed that people seemed to get the same amount of work done regardless of environment, but that some cultures require that no matter how much you are actually doing, you have to look busy.

Interviewing Tips

The interviewer does not have to be the only one who does a personality profile. If you think work environment is important to you, ask questions about it. You can even get ideas about the environment during the interview if you are being interviewed by someone from the department or the small company. During the plant visit, you can pay attention to the way people are working around you. Try to look at people who are far enough away that their behavior is not influenced by your presence. Do they seem stressed? Are they working together? How do people react as you pass them in the hallways? During one of my plant tours, I noticed that people we passed would smile and say, "hello," even if they did not know my interviewer. When I was working there, I found the atmosphere to be very friendly. During another interview, the floor workers avoided eye contact. While my department was friendly, the environment on the floor was not.

Source: Wisconsin Engineer

If employees are comfortable on their jobs, they will be able to communicate more effectively.

Some tips from the graduates are to avoid asking what the corporate culture is like because you will probably get a very generic answer. Instead, ask people what projects they are working on and what they think about them. See how they answer the questions and remember what they say. Pay close attention to everything that is going on around you, from the way people dress to the way they interact with each other.

Also, be sure to contact former co-op or intern students. Ask them what departments they were in, what they did, how they liked it and how they felt about their jobs. You can do the same with people who are currently working at the company. A good place to get these names is Engineering Career Services (ECS), which has a list of old co-ops and interns on file. You can also ask various other student organizations, such as ASME.

Remember, if you are a co-op or intern and do not like your work environment, that can be a good situation. Identify what it is you do not like and learn to avoid it in the future. It can be very useful to have a bad experience now because you will know what to look out for when looking for permanent placement. Good luck job hunting!

Author Bio: Diana Zeller is a senior in Industrial Engineering.

The Future of Industry
ISO 9000

by Trent Nelson

ISO 9000. ISO 9000? What the heck is that?! Don't worry about the meaning (International Organization for Standardization) because the content of the program is what's important. The main goal of ISO is to implement international standards for all businesses. In essence, what it will eventually accomplish is that when you buy a tube of Aqua-fresh toothpaste in Jakarta, it will be exactly the same as the one you buy at Walgreen's on State Street. However, the toothpaste may be cheaper in Jakarta. ISO sets a common standard for quality in industry, not a standard on the quality of the product.

As of today, 90 countries have currently adopted this process which began in Geneva, Switzerland in 1947. In the United States, around 16 thousand companies have their quality systems certified to ISO 9000. There are 100 thousand companies worldwide that are ISO certified, the majority of which can be found in Europe. According to the United States Department of Commerce, 500 thousand companies in the U.S. will need to implement ISO in the next five years in order to stay competitive.

ISO is concerned with how something is produced, but not necessarily the final product. There are three main points to the ISO process:

I. Achieve and maintain the quality of the product.
II. Give management assurance that quality is being met at every level in the workplace.
III. Give the customer a certainty that consistency is being met in regards to the service or product.

The core of ISO is that it is prevention-based quality assurance. If you look at Table 1, you will see that ISO 9000 is based on five building blocks. Around 40% of the businesses that already employ ISO do so under the ISO 9001 standard. 59% of the businesses use ISO 9002, while less than 5% use ISO 9003. An important point that needs to be emphasized is that these criterion are system standards, not product standards.

Documentation

Documentation is especially important to the ISO system. It is essential that everything is written down in four folios. The **Quality Manual** basically lays out the company's structure, its customers' desires, proper documentation methods and responsibilities of management to meet the prerequisites of the numerous clauses of quality. This manual is written by the executives with input from all levels of the firm. The **Quality Procedures** make it known who does what and when and where it is to be done. The procedures also tell what documentation is to be used and what might be produced from the efforts of the "doers." These same "doers" are the people that put the procedures together. The **Quality Work Instructions** are the actual "how-to" guidelines for the work to be done. These instructions may be written in diagram form or in various forms. Those "doers" are often the writers of this piece of documentation also. The **Quality Records** prove that the called for product or service standard was achieved and that the business's quality system was used correctly.

After all is said and done, the ISO 9000 system will make even the smallest business more competitive in todays global marketplace

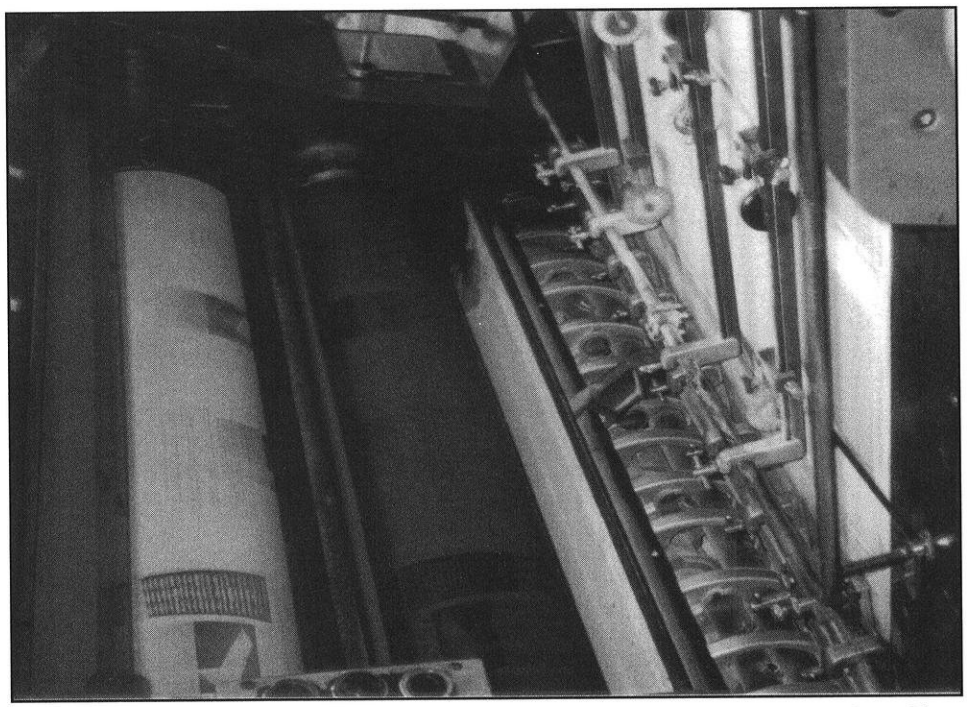
Certification and Auditing

In order to receive accreditation for being an ISO 9000 company, the company must pass a third party audit. A registrar comes into the company and spends anywhere from one to five days, depending on the size of the company, to ask numerous questions and check to make sure that the requirements of the standard are being followed.

There are 20 clauses, some of which do not apply to 9002 and 9003, which must be adhered to as to receive accreditation. The clauses give general provisions for the system but they do not state how to implement them. This is up to the individual company. For example, **Clause 4.8** deals with product identification and traceability. Briefly, it states that all products entering the company must be identified until they depart the premises. Also, the company will sometimes be called upon to trace the product back to its raw material. The people that are involved with this clause are any and all departments

Table 1. ISO 9000 Standards

ISO 9000	A guideline for the selection and use of quality mangement and quality as surance standards
ISO 9001	A model for the assurance of quality systems for design and development, production, installation, and servicing
ISO 9002	A model for the assurance of quality systems for production and installation
ISO 9003	A model for the assurance of quality sys tems for final inspection and test
ISO 9004	Guidelines for quality management and quality system elements



ISO 9000 main goals are to achieve and maintain quality for products produced in industry as well as giving management and the consumer assurance that quality is being met at every level in producing the product.

where the product may pass through. Some ways of documenting the products that enter the company is to label them with accompanying drawings or to have the actual routings certified.

Over 70% of businesses that apply for ISO 9000 the first time are accredited. A failing mark can not and should not be pointed at a single individual or department but rather should be looked at as a failure of the system itself. It may only require minor changes to correct the errors to get ready for another audit. In addition, businesses can conduct internal audits in order to improve their systems as the businesses strive for total quality management.

Whoa!! All of this is fine and would aid a firm, but what's the cost? The company's three major costs are in consulting (this is an outside source that will tell the business what needs to be changed in order to become accredited), registering to become certified, and the internal cost which is the time away from work in order to train the employees and the cost of new materials. To be honest, these costs are not that bad. The payback for the three of them is only two and a half to three years. That's not bad considering it takes some people thirty years to pay off a mortgage. And to see the final result of ISO 9000 will take a fourteen month implementation period. After all is said and done, the ISO 9000 system will make even the smallest business more competitive in todays global marketplace.

Author Bio: Trent Nelson is a sophomore majoring in astronautics. He enjoys playing golf in his free time.

Acknowledgments:
Professor Harold Steudel
"Is ISO 9000 the Path to TQM?"
By: James P. Corrigan
List of ISO 9000 certified companies:
http://www.iso9000directory.com

For more information on ISO 9000 see the following web sites

http://www.exit109.com/~leebee/
http://fox.nstn.ca/~cotter/overview/ISO_9000/iso.html
http://www.iso.ch/welcome.html
http://www.qualitydigest.com
http://www.quality.co.uk/quality/index.html
http://www.iso9000success.com/

Maybe, Maybe Not

by Luciano C. Oviedo

Not until you fall within the psychological obsession of striving entrepreneurs do you begin to fully realize the drive that is the backbone to the United States economy. Very few people are aware of what that concept means, and even fewer understand it.

[INTERLOGOS] is a new example of an Internet development and strategy business. This company's start-up has been initiated by UW - Madison Electrical Engineering students, Nikolai Krasnoperov and myself, Luciano Oviedo.

The motive to why such a venture has taken place in such a prosperous technology market is evident. In the Digital Age, one cannot afford to wait around for opportunities. One must take their tool set and analyze which route is the most advantageous for concrete, tangible results. Therefore, in supplement to our academic routine, we have decided to take the global technology of the Internet and put it in everyone's backyard.

The start-up concept is unique in that ideas are strategically developed to target an established need or usage.

The first virtual product is an Internet database, <**www.nevertheless.com**>, which specifically targets the everyday needs, wants, and services of all students. The database allows students to perform FREE commercial transactions via the Internet. For example, a student might sell used textbooks by posting a free ad in the "For Sale: Textbooks" category on the database instead of trading it back into the bookstore for a fraction of the price. Another student might advertise his or her computer services by posting a free ad in the "Student Related Info" category. Instead of students performing these tasks with traditional print media (or the "flyer method" which is littering this campus), they are given the medium to perform them electronically.

One can localize this database from anywhere around the country and use a customized search engine to locate any type of student advertisement from books and furniture to apt. sublets and word processing services. Students receive their own personal login and password, which allows them to create and modify any and all of their advertisements. If a student searching for an item or service is unable to locate it, they can make use of a feature that notifies them by e-mail when and if someone posts what they're looking for. Filled with many more user options, any student can find some profitable use with this database.

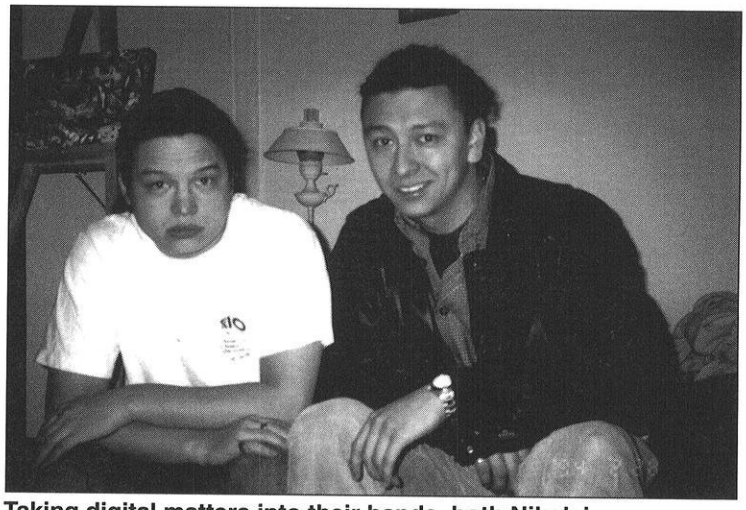
Revenue is generated by providing efficient advertising to local businesses at a fraction of the cost of traditional print media. Businesses looking to tap into the student consumer market (which is estimated to be around USD200 billion annually) can utilize special software to directly measure the number of advertisement viewing by end users. Since students spend between 10 to 20 hours on-line surfing and using the Internet for a variety of purposes, this service provides an ideal way for many businesses to reach their biggest customers — students. In turn, students benefit from having a wealth of information about local businesses in one, easy to use site.

This concept is a good example of how students can implement a business strategy while keeping their fellow students' welfare in mind. But, one faces both direct and indirect opposition when initiating such business ventures.

To market such ideas takes much time and effort to effectively spread the logic behind using a new system of doing business. Students, like all consumers, are accustomed to "the way it has always been" mentality. There is a learning curve associated with the process of evolving from traditional print media to Internet technology at the local level. Indirectly, the general engineering curriculum does not lend itself to promoting such undertakings. Despite strong programs, the Schoof's Prize for Creativity, and the newly formed Technology Enterprise Competition, it is still very unusual for students to form aggressive campaigns to initiate a start-up while at the university. It is much more common to hear the gossip on who has what job and what they are being paid. Even classes indirectly promote that mentality. Professors sometimes make examples of "...when you work for so and so..." or "...while working at so and so..." Much more preferable to a striving entrepreneur is to hear, "when you incorporate your own company..."

Either way, that is part of the filtering process in the evolution of self made business people. They posses the ability to see such obstacles as advantages rather than disadvantages. For those of you out there who have gone through similar experiences, you know what I mean. For those of you who have not, I urge you to take a step back and see what the university resources have to offer. After all, who do you think is paying for it?

Author Bio: Luciano Oviedo is a very tired ECE.



Taking digital matters into their hands, both Nikolai Krasnoperov and Luciano Oviedo agree the time is now.

Just One More

Best Bumperstickers Around

I don't suffer from insanity, I enjoy every minute of it.

We are Microsoft. Resistance Is Futile. You Will Be Assimilated.

Jesus is coming, everyone look busy.

Some people are alive only because it's illegal to kill them.

A cat almost always blinks when hit in the head with a ball peen hammer.

You're just jealous because the voices only talk to me.

I got a gun for my wife, best trade I ever made.

So you're a feminist...Isn't that cute!

Anyone can give up smoking, but it takes a real man to face cancer.

Beauty is in the eye of the beer holder.

Earth is the insane asylum for the universe.

Keep honking, I'm reloading.

Prevent inbreeding: ban country music.

As long as there are tests, there will be prayer in public schools.

Hang up and drive.

Happiness is a belt-fed weapon.

Laugh alone and the world thinks you're an idiot.

I don't have to be dead to donate my organ.

WARNING! Driver only carries $20.00 in ammunition

Sometimes I wake up grumpy; other times I let her sleep

Montana -- At least our cows are sane!

Guns don't kill people, postal workers do.

Ask me about microwaving cats for fun and profit.

I didn't fight my way to the top of the food chain to be a vegetarian.

There's too much youth, how about a fountain of smart.

If we aren't supposed to eat animals, why are they made of meat?

Forget about World Peace.....Visualize Using Your Turn Signal !

Friends help you move. Real friends help you move bodies.

-unknown source

WHY WE'RE ALL SO TIRED

For a couple years I've been blaming it on iron deficient blood, lack of vitamins, dieting and a dozen other maladies. But now I found out the real reason. I'm tired because I'm overworked. The population of this country is 237 million. 104 million are retired. That leaves 133 million to do the work. There are 85 million in school, which leave 48 million to do the work. Of this there are 29 million employed by the federal government. This leaves 19 million to do the work. Four million are in the Armed Forces, which leaves 15 million to do the work. Take from the total the 14,800,000 people who work for State and City Government and that leaves 200,000 to do the work. There are 188,000 ill and in hospitals, so that leaves 12,000 to do the work. Now, there are 11,998 people in Prisons. That leaves just two people to do the work.

You and me.....

And you're sitting there reading a magazine!

-Unknown source

Engineer Pop Quiz

The Answers

1. a coffin
2. the child was born before 1776
3. Mount Everest, it just hadn't been discovered!
4. Clara lives in the southern hemisphere.
5. World War I wasn't called "World War I" until World War II.
6. The word "and".
7. They fall in the same year every year, New Year's Day just arrives very early in the year and Christmas arrives very late in the same year.
8. The lady was a Justice of the Peace.
9. One thousand nine hundred and ninety dollar bills are worth one dollar more than one thousand nine hundred and eighty-nine dollar bills.
10. Only once, then you are subtracting it from 20.
11. An hour and a half IS 90 minutes.
12. "one word"
13. Penguins live in the Antarctic.
14. Neither, the yolk of the egg is yellow.
15. You have to take a picture of a man with a camera, not with a wooden leg.
16. They were husband and wife.
17. He can't because he's dead.

Finding a CAE machine

As the days warm, as the sun lasts longer, as the grass turns green, we know that the semester is coming to a close. With the end of the semester computer use increases to finish reports, projects, assignments, essays, models, simulations, and study for exams. Many students express distress at the inability to use a computer on campus during the end of the semester. The *Wisconsin Engineer* sat down with Mary Baldwin, Student Services Manager at the Computer-Aided Engineering Center (CAE).

The best method to getting projects completed is to plan ahead. Most labs are filled to at least 75% capacity during the hours of 11:00am to 1:00am. If you can stay up late or go in early in morning, you have the best chance of getting a machine. According to Mary Baldwin, sometimes the main CAE lab is full at 1:00am. There is also a break in usage that occurs during a traditional dinnertime, however the length of this break is decreasing over time. It is also important to note the scheduled classes in many CAE labs.

The CAE serves about 5000 users, ranging from professors to students and research assistants. Current NT machines (windows) number 178 and are located in 12 rooms around the Engineering campus. The NT machines are used by most students. However if you can, try to use one of 178 UNIX machines,try different campus labs, or use a machine off campus.

In general, Baldwin reported that NT use has been increasing. To compensate, 75 old pentium machines we be replaced plus there will be an additional 25+ new NTs installed, thereby increasing the total number of NT machines to well over 200. The CAE operates on a four year replacement schedule for all machines in labs. Last year the CAE updated the UNIX machines and this year features NT updates. The CAE will be installing new NT machines in room 2 of General Engineering. The new NTs are coming from a grant from Hewlett-Packard.

The HP grant allowed for the upgrade of other campus machines. As technology meets more needs of professors and students, many CAE labs have been scheduled for instructional use. Trends also point to greater instructional use of labs and less open classroom labs during the day.

"The [CAE] resources are in demand from the rest of campus," according to Baldwin. The CAE operates some of the best machines, in the largest numbers, in the university. Major expenses include the machines, applications, and networking equipment and software. Dean Bollinger has been very supportive of the CAE and state funds for laboratory and technology upgrades also provide money for better peripheral equipment, such as printers, more equipment, and upgrades. Old machines are sold to engineering departments before they are open for purchase from the rest of campus.

One area where students feel a financial reality is their paper consumption. Recently the CAE set the paper quota per student at 100 pages. The intention of the new quotas was to reduce the amount of pages used and reduce the costs of operating a large number of printers. However, paper consumption has not decreased. Baldwin reported that there is no downward trend in the total number of pages used per semester. As a result, students must purchase more pages and the money generated is allocated for new printers and upkeep for items like toner.

Overall, we found that a bit of preparation will save headaches and problems. The CAE seems to be responding to the needs of students and the College, while operating with real constraints.

Real-time Computer Usage Statistics
http://defiant.cae.wisc.edu/stats/labs/
Lab Locations
http://www.cae.wisc.edu/resources/sites/
Lab Schedules
http://www.cae.wisc.edu/resources/sites/classrooms/list/

POP QUIZ So you think you know it all-your an Engineer!

A quiz . . . think carefully about your answers.

The Questions

1. The maker doesn't want it; the buyer doesn't use it; and the user doesn't see it. What is it?
2. A child is born in Boston, Massachusetts to parents who were both born in Boston, Massachusetts. The child is not a United States citizen. How is this possible?
3. Before Mount Everest was discovered, what was the highest mountain on Earth?
4. Clara Clatter was born on December 27th, yet her birthday is always in the summer. How is this possible?
5. Captain Frank and some of the boys were exchanging old war stories. Art Bragg offered one about how his grandfather led a battalion against a German division during World War I. Through brilliant maneuvers he defeated them and captured valuable territory. After the battle he was presented with a sword bearing the inscription "To Captain Bragg for Bravery, Daring and Leadership. World War One. From the Men of Battalion 8." Captain Frank looked at Art and said, "You really don't expect anyone to believe that yarn, do you?" What's wrong with the story?
6. What is one thing that all wise men, regardless of their religion or politics, agree is between heaven and earth?
7. In what year did Christmas and New Year's fall in the same year?
8. A woman from New York married ten different men from that city, yet she did not break any laws. None of these men died and she never divorced. How was this possible?
9. Why are 1990 American dollar bills worth more than 1989 American dollar bills?
10. How many times can you subtract the number 5 from 25?
11. A taxi driver was called to take a group of passengers to the train station. The station is normally an hour away, but with traffic being extra heavy, it took a full hour and a half. On the return trip the traffic was still as heavy and yet it took only 90 minutes. Why?
12. How could you rearrange the letters in the words "new door" to make one word? Note: There is only one correct answer.
13. Even if they are starving, natives living in the Arctic will never eat a penguin's egg. Why not?
14. Which is correct to say, "The yolk of the egg are white" or "The yolk of the egg is white"?
15. In Okmulgee, Oklahoma, you cannot take a picture of a man with a wooden leg. Why not?
16. There were an electrician and a plumber waiting in line for admission to the "International Home Show". One of them was the father of the other's son. How could this be possible?
17. After the new Canon Law that took effect on November 27, 1983, would a Roman Catholic man be allowed to marry his widow's sister?

Answers on page 29

AFFIX
FIRST CLASS
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WILL NOT BE
DELIVERED WITHOUT
POSTAGE

WISCONSIN ENGINEER

1513 University Avenue
Madison, WI 53715

FOLD HERE

About you

1. **Are you:**
   - ☐ Male
   - ☐ Female
2. **What is your status?**
   - ☐ Undergrad. Student
   - ☐ Graduate Student
   - ☐ Faculty/Staff
   - ☐ Recruiter
   - ☐ Advertising Representative
   - ☐ Alumni
   - ☐ Other _____
3. **If you are affiliated with the University of Wisconsin, please indicate your number of completed years at the University.**
   - ☐ This is my first year
   - ☐ One
   - ☐ Two
   - ☐ Three
   - ☐ Four
4. **If you are a member of the University, please indicate your department.**
   - ☐ IE ☐ GLE ☐ ECE ☐ EPD
   - ☐ ChE ☐ CEE ☐ EP ☐ Other
   - ☐ MSE ☐ ME ☐ CS _____
5. **If you are an undergraduate student, do you intend on going to an undergraduate program?**
   - ☐ Yes
   - ☐ No
6. **If yes, please indicate what type of school you will attend.**
   - ☐ Engineering
   - ☐ Law
   - ☐ Business
   - ☐ Science
   - ☐ Other _____
7. **If you are a student, do you have a job during the school year?**
   - ☐ Yes
   - ☐ No

   Please indicate hours per week worked: _____
6. **Please choose the box that best describes your gross annual income.**
   - ☐ Under $5,000
   - ☐ $5,000-$10,000
   - ☐ $10,000-$15,000
   - ☐ $15,000-$25,000
   - ☐ $25,000-$40,000
   - ☐ $40,000 or more

FOLD HERE

About the *Wisconsin Engineer* distribution

1. **How many issues of the *Wisconsin Engineer* do you read per year?**
   - ☐ This is my first issue
   - ☐ One
   - ☐ Two
   - ☐ Three
   - ☐ Four
2. **How do you receive the *Wisconsin Engineer*?**
   - ☐ Entrances of buildings on campus
   - ☐ Classrooms on campus
   - ☐ Subscription
   - ☐ Special Mailing
   - ☐ Given issue, by whom: _____ _____ (students, faculty, friend, neighbor, etc.)
3. **If you found the *Wisconsin Engineer* in University of Wisconsin buildings, please check the buildings where you see or would like to see issues.**
   - ☐ Engineering Hall
   - ☐ CAE
   - ☐ Mechanical Engineering
   - ☐ Engr. Research Bld. (ERB)
   - ☐ General Engineering
   - ☐ Sterling Hall (physics)
   - ☐ Chemistry Building
   - ☐ Van Vleck (math)
   - ☐ Humanities Building
   - ☐ Union South
   - ☐ Computer Science Bldg.
   - ☐ Wendt Library
4. **Please write in additional areas where you would like to see the *Wisconsin Engineer*.**

   _____ _____

THANK YOU FOR YOUR HELP!

PLEASE FOLD SO THAT THE *WISCONSIN ENGINEER* SECTION SHOWS AND TAPE TO SEAL (DO NOT STAPLE).
PLEASE MAIL OR DEPOSIT IN *WISCONSIN ENGINEER* MAILBOX IN MECHNICAL ENGINEERING LOBBY

WISCONSIN ENGINEER
READER SURVEY

As a reader of the *Wisconsin Engineer,* you are extremely important to us. Please help us to continue to provide the information that informs, entertains, and enriches your experience at the University of Wisconsin-Madison. Please answer all the questions below. The more we know about you and your experiences here, the more responsive we can be. **Thank you for your help and continued support of the *Wisconsin Engineer.* Please complete and return this survey by May 31, 1998.**

About the *Wisconsin Engineer*

1. **What types of articles do you regularly read?**

☐ Editorial
☐ Faculty Profile
☐ Features
☐ Campus Update
☐ Opinion
☐ General Interest
☐ Technology
☐ On Campus
☐ Feature
☐ Just One More
☐ Other _____

2. **On average, how much time do you spend reading an issue of the *Wisconsin Engineer?***

☐ Under 1/2 hour
☐ 1/2 to 1 hour
☐ 1 hour or more

3. **On average, how many people (excluding yourself) read or look through your copy of the *Wisconsin Engineer?***

☐ One
☐ Two
☐ Three
☐ Four or more

4. **What other Campus/Madison newspapers or magazines do you regularly read?**

☐ Badger Herald
☐ Daily Cardinal
☐ Wisconsin Week
☐ Other _____
☐ Isthmus
☐ Capital Times
☐ Madison Magazine

4. **What national news magazines do you regularly read?**

☐ Time
☐ USNews&World Reports
☐ Newsweek
☐ Business Week
☐ Popular Science/Mechanics
☐ Wired

Our web site

1. **How often do you visit our web site www.cae.wisc.edu/~wiscengr?**

☐ Never
☐ Once per semester
☐ Once per issue
☐ 3 to 5 times per semester
☐ 6 times or more per semester

2. **What other news sites do you visit on the web?**

☐ Wired
☐ Time
☐ Yahoo News
☐ CNet
☐ ABC News
☐ CBS News
☐ NBC News
☐ ESPN Sportsline
☐ Other _____

About recruiting

1. **Do you attend Career Connections, in the fall of each year?**

☐ Yes ☐ No

2. **Do you anticipate the recruiting ads in the *Wisconsin Engineer?***

☐ Yes ☐ No

3. **What type of position are you looking for?**

☐ Intern
☐ Co-op
☐ Full time
☐ Part time

4. **Please check the following types of articles that interest you.**

☐ Current technology
☐ Business & engineering cooperation
☐ Business company profiles
☐ Engr. company profiles
☐ Other
☐ National companies
☐ Wisconsin companies
☐ Career opportunities
☐ Faculty & industry
☐ University & industry

5. **Would you like to see the *Wisconsin Engineer* focus on industry, recruiting and career articles?**

☐ Yes ☐ No

6. **Please select the following story topics that interest you.**

☐ Personal intern/coop experiences
☐ Experiences and opportunites with Engineering Career Services (ECS)
☐ Alumni activities
☐ Working conditions in different areas of the USA or the world
☐ Salary information
☐ Other _____

Additional comments

_____

_____

_____

_____

Please follow mailing instructions on opposite side.
Please complete and return survey by May 31, 1998

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WISCONSIN ENGINEER

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Friday April 24

Welcome and Opening Address	9:00a.m. - 9:50a.m.	Engineering Hall
Magazine Writing Critique	10:00a.m. - 10:50a.m.	Engineering Hall
Magazine Layout Critique	11:00a.m. - 11:50a.m.	Engineering Hall
Workshop #1 (Writing) (Web Site Design)	1:10p.m. - 2:25p.m.	Engineering Hall Unioun South
Workshop #2 (Editing) (Layout and Design)	2:35pm - 3:50p.m	Engineering Hall Union South
Workshop #3 (Advertising) (Graphic Design) (Business and Management)	4:00p.m. - 5:00p.m.	Engineering Hall Union South

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