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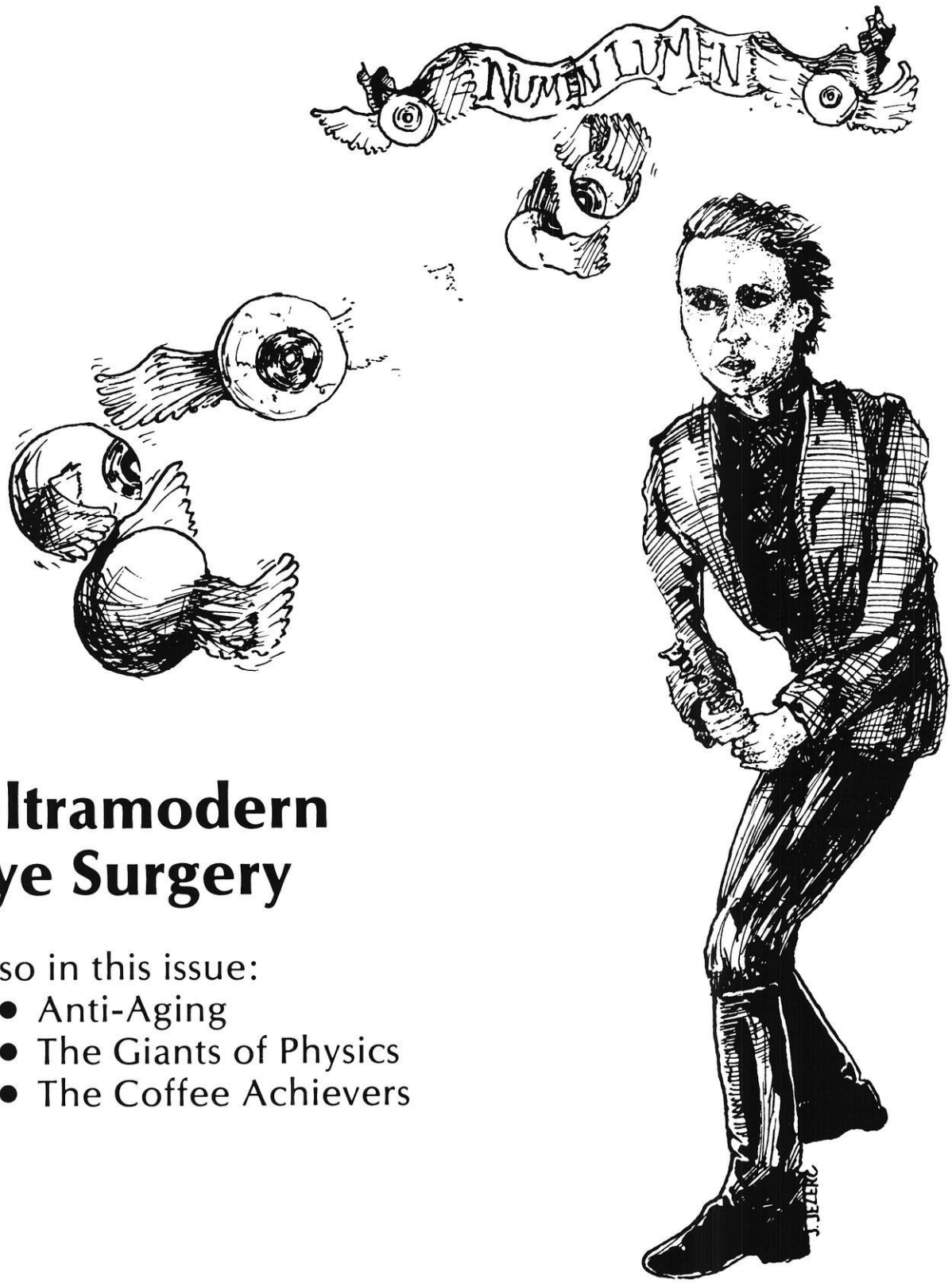
Volume 88, No. 4 April, 1984

wisconsin engineer



Ultramodern Eye Surgery

Also in this issue:

- Anti-Aging
- The Giants of Physics
- The Coffee Achievers

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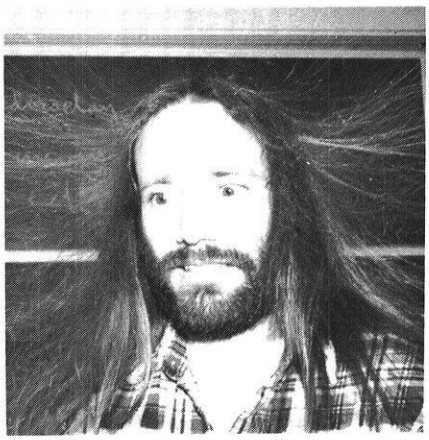
COLUMNS

FEATURES

page 11 Graphic by Jeff Jezerc



page 2 Photo by Ron Hillman

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Editorial
The Coffee Achievers

By Scott Paul

I would like to cure you of post-exam anxiety. As we all know, pre-exam anxiety can be somewhat useful because it can be used to channel your energies in a way that might help you. If you are nervous about an exam you are likely to study harder for it and get a better grade. But post-exam anxiety can only make you sick.

I can only begin to count the number of people who have allowed this malady to mess up their lives. The problem begins as soon as the exam is over. The student asks himself, "I wonder what my score will be?" His next move is to talk to his friends and compare notes. From this point in time until the exam is returned the only concern of the student is the possible size of any partial credit to be given. This is an incredible waste of time.

Just ask yourself, "What would Carl Sagan do if he were in this situation.

The students who go out and push a few other people off the sidewalks after the exam are at least getting the frustration out of their system. I worry about the people who spend the next four days looking at their feet. Sure, you're concerned about your grade, but fasting, going without sleep, throwing up, and looking at your feet until you get your exam back is something that I feel sure Carl Sagan would describe as "a pointless exercise in futility."

I kicked the post-exam anxiety habit and you can do it too. I simply asked myself "what would one of the **coffee achievers** do if he were in my position?" The coffee achievers are the people in the television commercials who are portrayed as "the movers, the shakers," and just all-around awesome studs.

"Anything but this," said the coffee achiever in me. The best thing to do was to practice selective forgetting and never even let the thought of the exam creep into my mind. Once I got the hang of it I found that it really worked! I decided that since I had spent many difficult hours preparing for an exam I had a right to take a little time out and use it purely for enjoyment. After taking the break I had earned, I found that I was relaxed and could get back to work. I could work much better when my stomach wasn't back retaking the exam.

There must be a million better things than worrying to do after an exam. Read a good book. Go out and try to pick up girls using hypnotism. Go to a bar where the only thing you will have to worry about is swallowing the metal tab that is inside your can of beer. Topple stonehenge. Search for freshwater whales in Lake Mendota. Father a child. Write a letter to Boy George . . . You get the idea.

When I finally put down my copy of *"101 Dead Elephant Jokes"* I found that it was no trouble at all to look my math book in the eye and say "I'll get you next time you . . ."

In short, worrying about exams you have already taken is a colossal waste of time. So is plotting a max/min curve of the scores you are going to need for the rest of the year in the class. It won't help you do any better. No coffee achiever worth his grounds would be caught dead worrying about yesterday's exam. Take a break--then get on with it. □

I have wasted time, and now time wastes me.

Shakespeare

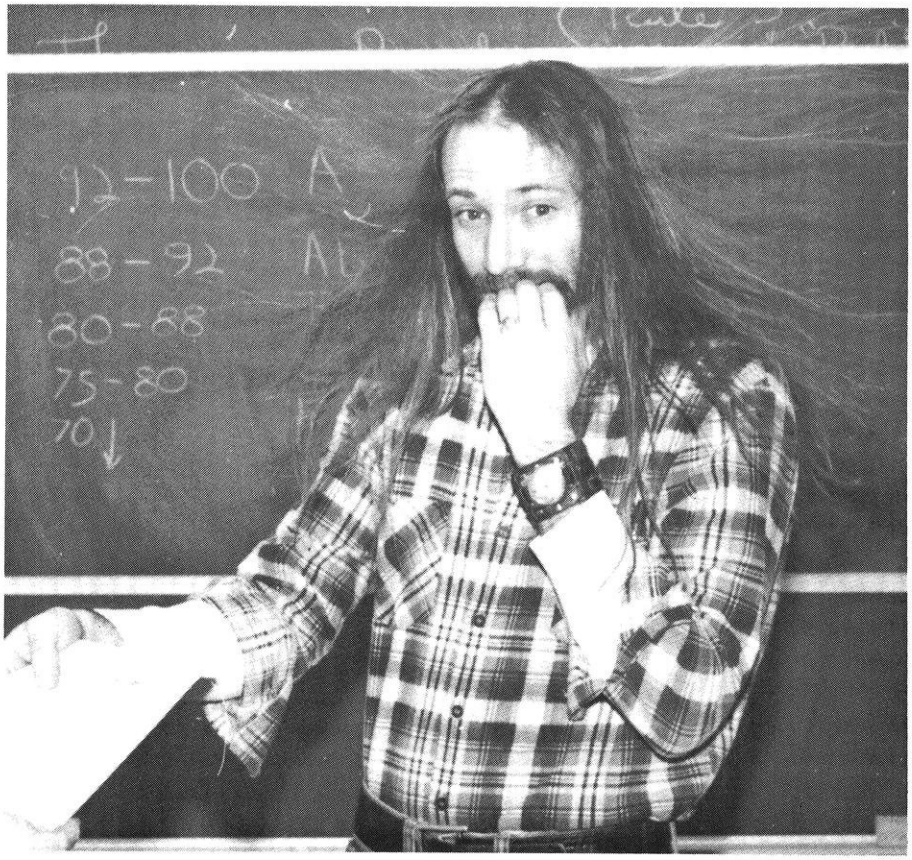


Photo by Ron Hillman

Giants of Days Past

A professor talks about the great men of physics he has known.

By John Yazek

Now, when engineering and science disciplines are becoming increasingly specialized it is interesting to look back on the days when many, if not all, of the great physicists of the time could be gathered together. One example of such a gathering is the work that was carried out at Los Alamos Laboratories during World War II. Here, people such as Fermi, Oppenheimer and Bohr came to know each other on a personal as well as a professional level. It was at Los Alamos that Professor H.H. Barschall worked and lived with many of these giants of physics.

Professor Barschall holds a joint appointment in Nuclear Engineering, Physics and Medical Physics here at the University, and is on the governing board of the American Institute of Physics. He is also the editor of the nuclear physics part of the Physical Review, the principal United States physics journal. He knew many of the most honored physicists of recent history and once gave a speech attended by Einstein and Pauli.

Of all the great physicists Professor Barschall has had the opportunity to meet and work with, he has been most impressed by Fermi.

I had the opportunity to speak with Professor Barschall about his personal experiences and he related a number of amusing anecdotes about these well known physicists. This conversation has led me to conclude that these men were more than the great physics minds that I have read about; they were real people.

Niels Bohr is credited with formulating the first consistent model describing the motion of the atomic electrons. He was, as described by Professor Barschall, "a very strong willed man who was exceedingly difficult to understand due to his strong accent and low voice." He was Danish and people often found it difficult to tell whether he was speaking Danish or English.

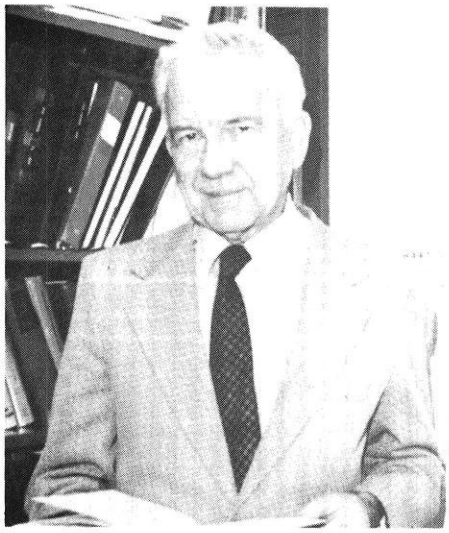


Photo by Ron Hillman

Professor Barschall, who has known many of the modern giants of physics, is a hard man to catch up with. But after some legwork we were able to capture this photo of him relaxing with a good physics book in his office.

He once gave a speech at the Wisconsin Union Theater during which he managed to entwine himself hopelessly in the microphone cord and at the same time befuddle everyone present with his strange dialect.

Albert Einstein is a name recognized by almost everyone because of his theory of special relativity and description of the photo-electric effect. He was a theorist, and never taught a course in an American University. Einstein, Professor Professor Barschall told me, "never was at ease speaking English even though he lived in the United States for over twenty years." It is interesting to see that a man as intelligent as he never took the time to learn English well enough to lecture without having an interpreter at hand.

Robert Oppenheimer was the director at Los Alamos Labs during the time Professor Barschall worked there. As described by Professor Barschall, Oppenheimer was forceful and was difficult to become personally close to. "He was a superb director who was able to influence those around him." During the course of the work at Los Alamos the government began to censor all mail entering and leaving the lab. There was strong opposition to this; the scientists felt that this was a violation of their rights. Oppenheimer, upon hearing of this opposition, scheduled a meeting where he gave a speech that convinced everyone working there that censorship was not only necessary, but was the best thing possible for all concerned.

Enrico Fermi was the man who designed and built the first nuclear fission reactor. He did much of the physical work of this construction himself. He was a person who liked to roll up his sleeves and get things done. According to Professor Barschall, "Fermi was an incredibly intelligent man who took great pride in being able to formulate an answer to almost any question asked of him. He was a remarkable lecturer who was simple and clear, and exciting to listen to. Fermi was a very pleasant person whom most people liked. He was outgoing and hospitable with almost everyone." Of all the great physicists Professor Barschall has had the opportunity to meet and work with, he has been most impressed with Fermi. Not only was he a great physicist, he was a great man.

Today, there are more scientists living than have lived throughout all of recorded history. As a result, new breakthroughs are coming faster than ever, but there is a drawback. Science is becoming a big industry, with many scientists becoming pieces in the industrial machinery. Obviously, we can no longer gather all of the great physicists in one room and it is not possible to know all of the physicists of the day personally, but I hope that this does not keep them from trying to know some of their associates on a personal level. I trust that for all the corporatization of science, this will be possible and scientists will continue to be the fine individuals they have always been. □

Focus on Laser Surgery

New surgical techniques using lasers are leading to breakthroughs in the treatment of eye disorders.

By Mark Sletten
and Cristine Carser

Considered to be a "revolutionary step forward" in the field of eye surgery, lasers are now the most sought after surgical technique. For decades lasers have had a vast amount of usage in industry, however most recently lasers have been utilized for surgical techniques in all medical fields.

More than 600 eye patients are treated at the University of Wisconsin and many of them are treated with the surgical laser techniques.

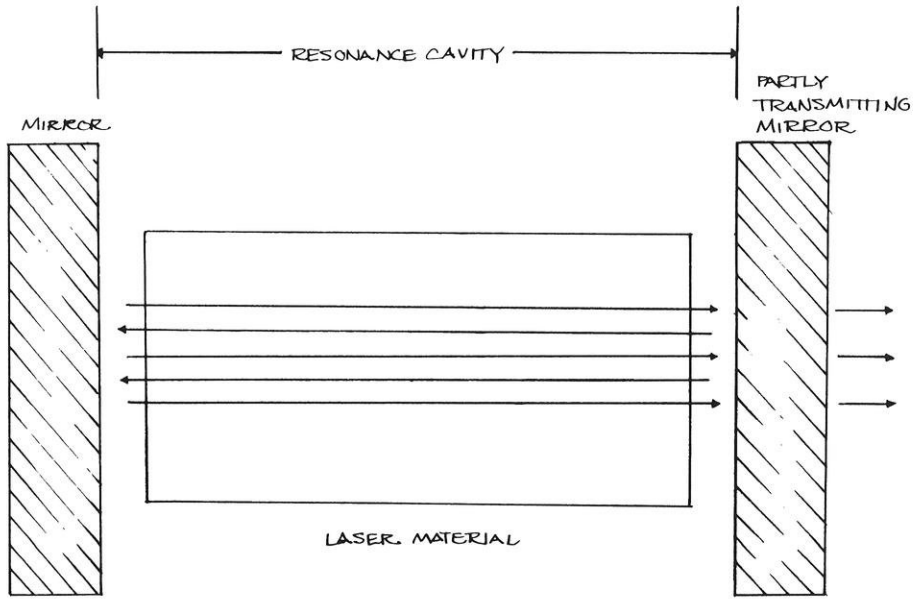
According to Dr. Suresh Chandra, Department of Ophthamology, University of Wisconsin-Madison, lasers have the ability to vaporize tissue by varying the power and time application to the eye. From the surgeon's standpoint, gaining access to many areas of the body is a difficult and tedious procedure. Some surgical lesions are inaccessible to standard techniques. "The potential advantages provided by the laser to the surgeon are numerous", Dr. Chandra stated. "There is an avoidance of hospitalization, reduction in infectious complications of incisional surgery, and the performance in surgery is rated highly."

However, there are some disadvantages. These include high cost, complex maintenance of an evolving technology, special training for surgeons, plus a possible hazard to patient and personnel from inadvertant laser exposure.

The theory behind the laser was firmly established as early as the 19th century with the advent of optical resonators. The first sucessful application of stimulated emission of microwaves was performed in 1955. In 1960 researchers first observed stimulated emission in the visible portion of the spectrum by exciting a ruby rod with intense pulses of light from a flash lamp, thus generating the first laser beam. Since that time, the laser's range of application has expanded extraordinarily.

While ophthalmologists use several types of lasers, the basic principle behind each is the same. An energy source, such as a high intensity light source or an electric current, pumps atoms in the active medium into excited high energy states. Eventually, a majority of the atoms become excited; a condition termed as *population inversion*. As atoms relax back down to the ground state, packets of light energy, photons, are released. The photons bounce off the end mirrors back into the lasing medium, stimulating more atoms to release photons. A domino affect occurs, resulting in a beam of light which is coherent (consisting of parallel rays of the same spectral color) and of high intensity (power per unit area).

Lasers may differ in the way the beam is controlled. Ophthalmologists utilize two lasing schemes; continuous wave (CW) and pulse. In a CW system a portion of the light energy produced by the lasing medium passes out the front end mirror (only partially reflective) at a steady rate. In a pulsed laser, various mechanical or optical switches temporarily block the rear mirror, stopping the release of energy from the medium. This allows a greater population inversion to build momentum (the energy pump is still "pumping" during this period). When the reflectivity of the rear mirror is suddenly restored, the medium releases its stored energy in a series of high intensity "giant" laser pulses.



A. Typical laser cavity, showing the laser material, the totally reflecting mirror, and the partly transmitting mirror that allows a portion of the resonating beam to escape from the cavity.

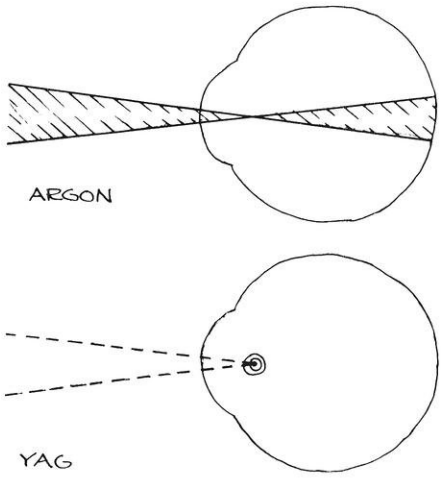
In ophthalmology, lasers can be further classified as to the action taking place within the eye. **Thermal** operation is based on the absorption of laser energy by eye tissues and the subsequent conversion of this energy to heat. Heating tissues in this manner causes **photocoagulation**, a cauterization or congealing of blood vessels and/or the formation of scar tissue. The extent of photocoagulation depends upon the intensity and duration of the laser pulse, and on the absorption characteristics of the tissue being treated. Different tissues absorb different spectral colors of light. The argon laser produces a wavelength ideal for thermal operation on the vessels of the retina. The argon wavelength is such that it passes through the vitreous (the clear fluid filling the eyeball) yet is absorbed by the pigmented retina (the "film" covering the back of the eyeball). Simlarly, the properties of the krypton laser make it another popular choice for thermal-mode operations.

One of the most common uses of the laser is in the treatment of the eye disease, glaucoma. For glaucoma, a laser is often used to induce a thermal lesion in and around the trabecular meshwork to open a pathway to tissue canals. Attempts have also been made to use non-thermal effects of laser pulses to overcome the low absorption of tissues. The rapid rise times and high electromagnetic fields of ultrashort laser pulses can generate phonons (a quantum of vibrational energy) or initiate electron avalanches with plasma formation. These can all act to create a shock wave sufficient to disrupt a very localized area of the trabecular meshwork. At the present, with either of these methods there is a high percentage success rate.

Another use is for treating diabetic retinopathy by photocoagulation. Diabetic retinopathy is results in having too many retinal vessels along the surface of the retina and in the vitreous cavity. These new vessels, because they are fragile, give rise to hemorrhages. Photocoagulation destroys the part of the retina that depends upon the chorodial circulation, the oxygen balance within the retina is changed, and the retina vessels no longer attempt to supply oxygen to the parts of the retina in which the vessels appeared as a result of the diabetic disease process.

One of the newest lasers in ophthalmology is the picosecond YAG (Yttrium-Aluminum-Garnet). A high intensity pulsed laser, the picosecond YAG is not used thermally. Instead, the high intensity beam produces a **plasma** (a cloud of ionized atoms) at the beam focal point. The plasma properties and the beam wavelength are such that laser propagation through the plasma does not occur. The plasma becomes a "shield" for tissues in the beam path, thus preventing thermal operation of the laser. However, radiating from the plasma shield is a shock wave, and it is this wave which alters tissues.

As in any use of lasers, the safety aspects of laser usage in ophthalmology are highly important because the eye is a vulnerable organ. Today, despite the wide use of lasers in industry, the potential for hazardous exposure to laser radiation is still probably greatest for the laser research worker. This risk is due to the need for flexibility in the arrangement of laserbeam delivery systems and to the requirements for unenclosed, high-power laser beams in these specialized applications. Special training for the usuage is required and it is necessary that medical laser products have a protective housing that prevents human access to hazardous laser radiation at all points. Reflections of argon and YAG laser radiation back through a fiber-optic endoscope must be attenuated with protective filters built into the endoscopic viewer. Hazardous laser reflections are the primary safety concern from the standpoint of laser radiation safety.



B. The shock wave concept of YAG laser surgery: By delivery ultrashort pulses in the nano- to picosecond range, concentrated in a small area at the laser focus enormous power density can be obtained. Optical breakdown takes place producing a centifrugal shockwave, and practically no heat is propagated. Mechanical disruption of the target tissue occurs independent of its pigmentation or chemical nature.

Today, despite the wide use of lasers in industry, the potential for hazardous exposure to laser radiation is still probably greatest for the laser research worker.

"At the present time the University of Wisconsin medical faculty is continuing research in eye diseases, and the surgical techniques provided by lasers," said Dr. Chandra. Over 600 eye patients are treated at the University of Wisconsin and many are treated with the surgical laser techniques. "Certainly lasers do provide new and revolutionary techniques within the medical spectrum," stated Dr. Chandra. "Plus, these lasers have become available to any facility, providing the lastest surgical procedures to treat and supply the necessary prevention of eye complications." □

Sources:
A. ***"Pulsed YAG Laser Surgery"*** *Danilee Aron-Rosa, M.D.*

B. ***"Ocular Photocoagulation"*** *Frances A. L'Esperance, Jr.*

The Logical Suspect

Soot particle growth as it takes place in wood-burning fireplaces, diesel engines, and industrial furnaces, has been attributed to a complex set of interdependent chemical reactions. A researcher at the General Motors Research Laboratories has demonstrated that the decomposition of a single species is primarily responsible.

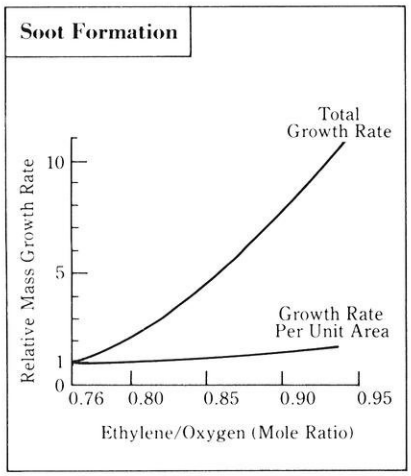
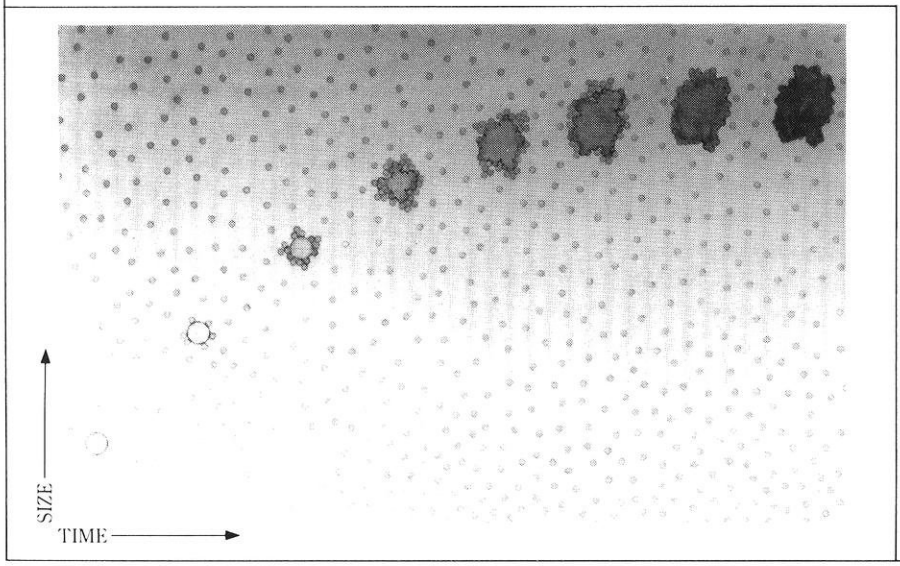


Figure 1: Total growth rate contrasted with growth rate per unit area plotted as a function of ethylene/oxygen mole ratio measured at a given height above the burner face.

Figure 2: Artist's rendition of the surface growth of a single soot particle by the incorporation of acetylene molecules.



SOOT FORMATION may be divided into two stages. Microscopic soot particles are generated in the "inception" stage. They reach full size in the "growth" stage, which accounts for more than 95% of their final mass. Most scientific exploration has concentrated on particle inception which, despite all the effort, remains unexplained. Dr. Stephen J. Harris, a physical chemist at the General Motors Research Laboratories, has reversed traditional priorities. Combining experiment with logic, he has formulated the first quantitative explanation of the growth stage in soot formation.

Dr. Harris arrived at his mechanism through an elaborate process of elimination. To focus on the chemistry of soot growth, he began by eliminating from his investigation the complexities introduced by turbulence and mixing. He limited his research to premixed, ethylene/oxygen, laminar flames with one-dimensional flow.

Previous descriptions in the literature told him that two processes take place simultaneously during growth. Incipient particles collide and coalesce into larger particles, while growing at the same time by incorporating hydrocarbon molecules from the burned gases.

The first process reduces total surface area without changing total mass, while the second, called "surface growth," increases both total surface area and total mass. Hence, the increase in the total mass of soot can be entirely attributed to surface growth.

Dr. Harris set out to identify the hydrocarbon molecules—or "growth species"—responsible for surface growth. Increasing by increments the richness of the flame, he made the key discovery that although the total mass growth rate (gm/sec) increases strongly when the ratio of ethylene to oxygen is increased, the mass growth rate per unit surface area (gm/cm^2/sec) increases only slightly (see Figure 1). Thus, the controlling variable for how much soot is formed is not the concentration of growth species, but the surface area available for growth.

This finding led him to conclude that richer flames produce more total soot because they gen-

erate more particles in the inception stage. More incipient particles offer greater initial surface area for the incorporation of hydrocarbons.

Since the growth rate per unit area must depend on growth species concentration, this concentration must be similar from flame to flame. Dr. Harris went on to reason that there must either be enough growth species at the outset to account for the total soot growth in the richest flame, or the species must be rapidly formed within the flame from another hydrocarbon present in high enough concentration.

HE NARROWED his search to the four most abundant classes of hydrocarbons found in flames: acetylene, polyacetylenes, polycyclic aromatic hydrocarbons (PAH), and methane. Methane can be eliminated, because its concentration does not decrease as soot is produced. There is not enough PAH to account for soot formation in any flame. Neither of these two hydrocarbons can be readily formed from the other major species present. That left only acetylene and the polyacetylenes.

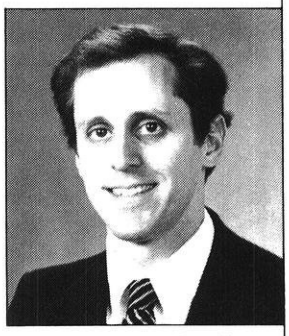
Acetylene contains enough hydrogen to account for the hydrogen content of soot measured in the early stages of growth. But among the polyacetylenes, only diacetylene could possibly supply enough hydrogen. That left acetylene and diacetylene.

There is more than enough acetylene to account for the mass of soot produced. There is not enough diacetylene, and while diacetylene can be formed from the abundant supply of acetylene, the reported rate of conversion is too slow for diacetylene to play a significant role. That left only acetylene.

Dr. Harris verified that acetylene is the growth species by determining that the slight increase in growth rate per unit area is proportional to the increase in acetylene concentration (see Figure 1). He also found that the rate constant he measured was in agreement with the reported rate constant for the decomposition of acetylene on carbon. These findings confirmed his hypothesis that soot particles grow in flames by the incorporation and subsequent decomposition of acetylene.

"Now that we know how soot grows," says Dr. Harris, "we can examine how it begins with greater understanding. Then, perhaps our knowledge will be complete enough to suggest better ways to reduce soot."

THE MAN BEHIND THE WORK



Dr. Stephen J. Harris is a Staff Research Chemist at the General Motors Research Laboratories. He is a member of the Physical Chemistry Department.

Dr. Harris graduated from UCLA in 1971. He received his Master's and Ph.D. degrees in physical chemistry from Harvard University. His doctoral thesis concerned Van der Waals forces between molecules. Following his Ph.D. in 1975, a Miller Institute Fellowship brought him back to the University of California, this time at Berkeley, where he spent two years studying laser-induced chemistry. He joined General Motors in 1977.

Dr. Harris conducted his investigation into soot particle growth with the aid of Senior Science Assistant Anita Weiner. His research interests at GM also include the use of laser diagnostic techniques in combustion analysis, with special emphasis on intracavity spectroscopy.

The Unknown Oasis

The Physical Sciences Laboratory provides many valuable services to university researchers.

By Lynn Leiwen

About 20 km southeast of Madison there exists a part of the University of Wisconsin called the Physical Sciences Laboratory (PSL). The PSL acts as a service organization and offers a wide range of skills in the sciences and engineering. It has a permanent full-time staff of approximately 80 persons with considerable diversity in their skills and knowledge. Therefore PSL has the capability to provide services in equipment design, construction and maintenance to investigators working in all areas. The PSL is capable of handling large and small scale tasks and will undertake projects independently or will work along with a group of researchers. Its services and facilities are highly sophisticated and are being continuously expanded as new technologies become available. Some of what the PSL has to offer is listed below:

PSL acts as a service organization and offers a wide range of skills in the sciences and engineering.

— Large and small scale machine shop work, drafting, welding of a wide range of conventional and exotic materials. Some of the more interesting mechanical equipment includes an electric discharge machine under computer control which cuts a 200 micron (5 mil) slit through conducting material up to 100 mm thick; a large metal shear which can cut 5 mm stainless and 7 mm mild steel 2 meters wide; a large vertical lathe which can turn diameters of 1.5 meters.

— Design and construction of electronic systems. This ranges from simple systems, microprocessing, and computer interfaces to more complex computer peripherals, electronic instruments and large digital systems. There is also research going on in X-Ray Lithography. This is a new IC-printing process which will use Aladdin, PSL's 1,000 MeV (million electron volt) synchrotron radiation storage ring, for the "photoprinting" of smaller and more efficient integrated circuits.

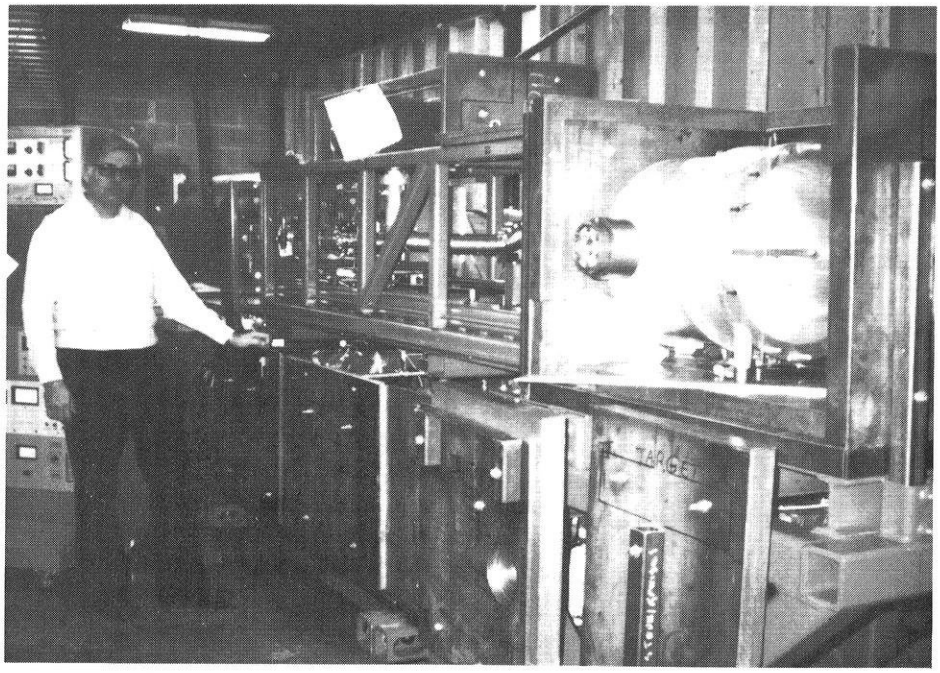
— Two Vax 11/780 computers which contain a present physical memory of 4 MBytes and a virtual address space for any user of 10 Billion Bytes. There are several links to campus over modern high speed (4800 baud) data lines. The computers are available for general purpose time-shared computing by the PSL staff and users. The PSL also provides equipment leases such as CRT terminals and small computers for campus projects.

— A programming staff is available to advise researchers and provide software handlers to operate the interfaces and components built by PSL.

— There are four clean rooms available; three for optical and high vacuum assemblies and one for welding high vacuum components.

— One of PSL's major facilities is the Synchroton Radiation Center. Through the use of the 240 MeV electron storage ring, Tantalus I, a source of far ultraviolet light and soft x-rays are obtained for the investigation of the optical and electronic properties of solids, liquids and gases.

The PSL is a self supporting unit which charges only for the services it performs. To determine the cost of a project a "design feasibility study" is performed in which experts on the project are called in and, if the project can be completely defined, then PSL will provide a firm quotation for the job. Otherwise, if the project is open ended (i.e., involves research or tests), services



Linwood C. Thomas, Mechanical Co-ordinator, shows the X-Ray Microbeam used in speech research being conducted at the Waisman Center.

will be provided on a Time and Materials basis. There are currently three different rates of structure by which charges are made. UW faculty are charged an internal rate while members from an outside University are charged an external rate and local industries and commercial businesses are charged a commercial rate.

There are more than 200 people who come from around the world to use the facilities at the Physical Sciences Laboratory.

To date, the PSL has more than 200 users who come from all over the world. There are about 40 projects underway, some of which are quite unusual. For example, research is being conducted in the design and construction of a stearable beam (1 MM) of x-rays with energies of up to 600 keV for speech research at the Waisman Center. The subject is seated in front of the microbeam with several gold pellets placed in specific areas in the mouth and on the tongue. The beam can pick up the movement of these pellets and a computer is used to record these movements. As an example, some people roll their tongue when saying the letter "r". The computer then would be used to display this rolling motion. It is believed that in being able to observe the motions in both normal and defected speech patterns much knowledge and advancement will be gained in speech research. Projects are also not limited only to the areas of science and engineering. There has been some research done in textiles for the Home Economics Department.

What has been presented in this article is only a fraction of what the PSL has to offer. Their advice is free -they only charge for the services they perform. They are a unique organization with friendly, eager individuals willing to provide help and services as needed. The PSL is a valuable, worthwhile and fascinating component of the University of Wisconsin. □

Get Ready for Expo '85!

By Scott Knox

Although Expo is still over a year away, preparations are beginning for the University of Wisconsin's Engineering extravaganza. The Engineering Exposition attracted 17,000 people in 1983, making it the largest student run event in the University system. It exposes students and the public to current technological advancements made within the College of Engineering and industry.

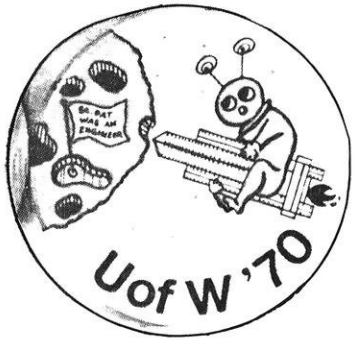
Interviews for co-chairmen of the Expo Executive Committee were concluded January 17 and Dean Robert Ratner, faculty advisor for the project, was extremely pleased with the response from students.

It is gratifying to find so much enthusiasm at a time when grades are so important.

Expo, he stressed, was a time consuming commitment for dedicated people. The executive committee is made up of a special type of student; one who has grades high enough so his course work will not suffer, yet one who also is prepared to make sacrifices in study time for the evolution of Expo.

"It is gratifying to find so much enthusiasm at a time when grades are so important." Ratner said.

The students chosen to comprise the 1985 Expo Executive Commitee are: Co-Chairperson, Sue A. Guzman, Jr. in Electrical/Computer Engineering, Wisconsin Rapids, Wisconsin; Co-Chairperson, David C. Franchino, Sr. in Mechanical Engineering, Shorewood, Wisconsin; Building and Exhibits, James E. Gifft, Jr. in Civil and Environmental Engineering, Hopkins, Minnesota; Personnel and Advance Promotion, Michelle E. Janewicz, Jr. in Industrial Engineering, Wilmette, Illinois; High School Public Relations, Linda D. Johnson, Sr. in Chemical Engineering, Milwaukee, Wisconsin; Student Exhibits, William S. Monfre, Sr. in Chemical Engineering, Brown Deer, Wisconsin; Publicity, James M. Nejedlo, Sr. in Mechanical Engineering, Green Bay, Wisconsin; and Industrial Exhibits, Toby R. Thomas, Sr. in Mechanical Engineering, Kenosha, Wisconsin.



The Executive Committee is looking forward to the 1985 Expo, and hopes you are too. If you are interested in getting involved, or have any questions please call 262-6842, or stop by the Expo office, 1142 Engineering Building.

Meet Me For Lunch

Take a tour of Wisconsin's zaniest dining hotspot--Union South.

By Greg Gorski

Graphic by Jeff Jezerc

The word is out, and by gosh, it sure is about time. The talk all over campus this semester has changed drastically from the tedious Rathskeller-rif-raf of "TGIF-TGIF-TGIF" to something we can all sink our teeth into. "Eat lunch at Union South," echoes down State Street. "Eat lunch at Union South," is whispered in Helen C. "Eat lunch at Union South," is even painted on the side of Rennebohm's. That's right folks, Union South is where it's at, and this is one engineer who kind of likes it.

It's the place where I don't have to worry whether my scarf matches my socks, or if my teeth are white. No one cares if my politics are in order or if my sweatshirt is ripped just right. Flannel is the fashion here. Gloomy frowns are in too, and so is any politician who promises to create enough government contracts so that we all get jobs. But we're not here to jabber; let's eat.

This is the place where 500 students are fed every five minutes. It provides rank and file feeding that would make McDonald's proud. (Each meal is given it's own special home-cooked tenderness and then plopped on a paper plate.) It all looks so good that I can't decide what to eat first. I had better not think about it too long or it will get cold. Somehow $10.50 seems all too cheap for a meal just like mom's. If the tables were organized better, then everyone from the Regent could eat here.

Anyway, let's not spend our entire lunch hour just eating. Let's dump our trays down the chute and hit the game room before it gets too crowded. Should I bowl? No wait, maybe ping-pong. No, maybe pool, or billiards, or Centipede, or pinball. I'm just too confused. I'll just settle for color TV in the always popular TV lounge.

Union South is the place where, on Wednesdays, instead of TV, I can enjoy beautiful live music in the Pit. Seriously, if I close my eyes I'd swear that old J.S. Bach himself was at the keyboard. Nothing this side of heaven could be so beautiful. The best part is that I've heard these songs so many times that I can sing right along. And when the songs aren't being played live, I can listen to them on a hi-fi juke box. And what I just can't believe is that this is all free!

Lunch at Union South always goes by so quickly that I'm always late for my 1:20 class. I know I'm late because it says so on that clock over there. And on that clock back there. And on that clock over there too.

So folks, if you're tired of eating with silver silverware, don't mind being a little late for class, and just generally like to have lunch in the fast lane, then grab your friends and come to Union South. You'll be glad you did. □

Anti-Aging Steps That You Can Take

A step-by-step plan that could extend your life.

By Scott Paul

Ponce de Leon never found his fountain of youth, and I can't promise you one either, but the life-extending measures described here are practical steps that you can take to reduce the effects of aging.

Aging seems to be a group of related problems. The body wears down from the action of disease and misuse. The body's support and repair systems are themselves affected over the passage of time, and are not able to keep up. The whole system starts to decay.

Much of the wear and tear on our bodies is the result of the action of free radicals upon cell structures. Free radicals are molecules with an extra electron. These free radicals are produced as a by-product of digestion, and because they are very reactive they attack and destroy cell membranes and DNA. When you are young your body can repair or replace many of these cells, but as you grow older your repair systems aren't working as well any more. Clearly, the less damage your body has to repair the better off you are going to be. By taking anti-oxidants, such as vitamin E, you can tie up many of the free radicals as they are produced and thus reduce their effect on your system.

The amount of food you eat affects your life span. In an experiment by Roy Walford, a professor at UCLA, a group of rats were kept on a low-calorie diet which was supplemented with vitamins. The rats lived 25-100% longer than average. The rats were undernourished, but not malnourished. An explanation for this is that the metabolism runs at a slower rate when it is given less fuel. Most systems tend to last longer when they aren't foced to be working at full capacity all the time. If you were to adopt a low-calorie diet and supplement that with multi-vitamins you should be reducing the work load upon your metabolism by slowing it down and not forcing it to burn up unnecessary extra calories. Also, by digesting less food you will be producing fewer free radicals to attack your cells.

Stay in shape. By keeping up with some regular form of exercise you will reduce your chances of having problems with your heart and circulatory system. If your veins are clogged it is hard for your brain to get enough oxygen for you to think straight. You also tend to get heart attacks and die. Then you have a real mess, don't you? Don't smoke either.

The best way to avoid physical destruction from diseases is to not get diseases. Your thymus gland produces hormones that keep your immune system going. It also controls the production of white blood cells. White blood cells are responsible for recognizing and fighting off things that don't belong in your body (infections, cancers, viruses). The problem is that your thymus is wearing down and getting smaller; your immune system doesn't work nearly as well now as it did when you were an infant. As you become older you become more succeptable to disease. Experiments have shown that old peoples' blood will attack disease as well as a young person's if they have been injected with thymosins, the hormones produced by the thymus gland. Thymosins are not currently available on your drugstore's shelves, but it is expected that one day thymosin boosters will be as commonplace as mouthwash is today.

Even if you can't take thymosins now there are still things you can do to give your immune system a boost. Vitamin C is an especially good thing to take if you are interested in keeping your body's defenses in top form. Zinc is also involved with your immune response; it probably wouldn't be a bad idea to take zinc supplements too.

Experts say that the human brain is put together well enough so that it should last from 150 to 200 years. The brain isn't the problem; it is in the systems that support it.

There is a simple program that could add years to your life. Eat less and supplement your diet with multi-vitamins. Take vitamin E for those free radicals. Boost your immune system with vitamin C and zinc. Stay in shape and don't smoke.

Science has not yet provided us with a fountain of youth, but we're starting to look in the right places. If Ponce de Leon were alive today . . . he'd be several hundred years old. □

The New Breed of Engineer

IBM has sponsored a new program at the UW to educate engineers who are capable of creating new manufacturing systems for industry.

By Cristine Carser

A "new breed" of engineers will emerge from the University of Wisconsin-Madison, thanks to the valuable investment made by the IBM Corporation. IBM is sponsoring the new graduate manufacturing systems engineering degree program.

The program, which began Fall 1983, is designed to develop engineers who are experienced with modern computer useage and able to implement and operate novel manufacturing systems for industry.

The IBM Corporation awarded UW-Madison a $2 million cash gift over a four-year period to introduce and continue studies in ultra-modern, computerized manufacturing operations for the future.

The IBM Corporation has awarded UW-Madison a $2 million cash gift over a four-year period to introduce and continue studies in ultra-modern, computerized manufacturing operations for the future.

Five universities throughout the United States were chosen from approximately 180 respondants for the master's degree program. Selected schools met criteria for excellence and having reputations as leading educational institutions for engineering studies.

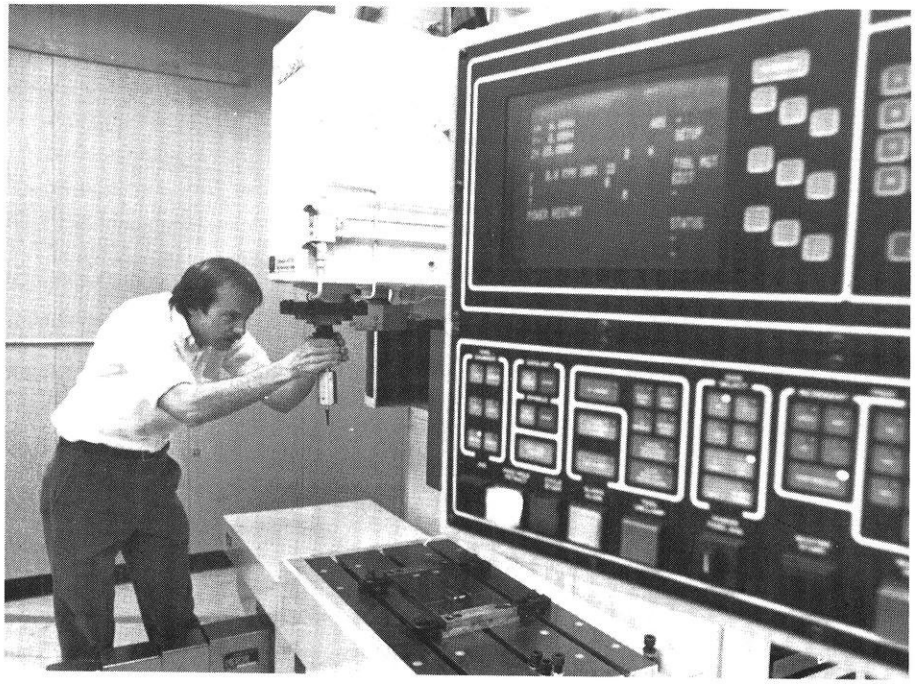
To continue academic excellence, the program has tough guidelines for students entering and studying the engineering field. Students must have a bachelor of science in engineering or a related physical science with an undergraduate grade point average of 3.00 or better. Graduates must also meet admissions requirements for the UW-Madison graduate school, plus maintain a 3.00 GPA in all graduate work.

Relating to manufacturing, the MSE curriculum includes model simulation, process development, planning, human factors, computer control, automation, robotics technology, and modern production control. Students do have the thesis option and some courses are associated with the College of Business.

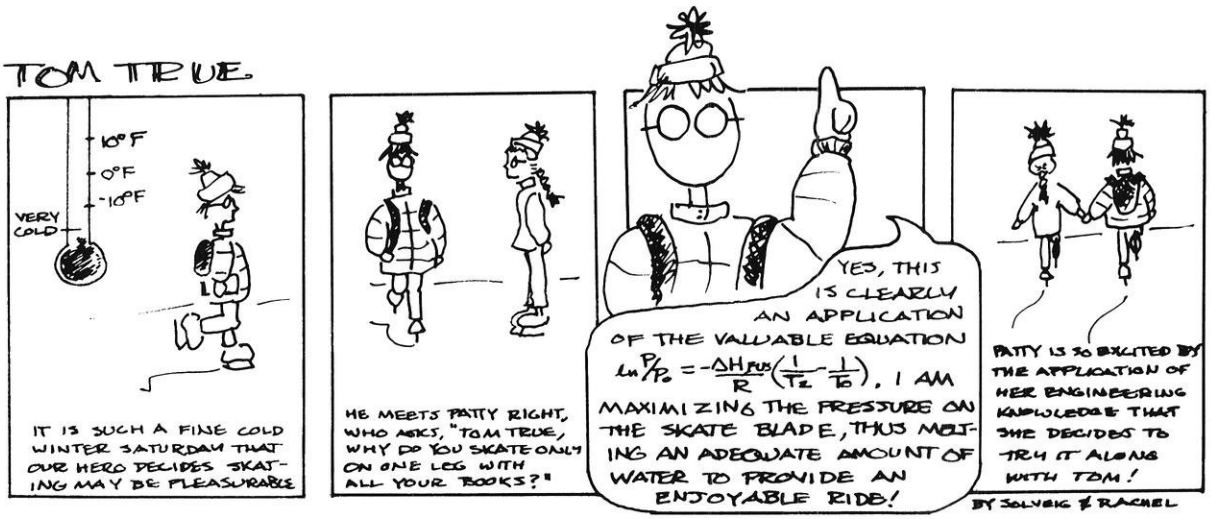
"Basically this is a program which will broaden the individual's background so he or she can interact with operational equipment, management, problems in industry or the modern computer techniques," stated Marvin DeVries, director of the MSE program at UW-Madison. "This is an excellent opportunity for those interested in manufacturing systems, and this is an exciting period for the University. We are building a unique bridge to something we don't have—engineers who can effectively deal with both technical and management aspects of the engineering business."

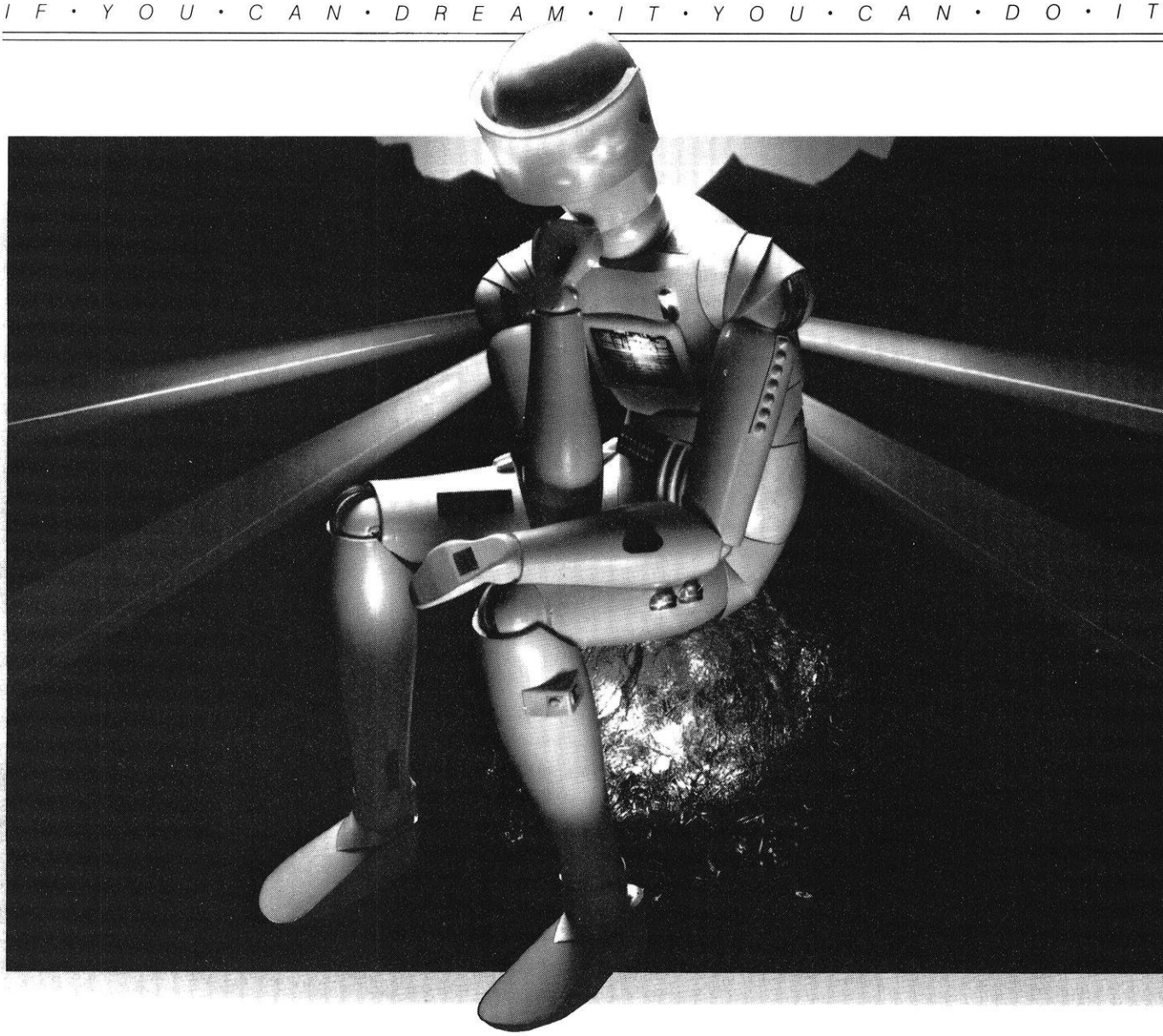
At the present time fifteen graduate students are enrolled in the program as well as eight experienced engineers who are in the work force.

Additional information on Manufacturing Systems Engineering is available at 164 Mechanical Engineering Bldg., University of Wisconsin-Madison. □



Asst. Prof. Neil A. Duffie inserts an end mill tool into the Cincinnati Milacron Machining Center, which will eventually be a component in a flexible manufacturing cell on campus. This cell will be used by MSE students to study advanced manufacturing technologies.





Create computers that capture the mysteries of common sense.

The brain does it naturally. It wonders. It thinks with spontaneity—advantages we haven't been able to give computers. We've made them "smart," able to make sophisticated calculations at very fast speeds. But we have yet to get them to act with insight, instinct, and intuition.

But what if we could devise ways to probe into the inner nature of human thought? So computers could follow the same rationale and reach the same conclusions a person would. What if we could actually design computers to capture the mysteries of common sense?

At GE, we've already begun to implement advances in knowledge engineering. We are codifying the knowledge, intuition and experience of expert engineers and technicians into computer algorithms for diagnostic troubleshooting. At present, we are applying this breakthrough to diesel electric locomotive systems to reduce the number of engine teardowns for factory repair as well as adapting this technology to affect savings in other areas of manufacturing.

We are also looking at parallel processing, a method that divides problems into parts and attacks them simultaneously, rather than sequentially, the way the human brain might.

While extending technology and application of computer systems is important, the real excitement and the challenge of knowledge engineering is its conception. At the heart of all expert systems are master engineers and technicians, preserving their knowledge and experience, questioning their logic and dissecting their dreams. As one young employee said, "At GE, we're not just shaping machines and technology. We're shaping opportunity."

Thinking about the possibilities is the first step to making things happen. And it all starts with an eagerness to dream, a willingness to dare and the determination to make visions, reality.

If you can dream it, you can do it.