

OSU IMPACT



**an ENDURING
CONNECTION**
ACHIEVEMENT in engineering, architecture & technology

THE CEAT SIGNATURE: TRADITION, INNOVATION, ACHIEVEMENT

Einstein's observations aptly frame my thoughts as we celebrate 101 years of graduates from the College of Engineering, Architecture and Technology with the publication of this issue of *IMPACT*. From the first graduates in 1902 to those in the class of 2003, our graduates have not only made their individual marks on the world but they have

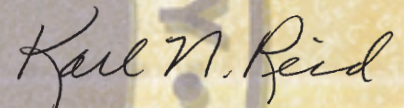
of *IMPACT* underscore this important part of today's signature.

What do Oklahoma State engineering seniors Tom Jenkins, Ashleigh Hildebrand, Cassie Mitchell, and 2003 graduates Bryan McLaughlin and Christina Lupher have in common? They each have been nationally recognized within the past

entrepreneur James R. Holland Jr., environmental consultant Kent E. Patterson, Hubble telescope engineer Donald W. Vanlandingham and oil industry innovator Jim B. Surjaatmadja. Each of these has contributed to that part of today's signature denoted by "CEAT graduates who are giants in their professions."

Another part of the signature of the College is that our members are graduates of the best educational institutions in the world. CEAT faculty has created a marvelous array of instruction, research, and outreach programs that are relevant and connected and among the best in the nation. This issue of *IMPACT* highlights some of those programs, and some of the incredible accomplishments of CEAT faculty who have achieved national and international prominence.

Read further and you will surely discover that 2003 was an extraordinary year for the College!



Karl Reid, Dean
College of Engineering, Architecture
and Technology

A HUNDRED TIMES A DAY I REMIND MYSELF THAT MY LIFE DEPENDS ON THE LABORS OF OTHER MEN, LIVING AND DEAD, AND THAT I MUST EXERT MYSELF IN ORDER TO GIVE, IN MEASURE AS I HAVE RECEIVED, AND AM STILL RECEIVING.

— ALBERT EINSTEIN

also defined the nature of the College. Many have contributed to the quality of life we have today, and many have given back to the College that gave so much to them.

Across time, each subsequent generation of graduates, through their passion and commitment, has helped create a "signature" for the College. An important aspect of the "signature" of the CEAT today is that students and graduates are *competitive with the best*. The cover and lead articles in this issue

year. Tom was named as a Truman Scholar; Ashleigh and Cassie were named as Goldwater Scholars; Bryan was named as a Goldwater Scholar and a Marshall Scholar and a *USA Today* Academic All American; and Christina was named the top industrial engineering student in the nation. *Each was competitive with the best!*

This issue of *IMPACT* also features a few of our distinguished graduates from earlier years, luminaries like architect Frank Chitwood,

Adam Hüffer



College of Engineering, Architecture and Technology national scholars Cassie Mitchell, seated, and Ashleigh Hildebrand, Dean Karl Reid and scholars Bryan McLaughlin and Tom Jenkins gather on the Student Union balcony for a photograph to commemorate the unprecedented number of national scholarships awarded to CEAT students in 2003.

I M P A C T

VOLUME 10, 2003

an ENDURING CONNECTION ACHIEVEMENT in engineering, architecture & technology

in **2**
SCHOLARSHIP

in **7**
RESEARCH

in **8**
PROGRAMS

in **12**
STEWARDSHIP

For 100 years, OSU's College of Engineering, Architecture and Technology has graduated talented and dedicated professionals who are passionate about their work and committed to building a better world. Each generation of CEAT graduates, adding to the legacies of previous graduates, has contributed design, engineering and technological advancements and helped shape an enduring tradition of innovation and achievement connecting all CEAT graduates as they endeavor to IMPACT the world.

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IMPACT is a publication of the Oklahoma State University College of Engineering, Architecture and Technology and is designed to provide information on college activities and accomplishments while fostering communication among the CEAT family and friends.

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I M P A C T

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ON THE COVER: In 2003, students in the CEAT garnered more national recognition than at any other time in the college's 105-year history. CEAT scholars featured are, clockwise from top left, Bryan McLaughlin, Goldwater Scholar, Marshall Scholar and a member of the *USA Today* College Academic Team; Ashleigh Hildebrand, Goldwater Scholar; Tom Jenkins, Truman Scholar; Christina Lupher, the top industrial engineering student in the world as selected by the Institute of Industrial Engineers; and Goldwater Scholar Cassie Mitchell. *The related stories are on pages 2 and 3.*

VIP INVITATION

The CEAT wants you to have access to up-to-date information on everything from the continuing development of the Advanced Technology Research Center to the establishment of new academic programs on the Stillwater campus and in Tulsa.

We invite you to be our guest for a VIP visit to campus and the CEAT. Contact Dean Karl Reid by phone at (405) 744-5140, by FAX at (405) 744-7545, or by e-mail at kreid@okstate.edu. If a trip to campus is not possible, visit the CEAT homepage through the OSU website at www.okstate.edu.



Bryan McLaughlin

All-American Academic

By the time Goldwater and Marshall Scholar Bryan McLaughlin graduated in May 2003 from the CEAT School of Electrical and Computer Engineering, he had garnered two more impressive honors.

USA Today named McLaughlin to the All-USA College Academic Team, and the National Science Foundation awarded him a graduate fellowship.

McLaughlin is the first student at a public university in Oklahoma to be named to the First Team of *USA Today's* All-USA College Academic Team.

McLaughlin's selection recognizes his creation of Engineering-Kids (EKIDS), a program in which OSU students visit area fifth-grade classrooms to excite young scholars about math and science; his Goldwater and Marshall Scholarships; and his internships at Sandia National Labs and the IBM Almaden Research Center.

The Marshall Scholarship he received in 2002 is funding McLaughlin's graduate study at Kings College at Cambridge where he is currently studying for master's degrees in both optical-electronics and high-speed circuit design. The National Science Foundation will defer McLaughlin's graduate fellowship award, worth \$27,000 a year for three years, until he completes his studies at Kings College.

ADAM HUFFER

an ENDURING CONNECTION OF SCHOLARSHIP

Throughout its 100-year history, the College of Engineering, Architecture and Technology has attracted and graduated exceptional students who reach the top of their professions, but no single year has surpassed 2003 in the number and achievement of CEAT student scholars.

ConocoPhillips Scholar Scores High Marks

Although reluctant at first to join her family's long line of OSU graduates, Ashley Price found opportunities at the College of Engineering, Architecture and Technology that made honoring the tradition irresistible. As a result, the May 2004 chemical engineering graduate has four patents pending and a job with ConocoPhillips.

Since her mother and father — a chemical engineering alumnus — grandparents, aunts, uncles and other extended family members attended OSU, Price intended to look elsewhere until she visited OSU and learned about the Phillips Enrichment Program, now the ConocoPhillips Spirit Scholars Program. "It was one of the reasons I liked OSU so much," she says. For Price, who admits the energy industry "is in my blood," the program's offer of a full scholarship tipped the scale.

Designed to promote leadership excellence and professional development, the ConocoPhillips Scholars program has given the Overland Park, Kan., native the opportunities to learn about the industry and build relationships within it. She interned at ConocoPhillips in research and development in the clean fuels division and in business development in the company's Liquid Natural Gas Ventures. "These internships let me see both ends of the business," Price says.

Her work as an intern looking for alternative production methods to refine ConocoPhillips' patented S Zorb Sulfur Removal Technology (SRT), which is used to meet EPA guidelines for removing sulfur from hydrocarbons, led to the filing of one international and three U.S. patents that will bear her name.

Her success landed Price a job with ConocoPhillips that will allow her to see upstream development firsthand. The one-year training program includes a rotation of three-months each in drilling, reservoir and production and will lead to a full-time position with the company. "I'll be experiencing these three areas to get a clearer idea of where I want to focus. At the end of the year, I'll go into one area or another or pursue another aspect of the business," she says. "I'm very excited."

The CEAT provided these opportunities, Price says, as well as an environment to hone her leadership skills. The 2003 finalist for the Goldwater Scholarship is president of the CEAT Student Council, the Omicron Delta Kappa National Leadership Honor Society and Omega Chi Epsilon Chemical Engineering Honor Society.

EILEEN MUSTAIN



Ashley Price



JENKINS

Lending Talent to Service

During 2003 Tom Jenkins, a senior in the School of Fire Protection and Safety Technology, became OSU's eighth Truman Scholar in 10 years.

The \$30,000 prize, which funds the final year of undergraduate study and two years of graduate study, is awarded to the nation's top college and university juniors who seek careers in public service, a path Jenkins began when he became a volunteer firefighter at age 16.

"I guess it was ingrained in me to be a public safety professional," Jenkins says. "I can't remember a time when it wasn't in my plans."

As a volunteer firefighter, the native of Broken Arrow, Okla., obtained certification, real-world experience and appreciation of the value of quality training and equipment upgrades, as well as practical advice on where to seek higher education.

"I started looking for a place to go to school, and it was right here," Jenkins says. "Everybody calls it the 'West Point of fire programs.' The degree is designed to accelerate learning in safety, hazardous materials, industrial hygiene and fire protection. It's not a firefighting program, per say, but the nation's fire service leaders learn here," he says.

"You look up big-name chiefs in the fire service periodicals, like Alan Brunacini in Phoenix, and in their bios you'll see OSU," he says. "If you want credibility behind your name, you're affiliated with OSU fire programs."

While employment as a firefighter does not require a bachelor's degree in fire protection and safety engineering technology, it can boost one's chances to head a major municipal department or work for the Federal Emergency Management Agency, says Jenkins, who plans to pursue a master's degree in public administration to further his career in the fire and emergency management services.

As president of OSU's chapter of the Fire Protection Society, Jenkins coordinated student assistance to the Stillwater fire marshal and initiated the organization's fire prevention outreach effort to the Greek community on fire prevention and safety. He is active in the College of Engineering, Architecture and Technology Scholars program and the ConocoPhillips Scholars program, and he participates in the National Fire Academy's prestigious Executive Fire Officer program in Maryland each May.

"I would like eventually to enter politics and push public safety platforms but not before serving a small city where implementing new public fire education programs and emergency and medical response policies could really make a difference," Jenkins says.

ADAM HUFFER

Continuing a Scholarly Tradition

The paths by which Cassie Mitchell and Ashleigh Hildebrand came to study chemical engineering at OSU and what they want to do in their careers are markedly different. However, their individual efforts to make the most of the experience provided by one of the university's most rigorous undergraduate degree programs are now forever linked.

Mitchell, a May 2004 graduate from Wagner, Okla., and Hildebrand, a senior from Wichita, Kan., are OSU's first multiple selections in the annual, national competition for the Barry M. Goldwater Scholarship. Their selections bring to nine the number of OSU students who since 1990 have won the premier undergraduate award for students in science, mathematics and engineering.

Mitchell first learned about engineering when exploring pre-med options during college recruiting visits. Determining her aspirations while still in high school, Hildebrand applied to OSU's School of Chemical Engineering after surveying her father's peers in

the petroleum and chemical industries and noting it was the only public university program they recommended.

Mitchell and Hildebrand have found in chemical engineering the flexibility to pursue varying scholastic interests. While maintaining stellar transcripts, they have excelled in the laboratory as Lew Wentz Research Scholars, the university's program that funds independent undergraduate research on projects of the students' conception.

On her way to an honors degree in chemical engineering emphasizing environmental protection, Hildebrand is completing the school's environmental option as well as a minor in chemistry. She spent 2003 working under the direction of Stephen McKeever, OSU Regents Professor of physics and Noble Research Fellow, in the optically and thermally stimulated phenomena lab. For her Wentz project, Hildebrand designed a dosimeter using sensor chips developed by McKeever.

A W.W. Allen Scholar, Hildebrand serves on the OSU University Honors Council and is working with the Honors Council and CEAT Dean Karl Reid to establish more honors engineering classes to give engineering students additional options in pursuing an honors degree. She plans to eventually teach at a major research institution.

Working with Randy Lewis, associate professor of chemical engineering, Mitchell designed a fluidized popcorn popper for her Wentz project. Her research experience also included a summer 2002 internship to help Tulsa-based Syntroleum engineers write a FORTRAN program as part of a computer-modeling project for transient operations of chemical reactors.

Mitchell was vice president of the OSU student chapter of the American Institute of Chemical Engineers and also active in the Society of Women Engineers. She plans to pursue a Ph.D. in chemical engineering before starting a career in biomedical engineering, where she plans to work on batteries for spinal cord stimulators and pacemakers.

ADAM HUFFER

OSU industrial engineering graduate Christina Lupher was designated the 2003 top industrial engineering student in the world by the Institute of Industrial Engineers, the world's largest professional industrial engineering society. The IIE Student Award for Excellence, given to only three graduating seniors, honors undergraduates whose scholarship and campus leadership have brought distinction to industrial engineering at their institution.

The honor capped Lupher's already illustrious career at OSU where she excelled academically while participating in dozens of student activities. During her freshman year, the graduate of Mount St. Mary's High School in Oklahoma City became a College of Engineering, Architecture and Technology Enrichment Scholar, a program that groom elite engineering students for professional leadership by providing special scholarship, travel, enrichment and networking opportunities.

By the time she graduated in May 2003 with bachelor's degrees in industrial engineering and Spanish, Lupher had earned OSU departmental scholarships from the Council of Partners, the Society of Hispanic Professional Engineers and the Lew Wentz Foundation. She also received national scholarships from the Tau Beta Pi Engineering Honor Society and the National Action Council for Minority Engineers (NACME).

Lupher participated in Collegiate Role Models for Educating Women (CREW) and the CEAT student council. She served as president of the Society of Women Engineers and the Alpha Pi Mu Industrial Engineering Honor Society and as webmaster for the OSU student chapter of IIE.

Her service to Alpha Pi Mu resulted in the local chapter being recognized by the national Alpha Pi Mu organization as the second-best student chapter in the country. The national organization also selected Lupher as one of the nation's top 10 students for 2003.

Lupher interned four consecutive summers for General Motors and became the first college intern at the Oklahoma City plant to win the GM Outstanding Intern Award. However, her plans to join the workforce are on hold while she works toward a master's degree in industrial engineering at Cornell University.

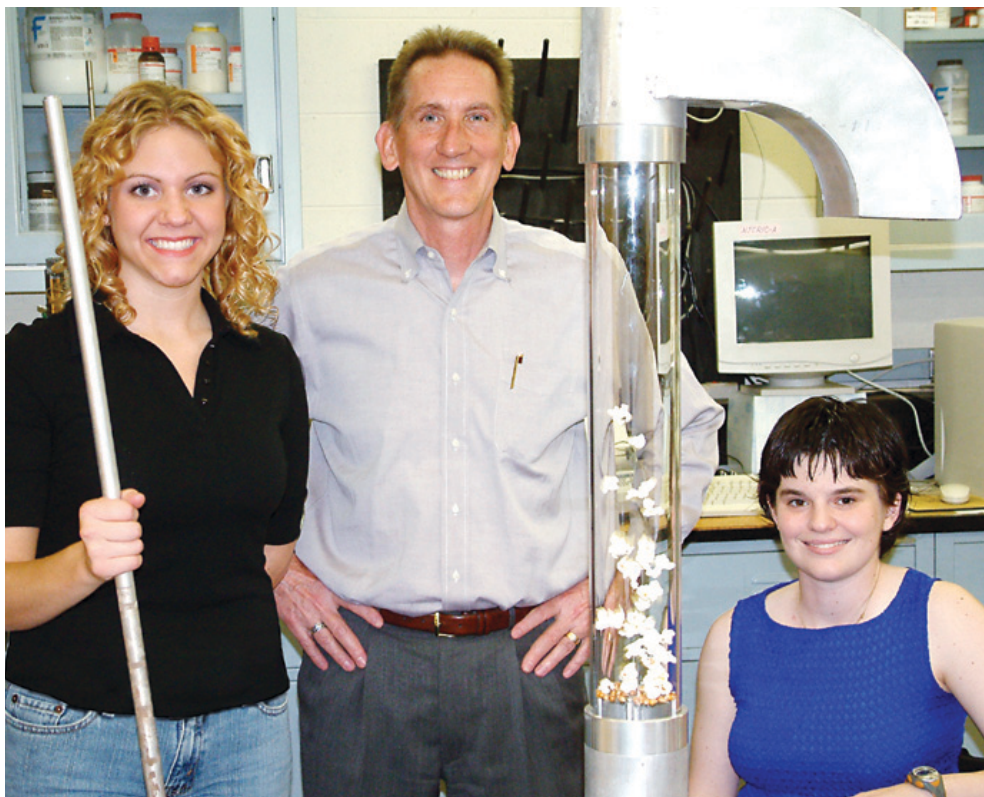
"The mentors I've had are the reason I've come so far, and I've really enjoyed being a mentor to others in organizations like CREW and Big Brothers, Big Sisters," Lupher says. "The experience has made me want to become a professor. After I complete my master's, I want to work for a few years in the private sector before going back to school to get my Ph.D. in industrial engineering, but ultimately I want to teach."

ADAM HUFFER



LUPHER

Chemical engineering students Ashleigh Hildebrand, left, and Cassie Mitchell, pose with Dr. Russell Rhinehart, professor and head of the School of Chemical Engineering, and their Wentz research projects.





Interior least terns, *Sterna antillarum athalassos*, prefer to nest on the ground on sandbars and islands within a river system, where their habitat is vulnerable to flooding when water levels are high and predators when water levels are low. One reason the interior least tern is endangered is because damming modifies river flow causing changes to the habitat where they build their nests. The U.S. Army Corps of Engineers has controlled water flow so that tern nests can be protected. While this benefits the tern habitat, it can be detrimental to hydropower generation, a key feature of the Keystone water resources.

Making the Most of the Least Tern Habitat

Enterprising biosystems and agricultural engineering seniors parlayed an academically challenging senior design assignment into an award-winning project and in the process managed to help solve a real-world need.

Mary Crawford, Matthew Simpson and Scott Schneider's work on designing an island habitat for the interior least tern was one of three collegiate-level student projects selected as the best in the nation for 2003 by the American Society of Agricultural Engineers.

Their assignment, as delivered by Paul Weckler, assistant professor in the Department of Biosystems and Agricultural Engineering, was "to create an artificial island in the middle of a river to provide a nesting habitat for the endangered interior least tern. This is a real-world problem, one that the Tulsa District of the U.S. Army Corps of Engineers would like you to solve for them," he told the students, explaining that the Corps approached OSU in the summer of 2002 and expressed interest in sponsoring a design project.

"Keystone Lake upstream has its own clientele of fishermen, swimmers, marinas and power companies; the water is in high demand for both recreation uses and hydro-power generation," says Earl Groves of the

U.S. Army Corps of Engineers, who was among the members of an inter-agency task force that worked with the OSU students.

As the water flows out of Keystone Dam, the sediments carried along by the water are deposited in a way that reduces least tern habitat for a significant distance downstream. "They like to nest on the sandy islands that stick up out of the water," says Ron Bell, reservoir control chief for the U.S. Army Corps of Engineers. "For a certain distance downstream there just aren't any because of the sediment trap caused by Keystone Dam."

Fortunately, the OSU students proved that man-made problems could be solved with brainpower and a little man-made ingenuity.

The trio combined specifications provided by the U.S. Army Corps of Engineers, the conditions of the Arkansas River and the nesting preferences of the birds to experiment with the best way to build permanent island-nesting sites.

"We met right after class that first day and started discussing plans, drawing them on paper and up on the chalkboard," says Simpson, a native of Meeker. "After going through a lot of drafts we eventually were able to use the OSU stream trailer, which allowed us to actually create a simulated river."

In the best tradition of science – observe, test and measure – the trio used the stream trailer to refine their ideas until, armed with their "simulated" knowledge, the team moved on to real-world testing at the Agricultural Research Service Water Research Laboratory at Lake Carl Blackwell, located west of Stillwater.

Using the facility, the students built and tested variations of "V-shaped" structures. They eventually settled on an inverted "V" with a barrier behind it. This choice allows the water to slow enough to trap sediment between the two structures, essentially creating an artificial island over time.

Even more fortuitous is that the artificial nesting islands provide valuable habitat for other wildlife as well. "Turtles can crawl up and lay their eggs there; amphibians of all sorts tend to congregate on these sandy islands; thousands of tadpoles can be seen; a whole host of species benefit from this type of habitat," says Kevin Stubbs of the U.S. Fish and Wildlife Service.

Groves and Bell say they are anxious to begin putting the OSU design to work in the Keystone area. "They came up with something very usable and in a very short period of time," Groves says. So usable, in fact, that the City of Tulsa has expressed interest in employing the students' design in its river systems.

In addition, the design project stands to provide yet more benefits to students, the university and Oklahoma. Fargo, Okla., native Scott Schneider was also enrolled in a graduate-level class that used the least tern project as a case study with the goal of developing a model that will one day allow scientists to create artificial nesting islands by computer.

Schneider explains that the computer modeling calculates water flow and other factors based on data provided by the U.S. Army Corps of Engineers. "It's a work in progress," says course instructor Bill Barfield, professor of biosystems and agricultural engineering. "We're not finished with the modeling effort, but theoretically we should be able to take the model we've got and put it into practice in a river."

The work done by Crawford, Simpson and Schneider has added to and helped perfect the model to the point where a final computer tool hopefully will be available to researchers and naturalists worldwide in three to five years.

DONALD STOTTS



CRAWFORD



SCHNEIDER



SIMPSON

photos/Todd Johnson

Architecture Students Continue Winning Streak

Students in the School of Architecture continued their astounding streak of success in national and international design contests in 2003, reaffirming OSU's architecture program as one of the most reputable in the country. OSU students demonstrated they are competitive in head-to-head, professionally judged matchups with licensed professionals as well as top students from other elite architecture programs.

Carrie Bobo and Michael Riley completed a project in spring 2003 that won second-place in the Malama International Professional Design Competition in Hawaii in October. Bobo and Riley's project was the only student entry to place in the contest featuring more than 500 submissions from around the world. The winner, a 13-member team of professionals from the San Francisco-based design consultancy Eight Inc., landed the commission to design the actual \$20 million project, while Riley and Bobo, now fifth-year seniors, received \$6,000.

The competition involved the design of the Malama Learning Center, a 25,000-square-foot, multi-use facility adjacent to a new, \$75-million design/build high school in the Hawaiian city of Kapolei, located on the coastal plain near the

Nature Conservancy of Hawaii's Honouliuli Preserve. The center's building program called for a unique and sustainable design to advance conservation, celebrate Hawaii's natural and cultural heritage and emphasize environment, culture, arts, science and technology under one roof.

To involve students in an exploration of sustainability, fourth-year studio instructors Khaled Mansy and Jeff Williams used the contest as the basis for the final assignment for students in their course last spring. In addition to Bobo and Riley's design, OSU entered 11 other student designs from the class under the name and license of one of their professors.

"The Malama Learning Center is envisioned as an international demonstration project on sustainable architecture, and the Hawaiian Nature Conservancy hopes it becomes a model for construction in Hawaii," says Williams, professor of architecture. "Because of the idyllic site and the center's use in the performance arts and conservation study, the program uniquely combined interesting cultural and ecological elements."

Bobo and Riley's design featuring open, high, floor-to-floor levels "produces an attractive

lantern-like structure visible from the entire area surrounding Kapolei and makes an elegant statement about conservation," writes W.H. Raymond Yeh, dean of the School of Architecture at the University of Hawaii and a member of the jury. "It is an exceedingly sensitive building design environmentally with carefully planned orientations making optimal use of the sun, natural lighting and air ventilation."

Jonathan Staub, senior designer at Philpotts and Associates in Honolulu and a community representative on the jury, says the design has nice symbolism. "I learned to understand the juxtaposition presented by this design – the idea that learning is ethereal and up in the air and that the cultural aspect was rooted in the ground," he says.

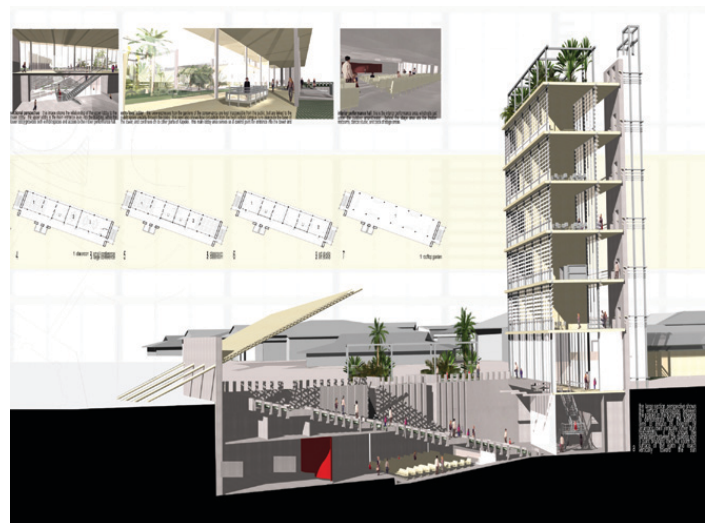
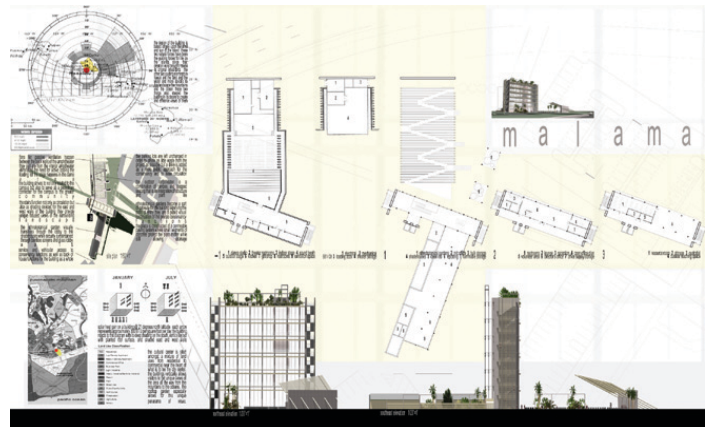
The second-place finish by Bobo and Riley adds to an impressive winning streak by OSU School of Architecture students. Over the past seven-and-a-half years, students in the school have captured 11 first-place wins, three second-place wins, six third-place wins and 21 honorable mentions in national and international competitions.

"Although there is no official compilation of student design competition results, if I were a betting man, I'd wager that no other architecture program in the country has had this many successes," says Randy Seitsinger, professor and head of the school. "I'm very proud of our students and faculty." ▲

ADAM HUFFER



Assistant professor Khaled Mansy, left, and professor Jeff Williams, shown with fifth-year seniors Carrie Bobo and Michael Riley, used the Malama International Professional Design Competition in Hawaii as a fourth-year studio assignment to involve students in an exploration of sustainability.



Other Notable Wins

Charisse Bennett garnered first place in the National Bentley Student Design Competition under the tutelage of studio instructors Mohammed Bilbeisi, Jeanne Homer and Jeff Williams.

Seung Ra and Antaiwan Wilson, under the instruction of Bob Wright, placed third in the National Prestressed+Precast Concrete Institute Design Competition.



Mathew Lee, Ph.D. student in mechanical engineering and recipient of OSU's 2002 Graduate Research Excellence Award, built and programmed a 26-processor computer system to simulate complex molecular dynamics.

Student-Built Computer Simulates Molecular Dynamics

When Ranga Komanduri, the Albert H. Nelson Jr. Professor of mechanical and aerospace engineering, offered Mathew Lee a job in 1999, Lee scarcely imagined going to graduate school, let alone the international stature of his employer. Today, Lee, a Ph.D. student mentored by Komanduri, contributes to some of the university's most innovative research.

When he graduated with a master's degree in mechanical engineering in 2002, Lee received the OSU 2002 Graduate Research Excellence Award for his thesis detailing the development of a user-friendly computer system to simulate molecular dynamics associated with nanometric cutting and tribology.

"We are interested mainly in single-crystal materials such as aluminum and copper and learning what happens when you deform and machine such materials at the nano level," Lee says. "No machines are capable of what we are simulating, so to explore it and eventually develop the machines and processes, we rely on mathematical equations."

Lee completed his master's work designing and building a \$30,000 computer system for complex molecular dynamics simulations that support ultra-precision machining research in the School of Mechanical and Aerospace Engineering's Advanced Manufacturing Process Laboratory.

"A normal PC has one CPU (central processing unit) so you can only do one thing at a time. We have 26

processors, so we can effectively do 26 things at a time," Lee explains. "It uses a normal PC workstation. But linked together with a network interconnect, it can distribute processes or computational sections of the simulation to each of the different nodes and run them simultaneously."

Collaborating with Joe Hershberger, an electrical engineering technology undergraduate, Lee coded three basic groups of applications linked by a library to perform the simulations. Each includes a user-friendly component.

"The processing software allows users to come in and create the atomic simulation they want, and it takes care of all the data structures," he says. "It handles all the complicated parts but allows users to develop or implement a molecular potential if they want to modify the model. There's also animation software to view the simulation."

Lee plans to expand his system to 256 processors, an expansion that will rival a multimillion-dollar supercomputer when completed.

When he first started working for Komanduri, Lee admits he had no idea who he was and was just happy to have the job. "I wouldn't say that I'm one of them yet, but Dr. K has produced a lot of good engineers," Lee says. "There are a few nice jobs available, but I think staying and working with him a little longer will really give me an advantage over a lot of people out there."

ADAM HUFFER

Student Bridges Gap in Tissue Engineering

Research by an OSU chemical engineering undergraduate holds the promise of hope for people reliant on tissue rejuvenation in areas such as the heart and blood vessels.

Ali Moshfeghian, now pursuing a master's degree study at OSU, is exploring and developing a new methodology for scaffold production combining both natural and synthetic materials.

"Scaffolds may be used to guide the growth of cellular tissues, but we seek certain properties with them," Moshfeghian says. "They have to be strong, non-toxic and support the cells."

Moshfeghian was one of seven finalists selected to present his work at the American Institute of Chemical Engineers national conference in fall 2002. His paper, which detailed his initial work as an undergraduate researcher under the tutelage of Dr. Sundar Madihally, assistant professor in OSU's School of Chemical Engineering, earned second place.

Madihally's bioengineering research emphasis involves the growth of tissues such as heart valves and blood vessels from umbilical stem cells.

"We feed the cells into the scaffold, grow them to a certain extent and then implant the scaffold into the body," Moshfeghian says.

"The scaffold eventually degrades, leaving the new tissue, but for a while it must support the ordering of the cells and the tissue's growth. The problem is no one material has ideal properties that meet all the requirements."

Madihally says some synthetic polymers with mechanical properties that allow researchers to manipulate the scaffold's rate of degradation and ordering of cells in tissue growth lack the cell attachment quality needed.

"On the other hand, cells will adhere readily to scaffolds made from natural polymers," Madihally adds, "but the mechanical properties of natural polymers cannot be tailored substantially."

Moshfeghian advanced his professor's concept of combining the natural polymer Chitosan, a biodegradable polysaccharide derived from materials including crab shells and insect exoskeletons, and PLGA, or poly-lactic glycolic acid, a synthetic polymer used in biomedical applications such as degradable sutures.

Moshfeghian has discovered a unique way of making the scaffold using an emulsion and freeze-drying system, although the likely prospect of licensing components of the process precludes both student and professor from revealing more specific details.

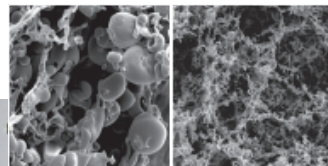
But Madihally acknowledges that the result of his protégé's work is groundbreaking.

"No one has made a tissue scaffold from emulsion, and some of the things Ali is characterizing now as a graduate student about how molecules attach to the scaffold have intellectual property implications," Madihally says.

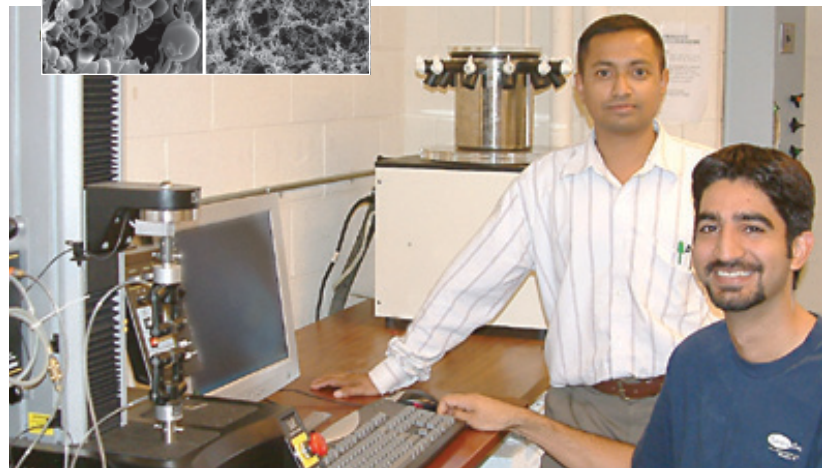
"This is a big step in the right direction."

ADAM HUFFER

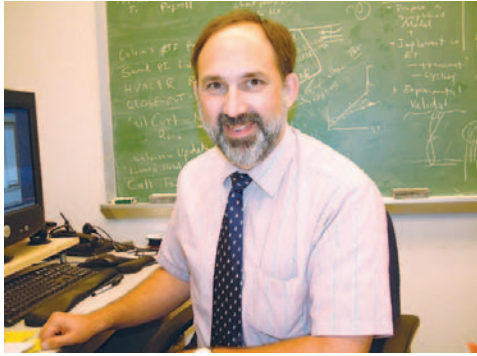
The effectiveness of the methodology Ali Moshfeghian advanced to combine natural and synthetic materials and make scaffolds for tissue engineering is evident in these photos. The first shows mixed Chitosan and PGLA polymers, their molecules clearly remaining separate. At the right are the same molecules in an organized, lattice-like arrangement after undergoing an emulsification and freeze-drying process. Now a chemical engineering graduate student, Moshfeghian presented the study he completed as an undergraduate researcher during the national finals of the American Institute of Chemical Engineers student paper competition and obtained a second place.



Ali Moshfeghian, seated, and Dr. Sundar Madihally in the laboratory.



an ENDURING CONNECTION OF RESEARCH



Adam Huffer

Fisher Collaborates on R&D 100 Project

It's no wonder that new software capable of significant cost-savings in the heating and cooling of existing and new buildings was downloaded from the U.S. Department of Energy's website more than 19,000 times last year.

The year 2003 saw remarkable occurrences in national energy affairs, such as a disruptive power outage in the Northwest, the ousting of California's governor over a budget crisis precipitated by energy regulatory mismanagement and continuing turmoil in the Mideast, the heart of global oil production.

Dan Fisher, assistant professor in the School of Mechanical and Aerospace Engineering, developed the program, EnergyPlus, along with colleagues from the University of Illinois, Lawrence Berkeley National Laboratory, Florida Solar Energy Center and the U.S. Army Construction Engineering Laboratory.

EnergyPlus is a computational engine that allows engineers, architects, researchers – and eventually homeowners – to model complex heating, cooling and lighting systems to make buildings more energy-efficient and comfortable.

Currently, energy use in buildings accounts for 30 to 40 percent of total energy use and two-thirds of electricity use in the United States. With the ability to cost effectively reduce a building's energy use by 25 percent or more, EnergyPlus is literally the first step toward achieving zero energy buildings, Fisher says.

EnergyPlus was named to *R&D Magazine's* 41st annual list of the top 100 technological achievements of the year, also known as the "Oscars of Innovation."

"There is a push within the Department of Energy, and worldwide, toward net-zero energy

buildings," Fisher says. "It's the Holy Grail of energy efficiency – a building that generates – by means of its own photovoltaic arrays – all the electricity that its high-tech, environmentally friendly systems need.

"To reach this goal requires extremely sophisticated design tools and complex models of building components," Fisher says. "EnergyPlus received this award because the computer program was designed to work at a level sufficient to achieve net-zero energy design goals."

EnergyPlus is a collection of mathematical models that describe the energy performance of a building's various components from the ventilation system and lighting to construction materials and indirect environmental effects. The software may be used to design a building and/or optimize a building's long-term energy performance.

Its usage requires interfaces that are being developed by third-party vendors. More than 50 licenses to collaborative developers and eight commercial licenses have been issued.

"We foresee homeowners eventually using a step-by-step program that asks questions, processes the responses and returns the results on screen," Fisher says. "For instance, you could run a simulation to determine how much and what kind of insulation to use or determine whether you need to add double- or triple-pane windows.

"Although the computational engine is free, the potential sale of such interfaces is the economic incentive for the third-party developers," he says.

Several buildings worldwide are being designed with EnergyPlus, including the new World Trade Center in New York City. A new federal building in San Francisco designed with the program is already under construction.

Reputation Draws NSF Workshop

When the National Science Foundation selected OSU to host its June symposium on the "Research Needs in Thermal Aspects of Material Removal Processes," it did so in part because of distinguished faculty researchers such as Ranga Komanduri, Regents Professor and the Albert H. Nelson Professor of mechanical and aerospace engineering.

Komanduri, who organized the three-day workshop, is a winner of multiple international awards for his work in precision machining and advanced manufacturing techniques and recipient of the 2003 Regents Distinguished Research Award.



Adam Huffer

Ranga Komanduri, center, 2003 Regents Distinguished Research Award recipient, appears with Mallika Kamarajugadda and Sujatha Iyengar. They, along with Naga Chandrasekaran, not pictured, received the Society of Manufacturing Engineers' 2003 Jiri Tlusty Outstanding Young Manufacturing Engineer Awards, bringing to eight the number of recipients who obtained master's and/or Ph.D. degrees at OSU under Komanduri's tutelage.

"We have been working on the thermal aspects of all kinds of specialized manufacturing processes here for a number of years, and our program has an excellent reputation not only with NSF but with our peers around the globe," Komanduri says. "NSF provided us with the funding to hold this workshop because of that reputation."

Underscoring that reputation for quality was the formal presentation of the Society of Manufacturing Engineers' 2003 Jiri Tlusty Outstanding Young Manufacturing Engineer Awards to three alumni of the School of Mechanical and Aerospace Engineering graduate program.

Naga Chandrasekaran with Micron Technologies Inc. in Boise, Idaho; Sujatha Iyengar with Saint Gobain Abrasives in Worcester, Mass.; and Mallika Kamarajugadda, an employee of Seagate Technology in Minneapolis, Minn., are among a select handful of six to eight practicing engineers a year who receive the SME honor.

Iyengar, Chandrasekaran and Kamarajugadda bring to eight the number of people who obtained master's and/or Ph.D. degrees in the school under Komanduri's tutelage prior to receiving the honor. ▲

an ENDURING CONNECTION OF PROGRAMS

New Center Links OSU, Industry

Dottie Witter



A Cooking Class for Firefighters?

Heart attacks — not fires — were the number one cause of firefighter fatalities in 2002, accounting for 37 of the 100 on-duty deaths, according to the U.S. Fire Administration.

Stress continues to increase for the men and women who are on the frontlines today not only for fires but terrorism.

OSU's Fire Service Training, in conjunction with the OSU Seretean Wellness Center, decided it could play an active role in helping to decrease these unnecessary deaths. Fifteen years ago the program developed "Fire Department Fitness Instructor Certification Training," which covers basic health and fitness, exercise, fitness assessments, stress management and nutrition.

Firefighters from around the nation journey to Stillwater twice a year for this program of professional instruction and state-of-the-art health education, a specially designed train-the-trainer program for fire service personnel.

According to Mary Talley, Seretean Wellness Center activities coordinator, all firefighter fitness programs must include activities for cardiovascular fitness, weight training and flexibility conditioning (stretching).

The program grew from the need for fire service people to be in good physical condition, Talley says. "Some of the firefighters in the program are firehouse firefighters, but some may also have a more supervisory capacity."

During their five days on campus they also eat lunch in the residence halls. "After the first day, their challenge is to make healthier choices for lunch," Talley says. "One thing they really seem to enjoy is the cooking demonstration because we try to teach them how to make firehouse cooking a little more healthy, yet tasty."

Dietitian Elizabeth Lohrman characterizes firemen as meat and potato eaters typically but notes that firehouses are becoming more health conscious. Before designing the menu she teaches, she gets to know their likes and dislikes.

"Part of the problem is they never know when they'll be called out, so there's a tendency to fill up when they can eat, and portions may be larger than we consider healthy," Lohrman says. "Stress is part of their job, and food is a major source of pleasure."

The departments of the participants are in every stage of development, Talley says, some starting from scratch with no programs of fitness or wellness, while others come from established programs to learn how to improve them.

"Sometimes their programs grow because the chief tells them to come, but a lot of the firefighters who come to our program have a background in exercise science, either a degree or personal interest," Talley says. "Hopefully we'll give them the tools to help develop a program and get it up and going."

DOTTIE WITTER

Warren Lewis, assistant professor of mechanical engineering technology, and mechanical engineering senior Eric Beeghly demonstrate lathe operation in the new Haas Technical Education Center.

OSU engineering and technology students can now experience the sophisticated tools of industry firsthand at the College of Engineering, Architecture and Technology's new machine tool laboratory, the Haas Technical Education Center. Generally cost-prohibitive for universities, the center's state-of-the-art computerized machine tools are made possible by an alliance with Haas Automation Inc. and the Haas Factory Outlet in Tulsa (a division of Timco) as well as the generosity of other supporting companies.

Haas, the largest manufacturer of American-made machine tools in the U.S., offers significant discounts to educational institutions as well as a unique entrustment program that allows schools to use entrusted machines for two years and then purchase them at fair market value or return them to the company for resale.

Through its agreement with Haas, the CEAT has acquired a vertical machining center, a turning center and lathe and mill simulators. Additionally, in exchange for posting their company names, Kennametal donates the tooling and Blaser the cutting fluids. Solid Works provides the parametric modeling software at a reduced price.

"Students are able to take their computer designs directly to the lathe," says Warren Lewis, assistant professor of mechanical engineering technology. "The Mini Baja team drew and tooled its race car's housing in one afternoon," he says,

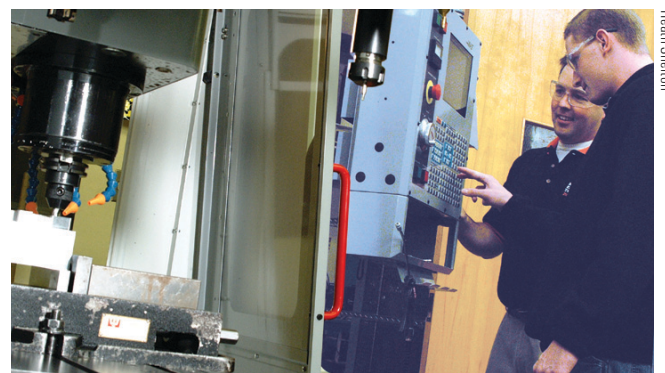
noting that several departments use the lab. "Industrial engineering classes use the machines for tool and process capability studies, and mechanical engineering technology classes use the machines to learn how to design and manufacture parts efficiently.

"We're educating the managers and engineers of the future," Lewis says. "With the Haas Technical Center, our students will be better prepared to step into industry positions because they're using the same technology to learn engineering processes." The Haas Center also helps students establish industry connections through interaction with the companies' representatives, he says.

OSU is likewise building relationships with Haas and the other industrial companies who help supply the center. But that's only one of the benefits, according to Lewis. Having the most current technology available aids CEAT recruitment and helps maintain accreditation status. "ABET (Accreditation Board for Engineering and Technology) looks for updated equipment," he says.

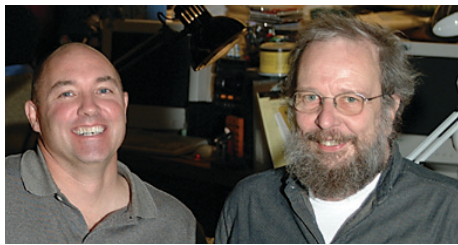
Establishing the center also benefits Haas as well as the other industrial suppliers. "As future engineers and machine purchasers, our students will already know Haas equipment and will certainly recognize the names of the companies who donate to the center," Lewis says. "The center gives Haas the opportunity to advance quality engineering education."

EILEEN MUSTAIN



Heath Shelton

Head of OSU's School of Architecture, Randy Seitsinger, left, credits architecture professor David Hansen, right, with the development of the school's new cross-cultural program, which is designed to increase student awareness of cultural influences on professional practice and to serve as a teaching model for professional practice education.



Heath Shelton

Architecture 'Crosses the Line'

The OSU School of Architecture has laid plans to pioneer a program designed to give architecture students a venue for understanding professional practice across cultural lines.

The new program, "Designing a Professional Practice Curriculum for Cross-Cultural Mobility and Community Engagement," is a partnership among nine schools of architecture in the U.S., Canada and Mexico funded by national grants from the participating countries. In addition to boosting the potential for professional mobility, the program aims to provide a teaching model for incorporating cross-border architectural competencies in the studio and an innovative approach to language development and cultural literacy.

Each partner institution in the program, slated to begin in fall 2004, will host a one-semester "international" studio focused on community engagement and cultural identity and comprised of students from the out-of-country partner institutions and the host school. Along with the pilot studio, the host institution will offer a co-requisite course to teach technical and professional terminology and practice regulations while familiarizing students with U.S., Canadian and Mexican cultural issues.

The U.S. Department of Education's Fund for the Improvement of Post Secondary Education (FIPSE) Program has awarded the OSU School of Architecture a four-year, \$65,611 grant to spend on this program. In addition to salary for an adjunct faculty member during the semester OSU hosts the international

studio, the grant provides funds for Spanish language instruction and travel along with \$27,000 to support nine students for study in one of the three Canadian or three Mexican universities.

The program targets students in the second semester of their third year through the fifth year, says Randy Seitsinger, head of the School of Architecture. "Although we're still developing selection criteria, it will likely include academic excellence and language preparation. Language is critical to international practice," he says, noting that classes at the three Mexican universities will be taught in Spanish.

When hosting the studio in fall 2005, OSU will receive 12 students, two from each of the Mexican and the Canadian universities, and pair them with OSU students. The program's interactive exchange will profoundly affect everyone, Seitsinger says. "In addition to the benefits for participants, their experiences and those of our guest students will provide insight into how those from other countries approach their environments."

Each studio will undertake a community-based project that will enhance economic development while meeting the requirements of sustainability and the community culture. "The students must find architectural solutions, and in doing so they will come to understand the architectural process and the community," Seitsinger says.

"Other schools of architecture are exploring international exchange," he says, "but the teaching methodology and the community approach in our program are innovative."

EILEEN MUSTAIN

Collaborations Customize Education

You might call it "custom education." But however you classify it, there is no denying the College of Engineering, Architecture and Technology's multidisciplinary programs are a huge success.

With 99 graduates as of fall 2003, OSU's Master of Science in Engineering and Technology Management (MSETM) program is a case in point. The MSETM program, designed for the engineer and scientist who have worked in industry for at least three years, is a made-to-fit program, says Ken Case, Regents Professor of industrial engineering and management who helped plan the curriculum. "We asked our customers 'How can we, as an educational institution, serve your needs?'"

Examining the list, it became apparent that no one department or college could satisfy all the requirements. Engineering could supply some of the requests but others involved learning how to read balance sheets and profit and loss statements or the management of people, Case explains. "Consequently, different groups from within the Colleges of Engineering, Architecture and Technology, Business Administration and Arts & Sciences had to team together, and the result has become a very, very popular program."

The program followed the lead of the Master of Science in Telecommunications Management (MSTM) program, which also makes use of a consortium of the Colleges of Engineering, Business Administration and Arts & Sciences.

The MSTM program, based in the College of Business, teaches technical and regulatory trends in the telecommunications industry and gives students a foundation for managing and designing telecommunications systems within organizations.

Another multidisciplinary graduate program that has evolved in the CEAT includes the Master of Science in Health Care Administration. This program calls on courses from the MBA program, political science, nutritional sciences and industrial engineering and management as well as other OSU courses.

Started in 1999, the Master of Science in Control Systems Engineering (MSCSE) blends classes from chemical engineering, electrical and computer engineering, industrial engineering and management and mechanical and aerospace engineering. "Our program is designed to help those who have undergraduate degrees in engineering or one of the sciences make the next step up in their companies," says Brenda Johnson, assistant director of the MSCSE program, which graduated its first student in December 2003.

Because most of the students are working professionals, the multidisciplinary programs accommodate students by streaming the courses over the Internet and delivering class material via CD-ROMs and interactive two-way video conferencing to a local OSU facility or to their corporate facility, Case says, citing remote classes at Halliburton, Seagate and ConocoPhillips.

TOM JOHNSTON

Vision 2025 Includes OSU Research Center

Tulsa County's vote to approve Vision 2025, a 1-cent sales tax increase to finance \$885 million in business incentives and community improvements, includes \$30 million to build a 180,000-square-foot Advanced Technology Research Center at OSU-Tulsa.

Focused on the development of next generation composites and materials for the aerospace, biotechnology, telecommunications and manufacturing industries, the ATRC is expected to create new jobs, attract new industries and produce an annual payroll of \$8 to \$10 million, including federal and private research funds.

It's expected that the greatest economic impact will come from commercializing the technology the research develops. The economic impact from spin-off companies marketing these technologies could reach \$400 million annually within 10 to 15 years.

New Product Development Center Yields Four Successes in First Year

When four of Oklahoma's small manufacturers said they needed help taking their companies to the next level, OSU engineering faculty and students made it happen through the New Product Development Center for Small Rural Manufacturers.

"We've completed new products for four small Oklahoma companies in our first year," says Larry Hoberock, co-director of the New Product Development Center along with Bill Barfield, Regents Service Professor of biosystems and agricultural engineering.

"Of the four projects, we expect to see 80 to 100 new manufacturing jobs in Oklahoma," adds Hoberock, professor and head of the School of Mechanical and Aerospace Engineering.

Manufacturing Extension Agents and OSU Applications Engineers through the Oklahoma Alliance for Manufacturing Excellence work with existing small manufacturers to determine a product's potential and then submit an application to the New Product Development Center.

Following a market analysis coordinated by the New Product Development Center Advisory Board and by Marketing Professor Gary Frankwick in the OSU College of Business Administration, Hoberock and Barfield approach faculty about the particular projects.

"It's a voluntary process depending on the specific expertise and interest of the faculty," Hoberock says. "Faculty are expected to bring in grants and contracts and these New Product Development Center projects are already funded, just looking for the right person to lead them."

The Oklahoma legislature appropriated \$400,000 for the Center's first year of operation in 2003 through the Oklahoma Department of Commerce and the Oklahoma Water Resources Board. This year the legislature committed another \$300,000 through the Oklahoma Department of Commerce. For 2005 and succeeding fiscal years, current plans call for \$300,000 each year from the legislature. The funds defray the costs of developing prototypes by paying for equipment and salaries for graduate student researchers, staff and faculty.

"This is one way for OSU to introduce our students to companies and show Oklahoma business leaders what our students can do," Hoberock says. "We hope these companies will hire them for further product development ideas because part of this concept is teaching companies the process of developing a new product and what kind of talent they need to go to the next level."

REMOTE CONTROL RAILROAD GONDOLA CAR MATERIAL HANDLER

An Oklahoma company wanted to create a large, remote-controlled machine that could mount itself on top of a railroad gondola car and then unload cargo from the railroad car or load cargo into the car before moving on to the next car.

"It had to be able to demount itself, as well," Hoberock adds.

"In addition, the company wanted the remote-controlled device to be able to travel from car to car without endangering the operator," Hoberock says.

Professor Marvin Smith of mechanical engineering technology took on the project and with the assistance of staff engineers Randy Perry and Fred Schroeder produced a prototype that was successfully field tested last spring and was transferred to the company. OSU Applications Engineer Win Adams is working with the firm to bring the product to full commercialization. A patent application has been filed, and licensing terms have been agreed upon. The company is planning a plant expansion, and up to 15 new manufacturing jobs are ultimately expected.

WIRELESS DATA TRANSFER FOR TRUCK SCALES

Another Oklahoma company with a solid reputation in the manufacture and sale of scales for weighing large trucks, such as in grain elevators and highway weight check stations, wanted to remove the wired connections from the scales to the central data collection station.

They proposed a wireless data transfer system that would solve the problem of wired connections failing due to abuse and fraying in tough environments and allow the data collection system to be located much further away.

"Such a capability would not only remove maintenance problems but would also open up new markets in airports and marine ports," Hoberock says. "Furthermore, if the data collection station could be located near an Internet connection, the data could then be easily transported to a central company facility, where calibration and diagnostics could be checked remotely by qualified technicians."

Professors Marvin Stone of biosystems and agricultural engineering and Tom Bertenshaw of electrical engineering technology led a team of students and staff, including Bill Holloway and Leonard Skach, along with assistant professor Ellis Nuckolls, in developing the working prototype.

Demonstrations of the device were held last summer, and the client has already added three engineering positions to his staff to begin integrating the device into his operations. In addition to creating new jobs in his current manufacturing plant, a new service center with engineering and information technology professionals has been started. The first customer trials are imminent, and production is expected to begin within the year. Up to 40 new jobs could ultimately result from this new product.

GRASS SPRIGGER MACHINERY

An Oklahoma company already known as a world leader in grass sprigging equipment used by farmers to plant grass in pastures turned to the New Product Development Center to be able to expand its product into other areas.

courtesy Paul Weckler



Assistant Professor Paul Weckler and his students in biosystems and agricultural engineering created a controller that provides greater flexibility in the production of planting grass.



Reviewing test results in the New Product Development Center are Sam Harp, OSU associate professor and senior applications engineer; Larry Hoberock, co-director of the New Product Development Center, and the president of a small manufacturing client of the NPDC.

The New Product Development Center links the innovative ideas and capabilities of rural manufacturers with the knowledge and technical expertise of land grant university faculty to develop and commercialize new products that strengthen rural economies and result in new and enhanced jobs, capital investment and increased tax bases. It is sponsored by the College of Engineering, Architecture and Technology and the Division of Agricultural Sciences and Natural Resources.

"Our goal in these partnerships is to promote job growth in rural areas by assisting manufacturers with the knowledge to produce new products," he says.

Hoberock says many small companies have a particular idea in mind for a new product, but they don't have the resources or technical capability to transfer the idea from concept to prototype.

"Without the means to introduce new products and take their companies to the next level, they often end up in decline due to competition from other 'me too' products, or they move their production to other countries with cheaper labor," he says. "That hurts Oklahoma when we lose those jobs."



WECKLER

"They wanted to expand their product to be useful at golf courses, hotels, resorts and other manicured lawn areas," Hoberock says.

Assistant Professor Paul Weckler and his students in biosystems and agricultural engineering had already developed a hydraulic system for the company through a separate class project. Now the challenge was the creation of a controller that would allow flexibility for the operator so that planting distances of each sprig of grass could be controlled and varied "on the fly."

"The prototype was field tested last summer and fall and is now being hardened for manufacture, with the assistance of OSU Applications Engineers Sam Harp and Clay Buford. The company will be taking it to national equipment shows next spring," Hoberock says. "I expect this company to be selling the product within the year." Up to 10 new jobs are expected.



Janet Varnum

J.M. Chung, right, associate professor of electrical engineering, with a group of graduate students, including Moses Lynn George and Theepa Natarajan, shown here, developed a working prototype of a high fidelity, wireless communication device for an Oklahoma company through the CEAT's New Product Development Center.

WIRELESS COMMUNICATIONS

One Oklahoma company wanted to create a high-fidelity, wireless communication device for "first-responders," such as police and firemen, capable of performing in "cluttered" areas without interference yet small and light enough to clip on a helmet.

"This company wanted to create a communications device that would give first-responders the ability to communicate even if they lost their home base," Hoberock says. OSU Applications Engineer Jim Friesen was instrumental in bringing the company and its concept to the center.

J.M. Chung, associate professor of electrical engineering, accepted the challenge and with a group of graduate students developed a working prototype. However, the company changed its marketing plans and elected not to pursue licensing. The device will be made available for other interested companies.

JANET VARNUM



Todd Johnston

Engineers working in OSU's Applications Engineering Program are back row, left to right, Doug Enns, Clay Buford and Sam Harp; and front row, Win Adams and Jim Friesen.

Applications Engineering Program Increases Oklahoma's Bottom Line

What would you say if someone asked you the location of the nation's leading manufacturer of anesthesia bags? Would you guess Akron, Ohio? Houston, Texas? How about Noble, Oklahoma.

Noble's Morris Latex Company is but one of the bright spots in the growing list of satisfied customers of OSU's Applications Engineering Program. The program, formally initiated in 1997 to address difficulties faced by Oklahoma's small rural manufacturers, works in tandem with the College of Engineering, Architecture and Technology and the Division of Agricultural Sciences and Natural Resources and the Oklahoma Alliance for Manufacturing Excellence. It is designed to bring help to small manufacturers in such areas as OSHA and EPA compliance, process and product development, manufacturing facility layout and manufacturing cost analysis.

The aim of the program is simple: if applications engineers can help rural manufacturers hurdle production problems, the manufacturers can increase quality and output, leading to larger businesses, which provides more jobs, which builds the county tax base, which leads to a financially stronger Oklahoma.

The program had a banner year in 2003, as it served more than 100 small, mostly rural, manufacturers employing a total of more than 4,500 people.

Sam Harp, senior applications engineer and director of program operations, says the program fills a strong need. "Manufacturers in Tulsa or Oklahoma City might not have any problem getting engineering help. But the further you get from the urban centers, the less likely it will be that the small manufacturer will get the help he or she needs. We think meeting those needs is a perfect fit for the land grant mission of Oklahoma State University."

In the case of Morris Latex Company, the firm was being plagued by the large amount of bags being rejected by their quality control section because of air leaks around the necks of the bags. Out of the 65,000 bags they make per day, approximately one in 10 was being rejected. The applications engineers shot slow-motion video of the factory's processes and determined the machine fingers that pull the bags off the forms weren't pulling them far enough away from the form to remove them, thus producing friction

that caused the leaks. The engineers suggested some adjustments to the manufacturing process and the implemented result substantially decreased the factory's reject rate. This resulted in lower production costs, which allowed the company to expand its market presence.

It's a result that has been repeated many times during 2003 from pet supply manufacturers to coffee companies to grass sprigging machine developers. The effort included more than 5,000 hours of direct engineering assistance and technology transfer activities.

Harp feels the time was well spent, however. As the result of the work of the six applications engineers on his staff, an independent survey of program clients has shown the total impact to the state was in excess of \$144 million in 2003.

"We were surprised at the size of our impact, considering the present economic picture," Harp says. "Everyone is looking to improve the bottom line, and we're very glad we can help them." ▲

TOM JOHNSTON

APPLICATIONS ENGINEERS CLIENT PROJECTS: FY 2003 IMPACTS

SALES INCREASE	\$41,085,950
SALES RETAINED THAT WOULD HAVE OTHERWISE BEEN LOST	\$36,069,700
COST SAVINGS	\$2,562,942
COSTS AVOIDED	\$1,891,857
436 NEW JOBS CREATED AT \$75,511 PER JOB	\$32,922,756
179 JOBS RETAINED AT \$75,511 PER JOB	\$13,516,469
18 JOBS LOST AT \$75,511 PER JOB	-\$1,359,158
INVESTMENT IN NEW PLANT FACILITIES AND EQUIPMENT	\$17,441,395
TOTAL IMPACT	\$144,131,911

an ENDURING CONNECTION OF STEWARDSHIP

AEP/PSO Supports Engineering at OSU-Tulsa

American Electric Power/Public Service Company of Oklahoma (AEP/PSO) has given \$25,000 to support the engineering program at OSU-Tulsa.

"This contribution will enable OSU-Tulsa to provide more opportunities for our students and faculty. When these students graduate, they'll be better prepared to work at companies like AEP," says OSU-Tulsa President Gary Trennepohl.

OSU is the second most recruited school in the nation for employees of AEP/PSO, according to Bill McKamey, general manager of community affairs.

Pete Churchwell, AEP/PSO president for Oklahoma, notes the historical relationship between the company and OSU. "We truly depend on OSU for preparing our future engineers. We have worked closely with the Stillwater campus and now are developing new associations on the Tulsa campus," he says.

"AEP/PSO has been very good to Oklahoma State University through the years," says Karl Reid, dean of OSU's College of Engineering, Architecture and Technology. "Excellence occurs in our engineering programs because of donors like AEP/PSO that care about quality."

The gift, to be administered by the OSU Foundation, will expand OSU-Tulsa's engineering program in the following areas:

- AEP/PSO Scholars Fund – 10 scholarships for outstanding students in various engineering fields
- AEP/PSO Excellence in Teaching Awards – two awards for outstanding faculty members and two for outstanding graduate instructors in engineering fields at OSU-Tulsa
- K-12 Focus on Engineering – a K-12 engineering awareness program for Tulsa area schools
- AEP/PSO President's Excellence Fund – field trips to AEP/PSO headquarters for scholarship students and their sponsors and support for the OSU-Tulsa student chapters of the American Society of Mechanical Engineers and the Institute of Electronics and Electrical Engineers

MARY BEA DRUMMOND

The School of Fire Protection and Safety Technology's new 10,000-square-foot fire laboratory at the corner of McElroy and McDonald Streets opened in October 2003 and currently holds approximately half of the fire protection and safety lab courses.

The remaining sections expect to move there by the start of the Fall 2004 semester as additional labs come online.

Heath Shelton



OSU Fire Lab Sparks National Interest

As OSU's School of Fire Protection and Safety Technology nears completion on its most substantial infrastructure development since building Fire Station No. 2 in 1939, Hughes Associates Inc. is donating \$25,000 to the school to help equip the new fire laboratory with a large-scale calorimeter for use in fire simulations.

Hughes, a fire science and engineering firm in Baltimore, Md., represents 12 companies in the fire services and fire protection and loss control industries and is a member of the school's advisory board.

"This much needed facility will serve the OSU fire community in fulfilling its missions for many years to come, and HAI is happy to assist with the project," says Craig Beyler, technical director at Hughes Associates.

The new fire laboratory will expand the hands-on components of the program, according to Thomas Woodford, associate professor and head of the school. "This new building is adding three major capabilities to our students' lab experience, a pump and sprinkler lab, an industrial hygiene lab with chemical fume hoods and a fire behavior lab.

"Under one roof, we'll be able to simulate an actual room fire, link it to an alarm system and measure how the alarm and the sprinkler system react and how the pumps react to the operation of the sprinkler system. Essentially, students in this laboratory will be able to take data at all stages from ignition to detection to suppression – that's a very unique capability," he says.

ADAM HUFFER

A Special Gift From a Special Family

The School of Civil and Environmental Engineering has received a major donation to *Project Excellence*, the school's campaign to update its laboratories. The Schwarz family, owners of Schwarz Ready Mix Inc. and its affiliated companies, has donated \$105,000 toward updating OSU's concrete laboratory.

This generous gift, the largest to *Project Excellence*, is unique not only in its size but in its source. The donation comes from seven Schwarz brothers, each of whom donated \$15,000. All seven work in the Schwarz companies and graduated from OSU.



SCHWARZ

Their parents, Pete Schwarz and Clara Reding, married in 1940 and settled on a 160-acre farm in Okarche, Okla. In late 1947, realizing the farm would not support their large and growing family, they bought two old Ford trucks and two concrete mixers and started Schwarz Ready Mix Inc.

A true "mom and pop" operation, their business prospered, and in 1952 the couple built a second ready mix plant in El Reno and a third plant in Yukon in 1956. In 1978, the Schwarz Paving Company spun off as a separate corporate entity specializing in concrete paving. Today Schwarz companies have 11 ready mix plants, 95 ready mix trucks, 30 tractor-trailer trucks, three sand-mining quarries and projects ranging from interstates to housing additions. They employ 250 Oklahoma City area residents and generate about \$40 million in annual sales.

In 1976, Pete retired and turned over Schwarz Ready Mix to his sons. All seven, Charles, Philip, Gene, Jim, David, George and Mark, have remained with the Schwarz companies.

They attribute their success to the twin values of hard work and fairness instilled in them by their parents. They are proud of following Pete's insistent admonition to treat their customers as family.

The Schwarz brothers' gift to *Project Excellence* is their way to repay OSU for the opportunities it provided them. The family reports they unanimously agreed to the gift with not a word of discussion at a recent stockholders meeting. They also agreed their father, who died in 1990, would approve of the gift. ▲

CHARLY FRIES

The Schwarz brothers pictured here with their mother, Clara, are, from left front, George, Mark and Gene and, from left back, David, Jim, Charles and Philip.



courtesy/Schwarz Family

an ENDURING CONNECTION OF HONORS



Todd Johnson

JOHNSON

Johnson Elected President of International Student Organization

Biosystems and agricultural engineering senior Candice Johnson was elected the 2003-04 president of the American Society of Agricultural Engineers (ASAE) National Preprofessionals Branch last fall during the annual meeting of the ASAE in Las Vegas, Nev. Johnson is OSU's second biosystems and agricultural engineering student elected to the office in the past six years, following Carly Washmon who held the 1998-99 presidency.

ASAE is comprised of 9,000 members in more than 100 countries. As the society's chief student officer, Johnson will head the six-member Preprofessional Officer team in its leadership of ASAE's 48 student-engineering branches and 25 student-mechanization branches around the world.

"Our primary goal on the officer team is to get students involved and show them how participation in a society like ASAE can influence professional pursuits and improve knowledge in their areas of interest," Johnson says.

Each summer since her freshman year as part of the College of Engineering, Architecture and Technology's Cooperative Education program, Johnson has worked full time for John Deere at the plant near her home outside Ankeny, Iowa. Last summer, she worked on sprayer design, an especially unique opportunity for Johnson, who has also been employed as an undergraduate research assistant by Professor John Solie, one of the principle investigators on OSU's GreenSeeker Sprayer, a sensor-based variable-rate fertilizer sprayer applicator for field crops.

An Outstanding Record

Six of the past seven years, OSU's student chapter of the American Institute of Chemical Engineers (AIChE) has ranked in the top 10 percent of the 150 AIChE chapters nationwide.

courtesy formula team



OSU's 2003 formula team placed in the top 10 percent in the nation in the Society of Automotive Engineers (SAE) national engineering competition. Competing with universities from around the world, the team's Formula SAE® race car placed 11th out of 125 overall, including 15th in the Design Event and third place in the Engine Management award.

A Team With a 'Lotta' Pull

OSU's Cowboy Motorsports team made an impressive showing at the 2003 American Society of Agricultural Engineers' quarter-scale tractor competition in Moline, Ill., in May. The motorsports team placed second in oral presentation, third in performance pulls and fourth overall in competition with more than 30 teams from the U.S. and Canada. The X-team – underclassmen who make improvements to the previous year's tractor and work on developing the new tractor – placed first overall in a field of 12.

The senior team members were Levi Johnson and David Crossley, co-directors of Cowboy Motorsports, Jacob Hamburger, Chad Fisher, G.L. Slaughter, Kyle Stein, Candi Johnson, Colby Funk and Adam Bohl. The X-team members were Joe Biggerstaff, the junior team director, Dustin Holden, Taylor Miller, Adam Gossen and Ryan Haar. John Solie, biosystems and agricultural engineering professor, was the team's adviser.



courtesy Cowboy Motorsports

Pink Power



Fuss Rheinhart

OSU chemical engineering students entered the first ChemE car in the national competition at the American Institute of Chemical Engineers (AIChE) in November 2003. Although the team came in 15th in a field of 25, the experience will help future teams compete nationally, says Ashley Price, member of the all-female team called the Pink Ladies. "We wanted to combat the masculinity of car building with a really feminine team name," says Price. "We wore goggles with rhinestones on them and put a pink rose in the water container on our car." The Pink Ladies team members are, from left, Emily Bruce, Lacy Smith, Sabrina Cobb, Ashley Price, Melanie Wright and Kelly Lane.

CMT Team Places Second Nationally



courtesy Dept. of Construction Management Technology

OSU's heavy/civil team included, left to right, Clay Patterson, Justin Lillie, Tim Caudle, Evan Anderson, Dana Hobson, department head and team coach, Quinten Smith and Reid Adams.

Students from the construction management technology department placed second in the heavy/civil construction portion of the Associated Schools of Construction/Associated General Contractors of America (ASC/AGC) national student competition held in April 2003.

The students earned the bid to nationals after dominating their regional competition in February.

Each ASC member may send a team to the ASC regional competitions to compete in one of three categories, commercial, heavy/civil and design-build. There are 140 construction schools located in the seven regions comprising the ASC.

The competition enables undergraduate ASC member students to participate in bidding scenarios that simulate the real-life process. The teams are judged on presentation skills, creativity, understanding of sound construction techniques and thoughtful methodology. ▲

STORIES BY ADAM HUFFER AND EILEEN MUSTAIN



Marvin Stone

A Three-Time Winner

Marvin Stone has had a great year, capping his 2002 Regents Distinguished Teaching Award with two additional regents honors in 2003. Excelling at both teaching and research, the professor of biosystems and agricultural engineering was named Regents Professor and also received the 2003 Regents Distinguished Research Award.

Winning awards is not new to Stone, who was named the American Society of Agricultural Engineers Young Educator in 1989 and the Halliburton Outstanding Faculty member in 1990 and in 2001.

"Students need the opportunity to succeed. Small successes are sufficient, and providing opportunity for successes is a key to learning," Stone says.

He says it's critical to convey practical relevance and give students the chance to relate what they're doing in class to what they will need to do later. "Even if engineering students are concentrating on a specific discipline, they will need all the fundamentals in the end," he says.

Stone, who honed expertise in sensor and control systems and instrumentation at Ralston-Purina before joining academia 20 years ago, has

instructed 10 different graduate and undergraduate courses, supervised 11 biosystems students in their completion of master's and doctoral degrees and served on committees for about 25 other graduate scholars during his tenure at OSU.

He was one of the researchers responsible for the development of the GreenSeeker sprayer. The award-winning GreenSeeker technology, a sensor-based variable-rate fertilizer sprayer applicator for field crops, has been hailed as a landmark development with the potential to solve many environmental and economic concerns related to crop production.

Stone's excellence has a tremendous impact on his students, according to Ron Elliott, professor and head of the Department of Biosystems and Agricultural Engineering. "He makes the students feel as if they are partners in the learning process," he says, adding that Stone's dedication to both aspects of his appointment is evident in the quality of his work.

"It's pretty unique to be at the top of your game in both teaching and research," Elliott says. "He exhibits excellence in all that he does."

CATHY HERREN
AND ADAM HUFFER

an ENDURING CONNECTION OF LEADERSHIP

DeYong Recognized for Outstanding Service

Camille DeYong received one of OSU's highest honors when OSU President David J. Schmidly presented her with his President's Service Award at the Fall Convocation ceremony.

The president presents the surprise award annually to one faculty member, one staff member and one administrator for outstanding service to OSU.

"Dr. DeYong, an associate professor in the OSU School of Industrial Engineering and Management, conducts research and instructs graduate students about the methodologies that make an exacting science of quality improvement," Schmidly says.

DeYong also has received top honors for exceptional instruction in the Master of Science in Engineering and Technology management program and the National Technological University (NTU). She has been consistently ranked among the top 10 percent of the NTU faculty, which includes teachers at approximately 50 of the nation's top schools, including M.I.T., Georgia Tech and California-Berkeley.

DeYong was also one of only two recipients of the 2002 Advancia award, issued by Advancia Corp. to acknowledge outstanding OSU faculty in the fields of distance learning and management information systems.

For the past several years, DeYong has been the faculty coordinator of OSU's Systems Sustainment and Enabling Technologies (ASSET) program, which began in 1994 to help in the procurement of parts for maintaining and repairing the country's aging military equipment. She is currently conducting research with a bank in Tulsa on service quality.

In addition to her many other responsibilities, DeYong is currently serving as a member of the OSU Strategic Planning Council, and she has been the co-chair of the OSU Retirement Subcommittee for the past two years. She also serves on one of the North Central Accreditation Sub-Committees.

"I was shocked to receive the President's Service Award because there are so many deserving people at OSU," DeYong says. "But, I was thrilled to accept the honor."

CAROLYN GONZALES



Camille DeYong



Adam Huffer

Ghajar Eases the 'Flow'

McGraw-Hill published a software package in 2003 that removes some of the tedium for students working on compressible flow calculations and expands the array of problems their professors can assign. Afshin Ghajar, Regents Professor of mechanical and aerospace engineering, developed the new software, called COMPROP2.

COMPROP2 complements the new, third edition of *Modern Compressible Flow with Historical Perspective*. The textbook by John D. Anderson at the University of Maryland is one of the most widely used in aerospace engineering programs across the country.

"Compressible fluid flow is a required course for our aerospace engineering students, and many of our mechanical engineering students take it as an elective," Ghajar says. "It's a fundamental study of aerospace engineering, and students learn about the characteristics of compressible fluid flow over airfoils, aircraft wings and bodies immersed in air, as well as the characteristics of compressible fluids moving through a conduit.

"This analysis is somewhat complicated, and there are lots of tables and charts that engineers rely upon to determine numeric values that we use in design calculations," he says. "Students still have to do all the engineering work, but with this software, we've attempted to replace reference books and put the tables and charts at their fingertips."

COMPROP2 lends to the diversity of problems instructors may assign by allowing users to determine values for many compressible fluids, according to Ghajar.

"Typically, the tables in the back of the textbooks are for air, but if you are working with other gasses – nitrogen, hydrogen, carbon dioxide – you have to generate the tables on your own," Ghajar says. "This program allows students to alter properties and generate the variables of other gasses as well so that they may spend more time solving problems than looking up and interpolating values."

The Windows operable, CD-ROM-based COMPROP2 is the culmination of an earlier, DOS operable version Ghajar began working on in 1997.



Party Pix

Pratt Named Regents Distinguished Teacher

Education is a "process" and not a "project," according to David Pratt, associate professor of industrial engineering and management. Pratt is one of eight OSU faculty members named as the 2003 recipients of Regents Distinguished Teaching Awards.

Pratt's nomination for the honor came from colleagues, students and former students. Colleague Kenneth E. Case, Regents Professor, says Pratt's 12 years of professional industrial experience provided him with relevant scenarios to share with students in driving home a point. William J. Kolarik, professor and head of the school, says Pratt is a prolific researcher who shares research knowledge with all his students, is innovative in his approaches and is constantly working to enhance his skills.

"Dr. Pratt approaches every class as an opportunity to teach not only theory but to relate these theoretical concepts to industrial situations," says 2003 graduate Christina Lupher. "Through telling stories about his own mistakes, he has made himself a very approachable person, a mentor for the students in industrial engineering and management."

Former student Edward L. McCombs, now an assistant professor at Texas Tech University, says calling Pratt "demanding" is an understatement. "My respect for his passion for teaching and knowledge spurred me to work harder and question more."

"I believe the role of a professor is to 'light fires'—to excite, challenge and motivate students to learn the material at hand and to become life-long learners," Pratt says. "In other words, to nurture and encourage the process of education."

Pratt, a Fellow of the American Production and Inventory Control Society and a Registered Professional Engineer, has also taught extensively in the master's degree program in Engineering and Technology Management, a program composed entirely of technical professionals employed in industry and delivered throughout the nation via distance learning.



Adam Huffer

Russell Elected ACI Fellow

Bruce Russell, associate professor of civil and environmental engineering, has been elected Fellow of the American Concrete Institute, International (ACI) for his contributions in research and teaching to advance knowledge in both prestressed concrete and concrete materials. ACI, with 20,000 members worldwide, is the major technical and educational society for concrete producers, contractors, engineers and scientists.

For his work to advance the widespread adoption of prestressed concrete in construction, Russell received the Martin P. Korn Award from the Precast/Prestressed Concrete Institute and the T.Y. Lin Award from the American Society of Civil Engineers (ASCE). He chairs ACI's publications committee and the ACI/ASCE Prestressed Concrete Committee. He also serves on the Building Code Subcommittee for precast and prestressed concrete.

Russell's research led advancements in the design and construction of highway bridges so that bridges are made stronger, more durable and longer-lived. Many of the advancements have also been applied to concrete pavements. Research partners include the National Cooperative Highway Research Program, the National Science Foundation, the North American Strand Producers and the Oklahoma Department of Transportation. Since joining the OSU faculty, Russell regularly teaches "Strength of Materials" to sophomore engineering students among a collection of graduate offerings.

Russell's selection pushes to 25 the number of active professors in the College of Engineering, Architecture and Technology who are Fellows in their various national professional societies, a distinction bestowed by members upon a few of their accomplished peers.



Andy Mahey

Spitler Assumes Presidency

Jeffrey Spitler, P.E., the C.M. Leonard Professor in the School of Mechanical and Aerospace Engineering, is serving this year as president of the International Building Performance Simulation Association (IBPSA).

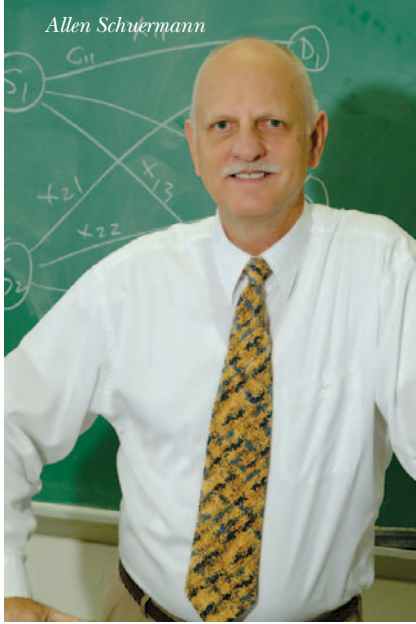
IBPSA is a non-profit international society of building performance simulation researchers, developers and practitioners who are dedicated to improving the building environment. It was founded in 1986 to advance and promote the science of building performance simulation in order to improve the design, construction, operation and maintenance of new and existing buildings worldwide.

Spitler's research interests include building energy analysis and load

calculations and thermal systems simulation and design. In spring 2003, a paper he co-authored received the Napier Shaw Bronze Medal from the Chartered Institution of Building Services Engineers, an international body that represents and provides services to the building services profession.

Other honors he has received include the 2000 Distinguished Service Award from the American Society of Heating, Refrigerating and Air-Conditioning Engineers; the IBPSA Outstanding New Contributor Award in 1991; and the 1992 Pi Tau Sigma Outstanding Faculty Member Award. He has also received the Halliburton Outstanding Young Teacher Award and the Halliburton Outstanding Faculty Award.

STORIES BY DOTTIE WITTER AND ADAM HUFFER



Schuermann Named IIE Fellow

Alpha Pi Mu, the national Industrial Engineering Honor Society, consistently ranked OSU's chapter as the top student chapter in the country from 1988 through 1998 as well as three of the past five years.

That's certainly a dynasty in sports terms and a testament to the caliber of membership, but students, like players, come and go. One constant for the local chapter has been its adviser, Allen Schuermann.

Schuermann, professor and director of undergraduate programs in the School of Industrial Engineering and Management, was named outstanding adviser by the College of Engineering, Architecture and Technology in 2003. And the Institute of Industrial Engineers, the premier professional affiliation for industrial engineers, presented Schuermann the prestigious Fellow Award in acknowledgement of his lifetime accomplishments and service to the profession.

The IIE Fellow distinction is reserved for "outstanding leaders of the profession who have made significant, nationally recognized contributions to industrial engineering" and is the highest classification of membership in the organization that boasts more than 17,000 industrial engineers and 150 chapters worldwide.

In addition to overseeing activities of the award-winning Alpha Pi Mu chapter, Schuermann guides top industrial engineering juniors and seniors in their individual endeavors. One student, Christina Lupher, a May 2003 graduate, was recognized by IIE as the top industrial engineering senior in the world.



Eileen Mustain

Harp Honored for Extension Work

Sam Harp, associate professor and senior applications engineer in the Department of Biosystems and Agricultural Engineering, received the 2003 Faculty Excellence Award in University Extension, International and Economic Development in recognition of his dedication, innovation and leadership in the applications engineering extension and outreach program.

Harp initiated the successful Applications Engineers Program in 1993 to provide engineering assistance to help small, rural Oklahoma manufacturers achieve success in the marketplace. Realizing that small manufacturers' long-term sustainability depends on developing new products, Harp also helped create the College of Engineering, Architecture and Technology's New Product Development Center.

"We focused on manufacturing because it is a capital intensive sector of our economy. Manufacturing supports the local infrastructure more than any other sector. It pays higher property taxes and higher wages," Harp says. "This work is all about creating jobs and rebuilding the tax base to stem the decline in the state's small towns."

In 2003, its first year of operation, the New Product Development Center completed new products for four Oklahoma companies. The Applications Engineers Program helped clients save costs, increase sales, retain and create jobs for a total positive impact on Oklahoma's economy of more than \$144 million in 2003.

The College of Engineering, Architecture and Technology and the Division of Agricultural Sciences and Natural Resources jointly sponsor the Applications Engineers Program and the New Product Development Center.



Adam Huffer

CASE

State Recognises Professor's Quality Work

Ken Case, Regents Professor of industrial engineering and management, received the Quality Oklahoman Award in 2003 from Gov. Brad Henry in recognition of his outstanding service in the state. The Oklahoma Quality Award Foundation Inc. board of directors, a group of state business leaders, chose Case to receive the honor.

"The foundation board gives the Quality Oklahoman Award to those people who advance the ideas and concepts of performance excellence, not only in business and manufacturing but also in other areas such as healthcare, education and government," says Mike Strong, executive director of the foundation. "Ken has distinguished himself in his work with the foundation in Oklahoma and throughout the United States."

Case is one of only nine National Academy of Engineering members from Oklahoma. Appointment to the body that regularly advises Congress and the White House is among the highest professional distinctions accorded an engineer. He also is an Academician in the International Academy for Quality, an invitation-only group of 75 of the world's leading experts on quality.

He is the current president of the American Society for Quality, a 120,000-member organization dedicated to advancing industry and organizational performance excellence via activities such as compilation of the American Customer Satisfaction Index and administration of the Malcolm Baldrige National Quality Awards. The Baldrige Award is the highest recognition for quality achievement a U.S. firm can receive.



Adam Huffer

BELL

Remarkable Career Achievement

The recipient rosters of the Max Jakob Memorial Award and the Donald Q. Kern Award are literally the who's who of heat transfer, but few individuals appear on both since the former acknowledges contributions to the fundamental engineering science of heat transfer and the latter its application. Even among giants, however, Ken Bell stands taller.

Bell, emeritus professor of chemical engineering, was named recipient of the 2003 Max Jakob Memorial Award. Presented jointly by the American Society of Mechanical Engineers and the American Institute of Chemical Engineers, the award commemorates Jakob's contributions to the science of heat transfer and recognizes individuals who have emulated the pioneering researcher, educator and author with their own eminent achievement or distinguished service.

Bell will be honored officially during the 2004 ASME Heat Transfer/Fluids Engineering Summer Conference in Charlotte, N.C., in July. He receives the Jakob Award some 26 years after his contributions to heat transfer technological applications and design practice were recognized with the Kern Award.

"The Jakob Memorial Award and the Kern Award are the two most significant national-level awards for career achievement in heat transfer," says Russell Rhinehart, Bartlett Chair and head of the School of Chemical Engineering. "For one person to win the top award for contributions to the science as well as the award for contributions to its practice is wholly singular and truly remarkable."

STORIES BY EILEEN MUSTAIN AND ADAM HUFFER



Lucca Honored Internationally

Don Lucca was not only inducted as a Fellow into the Society of Manufacturing Engineers in 2003, he also received the prestigious Mercator Professorship from the Deutsche Forschungsgemeinschaft, DFG, the German equivalent of the U.S. National Science Foundation. He is one of only eight university professors from the U.S. to hold one of the current 26 Mercator Professorships.

Lucca, mechanical and aerospace engineering professor and Tom J. Cunningham Chair, will spend eight months at the University of Bremen researching methods to produce optics for the next generation of photolithography used in OMIT – the high precision lens of imaging instruments such as cameras – and in the manufacturing of integrated circuits.

His research continues the work undertaken in 2002 by the interdisciplinary and international

Transregional Collaborative Research Center in Optics to explore the mass production of precise optical surfaces. The National Science Foundation and its German counterpart fund the center.

Lucca, who leads the center's U.S. team, is working with calcium fluoride (CaF_2), a special material that transmits ultraviolet light unlike commonly used optic glasses that absorb light in the deep UV. However, shaping CaF_2 to the optic introduces damage to the layers right below the surface, preventing UV transmission. "The research goal is to minimize or eliminate this damage," Lucca says.

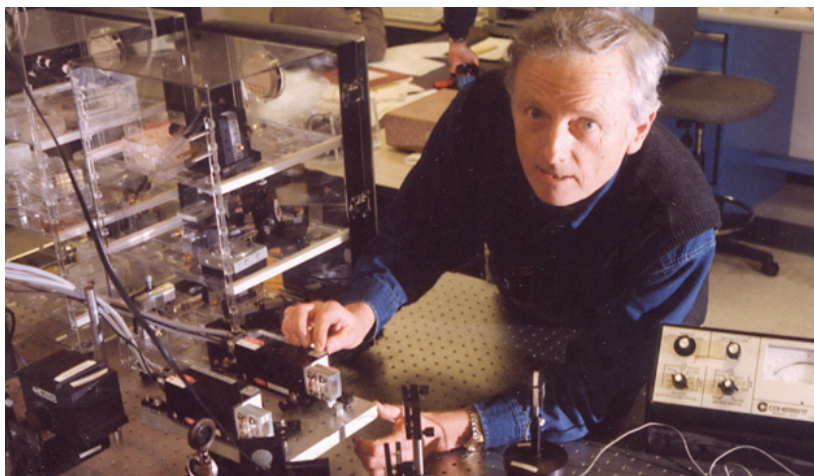
The University of Bremen is one of the leading institutions worldwide in research of high precision manufacturing and advanced manufacturing materials science. "I believe we can make significant progress in developing methods to produce advanced optics with these materials," he says.

Grischkowsky Joins Select Group

Daniel Grischkowsky, Regents Professor and Bellmon Professor of optoelectronics in the School of Electrical and Computer Engineering, received the Optical Society of America's 2003 William F. Meggers Award.

Grischkowsky joins a select list of the world's highly distinguished engineers and scientists, including a handful of Nobel Prize winners, who have previously received the award that recognizes outstanding work in spectroscopy.

In using lasers to drive electronics, Grischkowsky has developed and demonstrated some of the world's fastest optoelectronic circuitry. The society honored him for his "seminal contributions to the development and application of THz (terahertz) time-domain spectroscopy."



Ken Heit Photography

courtesy



Remembering Kenneth A. McCollom

Kenneth Allen McCollom, 81, died Oct. 3, 2003, at his home in Stillwater.

Those who knew and loved this former dean of the College of Engineering, Architecture and Technology will remember him for his warmth, his willingness to help wherever needed in his community and church and his unwavering loyalty to his family, university and profession.

McCollom, a native of Sentinel, Okla., began his career with the United States Army during World War II as a member of the 3187th Signal Service Battalion providing communications to the 3rd, 5th and 9th Armies for Gen. Omar Bradley's 12th Army group headquarters in Europe.

After his discharge, he earned a bachelor's degree in electrical engineering at OSU in 1948 and a master's degree in electrical engineering from the University of Illinois in 1949.

He joined the research and development department of Phillips Petroleum Company in 1949. His assignments took him to Bartlesville, Okla., Oak Ridge, Tenn., and Idaho Falls, Idaho. He became branch manager in the Atomic Energy Division before leaving Phillips in 1962 to pursue his doctorate in electrical engineering at Iowa State University.

McCollom completed his doctorate in 1964 and joined the faculty at OSU as a professor of electrical engineering. He served the CEAT as assistant dean from 1968-1973, associate dean from 1973-1977 and dean from 1977-1986.

While at the CEAT, he received the Chester A. Carlson Award from the American Society for Engineering Education for developing an individually paced instruction program for beginning engineering students. He received the Professional Achievement in Engineering Award from Iowa State University and was named Distinguished Alumnus by the Electrical and Computer Engineering Alumni Association at the University of Illinois. In 2000, he was inducted into the Oklahoma Higher Education Hall of Fame.

During his engineering career, McCollom served for 25 years as part-time administrative judge for the Atomic Safety and Licensing Board Panel of the U.S. Nuclear Regulatory Commission. He served six years as president of the Oklahoma Society of Professional Engineers and received recognition as the outstanding engineer in Oklahoma. ▲

Four Renowned Alumni Join the CEAT Hall of Fame

FRANK CHITWOOD

While many alumni strive to make a name that reflects proudly on their alma mater, Frank Chitwood's impact on OSU and the College of Engineering, Architecture and Technology is set in stone.

As senior vice president of the Tulsa-based Dewberry Design Group Inc., the 1958 graduate of OSU's School of Architecture has guided architectural endeavors renowned for practicality and innovation and marked by a passion to present clients — and the public — with projects that consistently exceed expectations.

During his professional career Chitwood has been in charge of more than 65 major projects for medical facilities, educational and public institutions and commercial firms throughout Oklahoma and the nation. His imprint can be seen in Tulsa's St. Francis Hospital, the architecturally acclaimed Mid-Continent Tower and the master plan for the OSU-Tulsa campus.

Chitwood, who is guided by the belief that great architecture creates atmospheres that work and make working within them enjoyable, directed the original 1987 expansion of Gallagher-Iba arena on OSU's Stillwater campus and the recent renovations of the Classroom Building and Willard Hall as well as the addition to the Student Union and the Center for Student Services.

The Poteau, Okla., native enrolled in OSU's School of Business following his graduation from high school in 1953. When economics proved less than stimulating for him, he followed his desire to explore the arts and building design and switched his major to architecture. He found an enjoyable home in Gundersen Hall and later on the job honed the business and legal acumen required to successfully lead an architecture firm.

Chitwood served as vice president, president and chairman of the board for the Tulsa-based architectural firm HTB Inc., which became Dewberry Design Group Inc. in 1996, and has received numerous professional honors, including Executive of the Year from the Tulsa Chapter of Executive Women International and the American Institute of Architects (AIA) Professional Service Distinction Award.

He has served on AIA committees for health and criminal justice architecture and as president of the Oklahoma Chapter of AIA, the Oklahoma Council of Architects and the Oklahoma Board of Governors of Licensed Architects and Landscape Architects. He has also served on the OSU-Tulsa President's Council and the professional advisory committee for OSU's School of Architecture.

A lead-by-example proponent of community involvement, Chitwood serves on the board of directors' executive committee of the Tulsa Boys Home, an organization dedicated to helping troubled and neglected youth. In recognition of his contributions to the Tulsa Boys Home, the Tulsa Volunteer Center awarded Chitwood the 2003 Volunteer of the Year Award for helping develop the master plan for the campus and helping the agency secure an \$11.6 million grant from the Reynolds Foundation for renovation and expansion.

His other past and ongoing affiliations include boards for the Tulsa Area United Way, Tulsa Opera, Woolaroc Museum, the Metropolitan Tulsa Chamber of Commerce and the Governor's International Team, which promotes international business development.

DONALD W. VANLANDINGHAM

Donald W. Vanlandingham's professional life is marked by participation in the development of some of the most notable engineering achievements in the history of American space exploration — including the single most prolific contributor to humankind's knowledge of the universe, the Hubble Space Telescope.

More than 20 years and billions of dollars in the making, the Hubble might have been NASA's most abysmal failure if not for visionaries like Vanlandingham, an OSU electrical engineering graduate. Following its 1990 deployment from the space shuttle Discovery, the Hubble delivered blurred images until astronauts on a return mission three years later replaced one of its instruments with a corrective optics device.

Vanlandingham, then vice president of electro-optical subsystems for Ball Aerospace and Technologies Corporation in Boulder, Colo., directed the development of the COSTAR instrument that remedied the flaw in the Hubble Telescope's principal

mirror to make possible its precise capture of never-before-seen galaxies, constellations and stellar phenomena.

Ball's success also led to the company's continuing relationship with the Hubble; every return mission since 1993 entailed outfitting the telescope with instruments developed by Ball Aerospace.

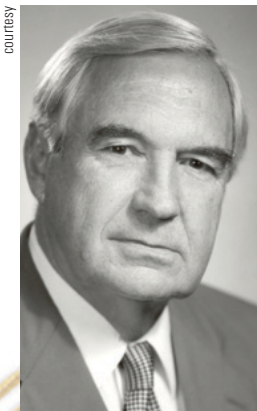
Vanlandingham obtained the approval of his wary management and board of directors to accept NASA's contract to build COSTAR. The same vision and perseverance landed him the positions of president and CEO of Ball Aerospace and Technologies Corporation and chairman of the board, where he serves today.

In between graduating from OSU in 1963 and earning a master's degree in electrical engineering from Columbia University in 1967, Vanlandingham served as a lieutenant commanding 40 enlisted men in the 405th Maintenance Battalion of the 5th Infantry Division at Fort Carson, Colo. The eye-opening experience of guiding young soldiers sharpened his ability to motivate and lead others toward a worthy goal. He received the Army Commendation Medal for Meritorious Service in 1965.

Attracted by the company's contracts to work on the SKYLAB Space Station, the Duncan, Okla., native joined Ball Aerospace as a production engineer in 1967. He has served in various capacities including manager of Star Tracker and Space Shuttle programs and director of Celestial Navigation products and has received the NASA SKYLAB Achievement Award for Scientific Instrumentation and the NASA Group Achievement Award for repair of the Hubble Space Telescope.

Vanlandingham applies his more than 30 years experience as a senior strategist in service to entities outside of Ball Aerospace such as the Boulder entrepreneurial community. As a board member of DigitalGlobe Inc., chairman of the Colorado Technology Incubator (CTEK) and member of CTEK Angels Investing Group, the National Space Foundation and the Colorado Governor's Science and Technology Commission, he helps shape the future of high-technologies and works to bring employment and education opportunities to his adopted state.

EACH YEAR THE COLLEGE OF
ENGINEERING, ARCHITECTURE
AND TECHNOLOGY RECOGNIZES
THE PROFESSIONAL
ACHIEVEMENTS OF TWO
OUTSTANDING ALUMNI
THROUGH INDUCTION INTO THE
CEAT HALL OF FAME. IN 2002,
THE CEAT HALL OF FAME
WELCOMED FRANK CHITWOOD
AND DONALD W.
VANLANDINGHAM AND IN 2003
JAMES R. HOLLAND JR. AND
KENT E. PATTERSON.



Frank Chitwood

JAMES R. HOLLAND JR.

James R. Holland Jr., president and chief executive officer of Unity Hunt Inc., has a trait common among CEAT Hall of Fame members; he is ill at ease talking about himself. One anecdote he will share, however, regards an early job interview with a major chemical company near the end of his studies in a technically oriented MBA program at Carnegie Mellon University's Graduate School of Industrial Administration. Impetuously sized-up as a parvenu by the recruiter and told in no uncertain terms to abandon any lofty ambitions to head the firm some day, Holland immediately left the session.

Uncompromising in the pursuit of excellence, Holland is distinguished by an unwavering commitment to growing new businesses and helping people pursue opportunity. Compelled by the realization that the inherent endowments of an engineering education — the abilities to analyze complex issues and solve problems — could be applied in corporate boardrooms, he determined to make them his domain while still a chemical engineering undergraduate at OSU.

Holland relishes a challenge. From the early days of his career at the international management consulting firm Booz, Allen and Hamilton, he demonstrated exceptional skill in developing sound business strategies and assembling and leading teams of talented people in their implementation, invariably addressing multiple, simultaneous chaotic scenarios. At just 33 years of age, he became president of KSA Industries, the first of three international holding companies he officially headed before taking the reins at Unity Hunt Inc. in 1991.

The cornerstones of Lamar Hunt's conglomerate are the Hunt Operating Group, Hunt Capital Group, Hunt Sports Group and Hunt Financial Group. A massive, diversified and private company, Unity Hunt Inc. is typically identified with its sports teams, including the Kansas City Chiefs and Chicago Bulls, but they are only part of its enterprise. Unity Hunt holdings around the globe are involved in energy and resources, entertainment, technology, consumer service, healthcare, investments and real estate development.

Over the span of his career, Holland has served as chairman or member of the board of directors of more than 50 companies, both public and private. He has also created, acquired as platforms and/or provided growth funding for 68 companies, not to mention uncounted future add-on companies. All are indications of the credibility his business acumen commands, but the hallmarks of Holland's success are embodied in the more than 10,000 employment positions generated as a result. He remains steadfastly committed to supporting entrepreneurs, which he calls the economic growth engine of global capitalism.

Holland excelled academically at OSU, graduating at the top of the 1966 class of chemical engineers and garnering numerous national recognitions for achievements in and outside the classroom while participating in an exhaustive list of campus and community activities. Kenneth Bell and John Erbar were his favorite teachers.

Professionally, he acknowledges the influences of Ralph Rogers, Jimmy Ling, K.S. "Bud" Adams, Eddie Chiles and Lamar Hunt, just a few of the many famed entrepreneurs that he has had the good fortune to call business associates.

KENT E. PATTERSON

Kent E. Patterson, co-founder and chief executive officer of Environmental Resources Management (ERM) Inc., reflects his rural upbringing near the northcentral Oklahoma town of Manchester in his frequent, extemporaneous and wise use of the state's native colloquialisms and in his humility. When asked about the role his extraordinary career has played in shaping modern, global environmental consulting, he quotes Yogi Berra: "When you come to a fork in the road, take it."

Although he initially pursued electrical engineering at OSU, Patterson discovered civil engineering and began to specialize in the environmental area after Ray Mill hired him to assist with air sampling studies at the Stillwater municipal waste treatment plant. He also acknowledges the influences of CEAT faculty members David MacAlpine, Al Halliburton, Don Kincannon and Tony Gaudy.

He graduated from OSU with a bachelor's degree in civil engineering in 1969 and a master's degree in bioenvironmental engineering in 1971. From 1972 to 1977 he worked as project engineer and manager and then assistant branch manager for Roy F. Weston Environmental Engineering in West Chester, Pa.

In 1977, as antipollution concerns and regulation were emerging, Patterson partnered with Paul Woodruff and Phil Buckingham to found the ERM Group near Philadelphia with the goal of building a national organization that would provide the highest quality environmental services to industrial clients. They started 11 new partner companies in their first nine years by offering equity to regionally established, seasoned entrepreneurs in place and familiar with local clients, governments and regulations.

ERM Inc. came to be known for personalized attention to detail, innovative solutions and exceptional service no matter the location. As a result, the company experienced more than 80 percent growth each year for the first 12 years of its existence and was recognized by *INC Magazine* for six consecutive years as one of the 500 fastest growing privately owned companies.

Some 26 years later, under the groundbreaking business model pioneered to establish it, ERM continues to thrive as one of the environmental industry's most economically viable and successful companies. It sits preeminently among global environmental, health and safety management and consulting organizations and boasts 2,300 professional specialists — mostly engineers and scientists — more than 100 locations in 35 countries with approximately \$300 million in annual revenues.

Patterson retired from ERM in 2000 but still has interests in an environmental construction company, an environmental laboratory and a computer information service company in addition to serving his community. He has chaired the Chester (Pa.) County United Way campaign and served on the board of trustees for the Chester County Partnership for Affordable Housing, the Philadelphia High School Environmental Academy, the Chester County Council of the Boy Scouts of America and the Philadelphia Academy of Natural Sciences. ▲



Donald W. Vanlandingham



James R. Holland Jr.



Kent E. Patterson

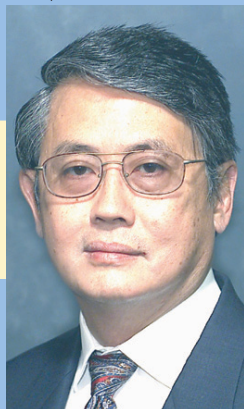
an ENDURING
CONNECTION
OF ALUMNI

ADAM HUFFER

Surjaatmadja Receives Highest CEAT Honor



Jim B. Surjaatmadja, Halliburton engineer and inventor, received the CEAT's 2003 Melvin R. Lohmann Medal, the highest honor the college awards for alumni achievement.



Jim B. Surjaatmadja

Jim B. Surjaatmadja, scientific/technical adviser in Halliburton Energy Services' research operations in Duncan, Okla., is the 2003 recipient of the College of Engineering, Architecture and Technology's Melvin R. Lohmann Medal, the highest honor the college awards for alumni achievement.

Hired by Halliburton in 1976 as an engineer, Surjaatmadja made his first major innovation in 1977, creating a diffuser for a wellhead isolation tool that supported fluid velocities of up to 280 feet per second. Prior to his invention, the company's down-hole fracturing tools allowed velocities of just 75 feet per second and often cut the tubing, resulting in tubing drops and, in each instance, losses in the millions of dollars. Revenues since attributed to Surjaatmadja's invention range in the billions of dollars.

Surjaatmadja also engineered an integrated data generation, analysis and reporting

system. Its many components allowed people in the field to obtain data from charts with a camera-like recorder, transfer the information on a card to a centralized processor and subsequently analyze and rapidly print massive, complex reports. Conceived and developed 24 years ago, Surjaatmadja's pioneering system essentially foretold modern integration of mobile computing hardware such as tablets and laptops and centrally based computers that are now commonly used by everyone from parcel delivery personnel and gas company meter readers to the police.

In the fields of cementing, fracturing and specialized down-hole tools, Surjaatmadja's innovations include a device and process to build a horizontal cement wall below ground; restraining devices for high-pressure equipment; accurate mathematical models for determining forces caused by explosions of gas, foams and sand-laden foam; and processes for welding steel to soil. His work gave rise to Halliburton offerings including its Wellhead Isolation Tool Service, Hydra-Blast ProSM Service, SurgiFracSM Service and CoilSweep Service. The 36 U.S. patents and 52 international patents that bear his signature perhaps best embody the groundbreaking nature of Surjaatmadja's engineering and research.

Fascinated by the inner workings of moving devices since he was a small child, Surjaatmadja initially pursued his interest at the Institute of Technology, Bandung, in his native homeland of Indonesia. Among

50 applicants accepted in 1964 from a field of 30,000, he majored in combustion engineering and obtained bachelor's and master's degrees before coming to the United States.

While earning master's and Ph.D. degrees in mechanical engineering at OSU, he served as a project engineer in the university's Fluid Power Research Center and as a graduate teaching associate in the School of Mechanical and Aerospace Engineering. His many contributions to technical literature include 55 technical papers and the textbook *Introduction to Fluid Logic* used today at colleges and universities around the world.

Surjaatmadja is a Fellow in the American Society of Mechanical Engineers, and virtually every "Who's Who" list of engineers and inventors also features his name. In 1980, the Oklahoma Society of Professional Engineers presented Surjaatmadja its Young Engineer of the Year Award.

The Lohmann Medal honors Melvin R. "Pete" Lohmann, who served OSU for 36 years. As dean from 1955 until 1977, he led the CEAT to international prominence while providing national leadership in the movement to adopt the professional school concept in engineering education. Largely as a result of Lohmann's service as national president of the Engineers Council for Professional Development and the American Society for Engineering Education, every reputable engineering program in the country today observes the professional school model as used by law and medical schools.

The CEAT awards the Melvin R. Lohmann Medal annually to a distinguished graduate of the college who has made outstanding technical or managerial contributions to his or her profession and/or to the education of engineers, architects and technologists. "Dr. Jim Surjaatmadja, the 2003 Lohmann Medal recipient, exemplifies the type of person for whom the award was intended," says Karl Reid, dean of the CEAT.

"With his many innovations and career achievements, he has helped position Halliburton as one of the world's leading diversified oilfield service companies and to advance the modern oil and gas industry as a whole," Reid says. "In presenting Jim the 13th Lohmann Medal, we add him to the ranks of innovators from this college such as Ed Roberts, who invented the personal computer and helped shape modern computing as it is known today." ▲

ADAM HUFFER

Thank You

Thank You, Halliburton

The continuity of Halliburton's support for faculty excellence in OSU's College of Engineering, Architecture and Technology is unmatched by any other company.

The longstanding relationship with OSU began in 1965 when the Halliburton Company of Houston, Texas, established the Halliburton Chair of Engineering, and it continues today with the gift that established the Halliburton Foundation Outstanding Faculty Awards in 1982.

OSU is privileged to be the only school with a Halliburton faculty recognition program. Halliburton's Outstanding Faculty Awards, conferred annually, recognize the extraordinary instruction and research contributions of CEAT faculty.

Halliburton 2003 Faculty Honors

The 2003 Halliburton Faculty Awards recognize the distinguished professional achievements of four of the CEAT's exceptional faculty members: Danielle Bellmer, Manjunath Kamath, John Phillips and Randy Lewis.

Danielle Bellmer, associate professor in the Department of Biosystems and Agricultural Engineering, received the 2003 Outstanding Young Faculty Member Award for superlative research and product development since she joined OSU's Food and Agricultural Products Research and Technology Center in 1997. Bellmer developed a process for the manufacturing of individually wrapped peanut butter slices, lending instant credibility to the newly established facility and its operations.

Bellmer consults with dozens of Oklahoma food processing companies and is a principal investigator on OSU's bio-fuels conversion project, an endeavor involving approximately a dozen multidisciplinary researchers who are streamlining the production of ethanol from switch grass. She serves as OSU's faculty adviser to the Society of Women Engineers and as co-coordinator of the Reaching Engineering and Architecture Career Heights program.

Manjunath Kamath, a 14-year member of the CEAT faculty and recipient of the Excellent Teacher Award, serves as professor and graduate coordinator in the School of Industrial Engineering and Management. He has created five and taught 10 different graduate-level courses and three different undergraduate-level courses on campus and via televised broadcast to distance learning sites, twice garnering industrial engineering and management students' selection as outstanding faculty member.

Kamath guided OSU's development of the landmark innovation "RAQs – Rapid Analysis of Queuing Systems," an instructional software package used globally to support analytical approaches for solving queuing network models used in systems design. As director of the Center for Computer Integrated Manufacturing, Kamath and graduate students under his tutelage maintain RAQs, release a new version approximately every two years and ensure its availability over the World Wide Web. To date, the software has been used for instruction and research purposes by more than 40 universities and 10 companies in 27 countries.

John Phillips, assistant professor of architectural engineering and OSU alumnus, received the 2003 Excellent Young Teacher Award. Phillips, who was selected by a committee of students and faculty members to receive the award, joined OSU in 2000 after spending 11 years in professional practice with engineering consulting firms in Oklahoma City, Tulsa, Los Angeles and Dallas.

In just three years, Phillips distinguished himself among the CEAT's most versatile instructors, earning outstanding student evaluations for his instruction in statics – a general engineering science course – and the School of Architecture's steel and wood structural engineering courses while simultaneously excelling as a faculty critic for senior-level architecture design studios.

Randy Lewis, associate professor of chemical engineering, is the 2003 Outstanding Faculty Member Award winner. He currently teaches the school's graduate course in biochemical engineering as well as undergraduate courses in chemical engineering and thermodynamics. Lewis is also at work on the development of a multidisciplinary graduate training program involving bio-based technology.

By applying chemical engineering principles to biomedical and biochemical systems, Lewis specializes in research to improve biomaterials and the formation of alcohols and other products from renewable resources, such as OSU's bio-fuels conversion project. He has been named the School of Chemical Engineering's Teacher of the Year and the CEAT Adviser of the Year. As a multiple term faculty adviser to the student chapter of the American Institute of Chemical Engineers (AIChE), Lewis has guided members to a performance level that consistently ranks their chapter among the top in the nation. In 2000, Lewis was named the nation's top AIChE faculty adviser. ▲



Danielle Bellmer



Manjunath Kamath



John Phillips



Randy Lewis

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One of Life's Little Gives and Takes

When Sam Regier decided to sell his family farm, he decided to help himself ... and the College of Engineering, Architecture and Technology.

Regier, a track team champ from Enid, chose Oklahoma A&M for its athletic scholarship opportunities. It was a good choice for the chemical engineering graduate ('47). Regier took what he learned at the state's land grant university and turned that knowledge into a long and successful career in the oil/energy industry. He traversed several continents with Texaco, Gulf and Kuwait Oil Companies. He consulted for Chevron. And then came the time to come home to Oklahoma.

That's when Regier began to think of Oklahoma State — and giving back. He no longer needed the farm that Cornelius and Katharina Regier had left. But OSU could reap the benefits. So Regier sat down with the planned giving folks at the OSU Foundation to put a charitable remainder trust in place — and the rest is history.

You might be interested in following in Regier's footsteps if

- you plan to sell your business or other highly appreciated asset;
- you would like to transfer significant assets to children with no gift or estate tax; or
- you would like to secure dependable fixed income at a very attractive rate for yourself and a survivor.

To explore various planned giving options, contact Jason Caniglia at jcaniglia@osuf.org or at (405) 744-3747.