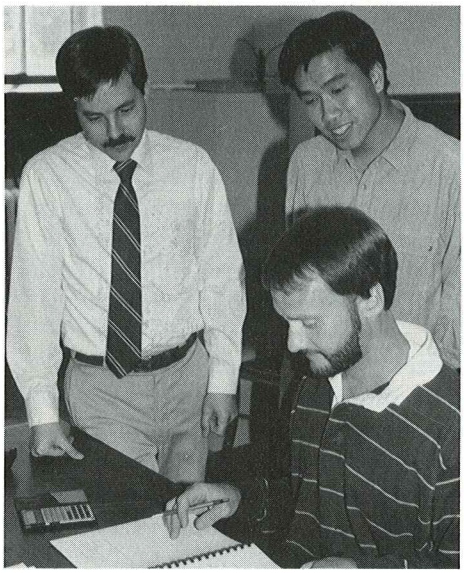
Mechanical Engineering Update
November 1990

ME offers research opportunities for undergraduates

Under a grant to ME professors Michael B. Pate and Howard N. Shapiro, project coordinator Richard P. Rusk is supervising 12 student engineers in a project sponsored by the Iowa Department of Natural Resources. The IDNR project, which aims to help save energy in Iowa's public buildings, allows qualifying school districts and local governments to borrow money at low interest rates from Iowa lending institutions to make energy-saving improvements; the resulting savings will be used to repay the loans.

On the basis of audits conducted for each building, private engineering firms prepare technical engineering analyses (TEA's) of the audit information. The ISU students are trained to review the improvements suggested in the TEA's, making sure the calculations and recommendations are as sound as possible, so that the energy savings will actually be realized when recommended building improvements are made.

Rusk, also a Ph.D. candidate in the ME Department, has trained these undergraduate researchers to comb through the TEA's to look for incompleteness, internal inconsistencies, and other "red flags." "They make certain that the reports have been reviewed from a technical standpoint," Rusk explained. "The result—more accurate information—should mean greater savings when the building improvements are implemented." Such improvements are generally related to heating and air conditioning—for example, recalibrating altered night-setback systems that were never reset.



Richard Rusk, David Hung, and Kirk Heer (clockwise from left) analyze energy audit information for the Iowa DNR.

Sixty students applied for the TEA reviewer positions; the 12 seniors selected (ME students unless otherwise indicated) were required to have at least a 2.9 cumulative gradepoint average: **Altaf Afroze, Lyle Berkenbosch, Joe Fehr, Kirk Heer** (office manager), **Charles Heldenbrand, David Hung, Doug Moore** (construction engineering with mechanical emphasis), **Cindy Marsh** (industrial and manufacturing systems engineering), **Randy Short, Mark Sorensen, Mike Stimson**, and **Chai-Huei The.**

As part of their training, Rusk's student reviewers visited Roosevelt School in Ames. There, Rusk said, the Ames director of buildings and grounds provided a complete tour of "the typical school building, including the mechanical room and even the roof. This experience made their upcoming review work seem a lot more real."

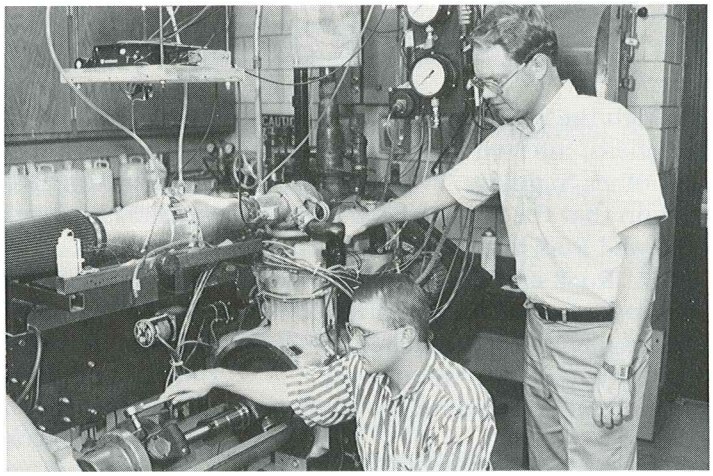
Undergraduates, continued on page 2

Undergraduates, from page 1

So far, Rusk's group has been working on reports from schools; next they'll analyze the audits of city and county government buildings.

"I'm amazed at the amount of detail, the tiny errors, that our group is able to spot. They are thorough, methodical, and enthusiastic. I'm very confident in the quality of the work they're doing to save energy and money for public buildings in Iowa— and happy to see them involved in a research project where they learn so much that's useful in a real-life situation," Rusk says.

Although the energy review project employs more undergraduates than any other single project, the ME Department offers many other opportunities for them to work with faculty members and graduate students on research projects.



Darren Herum installs the driveshaft on a John Deere diesel engine under the supervision of Professor Jon Van Gerpen.

Robert Moreland, a senior, works with Professor Joe Prusa to numerically analyze a convection model that includes boundary melting, showing the beginning of motion in a fluid and the transition from conduction to convection, both at critical Rayleigh numbers.

Professor Michael Pate oversees the work of two students in the Heat Transfer Laboratory and Refrigeration Laboratory. **Dwayne Wolf**, a junior, is working on refrigerant-oil property measurements with Nolan Van Gaalen, a Ph.D. student, and Steve Zoz, a master's degree candidate. **Tom Doerr**, a senior, works with graduate student Steve Eckels on an ASHRAE-funded project to measure the in-tube heat transfer performance of refrigeration tubes.

Theresa Hootman and **Todd Mayer**, both honors students, work with Professor Howard Shapiro in the HVAC Laboratory on the analysis of novel refrigeration cycles using alternative refrigerants.

Professor Robert Brown keeps four students busy on a variety of coal-related projects. **Jeff Delfs**, a junior research assistant, studies heat transfer in fluidized beds. **Chris Okiishi**, a sophomore, is working with Professor Brown on a similitude study in a circulating fluidized bed (along with graduate student Girija Parthasarthy). **Jeff Ahrens**, a senior, studies elutriation of char from a coal-fired fluidized combustor, and **John Kelly**, also a senior, works with measurement of critical heat flux in a liquid fluidized bed.

Jim Lynch, a senior, has been instrumental in developing software for visualization of mechanical systems, according to Professor Martin Vanderploeg. Jim also works with postdoctoral researcher Jeff Trom and graduate students Jay Shannan and Terran Boylan.

Professor P. A. Molian oversees four undergraduate students working on an industry/university project funded by Iowa Laser Technology, Incorporated, and the Iowa Department of Economic Development. The students, **Duane D. Miller, Sam Patel, Paul J. Van Gaal,** and **Brett Vogeler,** all seniors, are working closely with Molian to devise a nozzle that precisely controls the gas flow in a gas-assisted laser cutting process. This project is a collaborative effort between ISU and the University of Iowa Center for Laser Science and Engineering.

Scott Miller, a senior, studies under department chair Ted Okiishi and works with graduate student Steve Fisher and visiting scientist Guohua Sun on determining fluid flow patterns with ethylene tracer gas tracking in an axial-flow compressor.

Professor Okiishi is also supervising the research efforts of **Dale Van Zante**, a senior, and Mark Kroneman, a graduate student, who are using liquid crystal coatings for visualizing boundary layer development on turbine blade sections.

Under the supervision of Professor Jerry Hall, senior ME student **Todd Rea** is helping with torque sensors and leak detection in a project sponsored by Deere and Company.

In the internal combustion engine laboratory, senior **Bill Carr** and junior **Darren Herum** are working with professor Jon Van Gerpen as assistants responsible for a wide variety of laboratory tasks including engine experiment set-ups.

A Shell Undergraduate Research Assistantship program began this fall with support from the Shell Oil Company Foundation. The first appointees (and their faculty advisors) are **Jay Dinklage** (D. Van Meter and J. Van Gerpen)— "Effect of Alchohol-Water Mixture Fumigating in Diesel Engine Intake"; **Anthony Gates** (R. Scrutton)— "Surface of NC Machined Pockets"; and **Todd Mayer** (R.C. Brown)— "Neural Network Controller for a Fluidized Bed Combustor."

A letter from the chairman...

Dear Alumni and other friends of the ISU ME Department,

As chair of the department since July 1, 1990, I'm pleased to join my colleagues in greeting you with this issue of *ME Update*. The ME Department is moving rapidly ahead this year to take advantage of some outstanding opportunities for achieving excellence. And more than ever, your loyal support of our program is vital to any measure of success we enjoy; we want you to know that your continuing interest in mechanical engineering at ISU makes a significant impact on what we accomplish.

This academic year brings good news and new initiatives. Jim Bernard, our former chair, has been named director of the Iowa Center for Emerging Manufacturing Technology, an innovative new campus resource. This center promises to enhance our research and teaching efforts as it serves industry. (See story, p. 5.)

We're understandably enthused about increasing undergraduate student participation in our research projects (see cover story). Also, several of our students participated in the ISU solar car (PrISUm) project (see p. 4). These are only a few of several important "hands on" experiences we offer students. Other examples are cited in this newsletter. In future issues of *ME Update*, we'll let you in on more of these opportunities for undergraduates. We're fortunate to have so many talented students in the department (see undergraduate scholarship recipients on p. 9).

Our graduate program is also strong. We continually work to bring in external funds for graduate student research project support. On page 7 is a list of current off-campus sponsors of our research efforts. We're grateful for this support, which helps considerably in enhancing the quality of graduate education in the ME Department. Presently, we host nearly 100 graduate students. Our enrollment goal in five years is 135.

Some important transitions occurred recently. Jordan Larson and George Serovy, two of our senior

Department Chairman Ted Okiishi

professors who have brought great prestige to the department over the years, retired this past summer (see p. 7). Fortunately, they are still in Ames, so we can continue to benefit from their insights and good advice.

R. Rees Fullmer, our controls expert, who yielded to a long-standing desire to return to Utah, is now at Utah State University. He maintains an affiliation with ISU as a collaborating assistant professor.

We have gained a nuclear engineering program through a recent merger. While the B.S. degree in nuclear engineering at ISU is being phased out, we will continue to offer advanced degrees in this area. The nuclear engineering faculty, staff, and students are welcome additions to the department.

We've spent considerable time this fall developing a five-year strategic plan for the college and the department. Our department expects to recruit at least 14 new faculty in the next five years to replace retiring faculty and support planned department and college teaching, research, and outreach thrusts. We're happy to report that the ME Department was identified by the college administration as one of three programs in the college (along with Chemical Engineering and Civil and Construction Engineering) most likely to achieve national prominence and distinction in the next five years. We consider this designation a significant vote of confidence in our department, and we have every intention of delivering! If you would like a copy of ME's five-year strategic plan, please let me know.

To conclude, I'd like to thank all of you who have contributed to department endowment and scholarship funds. Your generosity goes a long way in allowing us to compete successfully for the best students and faculty available. I invite all of you to join us in building on our existing endowment and scholarship base to help make the department the best it can be. On page 11 we've listed the members of the Black-Hilstrom Club. New members are welcome! Information about contributions appears on page 12.

Best wishes for continued success and productivity.

Sincerely,

Ted

Ted Okiishi

ME students contribute to solar car's success

A team of mechanical engineering students led by Dale Van Zante, a senior from Otley, Iowa, contributed to the ISU solar car's 17th place finish in last summer's General Motors 1990 Sunrayce.

"PrISUm" finished the 11-day, 1,640-mile race that stretched from Lake Buena Vista, Florida, to the GM Technical Center in Warren, Michigan, with a time of 109 hours, eight minutes, and 29 seconds. The winning time was 72:50:47.

As captain of the mechanical systems design team, Van Zante and his ME crew—**Michael Brocka** of Waterloo; **Heather Dodd** and **Terry Herrman** of Ames; **David Grabowska** of Ankeny; and **Eric Wittrock** of Ocheyedan—were among those responsible for the design and construction of PrISUm's frame, suspension, steering, brakes, and drive train.

ME students with solar car (clockwise from left): Eric Wittrock, Mike Brocka, Dale Van Vante, Dave Grabowska, and Terry Herrman.

"We also worked closely with the aerospace engineers to build the car's shell and with a group of industrial engineers who designed the seat," said Van Zante. "And we took care of a lot of other little details, like brake pedals, that go into putting a car together."

Looking back, Van Zante admitted that even though PrISUm held together and survived the race in good condition, "we were a little over-designed—we built the car more rugged than it needed to be. We could have done things with a little more finesse to make the car lighter."

Van Zante called working on PrISUm "the most significant learning experience I've had in college. Besides using my engineering studies, I learned to manage a group of people and gained public speaking skills giving fund-raising presentations to corporations." He added, "I also met many people from electrical and industrial engineering whom I'd never have encountered without the solar car project. It was a fantastic experience."

PrISUm, now housed in a portable trailer on campus, has been accepted for a solar car race in Hawaii in June 1991. "We hope to participate if we can put together a new student team, modify PrISUm based on our Sunrayce experience, and raise the funds needed for the modifications and to finance the trip to Hawaii," said James C. Hill, project adviser and professor of chemical engineering.

Meanwhile, the $120,000 car will tour Iowa grade schools and high schools starting spring semester. ISU's "Iowa Alpha" chapter of TBΠ received a grant from the national organization to develop a program that uses the solar car as an exciting way to promote science and engineering careers to junior high students. "School kids really love the solar car—we could see that from the reaction we received at the towns along the race route," said Van Zante, who is also TBΠ chapter president. "It's a great way to show students what engineers actually do. Then we can encourage them to take the math and science courses they'll need to pursue a science or engineering career."

The ISU team also encountered enthusiastic alumni at most of the stops along the route, and alumni contributed money, components, and advice to the project. For example, **James A. Heise**, BSME '86, arranged for PrISUm's custom shock absorbers from his employer, the Delco Products Division of General Motors in Dayton, Ohio. Van Zante said that the future of ISU's solar car depends on the support the team receives—support that includes funds, technical assistance, components, and access to regional facilities.

"Facilities are where alumni could really help us," he said. "A good example is our composite shell. We had to do the fiberglass work in a wet layup, which was not the ideal method." The team would have preferred to use a composite process called prepreg, "but we couldn't find an autoclave in which to bake the shell," he explained. "We were willing to go to Chicago or some other city close to Ames over breaks to work on it, but we didn't know where to find such a facility."

Sunrayce veterans are conducting interviews to find student leaders to carry on the ISU Solar Car Project. Van Zante is hoping that a new team will be organized soon, "so we'll have a chance to pass on our ideas to the next team before we all graduate," he said.

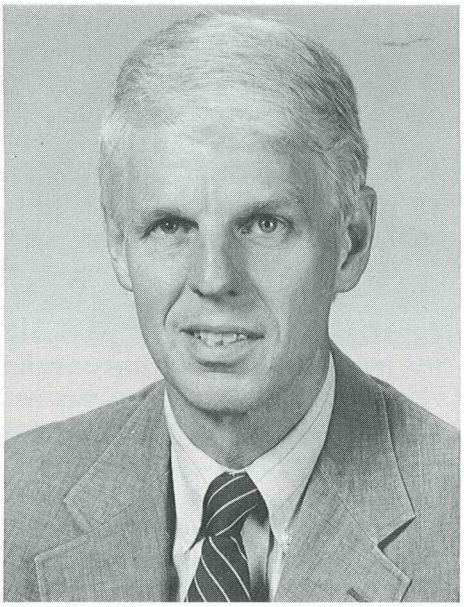
New center to give Iowa industry the competitive edge

Promoting the use of computer visualization and concurrent engineering in the manufacturing sector is the latest challenge for professor **James E. Bernard**. Bernard, who served as chairman of the ME Department for seven years, recently stepped back into the administrative ring as director of the Iowa Center for Emerging Manufacturing Technology.

The new center, part of ISU's Institute for Physical Research and Technology (IPRT), is aimed at improving the competitiveness of Iowa manufacturers in the national and international marketplace through technology transfer. It is funded by a $2.5 million, three-year grant from the Roy J. Carver Charitable Trust of Muscatine, Iowa, and $1.3 million from ISU. Future funding for the center will come from industrial and government partners.

"This center is a natural for Iowa State," said Bernard. "All the pieces are here— a nationally recognized engineering college that is rededicating itself to manufacturing, recognized expertise in related research and technology centers, and researchers who already are working in areas vital to manufacturing."

The center includes a new lab— the Carver Laboratory for Concurrent Design and Manufacturing— to be housed in the H. M. Black Engineering Building that will attract manufacturers to ISU to participate in research and educational programs. "We'll also send our engineers to factories throughout the state to learn from major Iowa manufacturers, such as Maytag, Deere & Company, and Rockwell International," said Bernard. He hopes to



Center Director Jim Bernard

involve more than 50 graduate and undergraduate students after three years. "Those students will take their knowledge and experience to industry throughout the state and the country," Bernard said. "That's a key part of making the U.S. more competitive.

"Researchers are developing high-quality computer animation that allows manufacturers to 'see' how industrial equipment will perform before it is purchased," said Bernard. Building on the computer graphics applications developed in ME's Computer Visualization Laboratory, led by associate professor of mechanical engineering **Martin J. Vanderploeg**, engineers and computer scientists at the new Iowa Center will apply that expertise to manufacturing. "This technology will allow manufacturers to use computers to visualize and improve complex manufacturing operations," said Bernard.

The Iowa Center's focus on concurrent engineering will allow manufacturers to bring together a number of separate processes, encouraging simultaneous cooperation and communication. This research will be directed by John K. Jackman, assistant professor of industrial and manufacturing systems engineering.

"The field of engineering has become quite specialized, sometimes to the detriment of the ultimate goal of producing new products as competitively as possible," Bernard said. "For example, if one kind of engineer designs an airplane part and another manufactures it, and still another develops a system to inspect it— and they're all working independently— you may end up with an expensive part that is difficult to properly inspect."

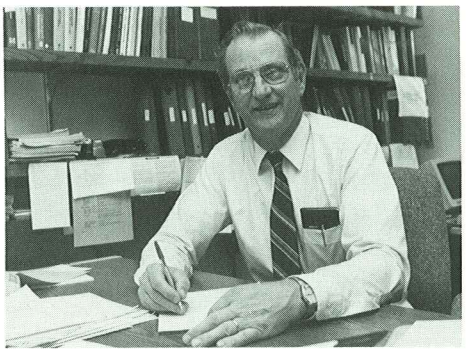
Faculty in mechanical engineering and industrial and manufacturing systems engineering will lead teaching and research activities at the new center. Iowa Center researchers will also work closely with researchers in the Center for Nondestructive Evaluation and the Center for Aviation Systems Reliability. The Iowa Center for Emerging Manufacturing Technology joins these centers and several others organized under the IPRT umbrella.

The Roy J. Carver Charitable Trust, Iowa's largest private foundation, was set up in 1981 to fund medical and scientific research. The Carver grant is among recent gifts to ISU's Partnership for Prominence capital campaign, which was announced earlier this fall.

Assistant chair Bathie "source of information"

According to Professor Bill Bathie, who serves as Assistant Chair of the ME Department, "No two work days are ever the same." Professor Bathie may teach one or two courses, talk with prospective students, and meet in committees one day. He may spend the next day talking with a prospective high school student, advising students currently in the department, and meeting with company representatives about upcoming ME graduates as potential job candidates.

Bathie, who has served in this capacity for nearly seven years, handles a wide variety of responsibilities in addition to teaching one or two courses each semester: supervising day-to-day operation of the main office; hiring all graduate teaching assistants; assisting and advising the chairman; overseeing assistantship appointments of all



Assistant Chairman Bill Bathie

graduate students; advising approximately 45 cooperative education students; supervising all department undergraduate student advisors; talking with prospective students, including high school seniors and those already enrolled at ISU; evaluating transfer credits for approximately 35 new transfer students each year; and serving as a resource person for several department committees.

"Professor Bathie is an up-to-date source of information on account balances, appointments, teaching assignments, space and physical facilities, and numerous other important department matters," according to department chairman Okiishi.

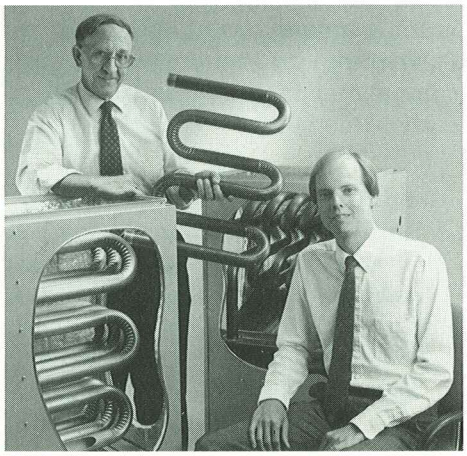
Bathie, who has been very active in ASME as a Fellow member, has also assisted the National Council of Examiners for Engineering and Surveying for several years. In the very limited time that remains, he is working on revising his textbook, *Fundamentals of Gas Turbines.*

"I'd like alumni to know that if they're ever in the Ames area, I'd be glad to give them a tour of the building," Bathie said.

Accolades for alumni: honors and awards

Two department alumni recently received the Excellence in Technology Award from the Raytheon Company. This award for technical achievement, Raytheon's highest and most prestigious, recognizes a select group of outstanding engineers and scientists among the company's 76,500 employees.

David M. Christensen (BSME '81) received the Raytheon award in



Christensen (BSME '81) with Raytheon supervisor Eugene Schuchert.

Spring 1990 for his work at Amana Refrigeration, Amana, Iowa, to develop a simple, durable, tubular heat exchanger for use in Amana's line of residential gas-fired heating equipment.

Joseph Musil (BSME '72) from Cedarapids, Inc., of Cedar Rapids, Iowa, also received the Raytheon award for his contribution to the development of the company's new line of highway construction (paving) equipment.

Randall C. Bauer (BSME '85, MSME '87) received the ASME Melville Medal for the best current original paper, "Secondary Flow, Turbulent Diffusion, and Mixing in Axial-Flow Compressors," in 1989.

Roger A. Heimbuch (BSME '66), **Dennis A. Johnson** (BSME '65), and **Max J. Miller** (BSME '62, MEME '69, PhD '73) each recently received the Engineering College Professional Achievement Citation in

Musil (BSME '72)

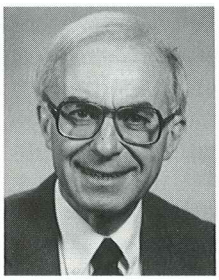
Engineering (PACE) Award in recognition of their superior technical and professional achievements.

William P.Binger (BSME '49) was recently elected to be a member of the Board of Directors of the ISU Foundation.

News of alumni honors are welcome. Submit this information to Ted Okiishi, ME Department, Iowa State University, Ames, Iowa 50011-2160.

ME professors retire

George K. Serovy, Anson Marston Distinguished Professor in Engineering, retired from ISU in August 1990. After he earned his B.S. degree here, graduating first in his class, he left ISU to work at the NASA Lewis Flight Propulsion Laboratory (now the NASA Lewis Research Center) in Cleveland. His teaching career began in the department four years later, in 1953, when he was appointed assistant professor; he earned his Ph.D. from ISU in 1958.



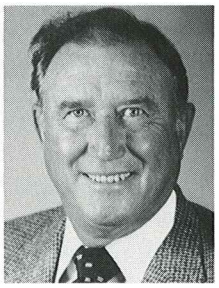
Serovy

A prolific author and highly respected researcher in his field, Serovy has established himself as an authority on turbomachinery fluid mechanics, and he is sought internationally as a consultant, lecturer, and panelist. Presently he is a member of the Propulsion and Energetics Panel of NATO/AGARD, as well as Technical Editor of two ASME Transactions journals, the *Journal of Turbomachinery* and the *Journal of Engineering for Gas Turbines and Power*.

Within the department, Serovy initiated the ISU Turbomachinery Components Research Program and originated and taught the department's courses in turbomachinery fluid dynamics.

Serovy left a lasting mark on the college as well as the department with his tireless efforts as Assistant to the Dean of Engineering, work that ultimately led to the completion and occupancy of the H. M. Black Engineering Building.

Jordan Larson, who retired in July 1990, has framed a long and varied career with two major stints in the department. After teaching at ISU from 1948 to 1956, he worked at the Pratt and Whitney Aircraft Division of United Aircraft Corporation. There, in charge of the Design Coordination Group, he worked on new engine design and directed a weight engineering group responsible for weight control and analysis of all Pratt and Whitney engines. Other projects included design and analysis of lightweight joints for segmented rocket cases, oil coolers, pressurizing and dump valves, fuel heaters, thrust reversers, and flow-turning projects. Larson also taught courses in mechanics and machine design to trainees and engineers at Pratt and Whitney. He was adjunct associate professor and chair of the Mechanical Engineering Department at the University of Hartford from 1956 to 1964.



Larson

Beginning the second part of his ISU career in 1970, he taught machine design courses, served as group leader of the department's design and manufacturing division, and more recently, chaired the curriculum committee.

Along the way, Larson also served in the U.S. Navy during WWII and the Korean War and operated a farm and a local bank!

A strong supporter of ISU athletics and a member of the Athletic Council and the Order of the Knoll, Larson is currently serving as the Engineering College co-chair for ISU's capital campaign, Partnership for Prominence.

Research sponsors lend vitality to graduate program

Research projects are vital to the graduate study program of the ME Department. Most of the research in the department is supported by contracts and grants from the sponsors listed below; this assistance is greatly appreciated. The goal for 1995 is 135 graduate students.

Aero Chem Research Laboratories
Air Conditioning Engineers
Air Force Aeropropulsion Laboratory
Air Force Office of Scientific Research
American Brass
American Society of Heating, Refrigeration and Air Conditioning Engineers
Applied Thermodynamics Systems
Bock Corporation
Breen Fund/ISU Electric Power Research Center
Carver Foundation
Chrysler
Cygnus Appliance
Du Pont
Fluidyne Engineering
Ford Motor Company
GE Aircraft Engines
General Electric
General Motors
Iowa Department of Economic Development
Iowa Department of Natural Resources
Iowa Electric Light and Power
ISU Electric Power Research Center
Materials Modification
Midwest Power Concepts, Inc.
Midwest Transportation Center
3M
Mobil Research and Development
Motor Vehicle Manufacturers Association
NASA Ames Research Center
NASA Kennedy Space Center
NASA Lewis Research Center
National Science Foundation
Navistar Technical Center
Radian Corporation
Sundstrand Heat Transfer
Technical Advances, Inc.
Textron Lycoming
U.S. Department of Commerce
U.S. Department of Energy
U.S. Department of Transportation

Students earn recognition in diverse arenas

Scott Lund was chosen by the Society of Automotive Engineers as one of three outstanding third-year engineering students to participate in the Washington Internships for Students of Engineering (WISE) 1990 summer program supported by SAE and 10 other professional societies and administered by the American Society of Engineering Education (ASEE). The trio spent ten weeks in the U.S. capitol, learning firsthand how engineers can contribute to public policy making.

Lund takes a broad view of the engineer's responsibility to inform the public about the dangers and implications of technology. "Engineers can provide the link between technical facts and human values," Lund says. His paper on the role of the federal government in the development of intelligent vehicle/highway systems is being published by the SAE.

Hootman

Summer internships have made the difference for **Theresa Hootman**, who will receive her B.S. degree in December 1991. Hootman spent her first summer internship (in 1989) with General Motors' Delco Products Division in Dayton, Ohio. There she worked in product engineering to evaluate and remedy the failure of a leveling device. In the summer of 1990, interning at Hoechst-Celanese Corporation in Corpus Christi, Texas, she was assigned projects at the technical center.

"Through my internships, I gained a better understanding of the value of professionalism, education, and communication. The exposure to industry has helped me realize my industrial interests, so I can focus my choice of coursework more appropriately," Hootman said.

Hootman is a member of TBΠ, the Society of Women Engineers, the Iowa State Volleyball Club, and the United States Volleyball Association. She has also participated in the ISU Honors Program.

Karen Smith, who began her M.S. degree program here this fall, received the 1990-91 William Binger Graduate Fellowship Award.

Karen graduated Magna Cum Laude with a B.S. degree in mechanical engineering from Lawrence Technological University in Southfield, Michigan, where her concentration was in systems design. Karen,

Smith

who said she chose ISU "because of its excellent facilities and teaching staff," also intends to pursue the Ph.D. at ISU.

Winner of the Society of Women Engineers' Madam Curie Award for achievement in math and science as a high school junior, Karen is a member of TBΠ and ΠTΣ. She recently passed the first half of the professional engineers' exam.

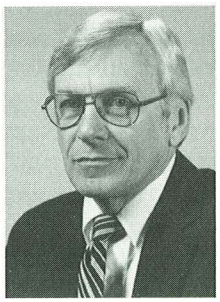
Three mechanical engineering students were selected as student athlete-scholars for 1989-1990: **David Eder** (football); **Greg Hester** (basketball); and **Shannon Boals** (football). **Boals** was also one of four 1990 Athletic Council's Highest Scholarship recipients; both he and Eder were on the Dean's List as well. Furthermore, Boals made the Dean's List Academic All Big 8 Honor Roll, which requires a minimum 3.00 GPA for the previous academic year (Fall 1988, Spring 1989) or a 3.00 cumulative GPA plus first or second team athletic standing.

Student awards, continued on page 9

Junkhan spends sabbatical in Brussels, Belgium

Professor George Junkhan has returned to the department after a one-year sabbatical leave at the von Karman Institute for Fluid Dynamics in Brussels, Belgium. The Institute, informally known as VKI, is devoted to research and graduate-level teaching and is staffed with leading scientists and visiting professors from countries in the North Atlantic Treaty Organization.

During his leave, Junkhan participated with Belgian faculty and



Junkhan

French students in a project to measure temperatures in the cooling passages of gas turbine blades. He also worked on improved design correlations for passages in enhanced heat exchangers by using data from studies done over the past several years at ISU.

During the spring of 1990, Junkhan lectured on heat exchangers at the University of Porto, Portugal, in cooperation with Portugese Professor Eduardo Maldonado, a 1982 Ph.D. ME graduate of ISU who has returned to his home country to establish a research program for energy efficiency in buildings for the southern-tier nations of the European Economic Community.

Student awards, from page 8

Erik Iverson, an M.S. student in Nuclear Engineering, designed a new type of nuclear reactor as part of his thesis research. According to his major professor, Bernard I. Spinrad, Iverson was one of three in the nation to receive a Department of Energy graduate student fellowship in nuclear engineering in 1989-1990. Iverson, ISU's first fellow, earned his B.S. degree as an honors student in 1989; he'll finish his M.S. degree in December and then pursue his Ph.D. at MIT.

Srikanth Padmanabhan (Mohan Devgun, major professor) received the Alfred V. Bodine Society of Manufacturing Engineers Award for his technical paper, "A Tandem Expert Support System as Justification for a Flexible Manufacturing System."

Edward J. Hall (Richard H. Pletcher, major professor) received a University Research Excellence Award in Fall 1989. His dissertation title was "Simulation of time-dependent compressible viscous flows using central and upwind-biased finite difference techniques."

Jeffrey D. Trom (Martin J. Vanderploeg, major professor) received a University Research Excellence Award for Spring 1990. His dissertation title was "Automated linearization of nonlinear coupled differential and algebraic equations."

Dale Van Zante was chosen as Outstanding Mechanical Engineering Senior for 1990 Engineering Week. He also received the Cardinal Key in Spring 1990.

Yvonne I. Lund received a Rockwell International Doctoral Fellowship.

James L. Davis and **Gary L. Sampson** received AMOCO Graduate Fellowships.

Scott Miller reigned as ISU Homecoming King this fall.

Undergraduate scholarship recipients and sponsors

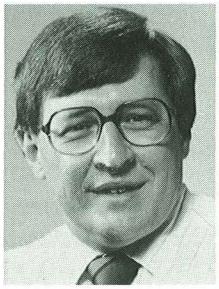
[Note that ten students are National Merit Scholars and twelve entering freshmen are among those receiving scholarships.]

Angela Ageyta	Hoechst-Celanese
Jeff Behan	Louis Bubeck
Torry Bergman	3M
Shannon Boals	General Motors
Paul Boor	ASME International Gas Turbine Institute
Michael Carney	National Merit Scholar
Brian Choi	3M
Martin Culpepper	Marston Club
Bruce Dalton	National Merit Scholar
Dean DeCock	Bourns
Jay Dinklage	Kimball Memorial
Jeffrey Dirkx	Henry M. Black
Heather Dodd	Burns and McDonnell
Kevin Dostal	Ronald McClellan
Mark Earley	Alcoa Foundation
Thomas Ewald	Alcoa Foundation
Robert Freiburger	ASME International Gas Turbine Institute
Jeremy Frye	Marston Club
David Gardner	National Merit Scholar
Lance Golinghorst	Marston Club
David Halblom	National Merit Scholar
Kirk Heer	William and Emily Haines
Theresa Hootman	Hoechst-Celanese
John Howrey	Marston Club
Ling-Shun Hung	Henry M. Black
Troy Johnson	Oscar L. Bock
Robert Kacmarynski	Phillips Petroleum
Bola King	George Washington Carver
Steven Koster	Marston Club and National Merit Scholar
Vincent Krekeler	National Merit Scholar
Mark Lansink	National Machine Tool
James Lynch	Henry M. Black
Colin MacGillivray	Marston Club
Christopher Maifield	Marston Club
Todd Mayer	General Motors
Garrett McClain	3M
Martha Minton	Alice Redington Black
Tammy Nordine	Alice Redington Black
Julia Osborn	Marston Club and National Merit Scholar
Victoria Patterson	Hoechst-Celanese
Diane Perella	Natural Gas Pipeline
Jack Riddle	National Merit Scholar
Dirk Roorda	National Merit Scholar
Brian Rosenboom	Marston Club
Chris Shafer	Maytag
Tamara Schroeder	Hoechst-Celanese
Randy Short	Phillips Petroleum
Peter Simmons	National Machine Tool
John Smart	National Achievement Scholar
Michael Smith	Kermit B. Meyers
Phillip Stallman	James River Corporation
Shannon Stobbe	Marston Club
Carrie Stover	Cargill
Michael Thatcher	Henry M. Black
Chris Thilges	Stan Anderson
Dale Van Zante	Ingersoll-Rand
Thedy Veliz	Paul Morgan
Chad Voelkers	General Motors
David Waller	Charles F. King
Sherry Warren	Paul Morgan
Dana Williams	National Merit Scholar
Joe Wolfe	Marston Club
Eric Wittrock	3M
Wyndle Young	Paul Morgan

Faculty garner local, national, and international honors

Mechanical engineering professor **Donald R. Flugrad** was one of two faculty from the College of Engineering who were honored with superior teaching awards for 1990. Flugrad received the college's Superior Engineering Teacher Award, presented by Dean David T. Kao, at the August convocation that marks the beginning of the academic year.

This award, conveyed with a plaque and $500, is based on student and faculty evaluations and considers personal qualities and development and application of innovative teaching techniques.



Flugrad

Professor Flugrad has taught both undergraduate and graduate courses in mechanical engineering, including mechanisms, mechanical design, and kinematics, since 1978. He helped to develop the department's robotics and new materials design courses and was responsible for introducing the graphics program AutoCAD into the entry course of the ME undergraduate curriculum.

Professor **Charles R. Mischke** received the 1990 Machine Design Award of the American Society of Mechanical Engineers (ASME) in Chicago during its Design Automation Conference in September. The award, established in 1958, recognizes eminent achievement or distinguished service in the field of machine design. Mischke, whose contributions to machine design and literature span more than 35 years, has been a member of ISU's ME Department since 1964. He has published numerous books and technical journal articles. Mischke is active in ASME and was elected a Fellow member in 1986.

Mischke

Gregory M. Maxwell received a Rockwell International Excellence Award in Fall 1990.

Theodore H. Okiishi received the ASME Melville Medal for the best current original paper, "Secondary Flow, Turbulent Diffusion, and Mixing in Axial-Flow Compressors," in 1989, and the Department of Mechanical Engineering Professor of the Year Award in 1990.

Michael B. Pate was promoted to professor in 1990.

Richard H. Pletcher received an Iowa State University Teaching Excellence Award in 1989.

Howard N. Shapiro received the American Society for Engineering Education Merriam/Wiley Distinguished Author Award for the textbook *Fundamentals of Engineering Thermodynamics*.

Howard N. Shapiro and **Jon H. Van Gerpen** won the E. F. Obert Outstanding Paper Award for "Second Law Analysis of Diesel Engine Combustion" in 1988.

Martin J. Vanderploeg was elected Outstanding Younger Member of the Mississippi Valley Section of the Society of Automotive Engineers in 1989 and was voted ISU Engineering Council Outstanding Mechanical Engineering Professor in 1990.

Jon Van Gerpen was promoted to Associate Professor with tenure in 1990.

Corporate gifts lend strength to ME Department

The department benefits greatly from generous corporate gifts including grants and equipment. This important assistance is gratefully acknowledged. The companies listed below have helped strengthen the department.

Aerospace Corporation
Alcoa
Amana Refrigeration
Ames Savings and Loan
Amoco
Bimet Corporation
Black and Veatch
Caterpillar
Chevron Chemical
Compressor Controls
Deere and Company
Digital Equipment Company
R. R. Donnelley and Sons
Dow Corning
Exxon
EMD Associates
Fisher Controls
General Electric
General Motors
Goodyear Tire and Rubber
Hoechst-Celanese
Honeywell
IBM
Ingersoll-Rand
Inland Steel-Ryerson
3M
McDonnell Douglas
Monsanto
Motor Parts-Princeton
Olin
Phillips Petroleum
Positech
PPG Industries
Pratt and Whitney
Proctor and Gamble
Raytheon
Rockwell International
Shell Oil
Schwab Vollhaber
SDRC
Sundstrand
Tektronix
Texas Instruments
Trane
Union Carbide
Utility Power Corporation
Waste Management Inc.

Black-Hilstrom funds help attract top faculty, students

Much of the continuing success of the Department of Mechanical Engineering is due to generous contributions from individuals and families. Interest earned by department endowment funds is used in numerous ways to help us strive toward excellence. Just as with any sound investment, this income is used as "seed money," and significant returns are expected—and realized. For example, some of the earnings from the Black-Hilstrom Fund are used to attract top faculty and students to ISU. The R. A. Engel Laboratory, the cornerstone of department efforts to integrate design and manufacturing, was established and continues to be sustained with interest income from the Engel Endowment Fund.

All contributors to the department are held in high esteem. The Black-Hilstrom Club began in 1984 as a means for recognizing and communicating with donors. Club members are appreciated for their considerable commitment to mechanical engineering programs at ISU. Listed below are individual and family donors; benefactors ($25,000 or more); fellows ($10,000 or more); and members ($1,000 or more).

The department is well on its way to national prominence and distinction. You too can participate in Partnership for Prominence—ISU's current capital campaign—by contributing to the Black-Hilstrom Fund. For your convenience, a form is available on the back page of this issue of *ME Update*.

Black-Hilstrom Club Members:

Benefactors:

Allen M. Acheson '50
William P. Binger '49
Henry M. Black '29 (deceased)
Raymond A. Engel '29 (deceased)
Hollis R. "Pete" Hilstrom '34
Robert P. Jensen '47
Frederick H. Rixe '44
Edwin C. Sandham '38

Fellows:

David H. Arnold '69
Roger Haines '53
Robert C. Hall '55
Jordan L. Larson, Jr. '47, '48
Ralph E. Manns '29
Harold M. Matheson '55
James A. Peterson '58

Members:

Jeffrey C. Ackerman '79
Margaret J. Albert '47
Mark M. Alleman '66
James H. & Patricia Anderson '49, '48
Wallace W. Anderson '66
Daniel H. Arnold '85
Richard R. Balsbaugh '51
Benjamin R. Barnard '57
William W. Bathie '57, '67
C. Sean Battles '67
Howard A. Baxter '37
In Memoriam, Edward H. Bergles
David A. Bear '58
James E. Bernard
Hubert J. Bierman '38
Lynn W. Biwer '40
Eugene R. Boedecker '52
Jack R. Bohn '55, '59
George M. Booth '30
Howard I. Bowers '48
James H. Boyd '38
Kenneth E. Brooker '42
Donald W. Buckingham '54
Marvin E. Bunse '70
David N. Callahan '59
Robert C. Callahan '61
William G. Castner '50
Robert G. Chamberlain '49
Peter J. Classen '57
Jeffrey D. Colwill '84
Douglas L. Corlette '48
Charles W. Craychee, Jr. '61
James E. Crouse '57
Karen K. Dahlerup '63
Chester W. Diercks '50
Lowell R. Dubberke '59
Dennis W. Dunn '77
J. Howard Dunn '31
Bernice Black Durand
Gisele K. Early '82
Joseph P. Eckman, Jr. '46
George M. Eveleth '35
John D. Eyestone '41
Karl Feise '35
Robert C. Fields '49
In Memoriam, Stephen P. Finders '72
James W. Freshour '52
James W. Fruehling '62
Carroll D. Fruth '42
Owen L. Garretson '37
Max P. Gassman '63
Kerry G. Geringer '66, '73
Bruce M. Gibson '63
Jeffrey R. Groene '81
Loren A. Gross '57, '66
Jerry Lee Hall '59, '63, '67
Jerry W. Hansen '72
Robert L. Hansen '65
Roger S. Hanson '54, '58
Gerald C. Hartman '59
In Memoriam, Laurel E. Hedeen '35
H. William Heilman, Jr. '39
Roger A. Heimbuch '66
J. Stephen Herring '71
Leland H. Hoffmeier '60
Frank S. Hong '74
David C. Horneys '62
Merle Huppert '42
Henryk Hurwicz '49, '50, '53
Francis C. Huyser '34
Lyle Darwin Inskeep '48
James K. Jensen
Bruce L. Johnson '55, '62
Kimberly Kay Johnson '81
Philip C. Jorgenson '83
Richard Kamber '59
Wayne C. Kempter '54
Merle Kirby '55
Mac G. Klingler '69
Larry L. Knotek '58
Gregory W. Knowles '40
Thomas J. Langenfeld '81
Dan R. Lawson '71
George E. Leonard
Robert A. Letz '62
Veva Lindsey
David MacMorris '49
Dean J. Madsen '40
Kevin J. Maguire '53
William March '46
Kenneth J. Marsh '63
John C. Mather '67, '75
Ronald E. McClellan '61
Robert R. McCutchen '50
Edward B. McCutcheon '69, '75
R. Wayne McLaughlin '29
Paul A. Mongerson, Jr. '44
Tsukasa Mukai '55
Donald L. Nordeen '54
James H. Norman '55
The Ted and Rae Okiishi Family
Morten L. Olson '53
David R. Onderdonk '80
Richard Parker '50
John H. Paine '57
Gaylord W. Penney '23
James E. Peters '57
Carlton H. Peterson '73
Howard Peterson '18
Larry C. Pithan '73
William G. Potter '49
Russell L. Power '49
Donald L. Reinertson '50

Black-Hilstrom, continued on page 12

Black-Hilstrom, from page 11

William L. Renaud '73
Wenceslaus M. Rodriquez '75
Douglas A. Rogers '53
Willard L. Rogers '42
Darel G. Roorda '85
Richard E. Ryder '47
Charles W. Sandford '49
Clifford W. Satre '50
Lawrence M. Scheier '79
John A. Scheid '56
Ralph B. Scherr '29
Walter J. Schlagel '35
Robert L. Schmidt '59
Vernan L. Schrimper '55
Craig A. Shaver '80
Donald H. Sherman '65, '67
Robert E. Siedelmann '50
William A. Sigman '50
Julian B. Silverberg '50
James E. Sirois '63
George L. Smith '31
Richard H. Stanley '55
Charles D. Statton '50
Calvin C. Staudt, Jr. '77
Edwin E. Stewart '61, '65
Carl G. Stolberg '57
Richard D. Strunk '58
Morton R. Swift '35
Peter W. Ten Pas '77, '90
David H. Thompson '57, '60, '63
Warren R. Thompson '48
Robert E. Thune '50
Paul L. Tjossem '58
Meryl L. Todd '31
Robert G. Trowbridge '59
Donald B. Turkington '44, '47
Michael G. Upchurch '73
Michael J. Vaclav '81
Roger D. Vanderzyl '68
Dale L. VanWyk '84
Byron Veath '51
Barney Vignovich '51
Phyllis N. Walters '84
Donald E. Wandling '64
William C. Waters '57
Clay M. Webb III '69, '85
Mark Henry Wegener '48, '51
Terry W. Westbrook '82
David R. Williams '76
Joseph M. Williams '58
Robert F. Witte '60
Paul Wolfmeyer '66
Terrill Woods '67, '77
James A. Yungclas '16
Moritz B. Zeiner '26, '33
Phillip Zink '57

THE BLACK-HILSTROM FUND

An Endowment for Mechanical Engineering

☐ To provide support for the Department of Mechanical Engineering I enclose $_____ by check made payable to the ISU Achievement Foundation and designated to the Black-Hilstrom Fund.

☐ To provide support for the Department of Mechanical Engineering, I pledge $_____ to be paid in ____ installments over _____ years. Please remind me each year in _____ (month). Enclosed is my first check for $_____ made payable to the ISU Achievement Foundation and designated to the Black-Hilstrom Fund.

☐ I am interested in other ways to help Mechanical Engineering.

_____

_____.

We need to know:

Date _____

Name _____

Degree(s) _____ year(s) granted _____

Address_____

City _____ State _____ Zip _____

My gift ☐ does ☐ does not qualify for a company matching gift.

Please return to:

the ISU Foundation
Alumni Suite
Memorial Union
2229 Lincoln Way
Ames, Iowa 50010-7164

Department of Mechanical Engineering
Iowa State University
2025 H. M. Black Engineering Bldg.
Ames, Iowa 50011-2160

Do Not Forward
Address Correction Requested
Return Postage Guaranteed

ME Update is prepared by the Office of Editorial Services for the Deartment of Mechanical Engineering at ISU. Please address comments, inquiries, and address changes to Ted Okiishi, Department Chairman, at the return address above.

Preparation and printing of this newsletter are not supported by state-appropriated funds.

ISU-ERI-91077