

## New ME Chair Warren DeVries is a natural

**T**he next time you visit campus, you're likely to see a gleaming blue '47 Ford pickup parked behind Black Engineering. The pampered antique is the prized possession of Warren DeVries, ISU's new ME department chair.

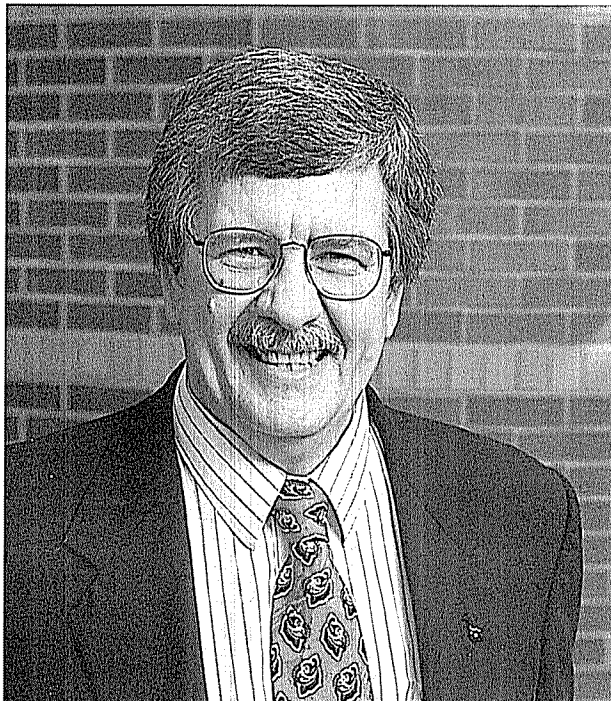
The truck might come as a surprise to those who know DeVries only by his impressive credentials: two years as a program director in the National Science Foundation's Division of Design, Manufacture, and Industrial Innovation; 14 years on the ME faculty at Rensselaer Polytechnic Institute in Troy, New York; president of SME's North American Manufacturing Institution; ASME senior vice president for engineering; and a Ph.D. in ME with minors in statistics and electrical and computer engineering from the University of Wisconsin-Madison in 1975.

Yet DeVries comes by his profession—and his classic Midwestern truck—naturally. Both his father and grandfather worked for Case Corporation in Racine, Wisconsin. "My grandfather was a tinsmith when they made threshing machines and my father apprenticed there as a metal pattern maker. That's probably how I got interested in working with mechanical things."

For DeVries, "working with mechanical things" means not only restoring a '47 Ford, but also cultivating his interest in manufacturing. At RPI he taught several undergraduate courses including Metal Cutting, Mechatronic System Design, and Design of Mechanical Systems, and wrote more than 40 research articles and two textbooks, *Analysis of Material Removal Processes* and *Microcomputer Applications in Manufacturing*.

Although DeVries knew a bit about ISU through RPI colleagues (Mike Jensen, MSME'76, Ph.D. ME'80, is on the ME faculty and former ISU Distinguished Professor and ME Department Chair Art Bergles was engineering dean at RPI), two factors weighed heavily in his decision to come here. "The students were an asset in the recruiting process. They really like Iowa State and the department. When I was making my decision, I received e-mail messages from the student member of the search committee! That was a positive. I don't know if that clinched the deal, but it made me think that the students were really concerned about finding a good DEO for the department," DeVries said.

DeVries also likes the direction ISU and its engineering college are headed. "The goals are right for where the world is going now. That became clear to me at NSF where I encouraged faculty to work on research with industry, not only because of the financial support, but also because industry offers interesting, challenging problems that have long-term relevance. Partnerships with industry are going to be the mode of action in the



DeVries

future nationally; and ME, the college, and ISU are very active players."

DeVries admits that he's still "learning how to be a department chair." His goal now is to maintain "the good things that are already occurring in the department," he said. "But, as a department, we need to focus on attracting women and minority students and faculty. It's not only the right thing to do, it's also the way the

workplace looks. It's just good preparation for people entering the workforce. I am optimistic because we were fortunate last year to recruit two excellent faculty—Abir Qamhiyah and Radha Sarma—who happened to be women. It's a plus to have them and Assistant Professor Judy Vance as role models for other young women engineers."

Now that he's been here awhile, one thing that's impressed him is the loyalty of alumni. "I see it in terms of their support for the department. I'm just amazed how strong that support is over the years. The legacy and name of Henry Black is amazing. So many people who were here during his tenure have anecdotes to tell—he made a pretty big impact on people's lives. And the newer generation of alums seem to have a strong positive feeling for the department, as well. My job is to make sure that I maintain and strengthen that," he said.

And how is that job going? "Everybody asks me that—and I say, "Well I still come in each morning and smile and most of the time I can still smile at the end of the day, so I think it's okay."

## Greetings from the MEs at ISU!



# Department Dynamics

## Shapiro named assistant dean

The College of Engineering's new assistant dean of engineering for undergraduate programs is ME Professor Howard Shapiro. Engineering Dean James Melsa, who announced the three-year appointment in January, said Shapiro is especially well prepared to lead the college's efforts to make changes in both content and methodology of undergraduate programs.

In his new position, Shapiro hopes to expand engineering faculty participation in Project LEA/RN, a teaching enhancement

program. "We are committed to implementing the most effective means for enhancing the learning of out students," Shapiro said. "I am excited about the potential impact of active and collaborative learning on our curriculum and instruction. We want to help our students be successful in the next century."



Shapiro

Shapiro will oversee the college's offices for classification, computer support, and student services. He also plans to continue teaching and research.

Shapiro joined ISU's ME faculty in 1975 after earning his Ph.D. from Ohio State University. Since 1990, he has directed the ISU Energy Analysis and Diagnostic Center and has been co-director of ISU's Center for Building Energy Research since 1991.

A highly regarded teacher, Shapiro has received many awards, including an ISU Excellence in Teaching Award (1991) and a Regents' Award for Faculty Excellence (1992). He was named the ME Seniors' Professor of the Year in 1994. Shapiro has been an elected member of the Ames School Board since 1988 and served as president for two years.

## Brown heads research center

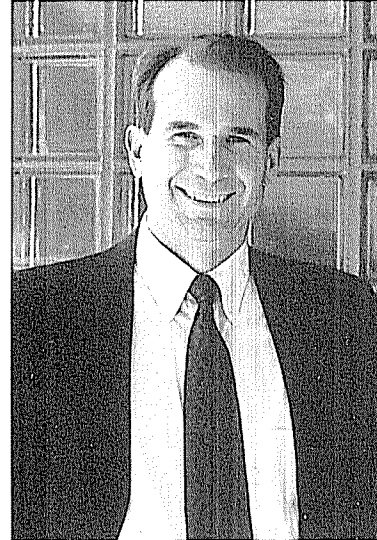
In August, ME Professor Robert C. Brown was appointed director of the Center for Coal and the Environment (CfCE). One of 11 centers administered through Iowa State's Institute for Physical Research and Technology, CfCE conducts interdisciplinary, applied research on sustainable energy technologies.

Under Brown's leadership the center's sustainable energy work will be concentrated in two programs: environmental technologies and biomass energy. "The environmental program will take advantage of existing research strengths at CfCE. And the new biomass energy program will address global climate change problems as well as regional economic development issues," he said.

Already the Center is playing a role in a \$20 million federal-local-private project to develop switch grass as a fuel for biomass power plants. CfCE will test the

gasification characteristics of the grass and will work with Energy Research Corporation on using biomass-derived gas in fuel cells.

Several ME students—both undergraduate and graduate—work on projects at the center, Brown said. One team is identifying promising biomass energy technologies and has created a biomass energy page on the World Wide Web at <www.public.iastate.edu/~iprt\_info/biomass>. A second team is developing new gasification processes and instruments to be used with biomass fuels.



Brown

Researcher in the College of Engineering. He holds four patents.

## Bullen is presidential appointee

ME Associate Professor Dan Bullen has been appointed by President Clinton to serve on the U.S. Nuclear Waste Technical Review Board (NWTRB). The board oversees the technical efforts of the U.S. Department of Energy on the safe shipment, storage, and disposal of high-level radioactive wastes.



Bullen

Created by Congress in 1987, the NWTRB consists of 11 members who are nominated by the National Academy of Sciences. Bullen is one of seven new appointees chosen on the basis of their distinguished service.

Of primary concern to the board is DOE's work on determining a site for long-term disposal of high-level radioactive wastes. A repository that can store such wastes for 10,000 years is planned for construction by the year 2010, Bullen said. "Choosing a site and designing a repository for such a long working lifetime makes it an unprecedented engineering challenge. I

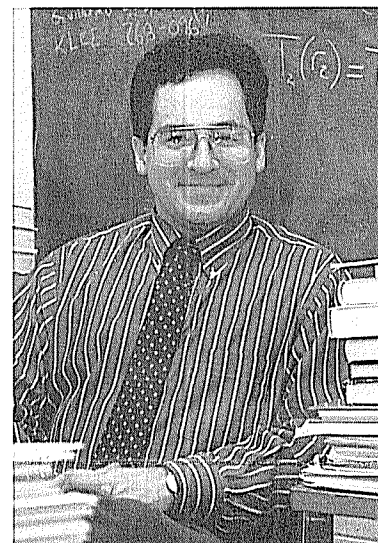
believe we can develop a technically sound and very safe disposal system," he said.

Bullen's expertise is in the area of performance assessments of engineered barrier systems. These systems will ultimately shield the high-level radioactivity emitted by the wastes and are a crucial element in the overall nuclear waste repository.

Bullen, who directs ISU's Nuclear Reactor Laboratory, spent the past 10 years studying various containment systems and how they perform in different environments, with different wastes, and over various periods of time.

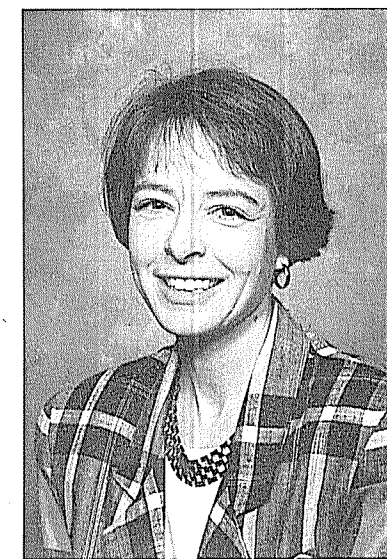
## Maldonado and Vance receive prestigious NSF award

ME Assistant Professors G. Ivan Maldonado and Judy Vance are among about 200 engineering and computer



Maldonado

faculty nationwide to receive the National Science Foundation's Early Career Awards. The competitive grants are awarded to young faculty who show exceptional promise as both researchers and teachers. Each faculty member receives NSF project funding of about \$50,000 annually for four years.



Vance

Maldonado's research project involves the development of a perturbation theory and neural net hybrid technique to solve very large systems of diffusion-like partial differential equations.

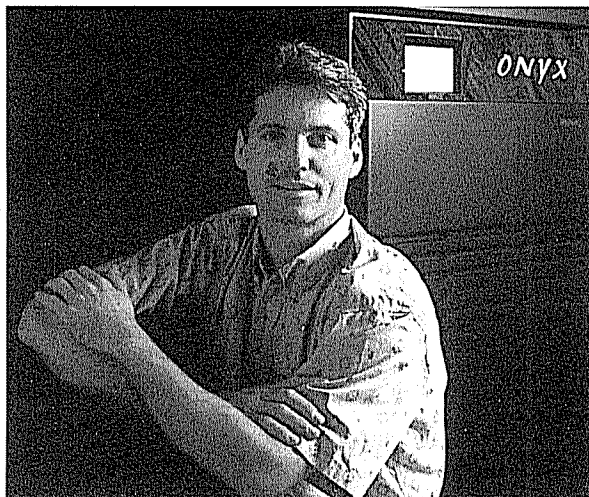
Maldonado received his doctorate in nuclear engineering from North

Carolina State University and is listed in *Who's Who in Science and Engineering*. He has won several honors including a 1996 Miller Faculty Teaching Fellowship and E-Council's award for Outstanding Professor of Nuclear Engineering.

Vance's research focuses on using virtual reality techniques to improve product design. She also researches the use of collaborative teaching techniques in the engineering classroom. Vance received her doctorate in mechanical engineering from ISU in 1992. Among other awards, she won the U.S. Department of Agriculture's Women's History Award in 1994.

### Oliver completes Boeing fellowship

Jim Oliver, ME associate professor, took part in Boeing's prestigious A.D. Welliver Faculty Summer Fellowship program last summer in Seattle, Washington. Boeing started the program in 1995 to strengthen ties between the industry and universities.



#### Oliver

Oliver, also associate director of the Iowa Center for Emerging Manufacturing Technology, said he came away from the eight-week fellowship with a better understanding of the aerospace industry.

"I learned a lot about the business forces that are motivating the aerospace industry to change," he said. "For example, the highest cost associated with running an airline is the cost of owning an airplane. The impact on airplane design, in practical terms, is that new technological advances are considered only when they can be incorporated without increased cost. The terminology used at Boeing is that new technology has to 'buy its way onto the airplane,'" he said.

Oliver, who participated in the program with 10 other university faculty, said engineering professors tend to pursue technology for technology's sake. "That mentality rubs off on our students," he said. "One of the main things that the Boeing people wanted us to take back to the classrooms is an appreciation of the bigger picture, which is to pursue new technology in the context of business, societal, political, and global constraints."

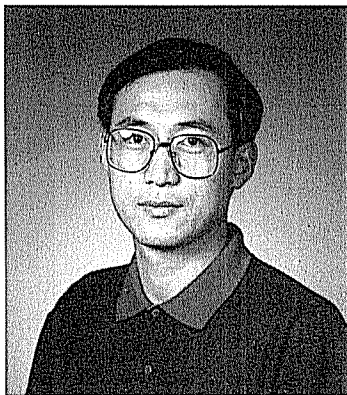
### Advisory council provides valuable guidance

Fifteen leaders from industry, business, and the ME profession serve on the department's advisory council. Meeting twice each year, they provide an outside perspective that can help the department make education more relevant to customers. The council also helps identify needs for long-term viability of the department; serves as an advocate for the department; provides counsel in strategic planning; and provides guidance in fund-raising.

"The advisory council is valuable for the department and we're asking members to do a little more now," said Warren DeVries, department chair. "One suggestion that came from the council was to survey alumni five years after they graduate. We'd like to see how our graduates are doing and how well prepared they felt when they entered the workplace."

At their fall meeting, council members ratified bylaws and elected Mike Mack of Waterloo, Iowa, president, and Dick McGaughy of Cedar Rapids, Iowa, vice presi-

### Three new faculty join ME



#### X. Daniel Fang

In just one short year, Assistant Professor X. Daniel Fang brought honors to the ME department. In May, the university awarded Fang a Miller Faculty Development Fellowship. His team was among 11

selected from a field of 80. In July, Fang, with ME faculty members, T. Kesavadas, James Oliver, and Judy Vance, received an NSF award to develop a virtual reality machining system that will help provide students with "hands-on" experience, enhance their understanding of machining principles, and promote their learning capability. This summer, he will be the engineering college representative on ISU President Jischke's delegation to China.

Fang earned his B.S. in 1983 and his M.S. in 1986 from Tsinghua University in Beijing, China. After working two years as an engineer at Guangzhou M & E Technology Development Company, he earned his Ph.D. from Australia's University of Wollongong in 1991. He did postdoctoral work at the University of Kentucky in 1992 and returned to the faculty of the University of Wollongong until 1995. Fang has authored or co-authored 28 research publications and given presentations in eight countries.

Since joining the ME faculty in August 1995, Fang has been teaching two undergraduate courses and a new 500-level course. He also conducts research in manufacturing processes (modeling, monitoring, control, animation, and virtual reality), machining tolerance, and selective assembly.

#### Abir Qamhiyah

Abir Qamhiyah joined the ME faculty as an assistant professor last August, which was about the same time that she received her Ph.D. in mechanical and industrial engineering from the University of Toronto. While at Toronto, she was a teaching assistant for three years and participated in lecturing a course in computer-aided design and engineering for one year.



Qamhiyah earned her bachelor's degree in ME from Kuwait University in 1989. She gained valuable experience in Kuwait working as a field maintenance engineer-in-training for the Kuwait National Petroleum Company and as a

construction site engineer-in-training. She also has worked as a consultant for the development of speech recognition software in Amman, Jordan.

Qamhiyah currently teaches *Design of Machine Elements* and is developing a senior-level experimental course in computer-aided design which will be offered next fall. Her research areas include intelligent computer-aided design systems, CAD/CAM integration, and feature-based CAD. She is the co-author of eight research publications.



#### Radha Sarma

Radha Sarma joined ISU's ME faculty as an assistant professor in January shortly after earning her Ph.D. from the University of Michigan. Sarma received her master's from the University of Toledo in Ohio in

1991 and her bachelor's from the Indian Institute of Technology in Madras, India in 1989.

While in graduate school, Sarma taught several courses in design and manufacturing. Her research focused on the development of new techniques of NC tool path generation for free form surfaces. She also worked for Chrysler on a virtual reality project in which tools were developed to view the interior of a car. Sarma is the co-author of six research publications.

Sarma currently teaches a course on mechanisms. Her research interests include geometric and surface modeling, computer-aided design and manufacturing, metrology, and dynamics and kinematics. Her current research involves developing product models for various manufacturing activities ranging from micro-electronics to traditional manufacturing.

dent. Four dedicated members are switching to emeritus status after giving generously of their time and expertise: Allen Acheson, BSME'50, Kansas City, Missouri; James Anderson, BSME'49, Palm Desert, California; Roger Heimbuch, BSME'65, Warren, Michigan; and Carsten Ingvaldstad, St. Paul, Minnesota. Their dedication has been greatly appreciated—and the department chair still has their phone numbers so that he can call on them for advice in the future.

Two new members will begin service at the spring meeting. Yvonne Lund, MSME'87, Ph.D. ME'95, is senior product development engineer at 3M in St. Paul, Minnesota. Keith Van Maanan, BSME'84, is a staff project engineer with GM Power Train Group in Ypsilanti, Michigan.

Alumni interested in serving on the council, or in working with the department in other ways, should contact Warren DeVries, ME Department, 2025 Black Engineering, ISU, Ames, Iowa 50011-2160; (515) 294-1423; <wdevries@iastate.edu>.

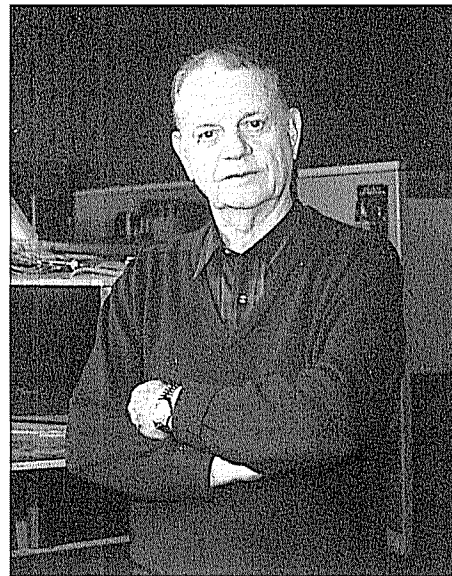
## Patrick Kavanagh retires after 40 years of teaching

**P**atrick Kavanagh, who in 1996 retired after nearly 40 years of teaching at ISU, said he hoped he turned out “critical thinkers.”

Although most of his teaching centered on the kinematics analysis and synthesis of mechanisms, his research focused on internal fluid mechanics of turbomachinery.

Kavanagh's expertise in turbomachinery also took him to Beijing, China, in May 1989 for a hydro-machinery conference; however, he received more than he bargained for. “We were there just as the Tiananmen Square fiasco broke out,” he said, referring to the democracy movement when thousands of students turned out to protest the repressive government.

Kavanagh and several American and European colleagues were on a boat near Wuhan where they were studying hydro power sites. “When we got off the boat, we heard what had happened in Beijing. I was scared because a group of students was blocking the bridge over the river and we had to cross that bridge to reach the airport. Some returned to Beijing; but the rest of us stayed in a hotel in Wuhan. We woke up in the morning, and for some reason the students were gone.”



He said most just left their luggage, crossed the bridge and headed for the airport as fast as they could. “I did get my luggage back, though, five months later.”

Despite that harrowing experience, Kavanagh went overseas again as a visiting professor at the University of Limerick in Ireland. Kavanagh said he thought the school was pleased to have him. “They said I could come back, anyway.” And he does hope to do another “stint of teaching” in Ireland. Also, Kavanagh and several others are collaborating on a textbook.

Kavanagh's proudest moment at ISU was when he was named a full professor in 1975. “That meant a lot to me because it says you've finally accomplished a significant goal.”

## A designer's designer retires

**R**etirement means never having to set your alarm,” said Leo Peters, who left his ME faculty position last May.

Although Peters enjoys having the freedom to visit his nine children and 11 grandkids, he misses teaching. “There is a real sense of satisfaction when former students write or visit me saying they appreciated everything I did for them,” said Peters, who taught at ISU for 35 years.

Mary J. Wickham, BSME'80, MSME'81, an engineer with Caterpillar in Illinois, is grateful to have studied under Peters. “He really cared about his students and went out of his way to accommodate them. His retirement is a great loss for ISU engineering students.”



Peters said, “I was a teacher and not a researcher; so I didn't bring in the research dollars. But I just really wanted to teach. I felt that I had a lot to offer students because of my background.”

Before coming to ISU in 1961 to earn his M.S. and Ph.D. degrees, he worked at John Deere Waterloo Tractor Works in the tractor component design department. He also served one year in Korea as an

Air Force officer and in Texas where he conducted operational suitability testing of equipment

He incorporated this background into his classroom, especially in senior design classes when he made students design projects — like the vinegar and baking soda powered car — without paper, calculator or computer. “I was trying to get through to them that there is a huge difference between designing something on paper and actually making it work,” he said.

Peters turned these projects into competitions in the early 1990s. “At first they had a lot of gripes. You know students, they never want to do more than they absolutely have to. But once they built something — then they got into the spirit of things. Oh, we had a lot of fun that first year. Some cars blew up; some didn't move at all; and some actually did what they were supposed to.”

Another legacy of Peters' career grew out of his legal consulting work. He consulted on nearly 4,000 cases and testified in more than 100 trials. The work led to *Legal Considerations and Design*, a course he developed. “I introduced students to another aspect of engineering design — the legal process,” he said. His legal work may have influenced two of his daughters to become attorneys. “They say they'll never hire me; but we've certainly had some good discussions.”

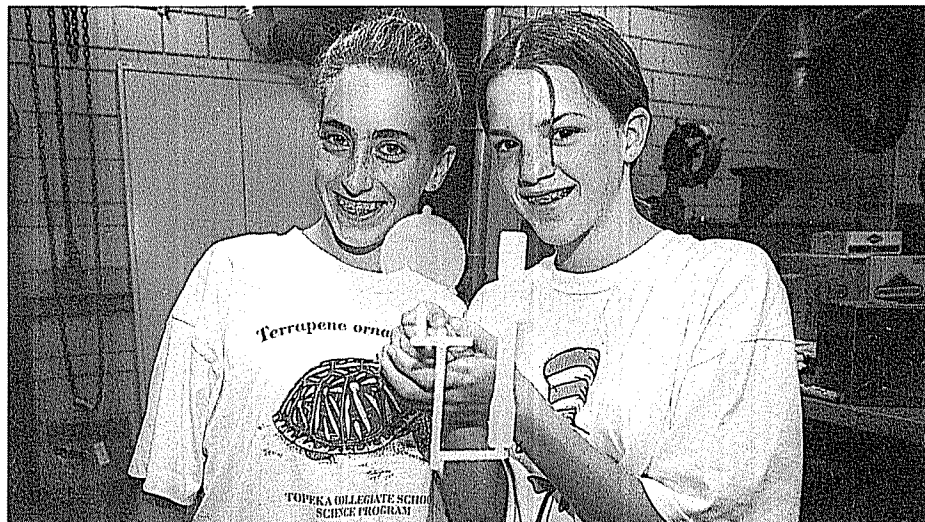
Peters' most memorable occasion at ISU was when his son, a student of his, presented the ME Professor of the Year Award to him in 1982. “Everyone kept this a secret, so I was really taken off guard. My son stood up and said I had provided him with inspiration and a really strong engineering background. It really touched my heart to hear him say that because all this time, I never thought he listened to a thing I said.”

Another fitting tribute to Peters' renowned concern for students came when he was named the College of Engineering's Outstanding Adviser in 1996.

## Future engineers

Stacie Kossoy of Topeka, Kansas, and Jenny Doty, of West Des Moines, Iowa, were among the talented and gifted middle school students who spent five days last summer in the state-of-the-art laboratories of Black Engineering on the ISU campus.

Through hands-on activities, the students designed, programmed, and tested a robot assembly project in the “Anatomy of R2D2” course. The course was one of several summer classes sponsored by the Office of Precollegiate Programs for Talented and Gifted Students at Iowa State.



## Bingers endow their graduate fellowship

Since 1983, Virginia and William Binger, BSME'49, have helped 15 promising mechanical engineers advance their studies and gain strong footing in their early careers. Now, because the Bingers want to ensure such opportunity continues for future generations, they've endowed the Binger Graduate Fellowship.

Originally established with the Bingers' annual gift to the Black-Hilstrom Fund, the fellowship grew to more than \$30,000 and was formally endowed last fall.

"It's a good feeling to know that our gift helps start outstanding students on their careers. We're pleased to be able to do that," Binger said.

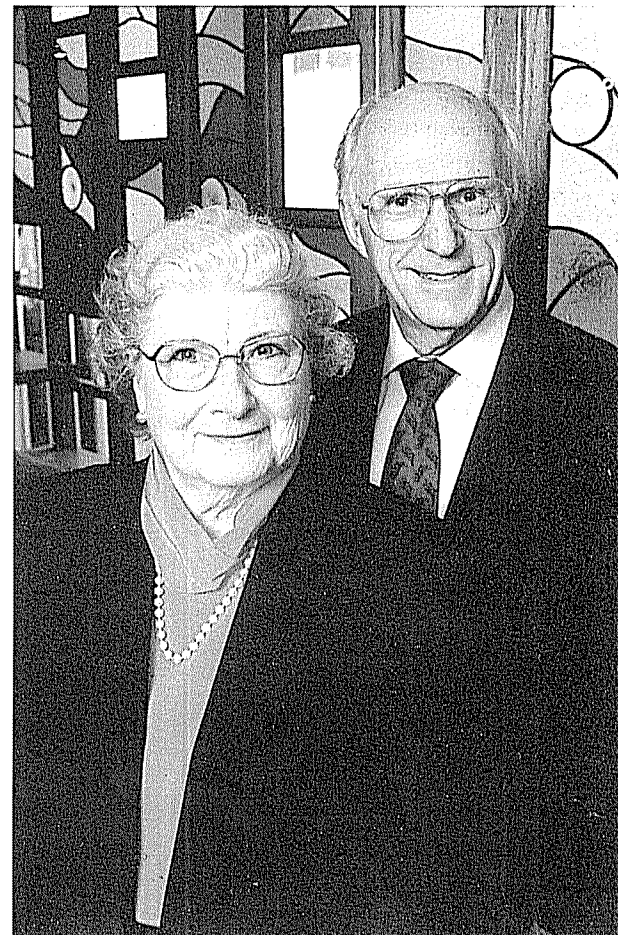
Binger's own career—36 years with the Shell Oil Company—started immediately after graduating from ISU. When he retired in 1985, Binger was recognized as a world authority on pipeline system and facility design and construction.

Assignments of increasing challenge and responsibility took the Bingers and their three daughters to Venezuela, Great Britain, and Denmark. Just nine years after graduating from ISU, Binger was project engineer for a major Venezuelan pipeline and shipping terminal that cost more than \$100 million.

By the mid-1970s, Binger was managing some of Shell's most complex pipeline projects. Working off the coast of North Wales—in what is arguably Great Britain's most beautiful countryside—he managed the design, construction, and start-up of a deep water tanker unloading terminal and associated pipeline. Through the adoption of the highest standards in materials, workmanship, and quality control, Binger completed the project to the total satisfaction of all concerned. For his sensitive approach, he was honored by the Royal Institute of British Architects 'in recognition of excellence in fitting an industrial facility into a rural setting.'

"We especially liked North Wales, and seriously considered retiring there," Binger said. "We lived there for four and half years and put down some roots. It was a tremendous place."

An alliance of major oil companies selected Binger in 1977 for what would be the greatest challenge of his career. He was chosen to manage the design and construction of the Louisiana Offshore Oil Port (LOOP) in the Gulf of Mexico. The first offshore crude oil unloading port in the United States, LOOP took four years to complete at a cost of \$700 million. Because it facilitated the unloading and turnaround time for huge ocean going tankers, it was a significant contribution to economical oil transportation and handling. The National Society of Professional Engineers named LOOP one of 10 Outstanding Engineering Projects for 1981. And the following year, it was named Outstanding Civil Engineering Project of the Year by the American Society of Civil Engineers.



Binger says his engineering education at ISU greatly helped prepare him for managing some of the most complicated engineering projects of their time. "It was a good, basic education. The engineering side of it helped me learn how to think and adapt and plan," he said. "The fact I had thermodynamics wasn't as important as the fact that I learned how to think like an engineer. That was the important thing."

The Bingers, who are moving this spring from Texas to Ames, have met several of the 15 Binger Fellows and followed their careers over the years. "They're outstanding. Each one of them. We've been extremely pleased by the quality of students that have been selected. It's exactly what we wanted—to help the department attract graduate students of high quality."

### Binger Graduate Fellows

1984 <b>Allan Lynch</b>	1992 <b>Shawn Poggemiller</b>
1985 <b>Robert S. Reid</b>	<b>Jeff Oatley</b> <b>Wade Huebsch</b>
1986 <b>Kevin Thompson</b>	1993 <b>Kevin Schmidt</b>
1987 <b>Bruce Reichert</b>	1994 <b>Shannon Stobbe</b> <b>Richard Windholtz</b>
1990 <b>Karen Smith</b>	1995 <b>Eric Wick</b>
1991 <b>Dave Grabowska</b>	1996 <b>Kimberly Zarley</b> <b>Michael Ryken</b>

## Your support makes a difference

Generous gifts from ISU ME alums, industry, and others enable our department to continue our tradition of academic excellence. Our ongoing success is linked closely to your contributions which are used for the following.

- Scholarships and fellowships
- Start-up funds to attract top-notch new faculty
- Seed money for development of new projects
- Laboratory equipment

The Black-Hilstrom Mechanical Engineering Development Fund grew out of a fund started more than 30 years ago by Hollis "Pete" Hilstrom, ME'34. In 1980, Henry Black, department head from 1946 to 1972, joined with Hilstrom to invite other alumni to contribute to the fund. Since then, the endowment has grown to more than \$1.7 million with gifts from more than 475 alumni.

You can participate in the Black-Hilstrom Fund using the form included here. Or call us at (515) 294-1423 to learn about other ways you can support ISU ME.

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*We appreciate your support!*

## ISU MEs on team that developed world's largest VR facility

Applying virtual reality (VR) and synthetic environments (SE) to engineering problems is a rapidly growing field rich with research and career opportunities. ME faculty and students involved with the multidisciplinary Iowa Center for Emerging Manufacturing Technology (ICEMT) are on the leading edge of this exciting technology. They've developed and constructed C2, the most advanced computer synthetic environment in the world.

C2 is a 12'x12' VR room that allows several people simultaneous real-time interaction with computer-generated images. The world-class facility was featured in the cover story of the February issue of *R&D Magazine*.

ME faculty James Bernard, James Oliver, Greg Luecke, and Judy Vance, along with faculty from other ISU departments, use C2 as a tool for applied research in ergonomics, architecture, molecular structures, space, and manufacturing environments. Located in Black Engineering, C2 is open for public tours on the third Friday of the month. Contact ICEMT at 515/294-3092.

**Visit us on the Web!**  
<http://www.eng.iastate.edu/me>

**MEupdate**

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## Mini-Baja and Formula teams gain practical experience

Look out, pedestrians! ISU's Mini-Baja and Formula teams are revving up again.

Trent Simpson, an ME junior and captain of the Mini-Baja Racing Team, said the all-terrain vehicle should be ready for this summer's Society of Automotive Engineers' Midwest competition in Ohio. The 13-student team will focus on redesigning the frame. "A lot of equipment broke down after ISU's last competition in 1994," Simpson said.



The Formula racing car probably will not compete until the 1998 SAE race in Detroit. The team of about 40 ME students hopes to have the car up and running by January. Co-captain and ME junior Steven Kistner said, "Everything on the car has to be re-designed and the engine's blown."

For both teams, money is the major obstacle. Kistner said, "Some schools raise as much as \$15,000 for their Formula car. On the average, we raise around \$1,500."

But the students learn considerably more about the real world of engineering. "We're able to apply some of what we've learned in the classroom to this practical, hands-on project. I think it will help us get jobs in our field because we're actually creating, designing and producing a product," Kistner said.

Simpson said listing the Mini-Baja project on his resume already has helped at interviews. "It's definitely a good conversation piece and all the company reps I've spoke with say they like that I've had this hands-on experience."

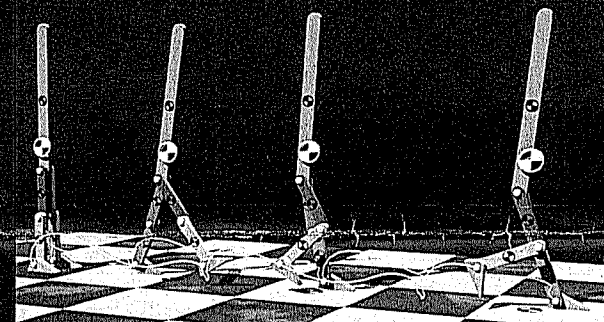
## Alum's animation wins international award

While working on his dissertation under ME Associate Professor Martin Vanderploeg, Jim Troy, BSME'90, MSME'92, Ph.D. ME'95, created a biped walking mechanism that has taken the computer animation world by storm.

Although they resemble child-like stick figures, the figures are extremely sophisticated physically based modeling and feedback control techniques. They are used to simulate realistic motion for a planar 7-link biped model.

Troy's biped simulations have won two prestigious honors, including acceptance into the Electronic Theater at SIGGRAPH 96, a major graphics conference. Most recently, the work won a LEAF Award for Research. (LEAF is the London Effects and Animation Festival sponsored by Disney.)

Possible applications for his work include generation of realistic motion for computer animation of virtual actors, analysis of human gait cycles for biomedical research, and hardware evaluation and design for robotic mechanisms.



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