

# DIMENSIONS

Department of Mechanical Engineering

FALL 2007 | Issue Number 15



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# Message from the Chair



This is an exciting time for mechanical engineering education at Iowa State University, and I am truly privileged to serve as the department's new chair.

Through the leadership and stewardship of my immediate predecessors—previous chair **Dr. Judy Vance** and interim chair **Dr. Mark Bryden**—I have inherited a department that by any measure is already strong in education, research, and professional service.

With the combined energy of more than one thousand students and world-class faculty, we are one of the largest programs in the United States, and our educational heritage is grounded in fundamental engineering science, laboratory experiences, and design. As our alumni have moved on to direct major corporations, become entrepreneurs in creating their own companies, and lead programs at Iowa State and other universities, they remain engaged in the department's life. And the department is nothing without the excellence and initiative of its staff and faculty. I am indeed fortunate to work with such a talented team.

We are poised for an exciting future, and the challenge for the coming years will be to direct our efforts in ways that will make the greatest contribution to that future.

We have begun a planning process to envision where we want the department to be intellectually positioned in 2025, since that is the year in which children born today will first enroll as mechanical engineering freshmen. Why will they have chosen to attend Iowa State? For what educational and research innovations will the department be acclaimed? How will we adapt in the coming decades to trends in demographics, globalization, the engineering workforce, and technology?

By addressing these and other important questions, we will develop a strategy for the department to innovate and lead its profession.

Of course, I could go on about the department's strengths and potential, but for now let me simply extend my greetings to you and invite your participation as we plan for the future. Please feel free to contact me at 515 294-7121 or [wickert@iastate.edu](mailto:wickert@iastate.edu).

Jonathan Wickert

## Larry and Pam Pithan Professor of Mechanical Engineering

ME alum **Larry Pithan**, and his wife, **Pam**, established the Larry and Pam Pithan Professor of Mechanical Engineering in June of this year. Larry Pithan is senior vice president at KJWW Engineering Consultants in Rock Island, Illinois. He earned his BS in mechanical engineering in 1973 and joined KJWW as a design engineer.

"I really appreciate the education I received at Iowa State and believe it has played a significant part in the success of my career," Pithan says.

The Pithans are long-time contributors to the ME department's Black-Hilstrom Fund, but decided to make a more significant investment this year. "Pam and I understand the challenges faced by Iowa State in recruiting and retaining the highest quality faculty and students, and we recognize the importance of philanthropy in meeting those challenges," Pithan explains. "We felt this named professorship was a great way to show our support for Iowa State."

*continued on page 7*

## ME '07 Fall Enrollment

**1,003 undergraduates**

Largest department in the College of Engineering and at Iowa State

**144 graduates**

Second largest graduate program in the College of Engineering

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# New ME chair promotes spirit of innovation

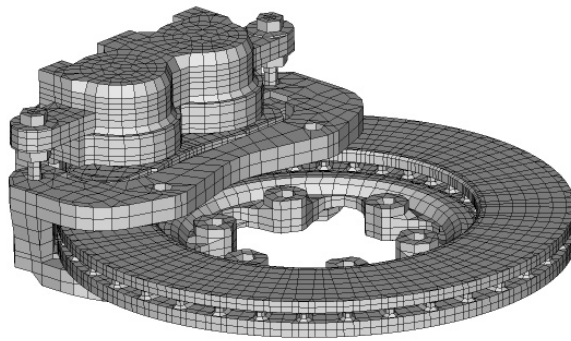
**Jonathan Wickert** admits it—rattles and buzzes drive him crazy.

As an engineer and a researcher, mechanical engineering's new department chair studies mechanical vibration and applied mechanics. He delves into what causes annoying noises, and he works on solutions.

But Wickert is also an educator, eager for students to share the excitement of solving problems in innovative ways. And he is a leader, envisioning the department positioning itself at the forefront of the mechanical engineering field.

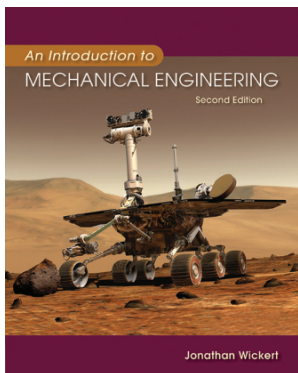
The son of an electrical engineer, Wickert grew up knowing that he also wanted to be an engineer, someone who had the skills to figure out new ways to solve problems. He chose mechanical engineering for his major at the University of California, Berkeley, because he liked the idea of working with cars and motorcycles.

Wickert's research, however, extends beyond those early interests. His expertise in the fields of mechanical vibration and applied mechanics combines physical modeling, analytical techniques, and measurement. One of the applications for his research is automotive disk brakes. He is the co-inventor of two patented devices designed to reduce brake noise. His research also includes applications such as hard disk drives and robotic libraries for computer data storage.



"The amount of data stored in enterprise applications is almost unimaginably large," Wickert says. "We used to talk about kilobytes and megabytes, and now it is gigabytes and terabytes. Imagine holding an electronic version of the print contents of the Library of Congress in the palm of your hand. Whether it is information on a Palm PDA or data collected from video surveillance, you have to be able to access it quickly, reliably, and precisely."

While Wickert's research has practical applications, his focus is on understanding fundamental phenomena, including stresses, vibration, and deformation, that affect the ability to quickly locate specific data. "Basic research—that is our role as educators in a university setting," he explains. "We create knowledge and disseminate it."



Throughout his 17-year tenure at Carnegie Mellon University, Wickert placed strong emphasis on teaching. He wrote a textbook, *An Introduction to Mechanical Engineering*, to give students a basic understanding of the field and to share with them how problem-solving skills and design analysis lead to real-world applications. He is presently working on the third edition of this widely used text.

Wickert's accomplishments at Carnegie Mellon included chairing a strategic planning initiative for a five-year roadmap to improve undergraduate and graduate education, leading the effort to create new laboratories, and collaborating on the development of Web-based software tutorials.

Wickert says he is excited to be at Iowa State because the mechanical engineering department already has such outstanding programs and a reputation as a dynamic community of scholars.

"The level of enthusiasm here at ISU is great," he says. "We have to take this energy and focus it. Much is changing in the world, and the department will need to grow and adapt as well. We have to be innovative as we plan our educational programs and as we develop the next generation of mechanical engineers."

## Jonathan Wickert

**Jonathan Wickert** joined the Iowa State faculty as the new chair of the Department of Mechanical Engineering and as the Larry and Pam Pithan Professor of Mechanical Engineering on July 23. He came to Iowa State from Carnegie Mellon University, where he had served on the faculty since 1990. A fellow of the American Society of Mechanical Engineers, Wickert is an accomplished educator and researcher. He wrote the textbook *An Introduction to Mechanical Engineering*, holds two U.S. patents, and is the author or co-author of more than 120 papers in archival journals and presented at technical conferences. His research in the fields of mechanical vibration and noise control combines analytical techniques and measurement.

He has received awards in recognition of his teaching and research from the American Society of Mechanical Engineers, the American Society of Automotive Engineers, the American Society for Engineering Education, and the Information Storage Industry Consortium.

Wickert earned his BS, MS, and PhD degrees in mechanical engineering from the University of California, Berkeley. He was an NSF/NATO postdoctoral fellow at the University of Cambridge, United Kingdom, prior to joining the Carnegie Mellon faculty.

# ME welcomes three new faculty members



When **LeAnn Faidley** moved to Ames in August 2006 to begin her position as an assistant professor, it was a homecoming of sorts.

Until age 18, she had lived her entire life in Rome, Italy, where her father worked for the U.N. Food and Agricultural Organization.

But family ties helped influence Faidley to attend Iowa State as an undergraduate. Her father, LeVern, grew up on a farm near Colfax and is an Iowa State alum (BSAgE'67), and her mother, Barbara, is a Michigan native. Faidley, who had fond memories of summer vacations on her grandparents' farm, chose Iowa State because of the science and engineering programs.

She earned BS degrees in physics and engineering science in 1999. As a participant in the Program for Women in Science and Engineering, Faidley was assigned a faculty mentor, **Alison Flatau**—now an aerospace engineering collaborating professor—and worked in Flatau's lab. She was a research assistant throughout her undergraduate studies and went on to earn an MS in engineering science in 2001.

Faidley also earned MS and PhD degrees in mechanical engineering in 2005 and 2006, respectively, at The Ohio State University.

Her research—characterization of smart materials—involves figuring out exactly how a material behaves and how it can be used. At Ohio State, Faidley worked with magnetic-based smart materials, which change their properties (size, shape, flexibility) as a result of changes in the magnetic field.

"I found in my PhD work that you can change the stiffness of nickel-manganese-galium almost 200% by altering the magnetic field," Faidley explains. "A practical application would be for something like vibration control in equipment. Instead of having to replace a spring every time you change some other part of a machine, you can input a different voltage and basically change the spring."

Faidley says her experiences as a student helped draw her back to Iowa State, but the potential for research collaborations with Ames Laboratory, the Center for Nondestructive Evaluation, and the Virtual Reality Applications Center made coming to Ames a unique opportunity. She is director of the Active Materials and Intelligent Structures and Systems Laboratory that she established in Howe Hall last fall.

And, of course, Faidley is thrilled to teach at her alma mater. As an MS student, she helped Professor **Loren Zachary**, now assistant dean, design an engineering mechanics class for elementary education majors.



**Terry Meyer** also joined the department as an assistant professor in fall 2006. Previously, Meyer worked at Innovative Scientific Solutions, Inc. (ISSI), an Ohio-based engineering research and development company. At ISSI, he performed research in advanced propulsion systems with the Air Force Research Laboratory at Wright-Patterson Air Force Base.

"My long-term goal had always been to teach and do research at a university," says Meyer, who earned his PhD at the University of Illinois, Urbana-Champaign, in 2001. "First, though, I wanted to build on my research skills and develop a niche that I could use to establish and sustain a research program."

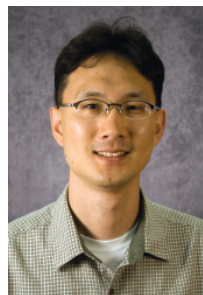
For his PhD research at Illinois, Meyer conducted experimental research in turbulent flows that earned him the American Institute of Aeronautics and Astronautics Graduate Award in Fluid Dynamics.

At Iowa State, Meyer is developing advanced tools and techniques for studying fluids and combustion in harsh environments from gas-turbine engines to rockets and hypersonic vehicles. "The primary goal in these power generation systems is to improve efficiency and reduce toxic pollutants," Meyer says. "These systems have become much more complex and are now being modified for use with alternative fuels. As a result, we need a more thorough understanding of the detailed physics that affect their performance."

Meyer is working with optical and laser-based tools and techniques to gain that understanding. "Optical methods are able to peer into and extract spatio-temporally resolved information from environments such as the middle of a flame zone," he explains. "Ultimately, we would like to be able to use optical sensors for intelligent control and operation of these devices."

At Iowa State, Meyer has begun collaborative work with researchers at the Ames Laboratory and the Office of Biorenewables Programs.

From a teaching standpoint, Meyer is putting into practice things he learned while lecturing at the University of Illinois. "It's a challenge to be a good teacher," he says, "but when done well, it is very rewarding."



The department's newest assistant professor is **Gap-Yong Kim**. Even before starting undergraduate studies at Yonsei University in Seoul, Kim could envision himself working in a university environment. "My dad is a university professor teaching mechanical engineering in Taegu, South Korea," Kim says. "I knew from his example that I wanted to be a professor, too."

After completing his BS at Yonsei University in 1997, Kim gained valuable experience designing equipment for Samick Precision Industry. The South Korean company develops and builds custom machinery to meet the specialized needs of its clients.

Kim began graduate studies at the University of Michigan in 2001. He chose Michigan because of its strong manufacturing/fabrication program and proximity to the automotive industry. He earned an MS in 2003 and a PhD in 2005 and then spent a year and a half as a postdoctoral fellow before coming to Iowa State this past August.

While at Michigan, Kim developed research interests in microscale fabrication technologies and hydrogen energy.

"The current technological trend is to make products such as cell phones and computers as compact as possible and, at the same time, enable them to do more tasks at a cheaper price," Kim says. "I am trying to look into various fabrication technologies to achieve this goal by scaling down conventional-sized manufacturing processes into very small-scale fabrication factories and by exploring hybrid technologies to innovatively solve the current challenges. But to do that, we first have to understand how materials behave at the microscale level and why they behave that way."

In his research at Iowa State, Kim will develop models to help answer these questions and invent new fabrication technologies for miniature parts. His long-term research goal is to participate in the development of technologies for future energy systems that will help address concerns such as pollution, the high demand for energy, and the depletion of fossil fuel supplies.

In addition to setting up his research program, Kim is teaching ME 324, Manufacturing Engineering, this fall.

"It is exciting to see students interested in learning," Kim says. "My goal is to motivate students while helping them build a greater knowledge base." He wants his students to not only understand theory, but be capable of using that knowledge to solve real-world problems.

## Vance serves at the NSF



In fall 2006, Professor **Judy M. Vance**, accepted a temporary assignment as program director for engineering design in the Civil, Mechanical, and Manufacturing Innovation Division at the National Science Foundation (NSF) in Arlington, Virginia. At the NSF, Vance recommends funding for research grants totaling approximately \$6.8 million annually and is responsible for peer reviews of research proposals submitted in the area of engineering design.

Vance became the first woman chair of the ME department in 2003, a role she held until accepting the NSF position. She began her Iowa State teaching career while in graduate school and worked her way up through the faculty ranks, with promotion to full professor in 2004. Her research emphasis is on virtual reality, investigating innovative ways to use this advanced technology to improve product design and development. She is also a faculty fellow in the Iowa State Virtual Reality Applications Center.

## Ted Okiishi retires



ME alum **Ted Okiishi**, who served as ME department chair from 1990 to 1995 and as associate dean of engineering for research and outreach since 1995, retired in August.

A native of Honolulu, Hawaii, Okiishi came to Iowa State in 1957 to earn a BS in mechanical engineering. During his senior year, his advisor, **George Serovy**, suggested he consider graduate school. "George introduced me to a lot of things about the world of academics, and I decided being a professor would be a very fulfilling profession," says Okiishi, who earned his MS in 1963 and PhD in 1965.

Following a two-year ROTC commitment, Okiishi returned to the ME department in 1967 as an assistant professor. He became a full professor in 1977.

He developed a comprehensive research program building on the work he had done at NASA Lewis Research Center. With his students, Okiishi conducted gas turbine engine research under the sponsorship of GE Aircraft Engines, Textron Lycoming, NASA, the U.S. Air Force, and the National Science Foundation. He and his co-authors received the American Society of Mechanical Engineers Melville Medal for best current paper society-wide in both 1989 and 1998.

In his role as associate dean, Okiishi was a mentor to faculty and advocate for the advancement of engineering research, graduate education, and economic development activities.

As a retiree, Okiishi is continuing his involvement with the American Society for Engineering Education and the American Society of Mechanical Engineering. He and his wife, Rae, will also be involved with service volunteer work and will spend more time with their children and grandchildren.



# Bioeconomy initiative offers wealth of opportunities

In April 2007, ConocoPhillips announced the establishment of an eight-year, \$22.5-million research program at Iowa State University dedicated to developing technologies that produce biorenewable fuels. The grant is among the largest industry grants specifically targeted for biofuels research at a university.

The announcement was the latest in a year of highlights related to the university-wide bioeconomy initiative. In October 2006, a campus-wide meeting alerted faculty to the scope of opportunities in biorenewables research, and in November Iowa State hosted a “call to action” summit that drew more than 400 participants from government, business, industry, agriculture, and academia to discuss the future of biorenewables in Iowa. In addition, the state of Iowa announced funding of a biorenewables research laboratory building on campus, and the Legislature passed the Iowa Power Fund, aimed at keeping the state on the cutting edge of the renewable fuels industry with investment in research and development.

The Iowa State Bioeconomy Initiative was launched in 2002 to develop technologies for converting crops and plant materials into chemicals, fuels, fibers, and energy. As the Iowa Farm Bureau Director of the Biorenewables Programs at Iowa State, the director of the Bioeconomy Institute (formerly known as the Office of Biorenewables Programs, or OBP), and as the ME department’s Bergles Professor in Thermal Science, **Robert C. Brown** coordinates the wide range of programs and activities connected to the initiative.

Currently, 150 Iowa State faculty members with ties to 18 academic departments and 19 research centers and institutes on campus are associated with the Bioeconomy Institute. The researchers have attracted more than \$43 million in cumulative sponsored research funding from industry and federal agencies ranging from the Department of Agriculture to the National Science Foundation.

While biorenewable fuels receive increasing publicity, Brown emphasizes that they are actually part of a bigger movement—the bioeconomy—for which he lists four goals: improve energy security by reducing reliance on imported petroleum; improve environmental quality by reducing emissions of greenhouse gases; expand markets for U.S. agricultural products; and provide economic development opportunities for rural America.

Researchers are working on numerous technologies that can transform biomass into biofuels and biobased products. “We don’t know what the preferred feedstock, process, or fuel will be,” Brown explains. “The field is wide open. With investment in research, however, we can develop and evaluate the various options.”

While Brown oversees the university’s bioeconomy efforts, his own research has played an instrumental role in developing and understanding thermochemical processes such as gasification and pyrolysis to produce biorenewable fuels. His work has helped provide the foundation for Iowa State’s bioeconomy initiative and has made Iowa State a leader in the field. The ME department plays a major role in Iowa State’s bioeconomy program.

One of Brown’s pursuits involves converting biomass to fuel through fast pyrolysis, which is of particular interest to ConocoPhillips. This process uses heat in the absence of oxygen to decompose biomass such as corn stocks,



*Robert C. Brown, the Iowa Farm Bureau Director of Iowa State’s Office of Biorenewables Programs, addresses the crowd at the announcement of ConocoPhillips’ eight-year, \$22.5-million grant to establish a research program dedicated to developing technologies that produce biorenewable fuels.*

wood chips, manure, or other biorenewables, into a bio-oil. “The bio-oil can be refined to gasoline-like fuels in a manner similar to petroleum refining,” says Brown. “It can be produced at processing facilities and stored until needed, which is an advantage compared to gasification.”

ConocoPhillips will also sponsor studies of other thermochemical technologies that produce biofuels and fund research on environmental sustainability and rural economies. Brown estimates the research program will involve 10 faculty members, plus graduate students, in the first year with additional researchers added in subsequent years. Three projects proposed by ME faculty have been approved: Brown will evaluate alternative methods for producing bio-oil; **Ted Heindel**, professor, will validate computational models of fluidized bed reactors used for fast pyrolysis and gasification; and **Terry Meyer**, assistant professor, will study combustion of bio-oil.

Other ME faculty are also involved in several projects associated with the Bioeconomy Initiative.

In a project partially funded by the Grow Iowa Values Fund, Brown has teamed up with Heindel, as well as Frontline BioEnergy, an Ames company that produces biomass gasification systems. They are studying and designing a gasifier that would be large enough to produce energy for an ethanol plant. The goal is to use the gasifier as an alternative to natural gas. Since natural gas is the second largest expense in ethanol production, this could significantly lower costs.

**Song-Chang Kong**, ME assistant professor, is studying biodiesel blends. In the quest to reduce petroleum dependency and decrease emissions, there is increased interest in using diesel engines for electricity generation. To make that feasible, however, nitrogen oxide emissions from biodiesel blends must be reduced. Kong is conducting a modeling study to determine how timing changes impact emissions. The Iowa Energy Center and Iowa Association of Municipal Utilities are funding the project.

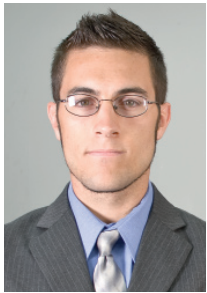
To learn more about the work being conducted through the OBP, please visit <http://www.biorenew.iastate.edu/>.

# ME students play key role in college leadership program

The Engineering Leadership Program (ELP), which was established in 2006, is focused on creating an environment that will help students develop strong leadership skills and encourage their active involvement in communities and organizations beyond the university. Minnesota-based 3M Corporation provided support with an initial gift of \$500,000.



ME alum **Sarah Walter**, who graduated in spring 2007 and is now an engineer at Rolls-Royce in Indianapolis, served as the first ELP student director. Walter and **Krishna Siddhanta Athreya**, ELP director, selected 11 juniors and seniors as the first cohort of 3M scholars in spring 2006. This group, which included 5 ME students, developed program ideas and activities for the new cohort of freshmen, which started in fall 2006. At full-strength, the four-year program will have 60 scholars with a new cohort added each fall.



**Greg McGrath**, ME senior, assumed the role of student director in June. **Adam Bragg**, also an ME senior, is one of two associate directors. McGrath reports that ELP is continuing to evolve, building on the programming developed during the initial year. Planned activities include retreats, leadership seminars, and discussions with business, academic, and political leaders.

A major thrust for ELP involves leadership learning experiences. "We are developing the criteria for a leadership learning project that the scholars will begin their second year and continue through their senior year," McGrath says. "The goal is for them to identify a problem of special interest to them and come up with a potential solution that they can develop and implement. Peer and faculty reviewers will offer input throughout the project."

To learn more about ELP, visit [www.eng.iastate.edu/leadership/](http://www.eng.iastate.edu/leadership/).

## Pithan Professor *continued from page 2*

**Jonathan Wickert**, the new chair of the Department of Mechanical Engineering, is the first recipient of the professorship and was formally recognized as the Larry and Pam Pithan Professor of Mechanical Engineering at a medallion ceremony this fall.

"Pam and I are extremely pleased and honored to be able to support Jonathan Wickert," Pithan says. "We had the pleasure of meeting Jon recently, and it is obvious he has great vision and will be an excellent leader for the department."

The Pithan's gift was made through the ISU Foundation, a private, non-profit corporation dedicated to securing and managing gifts and grants that benefit Iowa State University. For more information on the many ways you can support the Department of Mechanical Engineering, please contact **Mary Bilstad** at 515 294-1431 or **Hyemi Sevensen**, director of development, at 515 294-6055. A contribution form is available on page 11.

## Faculty honors and awards

ME faculty have recently received many college and university awards in recognition of outstanding performance in teaching, research, and service. Congratulations to these honorees.

**Douglas Beck**, academic advisor, College of Engineering Superior Advisor Award

**James Bernard**, distinguished professor, College of Engineering Faculty Leadership Award

**Mark Bryden**, associate professor, Iowa State University Margaret Ellen White Graduate Faculty Award

**Theodore Heindel**, professor, College of Engineering Superior Engineering Teacher Award

**Ron Nelson**, professor, College of Engineering VEISHEA Faculty Recognition Award

**Michael Olsen**, associate professor, College of Engineering Young Engineering Faculty Research Award

**Michael Pate**, professor, Iowa State University Louis Thompson Distinguished Undergraduate Teaching Award

**Richard Pletcher**, professor, Department of Aerospace Engineering Distinguished Faculty Award for Significant Contributions to Computational Fluid Dynamics

**Sriram Sundararajan**, assistant professor, Iowa State University Award for Early Achievement in Teaching; and College of Engineering Young Engineering Faculty Research Award

### R&D 100 Award

*R&D magazine* selected TBET, a texture-based engineering tool developed by **Mark Bryden** and his research team, as one of the top 100 innovations in 2006. TBET is part of a virtual engineering software package called VE-Suite that Bryden began developing in 2003. The research is supported by nearly \$1.3 million from the Ames Laboratory. Bryden's team includes **Gerrick Bivins**, who completed his MS in 2005 and now manages a software project in Bryden's lab, and **Doug McCorkle**, who earned his MS in 2002 and is working on his PhD.

# Deal named All-University Senior

ME senior **Chris Deal** is one of five Iowa State students who received the 2007 Wallace E. Barron All-University Senior Award. Presented by the Iowa State University Alumni Association, the award recognizes outstanding achievement in academics, leadership, and community service.

From the time he arrived on campus in 2003, Deal was determined to get involved in a variety of activities. One of his first—the Iowa State Dance Marathon, which raises money for the Children’s Hospital of Iowa—became a passion. The experience of meeting the children who benefit from the event was so inspirational that he got more involved each year. In what Deal describes as his proudest accomplishment at Iowa State, he was co-director of the 2007 marathon that raised a record-breaking \$160,664.

Deal, who is from Jefferson, Iowa, also applied his leadership skills to the Government of the Student Body as vice president in 2005–2006. “It was a challenge to stay current on many different issues,” he says, “but in today’s world, you need this kind of diverse background to succeed.”

This past summer, Deal was one of 11 engineering students selected from across the country to participate in the Washington Internships for Students of Engineering (WISE) Program. This program is aimed at helping students learn how government officials make decisions on complex technological issues and how engineers can contribute to legislative and regulatory public policy decisions. The American Society of Mechanical Engineers sponsored Deal’s participation.

As part of the internship, each student writes a policy paper on a topic of personal interest. Deal focused on global climate change policy in his paper, “Climate Change Technology Transfer: Opportunities in the Developing World.” In addition to his research, Deal drew on personal observations he gained from participation in a three-week study abroad program in China last May that looked at biorenewables and energy.

The interns’ papers are online in the *WISE Journal of Engineering and Public Policy*, [www.wise-intern.org/journal/2007/index.html](http://www.wise-intern.org/journal/2007/index.html).

After his graduation next May, Deal plans to begin graduate work in sustainable development. He has been selected to receive a Rotary Ambassadorial Scholarship starting in fall 2008.



# Students take aim at entrepreneurship



*Tyler Rasmussen (right) and David Lantz join Cy at the 2006 Engineering Career Fair.*

Spring 2007 ME graduate **Tyler Rasmussen** has begun his professional career as a project engineer with 3M in St. Paul, Minnesota, but he is also an entrepreneur.

Throughout his college years, Rasmussen sought out experiences to develop his entrepreneurial skills. In summer 2005, for example, he participated in the Okoboji Summer Entrepreneurship Institute, a week filled with seminars and interactions with entrepreneurs and business leaders. He also worked for the Small Business Development Center at the Iowa State University Research Park.

That preparation paid off. Last January, Rasmussen’s friend **David Lantz**, an aerospace and materials science and engineering major, suggested they invent a shot counter for use with airsoft guns. The guns, which fire plastic BBs, are used in recreational activities such as battle simulations. The two students designed a device and applied for and received a provisional patent. “Now we can put ‘patent pending’ on our product,” Rasmussen explains. “That means we can talk about it without worrying that someone will steal it.”

Since then, Rasmussen and Lantz have had plenty of opportunity to talk about their invention. They created a business plan to produce and market the shot counter and entered it in the 2007 Pappajohn New Venture Business Plan Competition. As regional finalists, they were among 12 teams from across Iowa selected for the state contest. Although Rasmussen and Lantz didn’t win the \$5,000 state prize, Rasmussen reports the experience was positive, and they are moving forward with plans to manufacture their product.



# Formula car biofuel powered

Iowa State's ethanol-powered formula car raced to an 18th-place finish in the field of 130 student-designed and student-built cars at the 2007 Formula SAE (Society of Automotive Engineers) competition last spring. It is the third year in a row Iowa State has finished in the top 20.

With a best-ever 7th-place finish in 2006, the 2007 team focused on getting more power from the engine and building a suspension that would help the car take corners and grip the track better, according to project director **Tony Sartor**, a May graduate in logistics and supply chain management. A team of 18 students designed and built the car.

The team earned top-20 finishes in acceleration, autocross (a quick and curvy half-mile course that can be raced at average speeds of 25 to 30 mph), and endurance and fuel economy (a 13.7-mile race that features top speeds of 65 mph).

While the team had problems with last minute assembly issues and oil leaks in the differential, Sartor was pleased with the final outcome. "The competition is getting so fierce," he said after the race. "Every team is getting a lot better. And a lot fewer teams are failing."

When not in the midst of a competition, SAE team members participate in a variety of outreach activities, sharing what they have learned about designing and building a racecar. Team members frequently talk to high school and 4-H students both on and off campus. They also participate in community/business events such as this fall's Renewables on Parade held in Washington, Iowa, and the Renewable Energy Expo in Solon, Iowa.

**Kyle Anderson**, a senior in mechanical engineering, is the Iowa State SAE president this year; **Ryan Venema**, a junior in pre-business, is project director; and **Adam Witthauer**, a graduate student in mechanical engineering, is technical director. To learn more about the Iowa State Formula SAE team and to follow the team's progress, visit [www.sae.stuorg.iastate.edu/formula/](http://www.sae.stuorg.iastate.edu/formula/).



*Members of Iowa State University's Formula SAE Team—left to right, Woody Witherow, Jason Lipas, Adam Witthauer, and Kyle Anderson—prepare the car they designed and built for an annual competition at the Ford Motor Company's Michigan Proving Grounds.*



*Jeff Bartels (left) and Simon Nielsen compete in the American Society of Mechanical Engineers East Coast Challenge in Orlando, Florida, last spring.*

## HPV team focuses on muscle power

One group of enterprising ME students has bypassed engines and solar cells to figure out how to get the most out of human muscle power. The human-powered vehicle (HPV) team designed and built a multi-rider HPV named Cyclocity for competition in the American Society of Mechanical Engineers (ASME) East Coast Challenge in Orlando last May.

While bicycles are the most familiar type of HPV, entries in this competition are specifically designed to be lightweight and aerodynamic. The teams are judged on originality and soundness, written and oral reports, and sprint and endurance events.

In designing and building Cyclocity, the students drew from their experiences in the 2006 ASME competition, which was the first-ever entry for an Iowa State team. One major design change repositioned the riders so they sat back-to-back rather than front-to-back. The new design reduced the frame length by two feet and made the steering more responsive, according to **Jeff Bartels**, ME graduate student and the 2007 team leader.

The team had a successful showing in Orlando. Cyclocity competed against four single-rider teams in the utility endurance event and came in first. In addition, Iowa State finished fourth in the overall endurance event with 25 single-rider teams competing.

In the multi-rider events, however, team members were disappointed to find out they had no direct competitors. Two other teams were registered, but neither actually competed. "Few teams want to build multi-rider vehicles, because it is harder to figure out how to make the drive train work," Bartels explains. "We like the challenge; plus, it encourages teamwork and allows more people the opportunity to ride."

**Jeff Feuerhelm**, a junior in mechanical engineering and the 2008 team leader, reports the team has started the concept development phase for next spring's competition. To learn more about the HPV team, visit [www3.me.iastate.edu/asme/HPV/HPV\\_home.html](http://www3.me.iastate.edu/asme/HPV/HPV_home.html).

# Engineering Distance Education offers continuing education options

Engineering Distance Education (EDE) at Iowa State makes it possible to take a single course or complete the entire 27 credits needed to earn an MS degree in mechanical engineering as an off-campus student.

EDE classes are delivered through an online system called WebCT. Students can view most classes while they are being taught on campus and use live chat to interact with the professor; or, they can download and view archived lectures at their convenience.

That is how **Jim Heise**, who is now a lecturer and advisor in the ME department, earned his MS degree. Heise, who graduated with his BS in 1986, began graduate work via EDE in 1999 while working full time and raising a family.

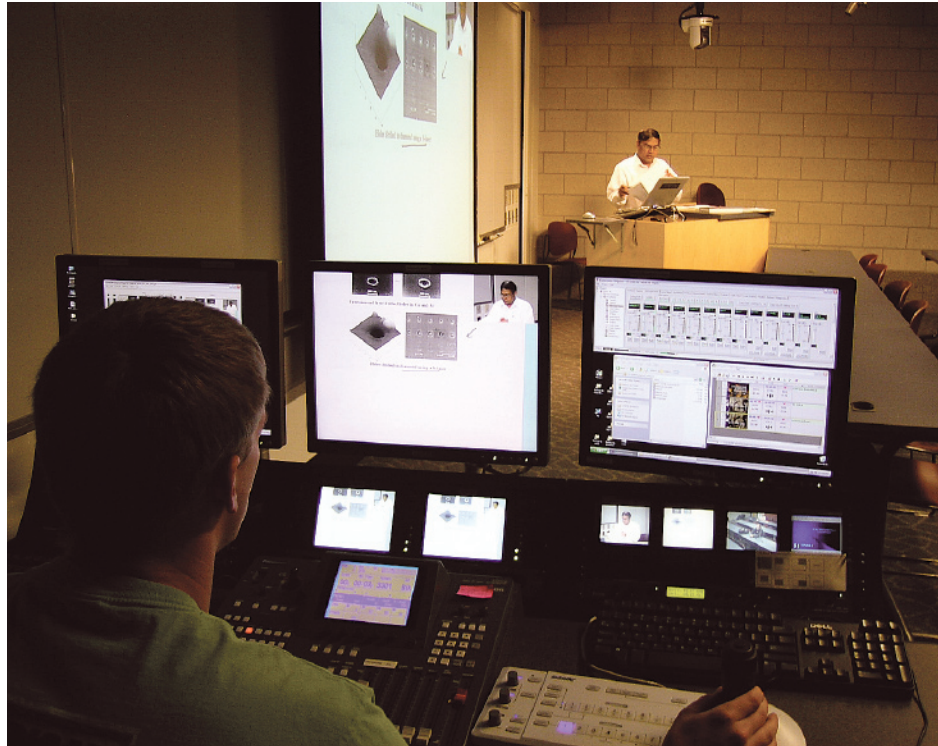
"I didn't have a lot of time to invest in going to classes on campus so EDE provided a great alternative," Heise says. "I chose the download option because my schedule didn't always allow for watching the lectures when they were posted. I often could get two to three lectures on one CD and could watch them at my leisure."

It was also easy for Heise to contact his professors through e-mail or phone calls. "They always made time to answer my questions," he says.

Having an MS degree made it possible for Heise to be appointed as a lecturer in the ME department in 2006 when his employer, Maytag, was sold to Whirlpool.

"I began graduate work because I thought it would expand my career options in industry," Heise says. "But I also knew I wanted to teach after I retired and would need a master's degree for that. The opportunity to teach just happened sooner than I anticipated."

All ME graduate classes and some advanced undergraduate courses are available through EDE, and the department will expand these offerings even more in the future. The courses offered each semester vary, but a wide selection is available each term. Registration is simple. Go to the EDE Web site ([www.ede.iastate.edu/](http://www.ede.iastate.edu/)) to find out what courses are being offered and follow the instructions. The Web site also explains the mechanics of taking off-campus courses and gives information about technical support and resources. Registration for spring semester began October 17.



*ME Professor Pal Molian teaches class in the Engineering Distance Education classroom in Howe Hall.*

Students can take up to nine credits before applying to graduate school, according to **Adin Mann**, ME associate professor and director of graduate education. "This gives students a chance to see if taking a class works with their family and work schedules," he explains.

Many students decide to earn their MS in mechanical engineering. "We don't have a required number of ME courses that students must take," Mann points out. "They might take industrial engineering or math or business courses along with their ME courses. Our focus is for the students to satisfy their personal career goals. It is a matter of the student putting together a three-person faculty committee and planning out a program of study."

All EDE students pay in-state tuition regardless of their location. Current graduate tuition is \$347 per credit hour. In addition, students pay a distance education fee of \$180 (streaming media/FTP download) or \$250 (CD-ROM) per credit hour and a computer fee based on the number of credit hours being taken.

Many companies support their employees' graduate work, according to Mann, but policies vary so it is important to check out the requirements. He also notes that undergraduate student loans can often be deferred while a student is in graduate school.

If you have questions about distance education in mechanical engineering or graduate school, contact Mann at 515 294-2877 or [jamann@iastate.edu](mailto:jamann@iastate.edu) or **Marti Steelman**, graduate secretary, at 515 294-0368 or [msteelma@iastate.edu](mailto:msteelma@iastate.edu) for further information.



# ME alum shares ups and downs of pro basketball



ME alum **Paul Shirley** has never worked as an engineer and likely never will. Nevertheless, he has brought the sort of attention to engineering and professional athletics that is not common to either field with his book, *Can I Keep My Jersey?: 11 Teams, 5 Countries, and 4 Years in My Life as a Basketball Vagabond*.

Growing up in Kansas, Shirley's dream was to play professional basketball. A six-foot ten-inch frame combined with good athletic skills and stubborn determination helped make that goal seem achievable, even for a skinny kid from the Midwest.

He got the chance to further develop his basketball skills at Iowa State helping the Cyclones win consecutive Big 12 conference titles in 2000 and 2001. Coach Tim Floyd had recruited Shirley to play basketball, but as a National Merit Scholarship finalist, Shirley came to Ames on an academic scholarship. He chose mechanical engineering as his major because he wanted to challenge himself.

"Combining basketball and engineering is not the usual path, but it worked out," Shirley says. "I have caught some flack for my references to Ames, but for me college was like a military camp. I went to class and then basketball practice, came home

and went to bed. It wasn't a lot of fun, but it served me well. I have had the chance to pursue my dream, and I have good friends all over the world."

While Shirley has had limited playing time in the NBA, he is motivated to keep trying. "You can't really succeed unless there is some disappointment along the way," he says. "Even in my wandering career, the disappointments make the successes feel a lot better, and they are also good learning experiences."

With the publication of his book last spring, Shirley has gained notoriety for a humorous insider's view of what it is like to be on the fringes of the NBA. He tells it like he sees it by pointing out the quirks because, he says, that is what is entertaining to readers. He has also shown that engineers and athletes can be versatile.

"I think people struggle with the idea that a person can be good at more than one thing," Shirley says. Seth Davis, from *Sports Illustrated*, agrees. He wrote in his August 22 column, "Shirley's writing skills are especially impressive considering he is a 29-year-old jock who majored in mechanical engineering at Iowa State."

For now, Shirley will continue to pursue a pro basketball career. When that is over, he says he will turn his attention to writing fiction.

## In the next issue of *Dimensions*

A new feature will start in the next issue of *Dimensions* that will give alumni the opportunity to be recognized for significant career developments or other accomplishments of merit. Please submit your noteworthy update with your name, type of degree, and year of graduation to mealumni@iastate.edu.

## Your support makes a difference

Generous gifts from Iowa State University ME alums, industry, and others enable our department to continue our tradition of academic excellence.

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In 1980, **Henry Black**, department head from 1946 to 1972, joined with **Hollis "Pete" Hilstrom**, ME'34, to invite alumni to contribute to the Black-Hilstrom Mechanical Engineering Development Fund. Since then, the endowment has grown to more than \$3.3 million with gifts from more than 475 alumni.

Please use this form to contribute or call us at 515 294-6055 to learn about other ways you can support Iowa State ME.

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# ME alum combines engineering and leadership



**W. Gary Gates** likes being a leader. “The opportunity and the ability to make a difference in the outcome intrigue me,” says Gates, CEO and president of Omaha Public Power District (OPPD) and 1972 Iowa State University alum. “It makes every day a good day.”

When Gates enrolled as an undergraduate in 1968, his goal was simple—become an engineer. “I didn’t have any thought that someday I would

be a CEO,” he says. His coursework in engineering science, however, helped him become both an accomplished engineer and an effective leader. “I got a very strong technical education,” Gates explains, “but more importantly I learned how to approach problem solving.”

That is a skill Gates has continued to build on throughout his career at OPPD. He started in 1972 as a test engineer at the district’s new Fort Calhoun Nuclear Generating Station. By 1982, Gates had advanced to manager of the station and in 1990 became division manager of nuclear operations. He was promoted to vice president responsible for OPPD’s nuclear organization in 1992 and became president and CEO in 2004.

Gates holds a master’s degree in industrial engineering from the University of Nebraska at Lincoln and a master’s degree in business

administration from Creighton University. He serves on the board of directors of the Nuclear Energy Institute, the Institute of Nuclear Power Operators, the World Association of Nuclear Power Operators, and many Omaha-area non-profit agency boards and councils.

As past chair of the ME department’s advisory council, Gates has helped the department stay current on what industry looks for in young engineers. “Today’s graduates are going to be in leadership positions very quickly,” he says. “They need good people skills, they need to understand leadership and management issues, and they need to value teamwork.”

Gates has a simple message for new graduates: “Don’t hesitate to contribute. As a professional, you have to be confident that you have the best solution and then go forward from there.”

In October 2006, the Iowa State University Alumni Association presented Gates with the Professional Achievement Citation in Engineering in recognition of significant accomplishments and service to the engineering profession and the university.