



University of Delaware

# Mechanical Engineering News

## Meet the Class of 2007



Inside this issue

**Announcing the third annual Business, Technology, and Careers Conference-April 2007**  
**Introducing the "Distinguished Career Alumni" class of 2007**



# Cheers from the Chair

Engineering around the world has been growing substantially. In China there are currently about 4,400,000 undergraduates majoring in engineering, which means that about 1 million people receive bachelors' degrees in engineering each year. That is a very large number, especially when compared to the 62,000 BS degrees in engineering awarded each year in the USA.

Such a large number of degrees are awarded in countries like China because engineering is seen as a vitally important field. About one-third of all college students in China major in engineering, but less than 15% do so in the United States. Of those who study engineering, Mechanical Engineering is the most popular major. There are 1,274 undergraduate ME programs in China (compared to 308 ABET accredited ME programs in the USA).

While many traditional mechanical engineering jobs may move overseas, there remains a substantial shortage in US trained engineers. Robert Stevens, CEO of Lockheed, wrote in the Wall Street Journal last April that his company currently needs to hire 14,000 American engineers per year to sustain his talent base. In three years he will need 44,000 new hires. With only 62,000 US graduates per year, the demand for US trained engineers may exceed the supply despite the rise in engineers trained abroad.

Since our field is growing so much internationally, Mechanical Engineering education at the University of Delaware has taken an increasingly global outlook. In this issue of our newsletter, you will learn about Dr. Len Schwartz's Study Abroad courses in Australia, which have been a popular option for our juniors for several years. This is just one of the Study Abroad electives for our students. You will also read about Dr. Jin-Qiao Sun's collaborations in China. Dr. Sun is one of many faculty members who have collaborators abroad, and the story of the excursion to China he took with his students is interesting reading.

As our field changes, we change as well. Mechanical engineering is certainly not a stagnant field, and we enjoy the challenge of keeping our students ahead of the game!

*Thomas B. Buehler*

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## ME News

Managing Editor-Nate Cloud  
Contributing Writer and Editor-Diane Kukich

# Editor's Notes:

Meet the class of 2007\* (cover). This is the largest class in 20 years! Good news, especially to those who have noted the need for more engineers to meet the many technological challenges that lie ahead for this country and the world!

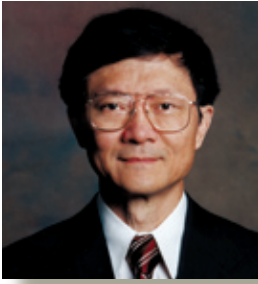
They are a special group based on my experience working with them in Senior Design this past Fall (see article on pp. 7-8). I urge you to meet them, and take part in the other opportunities that are offered at our third Alumni Career Celebration – Business, Technology, and Careers Conference on April 27th of this year. (see articles on pp. 13-15), and for more background please visit: <http://www.me.udel.edu/alumni/>

*Nate Cloud*

\* More correctly this is the senior design class of 2006 most of whom will graduate in May 2007. A few seniors who will graduate in 2007 are not pictured.

# Faculty & Staff Highlights

**Tsu-Wei Chou**, Pierre S. du Pont



Chair of Engineering, continues to be active in his research on carbon nanotube-based sensors and composites.

He was an invited speaker at the International Conference on Modern Materials & Technologies in Sicily, Italy, and the 16th European Conference on Fracture in Alexandroupolis, Greece. He also delivered keynote lectures at the World Congress on Computational Mechanics in Los Angeles, California, and the Annual Conference of the Quebec Center for Research on Polymers and Composites in Montreal, Canada. Chou was also invited to deliver a short course on Mechanics of Nanocomposites at both the Renton and Everett sites near Seattle of the Boeing Company.

**Michael Keefe** has been elected a



Fellow of the American Society of Mechanical Engineering. Keefe was cited for spending

his twenty-plus-year career mentoring young engineers, primarily undergraduates, and encouraging students to innovate. His research work has included 40 undergraduates, and he has directly instructed over 1000 undergraduates and 14 graduate students. Keefe was also credited with helping to create a senior-design course utilizing industrial sponsors and real-world projects. Active in ASME, he has served at the Section and National levels and was one of the founders of an ASME student competition. Keefe earned his Ph.D. at the University of Minnesota in Mechanical Engineering in 1985.

**Ajay Prasad** chaired the session



“Biofluids: Lungs” at the 59th Meeting of the Division of Fluid Dynamics of the American Physical Society

in Tampa, Florida, November 19-21, 2006. Prasad also gave an invited talk, “Flow and Dispersion Measurements in the Human Respiratory System,” sponsored by the Mechanical Engineering Department and the Bio-Engineering Department at Lehigh University on December 1, 2006.

**Lian-Ping Wang** spent one month



as a Visiting Scientist at the National Center for Atmospheric Research (NCAR) in the summer of 2006, working with NCAR Senior

Scientist Dr. Grabowski to further develop computational approaches for studying turbulent collisions of sedimenting droplets in clouds. Their goal is to provide a parameterization of the collision rate of droplets in a turbulent environment that can be used to improve numerical weather and climate models. Dr. Wang also received a Collaborative Research Award for Distinguished Overseas Scholar from the National Natural Science Foundation of China, which would allow him to collaborate with Prof. Guowei He at Institute of Mechanics, Chinese Academy of Sciences, for a period of three years, to develop a multi-scale approach for turbulent collision-coalescence of cloud droplets in warm rain processes.

## Office Staff News: Donna Fritz

Many of you know Donna Fritz, who was Administrative Assistant with the Department of Mechanical Engineering. Donna retired on December 31, 2006, after being with the department for 18 years. She began her employment with the University of Delaware on June 6, 1988. While providing invaluable support to the faculty, Ms. Fritz worked directly with the Chairperson on a daily basis. With her extensive knowledge of policies and procedures, everyone in the department depended on her tremendously. She will be greatly missed!

# Faculty Profile

## Len Schwartz

Prof. Leonard Schwartz earned his Ph.D. in Fluid Mechanics at Stanford University in 1972, and he has been teaching classes and conducting research on that topic for more than three decades.

However, he also has a “new” interest—wind power—which really isn’t new at all, since he holds a master’s degree in aerodynamics and worked as an aerodynamicist at Lockheed Missiles & Space Co. in the late 1960s.

In the Spring 2007 semester, Schwartz will bring that old-new interest to the classroom when he begins teaching an elective course on wind power. “The course will be aimed at providing a total picture of wind generation of electricity,” Schwartz says. “It will cover everything from dynamics and control theory to engineering economics, global warming, and the need for clean energy.”

“I think it’s an increasingly important technology that is coming on very fast,” he continues. “Wind power in the United States is set to double in the next few years. Oil at \$60 per barrel makes wind look very attractive.”

According to Schwartz, great advances have been made in windmills during the past 30 years. “They’re larger and better designed,” he says.



*Above and top right: Schwartz and his students take time out from studying fluid mechanics to pet kangaroos in Australia.*

Schwartz himself is no stranger to environmentally friendly approaches to the generation of energy. Most days, he commutes both ways to work on a bike, making the 16-mile round trip on the trails of White Clay Creek Park. When darkness encroaches in the winter, he still bikes in but gets a ride home from his son at night. Rain doesn’t stop him. Ice does.

One of Schwartz’s other claims to fame is that he is only the second engineering faculty member at UD to teach in a Study Abroad program. In January 2007, he took his fourth group of students to Australia for a program in fluid mechanics and Tasmanian geography.

“We apply the fluid mechanics classroom material to real-world examples such as Tasmanian water projects, beaches, and ship design,” he says.

The geography class is taught by a faculty member from the University of Tasmania, but Schwartz tags along. The geography component of the program ties into the engineering focus by touching on how water development and other projects have impacted many aspects of island living.

“The history of the area is extraordinary,” Schwartz says. “Tasmania was the main penal colony for the British Empire for 60 years, and there are still relics of that history. Most current Tasmanians are descended from the prisoners, a



fact of which they were ashamed until recently. Now they’re proud of it. For most of the prisoners, their greatest crime was being poor.”

Schwartz has a strong connection to Australia. He taught applied mathematics at the University of Adelaide for six years, spent two sabbatical leaves there, and had two sons born “down under.” He finds the country beautiful and the people delightful. The 33 students and two teaching assistants who accompanied him on the 2007 program not only visited Tasmania but also spent time in the more cosmopolitan cities of Melbourne and Sydney.

Schwartz is still active in fluid mechanics research as well. His specific area of expertise is coatings, an industry valued at several hundred billion dollars per year. Coatings are ubiquitous—playing a role in the pharmaceutical, automotive, and electronics industries, among others. Schwartz consults with a number of companies that use or produce coatings for various industrial products. He is also a Director of the International Society for Coating Science and Technology, an organization comprising about half academics and half practitioners.

Does he have any plans for retirement? “Not yet,” Schwartz says. “I’m having too much fun.”

# UD's Deng presented NSF Career Award

*Editor's Note: The following article was adapted from an article by Neil Thomas that appeared in UDaily on March 7, 2006*

Xinyan Deng, assistant professor of mechanical engineering, is looking to nature in her work to develop tiny robotic machines. Her innovative

Deng's goal is to create centimeter-scale microrobots that are lightweight and very small to conduct surveillance and search-and-rescue operations, often in areas that are inaccessible or hazardous to humans.

"Insects can hover, which is a very important quality in indoor applications such as surveillance and search-and-rescue," Deng says. "Insect flight is fundamentally different from other types of flight in nature."

To better understand how insects

provide great lessons to build small flying machines."

Deng said the theories developed from this research "will provide new understanding of the inherent flight stability and maneuverability present in insects and hopefully will lead to developing a new theory describing the underlying principles of the different flight phenomena observed in nature."

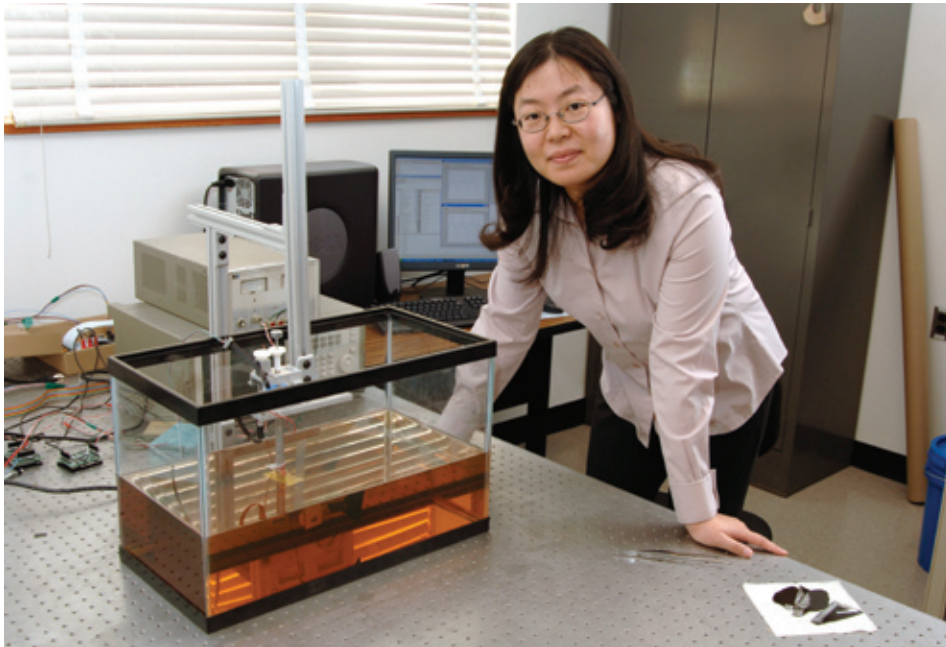
She is working with her students to develop functioning prototypes of mechanical flies and dragonflies for experimental studies. She also is working to develop models, including a virtual insect flight simulator found on her web site, [www.me.ude/deng/](http://www.me.ude/deng/), and to translate what is learned from those models to the design of actual machines.

"There are challenges as well as interesting discoveries," Deng said. "To others, sometimes this type of work sounds like science fiction. Biology and engineering are working hand in hand as multidisciplinary studies become increasingly important in current research fields."

In addition to her mechanical flying insect project, Deng is working on a robotic boxfish with support from the University of Delaware Research Foundation (UDRF). The goal is to build a one-centimeter square boxfish robot, and Deng's team has built a proof-of-concept prototype.

The boxfish robot is of interest because it can remain steady even in turbulent waters. Such a micro-underwater vehicle could be used to conduct underwater exploration, marine microorganism sensing, water pollution detection, and shipwreck exploration.

Deng received her doctorate in mechanical engineering from the University of California Berkeley in 2004 before joining the faculty at UD-ME. "The Department of Mechanical Engineering is very supportive of junior faculty, and I am really appreciative," she said.



*Besides researching the flight of insects, Xinyan Deng is working on building micro underwater vehicles (MUVs) with oscillating fins mimicking a boxfish. Boxfish are known for their ability to swim smoothly through turbulent waters of coral reefs and exhibit excellent maneuverability.*

research on the flight of insects and its potential use in microrobotic flying machines is currently supported by a \$455,000 National Science Foundation (NSF) Faculty Early Career Development Award.

The prestigious award is one of the National Science Foundation's highest honors for young faculty members, and it recognizes and supports the early career activities of those teachers and scholars who are most likely to become the academic leaders of the future.

fly and hover, she is studying the wing kinematics, body dynamics, flight control systems, and aerodynamics of flies and bees. Both have wings that can flap, rotate, and deviate, essentially making a figure-eight pattern as they move through the air.

"A fly can make a 90-degree turn in 50 milliseconds," Deng said. "This is a result of its highly maneuverable wings, enhanced aerodynamics, sophisticated neural motor control systems and advanced sensory systems, all of which

# ME Faculty Use Carbon Nanotubes to Detect Defects in Composites

*Editor's Note: This article was adapted from an article by Neil Thomas that was published in the October 4, 2006, issue of UDaily.*

Two ME researchers have discovered a means to detect and identify damage within advanced composite materials by using a network of tiny carbon nanotubes (CNTs), which act in much the same manner as human nerves.

The research is the work of Tsu-Wei Chou, Pierre S. du Pont Chair of Engineering, and Erik Thostenson, assistant professor of mechanical engineering. It was recently featured in an article published in the influential journal *Advanced Materials*.

“Carbon nanotubes are very small but have superb qualities,” Chou said. “They are very light and yet are 30 times as strong as high-strength steel and as stiff as diamonds.” In addition, they have an incredible ability to conduct heat and electricity.

Given these excellent properties, Chou and Thostenson set out to develop CNTs as sensors embedded within composite materials.

Despite their many advantages, fiber-reinforced composites can have weak spots at interface areas, which can result in defects, including tiny microcracks. Over time, microcracks can threaten the integrity of the composite. If CNTs are embedded uniformly throughout the composite material, they can be used to detect defects at onset. “Nanotubes are so small they can penetrate the areas in between the bundles of fiber and also between the layers of the composite, in the matrix-rich areas,” Thostenson said.

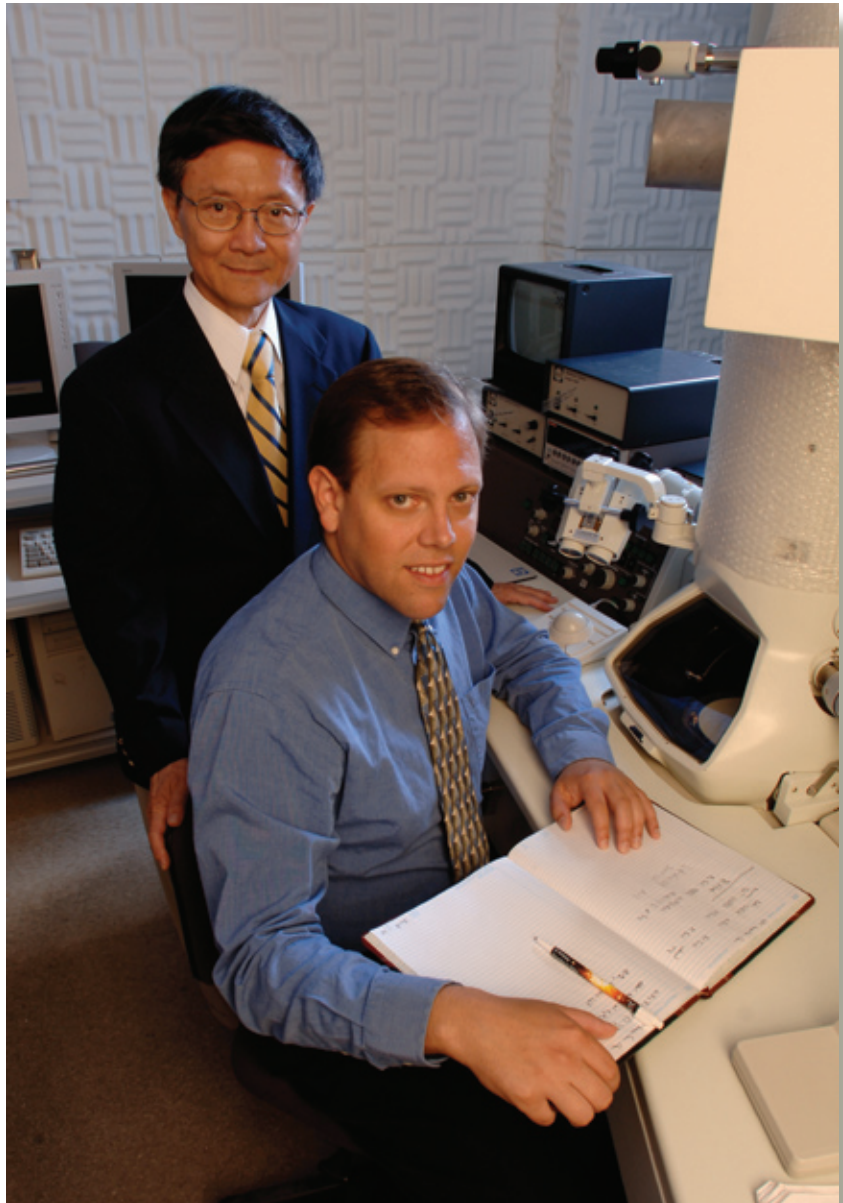
Because CNTs conduct electricity well, the researchers can pass an electrical current through the network; if

there is a microcrack, it breaks the pathway of the sensors, enabling the researchers to measure the response.

Chou credits Thostenson with developing a technique for disbursing the carbon nanotubes very uniformly in the matrix material, which is critical for the technique to be successful.

The work provides a new tool for current laboratory research while also offering the potential for myriad

practical applications in the future. With the ability to identify and track defects in a laboratory setting, the researchers can begin to develop strategies for more accurate predictions of the lifespan of composite materials—an important capability given the growing use of composites in sporting goods, civil infrastructure, and transportation.



*The nanotube research conducted by Tsu-Wei Chou (left) and Erik Thostenson is featured in an article in *Advanced Materials*.*

# Student Highlights



Anyone who thinks that the mechanical engineering curriculum is too rigorous to leave time for extracurricular activities should talk to Khenya Still.

A senior who says she “likes to stay busy,” Still has served as an officer of three student organizations, a RISE mentor and tutor, a member of the planning committee for ME’s Business, Technology, and Careers Conference, and a member of the SOLAR Council, which comprises members of various student organizations.

She has also completed three internships and a Study Abroad program in Costa Rica and will graduate in May 2007 with not only a mechanical engineering major but also a civil engineering minor.

Still, who came to Delaware from Mount Holly, New Jersey, chose UD because she liked the campus atmosphere here. She chose mechanical engineering as her major because she liked doing things with her hands. “I was always the one who assembled

things at our house,” she says.

After completing a certificate program in computer repair at the vo-tech high school she attended, Still considered majoring in computer engineering. But she was concerned about the need to continually return to school to keep up with changes in computer technology, and she liked ME because, as she puts it, “it covers almost everything.”

But the road to an ME degree has not been an easy one for Still. The first person in her family to go to college, she arrived at UD facing a number of challenges. “I was the only person from my high school to come here, so I didn’t know anybody,” she says. “I also struggled because I didn’t have the same math background as my classmates—coming from a vo-tech school, I had some catching up to do.”

Still began her studies at UD in the Summer Enrichment Program, which she found very helpful. “Since no one in my family had gone to college, I really didn’t have anyone to tell me what it would be like. Everything was totally new for me. The summer program familiarized me with the campus and prepared me to take college-level classes.” Tutoring through the RISE Program and mentoring through the Women in Engineering Program also helped.

The end result is that Khenya Still has done more than just catch up—she has completely immersed herself in the college experience, not only benefiting from the resources it offers but also giving back of herself and her time.

She is currently President of the National Society of Black Engineers, Secretary of the Society of Women Engineers, and Secretary of the Society of Hispanic Engineers—and she’s not even Hispanic.

Along with Janelle Konchar (BME2006), Still served on the planning committee for the 2006 ME business and careers conference. “These two students played a significant role in increasing student involvement in this event,” says ME Alumni Coordinator Nate Cloud. “We’re happy to have Khenya back on the planning committee for the 2007 alumni event.”

Still has completed three internships and appreciates the experience she has gained working for companies of varying sizes. Her main criterion in looking for future full-time job is that she would like to travel. “I really don’t care where I go,” she says. “I just like variety and diversity—I like learning about different cultures and meeting different people.”

That attitude has helped Khenya Still weather not only personal challenges but also the challenges inherent in being a woman in a traditionally male field and also in being a racial minority. “It doesn’t faze me,” she says. “This is how it’s going to be out in the real world, too.”

So how has she done it all and kept up her grades and is still smiling after all these years? “Lack of sleep,” she jokes.

Then she gets more serious and admits that her faith has played a big role in her ability to keep going. “My freshman year was especially tough,” she says. “In addition to all of the academic and cultural challenges, I also lost a cousin who was just my age.”

“But I found a church here and got the support I needed. My faith has played a large role in who I am. I also owe a lot to the support of my family. I wouldn’t be where I am without them.”

# Three Decades of ME Senior Design at UD

Professor Emeritus John Zimmerman, who died in April 2006, might be called the “Father of Senior Design” at the University of Delaware. Although Zimmerman died in April 2006, a few months before the program entered its thirtieth year, his legacy is evident in the modern version of the course.

“John was the one who conceived the idea of students working as consultants on design projects for actual clients, providing them with the real-world experience of engineering,” says Mike Keefe, one of the faculty members currently teaching the course. “Before that, the students simply worked on projects created by individual faculty members.”

Zimmerman may have been the Father of Senior Design, but Keefe is the course historian. He has kept meticulous records on all of the projects for the entire 22-year period since he joined the UD-ME faculty in 1985.

“Senior design in that era was run as a consulting firm known as New Castle Design Associates,” Keefe says. “The ‘company’ concept enabled students to gain the experience of designing solutions to real problems. Before that, it had been run more like a contest, the way MEEG 101 is now. The ‘new’ senior design was based on the concept of a capstone course that was project oriented and team oriented.”

Keefe credits others, including faculty members Ralph Cope and Dick Wilkins, with further refining the way the capstone course was organized and conducted.

“We realized that students learn better if they create something physical,” Keefe continues. “But some of them finished the course with only a paper design and analysis. Ralph [Cope] was the one who introduced the idea of requiring all teams to create a physical prototype that demonstrated the key concepts of the design.”

“Then, in the early 1990s, Dick [Wilkins] brought in concepts like

Quality Function Deployment (QFD) that were emerging in industry at that time. His contribution was to impose a design methodology on the course.” Over time, the process evolved into an Excel spreadsheet program called UDesign that gives each student a re-usable approach for starting any design project.

According to Wilkins, “The result is a repeatable, structured approach to B. V. Koen’s definition of the Engineering Method, which is the strategy for causing the best change in an uncertain or poorly defined situation within the available resources.”

It wasn’t until the late 1990s, however, that the projects became completely industry based. In 1999, Suresh Advani, acting Chair of ME at the time, hired Nate Cloud (BME1964) to further fill in the gap of senior design as a “real-world” engineering experience.

“Some of the projects had always been carried out for industry,” Keefe explains, “and the feedback we got indicated that the students working on those projects really benefited from the experience. It was decided that to strengthen the program, we would try to generate all of the projects from industrial clients. Suresh hired Nate to serve as the liaison between the senior design program and industrial sponsors.”

“Nate was the perfect person for the job,” Advani says. “He had many years of experience working for DuPont, and he was an alum who was looking to give back to the program that had provided him with an education.”

“I knew that if this was going to work, we needed a real commitment from the companies,” Cloud says. “So the way we set it up was that any company who donated to the department was guaranteed a project.”

It worked. All of the projects in Cloud’s first year were for industrial “customers.”

The following year, with the curricular changes stemming from ME 2000, the course went from two semesters to one. “It’s much more structured now,” says Keefe. “And the structure is brought by industry, as this is the way projects are actually run. The students have always learned design. Now they’re learning

project management as well.”

“It really has worked,” says Cloud, “as evidenced by the number of repeat sponsors.”

The program has also come full circle, with many alums serving as sponsors and advising students on industrial projects. George Sestak (BME1972), now with AstraZeneca, has a student team evaluating a heat recovery method for an HVAC system.

“The students are doing a great job,” Sestak says. “They grasped the concept quickly and came up with some good ideas within the first few weeks of the semester.”

“I think this is an excellent program,” he continues. “It’s great for me to be able to relate some of my experience to the young engineers who will be ‘carrying the torch.’”

Jim Kegelman (BME1988), an engineer with Dade Behring who is overseeing a project to develop an improved tablet feeder, also sees senior design as a win-win situation. “It’s truly valuable for the company while also providing a good learning opportunity for the students. We pay a \$5,000 fee, but we get back much more than that.”

“It’s an opportunity for us to learn too—as we explain our needs to the students, our own understanding is clarified,” Kegelman continues. “This is one of the most rewarding aspects of my job. It’s fun to associate with young people who have the whole world in front of them.”

DuPont engineer Kirsten Huesmann (BME2003) is advising a team charged with designing a device to test and break gears. “This is a great opportunity for us,” she says. “DuPont wanted to pursue the project, but it was too expensive for us to do in-house. We’ve passed the design work along to the students because it’s definitely within their capability. I’ve really welcomed the opportunity to come back and coach the students after being in industry for a few years.”

Senior Khenya Still, who is on Huesmann’s team, has nothing but good to say about the experience. “My team is great,” she says. “We really enjoy working together, and doing a project for industry has given me a good idea of



what it's like to work as a mechanical engineer."

Still is just one of the more than 1,650 students who have come through the program since Zimmerman's revamping of the course three decades ago. In all, ME students have completed more than

450 senior design projects in the past 30 years.

And Zimmerman himself remained active almost until his death. "After he retired in 1988, he stayed involved until he became ill," says Keefe. "He attended the final presentations every year and

served as an evaluator. The program as we know it today owes a lot to John Zimmerman and the many people who followed him and built on the foundation he laid for the program."

## Two Teams Tie for Senior ME Design Honor

*Editor's Note: This article was adapted from an article by Martin Mbugua that appeared in the Dec. 22, 2006, issue of UDaily.*

Two teams tied to win top honors at the ME senior design presentations on Monday, December 11. Selected from a pool of 16, the teams will present their projects during the 56th annual Engineers Week celebration at UD in February.

Nick Depompeo, Brian Hufe, Mike Sacra and Ben Stuchlik were picked for their design of a fastener tensile test system, sponsored by Southco Inc., which manufactures a variety of specially fasteners, latches, hinges and other components for the computer, electronics, automotive, industrial, military, aerospace, and recreational vehicle markets. The project was to design an improved method for testing several styles of "quarter turn" captive

fasteners used in military and aerospace applications with the aim of reducing labor and material cost, as well as the time required to conduct product testing.

Craig Livingston, Andrew Snodgrass, Jordan Weinstein, and Aaron Winn tied for the top honors with their design of an improved tablet feeder for Dade Behring Holdings Inc., the world's largest company dedicated solely to clinical diagnostics. The goal of the project was to reduce the cycle time of a tablet feeder on production line, significantly lowering operating cost and capital spending.

"Since we don't have a way for the students to practice what they learn, this is the closest that we can get to the real world," said Prof. Dick Wilkins, one of the Senior Design advisers. "By having the projects sponsored by industries, they get the feeling of a factory process."

During the program, 69 students in teams of four and five made presentations on a variety of concepts, from a metered-flow regulator to a bottle-closure sealing system and a blood-oxygenator test station.

The teams explained their concepts using charts, graphs, slide presentations and, in some cases, working models of the prototype.

Four judges—engineering professionals Peter Popper, a retired mechanical engineer; Glen Simmonds, a reliability engineer at DuPont; Peter Cloud, BME64, a retired mechanical engineer; and ME Prof. Ajay Prasad—awarded points for various aspects of the presentation, including communication, and asked follow-up questions.

According to project sponsor coordinator Nate Cloud, BME1964, sponsors benefit by getting results through projects that they specify based on actual needs.

"They find value in a solution to their problem," Cloud said. "If they are interested in hiring, they get a chance to have their companies' names in front of the whole class and get to know the team members. Some [sponsors] treat it as a recruiting opportunity, and many of the team members go on to work for the sponsors."



## Andrew Seagraves Receives Donald W. Harward Fellowship for 2007

Undergraduate Andrew Seagraves is the recipient of the Donald W. Harward Fellowship for 2007, an Honors Degree Award for students with outstanding academic records who are engaged in especially promising senior thesis research. Fellowship of \$600 given to enable the student to work full-time on their thesis over Winter Session.

# Prof. Sun Takes Students to China

ME Professor Jian-Qiao Sun firmly believes that studies should be mixed with fun, and he has several ideas about how to do that. One is taking small groups of students to his native China, where they have the opportunity to pay formal visits to universities as well as take informal tours of the country.

An international collaboration grant from the National Science Foundation (NSF) has enabled two trips, one in 2004 and another in 2006. The goal of the program is “active research engagement of U.S. students and junior researchers at the foreign site.”

The participants in Sun’s program have been a mix of undergraduate and graduate students. Junior Spencer Popejoy first became interested in the program when he heard other students talk about the adventures they had had on a previous trip. “They had some amazing pictures,” he says.

“The best part of the trip was the students at Huazhong University of Science and Technology. They were so friendly and showed us around the whole city of Wuhan.”

“I got to learn all about the Chinese culture firsthand,” he continues, “from their daily engineering lab work to just how tasty the Peking duck really is—Dr. Sun told us that the skin tastes like chocolate, and now I agree. I would go back to China in a heartbeat—the trip was fun, the people were friendly, and the food was great.”

Popejoy’s time in China was exactly what Sun hopes his students will experience. “When you interact that closely with people from another country, you really start to understand their culture,” he says. “You come back amazed by the people and the architecture. These trips also give American students a better idea of why China is rising so fast.”

In addition, Sun comments on the economic contrasts between his native and adopted countries. “The American students get to see that people in China work a lot harder for a lot less money,” he says.

The participants generally work in Sun’s labs doing research during the academic year, but the limited length of the stay in China precludes their conducting actual research there. However, they do visit the labs and classrooms and talk to Chinese grad

students about how things work there, he says.

Sun’s China trips reflect a University-wide commitment to international education. The Institute of International Education (IIE), founded in 1919 to support international educational exchange, recently released its “Open Door” report on U.S. students studying abroad. UD is ranked in the top 20 doctoral/research institutions in terms of undergraduate participation in Study Abroad and is the only public institution to appear on the list.

Lesla Griffiths, Director of UD’s Center for International Studies, attributes UD’s success to faculty who develop innovative and academically challenging programs and accompany the students abroad.

Sun’s trips to China certainly fit this description. And, like the students on UD’s other Study Abroad trips, they have the opportunity not only to learn about another culture but also to have fun while doing it. That’s a guaranteed recipe for success.



*Students participating in Prof. Sun's trips to China experience the culture and learn about the research process*



# Alumni Profiles

## Bill Wagamon

Bill Wagamon (BME1962) has tried to retire at least twice, but that lifestyle did not suit the former Hercules sales director. “I just wasn’t ready to stop working,” he says.

So instead, he’s now selling real estate in Sussex County, playing basketball in the Senior Olympics, and serving on the planning team for the annual ME business and career conference.

A native of Milton, Delaware, Wagamon was a three-sport athlete at UD. With basketball as his primary sport, he was recruited to play lacrosse and football by coaches who took note of his athletic abilities.

His most noteworthy accomplishment as a Blue Hen was becoming a member of the men’s basketball 20/20 club (20 points/20 rebounds) on January 3, 1962, when he scored 21 points while pulling down 25 rebounds against Drexel. With 549 career boards, Wagamon is 21st among Blue Hen rebounding leaders.

“Sports were very important to me when I was in college, and they still are,” Wagamon says. “Anyone can stay active and participate if they just find their level.” Wagamon’s level is still high—he competes nationally with other men over 65 in full-court basketball.

“I credit sports with getting me through the University of Delaware,” he says. “To play sports, you have to keep

your grades up, and, since you don’t have much extra time, you’re forced to be organized and to learn to be a better planner.”

Wagamon spent most of his career—29 years—with Hercules, Incorporated and then worked for Applied Extrusion Technologies, Inc. in New Castle, Delaware, for about eight years. Next, he did some consulting and finally spent a year substitute teaching and being an assistant basketball coach at a small private school in Newark, Delaware, where his wife taught.

Since the couple had been spending more and more time at their vacation condo in Lewes, Delaware, they decided to move there full-time about four years ago. Wagamon still wasn’t ready to retire, so he and his wife went back to school to get their Delaware real estate licenses. They now work as Realtors® at a local agency in Lewes. “I had spent my whole career in sales and marketing,” Wagamon says. “Crossing into real estate was a no-brainer—the skills are the same; you just have to learn the product. It’s a fun business.”

Wagamon seems to be a person who can find fun in just about anything he does. When ME alumni coordinator Nate Cloud (BME1964) called him almost three years ago to see if he was interested in helping to plan the department’s first

alumni career celebration, Wagamon didn’t hesitate to say yes. “Nate and I had played basketball together at Delaware for three years and were always kidding or needling each other,” he says. “Working on Nate’s committee gives us both an opportunity to continue that.”

“Interacting with this group [the conference planning team] has really been fun,” Wagamon says. He even laughs as he throws a \$1 bill onto the table in the middle of a planning meeting—the group’s penalty for making a funny, albeit sarcastic, comment to another colleague. “I love working with everyone on the team—from other alumni to current students to faculty.”



## Jim Hutchison

It’s pretty easy for Jim Hutchison (BME1978, MBA1981) to talk about his career—he’s had only one job since he graduated almost 30 years ago. “At the time,” he says, “my dad was a partner in a local engineering consulting business, but he wanted to leave and start his own practice.”

Hutchison joined his father in the new company, JAED Corporation, while working on his MBA. He recalls some tough early years: “The economy in the early 1980s was very tight, and it was a difficult time to start a new business. But we muddled along for a couple of years, and then it took off.”

Together, Jim and his father brought mechanical and structural expertise to the business, and, by the late 1980s, they had begun to specialize in educational projects, working on renovation and construction of public and private schools in Delaware and the surrounding states of New Jersey, Maryland, and Pennsylvania.

Jim’s father retired in 1990, and about 10 years ago, Jim launched a new initiative, a facilities group, in the firm. “We started assisting educational organizations with planning, including facility condition assessments,” he explains. “For example, we provide input when a school district is planning a referendum and trying to determine

how to best allocate their resources.”

“This new initiative has enabled us to expand beyond the four-state area that we serve in carrying out building projects—we can work with organizations all over the country on these types of projects,” he continues. “One of the real advantages we offer clients in facilities planning is a database of solutions that they can use in modifying, updating, and managing their capital plans.”

Last year, JAED acquired an architectural firm and changed its name to StudioJAED. Hutchison is now the president of the company, which

employs 40 to 45 people in two offices, the headquarters in Wilmington and a smaller office in Dover. But he still finds time to be heavily involved in ME alumni activities, particularly the business and careers conference.

“Jack Vinson pointed out to us several years ago that we have alumni all over the country who are doing spectacularly interesting things,” Hutchison says. “The conference is enabling us to bring some of that to the forefront.”

“Improved interactions among alumni, students, and faculty lead to good things for everyone,” he continues. “Students can learn about careers from alumni, and

they can tap into a network of alumni when they’re job hunting. For alums, UD is a great place to recruit—we have five or six former students working for us at StudioJAED at any given time. And it’s good for the faculty to know alumni so that they can advise their students about business opportunities.”

“One of the things that’s kept me involved,” Hutchison concludes, “is that there was no strong alumni presence when I was a student, and I think it’s really important to have this synergy. If we can make inroads to increase participation and communication, that will be mission accomplished.”

# Alumni News

## ME Grads Return to Classroom

David Henderson (BME2000) and James (Corky) Wert (BME1999) both



James Wert

lectured this fall in MEEG453, Manufacturing Processes & Systems. Taught by Prof. William Fagerstrom, the course is geared toward providing students with an understanding of

common processes, technologies, process systems, and industries.

Henderson, who is with Dade Behring, described many uses of rapid prototyping in Dade’s new product development. He showed the students many actual prototypes as well as slides of prototypes, ranging from parts for design and marketing to tooling for molding parts.

Wert, who is with Merck, discussed various jobs for mechanical engineers in the manufacturing of pharmaceuticals, including facilities engineering and technical support of manufacturing operations. He concluded with a summary of Merck’s activities in “lean manufacturing.”

According to Fagerstrom, one of the goals of the course is to help students bridge their careers from academia to the industrial environment and provide a basis for lifelong education.



David Henderson

## Alum Inducted Into UD Sports Hall of Fame

*Editor’s Note: This article was excerpted from a story published in UDaily on October 4, 2006.*

David L. “Dave” Sysko (BME1965) was one of nine former “Fightin’ Blue Hens” inducted into the University of Delaware Athletics Hall of Fame as members of the Class of 2006 at an invitation-only ceremony held on Friday, November 17, 2006, at the Bob Carpenter Center. The inductees were also recognized prior to the UD-Villanova University football game on Saturday, November 18, at Tubby Raymond Field at Delaware Stadium. This is the tenth induction class and brings the total number of UD Athletics Hall of Fame members to 86.

Sysko was one of the most prolific scorers in UD men’s basketball history

and helped lead the Hens to a three-year mark of 45-23, including what was then a school-record 18 wins in 1961-62. A three-year starter, he led the Middle Atlantic Conference as a senior in 1963-64 when he scored 23.9 points per game and was named honorable mention All-America and first team All-MAC. Sysko still holds UD’s modern single game record for most points in a game, 45 against Lafayette in 1964.

He and his wife, Patrice, reside in Wilmington, and have two children and two grandchildren.

Sysko has been the president of C.F. Kettering Inc. for the past 12 years and executive director of the Laffey-McHugh Foundation for the past seven years. Active in the community, Sysko was co-founder of Future Stars, an academic program for promising young basketball players in Wilmington and New Castle County, and he helped

found the Public Allies leadership program with his daughter, Suzanne Sysko, and Tony Allen in 1995.



## Alum and Son Launch Unique Business

David Wimberley (MME1970) admits that he has been “an inveterate maker of gadgets” all of his adult life.

“My gadget making led me to start a business in 1991 making tripod heads for long telephoto lenses,” he says. “My son got a degree in mechanical engineering from the University of Virginia and joined me in the mid-90s. Largely because of his efforts, the business has grown substantially.”

The company’s products are sold on the web ([www.tripodhead.com](http://www.tripodhead.com)) as well as at dealers throughout the country and even internationally.

Wimberley switched careers after getting his masters degree, earning a Ph.D. in clinical psychology in 1977. He worked for about 25 years at a mental health center in Winchester, Virginia.

“I suppose I am one of the more eccentric graduates of the Department,” he admits. With this latest career switch, Wimberley says that he is now inclined to think of himself as an engineer rather than as a psychologist, even though he doesn’t do any “hard-core engineering.”

As an undergraduate, Wimberley worked in the Department’s machine shop. “I now count machining among my many interests,” he says, “and I even have an idea for a commercial product aimed at the home shop machinist.”

Wimberley and his wife live in Winchester, Virginia. They have a daughter, a son, and three grandchildren.



## Alum Completes IronMan

When he was a UD-ME student working on the ASME Human Powered Vehicle project, Jonathan Blyer (BME2004) had no idea that he would someday be competing in races where all of the power is provided by the human body—his own, that is.

On October 21, 2006, Blyer completed what is arguably one of the

toughest athletic competitions in the world—the IronMan World Triathlon Championship in Hawaii.

“After graduating, I became obsessed with cycling, which was motivated by my experience in the ASME HPV project,” says Blyer, who is originally from Brooklyn, NY. “Shortly after returning home I found myself training for a few local triathlons. The training became an obsession, and I found myself engulfed by the sport.”

Blyer spent the first year or so after graduation doing machine design, but his passion for cycling won out, and he began working at a local triathlon shop designing the geometry of custom-made racing bicycles.

About a year ago, he decided that he was going to try to do the IronMan, a race for which competitors have to qualify by competing at other races. Blyer

managed to secure one of the coveted IronMan slots by winning his age group at a Half IronMan competition in Maryland in June.

“I spent the rest of the summer obsessing over training, and on October 14th I boarded a jet to Hawaii all ready to race one week later,” he says. “The event consists of a 2.4-mile swim in the choppy Hawaiian shores followed by a 112-mile bike ride into legendary headwinds followed by a 26.2-mile run in the blazing sun.”

Blyer finished the race in 11 hours and 11 minutes. Although a knee injury forced him to walk part of the marathon, Blyer couldn’t be happier with his accomplishment.

“The mental battle that I won over that course will be something I remember for the rest of my life,” he says. “The HPV competition was basically what created my interest in cycling in the first place, so here I am about three or four years later thanking you both [Nate Cloud and Ajay Prasad] again for all your help way back then and having a part in my recent achievement.”



# Business, Technology, and Career Conference

The 3rd Alumni Business, Technology, and Careers Conference will be held on Friday, April 27, 2007, at Clayton Hall on the University of Delaware's North Campus. The program for the afternoon and evening will include

- An overview of the state of the Mechanical Engineering Department at the University of Delaware.
- Seminars by faculty, alumni, and students on engineering technology, engineering business topics, and career planning and

experience. CEU credits will be offered.

- Extensive periods for interaction and networking among alums, faculty, and students, as well as review/discussion of current research and development displays with graduate students.
- Social times for reunion and further networking.
- Continuous refreshments, a cocktail hour, and dinner followed by a keynote speaker and a time to honor and hear from six alums who have been cited as

"Distinguished Career Alumni," class of 2007.

We hope ME alumni, faculty, and students will reserve the date. More detailed information on how to register will be posted on the event web site ([www.me.udel.edu/alumni/celebration07.html](http://www.me.udel.edu/alumni/celebration07.html)) in the near future. In the meantime, please take a minute to peruse the information and pictures from last year's event at [www.me.udel.edu/alumni/celebration06.html](http://www.me.udel.edu/alumni/celebration06.html).

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## Alums To Be Honored at Spring Conference

*Five distinguished alumni will be honored at the Mechanical Engineering Business, Technology, and Career Conference, to be held on April 27, 2007. Alumni are selected for recognition based on several criteria, including achievement, impact, uniqueness, and interest. The following highlights the careers of this year's Distinguished Career Alumni (DCA).*

**Donald R. Cohee, PE (BME1968)**, is Vice President of Research and Technology for ILC Dover in Frederica, Delaware. He has been with the company



since 1972, when he was hired as a Design Engineer. Cohee has worked in a variety of areas for ILC over the past three decades, focused on product and technology development

for space, defense, and industrial applications. In the course of his career, he has been granted nine US patents. Most recently, he is credited with creating a new ILC business process for developing commercial products based in large part on the Toyota product development process. Cohee is a member of the Delaware Science and Technology Council and the Engineering Outreach Advisory Council at the University of Delaware. He is also a member of the Board of Directors of the Delaware State University's High Technology Research Incubator Foundation. Prior to joining ILC, he spent five years with Newport News Shipbuilding and Dry Dock

Company, where he was a design engineer on the Aircraft Carrier Nimitz project.

Cohee, who was "surprised and honored" upon learning he had been selected for the DCA recognition, credits his ME education with forming the broad, solid foundation for his career. "Beyond good basic engineering," says Cohee, "the important elements in my career development have been recognizing the need for change, presenting a case for change, and implementing change. Continual learning is also critical."

**Michael J. Doyle (BME1992)** is a Special Agent for the Federal Bureau of Investigation in Newark, New Jersey. He also holds an MBA with a finance concentration from Drexel University. After he



joined the FBI and was assigned to a counter-terrorism squad, the FBI chose to leverage his engineering experience by naming him the Newark Division Weapons of Mass Destruction (WMD) Coordinator while a member of the Joint Terrorism Task Force. He has also accepted assignments investigating public corruption and foreign counterintelligence national security matters. Additionally, he is the Newark Division Hostage Negotiation Coordinator, where he oversees eight

Special Agents and is responsible for all aspects of the team. In his ten years with the FBI, Doyle has been involved in a number of significant cases, and has twice been nominated for the FBI Director's Award.

"Although not thought of as a traditional engineering profession, I believe being a Special Agent of the FBI is a natural extension of engineering training," Doyle says. The skills needed for success as an Agent are the

same as those for an engineer. Above all, the qualities of honesty, critical thinking, problem solving, cooperation, and communication, which are core elements of the University of Delaware Mechanical Engineering program, are vital to becoming a

quality Special Agent. Although many aspects of my career are interesting and at times are dynamic, succeeding in the job is the product of taking what is known, establishing what is unknown, applying techniques, skills and methods and solving for an answer.

The biggest compliment that can be paid to engineers, I believe, is reflected in the fact that currently, the FBI's highest recruiting desire has changed from law enforcement officers and lawyers to individuals with engineering experience."

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**James B. Foulk** (BME1959) is



the Chief Executive Officer of the SURVICE Engineering Company and President/CEO of the recently formed

Chesapeake Defense Services, Inc. in Belcamp, Maryland. After working for Standard Oil Company and the Army Research Laboratory, Foulk joined Sikorsky Aircraft in 1974 as head of Safety and Survivability and in 1976 was promoted to manager of System Engineering for the UH-60 Black Hawk helicopter development program. In 1978, he moved to Science Applications, Inc. (now SAIC), eventually opening a Bel Air, Maryland, office of SAI. In 1981, Jim and his wife Nancy (BSEd1973) decided to pursue his dream of establishing their own business, and they started the

SURVICE Engineering Company in the basement of their home. Their son Jeff (BME1982) joined them after graduation and is now President of SURVICE Engineering.

Since SURVICE's inception, Jim's business philosophy has been to bring talented subject matter experts together with bright young engineers and analysts to allow them to grow and mature the survivability discipline. Today, SURVICE has over 160 employees with offices at seven locations throughout the United States providing engineering services to make safe, survivable, and effective weapon systems for the nation's warfighters. Throughout his career, Jim has held leadership positions in a number of professional societies, national coordinating groups, joint working groups, etc. His work on the UH-60A Blackhawk was instrumental in Sikorsky being given American Helicopter Society's Grover E. Bell Award for outstanding contributions to helicopter development. In November 2003, he received the NDIA Combat

Survivability Division's Award for Leadership. In May 2006, he received the American Institute of Aeronautics and Astronautics (AIAA) 2006 Survivability Award.

"As I look back on my mechanical engineering education and its impact on my career development," he says, "there are two notable observations. First, my education taught me how to think like an engineer, in an inquiring and logical manner. Second, it taught me that failures are not always bad because you can usually learn something from each one. Also, I've learned that having a vision or purpose about what you want to do after graduation—together with a passion and persistence to accomplish it—will help sustain a long and enjoyable career. This includes, in my case, starting a new company after 38 years in the profession to conduct ballistic testing and metrology applications in a laboratory environment." In his spare time, Jim enjoys his eight young grandchildren and five young race horses.

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**Jerry Kegelman** (BME1978) is



Associate Director of Aerodynamics, Aerothermodynamics, and Acoustics Research and Technology at the NASA Langley Research

Center. After earning his bachelor's degree from the University of Delaware, he went on to earn an M.S. in aerospace engineering and a Ph.D.

in fluid mechanics/transition physics, both from the University of Notre Dame. In addition to his expertise in aerosciences, Kegelman has made contributions to the areas of complex mechanical systems, instrumentation and sensor systems, optical and laser systems, and major facility ground test systems. He is the author of over 50 technical publications and presentations.

"I am most honored by this award," says Kegelman. "I can still remember as if it was yesterday many of the positive interactions I had with the

faculty while I was there, especially Jim Danberg and Mike Greenberg. "I received a very well-rounded engineering education at UD, which has served me extremely well over the years. This background has given me a solid understanding of how 'all things mechanical' work. I went straight from UD to the University of Notre Dame for graduate work, and I felt I was very well prepared. I would recommend graduate education to any undergraduate these days, and all UD ME.s should be well prepared."

### Jodie (Kuchler) Morgan



(BME1985) is President of SPI Polyols, Inc. After earning her bachelor's degree in ME at UD, she completed an MBA at West Chester University.

Morgan joined ICI Americas, one of the previous owners of SPI, in 1985. Since then, she has held engineering, quality, sales and marketing, business development, and business management roles within various

business operations. SPI Polyols, which sells ingredients to the food, confectionery, and personal-care markets, has achieved double-digit profit growth over the past three years under her leadership. Morgan repositioned the under-performing business, and she is credited with restructuring the company's benefits program, diversifying its product line, and extending the business to global markets. She is a member of Vistage, a worldwide organization of CEOs and business leaders, President of The Structures Company, LLC, which handles commercial and residential real-estate investments, and is a member of the Board for JDRE's Delaware Chapter.

Morgan spoke on "Engineering and Finance - Your Keys to Success" at the 2006 ME Business & Career Conference. "A degree in mechanical engineering provides a good analytical foundation that can be leveraged," she said. "Adding knowledge of finance greatly improves your career opportunities. An engineering education opens doors, gives you credibility, and provides technical knowledge and problem-solving skills, but money impacts all decisions in business. The language of finance is a bridge between business functions and will increase your credibility."

### Nancy Sottos (BME86 and PhD91)



is the Donald B. Willett Professor of Engineering and Professor of Materials Science and Engineering at the University of Illinois at Urbana-

Champaign. Sottos is co-chair of the Molecular and Electronic Nanostructures Research Initiative and a part-time faculty member at the Beckman Institute for Advanced Science and Technology. Her research group studies the mechanics of complex, heterogeneous materials such as advanced composites, thin film devices, and microelectronic packaging.

Sottos's research and teaching awards include the Office of Naval Research Young Investigator Award

(1992), Outstanding Engineering Advisor Award (1992, 1998, 1999 and 2002), the Robert E. Miller award for Excellence in Teaching (1999), the University of Delaware Presidential Citation for Outstanding Achievement (2002), University Scholar (2002), the Hetényi Award from the Society for Experimental Mechanics (2004), and Fellow of the Society for Engineering Science (2007). In addition, her research group was awarded the American Society for Composites Best Paper Award in 2002 and 2003, and the Tech Museum of Innovation Award for Technology Benefiting Humanity in 2001 for her work on self-healing polymers. She is a member-at-large of the U.S. National Committee on Theoretical and Applied Mechanics, a member of the editorial board for Composites Science and Technology and Experimental Mechanics, and faculty advisor for the student chapter of the Society of Women Engineers.

"There are many things I appreciate about my undergraduate and graduate education at UD," Sottos says. "As I look back, the close interactions between faculty and students and the outstanding undergraduate research program probably had the most positive impact. At the graduate level, it was the forward-looking emphasis on interdisciplinary research and my close research ties with the Center for Composite Materials. Also, both the undergraduate and graduate curriculums had significant flexibility so that I could take a large number of math courses and materials courses from outside the department—a more broadly based math and science background has really been an asset for me.

"It is a wonderful honor to be selected for this award, and I am looking forward to having the chance to visit UD and meet the newest class of ME undergrads."

## Save the Date!

# On April 27, 2007, plan to attend the UDME Business, Technology, and Careers Conference.



# Alumni Notes

**Brian Murphy** (BME2002) is National Research Specialist for Aircraft Structures for the National Transportation Safety Board. His industry experiences include nearly sixteen years of performing detailed strength, fatigue and damage tolerance analysis on a variety of composite and metallic structure utilizing both hand analysis techniques and finite element methods. In 2004, Brian received the Dr. John Lauber Award for Technical Excellence. He lives in Northern Virginia with his wife Melodie and their two children, Brendan, age 8, and Brianna, age 5.

**Dr. S. Subbiah** (PhDME1989) has been at Fluent Inc., a leading engineering software company specializing in computational fluid dynamics (CFD) software, since he graduated 17 years ago. In 2000, Dr. Subbiah was promoted to the role of Vice President at Fluent and became responsible for the company's business in North America. On May 1, 2006, ANSYS Inc. acquired Fluent, and Dr. Subbiah is now a Vice President in ANSYS responsible for the customer support and services activities for all ANSYS/Fluent products in North America and India.

**David Teller** (BME1980) is the Global Supply Manager for Honeywell's Research Chemicals Business. He and his wife, Marsha, live in Western Michigan about 30 miles west of Grand Rapids. Their son Brandon is a freshman in mechanical engineering at the University of Michigan, and their twin daughters are freshmen in high school.

**Lauren Leonard Watson** (BME2002) works for Rohm and Haas Electronic Materials in Newark, Delaware, as a Utilities Engineer. She and her husband, Kevin, had a baby girl, Anne Marie, on August 21, 2006.

# In Memoriam

Allan Juster was born Sept. 8, 1922, in Albany, NY, and grew up in New York City. He attended Stuyvesant High School and Pratt Institute from which he graduated with a BME degree in 1947. He became an instructor of Mechanical Engineering at the University of Connecticut and, in 1950, he earned an MME degree from the University of Delaware. Caught up in the space race of the 1950s he next spent several years doing research at Diamond Ordnance Fuze Laboratories, Armour Research Foundation, Sperry Gyroscope Company and Republic Aviation.

While Allan and his first wife were living in Chicago their son, Randy, was born. His work took him back to New York and Allan moved his family to Long Island. From research Allen moved into teaching and founded the Department of Mechanical, Aerospace and Industrial Technology at New York Institute of Technology in 1966. In 1970 he developed the Department of Engineering Technology at Fairleigh Dickinson University in Teaneck, New Jersey.

For many years Allan had been working towards a PhD and finally achieved his goal in 1980 when he received that honor from New York University.

Allan retired from Fairleigh Dickinson University in 1985 and moved to Florida. He continued his travels to interesting places and also filled his time with volunteer activities. He tutored students in mathematics, taught mathematics at Sarasota High School and volunteered at Mote Marine Laboratory, Sarasota Memorial Hospital and the Sarasota Music Archive.

Allan died in Sarasota on July 23, 2006. He is survived by his son, Randy, of Sacramento, CA, and his loving friend, Ruth Eichhorn, of Sarasota.

# Feedback Form

Do you have any feedback (comments, questions)? Or let us know any current events or info not covered by the data sheet below.

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Information form for the department's records

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