



Mechanical Engineering News

University of Delaware

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Inside: Department News • Faculty Research • Student Profile • Senior Design • Awards • Alumni News

Message from the Chair



Tsu-Wei Chou

ME's class of 2003 is a first in two ways – it's the first to graduate under the new curriculum and the first to go all the way through our program under my chairmanship. So even though I'm always excited and proud to see a class graduate, I guess I have a special feeling about this one.

A lot has happened in the past six months. The move of the Department of Materials Science and Engineering into DuPont Hall has enabled our department to

occupy most of the Spencer Lab and to renovate several labs, including space for biomedical engineering research, computational mechanics, and combustion. During the next six months, we plan to renovate several more. We have also improved the physical structure and appearance of Spencer Lab.

We are continuing to strengthen our relations with alumni and devoting more efforts to development. The joining of Deirdre Smith to the College of Engineering is a big step in this direction – she is very energetic and enthusiastic about contributing in this area.

As always, we are proud of the many accomplishments of our faculty, students, and staff. We can't cover them all in any one issue of ME News, but I think our newsletter staff has put together a great sampling of stories to let our readers know what is going on in the department.

Please give us your feedback about the newsletter itself or about the activities of the department. We think great things are going on here in ME, but we know there is always room for improvement.

Editor's Note

Nanoscale technologies; the mathematics of biological systems; bio-mechanics; MEMS (microelectro-mechanical systems), flying robots...new directions in mechanical engineering! Some may think of mechanical engineering as having reached a zenith in the industrial past, but new fields of research have been rapidly emerging, creating new collaborative efforts across schools and departments and presenting exciting opportunities for students! We urge alumni to learn more about your Department by visiting or staying in touch by the various means available: visit our web site, give us feedback via email or the response form in this newsletter, and/or just call....and read more about "what's up" in the ME world in this newsletter – from flying robots (cover) to nanotechnology!

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Department News

Department Seminar Series

The department runs regular seminar series every semester in addition to many informal ones presented by our visiting professors and scientists. The departmental seminars have high academic standards and are often presented by the world-wide famous professors and researchers from prestigious universities and institutions. The seminar talks have covered the emerging research areas such as nano-technologies and MEMS, and the traditional subjects of the mechanical engineering including solid and fluid mechanics, and thermal sciences.

Please visit the departmental website for the schedule of future seminar talks.

Contact: Crystal Maccari/Jian Qiao Sun
- 302-831-6975

Jack R. Vinson Lecture announced



The 2003-04 academic year marks the 40th year of Jack Vinson's service at the University of Delaware. Dr. Vinson is the H. Fletcher Brown Professor of Mechanical and Aerospace

Engineering at the University of Delaware, with joint appointments to the Center for Composite Materials and the College of Marine Studies.

In addition to being the Founding Director of our internationally renowned Center for Composite Materials and Chair of Mechanical and Aerospace Engineering Department (1965-79), Professor Vinson is a dedicated teacher, a prominent researcher in structural mechanics and composite materials, an author/co-author of seven popular textbooks, a highly active contributor to several professional societies, and an inspiring mentor to graduate and undergraduate students.

To celebrate this milestone of an extraordinary career, the Mechanical Engineering Department has established the "Jack R. Vinson Lecture." The annual lectures will be delivered by prominent researchers/educators on topics in engineering science and technology. The inaugural Jack R. Vinson Lecture will be given in the fall of 2003.

In announcing the establishment of the Lecture, Dr. Tsu-Wei Chou, Pierre S. du Pont Chair of Engineering and Chair of Mechanical Engineering said, "I have had the privilege of working with Jack in the same department at Delaware for 34 years, and because of our common interests in teaching and research, I have followed his

professional career fairly closely. I deeply admire his scholarly accomplishments and truly marvel at his dedication to engineering education. His energy and enthusiasm toward his profession are just as vibrant now as when he first started four decades ago. His vision and pioneering efforts in teaching and research in the areas of composite materials and structures technology have had profound impact world-wide."

However, as one of his colleagues has pointed out, Professor Vinson's "most important impact on our industry and on engineering is in the people he has touched and educated over the years." This is borne out by the accolades Professor Vinson has received from many of his students, including the following recent comment: "I want to thank you for your kindness, understanding, and generosity for helping me 'help myself' over 25 years ago. When people ask me about my career, one of the important pieces in it was Dr. Jack Vinson. Remember, people are the greatest composite materials you'll ever work with."

Professor Vinson is the embodiment of an educator and a leader of the mechanical engineering profession. He is a true role model for junior engineering faculty. We are proud to establish this new lecture in his name and his honor.

History of Mechanical Engineering at UD

Alumni can help with Memories

The article below, "Where is ME on the UD Campus?" by Diane Kukich, was published in the *ME News*, Fall 1997, along with Interesting "Did You Knows" regarding UDME history. These include:

Did you know that?

The department of mechanical and electrical engineering was established in 1891.

At that time, the average annual salary for a full professor in 1891 was \$1,750!?

Frederick Bartlett and Frank H. Hynson are listed in our alumni database as the first graduating class in 1895? (Incidentally the data base includes 3,108 alums through the 2001 class - Editors note, July 03)

Mechanical Hall cost just over \$7,000 to build in 1898, Evans Hall was \$360,000 in 1930, and Spencer Lab cost

\$9.7 million in 1983?

The average starting salary for a mechanical engineer with a bachelor's degree was \$2,700 in 1947 and \$5,100 just 10 years later?

The father and son for whom Evans Hall was named served a total of 87 years on the boards of trustees of Delaware College and the University of Delaware?

When the department of mechanical and electrical engineering was established in 1891, one professor was assigned to the program; while in 1997, close to 30 full-time, visiting, and adjunct faculty are affiliated with the ME department?

Out of the 154 bachelor's degrees awarded by Delaware College between 1909 and 1914, 120 were in engineering, leading President Harter to say, "The College is now becoming an Engineering School largely"?

Electrical and mechanical engineering were part of a single department until 1911 and, even after they separated,

their curricula remained the same except for the fourth-year requirements?

In addition to these items we have begun compiling history items with the idea that we can create an updated "History of Mechanical Engineering at The University."

We need your help in this endeavor. Please send us history items that you might have from your files or from your memory. As a guide, the items might fit into the following categories, but we certainly don't want to limit your input to these—include anything you think could be of interest, and we will take it from there.

- Facilities
- Chairpersons, faculty
- Curricula
- Research areas
- Notable faculty, alumni
- Significant events

Contact: Nate Cloud (Ref: contact sheet; address)



Mike Keefe: Engineering Prof Started Education in Mathematics

by Diane Kukich

Although Mike Keefe says that he really had no clue what he wanted to do when he finished college with a math degree, being a faculty member in engineering seems to have worked out just fine for him. What he did know was that although he liked math, pure mathematics did not appeal to him as much as “applied math” did, so he chose mechanical engineering as the course of study for his master’s degree at the University of Minnesota.

While working for Honeywell, he earned his Ph.D. and was urged by his advisor to consider teaching as a career. By then, Keefe was married, and he and his wife had started the family that would eventually (or maybe the correct word is currently) grow to include 10 children.

In looking for a faculty position, Keefe looked at schools in the Midwest, while his wife, who was originally from Connecticut, focused on the East Coast. She saw an ad for an assistant professor position at the University of Delaware, and Keefe joined the UD faculty in 1985.

He teaches primarily machine design courses, and his research interests are all in areas related to solid modeling. “I’m still fundamentally a mathematician,” he says. “I like the

challenge of a proof.”

Now an associate professor, Keefe also enjoys the challenge of working with students. “I like to have lots of interaction with my students,” he says. “I try never to turn them away when they knock at the door.”

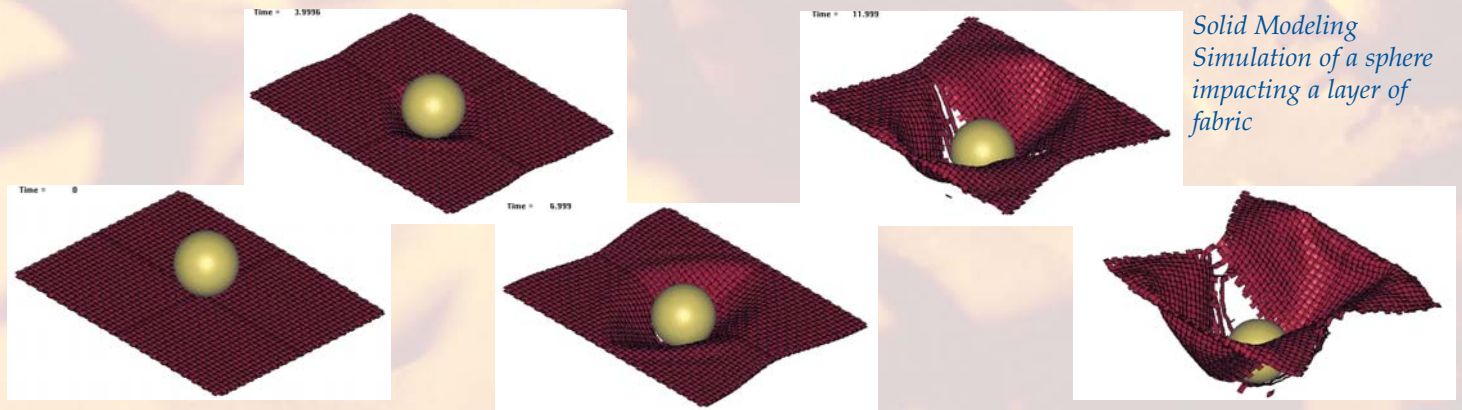
“If I had been interested in just the research part of my career,” he continues, “I would have taken a job in a government lab. But my whole reason for going into academia was to work with kids.”

Keefe admits that working with students takes a lot of time, as does his involvement with the Faculty Senate. But he believes that involvement in all three aspects of being a faculty member is critical. “Research is very important at a place like Delaware,” he says, “and so is teaching, including mentoring of students. In terms of service, a university is a community – if you want to ‘live’ here, you need to get involved.”



Front row l-r: Anne, Nicole, Andrew, wife Liz with baby Theresa
Second row: Christopher, Laura, David, Mike Keefe
Third row: Carolyn, Michelle, Stephanie

After spending almost two decades at UD, Keefe notes that some things have changed, while others haven’t. “In some ways, the University of Delaware is becoming more like a company as it gets bigger and more complex,” he says. “Things were certainly simpler when I came here in 1985. Today, sometimes the students seem to be here more as a means to get a job than as a place to learn. But I don’t think that students have changed in any fundamental way since then.”



Faculty and Staff Highlights



Anette M. Karlsson has been an Invited Guest Scientist at the Institute of Industrial Science, The University of Tokyo, from March 21-31, 2003. The visit was funded by the Center of Excellence, the Japanese Ministry of Education, Japan. During her visit she gave a seminar entitled "Failure Mechanics in Coated Structures Subjected to Corrosive Thermal Environments."



Jian-Qiao Sun has been promoted to the rank of Professor, effective September 2003.



Ajay K. Prasad is presenting an invited lecture at the Advances in Fluid Mechanics Symposium from July 24-25 in Bangalore, India. The proceedings of this symposium will be dedicated to Professor R. Narasimha to honor him on the occasion of his 70th birthday. Professor Prasad is also presenting a paper at the 5th European Fluid Mechanics Conference, to be held in Toulouse, France, August 24-28, 2003.



Andras Z. Szeri, has been invited to give a Plenary Lecture at the Congress of AIMETA (the Italian Association of Theoretical and Applied Mechanics), on September 9-12, 2003.

Suresh Advani, has provided technical editing for a book, *Advanced Polymeric Materials*. The book contains chapters that address current research in polymer composites, polymer blends, nanocomposites, and biopolymers; it was published by CRC press in April 2003.



Lian-Ping Wang was a Visiting Scientist at the National Center for Atmospheric Research (NCAR) in Boulder, CO, from January to March, 2003, where he gave a seminar to the Mesoscale and Microscale Meteorology Division titled "Effects of Turbulence on the Coagulation Growth of Cloud Droplets." NCAR is an NSF-funded, national research center focusing on atmospheric and related science problems.



Sunil K. Agrawal is a Bessel research awardee of the Alexander von Humboldt Foundation during the summer of 2003. He will attend an awards ceremony hosted by President of Germany. During the summer, he will be working jointly with researchers at Technical University of Darmstadt. During these visits, he has been invited to present seminars at Technical University, Vienna and Technical University, of Ulm. He has been nomi-



nated to be the Technical Program Chair for the 2004 ASME Mechanisms and Robotics Conference to be held in Utah. He will also assume the role of Chair of the ASME Technical Committee on Robotics for the years 2003 and 2004.

Dr. Eric Preissner (Ph.D.02) and **Dr. Jack R. Vinson**, H. Fletcher Brown Professor of Mechanical and Aerospace Engineering, the Center for Composite Materials, and the College of Marine Studies, have co-authored a paper entitled, "Theory for Midplane Asymmetric Sandwich Cylindrical Shells," which appeared in the *Journal of Sandwich Structures and Materials*, Vol. 5, No. 2, July, 2003.



Jian-Qiao Sun, Dean Eric Kaler and Jue Chen Sun at Dr. Sun's promotion reception.

STAFF

Donna Fritz was recognized for 15 years of service at a Service Awards luncheon Wednesday, March 26. "Thanks to [all of] you, the University of Delaware is a healthy and vibrant place well-known for its service to students, its leading-edge technologies and its academic excellence," UD President David Roselle said.

Introducing the Department Staff

Hello from the staff in the Mechanical Engineering Department!



This most energetic team of workers includes, from left to right: Donna Fritz/Administrative Assistant, Jean Anderson/Senior Secretary, Dawn Johnson/Records Analyst, Crystal Maccari/Staff Assistant, Sue Coombes/Manager of Operations, and Roger Stahl/Laboratory Coordinator.

Sue Coombes speaks for the entire staff when she describes the open and friendly atmos-

phere in the department. "We all know that our work for the department is beneficial to the success of the University of Delaware, and we strive to be excellent. In our daily tasks, accuracy, dependability and helpfulness are our tools. To benefit the faculty and students, staff teamwork is emphasized. We also have an excellent leader in our Chairperson, Dr. Tsu-Wei Chou. He cares deeply about the well-being of the staff and it shows in the high moral of everyone. We all enjoy being part of the great University of Delaware community!"



Research Highlights

Dr. Chou Leads Nanomaterials Research Team

ultra-small size adds new challenges to the research process

A team of researchers led by Tsu-Wei Chou, P.S. du Pont Chair of Engineering, was recently awarded a major grant from the National Science Foundation for research on carbon nanotubes. The funding from NIRT (Nanoscale Interdisciplinary Research Team) will support the team's efforts to synthesize, characterize, and model aligned nanotube arrays for nanoscale devices and composites. The team also includes researchers from Boston College and Northwestern University, as well as Associate Professor Hai Wang, Ph.D. student Erik Thostenson, and postdoctoral researcher Chunyu Li, all from UD.

According to Chou, the potential applications of the tiny carbon tubes, which measure from less than one to a few nanometers (one billionth of a meter) in diameter, range from molecular electronics and field emission dis-

plays to nanocomposites. "At the nanoscale," he says, "this unique form of carbon displays extraordinary mechanical and physical properties."

While the superior properties of carbon nanotubes are well known, their integration into practical materials and devices requires a basic understanding of their behavior—at length scales ranging from the atomistic to the macroscopic level. To facilitate the engineering application of these materials requires a fundamental understanding of their process-structure-property relations.

This is where Chou's expertise enters the picture. He has devoted much of his career as a researcher to studying these relationships in fiber composites. Now, he is simply downsizing. "It's just like working with fibers or 'whiskers,'" he says, "except that it's about three orders of magnitude smaller. I'm very excited about this work because, while some of the knowledge we've developed about traditional composites may be applicable to this field, it's really a totally new frontier because of the scale."

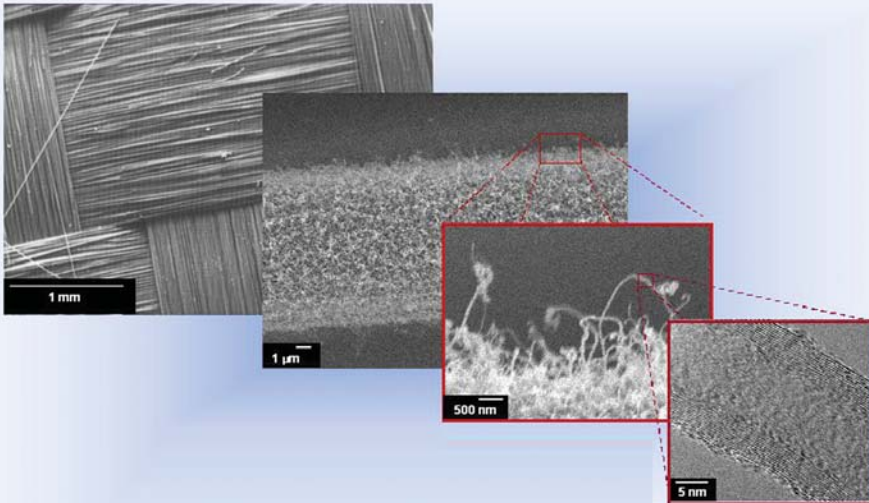
Exploring this new frontier means addressing questions such as "How do you make these tubes of high qual-

ity and free of defects?" and "How do you characterize the performance of materials this small?" According to Chou, conventional fabrication and characterization technologies are not adequate, and modeling requires scaling down to the atomistic level.

Chou's entry into the field of nanomaterials and nanostructures is timely. A number of government organizations, including NSF as well as the defense agencies, are extremely interested in the potential of these materials and are funding projects through a variety of programs. In addition to the recent NIRT grant, Chou is the PI for grants from NSF's NER (Nanoscale Exploratory Research) program, as well as from the Army Research Office (ARO), the Naval Research Laboratory (NRL), and the Air Force Office of Scientific Research (AFOSR). The funded research addresses both theoretical and applied topics and ranges from polymer- and ceramic-matrix composites reinforced with carbon nanotubes to microarray devices of aligned carbon nanotubes for biological and biomedical research.

The research results of Chou and co-workers have already been published in a number of prestigious physics, applied mechanics, and composite material journals. He has also been invited as a plenary and keynote speaker on nanostructured materials at international conferences in China, Belgium, Italy, Greece, and the U.S. Chou says. "I look to my work to form a bridge from the very basic research done by physicists and chemists to the practical applications. That's where I think I can make a contribution with my materials science and engineering background."

"I really enjoy what I'm doing right now," Chou continues. "It's exciting and there are new things happening almost every day. There is so much potential for this new technology—it doesn't mean that everything we dream of will become reality, but the opportunities are there."

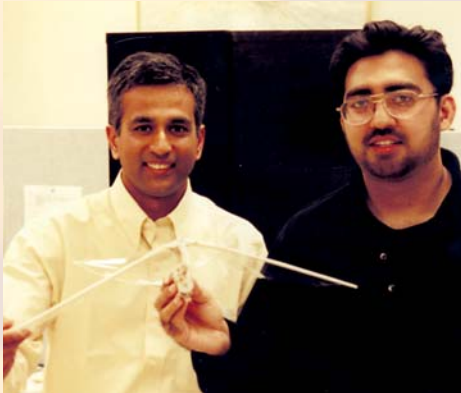


Reinforcement hierarchy across length scales: (from left) woven bundles of carbon fiber, "fuzzy" fibers where carbon nanotubes are grown on the surfaces, and the nanoscale structure of a multi-walled nanotube.

Flapping Wing Robots

...emulating nature's way

by Diane Kukich



Sunil Agrawal and Zaeem Khan

They may be high-tech in their design and intended application, but the unmanned flying vehicles that Prof. Sunil Agrawal and his students are building in the Mechanical Systems Lab at UD are made from some pretty simple materials – balsa wood, Mylar, and tiny motors and batteries. Ultimately, such devices may make their way into the human body for diagnostic purposes, into earthquake rubble for rescue, and into

industrial plants for quality control.

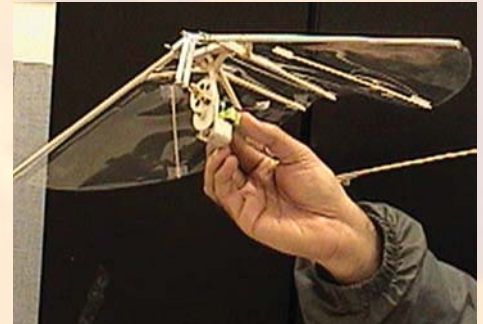
Inspired by insect biology, the tiny flapping-wing robots offer improved maneuverability over fixed-wing vehicles as well as the capability to hover. The flapping wing presents tremendous challenges, however, as it occupies an entirely different and less-understood regime of aerodynamics.

“We’re basically trying to make an artificial hummingbird,” says Agrawal, “which is much more difficult than it might seem. Making things mimic nature is scientifically fascinating but also extremely challenging.”

While the need for such devices in surveillance and telemetry has existed for some time, the technology to enable such miniaturization is relatively new and continuously evolving. Agrawal and his team are currently using motors the size of a woman’s pinkie, which means the resulting device is still at least 10 times as large as desired.

But Agrawal is pleased with the progress he and his team have made. They have designed and built a working prototype, thereby demonstrating the feasibility of their approach, but now they need to develop control systems.

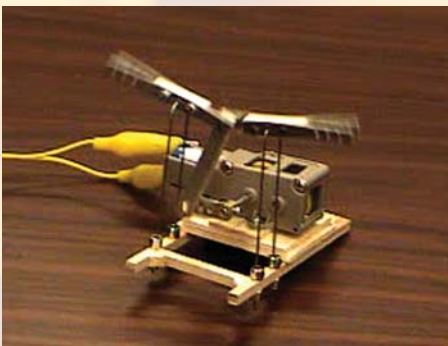
“Bees and birds have some very nice vision sensors,” says Agrawal, but we need to know a lot more about these biological systems and how to transfer such capabilities to



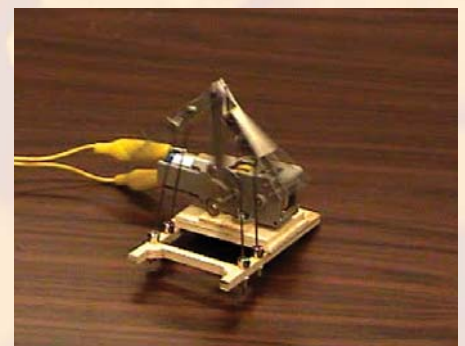
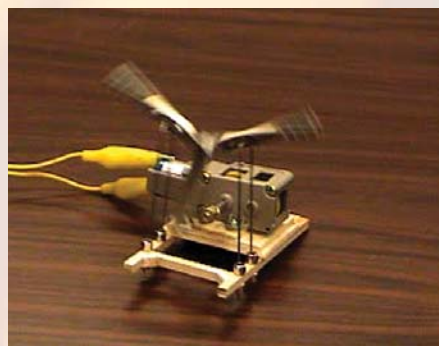
First flying prototype

machines.” To this end, scientists and engineers at Eglin Air Force Base, with whom Agrawal and his team are collaborating, are working directly with entomologists to study bee vision.

And what about the UD-ME team’s first prototype? It flew quite successfully for less than a minute before crashing on the roof of Spencer Lab. When grad student Zaeem Khan reached it to assess the damage, it was – like an injured insect – still flapping its wings.



Experimental set-up designed to test a mechanism that mimics an insect's thorax.



Test flight of second Flying Prototype which used and improved upon many features of the first prototype.

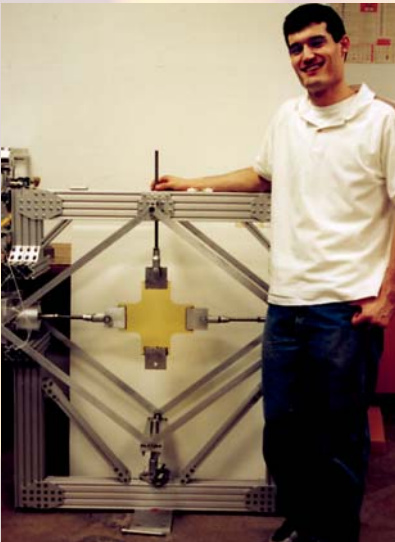


Student Focus

Top Senior Students: Kirstin Huesmann & David Forney Embark on Different Careers

**Choosing UD as place to
start journey leaves no
regrets**

by Diane Kukich



Dave Forney with Sr. Design Project:
A biaxial fabric tester

Being at the top of your class can open a lot of doors. For Dave Forney and Kirsten Huesmann, both 04BME, the doors opened in different, but equally prestigious, directions. Forney is headed for grad school at MIT, while Huesmann has been accepted into the DuPont Company's Field Engineering Program.

While most students attribute their choice of an engineering major to their love of, or talent in, math and science, for Forney, it was all about racing. "I've been racing go-carts since I was ten years old," he says. "I wanted to learn what I needed to know to optimize race cars for speed."

One of the factors instrumental in his decision to come to Delaware for mechanical engineering was the department's SAE race car team. "Being on the Formula One racecar



Kirsten Huesmann on a visit to the UD Solar House in Washington D.C.

team provides excellent hands-on design experience," he says. He participated in the program during his first three years and then moved on to more theoretically oriented research as a senior.

UD-ME proved to be a perfect program for him. "I enjoyed all the courses and found the faculty to be great," he says. "I'm looking forward to applying what they taught me in the future."

His dream of being a NASCAR driver has faded, but otherwise the future looks wide open to him. "I've tried to make my experience here broad," he says. "I plan to earn a Ph.D. and then I can see myself working just about anywhere — academia, a national lab, or industry." Forney worked at Lawrence Livermore National Lab last summer and this summer will intern with ZF, a German company that makes parts for BMW, Mercedes, and Porsche.

Top student status means a lot to him: "I'm proud of it because it means that I've done my best to understand the fundamentals of mechanical engineering," he says, "and that's important because we design things that people use every day and that they rely on."

Huesmann came to UD-ME from the Charter School of Wilmington, which is known for its strong math and science programs. The school is so competitive academically that she was ranked only third in her class there yet managed to come out on top in her mechanical engineering class at Delaware. UD was perfect for her because it was a top-ranked program

that enabled her to stay close to home.

The senior design project developed by the team she was on resulted in a patent for a locking shampoo cap that keeps the product from spilling in gym bags and suitcases. She learned a great deal from the project, which was sponsored by PolySeal.

"We got to work with not only a product engineer but also an HR director so that our project had a consumer twist to it," she says. "We developed designs and a consumer survey to assess customer reactions to our product. That was very helpful, as it gave us insight into issues we hadn't considered."

Her job at DuPont will take her on a rotation of positions that will change every two years. "The idea is that after several rotations, you'll have a pretty good idea of where you would like to locate and what you'd like to do," she says. "The program also prepares you for management because of the varied experience you gain."

Like Forney, Huesmann speaks highly about her experience at Delaware. "I had the opportunity to do undergraduate research and complete a Degree with Distinction under Dr. Jian Sun, and I also really enjoyed all of my classes and the faculty that taught them," she says.

THE ROAD NOT TAKEN, Robert Frost

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;
Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that the passing there
Had worn them really about the same,
And both that morning equally lay
In leaves no step had trodden black.
Oh, I kept the first for another day!
Yet knowing how way leads on to way,
I doubted if I should ever come back.
I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.

Human Powered Vehicle

Student Team Participates in ASME Competition

“Can’t wait to start on the new model for next year”

by Diane Kukich

Chris Pawson has scratches down the backs of both legs from mishaps with the human-powered vehicle that he and a group of four other ASME students built. But to Pawson, it’s a small price to pay for getting the vehicle designed, built, and actually running.

Along with teammate Jonathan Blyer, Pawson spent uncountable hours on the project, including day



falling off.... We love this thing even with all its flaws.”

After several months of work, the group traveled more than 1,000 miles



Jonathan Blyer and Chris Pawson with their Human Powered Vehicle

to Rolla, Missouri, to compete in the national ASME Human Powered Vehicle Competition. According to student chapter president Gwen Thorson, the competition consists of designing and building a vehicle that is run solely by human power, then racing it head to head against other universities in several events.

and night over spring break. “It was worth every minute,” says Pawson. “It was so rewarding to finally ride it—turning it, switching gears,

The events include a 100-meter dash sprint event to show off the vehicle’s speed, a utility event to demonstrate

maneuverability and versatility, and a 70-kilometer endurance event. “This year was the 20th anniversary of the competition, but it was the first time that the University of Delaware has taken part in it,” says Thorsen.

“About 15 schools from the East Coast showed up for the competition,” she adds. “Many of these schools have been participating for several years and have thousands of dollars invested in their entries. Our team spent approximately \$700 on our vehicle and used many recycled bicycle parts. We managed to place fifth in the sprint event and second in the utility event—losing only to an HPV with dual riders, while ours had one.”

“We didn’t get to finish the endurance event because our brakes failed during a torrential downpour, and we didn’t want to risk serious injury. Despite this stroke of bad luck, we are extremely happy with our performance in our first year at this competition, as we beat many teams that had been entering for years.”

Both Pawson and Blyer are seniors but have another semester to complete before graduating. “We plan to hang around until next year so we can do it again,” says Blyer. “It’s nice to relax right now for awhile, but we really can’t wait to get started again.”

They’ve already started dreaming about improvements—an innovative transmission design, maybe some composite materials for the frame....



John Blyer (Student Leader): Taking the Human Powered Vehicle, “Blue Steel” for the first test drive with the aerodynamic fairing.



“Blue Steel” on display prior to competition in Missouri.



Chris Pawson finishing in fifth place in the 100m sprint event.



SENIOR DESIGN - Seniors Learn "The Design Process"

by Nate Cloud

Blending: Innovation, Business Process Structure; Engineering, Teamwork; and Continuous Communication in pursuit of converting Ideas to Reality.

Cool Projects keep interest level high

Eleven student teams completed their Senior Design projects for indus-

trial sponsors this past December. Projects covered a wide range of challenges including process improvements and new product designs. Tackling real problems with "fresh minds", and exposure to students as potential associates in their businesses, continued to be key values expressed by sponsors in post project interviews early this year. Several students elected to continue developing their projects in the Spring semester.

The Local ASME Chapter presented awards on March 18, to the student teams that were judged by an ASME panel to have accomplished the most

outstanding projects. The awards were presented at ASME's annual dinner meeting, which also served as a "senior send-off" celebration. 2001 winners were:

- First Place: New Holland Team - Bale Machine Kicker
- Second Place: Poly-Seal Team - Disk top Closure
- Third Place: Air Products Team - Bag Packer Improvements

The event was postponed from



Team Air Products
Geo Harris, Justin Rogers, Ian Miller, & Jared Rochester

Team AstroPower 2
Rob Storey, Stephanie Trampeta, Ian Corden, & Leonna Ferraro

Team AstroPower 1
Dibylo Das, Silvia Pineda, Kerrie Smith, & Brendan Dempsey

Team Care-New Holland
John Ungar, Alan McIntosh, Michael P. Don Medley

Team Dade Behring
Brad Carey, Habib O'Neill, Antonio Barkley, & Annie Treng

Team Poly-Seal
Chris Englert, Kirstin Huser, Don Herr

sponsor →

Problem Definition
Design an enclosure that will not open prematurely and will maintain constant marketing appeal.

customer wants

Problem Description
On downhill slopes the ball does not go uphill far enough to allow the kicker to spring back and

Metrics and Target Values

metrics and specifications

Wants, Metrics & Target Values



February 18 because of the record snowstorm that paralyzed the area over the previous weekend.

Alumni, faculty, and parents of students attended the dinner, which has developed into a tradition, and enjoyed the opportunity to talk informally with the students about their project experience.

A large version of this two-page picture, created by Liz Dunkle, University Publications, is on display in the Senior Design display case in the main hallway in Spencer Lab. The display case also includes a plaque

with the outstanding team (above) from each year engraved on it. We welcome you to stop by Spencer Lab if you are in the Newark area to see the display.

A growing number of Alumni have been an integral part of project sponsorship, and some* have participated as the primary student team contact for the project:

*Mike Smoot, '82 - Xymid, LLC
 Matt Savage, '00 - Daimler Chrysler

Dave Friemuth, '90 - Harley Davidson

*Bob Andrews, '92 - Johnson Controls

Ralph Weis, '72 - ILC Dover

*Jim Kegelman, '88 - Dade Behring

*Alexis Cox, '01 - AstroPower

For more information contact*:

Nate Cloud, cloud@me.udel.edu, 302-778-4567;

Dick Wilkins, wilkins@udel.edu, 302-831-2006;

Michael Keefe, keefe@me.udel.edu, 302-831-8009;

Jim Glancey, jglancey@UDel.Edu, 302-831-0712/1179

Senior Design 2002



Team Dentsply
 Nick Nytkorczuk, Jonathan Lennon, Joe Feren & Dan O'Brien



Team DaimlerChrysler
 Jara McQuaid, Tim Grypa, Chovir Blanco, & James Antony



Team ILC Dover
 David Forney, Dan Gleason, & Jonathan Watts



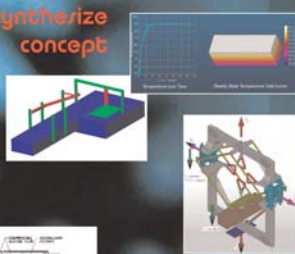
Team EcoThermal
 Tony Nava, Anthony Di Zorio, Tom Shipman, Katherine Piazza, & Matt Delaney



Team Northrop Grumman
 David Vanderlice, Nick Grossman, Dirk Veenema, & Tim Jenkins

ideas → design → proof of concept

synthesize concept



model concept



prototype concept



Load Centering Test

- Loadings on fabric sample must be directed down its center
- Strips of load applied to fabric to extend the load
- Load applied by the pressure gauge or load cell
- Strips of a uniform stress area through center of sample
- Measurable error of 10% loading error means a 10% error in 10% error of machine and error of sample

testing and analysis



benchmark technology



Alumni Focus

Alumni Provide Input for ABET Program

In March, a group of UD-ME alumni met with a team of faculty working on ME curriculum improvements generally aimed at better alignment with national accreditation criteria. ABET (Accreditation Board for Engineering & Technology) is a federation of 31 professional engineering and technical societies that accredits more than 2500 engineering, engineering technology, computing, and applied science programs at over 550 colleges and universities nationwide. ABET's current accreditation criteria are collectively known as EC 2000.

The faculty/alumni group discussed several planned improvement areas, including

Student advisement revisions in light of the new UD-wide online registration procedures,

Treatment of statistics in the ME curriculum,

ABET "breadth" outcomes, and Alumni interaction

In the area of **student advisement**, alumni suggested that a series of group advisement sessions be initiated for underclassmen, because they usually have common questions. Such sessions would also help to acquaint students with the facilities available within ME and generate more student-faculty interaction. It was also suggested that upperclassmen choose advisors based on their specialty field of interest (e.g., fluids, biomechanics, controls, etc.), interest in graduate school, and interest in business.

With regard to the treatment of **statistics** in the curriculum, there was general agreement about the desirability of thorough coverage of the basics.

Alumni were also supportive of the ABET "**breadth outcomes**," including the necessity of a broad education to understand the impact of engineering solutions in a global and societal con-

text. Also emphasized are a recognition for and an ability to engage in lifelong learning, as well as a knowledge of contemporary issues.

Finally, in the area of **alumni interactions**, there was general discussion and agreement that alumni are usually willing to be resource people for consulting about topics from senior design to job experiences and job hunting strategies.

The Department expects to continue to seek alumni input on ABET issues. For more information about ABET, see www.ABET.org.

Editor's Note: The alumni included Dina Berlingieri (98), Dawn Cintavey (02), Dave Henderson (99), Kevin Perdue (95), Shawn Riley (98), and Eric Wetzel (95). Faculty present were Mike Greenberg, Rick Hall, Mike Keefe, John Novotny, Ajay Prasad, and Dick Wilkins.

Vasilios Peros



As Vasilios Peros (M.S. Mechanical Engineering '87) can attest, engineering and law make an interesting and effective combination. After a sixteen year career as an engineer

and manager at a Fortune 100 technology corporation, Peros transitioned into his current position as an attorney at

Venable, LLP, one of the nation's top law firms with offices in and around Washington, D.C. Peros is one of only a few graduate students of the Mechanical Engineering Department to become an attorney.

Now with a J.D./M.B.A., he advises entrepreneurs and small to mid sized companies in the areas of corporate law, business transactions, intellectual property and technology. He has extensive experience on business issues relating to company formation, stock issuance, employment issues and financing. He counsels clients with respect to intellectual property issues such as copyrights, trademarks and trade secrets and with

respect to technology issues such as tech transfers, licensing and maximizing the value of their intellectual property portfolios. Peros enjoys working with the diverse clients and variety of technologies with which he is involved.

He has also taken his efforts into the university classroom. In Summer 2002, he taught an undergraduate entrepreneurship class at the College of Notre Dame of Maryland. In Fall 2003, he will teach an undergraduate intellectual property class at Johns Hopkins University.

He can be reached by telephone at (410) 528-2865 or by email at vperos@venable.com.

UDME Engineers at Boeing

Many UD ME Engineering Graduates Find Career Homes At Boeing

by Diane Kukich

Editor's Note: Nearly 90 UD grads currently work for the Boeing Company, 22 of which are MEs. The article below focuses on two who have been involved recently in helping to develop the relationship between Boeing and the Mechanical Engineering Department.

In an era when many people change jobs almost as often as they change hairstyles, Sherise Wood (93BME) and Scott Holmes (90BME, 94MME) have



Sherise Wood

bucked the trend and found a home at Boeing. Both have been with the company for close to a decade.

Wood joined the company immediately

after graduation. "They allow for a lot of mobility," she says. "To work here, you have to like change and challenge—you have to be prepared for opportunities that come up and take them." She is currently with the company's Integrated Defense Systems in Philadelphia working in rotorcraft but has had multiple—and varied—assignments over the past nine years, ranging from design and testing of aircraft to internal auditing.

The undergraduate research experience Wood gained at Delaware was instrumental in her getting a job at Boeing. She had worked with a UD team on a project to apply composites to bridge infrastructure renewal, making coupon samples and bonding them to metals. "My background in composites gave me an edge," she says, "and helped Boeing gain interest in me as a prospective employee."

Wood says she still takes advantage of that background in seeking new opportunities with the company. "For

example, my materials classes with Dr. Hall helped in my current work with stress engineering, an area in which I never thought I'd be working because my strength was always in fluid mechanics."

Wood also credits the senior design experience with honing her ability to do teamwork. "There are always strong and weak points within a team," she says, "and you have to learn how to work with those strengths and weaknesses. It reflects the true workplace because it's rare for an individual to work on a project alone in industry—all disciplines are represented on a product team. You also learn to work with deadlines, which is valuable in the workplace. To reach one goal, you may have to



Scott Holmes

give up another to create a valuable product." Holmes, who worked at UD's Center for Composite Materials (CCM), had actually done research projects for both McDonnell Douglas and Boeing while he was still a student. "That was how I got my job," he says, "directly through my industrial experience." Holmes is no longer doing R&D for the company but is instead a Project Engineering Program Specialist for the V-22 Osprey Program. "The multidisciplinary experience I gained at CCM really helped in what I'm doing now in terms of managing a team of people," he says.

Holmes's senior design experience also opened doors for him. He was part of a team that developed an automated resistance welder for joining large composite structures in a sequential process, which was awarded a U.S. patent. Alcoa funded the project and collaborated with the UD team. "That project was great," Holmes says. "The challenge was in learning

how to take the device and make it into something that could actually be used on the factory floor. I learned quickly that I had to be open to the idea of change and willing to adapt to changing needs."

He parlayed the senior design project into a graduate research project. Working directly with Alcoa personnel, he designed and built a working prototype that the company used to bond composites to aluminum, a technology used on the Audi. "I got an overnight education from that project," Holmes says. "I also learned about the patent process, which got me up the learning curve quickly." Holmes now holds several additional patents. "For me, senior design was a springboard for much bigger opportunities and a great learning experience," he says.

He also mentions the value of teamwork and gives Boeing credit for its "School-to-Work" program, which enables high school students to spend the summer rotating through various areas of the company. "They learn how to work with others and listen to other people's ideas," he says. "There are too many people with great technical skills but no knowledge of how to function in a team environment."

Holmes is currently enrolled in UD's Executive MBA program, where he hopes to formalize his business skills, including finance, program management, and investment strategies. And Wood? She's not sure what her next assignment will be, but she's always ready for a new opportunity to add to her growing repertoire of experience.



Several of the exciting, leading edge unmanned aircraft (UAVs-Unmanned Aerial Vehicle)



Don McCoy



Donald McCoy is a Deputy Associate Director for Weapons Physics at Los Alamos National Laboratory. He is currently responsible for pit manu-

facturing and certification programmatic activities at the laboratory. The main goal of the pit manufacturing and certification program is to certify a warhead with a Los Alamos manufactured pit by 2007 without additional nuclear testing. Don was the Program Director for Nuclear

Weapons Simulation and Computing at the Los Alamos National Laboratory from 1997 thru 2001. He managed a successful program that focused on the development of predictive nuclear weapons simulation tools. The program included simulation code development for nuclear performance and safety, engineering structural analysis, and manufacturing. This simulation code development included development of hydrodynamic, transport, materials and physics methods and models as well as the computer science techniques required to make these codes efficient on large scale clustered SMP platforms. The program was responsible for planning the procurement, acquisition, and stabilization of the most capable computer platforms in the world. The program helped develop the user requirements for the new Strategic Computing Complex. Don has held various Program Manager

positions in the nuclear weapons program and served on DOE change of station position for the Nuclear Testing Division and the Assistant Secretary for Defense Programs. He joined Los Alamos National Laboratory in 1980 and has experience in simulation code development, nuclear test diagnostics, and nuclear weapon design and certification. Don has received five Department of Energy Awards of Excellence in the Nuclear Weapons Program and a Los Alamos National Laboratory Distinguished Performance Award. He has a PhD and MS in Nuclear Engineering from Northwestern University and a BS in Mechanical Engineering from the University of Delaware. He is a member of the American Nuclear Society. Address: Los Alamos National Laboratory, P O Box 1663, MS F603, Los Alamos NM 87544. Email: dmccoy@lanl.gov.

UDME Alumni Save Lives

Are there really no coincidences?

by Diane Kukich

The mechanical engineering curriculum is known to be rigorous, but one thing it doesn't include is life-saving techniques. However, that didn't stop two current ME students or an alum from stepping in to help when needed.

John Barr and Justin Alms (04BME) were driving through Newark on a Saturday night in late November 2002 with another UD student, John Hawley, when they noticed a car stopped on the railroad tracks near the Deer Park Tavern on Main Street. They tried to assist the driver in pushing the car off the tracks, but when train lights approached, they realized they would have to do something more drastic. They pulled the driver, who was too intoxicated to help himself, out of the car and dragged him to safety just seconds before the train collided with the car. "We didn't plan on going out and saving anyone's life," said Barr. "Everyone acted on instinct. But we felt really good about it afterwards."

Unlike Barr and Alms, whose heroics will probably turn out to be a



Cape May New Jersey – 1946

once-in-a-lifetime occurrence, Joseph Frank (59MME) seems to have made a career out of saving lives. In a letter accompanying his recently submitted "Alumni Feedback" form, Frank recounts saving the lives of a drowning child, three welders on a 200-foot-high conveyor, and several choking babies. In addition to these good deeds, Frank has saved lives on the job in a less direct way.

In his various jobs with the U.S. Army and private industry, Frank contributed to the redesign of a rocket's geometry to prevent it from exploding, as well as to the design of a test fixture for submarines that were to be equipped with nuclear weapons. According to Frank, his fixture reduced the time to perform the test from 18-36 months to one month. "I think I put a monkey wrench into the Soviet Union's plans to start a nuclear

war with the U.S.," he wrote.

Frank originally had plans to continue at UD-ME for a doctoral degree, but an added language requirement induced him to walk away from the program with his courses complete but his thesis unfinished. Frank believes that his work could have had an impact on recent U.S. history: He had planned to investigate the concept of cutting channels through the mountains in Oregon and Washington to allow moist Japanese current air into the American Southwest, thereby preventing forest fires and opening up more farmland.

Forty years later, Frank is "angry with himself" for not finishing. And we'll never know whether his thesis might have had a major impact on how the U.S. Southwest developed.



Seventieth Birthday – 1998



Reflections and Memories

Recalling an ME Hall of Fame Athlete: Bauduy Grier

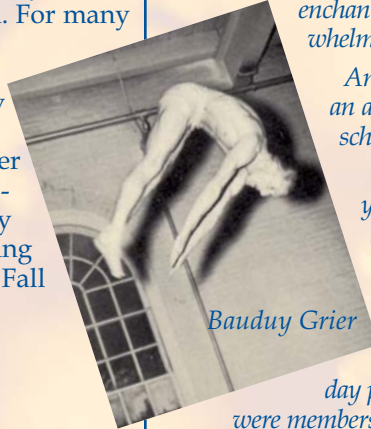
John Pursell, '49, has been a contributor to the *ME News* in the past (see *ME News - Fall/Winter 2001* issue; Reflections & Memories). John was born in Brooklyn, NY in 1927. His engineering career was with the Boeing Corporation. He retired 20 years ago, and now lives in Seattle Washington. For many of these retirement years John has been researching and writing extensively on WWII and the Vietnam Conflict for many years. When John was at The University in the late 40s he was a contributing writer - noteworthy for an Engineering student - to *The Cauldren* - a magazine produced by the English Department for creative writing students. The following appeared in the Fall 1947 issue of *The Cauldren*:

MODERN PROVERB

WHO IS THAT IDIOT, OUT ON THE WALL
THAT LAUGHS AT MY SPEECH AND SAYS NOTHING AT ALL?

My grandfather once was a talkative youth,
Believing the nonsense he spoke was the truth.
He started on earth and he built to the skies
A castle of horrible, terrible lies.
But as he grew older he slowly began
To change to a wiser, less talkative man.
He hoarded the knowledge he gathered each day
And parts of the castle soon crumbled away
As age led him on to the end of his walk
The more he would think and the less he would talk.
And that is why grandfather sits on the wall
And listens and laughs and says nothing at all.

- John M. Pursell



Dear, Nate

The article, Page 14, *ME News* of Winter 2003, discussing Bauduy Grier, took me back so very many years.

Our family moved from New York City to Wilmington in 1934. We settled into a modest house on McLane Street in Union Park Gardens. I entered the second grade at Lore School about eight blocks away.

At Christmas Season of that year, or the one following, the school held a great extravaganza in the auditorium. I recall to this day the enchantment of the colored lights and the music, almost overwhelming for a child of eight.

And then, with possibly "The Waltz of the Flowers" as an accompaniment, came the performance of stage of the school's Tumbling team, highlighted by Bauduy Grier.

I'm going to guess that at that time he was about ten years old, and in fifth grade. And Wow! I had never seen anything like that before.

I never met him personally -- two years difference is a great chasm when one is only eight, and hardly to be spanned. But I knew that he lived near Silverbrook Church, and I once delivered a birthday present to his home from my mother to his -- both were members of a Ladies' Club.

His picture, along with those of the other members of the Team, hung in the hallway near the office of the school Principal, Miss Pritchard. He may well have known my neighbors, Jim and Donald Dawson who, I believe, attended the same school.

His fame at that time was far greater and more worthy than mine, which I achieved by counterfeiting five-cent tickets to the *Our Gang* movies on my toy typewriter (all capital letters at that), and being betrayed to the authorities by my best friend, to whom I had given one.

Perhaps it was the ferocious lecture given me by Mrs. Dugan, the Vice Principal, who must surely have convulsed her cronies with that story over tea or beer (who knows?), that kept me from a life of crime: I hereby attest that I have never since counterfeited a five-cent *Our Gang* movie ticket.

May I wish you the very best, Bauduy Grier, wherever you are; you brought a sense of wonder to a small boy

John M. Pursell BME, 49

Alumni Business Highlight:

2Phase Technology; Bob Stratton '89

Robert Stratton BME 89 has co founded a company, 2Phase Technologies, that has developed and patented a system for reconfigurable tooling. After leaving Lockheed Martin after 12 years working on the F-22 fighter this company addresses one of the primary problems with composite manufacturing that Mr. Stratton found while working at Lockheed; cost and time to manufacture tooling. 2Phase's technology focuses on the use of ceramic micro spheres combined with a liquid of water soluble

binder and plasticizer, making a slurry like mixture. When the fluid is removed, the binder stay behind and locks the micro spheres together forming a ceramic like tool. The process can then be reversed for formation of another shape. Given a master shape to start with a tool can be fabricated in under an hour. Mr. Stratton has been working with the University of Delaware's Center for Composite Manufacturing for 2 years on the technology, in fact CCM was one of the earliest users of the technology. Mr. Stratton says, "one thing that was not taught in the Mechanical Engineering program at Delaware was how to raise money to fund and invention or idea, what a challenge, it took almost 2 years to secure

significant venture capital for a company startup". "It has been a very rewarding and educational experience, very different from life as an engineer with a big company," Stratton says. If interested in learning more, feel free to email Bob Stratton at bstrat@bellsouth.net.



Alumni Class Notes & Feedback

Karen Millsap (maiden name Karen Price) - '85 - BS mechanical engineering - Currently employed full time as a Polyester Product Specialist at Ticona in northern KY. Is married and has one son. Also self employed as a glass bead artist and jewelry designer. Beads and jewelry are available on the web at: <http://home.fuse.net/beadsnsuch>

Jules J. Schwartz '53,'63M, retired from Boston University as Emeritus Professor of Management and of Engineering, where he had previously served as Dean of the School of Management. He won both the University's Metcalf and Beckwith Awards for Distinguished Teaching. Earlier he had earned his doctorate from the Harvard Business School and also taught at the Wharton School of the University of Pennsylvania. He and his wife Sandra live in Belmont, MA and are both active members of the Harvard Institute for Learning in Retirement.

Hsien-Kuang Liu, Nyan-Hwa Tai, and Wen-Hung Lee (2002), "Effect of seawater on compressive strength of concrete cylinders reinforced by non-adhesive wound hybrid polymer composites," *Composites Science and Technology*, Vol. 62, pp. 2131-2141.

Michael Quariadi (BME 1995). I won two tournaments and got second place in two tournaments in Brazilian Jiu-Jitsu competition. I am currently pursuing a Master's Degree in Mechanical Engineering at the University of Texas at Austin. I am in their Mechanical Systems and Design Group and I will be starting work as a research assistant this summer(summer 2003).

Robert Stratton BME 89': In addition to starting a composites consulting company. Robert is a director and co-founder of 2Phase

Technologies at 2002 start-up, commercializing a company held patent on reconfigurable tooling. After raising more than 1.5 million in venture capital the company is manufacturing custom reconfigurable tooling for a variety of industries and uses, including US Army, Air Force, Boeing and many others. 2Phase had their first public display of this revolutionary technology in May 2003 at SAMPE 2003 in Long Beach Ca. More information on Robert and his new company at www.2phasetechnologies.com or bstrat@bellsouth.net

Michael Grimme '78 Living in Fort Lauderdale Florida with wife Pamela and four children. Currently owns a hotel business, an on-line development business, and a liquidation business. Our web site is www.grimmeholdings.com Fellow classmates are always welcome!!!! mgrimme@grimmeholdings.com

Jessica (Broderdorp) Nee '96. I was married on May 27th, 2001 to James Nee. I work for Honeywell in Fort Washington, PA as an energy



engineer, and I have worked there since 1998. I had son Jacob on July 12th, 2002.

Leslie (Rossman) Ball '00. I would be happy to update you on my life after Delaware. Unfortunately, none of it has to do with the world of engineering. The week before graduation in '00 I met my husband, Mark, and we were married June 30, 2001. I gave birth to our daughter, Molly Jean Ball, on 2/26/02 and then recently had our son, Riley Mark Ball, on 3/18/03. My days now consist of chasing a



one year old around the house and my night consist of waking up every 2-3 hours to feed a newborn.

It's a far cry from the engineering world that I thought I was going to be a part of... but to me it's much more fulfilling. I am currently halfway through a Master's degree in Mathematics from SUNY Brockport and plan on obtaining a Ph.D. and teaching math at the college level. I'm currently living north west of Rochester, NY and missing the Delaware weather more and more every day

Thomas Whitney MME'88 received his Ph.D. in Mechanical Engineering from the University of Dayton in commencement exercises held May 4, 2003. Tom is currently a Senior Research Engineer with the University of Dayton Research Institute. He resides in Kettering, Ohio, with his wife, Rhonda, and children Eric, 15, Michael, 12, and Caleb, 3.

Gary Becht, '85, and his wife, Patti, are expecting their second child (a girl) on August 2, 2003.

Gary A. Hecht, Esq., BME 1980, earned his J.D. degree in law from Temple University in 1991. He practices patent, trademark and copyright law and is a partner in the intellectual property law firm of Synnestvedt & Lechner LLP in Philadelphia, PA. He presently resides in Pennsylvania with his wife Lisa and two children.



Awards and Recognition

Honors Day Awards May 9, 2003

Senior Year Awards

W.Francis Lindell Mechanical Engineering Award To The Distinguished Senior:

David Forney

Kirstin Huesmann

Mary And George Nowinski Award For Excellence In Undergraduate Research:

Jared Rochester

Delaware Section Of The American Society Of Mechanical Engineers Senior Design Project

1st Place: Team 4 **M. Fyock,**
S. McIntosh,
D. Meckley,
J. Unger

2nd Place: Team 11 **C. Englert,**
K. Huesmann,
D. Kerr

Outstanding Alumni Awards

The following Mechanical Engineering Alumni have been recognized for their outstanding achievement and service by being honored with the highest level awards offered by the University of Delaware and the Engineering School.

n 2003 - **Donald R. McCoy '75** - Engineering's Outstanding Alumni Award

n 2002 - **Frederick H. Kohloss '51** MME - Engineering's Outstanding Alumni Award

n 2001 - **Nancy R. Sottos '86** - Presidential Citation

3rd Place: Team 1 **I. Miller,**
J. Rochester,
J. Rogers,
G.Harris

Junior Year Awards

W. Francis Lindell Mechanical Engineering Award To The Distinguished Junior:

Todd Fitzgerald

W. Francis Lindell Mechanical Engineering Achievement Award:

Christine Tate

Sophomore Year Awards

W. J. Renton Award For Outstanding Sophomore:

Michael Kutzer

Other Department Awards

Delaware Section Of The American Society Of Mechanical Engineers Outstanding Student:

Thomas Shipman

American Society Of Mechanical Engineers Student Section:

n 1993 - **David R. Helwig '73** - Presidential Citation

n 1986 - **C. Jackson Levis '50** - UD Outstanding Alumni Award

n 1984 - **W. Murray Campbell '50** - Alumni Wall of Fame

Information on the awards sponsored by the University's Alumni and University Relations Office can be found at

<http://www.udel.edu/alumni/awards/index.html>, including past winners, nomination criteria, and instructions on the nomination process.

The Engineering School's Outstanding Alumni Award is conferred on Honors day in the Spring, and nominations are received and

Gwen Thorson

Robert T. Bosworth Scholarship:

Matthew King

Redden Scholarship:

Hilary Goldman

Helwig Graduate Fellowship:

Brian Johnson

Conectiv Power And Light Scholarship:

Jennifer Pahnke

Liston Houston Scholarship:

Hilary Goldman

Patrice Hughes

Panel Of Distinguished Seniors:

Dirk Veenema

Black Alumni Org. Book Award:

Allison Bruton

Boeing Company Scholarship:

Scott Kasprzak

Wilmington West Rotary Scholarship:

James F. Moore III

Bill N. Baron Fellowship:

Thomas Shipman

reviewed in the fourth quarter of the preceding year. We urge you to submit nominations for these awards per the instructions at the above referenced web site.

Nominations for Engineering's Outstanding Alumni Award can be submitted to the Dean's office directly, or if you wish let me* know what your thoughts are on a candidate, and I will be pleased to help with the nomination process.

***Nate Cloud, University of Delaware, 126 Spencer Laboratory, Newark DE, 19716**



Addendum to the FY 2002 Donors List

The list of ME donors who have contributed to the University and the Mechanical Engineering Department that we published in the Winter 2003 issue of *ME News* was inadvertently truncated. The following people were not included in that listing, and we wanted to let you know who they are, and that their contributions are very much appreciated! Their names were added to a revised edition of the Winter 03 *News* and a new copy was mailed to each of them.

Mr. Alan J. Starr1999	Ann Massey Badmus, Esq.1984	Commander Donald R. Rice1973	Mr. Chandler S. Eason, Jr1959
Mr. George H. Sapna III1999	Mr. Richard D. Walls1984	Mr. Alton P. Smith, Jr.1973	Mr. James R. Stritzinger1959
Mr. Brent L. King1996	Mr. Kenneth L. Quesenberry ..1984	Mrs. Mary H. Swain1972	Mr. George A. MacFarland III 1959
Mr. Ashok Krishnamurthy1995	Mr. Bradford S. Walters.....1983	LCDR Margaretmary T. Weidert..1972	Mr. Lawrence E. Murray1958
Craig W. Murray, P.E.1993	Mr. Douglas K. Schehr1983	Mr. James H. Art1972	Mr. Donald L. Crouch1958
Mr. Andrew M. Lennon1993	Mr. Joseph D. Giordano1983	Mr. Scott T. Jednacz1972	Mr. Robert L. Stevens1958
Mr. Dominick A. Azeglio1992	Dr. William J. Taylor, Jr.....1983	Mr. Robert J. Singley1972	Mr. William S. Patterson, Jr.1958
Mr. Sean M. Foster1991	Mr. Jon G. Rowe1983	Mr. Donald R. Ritter1971	Mr. Frank S. Hyer II.....1958
Mr. John S. McWilliams.....1990	Mr. Barry A. Record.....1983	Mr. Douglas P. Oldfield.....1971	Mr. Robert F. Alsworth1958
Mr. Jonathan R. Stahl.....1990	Dr. Vishwanath Prasad1983	Mr. Marvin L. Gingrich.....1971	Mr. George H. King1957
Mr. John M. Fletcher III.....1989	Mr. Daniel S. Hudson1982	Lt. Colonel Mark J. Donald1971	Mr. Francis W. Jackson1957
Mr. John B. Wyckoff.....1989	Mr. Stephen S. Vinson1982	Mr. Reza F. Moqtaderi1971	Mr. Frank A. Stevens1957
Dr. Eric P. Beyeler.....1988	Mr. Peter A. Widdoes1982	Mr. Jeffery E. Smith1970	Dr. James N. Zaiser1957
Mrs. Patricia A. M. Derick1988	Ms. Linda M. Carapellucci1981	Mr. Fiore M. Celano, Jr.1970	Mr. Wayne E. McCabe1957
Mrs. Pamela A. Kaiser-Pare1987	Mr. Mark E. Deckers1981	Mr. Sepehr Mostaghim1970	Mr. Richard W. Perry1956
Dr. Robert A. Jurf1987	Mr. Ronald W. Gilkey1981	Dr. William A. Podgorski1970	Mr. William H. Lotter, Jr.....1956
Martha Meaney Murray, M.D. 1987	Mr. Richard B. Stickel1980	Mr. Robert W. Kinney1970	Mr. Edgar W. Cannon, Jr.1956
Mr. Gary N. Peterson.....1987	Mr. Gerald G. Weaver II1980	Dr. Kenneth A. Bannister1969	Mr. James T. Bueche.....1955
Mr. Alan J. DeFavero1987	Mr. Mark W. Hopkins1980	Mr. Samuel J. Kursh.....1969	Mr. Raymond T. Hoopes.....1955
Mr. Gregory W. Antal1986	Mr. David H. Nixon.....1980	Mr. D. Thomas Peterson1969	Mr. Paul F. Bender1955
Dr. Nancy R. Sottos1986	Mr. Joseph A. Marsilii, Jr.....1980	Mr. James A. Barger1969	Mr. Arthur J. Holveck1955
Mr. J. Kenneth Ryder1986	Mr. David F. Teller1980	Mr. Dean S. Gilchrist1968	Mr. John D. Hukill1954
Mr. Andrew C. Walck1986	Gary A. Hecht, Esq.1980	Mr. J. Philip Greiner.....1968	Mr. Robert E. Haley1954
Mr. David S. Diefenderfer.....1986	Mr. Barry M. Seidenstat1980	Mr. Russ Bonadonna1967	Mr. Charles W. Gurney1954
Dr. David E. Walrath1986	Mr. Ralph M. Nigro1980	Mr. David Hutton1967	Mr. John W. Grundy1954
Dr. Bruce A. Yost1985	Mr. Steven J. Krinsky1979	Mr. G. Mark Stofega, Jr1967	Mr. Purnal L. McWhorter III ..1954
Mr. Brian J. Blonski1985	Mr. John G. Woolfolk.....1979	Mr. Barry W. Hauf1967	Mr. Cornelius P. Zittere1953
Mr. Paul J. Manning.....1985	Mr. Gregory N. Dudkin1979	Mr. Patrick J. Reynolds1967	Mr. Richard E. Fisher1953
Mr. David J. Walbeck.....1985	Thomas E. Wilson, P.E.1979	Mr. Paul N. Costello1966	Mr. W. Richard Clendaniel1953
Ms. Mary Louise Mogan.....1984	Dr. Bakhtier Farouk1979	Mr. John W. Owen1965	Mr. Robert J. Redden1953
Mr. Jon P. Martin1984	Mr. Carl W. Strickler1978	Dr. Henry O. Foster1965	Mr. Harry E. Mayhew, Jr.....1953
Mr. Kenneth S. Solon1984	Mr. Stephen F. Fromyer, Jr.1978	Mr. C. William Spangler, Jr.1965	Mr. Ralph E. Gesell1952
	Mr. Stephen C. Hemberger.....1978	Mr. Barry H. Pritchard1965	Mr. Thomas A. McKenna1952
	Dr. Young-Kil Kim1978	Mr. David L. Sysko1964	Mr. Samuel H. Macrum, Jr1952
	Mr. Mark P. Hepp.....1977	Dr. Frederick P. Stecher1964	Mr. Donald B. Kiddoo1952
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	Mr. John L. Morrow, Jr.1973	Mr. Charles B. Woodward III ..1960	Mr. Charles L. Van Meter, Jr. ..1951
	Dr. Joseph J. S. Shen.....1973	Dr. Richard D. Swope1960	Mr. Benjamin E. Herring1950
	Mr. Steven R. Kiss1973	Dr. John F. Sontowski1960	Mr. Lawrence H. Gillespie, Jr. 1950
	Mr. David C. Haney.....1973	Mr. C. Richard Orth1960	Mr. H. Dudley Barton1950
	Mr. Lenn C. Daugherty1973	Mr. Edward J. Kelczewski1960	



Contacts

Contact information for faculty/staff features in this newsletter is included below. We urge you to contact these people if you have any questions or would simply like to talk with them about the topics in this newsletter.

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ALUMNI FEEDBACK - What's New With You?

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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Name _____
First Middle Last

Maiden _____

Delaware Degree BME Date _____ MME Date _____ Ph.D. Date _____

Spouse's Name _____ DE Alum? _____

Mailing Address _____

Home Phone _____ E-mail _____

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E-mail _____ Web Address _____

Please identify if your company is an affiliate or subsidiary of a larger company _____

Return this form to: Nate Cloud, 126 Spencer Lab, University of Delaware, Newark DE 19716 and/or contact me anytime at cloud@me.udel.edu or 302-778-4567





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