Mechanical Engineering News

University of Delaware

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inside: Department seminar lecture series • Faculty focus and research • Focus on students and undergraduate education • Alumni • Development

Message from the Chair

Tsu-Wei Chou

edited by Diane Kukich

This issue of ME News is a microcosm of life—good news and sad, news about the young and about the old. Our faculty focus and research highlights stories feature people in our department who are doing exciting things in their personal lives as well as in their research and teaching. At the other end of the spectrum, we are faced with the death of a departmental legend—Dr. Jerzy L. Nowinski. Prof. Nowinski was a war hero, an outstanding researcher in the field of engineering mechanics, and a treasured teacher. The story of the last few years of his long life is a human-interest story, in contrast to the "who's who" of his early and middle years.

In this issue, you'll also read about the promise of the next generation of mechanical engineers being educated in our department. Our student focus on Gwen Thorsen and the stories on ASME student chapter activities and on design provide insight into what our young people are doing in mechanical engineering. In this same newsletter, we have two pieces that take us well back in history.

And, as always, our alumni are prominently featured in ME News. From individual profiles to career briefs, we try to keep you informed about what other alumni are doing and make you feel involved with the department. Alumni are a valued resource for us, and Deirdre Smith, Director of Development for the College of Engineering, is a person who is well aware of the tremendous potential of this resource. The feature on Deirdre, as well as her development message, provide some insights into her goals for the College over the coming years. Our department is an important part of that overall effort, and this newsletter is an important vehicle for us to reach out to all of you. We appreciate your past and continuing support.

IN THIS ISSUE

Editor's Notes

As I was going through the process of putting together the list of ME alumni donors, shown on pages 14-15, I felt great appreciation for your support of the Department. The data was in spreadsheet format so naturally, as an engineer, I took a look at some of the statistics.

414 ME alums made contributions to the University in fiscal year 2003. This is 16% of our 2600+ active alumni. Going a little further I found that the top 17 donors represent 50% of the total $138,000 in contributions; and the top 92 give 80%. Interesting, but I decided to stop there, and urge all of you to join me in supporting our Department in Fiscal Year 2004 (ends June 30, 2004). As one example I'm kind of proud with the scholarship project that some of my basketball teammates, and fellow engineering alums started recently (page 15), so there are many ways that you can support the Department, ….and there are many needs to continue to improve the resources that enable our students to learn engineering. I can tell you from first hand experience over the past five years of close association, the young people who study and work toward their careers at Spencer Lab, are among the finest young men and women in the world! The future of engineering is in good hands!

—Nate Cloud '64

Jerzey Nowinski 1905-2004

Beloved professor passes—legacy of scientific achievement and love remain

by Diane Kukich

The headline in the Wilmington News Journal read "UD Luminary Jerzy Nowinski Dies." But those who knew Nowinski realized that he was more than just a bright light as a retired faculty member. He was also a noted scientist in his native country of Poland, a World War II hero, a devoted husband, and a loving friend.

Nowinski was born in 1905 and received his master of civil engineering and doctor of technical sciences degrees from the Polytechnic Institute of Warsaw. Before World War II, he was a senior researcher in the Polish Aeronautical Institute. During the war, he and his wife, Marie, became part of the Polish Resistance, providing a haven in secret rooms in their home for downed Allied pilots. After the war, Nowinski used his engineering skills to help rebuild the city of Warsaw. For all of these efforts, he received a number of honors, medals, and awards, including an officer Cross of Polonia Restituta, a Gold Medal of Merit, a Government Scientific Award, Silver and Gold Awards for the reconstruction of Warsaw, and an M.T. Huber Scientific Prize.

That was Nowinski's first life. "The second part of his life was much simpler," said Prof. Tsu Wei Chou, Chair of Mechanical Engineering, "but it was equally productive." In 1957, Nowinski defected to the United States while serving as a Visiting Lecturer at The Johns Hopkins University. His family joined him, and in 1958 the United States government granted them asylum. It was a dream that he had always held—to eventually come to America.

Nowinski made the most of the opportunities afforded him in his new country. He spent time as a faculty member at the universities of Wisconsin and Texas and then joined the University of Delaware in 1961. Delaware would become his home for the next four-plus decades. His work in engineering mechanics was so well-respected that he became the first faculty member at UD honored with a professorship in his name during his lifetime.

During his career at UD, he earned many awards, served as a reviewer for several professional periodicals, journals, and scientific societies; edited and authored a number of books; and published more than 240 articles in a variety of scientific fields.

Despite his renown, however, Nowinski will be remembered for much more than just his scientific accomplishments and his war-time heroism. "He was a long-time friend to the Newark Police Department," said Chou. "When he died, the funeral procession was escorted by eight police motorcycles and three patrol cars." A Newark PD officers award was named in honor of the Nowinskis for their contributions to and support of the Department.

Nowinski was also a supportive mentor to the many students whose lives he touched. One of them, Bryan Cheeseman, became part of the remarkable story that undergirds the third stage in Nowinski's life. He retired in 1973 but continued to conduct research, publish papers, and work with students. One of those students was Cheeseman.

"The story of Bryan and the Nowinskis is truly a remarkable one," said Chou, who held the Nowinski professorship before being named P.S. DuPont Professor in 2003. "George and Marie supported Bryan and took him into their home as a family member. As the Nowinskis aged, their roles shifted and Bryan began to lend them his support. After Marie died in 1997, Bryan continued to visit George twice every day, once at lunchtime and again for dinner. This was an absolutely amazing commitment, considering that by the last few years of George's life, Bryan had a wife, a baby of his own, and two stepchildren. The support of his wife, Brenda, was crucial to his ability to continue caring for George."

Cheeseman remembers going over to the Nowinski's house for the first time, in awe of meeting this individual who was so well-known and respected. But he was immediately told to call the famous professor by his first name, and it wasn't long before he learned that Nowinski shared many of the same difficulties that other engineering students faced.

"I remember being totally stuck on my Ph.D. problem for months," Cheeseman recalls. "When I told George about it, he grabbed my arm and said, 'I felt the same way.' He was one of the humblest people I've ever met."

Cheeseman also cherishes the moral support he received from the Nowinskis. "It meant so much to me to go to their house and into that warm and loving environment. I literally left my troubles at the doorstep when I went there."

Like many who lead very long lives, George Nowinski outlived not only his wife of 67 years but also his other relatives and friends. His obituary cited just one survivor: "his devoted, loving friend, Bryan Cheeseman of Newark."

Nowinski may have left behind only one survivor, but he was remembered by many at his funeral. "His former students came from as far away as Japan," said Chou. "Although it involved his death, this is a story with a happy ending. It also shows the spirit of what alumni mean to us—when they come back for an event like the funeral of a respected professor, it's like family."

Upcoming Events

Department of Mechanical Engineering Spring, 2004 Seminar Series Fridays : 12:15 pm - 1:15 pm in 114 Spencer Lab

Refreshments will be available at 12:00 PM in the lobby outside 114 Spencer

February 20, 2004
Professor Tom Shield,
University of Minnesota
"Magneto-Mechanical Testing of Ferromagnetic Shape-Memory Materials"

March 5, 2004
Professor Hiroshi Yabuno,
University of Tsukuba
"Stabilization and Motion Control for Some Mechanical Systems by Using Bifurcation"

March 12, 2004
Professor Sunil Agrawal,
University of Delaware
"Design of Gravity Balanced Machines – Applications in Rehabilitation"

March 15, 2004
Professor Mohamed Gad-el-Hak,
Virginia Commonwealth University
ASME Distinguished Lecturer Series
"Micro-Electro-Mechanical Systems"

SPECIAL SEMINARS

April 2, 2004
Gore Hall, Room 103, 2:30-4:30
J.L. Nowinski Lecture
Professor L.B. Freund,
Brown University
"The Mechanics of Cell Adhesion"

April 16, 2004
J.R. Vinson Lecture
Professor Samuel I. Stupp,
Northwestern University
"Materials and Self-Assembling Nanostructures"

Faculty Focus and Research

Jiam Qiao Sun

When Professor Jian Qiao Sun went to work for Lord Corporation in North Carolina after earning his Ph.D., his friends thought he had a dream job for an engineer. "It was at the research center in Raleigh," Sun says, "which was considered the 'country club' of the company. The benefits, the pay, and the people were all great." But Sun left after four years because the pull of academia was too strong for him to resist.

"I was really attracted by the idea of academic freedom," he says, "and at a university, you have full control over your own destiny. I also wanted to teach, as many people had told me, since I was in high school, that they thought I'd be good at it." Since coming to UD, Sun has not only taught but also created a number of new courses, including control of dynamic systems, structural dynamics and control, applied nonlinear control, and elastic stability of structures.

Sun believes strongly that faculty must balance teaching and research. "I guess it follows my belief in the Chinese philosophy of yin and yang," he says. "We should never be too extreme in either direction but should stay as close to the middle as possible."

Originally from China, Sun came to Delaware in 1994 after briefly considering settling on the West Coast. But he and his wife liked Delaware, and he decided to accept a faculty position at UD. He returns to China periodically and currently is collaborating on a three-year project there to investigate sand migration from storms. "My area of expertise is dynamic systems," Sun explains, "and sand is a dynamic system."

Sun began his work in this area as a Ph.D. candidate and has recently begun to explore new territory by investigating phenomena such as fatigue at increasingly smaller scales. Another area that Sun is currently focusing on is complexity modeling. "Many systems, ranging from sensing systems in buildings to water pollution and sand migration, involve lots of numbers coming in that need to be analyzed," he explains. "We're working on modeling such systems so that the important parameters can be identified. Applications range from breast cancer treatment to stock market analysis."

In the area of biomechanics, Sun is working on rehabilitation devices used to rebuild muscle strength after injury. "These devices use a controller to sense joint angles and enable precisely the correct amount of force to be applied—enough to maximize strength building while minimizing further injury," he explains. The technology takes advantage of magneto-rheological fluids, materials that change viscosity when a magnetic field is applied to them. Sun and his research group are currently working to apply the same technology to devices for stroke victims whose limbs are partially disabled.

Their goal is to build smaller devices that patients can take home with them. Handheld controllers with memory would maintain the patient's history. The beauty of the technology is that it provides data not only for planning therapeutic protocols for individual patients but also for conducting future research.

"There's a growing need for these types of assistive devices as the world population ages," Sun says.

Intelligent Rehabilitation Devices for Muscle Strengthening at Home

Dr. Jian-Qaio Sun (ME) and Dr. Katherine Rudolph (Department of Physical Therapy) are leading a project, funded by NIH for three years, to develop intelligent rehabilitation and exercise devices for clinic and home applications. "Delivery of rehabilitation services in the home and through telemedicine for patients with chronic obstructive pulmonary disease, congestive heart failure, hip procedures, and hip fractures can help them recover, gain strength, and achieve better health in general," Sun says. "However, effective, low-cost, portable devices for use in home care settings are sorely lacking. Therapists and patients need more options to strengthen weak muscles effectively and efficiently without manual resistance applied by a therapist."

"The ability of healthy muscle to produce torque depends on many factors," Sun continues, "including the length of the muscle, the shortening velocity, and biomechanical factors such as the muscle moment arm. All of these factors must be considered when strength-training programs are designed."

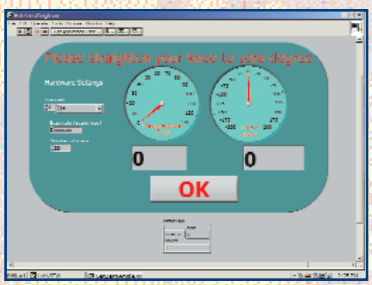
Equipment currently used for strength training in rehabilitation settings ranges from simple devices for exercise such as cuff weights or Theraband (Hygienic Corporation, Akron, OH) to isokinetic dynamometers. "It is difficult to achieve the proper resistance throughout the range of motion with the currently available devices," Sun says. "The ability to vary the amount of resistance throughout the range of motion in an exercise device would greatly improve the efficiency of strength training exercises in healthy individuals and patients and would allow therapists to provide better care to more patients."

This is where smart fluid devices designed by Rudolph and Sun come in. These devices can provide customized, variable resistance exercise for muscle strengthening by allowing the therapist to program the resistance to vary throughout the range of motion. The therapist could program the device to provide less resistance in the weaker ranges of motion and more resistance in the stronger ranges of motion. In addition, the resistance applied to the patient could be programmed appropriately to increase as the subject's strength improved. Devices incorporating the variable resistance ability could be designed to be small and portable for use in the home under the supervision of a home care therapist. Variable resistance mechanical devices can also be used in clinical settings.

The intelligent variable resistance rehabilitation devices are made with magnetorheological (MR) fluid dampers, motion and force sensors, and an electronic controller. The MR fluid is nontoxic and contained within a sealed chamber and is activated with an electromagnet. Sun explains that MR devices have several distinct advantages in rehabilitation applications.

First, a nine-volt battery is sufficient to provide a large range of resistance forces or torques. Second, the low-voltage power supply renders the device safe to operate and makes it very easy to integrate MR devices with electronic controllers. In addition, the motion and force sensors provide signals to a feedback control to deliver the programmed resistance profile for a patient according to the prescription of the therapist. Finally, the exercise time histories, consisting of the motion and force of the patient, are recorded in the controller for clinical analysis and research.

"As the population ages," Sun says, "there will be more and more demand for rehabilitation devices. We're very pleased with this project because it demonstrates how we as mechanical engineers can adapt our specialties in design, manufacturing, dynamics, controls, and so on to other applications such as physical rehabilitation."



Example of a long stroke R linear damper

Multi-functional and variable resistance rehabilitation device.

Laptop (left) and Pocket PC (right) used to input treatment parameters and provide feedback from the VRED

Variable resistance knee brace for muscle strengthening.

Dr. Sun with his research partner Dr. Rudolph (standing left) and their graduate students.

Suresh Advani

If not for an injury that sidelined a faculty colleague, Suresh Advani might have followed his original plan to earn a master's degree in the United States and then return to India to start a business. But teaching was apparently his destiny. "I taught a class in the fall for an instructor who had a broken leg," Advani explains. "At the end of the semester, many of the students came to me with Christmas gifts and told me that I was a born teacher. That was when I changed my mind and decided to go into academia."

Advani's penchant for teaching had actually been demonstrated earlier, but he had ignored the evidence. As an undergraduate at the IIT in India, he had typically stayed in on weekends studying while his four close friends spent the day hiking. "They would come back at dinnertime and say, 'Suresh, can you give us a crash course for tomorrow's exam?' It became part of my routine to spend an hour with them every Sunday night going over the basics. Later on, when I told them my plans to teach at the university level, they said they had known all along that that's what I would do."

His desire to teach brought him to academia, but composite materials brought him to Delaware. His Ph.D. dissertation at the University of Illinois at Urbana-Champaign had focused on fiber orientation during flow in polymer resins. "The University of Delaware was a natural fit for me," says Advani, "with its reputation for excellence in composites manufacturing research."

Since joining UD, Advani has enhanced that reputation with his work in flow modeling and simulation. "When I first came here," he says, "composites manufacturing was a black art. My goal was to try to inject some science into it, enabling the principles of heat and mass transfer to be applied to processing in a scientific way." He has successfully developed models that have been experimentally validated, refined, and then used by industry for simulation in prototype development.

And how does Advani see the present and future of composites? "We've made progress, but the picture is actually better in Europe than it is here in the United States," he says. "A lot of composites work here is for small-volume parts and is DoD-driven. DoD is willing to pay for 10 parts to be created, of which 9 may be rejected. The Europeans are much less tolerant of high costs and waste, so they are much more interested in using cost-saving simulations in their design. Being affiliated with CCM has really facilitated the transfer of this technology to industry."

Advani is more than content with his current research and teaching activities but is glad that he spent a year serving as Interim Chair of the Department several years ago. "I wanted to accomplish something, not just hold the torch," he says, "and I'm pretty proud of what we did with senior design by bringing Nate Cloud in to inject some real engineering into the program. Before that, most of the projects were in-house, and the students weren't getting the experience they needed. Working with industrial sponsors can be a real eye-opener for them."

As chair, Advani also came to see that hiring the right people is critical to an organization's success. "But after doing it for just a year, I realized that I was no longer able to devote the time to my students that they needed. I also wanted to get back to my book."

At home, Advani is exposed to the "softer" side of life through his wife Yolanda, who is an artist. They two have a 14-year-old son, Madhu, and a 7-year-old daughter, Diana. If Advani's predictions are correct, the two may follow in their parents' footsteps. "I can see my son being an engineer," he says, "as he's very interested in robotics. And I think my daughter will be an artist."

Professor Advani discussing with his students the role of resin impregnation in fibers during composites manufacturing

Composites Manufacturing Science

When Suresh Advani joined the ME Department at the University of Delaware after earning his Ph.D. at the University of Illinois at Urbana-Champaign, he had one main goal: to create a manufacturing science base for composites.

"Meeting that goal required a three-part approach," says Advani. "I had to conduct research to create a knowledge base, work with industry to identify the critical gaps in understanding, and package the information in a form that could be transferred to the user community."

Advani began by conducting model experiments using fluid flow and heat transfer principles to understand how flow behaves when fibers or fabrics are involved. Once this was understood, he created process models to mathematically describe the physical process. The next step was to develop a "virtual" process based on those mathematical models as well as simulations to make it easier for users to understand flow behavior in composites.

In the course of conducting this research and developing these tools, Advani graduated 15 Ph.D. students (five of themwhom are in academia accelerating the knowledge base) and 20 master's students. "Most have worked on some aspect of transport phenomena in composites manufacturing processes," he says. "There are many complicated equations and models buried in their theses and dissertations."

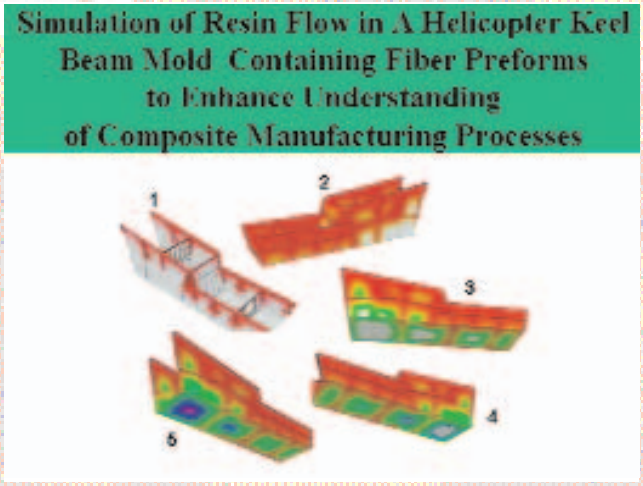
With this significant body of knowledge amassed, Advani decided it was time to document all of it in a book. During his recent sabbatical, he completed Process Modeling in Composites Manufacturing. "For the three years prior to writing the book, I had taught a course, '"Principles of Composites Modeling,'" Advani says. "This was valuable input to the book, as my students provided good feedback on what they understood and what they didn't." That course continues to be offered on-line, enabling the material to reach large numbers of end users.

Advani explains that another way the technology is being transferred is through a simulation program that even high school students can use because of its user-friendly interface. The simulation allows the user to see what happens when resin is injected into a closed mold.

"One of the major issues in composites is automation," Advani says. "There is a lot of variability in the process and materials, so one needs to be able to use all these tools in an intelligent manner to improve quality and repeatability. The steps we're taking toward that are to bring statistical modeling and control algorithms into the process, with sensors for feedback. We haven't totally turned a black art into a science, but we're making good progress toward that end."

Editor's Note: Advani's work in composites manufacturing has been supported by the Office of Naval Research for the past six years.

From Solid Modeling to Simulation of Mold Filling to Automated Control of the Process

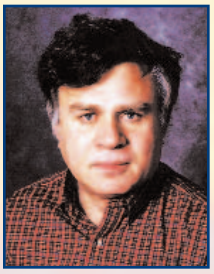


Simulation of resin flow in a helicopter keel beam mold containing fiber preforms to enhance understanding of composite molding processes.

Faculty/Staff Highlights

Faculty

Dr. Leonard Schwartz participated in the Mechanical Engineering Fall Seminar Series on Friday, October 17th. His topic was "Modeling of Thin-Layer Fluid Mechanics: 'I'd Rather Watch the Paint Dry.'"



Dr. Lian Ping Wang participated in the Mechanical Engineering Fall Seminar Series on Friday, November 7th . His topic was "Droplet-Turbulence Interactions in Atmospheric Clouds and Their Implications on the Warm Rain Formation."

Dr. Wojciech Grabowski from Mesoscale and Microscale Meteorology Division (MMM), National Center for Atmospheric Research (NCAR) will give a talk on "Clouds and Climate: Progress and Prospects" on December 1st . (Please contact Dr. L.P.Wang for any additional information

Dr. Suresh Advani is organizing and chairing an International Conference at University of Delaware in July 2004. It is called VIIth International Conference on Flow Processes in Composite Materials The website for it is https://www.ccm.udel.edu/fpcm7. Suresh Advani is chairing a symposium to honor Jack Vinson in July where we will have well-known scientist in Jack's field fly in for a day and talk about his accomplishments and the link between Jack and their contributions. The symposium will be on July 6th, 2004 and there will be a banquet in the evening

Dr. Thomas S. Buchanan was invited to give a keynote presentation on Neuromusculoskeletal Biomechanics to the American College of Sports Medicine. His graduate student, Glenn Williams, won the prestigious Pre-Doctoral Investigator Award from the American Society of Biomechanics. Dr. Williams is now an Assistant Professor at the University of Iowa.

Dr. Anette M. Karlsson organized a symposium at the 2003 ASME International Mechanical Engineering Congress in Washington DC, November 15 - 21, 2003. The symposium was entitled "Damage and Durability Tolerance of Heterogeneous Material Systems" and consisted of more than 30 papers.

Professor Karlsson was also invited to visit the German Aerospace Center (Deutsches Zentrum fur Luft- and Raumfahrt, DLR), Cologne, Germany in December 2003. The purpose of the visit, which was funded by DLR, was to discuss potential research collaborations. Dr. Karlsson gave a talk at the Annual Materials Research Meeting at DLR. The talk was entitled "Thermal fatigue of thermal barrier coatings: Linking materials science to applied mechanics."

Dr. Tsu-Wei Chou, Pierre du Pont Professor of Engineering, made several invited presentations on his nanomaterials research at universities and international conferences, including the following Keynote lectures: 6th Int. Seminar on Experimental Techniques & Design in Composite Materials, Vicenza, Italy 18th Annual Technical Conference, American Society for Composites, Gainesville, FL Airbus Symposium on Nanotechnology, Hamburg, Germany Nano-Macro Mechanics of Materials Conference, Hong Kong, China.

Staff

There is a friendly new face in the Mechanical Engineening Department's main office. Please welcome our new Staff Assistant, **Mrs. Elizabeth (Betty) Bonavita**. Betty comes to us from the UD Department of Nursing, where she has been employed for the past 19 years! In Mechanical Engineering, some of her many responsibilities will include assisting the department as the 'undergraduate coordinator,' working closely with the undergraduate faculty committee on subjects ranging from the organization of the all-important task of student advisement, to the gathering of grade rosters each semester. Betty will also be active in the planning of departmental events, and even helped us prepare this newsletter! If you're in the neighborhood, stop in and say hello.

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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Focus on Students and Undergraduate Education

Gwen Thorson

Anyone who believes that the ME curriculum is too rigorous to leave much time for extracurricular activities should talk to Gwen Thorson. A senior from Crofton, Maryland, Thorson has been involved in the Solar Decathlon, the ASME student chapter, and the Human-Powered Vehicle competition. As if that weren't enough, she was planning an alumni web project as she was negotiating the challenges of Senior Design. Oh, and one more thing—she'll graduate with not only a major in ME but also minors in math and economics.

Thorson knew from the age of seven that she wanted to be an engineer. "I was watching a PBS show on the Underwriters Laboratory and was fascinated with what they were doing to test products," she recalls. "I thought it was so cool to see them throwing baseballs through TV screens and dropping coffeepots on the floor."

It wasn't until she got to UD, though, that she identified mechanical as the branch of engineering she wanted to enter. But her arrival at Delaware was not a surprise—she is the ninth person in her family to attend UD, and others have followed since she enrolled. Her parents are "Double Dels," and her grandfather and several uncles also graduated from UD. Her sister and two cousins are currently students as well.

Thorson is currently the President of the ASME Student Chapter on campus but says that the leadership role she is playing "just kind of happened." As a freshman, she was involved in a study group with about a half dozen other MEs who lived on East Campus. "By the time I was a sophomore, the number had grown to 22, and by my junior year, it was 35. I was the one that organized it—sending out emails about where and when the group was meeting."

As a sophomore, she got involved with the Solar Decathlon project, doing the design work for the "hot water" and "comfort zone" categories. Then she became the unofficial plumber for the house, which had four different water systems. She credits the solar project with preparing her for the reworking and revising required with Senior Design. "Right up to the day we left for Washington, D.C.," she says, "we were changing materials and modifying plans."

In her junior year, Thorson coordinated the activities of the UD team competing in the Human-Powered Vehicle contest. "We plan to do it again this year," she says, "and we may have two entries this time. We had a lot of interest from students after last year's group came back and said how much fun they'd had."

Thorson's Senior Design team is working on a catheter-washing system for Turumo, a supplier of medical products. The catheters have to be cleaned after they come off the assembly line, or the coating that needs to be applied as a finish will not stick. "We've already had to scale down," Thorson says, "but that's what you learn from doing projects like this."

She is also completing a thesis for her Degree with Distinction. That project involves designing an automated water quality monitoring system for shallow-depth estuaries.

Thorson may eventually go to graduate school, but that is not her immediate objective. "I want to get out there and find a job that involves hands-on problem solving," she says. "I don't care where I go, but I'd like to work as a project engineer."

Despite the pressures of being in her last year at the University—with Senior Design, a thesis, and the upcoming HPV project to think about—Thorson wants to accomplish one more thing before she leaves UD. "Our class has been so close," she says, "that I'd like to set up a web site, with the opportunity for every class member to have his or her own page that could be updated over the years."

It's an ambitious idea but one that Alumni Coordinator Nate Cloud fully supports. "I think it's a great idea," he says. "I'd like to see it started and then continued by future classes so that we have a really effective resource for information about alumni."

Mechanical Engineering Seniors Present Design Projects

adapted from UDaily and edited by Nate Cloud

11:42 a.m., Dec. 22, 2003--UD mechanical engineering (ME) seniors mingled with clients as they waited to make their senior design project presentations at Clayton Hall, Friday, Dec. 12.

Faculty advisers Dick J. Wilkins, Michael Keefe and James L. Glancy conferred with their teams, giving them last minute advice as they prepared their presentations. Nate Cloud, sponsor liaison, coordinated administrative activities with project sponsors, who were there to watch students present the final results of their projects. Sponsors were also there to work with student teams to define the details transferring the results of the projects that their companies had defined to ultimately save them money, speed up production, or improve their product offering.

Senior design projects are real-life solutions to business and industry problems that require that graduating mechanical engineering students have learned design and engineering practice, realistic industrial management structure and professionalism in project activities.

Student projects start with meetings with clients to determine their needs. Then, the teams identify the best practices for the desired function, generate design concepts and work with clients to select the best concept.

An essential feature of the course is transforming the design into hardware, according to Wilkins. It involves building and testing prototypes, improving designs and satisfying the customer. There is a possibility the device will be manufactured and used by the client if successful.

This year students worked on projects for the following companies:

■ Air Products and Chemicals Inc.—for a boiler blow-down system that would be cost-effective while bringing the company into compliance with state regulations;

■ Dade Behring—for developing state of the art circuit board inspection processes and measuring equipment;

■ Daimler Chrysler Newark—for a car transport upgrade to increase the life of the carriers that run Dodge Durangos through a phosphate/E-coat system;

■ DuPont Engineering—for a tachometer calibration system for automating the inspection of the paste coating of electrodes on ceramic circuit boards;

■ W.L. Gore—for a system that incorporates a Gore-Tex membrane filter for the cooling of outdoor telecommunication base stations;

■ ILC Dover—for a low-cost functional glove that will sense key finger, thumb and wrist positions using compliant advanced technologies;

■ Northrop Grumman—for a tile insertion tool to insert and extract modules that are assembled in a tile format;

■ Polyseal/Berry Plastics—for a one-piece dispensing closure that it is difficult for a child to open yet simple enough that a senior adult would have no difficulty;

■ Precision Air Convey—for a self-contained unit that accepts small rolls of film that will automatically be stripped from the core via a guillotine knife; and

■ Terumo Medical—for improving the washing operations in tubing used for specialty sheaths making it more efficient and operator friendly.

Article by Barbara Garrison

The Air Products Team following their final project presentation at Clayton Hall. The team's project"Boiler blow-down system" was voted outstanding project by a panel of ASME judges.

Alumni

Reflections and Memories

by John Pursell

edited by Diane Kukich

The engineering student of today would have a hard time imagining a schedule that included classes all day from 8:00 a.m. to 5:00 p.m. with an hour off for lunch—followed by a mandatory study hall from 7:00 to 9:00 p.m. But John Pursell, who completed the Army Specialized Training Program (ASTP) at UD in May 1945, can remember adhering to this schedule. In fact, he still has a copy of the courses he took and the grades he received for them.

According to Pursell, in the early 1940s, the Civil Air Patrol (CAP) offered membership to high school students. "This membership included classes in military discipline, military courtesy, Morse Code, and other subjects," Pursell recalls. "Classes were held once a week in a building on Market Street in Wilmington. Once a male student turned 17, he was offered a chance to take a qualifying exam for the ASTRP, the reserve branch of the ASTP."

"I passed the exam in the summer of 1944 and started my senior year of high school in September," he continues. "Several weeks later, I was ordered to report to the University of Delaware ASTRP Office the first week in December. My high school principal agreed to grant me my high school diploma if I survived the University program until Spring 1945."

Quartered in Harter Hall, Pursell was joined by other new arrivals from New York and New Jersey. He remembers in detail the daily schedule: "Up at 5:30, flag-raising ceremony on the green in front of Harter Hall, back in to bathe and shave, off to breakfast…."

The rigorous schedule was a "tremendous change from the casual days at a small country high school." Pursell and his classmates took algebra and trigonometry, physics, chemistry, composition, U.S. in World Affairs since 1918, military, and physical education, for a total of 22 credit hours. Each term lasted 12 weeks.

All books were supplied for the students, but Pursell remembers buying his first slide rule for $12 at the University bookstore. "I used that slide rule all through my Boeing career until the small calculators first appeared in the 1970s," he says.

The second term included analytic geometry and calculus. "You can see that these classes provided a marvelous foundation for future mechanical engineer," Pursell says.

Despite the adult-like challenges these young students faced, they were all too aware of their relative immaturity. "In the dorm across from Harter Hall was a group of ASTP—that is, regular Army—students, with whom we never associated," Pursell recalls. "It was rumored that they were studying the Japanese language.

When the Army discontinued the program after Germany surrendered in May 1945, Pursell opted to join the Navy's V-5 program. He completed his sophomore year in engineering at the University of Pennsylvania.

"When I returned to Delaware in 1947 for my junior year," Pursell says, "many, if not most, of my fellow ME students were veterans of combat duty. There was an enormous difference in demeanor between the veterans and the students who had arrived directly high school. The veterans were extremely focused on getting an education, aware of how valuable that would be in their futures. Many were married and would not have been able to attend college if not for the G.I. Bill."

George Robert (Bob) Veazey

Biography from Delaware Aviation Hall of Fame Web Site: www.dahf.org

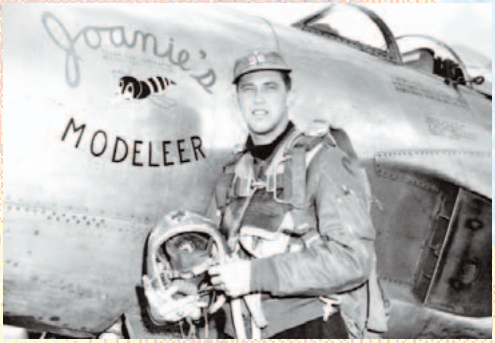
by Nate Cloud

George Robert (Bob) Veazey, Sr. of Wilmington, Del. flew a Lockheed F-80 jetfighter on 72 missions in the Korean War. He was lead pilot on many of them. On his 48th mission, he experienced a flame-out over enemy territory and, because his ejection gear failed, crash-landed on mudflats off Inchon. Unscathed, he was rescued by American helicopter crews. First Lieutenant Veazey earned the Air Medal with two Oak Leaf Clusters.

Back in the United States, Bob served as an instructor until retiring from the Air Force in 1955 to join All American Engineering Company (AAE) at the former DuPont Airfield in Wilmington. As project engineer and product line manager, he led design improvements in runway and carrier arresting gear and development of systems for mid-air retrieval of satellites, helicopter mid-air recovery of drone reconnaissance aircraft, pilot rescue, and unmanned vehicle launch and recovery. Some of his work was conducted at AAE's test site at Georgetown. He retired in 1991.

In retirement, Bob is consultant to Engineered Arresting Systems Corporation (successor to All American), NASA, and other agencies. He has presented numerous papers at technical symposia.

Bob and his wife Joan are the parents of a son, George Robert Jr. of Middletown, Del., and a daughter, Lynn Becraft of Virginia Beach, Va.



DELAWARE AVIATION HALL OF FAME

May 1, 2003

George R. Veazey, Sr.
2524 Kittiwake Drive
Wilmington DE 19805

Dear Mr. Veazey,

It is an honor to inform you that you have been elected to the Delaware Aviation Hall of Fame.

By this action, the Board of Trustees recognizes your value as a 72 mission jet fighter pilot in the Korean conflict and your design and development work on advanced aircraft arresting gear and systems for the retrieval of parachute borne capsules ejected from space vehicles.

Induction will take place at our annual Honors Banquet to be held October 11 at Clayton Hall of the University of Delaware. It would be a pleasure to have you and Mrs. Veazey as our guests, so we ask you to circle that important date on your calendar.

Harry Van Den Heuvel, Administrator of the Delaware Office of Aeronautics and a Trustee of this organization, will be your "telegram," keeping in touch with information and guidance. Meantime, we look forward to sharing an evening of fellowship with you and many of your admirers.

On behalf of the Board of Trustees,

David A. Moffitt
PRESIDENT

CC: Harry Van Den Heuvel

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Alumni Feedback

Stephanie (Simpson) Fagan BME98 is juggling her time between starting a new software business and taking care of Alison Simpson Fagan, born August 15, 2003. Her husband, Peter Fagan BCE97, is working as a mechanical engineer for Lockheed Martin in Baltimore.

Thomas M. Golden BME82 (MBA St. Joseph's University, 1992) is a Senior Validation Engineer, Manufacturing Reliability Group, with Baxter Biosciences, Los Angeles, CA. Mr. Golden has over 20 years experience in the health care, aerospace, nuclear, and shipyard industries. He is trained and certified in current Good Manufacturing Practices (cGMP) for pharmaceutical products. Mr. Golden's responsibility as a Validation Project Manager includes development and execution of IQ, OQ, and PQ protocols as well as development of Standard Operating Procedures (SOP). He also has experience with process validation protocols that were written and used at several major pharmaceutical companies.

Donald L. Flaggs BME73, MMAE78, (Ph.D. Stanford) is a Program Manager at the Lockheed Martin Advanced Technology Center in Palo Alto, CA, where he is involved in a number of aerospace-related modeling and simulation activities. Recently he was a member of the STS-107 Image Analysis Team supporting the Columbia Accident Investigation. He often telecommutes between CA and his 2nd home in Bangkok, Thailand, with his wife Yuki, who is Thai, and their two children.

Justin Schaffer BME99 and his wife Angie welcomed their first baby, Caroline Rose, on December 31, 2003. Justin says: "Actually, it's not nearly as scary as I thought it would be! Sleep has been lacking a little, but hey, what better way to have prepared for late nights than 4 years of Mechanical Engineering classes!" Justin works for Sunair Co. (www.sunair.com) which is an industrial pump distributor just north of Philly. He does application engineering and inside sales, as well as web design, computer upgrades, networking, etc.

Robert C. Bill BME66 (Ph.D. U of Mich 1970) is with the Army Research Laboratory working as Deputy Director of the Vehicle Technology Directorate which is co-located with NASA at the Glenn Research Center in Cleveland, Ohio. He leads a group of about 50 people doing research into advanced energy conversion and power transfer technologies for future air and ground vehicles. He is married and the father of two sons, and he makes his home in Rocky River, Ohio.

Edward D. Western BME65 is now Product Development Manager for Fortafil Fibers, Inc. in Rockwood, TN developing new carbon fiber products for recreational, industrial and military markets. Ed's wife, Virginia (Alexander) Western, HE66, teaches aerobics for the City of Kingston and wishes she could spend more time with grandchildren, Marc, Elise and Isabelle in Greenville, SC where their son, David, manages his computer business, Western Technologies.

Floyd Hasselriis, MSME50 is a Professional Engineer in five states. After serving as a First Engineer in the US Merchant Marine, he taught engineering at The Cooper Union, was chief engineer of American Hydrotherm Corporation, and then moved on to processing of Municipal Solid Waste into energy and power. He is a Member Emeritus and was past Chair of the ASME Solid Waste Processing Division and the ASME Research Committee on

Industrial and Municipal Waste. He was honored by ASME with a Dedicated Service Medal, and recently awarded a special honor as a Pioneer in waste processing. by ASME and IT3.

Stephen M. Di Giacomo, P.E., CEM BME79 lives in the Boston, MA area with his wife, Blanca, of eleven years and their three girls, Olivia, 5, and Julia and Lily, 3-year-old identical twins. Blanca left TJX where she was a buyer to become a full-time mom. Steve is Principal Engineer of a consulting engineering firm that he founded 7 years ago that specializes in energy-related facility issues. He has earned IAQ certification credits at the Harvard School of Public Health and has authored technical papers on CO2 based demand-controlled ventilation (DCV) in both Engineered Systems Magazine and the Journal of Energy Engineering. The Association of Energy Engineers New England Chapter selected Energy Management Associates for their 1999-2000 "Project of the Year" award for "Excellence in Energy Engineering" for work performed at the Harvard School of Public Health. See his web site at http://www.EnergyMgtAssoc.com for more information.

Mike Smoot BME82 lives in Richmond, VA, where he runs a business called Xymid LLC.

Valérie Guénon BME88 has been employed for 16 years at SNECMA, a French aeronautics and space engine and equipment group. She is currently manager of European affairs for the SNECMA group Research and Technology Directorate. She works and lives in Paris, France, with her partner, Philippe, and Ariane, 8, and Emmanuel, 2.

Carl Moore BME74 is a civilian employee of the Army Research Lab, Aberdeen Proving Ground, MD. He lives in North East, MD. He plays viola on a volunteer basis (includes Brandywine Pops orchestra), and has a music web site where he selected, arranged, and transcribed the music himself: http://www.centuria.com/~carl

Krishan Kumar Bhatia BME00 received his master's degree from Penn State this past year and will be continuing on for his PhD. His master's work was on carbon monoxide poisoning of hydrogen fuel cells for vehicle power train applications.

Business Highlights

James Hutchison BME78, MBA81 is CEO of 2 growing consulting groups located in Wilmington, JAED Architects and Engineers and JAED Facilities Solutions (www.jaed.com). JAED Architects and Engineers is a Mid-Atlantic regional design group specializing in building and related systems design in the education, industrial and government markets. JAED Facilities Solutions practices nationwide facilities management consulting and specializes in facility condition assessments, asset surveys, database applications and facility emergency preparedness. JAED Facilities Solutions has recently been retained as the facility condition assessment manager for a statewide property asset management project involving 50 million square feet of government buildings in the State of Illinois. Jim lives in Dover with his wife of 24 years, Karen (U of D Master Voc. Studies), and 2 children, Tyler, 12 and Caroline, 8. Jim is proud that the JAED organization currently employs 6 other U of D Engineering grads!

Stephen M. Di Giacomo, P.E., CEM BME79 is Principal Engineer of a consulting engineering firm that he founded 7 years ago that specializes in energy related facility issues. He has earned IAQ certification credits at the Harvard School of Public Health and has authored technical papers on CO2 based demand controlled ventilation (DCV) in both Engineered Systems Magazine and the Journal of Energy Engineering. The Association of Energy Engineers New England Chapter selected Energy Management Associates for their 1999-2000 "Project of the Year" award for "Excellence in Energy Engineering" for work performed at the Harvard School of Public Health. You can visit his web site at http://www.EnergyMgtAssoc.com for more information.

Tom Embley

Tom Embley (BME87) has fond memories of UDME—well, maybe fond isn't exactly the right word. He actually remembers it as being "like engineering boot camp, with a sink-or-swim atmosphere. It was tough," he says, "but it prepared me well." A local guy who graduated from Salesianum High School, Embley always had engineering "in his blood," but he also gravitated toward business, with a vision to someday own his own company.

For Embley, that vision was realized, and he emphasizes how invaluable the engineering education was in taking that path. "It prepares anyone to tackle any career path," he says, "because of training in problem solving. Senior Design was a highlight—it was the best course for me."

Now CEO of Precision Air Convey (PAC) in Newark, Del., Embley got his start by going to work for a small company partially owned by Jack Billingsley, formerly a DuPont consultant, who was then leading the Senior Design Course at UD. At the time, the company was called Precision Cutters, Inc. PCI had only a few employees, Embley recalls: a salesman, a support person, and Embley himself, who served as Staff Engineer.

"That job really combined my engineering and business interests," he says, "focusing on the quality control issues surrounding vendors and running projects from sales to start up." Although PCI was doing well, Embley was looking for more of a business challenge, so he left in 1995 and started a competing business. In 1999 he merged with PCI, leaving him with 50 percent ownership and operating responsibility for the new company (PAC).

PAC is the "world's leader for trim removal and matrix removal systems," servicing the industries of paper, film and sheet, converting, non-wovens, direct mail, and pressure-sensitive labels. "We emphasize truly understanding our customers and their needs," says Embley. "Our job is to educate our customers on what makes the most sense for their organizations." In spite of the poor economic picture of the past few years, the company has grown to a level of $7 million, with product installations on five continents and three facilities in the United States.

Embley considers PAC a "sales and engineering firm" rather than a fabricator, and his current goal is to grow the company by 25 percent per year. "We will introduced nine new products, and we're working to standardize our offerings as much as possible and to minimize custom work," he says.

Embley and his wife Mary Anne are Double Dels; she is a 1986 graduate of UD's nursing program. With three young children, Embley's life focuses "entirely on business and family at this point."

Development

Director's Message

Over 22,000 students applied for admission to the University of Delaware for the 2003-2004 academic year…Kiplinger has rated the U of D the 12th best value among public institutions of higher education, based on cost and quality…

As an alumnus, these facts make me proud, and grateful for my U of D education. They also remind me of the significant role that private support has had in advancing the University into the ranks of the nation's leading institutions of higher learning. Without private support to supplement the monies received through tuition and the State of Delaware, much of what our students, faculty and community enjoy today would not be possible.

This too is true in the College of Engineering. The support of our alumni and friends provides scholarship funding to attract and assist our students; faculty support to attract and keep top-notch teachers, researchers and mentors; funding to build and maintain state of the art equipment and facilities; and assistance for a multitude of other programs which enrich the quality of our students' education.

I invite you to join your fellow alumni in supporting the College of Engineering and the Mechanical Engineering Department, and know that your gift helps shape the future of the University. One hundred percent of the money you give reaches the college, department or program you designate.

And… the University's Alumni Association is offering a wonderful opportunity to increase your contribution by sponsoring the Alumni Challenge. Through this program, which runs through June 30, 2004, the association is offering to match gifts 1:1 up to $500 from new alumni donors. You designate your gift to any area of the University that you would like, and the match will go to that designation as well, effectively doubling your support!

For information on making a gift to the University, College of Department, or on the Alumni Challenge, please give me a call at (302) 831-8694 or email me at dsmith@udel.edu.

Deirdre Smith '86, '88
Director of Development
College of Engineering

Deirdre Smith with freshman mechanical engineering student Khenya Still at the Women in Engineering reception held at the University during National Engineers Week. Deirdre and Khenya are one of over fifty mentor/mentee pairs participating in the Women in Engineering Mentoring Program initiated this year by the College of Engineering.

When Deirdre Smith (BCE86, MCE88) joined the Engineering Alumni Association Board back in the early 90's, she got an immediate lesson in philanthropy from one of the University's major donors and fellow Board member, Chuck Joanedis (BChE50). "You got your education through the generosity of other people," Joanedis told her. "When you're done, you should give back. Even if it's a small amount, you can make an impact."

Smith took Joanedis's advice to heart, giving back in the form of not only money but also time, through service on the board for several years. But she never thought that someday she would be working with Joanedis from the "other side of the desk"—as Director of Development for the College of Engineering.

After working as an engineer for Duffield Associates in Wilmington for 14 years, Smith found her interest piqued when she heard that the University was searching for someone to fill the development position. "I wasn't even sure about what the job involved," she says, "but this seemed like an interesting opportunity to use my engineering background while also working with fellow alumni, at an institution for which I have very high regard."

Although the University had never hired an engineer for development, Dean of the College of Engineering Eric Kaler liked the idea. "He thought it would be an asset for the director to have a background similar to that of our students and alumni," Smith says.

Smith joined the University in 2003, in the fifth year of Delaware's major capital campaign. Her job now is to keep the momentum going. "The bar has been set very high," she says. "The good side is that the campaign has encouraged people to start giving and they feel good about it. The challenge now is to properly steward that effort and ensure that people continue their support." A major part of that effort is the new College of Engineering electronic newsletter as well as departmental newsletters like ME News. These media enable the College to reach out to a broad spectrum of alumni.

"Alumni who are providing significant support have the view that the education they got here was valuable and that their professors played an important role in that education," Smith says. She herself values the education she received at Delaware. Although her initial interest was in structural engineering, a course taken with Dov Leshchinsky during her junior year caused her to change direction and stay on for a master's in the geotechnical area.

The child of Irish immigrants, Smith grew up in a home where education was prized. "My father always told me I could do anything I wanted to do. He is a true believer that education is the key to a lifetime of opportunities," she says, "and I believe he is right."

Smith's vision for her job is to make philanthropy a part of the culture at UD, similar to the way it is at private schools. "At a public institution like Delaware," she says, "it's a younger concept, so development efforts have a lot of room to grow. I'd like to see alumni support become part of the tradition here. Many people don't realize what an important part of the budget private support is at a state school. We have to do our part in keeping alumni involved and engaged."

Alumni Support

Mechanical Engineering Alumni Donors to the University of Delaware in Fiscal Year 2003 (listed by class date in each gift category); and Other Friends contributing to the Mechanical Engineering Department (no graduation date indicated)

$7,000 to $11,000

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1960's Engineer - Athletes pass halfway mark in Scholarship Project

A group of Engineering graduates, who also were members of the University of Delaware Men's Basketball team in the early 60's, teamed up two years ago to begin contributing toward a scholarship for undergraduates engineers who were also varsity athletes. Since that time the affinity group has begun to solicit contribution help from a short list of "Friends" of 60's basketball, but so far the original small group of eight has raised over half the required minimum of $25,000 to endow a scholarship fund. Significant help has come from the team's Coach Irvin C. Wisniewski. Members of the team are shown (here) celebrating the past and their current effort to establish the scholarship for a future engineer undergrad. If you would like information on the scholarship process please contact: Nate Cloud at cloud@me.udel.edu or 302-778-4567; or Deirdre Smith, Director of Development – Engineering at dsmith@UDel.Edu or 302-831-8694.

ALUMNI FEEDBACK - What's New With You?

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