



Above: Jennifer explains the water filter to school children. Left: Bio-filter users and creators are very pleased.

Capstone Project Takes ME Student To Africa

he desire to make a difference is a strong motivator which has led ME senior Jennifer Miller on her first trip to Africa. The need for potable water is everpresent in this vast country and the aim of Jennifer and her Capstone team members is to design, build, and test a portable biofilter for use by indigenous people such as the Maasai, a nomadic group which travels with their cattle. Without a filtration device, these people and especially their children suffer high mortality due to waterborne diseases. The team also determined to use readily available materials: moringa seeds as a flocculant, and coffee grounds and clay for construction of the filter. The ultimate aim is for the filters to be constructed by Africans, increasing their self-reliance and enhancing their economy.

Jennifer flew to Nairobi, Kenya, to

test the filter, excited not only about the project, but also eager to meet the Maasai people and experience a new country and culture.

Here's Jennifer's report from the field: "We tested the filter yesterday with the Maasai tribe and had phenomenal results, so way to go everyone! I wish you all would have been there to see the excitement on the peoples' faces, it was so rewarding. The people really got involved with the process and jumped right in. They really liked the filter and wanted to drink the water immediately when it came out,...they did not need more tests but wanted to drink it then and there:) The people thought that the filter was something that would be really useful for them and want to use it, which I think is excellent feedback."

The data Jennifer brings back from field tests, and suggestions from the filter users will enable the team to make needed modifications. The bio-filter was on display at the UI's Engineering EXPO on the UI campus April 28.

Further thoughts from Jennifer: "Our client, Eric Morris, traveled to Kenya last February and saw the vast NEED for clean drinking water. It's really exciting to think that a senior design project in Idaho has the possibility to make such a huge impact. I'd like people to know that I really appreciate the support from the ME dept. I've really enjoyed going to school in Idaho, and it's nice to know that the department is behind me and presenting such great opportunities. Lastly my team members (Sam Creason and Nathan **Cropper**) are absolutely fantastic people and engineers. The team as a whole is so motivated it's been a blast working with such ambitious people. Our advisor Don Elger has been a tremendous help as well. He's very inspiring:)"

Jennifer personally paid for much of her trip to Africa and is still needing financial help with her travel. You can contribute to this project by sending donations directly to the ME Development Fund go to: www.sites.uidaho.edu/gifts.



from the Chair

Don Blackketter dblack@uidaho.edu Professor and Chair

Dear Friends,

As you can read, there are many exciting things happening at the UI Mechanical Engineering Department. As a faculty we think this year's seniors are some of the best we have seen and we are all extremely proud of their accomplishments.

From the Chair's perspective we are expanding our Advisory Board and the role they play in helping us continuously improve our program. Thanks to our past and future Board members.

We are preparing for the College of Engineering's Centennial which will occur in 2007 and will be kicked-off at EXPO 2007. As part of this event we will initiate a college and departmental development campaign to raise funds for our proposed Sustainable Energy Laboratory that we hope to build next to the Steam Plant. This building will be a "Green Building to do Green Research" and will house research facilities and ME offices.

Please stop in at the Mechanical Engineering Office if you are on campus. We would love to see you. Best regards,





ME NEWS

ME News is the newsletter of the University of Idaho Mechanical Engineering Department, PO Box 440902, Moscow, ID 83844-0902. Phone (208) 885-6579. Any opinions expressed herein are those of the writers and do not necessarily represent the official position(s) of the university or its Board of Regents.

Editor: Bob Stephens



NIATT Honors ME Graduate Student

athan Bradbury, ME graduate student, was selected Student-of-the-Year by the National Institute for Advanced Transportation Technology on the technical merit of his research, academic performance, professionalism and leadership. Nathan was honored at the annual Council of University Transportation Centers' banquet in January in Washington, DC, along with outstanding students from other University Transportation Centers. He also receives a \$1000 cash award.

The tenth student to be so honored since 1998 when NIATT was selected as a University Transportation Center, Nathan is a first-generation college student who will soon graduate with a Master of Science degree in mechanical engineering. After completing high school in Rathdrum, Idaho, Nathan earned an Associate Degree in Automobile Technology, enrolled at the UI and

began his involvement with the Society of Automotive Engineers Clean Snowmobile Challenge (CSC).

As a member and leader of the UI CSC team, Nathan led efforts to engineer a clean and quiet snowmobile using a four-stroke engine. With that four-stroke platform, the UI team captured first place in both the 2002 and 2003 competitions. A NIATT undergraduate internship the following year assisted him in research and testing of a gasoline/electric hybrid snowmobile. An EPSCoR grant enabled him to research technologies to improve fuel economy and reduce emissions of two-stroke engines. As a graduate student, Nathan is working to produce a turbocharged and direct-injected twostroke engine for use in snowmobile applications.

His technical knowledge, leadership, teaching skills, and high standards have set an excellent example for numerous younger students in engine development.



UI ASME __ students ready for a tour of Seattle manufacturing companies

ASME On The Move

Thirty University of Idaho students visited Seattle-area manufacturing companies in late January as part of an annual American Society of Mechanical Engineers field trip. Facilities toured included Gear Works, Boeing F22 site, Boeing 737 line, and the Museum of Flight.

First stop was The Gear Works in south Seattle where students saw parts in production from 5 inches to 15 feet in diameter. Applications ranged from wind turbines, to drawbridges, to overhead cranes. The gearbox tear-down and reassembly area was particularly interesting.

After lunch on the waterfront, the group drove to the F/A-22 fighter plane site, a secure area where no pictures can be taken. Students were able to see parts of the plane built from the

ground up. The facility incorporates Lean Manufacturing, a Japanese technique which eliminates waste and creates an efficient manufacturing process. The shop was spotless and sparkled like it had just been cleaned with Mr. Clean. A behind-the-scenes look at the composites of the F-22 as well as a peek at prototypes of the 787 aircraft got students excited about the future of aviation. Many techniques used on the F/A-22 could also be seen in commercial aircraft at the Boeing 737 site in Renton.

After a night enjoying the city, Saturday morning was spent visiting the Museum of Flight where our docents, retired Boeing employees and military men who had flown many of the planes in the museum, gave us a wealth of information.

Round 'N About (Facutly Activities)

John Crepeau has received a \$400,000 two-year grant from the Department of Energy's Nuclear Energy Research Initiative for his project, "Enhancements to High Temperature In-pile Thermocouple Measurements." With Idaho National Laboratory collaborator Joy Rempe and two graduate students, the project will develop thermocouples at high temperatures and radiation environments. These thermocouples will be used by major engineering companies throughout the world. Of the 130 proposals submitted, John's was one of the 18 funded.

Steve Penoncello has continued his partnership with Isothermal Systems Research (ISR) in Pullman, WA. Since Steve's sabbatical leave with ISR during the 2004-2005 year, the firm is funding continued research into thermophysical properties of fluids for use in spray cooling applications. Current research work includes the construction of apparatus to collect experimental fluid property data, and the improvement of thermophysical property models using that data.

John Sturgul has worked and lectured in South America many times during his tenure at the U of I, consulting and

presenting short courses for industry in Chile, Brazil, Peru, Venezuela and Argentina. Specializing in mine design using computer simulation and animation models, he assisted in the design of the largest mine of any type in the world, a surface copper mine that produces about 8 million tons per day. (In comparison, a large coal mine in the US might produce 15 million tons in a year.) John plans to return to Chile this summer to participate in designing what will be the largest underground mine in the world. As a result of his extensive work in Chile, John was elected an Honorary Member of the Chilean Institute of Mining Engineers, the only non-Chilean to be so honored.

Steve Beyerlein led two seminars, Cooperative and Problem-Based Teaching Strategies, and Assessment and Evaluation of Learning, as part of a continuing effort to maintain the high level of teaching on campus. These were two in a series of university-wide teaching seminars presented by the Faculty Council Teaching Enhancement Committee and the Vice Provost for Academic Affairs.

Karen Den Braven, professor of mechanical engineering, was named director of the Center for Clean Vehicle Technology in the National Institute for Advanced Transportation Technology. Her work with graduate and undergraduate students over the past five years to develop clean snowmobile technology has helped set standards to establish "Best Available Technology" requirements for snowmobile use in national parks.

Dean Edwards, who recently received a University of Idaho Award for Excellence in Research for 2005-06, reports receipt of \$1 million from the Office of Naval Research (ONR) to continue development of a high-performance lead-acid battery for military vehicles. Presently the project is focused on a battery for military electric vehicles, specifically the hummer. The long-term projection is a high-performance battery for use in any type of military vehicle.

Don Elger and faculty from several other departments are leading three teams of students who are cooperating on their Capstone projects. The student engineering group has designed a portable water filter to be used in the field, specially intended for indigenous people (see article in this Newsletter). Connected with the filter design is the group involved in entrepreneurship; how to set up a viable business. The third component is marketing; getting the product out to potential consumers. Integration and interdisciplinary study are broadening and enhancing the project for the nine students taking part.

During the trip, UI ASME students had an opportunity to meet and visit with a few University of Washington ASME members. A busy weekend of fun and professional practice concluded crossing Snoqualmie Pass after it had just been cleared of an avalanche.

EXPO 2006

The Expo showcase of senior design projects, undergraduate research projects and special studies from all areas of engineering, took place at the UI Student Union Building in April. Featured were exhibits, posters and technical presentations illustrating and demonstrating the projects. The largest event of its type in the Pacific Northwest, Expo draws attendees from throughout the region.

Students are judged on booth and poster design, completeness, and oral presentation. Some projects are now ready for application in industry; others may be passed on to a new team for further experimentation and/or refinement next year.

The projects are as varied as the students themselves, and reflect their areas of interest and expertise. Here is a sampling of the exhibits:

Team, Project and Sponsor

Clearwater: Portable Biofilter (related story on page 1) — *Eric Morris*Isocool: Spray Coolant Test Equipment — *Isothermal Research Systems*Distributed MegaWatts: Infrared Paper Dryer — *Potlatch Corporation*NASA V Team: Venus Descent Probe — *NASA*

Team Random: Neural Forearm Simulator
— Terry Soule

WY-TEL FSAE Wireless Telemetry Systems
— UI Engineering and local sponsors
Air-Haul: Optimization of Small Aircraft
Tug — Dan Holmes

EXPO 2006 demonstrated the following:

 Multi-disciplinary, multi-college projects are at an all time high.
 Teamwork rather than the individual approach is the norm. A prime example is the water-filter project, which includes students from a variety of disciplines.

- Expo continues to be a recruitment outreach for students and parents interested in seeing what the UI College of Engineering has to offer.
- Industry is hungry for UI College of Engineering students due to our reputation for quality engineering graduates.
- The Idaho Research Foundation continues to support engineering design Expo projects.

EXPO 2007 will be on Friday, April 27.

ME Outstanding Seniors 2006

Chosen by the ME faculty for such qualities as diligence and dedication in and out of class or lab, involvement in non-class engineering activities, and willingness to help others—classmates, professors, staff—are Jake Leachman from Lewiston, ID; Michael Maughan from Spokane, WA; and Kathryn McDonald from Fruitland, ID.

UI Clean Snowmoblie Challenge Team Survives Blizzard and Competition

Even two feet of snow and winds over fifty miles per hour couldn't stop the UI Clean Snowmobile. The University of Idaho Clean Snowmobile Competition team, composed of Mechanical Engineering students and captains Justin Johnson and Erik Van Patten, survived to place tenth in their sixth year at the competition, held at the Keweenaw Research Center near Houghton, in the Upper Peninsula of Michigan.

The team returned to the competition this year with their direct-injected two-stroke engine, which reduces pollution emissions and improves fuel economy, but retains the power of a stock two-stroke. With direct injection (DI), a precise amount of fuel is added to the cylinder at the optimum time for complete mixing and combustion. The students had designed and fabricated their own engine head, adding E-TEC injectors used

on Evinrude outboard engines. They also added a battery-less starting system, which develops enough current in one pull of the start rope to run the engine.

This year's sled was one of only eight to complete the 100 mile fuel economy run, which started just as the blizzard was ending. The team also placed first in the oral presentation and static display, and second in cost and written paper competitions. The UI DI was again the lightest snowmobile in the competition, weighing 615 pounds with a full tank of fuel.

More information on the competition is available at: www.sae.org/students/snow. htm.



ME freshman Drew Kirsch guides the UI's two-stroke direct-injected machine through the course.

Keep in touch! We want to hear from you!

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