

UI FutureTruck Team takes a break to pose at the FutureTruck Competition, summer 2004.

# FutureTruck 2004 Takes Highest Position Yet

The UI FutureTruck entry placed sixth in a field of 15 at the FutureTruck Competition in June, 2004. This is the best that the UI team has ever placed. Some highlights of the UI team and vehicle include:

- 67 students campuswide were members of this year's team.
   Participation included business, computer science, environmental science, art and architecture, and engineering majors.
- The team partnered with local businesses to build the

- vehicles; donations included more than \$50,000 worth of materials, supplies and professional assistance; Hall-Copeland Ford in Lewiston donated the use of a Ford Excursion for travel to Michigan for the competition.
- During the year, the team displayed the vehicle at Eastside Car Show, Vandal Friday, Troy High School, Women in Engineering Day, Earth Week and the ASUI hybrid vehicle show in Boise.

At the FutureTruck competition, the UI vehicle was unique; it was the only mild hybrid, meaning the engine provides primary power and the hybrid system assists by reducing the load on the engine. Like a full hybrid, a mild hybrid improves fuel economy and reduces tailpipe emissions but at a much lower capital cost. For example, the UI mild

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Words from the Chair

Ralph S. Budwig Professor and Chair

reetings to the alumni and friends of the Mechanical Engineering Department. I am pleased to write to you on behalf of the faculty, staff and students of the department.

The following charts deliver a clear message - the UI Mechanical Engineering program is indeed thriving. Our undergraduate enrollment has surpassed the level of 400 students and our externally sponsored expenditures now exceed \$2 million per year. These external funds, beyond our state budget, have been raised by M.E. faculty to support research and design projects that are a crucial part of the education of our undergraduate and graduate students. In addition, these externally funded projects are the primary activities that allow our faculty to stay current and in touch with their colleagues around the nation.

I am proud to report the program growth to you – but I also must let you know that the budget reduction process at UI continues. For some years, UI has evidently lived beyond its means. To rectify the accumulated deficit, an internal budget reduction process called the Multi-Year Plan has been instituted. These multiple rounds of budget cuts have taken their toll on the department.



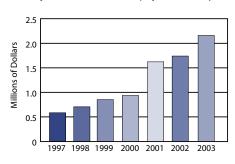
### **ME NEWS**

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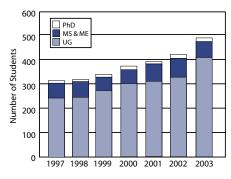
Editor: Bob Stephens



#### **Expenditures on Externally Sponsored Projects**



#### **Mechanical Engineering Enrollment Trends**



In 2003, Professor Ron Smelser resigned from the department to accept an associate dean position at UNC Charlotte and Associate Professor Tony Anderson resigned to accept a position with Orbital Sciences Corporation in Arizona. Both of their positions were frozen in order to meet future budget reduction targets of the Multi-Year Plan. This recent loss of mechanical engineering faculty follows the loss of two other positions in 2001 and 2002 that were used to meet a permanent state budget reduction. In January 2004, the faculty met for a two-day planning retreat in order to reaffirm our values and to develop a plan to move forward even in the midst of these significant losses of faculty. During the planning retreat, it quickly became clear that our principal value is to be a program that develops

**high quality and successful graduates.** We then brainstormed and prioritized a list of action items that support this principal value.

In addition to the planning retreat, which promoted a clear departmental vision and plan, the department now benefits from the support and counsel of an external advisory board. It is with great pleasure that I announce to you the charter members of the Mechanical Engineering Advisory Board.

**Mechanical Engineering Advisory Board Members: Robert Carson,** consultant for UI, Moscow, Idaho; Timothy Crawford, Xerox, Wilsonville, Oregon; David Damiano, Idaho Tech Help, Post Falls, Idaho; Jeffrey Daniels, U.S. Navy, Bayview, Idaho; Michele Friesen, Hewlett-Packard, Corvallis, Oregon; Howard Hooper, Hewlett-Packard, Boise, Idaho; Ronald King, Argonne National Lab, Idaho Falls, Idaho; Chris Manning, Manning Applied Technology, Troy, Idaho; Linda Morris, UI vice provost for Academic Affairs, Moscow, Idaho; Michael Ward, Autoliv North America, Ogden, Utah

The advisory board has met twice, once in May 2003 and once in May 2004. They are assisting the department in several ways: the periodic review of the Mechanical Engineering program, obtaining funding to support departmental priorities, improving relationships with the department's constituents, and advocating for the department. Please see the letter from the advisory board in this newsletter for additional information.

In July 2004, we welcomed Professor John Sturgul to the department. John originally joined UI in 1992 as a professor of Mining Engineering. He is an international leader in the area of simulation and animation of large operations and systems. John will be teaching a new mechanical engineering technical elective course on simulation and animation this fall. Please see the faculty activities section in this newsletter for news on other mechanical engineering faculty.

I welcome you to stop by for a visit, to give me a call, or to send an e-mail.

Ralph S. Budwig Professor and Chair rbudwig@uidaho.edu SAE Formula Car Design Uses All ME Skills

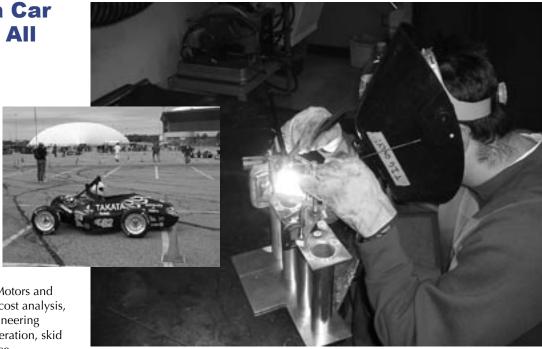
For the fifth year in a row, the University of Idaho has competed in the Formula SAE Competition where the engineering students must design, construct, test and race an open-wheeled race car. 140 university teams compete annually in May at the Pontiac Silverdome in Detroit, Mich. hosted by

Daimler-Chrysler, General Motors and Ford. Judging areas include cost analysis, marketing presentation, engineering design, fuel economy, acceleration, skid pad, autocross and endurance.

Each year, undergraduate and graduate students participate by racing a new car. The 2003-2004 team finished 21st in design — best ever for a UI team. They earned five first place trophies and two second place trophies over the past year in other local contests. The team also won a booth award at the 2004 University of Idaho Design Expo.

Students begin the year on one of three teams: drive train, frame or suspension. The drive train consists of a 600cc-motorcycle engine with students designing the fuel injection, cooling, intake, exhaust and differential systems. The suspension team designs a four-wheel, independent, double A-arm suspension, a steering system and a brake system. The frame team is responsible for a rigid space frame chassis, an ergonomic cockpit, driver controls and a fiberglass body.

The next stage requires the students to fabricate all necessary parts in the Mechanical Engineering Machine Shop



From manufacturing (right) to racing (left), the SAE Formula Car offers a range of ME challenges.

using various CNC and manual mills and lathes, as well as TIG welding the entire frame and suspension. Finally, the students test the vehicle, tune the shocks, suspension, engine and cockpit controls.

# Design highlights for the 2003-2004 vehicle include:

- An Audi Quattro differential repackaged into a lighter aluminum housing,
- A custom computer controlled fuel and spark system,
- A frame design based upon a series of tetrahedrons for superior torsional rigidity,
- A custom exhaust system tuned to work with the intake system for maximum torque across a wide range of RPM.

## Key design changes for the 2004-2005 vehicle include:

- Eliminating the chain drive system, using a custom gear drive system in its place,
- A dual plenum, dual runner length custom intake — a first of its kind for the Formula SAE competition,
- · An electronic traction control system,
- A revolutionary drive system that reduces the number of components in the drive train, that drastically reduces weight and increases efficiency

   another first for the competition.

The final result is a vehicle weighing less than 500 pounds that will outperform a Porsche 911 from 0-60 mph and pull more lateral g's on a 50 foot diameter skid-pad. We will keep you informed regarding the success of this year's team.

#### Continued from page 1 • Future Truck

hybrid Explorer conversion (FutureTruck 2002-04) cost less than 20 percent of the full hybrid Suburban conversion (FutureTruck 2000-02). Honda utilizes this concept in their hybrid vehicles.

Changes to the vehicle included a different engine, a rebuilt transmission, a custom transfer case (ME capstone project), a new electric power assist system (EE capstone project), a new

cooling system (ME capstone project), and a new control program. With the help of local businesses, a part of the team also built a hydraulic hybrid vehicle. The plan was to use this F350 to trailer the competition vehicle to Michigan. However, with escalating fuel prices right before competition and the offer by organizers to transport our vehicle to the competition at their expense, the team left the F350 at home.

Plans for this year (2004-2005) include continued work on both vehicles with the intention of transferring the technology to other types of vehicles such as refuse trucks and tractor-trailers. Like previous years, this will include members of the Advanced Vehicle Concepts Team (AVCT), senior project teams, and graduate students. Full results are described and posted at futuretruck.org.

### Round n' About — Faculty Activities For Fall 2004

Mike Anderson, professor, continues to teach the ME430 Senior Laboratory course, and also teaches ENGR220 Dynamics and ME413/513 Acoustics. His research activities include the development of ways to use ultrasonic waves in air to concentrate airborne particles. He gave an invited talk at the World Congress on Ultrasonics in Paris, France in September 2003 on this subject. This project now takes the form of a technology spin-off with Manning Applied Technologies, a local high-tech firm. Mike also participates with Dean Edwards in the Center for Intelligent Systems Research (CISR). Currently, Mike is working to develop underwater acoustic sensors and signal processing techniques to help autonomous underwater vehicles "swim" in formation.

Steve Beyerlein, professor, is now the faculty adviser for the student ASME section. Over the course of the last academic year, he's enjoyed traveling with them on trips to Lewiston, Spokane, Seattle, and Bellingham as well as the regional student conference where they placed exceptionally well. Dr. Beyerlein maintains a strong interest in educational research and faculty development, being heavily involved in the NSF sponsored Enriched Learning Environment project, the Transferable Integrated Design Engineering Education (TIDEE) consortium, and the Pacific Northwest section of the American Society for Engineering Education. Steve continues to collaborate with Judi Steciak and Automotive Resources in Sandpoint, Idaho, on development and testing of catalytic engine technology.

Don Blackketter, professor, returned from his sabbatical and resumed his duties in the department and as director of the Clean Vehicle Center. In January, he became the interim director of NIATT, the National Institute for Advanced Transportation Technology. He will return full time to the ME Department in January 2005. He currently has five graduate students in the areas of vehicle safety and hybrid vehicle technology.

Ralph Budwig, professor and chair, has re-started teaching the departmental junior level Experimental Methods for Engineers course after a four-year break. He continues to enjoy mentoring undergraduate and graduate students on several research projects, including ongoing work on using ultrasound to

separate particles from air flow streams, and an upcoming project on the design of a subsoil application system for granular polyacrylamide. Dr. Budwig is the chair of the UI 2005 Engineering Design Expo. The Expo, to be held on April 29, 2005, is the Northwest's premier engineering exposition.

John Crepeau, associate professor, has been doing research in the area of solidification of materials with internal heat generation. This work is applicable to nuclear energy and waste treatment, and this year he presented this work at the 12th International Conference on Nuclear Engineering in Washington D.C. He also has been doing work in porous media flows in geocentrifuges. This past summer, he served as the UI representative on the University of Chicago-led team bidding on the contract for operations of the Idaho National Laboratory.

Karen Den Braven, professor, continues to be faculty adviser of the UI Clean Snowmobile Team, which in March 2003 won the Society of Automotive Engineers Clean Snowmobile Challenge for the second year in a row (see related stories). Karen also is involved in developing cleaner two-stroke engines for use in recreational vehicles such as snowmobiles. She was named a Fellow of the American Society of Mechanical Engineers in February 2003, and also is a member of the ASME Energy Resources Board. Her research involves developing advanced and alternatively-powered snowmobiles for use in pristine areas.

Dean Edwards, professor, who is co-director of the Center for Intelligent Systems Research (CISR), continues to excel in procuring research funding. Dean's research group was awarded \$1.2 million for an additional year of funding from the Office of Naval Research (ONR) to investigate advanced controls and communications for miniature antonomous vehicles. ONR also has awarded CISR \$1 million to develop advanced batteries for military hybrid electric vehicles.

Don Elger, professor, was awarded a National Science Foundation funded project that is focused on creating enriched learning experiences for undergraduate students. This collaboration also includes colleagues from the colleges of Education and Business and Economics. Some of the exciting activities include: Mindworks — a learning environment

that is being designed to promote creative thinking, Peer-Mentors Community
— a community of students who serve as leaders and peer-mentors in classes such as freshman design, sophomore design and engineering fluid mechanics, Scholars Community — a community of faculty members who are collaborating to improving learning in many contexts, and Enterprise Program — creating an interdisciplinary curriculum that unites business and engineering students and faculty so that students gain genuine experiences in cross-functional teaming.

Fred Gunnerson, professor of Mechanical Engineering, has been assigned, on loan, to the Idaho National Engineering an Environmental Laboratory (INEEL) since 1999. He continues to serve as director of Energy Efficiency and Technology for the INEEL where he directs R&D programs in fossil fuels, hydrogen, renewable energies, sustainable design, transportation and materials. Every other year, he teaches a class in Turbomachinery for the College of Engineering.

Clark Lemmon, professor, recently developed a new curriculum course, ME225 Introduction to Machine Design. This class introduces students to two- and three-dimensional concepts, drawing processes, dimensioning, threads and fasteners, as well as tolerances. Clark continues to teach computer aided design and finite elements.

Edwin Odom, professor, works in the area of optimum design and recently sent three graduate students to the Op-Tech 04 conference in Colorado as well as one graduate student and himself to the UTS gear school in Illinois. As time permits, he stills follows his interest in experimental mechanics and the design of test fixtures. He continues to work on improving the graduate student experience through the Idaho Engineering Works and works with our machine shop to provide support for senior design as well as other faculty member's research needs.

**Steve Penoncello**, professor, is on sabbatical leave for fiscal year 2005. During his sabbatical, he will be working with Isothermal Systems Research (ISR) in Clarkston, Washington. ISR is involved in developing spray cooling technologies for application in the cooling of electronic components. Steve's work with ISR will include the development of a thermophysical property package that will

interface with ISR's computational fluid dynamics (CFD) spray cooling models. The property package will allow ISR to investigate the impact of different fluids or fluid mixtures in their spray cooling technologies.

Karl Rink, assistant professor, completed work on a new Explosion Dynamics Laboratory in spring 2004. In this laboratory, advanced data acquisition equipment is coupled with unique test fixtures to study the ballistic characteristics of electro-explosive devices (EED's) such as those used in automotive airbags, ejection seats, and propellant actuated devices. This laboratory complements another recently completed laboratory developed to study the hermetic behavior of EED components. In summer 2004, Karl was named a member of the American Institute of Aeronautics and Astronautics (AIAA) Energetic Components and Systems Technical Committee.

Larry Stauffer, professor, and his graduate students continue to conduct research with industry to help them improve their design and production processes and also engage in manufacturing extension activities through TechHelp. Most projects this past year were in the areas of lean manufacturing and design for manufacture and assembly. Larry has been helping the manufacturing program develop new laboratories. One of them, The Lean Six-Sigma Laboratory, will give students an opportunity to learn about lean and six sigma principles in a controlled, hands-on environment. It features a 12-foot raceway of Bosch conveyor that moves pallets through workstations, such as a pick-and-place machine, where students can learn to improve change-over times, conduct statistically designed experiments, collect data for discrete-event simulations and more.

John Sturgul, professor, was on sabbatical spring 2004. He spent some time at the University of Nevada-Reno, then took off for his real adventures. John visited Imperial College at the University of London and worked on a project to simulate a proposed underground pipe line for Alaskan oil. He then went to the University of Dar Es Salaam in Tanzania, East Africa, where he helped set up a program to train mining engineers.

Bob Stephens, associate professor, continues to teach the introductory ME design class, and also mechanics and failure. He is currently involved in a research project investigating the fatigue behavior of military landing gear materials. He has traveled to Salt Lake City numerous times this past year to meet with personnel at Hill Air Force Base regarding his research. He also was awarded a research grant to investigate the effects of deicing and anti-icing chemicals on the corrosion behavior of materials used in the trucking industry. Bob continues to be active in department recruitment and retention activities.

Judy Steciak, associate professor, continues to collaborate with other ME NIATT researchers and recently received an NSF grant for equipment that will be placed in the nearly-completed energy laboratories in the Idaho Water Center in Boise. She also collaborated with Boise State University material science faculty on a project to build meso-scale environmental sensors, combustors and thrusters. Judy continues to teach at a distance via the compressed video system.



### Student Mentors Enrich ME Design Classes

Student mentors are now improving the education in freshman, sophomore and junior level ME design classes. These talented undergraduate mentors provide individualized help for the students. They also reinforce a higher level of challenge and achievement within the class. The mentors provide "available" help when the class size is large and extend the professor's effectiveness.

Each mentor is a member of the "mentoring community." The community meets each week for both training and social contact. The mentors are trained in a variety of professional skills as well as mentoring. The training itself is a guided research process as part of a grant from the National Science Foundation.

Each mentor brings to the community their own individual strengths. However, one thing the mentors have in common is the joy of engineering. This internal drive motivates them to serve in the program. The mentors are compensated with one credit for each class mentored. Three credits accumulated amount to the equivalent of a ME technical elective.

The future of our mentors and mentoring program is bright. Not only are we increasing the quality of education for the design students, but the mentors also gain experiences useful for work in industry. This is truly a win-win situation.

# **ME Offers Record Number of Scholarships**

For the academic year beginning fall 2004, the Mechanical Engineering Department awarded more than \$75,000 in scholarships to nearly 90 students, both ME records! That means that more than one in five undergraduate students received a scholarship. Scholarship awards range from \$500-\$3,500, based on academic performance, need and selection. A large portion of these scholarships is derived from donations made to the ME Development Fund by you, our special alumni. Thanks for all your support! ⑤



It's all "Thumbs Up" for the UI Snowmobile Team, along with faculty advisor Karen Den Braven (far right), as the team wins for the second year in a row.

### **UI Snowmobile Wins Two in a Row**

The UI Snowmobile Team won their second straight SAE Clean Snowmobile Challenge March 25, 2003. In 2002, Idaho split top honors with Kettering University, as the two engineering teams finished within two points of each other. In 2003, Idaho was all by itself, finishing comfortably ahead of host team and second-place finisher Michigan Technological University (MTU). Idaho won five of 11 category awards overall during the four-day event. A dozen teams of student engineers and their snow machines from across the U.S. and Canada converged on MTU with the goal of reducing emissions and noise while maintaining or improving snowmobile performance.

Idaho swept the three major components of the Clean Snowmobile Challenge — emissions, noise and fuel economy, while performing relatively well in the performance categories: Handling (second), braking (fifth), and acceleration (sixth). Idaho's faculty adviser, Karen Den Braven, said her championship team never stopped trying. "They're hardworking, dedicated, and they're really learning how to do engineering," she said. "After each competition, they ask what needs to be improved, and they work on it."

# A Repeat Victory in the "Clean Snowmobile Challenge" gives UI Team reason for Change

After back-to-back victories in 2002 and 2003 (see related story), the UI team decided to begin the development of a clean two-stroke snowmobile rather than again compete with the championship four-stroke for the Clean Snowmobile Competition in 2004. While standard two-stroke engines are very fuel inefficient, they have a simple mechanical design compared to their four-stroke counterparts, and a much better power to weight ratio.

The team decided to design and build a gasoline direct-injection (GDI) two-stroke engine to decrease exhaust emissions and improve fuel economy without reducing the power output of the engine. Two exhaust silencers were used to reduce exhaust noise and using sound absorbing materials and a sealed hood targeted reduction of underhood noise.

While the initial prototype engine was ready in time for the competition, it did not place. With support from snowmobile and engine manufacturers, the second generation of the UI direct injection two-stoke is under construction. The UI Clean Snowmobile Team intends to resume its winning ways in 2005.



"Lighting Fast" poses prior to the Region VIII Micro Baja Competition in spring 2004.

## Micro Baja 2004: The Race to the Finish

The ASME Micro Baja Team from the University of Idaho worked exceptionally hard last year to create a competitive remote-controlled (RC) car

New designs and innovative steps were taken to create the best and most effective car that could hold up to the rigorous field tests. The ideal Micro Baja car needed to be lightweight, durable, fast, and manufacturable. With unique components, the RC car, named UI5LF—the fifth car in the UI series dubbed Lightning Fast, was a light, four-pound car that set new speeds during testing at the Region VIII Student Conference (RSC) in Pocatello in spring 2004. The competition not only tested the car's performance, but the team's research, designing, presenting, modeling and driving.

The team prepared for the competition by combining information into a specification manual, which they handed out at the competition. All year long, the Micro Baja team was given opportunities to speak to professors and students in various UI engineering classes as well as representatives from industry. All preparation culminated into one weekend, the RSC.

There were four categories in the annual competition: presentation, acceleration, slalom and the racetrack. UI placed in the top two in each category, and came away the overall winner.

The competition concluded with a victory dance by the UI5LF and team members who gladly accepted the newly created trophy. The UI Micro Baja team takes great pride in their work and will continue to strive for excellence as they plan for the coming year's competition.



Graduate students working with Dean Edwards display their underwater test platform for autonomous vehicle research at the Bayview, Idaho research facility.

### CISR Hits the Jackpot with Two Major Research Contracts

In just a few short years, Dean Edwards, professor in ME, has turned the Center for Intelligent Systems Research (CISR) into a major money winner. In the last two years, the center has brought in more than \$3.2 million worth of research in the areas of advanced lead acid battery development and autonomous vehicle research.

The primary goal of one of the Office of Naval Research (ONR) grants is to develop an advanced lead acid battery that overcomes the present lead acid battery shortcomings for military vehicles. These vehicles include hybrid electric vehicles (HEV's) and underwater vehicles.

More specifically, Dean and his research students will develop and tests cells, modules, as well as complete battery packs of advanced sealed lead acid batteries. They will be investigating the fundamental physical processes that limit the performance and life of these batteries and then develop and assemble components for an advanced powertrain and then will test their batteries in a complete drive system.

Military applications will include joint tactical electric vehicles such as off-road, Humvee-type vehicles as well as underwater vehicles such as small submersibles and miniature autonomous vehicles.

Another major ONR grant is associated with autonomous vehicle research, which extends Dean's "self-guiding log skidder" research from a few years ago. Autonomous vehicle research has direct applications in foresty applications, NASA Mars missions and underwater vehicles such as mini-sub and Crawler fleets.

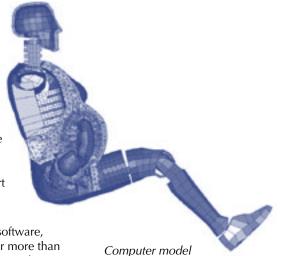
# Former UI ME Student Makes World News Headlines with Virtual Crash-Test Dummy

The Fall 2002 edition of the ME News included a brief write-up of Laura Thackray, UI BSME 1999, who was featured in an article in Automotive News, September 2002. Recently, Laura and her work as a mechanical engineer at Volvo has been featured in articles worldwide including the Wall Street Journal (Monday June 7, 2004).

Much of the foundation of Laura's work was laid in 2000 when she did a directed study with Don Blackketter, professor of ME, that was an analytical model of a pregnant woman. Laura and Don published a paper together in 2002 entitled "Three-Point Seatbelt Maternal Comfort and Fetal Safety." According to Don, she used this paper to get into graduate school in Sweden and then a job at Volvo.

In 2001, Laura began building the virtual dummy. With modeling software, the dummy can be scaled to any body size and stage of pregnancy. For more than two years, Laura has been simulating crashes with the dummy, named "Linda." In the model, a three-dimensional pregnant driver hurtles toward a brick wall or an oncoming vehicle. She slams on the brakes and the fetus jerks in her belly. The end result could be the fetus possibly separating from the placenta, an outcome that can cause the fetus to lose its source of nourishment, risking brain damage or death. While "Linda" is still a work in progress, the goal is to make it as human-like as possible to accurately predict the risk of injury.

The ME Department is exceptionally proud of Laura's accomplishments as a mechanical engineer and we wish her and all UI ME alum's good fortunes in their engineering endeavors.



of world's first virtual pregnant crash-test dummy, "Linda."

### ME Advisory Board Members Ask for Your Help

By Chris Manning, Manning Applied Technology

am honored to serve on the Mechanical Engineering Advisory Board. My company, Manning Applied Technology, is fortunate to have employed, over the past eight years, 11 mechanical engineering students and recent graduates from the University of Idaho. Their efforts have enabled Manning Applied Technology to win well over \$1 million of research and development funding. We appreciate the efforts of the Mechanical Engineering faculty and staff in producing these quality graduates.

The advisory board provides a vehicle for our company to invest in the Mechanical Engineering Department and quality future graduates. The advisory board recognizes that the Capstone Senior Design program provides a critical element of engineering education. We invite you to attend the next Engineering Design Expo on April 29, 2005, where

senior design projects from the entire College of Engineering will be on display. In May 2005, the advisory board will again meet and will review the program curriculum. The advisory board also is endeavoring to assist in the acquisition of equipment and in other areas.

The Mechanical Engineering Department and the University of Idaho are facing difficult times, now and in the years ahead. Enrollment continues to increase, while funding has been reduced for a number of reasons. This, in spite of an increase in the Idaho state sales tax that has helped protect education. In most organizations, the choice would be simple; scale back operations. Unfortunately, if the Mechanical Engineering program is reduced, there will be fewer opportunities for Idaho students to further their educations. The M.E. Department has been highly successful in providing Idaho students with a stepping stone to valuable careers. It would be unfortunate to reduce the opportunities for future students.

Another section of this newsletter (on page 11) contains an appeal to alumni for donations to strengthen the

Department at this critical time. The intent is to seek donations that augment, rather than replace, state funds. For example, donations are sought to purchase rapid prototyping equipment for seniors to use on their Capstone Design projects. Students benefit greatly from Capstone Design projects that are sponsored by regional companies and government labs. Please contact Professor Steve Beyerlein at sbeyer@uidaho.edu or at 208-885-4932 to inquire about sponsoring a project.

Donations from M.E. alumni will boost the morale of faculty, staff and students. The donated funds will allow the purchase of critical items to enhance student learning. There are more than 2,000 mechanical engineering alumni. A modest donation from each or even from most of the alumni will be very helpful at this critical time. On behalf of the Mechanical Engineering Advisory Board, I encourage each of you to support the department through donations to the Mechanical Engineering Development Fund. Details on where to send donations are provided on page 11 of this newsletter, or feel free to call 208-885-6579 if you need assistance.

# Engineers Outside the Classroom — ASME members keep busy

By Jessica Sampson, UI ASME student section vice president

Watching a Boeing 777 assembled in seven minutes isn't as awe-inspiring as seeing the parts in person. After a short, fast-forwarded version of the three-to-14 day production line for the jet airplane, 26 University of Idaho students toured the largest building, by volume, in the world; the Boeing-Everett facility.

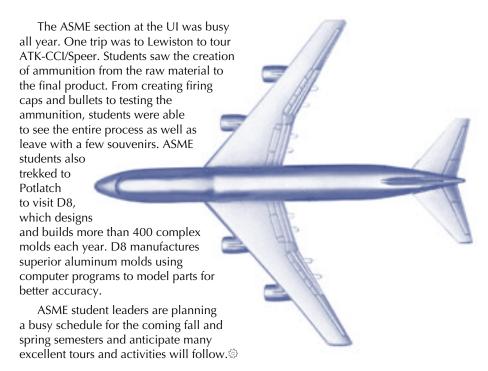
The ASME student section at the UI planned a jam-packed weekend last spring for mechanical engineering students. Boeing representatives gave the students a presentation on their new project, the Boeing 7E7, which is being created solely on computer. The tables then turned as representatives from major UI student project groups gave presentations as a snapshot of what the UI students are involved in. UI project presentations included the Micro Baja Team, Future Truck 2004, SAE Formula One car, and SAE Clean Snowmobile. A review of the Senior Capstone Design concept also was presented.

After leaving Boeing, the UI students traveled up to Bellingham, Wash. to meet Western Washington University engineering students. The WWU students showed off their machine shop and the projects that they were working on.

As a continuation of the impressive weekend, the next day was a stop at Kenworth-Paccar Technical Center. Who knew that semi trucks went through such rigorous testing? There were areas for cold and heat treatments as well as real time road tests. The site has its own test course that includes loose gravel, acid baths, water-damaged roads, hills and more. This strenuous testing can simulate, in two weeks, a part's life of over one million miles on the road. Once this tour was completed, the students returned to Moscow, with 10 hours of driving and a new appreciation for applied engineering.



UI ASME members take a break at the Kenworth-Paccar Technical Center after a long weekend of tours and technical presentations.



### Senior Capstone Design Class Attracts Top Industrial Sponsors





Team Aeroflex (Boeing) explain their "Pick and Place" mechanism to a curious student at the 2004 Design Expo. Snowmobiles and other design projects fill the platform outside the SUB at the 2004 Expo.

apstone Design, ME's year-long senior design sequence, continues to provide an arena for a transition from engineering coursework to engineering practice. A successful component of the class is the collaboration between industry and the university, where the industrial partner shows a vested interest in the project and is willing to invest time in working with the students. The projects typically require little or no research, meaning they involve existing technology. Benefits to the sponsor include interacting with students and faculty with expertise in the sponsors' field. In many instances, the sponsors are able to observe potential student hires that could help meet future recruitment needs. Donations for the projects are tax-deductible donations, and in the end, the sponsors receive a set of drawings, a technical report and a working prototype produced by the student design team.

Projects are typically identified, scoped and budgeted before the beginning of the fall semester. Funds are required to support travel to the company by all team members, instructor and mentor for a kickoff customer interview and for progress reports throughout the year. Funds also are needed for all raw materials, purchased components and consumables associated with class presentations. Most projects require a budget between \$3,000 -\$5,000. Given that most projects require an average of 1,000 person hours of effort over an eight month period to complete, the return for the sponsors is exceptional some simple math shows labor for engineering at about \$4 an hour!

### **Expo Sponsors and Projects**

This is a list of last year's sponsors and the corresponding design project. If you or your company have an interest in sponsoring a capstone design project, please visit the senior capstone design Web site, http://seniordesign.engr.uidaho. edu, click on sponsorships for a more detailed description of a sponsor's role, and then contact Steve Beyerlein at sbeyer@uidaho.edu. Please feel free to surf the capstone design Web site and check out the various design projects. Last year's group took home two "Booth Awards," two "Technical Presentation Awards," and the "People's Choice Award." Congratulations seniors.

Project
Touch Screen Testing Apparatus
Waste Can Cutter
Electrode Assembly Tool
Air Bag Folding System
Mechanical Seal & Leak Down Detection
Pick and Place Mechanism
Life Cycle Test Machine
Spray Visualization System
Fiber Stretching Mechanism
Position and Communication System
Direct Injection for a Two-Stroke Engine
2 Stroke Exhaust System
Exhaust Gas Energy Recovery
4x4 Engagement Mechanism
Electric Motor Assist System
Moth Egg Separator

### Join Us in the Support of the Mechanical Engineering Department

The Mechanical Engineering Development Fund. This fund supports undergraduate and graduate student scholarships, the upgrade of the mechanical engineering shop and labs, the upgrade of computer equipment and software, and faculty/staff development (travel to workshops and conferences). Last year's donations helped purchase a state-of-the-art computer numerically controlled lathe for the M.E. shop. The machinist and our students are using this lathe for their senior design projects and for graduate research projects.

Please make checks payable to: UI Foundation Inc. / M.E. Development Fund Mail to: Department of Mechanical Engineering, University of Idaho, Moscow, ID 83844-0902

The Mechanical Engineering Faculty Endowed Position. The department is announces the formation of an endowment that will fund a faculty position. Would you like to sponsor the first endowed faculty position in the Mechanical Engineering Department and, for that matter, in the College of Engineering? Acquiring an endowed faculty position will allow us to soar to a new level of leadership and excellence in engineering education – for example, a faculty position to focus on the issue of interdisciplinary design teams – bringing mechanical engineering students together with other engineering and business students to learn a broader approach to product design and development. A full faculty endowment will be funded at the level of \$3 million dollars. Don Evans, the College of Engineering director of development, is available to answer your questions and to provide assistance relative to endowing a faculty position in the Mechanical Engineering Department. He can be reached at (208) 885-7978 or by e-mail at devans@uidaho.edu.

The faculty, staff and students say thanks for supporting UI Mechanical Engineering!

### **Keep in touch!**

Let us know what you are doing. We want to hear from you!

Mail to: University of Idaho Mechanical Engineering Department,

EPB 324K, Moscow, ID 83844-0902

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### A Sabbatical Fulbright Experience

By Donald Blackketter

Spring 2003, I received a Fulbright award to Quito, Ecuador for six months. As part of my Fulbright award, I was assigned to work at two very different universities. One was a public university, Escuela Politécnica Nacional (EPN) and the other a private university called the Universidad San Francisco de Ouito (USFQ). The contrast was incredible. The private institution was much like a private liberal arts college in the U.S. with great facilities and a secure learning environment. However, the public university reflected a more realistic image of education in a third world country. Facilities were antiquated and funding was guite sparse. The similarities between the universities were the outstanding faculty and students.

I taught a senior level mechanics course at both institutions. I had 15 students in my class at EPN and two students in my class at the USFQ. The class at both institutions was a senior level technical elective. For the most part, all of the students were well qualified

and enthusiastic. I taught in both English and Spanish, depending on the day and topic. While my Spanish was poor, it did not seem to impede the learning and my Spanish certainly improved over the six months. Most of the students understood English even if they could not speak English well.

I also had the opportunity to present a number of seminars on clean vehicle technology. These were well received in a location that badly needs improvements in vehicle emissions. I also gave a seminar at the Fulbright Commission in Quito, and also made presentations at several universities including Universidad de Cuenca, the Universidad de Azuay, and the Universidad de Saliensia, ESPOL (Guayaquil).

This was an outstanding personal experience for me. The objective of the Fulbright is to have cultural exchange. For me, this was one of my primary values for coming to Ecuador as part of the Fulbright Program. It has been one of the most extraordinary experiences of my life in a personal way. We have made dear friends,

excellent professional contacts and fully experienced a new culture. One main highlight includes making great progress in learning Spanish. I plan to continue my study of the language and I am certain that I will return. I also plan on using the experience to help Latino



Don and Vicki Blackketter on the equator. Don is in the Northern Hemisphere, Vicki is in the south.

students who come to the UI. It also has been an excellent break from my normal responsibilities at the UI. I would love to share my experiences, both in Ecuador, and with the Fulbright for any who are interested.

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