West Virginia University
College of Engineering and Mineral Resources

MECHANICAL AND AEROSPACE ENGINEERING

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Dr. Ever Barbero, Chair

High school graduate numbers continue to rise in the US and a larger percentage of those will pursue college degrees. Engineering is loosing ground in the percentage of college freshmen to the life sciences and other disciplines –an alarming trend for the future of our country. Among engineering freshmen, mechanical engineering is one of the few disciplines growing. We see that growth at WVU and we are not only managing to keep growing but aggressively preparing to sustain it with larger, better programs. We anticipate a growing demand for our graduates at every level –Bachelor, Master, and Doctoral. With a large percentage of the engineering workforce, including faculty, retiring in the next 10 years or so, we expect strong demand for engineering graduates to take on leadership and academic positions and thus we are trying to position ourselves to attract more outstanding and diverse students into completing graduate studies. This newsletter is a valuable tool to reach out to our alumni so that we may stay in touch. This newsletter, however, allows us to present only a mere sampling of what the students, faculty, and staff of the Mechanical and Aerospace Department would like to share. For more information about our goings-on and the exciting new projects that are being launched every day here, we invite you to visit our department's website at http://www.mae.cemr.wvu.edu/. The website allows us to provide you with up to date information of what is going on in the department. It also provides our alumni and friends a channel of feedback which is always graciously received and given the utmost consideration. Once again we would like to express the importance we place on our alumni and would like to encourage them to contact me via email at ever.barbero@mail.wvu.edu or to call at (304)293-3111.

FACULTY AWARDS

WVU is proud to announce that **Dr. Wade W. Huebsch** has been selected to receive the 2005 Ralph R. Teetor Educational Award. This award annually recognizes outstanding engineering educators, offering them an opportunity to become acquainted with the professional activities of the automotive and aerospace industries. The program accomplishes this by underwriting the costs of bringing award recipients to an SAE meeting to participate in hosted industry tours and one-on-one meetings with industry professionals.

Established in 1965, this award is funded through a generous contribution by the late Ralph R. Teetor, 1936 SAE President, who believed that engineering educators are the most effective link between engineering students and their future careers.


Dr. Wade W. Huebsch

Dr. Huebsch is an assistant professor in the Mechanical and Aerospace Engineering Department at WVU. His research focuses on the area of computational fluid dynamics with emphasis on boundary layer flow control, wing morphing and aircraft icing. Huebsch is also involved in research related to the formation of aircraft contrails.

Additionally, he has taught courses at both the graduate and undergraduate level in aerodynamics and fluid dynamics, and the senior level capstone design course in aerospace - flight vehicle design. He also developed a new undergraduate course in CFD for the department. Dr. Huebsch serves as the faculty advisor for the American Institute of Aeronautics and Astronautics (AIAA) student branch at WVU.

Dr. Huebsch has received Outstanding Teacher and Young Researcher of the Year awards from the West Virginia University College of Engineering and Mineral Resources awards. He is a member of SAE, AIAA, the American Society of Engineering Education (ASEE), the aerospace engineering honor society, Sigma Gamma Tau, and the Sigma Xi research society.

Dr. Nigel Clark has been named a SAE Fellow. This membership grade provides a means to recognize and honor those members who have made a significant impact on society's mobility technology through research, innovation or creative leadership. SAE has about 90,000 members and elects only about 20 fellows a year (only 19 were elected this year).

This is a great honor, which is well deserved by Dr. Clark, and makes us all very proud. The SAE Fellow Committee made their selection based on his outstanding accomplishments in quantifying real-world emissions from heavy-duty vehicles and his work in the development of transportable heavy-duty chassis dynamometers.

Dr. Clark and the 2004-05 class of SAE Fellows will receive public recognition among their peers in ceremonies at the 2005 SAE World Congress, to be held April 11-14, 2005, in Detroit, Michigan.

Dr. Jacky Prucz was awarded the 2004 Weaver Award. Dr. Prucz works diligently to enhance the quality of our undergraduate and graduate programs and has done a great job teaching a number of "mechanics" courses.

Dr. Chuck Stanley received the 2004 Worrel award. Dr. Stanley's exemplary dedication to the department during ABET review was a key factor in our successful 6-year accreditation.

MAE Researchers win 1st Place with Superalloy Research. MAE researchers won 1st place among 70 posters presented at the 10th International Symposium on Superalloys held at Seven Springs, PA. The work on *"Fatigue crack propagation behavior of newly developed Allvac®718PLUS™ Superalloy"* was accomplished by Xinbo Liu (Research Assistant Professor), Shalini Rangarajan (Ph.D. candidate), Ever Barbero (Professor and Chair), Keh-Minn Chang (Adjunct Professor), Wei-Di Cao and Richard Kennedy (Allvac, Monroe, NC), and Tadeu Carneiro (Reference Metals Company, Bridgeville, PA).

STUDENT PROJECTS AND ACTIVITIES

"Challenge X" encourages college students to improve SUV technology continuing a 15-year tradition; WVU students tackle the next-generation hybrid vehicle competition. WVU engineering students will participate in a new engineering student vehicle competition that began in the 2004-05 academic year, managed by the U.S. Department of Energy's Argonne National Laboratory.

Challenge X: Crossover to Sustainable Mobility is the newest competition to challenge the WVU team. Different from Future Car and Future Truck, the latter which concluded in 2004, Challenge X focuses more on the modeling and simulation aspects of design in the first year. These processes are based on General Motors' Vehicle Development Process, a real-world process that GM follows when developing new vehicles. Then the second and third years are similar to the Future Truck's, where if the team "earns their keys" the first year, they will receive an SUV to transform into an advanced technology hybrid vehicle.

Since 1987 the U.S. Department of Energy (US DOE) has sponsored more than 45 advanced vehicle technology competitions through Argonne National Laboratory. The US DOE and General Motors are the headline sponsors for the 2005 competition.

Several innovations and ongoing research projects have resulted from the competitions. Most recently, in

The WVU Challenge X Executive Committee (L-R): Ryan Boring, Jeff Learn, Tim Wigton, Nathan Berry-Ann, Patrick Bozelli, Ryan Church, Heather Johnson, and Paul Biedler

the Future Truck 2004 competition, 8 teams surpassed the on-road fuel economy of the control vehicle (a 2002 Ford Explorer). The greenhouse gas emissions of 8 student vehicles were less than those of the control vehicle, with WVU reducing GHG emissions by an incredible 48%.

Leading the WVU team is Dr. Nigel Clark, team advisor and an expert in the areas of alternative fuels and the measurement and reduction of vehicle emissions, and Heather Johnson, team leader and senior in mechanical and aerospace engineering.

"I am proud to be part of this team," said Johnson. "It has provided me with knowledge and an out-of-the-classroom experience I never dreamed I would have. The Challenge X competition allows participants to work directly with automotive industry professionals and to get an insider's look at how they do their job—helping us become the next generation of automotive engineers."

The Challenge X competition invites 17 university teams from across North America to reengineer a 2005 Chevrolet Equinox, a compact SUV that already provides competitive fuel economy, to achieve four basic goals:

1. To reduce energy consumption
2. To decrease emissions
3. To maintain the stock vehicle's performance and utility features

"This is the first time that a student competition has emphasized the importance of fuel choice in achieving sustainable mobility," said Tom Stephens, group vice president for GM's Powertrain Division. "Challenge X provides the student teams an opportunity to take an open-minded well-to-wheels approach to all the issues involved in energy efficiency and emissions – including the fuel source, the propulsion system and the vehicle's real world utility and consumer appeal." Throughout the Challenge X competition, participating universities contribute funding, faculty release time, academic credit, and facilities for the students to develop and build their innovative designs. "Challenge X is a mechanism for demonstrating and expanding the progress that can be made when government, academia and the industry work together toward a common goal: sustainable mobility," Stephens said.

The 2004-07 Challenge X Teams
Michigan Technological University
Mississippi State University
Ohio State University
Pennsylvania State University
Rose-Hulman Institute of Technology
San Diego State University
Texas Tech University
University of Akron
University of California, Davis
University of Michigan
University of Tennessee
University of Texas at Austin
University of Tulsa
University of Waterloo
University of Wisconsin-Madison
West Virginia University

The **West Virginia University Transportable Emissions Laboratory** traveled to Mexico to assist the Mexico City Secretariat of Environment to evaluate climate friendly transit bus technologies to improve air quality in the Mexico City Metropolitan area. Mexico City is considering the construction of a new corridor system dedicated to transit buses and replacing existing buses with modern, high capacity buses.

In order to secure the maximum benefit for society the new technologies that are chosen must be ones that best fit the environmental, operational, economic and geographic characteristics of Mexico City especially regarding the altitude of the city. The program investigated a variety of transit vehicles

technologies including clean diesel buses with advanced after treatment technologies, diesel-electric hybrid buses and CNG fueled buses as well as the impact of developing dedicated transit bus corridors. Municipal and Federal agencies in Mexico teamed with the World Bank and WVU to evaluate available clean transit buses under operating conditions that simulate the real operation of the public transportation system in Mexico City.

The WVU Emissions Laboratory was set up in Mexico City for a month while emissions were measured from nine different transit buses including buses from US, European, and Chinese manufacturers. The data gathered from this study will assist the Mexico City environmental and transportation planners in making vehicle purchasing and highway construction decisions that will foster substantial improvements in air quality and public health in the city.

West Virginia Transportable Emissions Laboratory working in Mexico City

Eric Legg, senior mechanical engineering student, was selected as one of only 25 students to participate in the first SAE Leadership Development Program. This program is the first of many new offerings to SAE's younger members under the SAE Power Track. Power Track is a career pathway designed to help accelerate an individual's engineering career. Dr. Ken Means, who detailed the leadership skills exhibited by Eric, nominated him for participation in the program. As part of the award, he participated in a leadership program, in conjunction with the Section Officers Leadership Seminar (SOLS) in January at the Marriott Riverwalk Hotel in San Antonio, Texas. The event began on Thursday evening, January 27, with a joint reception at the Riverwalk Terrace from 8:00 to 10:00 pm. SAE covered all the travel expenses to the event.

The focus of the program is to further develop skills that are imperative as a leader in SAE and the mobility industries. SAE will work jointly with the SOLS group to foster relationships between the SAE Professional Sections and Student Chapters. There were sessions on Powerful Presentation Skills, Career Development, Mentoring, and more.

ASME Student Chapter tour of Cummins

ASME Student Chapter Tour. Twelve students from the ASME Student Chapter at West Virginia University traveled to Columbus Indiana to attend a recruiting event for Cummins. The students toured the Cummins plant where they viewed the engine assembly and dyno-testing and were able to drive 2 Dodge Ram Turbo-diesel pickup trucks. They also toured the Indianapolis Motor Speedway and museum. Thanks to Rob Smith (BSME '91, MSME '93) of Cummins Inc. and Dr. John Kuhlman (MAE Professor) who organized the tour.

Aashish Kalra, MAE graduate student, was recently awarded 3rd prize in a national competition held by the ASME for his essay on "The future role of mechanical engineers in Bioengineering". Aasish wrote the essay as part of a homework assignment for the MAE 425 class: Bioengineering. Established in 1954, the Arthur L. Williston award is presented annually by ASME to the student engineer or recent graduate who authors the best paper in the area of civic service.

The **17th Annual Pumpkin Drop** was held at the College of Engineering and Mineral Resources on Friday, October 29, 2004. The event has a traditional crowd of over 1,000, and is enjoyed by both young and old. Gourd hurlers fling their pumpkins from the top of the Engineering Sciences Building at a target 11 floors below. The challenge of the contest is to hit closest to the target center and have the pumpkin stay intact. Fifteen pumpkins survived out of a total of 135. The event is sponsored by the WVU Student Chapter of ASME. This year the event raised more money than any previous year with all proceeds going to the Ronald McDonald House.

Mountaineer Balloon Festival and Mini Baja Invitational. Last semester the department, the College, and BOPARC of Monongalia County hosted a Mini Baja Competition. Baja is a senior design project car competition sponsored by SAE. Engineering students are challenged to design and build an off-road vehicle that will survive the severe punishment of rough terrain and water. The race was held at Mylan Park in Morgantown, West Virginia on October 2nd. Fourteen cars participated in the race. First place was car #50 from WVU, second place was #33 from University of Akron, and third was #129 from University of Maryland Baltimore County.

UNDERGRADUATE SCHOLARSHIPS

The Allied Weight Engineers Scholarship is funded by the Society of Allied Weight Engineers. It is awarded to a student who demonstrates high academic promise and financial need. The 2004-2005 academic year recipient of this award is Alex Gray.

The Carl H. Cather Scholarship is funded by the family and friends of Carl H. Cather, former professor and chair of Theoretical and Applied Mechanics. It is awarded to Mechanical Engineering juniors or seniors in the top 25% of the class who have financial needs. The 2004-2005 academic year recipient of this award is Jacob Winterstine.

The Harold M. Cather Scholarship is funded by the estate of Harold M. Cather, former professor and chair of Mechanical Engineering. It is awarded to American students who have a minimum 3.0 GPA. First priority is given to Mechanical Engineering majors with financial need. The 2004-2005 academic year recipient of this award is Michael Shahan.

The Jerome B. Fanucci Scholarship is funded by family, alumni, and friends of Jerome Fanucci, former professor and chair of Aerospace Engineering. It is awarded to Aerospace Engineering students. The 2004-2005 academic year recipients of this award are John Harman, James Maley and Arthur Scherich.

The Hansen, Inc. Scholarship is funded by the William Stucki Hansen Foundation. It is awarded to juniors, seniors, or graduate students majoring in Mechanical Engineering. The 2004-2005 academic year recipients of this award are James Altobello, Emille Saiter and Adam Wells.

The MAE Department Scholarship is funded by alumni and friends of the department. These scholarships are awarded annually in the amount of $500 to $1000 to AE, ME, or Dual AE/ME majors based on academic merit. The 2004-2005 academic year recipients of this award are Nathan Fluharty, Eric Thompson and Adam Wells.

The Nathan Ness Scholarship is funded by the family of Nathan Ness, a Professor Emeritus of MAE. The 2004-2005 academic year recipient of this award is Shanti Hamburg.

The Benjamin H. Ulrich, Jr. and Leon Z. Seltzer Scholarship is funded by alumni and friends of Benjamin Ulrich, former professor of Aerospace Engineering and Leon Seltzer, former professor and chair of Aerospace Engineering. It is awarded to an Aerospace Engineering student. The 2004-2005 academic year recipients of this award are Caleb Murphy, Ryan Ness and Justin Smith.

The Donald T. Worrell Scholarship is funded by alumni and friends of Donald T. Worrell, former professor of Mechanical Engineering and Mechanics. It is awarded to a Mechanical Engineering student based on financial need and academic performance with a preference to West Virginia residents. The 2004-2005 academic year recipients of this award are Forrest Doss and Knute Scholl.

The Richard E. Walters Scholarship is funded by the family and friends of Richard E. Walters, former professor of MAE. It is awarded to a student majoring in Aerospace Engineering. The 2004-2005 academic year recipient of this award is Joshua Lantz.

The Society of American Engineers Scholarship was presented to Caleb Murphy for the 2004-2005 academic year.

MAE Reaching to Alumni and Friends

We encourage alumni to consider the effect that gifts such as these can have on the lives of over 150 new Mechanical and/or Aerospace engineers graduating every year. WVU has thought hard about how to make the most out of your donation and we believe the most impact will be obtained by investing in the following activities:

- Student Projects that support our team competitions organized by professional societies.
- The MAE Opportunity fund that is used to keep the department in step with current technological advancements.
- Student Support in the form of scholarships and fellowships. All types of donations are needed and all will aid the department in its continual quest for the highest quality educational experiences possible.

A Duel-Benefit Choice

We often wonder whether we'll "have enough" for retirement. One way to make sure that your coffers don't run dry is also a beneficial way to aid the Department of Mechanical and Aerospace Engineering's future.

An income-producing gift created with the WVU Foundation is such a beneficial option. It provides for quarterly income for life that can begin immediately or at a later time. However, the income tax deduction is earned right now. If appreciated assets, such as stocks or mutual funds, are used, the tax owed on their capital gain is avoided. That means that their full value is used as the basis for the income payout.

Such a gift requires at least $25,000 in cash or other assets. The income can be paid for 1 or 2 lives. When the income payout ends, the fund that remains will benefit MAE as the donor specified years before. Whether the choice is to support student projects, provide for laboratory improvements, create a scholarship or specify discretionary use, all are needed and all will aid the department in its continual quest for the highest quality educational experiences possible.

Bob Bragg, Director of Development, can help you choose the best way to provide for your retirement years and for MAE at the same time. Call him at 304-293-4821, ext. 2240 to learn more.

ALUMNI NEWS

Aric Jenkins (BSAE '95) is the lead Short Takeoff and Vertical Landing (STOVL) flying qualities engineer for the Joint Strike Fighter Program Office. He has worked in the Flight Dynamics Branch at Naval Air Systems Command, in Patuxent River, MD, since 1995. He is involved in flight certification and flight clearance for all variants of the Joint Strike Fighter (F-35A, F-35B, F-35C). He also works in support of flying qualities and flight clearances for new weapons and systems upgrades for the AV-8B. Aric received his MSAE from Florida Institute of Technology in 2002. In 2003 he graduated from US Naval Test Pilot School (Class 123). As a student at USNTPS, Aric obtained 100 flight hours in aircraft ranging from F/A-18B, F/A-18D, F-16B, Mirage 2000B, Mirage 2000N, Alpha Jet, T-38C, T-2C, C-12, P-3C, U-6, Casa Jet, Lear Jet, various gliders, and 2 helos (UH-60B and Dauphin).

Michael Plyler (BSAE '02) is currently working in the Conceptual Aircraft Design Branch for the Naval Air Systems Command, NAVAIR. Prior to this he

was assigned the command of Supervisor of Shipbuilding, Groton (SOSG). The purpose of this command is to supervise, the construction, overhaul, and repair of the US Navy Nuclear Submarine Fleet.

In February MAE Professor Emeritus Dick Walters and his wife, Ann, visited **Professor Lee Seltzer** and his wife, Amy, in Escondido, California. Now past his 92nd birthday, Prof. Seltzer lives in a retirement facility. He is in good health, but gave up his favorite pastime, golf, 2 years ago because of back trouble. Amy, a former music teacher, often plays her baby grand piano, and she and Lee both enjoy the good Southern California weather and friends where they live. We wish Lee and Amy the best in continuing their retirement.

Prof. Seltzer came to WVU from Virginia Tech in 1949, and was responsible for getting the new aeronautical engineering program revised and accredited. He initiated the graduate program in 1959, leaving in 1962 to become Dean of Parks College at St. Louis University, where he eventually retired at the age of 68. For most of the decade from 1949 to 1959, he and Prof. Ben Ulrich were the only two faculty members in the Aeronautical Engineering Department at WVU. Scholarships are established in both Prof. Seltzer's and Prof. Ulrich's names to aid undergraduate aerospace engineering students.

Greg Baughman (BSAE '85) was awarded the 2004 Richard L. Wernecke award. This award is presented to an individual who demonstrates exceptional performance in advancing the principles of engineering, planning, testing, reporting, leadership, teamwork, and innovation in the test and evaluation of rotorcraft and vertical-takeoff-and-landing aircraft. Baughman is the lead flight test engineer for the Presidential helicopter Flight Test Team.

The National Institute for Aviation Research (NIAR) at Wichita State University in collaboration with Raytheon Aircraft Company is making arrangements for the Institute's new Aircraft Structural Testing and Evaluation Center (ASTEC). Raytheon Aircraft is providing the NIAR with a full-scale structural test laboratory on its manufacturing campus in Wichita, KS. Last year **John S. Tomblin**, (BSAE '90, MSME '91, PhD '94) was named the Executive Director of the National Institute for Aviation Research at Wichita state University, KS.

This section is dedicated to include news about MAE alumni. We are very proud of your accomplishments and we want to share them with the remaining 2400 alumni. If you have some news about yourself or other MAE alumni, please let us know. You can write us (our complete address is on the back page) or send us e-mail at *ever.barbero@mail.wvu.edu*

We never seem to catch up with all of our alumni. Our database is incomplete and the contact information changes often. We need your help to update our records. Simply visit us on the web at *www.mae.cemr.wvu.edu* and fill in the web form *www.cemr.wvu.edu/alumni/address-update.php*

DONOR RECOGNITION

In this section we wish to recognize those individuals and corporations that through their generosity have an indelible impact on the life of students in MAE. In this issue we wish to recognize donations received in the period from July 2003 to June 2004. Our apologies to those that have been omitted inadvertently.

Michael J Kalo
James W Coffman
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Our fundraising objectives are:

- An endowment to support student projects, such as those described in this newsletter.
- Funds for purchase and maintenance of laboratory equipment.
- Opportunity funds that will enable the department to take advantage of opportunities in faculty and student recruitment and retention, high payoff projects, venture projects and so on.
- Endowed Scholarships to support undergraduate and graduate student recruitment and support undergraduate research opportunities.

If you or anyone you know is interested in contributing to Mechanical and Aerospace Engineering please contact Robert Bragg, CEMR's Director of Development, at 304-293-4821 ext. 2240 or Robert.Bragg@mail.wvu.edu. Please mention this newsletter and your intention of contributing funds for Mechanical and Aerospace Engineering.

Thank you for your continued support!