Steel Day in Washington D.C.

UA’s Steel Bridge Team, along with their advisor, Dr. David Roke, headed to the nation’s capital to participate in Steel Day 2013 activities on October 3rd and 4th.

One of the Steel Day events was hosted by the American Iron and Steel Institute (AISI) in Washington, D.C., in collaboration with the House and Senate Steel Caucuses and the National Steel Bridge Alliance (NSBA). The event featured remarks from Reps. Pete Visclosky (D-Indiana) and Virginia Foxx (R-North Carolina), as well as Roger Ferch, president of the American Institute of Steel Construction (AISC), Thomas J. Gibson, president and CEO of AISI, and Pat Natale, executive director of the American Society of Civil Engineers (ASCE).

UA’s Steel Bridge Team joined three other teams from the 2013 ASCE/AISC National Student Bridge Competition – the University of California at Berkeley, University of Delaware, and University of Maryland – in showcasing their large-scale, modular steel bridge designs during the event.

“I’m pleased to bring together Members of the House and Senate Steel Caucuses, industry leaders and these bright young minds to promote Steel Day,” said Gibson. “These students are the next generation of engineers. At a time when the ASCE is
The Publications Division of the American Society for Civil Engineers (ASCE) and the Subcommittee on Technical Advancement recently announced Dr. Wieslaw Binienda, chair of UA’s Department of Civil Engineering, as the recipient of the 2013 Richard R. Torrens Award for outstanding performance as editor of the *Journal of Aerospace Engineering*. The Richard R. Torrens Award was created to honor the memory of Richard Torrens, who served in the Publications Department at ASCE for 17 years and was Manager of Professional and Technical Publications.

According to ASCE, “The award is made in recognition of Torrens’ distinguished service and honors volunteer journal editors who have made outstanding contributions to the ASCE journals’ program.” The award is based on achievements in various categories, including journal competitiveness, turnaround time, growth, and creativity and innovation shown by the editor, among other measures of accomplishment.

Over the past few years, the journal has experienced growth in both the quantity and quality of journal manuscripts, as well as an increase in number of journal articles downloaded. This growth has culminated in the expansion of both the number of pages in the journal and the frequency of publication, which in 2014 will increase from four to six issues per year.

Dr. Binienda believes that the leadership and dedication shown by the journal’s associate and guest editors have been instrumental in the success of the journal, with their timely turnaround of journal manuscripts and their organization of special issues and sections on timely topics in aerospace engineering. Recent special sections and special issues have included the following:

- “Special Section on Intelligent Unmanned Systems” (October 2012) edited by Agus Budiyono, Bambang Riyanto, and Hoon Cheol Park
- “Special Issue on In Situ Resource Utilization” (January 2013), edited by Haym Benaroya, Philip Metzger, and Anthony Muscatello
- “Special Issue on Seventy Years of Aerospace Research and Technology Excellence at NASA Glenn Research Center” (April 2013) organized by Ji-Fen Li and Robert Goldberg
- “Special Section on Hydraulic and Earth Structures” (October 2013) organized by Pizhong Qiao and Cheung Kong

The journal team includes associate editors includes Robert Goldberg (NASA), Pier Marzocca (Clarkson University), Pizhong Qiao (Washington State University), as well as outgoing associate editors Daniel Valentine (Clarkson University) and Haym Benaroya (Rutgers University). In 2013, the journal was also pleased to welcome Aman Behal

Dr. Binienda Accepts 2013 Richard R. Torrens Award

Wieslaw Binienda (left) accepts the 2013 Torrence Award from Bruce Gossett
NASA’s Glenn Research Center (GRC) in Cleveland held its annual NASA Agency Honor and Center Awards ceremony on September 11, 2013 at the historic hangar at Lewis Field known as the Flight Research Building.

Among the honors was the Group Achievement Award for the NASA Glenn Special Journal Issue Team, which organized and produced the content for the April 2013 issue of the Journal of Aerospace Engineering, “Special Issue on Seventy Years of Aerospace Research and Technology Excellence at NASA Glenn Research Center.” This special issue, published by the American Society for Civil Engineers (ASCE), features technical articles about the history of the research pursued at NASA Glenn since its establishment in 1940 in support of both aeronautics and the space program. Expertise at NASA Glenn encompasses a wide variety of areas, including aircraft and spacecraft power and propulsion systems; aircraft engine noise research; communications, instrumentation and control systems; materials and structures for extreme environments; microgravity fluids and combustion; and bioscience and medical technology.

The team was led by journal associate editor Robert Goldberg, a NASA researcher and associate lecturer in UA’s Department of Civil Engineering, who organized the special issue with the help of Dr. Jih-Fen Lei, the director of the Research and Technology Directorate. The group included the contributing authors at NASA GRC, who wrote the technical papers included in the special issue, as well as the GRC program managers who provided historical overviews for each research area. The staff at GRC’s Publishing Services Department, who helped the authors to prepare images from the center’s archives and to format the manuscripts for publication, also played a significant role in the effort. Nick Violette, the journal’s coordinator at ASCE, and Sheila Pearson, the journal’s editorial assistant at UA, provided additional assistance in submitting the papers for publication, editing accompanying images, and coordinating with ASCE’s production staff.

Congratulations to Dr. Goldberg and his team for their successful efforts.
Dr. Anil Patnaik, Dr. Robert Liang, and their students are involved in a research project funded by the Ohio Department of Transportation (ODOT) to evaluate concrete barriers and the current design criteria used for these barriers to prevent falling rocks from reaching traveled lanes on Ohio roadways.

Impact tests were conducted over the past two years on the premises of the Duer Construction Company in Akron, just a few miles west of UA’s campus. The team evaluated the energy absorption capacity of ODOT standard 32-inch pre-cast concrete barriers and DOD standard 42-inch cast-in-place (CIP) concrete barriers.

In phase one, conducted in 2012, a crane was used to swing impacting balls made of different materials (concrete, steel, and natural rock) of various sizes and shapes to simulate the range of energies that may be expected during a natural rockfall. Impact energies were collected using accelerometers that the students attached to the ball and barriers, strain gages the students placed on the concrete surfaces and embedded steel reinforcing bars, and high-speed cameras and surveying instruments.

The results from this phase of the study will be used to determine the limitations of standard concrete barriers in absorbing the energy of falling rocks.

Additional impact tests and rollout tests were conducted at Duer Construction in the summer of 2013. The findings of the second phase of the study will be used to establish rockfall parameters in order to verify predictions obtained using currently available rockfall simulation software.

To find more details regarding the first phase of the project, including diagrams of the test setup and more photos showing the results of the impact tests, see the feature article about the project on pages 2 to 3 of ODOT’s Moving Forward newsletter, at http://www.dot.state.oh.us/Divisions/Planning/SPR/Research/Newsletters/2013%20Volume%202.pdf
Dr. William Schneider, Dr. Christopher Miller, and their students are working on a two-year research effort funded by a grant from the Ohio Department of Transportation (ODOT) to investigate alternatives to disposal of wastewater after ODOT personnel wash the salt trucks that are used for winter maintenance in Ohio.

The students reviewed available literature on wash management and surveyed departments of transportation in other states to determine the practices they use to manage wastewater. Next, the team visited ODOT garages in each of the state’s 12 districts to estimate the volume of wastewater generated by each facility and how much brine is used to treat the roadways for which ODOT is responsible in those areas. It is theorized that at least some of the wastewater could be re-used as brine for future road treatment.

In order to complete the study, monthly water quality samples were collected at three garage locations during the 2011-2012 winter season. The samples were analyzed for a number of constituents (including 17 heavy metals), and the test results were compared to various water quality standards. The students also developed an evaluation and calculation matrix in Microsoft Excel to help ODOT identify which of six options for cost-effective wastewater disposal alternatives would be appropriate at any given location, using inputs such as commercial disposal costs, and various site-specific parameters. In order to demonstrate the value of the matrix, the students applied the calculation matrix to facilities in ODOT District 4 and identified an alternative to current collection and disposal methods with potential savings to ODOT of $45,000 per year.

ODOT supported a research effort in the winter of 2012-2013 to conduct pilot filtration tests to show that it can be successfully used to reduce heavy metals in washwater and to help establish treatment protocols at ODOT facilities. Additional washwater sampling in every ODOT district was conducted. The test results from this sampling, along with traffic-based modeling, will be used to determine which ODOT garages are likely to generate the most heavy metals in washwater and which garages would realize the most savings from implementing a filtration metal-reduction treatment system.

See a full description of this research project on pages 3 to 5 of ODOT's Moving Forward newsletter:
http://www.dot.state.oh.us/Divisions/Planning/SPR/Research/Newsletters/2013%20Volume%201.pdf
The University of Akron is a member of a consortium of universities that won a $10.4 million award from the U.S. Department of Transportation (DOT) for its University Transportation Centers (UTC) program. UA will be a member of the Region 5 UTC, led by the University of Minnesota (UM) Center for Transportation Studies. Other members include the University of Illinois at Urbana-Champaign, Southern Illinois University, and Western Michigan University.

The Region 5 consortium will begin its two-year effort with a focus on targeted research, education, and technology transfer that will help identify and deliver improvements in transportation safety in Minnesota, Illinois, Indiana, Michigan, Ohio, and Wisconsin. Max Donath, professor of mechanical engineering at UM, will serve as director of the new Region 5 center.

“We’ve made great strides in transportation safety in the past 20 years, but that’s not enough for the families and friends of the 4,500 people who died on

“UTC” continued on page 7

### New Graduate Certificate Program Prepares Engineers for Nuclear Industry

On August 7, 2013, the UA Board of Trustees approved a curriculum change to create a new graduate certificate in nuclear engineering. Dr. William Arnold, Associate Lecturer in Civil Engineering, initiated and developed the new graduate certificate in nuclear engineering program. Arnold has been teaching nuclear courses since 2003.

The certificate is awarded upon completion of four nuclear courses at UA (which are taught sequentially over a two-year cycle) and any two additional engineering graduate courses. The four nuclear courses are:

- **Introduction to Nuclear Power Generation and Simulation**
- **Nuclear Reactor Engineering and Balance of Plant Systems**
- **Nuclear Process & Radioactive Waste Management, Safeguards and Security**
- **Nuclear Thermohydraulics, Simulation and Advanced Reactor Engineering**

All of the nuclear courses are taught with a distance learning component. The students are able to watch recorded lectures online, view original PowerPoint presentations, and access additional material added to the presentation during class (such as equations and highlights), and view all material written on the board via “Smart Board” technology. The distance learning component is ideal for engineers who travel or who have work hour or work location constraints. Simulation is emphasized in all courses, and balance of plant components are also covered in detail, as they are equally applicable to fossil power plants. The courses are also offered to other Ohio universities via an interstate agreement.

The creation of the certificate program at UA is a timely development. Recently, a number of top climate scientists – including former NASA scientist James Hansen, Ken Caldeira of the Carnegie Institution, Kerry Emanuel of MIT, and Tom Wigley of the University of Adelaide in Australia – have concluded that renewable energy will not be able to scale up quickly enough and that nuclear power is an important technology with the potential for reducing greenhouse gases.

The graduate certificate program will train engineers for the nuclear industry, which will be needed to help the nation reduce its reliance on fossil fuels.
The CAER and UA Sign Master Research Agreement

The Center for Advanced Engineering and Research (CAER) established a five-year master research agreement with UA to work together to sustain and improve the growth of targeted industry clusters in Virginia’s Region 2000.

Under the agreement, UA and CAER will work together in the development of research and educational projects in the targeted area of nuclear energy and in identifying resources needed to implement these plans. UA will provide personnel and expertise to CAER for administrative, research, and educational support services that will benefit the region’s high-tech companies. CAER will provide funding through federal, state, and industry sources and assist in managing the research projects with the university.

“With this new agreement we continue to build research capacity and expertise in our target technology sectors,” says Bob Bailey, executive director of CAER. “Having the University of Akron join our team only strengthens our region’s assets.”

“This partnership will strengthen and expand the College of Engineering’s nuclear engineering certificate program by allowing us to offer graduate students new educational and research opportunities using world-class simulators and control rooms,” says Dr. Binienda, chair of UA’s Department of Civil Engineering. “Roughly half of our nuclear engineering students attend part-time while working full-time in the nuclear and power industry, and the benefits of this partnership will directly transfer back to those employers.”

CAER has similar partnerships with the University of Virginia, Virginia Tech, James Madison University, and Liberty University’s School of Engineering & Computational Sciences (SECS).

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our region’s roads in 2011,” acknowledged Donath. “We need to determine and deliver the next wave of transportation safety improvements.”

The UA team, led by associate professor William Schneider, will perform hot spot analysis (a statistical analysis tool that uses cluster analysis and geographical information systems) to identify risk areas for impaired driving based on existing locations for related violations and crashes. The research will include working with police agencies to obtain data from citations and crash reports and using this data to generate maps that reveal high-risk areas.

“Our approach allows us to treat transportation safety in an integrated fashion,” says Schneider. “Recognizing that transportation safety is not only about the physical network of roads, highways and bike/pedestrian lanes—it is also about the behavior patterns of travelers.”

The goal for the UA effort is to increase the apprehension of impaired drivers in high-risk areas, which would lead to a long-term decrease in crashes, fatalities, and injuries by helping to remove impaired drivers from roadways in the region.
The Department of Civil Engineering and the UA Corrosion Program were instrumental in helping area teen Lisa Criscione complete a science fair project that earned her many accolades. Lisa, daughter of Joseph and Freda Criscione of Seven Hills, Ohio, will accept her latest award in February 2014. The Ohio Academy of Science selected Lisa as a delegate at the annual meeting of the American Junior Academy of Science (AJAS), America’s only research society for high school scientists. At the meeting, Lisa will present her research, Rusty Concrete: Will Too Much Water Corrode Concrete Faster? The fellowship from AJAS is the highest honor in the nation for a student researcher.

Lisa’s journey began in Seven Hills, Ohio, where she lives. “I decided to do this project because of the rusty reinforced concrete roads in my neighborhood,” said Lisa. She noticed how quickly a newer road in her neighborhood was rusting and questioned if increased water in the mix, due to rain, was the cause. Lisa’s working hypothesis was: “if excess water was in the concrete mix, then rust would appear on the reinforced concrete’s surface more quickly than if the mix contained the standard amount of water.”

Lisa was encouraged to pursue the issue for a science fair project. When it became apparent that preparing concrete mix and cutting rebar in the family’s basement would not be a good option, Freda turned to UA for help. Dr. Binienda directed her to Dr. Patnaik who met with Lisa to review her science fair proposal. The Crisciones were delighted with the outcome. “Dr. Patnaik was very enthusiastic about Lisa’s project, and he welcomed Lisa as a full-fledged member of the Corrosion Team. He encouraged Lisa to participate in all aspects of the experiment from preparing her test samples to formally presenting her results.”

Master’s student Jeremy Lewis became Lisa’s instructor and mentor, ensuring that Lisa could correctly perform each step of her experimental protocol herself. Under his supervision, Lisa was able to prepare, cure, and test her concrete samples in the corrosion lab.

“In the university’s Corrosion Lab, I made two batches of concrete with varying levels of water content and ended up with four samples from each batch. I reinforced each sample with rebar so it would be like the...
Robert D. Stevens New ASCE President-elect

By Doug Scott; Copyright 2013 American Society of Civil Engineers.

ASCE members have elected Robert D. Stevens, Ph.D., P.E., AICP, F.ASCE, as ASCE’s new president-elect. Stevens, who is the first ASCE Technical Region director to be elected president, began his involvement in ASCE in 1961 as a member of the Student Chapter at the University of Akron. He brings a wealth of expertise, having served on no fewer than 38 ASCE and Transportation and Development Institute (T&DI) committees throughout his distinguished career. Stevens also sits on the governing boards of Engineers Without Borders—USA and the American Road and Transportation Builders Association.

“I am thrilled to have this opportunity to be the president-elect of ASCE,” said Stevens upon being elected. “As I talk to different groups around the country, I find members are not aware of all of the opportunities ASCE has to offer; whether it be geographically, technically or professionally.

“So as we look ahead, one of the really important things is that through our communications our members become more aware of the things ASCE has available to them and the ways that they can participate in the Society to help advance the profession and themselves.”

Stevens says one of the things he hopes to accomplish as the Society’s future president is to increase membership.

“According to the Department of Labor, there are approximately 260,000 civil engineers in the work force and, not counting students, only 120,000 who are members of ASCE,” says Stevens. “So there is such a big pool of civil engineers out there who I think need be part of this highly recognized organization.”

In looking toward the future of civil engineering, Stevens says, “The profession has changed so much from when I first got into it. At that time there were hardly any computers, and now computers are doing a lot of the calculations and analysis. But we still need to understand what we are doing behind those calculations, and we still need more innovation in engineering and more emphasis on education—science, math, and technology in engineering—to help us provide a higher quality of life for people all around the world.”

Bruce Gossett, ASCE’s Managing Director of Publications, presented the Torrens award to Dr. Binienda at the 2013 Editors’ Workshop held at the ASCE offices in Reston, Virginia, on November 2nd.

Congratulations to everyone who has contributed to the success of the Journal of Aerospace Engineering!
Edward Machek Chosen as Student Respondent, Stays on for Master’s

Civil engineering student Edward Machek was conferred a diploma as part of the Summer Class of 2013 and was singled out for an additional honor: he was selected to be the student respondent for the 2 pm commencement ceremony on August 17th at E.J. Thomas Performing Arts Hall. Following President Proenza’s delivery of the commencement address at the ceremony, Machek took to the lectern to speak on behalf of his fellow classmates.

Machek, an honors student who was awarded a B.S. in Civil Engineering, magna cum laude, has been active in the department during his undergraduate years. Not only was Machek a member of the ASCE student chapter concrete canoe and steel bridge teams, but he also worked on research projects with professors Teresa Cutright and Stephen Duirk and pursued co-op assignments with the Ohio Department of Transportation. In addition, he tutored fellow students at Bierce Library and led study sessions in the Civil Engineering Lounge to encourage student success.

“I chose engineering because of the upper level thought required and the idea of creating new things, particularly in environmental engineering,” says Machek. “I’m interested in the physics of how things work. For example, the surface tension of water and how spillways are built to minimize the pounding of water.”
It was obvious to Machek that civil engineering would be his career focus. “Civil engineering is very cool,” he explains. “Engineering is a combination of science and math. Physics is all physics and chemistry is all chemistry, while engineering is a blend of all of them — and civil engineering is the most blended of all of them.”

Machek has made a lot of friends in the college during his undergraduate years, especially through his participation on the canoe and steel bridge teams, and he feels that his time at the college will contribute to his future success.

“I would say that through my Akron Experience, I have gained a lot more confidence in myself and in my value as a person, and my willingness to take on challenges, like public speaking,” Machek continues. “I was not good at it, but I worked at it and became better at communicating effectively and communicating my ideas.”

This fall, Machek began working on his master’s degree in civil engineering, where he will continue to live the dream, assisting Dr. Duirk with his safe drinking water research. His long-term goal is to earn a Ph.D. and become a professor himself.

The UA 2014 National Student Steel Bridge Contest (NSSBC) Host Committee is busy planning for the upcoming 2014 National competition that will be hosted by The University of Akron on May 23rd and 24th. The committee consists of two student directors, Erin Spahr and Katie Kitner, as well as faculty advisor, Dr. David Roke.

The event, which will be held at the John S. Knight Center, will draw teams of college students throughout the U.S., Canada, and Mexico as they compete for top honors in six categories (display, construction speed, lightness, stiffness, construction and economy, and structural efficiency).

Hosting the national competition takes a tremendous amount of time and effort. Thus far the committee, with help from subcommittee members Ben Thoburn, Justin Wolf, and Mike Benroth, has finalized event locations, received and inventoried testing equipment, sent out sponsorship letters, and is currently recruiting judges and volunteers.

If you would like to get involved as a sponsor or volunteer, please email the committee at nssbc14@uakron.edu or visit their webpage at https://www.uakron.edu/engineering/beyond-the-classroom/student-design-teams/steel-bridge-competition.dot.

“The canoe team worked through November to finalize their mix design and cut the mold, and they began to collect materials needed to construct the canoe. The team hopes to pour the concrete for the canoe on January 11, 2014. However, the canoe itself is only another factor that is critical for a successful effort is to have accomplished rowers. “We were holding lake practice days but since the weather has turned for the worse, we have moved our efforts indoors,” said 2013 concrete canoe captain Austin Feucht. Our best wishes to all the ASCE teams as they head to regionals in the spring!
The Steel Bridge team’s sightseeing adventures in D.C. included the U.S. Capitol building.

giving our nation’s aging infrastructure a barely passing grade, it is important that we promote strong engineering education and invest in America’s deficient bridges to ensure the health of our domestic infrastructure.”

Our thanks to the team for representing UA at Steel Day, and our best wishes for continued success in 2014!

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roads in my neighborhood. I let them cure. Then I took one sample from each batch and hooked it up to a corrosion cell. I ran an electrical current through each of them. I used a Webcam to record when rust first appeared on the surface of the sample.” From the videos, Lisa found that the concrete sample prepared with more water in the mix corroded faster than the sample prepared with less water. “You could clearly see the rust showing,” said Lisa. “I repeated the experiment three more times and got the same results. It proved my hypothesis was right.”

Lisa presented her findings to Dr. Joe Payer (Research Professor of Corrosion & Reliability Engineering at UA), Dr. Patnaik, and the Corrosion Team at UA. Dr. Payer invited her to present her project at a UA/Department of Defense conference on corrosion. Lisa also showcased her project at several regional science fairs in 2012. Due to her success, Lisa was nominated for the Broadcom MASTERS (Math, Applied Science, Technology and Engineering for Rising Stars) competition, a national competition for students in grades six through eight designed to inspire and encourage the nation’s young scientists, engineers, and innovators, where she was selected as a finalist. While Lisa didn’t win the Broadcom MASTERS competition, her project attracted notice, culminating in her invitation to exhibit her research at a poster session of 122nd Annual Meeting of The Ohio Academy of Science in April 2013 and her selection as an AJAS delegate.

Freda believes that Lisa’s success wouldn’t be possible without the help from UA, Dr. Payer, Dr. Patnaik, the Corrosion Team, and especially Lewis, who supervised the project. “Dr. Binienda, Dr. Payer, Dr. Patnaik, the Corrosion Team, and Ms. Cressman [Director, Women in Engineering, UA] should be commended for the support and encouragement they provided my daughter.”

Our best wishes to Lisa for much success in her future efforts!

“AJAS” continued from page 8