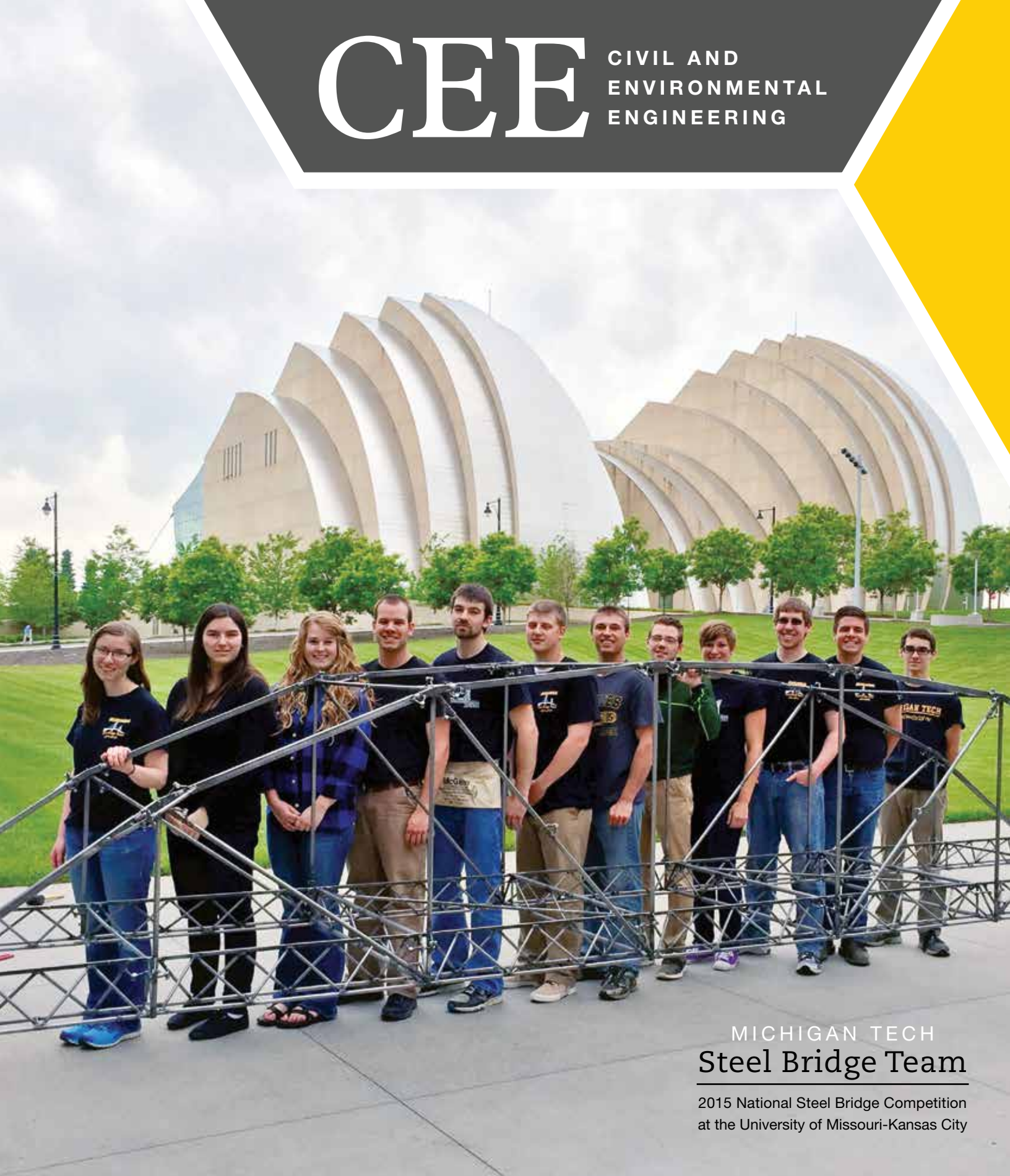


CEE

CIVIL AND ENVIRONMENTAL ENGINEERING



MICHIGAN TECH
Steel Bridge Team

2015 National Steel Bridge Competition
at the University of Missouri-Kansas City

Dear CEE Alumni & Friends,

Something our alumni have known for a long time but the rest of the world is finally catching up on is that Michigan Technological University is one of America's best small-town colleges (BestColleges.com). Not just for location, but also

Michigan Tech is one of the best academic institutions in the country where a student can come and feel part of the Michigan Tech family while getting one of the best hands-on training the world has to offer. It seems as though more and more companies are figuring this out based on our fall career fair numbers. Presently, civil and environmental engineering students at Michigan Tech have more career opportunities than I have ever seen. This past September, 370 companies visited us for Career Fair (yes, imagine some 370 companies trying to get hotel reservations in

Houghton). Over 120 companies were looking to hire civil and environmental engineering students for internships, co-ops, and full-time positions. I know of two companies alone that combined were looking to fill eighty entry-level civil and environmental engineering positions across the country. We do not have enough engineers to fill their demands, but from a student perspective, it is a good time to be a CEE Husky!

This past year, the new civil engineering (CE) curriculum was implemented and students seem to like the ability to concentrate more in one area of civil engineering. We still have a few minor changes to make but overall the new CE curriculum is a positive change. Every time I walk by the CEE capstone senior design lab, it is always filled with students

working and sharing ideas on their projects. Many thanks to General Motors for their generosity in providing funds for this lab as the students appreciate a nice modern place to get their work done. The steel bridge and concrete canoe teams continue their winning ways. Congratulations to those teams and many thanks to those companies and alumni that support the teams.

Our faculty and staff continue to excel in research and outreach programs working on over sixty projects with external expenditures over six million dollars in the past year. A few of the projects are highlighted in the newsletter. Several CEE faculty and students have received awards for their outstanding contributions to civil and environmental engineering.

As usual, our alumni continue to make a difference in our nation's infrastructure, Dr. Bernie Alkire ('61), engineering education; Don Anderson ('67), bridge and highway construction in Michigan; Terry Anderson ('69), highway infrastructure management; Kim Lobdell ('79), civil engineering transportation; Michael Malloy ('70), improving infrastructure in the southwestern US; Dr. Howard Perko ('93), advancing techniques in geotechnical engineering; Richard Anderson ('71), Distinguished Engineering Practitioner Award; Tom Irwin ('63), Michigan Department of Transportation Hall of Honor; and Wayne Bergstrom ('76), 2015-16 President Elect ABET. Congratulations to all of you!

Here at Michigan Tech we are always interested in hearing all of the great things alumni are doing from day to day. If you have any notable projects or awards you would like to share with us, just send us an email. On behalf of the students, faculty, and staff, I would like to thank all the CEE alumni for their support over the past year. Your contributions make a huge difference for our students.

GO HUSKIES!



David Hand • Class of 1980 • Professor & CEE Department Chair
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Michigan Tech Concrete Canoe //

The legacy of the concrete canoe team at Michigan Tech continues to be passed on and has grown to encompass students from many disciplines across campus. The Civil and Environmental Engineering Department continues to support the team at a significant level and has improved the facility used to construct the canoe.

This past year was an exceptional season for the Michigan Tech Concrete Canoe team. They successfully defended their title at the regional level and proudly earned an eleventh place finish at the ASCE National Competition in Clemson, South Carolina.

The theme for the 2015 canoe embraced what Michigan Tech and Houghton, Michigan are renowned for: winter! The canoe was named Talvi Sielu, Finnish for “Winter Soul,” and the display highlighted the winter activities and lifestyle of the Keweenaw, including hockey, ice fishing, and of course SNOW.

Talvi Sielu, built on the previous successes of past canoe designs, included further improvements to the hull. These developments were made to improve the canoe’s turning ability, along with design changes to embrace sustainability. The hull design provided a natural rise to the bow of the canoe when paddling—allowing for a smoother ride. Credit for Talvi Sielu is attributed to Sean Kuchta, who worked to make an innovative and advanced hull design.

For this upcoming year, the team plans to build upon the success and new knowledge gained from Talvi Sielu. The team will continue to improve the portland cement-based mix and the hull design committee aspires to improve the turning ability and paddler ergonomics by reducing the “bulge” used in previous years. The team is looking forward to a 2016 regional competition at Michigan State on April 7-10 with hopes of attending the ASCE National Competition hosted by the University of Texas, June 9-11. The CEE Department advisor of the concrete canoe team is Dr. Tess Ahlborn.

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2015 CONCRETE CANOE	AT A GLANCE
	Name: Talvi Sielu
	Width: 27.9"
	Length: 19'
	Depth: 15.6"
	Weight: 140 lbs



ON THE COVER

After finishing second regionally, the Michigan Tech Steel Bridge team traveled to the University of Missouri-Kansas City to compete at the national level during the American Society of Civil Engineers conference.

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Student Memorial Awards

The Civil and Environmental Engineering Department developed two memorial awards in 2006—the Nicole Bloom Award for Environmental Sustainability and the Danielle Ladwig Award for Graduate Excellence. The awards are dedicated in honor of two outstanding Civil and Environmental Engineering Department graduates.



THE NICOLE BLOOM AWARD FOR ENVIRONMENTAL SUSTAINABILITY

This award is made annually to an undergraduate civil or environmental engineering student who has demonstrated leadership, passion, and activism for effecting environmental sustainability at the local, national, or global level. This award is accompanied by the Pati Damoder and Soumitri Reddy \$1,500 undergraduate scholarship.

The 2015 Nicole Bloom Award was given to **Brent Cousino**. He will graduate with his baccalaureate in environmental engineering this spring and will continue on to complete a master's degree in civil engineering in spring 2016. Cousino was one of the student project managers for a senior design project instructed by Bill Leder. He led the environmental team on the design of a new state park at Piers Gorge on the Menominee River. Over the course of the project, Cousino showed outstanding leadership abilities and an impressive degree of tenacity, intelligence, and judgment in approaching the complex problems presented by the site. It was apparent during the field trip to the state park site that he is passionate about natural resources conservation. Some of his other activities include serving as the team captain for the Varsity Track and Field Team, two-time All-Conference Honors, and two-time All-Conference Academic Award. Cousino will be doing a summer internship this year with General Motors.



THE DANIELLE LADWIG AWARD FOR GRADUATE EXCELLENCE

This award is made annually to a graduate level civil or environmental engineering student in recognition of outstanding achievement in academics, research, and service, in memory of our friend and colleague, Danielle F. Ladwig. This award is accompanied by the Pati Damoder and Soumitri Reddy \$1,500 Graduate Fellowship.

The 2015 Danielle Ladwig Award for Graduate Excellence was given to two of our outstanding graduate students, Zoe Miller and Jennie Tyrrell. **Zoe Miller** is an environmental engineering master's student working in the area of stormwater modeling on a sponsored project studying sewer overflows in Cleveland. In her time at Michigan Tech, she has been a visiting student researcher at the University of Sonora in Hermosillo, Mexico; has been regularly involved in outreach events on campus through the Student Chapter of the Society of Hispanic Professional Engineers; and has participated at several national and regional conferences. Miller is from the Metro Detroit area and is planning to seek a consulting position focused on water resources engineering after completing her thesis in August.

Jennie Tyrrell is a civil engineering doctoral candidate working in the area of water resources to study scour reduction and sediment transport. She joined the Civil and Environmental Engineering Department in January of 2013. She is from Ft. Pierce, Florida and has over fifteen years of experience as a project manager with Richard K. Davis Construction Corporation. However, her doctoral research has taken her in a new direction in the area of water resources engineering where she is working on scour detection methods and flow velocities to forecast sediment transport. One of her interests in attending Michigan Tech was the opportunity to be involved with science, technology, engineering and mathematics (STEM) outreach. Tyrrell has been very active in volunteering with several groups including: the GEAR UP mentoring program with the Pre-College Innovative Outreach Institute, GET WISE for middle-school girls, Engineering Olympics, and Family Science and Engineering programs with Joan Chadde. She enjoys many outdoor activities in the summer including mountain biking and is learning to cross country ski and ice climb. After completing her PhD, Tyrrell hopes to weave her past industry work and current academic experience to serve as an educator, while investing in pre-college outreach opportunities.

Posthumous Degree Presented to the Family of Nathan Hayden



Department Chair, David Hand with Nathan's mother, Malinda, and siblings, Hunter and Alexis.

In December of 2014 the department lost an engaging civil engineering student, Nathan Hayden, to a tragic accident while he was working on an internship in Bay City, Michigan. He was active in the department and was a member of the men's rugby club team.

In October, a posthumous degree was presented to Hayden's family. It was a chance to celebrate his connection with Michigan Tech and his role in our campus community. During a special ceremony, the Hayden family was presented with his degree certificate by Vice President for Student Affairs and Advancement, Les Cook. We are honored to have been able to commemorate his connection with our department by presenting his family with the degree certificate.



GRADUATE TEACHING ASSISTANT OF THE YEAR AWARD

David Porter was voted the 2015 Graduate Teaching Assistant of the year by civil and environmental engineering students. Porter is civil engineering doctoral student working in the area of asphaltic pavements under Dr. Zhanping You. He has taught undergraduate labs related to civil engineering materials, CE3101.



DEPARTMENT SCHOLAR

Each year the department selects an outstanding undergraduate student to be considered for the University Scholar Award. **Jason Cattelino** was selected as the 2015 Civil and Environmental Engineering Department Scholar. Cattelino is a civil engineering student who is not only one of our top students with senior status with a GPA of 4.0, but is a true scholar at heart. Cattelino worked with Dr. Tess Ahlborn for over a

year as an undergraduate research assistant on MDOT funded research. He was able to provide proof of concept testing to use active thermography for detecting concrete delaminations on the underside of bridge decks, an area that is very difficult and time-consuming to inspect, using a technique that has not been used before for this type of an application. He was accepted to present his research findings at the American Concrete Institute Convention in April 2015. This travel was supported by a donation from Chevron to promote undergraduate research presentations.



GRADUATE RESEARCH AWARD

Xiao Sun, a civil engineering doctoral candidate, was recognized for his research in the area of transportation materials. He has been a very productive member of Dr. Qingli Dai's research team, publishing three refereed journal papers and two conference papers since beginning his studies with four more in review or final stages of preparation. He has contributed to two NSF funded projects, including work on the mechanisms of frost damage in concrete and smart wind turbine blades for vibration reductions.

Tess Ahlborn Brings Concrete Insights to India



Tess Ahlborn with S. Saraswati, president of the Indian Concrete Institute.

Michigan Tech is fortunate to have professors who are passionate about their specialties and their research. Not only are they teaching students to create the future, they are creating it themselves and have been doing so for a while.

Take Tess Ahlborn, for example. She is a professor of civil and environmental engineering at Michigan Tech, as well as an alumna. In 2014, Ahlborn was elected a Fellow of the American

Concrete Institute (ACI)—her second professional fellowship. The other is from the Precast/Prestressed Concrete Institute.

Last month, Ahlborn was also recognized as an ACI Ambassador to India. She flew to Kolkata, India, to attend and present at the Asian Concrete Federation Symposium on Ultra High Performance Concrete and the Fourth Asian Conference on Ecstasy in Concrete, organized by the Indian Concrete Institute

(ICI). As the keynote speaker at the Fourth Asian conference, Ahlborn discussed advances in ultra-high performance concrete in the US concrete construction market.

“There was a dual purpose for sending me,” says Ahlborn. “As the chair for the committee on Ultra-High Performance Concrete, ACI saw it as beneficial to have me attend the symposium as well as being a representative for the conference. We want to build good relations with the ICI, so this was a great opportunity.”

Since this was Ahlborn’s first time in India, she wanted to dive into the culture fully, which included dressing in a sari. “I wanted to embrace culture there as any other professional woman would,” she says.

ACI has been sending experts across the globe to promote and unify the concrete industry. The ACI wants to continue building a relationship with the ICI and help develop the industry in India by educating and training of the workforce.

Ahlborn brought her insights into India and its concrete industry back to the US, where she will share them in a discussion on strategic direction with ICI, at the ACI Convention in November in Denver.

Tribal Technical Assistance Program Honored for Excellence



Left to right: E. Aggo Akyea, Office of Business Opportunity and Equity Compliance (OBOEC) Director, Wisconsin DOT; Rebecca Burkel, Deputy Administrator of Statewide Bureaus, Wisconsin DOT; John Velat, Director, Michigan Tech TTAP; Joe Olson, Division of Transportation System Development Administrator.

Michigan Tech’s Tribal Technical Assistance Program (TTAP) has won a Tribal Excellence Award from the Wisconsin Department of Transportation. The award was presented at the Wisconsin Tribal Transportation Conference on November 3 in Green Bay.

Award recipients were recognized for providing exemplary contributions and services to building and enhancing partnerships with the Wisconsin DoT and Wisconsin’s tribal communities. TTAP provides technology, training, and information on tribal roads and bridges, tourism, recreation, and related economic development to tribal transportation and planning personnel. It is part of a nationwide program sponsored by the Federal Highway Administration and the Bureau of Indian Affairs.



Bhakta Rath Research Award //

Wind turbines appear simple, but it's the complex engineering behind the technology that makes harnessing the wind possible. Bridging the gap between mechanical details and large-scale infrastructure needs of wind turbine technology is also no easy feat. However, this is the research focus of Antonio Velazquez, who recently earned his PhD in civil engineering from Michigan Tech, and assistant professor Andrew Swartz. Their forward-thinking research on better monitoring systems for wind turbines earned the duo this year's Bhakta Rath Research Award.

The Bhakta Rath Research Award was established in 2010 by an endowment from Michigan Tech alumnus Bhakta Rath, and his wife, Sushama Rath. The award offers an opportunity to promote and reward excellence for "exceptional scientific and technological research in anticipation of the future needs of the nation while supporting potential advances in emerging technology." Each year a Michigan Tech PhD graduate student and his or her advisor are recognized.

The research, focused mostly on using wireless sensors to monitor the structural integrity and efficiency of wind turbines, has been published in high impact journals, including the Journal of Sound and Vibration and the Journal of Intelligent Material Systems and Structures. Swartz developed the wireless sensors during his dissertation and says they have a number of applications, including monitoring bridges, buildings, and anything that spins, like a helicopter or Ferris wheel. The sensors look for irregular vibrations and strain that can be caused by tower fatigue and many other specific structural symptoms that can lead to failure. The process of sorting the windy day vibrations from the mechanical failure vibrations can be tricky. Mathematical models are used to find patterns in the data, which helps clarify potential problems in the turbine infrastructure. The recorded data has to have a physical connection—like an irregular vibration recorded by the sensor has to connect to a wobbly blade instead of coming from a change in wind direction. The data itself doesn't always make that connection clear. The mathematical models the team developed shape the data into useful and statistically significant information.

"There are the obvious safety implications," Swartz says of applying the models to ensure the turbines are safe to use and work on; however, they can also help with more nuanced monitoring for preventive care to reduce the economic risks that come along with these structures. "With the blades and the gear boxes, there's a lot of moving parts that are very big, and they degrade over time and in random ways."

Both Swartz and Velazquez emphasize the link between the mechanics and infrastructure of wind turbine technologies. As the wind turbine industry expands—the Institute for Energy projects industry growth of twenty percent by 2030—the energy sector will need more collaboration between mechanical and civil engineers.



DISTINGUISHED TEACHING AWARD

Kris Mattila, associate professor of civil engineering, was awarded the 2015 Howard E. Hill Award for Outstanding Faculty of the Year in the Civil and Environmental Engineering Department. Dr. Mattila, who joined the faculty in 1994, teaches construction engineering courses. The Howard E. Hill Award, which recognizes excellence and passion for teaching, was established in 1994, and is determined annually by the CEE students. This is the fifth time that Dr. Mattila has been recognized with this award by the students in the Civil and Environmental Engineering Department for his excellence in teaching.



DAVID WATKINS

David Watkins was awarded the 2014 Editor's Citation for Excellence in Refereeing from the American Geophysical Union for outstanding service to the authors and readers of Water Resources Research.



Daisuke Minakata Wins Powe Award from Oak Ridge Associated Universities



One of the greatest needs facing mankind today is the safety and availability of water. Water scarcity, driven by climate change and other factors, presents major challenges to next-generation water infrastructures dealing with both planned and unplanned wastewater reuse.

A group of researchers, led by Michigan Tech's Daisuke Minakata, is developing innovative physical-chemical water treatment technologies and predictive tools using novel computational techniques.

For his efforts, Minakata has received a prestigious national award. Minakata, an assistant professor of civil and environmental engineering, has been named as a recipient of the 2015 Ralph E. Powe Junior Faculty Enhancement Award in the discipline of engineering and applied science.

The Powe award, given annually by the Oak Ridge Associated Universities (ORAU) in Tennessee, recognizes junior faculty for their outstanding work in engineering and applied science, life sciences, mathematics and computer science, physical sciences, policy management, or education. The awards provide seed money for research and are intended to enrich the research and professional growth of young faculty and result in new funding opportunities.

In his work, Minakata has been focusing on advanced chemical oxidation technologies called advanced oxidation processes (AOPs) that weaken known and emerging chemical compounds. At Michigan Tech, Minakata and colleague

Mark Rouleau, an assistant professor of social sciences, have been developing a model that predicts the fate of the organic degradation by products using a sophisticated computational approach.

"I greatly appreciate this honor and all the support I have received at Michigan Tech," Minakata says. He's confident of the importance of his ongoing research projects. "Anthropogenic chemicals, ones resulting from the influence of human beings, are present in water everywhere; and unfortunately many of these are not effectively treated by conventional water and wastewater treatment processes. Many anthropogenic chemicals are not biodegradable and are discharged into the environment via wastewater discharge."

Minakata says this affects natural environmental waters like the Great Lakes and people living downstream. He adds that it is especially critical in arid areas because of the urgent need for water reuse there. "Advanced water treatment technologies and assessment tools need to be developed and applied in engineered systems," he explains. "There are hundreds of thousands of chemicals in commercial production use and less than a hundred chemicals regulated by the Environmental Protection Agency, so the need for computational predictive tools is obvious."

Of the Powe award, David Reed, Michigan Tech's Vice President for Research says, "This is a highly competitive award; and I'm thrilled that another Michigan Tech faculty member has been selected." Minakata is the third Michigan Tech faculty member to receive the award in the past five years. Michigan Tech is a member of a consortium of more than 100 colleges and universities that comprise Oak Ridge Associated Universities, based in Oak Ridge, Tennessee.

Alex Mayer Receives 2015 Research Award

Water is perhaps the most controversial natural resource in the US. Alex Mayer recognizes that, for all its controversy, water is essential to life and society. Mayer holds the Charles and Patricia Nelson Presidential Professor position in civil and environmental engineering at Michigan Tech and studies water resources. For his dedication to studying water quality and scarcity—and his unique approach to these complex problems—Mayer won Michigan Tech's 2015 Research Award.

Dr. Dave Hand, Chair of the Civil and Environmental Engineering Department, nominated Mayer for the award.

"Alex is the complete package," Hand says, adding that Mayer is an exceptional teacher, strong researcher, and a valuable citizen in the campus community. In 2009, he received Michigan Tech's Distinguished Service Award. "His success lies in his in-depth knowledge of water issues in the natural environment and his ability to pull together the expertise required to solve complex problems."

Collaboration is indeed a hallmark of Mayer's research methods. He works not only across disciplines with other academics, but uses what is called participatory modeling to engage local community stakeholders.

"My research focuses on making water resources sustainable," Mayer says, explaining that sustainability requires buy-in from people in the community. Participatory modeling is based on building up local stakeholders' knowledge and involving them in developing water resource models. He adds that opening up people's worldviews is the most important, but perhaps most difficult, part of his work. "Everyone has their own kneejerk reactions when it comes to politics and culture and religion—you have to overcome those in order to work on solutions together."

Mayer applies this principle by transcending "the outside expert" model. When he and his colleagues come to a community struggling with water scarcity, Mayer says he doesn't lecture, he becomes a co-learner. The collaboration goes beyond interdisciplinary—it's transdisciplinary and connects to people outside academia. And for his part, he knows what he can offer: knowledge and expertise in understanding the water cycle and water infrastructure. With others offering similar skills in community development, agriculture, law, and local know-how, together they can more effectively sort through problems and pursue solutions.

That's why Mayer firmly believes in transdisciplinary work. He says it is key to engaging and empowering communities to learn the science and technical aspects behind water



scarcity and quality issues. Knowing that—and having the right tools, including the models Mayer helps develop—enables stakeholders to take action, whether that's installing better irrigation systems or monitoring local water quality. Currently, Mayer works in Southwestern communities, and is now part of a new project along the Rio Grande in New Mexico and Texas.

Even though much of his current research is far away, Mayer explains that the effectiveness of participatory modeling is an extension of the Michigan Tech campus community. The small size and rigor of research combine to make powerful interdisciplinary possibilities. He says receiving the 2015 Research Award is a reflection of the importance of transdisciplinary work at Michigan Tech, and a small, but proud smile crosses Mayer's face when he says he is honored to join the ranks of researchers he tries to emulate.

"I have to thank my colleagues for their patience as I learn about what they do—the languages they use in their disciplines, their thought processes and paradigms—it's definitely enriching, and I learn new ways to think," Mayer says, adding that collaborators outside his own field tend to ask the most challenging research questions. He also says it has humanized his research. "Collaborating with so many people helped me go from solving pure science problems to solving people problems."

And in the world of water resources, connecting with people makes all the difference.

Jennifer Becker, Eric Seagren Receive Wastewater Research Award

It's said that time heals all wounds. Time, as Michigan Tech researchers **Jennifer Becker** and **Eric Seagren** know, also has the power to inactivate disease-causing viruses, bacteria, and worms found in leftover organic matter from wastewater treatment. What Becker and Seagren want to know is—how much time?



The researchers are armed with a new Water Environment Research Foundation (WERF) award for their project: “High-Tech Analysis of Low-Tech Methods for Sustainable Class A Biosolids Production.” Becker, an associate professor of civil and environmental

engineering, and Seagren, a professor of civil and environmental engineering, will lead a team to establish a pilot-scale field test at the Portage Lake Water and Sewer Authority (PLWSA) in Houghton.

The \$37,000 award from WERF, the research arm of the Water Environment Federation, supports one part of a three-part research project that hopes to demonstrate how low-tech, low-cost biosolids treatment processes can be used to achieve Class A quality. Ultimately, the goal is to equip small-town water treatment superintendents and regulatory personnel across the nation with a mathematical formula that predicts pathogen die-off in the process. “We want to know how much time it takes to create Class A biosolids whose pathogens are virtually undetectable—or as I joke with my students, ‘you can roll around in it,’” Becker says.

GOING FROM B TO A

For more than 100 years, wastewater treatment plants, now called water resource recovery facilities (WRRFs), cleaned wastewater to protect human health and our lakes and streams—and by all accounts did a satisfactory job. The traditional process of removing organic matter and treating pathogens, however, is energy and infrastructure intensive and leaves communities with an abundance of Class B biosolids.

“The process of treating liquids creates a lot of solids,” Becker says. “Biosolids contain a lot of good stuff, including plant nutrients, and have many uses.”

Residual solids from wastewater treatment are called biosolids after they are treated to meet Environmental Protection Agency (EPA) requirements for application to agricultural and other

lands. If biosolids still have detectable levels of pathogens following treatment, they are categorized as Class B. If no pathogens are detected, the biosolids are labeled Class A.

Because of their detectable pathogen levels, application of Class B biosolids is restricted to land and mine reclamation and agricultural lands subject to site restrictions, management practices, and other requirements. Locally, land near Torch Lake once damaged by mining practices is now experiencing vegetation growth thanks to the application of Class B biosolids. In comparison, Class A biosolids have greater benefits and fewer restrictions and can be sold for use by farmers and homeowners as a fertilizer.

SUSTAINABILITY

More than eighty percent of WRRFs in the US serve a population of fewer than 10,000, according to the EPA's 2008 Clean Watersheds Needs Survey Report to Congress, cost-effectiveness, efficiency, and sustainability are growing concerns. This is particularly the case in an era of decreasing budgets and severe drought such as in the American West. In these times, forward-thinking WRRF superintendents are asking: is there a way to improve the water treatment process to meet these challenges?



Answering that question, as Becker and Seagren aim to do, should yield a high impact for WRRFs around the US. The pair was also recently awarded a \$400,000 Stormwater, Asset Management, and Wastewater (SAW) grant by the Michigan Department of Environmental Quality to

work with the Gogebic-Iron Wastewater Authority (GIWA) to evaluate and improve their biosolids treatment process. The SAW grant will establish a pilot-scale study at GIWA to parallel that at the PLWSA, in addition to a controlled lab study that will look at environmental conditions like temperature and moisture and how they impact pathogen reduction. The lab results will be used in developing the formula that WRRF superintendents and regulatory agencies around the nation can one day use to create low-cost, low-tech Class A biosolids.

“That’s the really cool part about this project: it’s driven by really smart superintendents who know how their plants work,” Becker says. “And they are constantly looking for ways to improve things.”



David Hand, left, and Zhanping You hold samples of crumb rubber from recycled tires.

Where the Rubber Meets the Rubber: Two Michigan Tech Studies Could Lead to Better, Greener Roads

Since the 1960s, Sun Belt states have built their roads using asphalt mixed with crumb rubber made from ground-up scrap tires. This rubberized asphalt not only provides a market for old tires, it is also quieter and longer lasting than conventional asphalt pavement, but will it work in a four-season climate; especially in places where winter comes early and stays late?

To find out, the Michigan Department of Environmental Quality (DEQ) awarded several grants to study rubberized asphalt, including two totaling \$1.2 million to Michigan Tech. One study aimed at studying emissions and the other will test a new technology that could, among other things, lower energy costs and make life easier for road crews.

Dr. David Hand, Chair of Michigan Tech's Civil and Environmental Engineering Department, leads the first study with \$336,214 from the state and matching funds from private sources. "Before the DEQ allows rubberized asphalt to be used on state roads, they want to know if adding crumb rubber to the hot mix asphalt will still allow us to meet Michigan's current air quality emissions standards," he said. "They want to make sure that nothing is being added to the pavement that could harm the environment. And they also want us to evaluate options for reducing the odors from asphalt plants."

The second study focuses on a new technology developed by Professor Zhanping You. With \$1.7 million, including \$855,860 from the DEQ and additional private support, You will be refining and testing a new, cooler way to make

rubberized asphalt. Conventional hot-mix asphalt uses a lot of energy and releases a lot of fumes. The warm-mix method uses a foaming process at lower temperatures, which requires less energy and reduces greenhouse gas emissions. "We've been doing research on both crumb rubber and warm-mix asphalt since 2006, and this new project is a great opportunity to combine both those technologies," he said.

The foam, made by injecting water into the asphalt, makes the mixture less viscous, so gravel can mix into it more easily. As it cools, his warm-mix asphalt also achieves a higher density than traditional asphalt pavement, and it can be made when the weather turns chilly, extending the construction season. Rubberized asphalt pavement already resists cracking in winter, and the warm-mix asphalt may make it even tougher. The lower temperatures should minimize the aging effect that heat has on many materials, causing premature failure.

Working with the local road commission in Keweenaw County, You's team installed the warm-mix rubberized asphalt this past July on the Mohawk Gay Road. It's hard to find a downside to rubberized asphalt, the researchers say. It turns a waste material—over eleven million tires are landfilled in Michigan each year—that is currently a burden to society, into a useful material for infrastructure, and it improves the pavement.

Alumni Engineers Recognized



Richard Anderson, P.E., a Michigan Tech civil engineering alumnus ('71), was awarded the 2015 Glen L. Martin Practitioner Service Award. The Glen L. Martin Practitioner Service Award is awarded to an engineering practitioner for distinguished service to or support of civil engineering education. The award was presented to Anderson at the annual conference of the American Society for Engineering Education (ASEE) in Seattle in June 2015.



On March 28, the ABET Board of Directors elected Civil and Environmental Engineering Department alumnus ('76), **Wayne R. Bergstrom, Ph.D., P.E., D.G.E.**, as its 2015-2016 President-Elect. Bergstrom is a Distinguished Engineer at Bechtel Infrastructure and Power Corporation. He has been active in his service to Michigan Tech through his participation on the Civil and Environmental Engineering Professional Advisory Committee (CEEPAC) and was a 2013 recipient of the ASCE's Excellence in Civil Engineering Education Leadership Award.

Michigan Department of Transportation – Hall of Honor



Thomas R. Irwin, P.E., '63, Michigan Tech Civil Engineering alumnus, was one of the 2014 honorees to join the Michigan Department of Transportation Hall of Honor. Irwin entered the highway construction industry in 1969. He has held prominent positions in transportation associations at the state and national level throughout his career.

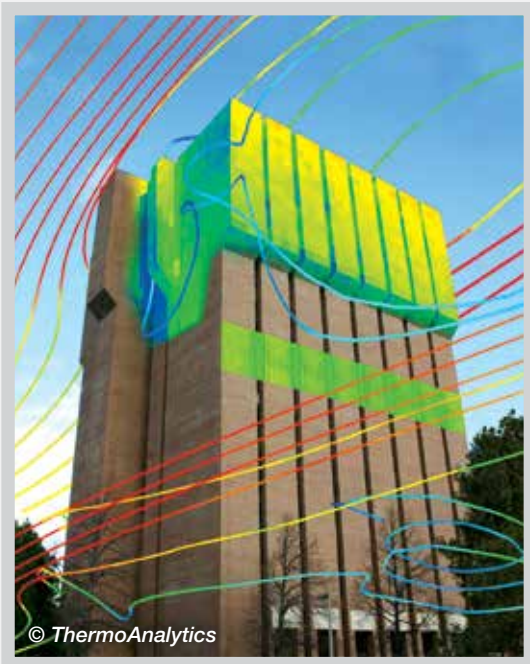
He was president and owner of Hodgkiss & Douma Inc. (H&D) from 1984 to 2005. Irwin believes in continuous knowledge growth and personal involvement to develop personally and encourage others to do the same. He is a past president of the Michigan Road Builders Association (now the Michigan Infrastructure Transportation Association), past president of

the Michigan Asphalt Paving Association (now the Asphalt Paving Association of Michigan), past state director of the National Asphalt Paving Association, past state director of the American Road and Transportation Builders Association (ARTBA), and past co-chair of ARTBA's environmental committee. He held the position of president on the Michigan Tech Fund board of trustees, serving on the board for eleven years. Irwin received Michigan Tech's Distinguished Alumni Award in 2014 and the Petoskey Regional Chamber of Commerce President's Award in 2003, among other awards throughout his years of service.

The Hall of Honor, a permanent display in the Van Wagoner Transportation Building in Lansing, was established in 1971 to honor individuals who have made outstanding contributions to developing Michigan's network of highways, roads, streets, transit systems, railroads, airports, and waterways. Honorees are elected by a committee representing a wide range of transportation industry organizations. With the inclusion of this year's honorees, a total of eighty-three people have been inducted into the Hall of Honor.

New Undergraduate Course Offering: Loads for Civil Structures

Civil engineering structural design is a decision-making process in which the engineer must choose the most appropriate structural system to meet a client's needs, design a suitable geometry for the support structure, and proportion members to provide adequate strength and stiffness to resist anticipated loads. Often, in the typical university structural engineering educational program, the loads used in class are presented as givens in order to allow students to focus on their early mastery of related topics such as structural analysis theory, member strength and limit states, as well as stability and serviceability concerns. In real life, the structural engineer is also responsible for determining the appropriate loads to apply to the structure, both those required by the applicable building code and those that will provide the level of performance expected by the owner.



In recent years, the field has accumulated knowledge of natural hazards and their associated structural responses have grown tremendously. These advances in knowledge have led to increases in the scope and complexity of building code requirements for structural loading, particularly for wind and seismic loads.

Recognizing these increases, the structural engineering group within the CEE Department decided to develop and offer a new course, focused on loads for civil structures. The course is intended to provide students with a knowledge base for the most commonly encountered loading types in building design.

The new course was offered as a special topics course in Spring of 2015, co-developed and presented by Professors Bill Bulleit and Andrew Swartz. The course topics included an introduction to natural hazards, a review of gravity and lateral load carrying systems, and load determination (using ASCE 7 as a text) of dead, live, snow, wind, and seismic loads. Thirty one students enrolled in the inaugural section of the course (a large number for a senior-level technical elective), indicating a significant demand among the students for a course of this kind. Due to the high level of interest from students, the department plans to offer the course again on an annual basis.

Michigan Tech is one of the first universities in the country to offer a course of this kind within their civil or structural engineering program. It is believed that innovative course offerings of this kind will help to maximize student success, minimize initial training for graduates, and provide them a solid technical foundation to build upon during their careers.

If alumni or friends of the department have questions about this course or wish to share their own thoughts and experiences, your perspectives are always welcome. Please feel free to contact Professor Bulleit (wbulleit@mtu.edu) or Professor Swartz (raswartz@mtu.edu).

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Academy of Civil & Environmental Engineers

The Civil and Environmental Engineering Academy Induction was held on October 2, 2015. The Academy was established in 1993 to recognize excellence and leadership in engineering and civic affairs of outstanding graduates and friends of the Civil and Environmental Engineering Department. Six alumni were honored bringing the Academy membership to 116. For a complete list of members and biographies please visit www.mtu.edu/cee/department/alumni/academy.



BERNARD D. ALKIRE, PHD, P.E. '61

Bernie Alkire completed his baccalaureate degree in civil engineering at Michigan Tech in 1961. After graduation, he served for two years in the US Army as a Lieutenant and then five years with the Michigan Department of State Highways as a Highway and Bridge Design Engineer before earning an MS and PhD in civil engineering at Michigan State. He returned to Michigan Tech as a faculty member in 1971. In his forty years in the Civil and Environmental Engineering Department, he taught a range of geotechnical, materials, and transportation related courses. In 2011 he retired from his academic career and is now an Emeritus Professor.



DONALD R. ANDERSON, P.E. '67

Donald Anderson completed his baccalaureate degree in civil engineering in 1967. He started his career with the Michigan Department of Transportation and later spent seven years with Midwest Bridge Co. In 1977 he joined with C-Way Construction Co., based in western Michigan. In 1986 when C-Way suspended operations in Michigan, Anderson and a partner, Gerrit TerLaan, decided to form their own company, AnLaan Corporation. AnLaan specialized in bridge construction, primarily in Michigan. The company was built from the ground up with a \$20,000 loan from each partner. In 2007, when three long-time employees purchased the company, the annual volume for AnLaan was \$30,000,000.



TERRY L. ANDERSON, P.E. '69

Terry Anderson completed his baccalaureate degree in civil engineering in 1969. After spending six years on active duty with the US Army he joined the Michigan Department of Transportation. His MDOT career spanned over thirty-two years, starting at the level of Transportation Engineer and retiring as a Senior Policy Executive in 2008. During his tenure, he helped to shift the focus to a more strategic management of the road systems. The "Preventative

Maintenance" program became recognized at the national level as a way of extending road life and allowed federal funds to be shifted for the first time toward maintenance of roads.



KIM M. LOBDELL, P.E. '79

Kim Lobdell completed her baccalaureate degree in civil engineering in 1979 at Michigan Tech and went on to earn a master's in business administration from the University of Wyoming. She is currently the President of KL Engineering, a civil engineering firm with three offices in Wisconsin. The firm specializes in transportation engineering projects and has approximately fifty employees. Lobdell began her professional career at General Motors but moved to

Wyoming to work for a small civil engineering consulting firm. Upon returning to Wisconsin in 1987, she was with Mead & Hunt for four years before starting her own practice, KL Engineering, in 1991.



MICHAEL W. MALLOY, P.E. '70

Michael Malloy completed his baccalaureate degree in civil engineering at Michigan Tech in 1970. He went on to join Gannett Fleming, Inc. as a staff engineer in his home town of Chicago. He moved up in the company serving as President and CEO of Gannett Fleming West, Inc. from 1987-2010 in New Mexico. He also served as the Vice President of Gannett Fleming, Inc., Director of Western Operations, from 2001-

2007 overseeing operations in Gannett Fleming's nineteen-state West Region. Currently, he is with WHPacific, Inc. in the New Mexico office as the Operations Manager and the Southwest Regional Transportation Director overseeing projects in New Mexico, Arizona, Colorado, and Texas.



HOWARD PERKO, PHD, P.E. '93

Howard Perko completed his baccalaureate degree in civil engineering at Michigan Tech in 1993. From there he went on to earn MS and PhD degrees from Colorado State University. He received research grants from NASA and is currently serving as a NASA Discovery Mission Specialist Reviewer. He also is an instructor at Colorado State University, co-teaching a graduate course in "Civil Engineering Entrepreneurism and Project Management." Dr. Perko's main career has been that

of a consulting civil engineer, founding two engineering firms which were ranked the sixth fastest growing businesses in Northern Colorado. In 2009, he was recruited to the position of Director of Engineering for Magnum Piering, Inc., a leading manufacturer of foundation products.

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THINK BIG Campaign

As a way to both promote go.cee.mtu.edu, a web-based mobile application, and to introduce high school students to the career opportunities available in the field of civil and environmental engineering, the Department launched the “Think BIG” campaign. The campaign was delivered to high school students and guidance counselors, featuring civil engineering alumnus Kevin Roell ('09) and his work on the historic Ore Dock for the City of Marquette on behalf of GEI Consultants. From the post card, students learned about the hands-on courses and small class sizes within the department and the countless interview opportunities available to students attending the career fair. Students further engaged with the department by going to our mobile application (go.cee.mtu.edu) to learn more about Roell and to view industry specific videos.

Like the campaign, the goal of the mobile application is to show high schoolers and other potential students that civil and environmental engineering includes bridges and buildings, water and wastewater, soil, roads and rails, construction, and everything in between. Our Department covers a broad range of topics and we have alumni working in every sector to improve and enhance the quality of life.

The application is managed internally in the Department, but the ultimate goal is to generate student and alumni engagement. If you know of a student or area high school that could benefit from the latest CEE industry news or technology release, we hope you will consider sharing our web-based mobile application.

While the application currently focuses on industry news, we would love to post about a project our current students or alumni are working on through a short write-up, photo, and/or video to show the amazing things our student interns and graduates go on to accomplish after earning their degrees at Michigan Tech!

To share a video or photo of a project you have or are conducting in the field, please email the information to ceeapp@mtu.edu.



Read the full article and explore the many articles, photos, and videos at:
GO.CEE.MTU.EDU/BIG

CEE CIVIL AND ENVIRONMENTAL ENGINEERING



iDesign //
iDesign is an international senior design opportunity in CEE that engages students with rural communities in Panama. In August, twenty-one students assisted with design of a pedestrian bridge and several water supply/distribution projects.

Learn more: mtu.edu/d80