

# THE BRIDGE

Missouri S&T  
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Civil, Architectural and Environmental Engineering

Steel Bridge Team  
qualifies for nationals

page 13

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# From the interim chair

**Joel G. Burken, Ph.D., P.E., BCEE**

The academic year 2015 to 2016 was unsettling in many ways for the Department of Civil, Architectural and Environmental Engineering. There were four announced changes in departmental leadership, followed by five simultaneous faculty searches. During unsettling times, keeping an eye on the horizon was difficult yet rewarding. We kept focus on our vision in regard to the department's strategic plan, remembering what was important and accomplishing great things. Here are a few noteworthy activities and achievements.

The expansion of Butler-Carlton Hall is closer to becoming a reality. When completed, the Advanced Construction and Materials Laboratory (ACML) will add over 12,000 square feet to our world-class research and teaching facilities we currently have of the planned \$6 million addition.

As noted above, we are in the midst of five faculty searches, which will enhance our department's education and research portfolios. Many faculty and staff put forth great effort to organize the multitude of interviews. Be on the lookout for "new faces" in our next issue of *The Bridge*.

We have also made great strides in our mentoring and experiential learning programs using a variety

of methods to connect students and recent graduates with alumni (see page 18).

In February, **Bob Brinkmann**, CE'71, founder and CEO of Brinkmann Constructors, gave a workshop on creativity and leadership to our student organization leaders, innovative undergraduate researchers and members of the University Innovation Fellows Program.

We are also proud of our student design teams. In May, the Steel Bridge Team qualified for nationals as a top team at the regional competition hosted in Rolla this year and the Concrete Canoe Team finished seventh (see page 13). As always, I am impressed with the tenacity of our students and this year was no exception. Their perseverance and hard work yielded one of the "best ever" ASCE Mid-Continent Student Conferences.

Many good things are marching on, as always, in Rolla.

Please keep in touch. Join us on LinkedIn to track some professional news and share opportunities at: <https://www.linkedin.com/groups/8526197>. Also like our Facebook page (MissouriSandTCaRE) to learn more about day-to-day events and great news from our team at Missouri S&T.



RELISHING THE MOMENT: Bob Brinkmann, pictured center, shares his presentation on creativity and leadership with a group of student leaders.



## MINER CONNECTIONS

Last January, Dr. Robert Holmes, CE'87, MS CE'89, had the privilege of working with Dr. David Mueller, CE'81 (pictured above left), getting his hydroacoustic instruments set up on his research boat before a day of data collection on the Mississippi River in Vicksburg, Miss.

### DEPARTMENT ADMINISTRATION

#### Interim Department Chair

Joel Burken, Ph.D., P.E., BCEE

#### Assistant Chairs

Civil: Genda Chen, Ph.D., P.E., FASCE

Architectural: Stuart Baur, Ph.D., A.I.A.

Environmental: Mark Fitch, Ph.D.

Graduate Program: Cesar Mendoza, Ph.D.

#### Undergraduate Advising Center Director

Eric Showalter, Ph.D., P.E.



[www.facebook.com/MissouriSandTCARe](http://www.facebook.com/MissouriSandTCARe)

## Wei-Wen Yu International Specialty Conference on Cold-Formed Steel Structures

Nov. 9-10, 2016 • Baltimore, Md.

<http://ccfsonline.org>

# THE BRIDGE



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Miners host the "Best Ever" Mid-Continent Student Conference in April — an engineering design event attended by some 16 university teams from states bordering Missouri.

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RE-CAST  
TIER 1 UNIVERSITY  
TRANSPORTATION CENTER

# Research makes its way Down Under



Dr. John J. Myers, acting vice provost and dean of the College of Engineering and Computing, professor of structural engineering and RE-CAST focus leader, gave a series of five technical presentations at the Second International Conference on Performance-based and Life-cycle Structural Engineering (PLSE 2015) in Brisbane, Queensland, Australia, and the Eighth International Structural Engineering and Construction Conference (ISEC-8) in Sydney, New South Wales, Australia. His technical presentations promoted RE-CAST — Research on Concrete Applications for Sustainable Transportation — Tier 1 University Transportation Center work to a broad new audience and included presentations on strengthening of reinforced concrete beams in shear with fiber-reinforced cementitious matrix, the creep and shrinkage of ecological self-consolidating concrete, the effect of accelerated curing on abrasion resistance of HVSCM-SC, the influence of near-surface mounted (NSM) FRP with cementitious material on the out-of-plane behavior of reinforced masonry walls, and the live-load distribution factors and service response of Missouri Bridge A7957.

These presentations and technical papers included Missouri S&T Ph.D. student co-authors **Zena Aljazeerai**, **Hayder Alghazali**, **Zuhair Al Jaber** and **Eli Hernandez**.

Australia's third-largest city  
Population: 2.31 million (2015)



# Concrete, reimagined

by Mary Helen Stoltz



**D+**. That's the barely passing cumulative grade the American Society of Civil Engineers gave U.S. infrastructure in its 2013 Report Card. A full national economic recovery will require serious infrastructure rehabilitation, and Missouri S&T researchers have come up with some innovative ways to accomplish it, using environmentally sustainable and resilient approaches.

**Dr. Kamal H. Khayat**, the Vernon and Maralee Jones Professor of Civil Engineering and director of S&T's Center for Infrastructure Engineering Studies, is leading a team of investigators in the Advanced Materials for Sustainable Infrastructure signature area. They're working to make high-performance, environmentally friendly construction materials to improve the nation's deteriorating infrastructure.

Concrete typically includes four key components: Portland cement (the "glue" matrix after reaction with water), water, fine aggregate (sand) and coarse aggregate (crushed rock or gravel). But Missouri S&T researchers are adding new materials to the mixture, like recycled concrete aggregate, fly ash (a by-product of coal plants), fibers like ground-up tires, fillers such as ground limestone and glass, as well as chemical admixtures. They're then testing how well the new sustainable materials perform under different environmental conditions and structural loads.

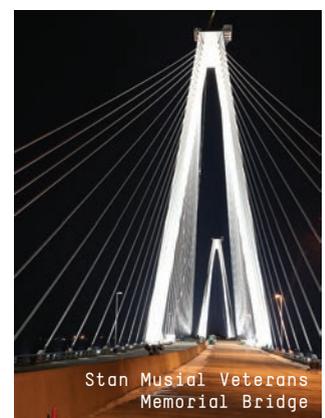
In one such project, S&T researchers are studying the behavior of high-performance concrete with adapted rheology (HPC-AR). Rheology involves flow behavior of

the material that cannot be measured with traditional test methods. HPC-AR is used for the construction of bridges, airports and rail systems, port and harbor facilities, and nuclear power plants.

"Unlike conventional concrete, HPC-AR such as self-consolidating concrete requires no mechanical consolidation and can flow readily into place to properly fill the formwork," says Khayat, who also serves as director of the RE-CAST University Transportation Center led by Missouri S&T. "This new class of HPC can lead to quicker construction, a greater level of automation and improved productivity."

The researchers are also investigating ultra-HPC, which has a compressive strength of up to 10 times that of conventional building materials, and "eco-crete," which contains a high volume of recycled materials.

Working with Missouri S&T's researchers, the Missouri Department of Transportation (MoDOT) used eco-crete with up to 40 percent recycled concrete aggregate (RCA) to build a portion of the approach to the Stan Musial Veterans



*(continued on page 7)*

# Flooding hampers holidays



This aerial photo shows the flooding at I-44 and MO Hwy. 141 interchange in the St. Louis suburb of Valley Park, Mo.

Source: Civil Air Patrol

Excessive heavy rainfall (upwards of 20 inches in certain locations) resulted in major flooding in parts of central and southeastern United States during December 2015 and January 2016.

Total damages from these floods were in the hundreds of millions of dollars. Missouri had 16 deaths due to the flooding and 37 counties and the City of St. Louis being declared a Federal Disaster Area. The transportation system, particularly in the St. Louis area, was hampered by road closures as I-55, I-44 and I-70 were inundated with floodwater.

**Dr. Robert Holmes, CE'87, MS CE'89,** was all too aware of the holiday flooding. In his position as the National Flood Coordinator for the U.S. Geological Survey (USGS), Holmes is responsible for ensuring the USGS operational and scientific response is meeting the needs of agencies like the National Weather Service (flood forecasting), the Army Corps of Engineers (flood control operations), and Federal Emergency Management Agency (emergency response and mitigation). He also has a role in guiding the USGS flood science efforts, particularly in understanding flood risk and mitigation.

This not only includes the magnitude and frequency of flooding at our 8,500-plus streamgages across the country, but helping guide our hydraulic modeling efforts that allow us to assist the water resources community in better preparing and mitigating for flooding.”

As part of his position, Holmes serves as a technical spokesperson for USGS nationally on flood science issues. During the flooding he did numerous interviews with national media outlets, including several live interviews on the Weather Channel during December and January.



Dr. Robert Holmes doing a live Weather Channel interview via Skype from a USGS research boat on the Mississippi River in St. Louis on New Year's Eve.

“I spend a great deal of time, both before and during floods, working across the spectrum of agencies (federal, state, and local) with our USGS Water Science Centers across the country to ensure that USGS is well positioned to collect the data and conduct the science that is crucial to understanding all facets of flooding.

“As an adjunct professor of civil engineering, I view these interviews similar to how I view my role in the classroom at Missouri S&T. It is all about informing and educating people. I try to help people better inform themselves about floods so that they better understand their risk. The federal and state governments can only do so much to prevent flood damages and loss of life. In the end, it comes down to local people, not only making good personal decisions on where to build, but serving in local elected positions that influence policy on where to build.”



View the full interview: <http://rol.la/holmes16>



**“Our main objective with eco-crete is to use at least 50 percent recycled materials, including industrial by-products, to reduce the cement content needed to make concrete. This will reduce the embodied energy and carbon footprint of concrete production.”**



**— Dr. Kamal H. Khayat**

Vernon and Maralee Jones Professor of Civil Engineering  
Director of S&T's Center for Infrastructure Engineering Studies

Memorial Bridge in downtown St. Louis. They used RCA recovered during the renovation of Lambert-St. Louis International Airport.

MoDOT built a 22.5-foot-wide ramp in four sections: a control section made with conventional concrete and three other sections made with concrete that incorporated different levels of RCA.

Missouri S&T researchers are monitoring the eco-crete's performance using various sensors embedded in the pavement. They hope to demonstrate that this environmentally friendly concrete can perform well in the long term.

“Our main objective with eco-crete is to use at least 50 percent recycled materials, including industrial by-products, to reduce the cement content needed to make concrete. This will reduce the embodied energy and carbon footprint of concrete production,” says Khayat. “It is also an effective way to reuse waste generated from demolitions – to keep it out of landfills and conserve non-renewable natural resources.”

One of the weak links in concrete is the quality of the interface between the hydrated cement paste and aggregate. Missouri S&T researchers are investigating ways to strengthen concrete by coating coarse aggregate with materials-engineered polymers before adding them to the cement mortar.

“The polymer molecules strengthen the contact with tether groups that act like a glue, as barriers to cracking between the aggregate and matrix,” says Dr. Thomas Schuman, professor of chemistry. “Polymers have entanglement. It's a bit like trying to remove one string of Christmas lights from a bunch – long cords with knobby protrusions.”

Schuman hopes to improve the strength of the matrix-aggregate interfaces to create tougher composite material that resists cracking, performs better structurally and has a longer service life.

“Concrete initially contains a lot of water to hydrate the matrix and bond with the aggregate,” says Schuman, but the bond can be porous and weak. “Polymers bond well to both the aggregate and the matrix and fill voids, so they can reduce the concrete's porosity and add strength and flexibility to reduce crack initiation and propagation.”

Schuman worked with Dr. K. Chandrashekhara, Curators' Professor of mechanical and aerospace engineering, and Dr. Jeffrey Volz, former assistant adjunct professor of civil, architectural and environmental engineering, to evaluate the engineering properties of the novel polymer-modified concrete.

photo by Sam O'Keefe



Mahdi Valipour, a Ph.D. candidate in civil engineering, works in the Advanced Construction and Materials Laboratory in the Center for Infrastructure Engineering Studies (CIES).



# 2015 Winter Commencement

## Alumni honored with professional distinction

The following two civil engineering alumni received the Award of Professional Distinction at winter commencement ceremonies.

### Ranney McDonough

**Ranney McDonough**, president of McDonough Engineering Corp., earned a bachelor of science degree in civil engineering from Missouri S&T in 1966 and was commissioned as an officer in the U.S. Army Corps of Engineers, serving in III Corps Vietnam from 1967 to 1968. Capt. McDonough flew combat missions for the 187th Assault Helicopter Company and single ship missions for the 25th Aviation Company. Combat missions were generally north of Saigon in the "Iron Triangle" area and occasionally into Cambodia. He was awarded the Air Medal with 17 oak leaf clusters by the U.S. Army, and was presented certificates of commendation from the South Vietnamese government or combat flight assignments. McDonough began his civil engineering career in 1969 in Houston, Texas, and in 1977, he established McDonough Engineering Corp., a civil engineering design firm. The firm provides design and project management services for public and private-sector clients primarily in the Gulf Coast area. McDonough has led the successful completion of over 2,000 civil engineering design and surveying projects throughout the Gulf Coast Region. For many of these projects, he has served as design engineer or principal in charge. McDonough is a licensed professional engineer in Texas, Louisiana, Oklahoma and Utah, and is a registered professional land surveyor in Texas. He is a member of the Missouri S&T Academy of Civil Engineers and the Order of the Golden Shillelagh, an honor member of Chi Epsilon, and a life member of the American Society of Civil Engineers. In 2012, he established the McDonough Engineering Corp. Endowed Scholarship for undergraduate civil engineering students. McDonough and his wife, Linda, live in Houston, Texas.



### David Wisch

**David John Wisch**, a Fellow at Chevron Corp. and the company's global technical authority for civil, structural and marine engineering, earned bachelor of science and master of science degrees in civil engineering from Missouri S&T in 1975 and 1977, respectively. His career has spanned operations, design and construction, standards leadership, and technology development primarily for offshore facilities. Wisch has been involved in numerous first-of-its-kind offshore developments, including engineering oversight for the world's deepest self-standing structure. He has worked and led standards activities in both the United States and internationally for over 35 years. Wisch joined Texaco in 1977. He was appointed a Texaco Fellow in 1997 and a Chevron Fellow in 2001 and served as chair of the Texaco/Chevron Fellows for 10 years. As one of 12 Fellows, he began the design, development and implementation of the Mentoring Excellence in Technology (MET) program, which he coordinated for six of its 10 offerings, successfully guiding the program through the Chevron Texaco merger. He also develops and teaches civil and structural courses for the Chevron Horizons program, a competency-based employee development program for all new technical employees with five or fewer years of industry experience. An active member of the American Petroleum Institute, he has been active in its offshore structures and standards activities for 30 years. He has chaired numerous task forces and subcommittees, including a task group in response of mooring failures during hurricanes Ivan, Katrina and Rita. He is a member of the American Society of Civil Engineers, the International Organization for Standards, received the Minerals Management Service Award and served on the National Academies Marine Board. Wisch is a member of the Missouri S&T Academy of Civil Engineers and the Academy of Miner Athletics. He and his wife, Leslie, live in Richmond, Texas.





# ment

photos by Sam O'Keefe

## Burken named Curators' Professor



### Dr. Joel Burken

Dr. Joel G. Burken, interim department chair and professor of civil, architectural and environmental engineering, has been named Curators' Professor of civil, architectural and environmental engineering. He is the first Curators' Professor appointed in the department since Dr. Franklin Cheng in 1987.

The University of Missouri System Board of Curators bestows the Curators' Professor title upon outstanding scholars with established reputations in their field of study. Burken is internationally recognized in the environmental engineering field.

## Sneed named American Concrete Institute Fellow

Dr. Lesley H. Sneed, associate professor of civil, architectural and environmental engineering, has been named a Fellow of the American Concrete Institute (ACI).

Fellow status is granted to ACI members who have made outstanding contributions to the production or use of concrete materials, products and structures for education, research, development, design, construction or management. In addition, Fellows have made significant contributions to ACI through committees or local chapters.

In the fall 2015 semester, Sneed taught Civil Engineering/Architectural Engineering 5220: Advanced Concrete Structures Design.

Her research interests include reinforced and pre-stressed concrete structural members and systems; structural models and experimental methods; innovative methods of repair and strengthening of structures subjected to seismic loading or other extreme hazards; evaluating existing structures; and design codes for structural concrete.

## Oerther earns AAEEES award

Dr. Daniel B. Oerther, the John A. and Susan Mathes Chair of civil, architectural and environmental engineering, has earned the Superior Achievement Award from the American Academy of Environmental Engineers and Scientists (AAEES) for his work to improve water quality in the Ixcán region of Guatemala. The award was presented in April at the academy's annual Excellence in Environmental Engineering and Science celebration at the National Press Club in Washington, D.C.

The award recognizes Oerther's work to improve water quality in the Ixcán region of Guatemala through a collaboration with student researchers, the public health service of Guatemala and a non-governmental organization based in Guatemala. Oerther was selected for the quality of his integrated approach and the observation that his solution contributed to both social good as well as the economic advancement of the villagers he sought to serve.



# Going with the FLOW

Missouri S&T professor  
aims to improve self-  
consolidating concrete

by Joe McCune

**A** Missouri S&T researcher is studying how to make concrete that can be placed without a lot of human intervention, and that can be poured in hard-to-reach places where people can't easily manipulate it.

**Dr. Dimitri Feys**, assistant professor of civil, architectural and environmental engineering at S&T, is working with self-consolidating concrete to produce beams that can be used to construct bridges, parking garages or other construction. Self-consolidating concrete is a type that flows easily in concrete forms or molds.

"The main use of this concrete is in Japan and Europe — 100 percent of the pre-cast industry in Denmark uses this type — and it slowly is making its way in the U.S. market," he says.

But there are challenges, Feys says. Chief among them is figuring out a way to keep the concrete homogenous throughout the produced structural element. That's important because the aggregate — the gravel or rocks used in the mixture — need to be uniformly distributed to ensure even strength throughout the product. If the gravel sinks to the bottom as the concrete flows through the form — known as dynamic segregation — it negatively affects the finished product's quality in strength and durability.

Professor Dimitri Feys is studying ways to make self-consolidating concrete suitable for bridge building and other construction projects.



Feys works with Coreslab Structures in Marshall, Mo., which has made 30-foot beams and 60-foot beams for the project. In a February test, they poured a 60-foot beam. “It went good, but not perfect,” Feys says. “It seems like the 60-foot flow distance is a step too far.”

The distance problem needs to be explained as a function of time, he says.

“Fresh concrete properties change with time and as a function of how fast it flows,” Feys says. “If it flows fast, it remains fluid or can even become more fluid. If it stops, or flows slowly, it stiffens. That stiffening is a function

of mix design and temperature. Since we are using a rapid-hardening cement and self-consolidating concrete, this concrete is more sensitive to stiffening.”

Feys can manipulate the concrete’s rheology, or flow, by changing its ratio of cement, aggregate, sand and water. And he can further change its properties by adding super-plasticizers, primarily polycarboxylate, which are essential for the concrete to flow easily. The challenge is to incorporate the proper amount of super-plasticizer for flowability while keeping the aggregate well dispersed.

He uses core samples to test the beams for gravel distribution, strength and an adequate distribution of air bubbles, essential for freeze-thaw durability. Feys and Dr. Julie Ann Hartell, assistant professor of civil and environmental engineering at Oklahoma State University, used ultrasound testing techniques on the produced beams to evaluate homogeneity.

“Inferior properties in specific zones of pre-cast beams can lead to reduced durability, leading to a premature need for repair or replacement, which in the end will cost taxpayers more money,” Feys says.

The ultimate goal is to make self-consolidating concrete a common product used in the U.S., he says.

Research team members from Missouri S&T are **Jason Cox**, senior research specialist; **John Bullock**, engineering technician I; **Aida Margarita Ley Hernandez** of Culiacán, Mexico, a graduate student in civil engineering; and **Sara Vanhooser** of O’Fallon, Mo., a senior in civil engineering.

The project is funded by the U.S. Department of Transportation through the Research on Concrete Applications for Sustainable Transportation (RE-CAST) consortium, in which Missouri S&T partners with Rutgers University, Southern University, the University of Illinois at Urbana-Champaign and the University of Miami.

Feys works with Coreslab Structures in Marshall, Mo., which has made 30-foot beams and 60-foot beams for the project.



# Gheni receives national Chi Epsilon Fellowship



**Ahmed Gheni**, Missouri S&T's Chi Epsilon Chapter vice president, has been selected as one of three 2016 National Chi Epsilon Graduate Fellowship recipients.

Since his initiation into Chi Epsilon in spring of 2015, Gheni has been actively involved in S&T's chapter. As social chair in fall 2015, he was responsible for preparing the

logistics of Chi Epsilon's meetings and organizing social events to improve "sociability." As vice president in spring 2016, he invited and coordinated speakers for Chi Epsilon's biweekly meetings. The speakers were from a variety of areas in the civil engineering profession and were invited to share their experiences and give solid career advice to members.

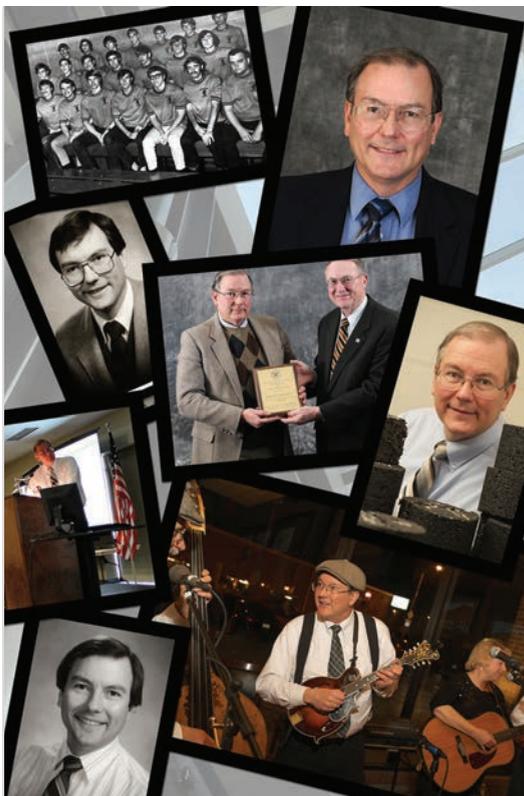
Applications for the Chi Epsilon National Fellowship were subjected to a technical review by the Missouri S&T chapter faculty advisor before being forwarded to the district councilor for merit review and ranking.

The top two candidates from each of the ten districts were then sent to the Chi Epsilon

National Office for additional consideration by the finalist selection committee. Gheni was chosen from among these national finalists as one of the three recipients across the U.S. of the 2016 Chi Epsilon Graduate Fellowship.

Gheni is currently pursuing his Ph.D. degree at S&T as a research assistant working with **Dr. Mohamed ElGawady**, associate professor and Benavides Faculty Scholar of civil, architectural and environmental engineering. His research involves post-tensioned masonry walls and using crumb rubber that comes from scrap tires to produce more ductile and sustainable construction materials.

Pictured above: Jerry Bayless congratulates Ahmed Gheni on his fellowship.



## Richardson retires

**Dr. David Richardson**, CE'71, MS CE'73, PhD CE'84, has retired after 31 years as an associate professor of civil, architectural and environmental engineering at Missouri S&T. Upon his retirement, Richardson was named a Chancellor's Professor. He will continue to teach one course per semester, continue his professional technical society activities with the American Concrete Institute, conduct the Superpave short course program, and direct the Asphalt and Concrete annual conferences.

Richardson is a registered professional engineer in two states, a member of the American Society of Civil Engineers and an ACI certification examiner. He has over 40 years of experience in construction materials, including positions with design and construction firms, departments of transportation, and university education and research positions, as well as sole ownership of a commercial testing laboratory and partner in a consulting firm.

During his teaching career, Richardson received 13 Outstanding Teaching Awards — officially tying with **Dr. William Andrews** for the most teaching awards in our department's history.

# ASCE MID- CONTINENT STUDENT CONFERENCE



## S&T's Steel Bridge team earns second, qualifies for nationals

Missouri S&T's Steel Bridge Design Team earned second place at the American Society of Civil Engineers' 2016 Mid-Continent Student Conference that S&T hosted in April. By doing so, the team qualified to compete at the national event, which was held May 27-28 at Brigham Young University in Provo, Utah.



During the competition, the team raced to construct its bridge as fast as possible. The bridge was scored on its weight and rigidity, construction speed and the number of team members building the bridge. Each bridge was also "load tested" to prove its weight-bearing abilities.

At the national event, approximately 50 teams competed to construct their bridges against the clock. Infractions, such as dropping bolts, holding two pieces of the bridge at once or stepping over designated safety lines, incurred time penalties.

Missouri S&T's Concrete Canoe Design Team also competed at the regional conference and earned seventh place. After passing a "swamp test," designed to test the buoyancy of the canoe, the team had to paddle its concrete boat in proof-of-concept women's, men's and combined sprints and endurance races to prove its construction integrity.





Lee Voth-Gaeddert, pictured left, with Dr. Daniel Oerther.

# Utilizing opportunity to make opportunity

For doctoral student **Lee Voth-Gaeddert** and his advisor, **Dr. Daniel Oerther**, research takes many forms. Whether it is analyzing data on a computer in a comfortable laboratory, sleeping on dirt floors in developing countries around the world, providing policy recommendations for the United States Department of State in Washington, D.C., or living in small spaces in Rolla, Mo., their approach is anything but typical.

Voth-Gaeddert and Oerther study poverty, in all shapes and forms. Currently their focus is on the link among child stunting and access to water, sanitation and hygiene in Guatemala. For his doctoral dissertation, Voth-Gaeddert is working with the United States Mission to Guatemala. Meanwhile, Oerther is continuing his work with the Secretary's Office of Global Food Security at the Department of State in Washington, D.C. Their path to this point showcases a unique style of empowerment pedagogy known as "co-learners." This approach shatters the traditional asymmetrical power relationship typical of faculty and students, and places both teacher and learner as pilgrims on the quest for knowledge.

Voth-Gaeddert first experienced the unique approach of Oerther's while completing two undergraduate research projects — micro-task-based job creation for villagers in Africa and the improvement of water filters for communities in Guatemala. After graduating from Missouri S&T with his bachelor's degree in civil engineering, Voth-Gaeddert began graduate studies working towards a master's degree in environmental engineering. Voth-Gaeddert's first trips overseas with Oerther included visits to India, Brazil and Bolivia. However, to build his perspective of domestic poverty issues, Oerther encouraged Voth-Gaeddert to live in a local trailer park in Rolla, between his international trips. Following an approach Oerther calls, "choose intentional living," Voth-Gaeddert focused on studying his physical environment and engaging the social environment by working with the community in which he became embedded.

"I was growing my knowledge of international development through my studies, but I wanted to experience a different socio-economic bracket in America," Voth-Gaeddert says. "While I was living in the trailer park in Rolla, one of the critical pieces of knowledge I gained is that being poor is expensive. When you live paycheck to paycheck, unexpected costs can make any exit strategy seem impossibly far away."

Though Voth-Gaeddert admits that living intentionally isn't easy, he's found some bright spots.

"I met some of the most wonderful people in that neighborhood," says Voth-Gaeddert.

In the summer of 2014, after having experienced the lower end of the socio-economic spectrum in America, Oerther invited Voth-Gaeddert to join him for a year-long living-learning experience in Washington, D.C. While Oerther worked in the Secretary of State's Office of Global Food Security as a Jefferson Science Fellow of the National Academies, Voth-Gaeddert invested his time in learning about the breadth of development agencies by completing four internships at the Millennium Challenge Corporation (MCC), the United States Agency for International Development (USAID), the United States Department of State, and the United Nations Food and Agriculture Organization (UN FAO).

"I learned that MCC works bilaterally with other nations implementing grants from the U.S. government over periods of five years. The goal of the grants is to alleviate bottlenecks to economic growth such as poor roads, a lack of electricity, or poor agricultural practices," says Voth-Gaeddert. "At MCC my job was to help them to rethink some of the traditional methodologies they used to assess the success of their programs."

In the fall of 2014, Voth-Gaeddert interned in the Office of Legislative Affairs at USAID. In this role, he worked directly with members of the United States Congress to share information about The Global Food Security Act, which is President Obama's signature effort to support Feed the Future. He also shared information with congressional members about plans to use United States funds to respond to the Ebola crises in West Africa.

In the spring of 2015, he joined Oerther at the Department of State in the Secretary's Office of Global Food Security. "My primary task was to aid in the establishment of the Global Alliance for Climate Smart Agriculture," says Voth-Gaeddert. "I also worked on projects related to urban food security and drafted briefs for the Secretary of State as well as principals such as United States Ambassadors."

Last summer, Voth-Gaeddert spent four months at the UN FAO where he learned how to work with United States Government agencies to development engagement opportunities for students in the United States.

Asked why he is interested in international development, Voth-Gaeddert shares, "I didn't get to choose where I was born. I was extremely lucky and blessed, so I feel an immense responsibility to utilize my opportunities to bring opportunity to others."

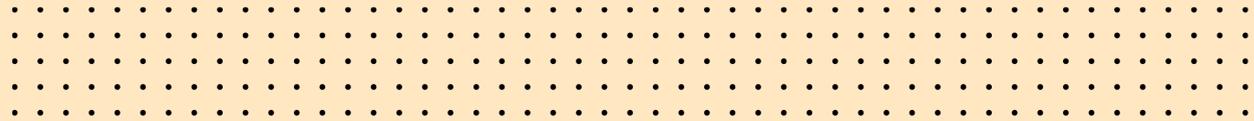
Since his internship with the United Nations ended in August, Voth-Gaeddert, with support from Oerther, moved abroad to Indonesia to take classes in system dynamics modeling at the Institute of Technology in Bandung and consult for the FAO-Indonesia field office on nutrition issues.

Having returned to Rolla in January 2016, Voth-Gaeddert has spent the spring semester working on the details for his upcoming field-campaign in Guatemala. With the support of the United States Peace Corps and utilizing his USAID connections, he will spend approximately six months in Guatemala collecting data to explore the correlations among child stunting and access to water, sanitation and hygiene. The approach he is taking for his doctoral dissertation will simultaneously explore how both technology and policy can influence child health in Guatemala, and he will be working to identify specific interventions that Environmental Engineers can use to improve these health outcomes.

When asked about the future, Voth-Gaeddert comments, "Through these unique experiences provided by Oerther, I have really learned what its like to be a researcher who not only cares about knowledge, but also cares about people. When I finish my dissertation, I want to pursue a career in academics or work in the United Nations systems where I can integrate my interests in environmental engineering and my desire to serve others. Dr. Daniel Oerther has been a wonderful role-model and mentor of how to accomplish both."



# Academy of Civil Engineers inducts nine new members



The following professionals were inducted into the Academy of Civil Engineers in April. They were recognized for their contributions to the profession, leadership and involvement with Missouri S&T.

## Neil S. Brady



**Neil S. Brady**, president and CEO of Anderson Engineering Inc. in Springfield, Missouri, earned a bachelor of science degree

in civil engineering from Missouri S&T in 1995. With four offices in southwestern Missouri and one in Destin, Florida, Anderson Engineering offers consulting engineering across the country. Brady is a longtime member of the American Society of Civil Engineers (ASCE), the National Society of Professional Engineers (NSPE) and the Missouri Society of Professional Engineers (MSPE). He is past president of MSPE and a past member of NSPE's House of Delegates. In the Springfield area, Brady is a member of Ozarks Greenways Technical Committee, past member of the city's Green Building Task Force and the Greene County Storm Water Management Task Force.

## Sean C. Henry



**Sean C. Henry**, director of public works and city engineer in Carbondale, Illinois, earned a bachelor of science degree in civil engineering

from Missouri S&T in 1995. While in school and shortly thereafter, he worked as a summer engineering technician and then as a civil engineer for the city of Carbondale. In late 1996, he joined the consulting engineering firm Asaturian Eaton & Associates in Carbondale. He was their first civil engineer with a degree and was instrumental in growing the civil engineering business for the firm. In the summer of 2006, he returned to the city of Carbondale and served as the city's maintenance and environmental services manager until the spring of 2011, when he was named the city's director of public works and city engineer. Henry is a member of ASCE, NSPE, the American Public Works Association (APWA)

and the Institute of Transportation Engineers (ITE). He is also chairman of the Professional Advisory Board for the civil and environmental engineering department at Southern Illinois University.

## Jim Kirby



**Jim Kirby**, a retired engineer with Black & Veatch, earned a bachelor of science degree in civil engineering from Missouri S&T in 1963.

He joined Black & Veatch and over the next 33 years he worked on a Corps of Engineers water resources project in Puerto Rico; a USAID-funded wastewater collection and treatment project in Cairo, Egypt, serving about 5 million people; a World Bank-funded wastewater project in Izmir, Turkey, serving 2.5 million people, an internationally funded water resources project in Chile and review of a wastewater and storm water master

plan for Dubai. Kirby retired after serving six years with the Kansas City Water Services Department as engineering division section manager for plant and process design. He is a diplomate in the American Academy of Environmental Engineers.

## Dr. Larry Mays



**Dr. Larry Mays**, professor in the School of Sustainable Engineering and the Built Environment at Arizona State University in Tempe,

Arizona, earned bachelor of science and master of science degrees in civil engineering from Missouri S&T in 1970 and 1971, respectively. He earned a Ph.D. from the University of Illinois in 1976 after serving in the military. During the past 27 years at Arizona State, he has served as department chair and as professor of civil and environmental engineering. He has been the author, co-author or editor-in-chief of 24 books, including the textbooks, *Applied Hydrology*; *Hydrosystems Engineering and Management*; *Water Resources Engineering*; and *Groundwater Hydrology*. He has volunteered or consulted the United Nations, the World Bank, the Texas attorney general's office, the American Water Works Association and the U.S. Army Corps of Engineers. He is a fellow member of ASCE, the International Water Resources Association and the International Water Association. He won engineering awards, including the ASCE Julian Hinds Award, the Prince Sultan bin Abdulaziz International Prize for Water – Surface Water Prize, and the Warren Hall Medal from the University Council on Water Resources.

## Rocky Miller



**Rocky Miller**, a member of the Missouri House of Representatives for District 124, earned a bachelor of science degree in civil

engineering from Missouri S&T in 1988. He worked for Laclede Gas and Iowa Southern Utilities before returning home to the Lake of the Ozarks. He now owns his family's engineering and environmental services firm, the Miller Companies. Elected to the Missouri legislature in 2012, Miller represents the Lake of the Ozarks area. As a state representative, he is chair of the energy and environment committee and serves on committees for natural resources, utilities and solid waste. Miller has received awards from the Electric Cooperatives, Missouri Chamber, St. Louis Business Journal and Missouri Farm Bureau for his work in the legislature. He is a member of the Southern States Energy Board, the energy and environment committee for the Southern Legislative Conference and the energy and environment committee for public policy with the Council of State Governments.

## Dr. Steve Starrett



**Dr. Steve Starrett**, associate professor of civil engineering and director of the honor and integrity systems at Kansas State

University in Manhattan, Kansas, earned a bachelor of science degree in civil engineering from Missouri S&T in 1989. He joined the civil engineering faculty at Kansas State University in 1994 and also is the director of the civil

engineering undergraduate program. With a key interest in engineering ethics, he has developed and taught courses on the subject and is near completion of co-authoring a book titled, *Pursuing Engineering Ethics Through Real World Case Studies*. Active in the National Institute for Engineering Ethics, Starrett served on its executive board from 2012 to 2014. He is the president-elect of ASCE's Environmental and Water Resources Institute and has served as the chair of the ASCE Committee on Ethical Practice. The National Academy of Engineering recently recognized one of his courses as an exemplar course in engineering ethics education.

## Gregg Wilhelm

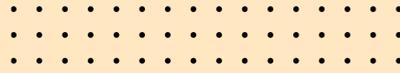


**Gregg Wilhelm**, retired Missouri Department of Transportation engineer, earned a bachelor of science degree in civil

engineering from Missouri S&T in 1983. He began his career with MoDOT in the St. Joseph District. In 1985, he transferred to the St. Louis District, where he worked on the geometric and hydraulic design of the Interstate-64 at I-270 interchange. Wilhelm then became the local programs design engineer, helping communities with projects that enhance transportation and the local economy. He was the MoDOT lead in working with Trailnet to rehabilitate the Old Chain of Rocks Bridge from a declining vehicular structure into an active transportation link across the Mississippi River. He retired from MoDOT in 2014. In 2010 he went on a church mission trip to Uganda, and after returning from that trip Three Avocados, a non-profit coffee company, was formed. Wilhelm has been actively involved with Three Avocados as the director of sales and operations, and all profits are sent to Uganda to help provide clean drinking

*(continued on the next page)*

# Academy of Civil Engineers



## inducts nine new members (continued)

water, or to Nicaragua to improve children's education. Since its formation in 2010, sales of Three Avocados coffee have helped provide over 21,000 people in Uganda with clean drinking water.

### David Wisch



**David Wisch**, an engineer with Chevron Corp. in Houston, earned bachelor of science and master of science degrees in

civil engineering from Missouri S&T in 1975 and 1977, respectively. He began his career in offshore engineering with Texaco and today is Chevron's global technical authority in civil, structural and marine engineering. He is the engineer of record for the first U.S. offshore platform to undergo certified verification agent (CVA) certification and provided engineering oversight for the world's deepest self-standing structure. Wisch has worked for more than 30 years in industry standards development for the American Petroleum Institute and the International Organization for Standardization. He chaired the API Committee on Offshore Structures and led the U.S. delegation to ISO's Offshore Structures Standards Committee. After hurricanes Ivan, Katrina and Rita, he led an API task force to develop consensus interim industry standards for mooring of floating drilling vessels. Wisch has chaired the Chevron Fellows program and the company's Mentoring Excellence in Technology programs and served two terms as a Marine Board Member for the National Academy of Engineering. He has

received awards for his work from the API, ISO, Chevron and the National Academy of Engineering. Wisch was a placekicker on the Miner football team and an officer of S&T's ASCE Student Chapter.

An honorary member is:

### Dr. Genda Chen



**Dr. Genda Chen**, Robert W. Abbett Distinguished Professor of Civil Engineering at Missouri S&T, earned bachelor

of science and master of science degrees from Dalian Institute of Technology in Dalian, China. In 1992, he earned a Ph.D. from the State University of New York at Buffalo. In 1996, Chen joined the civil, architectural and environmental engineering department at Missouri S&T as an assistant professor. His research interests include structural health monitoring, deterioration of composite structures, adaptive passive dampers, and seismic analysis and retrofit. Chen is the associate director of Missouri S&T's Mid-America Transportation Center. He holds three patents, has received the National Science Foundation CAREER Award, has been a U.S. delegate on nearly 20 national and international workshops, and has been an invitee to post-disaster reconnaissance, including the 2011 Japan earthquake, the 2010 Chile earthquake and Hurricane Katrina in 2005. He has authored over 120 journal articles and over 170 conference articles and written 37 engineering reports.

# Academy of Civil Engineering Mentoring Program

In advancing a professional career, we believe that mentoring plays a key role in learning how to be a professional in your specific setting and field.

Mentoring can play a crucial role and having a mentor that shares your similar background and values can provide valuable insight toward career advancement.

Initiated by **Ranney McDonough's** efforts, we have looked at a variety of methods to connect students and recent graduates with alumni willing to serve in a mentoring role. The efforts were concurrent with S&T's Career Opportunities and Employer Relations (COER) efforts to develop a campuswide mentoring program. So we are teaming with COER to utilize their tools and staff already experienced and focused upon the mentoring needs of new engineers.

We look to work with the COER staff and promote the interactions of CAREE's powerful alumni base and our next crop of leaders in the field of civil, architectural and environmental engineering.

To initiate the process, register as a mentor on the COER website and we will also be in touch as a department to see how we can improve upon the process to best serve our students and alumni. We believe that by connecting our new talented graduates with our legacy of engineering leaders, we can strengthen the futures of our Miner Alumni.

**Register online:** <http://career.mst.edu/alumni/mentoraminer>

# REMEMBERING VERNON T. JONES

## DONOR AND FRIEND

**Vernon T. Jones** could have chosen to hold onto every dime he made and no one would have blamed him.

After all, unpredictable circumstances often dictated his fate during his early years. Vernon was born July 3, 1929, in a humble house on the family's farm in western Missouri, and 3 months later the stock market crashed on Black Tuesday, spiraling this nation into the Great Depression. During that decade of tough times, Jones trekked to his two-room schoolhouse.

Things started looking up when Jones entered Lees Summit High School and later a teacher's college. But as fate and the backing of the Soviet Union would have it, North Korea marched across the 38th parallel just before Jones's 21st birthday. Jones was eventually drafted into the Army to the Counter Intelligence Corps, serving in Japan and Korea. Upon his discharge, he attended Missouri S&T (then the Missouri School of Mines), graduating with a B.S. in civil engineering in 1953.

After graduation, he joined Cities Service and rose in the ranks from oil tank farm superintendent to vice president of all transportation assets. Then, he was asked to head a joint venture with other major oil companies, becoming the first president of Explorer Pipeline Co. tasked with building a major system between Chicago and Freeport, Texas.

But just as the pipeline was reaching capacity the OPEC embargo halted the oil flow. Undaunted, he joined Williams Cos. in 1976 as pipeline division president and became president of the corporation in 1982. Under his leadership, the company grew and also developed a very successful fiber-optic-based telecommunications subsidiary.

During his tenure as Williams' president, he led a number of acquisitions, including Northwest Energy of Salt Lake City, a natural gas company that at the time had slightly more in assets than Williams. Under his leadership, the company also developed a very successful fiber-optic-based telecommunications subsidiary, led by fellow Rolla grad **Roy Wilkens**, EE '66.

Despite his early setbacks, Jones persevered and achieved a successful career and chose a path of giving back to his alma mater. Many at UMR/S&T have benefitted from his choice and generosity and many more will benefit far into the future.



photo by Miller Photography Inc.

After his retirement in 1992, Jones and his late wife, Maralee, endowed a chair in civil engineering and made a gift to help renovate Butler-Carlton Civil Engineering Hall.

Antonio Nanni, currently a professor and chair of the department of civil, architectural and environmental engineering at the University of Miami, joined the S&T civil engineering faculty in 1997 as the Vernon and Maralee Jones Endowed Professor of Civil Engineering. Nanni easily recalls his first meeting with Jones at an airport hotel in St. Louis, where he was interviewing for the faculty position Jones had endowed.

"I met Vernon almost two decades ago and still remember that occasion as if it were yesterday," said Nanni. "Needless to say for the ones who knew him, the questions he posed and the vision he laid out were among the main reasons I accepted the job. A decade later, when I decided to move back to my alma mater, he was the first one I called at S&T to inform him of my decision."

Beyond his gifts, Jones shared his expertise and his vision.

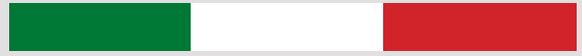
"Vernon was not just a successful alumnus, donor and supporter of S&T, he was a constant presence and source of advice, inspiration and help," said Nanni. "In addition to his regular campus visits, I could turn to him at key moments such as the time when we were developing our first bid for a University Transportation Center or when we desperately needed a pick-up truck to perform field research for MoDOT."

Perhaps it was because Jones knew what it meant to truly need something that he became one of the first alumni to endow a department chair.

"Mr. Jones was a truly visionary man, and I feel very fortunate to have known him," said **Kamal H. Khayat**, Vernon and Maralee Jones Endowed Professor of Civil Engineering and Director of the Center for Infrastructure Engineering Studies. "He was very supportive and appreciative of the advances made on our campus in the area of infrastructure engineering. His support played a fundamental role in providing vital resources to the Center for Infrastructure Engineering Studies and the CArEE department over many years. His generosity has

*(continued on page 22)*

# Investigating in Italy



Associate professor and Stirrat Faculty Scholar **Dr. Lesley Sneed** was on research leave during the spring 2016 semester in Italy, where she conducted pioneering work on strengthening of concrete structures using innovative composites. She was a visiting professor at the University of Padova from January through April and at the University of Bologna from April through June of 2016.

In Padova, Sneed worked with Professor Carlo Pellegrino's research group to plan, construct and carry out experimental testing of small-scale direct-shear tests and large-scale beam tests to study the bond behavior and shear-strengthening effectiveness of externally-bonded fiber reinforced composites. The experiments included a new measurement technique called digital image correlation, or DIC, to help gain a better understanding of the complex behavior of the bonded composites. This work is part of a European project called Endure, "European Network for Durable Reinforcement and Reinforcement Solutions," aimed at developing a new generation of researchers in the use of advanced composites.



Dr. Lesley Sneed, pictured left, learns new measurement techniques to gain a better understanding of the complex behavior of bonded composites.

In Bologna, Sneed worked with Professor Christian Carloni's research group on the bond behavior and confinement of fiber-reinforced composites bonded to concrete and masonry structures.

In addition to her work at the Universities of Padova and Bologna, Sneed planned to attend the COST Action TU1207, "Next Generation Design Guidelines for Composites in Construction," General Meeting on Textile Reinforced Mortars in Łódź, Poland, and visit collaborators at the University of Calabria and Politecnico di Milano in Italy to plan future research activities. Sneed has hosted several visiting faculty and Ph.D. student scholars from Italy at Missouri S&T and hopes to continue this exchange in the future.



## 58th Annual S&T Asphalt Conference

The department conducted the 58th Annual Asphalt Conference in November. Twenty-two presentations were made, including those by departmental alumni **David Richardson** ('71, '73, '84), **Brent Whitwell** ('05, '06), **Steve Jackson** ('07), **Rick Holesinger** ('85, '11), **Todd Miller** ('90), **Jason Blomberg** ('97) and **Pat Palmer** ('77). The conference was directed by Richardson. Attendance totaled 210.

## Concrete Conference

The annual Missouri Concrete Conference, directed by CAEE faculty member **Dave Richardson** ('71, '73, '84), was held on the S&T campus in March. Twenty-three presentations were given, including ones by departmental alumni **Rick Holesinger** ('85, '11), **Brent Whitwell** ('05, '06) and **Todd Miller** ('90). Attendance totaled 149.

## SUPERPAVE and Certification Courses

During the 2014-2015 season, five different types of certification courses were held at Missouri S&T: two Superpave QC/QA full certification short courses (5-day), three Superpave QC/QA re-certification short courses (2-day), one Binder Test course (1-day), three Aggregate Consensus Tests courses (1-day), and three TSR courses (1-day), for a total of 11 courses. 184 engineers, inspectors, and contractors were certified. The courses were directed and taught by faculty member **Dave Richardson** ('71, '73, '84). Other instructors included **Steve Jackson** ('07), and **Mike Lusher** ('96, '04). Over 3,000 individuals have gone through the training and certification at Missouri S&T since 1998.



## Delving into disruptors in DENMARK

**Dr. Glenn Morrison**, professor of environmental engineering at Missouri S&T, was recently awarded the Otto Mønsted Guest Professor at the Technical University of Denmark (DTU), just north of Copenhagen.

While at DTU, Morrison is studying the way that toxicants and endocrine disruptors present in indoor air movement through our skin into our bodies. Morrison would like to determine how much our built environment contributes to the "body burden" of these chemicals. Specifically, he believes that transfer from air-to-clothing-to-skin-to-blood is one of the most important routes.



Dr. Glenn Morrison in a climate-controlled chamber at DTU.

The Indoor Climate and Building Physics Group at DTU has a large number of climate-controlled chambers that are uniquely suited to the kinds of human subject studies necessary to understand the phenomenon.

The Otto Mønsted Foundation supports research and education in scientific and commercial disciplines that contribute to the development of Danish trade and industry. This fellowship supports Morrison for three months.



Technical University of Denmark



Pictured left to right: Dr. John Myers, Dr. Glenn Morrison, Dr. Mark Fitch, Dr. Eric Showalter and interim department chair Dr. Joel Burken.

## Fantastic four

Four civil, architectural and environmental engineering professors were honored, along with 24 others from Missouri S&T, for excellence and achievement in research, service and teaching during an awards ceremony held in February. Each winner received a monetary stipend funded by industry and alumni contributions.

**Dr. John Myers**, professor and acting vice provost and dean of the College of Engineering and Computing received the 2015 Faculty Excellence Award.

**Dr. W. Eric Showalter**, associate teaching professor, received the 2015 Faculty Achievement Award.

**Dr. Glenn Morrison**, professor, received the 2015 Faculty Research Award.

**Dr. Mark Fitch**, associate professor and assistant chair, received the 2015 Faculty Service Award.

## Outstanding Teaching Awards

Forty-one Missouri S&T faculty members received the Outstanding Teaching Award for 2014-15 during a ceremony held in November. The award is given each year to faculty members by the Outstanding Teaching Award Committee, which bases its selections on student evaluations. The following individuals from our department were selected for awards.

**Dr. Robert Holmes Jr.**, adjunct professor of civil, architectural and environmental engineering

**Dr. Mary Koen**, assistant adjunct professor of civil, architectural and environmental engineering

**Dr. David Richardson**, Chancellor's Professor of civil, architectural and environmental engineering

## VERNON T. JONES (CONTINUED)

impacted the success of many students, and his legacy will carry forward for many years to come."

Khayat and Nanni noted that over 40 graduate students gained directly from the generosity and leadership that Jones provided to S&T. Many have moved on to very successful careers, including some as professors themselves. This impact will continue forth in the education of leaders in the field of infrastructure engineering and have a lasting impact on our reputation both nationally and globally.

Jones saw much of his vision come to fruition before his passing on Feb. 19, 2016. By being an early major, visionary investor in the university, the legacy of Vernon and Maralee Jones has already had a profound impact upon a generation of faculty and students at S&T.

"I was blessed to know Vernon and Maralee and hope I will always honor them through my work as an educator and researcher," said Antonio Nanni.

Missouri S&T honored Jones with an award of professional distinction in 1974 and with an honorary degree in 1987. In 2011, Missouri S&T named Mr. Jones one of its inaugural class of Alumni of Influence.

## Going the distance

Two professors from the department were recognized in April for their outstanding teaching, quality of instruction and interaction with students in distance education.

**Dr. Glenn Morrison**, professor of environmental engineering, received the Global Learning 2015 Outstanding Teaching Excellence Award.

**Dr. Lesley Sneed**, associate professor, received the Global Learning 2015 Outstanding Teaching Commendation Award.

# Climate change thought leader GIVES STUECK LECTURE

Dr. G. Wayne Clough says that all engineering disciplines will be needed to combat climate change.

A leading voice in the climate change discussion, Clough presented the 2016 Stueck Lecture at Missouri S&T in April. Clough, president emeritus of the Georgia Institute of Technology and the immediate past secretary of the Smithsonian Institution, gave a talk titled “Climate Change — An Engineering Grand Challenge for Our Age.”

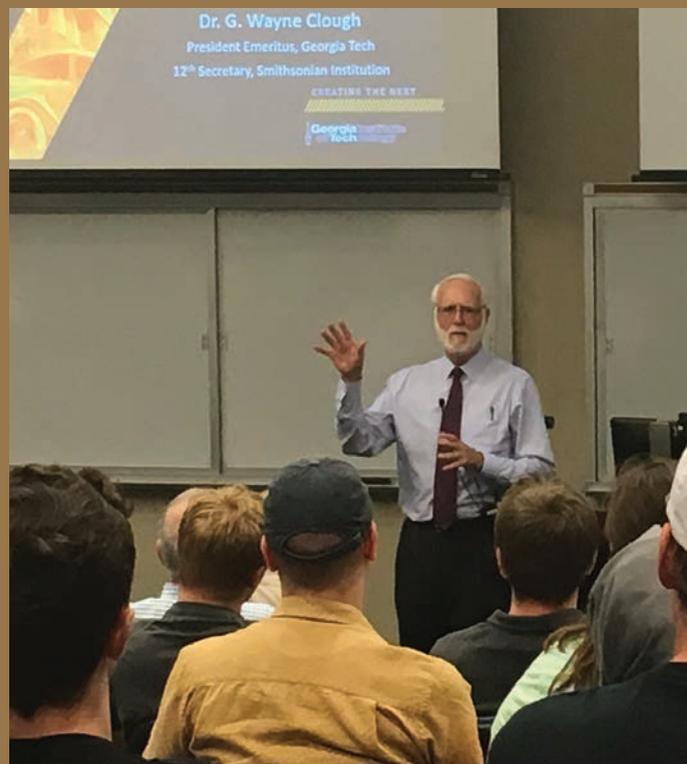
Clough reflected on this issue through the lens of his own experiences beginning with his four-year service as chair of the National Research Council Committee on New Orleans Regional Hurricane Protection Projects and continuing through his observations of the work of hundreds of Smithsonian scientists related to climate change. During his six years as secretary of the Smithsonian Institution, he was integrally involved in planning to protect Smithsonian museums and facilities that are at risk from storm surges and sea level rise.

Clough said that within the past five years, a tipping point has been reached regarding climate change: alternative fuels and power sources are becoming cheaper; the 2015 Paris agreement of 195 nations demonstrates worldwide recognition of the problem; and people are realizing that reducing carbon emissions is good for everyone in developed and developing nations.

“This is truly a worldwide mission and will engage all engineering disciplines, not just a few,” Clough says. “It is a golden opportunity for engineering and engineers to use their problem-solving skills to help improve the sustainability of our civilization even as several billion more people are added in the next 50 years.”

He also gave advice about the practical issues and opportunities that are ahead and why he is excited about the possibilities.

Clough served as the 10th president of Georgia Tech from 1994 to 2008 and as the 12th secretary of the Smithsonian from 2008 to 2014. A native of Georgia, he earned his bachelor of science and master of science degrees from Georgia Institute of Technology and a Ph.D. from the University of California-Berkeley. He taught at Duke University, Stanford University and Virginia Polytechnic Institute and State University, where he



**“This is truly a worldwide mission and will engage all engineering disciplines, not just a few.”**

— Dr. G. Wayne Clough

served as the chair of the department of civil and environmental engineering and dean of the college of engineering. In 1992, he was named provost at the University of Washington.

Clough was elected to the National Academy of Engineering in 1990 and the American Academy of Arts and Sciences in 2010. He was appointed to the National Science Board and the President’s Council of Advisors on Science and Technology by President George W. Bush, and he

has received honorary doctorates from 12 universities.

This lecture was presented as part of the Neil and Maurita Stueck Distinguished Lecture Series for Civil, Architectural and Environmental Engineering at S&T. The series is made possible by a fund established by **Maurita Stueck** to bring additional outside perspectives to S&T students, and to honor her late husband, **Neil Stueck**, a 1943 civil engineering graduate of the university.

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Jerry Bayless, CE'59, MS CE'62,  
carries the University Mace  
during 2016 spring commencement.

## BAYLESS CARRIES UNIVERSITY MACE AT COMMENCEMENT

**Jerry Bayless**, CE'59, MS CE'62, was selected to carry the University Mace and lead the procession during 2016 spring commencement.

The honor was bestowed upon Bayless as a testament to his unparalleled history with the MSM/UMR/S&T campus. Bayless arrived on campus in 1955 and joined the faculty in 1959. With license plates that read "MR UMR," Bayless' contributions to our students and campus are unmatched.

The University Mace has a unique history, created in 2015 by **Jeff Heniff** in the Rock Mechanics and Explosives Research Center, using the university's specialized waterjet technology. The mace includes the university's historic emblem in its crown. Historically, the mace is a symbol of authority dating from medieval times, when knights carried them during processions with their royalty. As the tradition grew, the mace became a ceremonial symbol of peaceful leadership and was embellished with jewels and metals. Today, the mace is carried before the Chancellor during the commencement procession.