



SPRING 2008 ~ VOLUME 3, ISSUE 3

A MESSAGE FROM THE DIRECTOR — JOHN J. MYERS

The past few months have been very exciting at our National University Transportation Center with changes in Center personnel and several distinguished visitors.

On February 22, 2008, we had a wonderful opportunity to host RITA Administrator Paul Brubaker, Ms. Jan Brecht-Clark (RITA), and Mr. Stephen Costa (Volpe Center). Administrator Brubaker was able to see how the USDOT funding has been invested and utilized. Their visit included tours and meetings both on and off campus, including time in our Hydrogen powered vehicle. In fact, Administrator Brubaker got to find out first hand just how good the traction is on our Hydrogen Powered Bus on a snowy Interstate-44. Nothing like a good old fashioned field test to validate the technology! Way to go Paul and thanks for your visit!

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We also had a USDOT Research & Innovative Technology Administration (RITA) Site visit on April 15, 2008. Interestingly enough, their visit (audit) just happened to fall on tax day! Huh, coincidence? Seriously though, we were much honored to host Ms. Robin Kline and Ms. Amy Sterns from USDOT’s RITA and have the opportunity to brag about various NUTC related activities. Read more about the visit on page 2. Thank you to everyone at Missouri S&T that assisted during both visits.

Ms. Jessica Dafni recently joined CTIS as Technical Editor. She brings with her wonderful editorial and web-based skills that will significantly add to our center. One of her creations is this edition of the NUTC News. WELCOME ABOARD Jessica! We are so very happy to have you join our team.

Now I invite you to read our most recent newsletter. Within it you will learn more about our programs and the faculty and students whom make the Center for Transportation Infrastructure and Safety successful.

Warm Regards, John

UPCOMING EVENTS

6th National Seismic Conference on Bridges & Highways

July 27-30, 2008
Charleston, SC

6th International Conference on Case Histories in Geotechnical Engineering

August 11-16, 2008
Arlington, VA

New Madrid Seismic Zone Conference

August 12-14, 2008
Rolla, Missouri

More information
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• • • • • **RITA VISITS CTIS: APRIL 2008** • • • • •

On April 15, 2008, University Transportation Center (UTC) program specialists Robin Kline and Amy Stearns from the Research and Innovative Technology Administration (RITA), United States Department of Transportation visited the Missouri University of Science & Technology campus for an update on the Center for Transportation Infrastructure and Safety's (CTIS) national center program.

The morning began with a welcome and brief overview of the University from Provost, Kent Wray. Vice Provost for Research, K. Krishnamurthy, presented information about the University's strategic



Before taking a ride on the hydrogen bus.

Left to right: John Myers, Robin Kline and Amy Stearns.

goals, current programs, the University's ranking as a top U.S. technical university and the significance of CTIS as a University asset.

CTIS Interim Director, Dr. John J. Myers, shared information about the current activities and state of the Center. Areas covered included: the history of the University Transportation Center at Missouri University of Science & Technology; current mission, theme areas and management; funding overview; and sample success stories in research, education and technology transfer. Dr. John Sheffield, Associate



Students explain how ethanol becomes hydrogen at the Ethanol Reforming Lab.

Director of CTIS, provided an update on the Center's hydrogen activities.

These presentations and discussions laid the foundation to share details about the future of the Center and new projects on the horizon. Hydrogen activities on and around campus will continue with the fine-tuning and further development of technology as well as the construction of a permanent hydrogen fueling station. Additionally, the Center looks forward to the opportunity to collaborate with private sector

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Student Michael Murphy with his prestressed girder at the SERL High Bay Structures Lab.



**OUT OF THE
BLUE
AND INTO THE
GREEN**

The Hydrogen Design Team receive awards from NHA Chairman and President of Shell Hydrogen Phil Baxley, SCHFCA Director Shannon Baxter Clemmons, DOT Administrator Paul Brubaker and DOE Deputy Assistant Secretary Steve Chalk.

Can you envision a safe, energy efficient airport with less noise, clean air and clean water? The Missouri University of Science & Technology 2007-2008 Hydrogen Design Team can, and their vision is hydrogen.

As grand prize winners of the Hydrogen Education Foundation's (HEF) 2007-2008 Hydrogen Student Design Contest, the Missouri S&T team traveled to Sacramento, CA for an awards ceremony and to present their design to over 1,000 industry professionals at the NHA's 19th Annual Hydrogen Conference.

Using the Columbia Metropolitan Airport in Columbia, SC as a basis for design and with an imagined budget of \$3 million, the student design teams were asked to propose hydrogen technology solutions for the three most common challenges to airports: noise, air pollution and groundwater contamination. Additionally, each design was required to include necessary safety, economic and environmental analyses as well as a feasible marketing and education campaigns.

The Missouri S&T team's proposal was unique because of a strong focus on public education and outreach as well as the use of a wide range of hydrogen technologies which are already available in the consumer market, making it "completely realistic and technically accurate," according to the Columbia Airport Director Mike Flack. "If implemented, this design would greatly decrease our energy footprint and bolster airport operations as a whole." The airport would not only see a reduction in emissions, but also a potential savings of \$28,000 in annual energy costs.

Some of the design elements proposed by the Missouri S&T team include: a primary fuel cell system to provide 200 kW of power to the airport; back-up power supply to protect the airport's computer systems; portable fuel cell power for tools and communications; a hydrogen forklift and baggage tug for use on the tarmac; and two hydrogen vehicles: an ICE shuttle bus to transport passengers from the airport to downtown and a hydrogen fuel cell scooter for use at the airport.

Continued on page 4...



Site visit continued from page 2...

firms to undertake a 20-year project of updating, replacing, repairing, monitoring and maintaining 802 bridges across the state of Missouri.

After lunch, CTIS staff members and RITA representatives rode the hydrogen-powered bus to Hypoint Industrial Park where they met with Professor of Chemical Engineering, Sunggyu "KB" Lee and toured his Ethanol Reforming Lab.



A steel free mock-up at the SERL High Bay Structures Lab.

Back on campus, a poster session was held in the Atrium of Butler-Carlton Hall. Students and faculty members gave brief presentations on recent UTC funded projects in transportation research, education and technology transfer, explaining the particular relevance of a project to the current needs of the field.

The visit concluded with a tour, led by Dr. John J. Myers, of the SERL High Bay Structures Lab, the home to a variety of equipment for small-scale and full-scale structural testing under static, fatigue and earthquake simulations.



Hydrogen continued from page 3...

The competition was sponsored by the South Carolina Hydrogen and Fuel Cell Alliance (SCHFCA), the U.S. Department of Energy, Chevron, Sacramento Municipal Utility District, Natural Resources Canada and American Wind Power and Hydrogen.

The interdisciplinary Hydrogen Design Team at Missouri S&T competed against twenty-two other teams from around the world in the 2007-2008 competition, including teams from Canada, China, Guinea, India, Libya, Nigeria, the United Kingdom and the United States.

Members of the student Hydrogen Design Team, advised by Dr. John Sheffield, include:

- Michael Steven Borrini of St. Louis, a December 2007 mechanical engineering graduate
- Gustavo D'Agnesse of St. Charles, Mo., a senior in mechanical engineering
- Javier E. Garcia Joo of Lima, Peru, a graduate student in mechanical engineering
- Matthew David Richardson of St. Louis, a December 2007 mechanical engineering graduate
- Jadranko Sarar of Kansas City, Mo., a senior in mechanical engineering
- Mathew Thomas of Kottayam, Kerala, India, a graduate student in mechanical engineering
- Fanny E. Valencia Juscamaita of Lima, Peru, a former visiting scholar and chemical engineering student

Watch a 13-minute video of the proposal at <http://h2miner.mst.edu/Presentations/Hydrogen-WMV.wmv>. For more information about hydrogen activities at Missouri S&T, visit <http://h2miner.mst.edu>.



“SHOW-ME” ROAD SCHOLAR PROGRAM

Missouri LTAP is excited to announce that they are in the final stages of developing a Road Scholar Program for Missouri. Many states have a Road Scholar Program, which is a certification program that recognizes the importance and benefit of continued education and training in areas related to workers' current and future positions within transportation and public works agencies. The primary purpose of the program is to promote a skilled workforce for Missouri local transportation and public works agencies. The program provides recognition through training, which provides increased knowledge of road maintenance procedures and improved technical, supervisory and managerial skills. A Road Scholar Program is set up to enhance the skills and knowledge of maintenance personnel as well as those who supervise others or aspire to manage in local transportation and public works operations.

Road Scholar Programs are set up with various levels of training in areas such as road maintenance procedures, equipment operating skills, technical skills, supervisory skills and executive development. Certificates are awarded at each program level and must be earned at the proceeding level in order to obtain a certificate at a more advanced level. The programs are usually open to all those involved with transportation and public works in the state. Certification is awarded upon completion of a specified number of required courses pertinent to the program level the participant is working to achieve.

Participating partners in the program determine the required courses, along with course content.

Missouri LTAP has been partnering in the development of the “Show-Me” Road Scholar Program with the Missouri Department of Transportation (MoDOT), Federal Highway Administration (FHWA), Missouri Association of Counties (MAC), Missouri Municipal League (MML), Missouri Association of County Transportation Officials (MACTO), Missouri Chapter of American Public Works Association (APWA), Missouri Public Entity Risk Management Fund (MOPERM), Linn State Technical College and the University of Missouri Extension. Each organization has been assisting in outlining the needs of its members and assisting in the development of training to meet those needs, along with the needs of everyone involved in city and county transportation and public works in the state. In

addition, everyone involved has been discussing the best method of rewarding participants who complete the program as well as the best format to provide recognition for becoming a Road Scholar. It is hoped that in time being a Road Scholar in Missouri will be the goal of all those involved in local public works. The success of the program will ensure that cities and counties have a well-trained and dedicated work force for the future.

For more information about the program, visit <http://mltrco1.cc.umn.edu/index.html>.



Article by Heath Pickerill, Director, Missouri LTAP and Dan Ratermann, Outreach Coordinator, Missouri LTAP.
Article first appeared in the Spring 2008 Quarterly Newsletter of the Missouri Local Technical Assistance Program.



UPCOMING CONFERENCES: SUMMER 2008

6TH NATIONAL SEISMIC CONFERENCE ON BRIDGES & HIGHWAYS: SEISMIC TECHNOLOGIES FOR EXTREME LOADS

July 27-30, 2008

*Francis Marion Hotel,
Charleston, South Carolina*

Last day for registration:
June 30, 2008

The technical program will feature over 75 technical presentations and keynote speakers from around the world. There will be two "best paper" awards presented. The conference will include a student design competition, a poster session, an awards luncheon and an optional boat tour of Charleston harbor and the recently completed Arthur Ravenel Jr. (Cooper River) Bridge. There will be a pre-conference workshop on Sunday. Also planned is a technical exhibition where engineers and managers can talk personally with company representatives who can explain the latest technology, products and services in the field.

For more information visit:
<http://www.scdot.org/events/6nsc/default.shtml>

6TH INTERNATIONAL CONFERENCE ON CASE HISTORIES IN GEOTECHNICAL ENGINEERING AND SYMPOSIUM IN HONOR OF PROFESSOR JAMES K. MITCHELL

August 11-16, 2008

*Crystal Gateway Marriott,
Arlington, Virginia*

To register, visit:
<http://campus.mst.edu/6icchge/register/index.html>

There will be participation of professionals from 30 or more countries from around the world to present their recent research findings. The exchange of information during the conference will advance the state of the art and practice in several areas and will give definitive direction to future work.

In addition to the conference, a short course on Soil Dynamics, a spouses program, a post-conference tour and an exhibition will be offered.

For more information visit:
<http://campus.mst.edu/6icchge/index.html>

NEW MADRID SEISMIC ZONE CONFERENCE: PREPARING FOR A SIGNIFICANT CENTRAL U.S. EARTHQUAKE

August 12-14, 2008

*Havener Center, Missouri S&T,
Rolla, Missouri*

To save \$100 register before:
May 31, 2008

This conference will provide a regional forum for the presentation, exchange of ideas, and potential solutions involved with preparing for a significant central U.S. earthquake.

The conference will open communication with academia, government, non-government agencies and the private sectors to address the current and forecasted needs of the response and recovery community.

Training opportunities include:

- Certified Emergency Management Training
- Community Disaster Response Training
- Using Civil Support Teams (CSTs) for Seismic Event Responses

For more information visit:
<http://conference.mst.edu/newmadridconf/>



DR. K. CHANDRASHEKHARA

CURATORS' PROFESSOR OF MECHANICAL AND AEROSPACE ENGINEERING

Dr. K. Chandrashekhara, professor of mechanical and aerospace engineering at the Missouri University of Science and Technology and director of composite manufacturing laboratory, has been named Curators' professor of mechanical and aerospace engineering. The professorship is awarded by the University of Missouri Board of Curators to outstanding scholars with established reputation in their field of study.

Dr. Chandrashekhara came to Missouri S & T in 1985 after earning a Ph. D. in engineering science and mechanics at Virginia Polytechnic Institute and State University in Blacksburg, VA. He was promoted to associate professor of mechanical and aerospace engineering at Missouri S & T in 1991 and earned the rank of professor in 1997.

Dr. Chandrashekhara specializes in composite manufacturing, smart structures, biocomposites, nanocomposites, and finite element analysis. His research projects have been funded by the National Science Foundation, Army Research Office, the Office of Naval Research, the Air Force

Research Laboratory, the Department of Agriculture, the Department of Housing and Urban Development, the Department of Transportation, the United Soybean Board, the National University Transportation Center, and several industries.



A winner of several Faculty Excellence Awards at Missouri S & T, Dr. Chandrashekhara has published his research in more than 75 scholarly journals. He is the co-author of a leading textbook on composite materials and is on the editorial board of the Journal of Biobased Materials and Bioenergy. He is a Fellow of the American Society of Mechanical engineers and an Associate Fellow of the American Institute of Aeronautics and Astronautics.

Dr. Chandrashekhara holds a master's degree in aerospace engineering from the Indian Institute of Technology, a bachelor's degree in aerospace reengineering from the Madras Institute of Technology and a bachelor's degree in applied mathematics from the University of Mysore, India.



**2007 UNIVERSITY
TRANSPORTATION CENTER
OUTSTANDING STUDENT
OF THE YEAR:
DAVID J. HOLDENER**

David J. Holdener has been named Outstanding UMR-Missouri S&T UTC Student of the Year. The award was made based on his excellent academic performance, the technical merit of his research topic and his service to both the University and surrounding communities.

Holdener earned a B.S. degree in Civil Engineering with Magna Cum Laude honors from the University of Missouri-Rolla (UMR) in May 2004. During his undergraduate career, Holdener was a member of the UMR chapters of American Society of Civil Engineers (ASCE) and Tau Beta Pi National Engineering Honor Society. He served as social chair of Chi Epsilon, the National Civil Engineering Honor Society, and as treasurer for the UMR Concrete Canoe Team.

After working in industry for two years, Holdener decided to return to Rolla to pursue an advanced degree in Civil Engineering at the Missouri University of Science & Technology. "I felt I needed to advance my career and gain more technical expertise in the structural engineering arena," says Holdener, "Additionally, conducting a research project appealed to me."

As a graduate student, Holdener has studied and made technical contributions to several aspects of Fiber Reinforced Polymer (FRP) bridge applications, including: field validation of both existing bridges strengthened with FRP and



David Holdener was recognized at the TRB Awards Ceremony on January 12, 2008. Left to right: President CUTC/Director of the Mineta Institute at San Jose State University Rod Diridon, Ph.D., DOT Administrator Paul Brubaker, David J. Holdener and Former Transportation Secretary Norman Mineta.

new bridges employing FRP technologies. "This material will help bridges last longer and gives engineers another material to consider when designing or strengthening structures," says Holdener.

During his graduate work, Holdener's advisor, Dr. John J. Myers, encouraged him to get involved with the UMR-MST PCI Big Beam Competition Team. "The contest involved designing, fabricating and testing a prestressed beam that needed to carry a load between 16 and 19 tons," explains Holdener. "We designed a beam that helped us secure a second place regional finish."

Holdener anticipates graduating from Missouri S&T with a M.S. degree in Civil Engineering in May 2008 and plans to work in industry as a structural engineer designing bridges.



MISSOURI
S&T

GeoMO 2008

Geotechnical Earthquake Engineering - Site Response

After the recent earthquake in Illinois, the perceived risk of a significant earthquake occurring in the Midwest has become a reality. Coupled with the constant reminder of the New Madrid Seismic Zone, new code requirements and current USGS hazard mapping, the topics discussed at the GeoMO2008-Geotechnical Earthquake Engineering - Site Response Conference were both timely and of great interest to participants.

On May 2, 2008, 95 members of the Midwest civil engineering community gathered at the Missouri University of Science & Technology Havener Center for a one-day seminar given by two of the leading authorities on soil stabilization.

Dr. Steven L. Kramer, P.E., is a specialist in geotechnical earthquake engineering and site response. Dr. Pedro Arduino specializes in computational geomechanics with an emphasis in constitutive modeling of soils, coupled formulations,

contact mechanics and general finite solutions for geotechnical problems. Both presenters are professors of civil and environmental engineering from the University of Washington, authors and have extensive experience with site response.



Lecture topics included: Introduction to Site Effects; Ground Motions and Hazard Analyses; Dynamic Soil Properties; 1-D Analyses; 2-D Analyses and Site Response in the Future. These topics were chosen to provide answers to questions that arise frequently in site response-related new or retrofit engineering projects. References, notes and examples of up-to-date methods in site response were also provided.

The conference was directed by Dr. Ronaldo Luna of Missouri S&T and sponsored by the National University Transportation Center and the Civil, Architectural and Environmental Engineering Department. Participants were awarded six Professional Development Hours (PDHs).

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