

RE-CAST



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Missouri University of Science and Technology
 :: mst.edu

University of Illinois at Urbana-Champaign
 :: illinois.edu

Rutgers, The State University of New Jersey
 :: rutgers.edu

University of Miami
 :: miami.edu

Southern University and A&M College
 :: subr.edu



Director's Message



Dr. Kamal H. Khayat
 Director,
 RE-CAST University Transportation Center

Missouri University of Science and Technology is honored to be selected to lead this Tier-1 University Transportation Center, in partnership with University of Illinois at Urbana-Champaign, Rutgers, The State University of New Jersey, Southern University and A&M College and University of Miami. The synergism created by this network is critical to the mission of providing leadership in conducting basic and applied research in the field of transportation infrastructure, in addition to education and workforce development, and technology transfer. RE-CAST will foster research excellence and the needed expertise and technology to develop the next generation of sustainable transportation structures.

"This grant has opened an avenue of opportunity for collaborations amongst the consortium members and many outside organizations. The ultimate goal of the proposed research program is to fast-track the acceptance of these technologies and develop national standards and guidelines for their use for the reconstruction of the nation's infrastructure for the 21st Century.

This consortium has the opportunity to do great things. We have assembled a wonderful team of researchers, staff and students — this grant will give them the opportunity to shine."

-Dr. Kamal H. Khayat, RE-CAST Director

CENTER OVERVIEW

The University Transportation Center for REsearch on Concrete Applications for Sustainable Transportation (RE-CAST) will provide a collaborative and multidisciplinary vehicle for addressing the nation's complex and growing transportation infrastructure needs, with the ultimate goal of ensuring a sustainable, reliable, and safe national transportation infrastructure.

The US Department of Transportation identified five strategic goals specific to the nation's infrastructure: Safety, State of Good Repair, Economic Competitiveness, Livable Communities, and Environmental Sustainability. RE-CAST will focus research efforts primarily on State of Good Repair.

This UTC program will specifically seek to improve transportation infrastructure condition and performance through increased use of design, materials, construction, and maintenance innovations and will also aim to reduce the environmental impacts of such infrastructure through innovations in design, construction, operation, preservation, and maintenance.

THEMES AREAS

- A. Innovative Materials for Accelerated Construction and Sustainable Construction
- B. Durable Materials for Rehabilitation of Transportation Infrastructure

RESEARCH FOCUS AREAS

Focus Area 1: High-Performance Concrete with Adapted Rheology (HPC-AR)

The first Focus Area deals with the design and implementation of HPC-AR for civil infrastructure applications. HPC-AR requires less consolidation compared to conventional concrete and relies more on fresh concrete characteristics to properly fill the formwork. HPC-AR is specifically targeted for the construction of bridges, airports, and rail systems, as well as port and harbor facilities that must be maintained in a State of Good Repair to ensure the nation's economic growth.

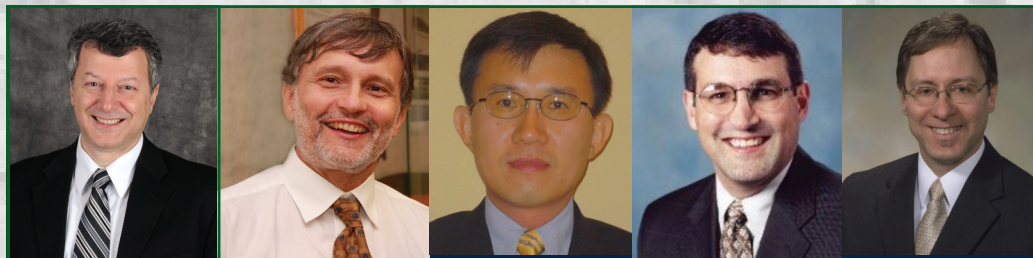
Focus Area 2: Sustainable Pavement Construction

The second research Focus Area deals with the use of high volume recycled materials for infrastructure construction. The primary research projects in this Focus Area include: (2-A) high-volume recycled materials for pavement construction and (2-B) rapid pavement construction.

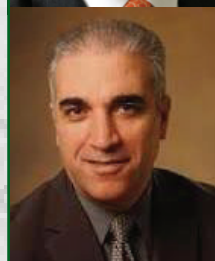
Focus Area 3: Novel Fiber-Reinforced Composites

The third Focus Area involves the design and implementation of novel fiber-reinforced composites for infrastructure rehabilitation. Such materials can lead to improved cracking resistance and sustainable repair applications. Inclusion of fiber can result in a new generation of repair materials to restore structural capacity and improve the service life of the structure.

Meet the RE-CAST Research Team



Dr. Kamal Khayat is the Director of the RE-CAST University Transportation Center. He joined Missouri S&T in August of 2011 as the Vernon and Maralee Jones Professor of Civil Engineering and Director of the Center for Infrastructure Engineering Studies. He specializes in the development of high-performance cement-based materials for structural applications and rehabilitation, particularly focusing on self-consolidating concrete and high-performance concrete behavior.



Dr. Antonio Nanni is the RE-CAST Associate Director for the University of Miami campus. He is a structural engineer interested in construction materials, their structural performance, and field application. His interests are in the field of civil infrastructure sustainability and renewal. In the past 27 years, he has obtained experience in concrete and advanced composites based systems as the principal investigator of projects sponsored by federal and state agencies, and private industry.

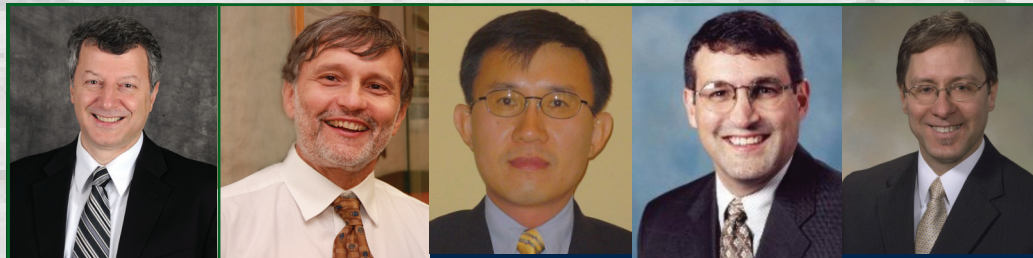


Dr. David A. Lange is the RE-CAST Associate Director for the University of IL-Urbana-Champaign campus, where he is a professor of civil engineering. Lange served as Associate Head of the Department of Civil and Environmental Engineering from 2004-10. His research area is microstructure and properties of construction materials. Recent topics include characterization of pore structure, drying phenomenon and measurement of internal relative humidity gradients, shrinkage/creep, and cracking.

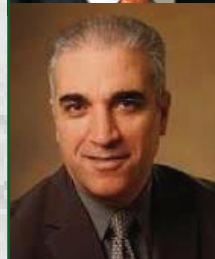


Dr. Hanif Nassif is the RE-CAST Associate Director for the Rutgers campus. He established the Bridge Engineering program at Rutgers. He previously worked various projects related to fatigue behavior of bridges, Weigh-In-Motion, and analytical modeling. He is currently involved in similar projects sponsored by the New Jersey Turnpike Authority related to finite element modeling, field instrumentation and monitoring, and WIM data collection. He was also involved in the pioneering work of the calibration and development of the new LRFD-AASHTO Bridge Design Specifications, as well as the Ontario Bridge Design Code.

Meet the RE-CAST Research Team



Kaan M.A. Özbay is a Professor at the department of Civil and Urban engineering at NYU-Poly and Center for Urban Science and Progress (CUSP). Dr. Özbay's research interest in transportation covers advanced technology and sensor applications, incident and emergency management, development of real-time control techniques for traffic, traffic safety, and transportation economics with an emphasis on life cycle cost analysis and appraisal of transportation projects using cost and benefit analysis.



Dr. John J. Myers is a Professor of Civil Engineering at Missouri S&T. Over the past 18 years, his focus has concentrated on high-strength / high performance concrete (HS/HPC), SCC, HVFAC behavior and durability performance; fiber-reinforced polymers in structural repair and strengthening applications; development of environmentally sensitive construction materials; and blast resistance of structures.



Dr. Alex Shin is an Associate Professor of Civil Engineering at the Southern University and A&M College. He specializes in the characterization of



high-performance cement-based materials for the applications of pavement and structural rehabilitation. In particular, his focus has concentrated on the bonding behavior between old concrete and new layers, including new concrete, elastomeric materials, and FRC.

Dr. Jeffery S. Volz is an Associate Professor of Civil Engineering at University of Oklahoma. He has over sixteen years of practical design experience in both bridge and building design areas, including eight years for a subsidiary of the Portland Cement Association investigating cementitious materials for strength, durability, fatigue, impact, and blast resistance.

Dr. Dimitri Feys is Assistant Professor of Civil Engineering at the Missouri University of Science and Technology. His research area is in mix design, fresh properties and casting of concrete. Main subjects deal with rheology of highly-workable cement-based materials, mix design of high-performance, highly workable concrete and casting of concrete, including pumping.

Do something constructive this summer!

RE-CAST five-day graduate summer course: Fundamentals of Rheology & Applications on Cement-Based Materials



This is an accelerated short course for graduate students being offered this summer at Missouri University of Science and Technology. It is designed to give graduate students an understanding of rheology fundamentals, principles of measurements and the applications on cement-based materials. The theoretical lectures will be supported by three lab sessions. Students will receive hands-on experience with no less than six different rheometers.

When: July 14 - 18, 2014

Where: Butler-Carlton Hall, 1401 N. Pine Street, Rolla, MO

Instructors:

Kamal Khayat

Vernon and Maralee Jones Professor of Civil Engineering: Materials, Missouri S&T

David Lange

Narbey Khachaturian Faculty Scholar and Professor, University of Illinois at Urbana-Champaign

Dimitri Feys

Assistant Professor, Civil Engineering: Materials, Missouri S&T

FEATURES AND BENEFITS

- Review the basic concepts of rheology and rheometry
- Learn fundamental physics of suspension rheology
- Apply this knowledge on cement-based materials
- Use the latest and greatest equipment
- Understand day-to-day practical situations
- Improve the quality of your research

The RE-CAST team is currently determining the number of credits earned and cost. If interested, please contact Abigail Sherman at 573-341-7884 or by email at abigayle@mst.edu.

RESEARCH ADVISORY COMMITTEE



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