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LTRC Welcomes New Chief Engineer to Chair 2001 Policy Committee

DOTD Chief Engineer Bill Temple

LTRC is pleased to announce the election of recently appointed DOTD Chief Engineer Bill Temple as the chairman of the committee, replacing former DOTD Chief Engineer Roddy Dillon, who has retired.

The LTRC Policy Committee was established to advise and make recommendations concerning research and technology transfer programs, budgeting, and the policies of the center. The committee meets at least twice a year and is composed of ten members: three appointees of the secretary of DOTD, one appointee of the chancellor of LSU, one appointee from each of six other state universities with civil engineering programs, the director of LTRC, and an FHWA appointed observer.

The appointment of Temple as chairman of the Policy Committee is in a way a homecoming for LTRC and

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Louisiana's First All-HPC Project Wins Award

The Louisiana chapter of the American Concrete Institute has honored the state's first all high performance concrete (HPC) project with the "Best Concrete Project Award" at a banquet recently held in Metairie.

The Charenton Canal Bridge (SP 241-02-0040), on State Route 87 in Charenton, was awarded the Award of Excellence in the categories of "technology" and "highways and bridges." The Charenton Canal Bridge is the first bridge in Louisiana to be built entirely of high performance concrete.

The bridge was also the first completed project following the LTRC research study entitled "Implementation of

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LTRC Welcomes New Chief Engineer (cont. from page 1)

for Temple, who served as a research engineer for 24 years and as the associate director of research at the center from 1989 until 1996. Temple, a 28-year veteran of the department, was then promoted to chief of the DOTD maintenance division in 1996 before being appointed assistant secretary of operations in 1999. As chief engineer, Temple will oversee the department's maintenance, construction, and design sections as well as LTRC.

"LTRC is uniquely well-situated to serve as an effective bridge between practicing transportation professionals and the state's academic resources," noted LTRC Director Joe Baker. "The LTRC Policy Committee is structured to enable the communication and partnership necessary to define and resolve technology and education issues of common interest in the transportation field."

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The current committee is comprised of the following individuals:

Chairman:

Bill Temple, P.E.,
Chief Engineer, DOTD

Vice-Chairman:

Freddy Roberts, Ph.D., P.E.
Professor of Civil Engineering, Louisiana Tech University

Members:

Joe Baker, P.E.,
Director, LTRC

Robert Bruce, Ph.D.
Professor of Civil Engineering, Tulane University

Blaise Carriere, P.E.
Deputy Secretary, DOTD

Ken Perret, P.E.
Assistant Secretary, Planning and Programming, DOTD

Kenneth McManis, Ph.D., P.E.
Professor and Department Chair, Department of Civil Engineering, University of New Orleans

Mehmet Tumay, Ph.D.
Associate Dean, Engineering College, Professor of Civil and Environmental Engineering, Louisiana State University

J.O. Uppot, Ph.D., P.E.
Professor, Coordinator, and Graduate Director,
Department of Civil Engineering, McNeese University

Ernest Walker, Ph.D., P.E.
Dean, College of Engineering, Southern University

Robert Wang, Ph.D., P.E.
Professor, Department of Civil Engineering,
University of Louisiana at Lafayette

Invited Observer:

Virgil Page, P.E.
Planning and Research Engineer, FHWA

Recording Secretary:

Toni Daigle
Executive Services Assistant, LTRC

Expanding Horizons: LTRC Researchers Examine Distance Learning for Engineers

Researchers at the Louisiana Transportation Research Center, led by Dr. Peter Stopher, have broken new ground by designing and implementing distance learning courses to help establish a professional master's degree program in Civil Engineering. The program developers have determined that a number of courses should be offered on different campuses throughout Louisiana in order to provide continuing education to professional engineers all over the state.

For additional information contact Dr. Babak Naghavi at (225) 767-9123.

The project's purpose was to develop a short course on a topic of major interest to DOTD and to offer this through distance learning capabilities. The course was designed to serve two functions: offer an opportunity for staff of DOTD, FHWA, and MPOs to learn about transportation planning and act as a prototype and proof-of-concept test for distance learning education.

DOTD assisted in selecting a curriculum covering land use models, trip generation, trip distribution, mode choice, assignment, and needed background and supplementary material. An introductory level course with homework problems that students could solve in spreadsheets or with calculators, the course included approximately 28 hours of classroom contact time over a two-week period.

The Center for Distance Education at LSU provided training on preparation and delivery for the instructor of the course, and a previously offered lesson on travel forecasting was used as a basis for making slide shows, worksheets, and presentations. Students were also given printouts of the overheads used in the class.

Two classes were used for this distance education course, one having an instructor and the other as the remote location with a proctor. Because there was only one remote classroom, some of the aspects of a full distance delivery were not experienced, such as switching from classroom to classroom as questions are asked by different students.

Evaluations of the class indicated that most items were rated between very good and excellent, with three—seat comfort, ease of viewing videos and graphics, and applicability to current job—being in the good to very good range.

One of the conclusions reached was that the distance course should be spread out over a longer period of time. The course was compressed into two consecutive weeks, with six or seven hours of lessons a day. Students did not have sufficient time to absorb the material and do the homework.

It was also recommended that a three-credit hour course be developed from this material that could serve multiple purposes, including a continuing education course for the proposed MCE, a professional master's degree currently being proposed by six universities in the state. Another possible option is to condense the course material to a one-day short course that would provide an introduction to transportation planning for professionals working in other areas of transportation such as design and construction.

Searching for New Alternatives:
LTRC Investigates use of GGBFS Grade 100

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elps protect the environment and saves money.

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Protecting the environment while encouraging cost-efficient production are two major concerns in our new world economy—concerns that are often diametrically opposed. The search for new products and technologies that can bridge the gap between the two is becoming more and more important for all industries, including transportation.

Researchers at LTRC are investigating a product that has the potential to be both environmentally responsible and fiscally rewarding—ground-granulated blast-furnace slag (GGBFS) grade 100—by allowing for the replacement of proportional amounts of cement, up to 50 percent, in concrete mixtures. The research is comparing GGBFS grade 100 to GGBFS grade 120, a finer-grain product that was recently approved by DOTD for use in its pavements and structures. The GGBFS grade 120 has already reduced costs for construction, but if GGBFS grade 100 is found to produce a comparable quality concrete product, the savings could be even greater.

Currently there are two pavement projects and one structural project that use GGBFS grade 120, but only one source provider. If the research proves that GGBFS grade 100 produces concrete that is strong, durable, workable, economical, and comparable to GGBFS grade 120, then grade 100 would be competitive with all of the concrete the department currently uses.

A previous study has been conducted that looked at the results of GGBFS Grade 120 in different situations. Through the same series of standard ASTM tests, researchers are attempting to determine the effects of GGBFS grade 100 on concrete at various substitution rates and temperatures. The tests will determine strength, durability, and workability of the concrete and provide a basis for comparison to grade 120.

Ultimately, the research results will assist DOTD in determining whether or not the use of GGBFS grade 100 is a feasible option. While the implementation of GGBFS grade 120, when allowed, has already proven to be more economical than 100 percent conventional cement, GGBFS grade 100 has the potential to be at least comparable to grade 120 while providing an important ecological benefit through the recycling of what, like grade 120, would have otherwise been waste material.

All-HPC Project Wins Award (cont. from page 1)

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High Performance Concrete in Louisiana Bridges." The LTRC study has lead to an investigation into the fatigue and shear behavior of HPC bulb-T girders and its results will assist bridge design engineers in the future design of bulb-T girders for bridges.

The LTRC research will result in stronger and longer girders which can be designed either for a reduction in the number of girders used per span or for longer span lengths, ultimately providing significant cost savings in state bridge construction.

Congratulations for this award go to Paul Fossier, DOTD Bridge Design; John Eggers, Randy Young, Al Mix, and Matt Tircuit, all of LTRC; Bob Bruce, Tulane University Civil Engineering Department; Henry Russell, HGR, Inc.; John Roller, Construction Technology Laboratories, Inc.; Coastal Bridge Company; Gulf Coast Prestress; and Baldwin Redi Mix.

ACCOMPLISHMENTS

Our special congratulations go to DOTD's Undersecretary, John Basilica, Jr., also a Louisiana National Guardsman who began his Army career in 1978 and was recently promoted to the rank of Brigadier General. Basilica has been a member of the Louisiana Army Guard since 1992, when he joined DOTD, and has risen from the rank of major to the prestigious rank of brigadier general during that time. He is currently the commander of the 256th Infantry Brigade, eSB (Enhanced Separate Brigade), one of fifteen Enhanced Combat Brigades in the Army. Congratulations, John.

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Joe T. Baker, P.E. Director, LTRC
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Sandy Fiser Editor
Kirt Clement, P.E. Assoc. Director, Technology Transfer
Vicki Dischler Graphic Designer
Renee´ Laborde - Editorial Assistant

LTRC Research Examines New Cleaning/Coating Technology

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ormation,
ntact Dr.
. Meletis,
ncipal
estigator
the proj-
, at (225)
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When driving over the Mississippi River Bridge in Baton Rouge, or any other bridge, do you ever stop and wonder about the massive structure that is safely transporting you to the other side? Do you ever think about the longevity of such a structure? Researchers at LTRC have pondered those exact thoughts.

Because such huge amounts of steel are used in the highway systems of Louisiana, corrosion resistance, longevity, and maintenance of steel structures is of utmost importance in preserving and advancing the infrastructure. To prolong the life of these steel structures, an application of protective coating is required to prevent corrosion. The adhesion of the coating is extremely important, and the steel must first be cleaned, removing film and layers of contaminants, to ensure proper adhesion.

Current cleaning practices have had major disadvantages including high-energy costs, unfriendliness with the environment, disposal problems, etc. Electrolytic cleaning methods are known, but have not been successfully commercialized. Also, current metal coating methods have several limitations. But, there is a new process—electro-plasma cleaning and deposition (EPCAD)—that LTRC research, conducted by Dr. I.E. Meletis of LSU in a project that is being funded by the FHWA, has been investigating. It is a patented, environmentally-friendly technology that has the potential to overcome many of the limitations and drawbacks of conventional methods.

The researchers wanted to study this new process by looking at the effects of critical processing parameters on surface cleaning and surface micro-roughness, establishing optimum conditions for achieving quality coatings and controlling coating thickness, and establishing process variables for achieving and coating treatments in a single step.

To achieve these objectives, the researchers used low carbon steel, studied as a flat plate and a bar. They accomplished several things in their research that included determining the effect of processing parameters on uniformity and quality of cleaning and surface roughness, characterizing and evaluating cleaned surfaces, characterizing and analyzing electrolyte composition parameters as a function of usage, establishing a steady-state operation requirement, concentrating on coating processes, characterizing coating quality and properties, and searching for process parameters that can achieve simultaneous cleaning and coating.

The results and developed technology from this study can be applied to steel structures in bridges and elevated highways as well as in steel rebar reinforcements of bridge decks. Subsequently, the research has the potential to benefit all federal and state transportation owners of such structures.

With the introduction of the electro-plasma process, structures built over rivers, creeks, lakes, and even elevated interstates could see a valuable increase in the life of the structure, which translates into money saved for the state.

Researchers Sound New Ideas for Aircraft Operations

Go to any airport at any time of the day and what do you see – pandemonium. Baggage is moving in one direction, passengers in another. Flight attendants, pilots, and people are all trying to get to their destination. To keep airports running smoothly, accurate records of all airport activities need to be kept.

Large airports are by necessity equipped with the means to track every minutia of daily operations, but for smaller and rural airports that may be manned only during certain hours, record keeping can become a problem. Research sponsored by LTRC and conducted by Dr. Charles A. Harlow, LSU, recognized this need and has designed a system to help solve the problem.

The researchers wanted to develop a prototype for an automatic aircraft operation monitoring system which would identify numbers and types of aircraft which take off and land. This information is of great importance in qualifying for funding, particularly at small unmanned airports. Some of the issues involved in deploying technologies for monitoring aircraft operations include the cost of the monitoring operation, the reliability of the system, the portability of the system, the ability of the system to operate self-contained in the field, and the ability of the system to be acceptable and not interfere with airport operations.

After an evaluation of possible methods for deploying a monitoring system, the investigators determined that acoustic technology offered the best prospect. They created a database consisting of airport information, runway information, acoustic records, photographic records, a description of the event (take-off, landing) aircraft type, and environmental information.

The researchers determined that the best way to identify aircraft was from sound signals, but the signals presented an object identification problem with different types of aircraft. Feature extraction, the process of reducing the amount of data while retaining the ability to recognize the object, was used to solve the problem.

Sound data are often processed in the root mean square of the sound signal pressure. The equivalent continuous sound level over a specified time interval is the equivalent steady level that would have the same RMS value over that time interval. Some sound events, such as jet aircrafts, are loud. Single engine propeller aircraft landings are very quiet. Other measures can be related to the

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Aircraft Operations Classification System (cont. from page 7)

shape of the curves. A fast aircraft, such as a jet, will have a curve that is steeper as the plane approaches, compared to a propeller aircraft. Using algorithms and acoustic signals as well as frequency, skewness, and symmetry measurements, a system was developed that was capable of classifying and monitoring different aircrafts and airport operations.

For the purpose of the research, there were a total of 105 takeoff events for jets, multi-engine and single engine planes, and helicopters. The accuracy of testing was 100 percent. A second study was conducted that included 48 sound events that were not aircraft events, such as various background noises including tractors, cars, trucks, construction sounds, etc. The testing results of the second study were also 100 percent.

The researchers believe further tests in the field and refinements to the algorithms and software can yield an even more promising commercial solution. With a system such as the researchers propose, smaller airports could have more accurate records and a more efficient classification system.

For additional information contact Dr. Charles A. Harlow, principal investigator for the project, (225) 388-6796.

The Lighter Side of Technology