T I R E

2002

A w a r d s

LTRC

Technology Transfer Program

2002 Transportation Innovation for Research Exploration (TIRE) Program Awards

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LTRC

Louisiana Transportation Research Center

Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

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In response to a Request for Proposals for the 2002 Transportation Innovation for Research Exploration (TIRE) Program, the Louisiana Transportation Research Center (LTRC) received twenty-five proposals for small-scale, exploratory research in all fields of transportation science, engineering, and education. Funding for the TIRE program is limited to $30,000 per project.

TIRE program research is characterized by one or more of the following tenets:

- Work is preliminary on untested and novel ideas.
- Work involves venture into emerging research ideas.
- Work entails application of new expertise or approaches to "old" research topics.
- Work is multi-disciplinary in nature, crossing LTRC program boundaries.
- Work has severe urgency with regard to availability of (or access to) data, facilities, or equipment.
- Work is likely to catalyze rapid and innovative advances.

After review and evaluation of the submitted proposals, the TIRE project selection committee selected four projects for the 2002 program. A brief synopsis of the selected projects follows.

02-1TIRE **Waste Tire Fiber Modified Concrete**

Principal Investigator - Dr. Guoqiang Li, Louisiana State University

Adding shreds of waste tire rubber to portland cement concrete represents an alternative use for abandoned tires and a means of reducing concrete brittleness. Although the strength of concrete modified by the addition of rubber may be reduced, it is anticipated that concrete durability will be enhanced by the modification. The objective of this project is to evaluate the effects of adding waste tire rubber fibers to portland cement concrete. This project may lead to improved pavement ride quality and a significant favorable environmental impact on Louisiana.

02-2TIRE **Research & Development of Louisiana's First FRP Bridge**

Principal Investigator - Dr. Abdelkader Tayebi, Louisiana Tech University

The rebuilding of an aging infrastructure is a major problem facing our nation today. Bridge engineers have been considering alternative materials such as fiber-reinforced polymer (FRP) composites that appear to be less vulnerable to environmental damage than the materials that have been commonly used, such as concrete and steel. Another benefit of using composites is reduced construction costs due to their light weight and ease of installation. Composite structures also have competitive initial costs and excellent life-cycle costs. The objective of the proposed research is a design for Louisiana's first full FRP composite bridge.

02-3TIRE **Synthesis and Evaluation of Block Copolymers as Anti-stripping Additives**

Principal Investigator - Dr. William Daly, Louisiana State University

The adhesion of asphalt cement to aggregate surfaces can be enhanced by incorporating an anti-stripping additive into the asphalt cement prior to the addition of aggregate. Designed block copolymers are being considered for use as anti-stripping additives. It is anticipated that properly-designed block copolymers will create stronger adhesive bonds between aggregate and asphalt cement. These copolymers will be blended with asphalt cements commonly used by LaDOTD, then mixed with aggregates having various stripping properties. The stripping characteristics of the resultant mixtures will be evaluated. This research will demonstrate the utility of block copolymers as anti-stripping additives.

02-4TIRE **Application of Smart Materials in Bridges and Pavements**

Principal Investigator - Dr. Steve Cai, Louisiana State University

Development of a structure that can adapt itself to problems associated with differential settlement, cracks, and bearing malfunction will be investigated. Smart materials, such as Shape Memory Alloys (SMA), can serve as sensors to monitor force distributions, and appropriately adjust bearing forces. Smart materials may also be used to address issues such as pavement crack repair. By incorporating smart materials into the design and construction of a bridge, the structure may be made capable of adjusting its internal forces so as to adapt itself to different environmental loads. The proposed research is intended to serve as a catalyst for more in-depth studies into this area.