SPARKING INNOVATIVE TRANSPORTATION SOLUTIONS

Issue 3
Spring/Summer
2003

HIGH-SPEED RAIL
HIGHWAY SYSTEMS
TRANSIT &
TRANSPORTATION SAFETY

Ignition

News from **TRB's IDEA** Programs

INSIDE:

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

THE IDEA PROGRAMS

Innovations Deserving Exploratory Analysis

IDEA programs provide start-up funding for promising but unproven innovations in surface transportation systems. The programs' goal is to foster ingenious solutions that are unlikely to be funded through traditional programs.

Managed by the Transportation Research Board, IDEA programs are supported by the member state departments of transportation of the American Association of State Highway and Transportation Officials (AASHTO), the Federal Transit Administration (FTA), the Federal Railroad Administration (FRA), and the Federal Motor Carrier Safety Administration (FMCSA).

The Transit IDEA program, which receives funding from FTA as part of the Transit Cooperative Research Program, is guided by a panel chaired by Eva Lerner-Lam, Palisades Consulting Group. Harvey Berlin is the TRB program officer.

High-Speed Rail IDEA is funded by the FRA as part of its next-generation high-speed rail research. A committee chaired by William J. Harris, Consultant, has oversight. Charles Taylor is the TRB program officer.

The NCHRP Highway IDEA program is supported by the member state departments of transportation of AASHTO through the National Cooperative Highway Research Program (NCHRP). It is guided by a panel chaired by Carol A. Murray, Commissioner, New Hampshire DOT; Inam Jawed is TRB program officer.

Safety IDEA is jointly funded by FMCSA and FRA. The committee is chaired by Ray Pethtel, Virginia Tech Transportation Institute. Harvey Berlin is TRB program officer.

Visit the IDEA web site:
www.nationalacademies.org/trb/idea

Cover photo by Aaron Byrd, Virginia Tech Transportation Institute.

TRANSPORTATION RESEARCH BOARD
500 Fifth Street, NW
Washington, DC 20001

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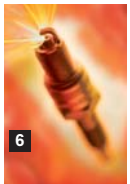

Safe Progress

Are there automated vehicles and personal aircraft in our future or will fickle funding policies stymie progress? Is all this technology *really* progress? The shape of transportation in the future, the benefits of technology, and the responsibilities of research funding agencies all come into sharper focus under the scrutiny of Ray Pethtel, chairman of TRB's Safety IDEA committee.

In *Driving Safety with Technology*, Pethtel, University Transportation Fellow at Virginia Tech and facilitator for the Virginia Smart Road, makes the case for technology as a first defense. The Smart Road, a test bed for evaluating technologies and conducting pavement research, is a full-scale facility where climate conditions are conjured up in a control booth and a trip on the tour bus (shown on our cover) might take you through wind, fog, rain, or ice, just as a real bus trip might.

SAFETEA—The very name of Transportation Secretary Mineta's proposed surface transportation reauthorization bill emphasizes a likely focus of new initiatives in the coming years. That emphasis on improving transportation safety was anticipated by the Federal Railroad Administration's decision to join the Federal Motor Carrier Administration in sponsoring the Safety IDEA program. And speaking of buses, this collaboration strengthens a program that supports innovations in railroad, truck, and intercity bus safety, no matter what the weather. Find more information in the New Ideas department, along with updates on promising IDEA projects.

Try connecting these dots: bomb-pocked runways in Iraq, bridge beam developers in Chicago, and rail car designers in Baltimore. In the Business section, you'll read how they all come together in "Serendipity Cements a Bridge Deal." There's real progress in this issue.

Neil F. Hawks
Director, Special Programs
Transportation Research Board
of the National Academies

Your comments are welcome and may be sent to the editor at: **lmason@nas.edu**.

Courtesy of VTTI

Ray Pethtel
University Transportation Fellow and Associate Director, Virginia Tech Transportation Institute

Insight

Driving Safety with Technology

Even when the sky above Blacksburg, Virginia, is springtime blue and the azaleas on the campus of Virginia Tech are barely stirred by a breeze, hard rain may ride the howling winds along the 2-mile stretch of Smart Road nearby. A state-of-the-art facility for pavement research and evaluation of intelligent transportation systems technologies, the Smart Road has its own version of climate control.

Currently a 2.2-mile two-lane road, the Smart Road includes Virginia's highest bridge, which stretches 2,000 feet across Wilson Creek at a height of 170 feet. When the 5.7-mile project is completed, the Smart Road will be a four-lane, limited-access highway between Blacksburg and I-81.

Ray Pethtel is facilitator and spokesperson for the Smart Road and, as University Transportation Fellow and Associate Director of the Center for Transportation Research, is responsible for providing leadership and direction for Virginia Tech's transportation interests. He holds an appointment as Visiting Professor at the Center for Public Administration and Policy and heads the Center's Institute for Policy Outreach. Along with managing several research projects and teaching graduate classes, he also chairs the committee that guides TRB's Safety IDEA program.

> "Almost all of the technology we need to reduce accidents is out there, but it's not ripe yet."

Pethtel talked with us about the role of technology in improving transportation safety and how the administration of research programs can impact their progress.

Can technology really make a difference when so many roadway hazards are created by drivers—driving too fast, too slow, or too close or when distracted, for example? Can technology save us from ourselves?

It can't totally reduce driver error or mechanical failure, but it can do a lot. Technology can offer tremendous assistance to safety and to vehicle mechanics. Systems to monitor tire pressure, in-vehicle devices to reduce headlight glare, technologies for information on a driver's physical condition that might be reason to delay a trip, obstacle detection, collision avoidance, advanced cruise control, are all examples. So, the answer is, yes, technology is, can, and will promote safety, convenience, and efficiency in our transportation systems.

When you look ahead 10, 20, or 50 years, do you see real changes in transportation practice? What is different, are there still as many of us on the roads? Are we any safer?

We have alternative futures. One is very similar to what we have today: we travel by highway between cities, although more transit—buses and fixed rail—is used by residents. We have significant sprawl, which is nothing new of course, we had it before—when Daniel Boone went exploring. And we have significant environmental issues.

On the other hand, if we're smart, we'll have a couple improvements. We'll have less air pollution from vehicles because of fuel cell technology. We may have a lane set aside for automated vehicles. We'll

have much cleaner-running vehicles. Suburban areas will have more transit alternatives, but we'll still have congestion. We'll have more heavy rail and more buses but we'll primarily depend on personal vehicles. Aviation plays a bigger role, with personal aircraft becoming the transportation choice for business travel.

Based on what you know about the administration of public policy, is it possible to maintain focus on specific goals over a period of 10, 20, or 50 years?

It is, but we've got to demonstrate progress toward goals by showing improvements; pick the low-hanging fruit first. The Interstate 81 Traffic Information System (511), for example, provides travel information that's available over the Internet, phone, and radio. In the next step, monitors can measure congestion. Drivers will see displays telling them there is congestion ahead and that the travel time from where they are to the next town is 15 minutes on this route. Sensors monitor weather conditions and report high winds or ice. Displays list services for stranded or detoured motorists. What goes wrong with transportation systems is incidents. Technology is particularly good at reducing incidents and identifying those that do occur, which helps reduce accidents and congestion.

Almost all of the technology we need to reduce accidents is out there, but it's not ripe yet. It's the job of federal and state governments to fund the development to a reliable standard. States don't fund research enough to quickly develop technologies. Progress occurs when money is available to make it happen.

And we need to be wise about how we invest that funding. We need to divide transportation research into infrastructure, operator, and vehicle areas and then develop policies and applications to effect implementation. Ideal research involves first understanding the reasons for the problem and then looking for counter measures. As an example, at VTTI we're conducting naturalistic driving studies to examine actual driving habits; and we are looking at the interaction between cars and trucks to develop data that reflect current reality, rather than relying on assumptions about those interactions. The data will help us understand the reasons behind certain driving characteristics so that the real problems can be addressed.

What advice do you have for investigators who might be considering a proposal for IDEA funding?

Listen to the sponsor, pay attention to the priorities stated in the program brochures. Clearly demonstrate why your idea is significant, how it addresses the problem, and the likely outcome of your project. And, most of all, pay attention to how you communicate your idea.

Courtesy of VTTI

New Railroad Safety Research on Track

Railroad safety applied research is being broadened thanks to Federal Railroad Administration (FRA) sponsorship of the Safety IDEA program starting this year.

The FRA joins the Federal Motor Carrier Safety Administration (FMCSA), which began funding the program when it started in 2002. With the expanded focus of the program, TRB is accepting proposals for development of innovative concepts and methods for improving railroad, intercity bus, and truck safety.

TRB's Safety IDEA program promotes innovations in railroad safety and motor carrier safety by providing funds at the critical early stages of investigations to evaluate unproven concepts and innovative approaches, and for developing and testing prototypes. Proposals are due September 1, 2003. Any public or private organization, institution, university, or company is eligible to submit a proposal. Possible areas of investigation include

- Vehicle sensors to monitor safety systems, e.g., brakes or wheels
- Improved technology for awareness and warning of other vehicles near trucks
- Operator fatigue monitoring or alertness improvement
- Railroad and truck vehicle security
- Railroad rolling stock innovations to improve safety
- Railroad grade crossing safety enhancements

Additional information on the programs and how to prepare and submit proposals is available on the IDEA web site at **www.nationalacademies.org/trb/idea**.

Questions can be addressed to Harvey Berlin, Senior Program Officer, or Debbie Irvin, Administrative Assistant, at telephone (202) 334-3310. ❖

Predicting Trouble

Suppose you knew in June that your car's water pump would need to be replaced in November or that the engine would need work in August. That would be useful information. Suppose you had 700 cars and that thousands of people depended on them every day. Now that information would be really useful.

That's the premise put forward in Transit IDEA Project 30 by investigator Gary O'Neill from the Georgia Tech Research Institute. Working in collaboration with the Metropolitan Atlanta Rapid Transit Authority (MARTA), which really does operate more than 700 transit buses, O'Neill is developing a method to capture performance data from onboard sensors at a common node or data port. The information can be used to schedule maintenance to optimize performance, improve diagnostics, and analyze historical trends. Such a system would promote reliable service, protect rolling stock investments, and improve efficiencies of cost. Successful development of the prototype and a few refinements will likely result in implementation at MARTA and possibly other transit agencies. Details about the project, "Predictive Diagnostics for Bus Maintenance," are available on the IDEA Web page in the Transit IDEA Annual Progress Report at: **www.nationalacademies.org/trb/idea**. ❖

Photo Imaging by Kelly Mills © MARTA 2002

Contact Information:

gary.oneill@gtri.gatech.edu

Keeping the Lead Out

Protecting streams, rivers, and wetlands from contamination with lead-based paints during bridge painting projects has become an important but expensive priority for transportation agencies. Wastewater treatment procedures to reduce lead levels have been cumbersome and costly, especially when the resulting lead levels require the wastewater to be trucked to disposal facilities for hazardous materials where special permits are required.

In NCHRP IDEA Project 72: Improved Filtration of Wash Water Generated During Bridge Maintenance Painting, investigators developed a portable filtration system that reduces lead content to levels the EPA finds acceptable for release into the environment. As the IDEA project demonstrated, the system operates less expensively than traditional filtration systems and eliminates associated disposal costs. The investigators are developing a plan to commercialize the product and have established an agreement with the

Kentucky Transportation Cabinet for further testing and refinements during the 2003 painting season. ❖

Contact Information:

vicki.ainslie@gtri.gatech.edu

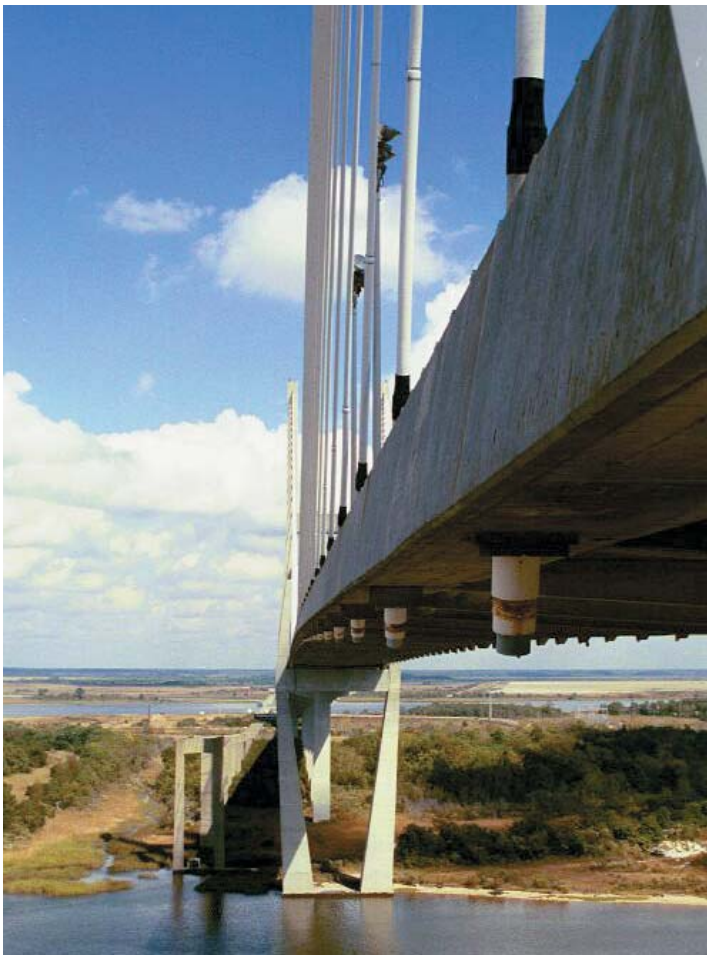

Photo by A. Mehrabi

Bad Vibrations

Bridge stay cables are subject to damaging vibrations caused by wind and rain. NCHRP IDEA Project 71, "Implementation of Tuned Dampers for Suppression of Bridge Stay Cable Vibrations," tested the effectiveness of a new hybrid design for tuned impact dampers, which absorb much of the energy from vibrations. After laboratory testing, prototype dampers were installed on a major cable-stayed bridge in the United States, where the field tests confirmed that the system suppressed vibrations and increased the cable damping ratios.

A major stay cable manufacturer, the state of Alabama, and a pooled fund study team from the Federal Highway Administration have expressed interest in advancing the commercial development of this technology. ❖

Contact Information:

Armin Mehrabi,
amehrabi@ctlgroup.com

Serendipity Cements a Bridge Deal

What could bombed-out airplane runways in Iraq, rail car designers in Baltimore, and bridge beam developers in Chicago possibly have in common? At least two things, it turns out. One of them is a magnesium-phosphate cement used to rapidly repair those runways. Mike Riley and his team of scientists at CeraTech, Inc., based in Baltimore, joined with Tim Langan of Surface Treatment Technologies, Inc. (STT) also in Baltimore, to produce a cement product that can patch a runway in 20 minutes. STT is also working on high-strength, light-weight rail car designs with funding from the High-Speed Rail IDEA program, which is the second common element.

Langan, principal investigator for the HSR car project, happened to mention the super-quick setting cement to Chuck Taylor, the HSR IDEA program officer. Chuck wondered out loud if Teng & Associates in Chicago, who are developing a hybrid-composite structural beam system for railroad bridges through another HSR IDEA project, would be interested. (This project is described on page 7 of the Fall 2002 issue of Ignition, available on the Internet at: **www.nationalacademies.org/trb/idea.**)

Teng & Associates were interested. They now plan to use the cement in their beam design and CeraTech plans to provide additional cost-sharing to complete the testing phase of the bridge beam system required under the IDEA contract. Discussions are being held with the United States Marine Corps about using the cement and the hybrid beam to develop a modular composite bridge system that can be rapidly erected in combat environments.

Contacts: John Hillman, Principal Investigator at Teng & Associates for HSR IDEA Project 23: Investigation of a Hybrid-Composite Beam System: HillmanJR@teng.com. Tim Langan, Principal Investigator for HSR IDEA Project 32: High-Strength, Lightweight Car Bodies for High-Speed Rail Vehicles: Tlangan@bcpl.net. Mike Riley: mike.riley@ceratechinc.com

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