

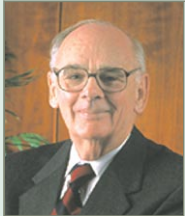


HIGHLIGHTS

Cambridge, Massachusetts

Jan/Feb 2004

National Transportation Systems Center



Richard R. John

Director's Notes

Supporting a Safe and Productive Rail System

The FRA addresses all phases of railroad operations to ensure that the railroads in the United States continue to be among the world's safest and most productive. The Volpe Center has been instrumental in supporting this effort by developing innovative technologies and procedures that are technically and economically sound.

This issue of *Highlights* includes just a few examples of Volpe's comprehensive work for the FRA. The Focus article addresses Volpe's evaluation of new crash energy management designs for rail vehicles.

A series of full-scale crash tests designed by the Volpe Center and managed with the FRA measures the crashworthiness of railcars; test results have and will contribute to regulations and design standards that help protect rail passengers and crewmembers.

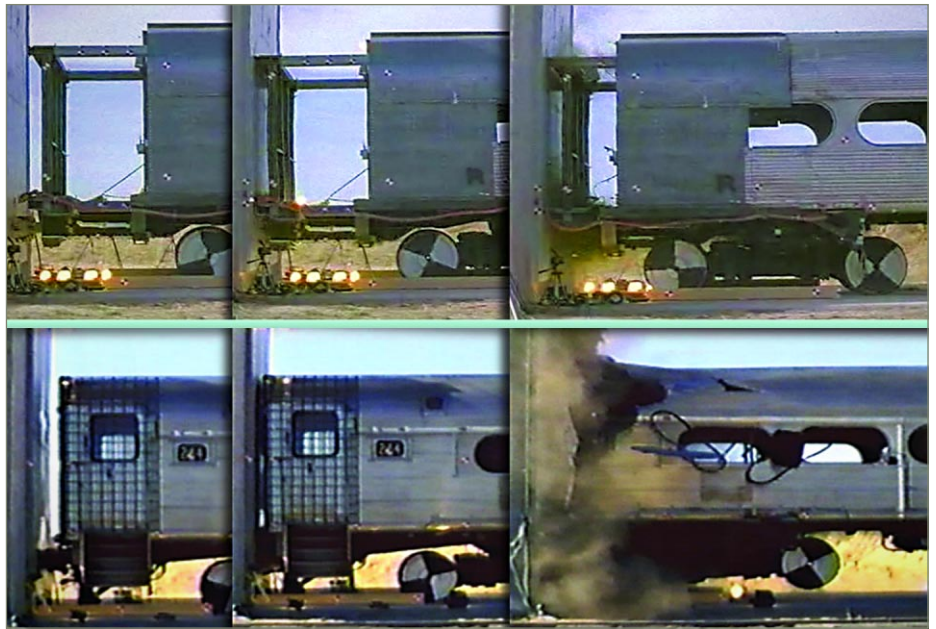
On a very different scale, a Volpe team is developing a software application that

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Inside

- Introducing Volpe's newest Domain Expert
- Considering **human factors** in design
- Developing data-driven **state safety plans**
- Creating a **railroad traffic planning** tool

Focus



The Volpe Center has designed a series of tests to measure and compare the crashworthiness performance of conventional rail passenger equipment (bottom) to cars retrofitted with designs intended to improve crashworthiness (top).

Promoting and Improving the Safety of Rail Service

The resurgence of intercity and commuter passenger rail service in the United States offers travelers viable options to air and highway travel, which can translate into reduced traffic congestion and fewer environmental impacts. In response to increased demand for service, new equipment is being developed. However, as rail traffic and speed increases, so does the potential for accidents, serious injuries, and fatalities; until recently there were no federal or industry standards governing the safety performance of new equipment designs. Ongoing Volpe Center research in support of the Federal Railroad Administration (FRA) is contributing to new regulations and standards that will help protect passengers and crew members in the event of rail accidents.

In collaboration with the FRA's Equipment Safety Research Program, the Volpe Center has supported a testing program that determines the performance of both conventional and improved crashworthiness designs of

passenger rail cars. Volpe's principal role has been to conduct the research, which involves defining appropriate scenarios to study collisions, developing computer models to simulate the structural and dynamic results of the collisions, designing and supervising the full-scale tests, processing the test data, and comparing the test measurements with the analysis results. The computer models are then used to evaluate a wider range of collision conditions than can be tested.

Performing Full-Scale Rail Car Testing

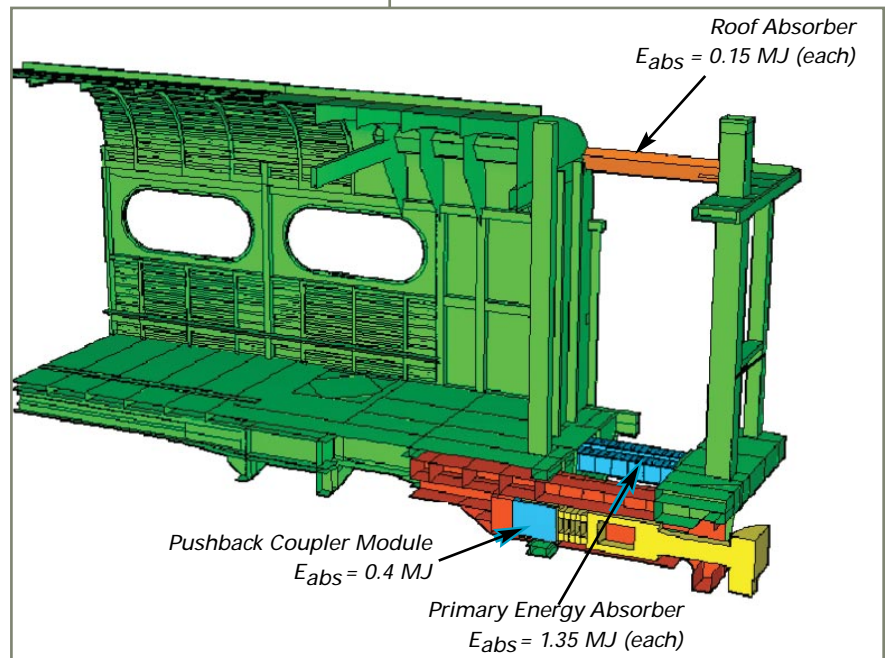
The first series of full-scale tests defined the crashworthiness of conventional-design equipment in three impact conditions. Corresponding tests of modified passenger rail cars have begun. This testing arrangement allows comparison of the performance of both types of equipment. The Volpe team determines what studies and tests need to be performed, defines objectives, carries out the studies and tests (both in-house and with contractor support), and applies the results to develop recommendations for rail equipment crashworthiness standards and regulations.

On December 3, 2003, a single-car impact test was conducted to assess the crashworthiness performance of a passenger rail car retrofitted with crash energy management (CEM) crush zones. The CEM design is intended to limit the structural damage from intruding into the passenger compartment. Mr. David Tyrell, Mr. Eloy Martinez, and Ms. Karina Jacobsen of the Structures and Dynamics Division traveled to the Transportation Technology Center, an intermodal research and test center in Pueblo, Colorado, to supervise the implementation of the test. In test conditions similar to those of the earlier corresponding conventional-car test, the retrofitted CEM car was pushed up to nominally 35 mph and collided with a rigid barrier. The vehicle was instrumented to capture several categories of data; high-speed film and video provided a secondary set of data.

The preliminary test results indicate that the CEM design has superior crashworthiness performance over conventional equipment. The conventional car experienced more than 5 feet of crush, whereas the CEM design was about 3 feet, limiting the vehicle damage to the unoccupied volume.



The test vehicle was a Budd Pioneer cab car retrofitted with an end structure of crash energy management design.



The specific crash energy management design selected for the rail car test is a series of trigger mechanisms and crushable components that, when activated, cause the end of the car to crush in a controlled manner. There are three primary crushable elements: the pushback coupler module, the primary energy absorbers, and the roof absorbers.

CEM is engineered by using zones of controlled crush; the collision energy is absorbed by a series of components with known structural characteristics. The crush is distributed throughout the length of a train, limiting damage to unoccupied areas in multiple cars rather than crushing large volumes of the first car, as is characteristic of existing equipment. The test results show that the CEM crush zone performed as engineered. In comparison with pre-test design estimates, the overall test performance was in close agreement.

Single-car test data is currently being further processed and analyzed. Additionally, test results are being used to refine the test model. Upcoming tests of the CEM design include a two-coupled car impact with a fixed barrier, which will include interior-occupant tests, and a cab car-led train impacting a locomotive-led train.

Validating and Improving Computer Models

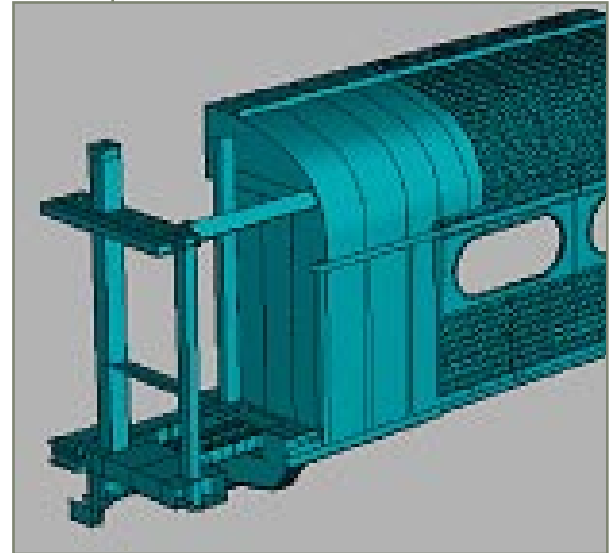
While the principal objective of this testing program is to determine effective strategies for improved structural crashworthiness and improved occupant protection, a secondary objective is to validate and improve the computer models that have been developed as part of rail vehicle crashworthiness research. As part of test planning, detailed computer simulations are performed prior to each test. The results of the simulations are used to determine the impact speed as well as other details of the test, such as accelerometer size and location. After the test, the simulation results are compared with the test measurement and the analyses are refined as necessary.

Impacting Federal Regulations and Industry Standards

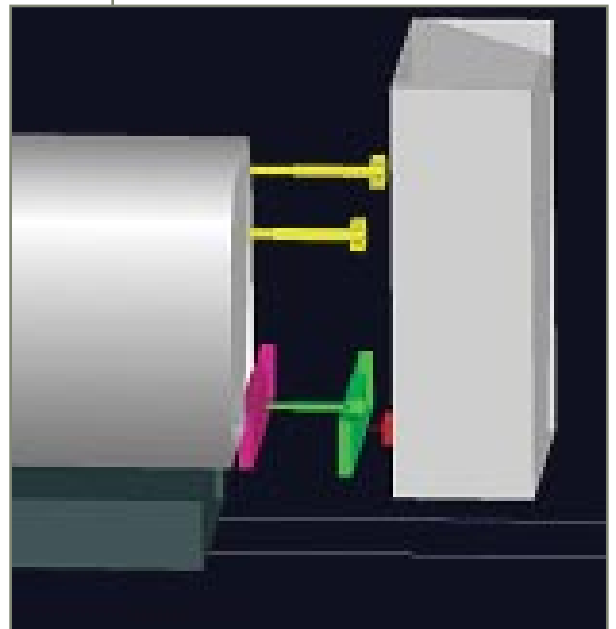
Results of this research have been used to develop the crashworthiness requirements for Amtrak’s high-speed trainset, to develop and improve the FRA’s Passenger Equipment Safety Standards, and to draft revisions and additions to FRA locomotive crashworthiness regulations as well as the Association of American Railroads (AAR) standards. The American Public Transportation Association (APTA) is using information from this research to further develop and refine industry standards and recommended practices for rail passenger equipment crashworthiness.

Through APTA and AAR, the railroads and suppliers are involved in planning and conducting crashworthiness studies. The results are presented to these organizations, and are documented in government reports and in technical papers written for the American Society of Mechanical Engineers, the Transportation Research Board, and other technical organizations.

Computer models, such as those shown below, are used to simulate the full-scale impact tests. Finite element models provide information on the structural force/crush behavior. A collision dynamics model then uses the force/crush characteristic to produce estimates of the gross motions of the colliding bodies.



Finite element model



Collision dynamics model



Considering Human Factors in the Design of Electronic Flight Bags (FAA)

Electronic Flight Bags (EFBs) are small, information-management devices designed to help pilots and aircraft operators conduct flights more efficiently and safely. Originally seen as simple repositories for electronic documents such as checklists, operating manuals, and navigation publications, EFBs are now seen as multifunctional devices that can support an array of applications, including cabin surveillance, surface moving maps, electronic messaging, and display of live weather. Currently, laptop-style EFBs are used during operations at many airlines both in the United States and in Europe; they are often used to calculate flight performance and/or view airline documents.

Although EFBs hold great promise, government regulators, potential customers, and industry developers all agree that they raise many human factors considerations that must be handled appropriately to avoid adverse effects. For example, without careful design EFBs could increase workload and head-down time, and distract the flight crew from higher priority tasks. To understand and assess the full impact of an EFB, designers and evaluators must understand how the device will function and be used by crews, how the device will interact with other flight deck equipment, and how training and operating procedures will be affected.

The Volpe Center supports the Federal Aviation Administration (FAA) Human Factors Research and Engineering Division by identifying and prioritizing human factors considerations in the design and use of EFBs. The FAA first asked Volpe to support development of an EFB Advisory Circular in 1998. Volpe's initial effort resulted in a comprehensive document, released in September 2000, titled "Human Factors Considerations in the Design and Evaluation of Electronic Flight Bags Version 1: Basic Functions." This document, which was developed in coordination with the Air Transport Association Digital Display Working Group, was used as a source of information for the FAA Advisory Circular for EFBs (AC 120-76A). The Advisory Circular covers issues related to the installation of an EFB system in the aircraft and its use by the flight crew.

In fall 2003, the Volpe Center published a final report, *Human Factors Considerations in the Design and Evaluation of Electronic Flight Bags (EFBs) Version 2*. Like the earlier report, Version 2 contains information for FAA evaluators, system designers/manufacturers, and operators about the many EFB human factors considerations that need to be addressed during design



The accelerated development and proliferation of EFBs in the past few years make human factors research critical. To ensure the safe use of EFBs by flight crews, human factors considerations must be addressed during design and evaluation. Above, a pilot uses a tablet computer. (Photo courtesy of Teledyne Controls.)

and evaluation. Industry comments on Version 1 were incorporated into this release; as a result, the guidance in Version 2 is more comprehensive and detailed throughout. The new document also contains information on electronic charts, the rapidly growing EFB industry, and a summary of equipment requirements and recommendations for quick reference.

The report was authored by Dr. Divya C. Chandra and Dr. Michelle Yeh of Volpe's Operator Performance and Safety Analysis Division, Dr. Victor Riley of User Interaction Research and Design (a Volpe Center contractor), and Ms. Susan J. Mangold of Battelle Memorial Institute (a Volpe Center contractor). The report and further information on the project are available at <http://www.volpe.dot.gov/opsad/efb>.

Using the Version 2 document as a foundation, the Volpe Center is developing evaluation tools and procedures for use by inspectors who evaluate EFBs in the field.

Developing Data-Driven State Safety Plans (FMCSA)

The primary mission of the Federal Motor Carrier Safety Administration (FMCSA) is to reduce crashes, injuries, and fatalities involving large trucks and buses. Accordingly, FMCSA is focused on conducting data-driven analysis to help identify effective programs that improve motor carrier safety. Recently, a Volpe Center team developed and delivered data-analysis training to all FMCSA Division Administrators to aid in the development of annual safety plans.

The FMCSA now requires that all Division Administrators develop annual state-level safety plans for their states using existing resources. In support of this new requirement, the Volpe team developed a four-step approach to creating an effective safety plan, which was included as part of the training. The approach includes: (1) clearly identifying the state's safety goals, (2) identifying and quantifying safety issues in the state by using existing information and resources, (3) identifying state countermeasures and safety programs that could lead to safety improvements, and (4) establishing effective measures to monitor results. The team utilized Analysis & Information (A&I) Online — a Web-based tool designed by Volpe for FMCSA — to provide quick and efficient access to descriptive statistics and analyses of commercial vehicle operator safety information. The Web site (<http://ai.volpe.dot.gov/mcspa.asp>) is a valuable resource for FMCSA in promoting motor carrier safety.

The Volpe team provided hands-on training for Division Administrators in all 50 states and the District of Columbia. The Division Administrators learned to conduct data analysis using existing information resources (such as A&I Online) and to develop effective State Motor Carrier Safety Plans. The success of the training has led to plans for training in the spring of

The Volpe Center supports FMCSA in carrying out its safety mandate by providing safety analysis expertise and innovative information resources.

2004 for the FMCSA State Motor Carrier Safety Assistance Program coordinators responsible for developing annual Commercial Vehicle Safety Plans.

Mr. Donald Wright and Ms. Nancy Kennedy of the Motor Carrier Safety Assessment Division led the Volpe team. Team members included Ms. Candace Brown, Ms. Julie Nixon, and Ms. Cyndy Shaffer, also of the Division; Ms. Dana Larkin of the Planning and Policy Analysis Division; Messrs. Dennis Piccolo, Kevin Berry, Arturo Torres, and Walt Zak of EG&G Technical Services (a Volpe Center on-site contractor); and Ms. Anusha Seetharaman of Cambridge Systematics (a Volpe Center on-site contractor).



Volpe Delivers Railroad Traffic Planning Software (FRA)

The Volpe Center is developing a decision-support tool – the Railroad Traffic Planner – to enable more effective planning and management of railroad operations. The software, developed in collaboration with the Massachusetts Institute of Technology, demonstrates how traffic planners and operations managers can more effectively create and analyze complex railroad schedules. The tool was designed for short-line and regional railroads with the need for a stand-alone planning aid. This project, sponsored by the Federal Railroad Administration’s Office of Research and Development Human Factors Program, supports the objective of enabling easier, safer, and more productive processes through the development and technology transfer of decision-support tools.

The Railroad Traffic Planner graphically displays train schedules using stringline diagrams that show each train’s location across time as a string. Stringlines have been used in the railroad industry for many years to help planners analyze schedules, but the traditional approaches are time consuming and unwieldy. The Railroad Traffic Planner allows users to quickly generate and modify strings, enabling them to identify and resolve potential conflicts. Railroad planners can simulate proposed changes by repositioning trains or modifying variables, such as speed or how long a train stays in one place, and then view the consequences of their changes in graphic and tabular form. Consequences may include impacts on travel time and track use. For example, to ensure safety and efficiency when railroads use single track for travel in both directions, it is important for planners to analyze where and when the trains will meet or pass each other. The software also enables railroad planners to quickly assess the impact of maintenance activities, insert additional trains, and recover from emergencies, and minimize their negative impact on train operations.

The Railroad Traffic Planner is a stand-alone planning aid that enables the user to identify and resolve schedule conflicts by simulating changes and assessing their impacts on operations.

On November 25, 2003, Ms. Mary Lee of the Operator Performance and Safety Analysis Division set up the latest demonstration version of the Railroad Traffic Planner at the Guilford Rail System in Billerica, Massachusetts. During this visit, the Guilford traffic planners indicated how they would use this application to analyze the impact of various factors, such as temporary speed restrictions and passenger trains sharing track with Guilford freight trains, to help them determine the best times for crew scheduling. Additional feedback from users will enable the Volpe team to refine the software and develop the tool for wider distribution.

The Volpe team is currently adding a module to the Railroad Traffic Planner that will enable a tracking system that uses the Global Positioning System to show near-real-time position data of locomotives.



Volpe Center's Project Management Initiatives

Successful project management practice is “mission critical” to the Volpe Center’s ability to perform its work. The Center is acknowledged for its excellent technical work, and is now reevaluating and standardizing its project management practices, planning, and implementing improvements across the enterprise. This activity is, in part, a response to a recent Research and Special Programs Administration (RSPA) assessment. A new framework will enable managers to better organize, plan, control, monitor, and execute project management functions.

The Center is using a variety of approaches to mature its management practices and integrate project management tools into the organization. These include generating project management standards that will establish a basic set of principles for managers while allowing them to tailor information to meet customer needs. The Center is in the process of developing requirements for an automated project management tool, known as Project Management Information System (PROMIS), which will provide project financial and resource data, as well as schedule, milestone, and performance data. PROMIS will not only support project managers, but will also provide upper management and customers with ready access to project information.

A critical component in this endeavor is providing Volpe staff with adequate training. Currently, the Center is developing a curriculum that will include hands-on training and formal courses on such topics as: Basic Project Management, Customer Relationship Skills, Project Cost Estimation and Scheduling, and Writing Performance-Based Statements of Work. In

addition, Volpe is encouraging project managers to pursue project management certification that meets national and international standards.

The Center has appointed several teams to work on different aspects of improved project management: producing standards for project management practices, project planning, project staffing, cost and schedule estimation, scope management, and risk management.

The Volpe Center is committed to introducing management practices that are standardized yet flexible enough to accommodate varying degrees of project complexity. The combination of project management standard practices coupled with the project management information system will provide two core elements to begin the transformation of the Volpe Center to a more proactive Project Management-centric organization that will complement our long-standing technical excellence.

Highlighting Volpe Experts

Anya A. Carroll: Domain Expert in Surface Transportation Operations

This is the first in a series of articles about the Volpe Center's National and Domain Experts. In the Director's column of this issue, Dr. Richard R. John discusses this select group and how it benefits the Center and its sponsors.

Ms. Anya A. Carroll, a civil engineer and research scientist, is a Volpe Center Domain Expert in Surface Transportation Operations.

Ms. Carroll joined the Volpe Center 23 years ago, after earning a B.S. in Civil Engineering from Tufts University. She is recognized as an international authority on surface transportation safety issues related to highway and rail operations. For 15 years, Ms. Carroll has led the Center's efforts to support the Federal Railroad Administration (FRA) in finding ways to reduce the number of collisions between trains and road vehicles and the resulting deaths and injuries. Due in part to the Center's work, significant reduction in the number of incidents and fatalities have occurred from 1994 through 2002: 37 percent and 42 percent, respectively. These results move the Department closer to its Action Plan performance goals of reductions by 50 percent in both categories by 2004.

The Center's work has supported numerous legislative efforts by the FRA to include active signal systems inspection, maintenance and testing, locomotive and freight car conspicuity, and railroad horn systems. More recently, this work has included evaluating the use of Intelligent Transportation Systems at highway-rail intersections as well as evaluating



Ms. Anya A. Carroll presents at a poster session on Railroad Infrastructure Security Systems at the 6th World Congress on Railway Research in Edinburgh, Scotland.

other obstacle-detection and intrusion-detection technologies for railroad infrastructure security.

Ms. Carroll has played a significant role in national and international symposia, workshops, and seminars that have brought together academia, railroad industry experts, and stakeholders from different modalities and nationalities in the area of rail safety research. She has frequently represented the Center and the U.S. DOT at international events in Australia, the United Kingdom, and Canada to both share the results of her research and determine lessons learned from the approaches taken by other countries. She has led efforts to analyze and define highway-rail crash problems and characteristics and to thus provide insights regarding crash causation and prevention.

Ms. Carroll uses her management, research, and technical experience to further the safety needs of the transportation enterprise. She presides over the National Academy of Sciences Transportation Research Board's Committee on Highway Rail Grade Crossings and is actively participating in the International Organizing Committee for the 8th International Level (Grade) Crossing Symposium to be held at Sheffield University, England in April 2004. She not only provides technical advice to the Center's top management, but also takes great pride in mentoring and providing technical leadership to multidisciplinary teams conducting analytic and experimental research efforts.

Published & Presented

- **Realistic Radio Communications Research.** November 5 and 6, 2003, the Volpe Center participated in the Royal Aeronautical Society International Conference on the Simulation of the Environment, held in London, U.K. Dr. Judith Bürki-Cohen of the Operator Performance and Safety Analysis Division presented "Evidence for the Need of Realistic Radio Communications for Airline Pilot Simulator Training and Evaluation." Dr. Bürki-Cohen's paper summarizes existing radio communication practices, literature, and industry and airline efforts to improve realistic radio communications simulation. It also presents the results of an earlier study on the impact of current practices on initial operating experience.
- **ITS World Congress.** November 16 through 21, 2003, Ms. Jane Lappin of the Economic and Industry Analysis Division attended the ITS World Congress in Madrid, Spain. Ms. Lappin presented "Los Angeles and Seattle: A Comparative Analysis of Customer Response to Traffic Information," co-authored by Ms. Margaret Petrella, also of the Division. The paper compares customer response to online traffic information in two of the most congested cities in the United States with the objectives of developing a better understanding of the regional characteristics that define the market for

online traffic information services, and identifying customer requirements for a satisfactory traffic information service.

- **International Electric Vehicle Symposium.** November 16 to 18, 2003, Mr. William P. Chernicoff of the Service and Operations Assessment Division participated in the 20th International Electric Vehicle Symposium, in Long Beach, California. He presented the paper “Hybrid Electric Tow Tractors for the Military.” The Volpe Center has been providing support to the Department of Defense to develop and deploy a dual-use hybrid tow tractor with the objective of reducing fuel consumption, emissions, and parts and labor necessary to maintain and operate these vehicles.
- **Sleep Apnea Crash Risk Study.** Dr. Lawrence Barr of the Accident Prevention Division completed a study to assess the risks of commercial vehicle crashes due to the presence and severity of obstructive sleep apnea among a sample of 406 truck drivers, the majority of whom were local/short-haul operators. The primary objectives of the study were to understand the impact of sleep apnea and driver impairment on crash involvement, the number of crashes, and severity of crashes. Results of the study showed that drivers diagnosed with sleep apnea had no greater likelihood of having a crash, or multiple crashes, than drivers without sleep apnea. The Federal Motor Carrier Safety Administration’s (FMCSA) Office of Research and Technology sponsored the study. A final report, “Sleep Apnea Crash Risk Study,” documenting the study and recommending areas for future research, was submitted to FMCSA in November 2003.
- **National GIS Day.** Dr. Alan Rao was invited to participate in a panel session titled “Enabling the Business of Government Using Geospatial Technology: A Roadmap for Coordinated and Collaborative National Action,” held on “GIS Day,” November 19, 2003, in Washington, D.C. The session was organized by the Council for Excellence in Government and sponsored by the Office of Management and Budget. Representatives from federal agencies and industry organizations addressed topics ranging from President Bush’s 24 e-government initiatives to the costs and benefits of GIS (Geographic Information System) in state and local governments. Dr. Rao emphasized the U.S. DOT’s commitment in support of the proposed “data exchange standards.” He used the Bureau of Transportation Statistics’ National Transportation Atlas Data (NTAD) as an example to call for interagency collaboration and data sharing.
- **Operator Fatigue Management.** November 17 through 21, 2003, Dr. Stephen Popkin of the Operator Performance and Safety Analysis Division participated in the International Symposium on Night and Shiftwork in Santos, Brazil, in support of the Federal Railroad Administration Office of Research and Development. Dr. Popkin, who co-chairs the U.S. DOT Operator Fatigue Management Program, presented a keynote address, “Developing Fatigue Management Resources for the Transportation Enterprise: U.S. Experience Towards a Non-prescriptive Approach,” at the Management and Safety in Transportation workshop.

- **Equity of Congestion Pricing.** November 19 to 22, 2003, Dr. Doug Lee of the Economic and Industry Analysis Division attended the International Symposium on Road Pricing in Key Biscayne, Florida, which is presented by the Transportation Research Board and sanctioned by the National Research Council of the National Academies. Dr. Lee presented a paper, “Impacts of Road Pricing on Income Classes,” which reviewed empirical evidence on the distributional impacts of peak period pricing, or “value pricing,” and compared it to standard distributions of household income. He found that although peak period travelers, and especially those who pay tolls, are well above average in income, the payments do not rise quite as fast as income; hence the charges, viewed as a tax, are mildly regressive. Other revenue instruments, such as the fuel tax, are similarly mildly regressive. Recycling the revenues from tolls, however, could easily correct any distributional inequities if so desired.
- **Bus Axle Weight Study.** At the request of Congress, in December 2003 the Department of Transportation submitted a study on the applicability of federal maximum weight limitations to over-the-road buses and public transit vehicles. The Volpe Center conducted the study and prepared the report for the Federal Transit Administration. The report included an assessment of current status and trends in bus axle weight; an estimate of the cost of pavement damage caused by buses; an assessment of the technical and economic feasibility of lighter weight buses; a benefit-cost evaluation of selected policies; and recommendations to Congress. The Volpe team, led by Dr. Scott Smith of the Service and Operations Assessment Division, also included Dr. John Brewer, Vehicle Crashworthiness Division; Mr. William Chernicoff and Mr. Scott Lian, Service and Operations Assessment Division; Dr. Doug Lee, Economic and Industry Analysis Division; and Mr. Ed Ramsdell, Chief of the Economic and Industry Analysis Division.
- **Estimating Vehicle Miles Traveled.** The 2003 series of the *Transportation Research Board (TRB): Journal of the Transportation Research Board* recently published the paper titled “Methodology for Estimating Vehicle Miles Traveled for Commercial Motor Vehicles at the State Level” which was submitted by Ms. Candace Brown, Ms. Nancy Kennedy, and Mr. Don Wright of the Motor Carrier Safety Assessment Division and Mr. Walt Zak of EG&G Technical Services (a Volpe Center on-site contractor). The paper describes a method to better estimate large truck and bus vehicle miles traveled (VMT) at the state level in order to accurately calculate commercial motor vehicle-related crash rates for state and federal programs. The adjusted state VMT for commercial vehicles supports measurement of program effectiveness and development of countermeasures to promote motor carrier safety.
- **Invited Lecture at George Mason University.** At the invitation of Professor George Donohue, former Federal Aviation Administration Associate Administrator of Research and Acquisition, Dr. Eugene Gilbo of the Volpe Center’s Automation Applications Division visited George Mason University in Fairfax, Virginia, on December 4 and 5, 2003. Dr. Gilbo gave a seminar at the Department of System Engineering and Operations Research on his study of Airport Arrival/Departure Optimization. The subject of

Director’s Notes

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railroads can use to plan and manage operations more effectively. This work supports the FRA’s objective of enabling easier, safer, more productive processes through the development and technology transfer of decision-support tools.

For more than two decades, the Center has supported the FRA’s efforts to improve the safety of highway-rail grade crossings. Although during this time there has been a significant reduction in collisions between trains and road vehicles, new technologies and collaborative approaches hold promise for substantial progress. The Center’s work in this area is led by Anya Carroll, whose accomplishments are described in a new feature that debuts in this issue.

“Highlighting Volpe’s Experts” will introduce Volpe’s National and Domain Experts — seasoned professionals with nationally recognized expertise and knowledge in technical disciplines and/or transportation domains. The Center and our sponsors call on these leaders to guide the initiation, development, and implementation of research and technology programs that address critical national issues and challenges. Beyond their strong technical background, staff members selected for this position have demonstrated exceptional ability to lead collaborative efforts that cross disciplines and organizations. Working closely with me as well as with the Center’s upper management and other senior technical staff, Volpe’s designated experts identify emerging transportation technologies and evolving national concerns, facilitating knowledge transfer that helps ensure that Volpe continues to provide our sponsors with innovative solutions.

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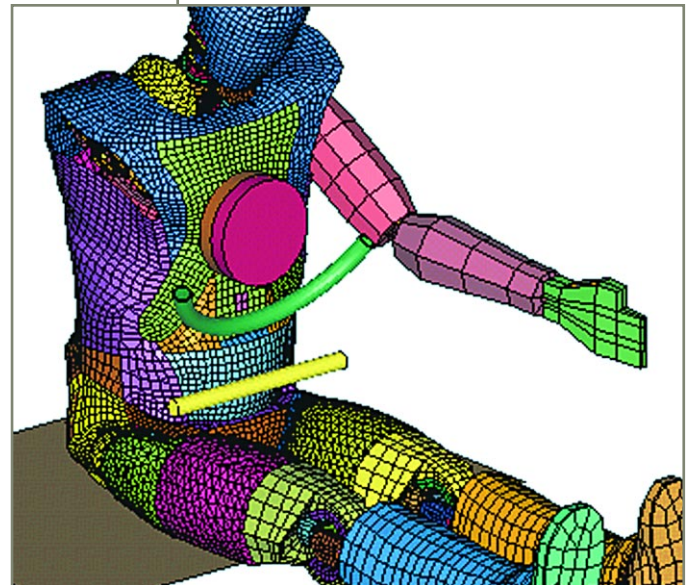
Airport Arrival/Departure Optimization, part of the University's senior design Capstone Project, deals with developing a design prototype that integrates three major components: the Corridor Integrated Weather System, Airport Arrival/Departure Optimization, and NASA's Surface Management System.

- **Air Transport Human Factors.** Dr. Michelle Yeh of the Operator Performance and Safety Analysis Division presented a paper titled "Air Transport Pilots' Information Priorities for Surface Moving Maps" at the 47th Annual Human Factors and Ergonomics Society Conference in Denver, Colorado. The paper is based on a study in which air transport pilots rated the value of different types of information for conducting operations on or near the airport surface. The ratings identified a set of items considered to be of high value across all phases of flight, but also emphasized the shifting need for information across different phases.
- **Full-Scale Impact Tests.** Mr. Matthew Lyons of the Structures and Dynamics Division presented "Full Scale Tank Car Coupler Impact Tests," at the 2003 American Society for Mechanical Engineers International Mechanical Engineering Congress and R&D Expo held November 15 to 21, 2003, in Washington, D.C. The paper was co-authored by Mr. Lyons, Dr. William Riddell, also of the Division, and Mr. Kevin Koch of Transportation Technology Center, Inc.
- **Finite Element Model of Crash Test Dummy.** Volpe's Vehicle Crashworthiness Division has developed a finite element model of the THOR crash test dummy for the National Highway Traffic Safety Administration's (NHTSA) National Transportation Biomechanics Research Center. Dr. Hailing Yu of EG&G Technical Services (an on-site Volpe Center contractor) presented a paper on the model development at the 2003 ASME International Mechanical Engineering Congress and RD&D Exposition held in Washington, D.C. November 15 - 21, 2003. The paper, "Finite Element Model of the Crash Test Dummy THOR: Torso Sub-Assemblies," was co-authored by Mr. Frank DiMasi of the Vehicle Crashworthiness Division, and Dr. Marisol Medri and Dr. Qing (Calvin) Zhou of EG&G Technical Services (a Volpe Center on-site contractor).

Director's Notes

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Finally, in this issue we continue to discuss changes taking place at the Center that will advance our customer service. We consider communications and reporting to be key elements of excellent project management. Redesigning our project management processes and tools will augment our technical expertise with improved capabilities in these areas, helping us to provide our customers with the best possible product.



Simulation of torso impacts using the THOR finite element model (the right upper extremity is not shown).