

# Technology Corridor News

Federal Motor Carrier Safety Administration

Office of Analysis, Research, and Technology

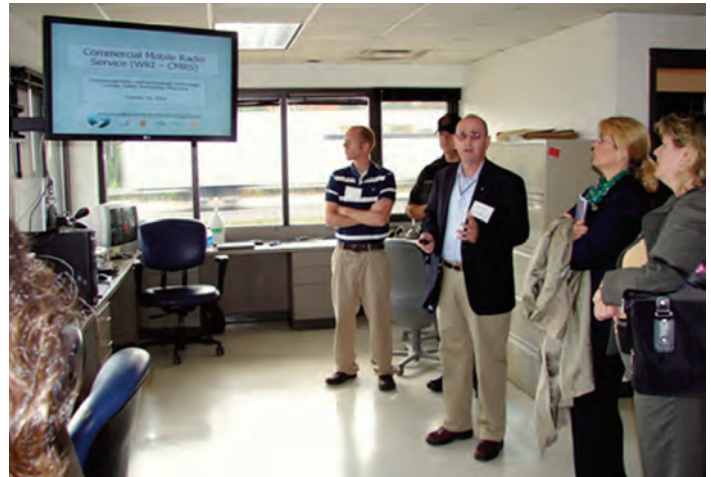
## CMV Technologies Showcased in Tennessee

The second triennial Federal Motor Carrier Safety Administration (FMCSA) Commercial Motor Vehicle (CMV) Safety Technology Showcase was conducted within FMCSA's Commercial Motor Vehicle Roadside Technology Corridor (CMVRTC) at the Greene County, Tennessee, CMV Inspection station on October 14, 2010. The event was conducted in partnership with Oak Ridge National Laboratory (ORNL), which facilitated the event, and the Tennessee Department of Transportation, Tennessee Department of Safety, and the University of Tennessee.

FMCSA Administrator Anne S. Ferro was among more than 200 attendees who got a first-hand look at new-to-market and emerging roadside inspection technologies that better equip Federal inspectors and State law enforcement as they conduct regular inspections to improve the safe operation of commercial trucks and buses.

"FMCSA is committed to strengthening commercial vehicle safety through the use of new technology," Ferro said. "By providing a platform to test, evaluate, and refine new enforcement technologies, we are able to clearly understand their benefits and encourage deployment on the State level."

Other participants included Tennessee Highway Patrol senior leadership; representatives from the Kentucky, Mis-



**Gary Capps (center), Technical Director of CMVRTC, gives an overview of the Wireless Roadside Inspection System to FMCSA Administrator Anne Ferro and others.**

issippi, New York, and Virginia departments of Safety and Transportation; Tennessee Trucking Association; Tennessee Motor Coach Association; staff from Department of Energy, the National Transportation Research Center, Inc., the Battelle Memorial Institute and 26 private companies.

During the 4-hour event, technology experts and users from partnering organizations staffed 12 technology stations where they conducted demonstrations including:

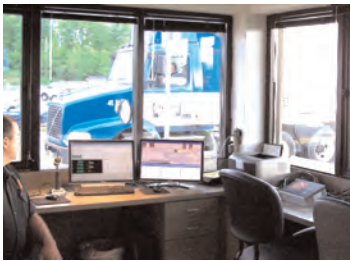
**Wireless Roadside Inspection (WRI):** Using a fixed site or mobile vehicle, WRI is designed to conduct up to 25 times more vehicle inspections a year than the current, in-person inspection process. A WRI inspection can obtain real-time driver and carrier identity, vehicle condition,

and hours-of-service violations while the vehicle is traveling at highway speed.

During the event, a Greene Coach Tours motorcoach passed by the inspection station in the normal traffic flow. As the motorcoach approached the station, a preconfigured geo-fence triggered onboard equipment to send driver hours-of-service information and other credentialing information wirelessly to the John A. Volpe National Transportation Systems Center in Cambridge, MA. The information was relayed in real time to a display at the station, where observers viewed driver duty status changes, as well as carrier, driver, and vehicle identification information.

**Smart Infrared Inspection System (SIRIS):** SIRIS detects brake, wheel, and tire

*(Continued on Page 2)*



*"FMCSA is committed to strengthening commercial vehicle safety through the use of new technology."*

*—Anne Ferro  
(Page 1)*

*"The SIRIS device proved to be a viable screening tool for the detection of vehicles with brake defects."*

*(Page 3)*

## CMV Technologies Showcased in Tennessee (from Page 1)

problems by comparing infrared thermal images of wheels as the vehicle enters a weigh station. A Wal-Mart class-8 truck was used to demonstrate the technology and observers were able to see the results of the infrared inspection as the vehicle passed by the SIRIS system. Participants were also shown past infrared inspections of vehicles that had defective brake components and underinflated tires.

**Performance-Based Brake Tester (PBBT):** PBBT technology provides a safe, accurate, and objective assessment of a vehicle's brake force and overall brake performance, parameters which are directly related to a vehicle's ability to stop. A Wal-Mart vehicle was used to demonstrate the PBBT machine's inspection of the vehicle's braking system. Participants could see the results on a nearby display board and also in print form.

**Medium Truck Duty Cycle:** An ORNL-developed data acquisition system (DAS) collected data from vehicle-borne safety sensors on three H.T. Hackney class-7 tractor-trailers. These sensors provide vehicle brake status, weight, and tire pressure monitoring capability. This collected data is being used to develop tools that one day may augment a vehicle's safety fitness information. Sample data



**The Wal-Mart test vehicle approaches the SIRIS sensors.**

and conclusions were presented along with an H.T. Hackney vehicle equipped with the safety sensors and the ORNL DAS.

**Technology in Motion Vehicle (TMV):** The TMV demonstration vehicle, equipped with an integrated USDOT number reader and several demonstration units (electronic onboard recorder, brake status monitor, and self-weighing system) raises stakeholder awareness and fosters adoption of the featured technologies. The TMV was present for participants to interact with.

FMCSA launched the CMVRTC in 2007 in partnership with the Tennessee Departments of Safety and Transportation, ORNL, and the University of Tennessee to further enable FMCSA testing of current, new-to-market, and emerging CMV safety

technologies and to promote their usage and acceptance by stakeholders.

The CMVRTC is managed through the FMCSA's Office of Analysis, Research, and Technology (ART) via an interagency agreement with ORNL. Since 2007, ART has established internal partnerships with the FMCSA Offices of Bus and Truck Standards and Operations, Enforcement and Compliance, and Safety Programs in Headquarters, and with the Southern Service Center in the Field. The CMVRTC is available to these and other FMCSA offices with management support provided by ORNL. ART has also established an external partnership with Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy to collect CMV safety sensor data from a DOE partner fleet. This data will be used to support the objectives of the CMVRTC.

The CMVRTC vision is to expand the corridor to additional inspection sites in Tennessee and other states as program-level efforts such as WRI and SIRIS mature and require a larger test bed with multisite, multistate participation. Additionally, the CMVRTC plays a prominent role in supporting FMCSA's technology transfer activities, enabling the accelerated deployment of proven safety technologies.

## Wireless Roadside Inspection Pilot Test Underway (Update)

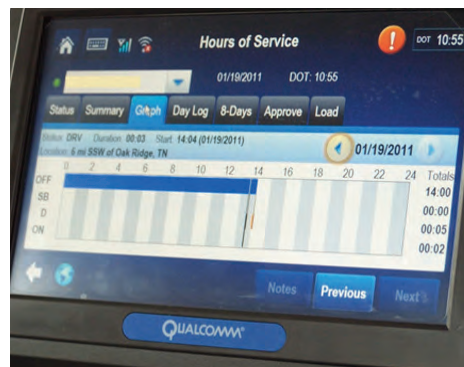
The Pilot Testing phase of the Wireless Roadside Inspection (WRI) effort is under way in Kentucky, New York, and Tennessee. The goal of the WRI Pilot Test program is to validate various technology methods for wireless inspection of commercial motor vehicles including driver, vehicle, and carrier identification and driver and vehicle status. This information is packaged into a safety data message (SDM) and transferred to a government back office for further processing. The data gathered from the WRI Pilot Test will feed the go/no-go decision making process for a WRI field operational test to be conducted in the FY13-14 timeframe and will be used to further refine the WRI concept of operations and architecture documents.

The pilot test started in October 2010 and will conclude on January 31, 2011. In Kentucky, the testing is being conducted at the Boone County CMV Inspection Station on I-71 and employs optical character reader technology to identify the carrier

and vehicle. Once this is accomplished, inspection station personnel request driver data from the carrier. Grammer Trucking and Mercer Transportation are partnering with the Kentucky Transportation Center to facilitate the testing in Boone County.

The New York testing is taking place in Long Island using Dedicated Short-Range Communications (DSRC) and a test vehicle from the Volvo Group. Information from the vehicles is passed to a roadside node and then to the Government back office.

In Tennessee, Commercial Mobile Radio Services (CMRS) units are being used from three telematics providers. Six fleets are participating with a total of 27 commercial vehicles. Some unique features of the Tennessee platform are 1) a self-test mode to allow drivers to view the SDM data before beginning their trip; 2) a pull-in/bypass indicator to allow the WRI process to be used in real-time at inspection stations; and 3) the inclusion of some



**WRI CMRS device showing driver hours-of-service data during roadside collaboration of the WRI data.**

limited safety sensor data (weight, tire, and brake).

The testing to date is promising with hundreds of SDMs having been generated for the test vehicles. The results of these wireless inspections are available to be viewed by enforcement and the carriers as a part of the Pilot Test.



# Smart Infrared Inspection System Completes 7-Month Field Test (Update)

The Smart Infrared Inspection System (SIRIS) was installed at the Greene County, Tennessee Commercial Motor Vehicle (CMV) Inspection Station in a semi-permanent fashion. A 7-month field operational test (FOT) on this system was completed in September 2010. This was the third phase of this project, following the proof of concept testing conducted in 2007 and the Pilot Test conducted in 2009.

During the testing, SIRIS operated completely autonomously, evaluating vehicles as they passed through the ramp to the pit scale at the inspection station. The system then alerted inspectors when a thermal anomaly was encountered with a vehicle's brakes, tires, or wheel-end bearings.

SIRIS evaluated a total of 4,373 CMVs during this pilot testing. Of those, 359 (8.2 percent) were flagged for one or more thermal issues, with brakes comprising the largest portion of problems. Vehicles flagged by SIRIS were then given a PBBT test and most were given a North American Standard (NAS) Level-1 or

Level-2 inspection. This resulted in a total of 275 Level-1 and PBBT inspections and 30 Level-2 inspections being performed.

Of the 305 vehicles inspections performed, 193 vehicles were placed OOS for a safety issues and an additional 41 inspected vehicles were found to have safety defects that were noted but did not meet OOS criteria. These results are shown in Table 1 and Table 2.

There were some operational stability issues with the system during the FOT that seemed to be caused by inclement weather, power fluctuations and interruptions, and vehicles moving faster than 15–20 miles per hour. However, the SIRIS device proved to be a viable screening tool for the detection of vehicles with brake defects.

Additionally, for the small sample of tire data, it appears that SIRIS may be an effective screening tool for tires that are dangerously overheated due to pressure or loading issues.

The next step in the process of creating a nationally-deployable infrared screening tool is to draft functional and

**Table 1. 2009 Summary of SIRUS Test Results**

<b>Total Vehicles Scanned by SIRIS</b>	4,373
<b>Total Vehicles Flagged by SIRIS</b>	359 (8.2%)
• <b>Flagged for Brakes</b>	328
• <b>Flagged for Tires</b>	29
• <b>Flagged for Bearings</b>	2
<b>Total Vehicles Subjected to Inspection</b>	305
<b>Total Vehicles Placed OOS for Reason Directly Related to SIRIS Flag</b>	193 (63.3%)
<b>Total Vehicles with any flaws found</b>	234 (76.7%)

**Table 2. 2009 Detailed Summary of SIRUS Flags**

Type of Flaw Detected	Inspections	OOS	Related Issue or Violation	Nothing Found
<b>Brakes</b>	274	174 (63.5%)	33 (12.0%)	67 (24.5%)
<b>Tires</b>	29	18 (62.1%)	8 (27.6%)	3 (10.3%)
<b>Bearings</b>	2	1 (50.0%)	0	1 (50.0%)
<b>Total</b>	305	193 (63.3%)	41 (13.4%)	71 (23.3%)

performance specifications that can be used by States interested in deploying this type of equipment.

These specifications will be based in part on the performance and capabilities of SIRIS and are expected to be avail-

able in late 2011.

*Note: for more information on the SIRIS system see Issues 2, 3, and 4 of the Technology Corridor News @ <http://www.fmcsa.dot.gov/facts-research/art-Technology-Corridor-Newsletter.htm>*

## Real-Time Dynamic Brake Assessment Data Collection Complete

In early December, data were collected for the Real-Time Dynamic Brake Assessment (RTDBA) proof of concept at the Greene County, Tennessee CMV Inspection Station. The goal of this preliminary testing is to determine the feasibility of developing an onboard system to monitor the performance of a vehicle's braking

system as the vehicle undergoes normal operation. The algorithm to be developed will be based on data for low-pressure stops; data collected previously by the Department of Energy in partnership with FMCSA revealed that these lower-pressure brake applications were characteristic of most driving situations for the vehicles

tested. Data collected for the RTDBA effort included brake application pressure, speed, and weight data from both real-world and test environments. In addition to stopping tests performed at various speeds, brake application pressures, and loading conditions, a series of PBBT-based tests were performed.



**Preparations for Initial PBBT Testing on the First Day.**



**Weighing at the End of the Final Day of Testing.**