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Onboard monitoring technology continues to provide railroads with better ways to monitor and track cars and locomotives

By Desiree J. Hanford

Rail executives are always minding their respective roads' bottom lines, but the current state of the economy makes doing so all the more imperative. Through Sept. 12, carload traffic was down 18.4 percent and intermodal traffic fell 16.9 percent compared with the year-ago period. "I think the simple reality of life right now is with this massive downshift in the economy, it's really having an effect on the industry," says Marshall Beck, senior vice president of marketing and sales for New York Air Brake Corp.

In short: Railroad officials have kicked the efficiency drive up a notch, whether they're searching for ways to streamline when reviewing their operational processes or their balance sheets.

For help, many are tapping onboard monitoring technology. The devices and systems provide railroads with tools to be more efficient, which in turn is better for their bottom lines. The technology can be used to track everything from how much fuel is being used to how efficiently an engineer navigates a long, winding curve. The data that's gathered enables rail planners to make real-time adjustments to a train that's well into its route or changes on a route that's still weeks away.

For an update on a range of onboard monitoring technology that railroads have at their disposal, *Progressive Railroading* recently checked in with a cross-section of suppliers, who shared descriptions of their product and system offerings.

Bach-Simpson Corp.

Bach-Simpson Corp. offers the 54000 Series Event Recorder. The information gathered by the recorder can help freight and passenger railroads develop more effective preventative maintenance programs, monitor fuel usage, train handling and overall performance, and support accident investigation efforts. All of the data can be downloaded for analysis. The 5400 Series unit can monitor and record as many as 64 digital channels, 16 analog channels and four frequency channels, says Paul Weber, Bach-Simpson's general manager.

The recorder also features an internal hardened memory module that can withstand accidents and fires, enabling data to be retrieved despite adverse conditions.

"All this allows our customers to meet the necessary requirements, but also provide them the basic health monitoring for a freight or rail locomotive," Weber says. "That helps provide them information for assessing efficiency, safety and maintainability."

Bach-Simpson also can synchronize the event recorder system with a video recorder.

"If you go into a court case, the video data can be discounted because the other side will say that the event shows something happened at such-and-such times and the video recorder shows another time," Weber says. "We can synchronize that information and it helps in an incident."

Invensys Rail/Safetran

Invensys Rail/Safetran offers the Communications Management Unit (CMU), which monitors locomotive operating parameters and periodically transmits the data to a railroad central office that can track locomotive status and location. The CMU comprises custom-designed and off-the-shelf components to "minimize the cost of the system," Director of Marketing John Maynie said via email. More than 2,400 CMUs are installed in the field.

Two wireless paths are used, depending on the data type and quantity of data to be sent. An 802.11 wireless connection is used to upload new or revised CMU software and download larger data files generated from the Federal Railroad Administration event recorder and various fault logs. A cellular connection is used to periodically send GPS location, fuel level and locomotive status. A message is immediately transmitted if an alarm condition is detected, such as low battery voltage, hot engine, traction motor over-current or other situations. Several spare inputs, and the business rules associated with them, are configurable to user requirements, Maynie said.

As these devices become more prevalent on the railroads, analysis of the periodic position messages and the event recorder data logs will enable locomotive operators to assess their asset utilization and compliance with operating rules, Maynie said. Future enhancements via additional communication pathways and the integration of wayside equipment status information will give railroads "an overview of their entire rail network and allow them to proactively plan for the optimum movement of trains across the network," he said.

IONX L.L.C.

IONX L.L.C. offers the IONX Edge^a and Connect^a asset monitoring systems that enable railroads to track and monitor rail cars and locomotives, respectively. IONX systems include a communication management unit, status and event sensors, and a user-friendly Web

interface. The systems employ satellite and cellular technology to provide "the best coverage possible," according to a statement posted on the company's Web site.

For locomotive and fleet vehicle monitoring, IONX Connect can: detect excessive idle times with immediate violation alerts; track fuel use, including refuel locations and amounts; monitor overspeed impact via an internally mounted accelerometer; and detect speed violations and "man down," the latter being an option for remote-control-equipped locomotives.

For rail-car monitoring, the IONX Edge system features ultra-low power telematics technology to monitor and track freight car assets. The IONX system is designed to deliver location and condition status reports via satellite or cellular connections to help shippers and others improve shipment safety, security, turn cycles and fleet utilization. Sensors can monitor load, hatch status, temperature and pressure status.

"Whether a car is empty or loaded and to what extent it's loaded has implications for the service environment and the service life of certain components, as well as implications for assets utilization and velocity," says Patrick Ameen, vice president and general manager of IONX, a business unit of Amsted Rail.

The company's most recent addition — IONXlive Interactive Dashboard for Locomotives — enables train operators to get a "complete bird's eye view" and drill into the specific metrics, says William LeFebvre, IONX's chief technology officer.

Lat-Lon L.L.C.

Lat-Lon L.L.C.'s latest onboard monitoring device is the LMU2, a second-generation locomotive monitoring unit designed for short lines and switching locomotives, says Chief Executive Officer David Baker.

The LMU2 features three-axis impact detection and two control relays. Per customer request, the LMU2 also has more inputs than the LMU, including 12 digital and four analog inputs. LMU customers quickly used up their four inputs, so Lat-Lon decided to expand the number with the LMU2. "We thought, "Let's just put more in there and not have people worry about it,"" Baker says.

Lat-Lon also offers a solar tracking unit and customers can opt for up to 10 wireless sensors that can track hatches, valves, temperature and more. The company recently launched a Web site that's formatted for mobile use: It's designed to be easily readable and usable via cell phone, Blackberry or iPhone-type devices. The site can tell operators where a train is at any given moment, Baker says.

New York Air Brake Corp.

New York Air Brake's Locomotive Engineer Assist Display Event Recorder (LEADER) is a real-time onboard monitoring tool designed to enhance the locomotive engineer's train-handling capability. LEADER helps engineers make critical evaluations of operating parameters and can "greatly increase fuel efficiency, reduce equipment wear, and promote more profitable procedures and techniques," the company says.

With LEADER, every train trip is recorded and the engineer's performance is measured so that information can be analyzed to see how well the train is meeting specific safety, speed and operating criteria.

"What we're all about is optimized train handling, with a view to optimizing energy usage by looking at all the energy used or put into a train — either by man with fuel or Mother Nature by going down a hill," Beck says.

If a railroad can eliminate the differences among engineers and crews in the way a train is operated, it's possible to reduce fuel usage by 15 percent on a typical train, he says.

There isn't much a railroad can do to lower the amount fuel being consumed when a train is on a flat route for several hundred miles, Beck says, "but when it comes to train handling, anticipating where you use momentum and keeping the speed modulated, there are many things you can do to address the energy issue."

Railhead Vision Systems

Railhead Vision Systems offers digital video recorders, products the company has improved through the introduction of H.264 compression for better video quality and smaller bandwidth for wireless use, said Tom Poulsen, director of sales and marketing, via email. Railhead also is working on onboard monitoring equipment that can withstand head-on collisions.

"It is important that the equipment used in the rail industry is shock dampened and fire retardant," Poulsen said.

Meanwhile, Railhead earlier this year received a contract from Southern California Regional Rail Authority's Metrolink to install inward-facing cameras on all locomotives and cab cars. The cameras will record activities of engineers and other train staff for forensic and investigative purposes, and be used to deter the "type of unauthorized activities" identified in the September 2008 Chatsworth, Calif., accident investigation, Metrolink officials said in a prepared statement. The contract marked the first time Railhead had been asked to monitor the audio and video within the cab of the locomotive, Poulsen said.

As the technology evolution continues, customers can expect to see lower acquisition costs, higher frame rates, increased storage from solid state technology and live video, Poulsen said.

"They are also going to be interested in obtaining as much information as possible in one simple and easy-to-use software format," he said, adding that Railhead has partnered with other companies that provide these features.

Ultra-Tech Enterprises Inc.

Ultra-Tech Enterprises Inc.'s newest onboard monitoring offering is a continuous On-board Hot-Bearing Detection (HBD) Unit.

"The primary function of the HBD Unit is to monitor the temperature of the eight wheel bearings of the car via sensors located at each wheel bearing and to provide a total warning system in the event of a fault within itself, or any one of, or all of the bearing sensors," Ultra-Tech Enterprises President Paul Benton said in an email.

Simultaneously, the self-contained, microprocessor-based unit will signal local audible/visual and train-line alarms for over-temperature wheel bearings or for system failure.

Looking ahead, Benton expects 2010 to be "very promising," in part due to pent-up demand.

Wi-Tronix L.L.C.

Wi-Tronix" L.L.C.'s Wi-Tracker tracks asset locations via an onboard GPS and reports information via wireless communications. Location data is coupled with the company's Universal Event/Data Recorder Interface technology to provide a complete and up-to-the-minute mobile asset "snapshot," the company says. Information is available via a secure Web site and integrated mapping tools.

With the Wi-Tracker, speed, throttle position, direction and more can be monitored, tracked and updated using wireless, satellite or cellular technologies, notes Fred Cozzi, vice president of sales and marketing. Amtrak uses all three technologies, while many Class Is use cellular technology, he adds.

"And since we interface to event recorders, we can let the back office know about items such as speed," Cozzi says. "We are also interfaced with camera systems, making sure a camera is recording properly. We interface with all types of different components."

Earlier this year, Wi-Tronix obtained a contract from Amtrak to provide remote monitoring systems for the national intercity passenger railroad's entire fleet of diesel-electric locomotives. The supplier will provide a complete turnkey system that will include the Wi-Tronix Wireless Processing Unit, Wi-Fuel Sensor, Wi-Fuel Display, Wi-Cab Display, and Locomotive Digital Video Recorder and Camera. Wi-Tronix also will install the 262 systems on GE P38-8s, P42s Genesis and EMD F59-PHI locomotives.

Wi-Tronix is at the "cutting edge" of technology, looking to help railroads wherever it can, Cozzi says. For example, a railroad that routes trains through California, which has strict

locomotive emission regulations, can monitor emissions and fuel burn while traveling in the state.

"We can monitor for locomotive utilization inside the set perimeter determining how much fuel was burned in the state," Cozzi says. "This enables the customer to report exactly how much fuel they burned while in the state and enabling them to only pay for the tax for that amount."

ZTR Control Systems

ZTR Control Systems offers SmartStart II, an updated version of the company's SmartStart, an automatic engine shutdown/startup idle reduction technology.

SmartStart II meets the U.S. Environmental Protection Agency's requirements regarding emissions on remanufactured and new locomotives that took effect in January. Under certain conditions, SmartStart II limits idle time to 30 minutes. With the new SAVER option, remote data downloads allow for automated reports on fuel savings, emission reductions and any maintenance needed to improve shutdown time, according to information provided by the company.

Now more than ever, railroads are looking for ways to reduce costs, including fuel costs, and comply with emission requirements, says Len Auer, marketing manager for ZTR Control Systems.

"Customers are going to be ready when the economy picks back up to make the investments," he says. "We're seeing customers who are really being able to define how the investment will reduce their costs, and that's the real point at which the investment begins to make a lot of sense to them." **PR**

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