

TRACTION Technology



Trains, strains, and auto-surveillance

The need to ensure compliance with emissions standards led to the development of an engine control unit with remote condition monitoring.

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Ensuring compliance with the US Environmental Protection Agency's emissions standards is a key focus of attention for the builders and operators of locomotives across North America.

Pennsylvania-based Brookville Equipment Corp is expanding its business supplying new and remanufactured diesel locomotives to both freight and regional passenger operators. In February 2011, the company won a US\$109m order from Southern Florida Regional Transportation Authority to supply 10 BL36PH passenger locomotives for Tri-Rail commuter services between Miami, Fort Lauderdale and West Palm Beach. The contract included options for up to 17 more locomotives, of which two have since been called off.

Designed by Cesar Vergara, the streamlined 3600 hp locomotive is powered by an MTU Series 4000 V20 engine, with a separate 500 hp Caterpillar C-18 to provide head-end power. Most of the locomotives' systems are managed by a digital Traction & Engine Control Unit supplied by TMV Control Systems, based in Cambridge, Ontario. We have been supplying TECUs since 2005 for a wide variety of locomotives, including Brookville-built gensets and

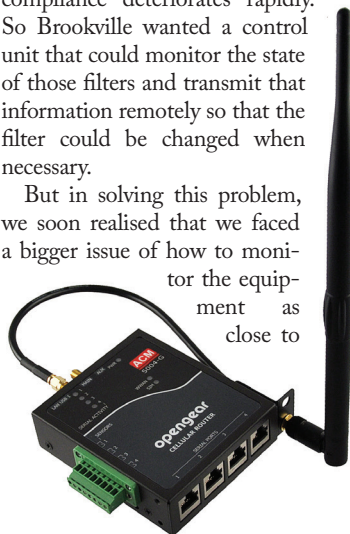
others for Norfolk Southern.

At the time the contract was placed, all new or remanufactured locomotives needed to meet EPA Tier 3 standards, but Brookville wanted to ensure that the BL36PH would align with the Tier 4 standards which come into force on January 1 2015. This led to the development of an updated version of the TECU, incorporating a number of enhancements.

Ensuring compliance with the EPA emissions standards only works if the locomotive and its main components are functioning correctly. One critical factor is the state of a locomotive's exhaust filter, as if this gets plugged, then emissions compliance deteriorates rapidly. So Brookville wanted a control unit that could monitor the state of those filters and transmit that information remotely so that the filter could be changed when necessary.

But in solving this problem, we soon realised that we faced a bigger issue of how to monitor the equipment as

close to



Brookville Equipment Corp is supplying 12 of these BL36PH diesel locos to Tri-Rail, and has options for a further 15.

The Opendgear remote monitoring unit (left) includes GPS location so that the position and condition of all locomotives can be monitored in real time (below).

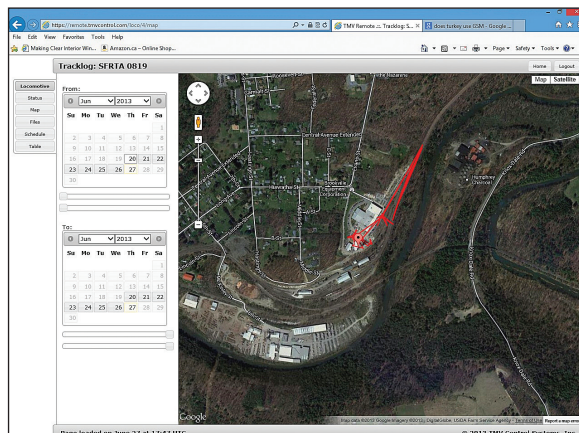
real-time as possible. Modern locomotives are complicated pieces of engineering that require regular upkeep and maintenance, but trains, by purpose, move. They spend most of their working time away from their home depot or operational base. Chasing down far-flung units to recover data can be an expensive and time-consuming prospect. So they are a prime target for remote monitoring.

Real-time condition monitoring offers the potential for automating the data gathering process for a whole fleet regardless where they are located, significantly reducing the time needed to access maintenance information and fault logs. Ultimately, the aim must be to reduce the time between when a problem arises and when the operators or maintenance staff become aware of it, enabling them to deal with the issue in a timely manner.

In adding remote monitoring capabilities to the TECU, we needed a system that would allow access to the monitoring information across long distances and varying geography, not just in stations or depots with a steady wi-fi connection. It also needed to transmit the critical data securely.

We decided to adopt Opendgear remote monitoring equipment, which is primarily designed for use with data centres. It has built-in 3G cellular connectivity and OpenVPN support for integration into the locomotives. In effect, the locomotive could be 're-imagined' as a small, contained and mobile data centre, and thus benefit from the same kinds of data centre monitoring hardware. The locomotives can transmit information anywhere where there is a mobile phone signal.

The modified TECU means that Tri-Rail can monitor its locomotives 24 h/day regardless of where the equipment is located. We are now also able to incorporate remote monitoring into TECUs for other operators, vastly improving their ability to track and service any locomotive. It is amazing what comes out of a simple request to monitor the condition of locomotive filters for emissions standards. ■





USA

Natural gas locomotive

Following two years of technology evaluation, Motive Power & Equipment Solutions has announced plans to launch the Greenville MP1500, a low-emissions genset locomotive which would be fuelled by a combination of natural gas and diesel.

MP&ES is working with technology partner OptiFuel Systems to develop the 1500 hp freight locomotive. The first orders are expected this year for the design, which would be based on remanufactured locomotives repowered as twin-engine dual-fuel gensets.

'Natural gas offers our customers an opportunity to greatly reduce their operating fuel costs while cutting emissions at the same time,' said MP&ES CEO & President David Wilkerson. 'The availability of low-cost, US-sourced natural gas provides an unprecedented opportunity for green locomotives.'

★ Indiana Harbor Belt Railroad is considering converting 31 locomotives to natural gas fuel. ■

CHINA

Higher horsepower hybrid

CSR Ziyang Locomotive Co announced on April 28 that it is to build a battery-diesel locomotive rated at up to 2500 kW. Although other countries have been developing hybrid locomotives for some years, CSR believes the most powerful in service so far is rated at just 1200 kW.

CSR Ziyang developed its first 1000 kW hybrid shunting locomotive in 2010; this demonstrated a reduction in fuel consumption of between 50% and 70% compared to a conventional diesel of the same rating. There was also a reduction in exhaust emissions of between 40% and 50%, giving an annual reduction of around 500 tonnes in emissions of SO₂, CO, NO_x and other harmful substances.

The 2500 kW hybrid is being developed under a research contract between CSR Ziyang Locomotive, CSR Corp and China Railway Corp. The six-axle shunting locomotive will have a 6L280 EFI engine, a high-power battery pack, and AC drive technology. It will be able to operate using the diesel generator, battery pack or a combination of both. The company plans to use standardised manufacturing techniques and modular components to simplify maintenance. The traction control technology will be based on that of the earlier 1000 kW hybrid locomotive, but will be optimised to improve the energy-saving performance. ■

CANADA

Economical shunter

TractivePower Corp has unveiled its TP56 three-axle industrial switcher, primarily intended to compete in the 'rail-car mover' market, shunting wagons in industrial sidings. It makes use of readily available industrial and railway components, and can be serviced in the field.

The TP56 is powered by a Caterpillar C9 industrial diesel engine rated at 375 hp, and the standard model produces a tractive effort of 250 kN. The locomotive can be ballasted to give a heavier axleload, which would raise the tractive effort to 290 kN.

The 9.8 m long locomotive is based on a cut-down EMD SD40 frame, and rides on a single three-axle EMD HTC bogie, which can negotiate curves down to a minimum radius of 53 m. The



EMD D77 traction motors give a top speed of 40 km/h.

The TP56 has a full-size cab, which can be equipped with climate control if required. It is provided with a standard AAR control stand, and can be supplied with remote control equipment.

Headquartered in North Vancouver, British Columbia, TractivePower Corp was founded by Frank Donnelly, who designed and built the RailPower Technologies Green Goat hybrid locomotive. ■

Powered by a Caterpillar industrial diesel engine, the TP56 is built around the frame and bogie of an EMD SD40.

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