



porterbrook 

crosscountry 

Turbostar CBM

The Challenge

Porterbrook owns approximately 30% of rolling stock in the UK and they recognise the huge opportunities that remote condition monitoring (RCM) technologies present. These are key in optimising their business and rail industry delivery, ensuring the performance and longevity of the assets. Porterbrook's target was to improve reliability and reduce maintenance costs by maximising the ability to predict when interventions are required, rather than relying on reactive practices.

Porterbrook was looking for a partner that could assist in building its Remote Condition Monitoring solution, starting with the fleet of approximately 500 Turbostar vehicles. These solutions needed to deliver data to the existing Porterbrook Data Lake, ready for analysis as well as providing direct information to operators.

Cross Country operates a fleet of 80 Turbostar vehicles which Instrumentel had partnered with previously to provide remote monitoring of fuel consumption and the engine for a single unit.

Instrumentel were asked to design, install and support a remote condition monitoring solution to provide a number of priority signals and extract the data required, correlate it with GPS data and turn it into actionable information that was required to move towards a more predictive form of maintenance for the fleet.

The Solution

Instrumentel designed a remote condition monitoring solution, which coupled with our proven hardware, monitors the condition of rolling stock assets. The focus was on predicting and preventing failures of the vehicles which are installed with Instrumentel's monitoring equipment. The Diagnostic hubs are capturing 82 signals per vehicle meaning over 6,000 signals are processed every second across the fleet.

Hardware is installed to monitor the following systems on each vehicle:

- Engine
- Transmission
- Hydrostatics
- Brakes
- Air System

Data is captured on Instrumentel's Diagnostic Hub and securely transferred to our Servers in real-time (every second) and back-filled if remote connectivity is temporarily lost. Data is stored in our cloud-based servers, where our analytics platform is able to interpret the data and turn it into usable, actionable information.

The output of the analytics are a number of events categorised as follows:

- Critical - Immediate action required to avoid catastrophic failure.
- Operational - Action is required to mitigate failure in the future (with a lead time to failure).
- Maintenance - Automation of maintenance tasks, or direction for the maintenance teams to act on at next scheduled maintenance, such as whether to change a filter.

Instrumentel's team of engineers identified the appropriate location for the Diagnostic Hub to be installed, configured for the requirements of each vehicle and commissioned the equipment to securely transmit the data remotely.

The fleet fitment was completed during the existing heavy overhaul program to minimise any impact on train availability, a testament to the design for install and maintenance approach applied by Instrumentel for every customer.

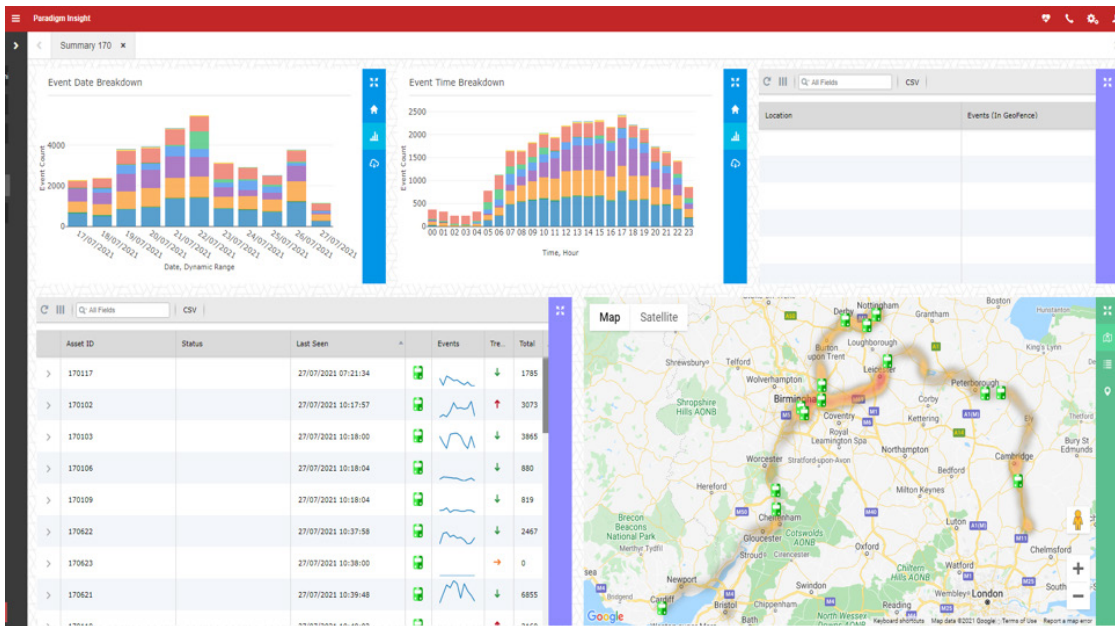
Data Analytics

The fleet of vehicles were installed with Instrumentel's equipment allowing real-time access to a wealth of data for each vehicle. The data is displayed on Instrumentel's web portal Paradigm Insight which is available on any device with an internet connection. The monitoring equipment provides useable, actionable information to allow targeted maintenance of vehicles resulting in:

- Improved vehicle reliability and availability
- Reduced maintenance time for diagnostics
- Real-time location of key assets
- The move to a Condition Based Maintenance regime

Data is securely transferred from the vehicles to our servers using end to end encryption via VPN.

All signals are analysed for any variance to their normal behaviour and alerts are notified to Porterbrook and Cross Country via email, with further analysis available using Paradigm Insight. An example of how the data is provided to Cross Country and Porterbrook is shown on page 3.



Example of Porterbrook Cross Country fleet data visualisation in Paradigm Insight

What next for Porterbrook

Instrumentel now works with Porterbrook’s engineers and operational staff to analyse key data signals to create alerts when the engines are not working within their performance parameters. Weekly workshops are held to interrogate the events and drive reliability further and we are working hard with key users on the ground to embed the use of RCM within existing process at a depot level.

Instrumentel has also fitted a First in Class unit with additional equipment to monitor every critical subsystem on the unit including HVAC, doors, toilets and fuel as well as others. CrossCountry will evaluate the benefits of the additional information this unit provides in support of potentially generating a business case to replicate this across the remainder of the CrossCountry Turbostar fleet.

“The solution from Instrumentel allows CrossCountry and our partners to better understand the performance of the fleet and is highlighting problems before they become performance affecting. All of the teams are now working very closely and diligently following completion of fleet fitment of the initial RCM package. The next stages are very much about refinement of the data in support of extracting maximum benefit which will be a constant process of evolution in pursuit of excellence”.

Adrian Hugill, Head of Fleet and Engineering, CrossCountry



“Instrumentel has worked flexibly to supply and support the RCM equipment on the CrossCountry fleet, adapting the solution to meet our needs. Together as partners we are advancing the use of remote monitoring solutions to reduce failures and improve the maintainability of the Turbostars. This is delivering immediate benefits for CrossCountry and through the long-term partnership we have, the benefits will continue to grow.”

Stephanie Klecha, Head of Digital Services, Porterbrook

