SmartSystems

by Unipart Rail

Remote Condition Monitoring systems and products

- Operational benefits from improved performance
- Suitable for new and retrofit installations
- Leading edge technology
- Networking products together to provide intelligent, usable information
- Technology transfer from other industries into the rail sector

UNIPART *RAIL*

SERVING THE WORLD'S RAILWAYS

# Innovative Technology Products to Monitor Performance

Remote Condition Monitoring (RCM) technology systems are becoming increasingly important for train operators as an effective means of understanding the performance of products during service operation.

To meet this requirement Unipart Rail has developed a number of RCM systems which can be encompassed within new train design and manufacture or retrospectively fitted to existing rolling stock fleets.

Unipart Rail also has an extensive range of industrial and academic technology partners who are able to develop and manufacture bespoke solutions to monitor the performance of a wider range of products in numerous and challenging applications.

The Unipart Rail RCM technology range can be linked to existing train diagnostics monitoring systems or to a bespoke hub arrangement which offers the facility to connect multiple technology measuring systems together.

UR-Smart leading edge systems and products

Ethernet

HUB

Remote condition monitoring systems
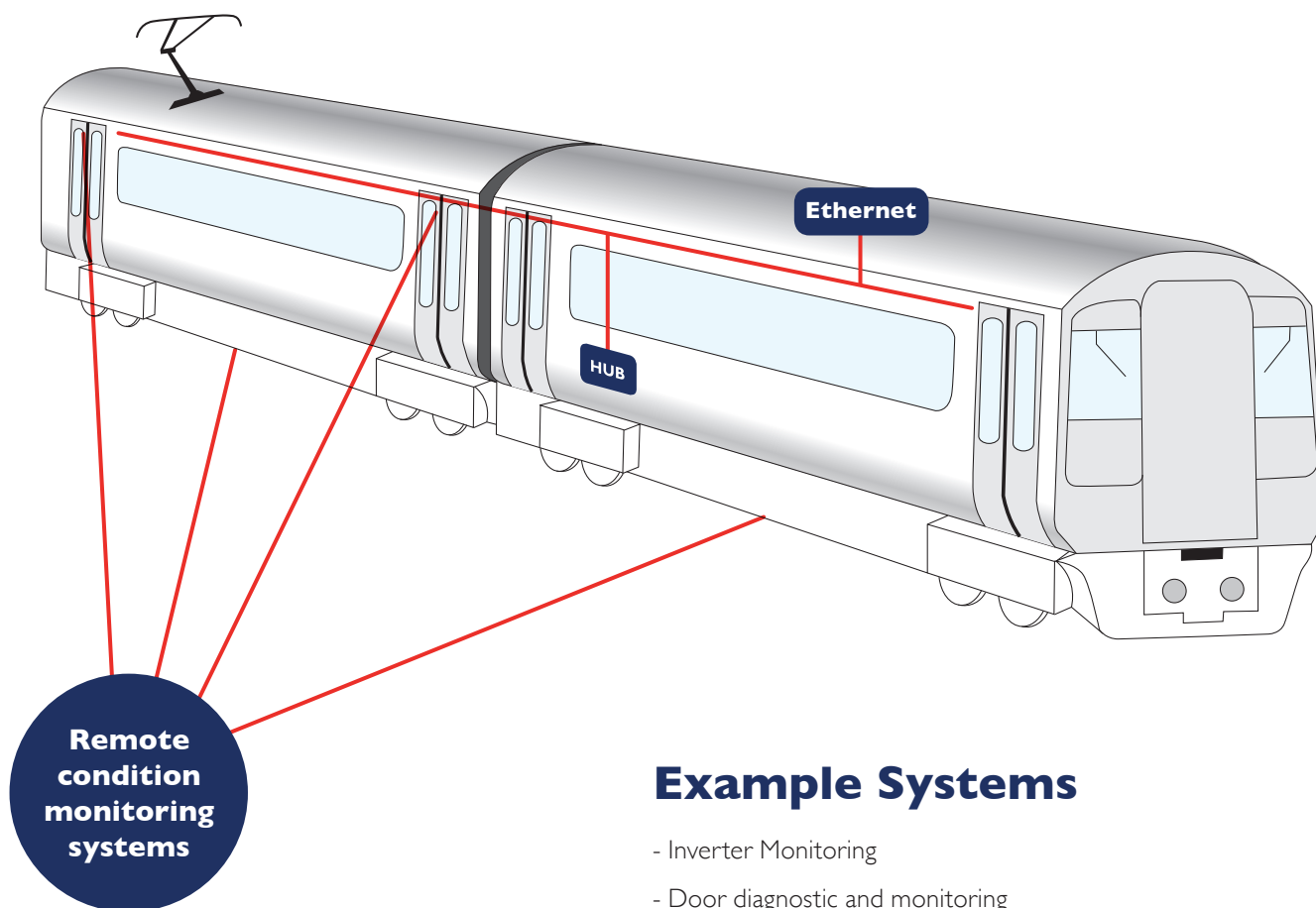
Example Systems

- Inverter Monitoring

- Door diagnostic and monitoring

- Traction Motor Monitoring

- Engine Monitoring

- Event Monitoring

- Radiator Monitoring

- Fuel Monitoring

Inverter Monitoring

Inverter monitoring is measuring the usage and performance of passenger facing power plugs. This will help monitor that the power is always available keeping customer satisfaction and comfort levels high. The system can alert when any failure is present before a customer complaint is raised as well as contain a number of data points (such as current draw and temperature) to detect the failure condition.

Benefits:

- Earlier maintenance interventions by monitoring the key parameters and identifying deviations

- Greater understanding of in service invertor capacity

- Real time monitoring

- Historical data capture

SmartDoor
by Unipart Rail

The DDU is an innovative solution to monitor the performance of train door systems. It is non-intrusive, low cost and delivers automated 'health indicators', allowing effective and targeted maintenance. The solution comprises a DDU and door strip, the DDU is attached to the train in a fixed position while the door strip is attached to the train door (moving part). The DDU requests data from the door strip at 15ms intervals. As each tag (on the door strip) passes over the DDU, data is wirelessly transmitted back to the unit. The powerful onboard processors determine the 'health' of the door. This data is transmitted over a network to a database for storage and analysis, where historical trends can be plotted. From the database a detailed profile of the door behaviour is obtained, including velocity curves at each stage of an open or close process.

Benefits:

- Changing maintenance regimes to increase savings

- Increase vehicle in-service availability

- Door life-time data capture

- Monitoring at 25 times faster than a human eye

- 'Traffic Light' status indication

- 15 minute retrofit installation

- Fully networkable both wired and wireless

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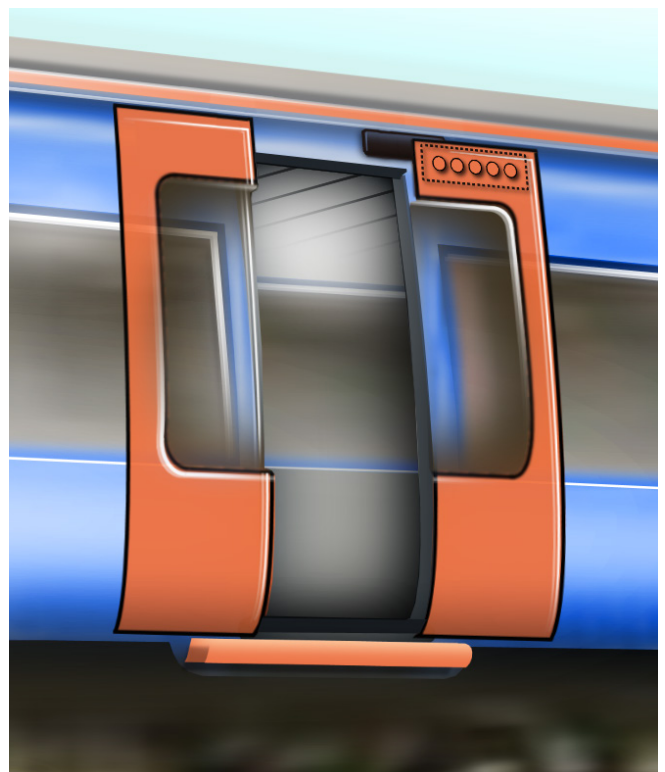
Traction Motor Monitoring

Traction motors can be monitored to detect and avoid failures due to heat and potential flashover fires. The detection is possible by using a combination of thermocouples, optical sensors and current and voltage transformers.

Comparisons between different traction motors is also possible, by monitoring the heat and taking high frequency readings to create a heat profile per traction motor. On multi carriage trains it is also possible to compare the heat flow from the front of the train to the back of the train.

Benefits:

- New product retrofitted onto old vehicles monitoring

- Recognise early signatures for flash over faults

Engine Monitoring

Close monitoring of engine performance can give indications of a potential engine failure. This gives the opportunity for timely predictive maintenance on trains and avoid in service failures. While the train is being serviced, data can help plan and aid more efficient use of an Engineer's time maintaining the vehicle. This advantage will help reduce a number of train delays and cancelations and would save thousands per year in fines. Key signals that can be monitored are charge air pressure and temperature, engine speed, notch, ambient temperature to name a few.

Benefits:

- Early maintenance interventions by monitoring key parameters

- Remote data

- Over maintenance reduced

- Comparisons to other engines across the fleet

Event Monitoring

On train electronic systems and devices such as power convertors, control valves, PA/PIS systems can fail due to unexpected high voltage spikes. These spikes can occur when trains couple or split. Using the Hi speed diagnostic hub, these high voltage events can be logged in a high resolution giving feedback as to the cause of any failures.

The Hi speed hub measures up to 500,000 samples per second. This high detail analysis can give informed decisions on implementing techniques to avoid future failures and train downtime.

Benefits:

- Very high speed sampling and on-board processing enabling rapid analysis of errors

- Understanding the impact of errors

- Portable solution to other assets

Radiator Monitoring

Radiator failures are sporadic and can be caused due to blockages or leakages. When a radiator fails in service the engine is set to idle and maintenance is required. Having telemetry on radiators allows the train operator to monitor conditions such as coolant water inlet and outlet pressure, coolant water inlet and outlet temperature, radiator air in and air out temperature and fan speed. Monitoring these signals remotely helps mitigate in service failures. Historic data also enables predictive maintenance to be planned, lowering maintenance costs.

Radiator monitoring in the summer is beneficial especially during the hottest time of the year when the engine radiator is working the hardest to stay cool during extremes of temperature and loading.

Benefits:

- Early maintenance interventions by monitoring key parameters

- Remote data

- Inform new radiator design

- Comparisons of radiators across fleets

- Reduce over maintenance
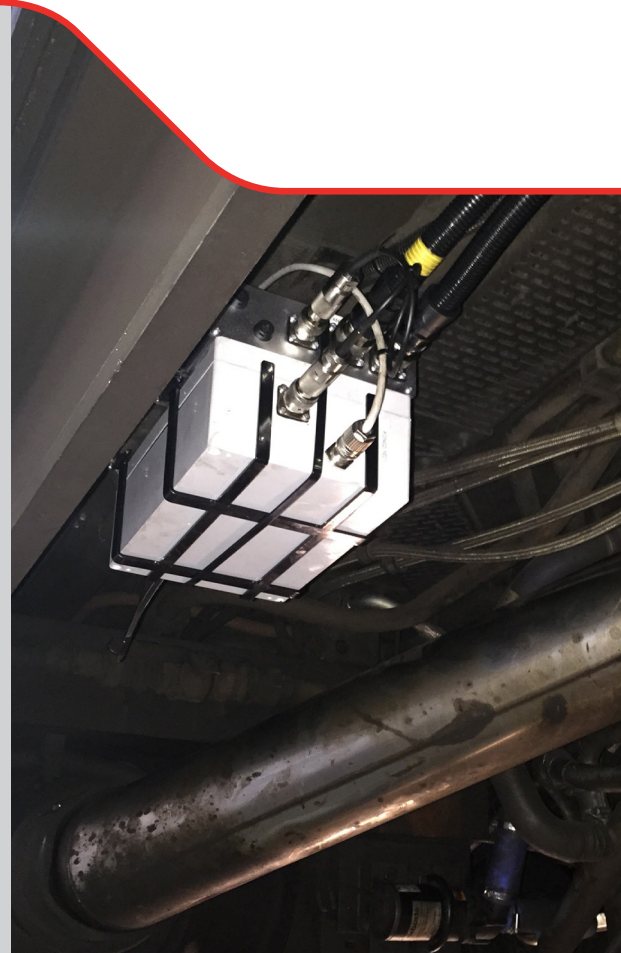
Fuel Monitoring

A key running cost of trains is in the fuel they consume. Close monitoring of the engine's fuel usage can give insights of how to effectively improve fuel efficiency. This data collection is done by measuring fuel usage as well as the route location and throttle position. This collected data will give evidence on how to improve driver behaviour and potentially save up to 10% in fuel per year reducing fuel bills by hundreds of thousands of pounds per annum.

Benefits:

- Driver behaviours monitored

- Fuel usage measured

- Measuring component changes on engine

About Unipart

The Unipart Group is a leading UK manufacturer, full service logistics provider and consultant in operational excellence. Operating across a range of market sectors, including automotive, manufacturing, mobile telecoms, rail, retail and technology, Unipart offers a breadth of services to a wide range of blue chip clients internationally.

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