



DOOR DIAGNOSTICS JUST GOT SMARTER

Instrumentel's Distributed Door diagnostics system offers a cost effective complete solution for remotely monitoring the condition and performance of train doors whilst in operation

Overview

In 2011 rail passengers reached highest peak time levels ever recorded with approximately 40.6 billion passenger miles taking place. Today 30% more passengers use the rail network than 45 years ago, with 27 new lines and 68 more stations added in the last 10 years alone. This means there are more trains operating today and as a result each door opens and closes much more frequently.

A study by Raildoor Solutions Ltd., shows that door failures are the primary cause for late trains with door faults accounting for over 30% of train failures. The delay is due to safety reasons whereby the brake systems can not be released on a train until the doors are completely shut and locked. When a fault does occur, each train operating company incurs a fine, the amount of which is dependent on the length of the delay and the number of other services

affected due to the line blockage. In and around busy cities the 'knock on' effect can create many tens of thousands of pounds in fines.

For this reason all train doors are maintained regularly whether the doors need it or not. e.g. a disabled toilet door is maintained at the same intervals, as a passenger entrance door. This maintenance is a considerable expense which could be significantly reduced by not over maintaining the doors.

An ideal solution would be to predict emerging door faults within a fleet, enabling maintenance to be scheduled and doors maintained on an as-needs basis.

In this Case Study we describe how the Instrumentel's Distributed Door Diagnostic Unit (DDU) meets the needs of rail operators by providing a cost-effective, retrofittable door condition monitoring system, providing continuous door performance data.

The Instrumentel DDU

The Instrumentel Door Diagnostics Unit (DDU) enables remote monitoring of train doors through the use of inductively coupled telemetry.



The DDU has powerful onboard processing capabilities, including an FPGA and micro-processor. These allow for complex parallel processing of data in real-time such as Digital Signal Processing while writing to an onboard uSD memory card.

Instrumentel's Distributed Door Diagnostics Unit solution

The Instrumentel 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. The solution offers a number of significant benefits, including:

- Real time monitoring of door performance to enable early identification of wear, which may be used for maintenance scheduling purposes.

- Cost effective installation process with a 15 minute installation time per door.
- Automated communication of all data or just simple "health" indicators to a central database.
- The sampled data can be transmitted over an existing communications network using a proprietary or standard communications protocols, such as: WiFi, Bluetooth, Zigbee, Ethernet, CAN, USB, modbus etc.
- The system is capable of monitoring other train parameters and systems, such as Heating Air-conditioning and Ventilation (HVAC).

Summary

The Instrumentel Distributed Door Diagnostic Unit solution is capable of monitoring the performance of train doors, in a cost effective and non-intrusive way. This offers the Train Operating Companies (TOC) many benefits including maintenance cost savings.

Already in use on a number of UK fleets, the Instrumentel Distributed Door Diagnostics System is a unique and innovative, world-leading solution to train door monitoring. A non-intrusive, cost effective and flexible system, that has short installation times and can communicate door management data over many networks.

Instrumentel - leaders in electronic systems for data acquisition from extreme environments

Instrumentel specialises in electronic systems for acquiring data from extreme and difficult to access environments.

Our expertise has been proven in multiple markets including engine and electric motor telemetry, explosion metrology and condition-based monitoring of industrial processes and railway rolling stock.

The Instrumentel product range includes:

MDS: A versatile system for collecting data from moving parts such as internal combustion engine pistons and valves, turbines and electric motors.

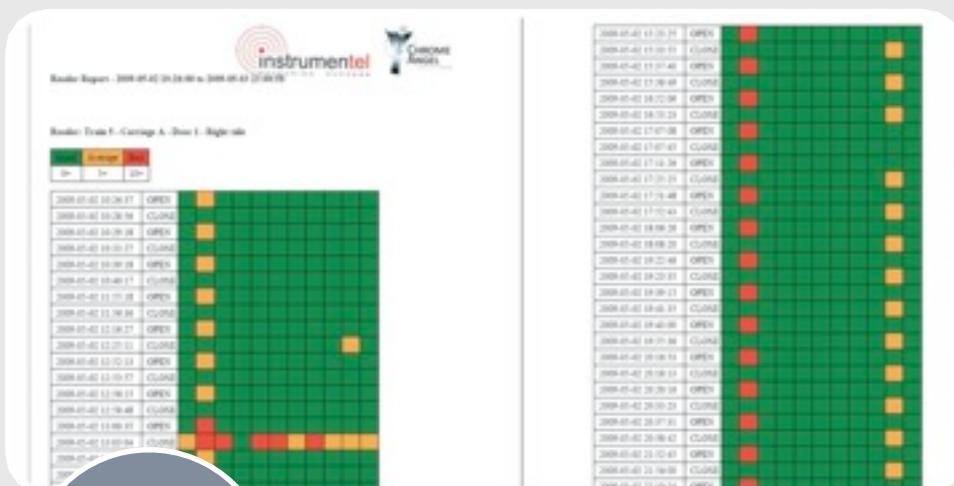
EDS: A robust high-temperature system for collection of process-related data from extreme environments. The EMU has been applied to a diverse range of applications including monitoring the temperature of molten steel in a foundry and determining the temperature and pressure from the centre of an explosive blast.

DDU: The Doors Diagnostic Unit is optimised for condition-based monitoring of sliding doors, particularly those used in rail rolling stock and elevators. The DDU is quickly retrofitted without the need to break into existing safety systems, and provides continuous feedback on door operation.

Proven in multiple markets

Instrumentel's world leading capabilities have been validated in a number of industries.

These include explosion, earthquake and nuclear waste monitoring, as well as monitoring moving parts in the rail, automotive and machine tool industries.



World-leading inductively-coupled telemetry

The DDU produces simple reports using traffic light indicators to display the health of the door. Each row in the table represents a door open/close cycle. Each row is time stamped with the individual squares showing the health of each part of the cycle i.e. the pop out of the latch.