Transmission Dynamics

Pantograph Collision Assessment System (PANDAS)

OVERVIEW

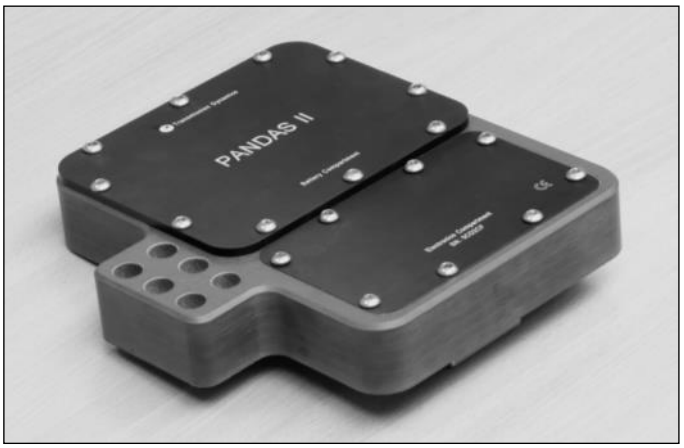
Overhead line (OHL) damage (mechanical faults and de-wirements) cost the UK Rail industry £21 million between 2009 and 2013, and caused over 3980 hours of delays.

In 2008, to overcome these increasing problems, Transmission Dynamics developed and deployed our first PANDAS system on routinely operating high-speed passenger trains (UK Pendolino).

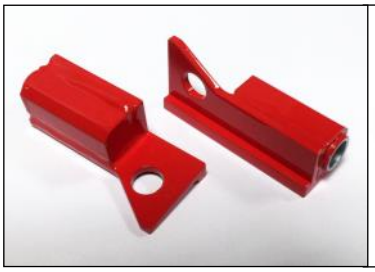
PANDAS detects and accurately locates mechanical obstacles causing impacts to the carbon strip. When events are detected, the system automatically deploys a report via email (and SMS) to stakeholders within seconds of its occurrence. Found early enough, these sites are rectified before the damage develops further and a serious incident occurs.

Continuous development has resulted in an extremely reliable system, proven over many years of service under extreme environmental conditions. The product has evolved to become an industry standard pantograph monitoring system, installed across Europe, Australia and the USA.

The Data Processing Module (DPM, below) is installed on the live pantograph frame. Intelligent power management and the robust enclosure guarantees long-term reliable operation.



Accelerometers (shown below left) detect high transient signals exceeding the user-defined limits, whilst wireless limit switches (shown below right) fitted to the horns provide an early indication of problems with OHL wire stagger (wire sliding over the horns).



The system is designed for operation in a strong EMI environment, and fully certified for rail compliance to UKAS standard EN50121-3-2:2006 (emissions and immunity).

Winner of the RBA Engineering Excellence Award

RBA Rail Business Awards 2011 – Rail Engineering Excellence Award

- machine dynamics, NVH, failure analysis, fatigue/accelerated life testing
- specialised instrumentation, data acquisition and analysis
- rotating machinery design and troubleshooting: gearboxes, shafts, bearings, couplings, belts and chains

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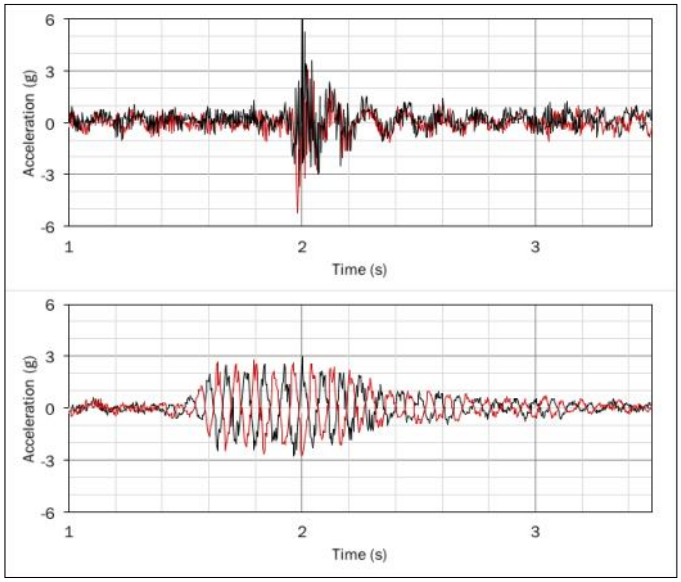
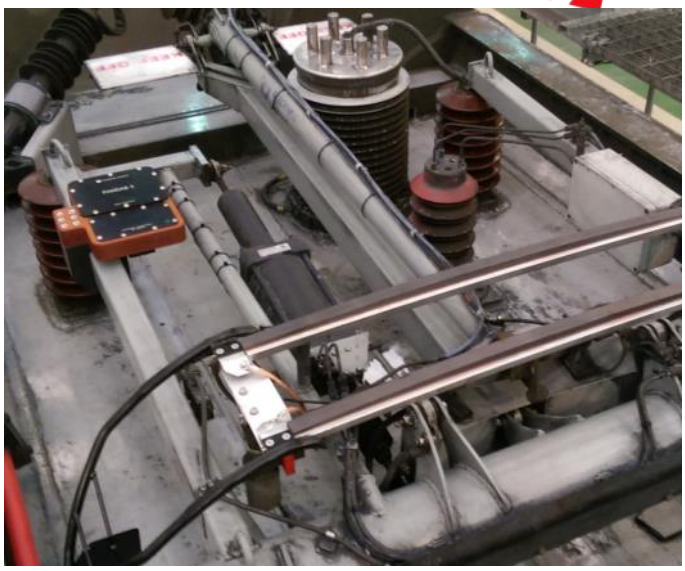
Time-domain traces (examples shown below), together with a precise GPS stamp (date/time and location), are included within the reports.



The first example shows a typical impact, whilst the second is a pantograph response in yaw caused by an asymmetric impact, confirmed by the antiphase vibration of the two accelerometers. This degree of detail allows accurate diagnostics of the OHL-pantograph dynamic response to impact.

"We recently prevented a dewirement in our area by reacting to the alerts received by PANDAS"

NetworkRail

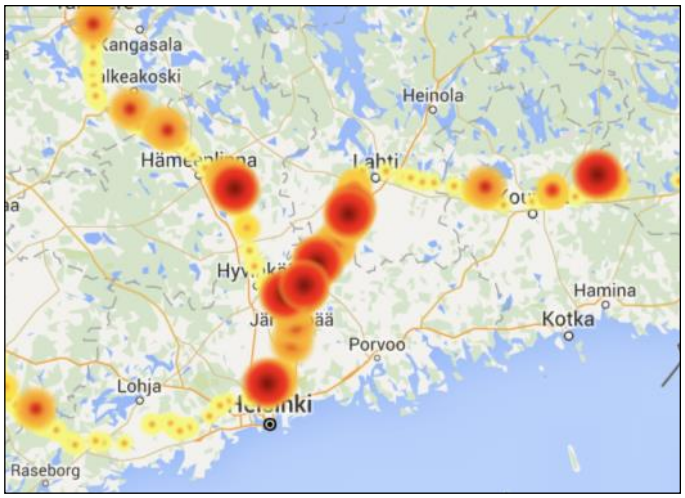


Data is transferred to our secure server over a GSM connection, where powerful analysis tools monitor and trend problematic areas over time.

"The PANDAS system has prevented eight major incidents on our rail network over the past year"

INFRABEL

All events are collated onto a map, with an at-a-glance indication of their severity level (example shown below, courtesy of the Finnish Transport Agency).



Details of individual reports can be viewed by clicking on their location. Advanced condition monitoring routines allow powerful trending of faults, and their development/elimination over time.

"By detecting these defects early, we can make repairs before they cause more serious damage which can lead to significant disruptions to the service and costs to the business"

METRO

More information, including a full technical summary, can be accessed on our website.