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Wayside Condition Monitoring Systems

Asia-Pacific Railway Innovations Forum, 23rd May 2019



Who is Wabtec?









Who is Track IQ?



- Wabtec Company
- 5 Office Locations
- Systems in 18 Countries
- Major OEM supplier of wayside technology
- Supported by Wabtec representatives worldwide

Australian based manufacturing (Perth and Adelaide), with offices in UK, India and USA.



Track IQ Products



- Wayside systems
- On track
- Next to track

- Machine Vision
- Acoustics
- Force and Vibration



Track IQ Products



- Rolling Stock Measurement
- Condition Monitoring Data
- Optimise Maintenance

- Monitor hidden components
- Prevent in-service failures
- Extend component life



Reference List - 200 systems globally





Machine Vision Suite



- Wheel Inspection
- Brake Inspection
- End cap and Axle Inspection
- Side frame Inspection

- Undercarriage Inspection
- Spring Condition Inspection
- Coupler and Draft Gear Inspection
- Wagon Body Inspection



Wheel Profile Monitor

Measurements

- Wheel profile curve
- Flange thickness
- Flange height
- Rim Thickness
- Diameter
- Tread Hollow
- Back to Back
- Tracking







Bogie Side View

End Cap Monitor

- End Cap Damage and Assessment
- End Cap Bolt Detection
- Leaking Grease Detection
- Adapter Gap Measurement
- Optional Wheel Rotation / Locked wheels

Spring Condition Monitor

- Spring Damage and Assessment
- Spring Detection (Missing and Broken)
- Friction Wedge Measurement
- Uneven Compression and Load

Centre Bowl Monitor

• Centre Bowl and Pin alignment









Brake Inspection Monitor (BIM)

- Pad Thickness
- Securing Key Presence
- Pad Presence (Missing or Broken)
- Brake Application Distance
- Uneven Pad Wear
- Disc Brakes

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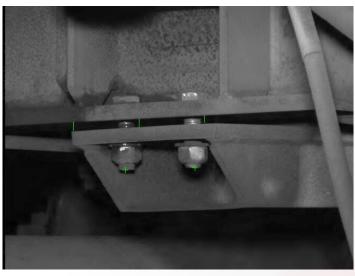


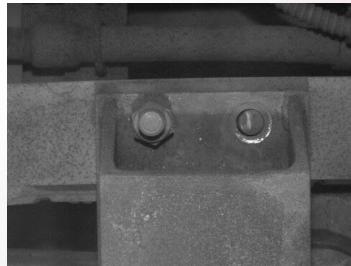


Under Carriage Monitor

- Coupler Damage and Assessment
- Coupler Pin and bolt Detection
- Undercarriage Damage and Assessment
- R-Clips and hoses Assessment









Wagon Body and Side Frame Monitoring

Wagon Body Monitor: Wagon Body Damage and Assessment



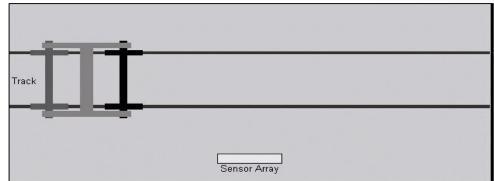
Side Frame Monitor: Wagon Body Damage and Assessment





RailBAM – In Operation





- Bearing Acoustic Monitor
- Detects defects with Axle bearings.
- Prevents in-service failures and enables optimised maintenance.



RailBAM - Types of Faults Detected

Cup/Cone Spalls

Roller Spalls

Multiple Spalls

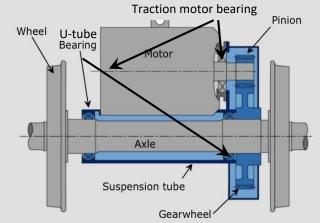
Extended Spalls





RailBAM IB – Inboard Monitoring





Reuse of RailBAM technology

- Targets inboard axle bearings
- Targets traction motor bearings

Successful U-tube bearing detections

- Cup and cone defects
- PE and CE
- Line and extended spalls



Inboard axle journal bearing



U-tube cone extended spall

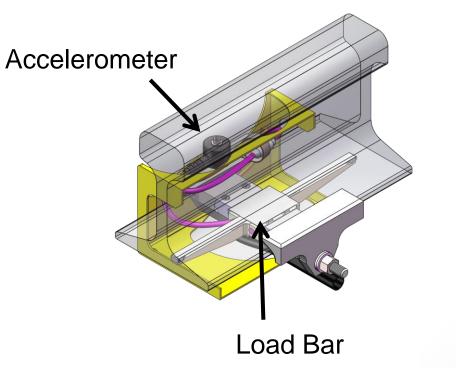


U-tube cup extended spall



WCM - Wheel Condition Monitor (WCM)

- Combined Weigh In Motion (WIM) and Wheel Impact Load Detector (WILD).
- Installation is an array of clamp-on Load Bar (weight) and Accelerometer (impact) sensors.







WCM - Results

Outputs:

- Wheel Impacts (damage)
- Wheel Roughness
- Overload Alerts (Vehicle or Axle based)
- Imbalance Alerts (Vehicle Based)
 - End-to-End (ETE) = leading axles vs trailing axles
 - Side-to-Side (STS) = left wheels vs right wheels
 - Wheel unloading = Wheel load vs average wheel load (per bogie/vehicle)



Wheel Flat / Spall



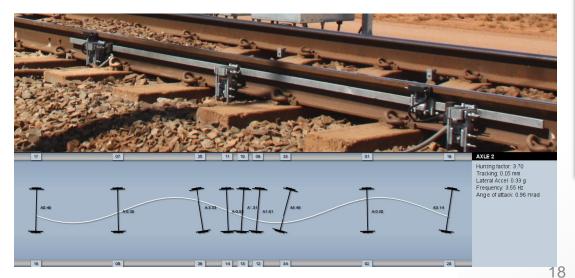
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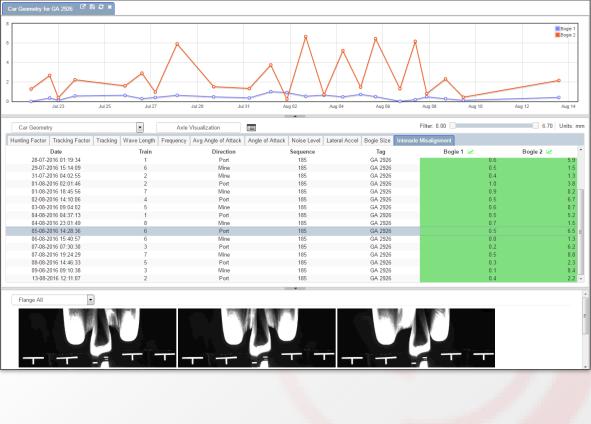


Bogie Geometry Monitoring

Key Measurement Features:

- Hunting
- Tracking
- Angle of Attack
- Inter-axle Misalignment
- Axle Visualization







Train Noise Monitor



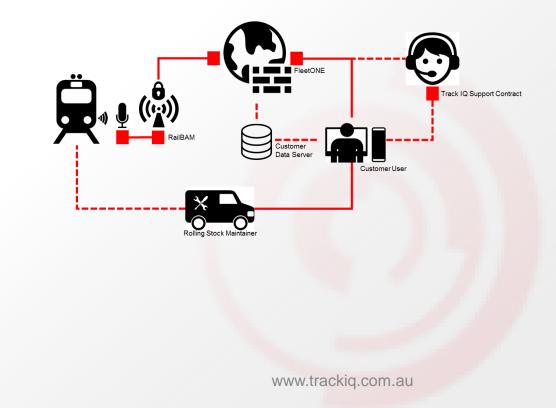
- TNM is an Environmental Noise level monitoring system for Rail Noise in urban areas.
- TNM is fundamentally a microphone with a number of add-ons to build a complete solution for noise monitoring:
 - Camera + lighting
 - Solar Power.
 - Laser train presence detection.
 - AVI tag reader.
 - Weather station.
 - Vandal resistant housing



FleetONE – Purpose and Scope

Global Functions:

- Unifies multiple wayside sensor data into a single point of access.
- Provides a "core" system platform so customer specific data presentations can be configured.
- Integrates with existing maintenance systems (e.g. SAP) to retrieve information about completed work, automatically raise work orders and sends maintenance notifications based on input data.
- Allows 'on condition' based maintenance requests to be automatically generated (e.g. via email) by running customised searches on the data.





FleetONE – Trending & Visualisation





FleetONE – Data Visualisation

- Information presented with clear visual indicators where anomalies occur.
- Personalised user rules can be implemented to manage the alerts.
- Providing the 'right information to the right person at the right time'.

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					Brake shoe	15.22						Brake shoe	36.26							
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Working with Track IQ

- Deployed in several developing countries.
- Deployed harsh climate and environments humid, wet, arid, cold.
- Track IQ meets local content requirements with assembly, install and support able to be met using local labor.
- Individual systems and modules can be installed as needed to provide a low \$\$ solution.
- Systems can be extended as via add-ons over time.



Conclusion

The Track IQ product suite is a low-cost method of proving immediate benefits to railways by:

- Increasing safety by alerting on damaged components.
- Increasing accuracy of inspections.
- Increasing coverage by allowing inspections of components that are hard or impossible to measure manually.

Our products provide a direct benefit, saving \$\$ by:

- Preventing in-service delays
- Enabling predictive maintenance.



Thank you for your attention.



