Wayside Condition Monitoring Systems

Asia-Pacific Railway Innovations Forum, 23rd May 2019

Who is Wabtec?

Wabtec CORPORATION

Faiveley Transport
A Wabtec Company

GE Transportation

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.

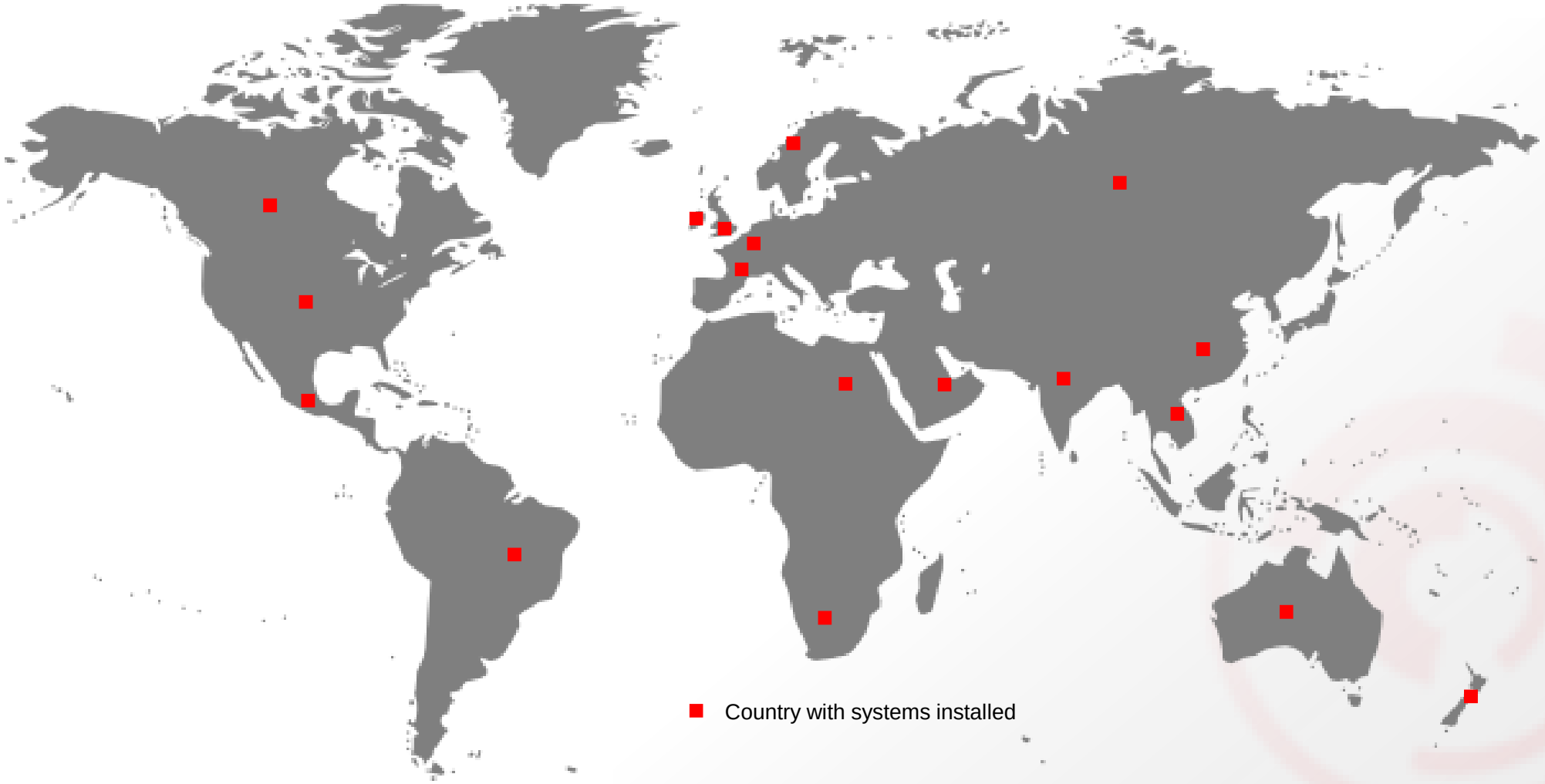
Track IQ Products

- 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



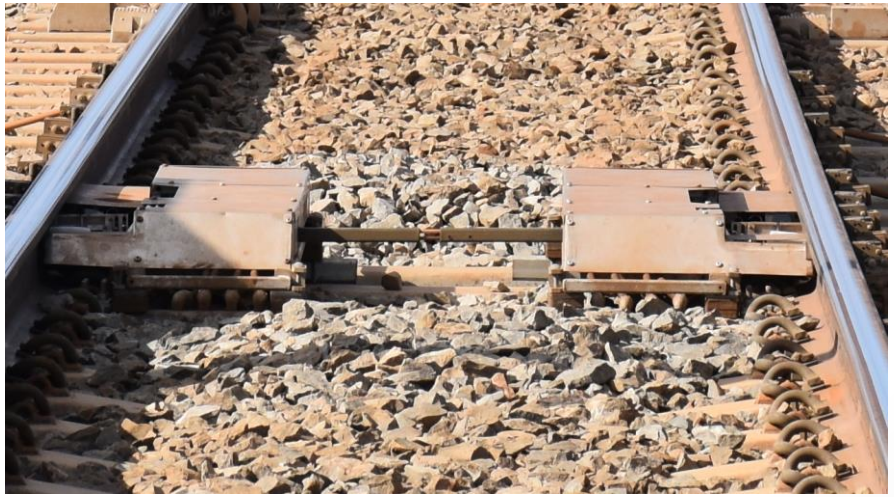
Machine Vision Suite

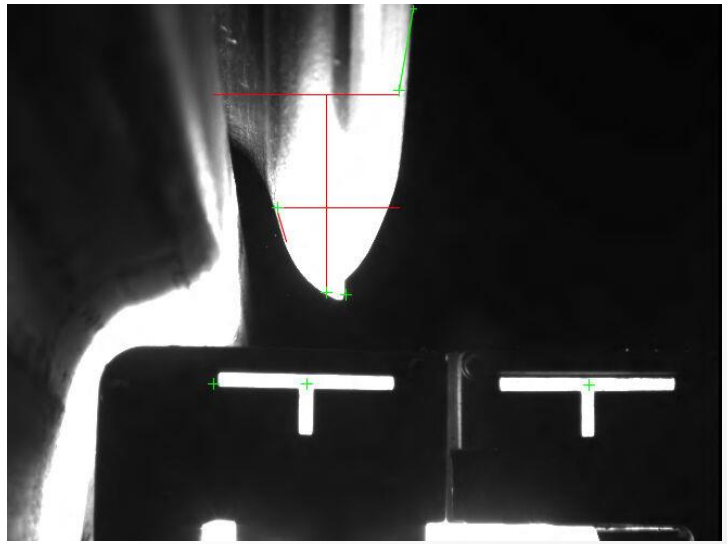
- Wheel Inspection
- Brake Inspection
- End cap and Axle Inspection
- Side frame Inspection
- Undercarriage Inspection
- Spring Condition Inspection
- Coupler and Draft Gear Inspection
- Wagon Body Inspection

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

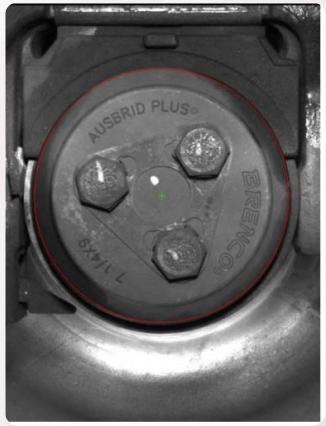
- End Cap Damage and Assessment
- End Cap Bolt Detection
- Leaking Grease Detection
- Adapter Gap Measurement
- Optional Wheel Rotation / Locked wheels

Spring Condition Monitor

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

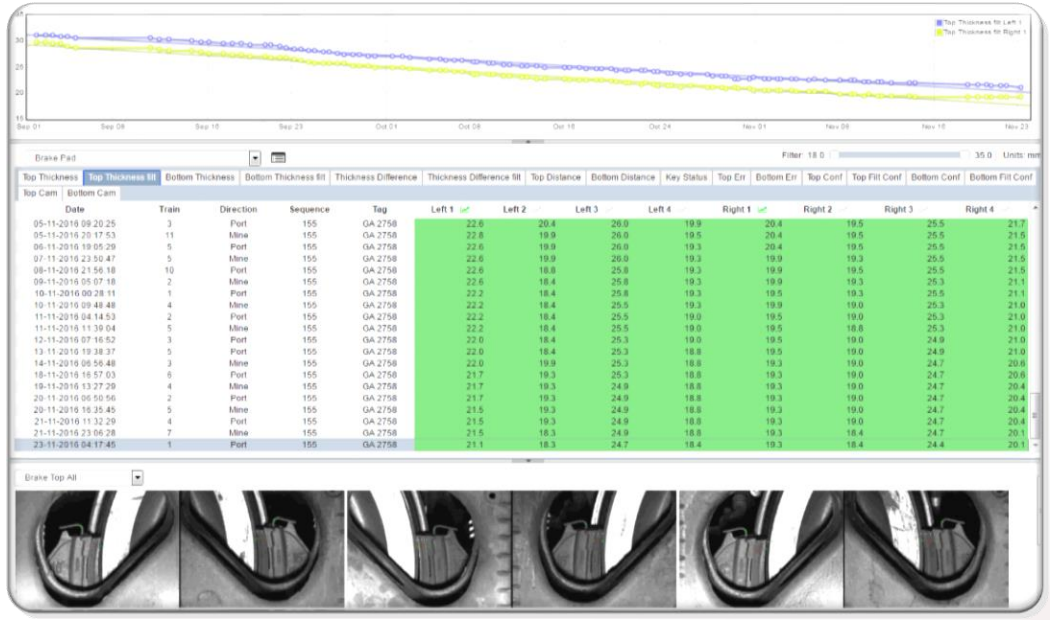
Centre Bowl Monitor

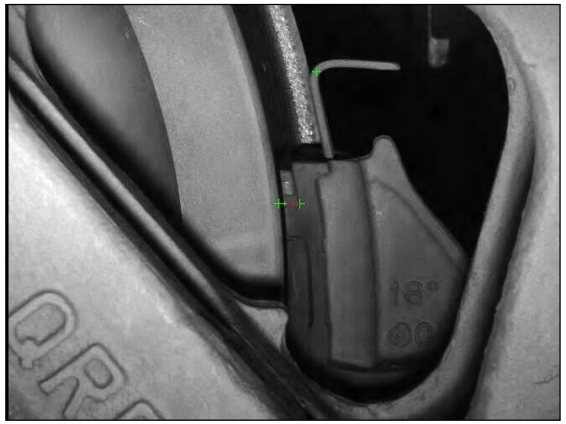
- Centre Bowl and Pin alignment



Brake Inspection Monitor (BIM)

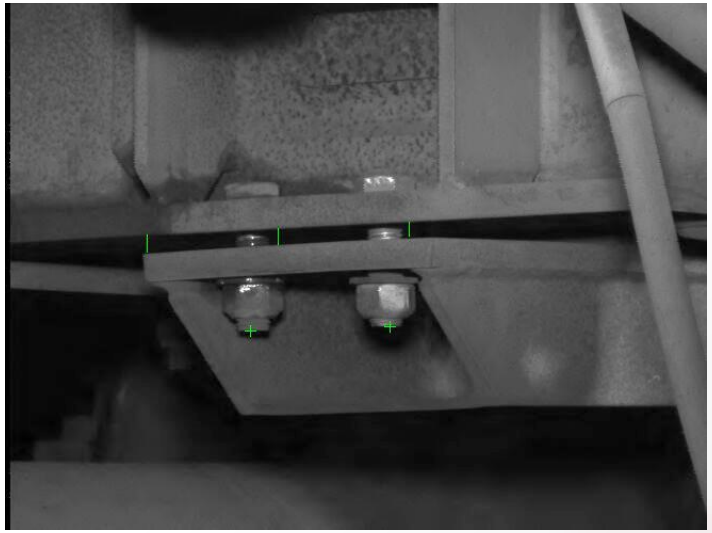
- Pad Thickness
- Securing Key Presence
- Pad Presence (Missing or Broken)
- Brake Application Distance
- Uneven Pad Wear
- Disc Brakes

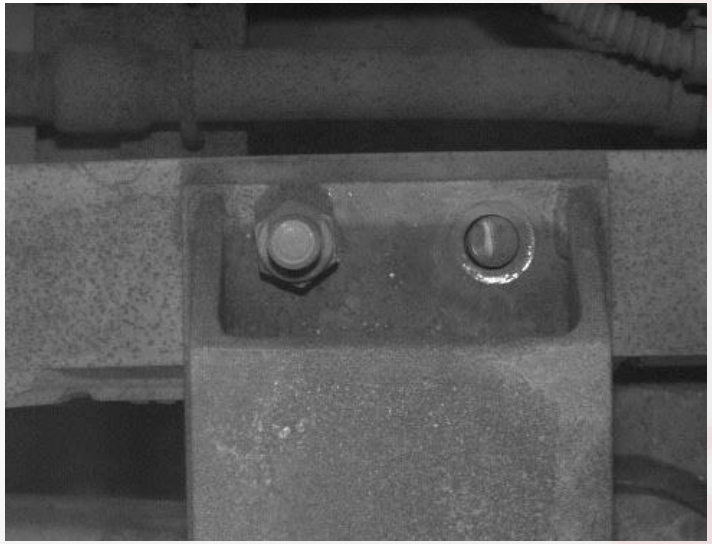




Under Carriage Monitor

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

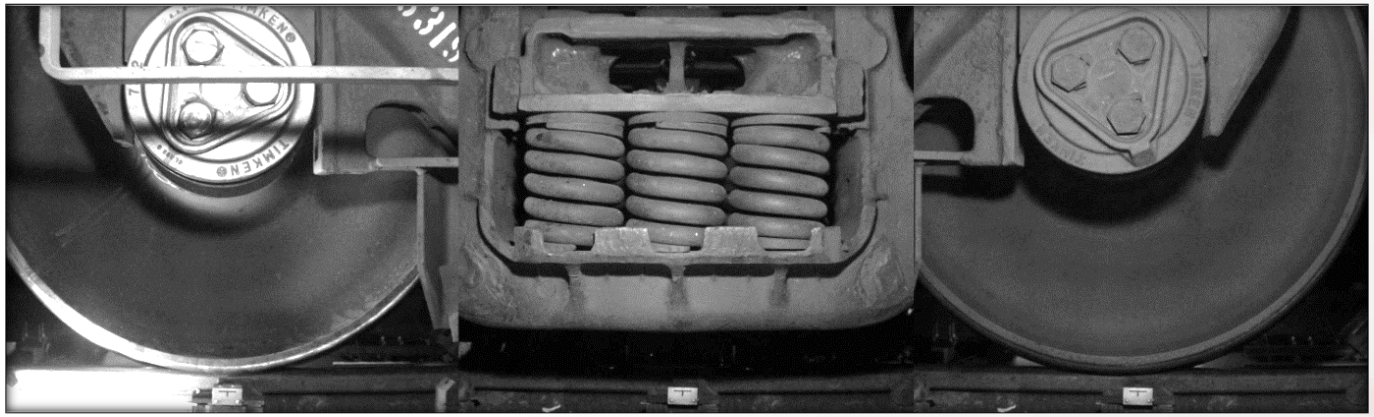




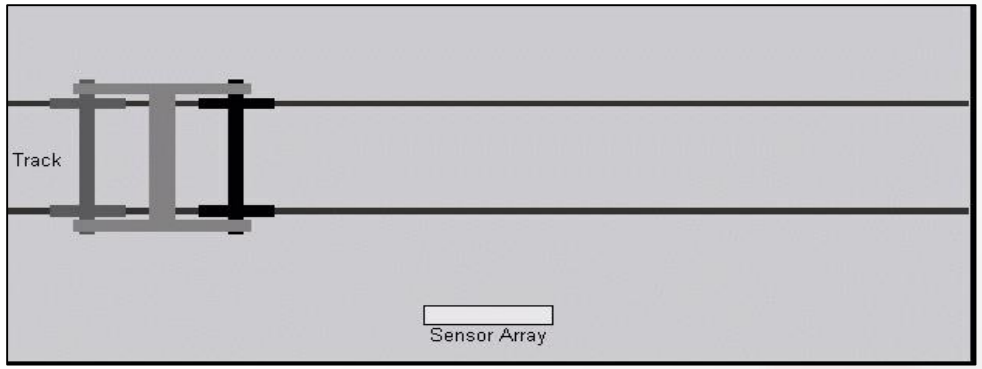
Wagon Body and Side Frame Monitoring

Wagon Body Monitor: Wagon Body Damage and Assessment

Side Frame Monitor: Wagon Body Damage and Assessment



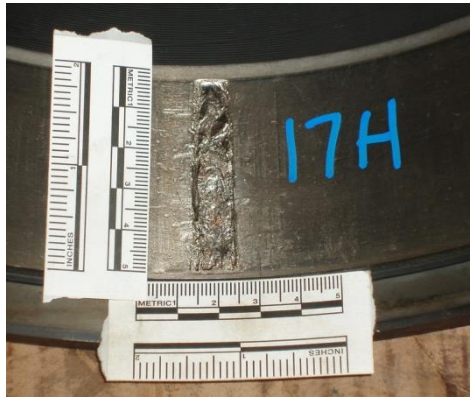
RailBAM – In Operation



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

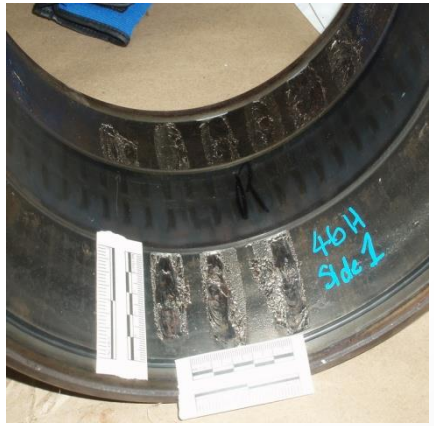
RailBAM - Types of Faults Detected

Cup/Cone Spalls



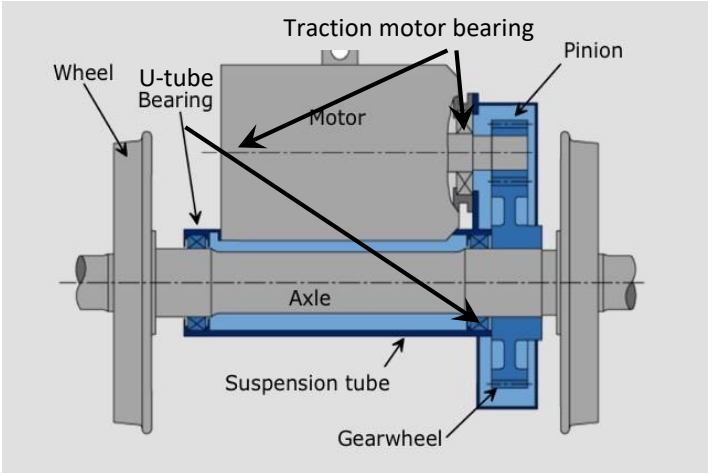
Roller Spalls

Multiple Spalls



Extended Spalls

RailBAM IB – Inboard Monitoring



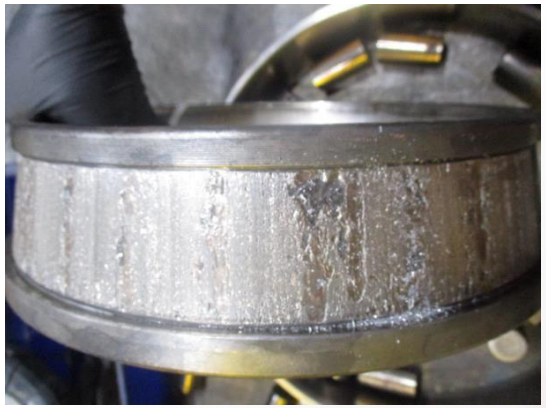
Reuse of RailBAM technology

- 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

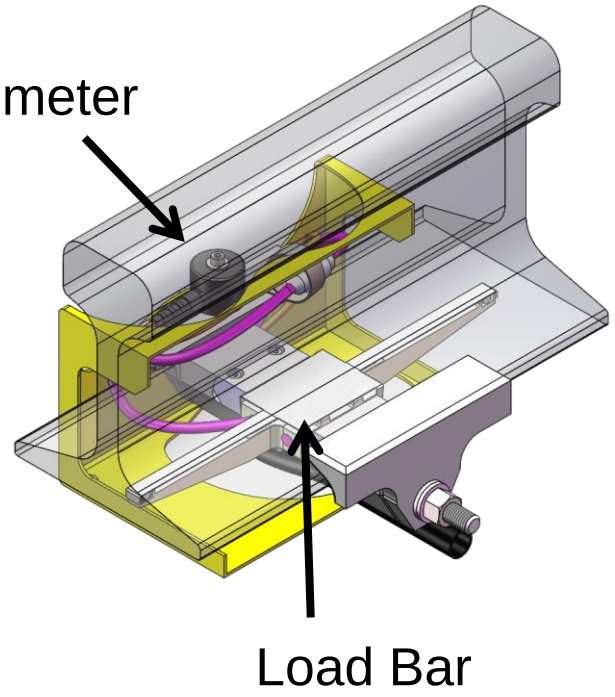


U-tube cone extended spall

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)

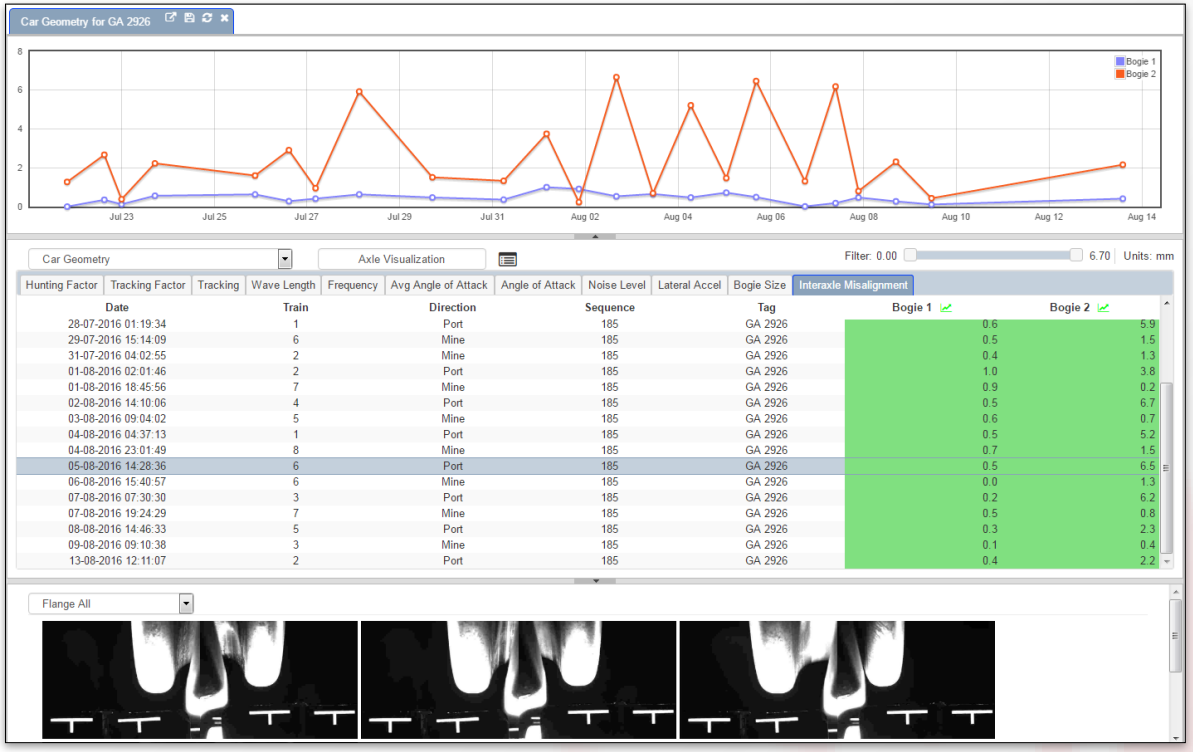
Wheel Flat / Spall

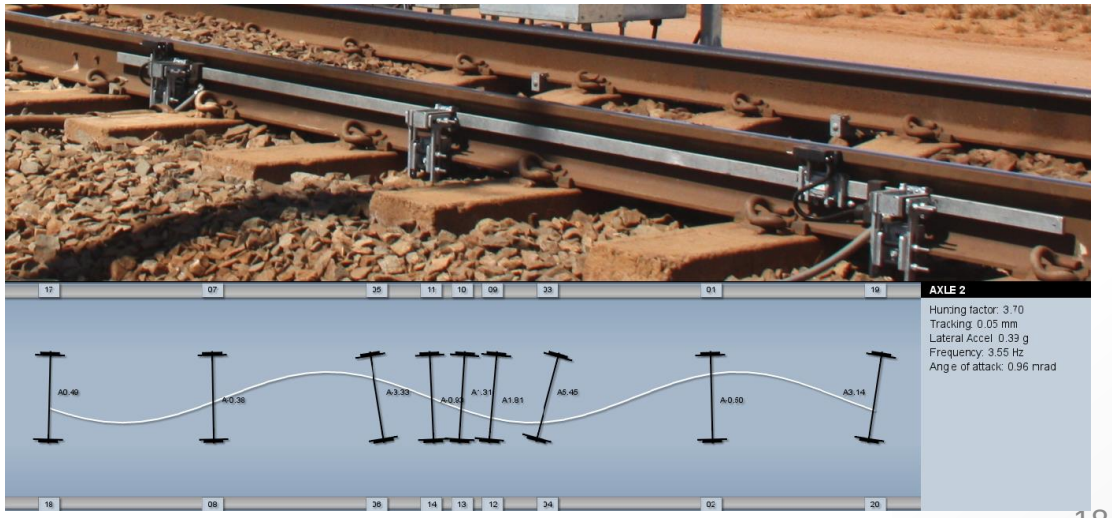
Shelling

Bogie Geometry Monitoring

Key Measurement Features:

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





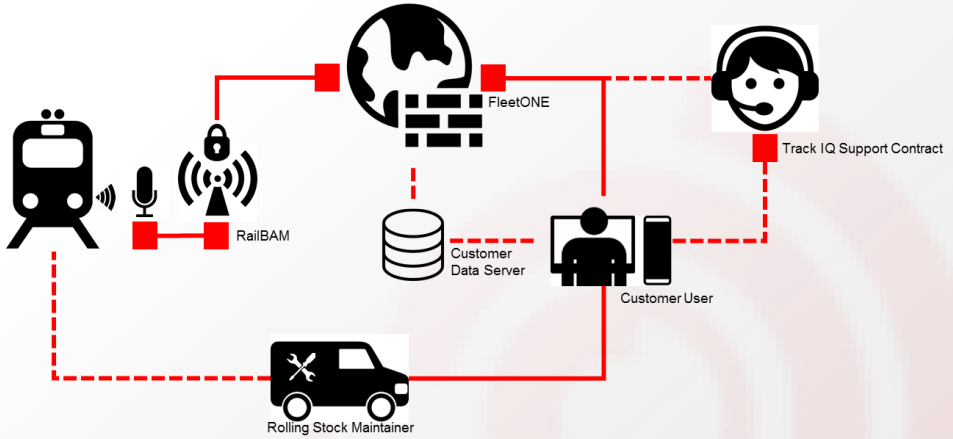
Train Noise Monitor

- 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

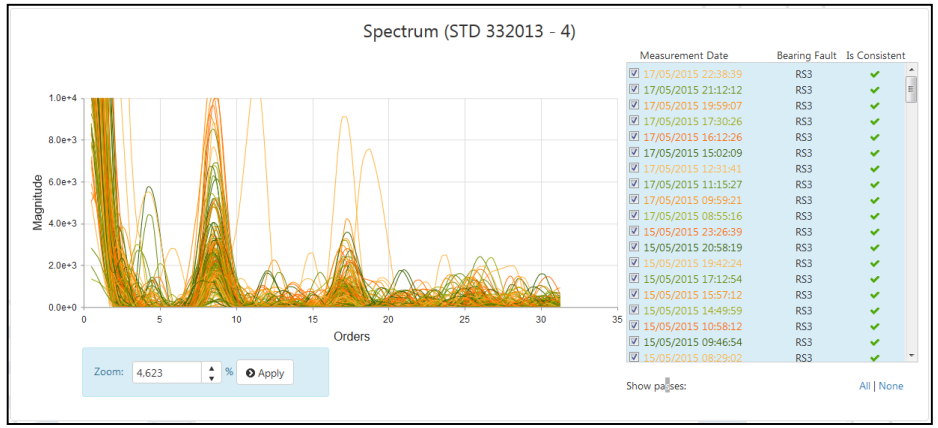
FleetONE – Purpose and Scope

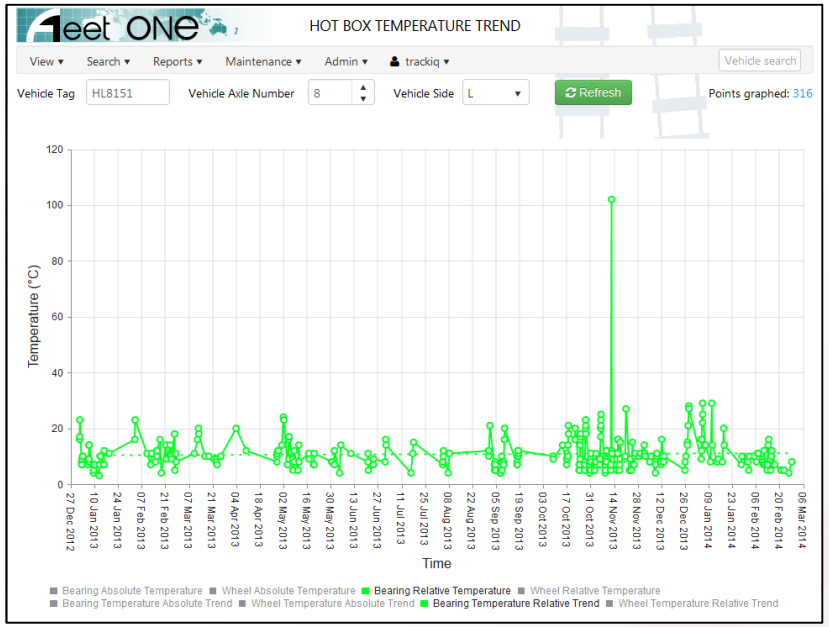
Global Functions:

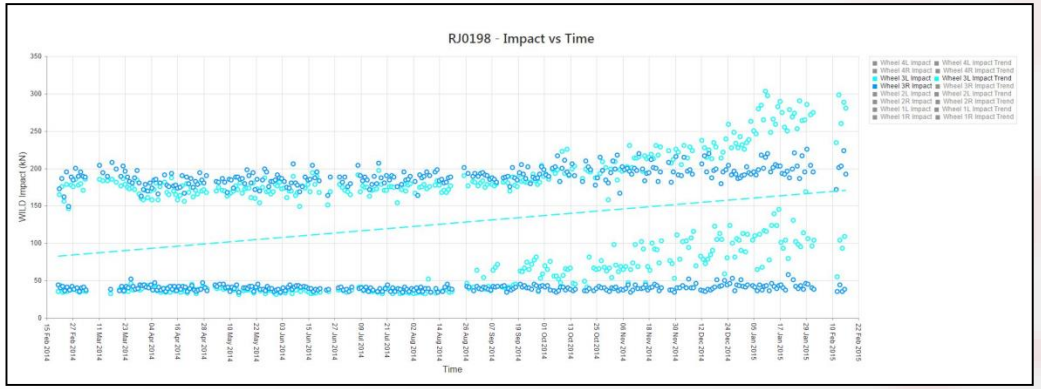
- Unifies multiple wayside sensor data into a single point of access.
- Provides a “core” system platform so customer specific data presentations can be configured.
- Integrates with existing maintenance systems (e.g. SAP) to retrieve information about completed work, automatically raise work orders 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

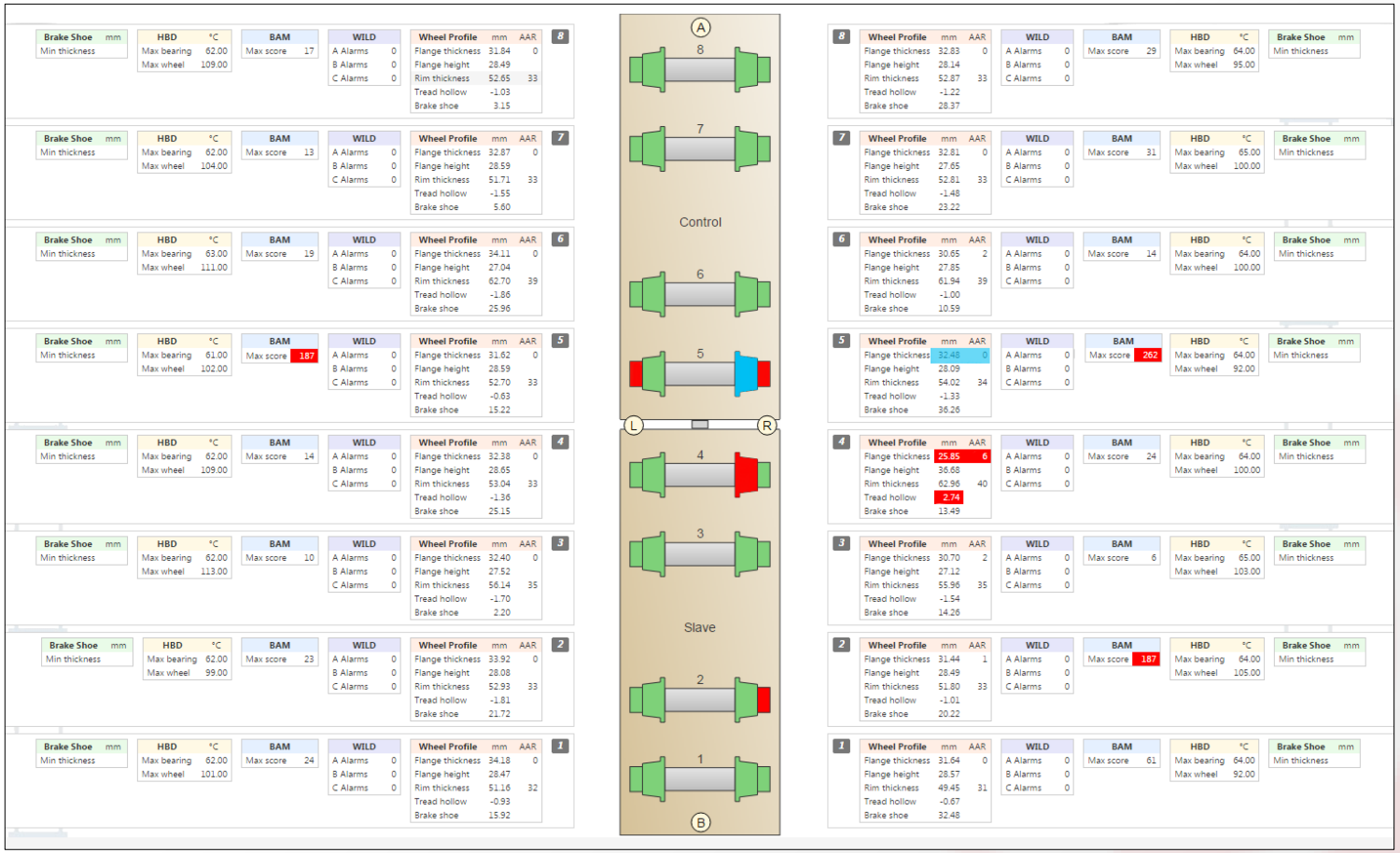






FleetONE – Data Visualisation

- 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’.



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.

Track IQ
A Wabtec company

Thank you for your attention.

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CORPORATION