

# WCM

## Wheel Condition Monitor



WCM and the WMS data management product can be used as a tool for predictive maintenance and risk management.

Monitoring and acting of the data produced by the WCM can:

- Improve safety
- Quantify track and structure loading and stresses, by operator and class of vehicle.
- Identify changes in rolling stock condition through long term macro trending, by operator.
- Reduce maintenance costs - early service reduces collateral damage and repair costs.
- Improve maintenance procedures by providing data to isolate the root cause of defects.
- Reduce fuel consumption
- Optimize maintenance resources

The Teknis Electronics **WCM** is the result of over 10 years development and refinement. Systems are now operating on three continents, in climates ranging from arctic to temperate, tropical to desert and on railways ranging from heavy haul to high speed electrified passenger.

The Teknis **WCM** analyzes wheel condition and monitors structure loading. The WCM records all rail/wheel events and so can identify those vehicles doing the most damage to tracks and structures.

Other systems use either accelerometer or strain gauge sensors. The **WCM** is a hybrid system using both accelerometers and strain gauges in load cells. This technique enables the **WCM** to have 100% wheel surface coverage and to resolve multiple defects on a wheel. This technique provides results that are independent of sprung mass thus enabling its use as a predictive monitor instead of a go-no/go detector.

Teknis' **WCM** mounts to standard track structure and comprises clamp-on track-mounted sensors and trackside processors to evaluate and process signals. The WCM integrates into the WMS software product to further process, correlate and trend the results.

Each array is connected to a purpose built signal processor that interfaces to the AVI reader, 10 accelerometers, temperature sensors, 4 wheel sensors, and up to 24 channels of strain gauge bridges. Sampling rates and frequency domains are dynamically selected based on train speeds to 250 km/h.

Track-mounted arrays are fully electrically insulated and do not compromise signaling or rail monitoring. Teknis' design allows routine maintenance (e.g. tamping operations) to proceed across the array. The **WCM** arrays are self-compensating to ensure a linear and scaled response in changing track modulus and climate. Systems are installed on non-electrified and a variety of electrification methods.



- Wheel impact measures, each wheel, 100% coverage (gRMS & est.kN)
- Axle mass to 5% (quasi-static)
- Full AAR S918 AVI tag support
- Rail and ambient temperature
- Peak lateral forces for both rails at three cribs *[optional]*
- Peak vertical force for both rails at six cribs *[optional]*
- Train speeds 30 km/h to 250 km/h
- Tangent track, no need for special track layout.
- Concrete or timber sleeper, rail sizes 43kg to 68kg

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# WMS

## Wayside Monitoring System

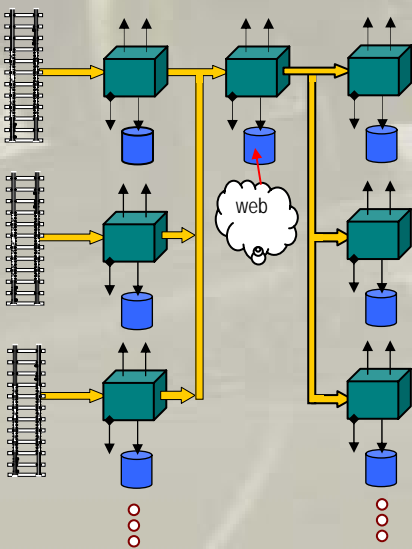


The current industry philosophy in existing wayside monitoring is usually for “go, no-go” services that create “operational exceptions”. This approach provides little data for targeted maintenance and thus it is difficult to identify developing trends and relationships

The Wayside Monitoring System integrates specialized monitoring equipment into a single database. This provides a means to correlate the individual measurements and quantify interaction and relationships between such things as wheel impacts, bogie tracking geometry, bearing condition and wheel wear. The Wheel Condition Monitor (WCM) shown overleaf is one component of the Wayside Monitoring System (WMS).

Most wayside monitoring systems currently integrate disparate sensors with customized software. By providing integrated information through “data fusion” the WMS makes this information available to the customer’s existing IT infrastructure. This decreases commissioning costs and shortens the time to deliver data for engineering and operational departments.

The WMS is an **open**, scalable and modular system that interfaces to selected vendor’s sensors. Each of these optional modules can be added to the system at any time and remain fully independent of the overall WMS. In this way, the WMS serves as a high-level data infrastructure that does not interfere with or restrict the standalone operation of each of the sensor systems in any way.



The core of the WMS is essentially a database and a software application containing data from all sensors fully integrated at the train, vehicle and axle level.

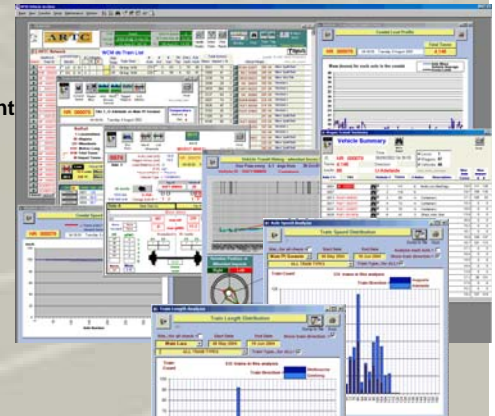
Each WMS node is the same and can be connected to remote equipment, other nodes, modem lines, internet, intranet, Train Control Systems, LAN, WAN and local archive databases.

Nodes can be grouped and each can process to specific owners, trains and vehicles if required. These can be located at workshops or depots or run from central servers.

The WMS is scalable. It will run on a notebook or an enterprise server. WMS includes a workstation interface and a WEB interface. Data storage is scalable from Access to SQL Server. Multiple archives can be maintained.

The following functionality is integrated into the WMS:

- Wheel Profile
- Angle of Attack, Tracking Position
- Bogie/Truck alignment
- Vehicle Hunting as frequency & displacement
- Axle Mass
- Lateral Force
- Vertical Force
- Wheel Impact
- Bearing condition (Acoustic or HBD)
- Train Control and Train ID
- Vehicle specifications
- Track access standards (speed/load)
- Other, on enquiry



Features include:

- Automated notification
- User configurable alarm and criteria
- Defect trending – by vehicle and bogie
- Custom data export
- Many standard reports with spreadsheet output
  - Alarms
  - Wheel Quality
  - Vehicle history
  - Operator summaries
  - Track loading summaries
  - Axle mass
  - Speed distribution
  - etc



These systems interface with the WMS under alliance agreements:

**WCM** Teknis Wheel Condition Monitor  
**WheelSpec™** ImageMap Laser Wheel Profiling System  
**T/BOGI™** WID Optical Bogie Geometry System  
**RailBam™** Vipac Acoustic Bearing Analysis System



Contact Teknis for details of other interfaced equipment