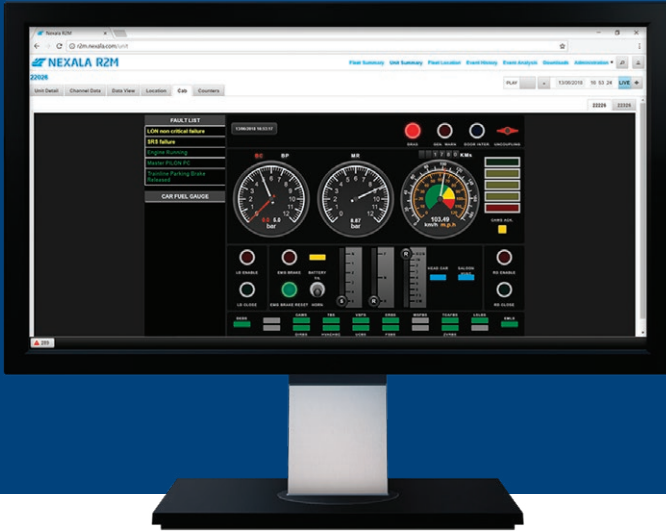




R2M System

REAL-TIME REMOTE DIAGNOSTIC MONITORING



Greater reliability for improved availability

Trimble® R2M system provides a comprehensive view of fleet status including specific faults and identifies potential faults that may arise.

REAL-TIME INTELLIGENT DECISION MAKING

Bring real-time fault information into the control room for intelligent decisions and planning with the Trimble R2M remote diagnostic system. It analyzes and detects anomalies in on-vehicle component behavior to identify component health and possible impacts. R2M processes diagnostic data received from each rail vehicle in real-time. This provides a comprehensive view of the overall fleet status including any specific vehicle faults and identifies any potential faults that may arise. Trimble R2M's powerful rules engine with customizable rules provides fully configurable technical and operational warnings and alerts which drives reliability growth and mitigates failures.

CONDITION BASED MAINTENANCE

Trimble R2M also analyzes and detects anomalies, in specific on vehicle component behavior, and uses this information to identify the health and status of both the individual component and the possible impact that this behavior may have on the vehicle and to the overall fleet. It pinpoints areas of difficulty for the vehicle operator enhancing infrastructure management. Moving from time to condition based maintenance routines increases mean time between faults reducing maintenance and running costs.

PREVENTING ISSUES IMPROVES SAFETY

R2M immediately identifies faults and prevents potential faults improving fleet safety. R2M can also be used after an incident or fault has occurred to replay the history of events and the condition and behavior of the vehicle that led to the fault or incident.

BENEFITS

▶ **Reduce maintenance and operational costs**

Trimble R2M increases mean time between faults, refines maintenance diagnosis, and reduces “no fault found” outcomes lowering maintenance and running costs.

▶ **Management efficiency for greater reliability and availability**

Powerful customizable rules engine with fully configurable warnings and alerts mitigates in service failures and improves reliability.

R2M provides the operator and control room/maintenance environments with real-time diagnostic information and cab views to enable optimal operations and maintenance planning.

The system improves infrastructure management by pinpointing areas of difficulty for example areas of excessive wheel slip or catenary issues etc.

▶ **Improve safety**

Immediately identifying faults and preventing potential faults improves fleet safety.

Areas Addressed	Benefit
Miles per casualty	Improved by 60%
Delay minutes	Reduced by 40%
Maintenance investigation time	Reduced by 65%
Return on investment	< 9 months

FEATURES

- ▶ Works with existing on-board event recorders and train management systems
- ▶ For older fleets additional sensors can be added as part of routine maintenance and included in the system automatically
- ▶ Facilitates interactive and predictive fault detection
- ▶ Rules engine functionality automates data processing by defining data values required to cause an alert to be fired triggering action
- ▶ New rules and alerts can be defined and added to the system without affecting vehicles in service
- ▶ Real-time cross fleet performance monitoring identifies trends as they occur within a fleet
- ▶ Displays real-time schematic view of key subsystems as trains are in service
- ▶ Tracks vehicle and fleet location through mapping software
- ▶ View cab equipment in real time from the control room to understand the driver’s experience
- ▶ Replay fault events to accurately diagnose root cause and repair actions during maintenance
- ▶ Recommends maintenance repair actions to the fleet maintainer based on the data received from on board systems

Example signals and subsystems

- ▶ TMS (Train management systems)
- ▶ Event recorders/OTMRs
- ▶ Power pack/traction
- ▶ Brakes/doors/batteries/HVAC
- ▶ Safety systems (e.g., AWS/TPWS)
- ▶ PA/PIS

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