LORD APPLICATION NOTE

High Speed Train Wireless Sensing

Sensing Systems for Improved Maintenance, Tracking, and Safety

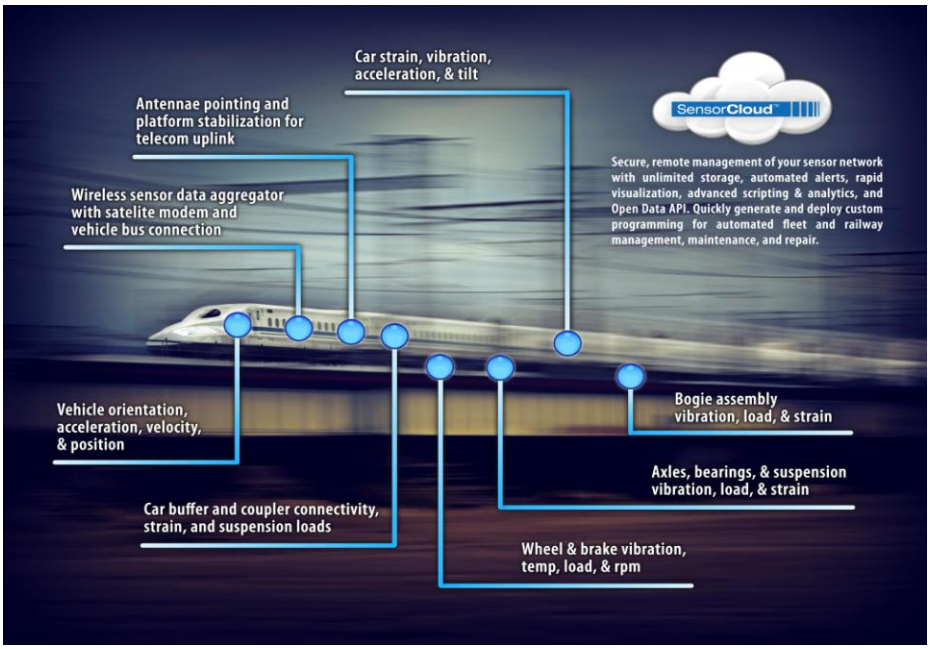
APPLICATION

Industry: Heavy Vehicles

Field: Health Monitoring, Asset Tracking, and Condition Based Maintenance

Products: G-Link2™, SG-Link®, V-Link®, TC-Link®, 3DM-GX3® -45, WSDA® -1000, and SensorCloud™

Parameters: Vibration, Tilt, Strain, Load, Displacement, Temperature, Acceleration (sustained and shock), Humidity/Moisture, Location, & Stabilization



BENEFITS

- Easy retrofit of active fleet or integration with new rolling stock
- Reduced rail inspections and non-revenue generating rolling stock
- Real-time remote view of entire fleet and network health including valuable cargo
- Custom alerts and scripting for a bespoke solution
- Extended component life
- Improved maintenance schedule
- Reduced operating cost
- Improved personnel, passenger, and infrastructure safety

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In-Service Fleet Sensing Capabilities

Maintenance and service is a key contributor to the total cost of high speed train ownership. While high speed rail often costs over $10,000,000 per mile to construct, the ongoing maintenance and operation cost can approach $200,000 per mile of track annually. (New York Times, 2009) LORD MicroStrain® wireless sensing systems provide fleet operators with a quick and cost-effective path to embedding health sensing capabilities on both critical components for new and existing rolling stock for continuous, automated condition updates.

The elimination of wires facilitates the easy retrofit of active engines and cars. LORD MicroStrain scalable wireless sensing networks provides a range of sensing capabilities on distributed components. Solutions include wireless vibration sensors, wireless load sensors, wireless strain sensors, and wireless temperature sensors on bogies, wheels, brakes, and axles; miniature inclinometers and inertial sensors for feedback car positioning and dynamics; high-value asset and cargo health tracking. Specifically, LORD's wireless systems enable condition monitoring of distributed rail health directly from the bogies of in-service trains. As a result, operators can monitor track and infrastructure safety without servicing redundant, non-revenue generating rolling stock.

LORD's lossless LXRS® wireless communication with extended range ensures reliable data transmission on dynamic components, while low power consumption and energy harvesting significantly reduce or eliminate battery maintenance in long-term applications.

Real-Time Remote Monitoring

Combined with SensorCloud™ remote network monitoring and management, LORD MicroStrain provides an end-to-end sensing solution that delivers real-time actionable information. Embedded analytics and customizable alerts allow users to define their key thresholds and receive automated messages about remote train health via satellite or cellular modem. MathEngine® web-based analytics provide a robust scripting environment for programming new or porting in existing prognostic algorithms. As a result, operators can schedule maintenance and anticipate part replacement before failures occur, and track fleet movement and cargo health for optimized fleet operation and service costs.

LORD MicroStrain® SENSING SYSTEMS