SKF Multilog Online System IMx-R for railway condition monitoring

Increasing vehicle safety, reliability and profitability through advanced fault detection and prevention

For today's railway vehicles, the primary means of detecting bearing damage is temperature monitoring – a process that cannot detect impending failures in their early stages. Since relying on temperature monitoring alone would result in frequent breakdowns on the track, operators mitigate the risk of in-service failures by adhering to very conservative time-based maintenance intervals – a highly inefficient and costly approach.

Developed exclusively for railway applications, the SKF Multilog Online System IMx-R offers a far more functional, cost-effective alternative. Using several modular sensors that monitor and transmit a range of bogie operating condition data simultaneously, the SKF Multilog IMx-R works with SKF @ptitude Observer software as a complete mechanical condition monitoring and protection system.

Along with enabling early fault detection, the SKF Multilog IMx-R generates automatic advice for correcting existing or impending conditions. The system also provides automatic load- and speed-dependent warnings and alarms that initiate on-board and external communications, data processing for automatic diagnosis and root cause analysis, links to maintenance management systems for scheduling, spare part and work order management and end-user, system and Web-based data access.
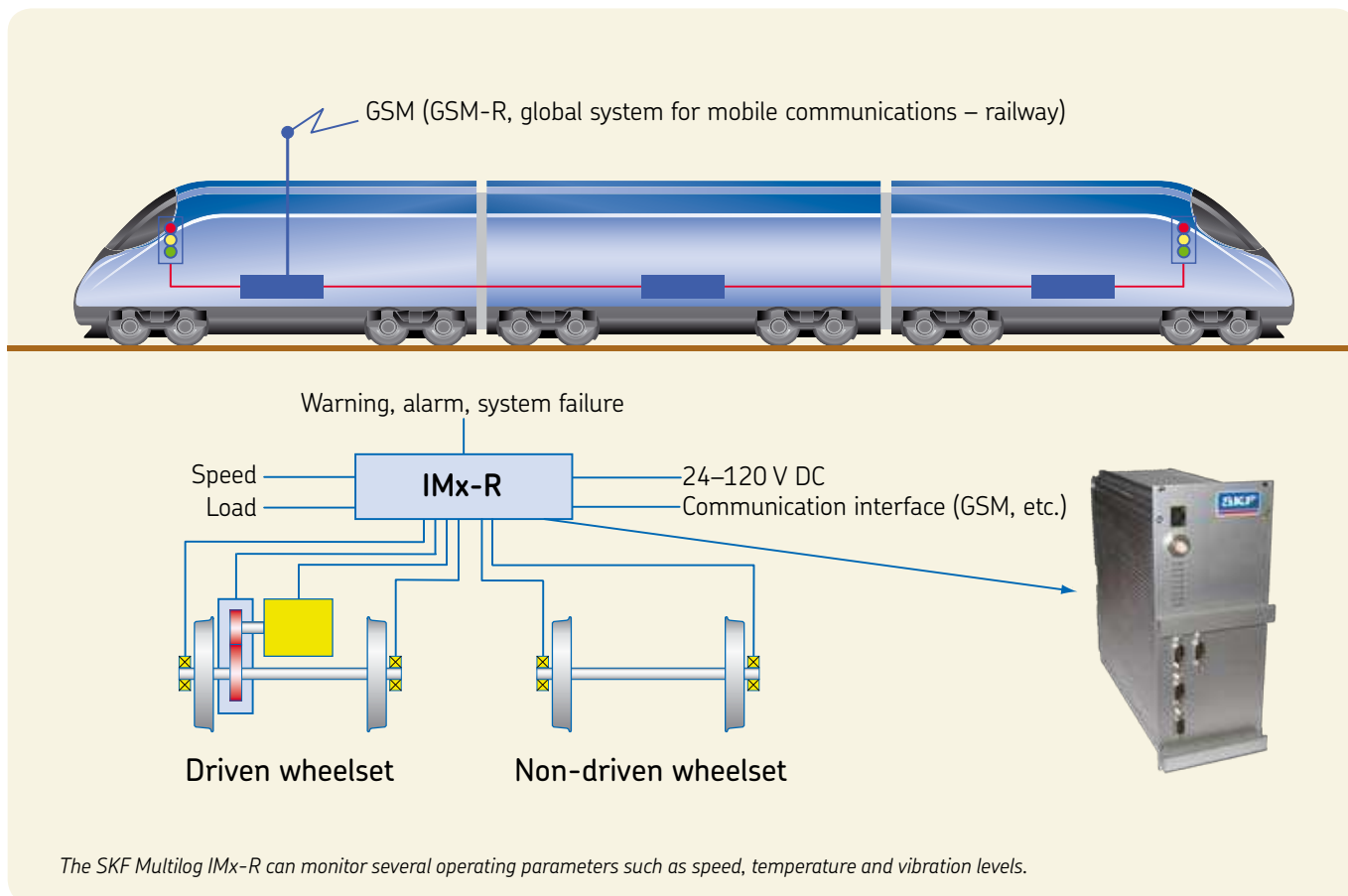
Monitoring capabilities

- Wheelset bearing condition and grease service life
- Wheel flats and shape
- Bogie stability/hunting sensoring
- Propulsion system condition
- Unbalance and resonance condition

Benefits

- Increased safety and reliability
- Reduced maintenance costs
- Improved maintenance and planning
- Extended overhaul intervals
- Reduced unplanned downtime and standstills
- Root cause analysis capabilities
- Optimized spare parts logistics

The SKF Multilog IMx-R can monitor several operating parameters such as speed, temperature and vibration levels.

Wheel set monitoring

With the SKF Multilog IMx-R, a vibration sensor is mounted on the axlebox housing or integrated into the axlebox bearing to capture wheel set operating data. This information is used to determine wheel set conditions, including wheel flats and wheel shape.

Real-time calculations also utilize shaft speed data. The result? Instead of arbitrary, time-based maintenance schedules, the SKF Multilog IMx-R enables much more cost-effective condition-based wheel maintenance, optimizing wheel set operating distances without compromising safety and reliability.
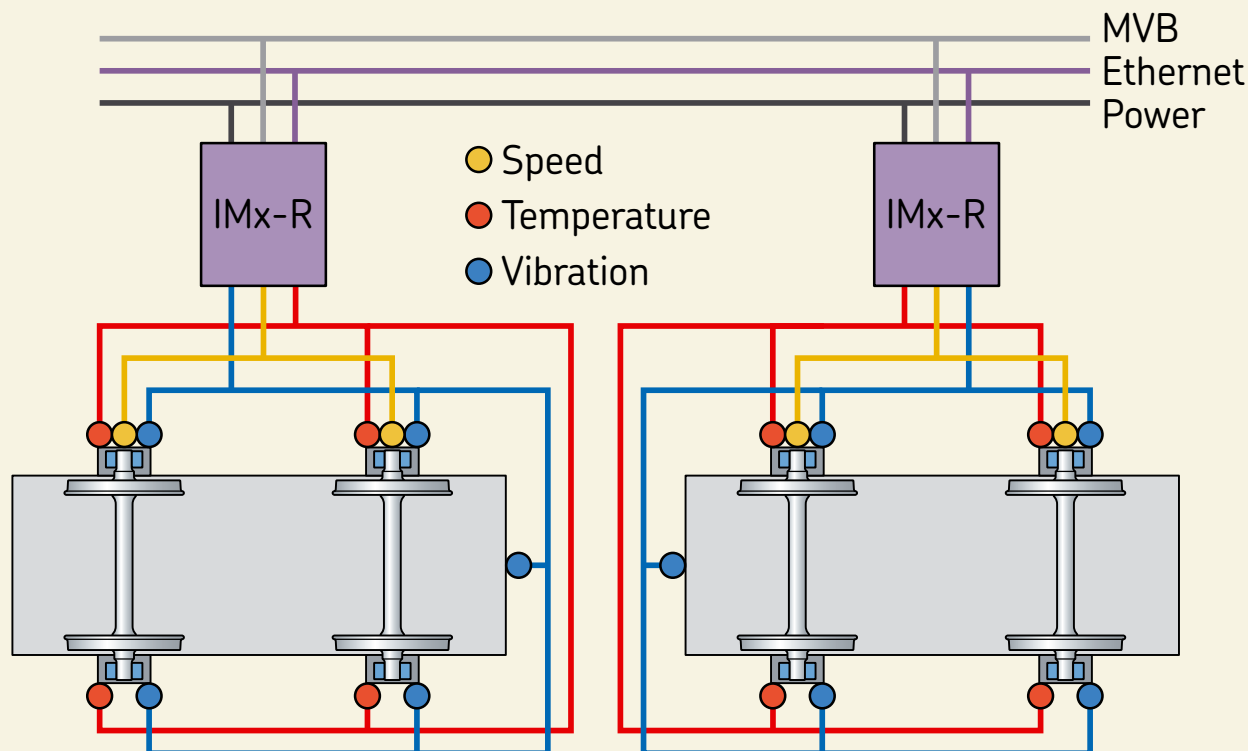
Axlebox bearing monitoring

For decades, axlebox bearings have been monitored by stationary trackside-mounted temperature and noise detection systems that can only spot heavily worn or damaged components. When advanced faults are detected, trains must be stopped so faulty wagons can be replaced. The SKF Multilog IMx-R makes such costly operational delays a thing of the past.

Axlebox bearing vibration sensors mounted on the axlebox housing or integrated into the axlebox bearing detect dynamic frequencies of bearing elements such as rollers and inner ring raceways, as well as toothed wheels. The SKF Multilog IMx-R uses this data, along with information about specific bearing geometry and shaft speed, to identify bearing problems very early on, enabling more cost-effective maintenance planning and optimized bearing lifecycles.

Propulsion system monitoring

SKF Multilog IMx-R bearing vibration sensors can monitor traction motors, gearbox bearings and toothed wheels, and cardan shafts and couplings. Along with vibration frequencies, the system processes speed, load and gearbox ratios to detect unbalance, misalignment, shaft bending, loose parts, damaged bearings or gear wheels, and resonance. Gearbox oil temperature, level and condition can be included as part of the system, or function in a stand-alone mode.

GPS track profiling

When linked to a global positioning system (GPS), the SKF Multilog IMx-R uses axlebox vibrations to facilitate profiling of the track. By measuring wheel set conditions over time, the system can detect track deterioration. While vibration sensors are employed most often, the system can accommodate any sensor type, including an SKF Axletronic odometer sensor.

SKF Multilog IMx-R technical highlights

In addition to the analogue channels, the IMx-R uses four digital channels to measure speed, trigger, or digital status. Several measurement points may be attached to one channel; both AC and DC measurements can be measured on the same channel. Users can set individual conditions for warning, and alarms can be set for each point. Warnings and alarms can be controlled by speed or load.
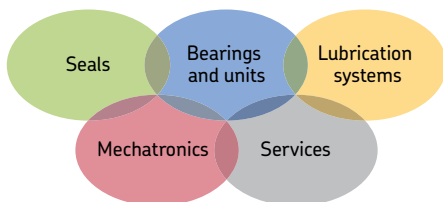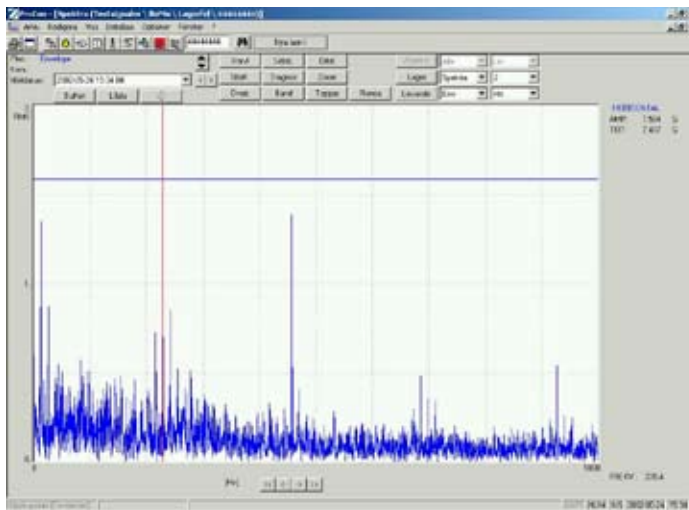
The unit's unique, built-in hardware auto diagnosis system continuously checks all sensors, cabling and electronics for faults, signal interruptions or power failures. In the event of power failures, the system automatically restarts when power returns.

IMx-R design details

- complies with TSI regulations UIC 515-1
- meets TSI Directive 96/48 EC and EN 15437-2
- SIL Safety Integrity Level 2 certified (measurement of performance required for safety instrumented function)
- mounted in a 19" rack
- true simultaneous measurement of all channels
- multi-parameter gating
- digital peak enveloping (DPE)
- adaptive alarm levels
- data buffering in non-volatile memory when communication is down
- output relay drivers
- fully supported by SKF @ptitude Observer

SKF

SKF @ptitude Observer software

SKF @ptitude Observer is a powerful diagnostic software application for the condition monitoring of rotating machinery and works seamlessly with the SKF Multilog IMx-R. The hot box axlebox and bogie hunting detection and condition monitoring data from the SKF Multilog IMx-R are stored in the SKF @ptitude Observer database. This data is further processed by the software to produce machine condition results such as trends and clear text messages showing machine faults detected. These results can be easily accessed through the user-friendly interface of the SKF @ptitude Observer software.

The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry world-wide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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