



eRTM

Wireless Rail Temperature Measurement System

ADVANCED RAIL-STRESS MONITORING

ABOUT EVOPRO

evopro group is an international engineering company that provides comprehensive engineering services and develops innovative products in various industries worldwide, with a focus on transportation technologies, energy and industrial automation.



MISSION & SOLUTION

evopro has created state-of-the-art and cost-effective solutions to help the stakeholders of the railway transportation ecosystem overcome the challenges of providing safe and efficient transportation. Rail-temperature is an important parameter of railway tracks, as it is related to, and thus, an excellent indicator of the internal stress of the rail. The internal stress of the rails is induced by its blocked thermal expansion at different ambient conditions, which might lead to rail-buckling that poses a potential derailment-hazard.

Integrating the most advanced measurement and telecommunication technologies, evopro offers its **Railway Diagnostics** product line, including **eRTM - Wireless Rail Temperature Measurement System**.



ADVANTAGES

eRTM Wireless Rail Temperature Measurement System increases traffic safety and because it increases energy efficiency, it also lowers operational costs.

FEATURES

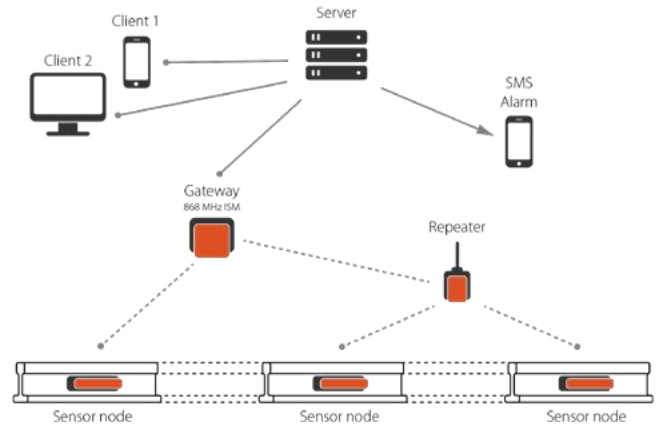
- Thermistor-based measurement of inner rail temperature
- Automatic self-diagnostics and continuous remote maintenance function
- Embedded electronics in each measurement module for noise-free high-accuracy measurements
- Wireless communication between on-site system elements - cost effective installation
- Secure data transmission via GSM/GPRS/HSPA/LTE or DSL/Fiber
- Customized software integration into railway operator IT system
- Low power requirements. Battery operated sensors, system Gateway powered from 230V.
- Battery powered UPS for the on-site gateway unit for enhanced availability
- Cost-effective installation on existing rail-track types without the need for traffic limitation, special understructure, or severe alterations in the rails
- Available also as Service on BOO basis

SYSTEM ARCHITECTURE

The eRTM system is a **wireless, battery-powered sensor network** for real-time monitoring of rail-temperature, and thus, rail-stress distribution. Recordings are based on the measurements of thermistors mounted to the web of the rail. By applying **mesh technology**, repeaters allow the deployment of a wireless network covering large rail-track distances. Rail temperature is measured and data is sent periodically to the gateway unit.

The gateway module performs local data processing and logging, and transmits the results to the central diagnostic server and data center via broadband communication network. The gateway unit can be accessed via local Ethernet or WiFi terminals by service maintenance personnel.

Multiple wayside eRTM systems can be integrated into a redundant high availability diagnostic server solution. The server performs system wide data processing and evaluation, trend analysis, prediction, data storage and sends the alarm and warning signals to configured operational clients. All system functions are available and visualized through the central system, which can be accessed by various web browser applications.



SELF- & REMOTE-DIAGNOSTICS

The status and the availability of all system components - including the batteries - are monitored continuously, and an alert is sent to the Operator automatically in case of any problem with the operation of the measurement system, or when the batteries are close to depletion and need to be replaced.

SERVICES

evopro offers highly customized turn-key software development services for integrating the eRTM system central diagnostic server into the IT system of the railway operator for integrated monitoring and alarm functionality.

P A R A M E T E R S

Measurement accuracy	±1 °C
Temperature resolution	± 0.5°C
Temperature measurement range	-40 °C ... +125°C
Sensor time constant	< 1s
Rail temperature	-40 °C ... +75°C
Maximum number of measurement points	256
Measurement frequency range	10 min. – 12 hrs.
Repeater-sensor distance	max. 100 m
Repeater-repeater distance	max. 1000 m
On-site communication (sensor-repeater-gateway)	868 MHz ISM
Gateway off-site communication	GSM/GPRS/HSPA/LTE or DSL/Fiber
Sensor battery life	3 years (1 hour measurement cycle)
Electric supply (of Gateway)	230 (190-250) V
Electric supply frequency (of Gateway)	50/75 Hz
Electric power consumption (of Gateway)	max. 50 VA
Ambient operational temperature	-40°C...+85°C
Module environmental protection	IP67
Minimal lifetime	10 years
MTBF	10.000 hrs.
Rail type (UIC)	48, 49, 54, 60
Railroad sleeper distance	580-650 mm
Relative humidity of ambient air	20 – 95%
Internal accumulator capacity (of Gateway)	12Ah
Operating time in case of power failure	20 min

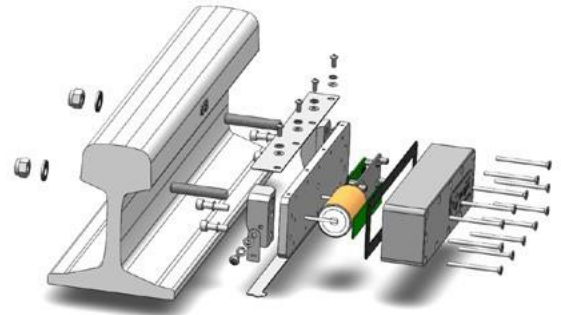
FUNCTIONS

Wireless Rail-Temperature Measurement system with

- measurement accuracy of $\pm 1^{\circ}\text{C}$
- thermistor response time of $< 1\text{s}$
- battery duration of > 3 years

along with monitoring, prediction and alarm functions.

All warning and alarm threshold limit values can be set by the Operator.



BENEFITS

INCREASED SAFETY

Derailment prevention by **detecting, predicting,** and alarming on potential **rail-buckling conditions** in summer-time operations.

OPERATING COST REDUCTION

Preservation and lifetime extension of both the **infrastructure** and the **rolling stocks** with derailment prevention.

Energy savings by measurement controlled railway-switch heating in winter-time operations.

BUSINESS EFFICIENCY AND PROFITABILITY

Effective traffic management with optimized duration, localization and extent of speed limitations, based on real-time rail-track temperature conditions and predictions.

Effective maintenance planning by predicting rail defects and failures related to temperature variations, and by scheduling stress-free periods for rail-track maintenance.

ENVIRONMENTAL PROTECTION

CO₂ reduction by energy savings.



it's possible!

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