move SOLUTIONS

SMART RAILWAY MONITORING

The all-in-one system for **railway** monitoring

The complete solution for **static SHM**, **dynamic SHM** and **geotechnical and environmental monitoring**

Track monitoring • Ballast void • Rail bridges • Subways • Track monitoring • Ballast void • Rail Bridges • Subways • Track monitoring • Ballast void • Rail brid

Track conditions

Vertical deflection, cant and twist

Ballast void

Ballast conditions, settlement of the track, dynamic displacement and frequencies

Slope stability

Slope angle variations, groundwater level and weather conditions

Railway bridge

Oscillation and vibration peaks, modal analysis, deck deformation, span stability, joint behaviour

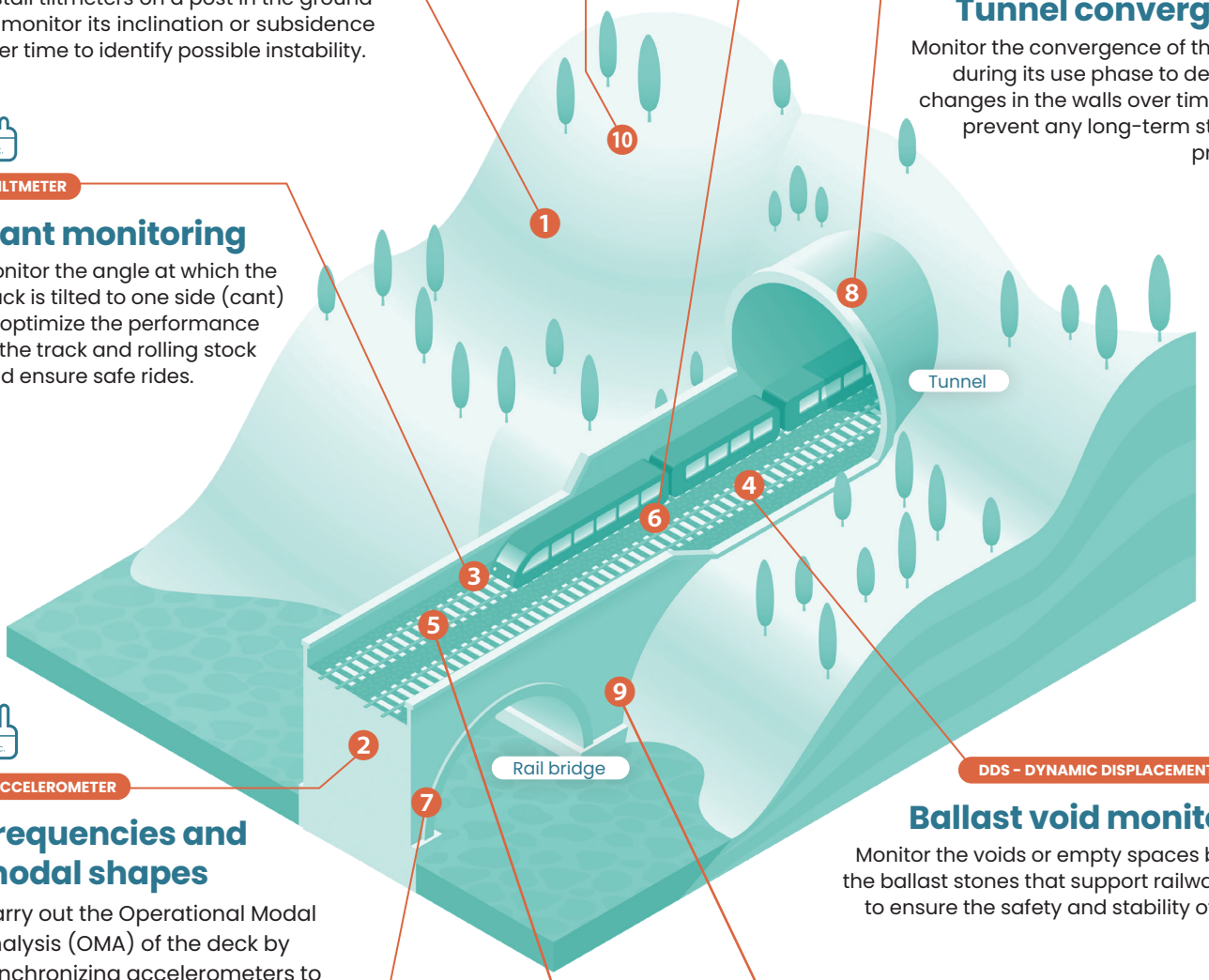
Railway tunnel

Convergence, longitudinal settlement, deformations and cracks

www.movesolutions.it

✔ Enhance safety ✔ Increase productivity ✔ Improve decision-making

Smart rail monitoring with dynamic and static wireless IoT sensors



TILTMETER

Twist monitoring

Monitor the expansion of the bridge joints to ensure that they expand and contract within acceptable limits.

TILTMETER

Slope monitoring

Install tiltmeters on a post in the ground to monitor its inclination or subsidence over time to identify possible instability.

TILT BEAM

Tunnel convergence

Monitor the convergence of the tunnel during its use phase to detect any changes in the walls over time and to prevent any long-term structural problems.

TILTMETER

Cant monitoring

Monitor the angle at which the track is tilted to one side (cant) to optimize the performance of the track and rolling stock and ensure safe rides.

DDS - DYNAMIC DISPLACEMENT SENSOR

Ballast void monitoring

Monitor the voids or empty spaces between the ballast stones that support railway tracks to ensure the safety and stability of railway tracks.

ACCELEROMETER

Frequencies and modal shapes

Carry out the Operational Modal Analysis (OMA) of the deck by synchronizing accelerometers to identify relevant vibration modes and their evolution over time.

SINGLE CHANNEL NODE + PIEZOMETER

Water pressure and level

Monitor the interstitial water pressure and changes in groundwater level to detect changes in the surrounding soil and potential hazards to the railway.

SINGLE CHANNEL NODE + CRACKMETER

Bridge joint monitoring

Monitor the expansion of the bridge joints to ensure that they expand and contract within acceptable limits.

TILT BEAM

Vertical settlement

Monitor the downward movement of the track and its supporting structures for early detection of uneven tracks.

Wireless sensors for railway monitoring

• Track monitoring • Ballast void • Rail Bridges • Subways

2

ACCELEROMETER

Measure acceleration (mg) and frequency (Hz) on three axes, synchronizing devices for modal analysis.

4

DDS DYNAMIC DISPLACEMENT SENSOR

Measure the dynamic amplitude of the displacement (mm) and the vibration frequency through an FFT algorithm.

1 3 6

TILTMETER

Measure rotation, ground deformation and triaxial tilt changes, with the option of synchronizing devices to better assess the stability of structures.

7 9

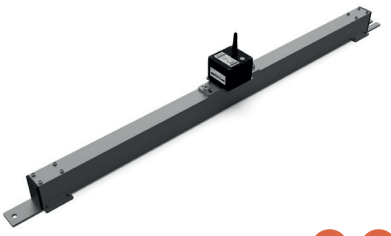
SINGLE CHANNEL NODE

Make geotechnical and environmental probes suited for wireless communication and receive alarms for threshold breaches.

10

GATEWAY

Collect data measured by the sensors and transmit them to the MyMove IoT Platform where they will be processed and analyzed.



5 8

TILT BEAM

Measure the degree of slope or tilt over a larger area with a series of Tiltmeters attached to a bar.

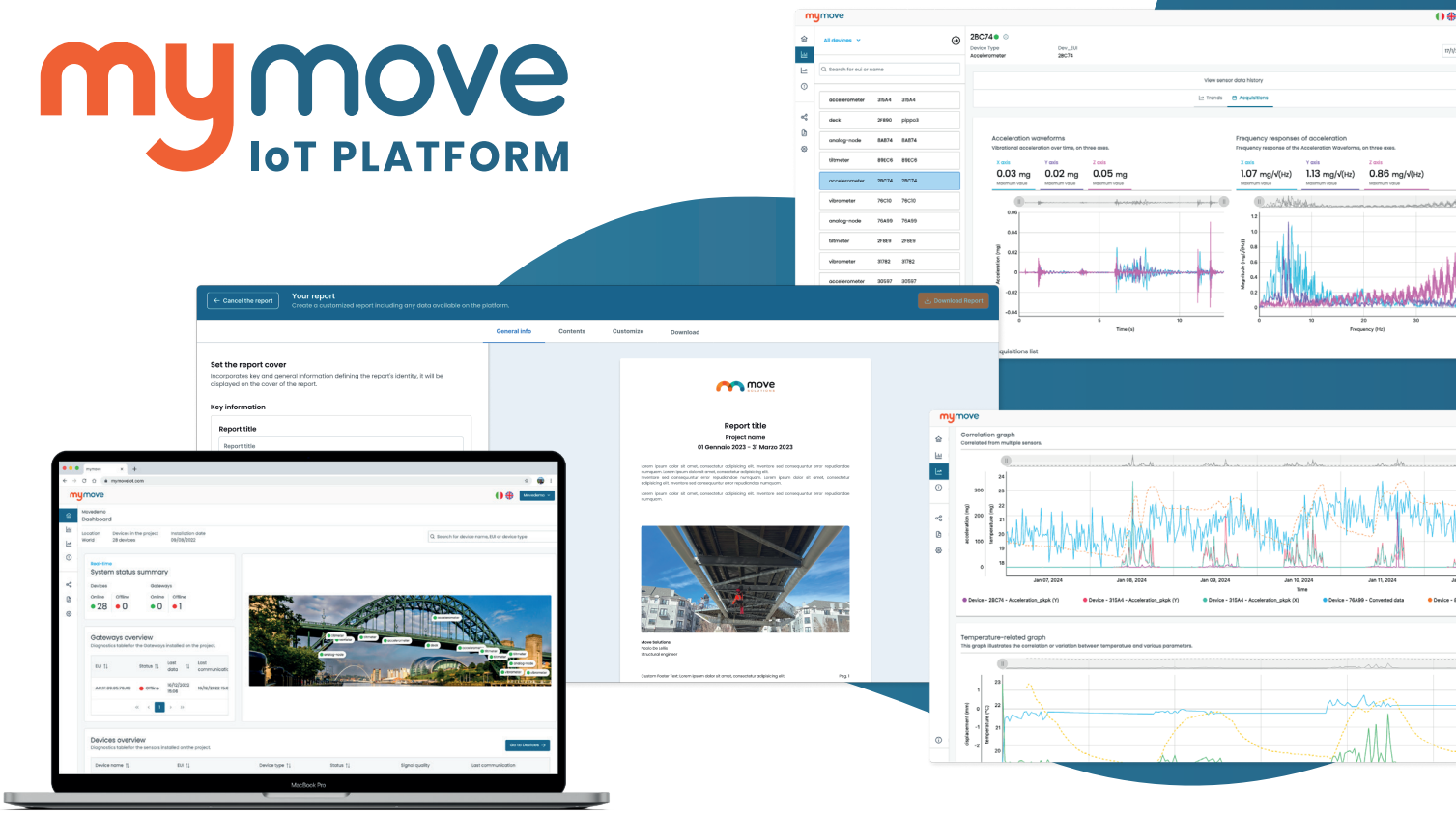
All our sensors are **battery-powered** and they measure **temperature**.

CASE STUDY

Railway bridge • Casella, Italy

Located on the Scrivia river, the bridge is about 160 meters long and is divided into 7 spans with lowered arches, in reinforced concrete. Move Solutions wireless SHM sensors were used to monitor the health of the structure; a **DDS** (Dynamic Displacement Sensor) was installed on the intrados of the arch and on the piles to record all the dynamic events caused by the passage of the train at high speeds, and a **Tiltmeter** was used to monitor the inclination of the structure.

mymove IoT PLATFORM



All-in-one

Comprehensive structural analysis for efficient monitoring

User-centered

Designed to meet and anticipate your needs

Intuitive interface

Clear and simple design for a smooth user experience

Manage

Efficiently oversee your projects with ease, monitoring **multiple structures** through a single account. Configure **multi-level severity alarms** for proactive risk management, ensuring timely responses to potential issues and improving the safety of your structures.

Explore

Delve into **historical data**, accessing comprehensive **trends** and detailed **acquisition lists**. Uncover hidden patterns and anomalies for a complete understanding of your structure behavior, aiding in predictive maintenance and strategic planning.

Analyze

Interpret complex data with a**dvanced analytics**, **comparing graphs** and generating **customized reports**. Transform them into actionable insights, for informed decision-making and improved longevity and safety of your infrastructure.

Be in control of your structural monitoring, anywhere you are.

Discover all the features available on **MyMove IoT Platform** ›

Smart Structural Health Monitoring
A comprehensive solution

Our Smart Structural Health Monitoring (SHM) system offers a complete solution that helps detect potential issues before they become critical, ensuring the safety and longevity of structures.

Wireless system

Avoid expensive and complex installations thanks to battery-powered, LoRaWAN-based and long-lasting devices.

Remote monitoring

View all sensor-collected data on our MyMove IoT Platform, accessible from any computer at any time.

Threshold setting

Configure sensors according to your needs to receive automated alerts of threshold breaches.

Static SHM

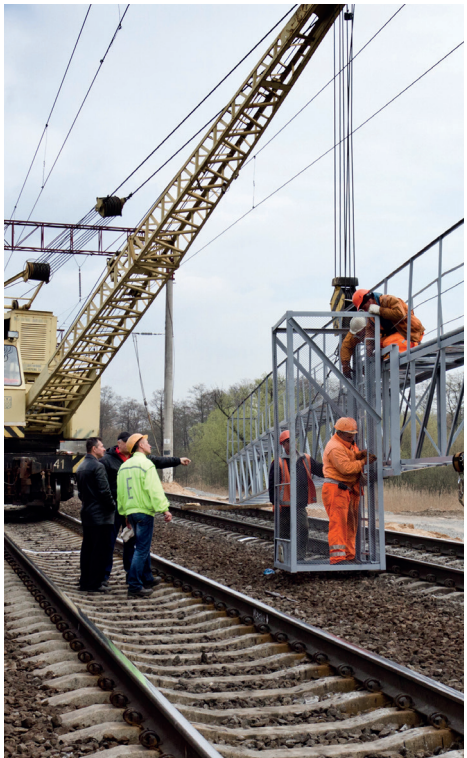
Static structural health monitoring measures slow-varying parameters over a long period of time, such as inclination, rotation, static displacement, and crack monitoring. This type of analysis is appropriate for structures that are subject to gradual load changes.

Dynamic SHM

Dynamic structural health monitoring is used to handle dynamic loading, such as frequencies, dynamic displacement, modal forms, vibrations and accelerations. This type of analysis is suitable for structures subject to fast impacts involving frequencies and vibrations.

Geotechnical & environmental

Geotechnical monitoring focuses on ground movement, settlement, slope stability, subsidence and any changes that affect the structure stability. Environmental monitoring looks at factors like air quality, water level, soil contamination, wind speed and anything that accelarates structure degradation.



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✔ Enhance safety ✔ Increase productivity ✔ Improve quality

move
SOLUTIONS

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