# ARGOS®

## DATA FOR MAINTENANCE AND CHECKPOINTS

# Wayside train measurement plus monitoring

# ARGOS® from HBK: Precise and Reliable Measurement Data for the Rail Industry

**WITH ARGOS® SYSTEMS YOU BENEFIT FROM THE ADVANTAGES OF EXPERT MEASUREMENT TECHNOLOGY FROM HBK – ONE OF THE WORLD'S LEADING SUPPLIERS OF PRECISE AND RELIABLE SENSORS.**

### Free choice of technologies.

HBK knows current sensor technologies and therefore always selects the appropriate technology for your application, regardless of whether it is strain gauge, fiber optic, or piezo technology.

### Precision pays for itself.

The more accurate the measurement data in WTMS systems, is the more safely and precisely you can implement changes to your existing rail system. Only valid measurement data allow the development of further business models and strategies for preventive maintenance and cost reduction measures.

### A safe future.

The modular design of Argos® is its strength. Argos® is continuously developed to adapt to changing application requirements. Argos® can be extended from the cost-effective and simple wayside train monitoring system (WTMS) to the precise and efficient wayside train monitoring and measurement system (WTM+M system) at any time.

### Interfaces are our language.

Integration with main control centers and third-party systems via standardized or customer-specific interfaces is simple. Modern vehicle management concepts are supported via a complete RFID integration.

### Automatic ROI.

Studies have shown a proven high return on investment (ROI) for WTM+M systems. Short-term results can be achieved by preventing derailments, while in the medium and long term, the track systems and vehicles can be protected (supporting preventive maintenance based on the actual condition).

## HBK OFFERS A CHOICE OF SENSOR TECHNOLOGIES. YOUR ADVANTAGE: YOUR REQUIREMENTS DETERMINE WHICH TECHNOLOGY IS USED. AND NOT THE OTHER WAY AROUND …

### STRAIN GAUGES

**Tried and tested**

The tried and tested standard technology: compact, cost-effective and robust. Implemented millions of times and quick to install, the strain gauges benefit from HBK's in-house development and production capacities.
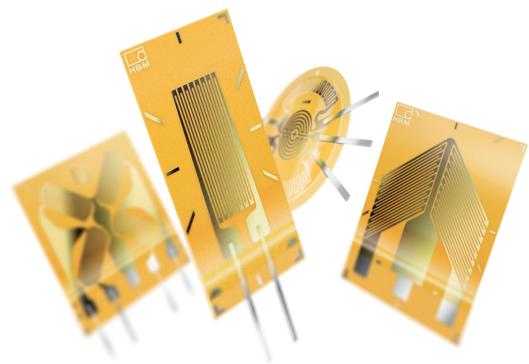
### FIBER OPTICS

**The long-distance system**

Optical fiber Bragg grating technologies demonstrate their strengths when it comes to long distances, exposure to extreme EMC influences, or measurements at high-voltage levels. There is no signal loss and it is not affected by electromagnetic interferences over long distances. You benefit from HBK's own development and production center for optical sensors and electronics. The technology and knowledge on how to achieve accurate results is maintained in-house.
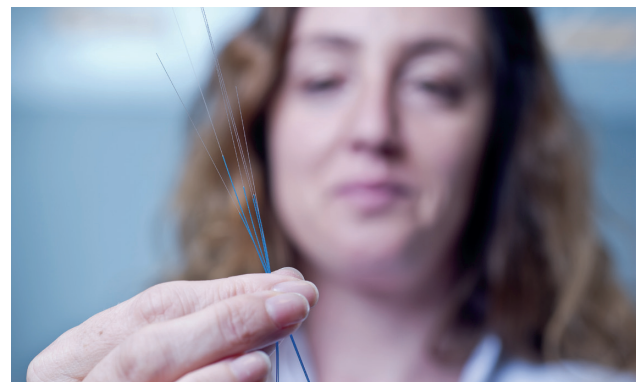
### PIEZO

**The dynamic solution**

Piezo sensors can help when dynamic forces occur. For a long time, HBK has showcased its skills in the piezo technology sector with its „PACEline" brand.
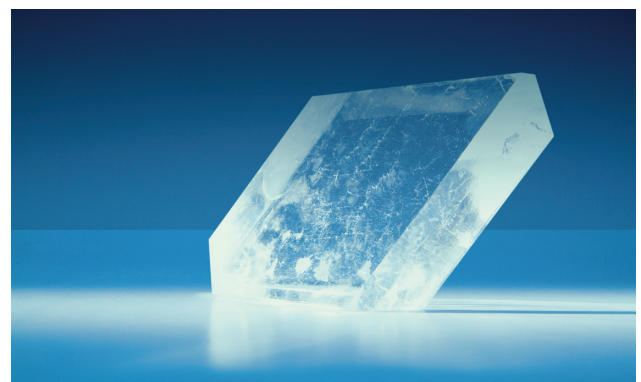
# Unlock precision and safety with ARGOS® measurement data

## WAYSIDE TRAIN MONITORING PROVIDES ADDED VALUE

A variety of WTMS systems are available. However, ARGOS® can offer more: We do not only assess vertical static and dynamic forces as well as horizontal and longitudinal forces but we also evaluate operational behavior and highly accurate wheel shapes. And, not least: there is the precision and safety of our measurement data. This is why we also call ARGOS® a wayside train monitoring and measurement system.

Our WTM+M system offers infrastructure operators and rail companies (WTM+M system) the maximum level of safety and efficiency during operation. Thanks to the precision of our technology, we provide reliable data that enables the operator to monitor and set limit values with a high degree of reliability.

- Experienced engineers
- Maximum safety and efficiency
- Fully-installed systems
- Available worldwide
- Proven return on investment
- Easy to get started - simple to upgrade
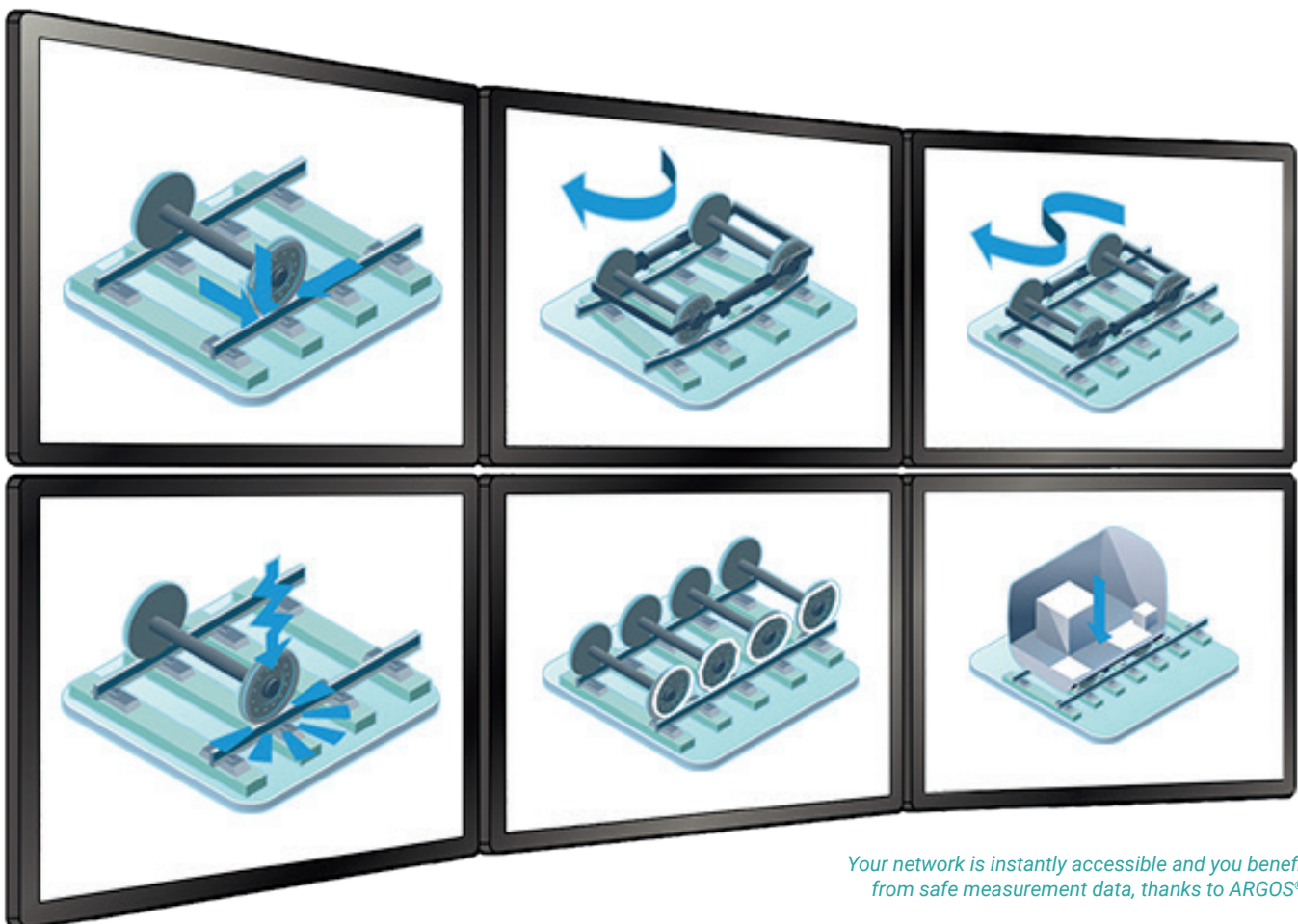
*Your network is instantly accessible and you benefit from safe measurement data, thanks to ARGOS®.*

# ARGOS® **provides information on various issues**

## WTM+ – Wayside Train Measurement Systems

- **WILD**  Detection of highly dynamic wheel forces

- **WIM**  Highly accurate measurement of the loading state

- **OOR**  Exact measurement of wheel shape irregularities - online data for maintenance

- **RBM**  Tangent track: monitoring of the sine run – instability detection (hunting oscillation).

- **RBM**  Curve Derailment safety; Y/Q in bends

- **Long**  Monitoring of longitudinal forces (braking and driving forces) during operation

## WTM – Wayside Train Monitoring Systems

- **Instant**  WTMS to measure the loading state and dynamic wheel forces

- **Instant RBM**  Monitoring of horizontal forces

- **Instant OL**  Mobile recording of load spectrums on the infrastructure

## WILD – Wheel Impact Load Detection

## WIM – Weighing In Motion

## OOR – Out Of Roundness

## RBM – Running Behaviour Measurement

## OL – Overall Load

### A FULLY INSTALLED SYSTEM - AVAILABLE AROUND THE WORLD

ARGOS® provides you with a fully installed system: this means that ARGOS® sensors and measurement instruments are installed and put into operation by HBK or our partner. The corresponding software then provides immediate access to the measurement data at any time. A connection to main control centers is easy to establish via interfaces.

# Preserve your rail infrastructure

**IMMEDIATE INSIGHTS INTO RAIL NETWORK LOAD, VEHICLES CONDITIONS AND OPERATIONAL STATE , AS WELL AS DERAILMENT PREVENTION WITH ARGOS®.**

- Preventive measures to avoid derailments

- Reduction of risks caused by non-compliant vehicles

- Optimization of track maintenance

- Reduction of the legal and financial risks

- Sound measurement data provides an actual basis and not just estimates

**WIM Module**

*A dynamic scale which controls the load distribution on vehicles with the highest accuracy*



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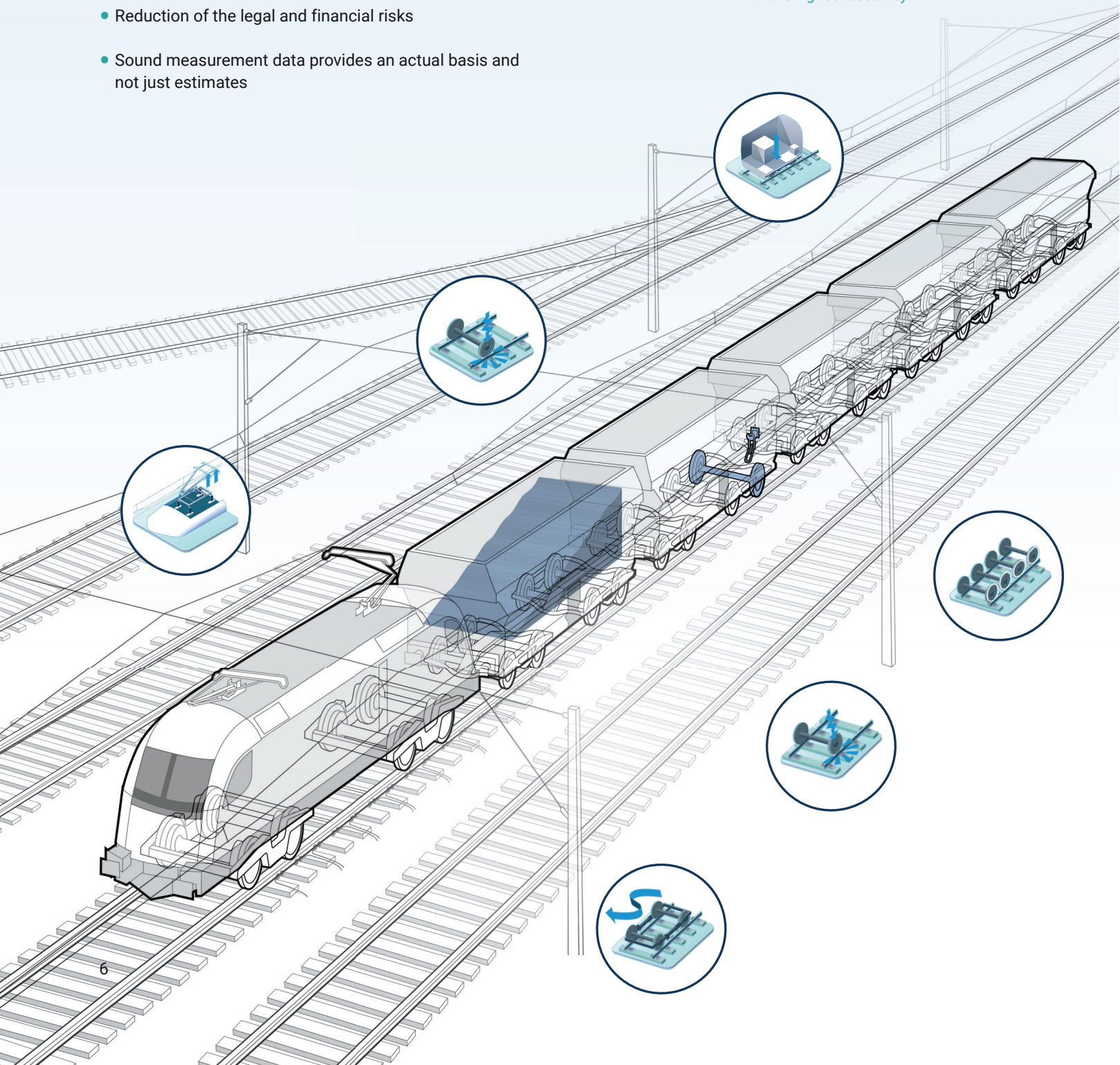
## VALID OVERVIEW OF THE LOAD ON THE TRACK

- Reliable live data about the load on the track - real-time information management and statistics

- Determination of dynamic forces and quasi-static loading - vertical and lateral

- Prompt detection of changes to the use of the infra-structure

- Reliable and real-time warnings sent to infrastructure users (incorrect loading, charge transfers, lack of maintenance)

- Maintenance planning and component optimization thanks to measured fatigue loads
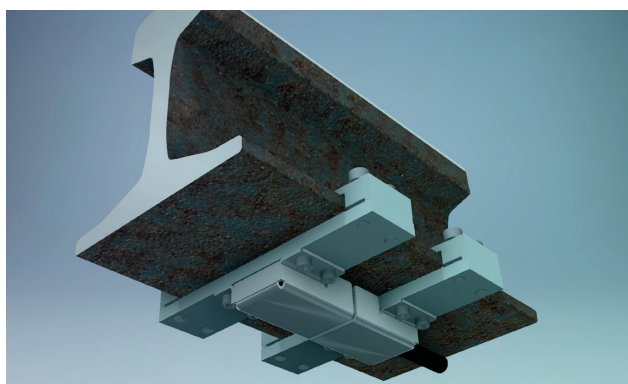
## DERAILMENT PREVENTION

- Early detection of warning signs and prevention of derailments:
  - Early detection of incorrectly loaded vehicles by determining the loading state
  - Instabilities (hunting oscillation) on tangent tracks (e.g. light vehicles can be affected by hunting if the conicity of the wheels is not correct).
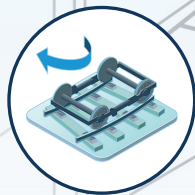  - Monitoring the derailment factors on bends, not exceeding the Y/Q value







*Clamping device*



*Measurement rail*

# Data-driven maintenance solutions for vehicle operators

ARGOS® SYSTEMS PROVIDE ACCURATE DATA TO OPTIMIZE YOUR MAINTENANCE STRATEGIES, ENSURING EFFICIENT, COST-EFFECTIVE OPERATIONS AND LONGEVITY OF YOUR FLEET.
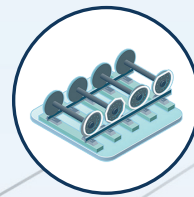
**OOR Module**

*Detects deviations from the ideal roundness of a wheel (flat positions, polygonizations, duality, eccentricity) with high precision – accuracy 0.05mm*

**RBM Curve Module:**

*Continuous tracking of horizontal and vertical forces enables the measurement of curve running behavior, track displacement forces, and staggering properties.*
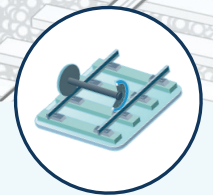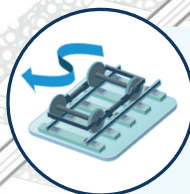
**Profile Module**
*Cross-wheel profile measurement with an accuracy of 0.1mm*

**RBM Straight Module**

*Measurement of the horizontal forces for detecting unstable running behavior of vehicles*

## SUPPORTS MODERN AND COST-EFFICENT PREDICTIVE MAINTENANCE CONCEPTS

- Detecting of maintenance delays based on the running behavior

- Precise measurements of defects of the wheel shape. The detection of defects can be traced to schedule maintenance in the best time slots available.

- Condition-based maintenance combined with time-based maintenance. Virtually no need for expensive repairs of defects.

- Full quality control and complete maintenance over the vehicle's entire service life

- Assessment of suppliers and components (e.g. regarding deterioration of mounted wheels on an axle)

## COMPLETE INFORMATION ON VEHICLE

- Reduction of maintenance and downtimes due to increased dynamic loads and wheel shape damages (damages of storage, fatigue strength of mounted wheels on an axle, and vehicle structure)

- Optimized use of assets

- Conformity assessment of vehicles always available

- Increased safety and reliability in operation. Reduces commercial and safety risks
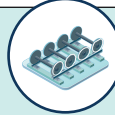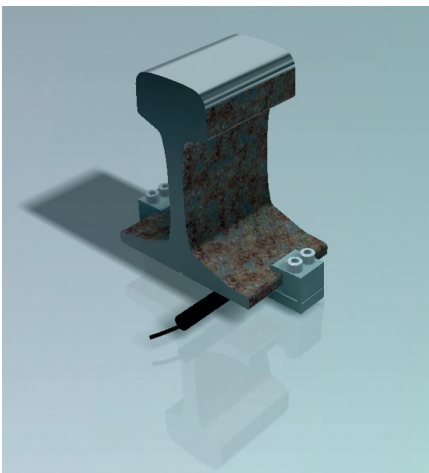










*Out of roundness*
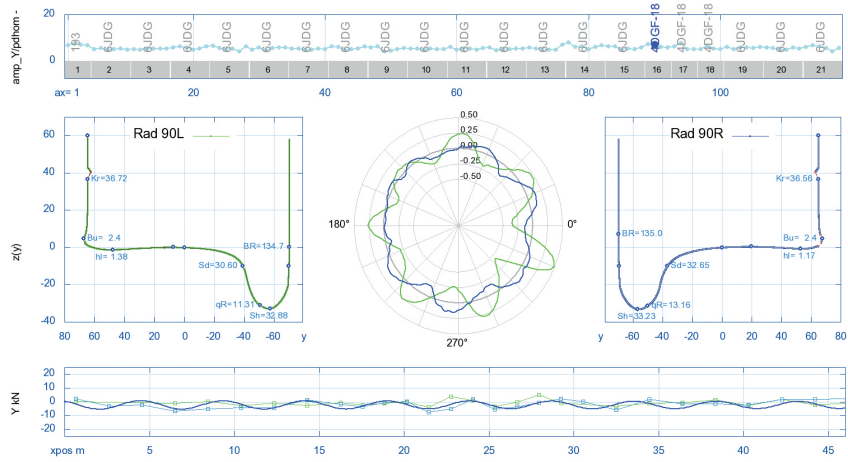
*Running behaviour*

*RBM straight*

# Tailor your maintenance or monitoring system

ARGOS® IS A MODULAR SYSTEM. DEPENDING ON YOUR APPLICATION, YOU CAN COMBINE ONE OR SEVERAL MODULES WITH ONE ANOTHER. EXISTING SYSTEMS ARE SIMPLE TO EQUIP.

| | | WIM<br>Vehicle weight, axle loads, wheel forces & loading state | WILD<br>Dynamic wheel forces | OOR<br>Wheel shape irregularities |
|---|---|---|---|---|
| **Functionality** | | | | |
| **Measurement** | **WTM⁺** | **ARGOS® WIM** | **ARGOS® WIM/WILD** | **ARGOS® OOR** |
| | **WTM⁺ Performance** | Train weight: 1 % to 100 km/h 2 % to 200 km/h<br><br>Vehicle weight: 1.5 % to 100 km/h 2 % to 200 km/h | **Dynamic force: 3%** | Exact qualification and classification of wheel shape irregularities:<br>• Resolution better than 0.01 mm, measurement repeatability 0.05 mm as trend function, 0.1 mm as individual measurement<br>• Flat point 30 mm or greater<br>• Polygonization order, 2nd to 32nd |
| | **WTM⁺ Installation** | Measurement Rail | Measurement Rail | Clamping Device |
| **Monitoring** | **WTM** | **ARGOS® Instant** | **ARGOS® Instant** | |
| | **WTM Performance** | Train weight: • Instant HP <3% • Instant 3% • Instant OL 8%<br>Vehicle weight: • Instant HP <3% • Instant 5% • Instant OL 8% | • Detection of wheel shape irregularities via dynamic force<br>• Classification of the dynamic<br>• Maximum force for warning and alarm<br>• Dynamic force: 5% | |
| | **WTM Installation** | Clamping Device | Clamping Device | |

**Ambient conditions**

*IP67, -30 °C to +75 °C*
*The system is protected against fine dust, ice and snow, impacts from rocks (track ballast), chemical products (sulfur, oil, phosphate) from the vehicles, and rail-specific electromagnetic effects.*

**Operational conditions of use**

*Operating conditions for practically all vehicles used in the network*
*Axle loads: 800 kg to 40 t;*
*Wheel diameter: 300 to 2,000 mm*

## MAKE YOUR CHOICE FOR YOUR MAINTENANCE AND/OR MONITORING SYSTEM.

| RBM Straight Horizontal forces, unstable vehicle run | RBM Curve Horizontal forces, curve | LONG Longitudinal forces, braking and driving forces |
|---|---|---|
| **ARGOS® RBM Straight** | **ARGOS® RBM Curve** | **ARGOS® LONG** |
| Train weight: 1 % to 100 km/h 2 % to 200 km/h Vehicle weight: 1.5 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad | Train weight: 1 % to 100 km/h 2 % to 200 km/h Vehicle weight: 1.5 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad | **Longitudinal forces: 3%** |
| Measurement Rail | Measurement Rail | Measurement Rail |
| **ARGOS® Instant RBM** | **ARGOS® Instant RBM** | |
| Train weight: 3 % Vehicle weight: 3 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad | Train weight: 3 % Vehicle weight: 3 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad | |
| Clamping Device | Clamping Device | |

**Interfaces**

*TCP/IP, FTPS, XML, CSV, ARAMIS, UIC broker:*
*2807, 2101, 2201, 2295, 2296, RFID, SCADA, integration of train information systems (uni- and bi-directional)*
*Professional data management for processing, statistical analysis, and reporting*

# Delivering precision for progress: Our cutting-edge sensing technology and insights drive solutions for a safe, more efficient, and sustainable rail system.

## Precision with advanced sensing technology

### RAIL ENGINEERING PIONEERS

Our rail engineering team excels in delivering precision for progress. Utilizing cutting-edge sensing technology and insights, we drive solutions that enhance safety, efficiency, and sustainability in rail systems, paving the way for a better transportation future.

AUSTRIA