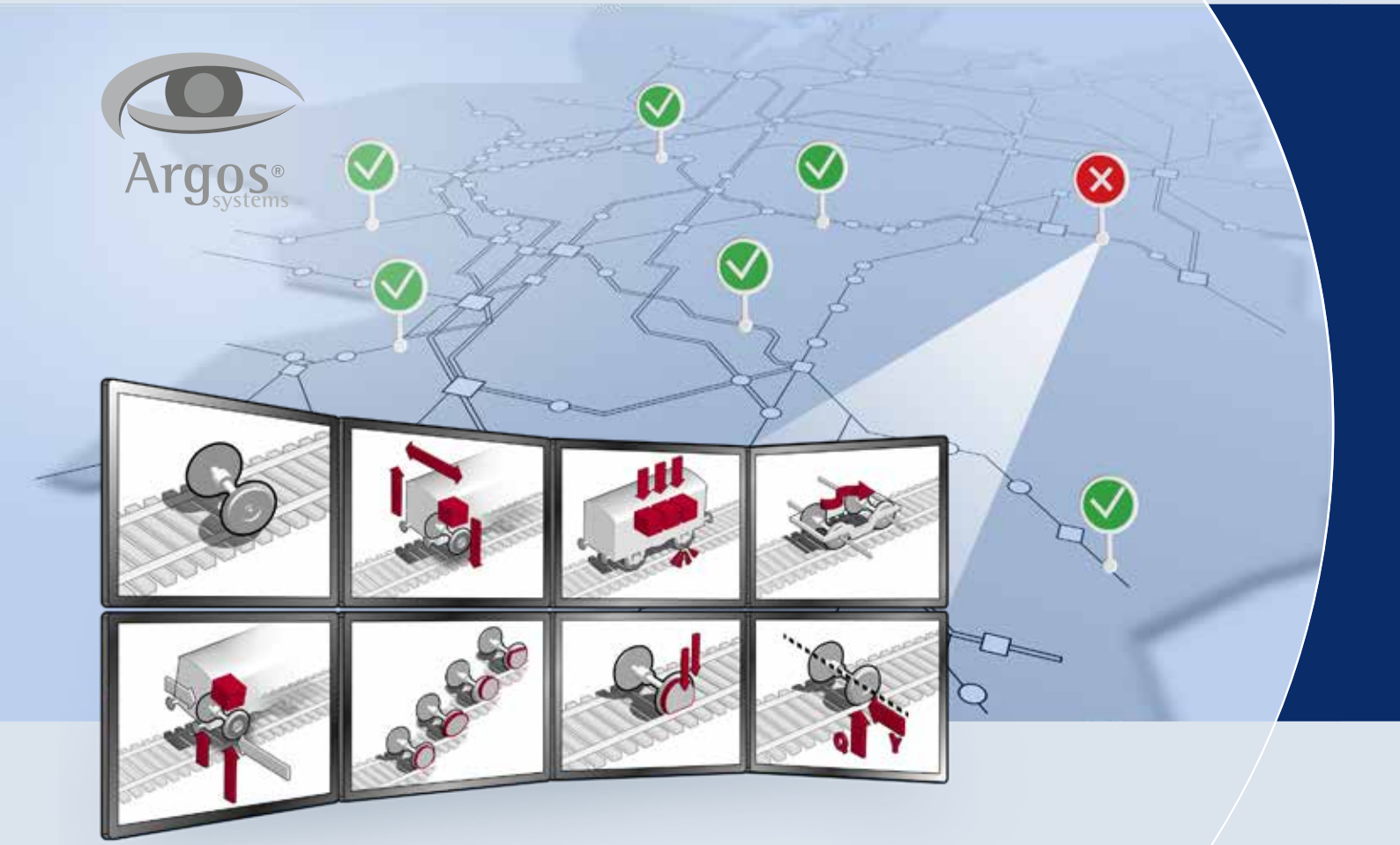
Wayside Train Monitoring+Measurement

With the Bonus of Precision Measurement Technology



HBM

Argos® from HBM: Precise and Reliable Measurement Data for the Rail Industry

With Argos® Systems you benefit from the advantages of expert measurement technology from HBM – one of the world's leading suppliers of precise and reliable sensors.

Free choice of technologies.

- HBM 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.

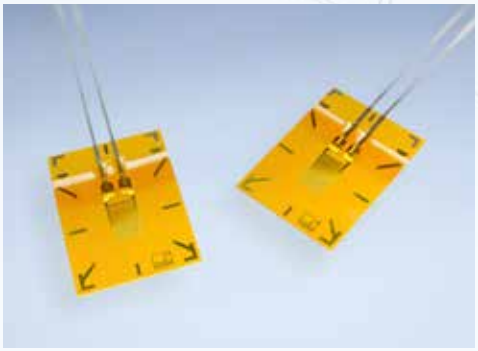
- Studies have shown a proven high return on investment (ROI) for WTM^{+M} systems. Short-term results can be achieved by preventing derailments, while in the medium and long term, the track systems and vehicles can be protected (supporting preventive maintenance based on the actual condition).

HBM 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 HBM's in-house development and production capacities.

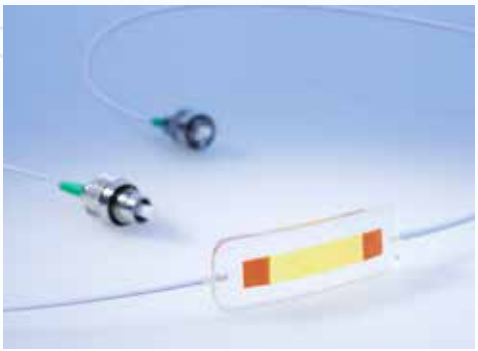


HBM Strain Gauges

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 HBM'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.



HBM Fiber Optic Sensors

PIEZO

The dynamic solution

- Piezo sensors can help when dynamic forces occur. For a long time, HBM has showcased its skills in the piezo technology sector with its „PACEline" brand.

HBM Piezo Sensors

The Advantage of Safe Measurement Data

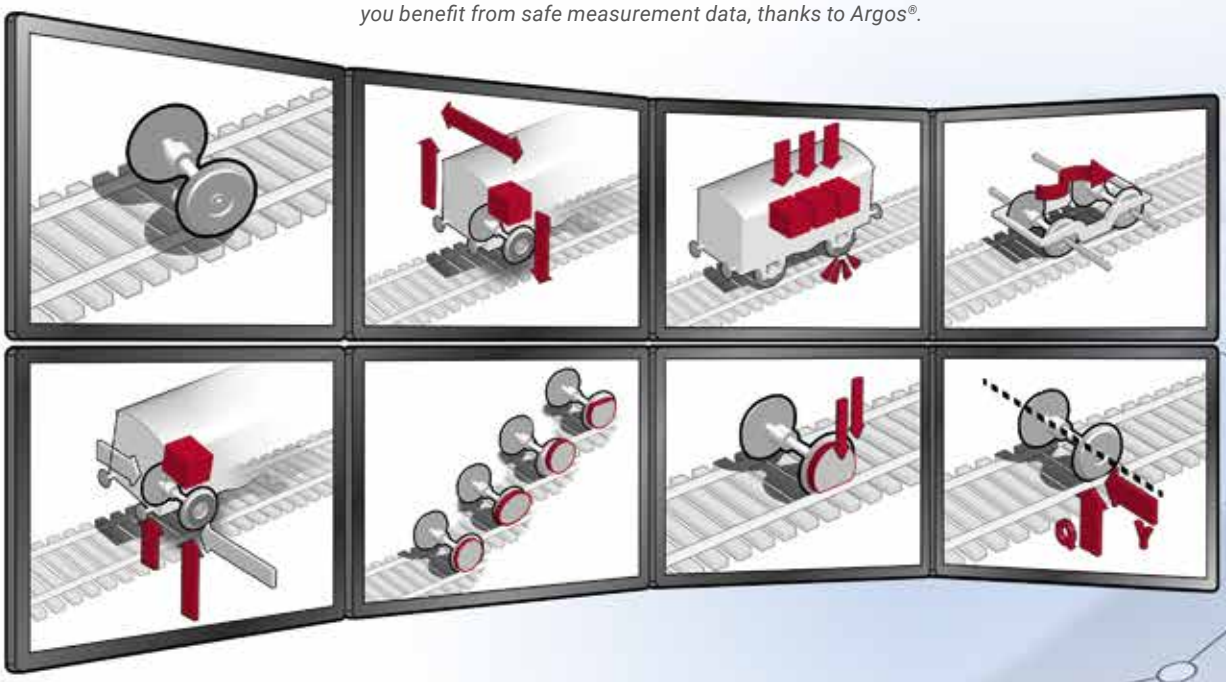
Wayside Train Monitoring Provides Added Value

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^{+M} 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 Straight — Straight line: 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 systems

- Instant — Simple 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
- DERAIL — Derailment detection
- DED — Dragging equipment detector (hanging couplings)

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 HBM 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.

Argos® - Fast installation, reliable in use

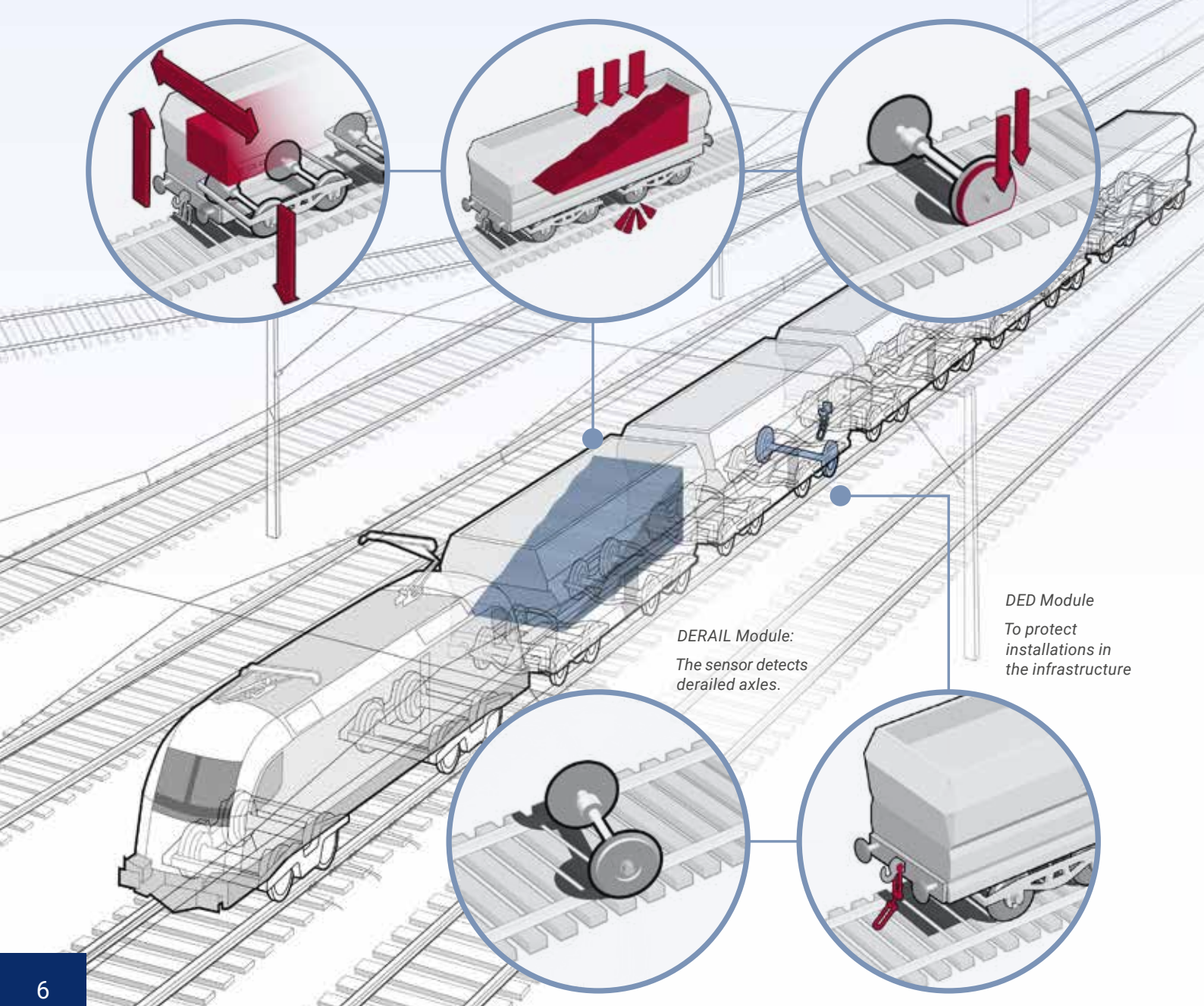
Optimized for Infrastructure Applications

Argos® provides an immediate overview of the reliable data regarding the actual load on your rail network.

- 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



DERAIL Module:

The sensor detects derailed axles.

DED Module

To protect installations in the infrastructure

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 infrastructure
- 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 straight lines (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

Derailment and impact detection

- Immediate detection of derailments and hanging parts (e.g. couplings)

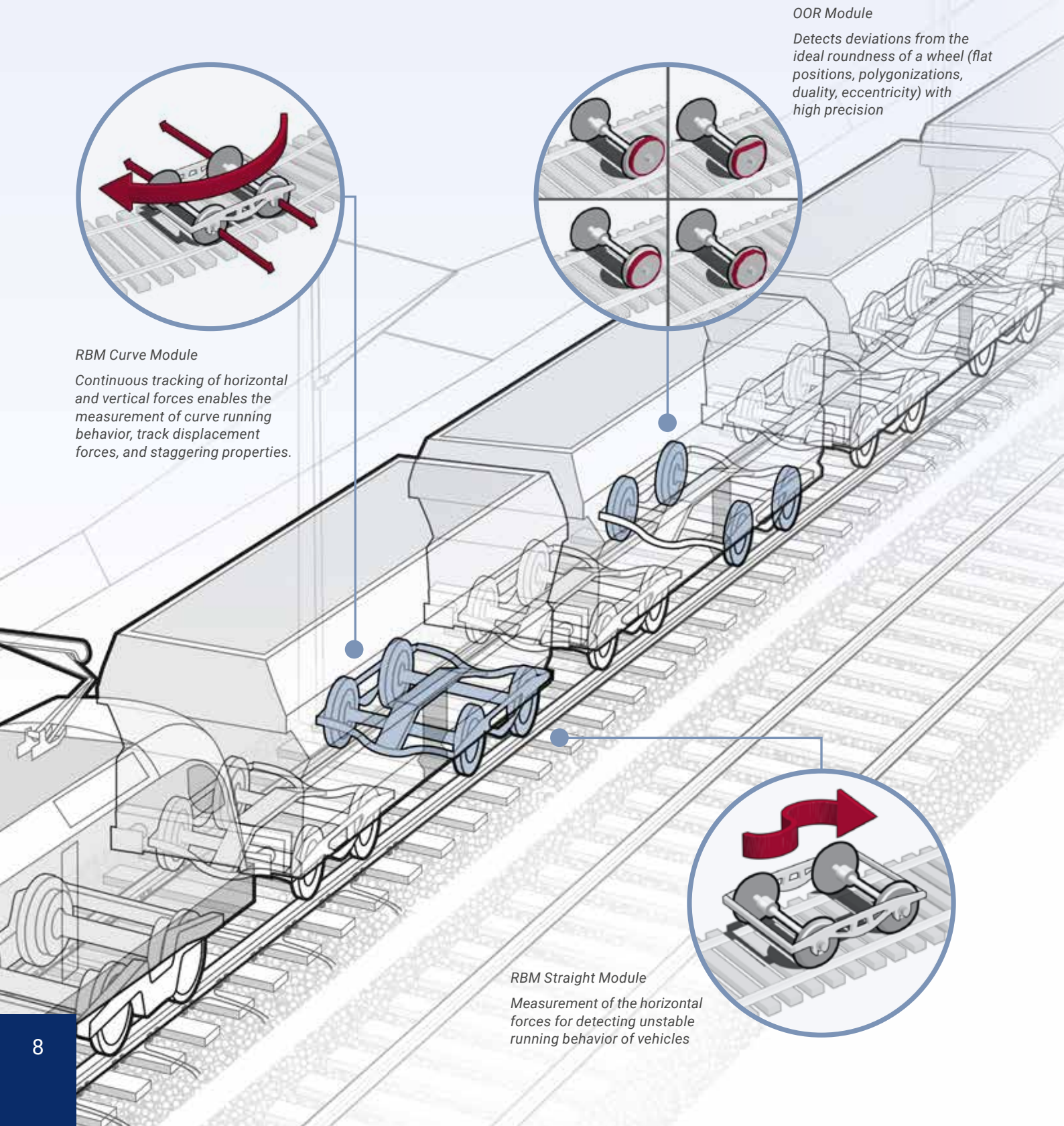
DERAIL

Instant

WIM

Solutions for Vehicle Operators

Argos® Systems provides you with pioneering solutions for the modern and efficient operation of vehicles. Here, you can also take advantage of reliable and accurate measurement data.



OOR Module

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

RBM Curve Module

Continuous tracking of horizontal and vertical forces enables the measurement of curve running behavior, track displacement forces, and staggering properties.

RBM Straight Module

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

Complete information on vehicle and load data

- Increased safety and reliability in operation. Reduces commercial and safety risks
- Fully automated control of loading
- Monitoring of overload and load displacement
- 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)
- Immediate preventive detection of vehicles with a risk of derailment
- Optimized use of assets
- Conformity assessment of vehicles always available

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)

OOR

RBM Curve

RBM Straight

The modules at a glance

Functionality		**WIM** **Vehicle weight,axle loads, wheel forces and loading state**	**WILD** **Dynamic wheel forces**	**OOR** **Wheel shape irregularities**
High performance systems	WTM+M	Argos® WIM Argos® RBM Straight Argos® RBM Curve*	Argos® WIM Argos® RBM Straight Argos® RBM Curve	Argos® OOR Argos® WIM Argos® RBM Straight
	WTM+M Performance	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	Dynamic force: 3%	Exact qualification and classification of wheel shape irregularities: · Resolution better than 0.01 mm, measurement repeatability 0.05 mm as trend function, 0.1 mm as individual measurement · Flat point 30 mm or greater · Polygonization order, 2nd to 32nd
	WTM+M Installation	Measurement rail	Measurement rail	Clamping device
Standard performance systems	WTM	Argos® Instant Argos® Instant RBM Argos® Instant OL	Argos® Instant Argos® Instant RBM	Argos® Instant Argos® Instant RBM
	WTM Performance	Train weight: · Instant HP <3% · Instant 3% · Instant OL 8% Vehicle weight: · Instant HP 3% · Instant 5% · Instant OL 8%	· Detection of wheel shape irregularities via dynamic force · Classification of the dynamic · Maximum force for warning and alarm · Dynamic force: 5%	
	WTM Installation	Clamping device	Clamping device	Clamping device
	can be combined with			Argos® WIM Argos® RBM Straight Argos® Instant Argos® Instant RBM

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

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. The measurement technology is also quick to install on the track.

RBM Straight **Horizontal forces, unstable vehicle run**	**RBM Curve** **Horizontal forces, curve**	**LONG** **Longitudinal forces, braking and driving forces**	**DERAIL, DED** **Derailment detection, hanging couplings**
Argos® RBM Straight	Argos® RBM Curve	Argos® LONG Argos® WIM Argos® RBM Straight	
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		Argos® DERAIL Argos® DED
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		· Self-monitoring system · Reliably protected against false activation (including vandalism and sabotage)
Clamping device	Clamping device		Mounted on the tie
		Argos® WIM Argos® RBM Straight	

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

www.hbm.com

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