Wayside Train Monitoring

Structural health monitoring of railway vehicles
Safety in operation. Today and in the future.

Argos® is a Wayside Train Monitoring System that gives you answers to questions about the future while adapting optimally to your requirements. The ever growing load of railway networks with increasingly dense train cycles has a major effect on reliable and efficient management of the infrastructure. With precise sensor systems and data acquisition from HBM, number one worldwide in measurement technology, you will achieve maximum measurement accuracy in rail/wheel contact measurements.

**Infrastructure managers benefit:**
- Continuous full transparency of the dynamic and static load in the rail network
- Reliable and efficient infrastructure management
- Modular structure – an easy and cost-effective way to get started with expandable modules
- No changes to the rail: The sensors are simply clamped or glued on

**Rolling stock companies benefit:**
- Boosts the cost efficiency of vehicle usage by detecting damage early
- More safety and reliability in operation
- Information about loading status

An easy way for you to get started: Instant module

Argos® Instant is your easy and cost-efficient introduction to professional infrastructure-based train monitoring, to detect overloads, load shifting and dynamic force overshoots and for continuous verification of rolling stock. As a modular system, Argos® can easily be extended with additional modules, simply by clamping additional sensors to the rail.

Monitoring loading: WIM module

Argos® Systems WIM (Weigh-in-Motion) can be used to acquire the load status of vehicles at normal line speed with the greatest possible accuracy:
- Measuring overloads and shifting loads
- Detecting dynamic wheel force

Impact detection for track safety: DERAIL module

With the Argos® Systems modules for impact detection DERAIL and DED (Derailment-Detector and Dragging-Equipment-Detector) you can make an active contribution to detecting derailments and protecting trackside equipment (balises):
- Derailed wheel
- Hanging couplings
Instant module:
Cost-effective acquisition of dynamic forces to determine train and vehicle weights and wheel flats

WIM module:
Dynamic weigher that measures the loading status of vehicles with very high accuracy

DERAIL module:
The derailment detector identifies derailed axles

DED module:
To protect installations in the infrastructure

A system for more safety
Argos® grows with your requirements!

In addition to the modules for monitoring loading and wheel shapes, we also offer you other modules for monitoring wheel running behavior (ratio of horizontal to vertical forces) as preventive protection against derailment, and derailment sensors for limiting damage. A wide range of commonly used interfaces to train information systems is available for data exchange, together with a series of standard data formats. For central data processing of data for all measuring points, we offer you a coordinated software solution with extensive railway-specific statistics elements.

Protection against derailment by monitoring the running behavior: RBM module

The Argos® Systems RBM module (Running Behavior Measurement) continuously measures horizontal and vertical forces to monitor the risk of vehicles derailing, both on straight tracks and on curves. An additional requirement on curves is to avoid unnecessarily high driving forces in order to reduce wear and stress on the superstructure:

- Measures instability, track displacement forces and swaying characteristics
- Continuous acquisition of dynamic wheel force (horizontal and vertical)

Irregularities in wheel shape: OOR module

The Argos® Systems OOR module (Out-of-Roundness) measures deviation from an ideally round wheel:

- Deviations with a delta R better than 0.01 mm resolution
- Detection of wheel flats, polygonization, ovality and eccentricity

Easy, central data manipulation: MAS module

The Argos® Systems MAS module (data management, analysis and statistics) for data manipulation allows you to collect local Argos® measuring points centrally and together with complete data:

- Prompt data processing
- Complex analysis and statistical evaluations
- Extensive report generation
RBM module:
Horizontal and vertical forces are continuously measured to monitor for instability, track displacement forces and swaying characteristics.

MAS module:
Collect and manage data easily and reliably and use it for statistical analysis.

OOD module:
Measures the deviation from an ideally round wheel with high accuracy (wheel flats, polygonization, ovality and eccentricity).
Argos® systems: overview of modules

Use reliable information to operate and monitor your railway networks: with Argos® systems. Easy to get started, can be expanded without difficulty. Here you see an overview of the SIL 0 certified modules:

<table>
<thead>
<tr>
<th>Argos® modules</th>
<th>Functions</th>
<th>Measurement accuracy</th>
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</table>
| Instant        | Loading and wheel shapes | Train weight: 3 %  
Vehicle weight: 5 % |
| Instant HP     | Precise measurements of loading and wheel shapes | Train weight: 3 %  
Vehicle weight: 3 % |
| WIM            | Dynamic weigher – high-precision weight measurements during operation | 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 |
| OOR            | Measures the deviation of the round wheel (40 to 300 km/h) | Exact qualification and classification of wheel shape irregularities  
- R resolution better than 0.01 mm,  
resolution 0.05 mm as trend function,  
0.1 mm as individual measurement  
- Wheel flats 30 mm or greater  
- Polygonization, 2nd to 32nd order |
| RBM / straight | Analysis of running behavior on straight tracks | 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 |
| RBM / curve    | High-precision analysis of running behavior on curves | Horizontal forces: 3 % to 100 km/h  
5 % to 200 km/h  
Striking angle: +/-20 mrad |
| DERAIL and DED | Derailment and impact detection | System self-monitoring  
Reliably protected against false activation (including vandalism and sabotage) |
<p>| MAS            | Professional data management for processing, statistical analysis and reporting | |</p>
<table>
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<tr>
<th>Degree of protection</th>
<th>Vehicle detection</th>
<th>Travel speed</th>
<th>Axle loads</th>
<th>Wheel diameter</th>
<th>Ambient conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP67</td>
<td>Practically all vehicles traveling in the network</td>
<td>5 to 300 km/h</td>
<td>800 kg to 40 t</td>
<td>300 to 2,000 mm</td>
<td>-30 °C to +75 °C</td>
</tr>
</tbody>
</table>

The system is protected against:
- Fine dust
- Ice and snow
- Stone chipping (by track ballast)
- Chemical products (sulfur, oil, phosphate) that fall from vehicles
- Rail-specific electromagnetic effects
measure and predict with confidence