



# WORM

## WHEEL OUT OF ROUNDNESS MEASUREMENT

### DESCRIPTION

The WORM system (Wheel Out of Roundness Measurement) is specifically developed for the detection of flats and out of roundness of wheels on heavy rail and light rail vehicles.

The system was developed under the SAFERAIL project, which was funded by the European Commission and is now commercially available for worldwide application.

Using on-line vibration measurement technology, the WORM system provides a reliable, fast and affordable technology for the detection of wheel flats, out-of-roundness and polygonisation.



### TECHNOLOGY

#### Control Box

An industrial enclosure or street cabinet contains the data acquisition module and an industrial computing unit. The box is installed in the vicinity of the track up to a distance of 150 m. The control box is of a water and wind proof construction. All cabling runs directly from the vibration sensors to this box. The control box is hooked up to the power grid and connected to the internet (data). Optionally, a wireless data connection can be configured.



#### Vehicle identification

Vehicle identification is based on readings from existing vehicle identification loops or RFID tags.

The measurements are linked with the vehicle identification so that they are assigned to a specific wheel.

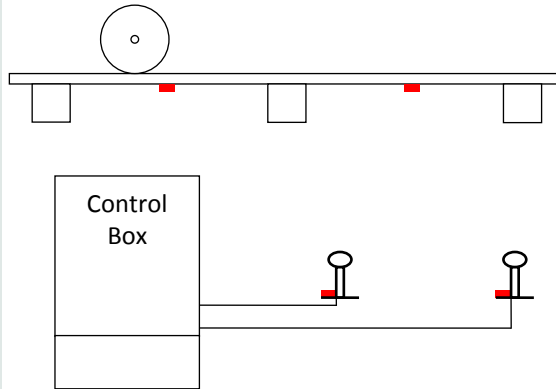


#### Sensor Installation

The sensors are glued to the rail and to the sleeper by means of a two-component epoxy that provides exceptionally high adhesion.



## Data acquisition

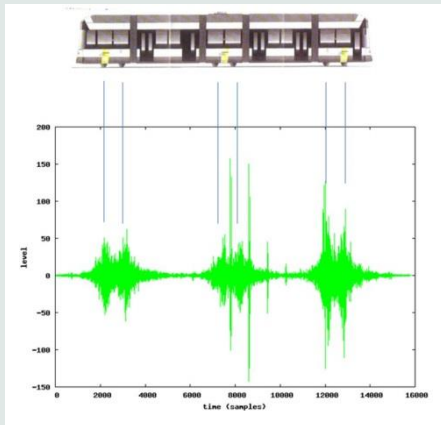


The system uses four sensitive vibration sensors:

- two on the foot of the left rail.
- two on the foot of the right rail.

## Data Processing

Time domain and frequency domain analysis is performed for each vehicle passage. The example shows the time plot of a vehicle with three bogies and six axles. The plot shows a large wheel flat on the fourth axle.



## SOFTWARE

The standard software allows the viewing of the measurement date and time, the vehicle identity and speed and the wheel flats or the out-of roundness.

The data can be viewed with a browser through a standard internet connection (password-protected website).

Email or text message alerts can be configured and sent automatically to the maintenance crew/responsible.

The information can be transmitted to a remote location for integration into a maintenance vehicle database.

An automated back-up is stored on the i-moss servers.

The screenshot shows the WORM APT software interface. The title bar reads 'WORM APT Track Products and Measurement Devices'. Below the title bar, there are several tabs and filters. The main area displays a table of measurement data with columns for System, Date, Time, Vehicle, Defect, and Weight. The table contains several rows of data, including details for vehicle 7228 and 7203.

System	Date	Time	Vehicle	Defect	Weight	
A114-1	2013-05-08	07:24	7228	Helmholz	Flat 115	6942
A114-0	2013-05-08	05:28	7203	Helmholz	Flat 95	7596
A114-1	2013-05-08	02:07	7205	Helmholz	Flat 94	8012
A114-0	2013-05-08	04:12	7204	Helmholz	Flat 284	7264
A114-0	2013-05-08	02:50	7207	Helmholz	Flat 164	7784
A114-0	2013-05-07	21:23	7241	Helmholz	Flat 215	7721
A114-0	2013-05-07	16:28	7004	PCC	Flat 199	5051