

# APT- WORM WHEEL OUT OF ROUNDNESS MEASUREMENT

## DESCRIPTION



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

### Contact

#### APT

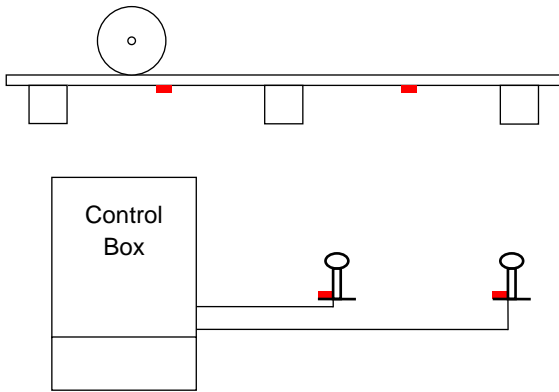
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### Data acquisition

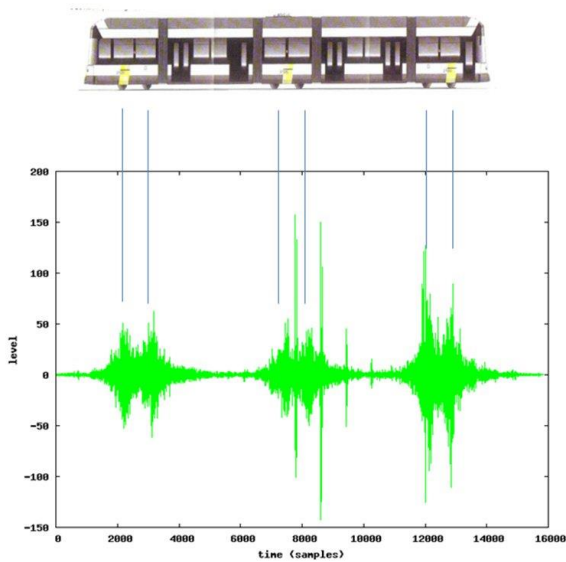


The system uses four sensitive vibration sensors:

- 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 passage, 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 APT servers.

The screenshot shows the WORM APT software interface. The top part displays a table of measurement data. The bottom part shows a detailed view of a specific measurement, including a graph of the acceleration signal and a list of detected defects.

System	Date	Time	Vehicle	Defect	Weight
A114-1	2013-05-08	07:24	7228 Hermelijn	Flat 115	8942
A114-0	2013-05-08	05:28	7203 Hermelijn	Flat 96	7596
A114-1	2013-05-08	05:07	7258 Hermelijn	Flat 94	8012
A114-0	2013-05-08	04:12	7204 Hermelijn	Flat 284	7264
A114-0	2013-05-08	02:50	7207 Hermelijn	Flat 164	7784
A114-0	2013-05-07	21:23	7241 Hermelijn	Flat 215	7721
A114-0	2013-05-07	16:28	7004 PCC	Flat 199	5051

Detailed view of a measurement (A114-1):

- Speed: 13.8m/s
- Duration: 3.6s
- Location: GPS
- Defect: R-3 115
- Peak accel: 219m/s<sup>2</sup>
- Axes: 6
- L1, R1, L2, R2