

Hot-Wheel
Optical Measurement System For Railway Wheels
Up To 1200°C Inspections



About Railway Hot Wheel System

The system is designed to allow fully automated inspection of railway wheels in hot (1200°C) conditions. The wheels are placed on the rotating table of the system by the robots. During one revolution of the table, the 3D profile of the wheel is recorded by non-contact, thermostabilized laser sensors.

Description

The wheels are placed on the rotating table of the system by the robots. During one revolution of the table, the 3D profile of the wheel is recorded by non-contact, thermostabilized laser sensors. The measurement results are displayed on two operator screens. The first screen shows the 3D profile of the inspected wheel. The surfaces of the model are coloured according to the divergences and tolerances.

The second screen shows the functional status of the equipment and its components (with the possibility of programming, adjustment, and control) as well as the status and result of the current measurement.

The system allows to receive parameters of the manufacturing process (wheel type, tolerances, etc.) from the control system of the workshop and transfer back the information about the performed measurements (measured data, validity code, point cloud). Measurement results are stored in the enterprise database. For the following estimations or statistics purposes, the data can be called up and presented again in the same form in the software.

Thermally Insulated Measurement Heads

The geometric dimensions of the wheels are scanned by three binocular measurement heads, which are based on the principle of laser triangulation.

- Laser beam forms into a line by optics and projected onto the measurement object. The laser line image is projected onto the photosensor.
- The laser image on the photosensor is geometrically corrected and evaluated. Processing steps are similar to laser point triangulation.
- The design of the protective box of the measuring heads provides cooling and compressed air cleaning.
- The cooling system ensures stable operating temperature of the measuring system electronics.
- Permanent cleaning the optical windows of the measurement heads by compressed air prevents them from becoming dirty. Keeping the windows clean eliminates distortion of the received data and ensures the accuracy of the measurement system.



Wheel Geometry Measurement Software Module

The software allows the operator to control the measurement process, namely:

- Calibration.
- Settings management.
- Loading reference values.
- Measuring process control.
- Current system status indication.
- Logging and archiving of measurement data.
- Visualisation of the measured wheel profile and measured parameters.



The operator can see the current status of the system components at any time: the frame and sensor temperature; pump drive, table drive, window blower, encoder, liquid level, etc. All the states and their changes are saved into a log file. The status of input and output signals is displayed on the screen in real-time.

The reference data can be loaded as a DXF file as well as in tabular form. The measurement window displays the measured values and the contour of the wheel section. Critical system information, manual camera control panel, system status and measurement status messages are indicated as well.

Measurement Window

Based on the measurement results, a protocol is formed. The protocol contains Wheel number, Wheel type, Stamp number, Date and time of measurement's start and end, minimum, average, and maximum values of parameters.

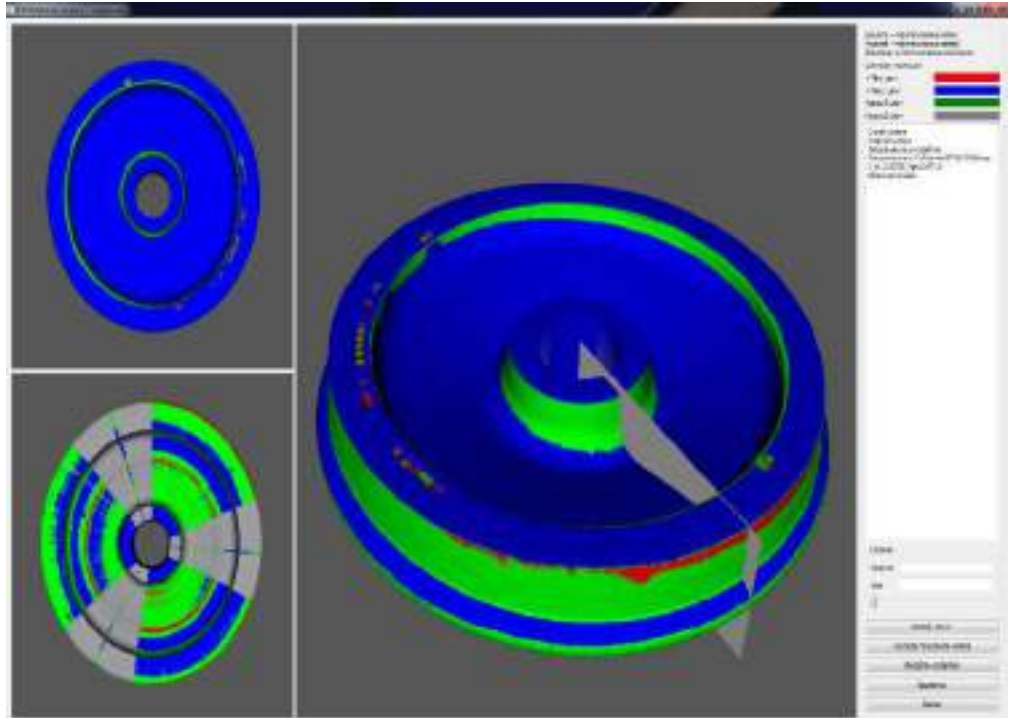
The measured wheel data can be archived on a USB stick or the file server. Raw data and/or profile data, measurement protocols, system logs and 3D models can be stored as well. The archive window shows the average deviations from the specified values for all parameters. Excess divergence is highlighted in colour depending on its degree.

Wheel 3D Display Software Module

A three-dimensional model is built for every measured wheel. The model is updated immediately after the end of each measurement cycle. The 3D visualisation program window is displayed on the left-hand monitor.

The sections of the 3D model are painted in colours depending on the degree of deviation from the reference values. Surfaces painted red or blue indicate that the deviation in the wheel geometry has been exceeded.

The operator can rotate the model and zoom it in/out to select the optimal viewing angle. For better orientation, the cut plane is displayed in the 3D image.



The selected cross-section is drawn in the measurement window (on the right monitor). It is possible to load the previously measured wheel offline from the archive.

System Includes

- Cables.
- Software.
- Rotary Table.
- Control Panel.
- Power System.
- Control System.
- Cooling System For Mechanics.
- Cooling System For Measurement Heads.
- C-Formed Thermally Insulated Measuring Framework.
- Three Thermally Insulated Measurement Heads (Laser Scanners).
- User Manual, Maintenance Papers, Troubleshooting, Spare Parts Papers.

Specification

Maximum Wheel Outer Diameter:	1400 (1600) mm
Maximum Wheel:	Width 500 mm Height 800mm
Linear Dimensions Range:	5 ... 1400 (1600) mm
Wheel Temperature:	Up To 1200°C
Time Of Measurement Cycle:	Less Than 20 Seconds
Number Of Profiles Per Revolution:	More 500
Relief Marking Check:	More 1024

Accuracy

Linear Dimensions:	± 1 mm
Eccentricity:	± 1 mm
Outer Diameter:	± 0,5 (1) mm
Depth Of Defects And Marking:	± 0,5 (1) mm
Network Interface:	Profinet
Cooling System:	Active Chiller Water-Water (Antifreeze) Closed Loop

Environmental Conditions

Ambient Temperature:	- 20°C to +60°C
Air Humidity:	Less 90 %
Atmospheric Pressure:	750 ± 30

Power

Circuit:	Three-Phase, 50 Hz ± 0,4 Hz
Voltage:	230/400 V ± 5%
Power:	15 Kw

Warranty:	3 Years
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