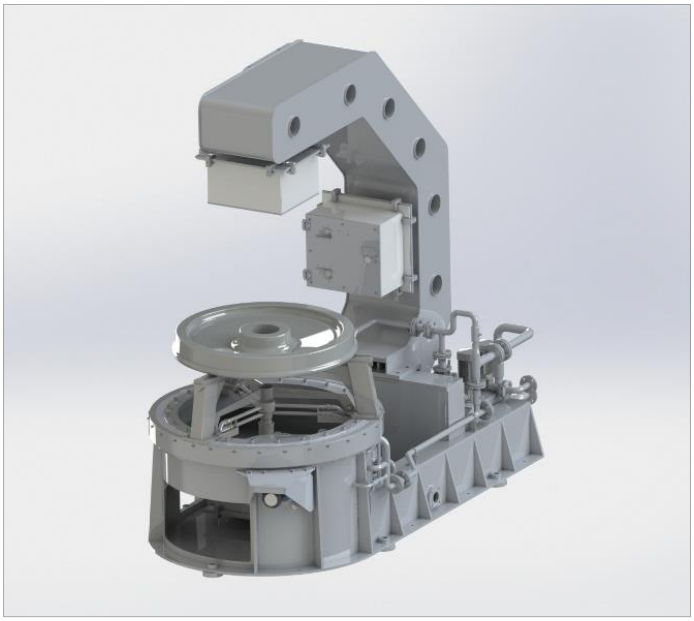
HOT-WHEEL

Optical measurement system for railway wheel (up to 1200^0) inspection

Specification

Thermostabilized optical measurement system for quality control of railroad wheels. Wheels temperature is up to 1200 degrees



FEATURES

- Non-contact optical scanning
- For hot objects with temperature up to 1200 degrees
- Less 20 sec for one wheel inspection
- 3D visualisation with deviation colour coding
- Reference model in table form or DXF
- Conversion to cold body geometry
- Heat and vibration resistance
- Self-diagnostics

MEASURABLE PARAMETERS

- Outer diameter
- Back-face and front-face rim inside diameter
- Wheel plate thickness
- Rim width
- Wheel flange diameter
- Wheel hub external diameter
- Wheel flange width
- Wheel hub height
- Eccentricity
- Depth of defects and anomalies
- Depth and location of relief marking

+ other parameters according customer's specification

APPLICATION

On-line geometry inspection of railway wheel in cold and hot conditions with temperature 950…1200 ^{0}C

- The system scans a full 360^0 wheel profile.
- Export of measured data and system status to the control system of the enterprise process control system.
- Calculation and visualization of parameter deviation including colour coding in 3D.
- Materials with a coefficient of thermal expansion close to one are applied
- Active cooling system.
- Operation in continuous mode 24/7.
- Working in harsh conditions.
- Integrated into the wheel rolling mill cycle.
- Measuring process is synchronized with the robots.

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).

Optical Measurement Systems D-TEST

D-TEST Optical Measurement Systems
Kariernaia, 16, Yekaterinburg, Russia
+73432227565, www.d-test.ru, mail@d-test.ru

HOT-WHEEL

Optical measurement system for railway wheel (up to 1200^0) inspection

Specification – page 2

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.

SPECIFICATION

Maximum wheel outer diameter, mm	1400 (1600)
Maximum wheel width/height, mm	500 (800)
Linear dimensions range, mm	5 … 1400 (1600)
Wheel temperature, ^{0}C	Up to 1 200
Time of measurement cycle, sec	less 20
Number of profiles per revolution	more 500 (more 1024 for relief marking check)
Accuracy	
• linear dimensions, mm	± 1
• eccentricity, mm	± 1
• outer diameter, mm	± 0,5 (1)
• depth of defects and marking, mm	± 0,5 (1)
Network interface	Profinet
Cooling system	Active chiller water-water (antifreeze) Closed loop.
Environmental conditions	
• ambient temperature, ^{0}C	- 20 … +60
• air humidity	less 90 %
• atmospheric pressure	750 ± 30
Power	
• circuit	three-phase, 50 ± 0,4 Hz
• voltage	230/400 V ± 5%
• power	15 kW

Warranty 3 years

Optical Measurement Systems D-TEST
D-TEST Optical Measurement Systems
Kariernaia, 16, Yekaterinburg, Russia
+73432227565, www.d-test.ru, mail@d-test.ru

HOT-WHEEL

Optical measurement system for railway wheel (up to 1200^0) inspection

Specification – page 3

Supply includes

- C-formed thermally insulated measuring framework
- Three thermally insulated measurement heads (laser scanners)
- Rotary table
- Cooling system for Mechanics
- Cooling system for Measurement heads
- Cables
- Control panel
- Power system
- Control system
- Software
- User manual, Maintenance papers, Troubleshooting, Spare parts papers

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.

Optical Measurement Systems D-TEST
D-TEST Optical Measurement Systems
Kariernaia, 16, Yekaterinburg, Russia
+73432227565, www.d-test.ru, mail@d-test.ru

HOT-WHEEL

Optical measurement system for railway wheel (up to 1200^0) inspection

Specification – page 4

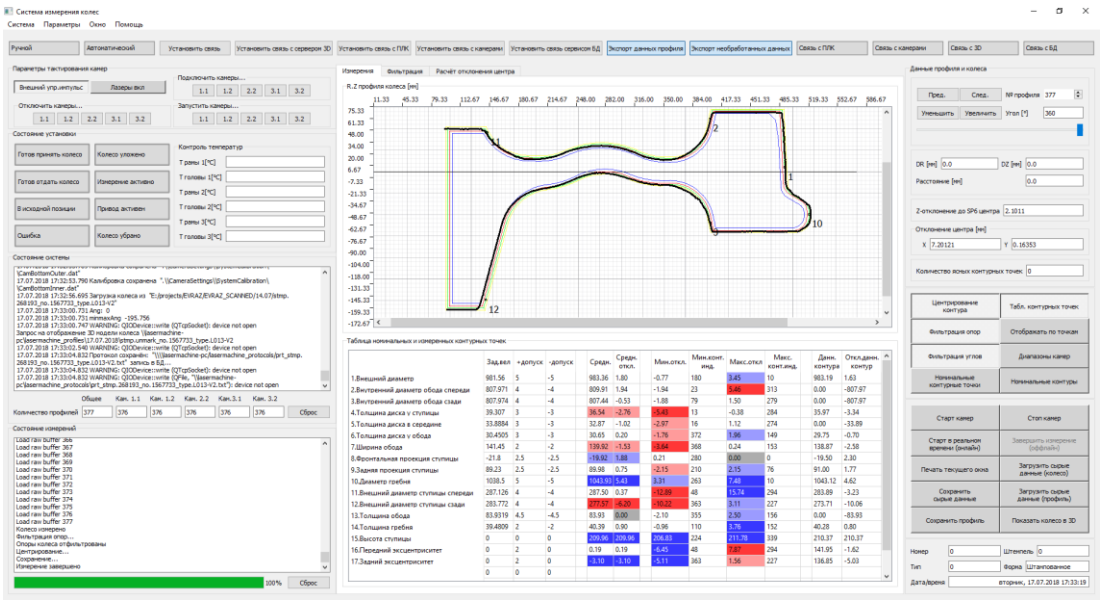
Wheel geometry measurement software module

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

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

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 realtime.

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.



Mesurement 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.

OPTICAL MEASUREMENT SYSTEMS D-TEST

D-TEST Optical Measurement Systems
Kariernaia, 16, Yekaterinburg, Russia
+73432227565, www.d-test.ru, mail@d-test.ru

HOT-WHEEL

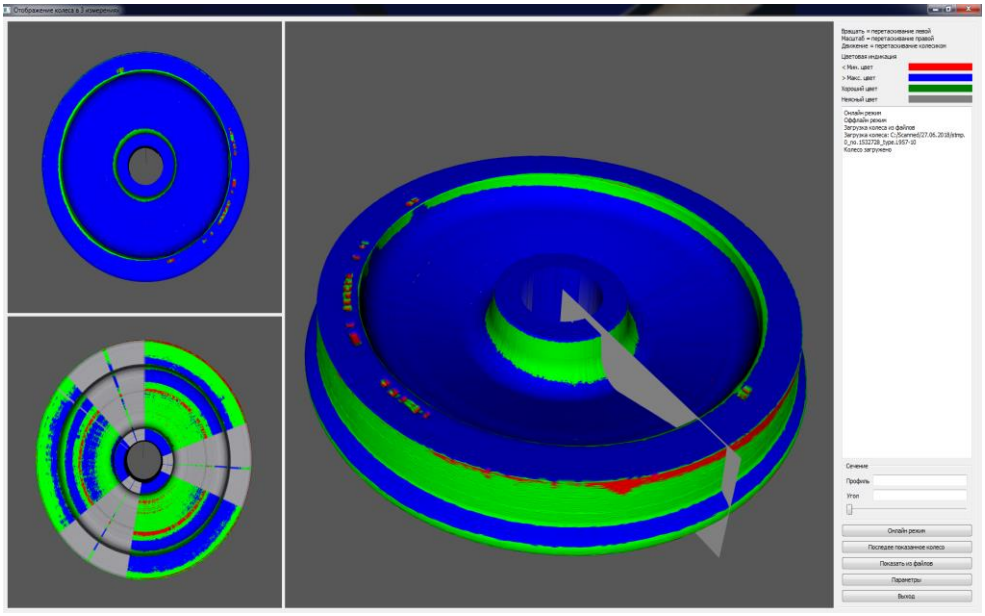
Optical measurement system for railway wheel (up to 1200^0) inspection

Specification – page 5

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.



3D Display Module

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.

For notes

Optical Measurement Systems D-TEST

D-TEST Optical Measurement Systems
Kariernaia, 16, Yekaterinburg, Russia
+73432227565, www.d-test.ru, mail@d-test.ru