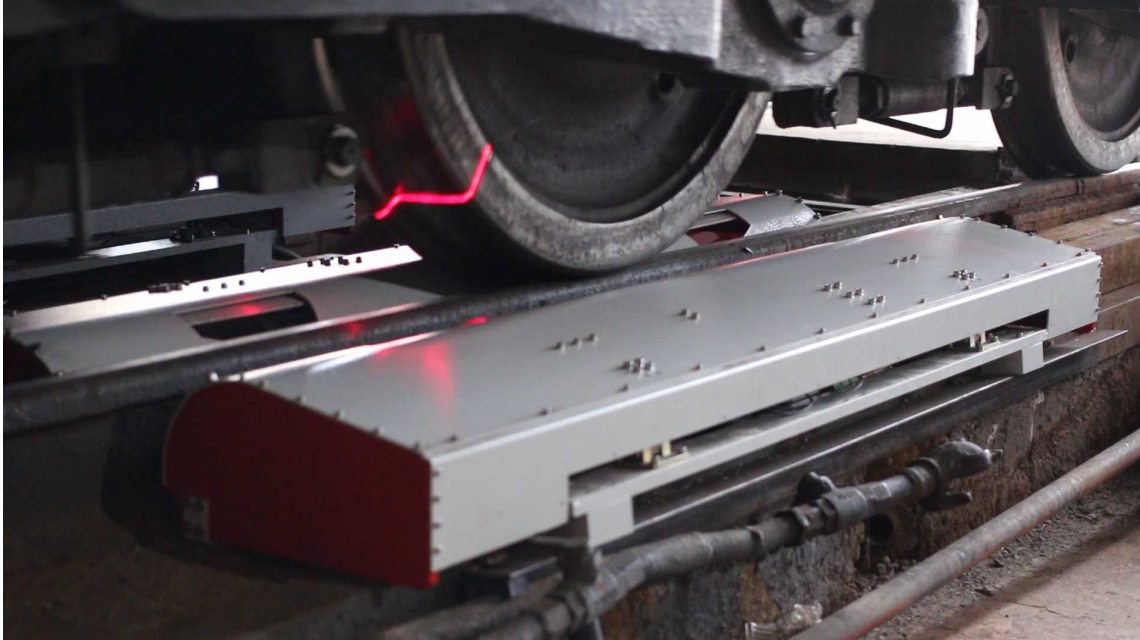




RIFTEK

Sensors & Instruments



REAL TIME WHEELS GEOMETRY MEASUREMENT SYSTEM

3DWheel Series

User's manual

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1. Safety precautions and measurement conditions

- Use supply voltage and interfaces indicated in the system specifications.
- In connection/disconnection of cables, the system power must be switched off.
- The system must be grounded. All power cables must be shielded.

2. CE Compliance

The system has been developed for use in industry and meets the requirements of the following Directives:

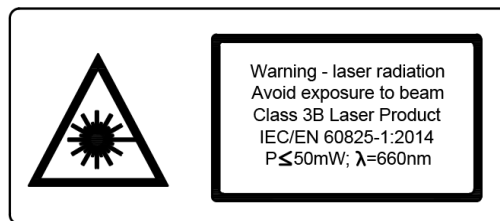
- EU directive 2014/30/EU (Electromagnetic compatibility).

3. Laser safety

The 3DWheel system contains laser scanners RF627, which correspond to the 2M or 3B safety classes according to IEC/EN 60825-1:2014.

3.1. Class 3B scanners

The scanners make use semiconductor laser. Maximum output power is 50 mW. The scanners belong to the 3B laser safety class. The following warning label is placed on the scanner housing:

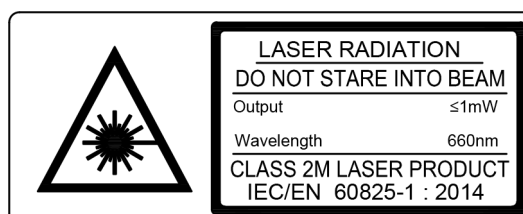


The following safety measures should be taken while operating the scanners:

- Do not target laser beam to humans;
- Avoid staring into the laser beam through optical instruments;
- Mount the scanner so that the laser beam is positioned above or below the eyes level;
- Mount the scanner so that the laser beam does not fall onto a mirror surface;
- Use protective goggles while operating the scanner;
- Avoid staring at the laser beam going out of the scanner and the beam reflected from a mirror surface;
- Do not disassemble the scanner;
- Use the laser deactivation function in emergency.

3.2. Class 2M scanners

The scanners make use of an c.w. 660 nm or 405 wavelength semiconductor laser. Maximum output power is 1 mW. The sensors belong to the 2M laser safety class. The following warning label is placed on the scanner housing:



The following safety measures should be taken while operating the scanners:

- Do not target laser beam to humans;
- Do not disassemble the scanner;
- Avoid staring into the laser beam.

4. General information

The 3DWheel system is designed for non-contact automatic measurement of geometrical parameters of wheelsets. The system uses a combination of 2D laser scanners RF627 Series mounted wayside in the track area and calibrated into one common coordinate system. All measurements are performed in the real-time mode.

The main advantages of the system are as follows:

- Measurements are performed on moving trains.
- A modular structure allows to configure the system to customer's requirements (landscape, climatic and technical conditions).
- Automatic recognition of the train number and automatic start of the measurement process.
- Non-contact measurement method.
- Taking a full profile of the wheel rolling surface.
- Control of geometrical parameters of railway wheels:
 - flange height;
 - flange thickness;
 - flange slope;
 - rim width;
 - rim thickness;
 - wheel diameter;
 - back-to-back distance.
- Generating reports in CSV format with the ability to export data to other systems (integration into existing infrastructure).
- Ability to receive data by email or SMS.
- Electronic database of the railway wheels wear.
- Autonomous operation - there is no need to control the measurement process.
- The system is virtually maintenance free.
- The system is very easy to install due to a modular structure.
- The system has protection against climatic and technogenic factors such as rain, snow, dust, lubricating fluid.

5. Basic technical data

Parameter	Value
<i>Measurement range</i>	
flange height, mm	20...45
flange thickness, mm	20...50
flange slope, mm	1...15
rim thickness, mm	30...100
diameter, mm	700...1000
back-to-back distance, mm	according to the railway track width
<i>Measurement error</i>	
flange height, mm	± 0,15
flange thickness, mm	± 0,15
flange slope, mm	± 0,3
rim thickness, mm	± 0,15
diameter, mm	± 0,5
back-to-back distance, mm	± 0,3
Train speed, km/hour	up to 45
Power supply, V	380 (AC)
Power consumption, kW, no more	2 (without compressor)
Operation temperature, °C	-40...+50
Relative humidity, %	5-95 (no condensation)
Enclosure rating	IP67

6. Structure and operating principle

The 3DWheel system has a modular and open configuration, which makes it possible to adapt it to any types of railroad tracks and railway wheels, and to reduce the technical maintenance to a minimum.

A functional diagram of the system is shown in Figure 1.

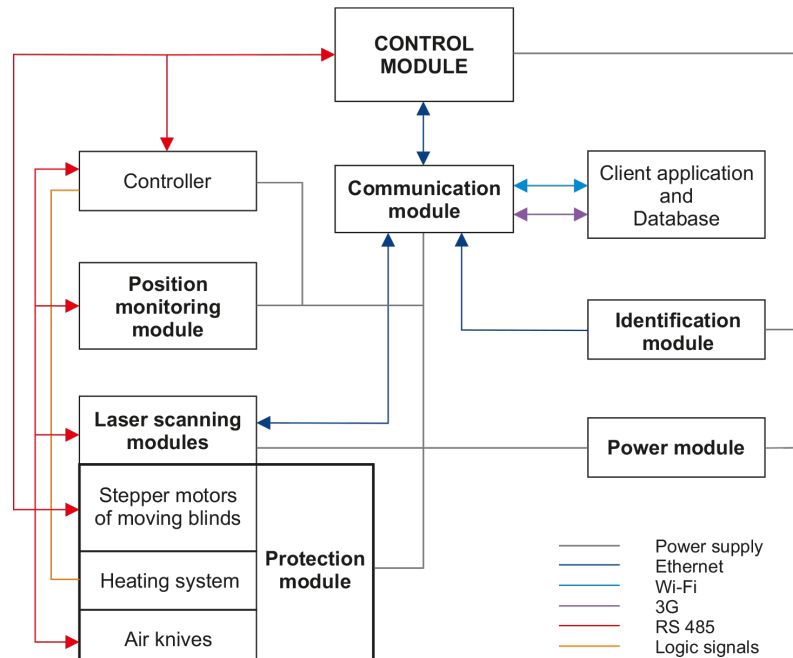


Figure 1

The main modules of the 3DWheel system are as follows:

1) **Laser scanning modules**. These modules are intended for scanning of the wheelset. They contain 2D laser scanners RF627 Series mounted wayside in the track area and calibrated into one common coordinate system.

2) **Air conditioning and protection module**. It is intended to maintain a stable temperature inside laser scanning modules, and for mechanical protection of laser scanners against any possible damage and contamination.

3) **Position monitoring module**. It is intended to monitor the position of the wheel relative to the laser scanning modules. This module contains inductive sensors mounted wayside in the track area, which run the scanning process when the wheelset is detected.

4) **Identification module**. It is intended to identify the train number. The module contains the RFID registration system.

5) **Control module**. It is intended to coordinate the operation of all modules of the system, to gather data, to create a mathematical model of the wheel profile, to calculate required geometrical parameters, and to generate reports to sent to the operator.

6) **Communication module**. It is intended for remote access to the 3DWheel system in order to test it, to change settings, or to transmit data to depot.

7) **Power module**. It is intended to provide a stable power supply of all 3DWheel modules. It guarantees the uninterruptible power supply for 60 minutes in a case when an external mains voltage is lost.

The 3DWheel system operates as follows:

- The **Position monitoring module** detects the rolling stock.
- When the rolling stock is detected, the **Control module** turns on the **Laser scanning modules**, opens the protective blinds, and turns on the Air Knife system.
- The **Identification module** recognizes the train number.

- The **Position monitoring module** detects the wheels, and the **Laser scanning modules** start the scanning process.
- The **Laser scanning modules** are taking the wheel profiles, when the wheelset is going through the control area.
- Data gathered from all scanners are transmitted to the **Control module** for calculation of geometrical parameters of the wheels.
- The received data are grouped and the **Communication module** sends them to the client application and to the database.

6.1. Laser scanning modules

Laser scanning modules consist of a combination of 2D laser scanners RF627 Series mounted wayside in the track area and calibrated into one common coordinate system. These modules scan the wheel surface and then transmit data to the **Control module** for calculating geometrical parameters of the wheels.

Modules containing two scanners are placed on the outer side of the rail. Modules containing three scanners are placed on the inner side of the rail. In order to avoid mutual influence on each other, scanners located on the opposite sides of the rail have lasers of different wavelengths (RED and IR).

After detecting the wheelset, laser scanning modules are activated and scan the wheelsets, when the rolling stock is going through the control area. Upon completion of the scanning process, laser scanning modules will be turned off.

Laser scanning modules come with the special protective housings equipped with the conditioning system and the Air Knife system. To eliminate the influence of vibrations and shocks, laser scanning modules are equipped with shock-absorbing supports.

Overall and mounting dimensions of laser scanning modules as well as the variant of installation are shown in Figures 2.

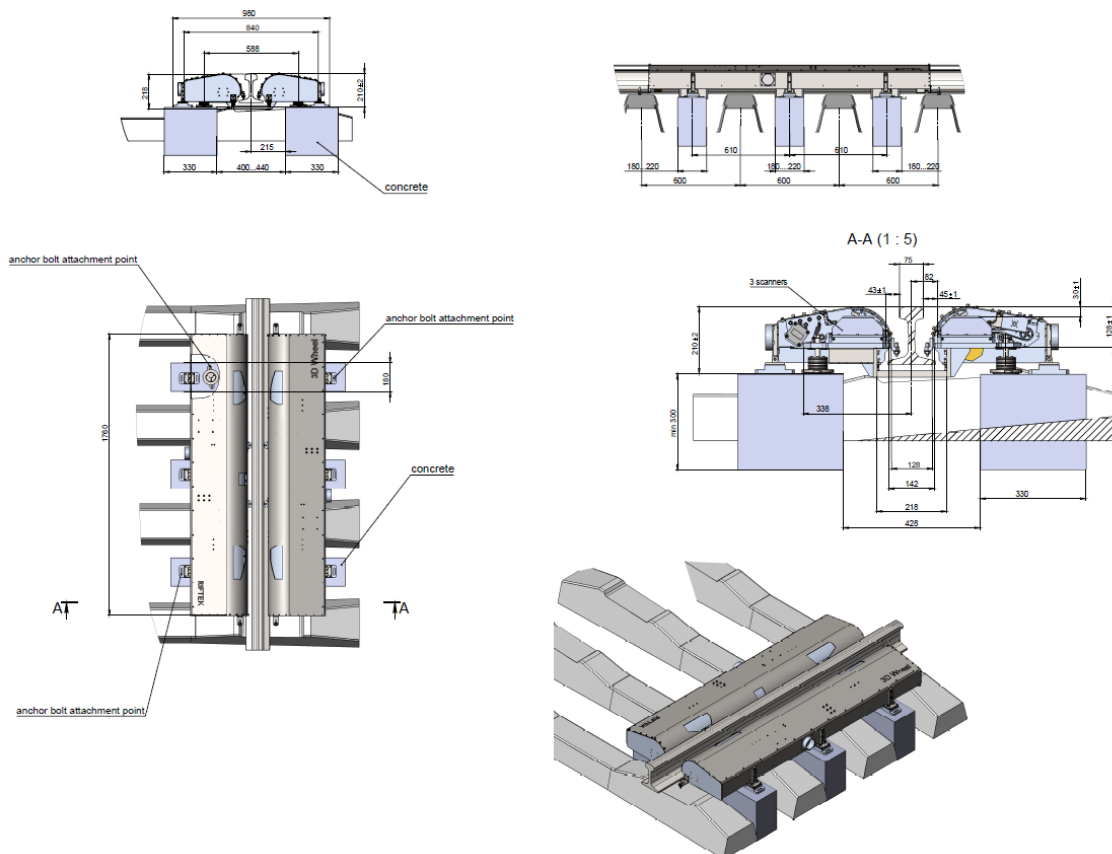


Figure 2

6.2. Air conditioning and protection module

The **Air conditioning and protection module** is intended to maintain a stable temperature inside laser scanning modules as well as for air and mechanical protection of laser scanners.

The heating system is activated, when the thermostat inside the protective housing registers a temperature below +15°C. The air is heated by built-in heaters, the warm air circulation is provided by built-in fans.

The mechanical protection system and the Air Knife system are activated, when the rolling stock is detected by the first inductive sensor. The special moving blinds of protective housings open and the air knives start to work. Upon completion of the scanning process, the mechanical protection system and the Air Knife system will be disabled.

6.3. Position monitoring module

The **Position monitoring module** contains three (four for revers traffic) inductive sensors. Inductive sensors are placed on the railway track as shown schematically in Figure 3.

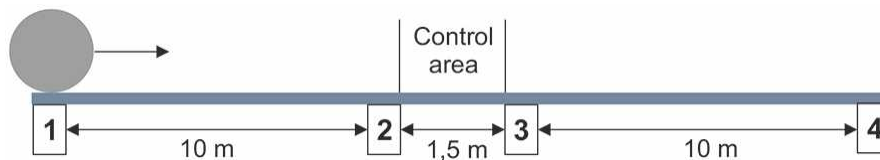


Figure 3

The first inductive sensor (1) is placed at the distance about 10 m from Laser scanning modules. When the wheelset is detected, the Control module opens the moving blinds on protective housings, activates the air knives, and switches Laser scanning modules to the data acquisition mode.

When the wheel is detected by the next inductive sensor (2) placed directly in front of Laser scanning modules, the Control module turns on the lasers of laser scanners, and the scanning process begins.

When the wheel is detected by the third inductive sensor (3), the Control module turns off the lasers and stops the data acquisition.

After measuring the last wheel, the system waits for timeout, and then closes the moving blinds on protective housings, and turns off the air knives. The system goes into standby mode.

The fourth inductive sensor (4) is placed at the distance of 10 m from Laser scanning modules and is used only when the train moves in the opposite direction. In this case, it functions as the first inductive sensor, the third sensor functions as the second, and the second sensor functions as the third.

6.4. Identification module

The RFID Identification module allows to recognize the train number.

Parameters of train number interpretation are set in accordance with customer's requirements.

6.5. Control, communication and power module

The **Control module** is a server computer. It is intended to coordinate the operation of all other modules, to gather data from laser scanners, to create a mathematical model of the wheel profile, and to calculate geometrical parameters.

The **Communication module** is intended to organize a remote access to the 3DWheel system for testing, configuring parameters, and for transmitting data.

The **Communication module** contains:

- Network switch
- Wi-Fi modem
- 3G modem

The **Power module** is intended to maintain a stable power supply for the 3DWheel system. It provides 60 minutes of uninterrupted power supply when the mains voltage is lost.

The **Power module** contains:

- Uninterruptible power supply (UPS)
- Power supply unit (2 pcs.):
 - for laser scanning modules
 - for the heating system



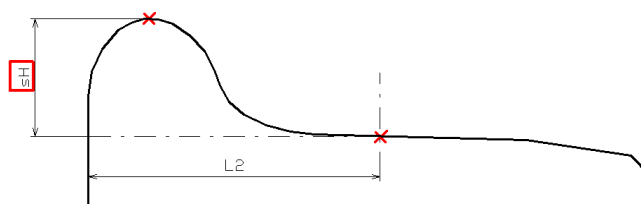
7. Geometric parameters of the wheel under control

Geometric parameters of the wheelset are calculated automatically after laser scanning of wheels is completed. To calculate geometric parameters of the profile, use is made of reference points on the wheel profile. Location of the reference points is defined by L- and P-parameters.

7.1. Flange height, sH

Calculation of the flange height is determined by parameter L2.

The flange height is calculated as a distance measured vertically between the flange top and the point of wheel rolling surface at any preselected distance (L2) away from the inner face of the wheel tire.



7.2. Flange thickness, sD

Calculation of the flange thickness is determined by parameter L3 that specifies Point 1 on the flange surface. There are two ways to specify the parameter:

Method 1	
Height L3 is measured vertically upward from a point of the wheel rolling surface, the position of which is defined by parameter L2.	
Method 2	
Height L3 is measured vertically downward from the flange top.	

The flange thickness is calculated as a distance measured horizontally at any preselected height (L3) between two points (Point 1 and Point 2) lying on the opposite sides of the flange top.

There are two ways to calculate the flange thickness:

Method 1	
Point 1 is defined by parameter L3. Point 2 is the intersection point of a horizontal line and a line lying on the internal face of the wheel.	
Method 2	
Point 1 is defined by parameter L3. Point 2 is the intersection point of a horizontal line and the flange surface.	

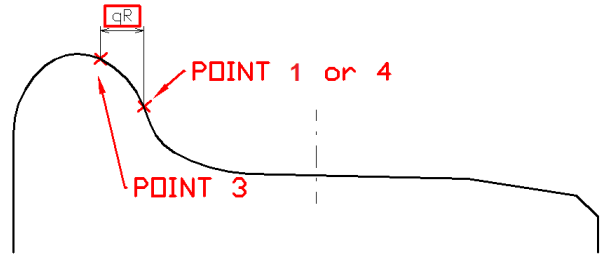
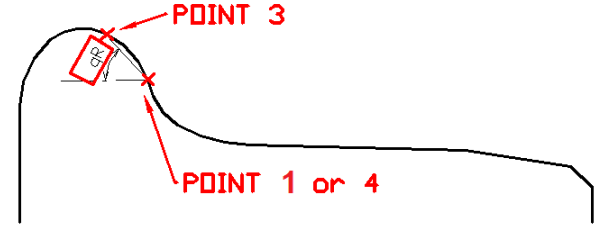
Note: Both calculation methods can be performed simultaneously.

7.3. Flange slope, qR

Calculation of the flange slope is determined by parameters L1 and L3 (or L4).

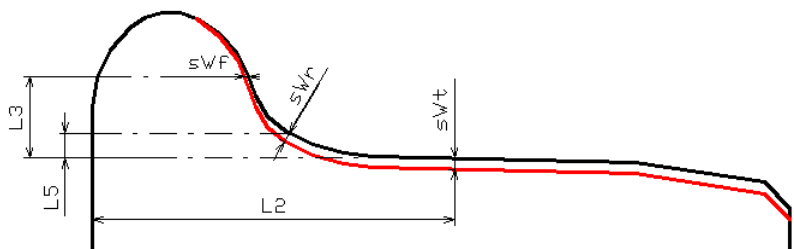
<p>Height L1 is measured vertically downward from the flange top and determines Point 3 on the flange surface.</p> <p>Height L4 is measured vertically upward from a point of the wheel rolling surface, the position of which is defined by parameter L2 (wheel rolling circle), and determines Point 4 on the flange surface.</p> <p>Height L3 is described in paragraph 7.2.</p>	
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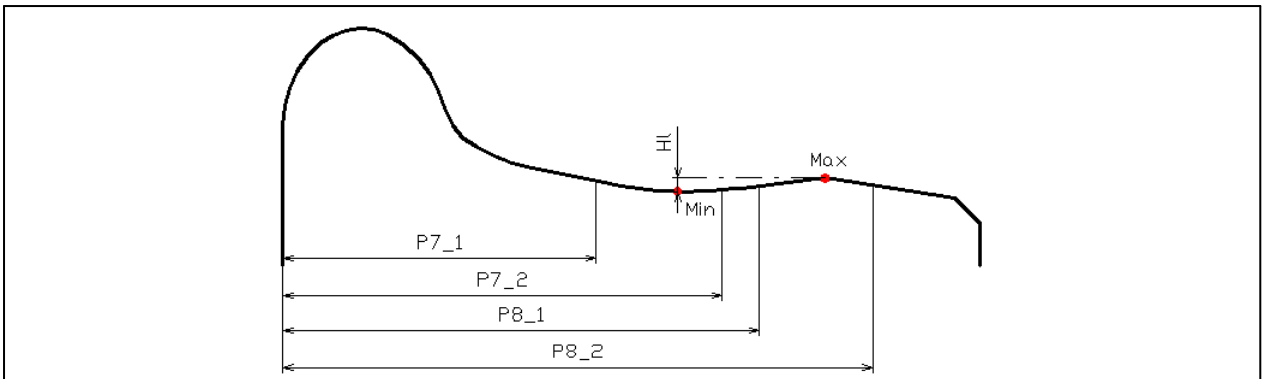
There are three ways to calculate the flange slope:

<p>Method 1 Calculation in millimeters</p> <p>The flange slope is calculated as a distance measured horizontally between Point 3 and Point 1 (or 4). The PDA screen displays information in millimeters.</p>	
<p>Method 2 Calculation in degrees</p> <p>The slope is calculated as the inclination angle of a straight line passing through Point 1 or 4. The PDA screen displays information in degrees.</p>	
<p>Method 3 Pass/Fail</p> <p>The calculation is performed according to Method 1. The PDA screen displays information only about whether the measured slope meets the tolerance conditions or not.</p>	

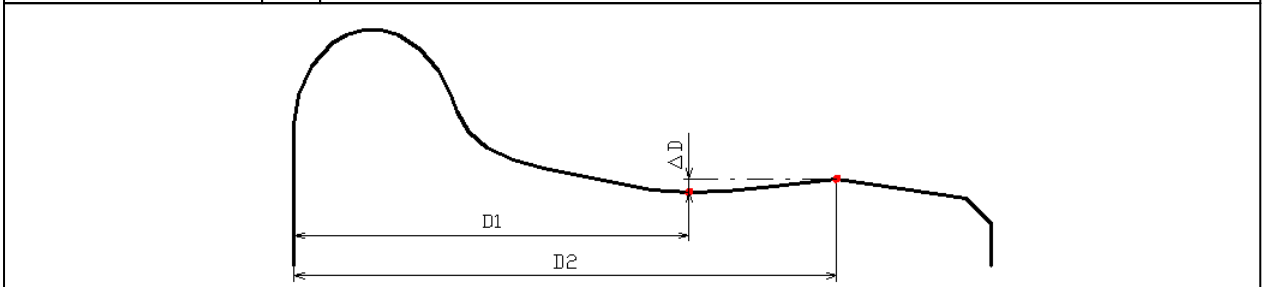
7.4. Wear parameters

The following wear parameters are calculated automatically:

Vertical wear	Wt	is calculated as the difference between the measured flange height and the flange height of the selected reference.
Horizontal wear	Wf	is calculated as the difference between the measured flange thickness and the flange thickness of the selected reference at height L3.
Corner wear	Wr	is calculated as the distance along the normal to the tangent at the point at height L5 from the wheel rolling circle of the measured profile, and the selected reference.
 <p>* Red color indicates the worn profile</p>		
Hollow	HI	<p>is calculated as the difference between the maximum and minimum values within the specified limits.</p> <p>The search limits:</p> <ul style="list-style-type: none"> - parameters of the minimum value [P7_1..P7_2] - parameters of the maximum value [P8_1..P8_2]



Difference of diameters	dD	is calculated as the difference between diameter at point D1 and diameter at point D2.
-------------------------	----	--

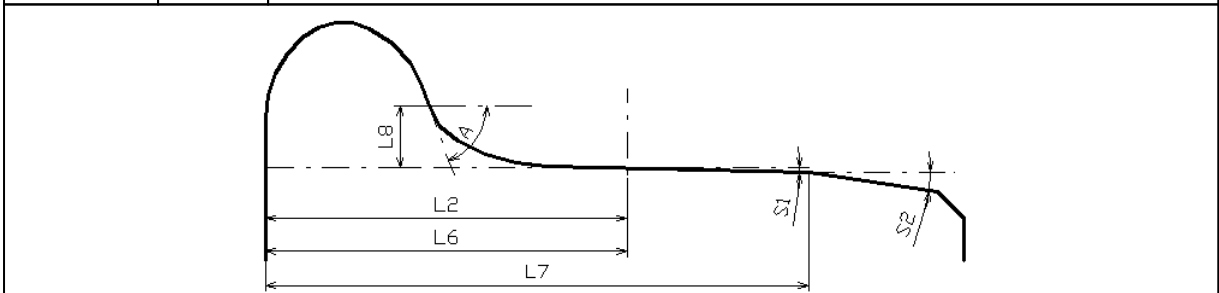


Even wear	W1	is the maximum vertical wheel wear selected from several measurements.
Uneven wear	W2	is the difference between the maximum wheel wear and the minimum wheel wear (selected from several measurements).

7.5. Angle parameters

The following profile parameters are calculated automatically:

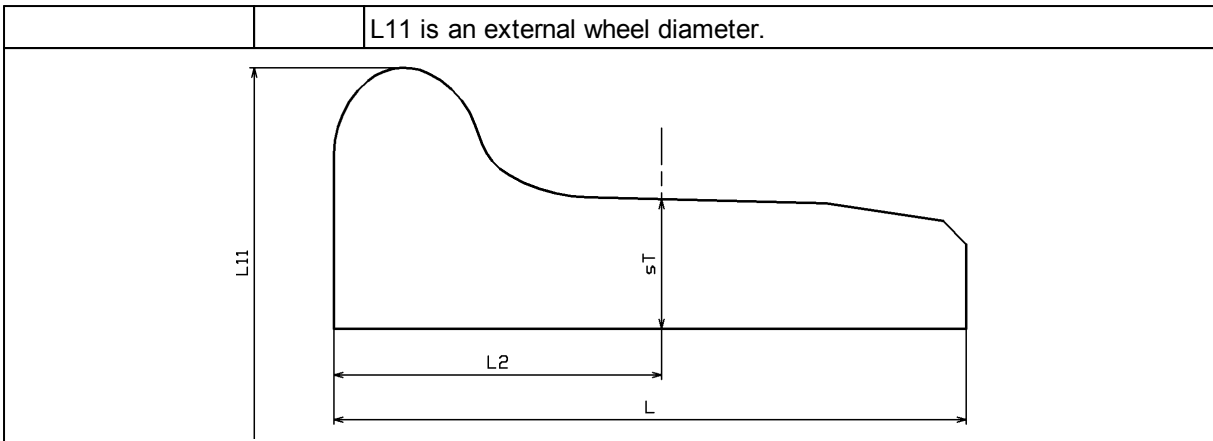
Inclination	A	is calculated as the profile inclination angle (in degrees) at a point with coordinate L8.
Angle 1	S1	is calculated as the inclination angle of the straight line (in percents) passing through points on the wheel surface located at preset distance L6 from the wheel face and the distance L6+10mm from the wheel face.
Angle 2	S2	is calculated as the inclination angle of the straight line (in percents) passing through points on the wheel surface located at preset distance L7 from the wheel face and the distance L7+10mm from the wheel face.



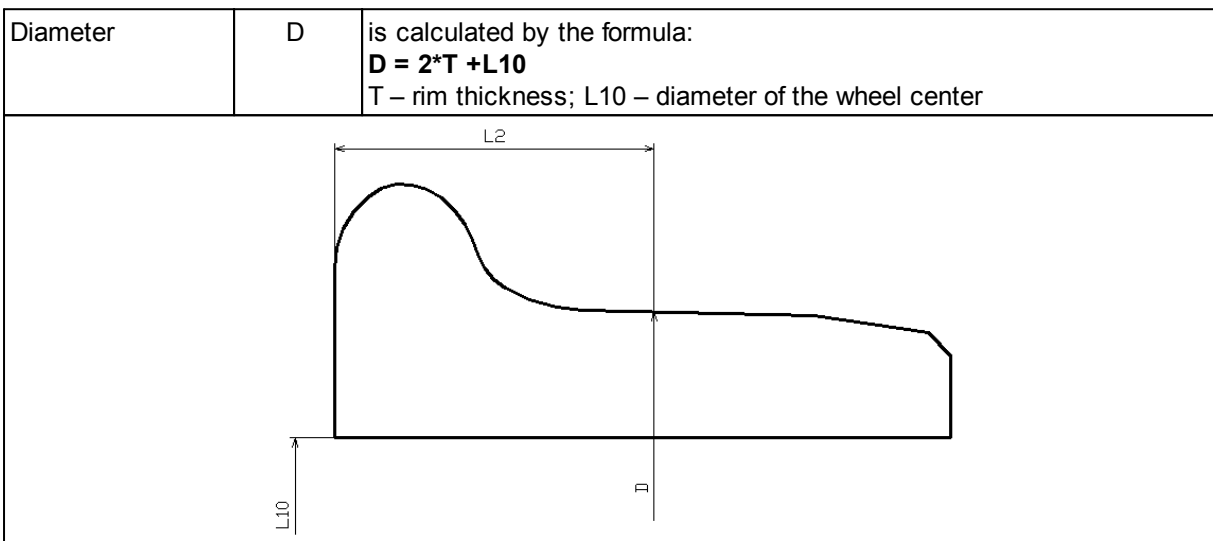
7.6. Rim parameters

The following rim parameters are calculated automatically:

Rim width	L	is calculated as a distance measured vertically between the internal and the external basic wheel surface.
Rim thickness	sT	is calculated as a distance measured vertically between the internal rim diameter and a point on the wheel rolling circle located on any preset distance L2 away from the wheel face.



7.7. Wheel diameter



8. Intended use

In order to use the system properly, it is necessary to read this User's Manual and to follow all instructions.

The specialists, which will work with the system, must have the appropriate qualifications, and must receive the training conducted by the Manufacturer. The specialists must know about all system components, risks associated with the system installation, permissible actions and how to handle emergency situations.

All repair works must be performed in consultation with the Manufacturer in order to avoid critical damage to the equipment.

8.1. Preparation for use

The preparation involves the following steps:

- Visual inspection.
- System installation.
- Powering the system.
- Setting the laser scanning modules.
- Setting the calculated parameters.

8.1.1. Visual inspection

**ATTENTION!**

The visual inspection must be performed once a week.

- Check the equipment for completeness and absence of damage.
- Check the cables and ground wires.
- Check the windows of laser scanners and, if necessary, clean them with a soft, lint-free cloth and non-streaking glass cleaner or 20% alcohol.

8.1.2. System installation

8.1.2.1. Mounting place

The 3DWheel system must be installed in accordance with the documentation and in consultation with the Manufacturer.

The mounting place must be prepared for the system installation - all preparation work must be performed under control of the Manufacturer's specialists.

Make sure that the mounting place meets the following conditions:

- The railway track, where the system will be installed, must not have the angle of inclination greater than 5°.
- There must be enough space to fix the inductive sensors onto the lower face of the rail.

8.1.2.2. Equipment installation

The system is supplied as a set of modules ready to install. The specialists responsible for the system installation must have the appropriate qualifications.

Safety precautions:

- Lift and move the equipment carefully, without sudden movements. The modules weighing more than 10 kg must be transported using the special equipment (trolley or forklift).
- The equipment for transporting the modules must be certified, and its maximum workload must be greater than the cargo weight.
- Only people working on the system installation are allowed to be in the mounting area.

**ATTENTION!**

- The system must be grounded – static electricity may cause the failure of electronic components.
- All power cables must be shielded.

8.1.3. Powering the system

Feed power to the system – 380V AC.

8.1.4. Setting the laser scanning modules

The setting procedure is performed once (except for the calibration) when the system is installed onto the railway track. The setting procedure must be performed for every scanner of laser scanning modules. In case of the replacement of one or more scanners, it will be necessary to repeat the setting procedure for the new scanners.

Please follow the sequence of these steps:

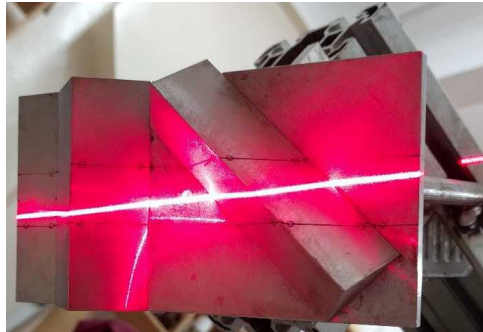
- Adjustment.

- Calibration.
- Setting the exposure time.
- Setting the filter parameters.

8.1.4.1. Adjustment


The adjustment procedure is performed using the special calibration bogie supplied with the system.

It is necessary to adjust the scanner position so that the laser beam is directed at the specially marked area of the calibration plate. The scanner position can be adjusted using the bracket designed for this purpose.



8.1.4.2. Calibration

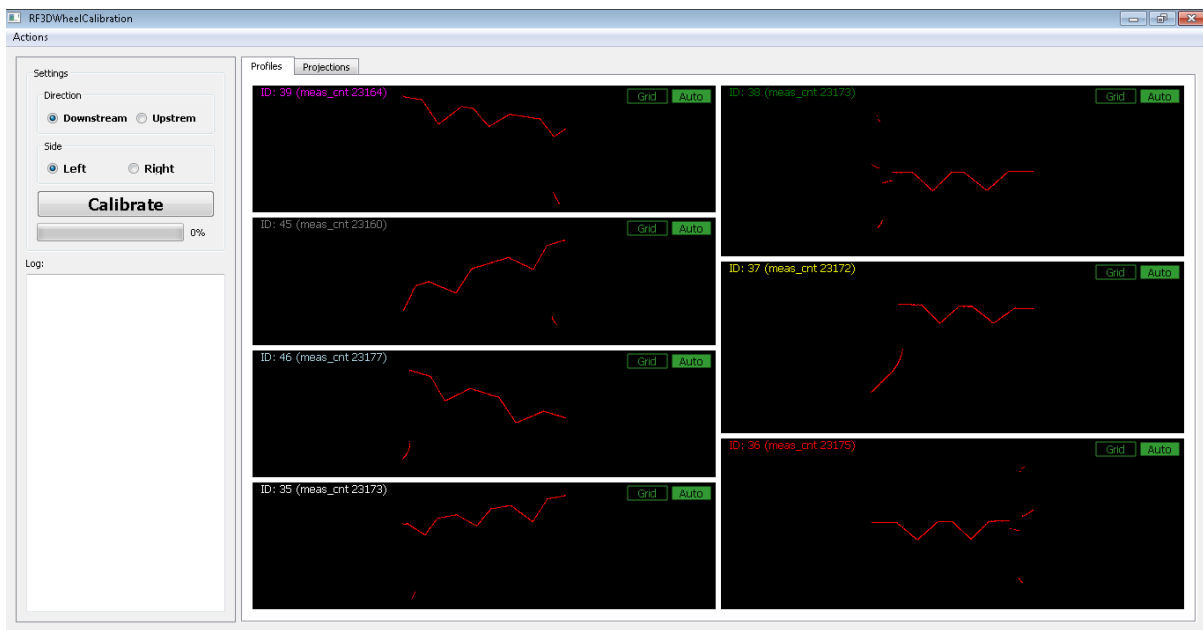
8.1.4.2.1. Calibration procedure

 **ATTENTION!**
 In the first two months of operation, the calibration procedure must be performed once a week. After two months of operation, the system must be calibrated once a month.

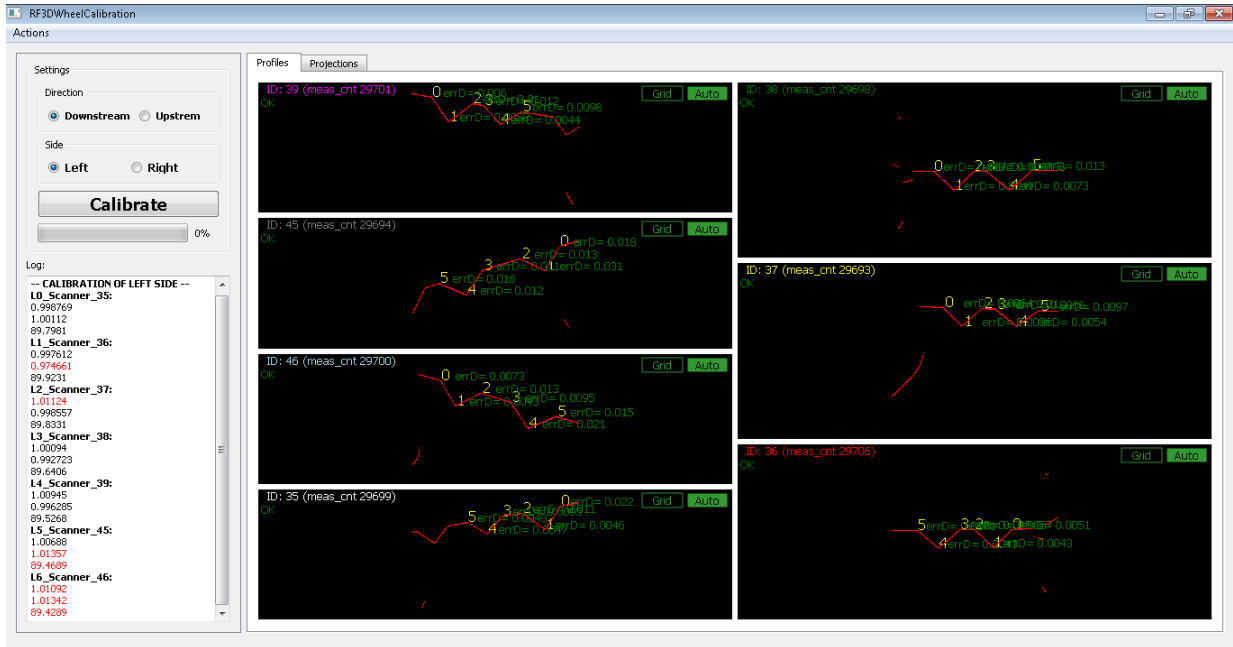
The calibration procedure is performed using the special calibration bogie supplied with the system.

To perform the calibration procedure, please follow the steps below:

- 1) Install the calibration bogie so that the laser beams are directed at the specially marked area of the calibration plate (see the photo in the previous paragraph).
- 2) Run the **RF3DWheelCalibration** software.



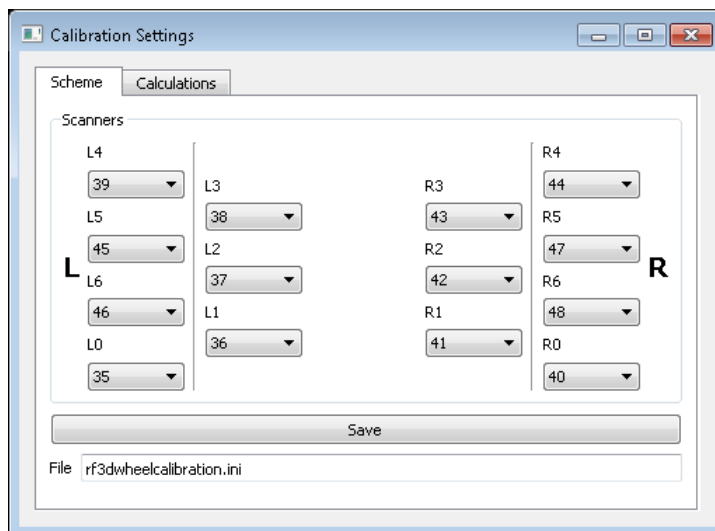
- 3) Select the direction: **Downstream** or **Upstream**. The calibration can be done using both sides of the calibration bogie. So, if you calibrate the scanners of the left scanning module using the left side of the calibration bogie, you need to select **Downstream**. If, for example, you calibrate the scanners of the left scanning module using the right side of the calibration bogie, select **Upstream**.
- 4) Click **Calibrate**.
- 5) If the calibration is successful, the program will show:



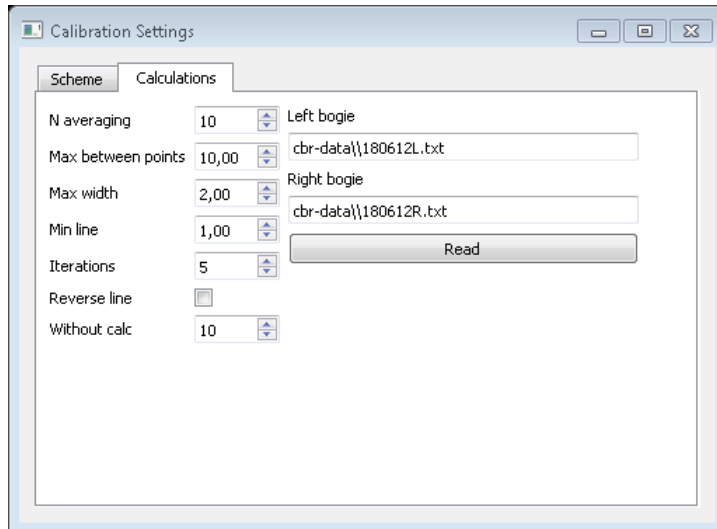
- 6) Select **Right** in order to calibrate the scanners of the right scanning module.
- 7) Click **Calibrate**.
- 8) If the calibration is successful, the calibration procedure is complete.

8.1.4.2.2. Calibration settings

Click the **Actions** button in the upper left corner of the window, and select **Settings**. The **Calibration Settings** window appears:



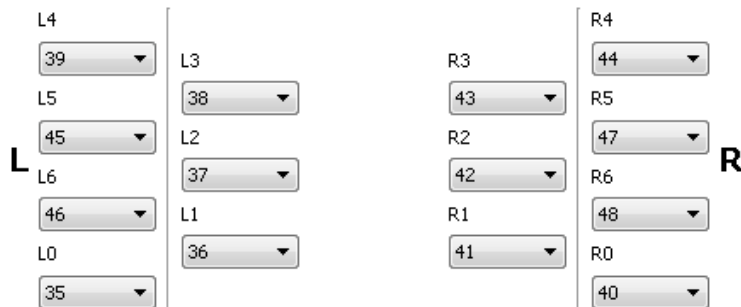
The **Scheme** tab shows the position of the scanners in the scanning modules. If you change any settings, click **Save**. All settings are written to the file specified in the **File** field. To view the calculation settings, go to the **Calculations** tab:



ATTENTION!
The user is not allowed to change any settings in the **Calculations** tab.

8.1.4.3. Setting the exposure time

The position of the scanners is shown below.

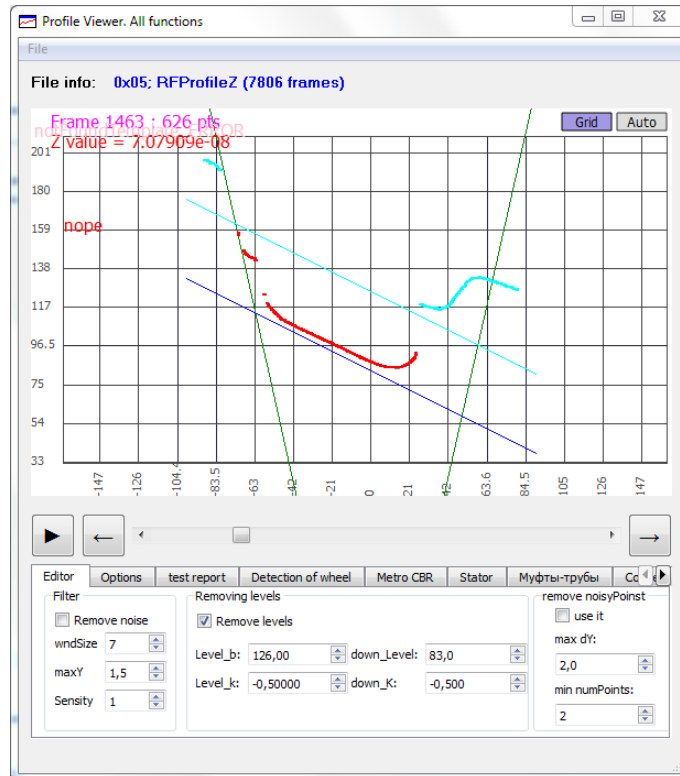


Set the exposure time for each scanner using the service software for RF625 scanners. The recommended values are shown in the table below.

Left side		Right side	
Scanner #	Exposure time, μ s	Scanner #	Exposure time, μ s
35	800	40	800
36	1200	41	1200
37	500	42	500
38	1200	43	1200
39	800	44	800
45	1000	47	1000
46	1000	48	1000

8.1.4.4. Setting the filter parameters

Use the **Profile Viewer** program (full version).



You can define areas to be deleted above and below the selected line. Parameters of the line are written to the file with calibration data (**calibr.ini**), and have the following format:

```
Level1=1 (means that the points above the line will be deleted)
Level1_k=-0.5
Level1_b=126
Level2=-1 (means that the points below the line will be deleted)
Level2_k=-0.5
Level2_b=80
```

8.1.5. Setting the calculated parameters

Parameters must be set in the file **settings.ini**.

```
[CalcProfParameters]
```

```
if (PadHeight == 0) y5 = y0 + L5Point;
```

```
if (PadHeight == 1) y5 = y2 - L5Point;
```

```
L1Point=2 //L1 - a point located below the flange vertex by 2 mm;
```

```
L2Point=70.0 //L2 - a point located at the distance of 70 mm and used for the flange height calculation;
```

```
L3Point= 18 // L3 - deviation from the flange vertex;
```

```
L5Point=13 // L5 - defines the flange thickness.
```

Default parameters:

```
PadHeight = 0.0
```

```
L1Point = 2.0
```

```
L2Point = 70.0
```

```
L3Point = 13.0
```

```
L5Point = 18.0
```

8.2. Operating the system

When all preparation work is done and the system is powered on, it is completely ready to operate.

The measurement process starts automatically, when an inductive sensor detects the wheel. Wheel profiles are taken, when the rolling stock goes through the control area. The maximum train speed is 45 km/hour.

Data gathered from all scanners are transmitted to a server computer via Ethernet in order to calculate geometrical parameters of the wheels. Calculated parameters are sent to the database and to the client application.

9. Software

9.1. System requirements

Operating system	<ul style="list-style-type: none"> • Windows 7 and later, or • Linux
Memory	at least 200 MB RAM
SSD	at least 50 MB available

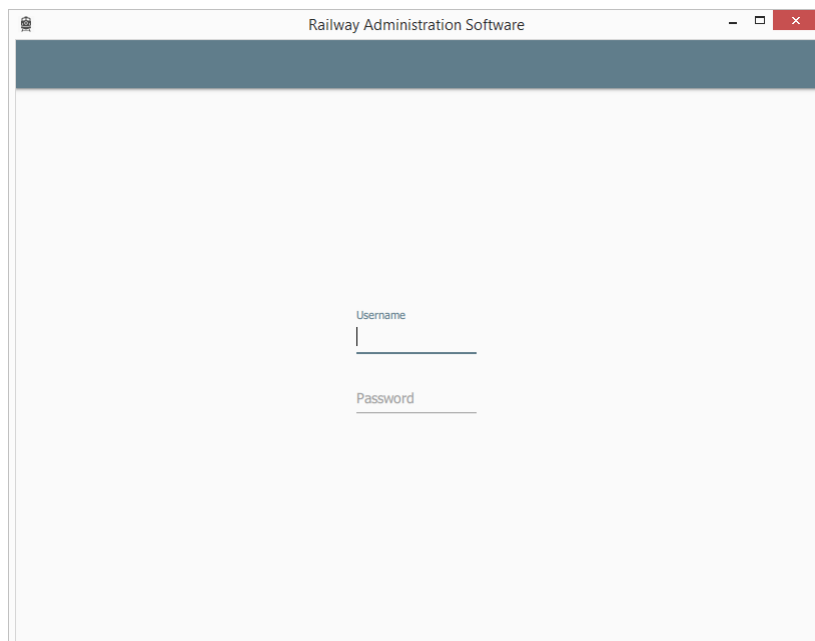
9.2. Installation

To install the software, you need to run **ras.exe**. Follow the guidelines in dialog boxes of the Installation Wizard. By default, the software will be installed in the following directory – C:\Program Files\RIFTEK LLC\RAS\.

To start the software, select **Start > All programs > RIFTEK LLC > RAS > ras.exe**.

9.3. Authorization

After you run the software, you need to log in:



Enter the user name and the password in order to log in to the RAS software.

9.4. Settings

Click the button in the upper right corner of the main window - .

Settings

Database server address
kostovsky.pro

Database server port
3306

Repository root
/mnt/ssd120/try_again

Video subdirectory
video

Video filename
record.avi

Show all videos

User external player

Language: English ▼

Theme: Light ▼

Primary color: BlueGrey ▼

Accent color: BlueGrey ▼

Field / Option	Description
Database server address	Enter the address and port of the database server.
Database server port	
Repository root	Enter a path to the repository.
Video subdirectory	Enter the name of the video files directory.
Video filename	Enter the name of video files.
Show all videos	Display the "Video" icons in the "Measurements" tab for every train. Note: If there is no video files directory on the computer, the "Video" icons will not be displayed.
User external player	Select this option if you run the RAS software on Windows, because in this case the embedded video player doesn't work.
Language	Select the program language.
Theme	Select the theme: Light or Dark.
Primary color	Select the primary color (the tabs bar).
Accent color	Select the accent color (buttons, checkboxes).

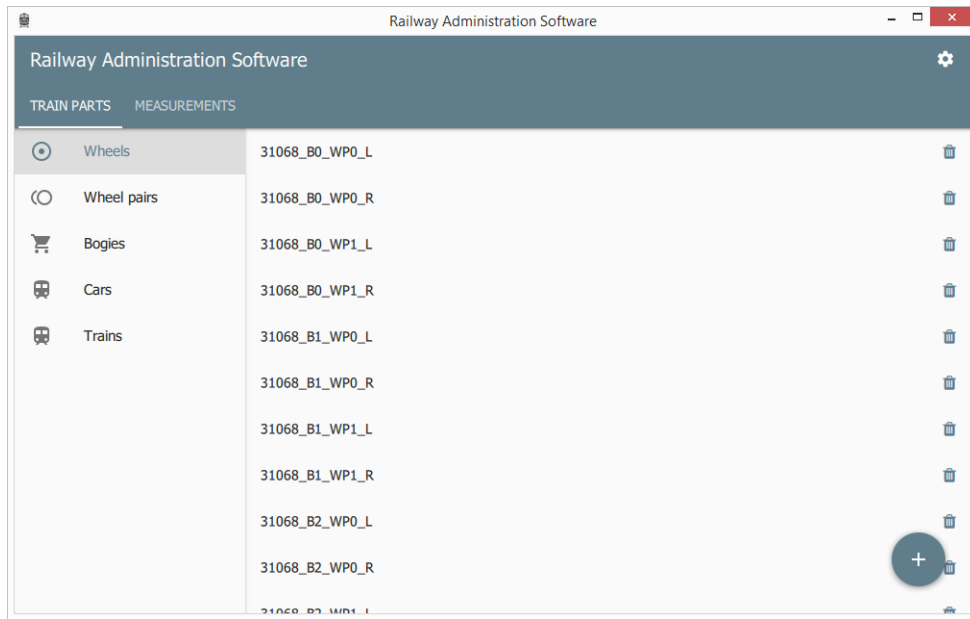
9.5. Main window

9.5.1. "TRAIN PARTS" tab

After the Identification module recognizes a serial number of the car, this serial number appears in the **TRAIN PARTS** tab together with automatically generated serial numbers of the wheels, wheelsets, and bogies. If necessary, the user can edit serial numbers and change some parameters set by default - see the paragraphs below.

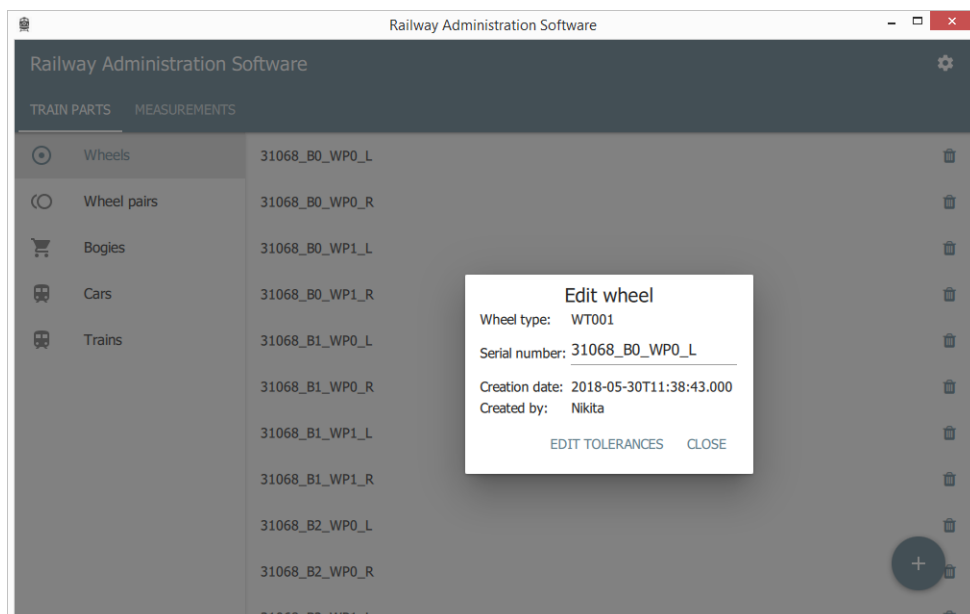
9.5.1.1. Wheels

The **Wheels** tab:




Serial numbers of the wheels are generated automatically in accordance with a serial number of the car.

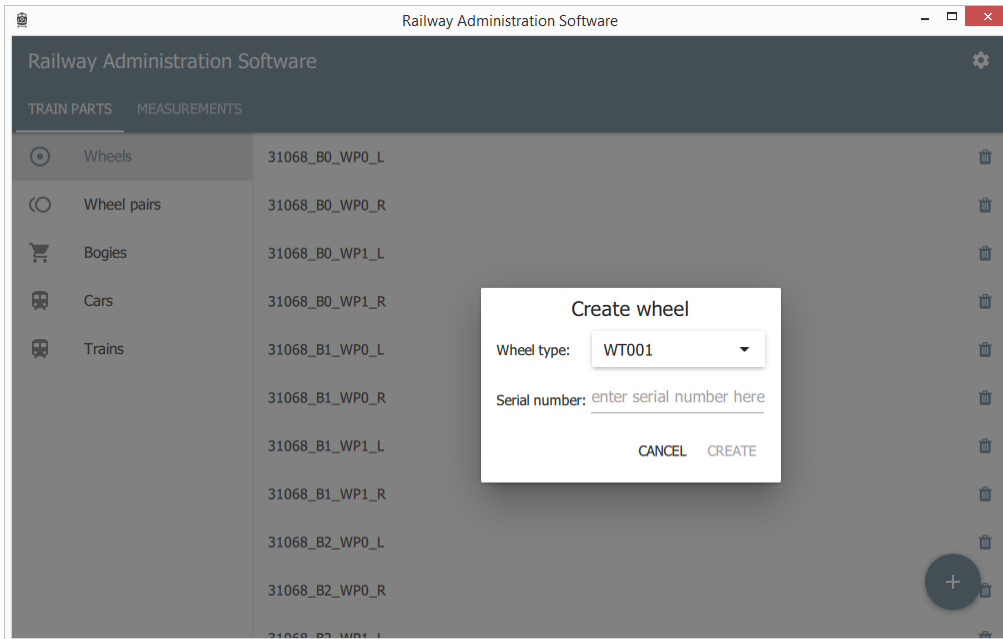
The user is allowed to edit a serial number of the wheel and the tolerances. Click on a serial number of the wheel. The following window appears:



To edit a serial number, just type a new one in the **Serial number** field.

If you need to set the custom tolerances, click the **EDIT TOLERANCES** button and add the measurement types with new tolerances.

To add a new wheel to the list, click the button in the lower right corner of the **Wheels** tab - . The following window appears:

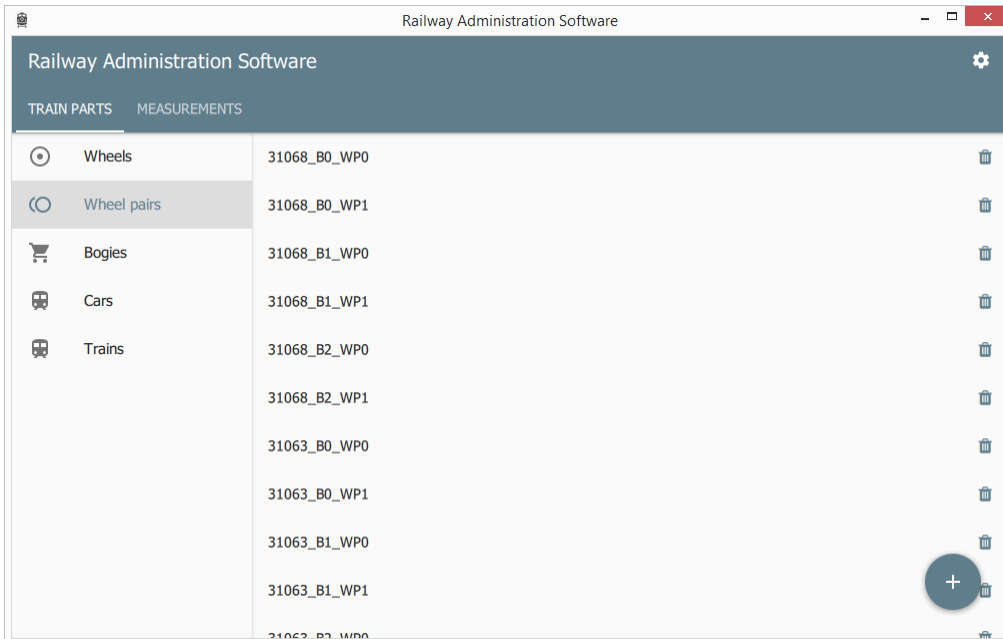


Select the wheel type, enter a serial number, and click **CREATE**.

To delete the wheel, click .

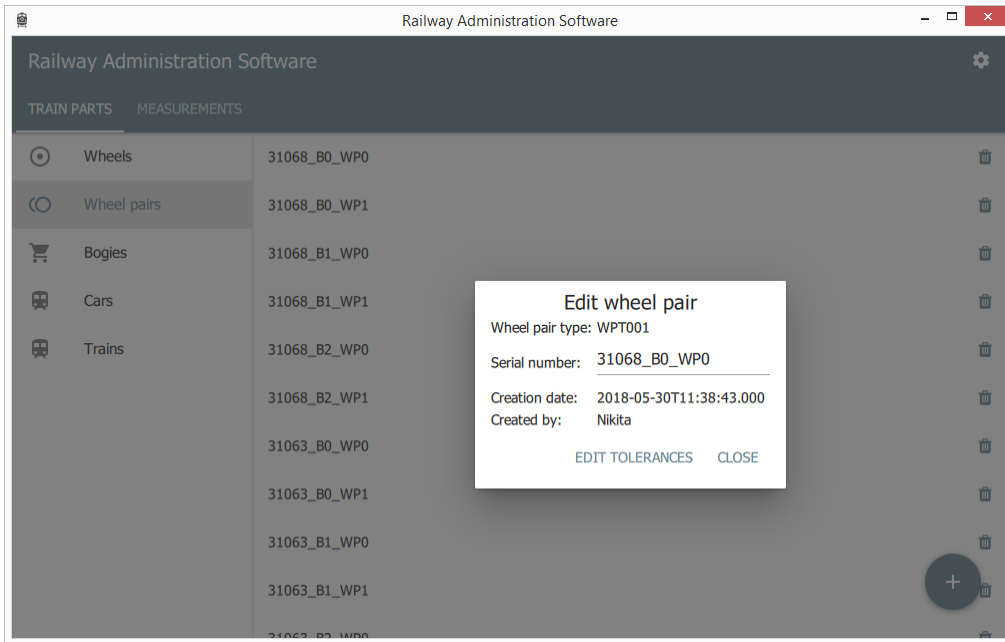
9.5.1.2. Wheel Pairs

The **Wheel pairs** tab:




Serial numbers of the wheelsets are generated automatically in accordance with a serial number of the car.

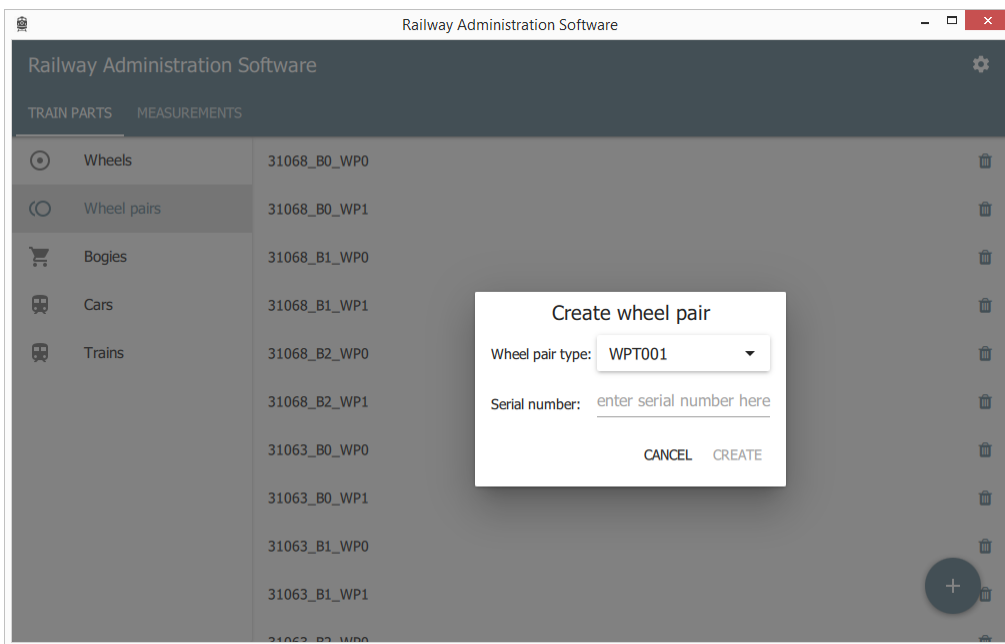
The user is allowed to edit a serial number of the wheelset and the tolerances. Click on a serial number of the wheelset. The following window appears:



To edit a serial number, just type a new one in the **Serial number** field.

If you need to set the custom tolerances, click the **EDIT TOLERANCES** button and add the measurement types with new tolerances.

To add a new wheelset to the list, click the button in the lower right corner of the **Wheel pairs** tab - . The following window appears:

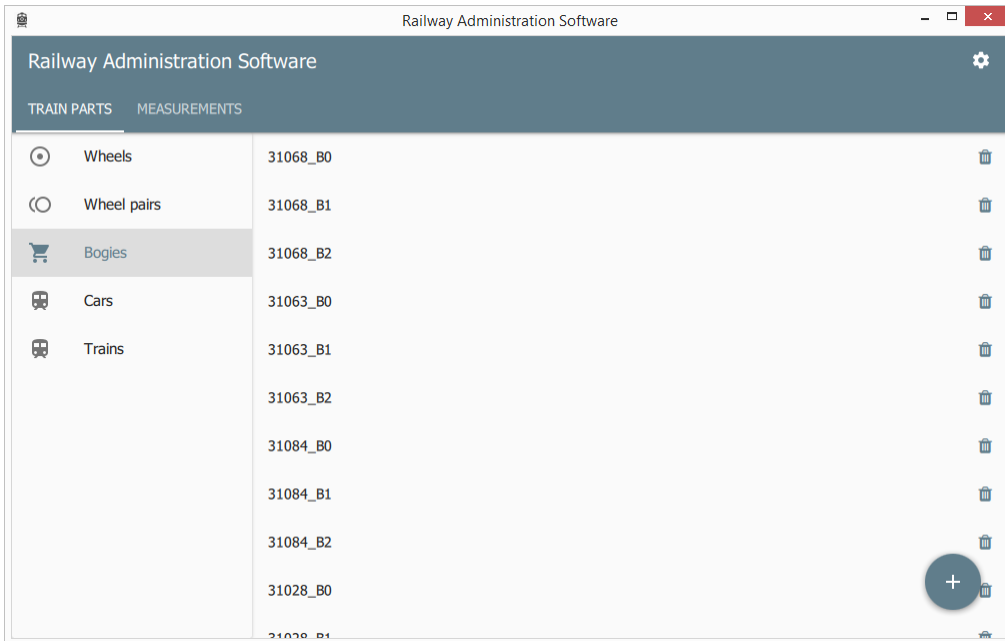


Select the wheelset type, enter a serial number, and click **CREATE**.

To delete the wheelset, click .

9.5.1.3. Bogies

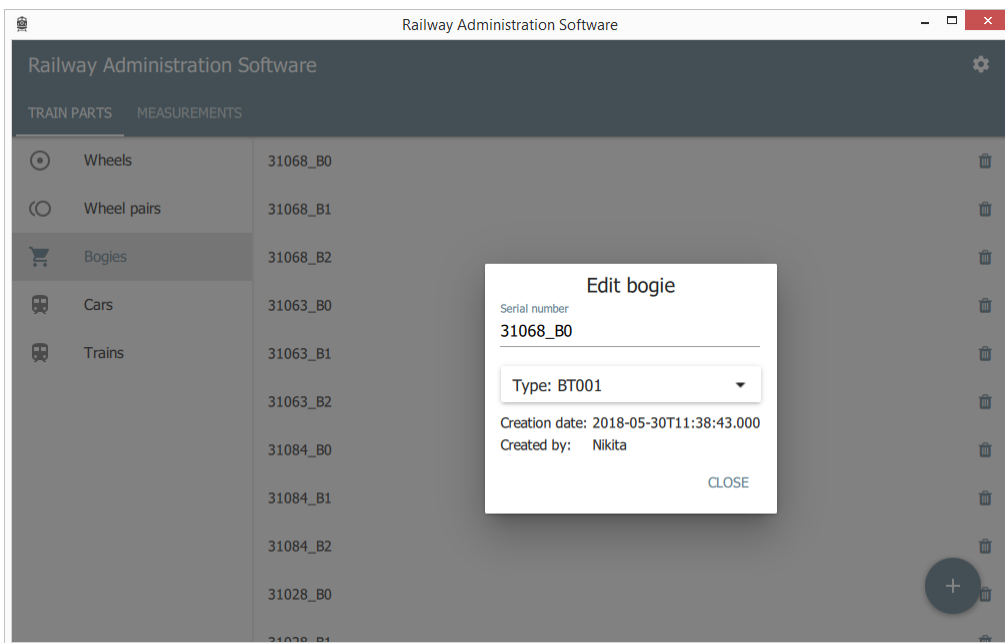
The **Bogies** tab:



25


Serial numbers of the bogies are generated automatically in accordance with a serial number of the car.

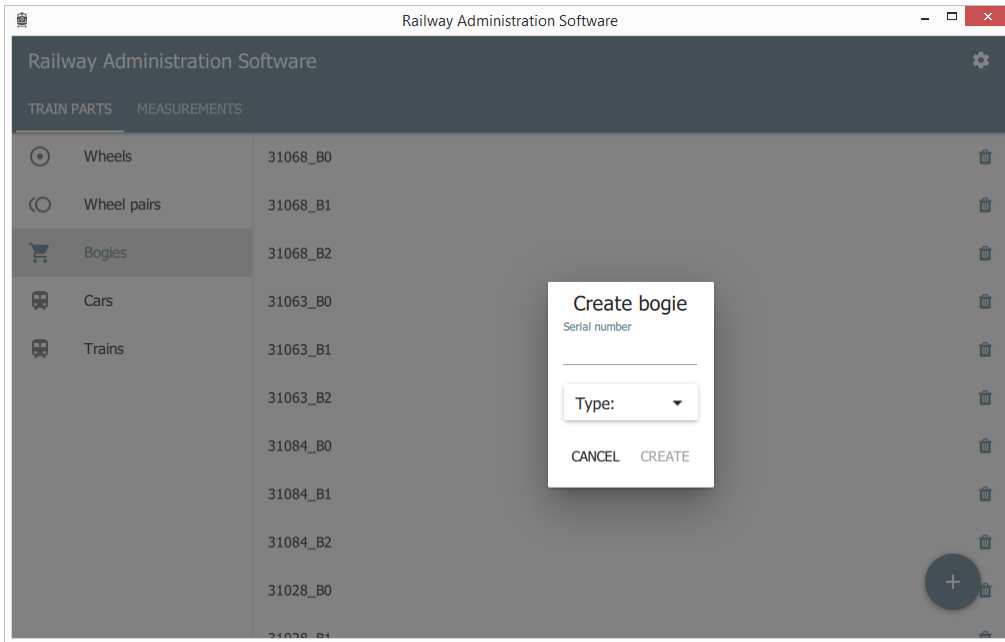
The user is allowed to edit a serial number of the bogie and its type. Click on a serial number of the bogie. The following window appears:




To change a serial number, just type a new one in the **Serial number** field.

To change the bogie type, select another one from the **Type** drop-down list.

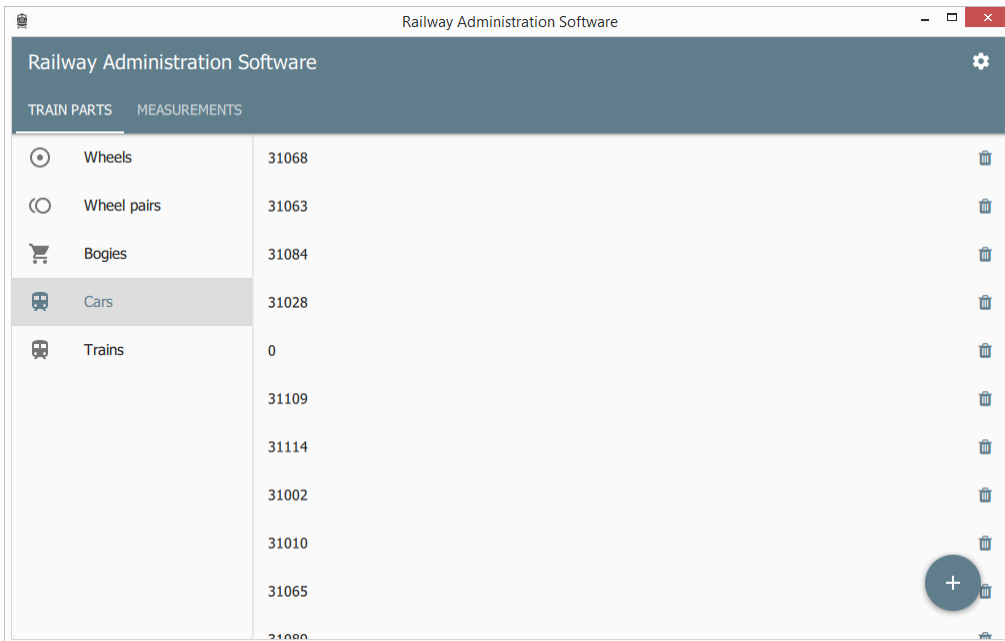
To add a new bogie to the list, click the button in the lower right corner of the **Bogies** tab - . The following window appears:



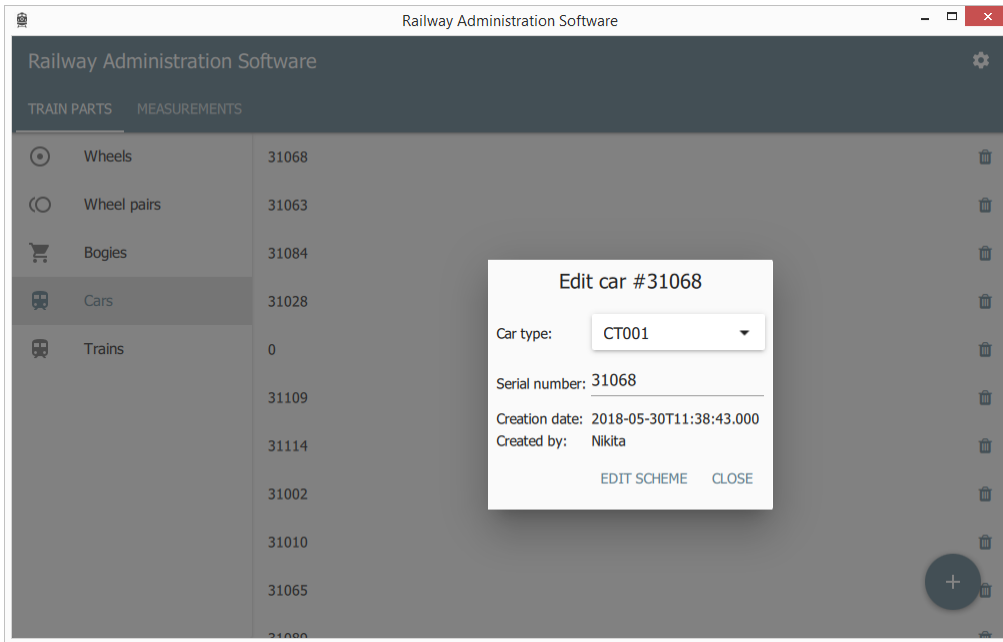
Enter a serial number, select a type, and click **CREATE**.
To delete the bogie, click .

9.5.1.4. Cars

The **Cars** tab:



The user is allowed to edit a serial number of the car, its type and scheme. Click on a serial number of the car. The following window appears:



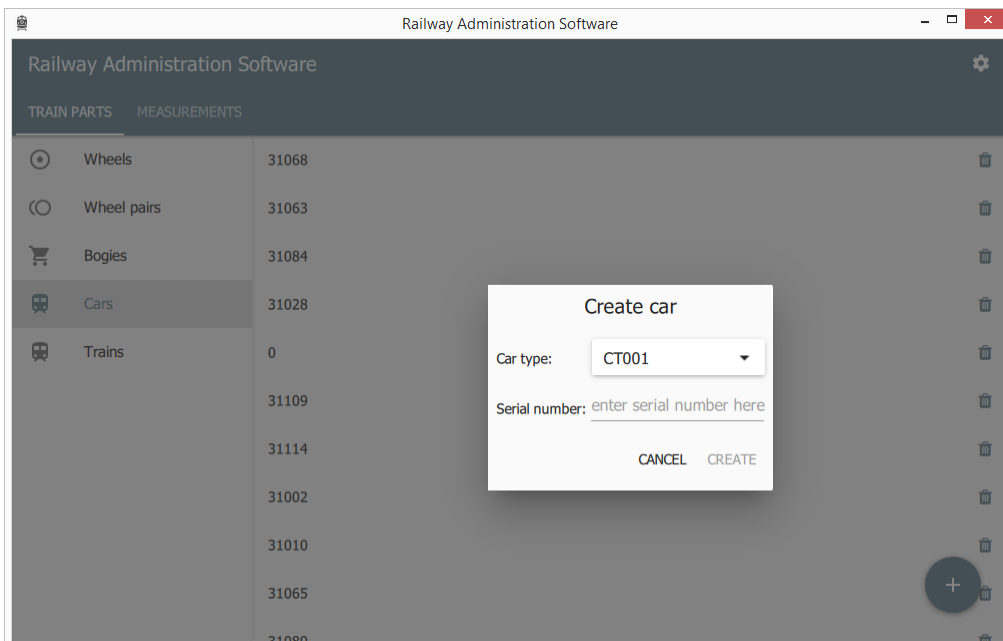
To change the car type, select another one from the **Car type** drop-down list.

To change a serial number, just type a new one in the **Serial number** field.


To edit the car scheme, click the **EDIT SCHEME** button.

To add a new car to the list, click the button in the lower right corner of the **Cars** tab

-  . The following window appears:

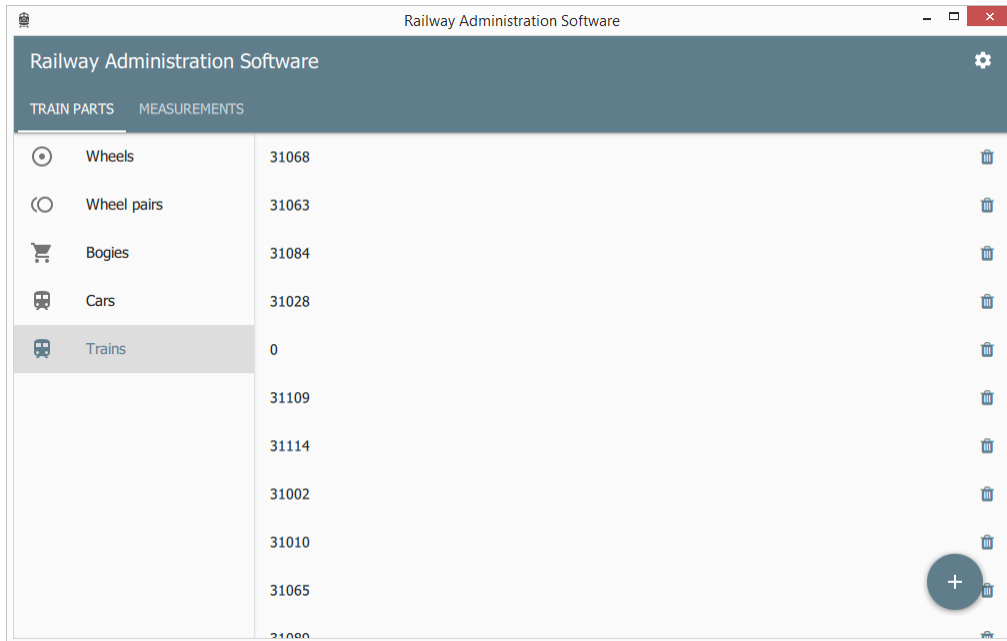


Select a type, enter a serial number, and click **CREATE**.

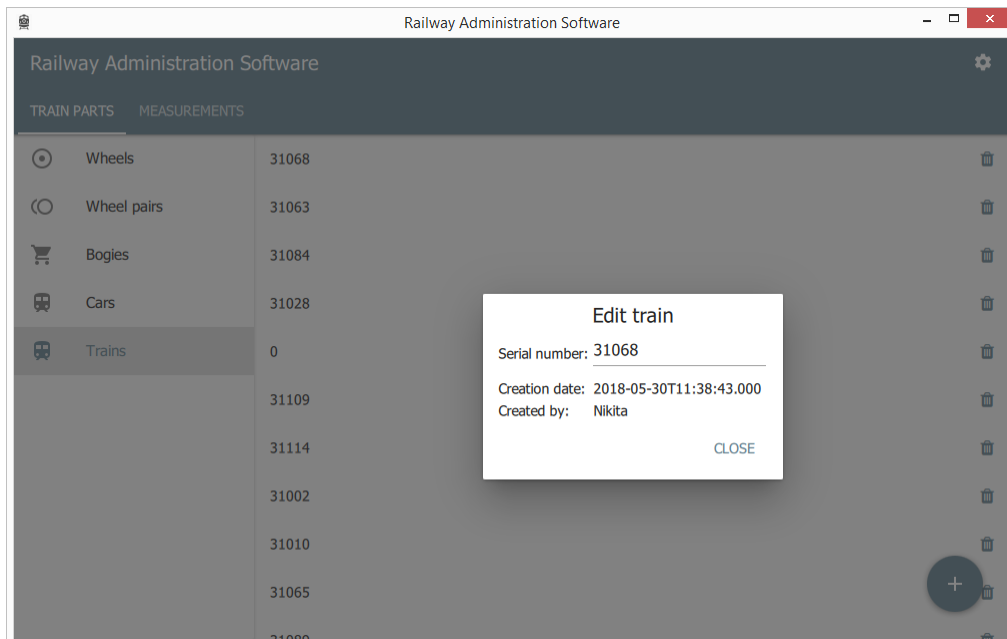
To delete the car, click .

9.5.1.5. Trains


The **Trains** tab:

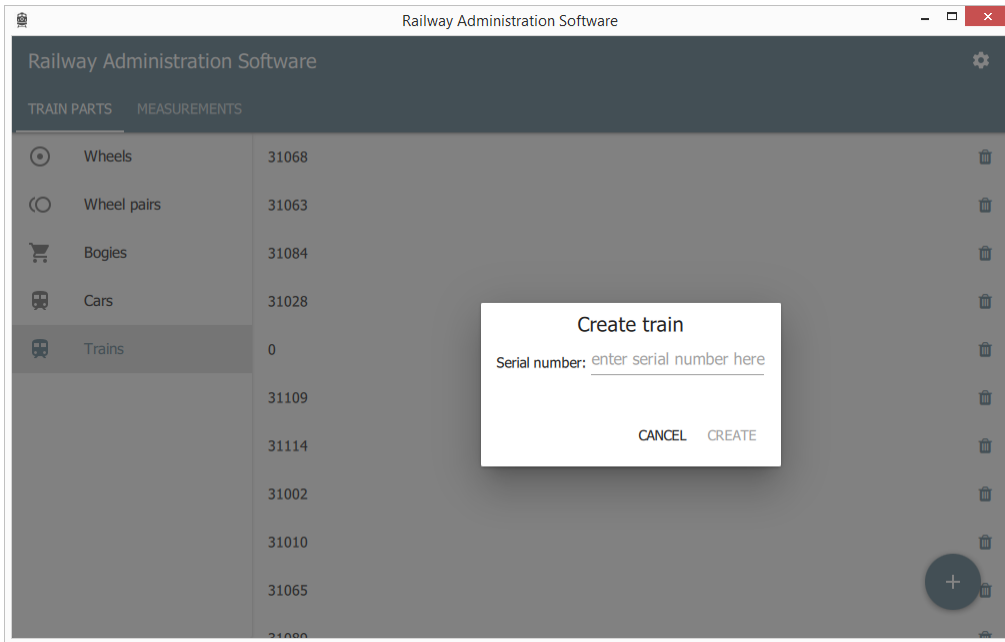



The **Trains** tab contains a list of serial numbers of the trains. To edit a serial number, you need to click on it. The following window appears:



To change a serial number, just type a new one in the **Serial number** field.

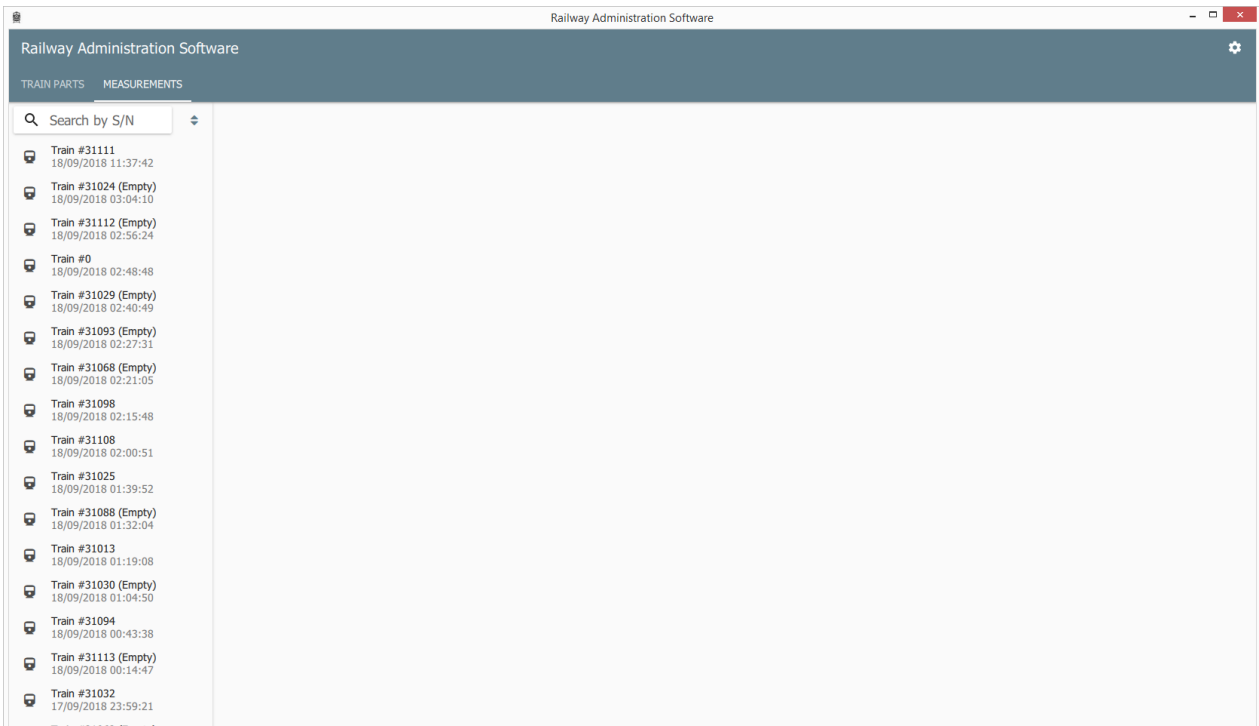
To add a new train to the list, click the button in the lower right corner of the **Trains** tab - . The following window appears:



Enter a serial number and click **CREATE**.
To delete the train, click .

9.5.2. "MEASUREMENTS" tab

The **MEASUREMENTS** tab contains the measurement results. The data is automatically added to the table after the train passes through the control area.



To view the measurement results, click on the item on the left side of the window.

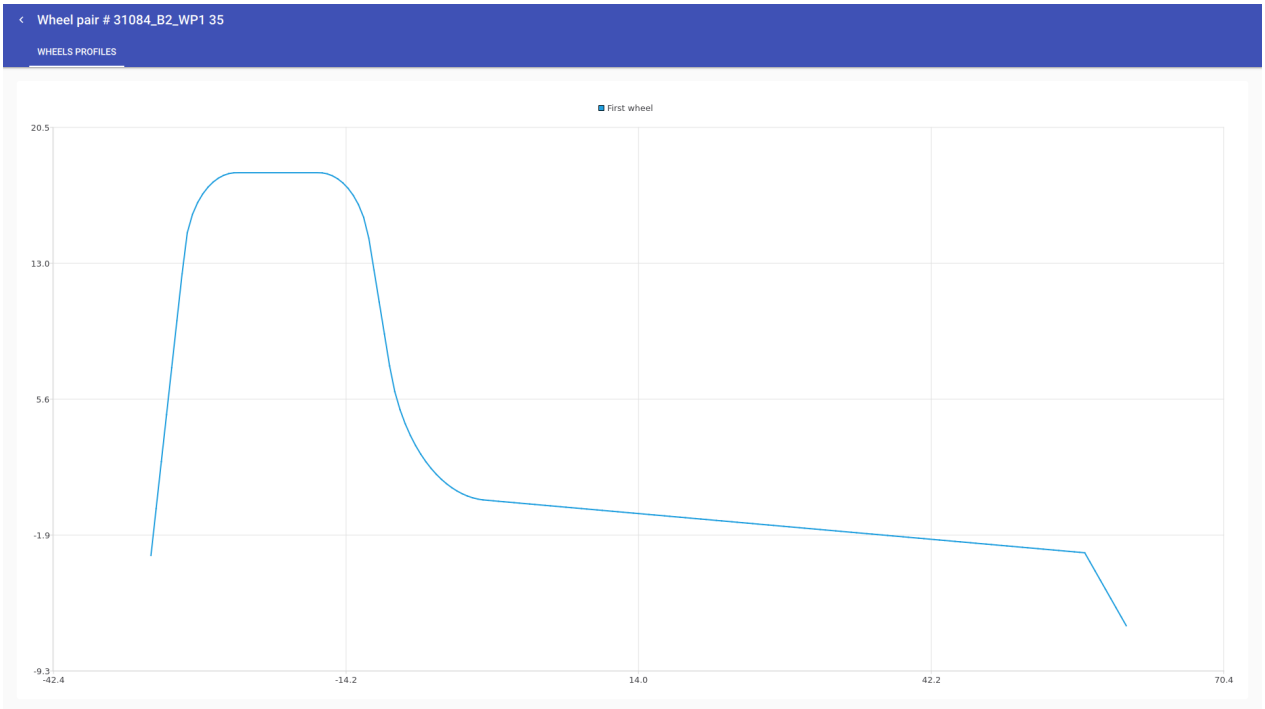
Railway Administration Software


TRAIN PARTS MEASUREMENTS

Search by S/N

	Diameter (D) (Left)	Diameter (D) (Right)	Flange Height (sH) (Left)	Flange Height (sH) (Right)	Flange Width (sD) (Left)	Flange Width (sD) (Right)	Rim Width (L) (Left)	Rim Width (L) (Right)	Rim Thickness (T) (Left)	Rim Thickness (T) (Right)	Out Growth (oG) (Left)	Out Growth (oG) (Right)	Radial Runout (rO) (Left)	Radial Runout (rO) (Right)	Back-to-Back Distance (B2b)	Axial Runout (AxisRO)	Diameter wheelset (DD)	Diameter difference car (DDC)
Train #31111 18/09/2018 11:37:42	613.31	611.87	16.58	16.05	12.85	12.31	94.79	94.89	55.15	54.44	2.70	3.25	3.68	3.68	1475...	9.75	1.44	0.00
Train #31024 (Empty) 18/09/2018 03:04:10	616.90	612.69	15.84	18.33	18.39	17.68	93.92	94.94	56.95	54.84	3.02	3.57	4.03	4.03	1475...	9.90	4.21	0.00
Train #31112 (Empty) 18/09/2018 02:56:24	616.36	615.62	16.33	16.60	14.07	13.81	94.65	94.77	56.68	56.31	2.43	2.53	0.60	0.60	1476...	8.88	0.74	0.00
Train #0 18/09/2018 02:48:48	616.89	615.64	17.05	18.06	18.30	19.03	94.48	94.82	56.95	56.32	2.74	3.11	3.43	3.43	1475...	8.46	1.25	0.00
Train #31029 (Empty) 18/09/2018 02:40:49	616.89	614.39	15.68	16.77	13.93	13.66	94.40	94.68	56.94	55.70	2.63	2.78	0.60	0.60	1475...	9.40	2.49	0.00
Train #31093 (Empty) 18/09/2018 02:27:31	616.11	613.93	17.14	18.18	18.69	19.05	93.97	94.16	56.55	55.47	3.21	3.32	2.71	2.71	1475...	8.83	2.17	0.00
Train #31068 (Empty) 18/09/2018 02:21:05																		
Train #31098 18/09/2018 02:15:48																		
Train #31108 18/09/2018 02:00:51																		
Train #31025 18/09/2018 01:39:52																		
Train #31088 (Empty) 18/09/2018 01:32:04																		
Train #31013 18/09/2018 01:19:08																		
Train #31030 (Empty) 18/09/2018 01:04:50																		
Train #31094 18/09/2018 00:43:38																		
Train #31113 (Empty) 18/09/2018 00:14:47																		
Train #31032 17/09/2018 23:59:21																		

To view the wheel profile, double-click on the diameter value in the table of measurement results.



You can use the search bar to find the train by its serial number.
To apply sorting and filtering, click  and select the options:

View: Passages

Sort by: Date/Time

Order: Descending

Show empty

Show unrecognized

Strict filter

9.6. Hot keys

Ctrl + Page Up Ctrl + Page Down	Switching between the items in the list.
Ctrl + N	Create a new item.
Ctrl + Q	Close the software application.
Ctrl + Shift + Q	Log out.
Alt + 1 Alt + 2 Alt + 3	Switching between tabs: 1 - BASIC WIZARDS, 2 - TRAIN PARTS, 3 - MEASUREMENTS.
Esc	Go back to the main window.

10. Technical maintenance

The technical maintenance of the system is performed to guarantee its permanent readiness for operation as well as to prevent premature failure of the system components. The technical maintenance involves preventive measures aimed at identifying and eliminating defects, and at ensuring a normal operation of the system.

The following maintenance procedures must be performed daily:

- Visual inspection of the system for completeness and absence of damage.
- Visual inspection of the windows of all scanners for contamination and, if necessary, cleaning with a soft, lint-free cloth and non-streaking glass cleaner or 20% alcohol.

The following maintenance procedures must be performed once a month:

- Calibration (see par. [8.1.4.2.](#)). **NOTE:** In the first two months of operation, the calibration procedure must be performed once a week.

11. Warranty policy

Warranty assurance for the Real Time Wheels Geometry Measurement System 3DWheel Series – 24 months from the date of putting in operation; warranty shelf-life – 12 months.

12. List of changes

Date	Revision	Description
01.08.2017	1.0.0	Starting document.
01.08.2018	1.1.0	Updated: <ul style="list-style-type: none"> • 8.1.4.2. "Calibration" • 8.1.4.3. "Setting the exposure time" • 9. "Software"

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14. RIFTEK's measurement devices for railway transport

Laser wheel profilometer. IKP Series

A laser profilometer is designed for the measuring of:

- wheel flange height;
- wheel flange thickness;
- wheel flange slope;
- full profile scanning and analyze of wheel rolling surface;
- maintaining of electronic wear data base;
- control of tolerances and sorting in the course of checkup, examination, repair and formation of railway wheel sets.

Measurements are made directly on rolling stock without wheel set roll-out.



Portable laser rail profilometer. PRP Series

The main functions of PRP are:

- obtaining the information on the cross-section profile of the working railhead surface;
- full profile scanning and analyze of the railhead acting face;
- visualization of the combined graphical images of actual and new cross-section railhead profiles on the display of system unit.



Wheel diameter measuring gauge. IDK Series

Electronic gauge is designed for measuring wheel rolling circle diameter of railway, metro and tram wheel sets.

Measurements are made directly on rolling stock without wheel set roll-out.





Back-to-back distance measuring gauge. IMR Series

Gauge is designed for contactless measuring of back-to-back distance of railway, metro and tram wheels in the course of checkup, examination, repair and formation of wheel sets.

Measurements are made directly on rolling stock without wheel set roll-out.



Back-to-back distance measuring gauge. IMR-L Series

Gauge is designed for contactless measuring of back-to-back distance of railway, metro and tram wheels in the course of checkup, examination, repair and formation of wheel sets.

Measurements are made directly on rolling stock without wheel set roll-out.



Disc brakes profile gauge, IKD Series

Laser disc brakes profilometer IKD Series is designed for disc brakes profile measuring.

The main functions of IKD are:

- obtaining the information on the profile parameters of the working disc brakes surface;
- full profile scanning and analyze of the disc brakes acting face;
- visualization of the combined graphical images of actual and new disc brakes profiles on the display of system unit.



Automatic real-time system for measurement of wheelsets geometrical parameters

The system is designed for contactless automatic measurement of geometrical parameters of railway wheels and uses a combination of 2D laser scanners, mounted wayside in the track area.

The system can be easily installed at any type of rail infrastructure.