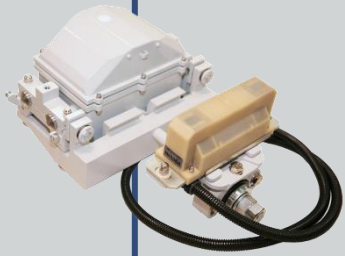


**WAYSIDE ROLLING STOCK DIAGNOSTIC  
AND MONITORING AKRO**

**AKRO** is a comprehensive solution for an intelligent rolling stock diagnostics and monitoring system

- Modular wayside diagnostic equipment (checkpoint and station equipment)
- Flexible and multi-level centralization for monitoring



**HBD** – Hot Box Detection

**HWD** – Hot Wheel Detection

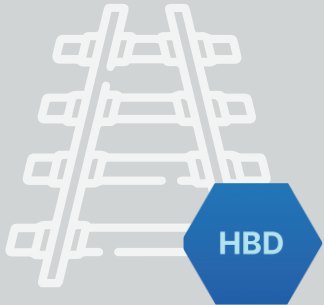
**DED** – Dragging Equipment Detection

**AVI** – Automatic Vehicle Identification

**WDD** – Wheel Defect Detection

**WIM** – Weighing In Motion

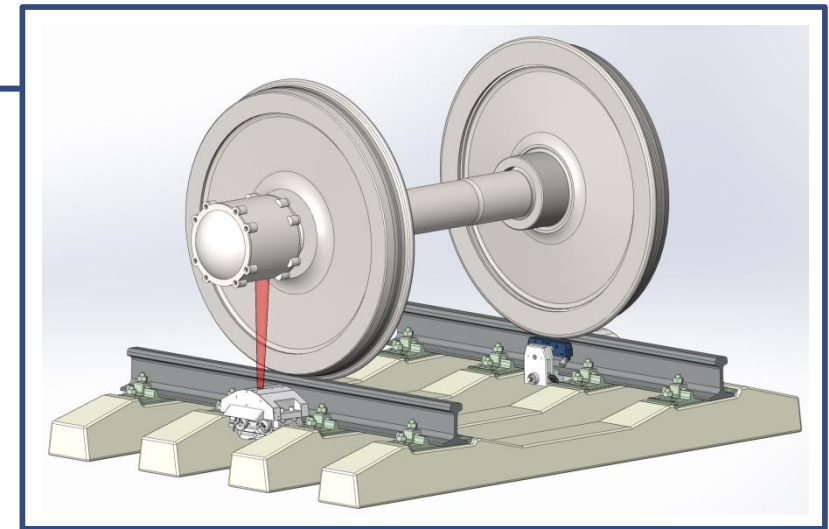




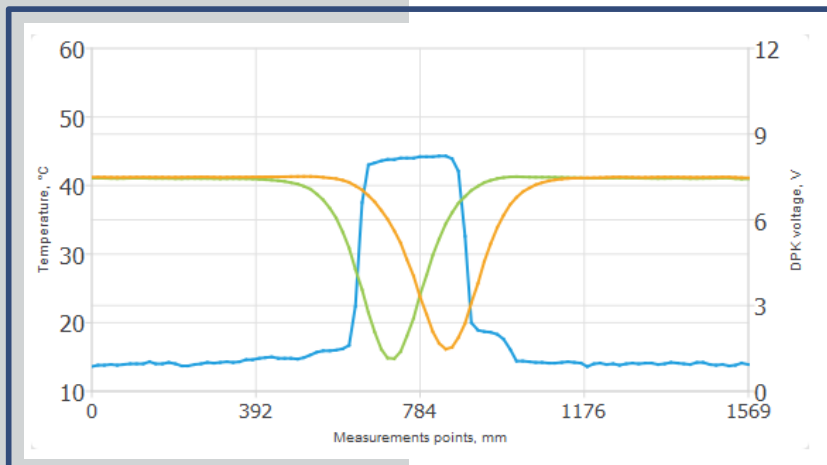
## Hot Box Detection (HBD)

Bearing defects and brake system failures are the most common rolling stock failures. However, they are dangerous and can lead to derailment of the train.

Economic losses from such incidents can reach millions of euros.

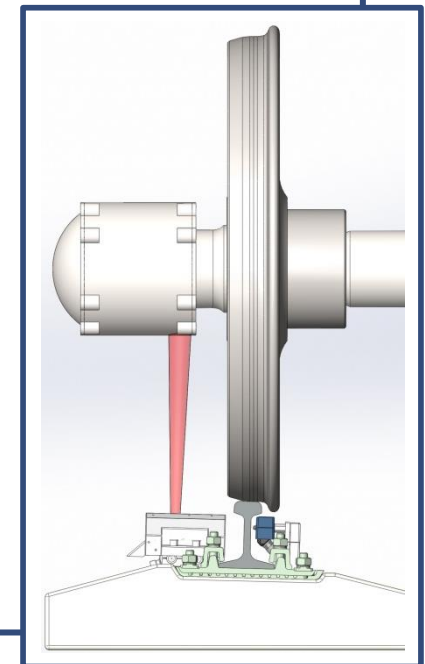


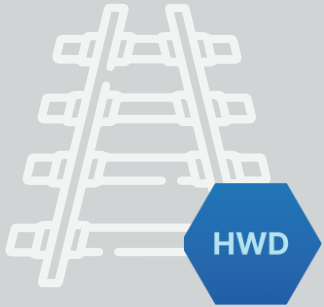
**HBD function** is used for checking the Axle Box heating due to bearing fail.



**AKRO allows the operator to view the temperature profiles of each axle box\*. This feature helps to minimize the waste of resources on false positive alarms/warnings.**

*\*only temperature profiles where alarm or warning were recorded are stored on a long-term basis.*

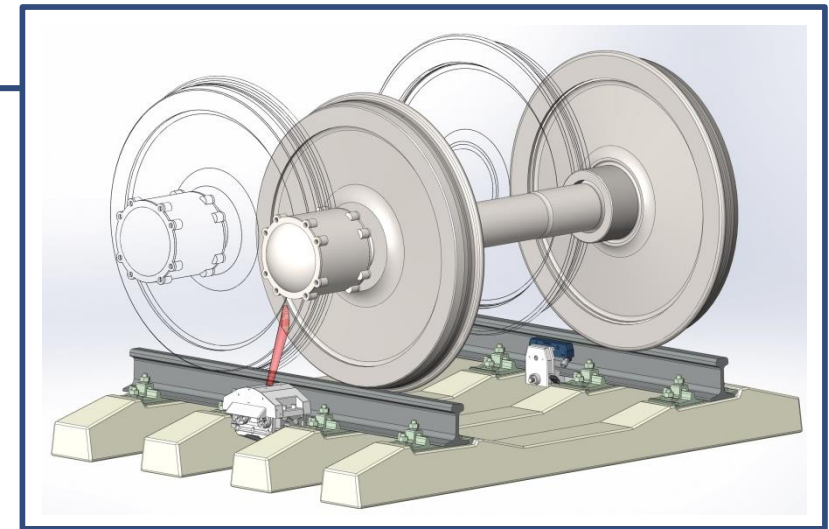




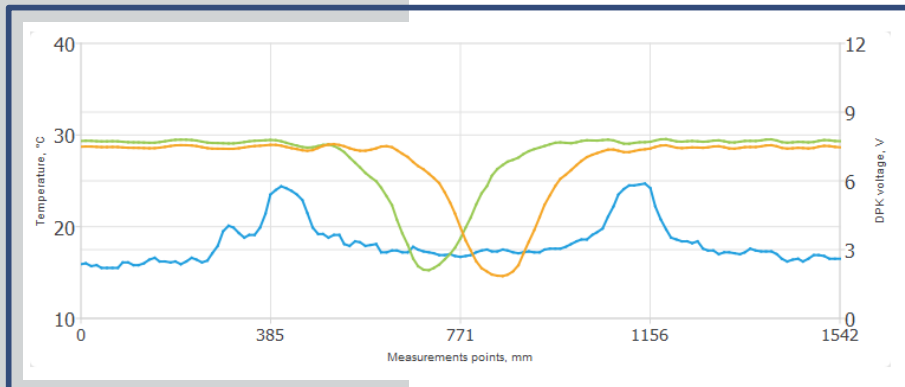
## Hot Wheel Detection (HWD)

Another rolling stock issue is a brake system failure (jamming or wearing out of the pads). If the brake pads are jammed, they wear out quickly and increase fuel/energy consumption for traction. In some cases, significant heating of the wheel rim can be a fire hazard.

AKRO allows you to measure the temperature in the rim area, the area that heats up the most when the brakes are stuck.

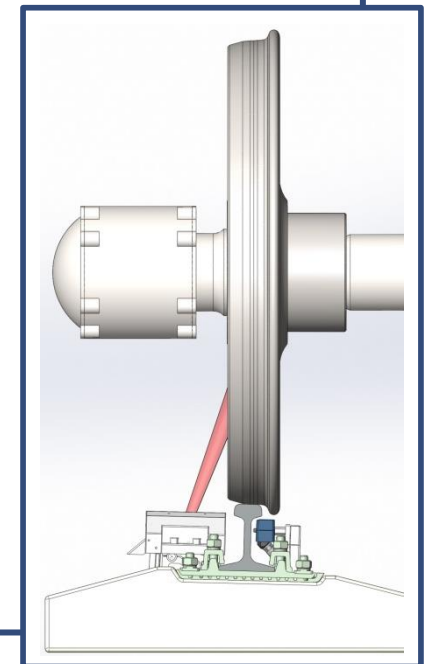


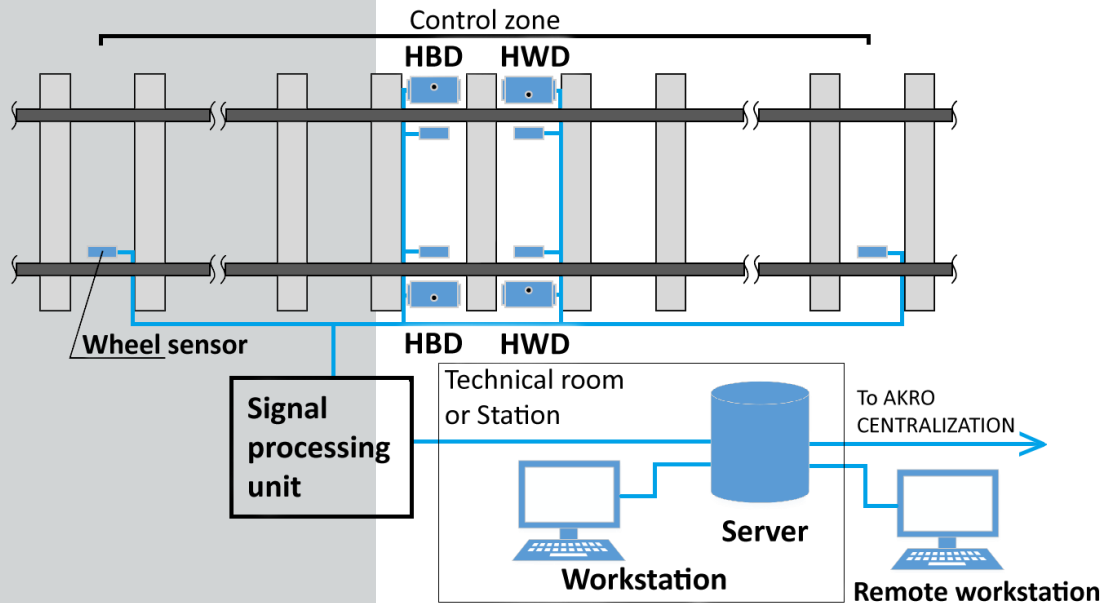
**HWD function** is used for checking Wheel Disk heating due to jammed brake pads.




**AKRO allows the operator to view the temperature profiles of each wheel disk\*. This feature helps to minimize the waste of resources on false positive alarms/warnings**

*\*only temperature profiles where alarm or warning were recorded are stored on a long-term basis.*






 **Checkpoint equipment**

- **HBD** measures the temperature of the axle boxes
- **HWD** measures the temperature of the wheel disks
- **Signal Processing Unit** collects and processes the measured data and stores the data until transferring it to the server

*The Signal Processing Unit* has a built-in uninterruptible power supply function (8 h. minimum).

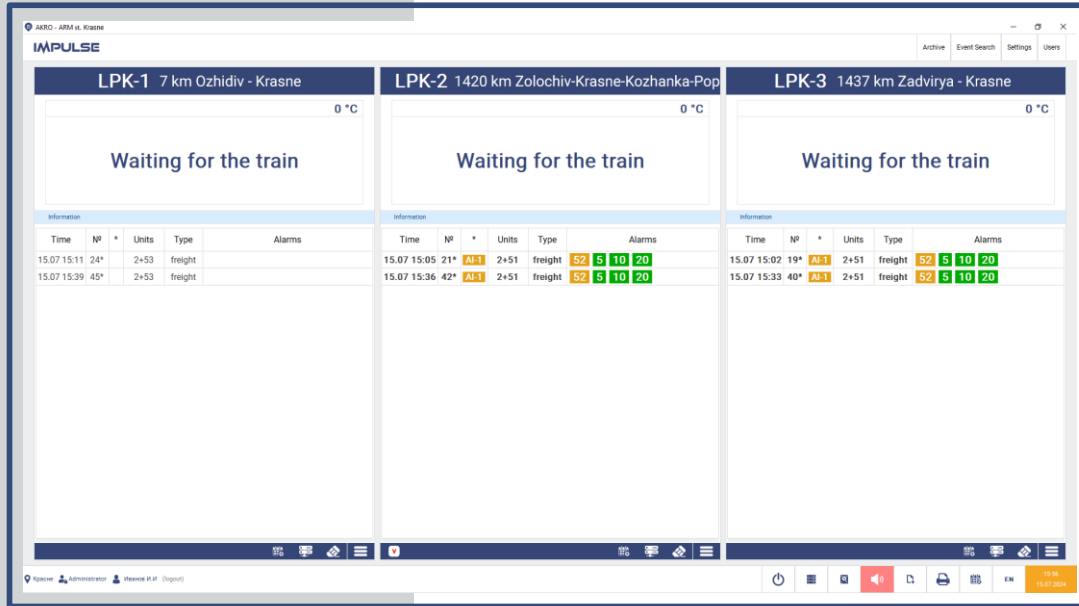
 **Station equipment**

- **Server\***
- **A Workstation** is one or some industrial workstations\*

*The Workstation* can be connected to the Server via a local network or remotely.

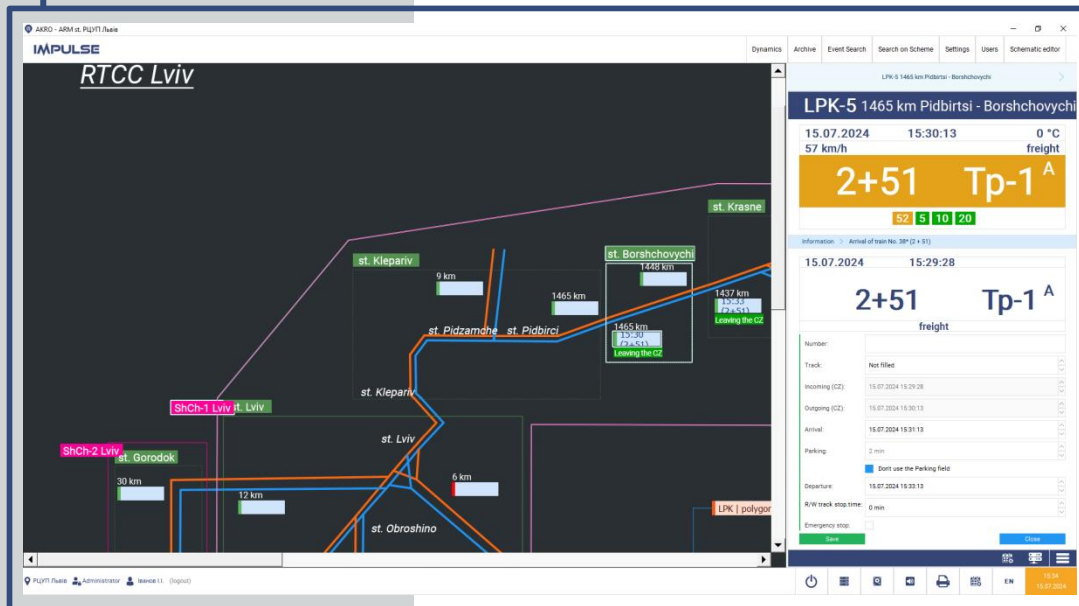
*\*Server and industrial workstation* are supplied as standard with passive cooling.





**AKRO-B software - an intelligent diagnostic tool**

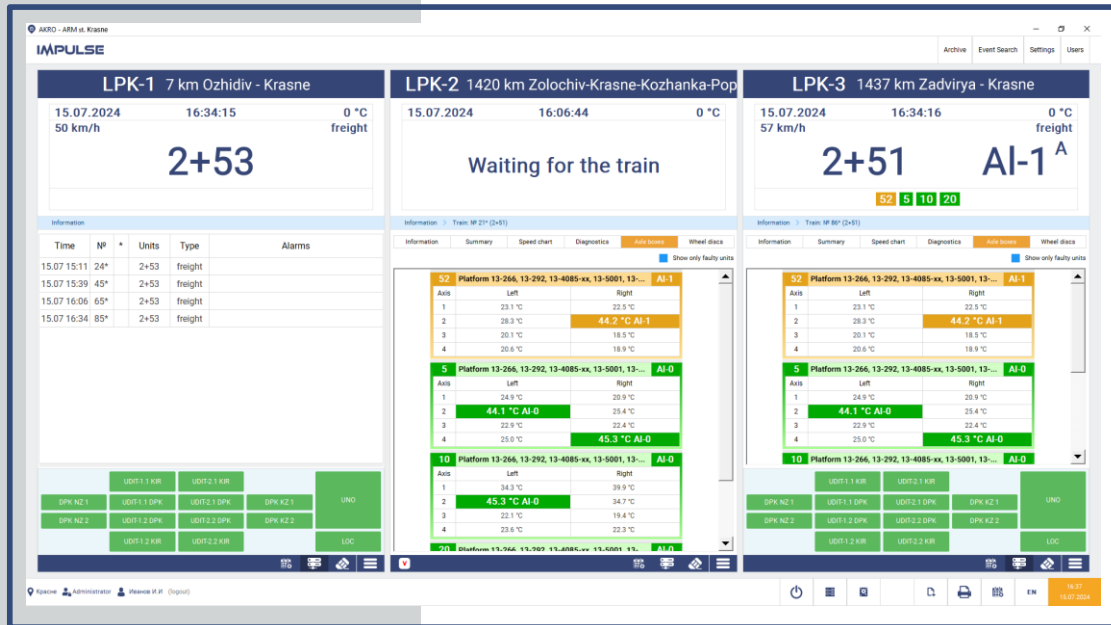
AKRO-B allows the station dispatcher to operate up to 4 sets of AKRO checkpoint equipment at one workstation



**AKRO-C software - an intelligent monitoring (centralization) tool**

AKRO-C allows you to build a centralization system for servicing a railway section, regional or national railway



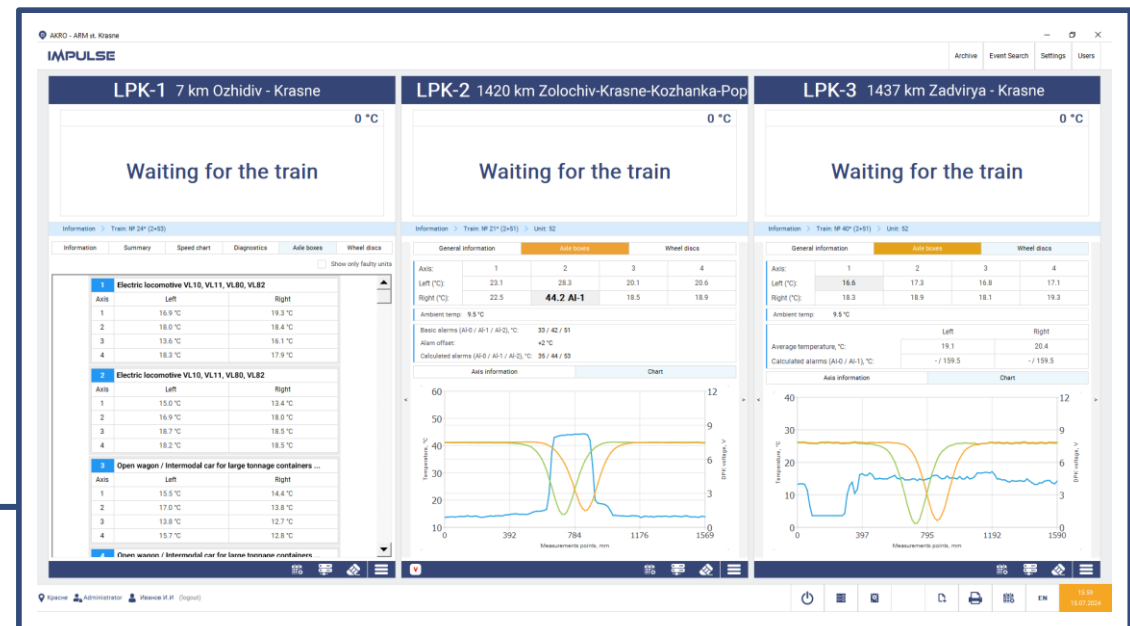
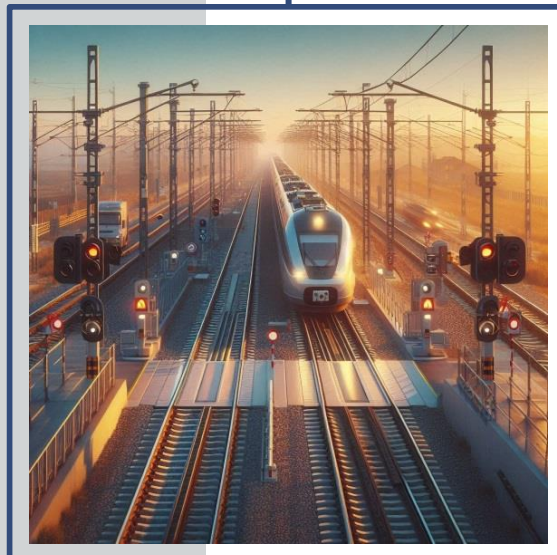


AKRO-B allows the operator to get:

- Information about trains (in real time or those that have passed earlier):
- Status of check-point equipment.

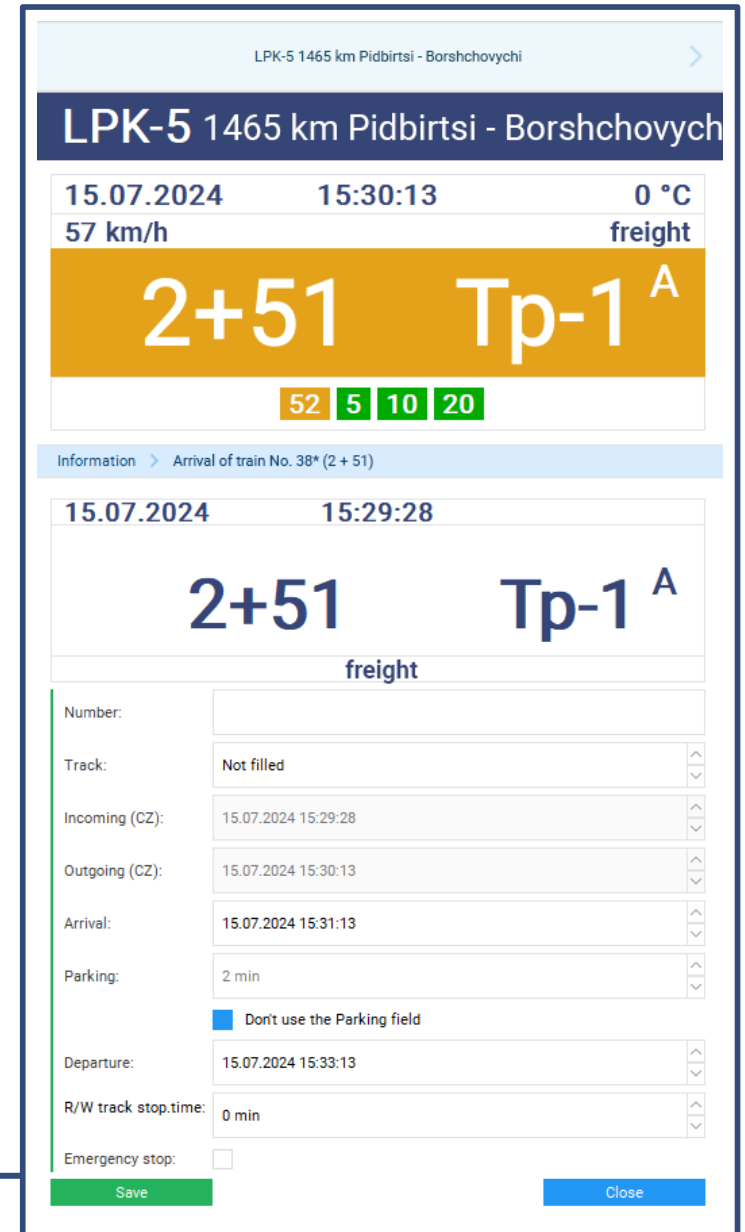
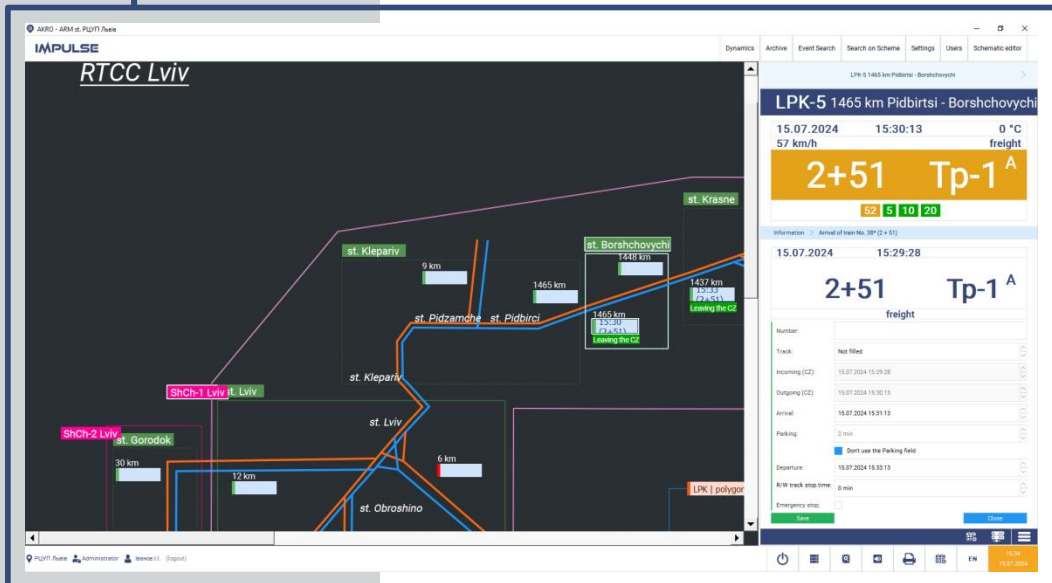
Possibility to view all measured temperature profiles (axle boxes and wheel disks).

Temperature profiles include both temperature data and signals from wheel sensors. This combination allows to quickly and adequately evaluate the primary measurement data if necessary.



## Operational information about the situation, notifications of warnings and alarms:

- Information about the status of rolling stock in trains that have passed through checkpoints
- Details of warnings and alarms of each train passage
- Other information about train passages





Access to detailed information about the condition of the train and AKRO equipment at checkpoints:



Date and time of train passage



Number of rolling stock/axles in the train



Train warnings and alarms



Condition of the AKRO checkpoint equipment

Online monitoring tool

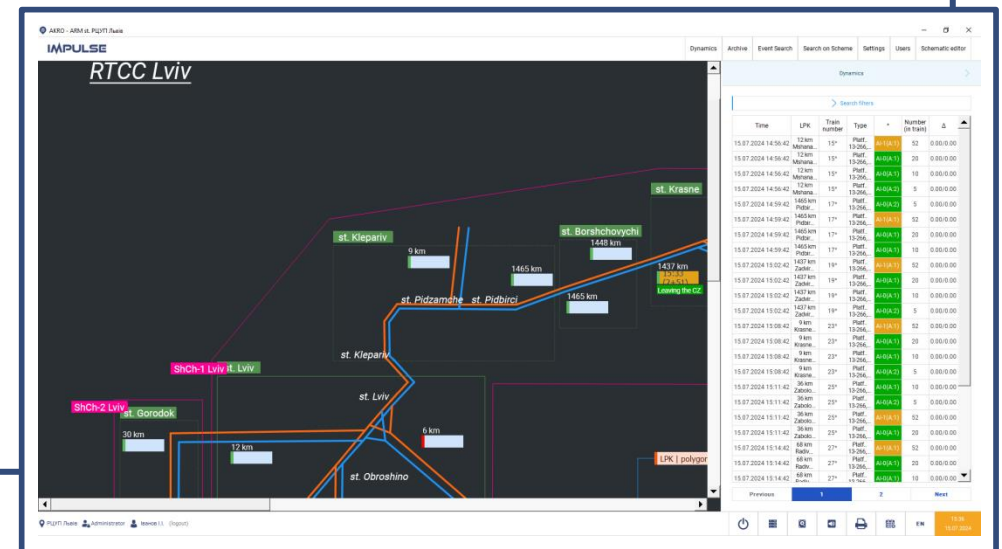
Flexible train search filter:  
by date, by checkpoint, by  
specific warnings or alarms, etc.

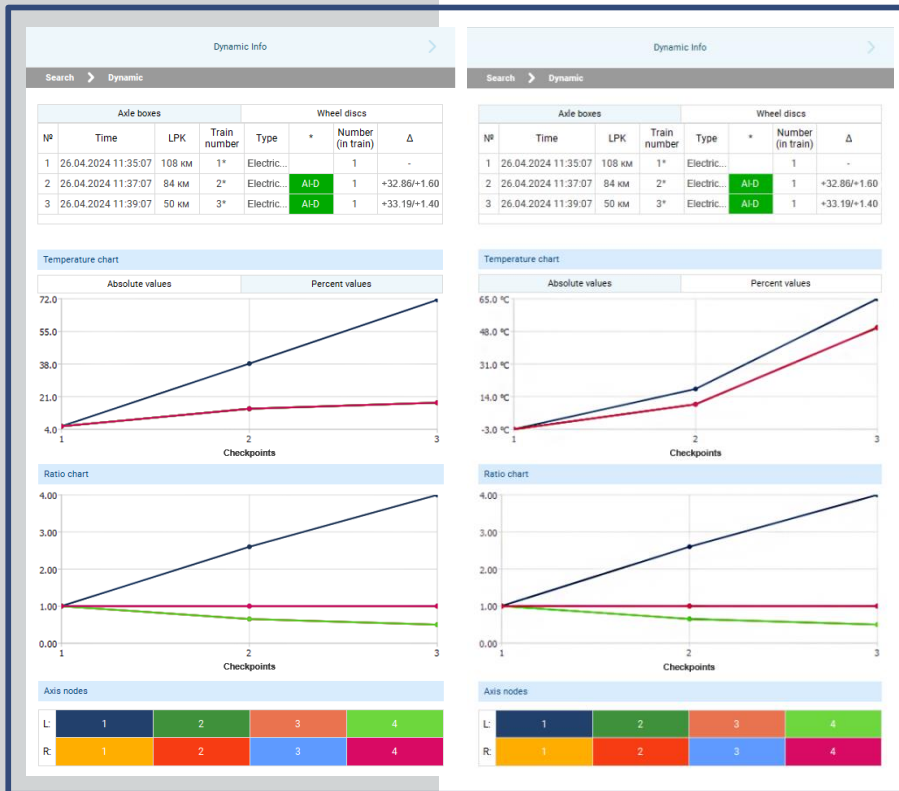
Dynamics

Search filters

Time	LPK	Train number	Type	*	Number (in train)	Δ
15.07.2024 14:56:42	12 km Mshana...	15*	Platf.. 13-266...	AI-1 (A.1)	52	0.00/0.00
15.07.2024 14:56:42	12 km Mshana...	15*	Platf.. 13-266...	AI-0(A.1)	20	0.00/0.00
15.07.2024 14:56:42	12 km Mshana...	15*	Platf.. 13-266...	AI-0(A.1)	10	0.00/0.00
15.07.2024 14:56:42	12 km Mshana...	15*	Platf.. 13-266...	AI-0(A.2)	5	0.00/0.00
15.07.2024 14:59:42	1465 km Pidbir...	17*	Platf.. 13-266...	AI-0(A.2)	5	0.00/0.00
15.07.2024 14:59:42	1465 km Pidbir...	17*	Platf.. 13-266...	AI-1 (A.1)	52	0.00/0.00
15.07.2024 14:59:42	1465 km Pidbir...	17*	Platf.. 13-266...	AI-0(A.1)	20	0.00/0.00
15.07.2024 14:59:42	1465 km Pidbir...	17*	Platf.. 13-266...	AI-0(A.1)	10	0.00/0.00
15.07.2024 15:02:42	1437 km Zadvir...	19*	Platf.. 13-266...	AI-1 (A.1)	52	0.00/0.00
15.07.2024 15:02:42	1437 km Zadvir...	19*	Platf.. 13-266...	AI-0(A.1)	20	0.00/0.00
15.07.2024 15:02:42	1437 km Zadvir...	19*	Platf.. 13-266...	AI-0(A.1)	10	0.00/0.00
15.07.2024 15:02:42	1437 km Zadvir...	19*	Platf.. 13-266...	AI-0(A.2)	5	0.00/0.00
15.07.2024 15:08:42	9 km Krasne...	23*	Platf.. 13-266...	AI-1 (A.1)	52	0.00/0.00
15.07.2024 15:08:42	9 km Krasne...	23*	Platf.. 13-266...	AI-0(A.1)	20	0.00/0.00
15.07.2024 15:08:42	9 km Krasne...	23*	Platf.. 13-266...	AI-0(A.1)	10	0.00/0.00
15.07.2024 15:08:42	9 km Krasne...	23*	Platf.. 13-266...	AI-0(A.2)	5	0.00/0.00
15.07.2024 15:11:42	36 km Zabolo...	25*	Platf.. 13-266...	AI-0(A.1)	10	0.00/0.00
15.07.2024 15:11:42	36 km Zabolo...	25*	Platf.. 13-266...	AI-0(A.2)	5	0.00/0.00
15.07.2024 15:11:42	36 km Zabolo...	25*	Platf.. 13-266...	AI-1 (A.1)	52	0.00/0.00
15.07.2024 15:11:42	36 km Zabolo...	25*	Platf.. 13-266...	AI-0(A.1)	20	0.00/0.00
15.07.2024 15:14:42	68 km Radiv...	27*	Platf.. 13-266...	AI-1 (A.1)	52	0.00/0.00
15.07.2024 15:14:42	68 km Radiv...	27*	Platf.. 13-266...	AI-0(A.1)	20	0.00/0.00
15.07.2024 15:14:42	68 km Radiv...	27*	Platf.. 13-266...	AI-0(A.1)	10	0.00/0.00

Previous 1 2 Next

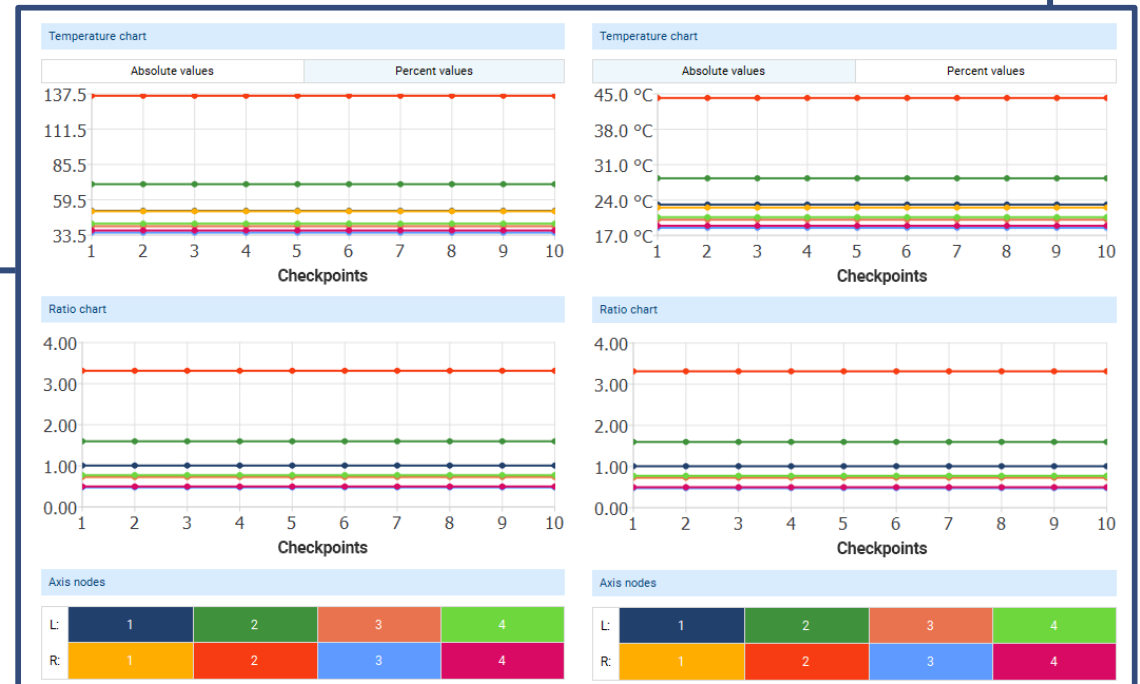




## Monitoring of rolling stock condition changes in dynamics:

- Computer-aided analysis of Axle Box heating
- Computer-aided analysis of Wheel heating
- Computer-aided analysis of other parameters (programmable)

It allows you to visualize temperature changes in absolute values, percentages and coefficients in the form of graphs





## Technical specification:

<b>Train Speed</b>	1 to 350 km/h
<b>Bearing Temperature</b>	up to +120°C
<b>Wheel/Brake Temperature</b>	up to +600°C
<b>Temperature Measurement Accuracy:</b>	
• Axle Box (Bearing)	±2°C
• Wheel/Brake	±2°C / 5%
<b>IP Class of Sensors</b>	IP53
<b>Operating Temperature</b>	-45 to +65°C (+55°C long-term operation)
<b>Average Lifetime</b>	15 years
<b>Alarm Signaling time</b>	5 sec. max



More than 40 sets of AKRO with HBD & HWD functions are operating on national public railways on the JSC "Ukrainian railways".



Another 180 AKRO's (HBD & HWD) have been contracted for installation by the end of 2025.



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