



Predictive Acoustical Detection

Planning of Maintenance based on real-time advance knowledge of the condition of railway undercarriage through passive measurements.

„PAUK-11K“





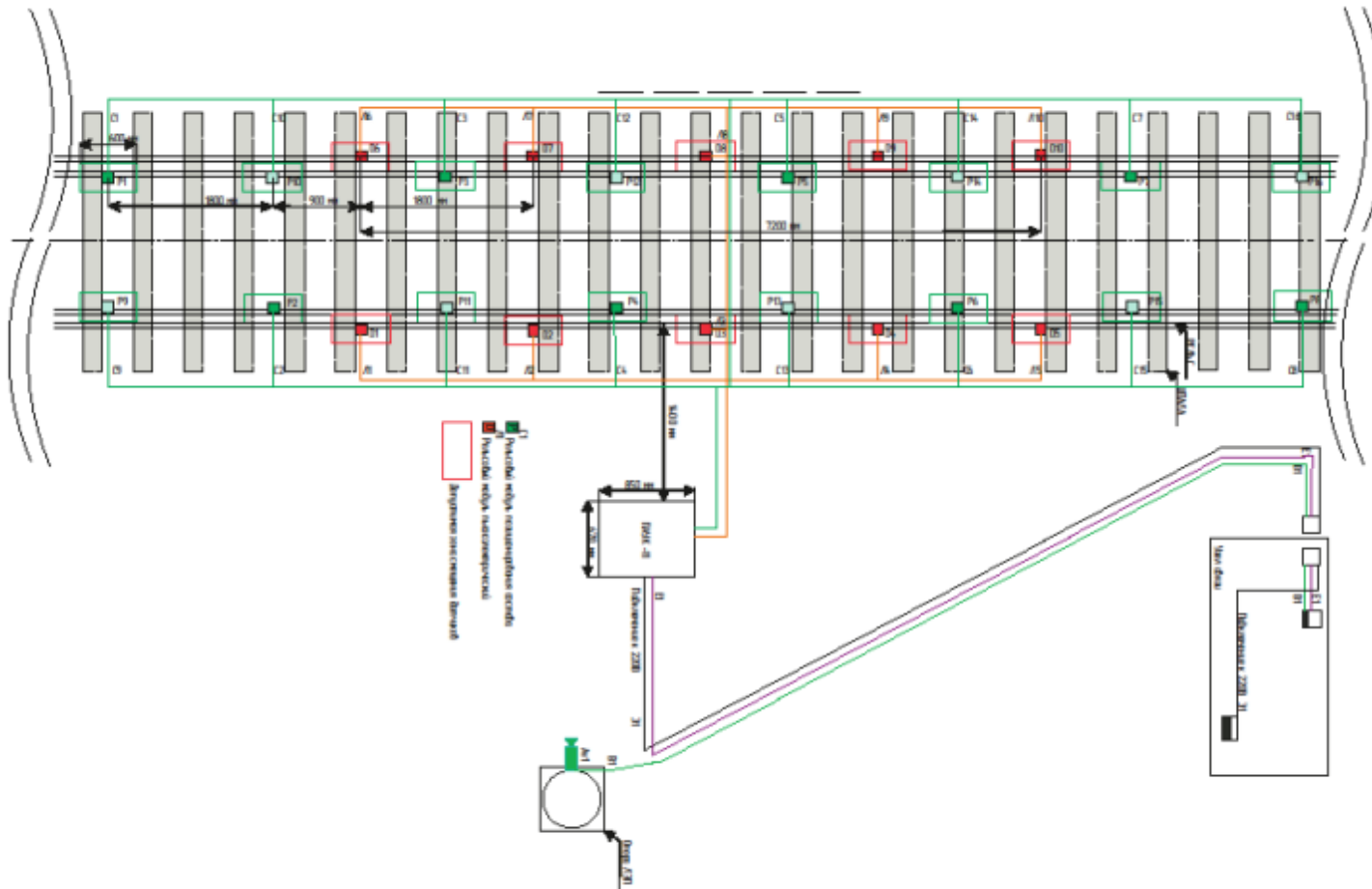
Acoustic Emission Measurement station «PAUK-11к»

The Acoustic Emission measurement station, "PAUK-11к" enables the user to detect the condition of the undercarriage, thereby increasing the safety of rail transportation.

- "PAUK-11к" identifies automatically the identity of each railcar as it passes the measurement station, even at high speed.
- The following items are identified.
 - Defects in the wheel surface
 - Defects in the bearings and other moving parts in the axle system
 - Amount of lubrication still available
 - Position of the wheels to the axles
- Not only can "PAUK-11к" detect if a defect has occurred but also the type of defect and, above all, **it can predict when maintenance will be needed in the future.**



Station Layout «PAUK-11κ»





Acoustic Emission Measurement «PAUK-11к»





Acoustic Emission Measurement station «Pauk-11к»





Example of the User Interface «PAUK-11к»

ПОСТ АКУСТИЧЕСКОГО УЛЬТРАЗВУКОВОГО КОНТРОЛЯ «ПАУК-11К»

Обновить данные Найти состав Выгрузить отчет Экспортировать данные


Список составов

| | |
|-------------------|------|
| 04.02.18 12:03:43 | 5333 |
| 02.02.18 12:36:40 | 2839 |
| 02.02.18 10:56:36 | 0400 |
| 02.02.18 10:32:57 | 0302 |
| 31.01.18 12:50:34 | 3025 |
| 31.01.18 12:29:18 | 3100 |
| 31.01.18 12:20:10 | 0401 |

Состав № 5333 9578 (04.02.18 12:03:43) ФОТО

| Вагон (ПП) | Вагон (ИН) | КП (состав) | КП (вагон) | Левая | Правая | |
|------------|------------|-------------|------------|-------|--------|------|
| 15 | | 65 | 2 | | 345 | ФОТО |
| 16 | | 69 | | 625 | | ФОТО |
| 23 | | 98 | 3 | 345 | | ФОТО |
| 24 | | 10 | 2 | 315 | | ФОТО |
| 44 | | 181 | 2 | | 355 | ФОТО |

Дополнительно



Номер состава:
Дата/время состава:
Количество вагонов:
Количество осей (КП):
Статус "Критично":
Статус "Предупреждение":

Replace as soon as possible (Red box with arrow pointing to the '625' value in the table)

Schedule maintenance (Yellow box with arrows pointing to the '345', '315', and '355' values in the table)

ООО «МЕТКАТОМ», 2018



Acoustic Emission Measurement station «Pauk-11к»

Operational Overview

- The installation and start of operations takes around 5 days and can be done with minimal interference to daily track operations.
- The identity and direction of travel of each wagon can be accomplished by RFID or OCR.
- All measurements are stored in a databank and can be accessed to perform analyses for maintenance or can be integrated into existing customer systems.
- Low maintenance and with a back-up power in case of electrical outage.
- The system is manless and does not emit any dangerous signals or current.



Wheel/Track Interface Monitoring

- Wear and damage to the surface of the wheels from daily operations and track irregularities
- Undercut of the wheel flange
- Premature wear of elements at the tension points of the bogie parts of the freight wagons

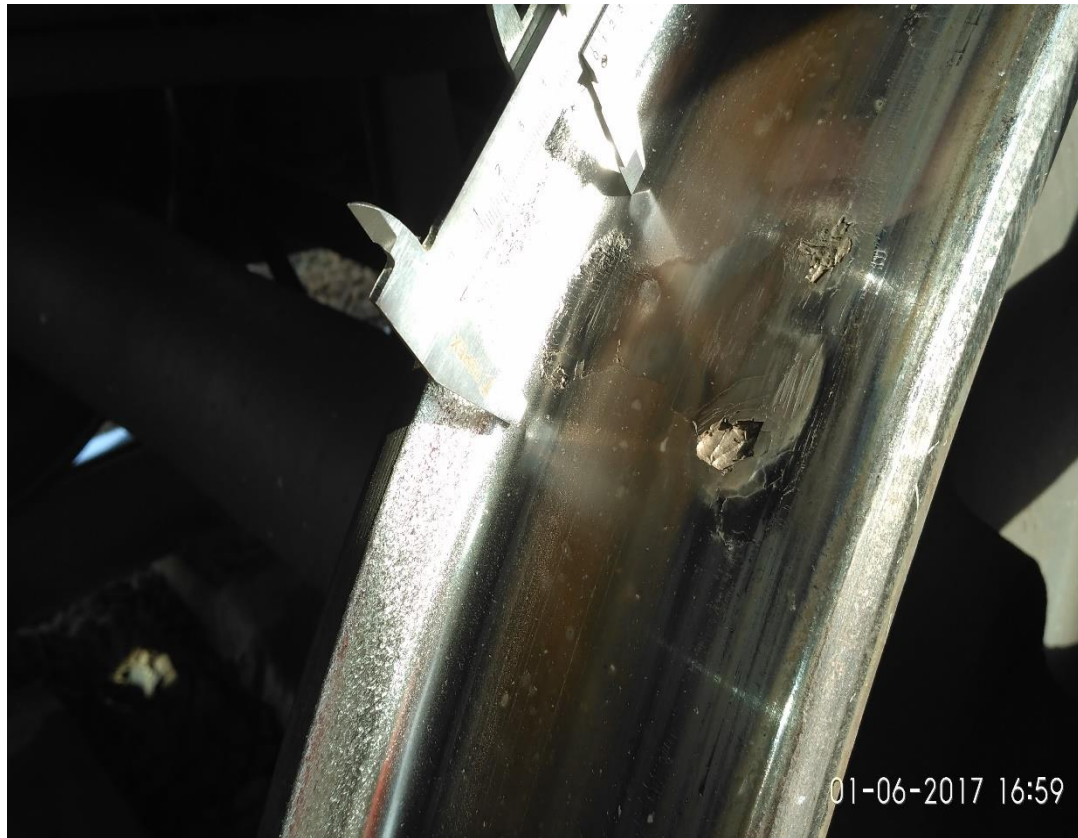


The interface of wheel to track is the area most prone to pre-mature failure.



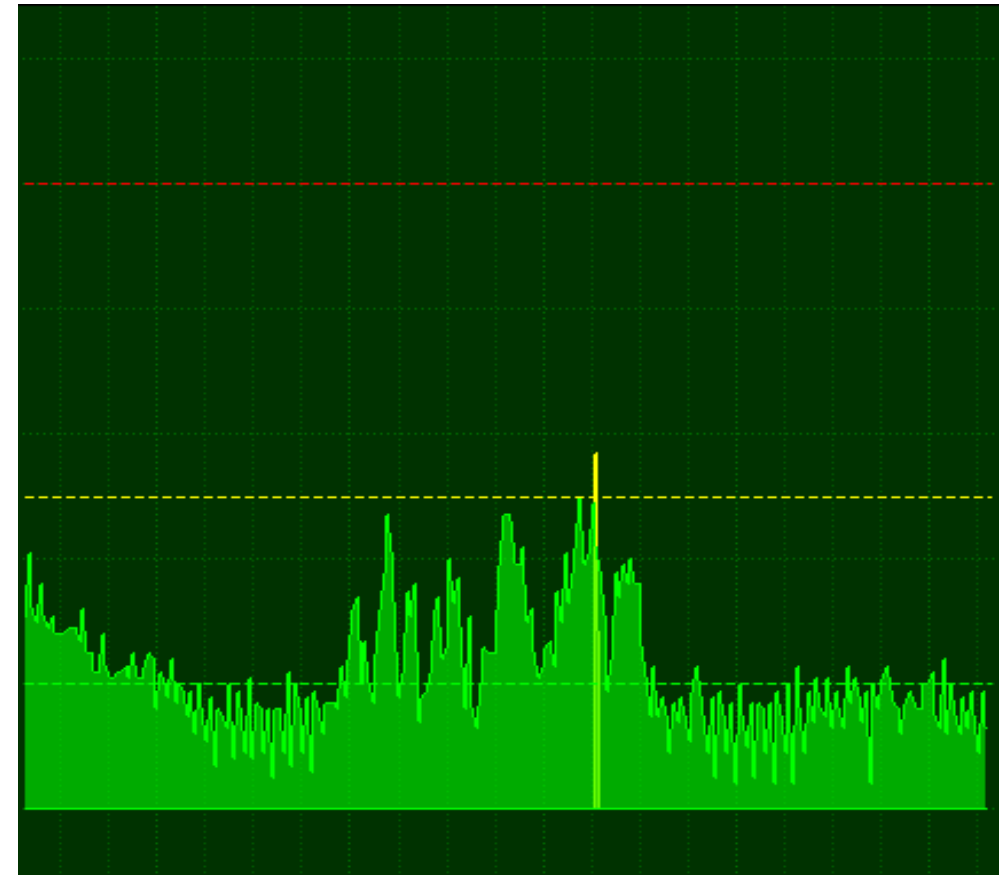
Wagon № 56963390

Wheelset №1 right side



Measurement by «PAUK-11к»

Integralparameter D 225-278

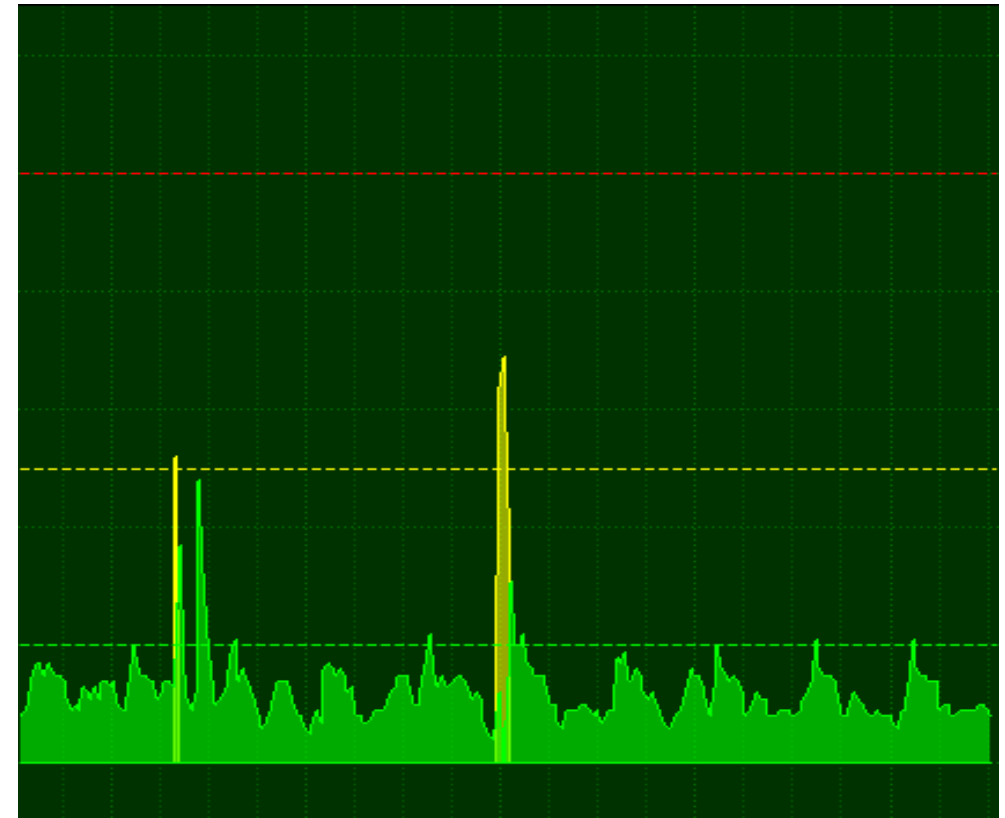




Wagon № 61850905
Wheelset №3 right-side



Measurement by «PAUK-11к»
Integralparameter D 347



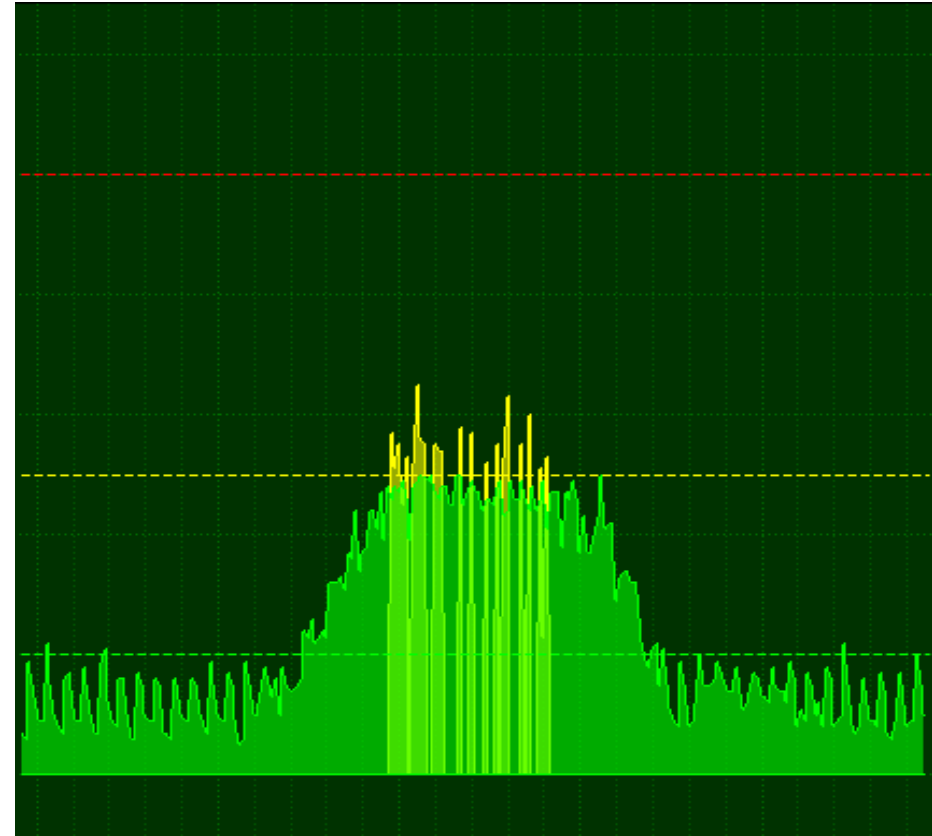


Real Life example

Wagon № 59104414
Wheelset №3 right-side



Measurement by «PAUK-11к»
Integralparameter D 304-317





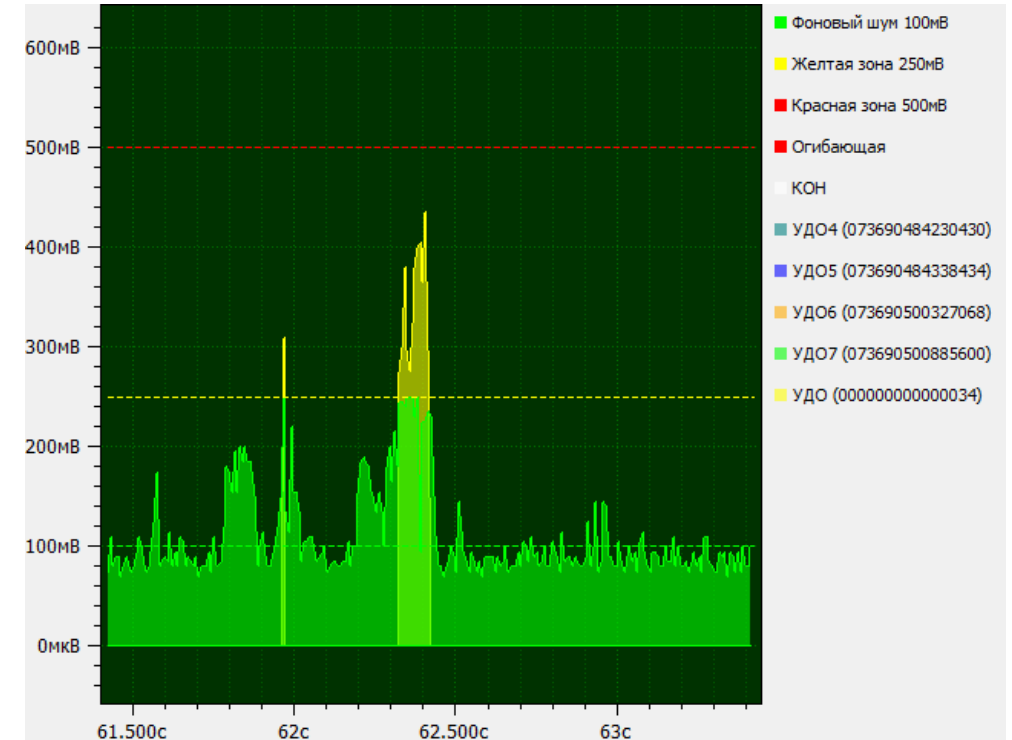
Wagon № 52962370

Wheelset №1 right side



Measurement by «PAUK-11к»

Integralparameter D 278-429

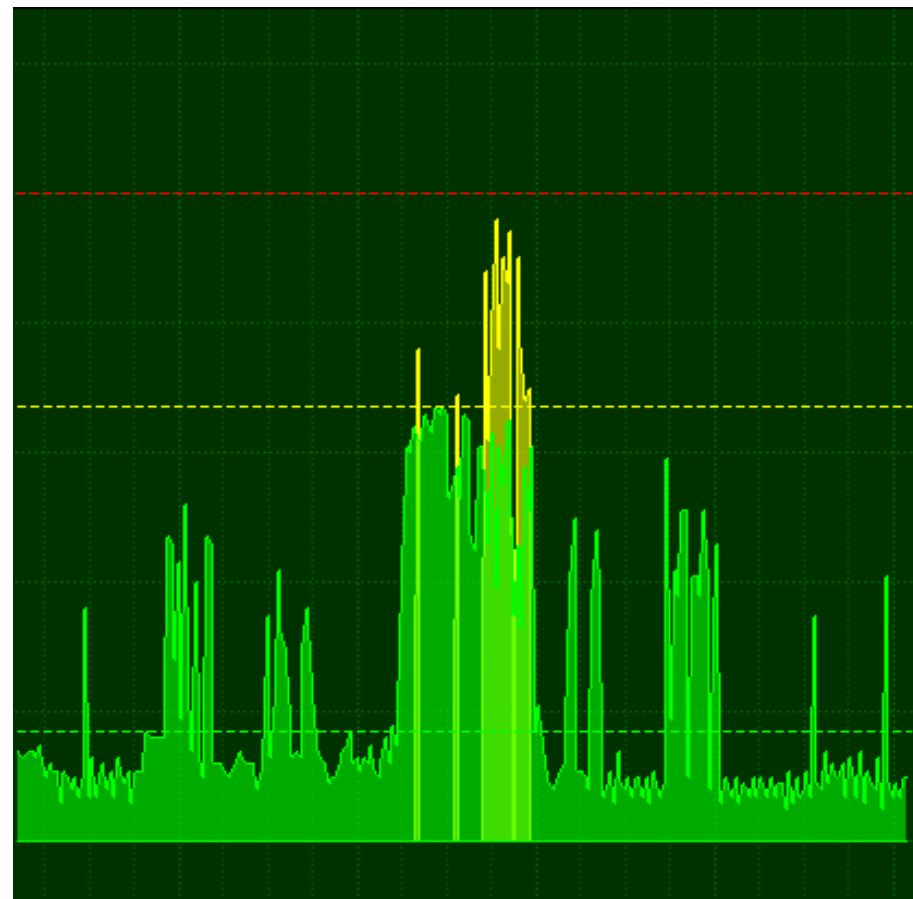




Wagon № 61850905
Wheelset №2 left side



Measurement by «PAUK-11к»
Integralparameter D 319-476

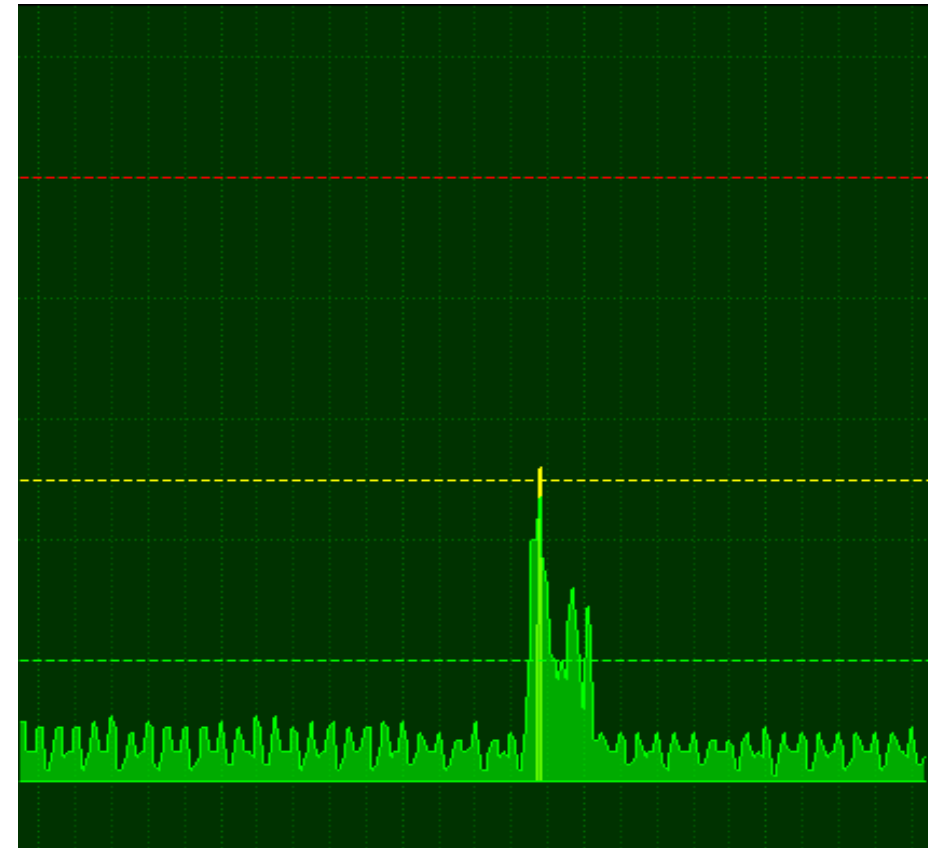




Wagon № 63554521
Wheelset №3 left side



Measurement by «PAUK-11к»
Integralparameter D 196-247





Real Life example

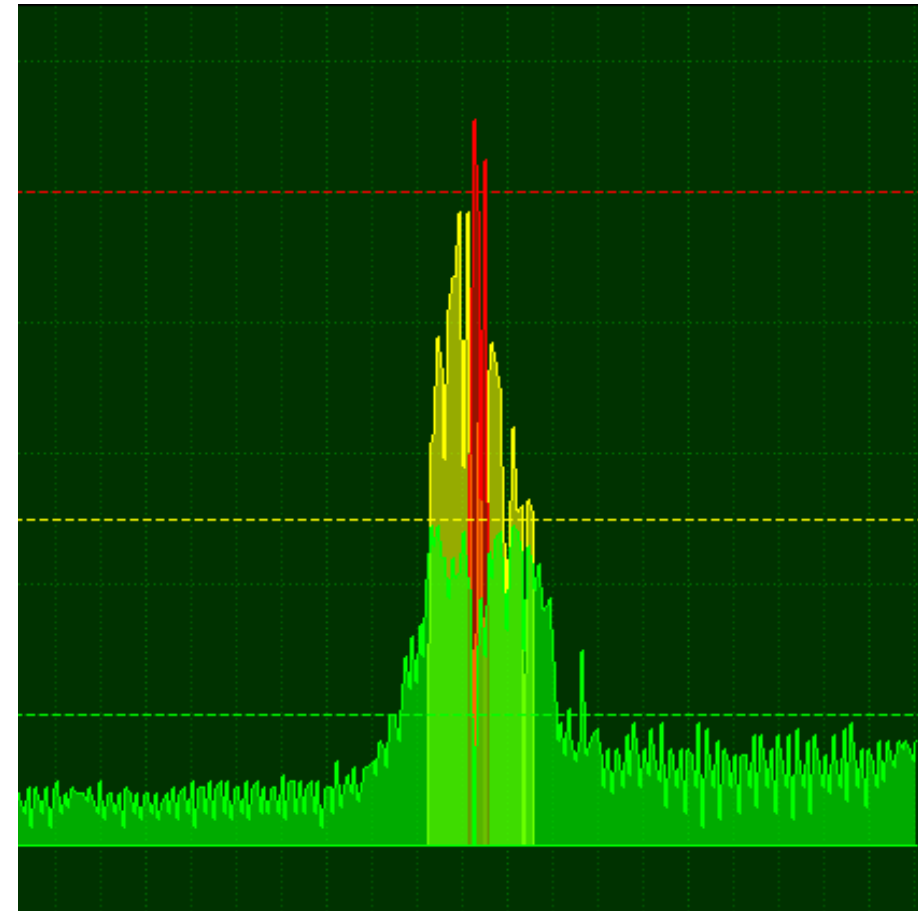
Wagon № 55698468

Wheelset №3 right side



Measurement by «PAUK-11к»

Integralparameter D 225-545

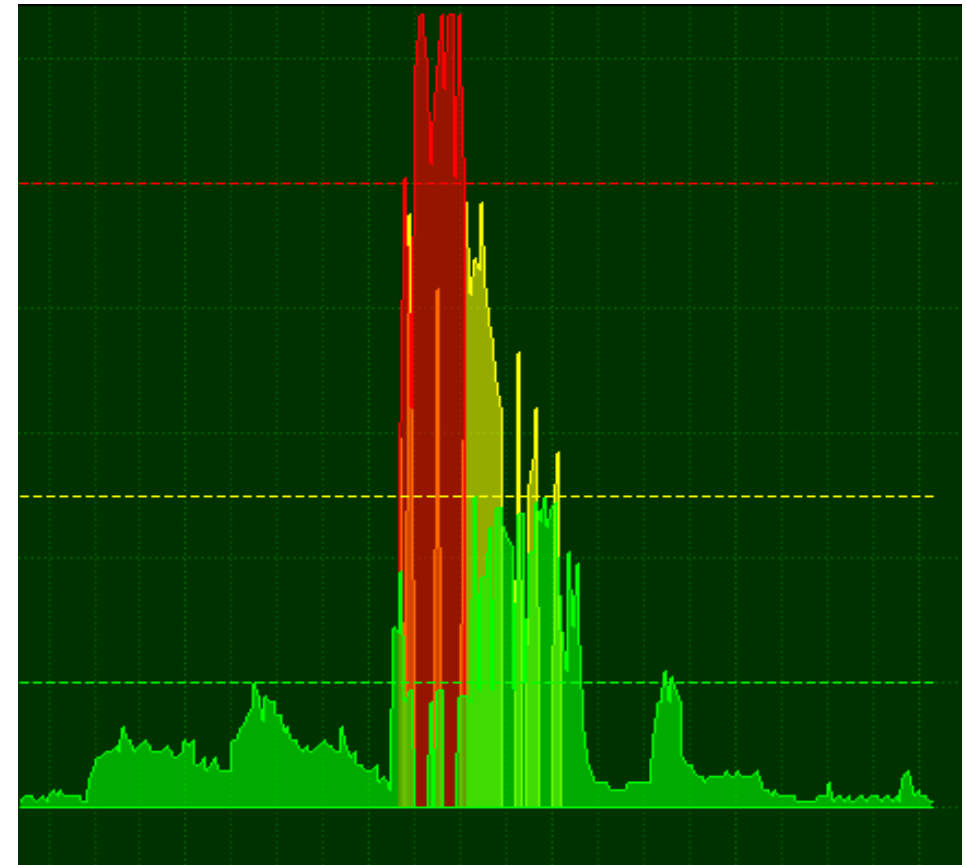




**Wagon № 60790086 (Reparaturfall)
Wheelset №4 right side**



**Measurement by «PAUK-11к»
Integralparameter D 613-627**





SUMMARY OF MEASUREMENTS „PAUK-11K"

During the 39 days of controlled operational tests that were carried out on the Oktyabrskaya railway line, the PAUK-11k test station found defects that were subsequently confirmed by visual inspection and with measurements of the size of the defects.

| Number of wheel sets inspected | Number of defects of the wheel surface identified | Number of critical defects of the wheel surface identified | Number of Wagons de-activated due to detected defects |
|--------------------------------|---|--|---|
| 3 352 | 782 (23%), thereof wheel cracks 443 (13%) | 95 (12%), 6 Wagons had defects on more than one wheelset | 89 (11%) |

Approx. 40% of the remaining 687 wheel sets (782 - 95 pieces) showed defects in the surface of the wheel sets which were borderline.



TEST RESULTS OF „PAUK-11K”

In accordance with the approved test plan, the Oktjabrskaya Railway conducted controlled operational tests from May 18 to June 25, 2017 with the test station ("PAUK-11K"):

1. Tested - 3 352 wheel sets; at 838 wagons.
2. Detection of defects on the surface of the wheels - 782 wheel sets (23.2%), of which:
 - Rip troughs - 443 wheel sets (56.6%);
 - Slider defect - 156 wheel sets (20.0%);
 - welding - 48 wheelsets (6.1%);
 - Uneven wear - 135 wheel sets (17.3%).
3. Detection of defects in the borderline area - 95 wheel sets (12.1%), of which:
 - Rip troughs - 52 wheel sets (54.7%);
 - Slider defect - 15 wheel sets (15.8%);
 - Welding - 3 wheel sets (3.2%);
 - Uneven wear - 25 wheelsets (26.3%).
4. De-ctivated wagons - 89 (6 of them - with 2 sets of wheels with unacceptable defects).
5. Almost 40% of the remaining 687 wheelsets had other defects on the wheel surface of the wheel sets that were on the border with the unacceptable defects.



**On the basis of the test results
15 Pauk-11k stations have
been installed and 17 will be
installed this year.**