mallenom
SYSTEMS

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ARDIS
system for railcars'
identification and control

ARDIS
LINE
of SOLUTIONS

- Railcars' identification

- Weighing automation

- Location control

- Commercial inspection

- Containers' identification

- 3D-scanning

FULL-SCALE ARDIS AUTOMATION

Approach to the digital management of railway transport at an enterprise based on machine vision

weighing

55126643

ID number recognition

location

loading positioning

scanning

ID number recognition
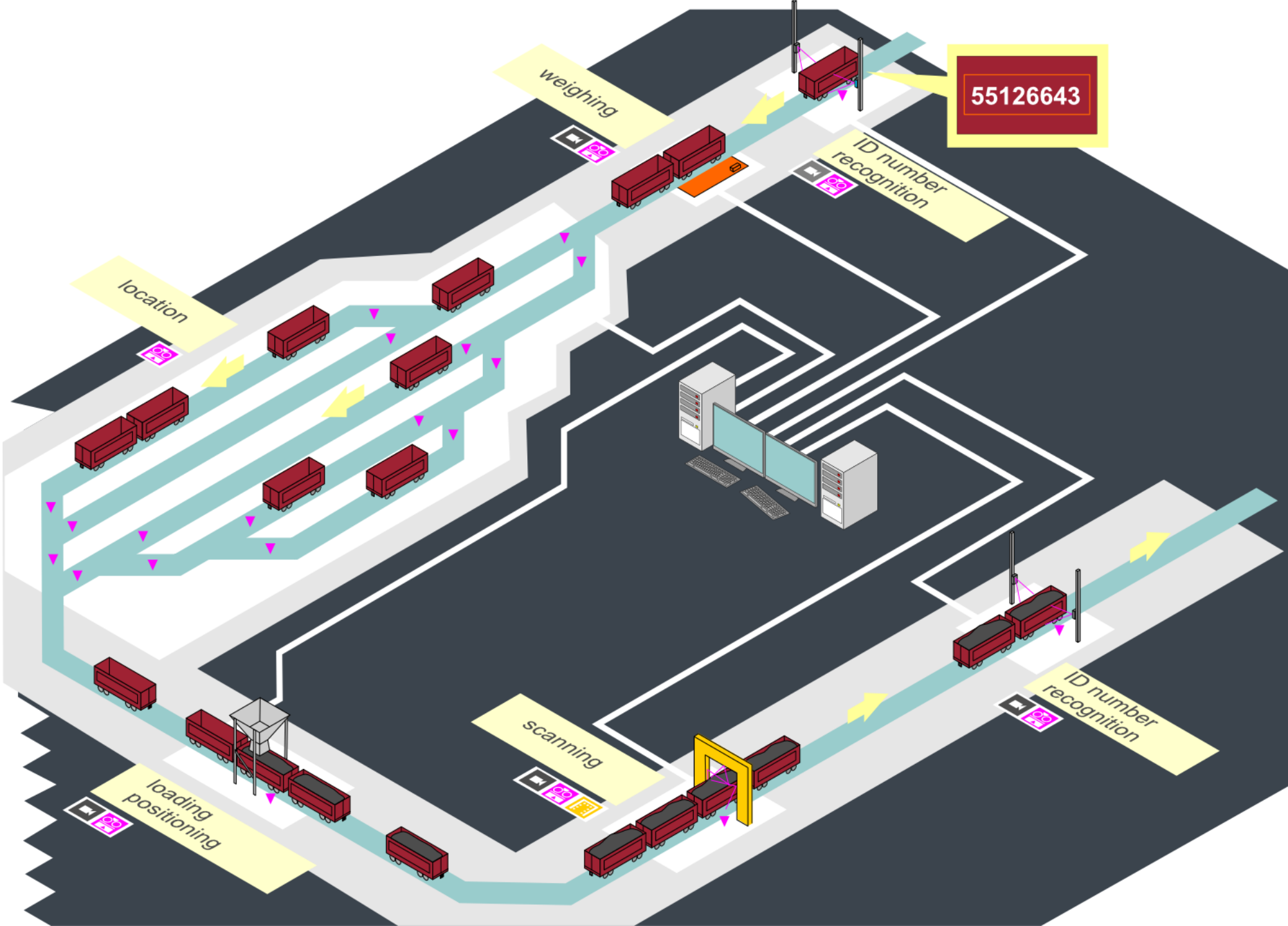
PURPOSES OF ARDIS USE

General

1. Minimisation of the human factor impact
2. Reduction of operational expenses and losses
3. Improvement in efficiency and transparency of production processes
4. Reduction of time required for the paperwork

PURPOSES OF ARDIS USE

For product manufacturing services

- Minimisation of the human factor impact
- Reduction of operational expenses
- Improvement of product dispatch rate
- Automation of the paperwork

For logistics services and railway yards

- Collection of data for railway transportation management system
- Collection of evidence in case of legal disputes
- Control for location and travel of railcars
- Automatic control for time the railcar spends on premises
- Control for the return of railcars to contracting party

For security services

- Control for the location and travel of railcars
- Visual inspection of the railcars
- Detection of suspicious railcar movements
- Detection of changes in railcar weight

BENEFITS FROM ARDIS USE

Photo and video imaging of railcars/containers in the case of legal disputes with contracting parties (in cases of containers and railcars damage, dirtying/contamination, presence of particular cargo, etc.)

Automation of the services for processing of railcars based on video image (reduction of operational expenses, number of times personnel needs to be on the rail tracks, reduction of potential injuries, etc.)

Reduction of time and resources needed to perform the weight measurement using dynamic rail scales

Formation of the list of the passing railcars and comparison with the list of the railcars that have been scheduled to pass through the control point.

Identification of actual time of railcar arrival for speeding up the subsequent operations for railcar processing (improving the efficiency of processing the arrived railcars)

Control of the actual time the railcar spends on the premises to avoid penalties due to late return of the railcar

Accumulation of statistical data for the travel of the railcars for optimisation of production processes

ARDIS FUNCTIONALITY

Low level
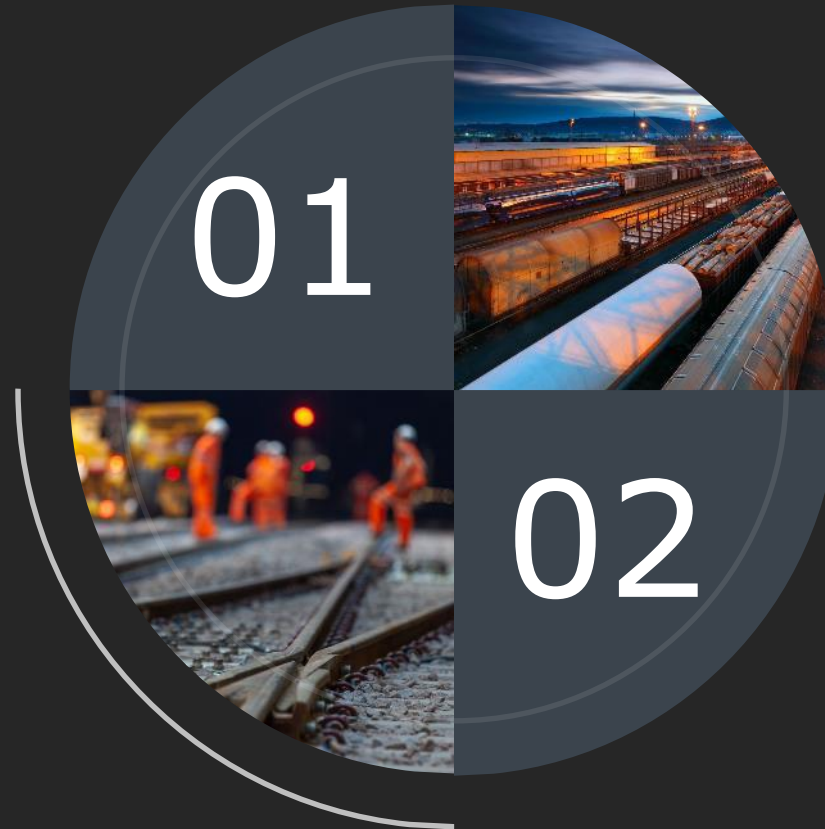
Railcars counting

Recognition of ID numbers

Identification of travel direction

Integration with scales and industrial control systems

Integration with enterprise information system

Video imaging of railcars

Imaging of railcars using thermal imaging cameras

High level

Automation of the product dispatch using railcar scales

Visual (commercial) inspection of railcars, collection of evidence in case of legal disputes

Comparison of railcars with the reference list for arriving railcars, access control for the railcars

Check whether the weighing has occurred for departing railcars

Comparison of the taken weight measurements with the ones stated in the documents

Control for the duration of railcar stay on and outside of the premises

Control of railcars location

ARDIS
STANDARD
CONFIGURATION

1. Cameras
2. Exterior lights
3. Wheelset sensors
4. ARDIS cabinet
5. Server
6. Operator workstation
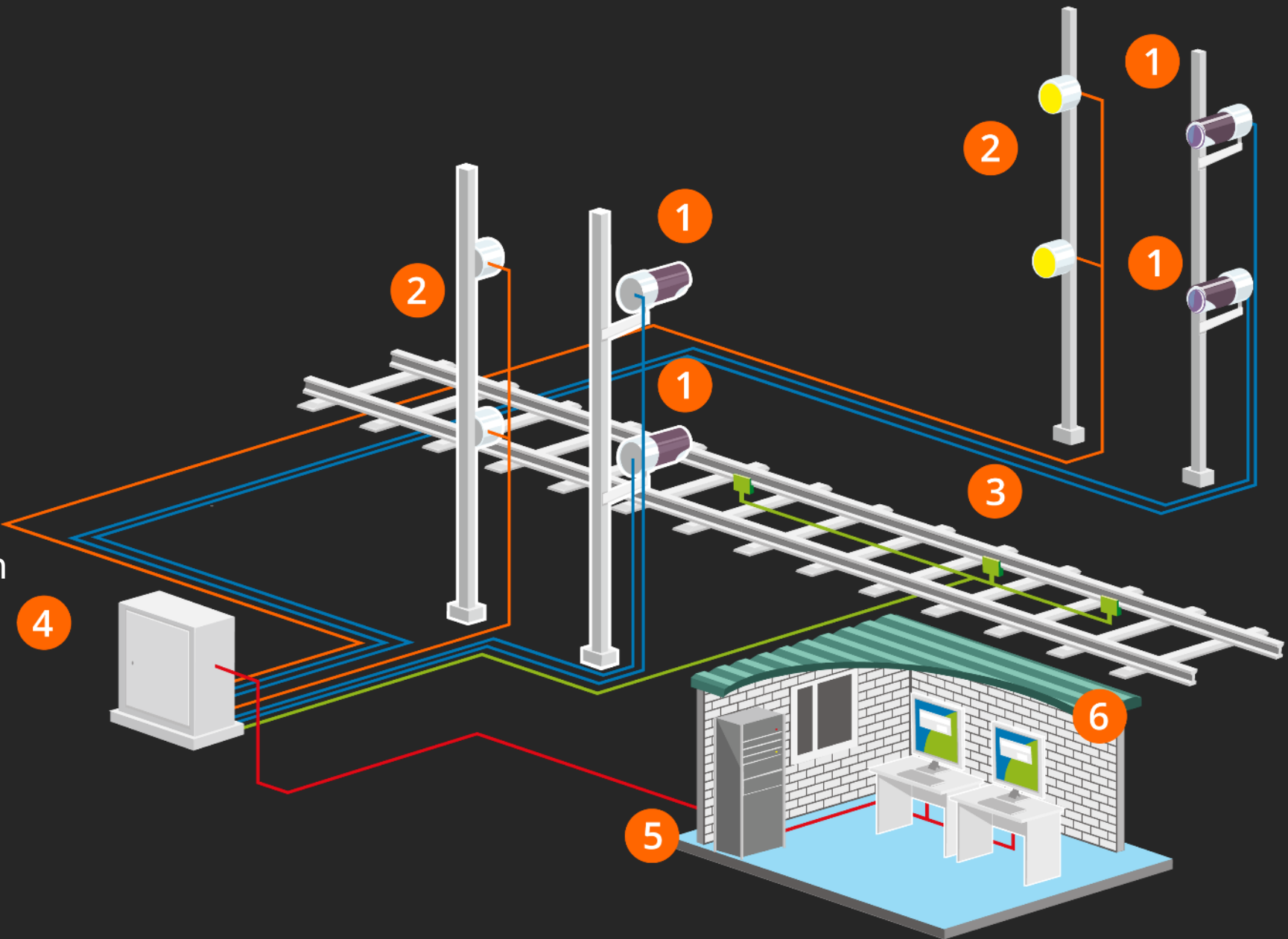
REASON TO USE
4 CAMERAS

Recognition of all 4 available identification numbers of a railcar and derivation of final result based on proprietary mathematical algorithm allows to identify many railcars that are otherwise present significant challenges for reliable recognition.

Overall, the simultaneous recognition of 4 identification numbers improves the quality of the final recognition results.

WHEELSET SENSORS

Ways to detect individual railcars:

- Inductive wheelset sensors
- Optical sensors
- Video analytics

Inductive wheelset sensors

Minimisation of false activation (they are not activated by people, animals, changes in weather).

Do not depend from weather conditions, position of Sun, available illumination.

Possibility to detect railcars' types, direction of movement.

Widely used in the rail way and underground systems.

Installation directly on the rail.

Optical sensors

False readings due to activation by people, animals, changes in weather.

Efficiency depends from weather conditions, position of Sun, available illumination.

Limitations for open-bed railcars, railcars with windows, platform railcars.

Video analytics

Requires 2 mounting polls for installation of receiver and transmitter for light emitter.

Video analytics does not guarantee 100% accuracy.

Efficiency depends on correct and careful placement of the equipment.

Limitations for open-bed railcars and platform railcars.

AUTOMATED WORKSTATION FOR LOGYSTICS OPERATOR

Commercial inspection – ability to connect several video cameras for inspection of railcars from different angles

RECOGNITION OF CONTAINER ID NUMBERS

ARDIS enables to expand functionality with a subsystem for recognition of containers' ID numbers with the ability to link the container number with the number of railcar platform that transports the set container.
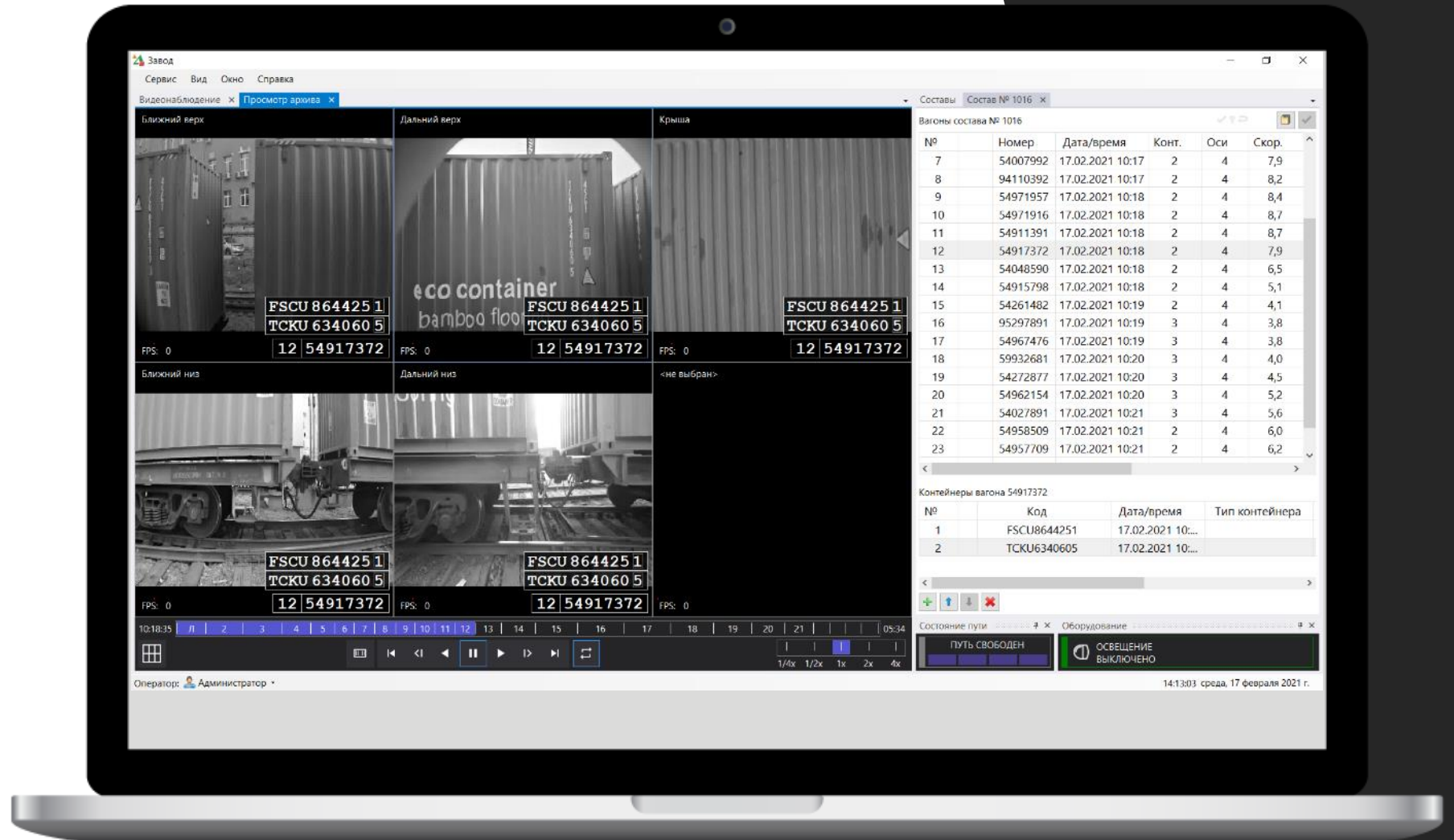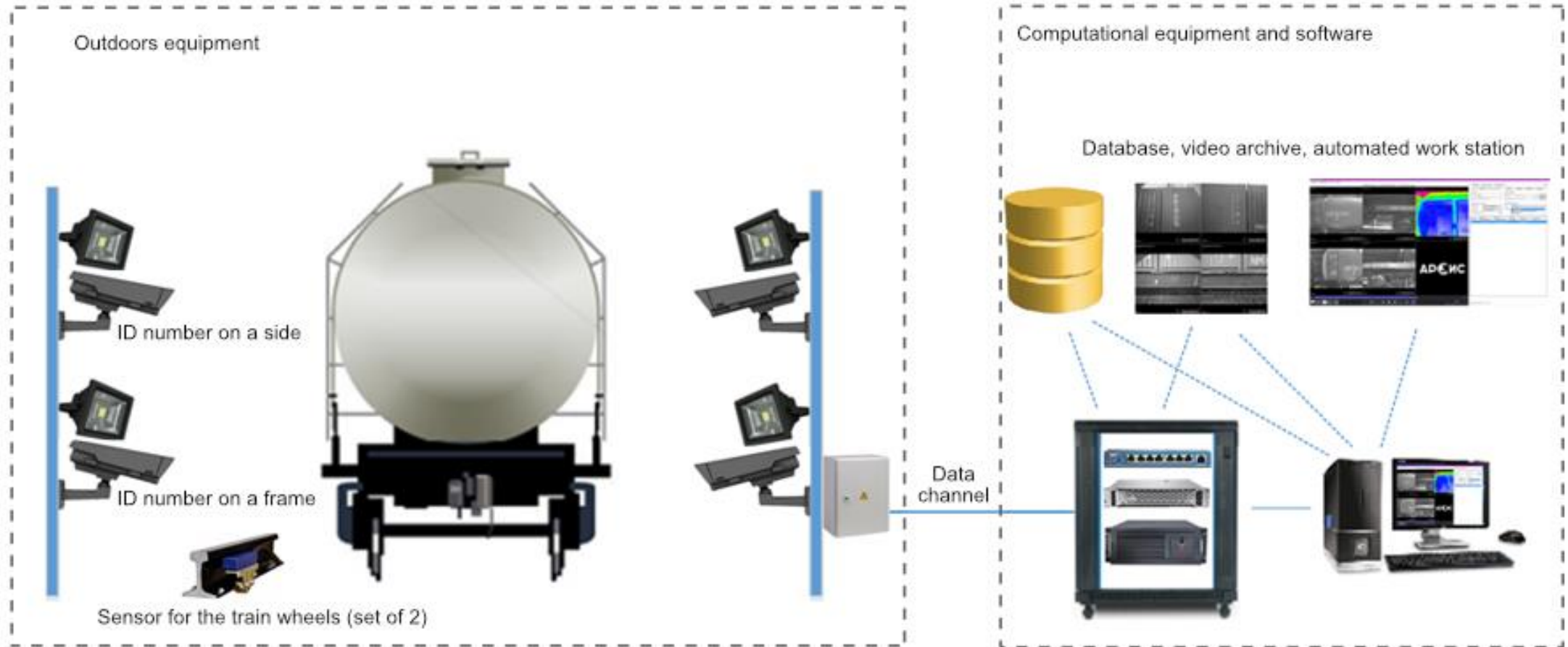
AUTOMATED WORKSTATION FOR SCALES OPERATOR

ARDIS allows to automate the weighing of the railway transport with automatic calculation of Net weight
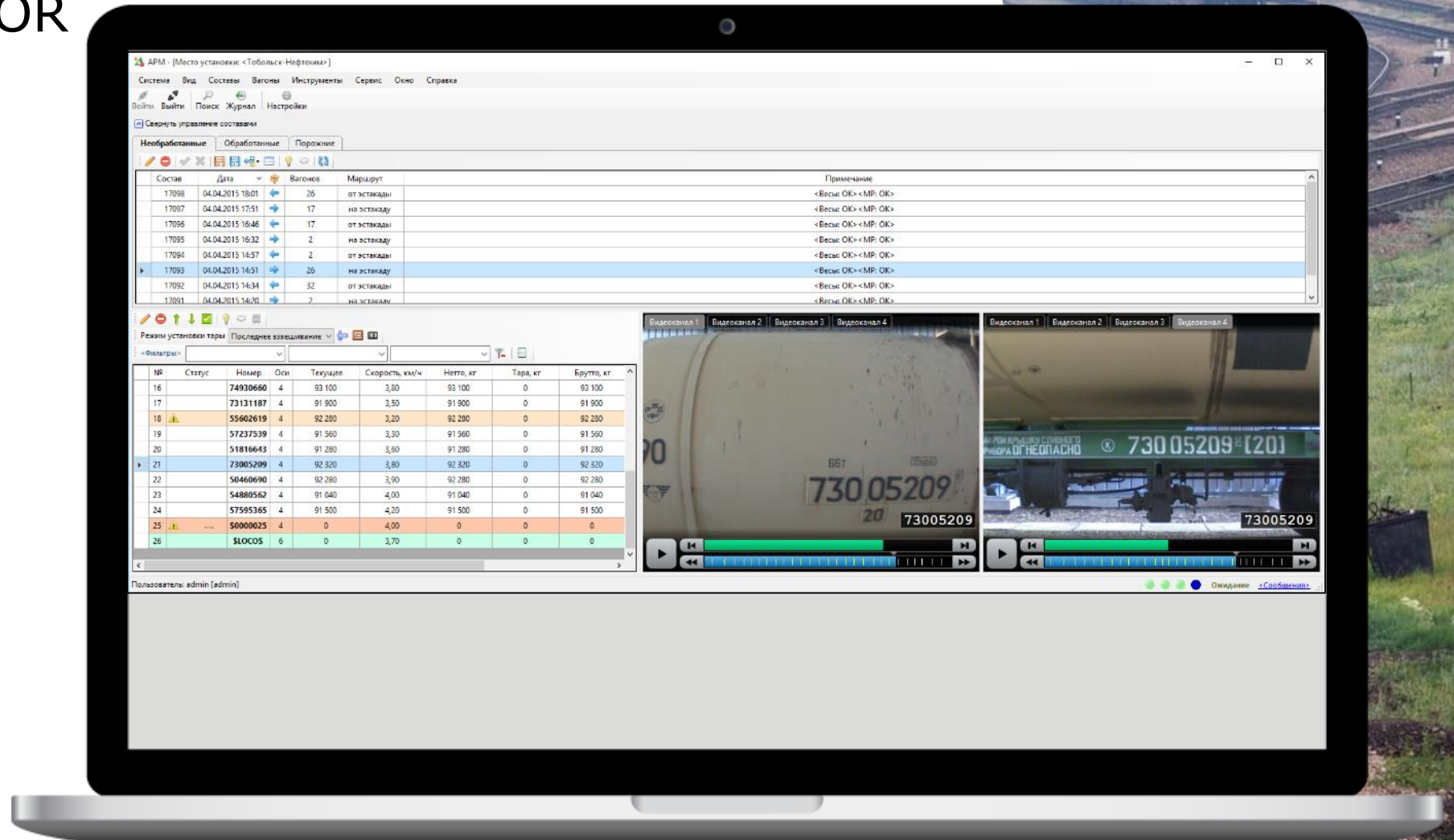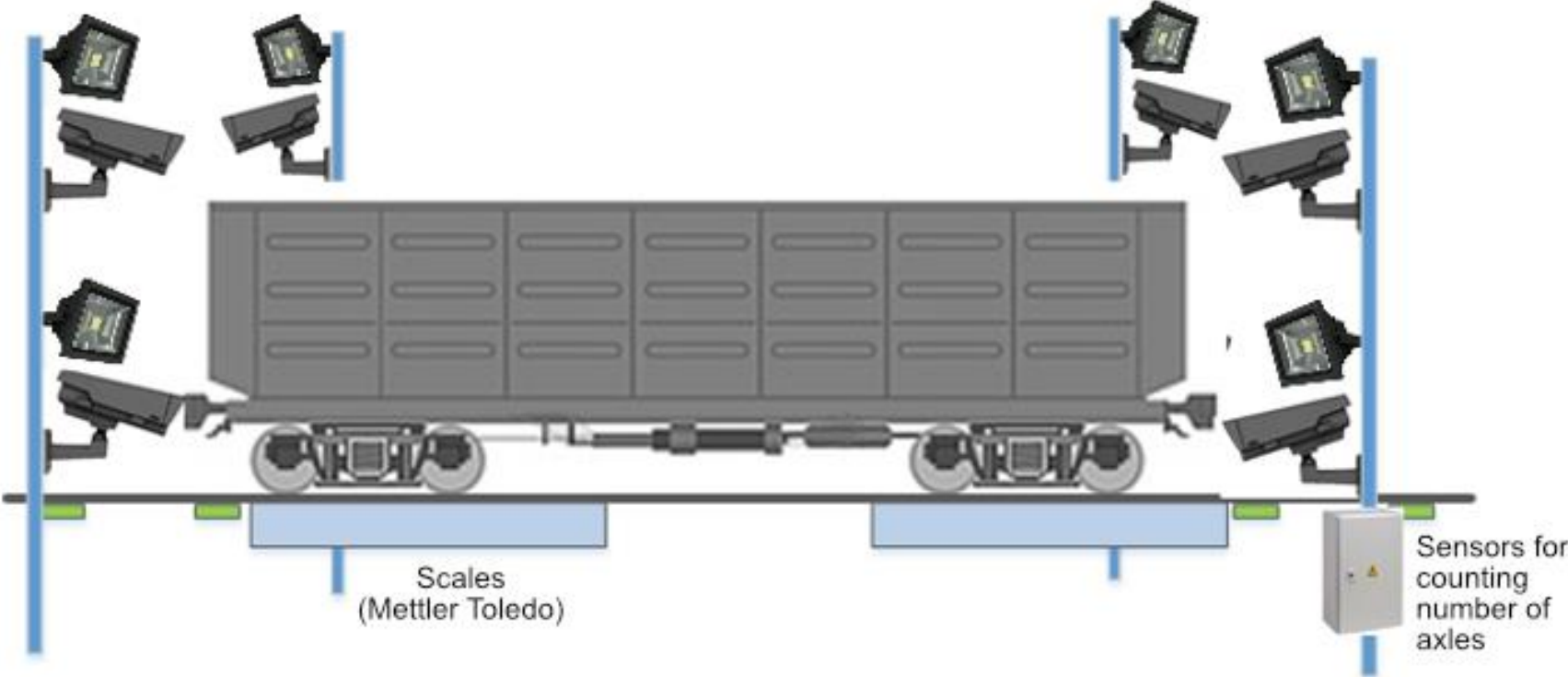
RECOGNITION OF MOVING RAILCARS
HARDWARE COMPOSITION

RECOGNITION OF STATIONARY RAILCARS
HARDWARE COMPOSITION

Recognition as the railcar
enters the scales for railway transport

Operator's work
station

Processing unit

Scales
(Mettler Toledo)

Sensors for
counting
number of
axles

ARDIS MODULE FOR MONITORING EFFICIENCY AND FUNCTIONALITY OF HARDWARE AND SOFTWARE SYSTEM COMPONENTS

ARDIS TECHNICAL ADVANTAGES

Stand-alone solution
(ARDIS is not an add-on module for video surveillance system)

High recognition accuracy for the railcar identification numbers thanks to the recognition algorithm that utilises all available identification numbers (2 located on the sides of railcar, 2 – on the frame) using 4 video cameras.

Reliable method for counting the railcars in any weather condition by utilising specialised sensors for detection of train wheels.

Ability to perform recognition of the identification numbers during railcar stops and change of the direction of travel (optional)

Ability to recognise different types of the railcars from single control point

Specialised software solutions for the railway scales, logistics services, security services.

Specialised software modules for system administrator (ARDIS.Monitoring) to monitor efficiency and functionality of the system and its components.

IMPLEMENTATION CASES

OIL REFINERY
MAZYR, BELARUS

ARDIS addresses the following tasks at the facility:

- Automation of railcar scales
- Automatic calculation of net weight
- Automation of the paperwork
- Reduction of operational expenses and improvement in the dispatch rate

System operator controls weighing of the railcars, manually enters missing data and generates required reports. Weight measurement results are transferred into enterprise information system for the further processing.
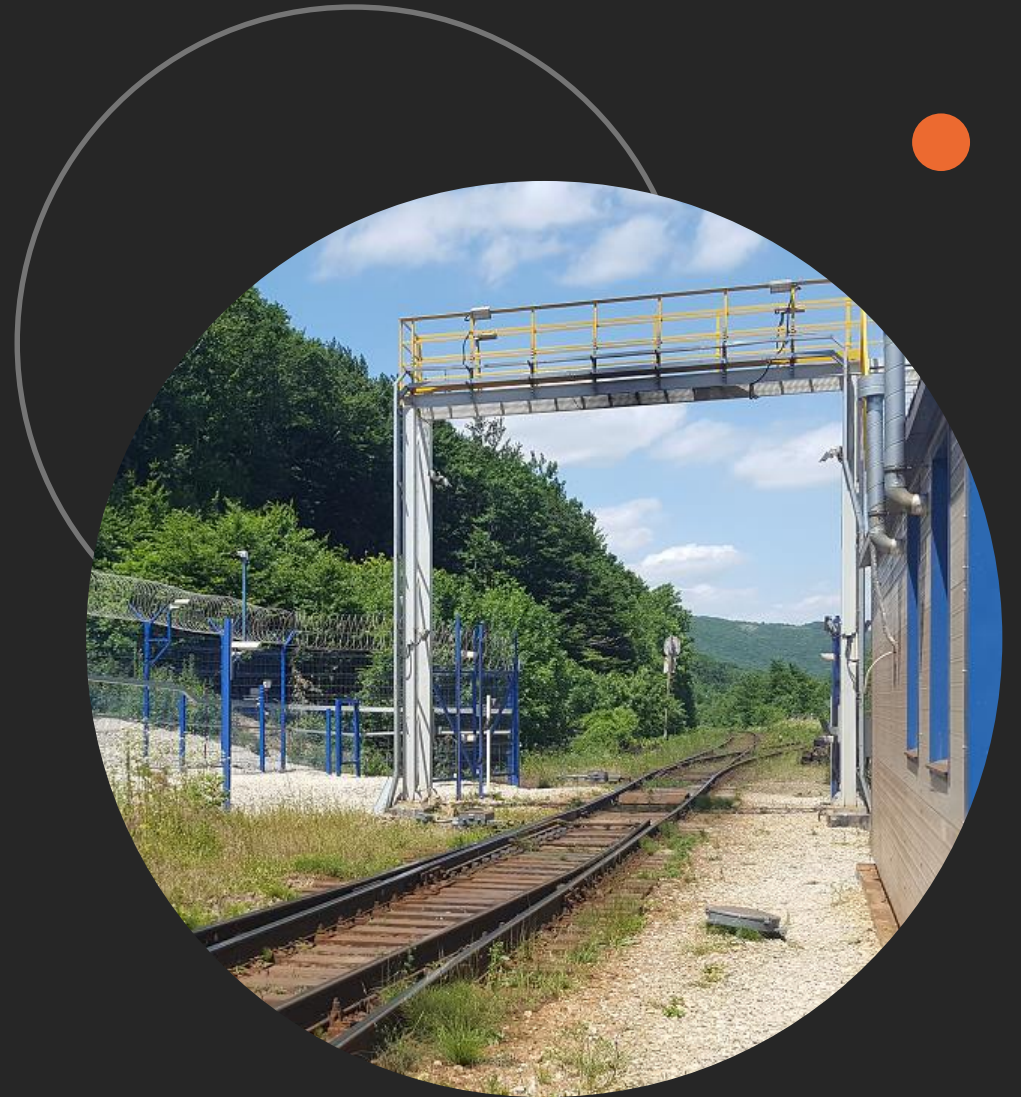
IMPLEMENTATION CASES

OIL REFINERY
NOVOROSSIYSK, RUSSIA

ARDIS System is installed at the railway track for arriving railcars to address the following tasks:

- Cross verification of railcar numbers and transported cargo with the enterprise schedule and documentation

- External examination of the railcars

- Control for the dispatch of the oil and oil products with the use of thermal imaging cameras

Implementation of ARDIS on the enterprise premises improves the overall security level, provides control for the location of the railcars, and helps to resolve the disputes about available and occupied volume of the rail tank cars.

In 2018, upon the request from the customer, the new ARDIS.AutoReport module has been developed that automatically generates reports of specified layout and saves them to the network storage folders of the enterprise for ensuring efficient processing of collected system data by different departments at the facility.

IMPLEMENTATION CASES

OIL REFINERY
VOLGOGRAD and UKHTA, RUSSIA

Implemented solution enables the enterprises to:

- Substantially increase the dispatch rate

- Minimise human factor

- Reduce the amount of manually performed operations

ARDIS.OilAccount system for monitoring of oil products, that is based on ARDIS system for recognition of railcars' ID numbers and Mettler Toledo railcar scales, automatically recognizes railcars' ID numbers and forms the database with information for the railcars that have been weighted. These database entries include railcars' ID numbers, gross and weight of each railcar, and images for each railcar.
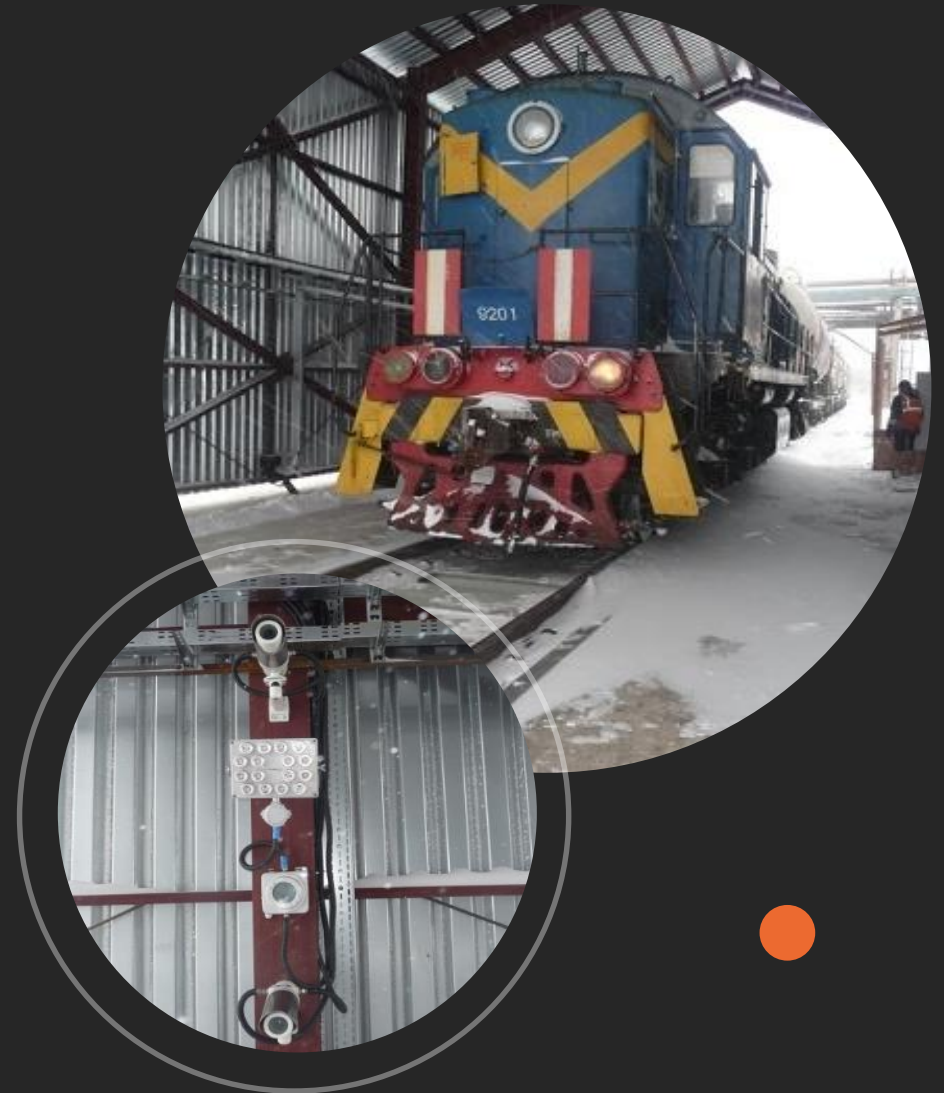
IMPLEMENTATION CASES

OIL REFINERY
UFA, RUSSIA

Implementation of the system allows to:

- substantially upgrade the processes for commercial processing and logistics management for the operations related to the use of railway infrastructure on the premises of enterprise

Overall, 21 sections at 4 oil refineries have been automated with ARDIS system for recognition of railcar ID numbers and ARDIS.OilAccount system for monitoring of oil products

The system consists of 84 IP-cameras, 24 servers and 25 automated workstations.

TECHNICAL CHALLENGES THAT CAN BE ADDRESSED DURING SYSTEM IMPLEMENTATION

ARDIS can successfully address its tasks even with the following challenges:

- Limited available space for system installation
- Shunting operations at the system installation site (stops, reverse, etc.)
- Task of understanding maneuvers, tracking of the railcars during maneuvers
- Different types of the railcars (platforms, tankers, special purpose railcars, etc.)
- Large distances between physical elements and sensors of the system
- Poor quality of identification markings (dirty railcars)
- Multiple passages of the railcars at the weight measurement station

CONTROL OF RAILCAR LOCATION AT A RAILWAY YARD

ARDIS.Location is a hardware-software complex that allows to monitor the travel and location of the railcars and locomotives at the railway yard of manufacturing facility with the use of specialised hardware for counting the railcars (at the railway intersections) and system for recognition of the railcar identification numbers (at the point of entry to the enterprise).

Addressed problems:

- Lost railcars

- Delay in the return of railcars to contracting party

- Suboptimal shunting work

- Challenges in optimisation and making of logistics decisions (absence of complete data for travel of the railcars)

- Large amount of routine and repetitive labour for monitoring location of the railcars

- Possibility for mistakes, intentional adverse actions (human factor)

- Need for the people presence at the rail tracks (associated health and safety risks)

VISUALISATION FOR RAILWAY TRACKS AND RAILCARS LOCATION
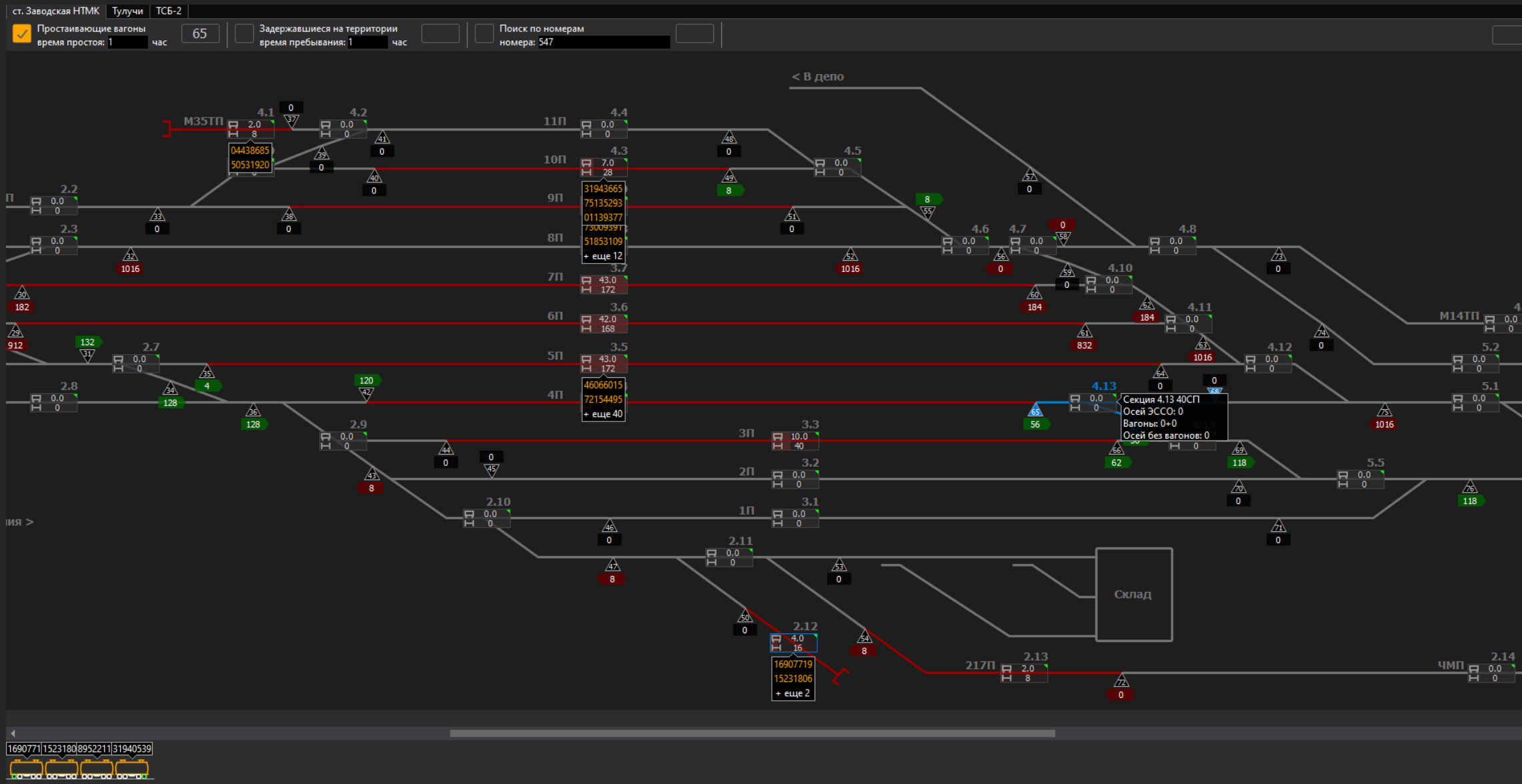
TECHNICAL SOLUTION

ARDIS at the railcars' entering point to the production facility

Purpose:

- Identification of the railcars
- Detection the number of axles for each railcar

Axle counting sensors at each railway intersection

Purpose:

- Detection of railcars traveling across different railway tracks (solely based on counting the axles without the use of video cameras)

ARDIS.Location software

Purpose:

- Collection and analysis of data from ARDIS and all exterior sensors, monitoring the railcars travel, visualization, etc.

IMPLEMENTATION BENEFITS

Collection of the evidence in the case of legal disputes with contracting parties (collection of video evidence while railcars are on the premises of the enterprise)

Minimisation in the number of fines for the delayed return of the railcars (hundreds of thousands of USD per year for large-scale enterprises)

Improvement in railway capacity as a result of increase in precision level of railway logistics management

Decrease in the need for the physical presence of personnel at the railway tracks (health and safety)

Minimisation of the human factor influence of logistics operations

Reduction of operational expenses for logistics operation

Ability to perform calculation for several indicators (the time the railcar spends on the premises, utilisation level of the railways, etc.) to enable data-driven decision making for the enterprise railway logistics

Analysis based on the historic data with the ability to model different scenarios

Provision of up-to-date data to all relevant information system and services of the enterprise
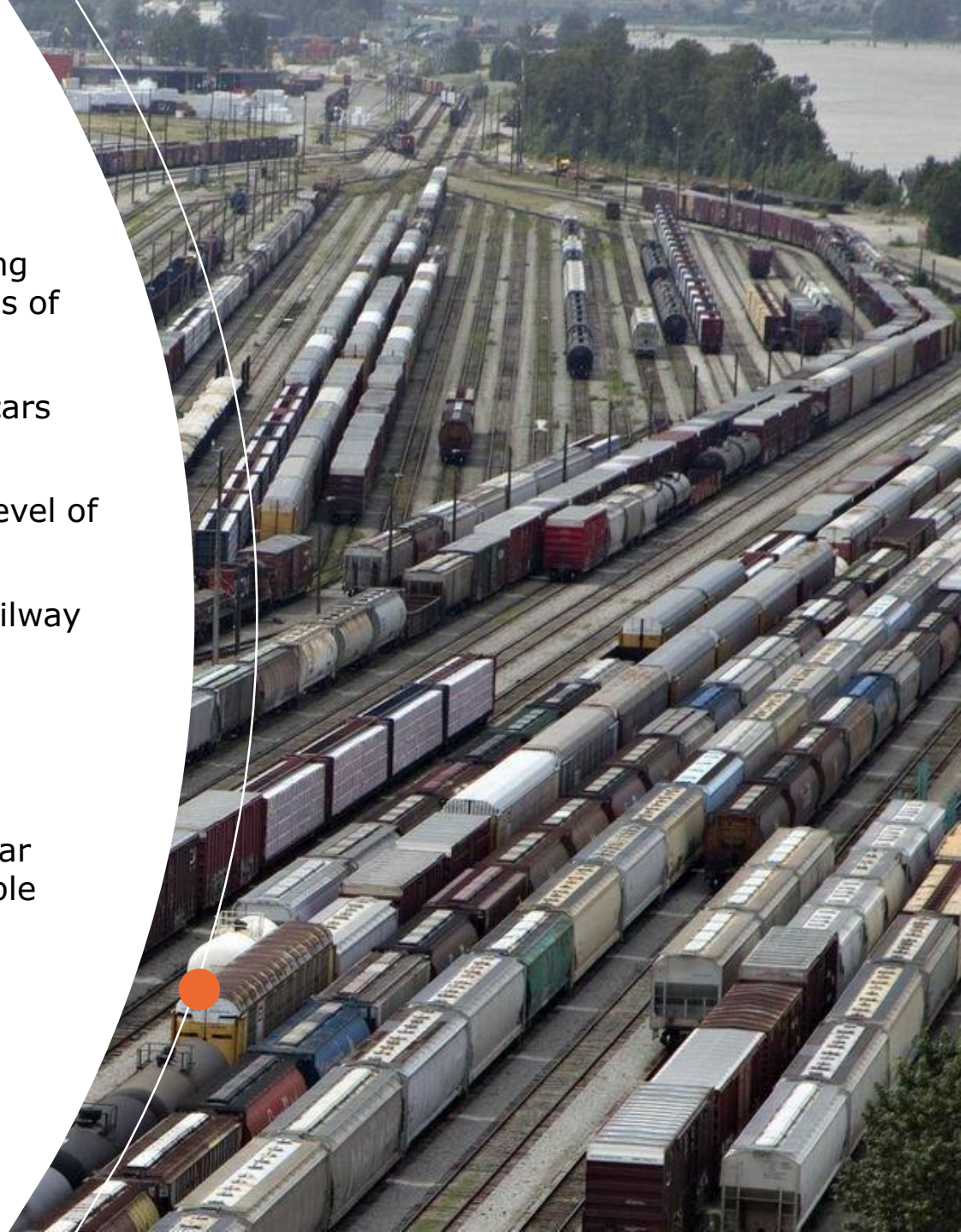
ABOUT COMPANY

Mallenom Systems is leading Russian company in the domain of development and implementation of computer vision and industrial video analytics systems based on machine vision and artificial intelligence technologies.

Mallenom Systems areas of specialisation:

- Identification and monitoring of railcars, rail tank cars and containers
- Video control and monitoring of road vehicles
- Industrial control based on machine vision
- Control of people and events based on video

BROCHURE   WEBSITE

PERFORMED TASKS

Pre-design work

Preliminary research

Formulation of technical tasks and other project documentation

Delivery and setup of the hardware

Delivery, setup, commissioning and putting into operation of all supplied machine vision equipment

Software development

Development from separate modules to allocated information systems with modern user interface

Maintenance and warranty service

Consultation and engineering support. Warranty and post warranty service

WHY US?

ARDIS is utilised by

MALLENOM SYSTEMS:

- More than 50 ARDIS implementations in Russia and CIS region

- System implementation at critical dispatch centers of LUKOIL, Gazprom-Neft, etc.

- Specialisation on machine vision systems

- Ability to perform deep system adaptation given unique conditions and demands at the implementation site

- Integration and system launch is performed directly by the system developers

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PLEASE FEEL FREE
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