Research&Development Company
PROMELECTRONICA

COMPANY SYSTEMS IMPLEMENTATIONS CONTACTS

ABOUT US

Nearly 30 years R&D Company Promelectronica has been developing, manufacturing and implementing electronic signalling and telecommunication systems for mainlines, private industrial lines and metro.

The pace of modern life is constantly speeding up and sets new challenges. In turn, railways keep up with modern requirements: new territories are being developed, traffic speeds and volume are increasing. At that, train traffic safety is crucial for railway sector development. Our main goal is to ensure required level of safety through modern railway signalling and telecommunication systems. Our systems operate in various environments and conditions, on sections of any length and any degree of traffic intensity thanks to unique technologies. Today our systems ensure traffic safety in 18 countries: on all railroads of the Russian Federation, countries of CIS, Baltic states, European Union, Columbia, Brazil, Indonesia and South Korea.

WE OFFER

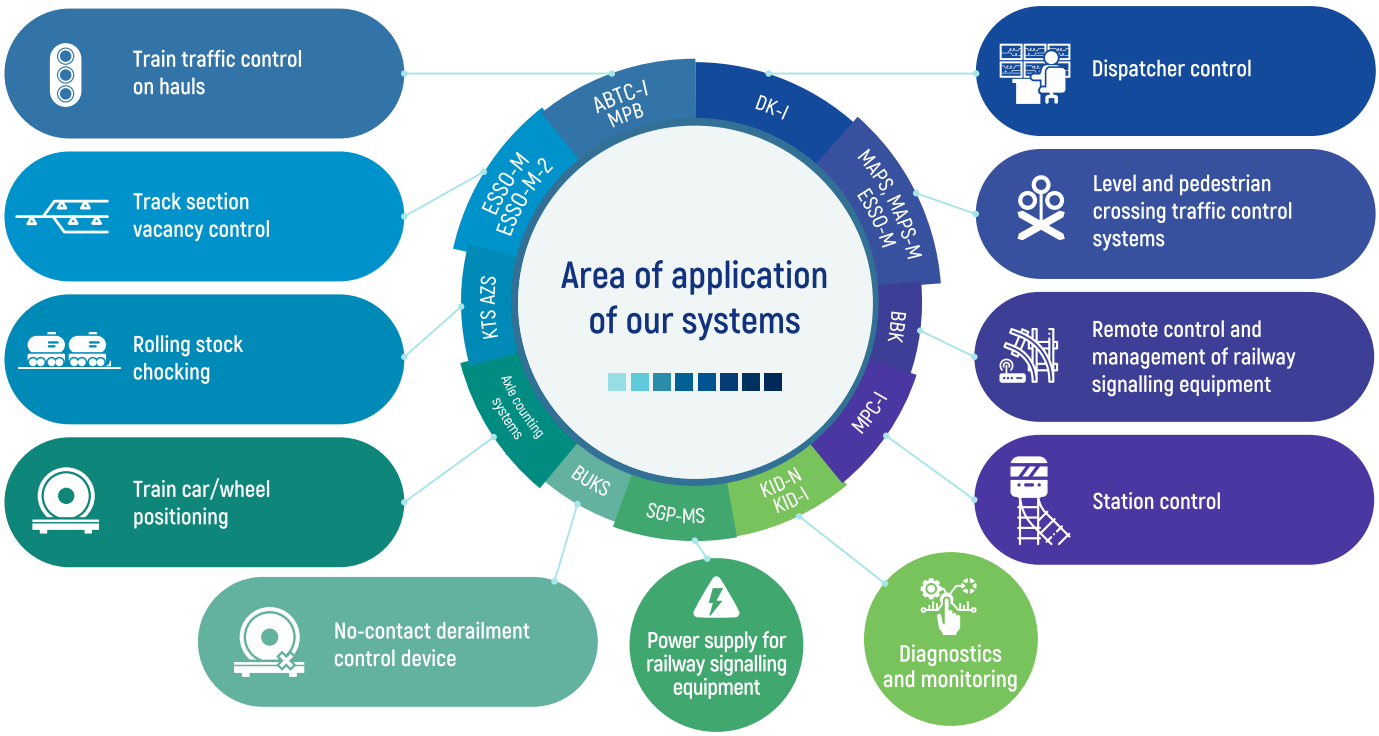
- railway signalling and telecommunication systems;
- package of works aimed at implementation of our systems;
- support of implemented systems all across Russia and foreign states.

29 years on the market

Main office in Ekaterinburg, 4 branches across Russia

Implemented in 18 countries

RAILWAY SIGNALLING AND TELECOMMUNICATION SYSTEMS



- development and engineering;
- surveying;
- manufacture;
- delivery;
- construction and test and commissioning works;
- personnel training.

R&D Company Promelectronica is one of a few companies that has a permit to design safety systems for the JSC Russian Railways. We have developed more than 50 approved books of standards, guidelines and technical solutions on designing of our systems. We have our own training classes to prepare operating personnel to maintenance and operation of our systems, as well as interactive help programs. Our specialists conduct training on site during implementation of new systems.

ABOUT COMPANY

INNOVATIONS, SERVICE, QUALITY

Development and manufacture of low-maintenance railway signalling and telecommunication systems is impossible without constant enhancement of quality. Quality of manufactured products. Quality of management and work practices.

Since 2006 we have been running our business in accordance with the international business quality management standard of ISO 9000-series. All supplied systems are provided with relevant normative technical documentation and have required certificates of conformity, whereas all the works have permits as per SRO.

We have successfully undergone certification audit for compliance to railway industry standard ISO/TS 22163:2017 (IRIS). Area of certification: designing, development, manufacture and maintenance of railway signalling and telecommunication systems.

Business practices of R&D Company Promelectronica are confirmed to be compliant with the ISO 14001:2015 standard in relation to design and development, manufacture, implementation and maintenance of railway signalling, telecommunication and automation systems.

Our axle counting systems ESSO and ESSO-M, as well as electronic interlocking system MPC-I are compliant to the highest Safety Integrity Level SIL 4 of the CENELEC standard.

SUPPORT OF IMPLEMENTED SYSTEMS ALL ACROSS RUSSIA AND FOREIGN COUNTRIES

- warranty maintenance;
- system operation monitoring, post-warranty maintenance and modernization;
- life-long author's supervision;
- equipment recycling.

OUR DEVELOPMENTS ARE HIGHLY PRAISED BY EXPERTS

R&D Company Promelectronica is a multiple award winner of the Russian Railways for the best quality of rolling stock and complex technical systems.

The Company is also a laureate of the "Golden Chariot" public national award of the railway industry in nomination "Leader in construction of transport facilities of Russia".

MAINLINES

INDUSTRIAL RAILWAYS

METROS

- **ARM ETs Interlocking terminal**
  Hardware kit to replace station master control panel with ARM DSP terminal
- **MPC-I Interlocking System with relay-contact interface:**
  - with redundant control panel
  - with hot standby

Capability to control several stations from a single post

Relay-contact Interface

Digital Interface

MPC-I

- **MPC-I Interlocking System with Object controllers:**
  - with UKC hot standby
  - with hot standby of object controllers
- **MPC-I for multistation management mode**

Capability of decentralized equipment arrangement at comprehensive track construction

Station Control

MPC-I ELECTRONIC INTERLOCKING SYSTEM

MPC-I performs interlocked control over trackside equipment: points, light signals, level-crossings and other signalling and telecommunication systems.

MPC-I is used on distributed posts of any configuration (small, medium and large stations, sidings, passing loops, junctions), which require train and shunting routing by light signals, as well as automatic block systems and CTC systems.

USER ADVANTAGES

- Capability to create information and control systems of any configuration and complexity.
- In-built event logging system with 100% redundancy. Does not depend on operability of any work stations.
- Various redundancy types – from direct control panels up to full redundancy of interlocking controllers with "2 out of 2 + 2 out of 2" architecture featuring partially or fully redundant object controller system. Redundancy can be configured as per Customer's requirements.
- All MPC-I components are protected against cyber security threats.
- In-built automatic subsystem for measurement of insulation resistance, tower voltages and currents based on KID-series devices.
- System interface in 4 languages. Operating documentation in languages of country of implementation.
- Highest level of Safety Integrity Level SIL4 of CENELEC standard.
- Award of the Russian Railways for the best quality of complex technical equipment.
- One of the most compact interlocking solutions. Can be housed in MKM Equipment Container Module.

MPC-I software and hardware allow

- dividing large stations into unlimited number of control areas, both constant and temporary;
- allocating sections for local control on stations with shunting operations, both including arrangement of an additional work station or via point control post;
- integrating low traffic stations into single control posts without central posts of CTC and linear CTC posts, while leaving local control capability;
- arranging multi-level hierarchic control systems of "zone-station-section-road" type with a capability of immediate transfer of control to a relevant level, if necessary.

Local area networks, arranged by in-built means of the ShTK Communications Cabinet and channeling equipment allow creating various configurations of the facility. ShTK Cabinet ensures operation of all work stations with fully automatic redundancy of all equipment, as well as provides simple integration with any external system, including CTC, SCADA, while ensuring information security, logging of equipment operation and personnel actions.

EQUIPMENT

- ShTK Communications Cabinet;
- UKC Interlocking Controller with interlocking dependencies logic software;
- Interlocked objects (track circuits, axle counting equipment, light signals, point drives, shunting lights, vehicle inspection control panels and other mass-produced trackside equipment), signalling cable network, as well as object controllers and interfacing relay schemes;
- SGP-MS uninterruptable power supply system for electronic systems.

ShTK Communications Cabinet

UKC Interlocking Controller Cabinet

EQUIPMENT

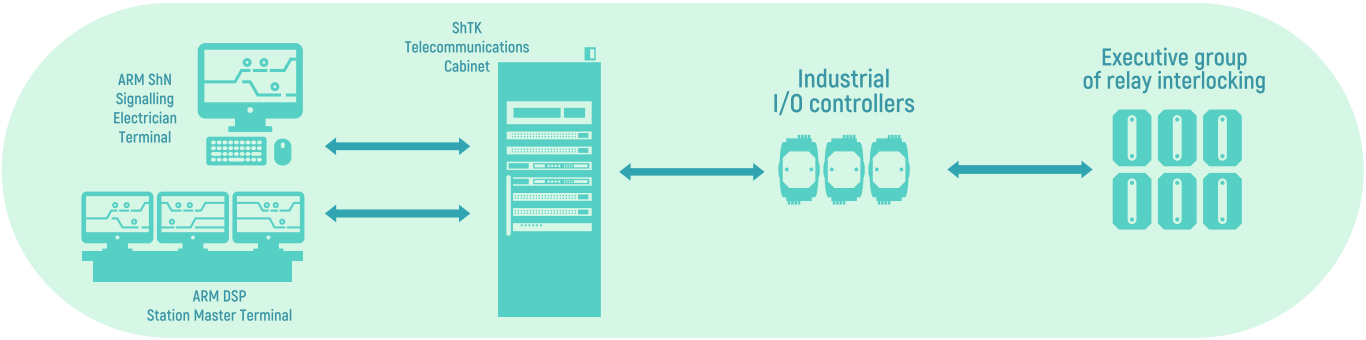
- ARM DSP redundant Station Operator Work Station;
- ARM ShN Signalling Electrician Work Station;
- redundant direct control panel for management of points in case both ARM DSP sets and UKC are rendered out of order. Redundant control panel is a part of simplified MPC-I variant.

ARM DSP Station Operator Work Station

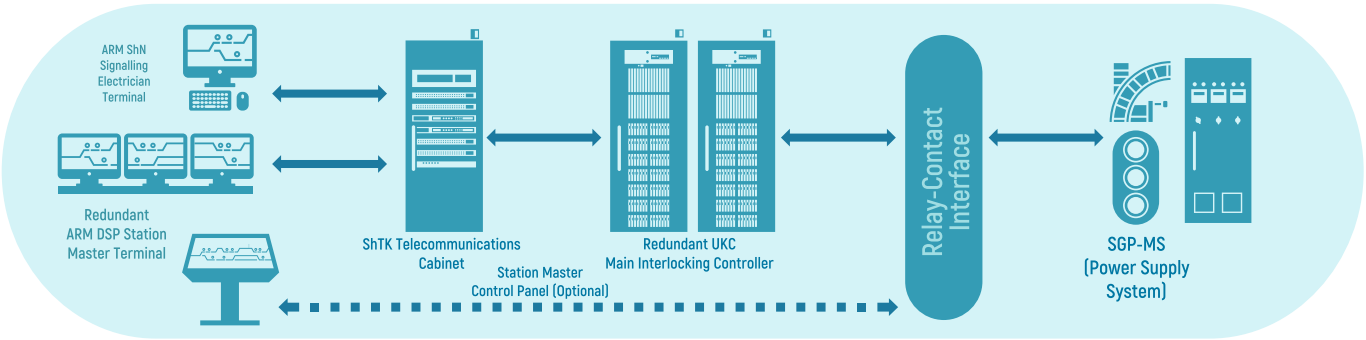
ARM ShN Signalling Electrician Work Station

IMPLEMENTATION VARIANTS

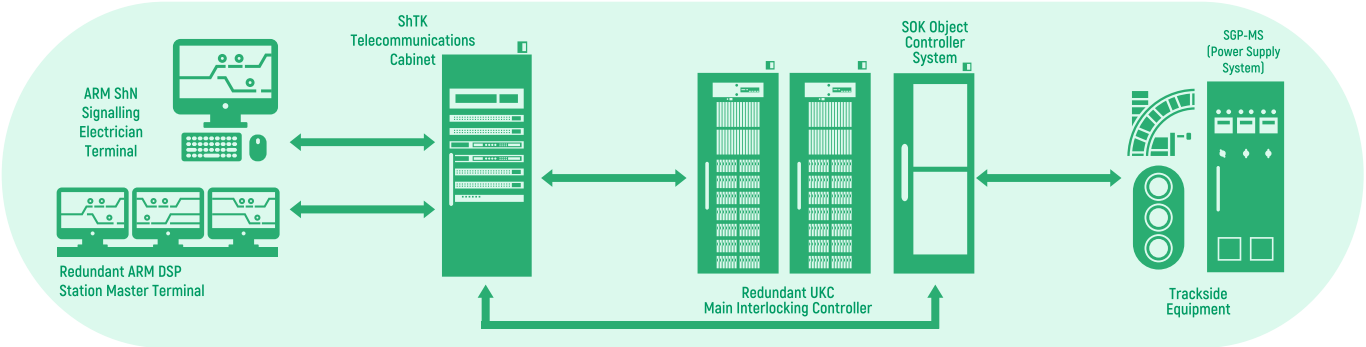
ARM ETs



MPC-I with relay-contact interface



MPC-I with digital interface

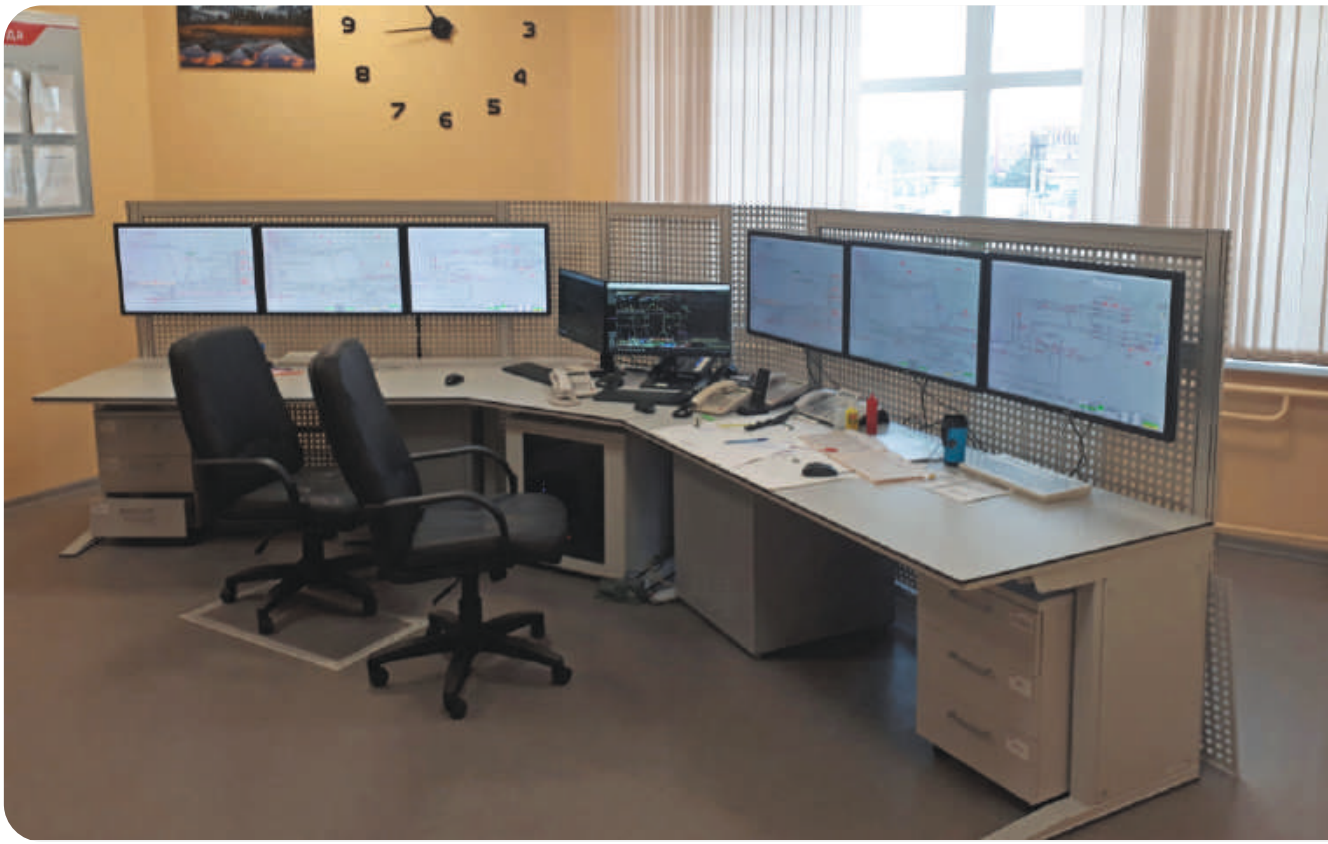


ARM ETs

Solution for partial modernization of electric relay interlocking systems. Software and hardware complex installed at a station, allowing replacement of control panels with modern station operator work stations at minimal financial costs.

Modernized electric interlocking features new event logging capabilities, as well as remote control feature.

This solution is used on operating stations of any size, when already installed relay electrical interlocking systems have not reached the end of their lifecycle. ARM ETs is also a cost efficient solution for designing of new small stations.



MPC-I WITH RELAY CONTACT INTERFACE

Interface based on railway signalling and telecommunication relays of 1st reliability class.

MPC-I with relay contact interface uses UKC Interlocking Controller to perform logical dependencies of electric interlocking system. The solution is efficient for partial modernization of stations when replacement of trackside cable network is not possible.

TECHNICAL DATA

- average time to design logic (for a station with 30 points): 1-2 weeks;
- number of points per UKC (one or first UKC): 35;
- number of points per every next UKC: 45;
- total number of interlocked points: unlimited.

MPC-I WITH DIGITAL INTERFACE

Object controller system provides non-relay control and monitoring of trackside equipment, such as points and light signals. The system converts logical information coming from UKC (such as, signal aspect, point switching command) into physical information (current, voltage) in accordance with the configuration of an interlocked object.

Interface of object controllers system with UKC is based on specialized communication object controllers via secure protocol. Point object controllers are designed for control and monitoring of DC (110-230V), AC single-phase (220/230V), AC three-phase (3x220 – 3x400V) point drives via two-/five-/seven-/nine-wire communication lines (nine-wire circuit features non-contact sensors). Each object controller controls 8 channels of light signalling systems (distributed between 1-4 light signals), as well as controls "coil" condition (both in enabled and disabled state of a controlled object). Separate coils of bulb light signals, as well as standard LED-lamps can be used as light signalling systems.

SOK Object Controller System provides additional functions

- decentralized equipment allocation on large stations, control over adjacent stations without arrangement of local interlocking posts (multistation control mode);
- combination of relay interface with centralized control and modern non-relay centralized/decentralized object controller system interface;
- station management from joint points without the need to install interlocking controllers, complex power supply equipment and other equipment on the stations;
- new structured multi-level MPC-I diagnostic subsystem to ensure fast detection of failure and pre-failure conditions.

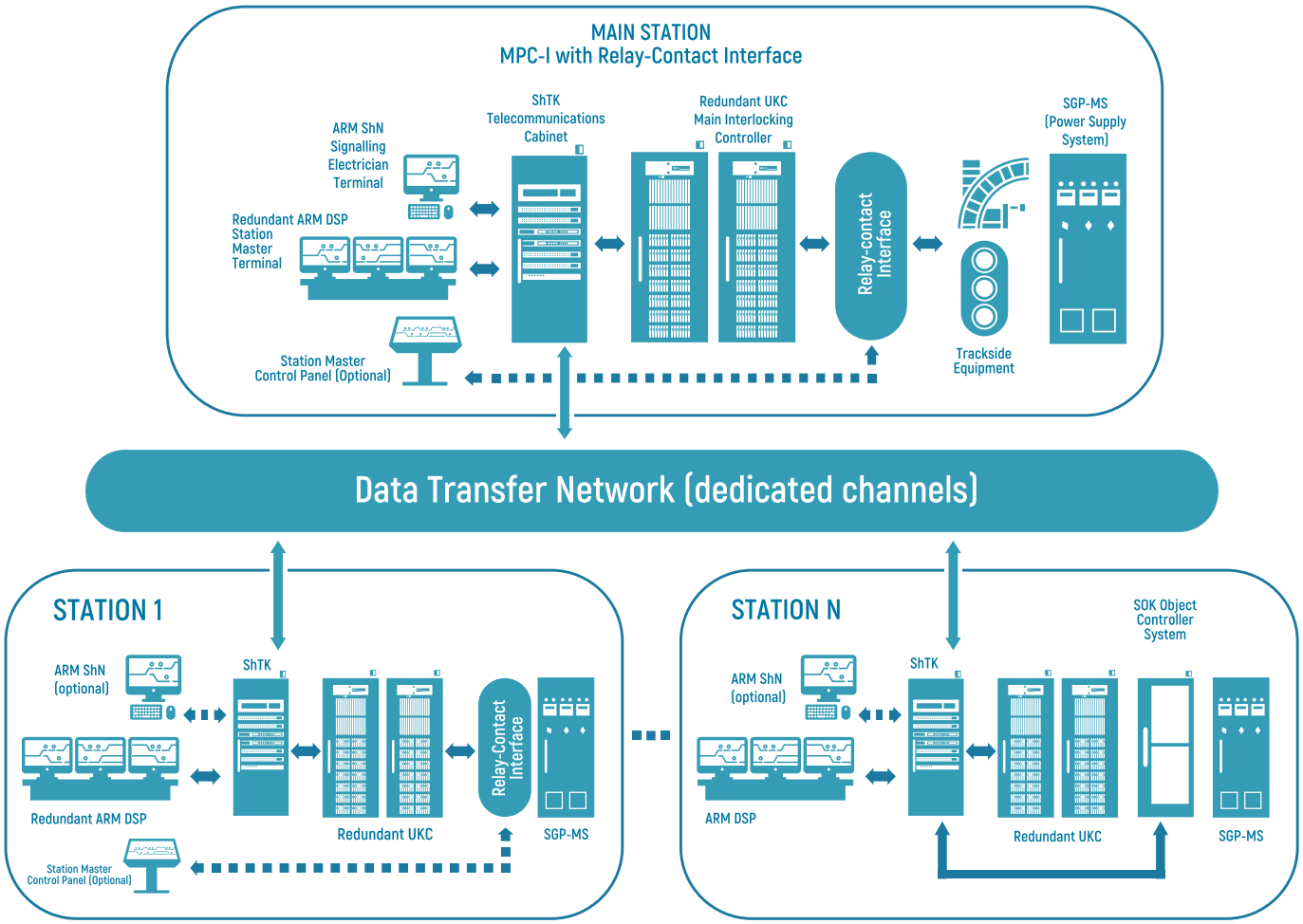
TECHNICAL DATA

- nominal power supply voltage: 24 VDC;
- number of points per cabinet: up to 18 (without redundancy);
- possibility to connect 24 points per cabinet at limitation of functionality of a point object controller;
- number of lights per one cabinet: up to 144 (without redundancy);
- possibility to connect up to 216 lights per cabinet at limitation of functionality of a light signal object controller.

REMOTE STATION CONTROL FROM SINGLE POST

Feature is used on low-traffic sections to reduce operating personnel, as well as on sections that allow for temporary work of station operators on particular stations.

Each station is fitted with MPC-I set both with relay-contact interface and digital interface.

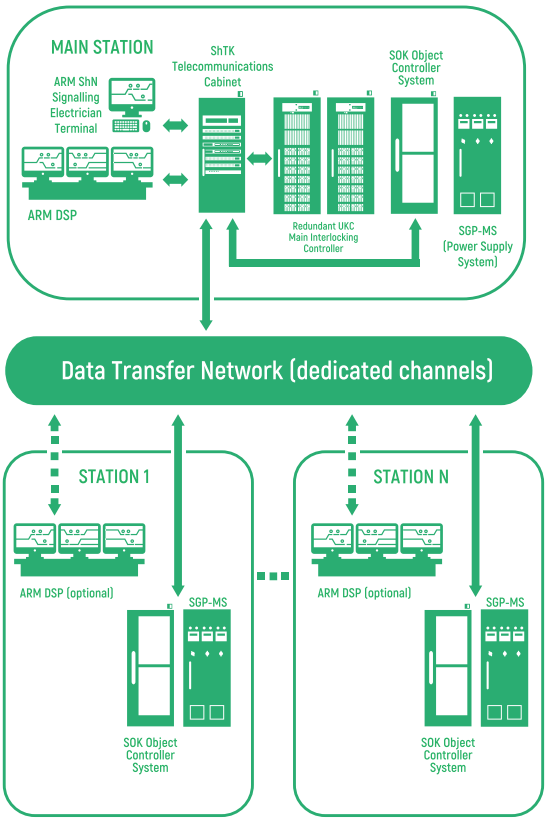


MULTISTATION MODE

Decentralized equipment allocation on large stations, management of adjacent stations without arrangement of interlocking posts on them.

In multistation setup, a single MPC-I interlocking processor (redundant interlocking controller with communications cabinet) on a basic (sectional or major intermediate) station simultaneously interacts with object controllers of several adjacent sidings, turnouts and small intermediate stations on the basis of full load of interlocking processor.

Multistation mode considerably saves on costs for comprehensive line construction.



UKC HOT STANDBY

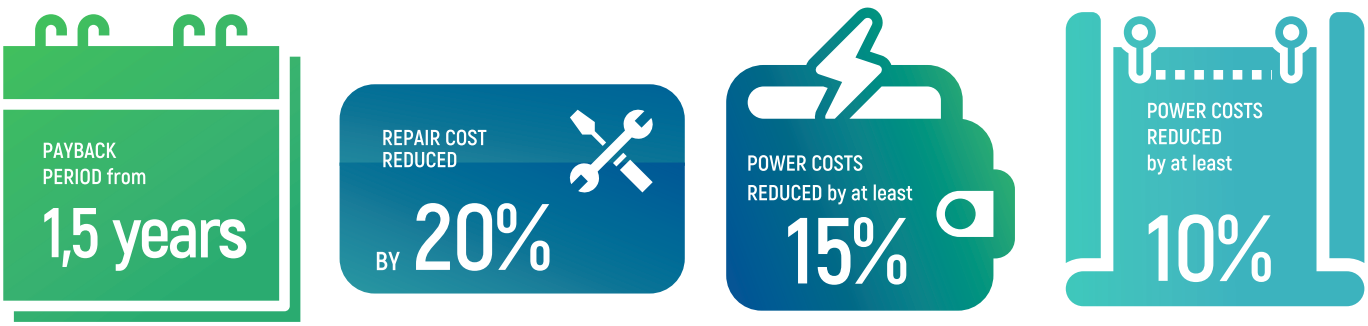
Used for enhancement of UKC reliability and is based on "2 out of 2 + 2 out of 2" architecture.

Each UKC Cabinet performs degradation degree diagnostics, which detects presence of hardware failures or errors in the interlocking controller or interacting subsystems based on current or new diagnostic data. Information on degree of degradation of an interlocking controller is transmitted to the paired controller via two-way communication every operating cycle. At any time, functioning of the system is ensured by only one interlocking controller with the lesser degradation degree, which is called an "active" set. Deactivated UKC, being a passive set, does not interfere with the system operation.

Decision to switch roles of the sets is based on the following information:

- degradation degree of the active UKC set is higher than of a passive set for the duration of two or more cycles of hot standby;
- operator issued a forced UKC activation command (using ARM DSP or ARM ShN work stations). UKC switchover time does not exceed 200-500 ms.

MPC-I COST EFFICIENCY

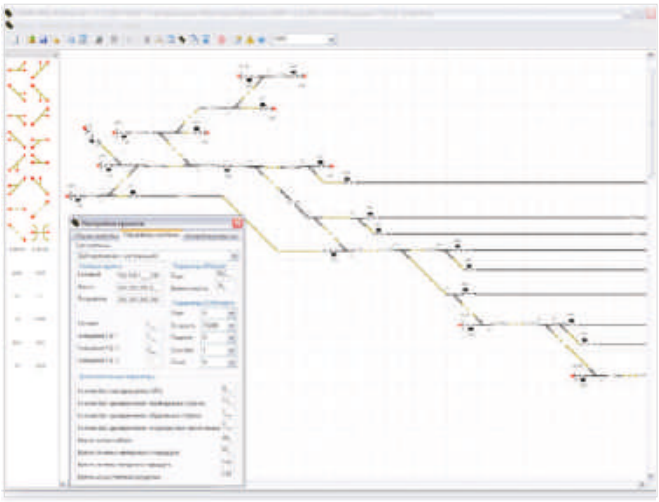


MPC-I CAD SOFTWARE

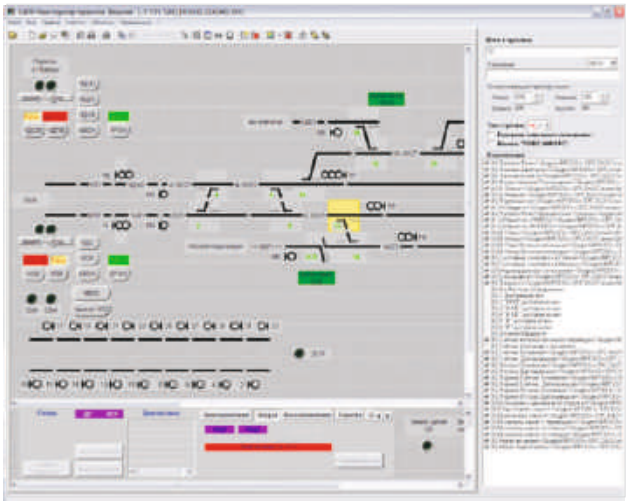
Created to assist designers and customers of MPC-I.

CAD significantly reduces design efforts and allows trained and authorized personnel on site to adjust MPC-I software in case changes to the station layout were made.

This feature significantly reduces the impact of the human factor as well. Operators are given two options for reconfiguration of the system – using designing capabilities of R&D Company Promelectronica and independent adaptation within the limits of introduced changes using MPC-I CAD software in cooperation with the Service Center of R&D Promelectronica.



Adaptation of the middle level of MPC-I



Adaptation of the upper level of MPC-I

MPC-I LABORATORY TRAINING SET

Created to train station operators on MPC-I operating principles.

The set controls a mockup of a small station and includes the following equipment:

- UKC Interlocking Controller Cabinet;
- rack with relay-contact interface;
- SGP-MS Power Supply Unit;
- station mockup based on redundant station control panel;
- ARM DSP Station Operator Work Station and ARM ShN Electrician Work Station.

Training course features simulation of interlocking system operation, such as setting and locking of routes, point switching, arrival of a train to a station, as well as search and elimination of possible failures.

STATION OPERATOR TRAINING SET

Station Operator training set is designed to train station operators prior to station commissioning or during scheduled training courses.

Station operator training set is based on MPC-I simulator software and includes a work station and specialized MPC-I software. Training work station is fully identical to an actual electrician work station of MPC-I. Compact size of the set allows allocation within the station building, class rooms, etc. The set is powered by 220V AC.

Station operator training is performed with a simulation of a station they are going to operate. Station layout on the station operator work station screen is fully identical to the work station of an actual station.

The training set allows station operators to learn operating principles of MPC-I Interlocking System in the main control mode, featuring:

- signing-in and user authorization;
- route setting and cancelling;
- point switching;
- operator's actions in case of malfunction or false occupancy of a section;
- supplementary point switching;
- manual division of sections;
- calling-on signal opening;
- procedure of receiving trains under conditions of equipment failure.

Station Operator training set

MAINLINES

INDUSTRIAL RAILWAYS

METROS

CITY RAIL TRANSPORT

- ESSO-M Axle Counting System
- Track circuit redundancy by ESSO-M equipment

Relay-contact interface

Digital interface

Track section vacancy control

- ESSO-M-2 Axle Counting System

CONTROL OF TRACK SECTION VACANCY

AXLE COUNTING SYSTEMS

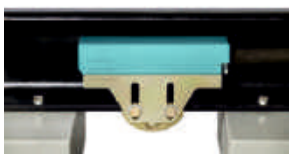
R&D Company Promelectronica implemented axle counter technology for the first time back in 1996 in the form of ESSO system: in 1996 the system was implemented on industrial line and as early as 1999 the system was implemented on mainlines. Our specialists are constantly improving their systems. A new generation of the system ESSO-M was commissioned on mainline in 2014, while ESSO-M-2 with non-relay integration with signalling systems was commissioned in 2017.

ESSO-M AXLE COUNTING SYSTEM

Controls vacancy/occupancy of a track of any configuration and length and serves as an alternative to track circuits. ESSO-M integrates with upper level systems via relay-contact interface.

- Main interface: relay-contact.
- One evaluator unit controls up to 15 sections.
- ESSO-M modules can be easily integrated into standard upper level system cabinets: 1 cabinet houses up to 45 sections/up to 68 counting posts.
- Highest Safety Integrity Level – CENELEC SIL4.
- Award of the Russian Railways for the best quality of complex technical equipment.

ESSO-M tower equipment



DKU Wheel Sensor

ESSO-M-2 AXLE COUNTING SYSTEM

Controls vacancy/occupancy of tracks of any configuration and length.
The system represents a new technological level by employing non-relay integration with current singalling systems. ESSO-M-2 provides improved integration circuit reliability with upper level systems through digital secure redundant Ethernet-based interface.

- Main interface: serial redundant Ethernet interface.
- Configurable by software.
- Can be integrated via relay-contact interface.
- One evaluator unit controls up to 14 sections.
- One cabinet houses up to 3 evaluators – 42 sections/68 counting posts.

ESSO-M-2 tower equipment

DKU-M Wheel Sensor

ESSO-M and ESSO-M-2 systems are used on stations and interstation lines of public and non-public railways, as well as metro and high-speed light rails. The systems can also be used as track circuit redundancy and detection of tail end of a train for application on pedestrian crossings. ESSO-M/ESSO-M-2 can be integrated into any existing signalling systems both when constructing new facilities and modernizing or overhauling existing ones. Both systems provide detailed technological and diagnostic information on an LCD-screen with user friendly interface, such as: number of axles that followed through each counting post considering their direction, pre-failure conditions of communication channels with axle counting posts. The systems have in-built interactive troubleshooting guide, as well as a capability to connect remote diagnostics.

ESSO-M, ESSO-M-2 ADVANTAGES

- Can be operated with any type of roadbed.
- Does not require electrical adjustment.
- User-friendly interface.
- Interactive troubleshooting guide.
- In-built diagnostic, monitoring and event logging system.

EQUIPMENT

Outdoor units:

- DKU/DKU-M Wheel Sensors with sensor clamps;

Indoor units:

- KBR Evaluator Unit, PLR Counting Board and PLI Communication Board. ESSO-M-2 also includes KLK Configuration Key;
- UPSP Axle Counter Adapater and USKS Interfacing Unit;
- PT Visual Panel (ESSO-M) and PT-2 (ESSO-M-2);
- PSLZ False Occupancy Reset Panel (only for ESSO-M);
- overvoltage and lightning protection devices;
- DS Diagnostic System.

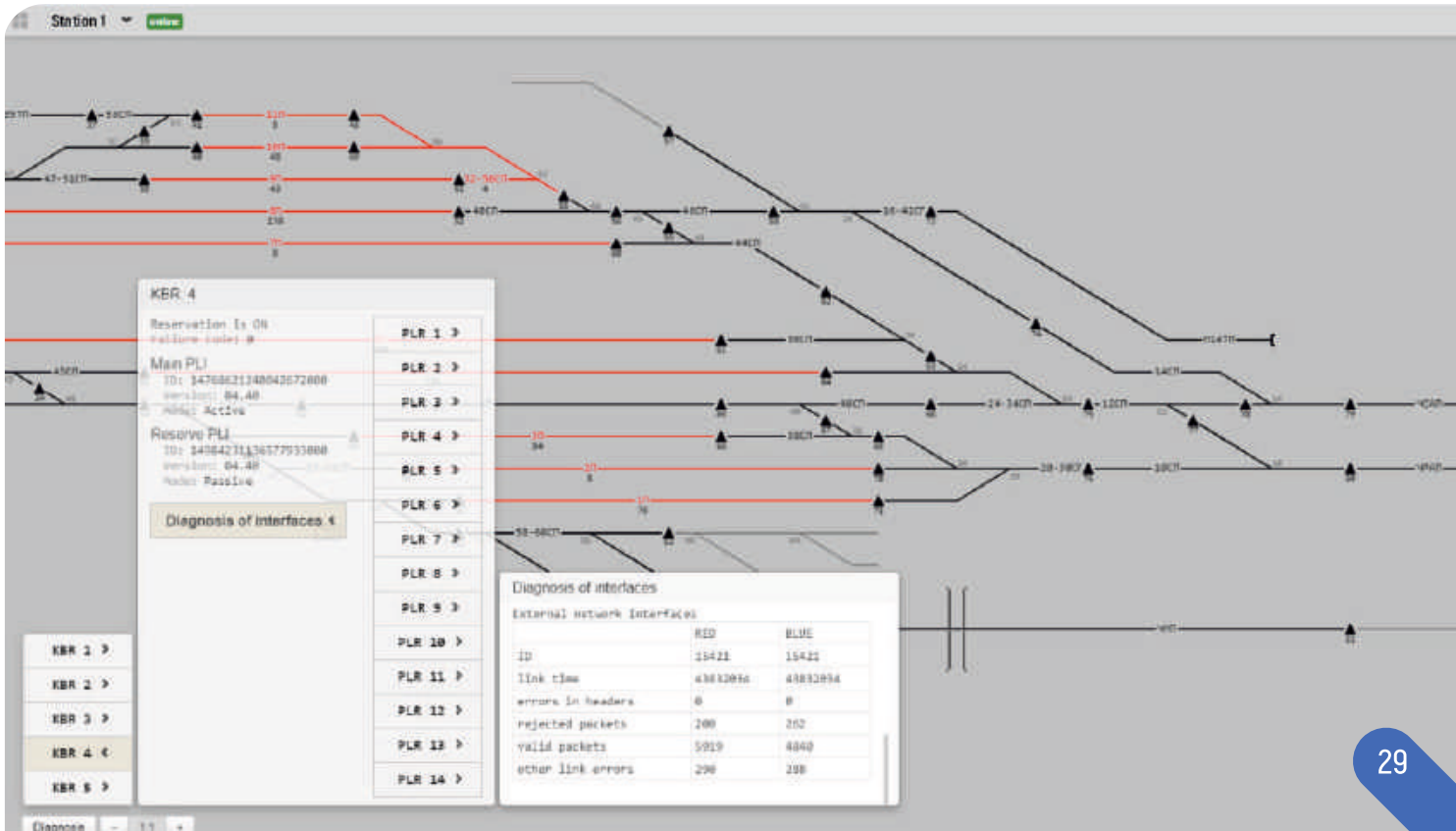
TECHNICAL DATA

- power supply voltage: AC – 220 V, DC – 24 V;
- power consumption per one counting post: 2 W;
- wheel speed: 0 - 360 km/h;
- guaranteed data transmission distance between tower and trackside equipment: up to 5 km – via signalling cable, up to 35 km – via communication cables, unlimited – via multiplexing equipment, radio relay and fiber-optic communication lines;
- a pair of wires for connection of trackside equipment to tower;
- does not require specialized uninterruptable power supply equipment;
- operating temperature range for trackside equipment: -60°C up to +70°C, tower equipment: -40°C up to +70°C;
- electromagnetic compatibility and mechanical loads, climatic conditions as per GOST 34012, EN 50125-3;
- standard cabinet dimensions: 600x2100x720 mm;
- RS-485 (Modbus) diagnostic interface.

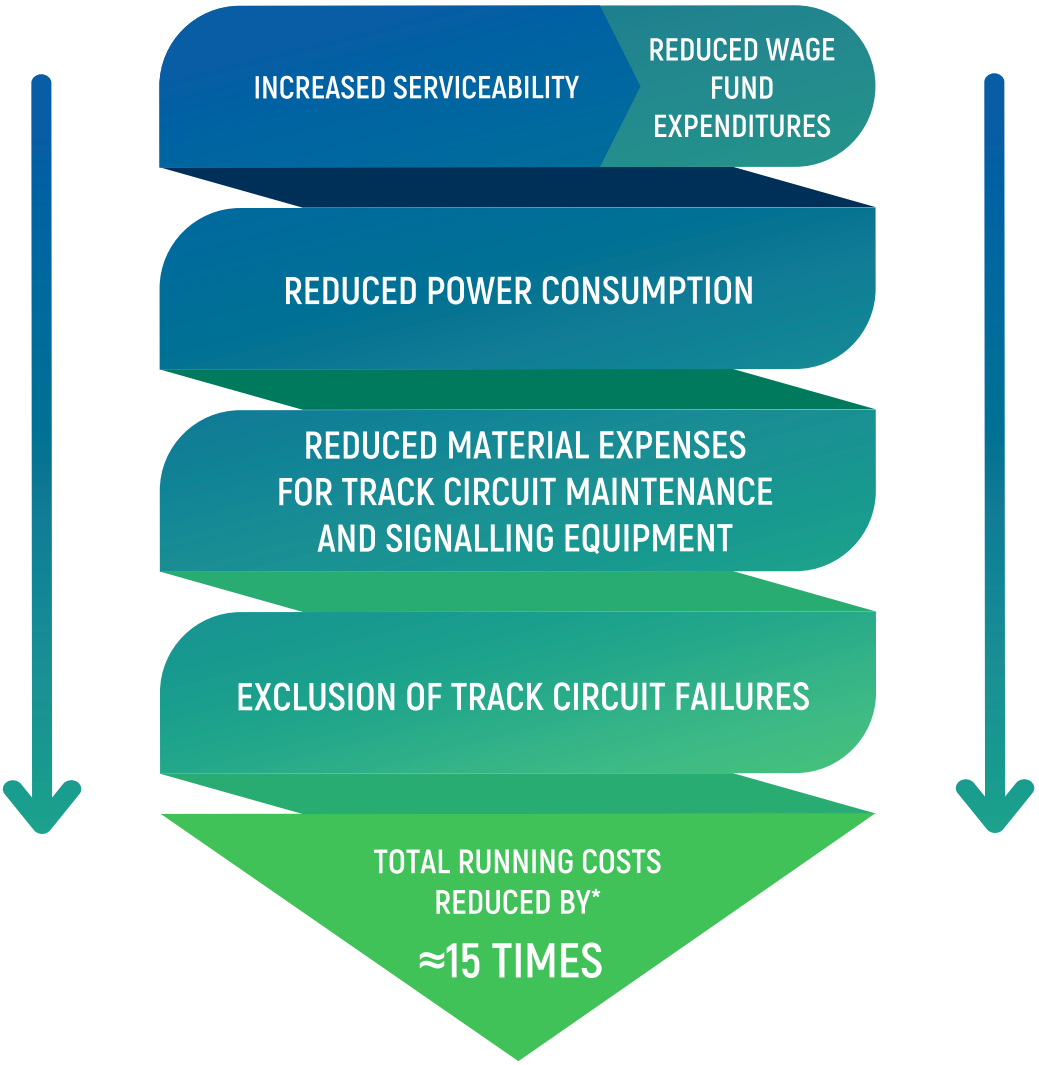
DIAGNOSTICS AND MONITORING

DS Diagnostic System comprised as software and hardware complex allows live tracking of system condition, transmit diagnostic information to upper level systems and log events. Information gathers by DS streamlines maintenance and troubleshooting, as well as enables additional functions: tracking of a train movement along the station, maintenance of trackside equipment as per actual wear condition.

ESSO-M/ESSO-M-2 work station is designed for live monitoring of system status of the station, logging and viewing of information and troubleshooting. On booting ESSO-M/ESSO-M-2 work station displays the list of stations available for monitoring with their miniaturized layouts. Scale of the selected layout can be adjusted. Clicking on a section displays detailed information on its status.



ESSO-M AND ESSO-M-2 COST EFFICIENCY IN COMPARISON WITH TRACK CIRCUITS

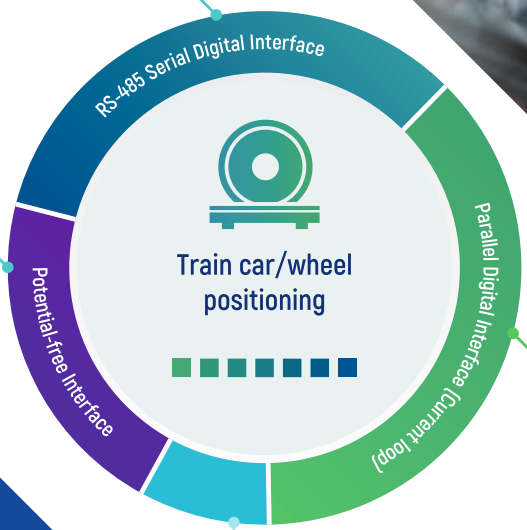


*according to calculated rate a particular mainline project

- MAINLINES
- INDUSTRIAL RAILWAYS
- METROS
- CITY RAIL TRANSPORT

TRAIN CAR/WHEEL POSITIONING

- DKU-02 Koldun Wheel Sensor
- DKL Rail Contact Wheel Sensor



- ESSO-ILS Axle Counting System
- Application of ESSO-M and MPC-I
- DKT Technological Wheel Sensor

DKU-02 KOLDUN WHEEL SENSOR

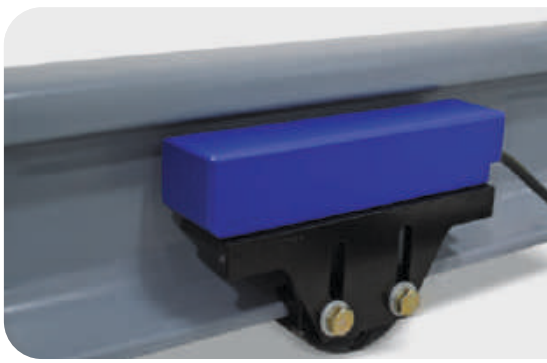
DKU-02 Koldun Wheel Sensor is designed for application in information and logistic systems related to mainline train traffic. DKU-02 Koldun serves as primary source of data for these systems, as it detects wheel presence within the sensing area, counts axles considering their movement direction, calculates wheel movement parameters and transmits data to upper level system.

FUNCTIONS

- detection of wheel passing, movement direction and wheel speed;
- axle counting considering their movement direction;
- wheel detection within sensing area;
- continuous self-check of functionality and position in relation to a rail;
- transmission of gathered information to an upper level system;
- remote control capability.

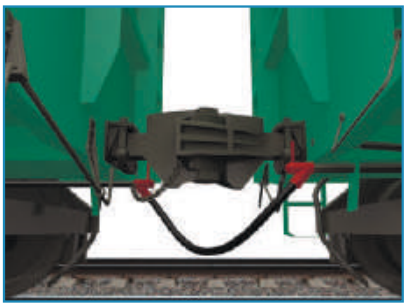
USER ADVANTAGES

- Individual processing of gathered information.
- Software configurable to the customer's needs.
- Direct connection to information and logistic information.
- Increased resistance to special vehicles (snow plowers, track carts, etc).



DKU-02 Koldun

AREAS OF APPLICATION



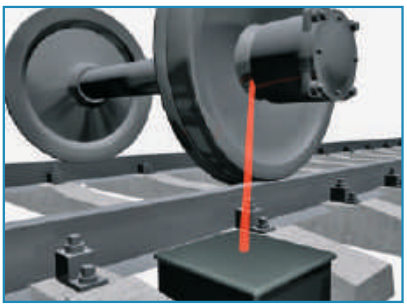
Automatic coupling control systems

Warning of operating personnel about incoming trains

Rolling stock speed measurement

Train car weighing

Train car type identification



Positioning in hot box detection systems

TECHNICAL DATA

- RS-485 serial digital interface with Modbus RTU protocol;
- direct current power supply voltage: 18 – 36 V;
- power consumption: 2 W max;
- wheel speed range: 0 – 100 km /h;
- detected wheel diameters: 300 – 1500 mm;
- operating temperature range: from -60°C to +70°C.

DKT WHEEL SENSOR

Detects a wheel within sensing areas, transmits signal on wheel presence and functionality check data to upper level system.

AREAS OF APPLICATION

- automation systems of shunting systems;
- information and logistic, as well as monitoring and measurement systems.

USER ADVANTAGES

- Fast and simple installation on all rail types.
- Does not require maintenance.

TECHNICAL DATA

- parallel digital interface ("current loop");
- two wheel sensing areas;
- data transmission time on wheel presence to evaluator device: up to 8 ms;
- extended operational temperature range: from -60°C to +70°C;
- electromagnetic compatibility, mechanical loads, climatic conditions as per GOST 34012.

DKT Wheel Sensor

DKL "RAIL CONTACT"SENSOR

DKL Sensor detects train axle passing. Suitable for mobile solutions. Lightweight and compact.

AREAS OF APPLICATION

- alarm systems for track maintenance crews;
- precise wheel positioning systems.

USER ADVANTAGES

- Fast and simple installation on all rail types in less than 5 minutes.
- Does not require maintenance.

TECHNICAL DATA

- safe "dry contact" (potential-free) interface;
- extended operational range: from -60°C to +70°C.

DKL Sensor

ESSO-ILS AXLE COUNTING SYSTEM

The system is used as a part of information and logistic systems to track locomotives and train cars within the station. ESSO-ILS uses standard interface to number of axles and their movement direction to upper level system.

USER ADVANTAGES

- Decreased size and cost of tower equipment in comparison with ESSO-M and ESSO-M-2.
- High system reliability, axle counting error probability does not exceed $1{,}0 \cdot 10^{-6}$.
- Uses safe DKU-M Wheel sensors without additional trackside equipment.
- Can be retrofitted with additional ESSO-M and ESSO-M-2 tower equipment and integrated with MPC-I.
- Provides power supply for counting posts, gathers information from sensors and protects equipment against surge and lightning overvoltages.

ESSO-ILS tower equipment

TECHNICAL DATA

- Ethernet interface with ModBus TCP protocol;
- power supply voltage: alternate current – 220V, direct current - 24 V;
- power consumption per one counting post: 2 W;
- detectable wheel speed: 0 – 360 km/h;
- operating temperature range for trackside: from -60°C to +70°C, tower equipment: from -40°C to +70°C;
- electromagnetic compatibility, mechanical loads and climatic conditions: GOST 34012, EN 50125-3.

KID-I INSULATION RESISTANCE CONTROLLER. KID-N VOLTAGE MEASUREMENT CONTROLLER

Performs remote insulation resistance and power supply voltage control with transmission of measurement data to external systems.

- Controllers are fully automatic and do not require operator's interference. Both insulation resistance controller (KID-I) and voltage controller (KID-N) have 8 channels to control 8 circuits simultaneously.
- KID-N measures constant voltage and current AC voltage value independent of the signal type in the range from 20 Hz to 5.5kHz.
- KID-I measures insulation resistance in the range from 1 MOhm to 10 MOhm. Measurements accuracy is not standardized for ranges below 1 MOhm and the device can be used as an indicator.
- KID-I and KID-N controllers can be used both as a part of MPC-I and as a part of any SCADA-system that supports RS-485 and Modbus protocol. We have developed solutions for application of these controllers in MPC-I and other independent systems.
- Controllers are fitted with in-built protection against pulse noise.

KID-I, KID-N

MAINLINES

INDUSTRIAL RAILWAYS

- ABTC-I Electronic Auto Block System with voice-frequency track circuits
  - ALSO
  - Mobile block-sections
  - ALS-EN
- MPC-I based automatic block

Dense traffic sections

Train traffic control on hauls

Low traffic sections

- MPB Electronic Semi-Automatic Block System
  - with control of a train arrival in full
  - without control of a train arrival in full
- MPB Electronic Semi-Automatic Blok System with automatic block-post
- MPC-I based automatic block

Capability of data transmission via different communication channels

TRAIN TRAFFIC CONTROL ON HAULS

ABTC-I ELECTRONIC AUTO BLOCK SYSTEM WITH VOICE-FREQUENCY TRACK CIRCUITS

ABTC-I Electronic Auto Block System with Voice-Frequency Track Circuits is designed for train spacing and ensuring train traffic safety at any type of sections, including high-speed ones, with any type of traction on single, double and multitrack lines.

The system is based on voice-frequency track circuits without insulating joints. Each of adjacent stations is fitted with ABTC-I subset that manages its part of the line.

- Internal data flows are processed by high-performance controllers with embedded hardware self-diagnostic tools.
- FSTEK Certificate for protection against undeclared capabilities and unauthorized access.
- Confirmed cybersecurity.

ABTC-I equipment is based on high-performance electronic elements without electromagnetic relays. Depending on Customer's requirements there could be implemented auto-block algorithms with three- and four-aspects light signals, automatic locomotive signalling as independent train spacing system (ALSO) and train spacing systems with agile block-sections.

USER ADVANTAGES

- Fully non-relay system.
- Monitoring and continuous event logging.
- Interfacing with MPC-I via digital interface.
- Increased resistance to impulse, switching and lightning overvoltages.

EQUIPMENT

- ABTC-I Control Cabinet;
- Track Circuits Cabinet;
- Control Module (MU);
- Complex Waveform Generator (GKS);
- Trackside Receivers Module (MPP);
- Relay Interface Module (MEC);
- ARM Interfacing Module (MARM);
- Interstation Link Module (FOC-MSS);
- Interfacing Module (MDC).

ABTC-I equipment is modular and placed in 19" Euromechanics standard cabinets.
Indoor equipment could be located in buildings or MKM Equipment Container Module.

ABTC-I Control Cabinet

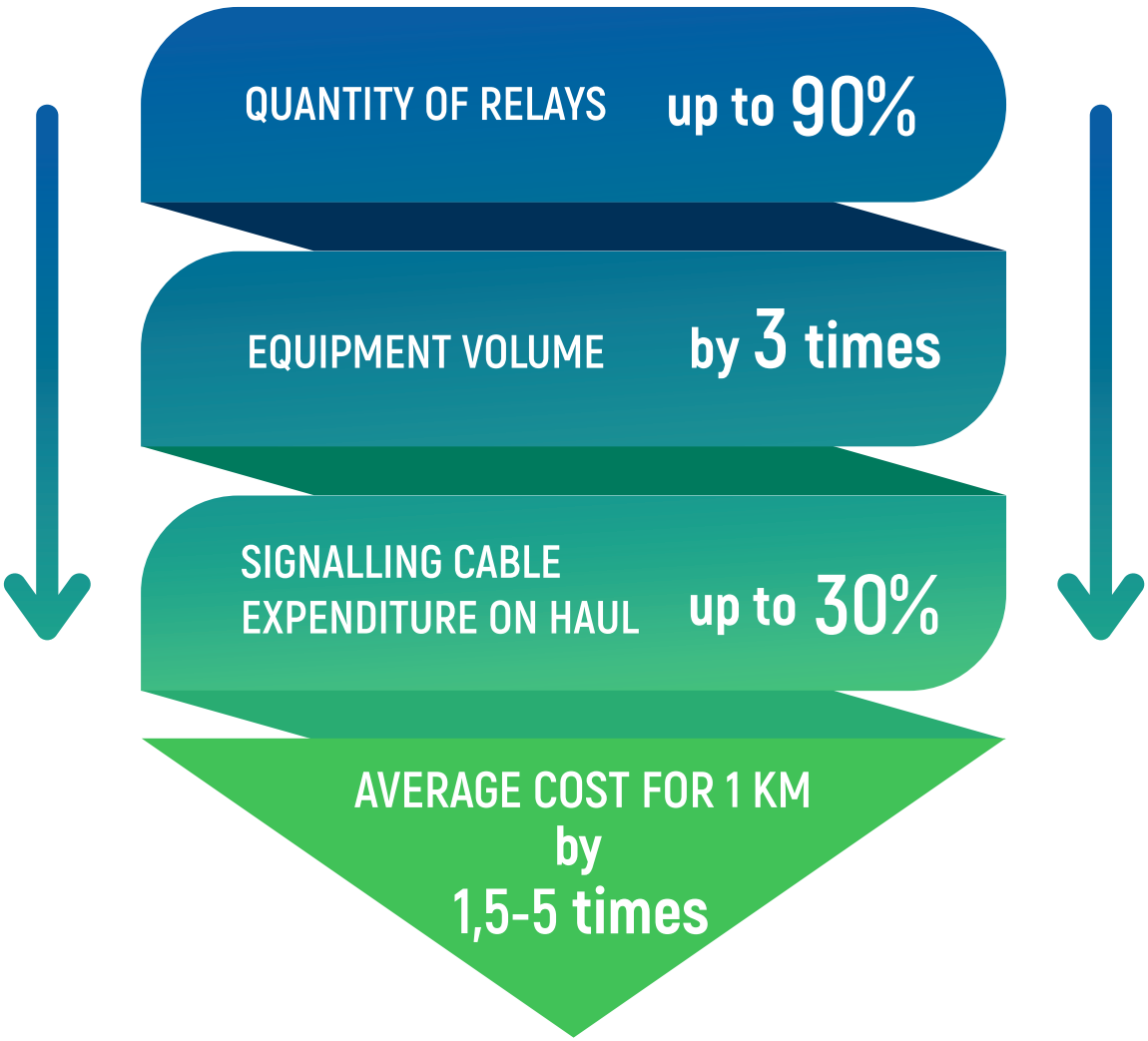
TECHNICAL DATA

- length of haul (without intermediate points): up to 30 km;
- number of track circuits per a haul: up to 120;
- number of trackside light signals per a haul (in both directions): up to 120;
- track circuits with carrier frequencies from 475 to 925 Hz are used to control rail line;
- track circuit length: from 250 m to 800m;
- ALSN and ALS-EN coding of track circuits;
- lamp and LED light signals;
- embedded control of cable connection with trackside equipment;
- monitoring of rail line control signals without using additional measurement tools, data communication with diagnostic and monitoring systems.

ABTC-I provides interaction with:

- electronic, relay-electronic and relay interlocking systems;
- CTC, dispatcher control systems;
- automatic level-crossing systems, pedestrian warning systems;
- bridge warning systems, barrier systems, derailment control systems;
- tools that duplicate data communication with locomotive (radio channel).

ABTC-I COST EFFICIENCY



*in comparison with other automatic block systems

MPB ELECTRONIC SEMI-AUTOMATIC BLOCK SYSTEM

MPB is designed for train spacing on lines with low traffic intensity and serves as a functional alternative to relay semi-automatic block system. MPB is compact, cost efficient and has extended functionality.

The system performs the block functions supplemented with control of train arrival in full. Haul vacancy control can be carried out by in-built tools (axle counting) as well as external track control systems. It is possible to arrange a block-post to increase line throughput. MPB controller performs logic of block-post dependencies without any change in hard- or software.
In case of several automatic block-posts per a line, MPB could perform as alternative system to automatic block system based on axle counting.

USER ADVANTAGES

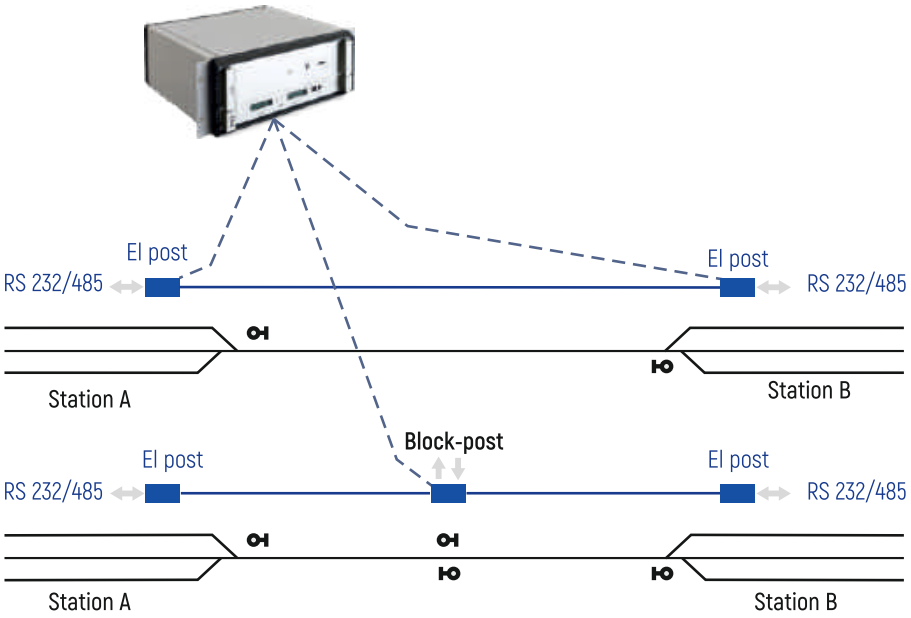
- Automated communication channel redundancy.
- In-built diagnostic and event logging.
- Line equipped with MPB could be connected to CTC.
- No specific design and configuration tools.
- Improvement of work environment due to logging of all personnel actions and command automation.
- Award of the Russian Railways the best quality of complex technical equipment.

EQUIPMENT

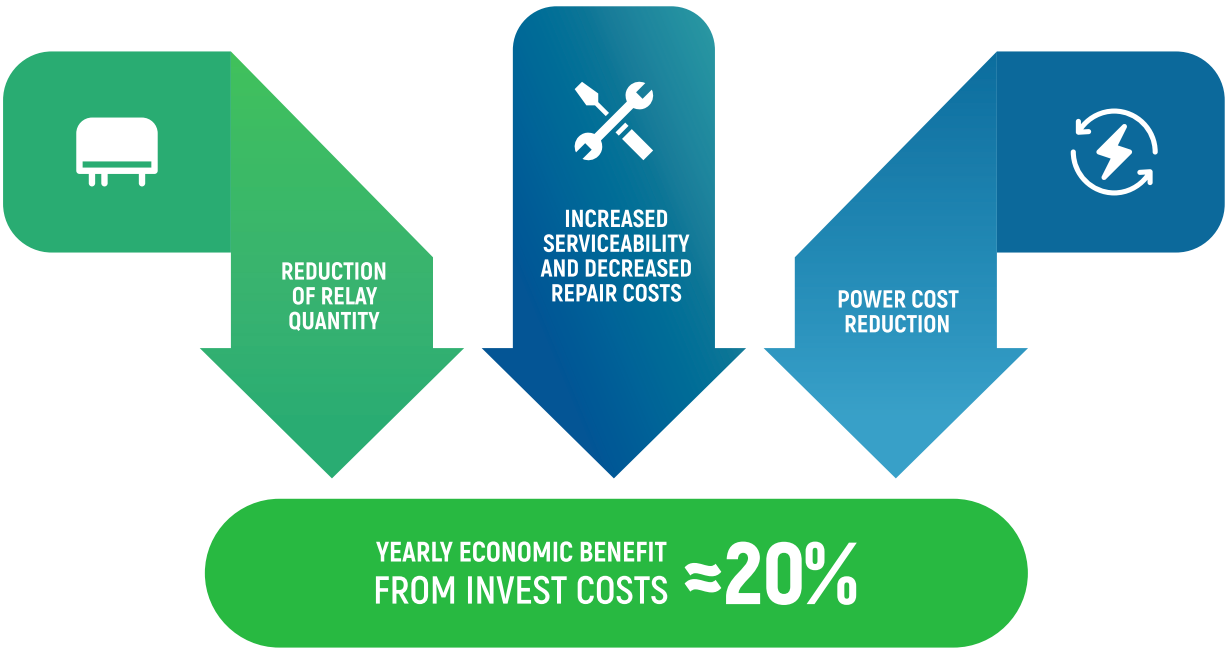
- two similar semi-sets (block of controllers) placed at stations adjacent to a haul;
- ESSO/ESSO-M trackside equipment (line vacancy control by axle counting).

TECHNICAL DATA

- power supply: 12 V DC or 24 V DC, 16 V AC;
- power consumption (excl. trackside equipment): not over 10 W;
- dimensions (WxHxD): 315x125x275 mm;
- operating temperature range: from - 60°C to +85°C;
- integration with contemporary digital signalling via RS-232/485, Modbus;
- up to 10 automatic block-posts.



MPB COST EFFICIENCY



ULIS MPB LABORATORY SET

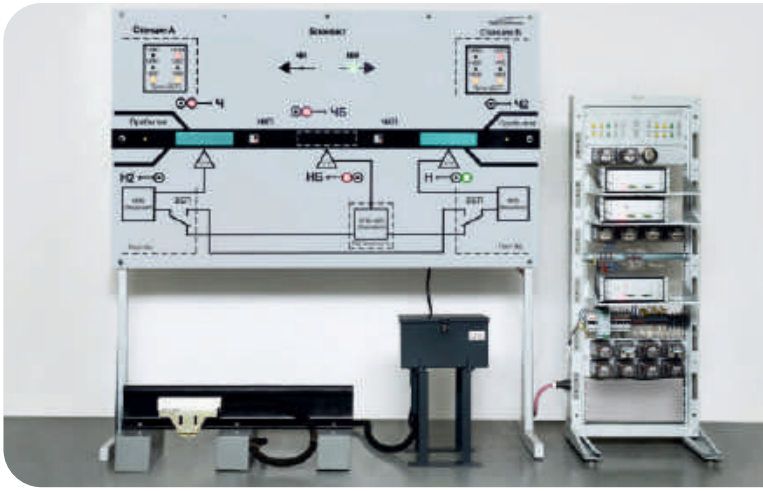
ULIS MPB is designed to study MPB electronic semi-automatic block system in railway teaching facilities and at upgrade training courses for mainline and industrial railway personnel operating the system.

The Laboratory Set is comprised of a rack with MPB indoor equipment and a board with a schematic representation of a single-track section between two stations with automatic block-post.

Besides trackside equipment, there are station master console indicators, entrance, exit and intermediate signals of block-post, buttons for imitation of train arrival at station and schematically drawn data communication lines between MPB blocks and connected devices. A counting post is installed on a track fragment for visual demonstration of MPB trackside equipment.

ULIS MPB demonstrates:

- principles of receiving and departing trains;
- MPB configuration tools;
- indication and control tools in normal operation mode;
- indication and diagnostic tools in case of malfunction.



ULIS MPB

MAINLINES

INDUSTRIAL RAILWAYS

LEVEL AND PEDESTRIAN CROSSING TRAFFIC CONTROL SYSTEMS

Pedestrian crossing

Level-crossing

Level and pedestrian crossing traffic control systems

- MAPS Automatic Level-Crossing Control System

  Section not equipped with track circuits

- ESSO-M Axle Counting System

  Section equipped with track circuits

- MAPS Automatic Level-Crossing Control System
  - with CCTV/traffic rules violation camera on level-crossing

  Signalling with relay-contact interface for all types of level-crossings

- Track circuit redundancy with ESSO-M equipment

- MAPS-M Non-Relay Automatic Level-Crossing System

  Non-relay signalling with advanced diagnostic for non-guarded level-crossing

MAPS AUTOMATIC LEVEL-CROSSING CONTROL SYSTEM

The system is designed for guarded and non-guarded level and pedestrian crossings on single- and multitrack lines with any traffic intensity including warning sections with station tracks. MAPS is a relay-contact signalling for all types of level-crossings. It operates at any type of block signalling and at track sections without train spacing systems.

MAPS is implemented at designing new and modernization of actual level and pedestrian crossings of all types. System monitors and controls all existing level-crossing signalling devices: level-crossing light signals, audio warning, barriers of all types, obstruction devices and protecting signals. All dependencies preset in level-crossing signalling are maintained.

USER ADVANTAGES

- Easy to adapt in case of changed maximum speed of movement at track section.
- Easy to install, low maintenance system.
- Highly reliable. The system keeps performing level-crossing control functions even at four to six faulty counting posts.
- Award of the Russian Railways for the best quality of complex technical equipment.

MAPS Level-Crossing Unit

MAPS controls level-crossing sections via axle counting. The system activates warning and controls executive devices of level-crossing signalling when train is approaching to the activating section on any track under control. Track could be of any type and with any track block signalling. **Warning is stopped and level-crossing is opened when rear end of a train has passed level-crossing and warning sections are clear.**

EQUIPMENT

- MAPS Level-Crossing Unit;
- trackside units of Axle counting systems: DKU/DKU-M Wheel Sensors;
- relay-contact equipment.

MAPS Level-Crossing Unit transmits control and diagnostic information about level-crossing operation, MAPS Unit and counting posts over VF channels to the nearest station.

Depending on conditions at site, the indoor equipment could be placed in building, relay cabinet and MKM Equipment Container Module.

TECHNICAL DATA

- DC voltage: from 11 to 36 V DC;
- nominal power supply: 12 or 24 V;
- power consumption (excl. trackside equipment): not over 15 W;
- operating temperature range: from -60°C to +85°C;
- dimensions (HxWxD): 315x175x275 mm;
- interfacing with digital signalling systems via RS-232/485, Modbus.

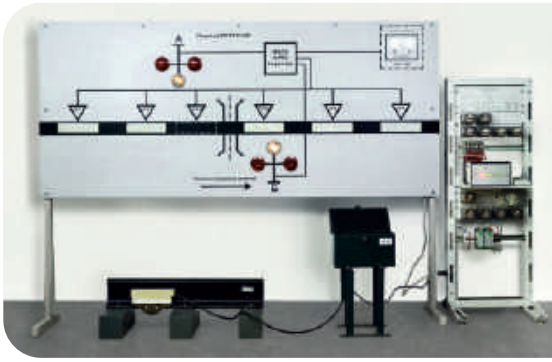
ULIS MAPS LABORATORY SET

ULIS MAPS is designed to study operation of MAPS Automatic Level-Crossing Control System. It is a mock-up of single-track guarded level-crossing equipped with white light signals.

The laboratory set consists of a rack with MAPS indoor equipment and a board with trackside units. ULIS MAPS board represents the layout of a single-level crossing of railway tracks and road. The trackside units, lamps of level-crossing signals, indicators of level-crossing status and data communication lines are schematically shown on the board. A counting post is installed on a track fragment for visual demonstration of MAPS trackside equipment. Wheel imitator is used to simulate passing of a train over counting posts at level-crossing.

ULIS MAPS demonstrates:

- control principles of vacancy/occupancy of approaching and departure section;
- MAPS configuration tools;
- indication and control tools in normal operation mode;
- indication and diagnostic tools in case of malfunction.



ULIS MAPS

MAPS-M AUTOMATIC NON-RELAY LEVEL-CROSSING SYSTEM

The system is designed for non-guarded level-crossings at single-and double-track lines, fitted with any type of train spacing systems.

MAPS-M controls track sections using embedded MAPS Automatic Level-Crossing Control Units via axle counting. MAPS-M is placed close to level-crossing in MKM Mobile Equipment Container. The Equipment Container ensures climatic conditions for MAPS-M and makes work environment safe and comfortable for maintenance personnel.

USER ADVANTAGES

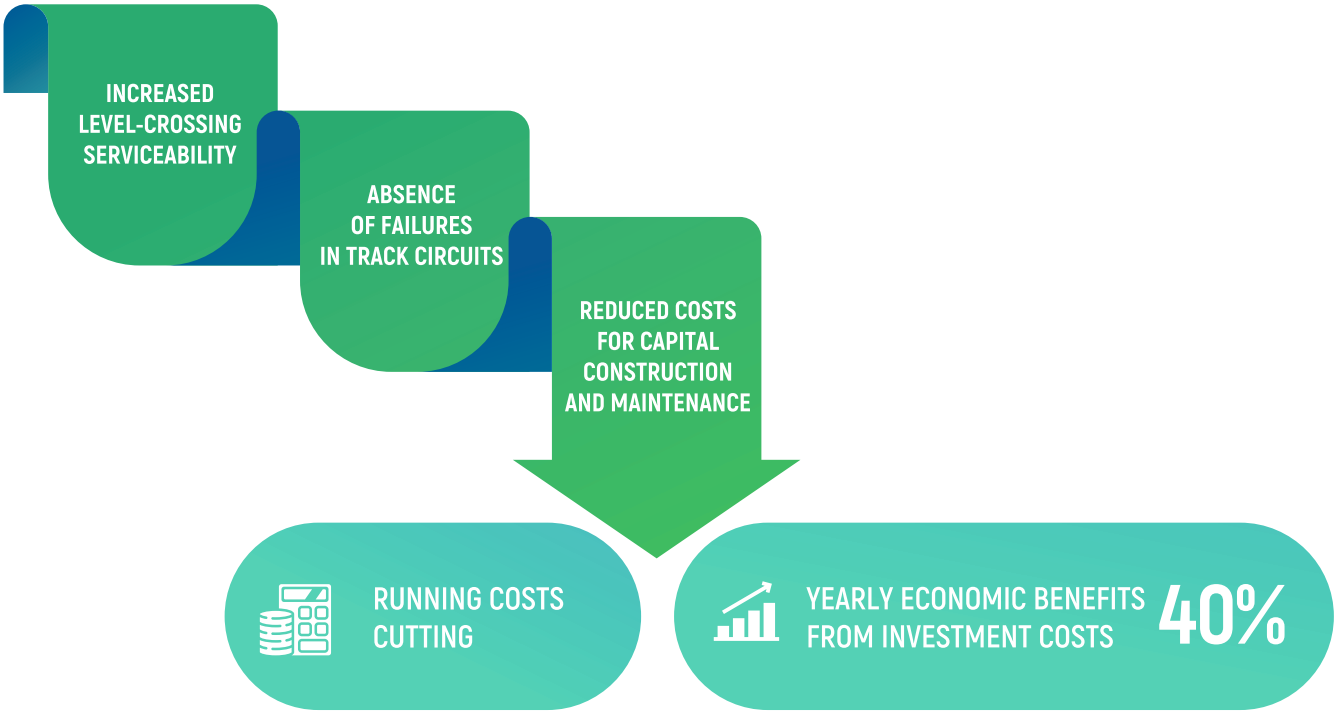
- Factory ready solution. Less mounting works at construction stage.
- Extended in-built diagnostic, event logging.
- Highly protected against lightning and switching overvoltage.
- User-friendly interface at MAPS-M indication panel.

TECHNICAL DATA

- AC power supply inputs: (for main and backup feeders);
- power supply voltage: from 198 to 242 V, 50 Hz;
- nominal power consumption: not over 350 W;
- maximum power consumption: not over 750 W (accumulators);
- autonomous operation in case of no power supply: up to 24 h;
- lamp and LED light signals;
- number of signalling devices under control:
  red aspect signal – 4 units,
  white aspect signal– 2 units,
  audio caution signal – 2 units;
- connection with external control and diagnostic equipment:
  diagnostic output (RS-485) – 1 pc.,
  discrete diagnostic output– 8 pcs;
- dimensions (HxWxD): 2025x800x700 mm.

MAPS-M

MAPS, MAPS-M COST EFFICIENCY



PEDESTRIAN CROSSINGS AND PATHWAYS

Pedestrian crossings and pathways at mainlines and industrial railways provide safe and convenient crossing.

Pedestrian crossings and pathways are ensured at single- and multitrack sections with or without track circuits. ESSO-M Axle Counting System is applied for sections equipped with track circuits as part of pedestrian crossing signalling control. MAPS Automatic Level-Crossing Control System is used at sections without track circuits. Counting posts are installed at boundaries of sections and connected to indoor equipment to control vacancy/occupancy. Warning is triggered when a train is approaching pedestrian crossing in any direction. After train's rear end has passed pedestrian crossing area, limited by counting posts, the system activates the proceed signal.

CCTV

Video registration units at railway and pedestrian crossings increase traffic safety, ensure visual control at level-crossing and, therefore, allow to make immediate decisions which fit the situation. Also, CCTV registers unauthorized access.

- Increased traffic safety.
- Recording of events on level-crossing and watchman's actions.
- Reliable evidence base.

MAINLINES

INDUSTRIAL RAILWAYS

- BBK-02 Controller Base Block

Remote control and management of railway signalling equipment

REMOTE CONTROL AND MANAGEMENT OF RAILWAY SIGNALLING EQUIPMENT

BBK-02 CONTROLLER BASE BLOCK

BBK-02 is intended for organizing remote control and monitoring of signalling equipment (incl. pointsman's tower and station light signals) with minimum communication link and ensuring safety requirements.

TECHNICAL DATA

- discrete inputs: 16;
- discrete outputs: 16;
- DC power supply: 12 V or 24 V;
- AC power supply: 16 V;
- power consumption: not over 10 W;
- dimensions (HxWxD): 125x315x275 mm;
- operating temperature range: from -60°C to +85°C;
- interfacing with contemporary signalling systems: RS-232/485, Modbus open protocol.

BBK-02

BBK-02 COST EFFICIENCY

- reduction of running costs on maintenance of signalling equipment due to implementation of diagnostic units;
- reduced load on operating personnel;
- control and monitoring of remote signalling units if there is no signal cable or it is not reasonable to apply it. Transition to FOB lines.
- BBK-02 is placed in buildings, relay cabinets and MKM Equipment Container Module.

MAINLINES

INDUSTRIAL RAILWAYS

- KTS AZS Automatic Rolling Stock Chocking System

Rolling Stock Chocking

- BUKS No-Contact Derailment Control Device

ROLLING STOCK CHOCKING

KTS AZS ROLLING STOCK CHOCKING SYSTEM

KTS AZS Rolling Stock Chocking System is designed for automation of precise stopping and train chocking at reception and departure tracks of railway stations.

EQUIPMENT

- stationary heavy-duty chocks;
- subsystem for precise train stopping;
- station Master workstation for command input and system performance monitoring;
- subsystem for chock drive control.

Local Control Panel

TECHNICAL DATA

- chocking a train with the total mass of:
  - up to 10 000 tonnes on a track with a slope up to 0.003;
  - up to 5 000 tonnes on a track with a slope up to 0.006;
- multiple control modes: interlocked and local;
- subsystem for precise train stopping.

Wheel pair chocking

KTS AZS employs stationary heavy-duty braking chocks consisting of two modules – chocking and absorbing modules. The modules are installed on reception and departure tracks – one set for each track, except main tracks and tracks designated for non-stop passing.

A train is chocked by electromechanically driven elements of the braking chock that change their position by an operator's command providing mechanical effect on rolling stocks' wheel pairs. KTS AZS protects fixed rolling stock or its any part against unauthorized movement.

KTS AZS COST EFFICIENCY

- reduced operating costs due to no signalling staff work;
- reduction of running costs due to elimination of signalling specialists labour;
- increased work culture and no operating personnel in the hazardous area.

Braking Chock

BUKS NO-CONTACT DERAILMENT CONTROL DEVICE

BUKS is a trackside no-contact indestructible derailment control system with extended functionality. The system is related to automatic control of rolling stock condition.

EQUIPMENT

Outdoor units:

- DKS Derailment Detector generates signals of car passing and derailment;
- BOS Signal Processing Unit detects clearance violation, identifies derailment side and car number as well as direction and train speed. BOS ensures self-diagnostic and diagnostic of DKS, sends data to upper-level systems.

Indoor units:

- BI Interfacing Unit provides connection with electronic signalling systems via digital and relay interfaces, ensures BI diagnostic and power supply of BOS.

BOS Signal Processing Unit

BI Interfacing Unit

TECHNICAL DATA

- cable between DKS and BOS: 3 m;
- BUKS power supply: 24 V by station battery in case of centralized power supply;
- interface: EIA-485 serial interface, relay interface ensured by KVS type relay;
- two-wire line connection of trackside devices with and indoor equipment;
- max. distance between indoor and trackside equipment: 5 m;
- power consumption: max. 10 W.

In normal mode BUKS registers train car number and direction of train movement. Data are displayed by BI indicators and sent to upper-level system. In case of lower clearance violation, it generates data on derailment, car number and side of derailment. These data are transmitted to upper-level system and displayed by BI indicators. The 1N-1350 type KVS relay is also activated. Such status is hold for 10-20 s required for reliable detection of lower clearance violation by signalling systems. After 10-20 s BUKS is automatically recovered and is capable to detect lower clearance violation.

INDUSTRIAL RAILWAYS

- DK-I Dispatcher Control

Dispatcher Control

DISPATCHER CONTROL

DK-I DISPATCHER CONTROL

DK-I is designed for collecting, transmitting and displaying data on train situation and signalling equipment status.

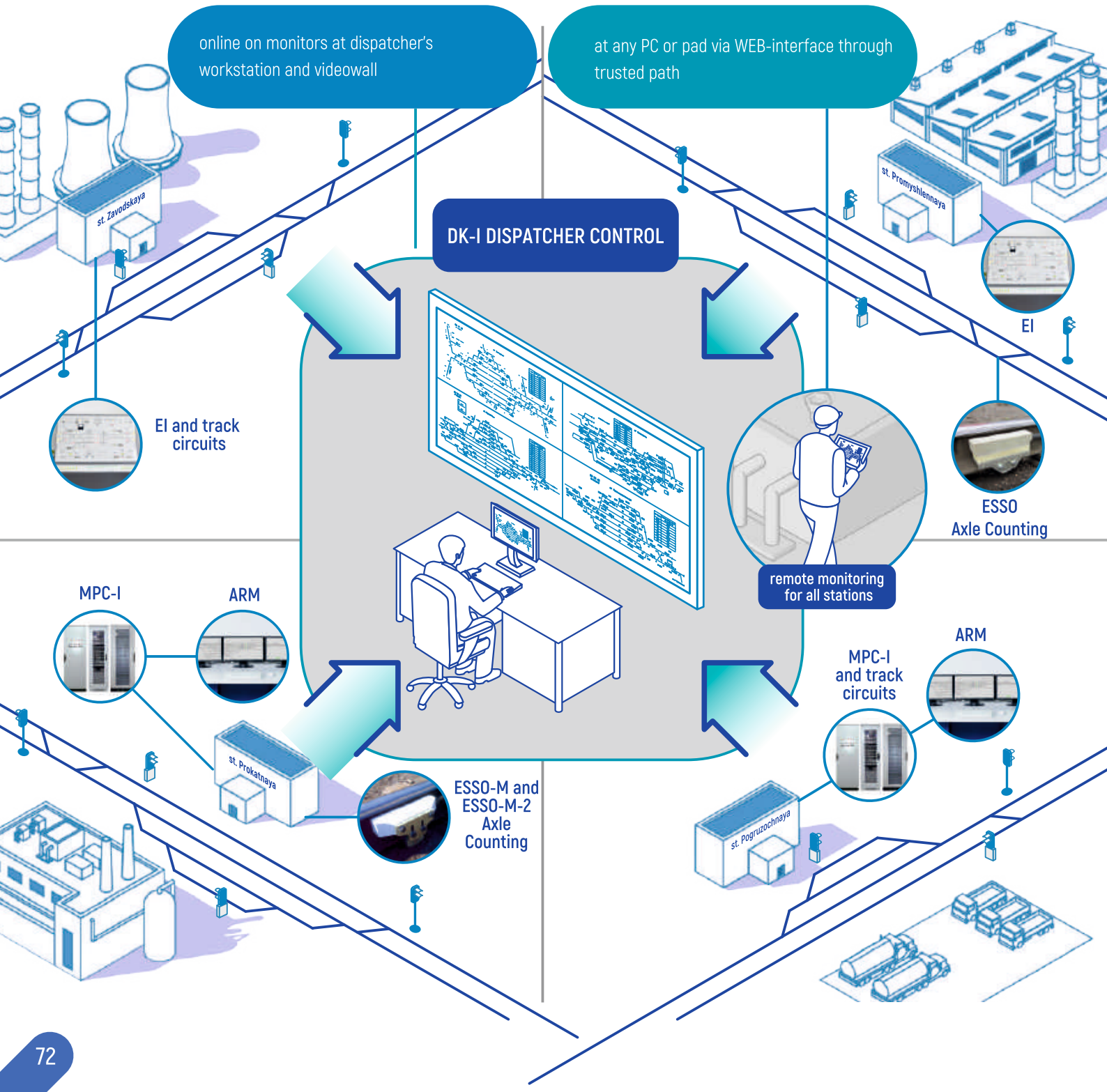
Station could be equipped with MPC-I Electronic Interlocking, ESSO/ESSO-M/ESSO-M-2 Axle Counting Systems, relay interlocking and track circuits. DK-I is applied for organizing centralized dispatcher offices, ensuring monitoring a transport situation and railway automatics status. The system collects and logs data on a train situation and objects under control. Embedded subsystem for insulation resistance and voltage measurement monitors signalling devices' status. DK-I adaptation software is developed in short terms due to MPC-I CAD.

DK-I COST EFFICIENCY

- increased wagon turnover due to collected data and enhanced monitoring a train situation;
- reduced demurrage of shunting locomotives;
- enhanced control, logging and analysis of rolling stock operation results.

DK-I System

BROWSING DATA AT DK-I



MAINLINES

INDUSTRIAL RAILWAYS

METROS

SIGNALLING EQUIPMENT POWER SUPPLY

Signalling equipment power supply

- SGP-MS Uniterruptible Power Supply System

SGP-MS UNITERRUPTIBLE POWER SUPPLY SYSTEM

SGP-MS is designed for centralized power supply of MPC-I equipment or other similar systems at track sections with any type of traction or for replacement of old type supply systems.

SGP-MS executes reception, distribution, conversion and record-keeping of electric energy; protects power supply lines from atmospheric and switching overvoltage, short circuits, surge overvoltage; executes control of electric energy quality, commutation of feeders and electrical isolation of power supply circuits. Different types of SGP-MS enable to select optimal version of power supply system corresponding to the required level of power and backup time.

EQUIPMENT

- Power-off and Protection Switchboard;
- Incoming and Distribution Cabinet;
- Incoming Cabinet, Distribution Cabinet;
- Transformer Cabinet;
- Isolating Transformer;
- Uninterruptible Power Supply;
- Accumulator Battery;
- Battery Switchboard;
- Automatic Standby Switchboard;
- Uninterruptible Supply Unit (UPS).

TECHNICAL DATA

- UPS ensures uninterruptible power supply of all trackside and indoor units at station;
- power supply backup time: 10 min, 2 h, 4 h or 8 h;
- nominal load capability of the system: 10, 15, 20, 30 or 50 kW.

System SGP-MS

SGP-MS COST EFFICIENCY

- reduction of operational expenses due to maintenance-free or low-maintenance components;
- assurance of uninterruptable power supply that enable autonomous operation of station up to 8 h (in case of diesel generator time depends on its parameters);
- select type of the system depending on your requests;
- less time for search and removal of faults.

MAINLINES

INDUSTRIAL RAILWAYS

MKM

Solution for equipment allocation

- MKM Equipment Container Module

MKM

SOLUTION FOR EQUIPMENT ALLOCATION

MKM EQUIPMENT CONTAINER MODULE

MKM Module is designed for allocation of railway signalling equipment and 365/7/24 operation in any climate conditions. The module is applied in case of no building or if placement of equipment in a building is not reasonable.

This is a factory-ready solution with a high-tech life support system: the module is fitted with main and emergency lighting, fire suppression system, ventilation, air conditioning, heating, access control system, fire and security alarm system.

- MKM is manufactured considering operating climate conditions. In case of operation in a low-temperature region, MKM has an entrance enclosure. Depending on customer requirements there could be implemented vandal resistant options.
- MKM is a turnkey solution – manufacture of a module, its internal fitting and mounting of signalling equipment and commissioning.
- Customized size of MKM Module. Size depends on station and required volume of equipment, number of staff.
- MKM Module can be scaled by adding up modules into complexes. Complex could be divided into single modules and relocated. Internal equipment is not demounted and does not require additional test.
- Average time for installation of module on site is 2 h. Leveling pads located on the base are used to bring the Module to required level without any auxiliary tools and expensive foundation.
- MKM Module fulfills requirements of GOST R 51321.1-2007 (IEC 60439-1:2004).
- Comfortable work environment for operating staff.

TECHNICAL DATA

- hermetic body of MKM Module;
- operating temperature range: from -60C° to +50C°;
- operating temperature range inside the Module: from +5C° to +25C°;
- air-conditioning redundancy scheme: N+1;
- gas fire extinguishing agent: Khladon 227ea;
- the highest IP protection against external actions.

MKM COST EFFICIENCY

- reduction of expenses for capital construction and connection of utilities;
- supply of equipped module: 12-16 weeks;
- factory-ready solution;
- warranty for the whole complex: MKM Module and signalling equipment;
- scalable solution.

OUR SYSTEMS ON THE MAP

Our systems are being operated in 18 countries: on all railroads of the Russian Federation, countries of CIS, Baltic states, European Union, Columbia, Brazil, Indonesia and South Korea.

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