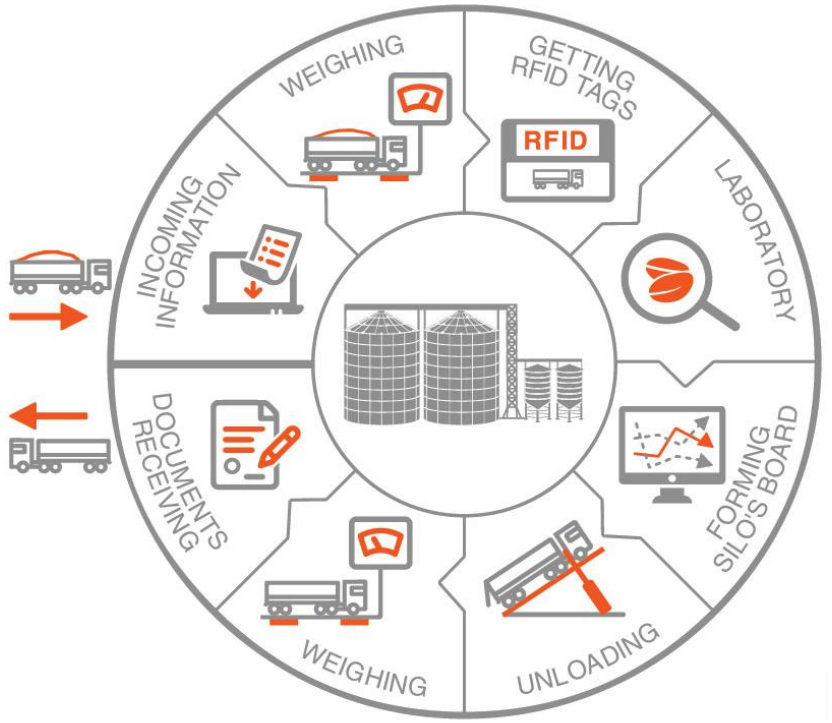
COMPLITE RANGE OF AUTOMATION SERVICES FOR GRAIN STORAGE COMPLEXES

Own production of power supply and control cabinets | Own software installation | Assembly and commissioning

GRAIN RECEIVING SCHEME
ON AUTOMATED GRAIN STORAGE COMPLEXES

- Product moving management (loading, cleaning, drying, storing, shipping, etc.).
- Creating, saving and correcting routes.
- Selection of routes for product moving from previously formed routes (provides energy efficiency and prevents mixing of crops) or by operator's commands.
- Grain temperature control and accounting.
- Qualitative and quantitative accounting of silo board indicators.
- Maintenance and repair log.
- Complete information about grain storage complex.
- Archiving data concerning technological equipment, product placement, etc.
- Communication and data exchange with accounting system.



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SOLUTION CREATED ONLY FOR AUTOMATION OF GRAIN STORAGE COMPLEXES

- Based on our own experience as manufacturer of grain storage equipment.
- Knowledge of production processes.
- Best solutions that we met on a variety of sites.

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MANAGE YOUR PROFIT

We make the processes on the grain storage complex as transparent and controlled as possible.

The software includes 4 blocks:

- Transportation equipment.
- Maintenance and repair.
- Thermometry.
- Silo board.

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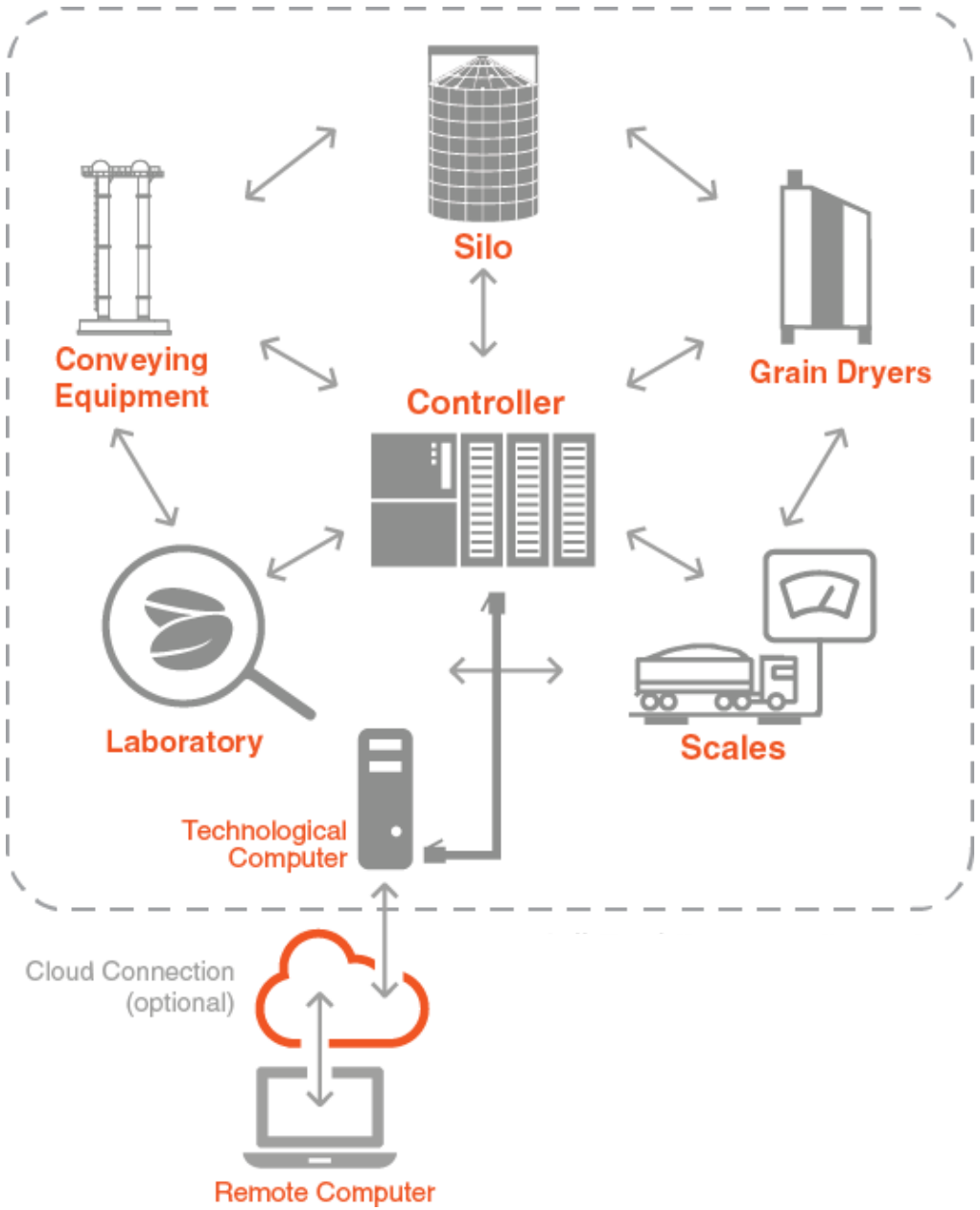
IIoT PLATFORM
GRAINE STORAGE COMPLEX



WHAT DO WE OFFER TO THE CUSTOMER?

- Automation of equipment and technological processes on linear grain storage complexes.
- Combining all processes into a single consistent system.

The IIoT Platform is a software designed to connect industrial Internet-based things (such as sensors, controllers and other devices) to the cloud.

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EIGHT ARGUMENTS “FOR”

Database runs
through the client server

Cloud
Storage

Integration into
any accounting system

Unlimited number
of workstations

Open Source

Service 24/7

Remote
configuration option

Access to the object
anywhere

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PROGRAMMED CONTROLLER «Phoenix Contact PLCNext»

A software solutions implemented on “PLCnext Technology” platform is provided by Phoenix Contact, a German electrical engineering giant.

Open source:

- The objective oriented programming languages.
- Using open source programs.
- Ensuring data security.
- Operating with large quantity of data (Big Data).

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VISUALIZATION OF PRODUCTION PROCESSES

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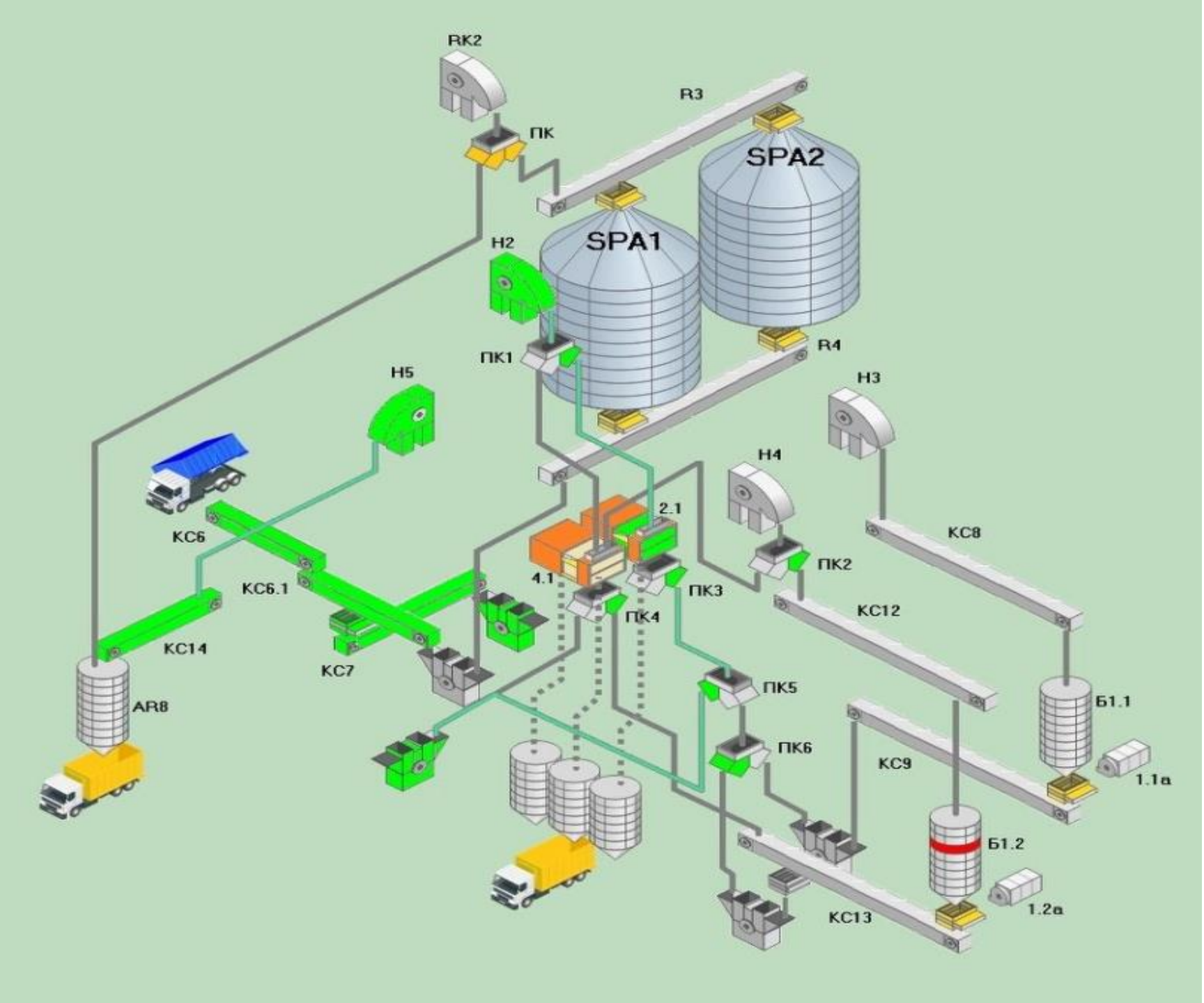

EXAMPLE #1

The visualization was developed by KMZ Industries.

Facility: Agro-Ros`.

Used colors decoding:

- green – active route selected;
- red – alarm situation.

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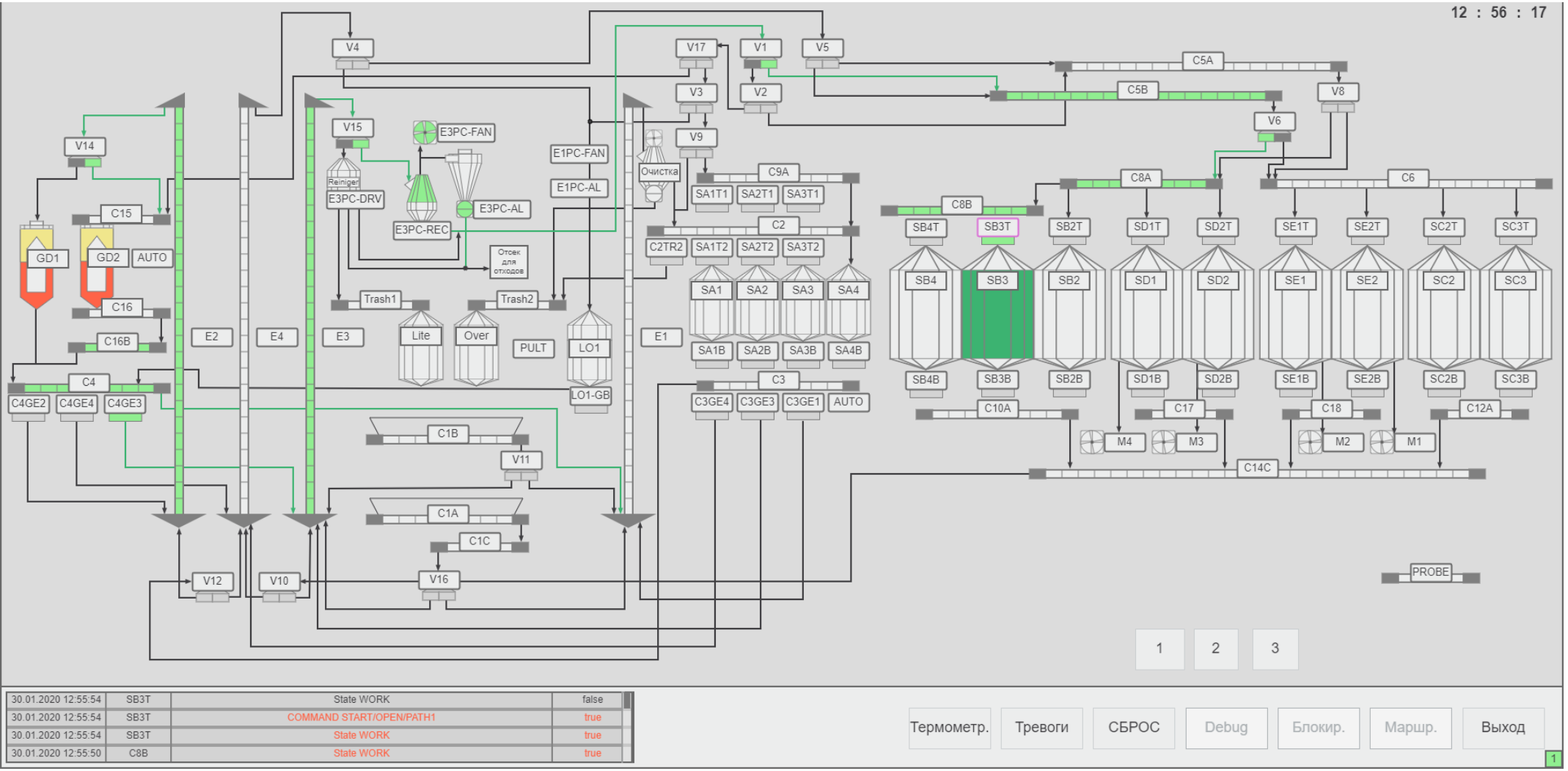
EXAMPLE #2



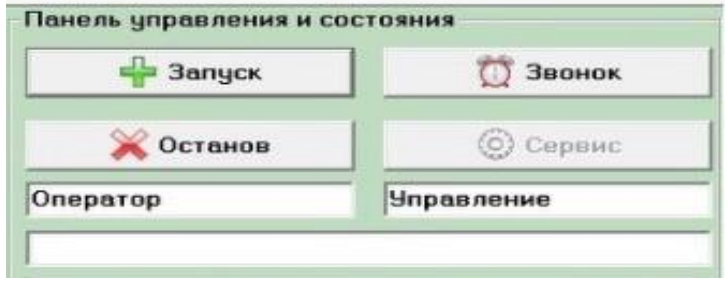
Visualization, based on the “PCLnext” controller.

Facility: UIFK-AGRO.

The selected active route is indicated in green.

EASY OPERATOR WORK ON ONE SCREEN

Management **menu**



Operating log **in real time**

Controller status

ACCESS CONTROL

Each employee of the grain storage – from the management to the maintenance staff – has own level of access in the system.

- An operator has access to the acceptance of the grain and its transfer to production in accordance with the approved tasks.
- A materially responsible person has the opportunity to ship the goods in accordance with the approved tasks, which are fixed in the system.

Any automation system adapts to the customer organizational structure.

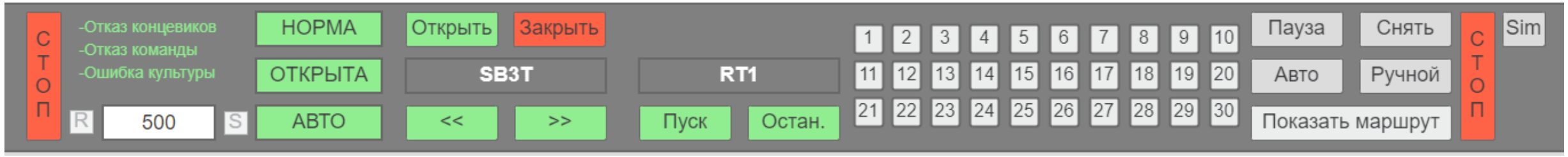
ACCESS LEVELS (example)

3 access levels:

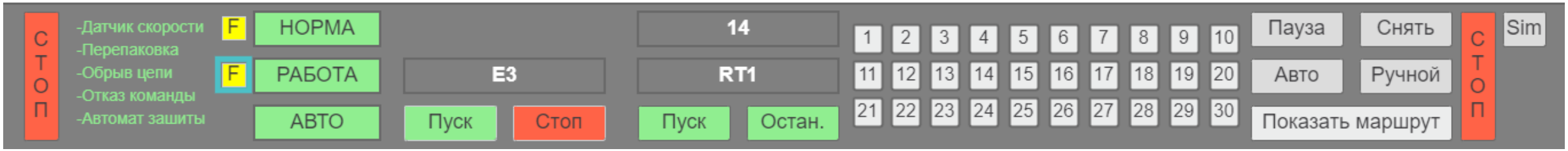
- Operator.
- Responsible engineer.
- Director (view rights only, no interference into equipment operation).

	Operator	Responsible engineer
Opportunity to redraw routes	-	+
General interlocks cut off	-	+
Opportunity to control sensors, set values	-	+

Access level “Operator”

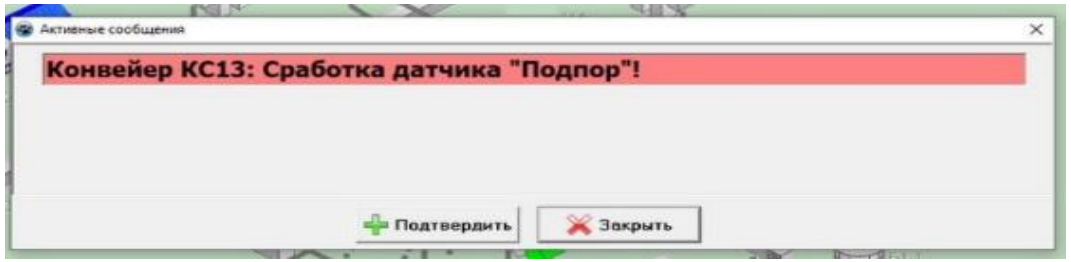


Access level “Responsible Engineer”



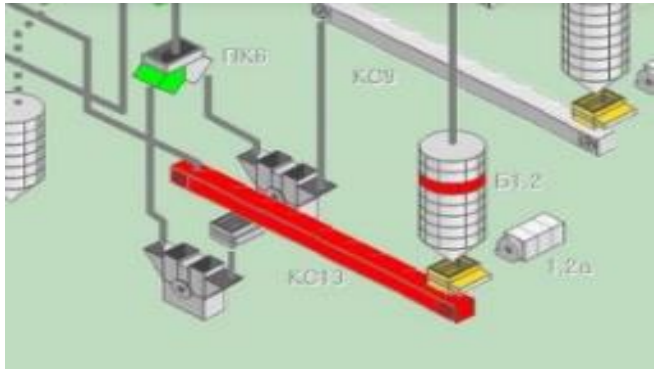
SYSTEM RESPONSE TO EMERGENCY SITUATIONS

Message on operator`s desktop



Recording of emergency situation in the operating log

Displaying the unit with emergency situation on visualization

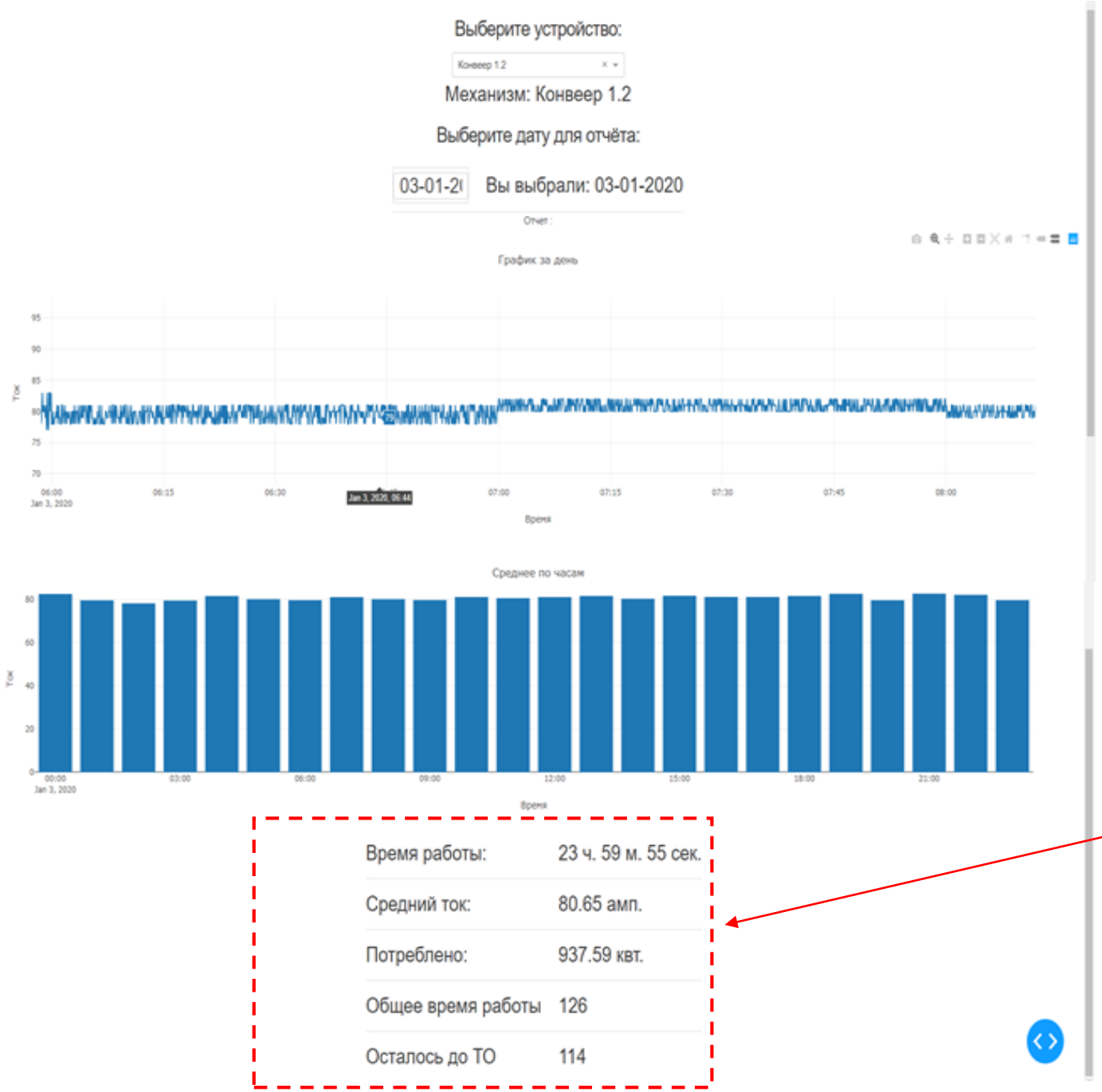


TECHNOLOGICAL MAINTENANCE AND REPAIR

The automation provides service works by plan so that breakdowns during the season eliminate.

1. Forecast of maintenance and repair of each item of equipment based on the maintenance and analysis of the failure log.
2. This allows use not only temporarily guarantee but also a guarantee by a quantity of operating hours. It suits for equipment that works seasonally.
3. A contractor has an access to the equipment operating log, define recommendations for the next period, and is responsible for them.

DEVICES MONITORING MODULE



1. Choosing the mechanism for tracking in real time.
2. Date choosing.
3. Daily load scheme (average /day).
4. Load scheme (average/hour).
5. Indicators menu.

Summary information for specific device

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AUTOMATION OF GRAIN DRYER

KMZ Industries development ensures that the grain dryer operates automatically in accordance with set temperature and humidity parameters.

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WHAT DOES PROCESS CONTROL SYSTEM (PCS) OF GRAIN DRYER?

It lets control the grain dryer automatically or manually

It controls burners

It manages of grain dryer unloading mechanisms (as pneumatic valves) as well as transportation mechanisms such as elevators, conveyors, valves. This is an additional option.

It controls fans those are using in aspiration, dust suppression, and recuperation systems

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GRAIN DRYER CONTROL WITH PCS

"KMZ Industries" software development provides:

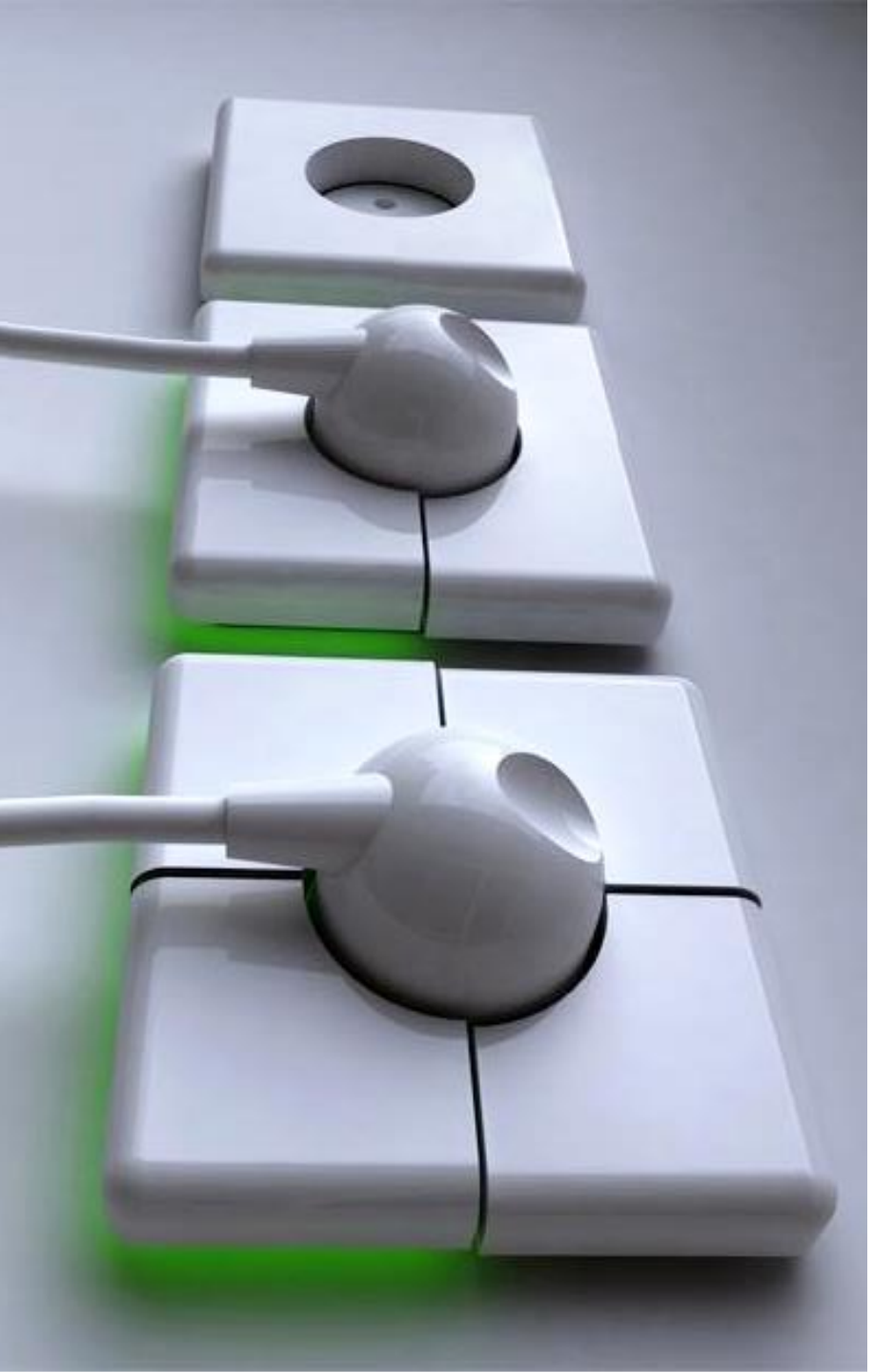
- Aspiration fan monitoring (vibration sensor reading).
- Fan management and control with "Schneider Electric" frequency converter.
- Grain dryer loading / unloading control.
- Burner power.
- Temperature parameters of drying agent, exhaust air, grain.
- Unloading frequencies (process speed).

Alarm log and drying recipe log are maintained.

Developed modules that are included in the complete kit in accordance with customer confirmation:

- Control of air pressure in the pneumatic system (with the compressor equipment sensor pressure switch).
- Control of grain moisture.
- Aspiration fan motor temperatures.

Sensors for the operation of these modules and their installation are not included in standard kit.



INTEGRATION IN PROCESS CONTROL SYSTEM OF GRAIN STORAGE COMPLEX

The complex of grain dryer control may be integrated into the existing PCS at the level of Ethernet, Modbus RTU (other protocols – by agreement) and/or discrete signals.

SOFTWARE PLATFORM

Software implementation :

- Visualizes the technological process using web technologies.
- Provides control, management and registration of the drying process.
- Provides for the possibility of integration into the PCS of the enterprise.
- Provides the possibility of manual control during commissioning.

KMZ Industries software consists of 2 parts:

1. Control algorithms installed on the controller.
2. The drying process visualization program is an intuitive clear interface that shows drying process.

DRYING PROCESS VISUALIZATION

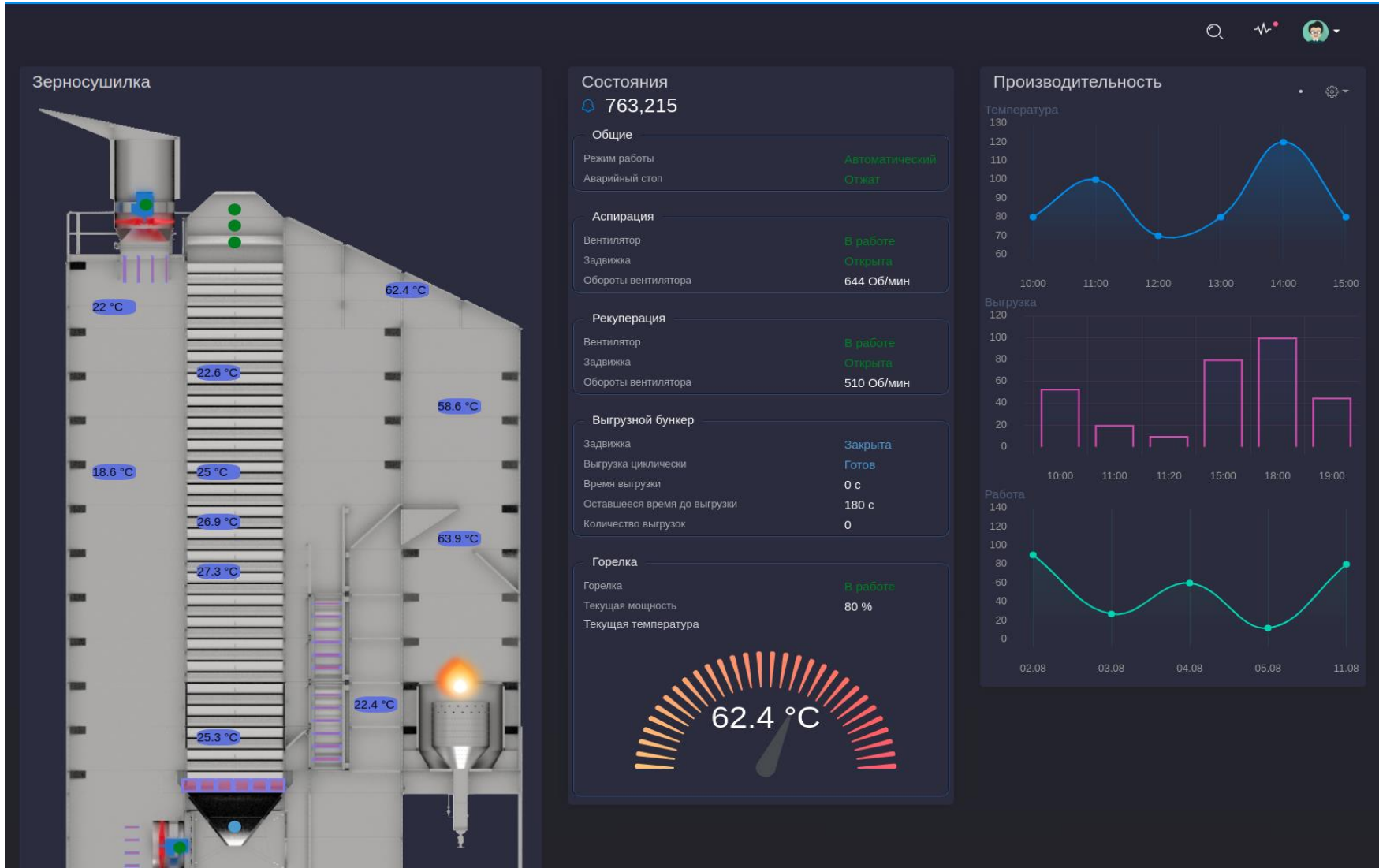
The opportunity to assign:

- Unloading time, sec.
- Unloading interval, sec.
- Choose a recipe (one of the stored drying methods with established parameters).

Tracked in real time :

- Temperature in different areas.
- The work of aspiration and recuperation systems.
- Work of fans, burner, unloading system.
- Efficiency (temperature, discharge).

Facilities: Spetszemtehnika, Povernennya.



OPERATOR'S AUTOMATED WORKPLACE

An operator of the grain dryer keeps track of all the necessary information about the drying process and manages it at his automated workplace (AWP).

Operator`s AWP = Personal Computer + 27“ Monitor + Mouse + Keyboard

The visualization program is IT and cloud solutions.

- The basic version provides the installation of AWP not more than 15 m from the control panel.
- The software is installed at the manufacturing facility.

OWN MANUFACTURING OF ELECTRIC SUPPLY & CONTROLS CABINETS

- Power supply cabinets.
- Control cabinets.

POWER SUPPLY CABINETS

Power supply cabinets are used for control and protection of electrical equipment of grain dryers, elevators, conveyors, grain cleaning machine, etc.

Standard delivery kit consists of:

- Floor metal construction with IP55 protection degree (“Rittal”, Germany).
- Commissioning equipment (in the basic version – “Schneider Electric”).
- Relay module, cleats, markings (in the basic version – “Phoenix Contact”).

* It is also possible to use products of other world brands such as “ Siemens”, “ Eaton”, “ABB” and others. Please, note it in a technical specification.

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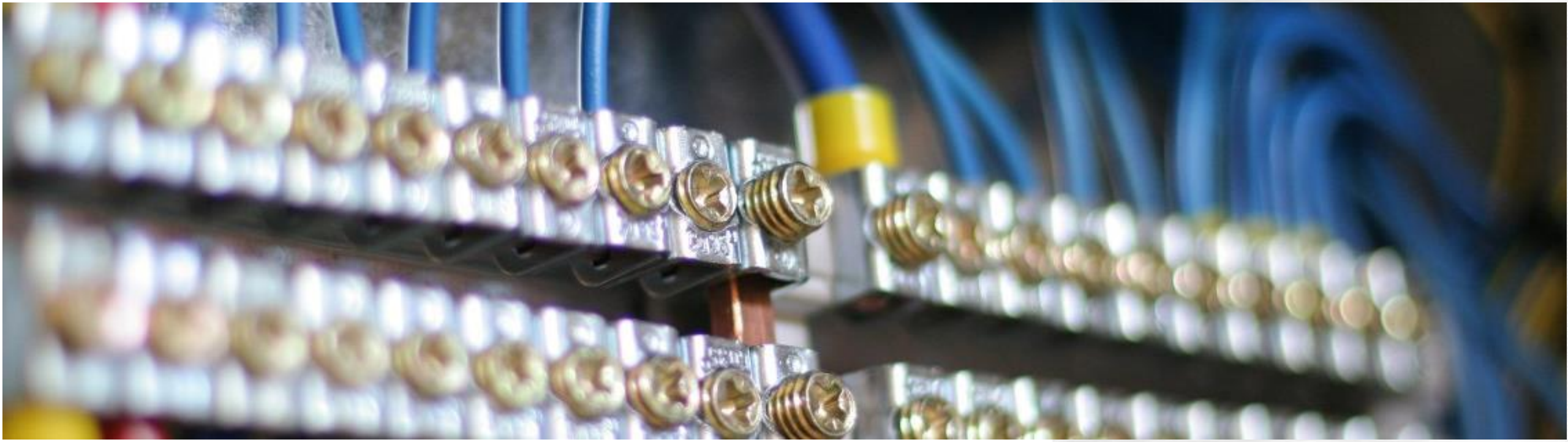
CONTROL CABINETS

Control cabinets are used to control the process of equipment operation in automatic and manual modes.

Standard kit consists of:

- Floor metal construction with IP55 protection degree (Rittal, Germany).
- Controller “Phoenix Contact PLCNext”.
- Power supply “Phoenix Contact”.
- Transformer 220/24 “Phoenix Contact”.
- Discrete input / output module.
- Analog input module.
- Temperature module (optionally, in accordance with a customer`s request).
- Relay module “Phoenix Contact”.

DETAILS AND ELECTRICAL INSTALLATIONS



COMPLETE SET OF GRAIN DRYER

Grain temperature sensors and hot/exhaust/ambient temperature sensors. The amount is determined by the design of the grain dryer. In the basic configuration sensors are placed through one section.

Limit temperature sensors (fire safety warning).

Aspiration fan vibration sensor

Grain moisture sensors (optional)

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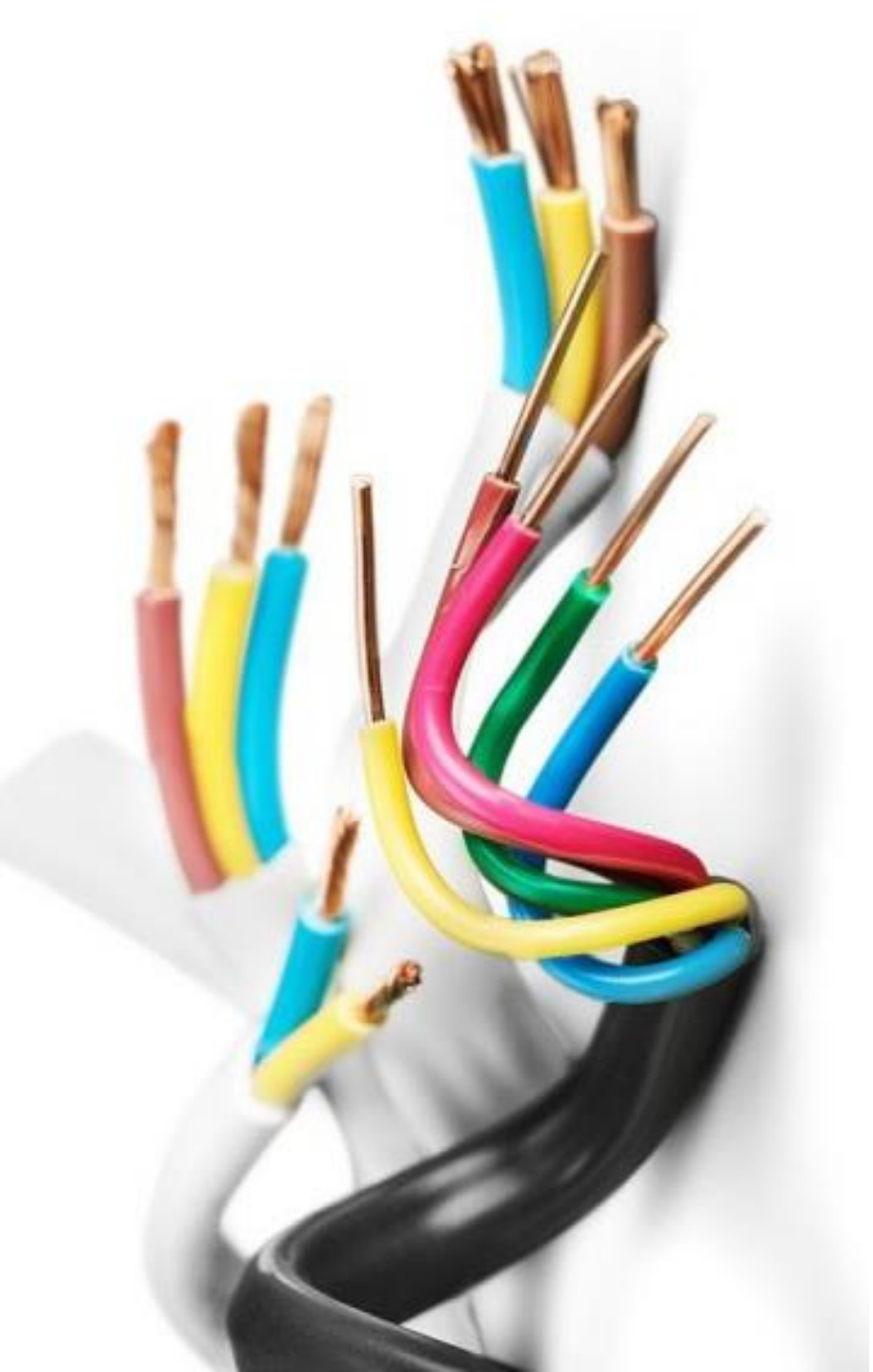
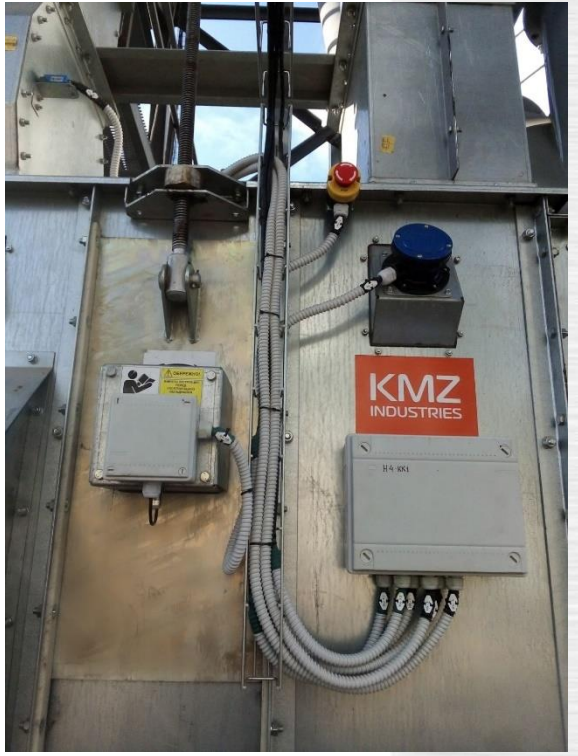


CABLE AND CONDUCTOR PRODUCTS

- The electric motors cable connection is made with copper cable conductors (Ukraine, in accordance with GOST).

- For sensors connection — multi-core cable (copper) (“Lapp”, Germany).
- For cable routing — cable ladder with cover (“OBO Bettermann”).



EXAMPLES OF ELECTRICAL INSTALLATIONS

- Laying of cable lines, laying of cable.
- Power cabinets connection.
- Sensors and power posts connection.
- Sensors, intermediate boxes connection.

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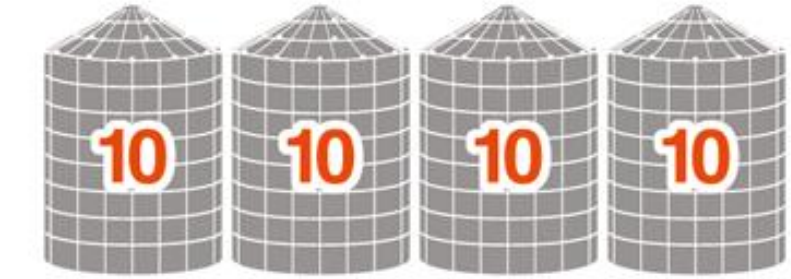
CONCLUSIONS: LEAD-TIME, COSTS AND RESOURCES

LEAD-TIME OF DEVELOPING AND IMPLEMENTATING PROCESS CONTROLE SYSTEM FOR A GRAIN STORAGE COMPLEX



grain storage complex **40.000** t

= **3-4** months

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ADVANTAGES OF AUTOMATION by KMZ INDUSTRIES

- We do the whole range of services such as a production of Power supply cabinets and control cabinets, a software development and installation, installation and commissioning.
- Our system is developed by a modular principle. That means that all grain storage equipment is managed by one program.
- There are no hidden costs for work places licenses, development environment from the controller vendor, etc.
- Visualization of technological processes allows to link all the technological processes of the grain storage (such as reception, sampling, analysis, cleaning, drying, storage, and shipping) into the one management program.

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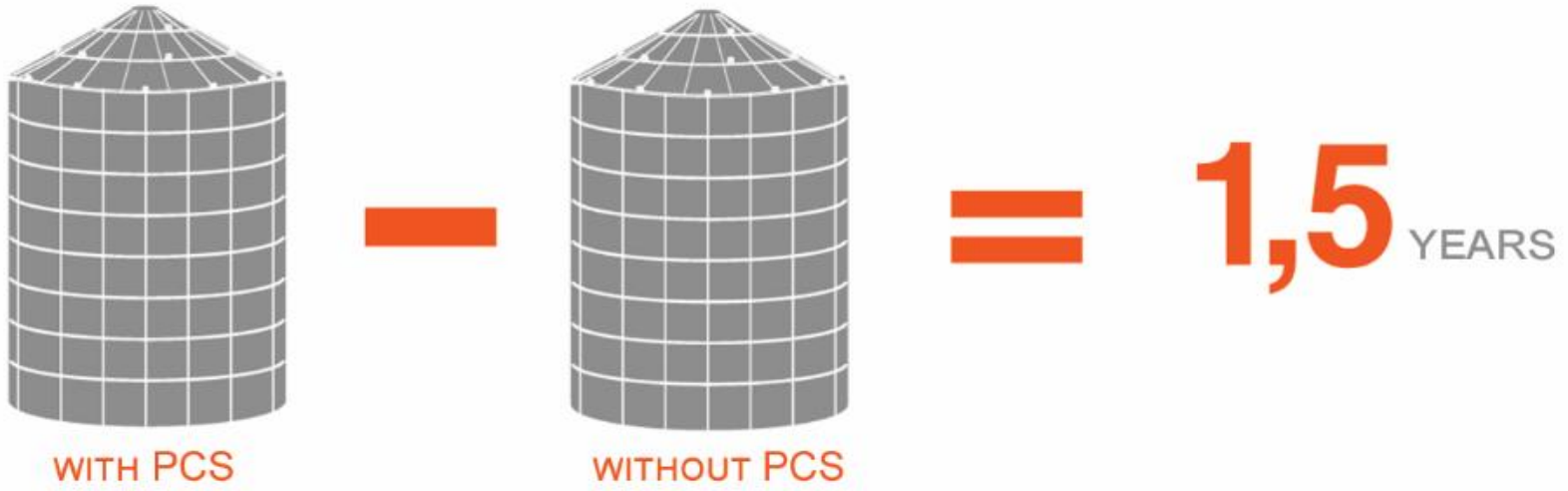
COMPARE THE PAYBACK PERIOD OF GRAIN STORAGE COMPLEX



2020. YEAR SUMMARY

67 projects

During 2020 67 projects were completed. The division in charge of automation has automated its own as well as customer's equipment.

30

30 different customers have ordered automation from KMZ Industries.

40%

The Automation division has seen an almost 40 per cent growth since 2019.

the first

KMZ Industries implemented the first release of the grain storage complex maintenance and repair system.

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THANK YOU!

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