



## BRICE-BAKER. GRAIN DRYERS WITH 100% AUTOMATION

Environmental safety | High-efficient | High-capacity | Grain care

# THE ONLY UKRAINIAN PRODUCER OF COMPLEX SOLUTIONS FOR GRAIN STORAGE AND HANDLING



- European standards for design, production, installation, and servicing.
- Automation of technological processes.
- Integration of separate grain storage work areas (weighing, laboratory, drying, cleaning, storage, shipping) into a single automated elevator control system.

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8 000 000 m<sup>3</sup>

Over 8,000,000 m<sup>3</sup> of storage have already been commissioned.

Over 40 new products and equipment upgrades are developed and implemented annually

≈40 new products annually

15 years

15 years of continuous innovation in conveying equipment

Over the years, the company has implemented more than 5,000 projects

5,000 projects

## MAIN FIGURES ABOUT KMZ INDUSTRIES

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## INTELLECTUAL AND MANUFACTURING RESOURCES

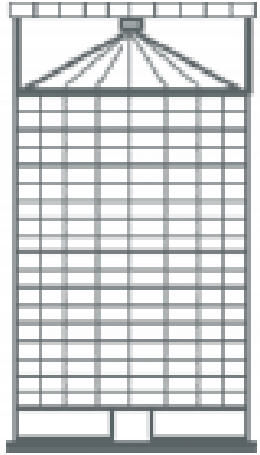


- Unique solutions for customers of KMZ Industries are developed by the company's own engineering department.
- The facility is equipped with the most advanced high-precision technological equipment in Ukraine — Japanese and American equipment lines by AMADA and BRADBURY, FICEP and SMEC processing machines.
- Production facilities are located in Karlivka, Region of Poltava (Karlivskyyi Machine-Building Plant PJSC).
- The company has an installation department, maintenance department, and grain storage automation department.

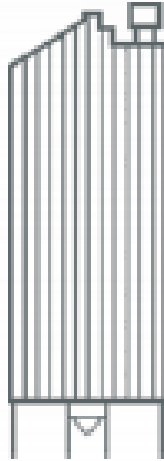
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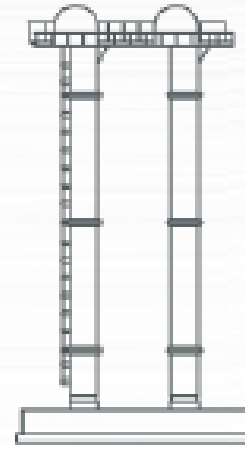
# A NEW GENERATION OF GRAIN STORAGE EQUIPMENT THAT FULLY COMPLIES WITH THE EU QUALITY



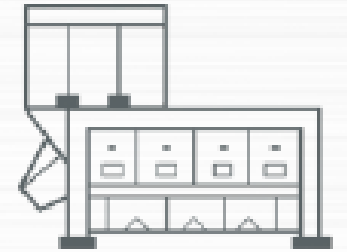
SILOS



GRAIN DRYERS



CONVEYING EQUIPMENT



GRAIN CLEANERS

- **Flat bottom and hopper silos** with storage capacity up to 21,315 m<sup>3</sup> (16,625 t of wheat), with diameter up to 32 m.
- Brice-Baker **grain dryers** with capacity from 9 to 300 t/h and gas consumption from 0.9 m<sup>3</sup>/ton-percent. DSP grain dryers with a capacity from 25, 50 and 100 t/h.
- **Conveying equipment**: bucket elevators up to 800 t/h capacity; chain conveyors – up to 500 t/h; auger conveyors – up to 200 t/h; belt conveyors – up to 1,500 t/h.
- KBS **grain cleaners** with a capacity up to 200 t/h for coarse separation.
- Auxiliary equipment with throughput capacity up to 1,500 t/h (including self-gravity tubes).



## CORRECT INSTALLATION IS THE KEY TO TROUBLE-FREE OPERATION OF THE EQUIPMENT

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The company's capabilities allow for simultaneous installation of several objects.

- We carry out works on installation of the elevator complex equipment, automation, equipment setup and commissioning.
- We carry out professional inspection, diagnostics and repair of equipment.
- We train elevator complex personnel.
- We install both our own elevator complex equipment and equipment from other manufacturers.

The customers who order the equipment installation from KMZ Industries receive an extended warranty on our equipment.

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## WE MAKE PROCESSES AT THE GRAIN STORAGE COMPLEX AS TRANSPARENT AND CONTROLLED AS POSSIBLE

- 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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## WHO ARE OUR CUSTOMERS?

The advantage of KMZ Industries is tens of years of successful operation of our production equipment at elevator complexes in various industries:

- from farms to national-scale grain storages,
- from seed plants to mixed fodder manufacturers.

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## EXPERTISE PROVED BY TIME

Over the years, the company has implemented more than 5,000 projects in various areas: from small receiving complexes to port terminals in Ukraine and abroad.

- Port terminal in Iran
- Farmers grain storage complexes in Estonia, Romania, and Poland
- Завод із виробництва рибного корму в Румунії
- Grain receiving complexes in Moldova and Belarus
- Supplying of the equipment to Kazakhstan, Bulgaria, and Hungary



# THE LEADING PRODUCER OF GRAIN DRYERS IN UKRAINE



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# 2 model lines

KMZ Industries produces 2 model lines:  
BBK (English version) and DSP (Ukrainian  
design).

More than 500 grain dryers produced by KMZ  
Industries are currently in operation in Ukraine

# > 500

# 118 models

The biggest range of grain dryers in Ukraine.  
Their capacity is from 9 to 300 t/h

About 60% of grain dryers of Ukrainian  
production are produced by our plant annually

# 60%

## MAIN FIGURES OF OUR PRODUCTION OF GRAIN DRYERS

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## MODEL LINES



**DSP** is a grain dryer of Ukrainian design.

3 models

A grain dryer that is popular more than 50 years.  
It is reliable and easy to operate.



**Brice-Baker** is a grain dryer of English design.

115 models

High-efficient and energy-saving grain dryers  
with the capacity up to 300 t/h

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## HOW DO BRICE-BAKER GRAIN DRYERS APPEARE IN UKRAINE?

In 2012 KMZ Industries acquired British company Brice-Baker – one of leading European manufacturer of grain storage equipment.

- This way unique engineering solutions for grain dryers and silos were obtained
- The company's production facilities were modernized and product lines were upgraded
- This step allowed us to introduce new generation products to our customers

The grain dryers were improved by a dust suppression system, a heat recovery system, etc. Currently, the entire model range of Brice-Baker grain dryers (115 models) is manufactured at KMZ Industries production facility in Ukraine.

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97,85%

Efficiency of dust removal with our aspiration system is more than 97.85%

Made from S350GD high-strength galvanized steel of European origin, with 2 mm thickness (zinc coating up to 600 g/m<sup>3</sup>).

S350GD

from 0,9  
m<sup>3</sup>/ton-percent

The gas consumption is from 0.9 m<sup>3</sup>/ton-percent

Grain dryer with 100% automation. Process control from the operator's

100%

## MAIN FIGURES OF BRICE-BAKER

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## 5 TOP ADVANTAGES OF BRICE-BAKER GRAIN DRYERS



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## SAVINGS OF OPERATING COST

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- Specific consumption of natural gas from 0.9 m<sup>3</sup>/ton-percent.
- Heat recovery
- Operation based on exhaust principle. Uses 40% less energy compared to grain dryers using air pumping.
- Energy efficient direct flame gas burners (Tecflam, Promgazaparat).
- Insulation with non-combustible basalt plates to increase energy efficiency by reducing heat transfer.



## AUTOMATION TO MINIMIZE OF ERRORS

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- Grain dryer with 100% automation. Process control from the operator's workstation.
- Preventive fire alarm. Eliminates overheating and exceeding the operating temperature limits.
- Saving selected drying recipes. Creating and saving custom recipes.
- Temperature monitoring.
- Grain moisture control, fan vibration control (optional).



## VERSATILITY

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- Drying of all types of cereal crops, oilseeds and legumes.
- Operation on all types of fuel (simultaneous connection of two kinds of fuel is possible).
- High efficiency in wet grain handling.
- Adjustable cooling zone.

# ENVIRONMENTAL SAFETY AND QUALITY

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- Aspiration system that captures up to 97.85% of dust.
- Meets the requirements of TUU 28.9-14311169126:2016, DSTU EN 1050:2003, DSTU EN 292-22001 (EN 292-2:1991, IDT), DSTU EN 60204-1:2006 (EN 60204-1:1997, IDT), GOST 12.2.124-90, and GOST 12.2.007.0-75.



## SCALABILITY

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- Wide product range. Productivity from 9 to 300 t/h.
- Modularity: possibility to expand and increase power by adding sections.



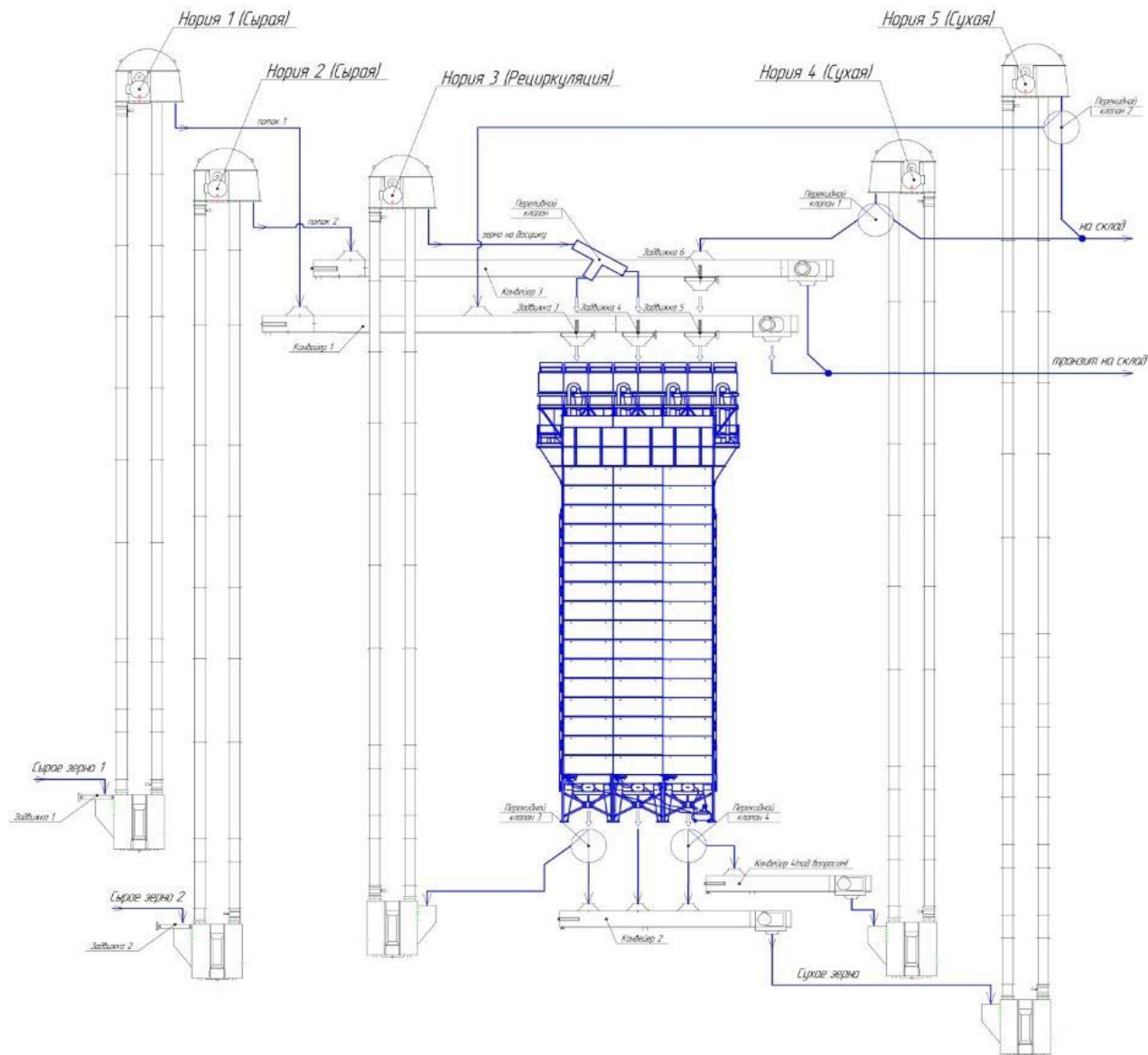


# BRICE-BAKER GRAIN DRYER FLOW DIAGRAM

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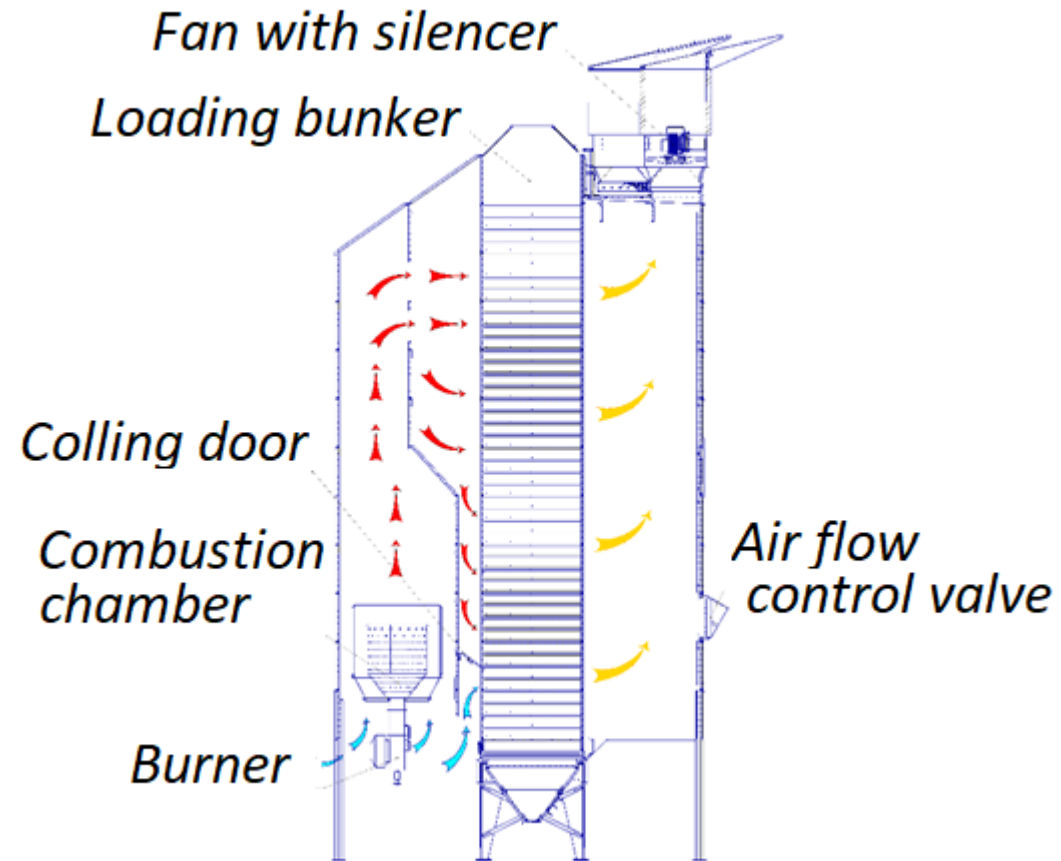
# OPERATION PRINCIPLE



Build any grain thermal treatment technological process.

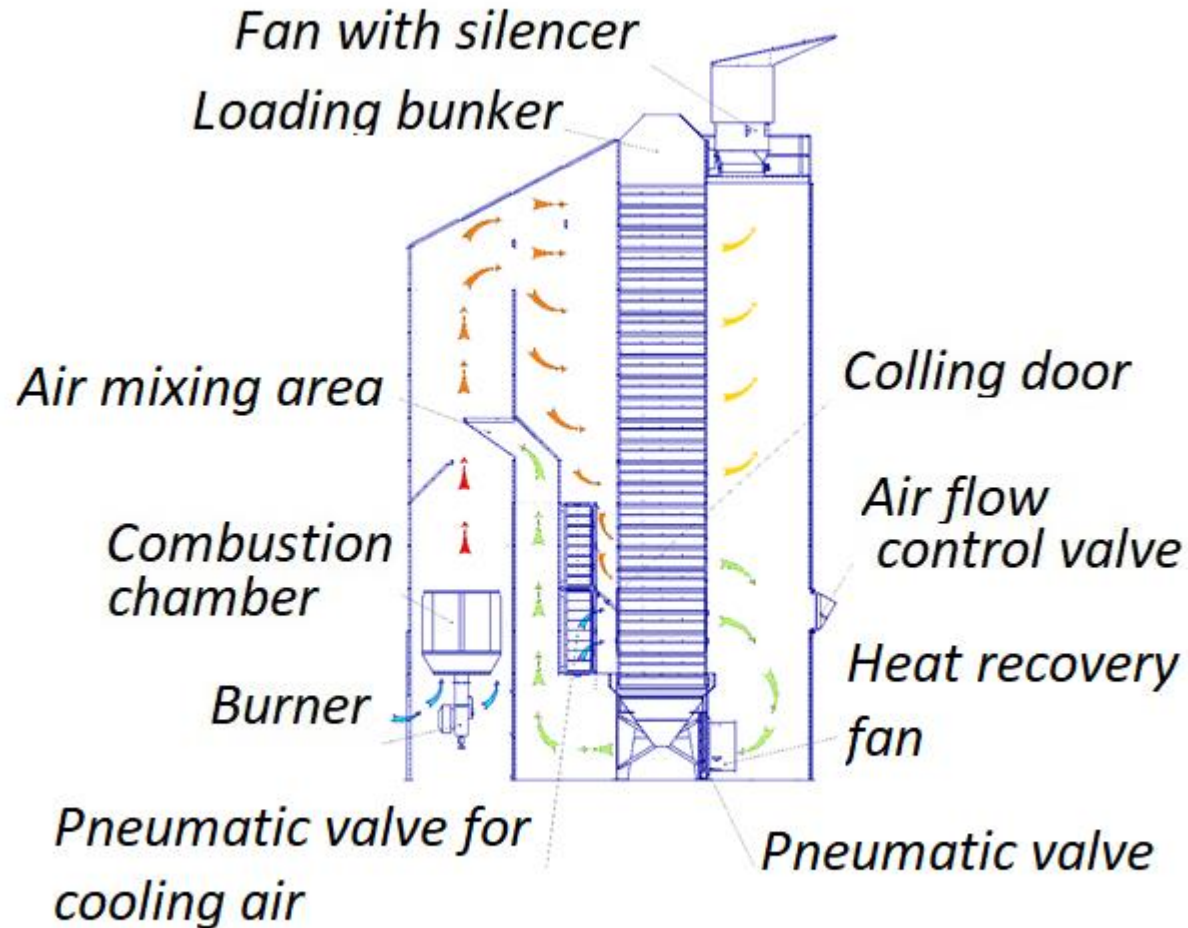
- Set up appropriate technological conveyor system and use each shaft separately (in case of multi shaft dryer) in order to achieve required % for moisture decrease.
- Ability to dry grain with recirculation for minimum process heating which may damage grain.
- Smooth soy crops drying during heating, cooling, tempering, heating-cooling in high productivity mode.
- Along with spare drying mode grain dryer provides high productivity for oil seeds.

# CONTINUOUS FLOW GRAIN DRYER BRICE-BAKER



# FLOW DIAGRAM WITH HEAT RECOVERY

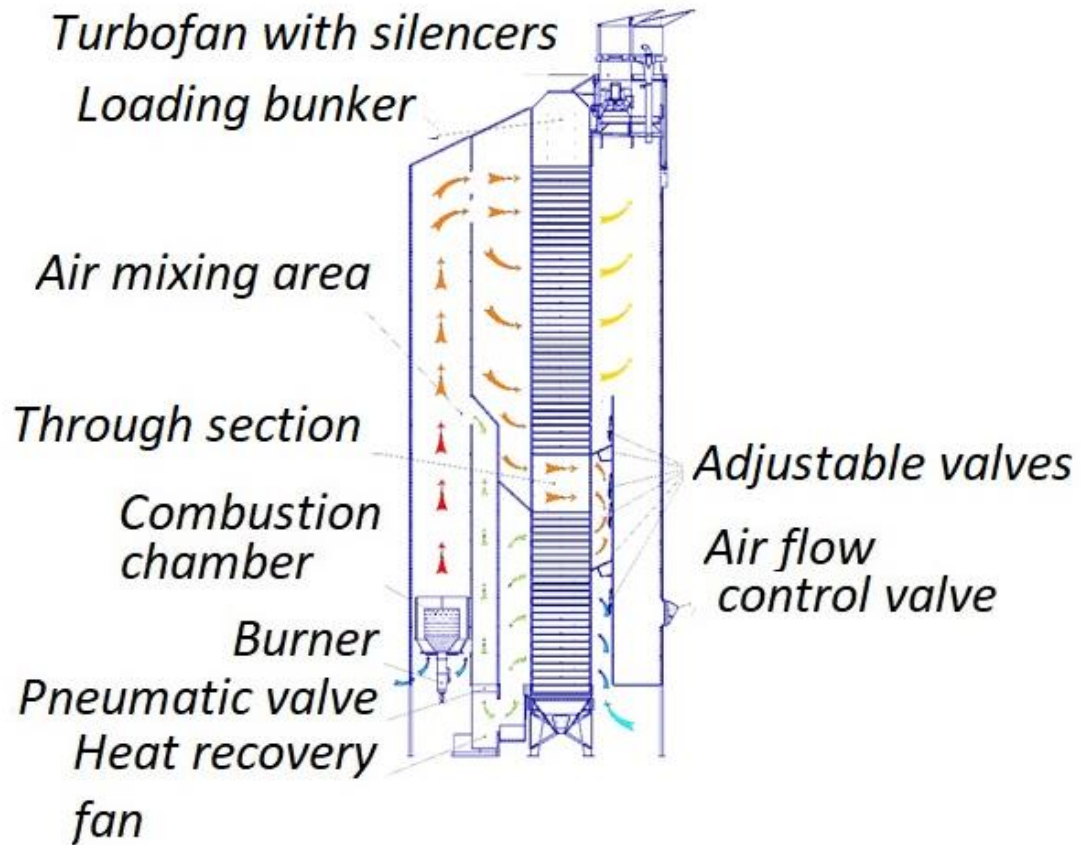
- Part of the hot exhaust air with the lowest moisture content and the air after cooling are fed through the fan into the hot air chamber for reuse.
- Up to 30% lower fuel consumption compared to grain dryers without recuperation.
- Air is fed into the hot air chamber bypassing the gas burner. This ensures fire safety.

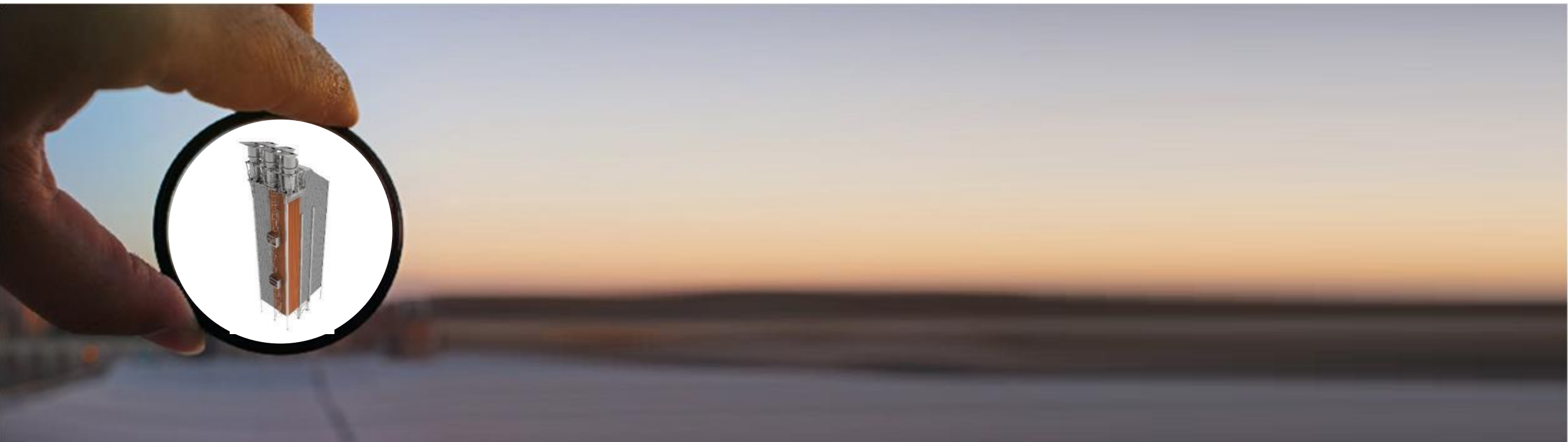




# FLOW DIAGRAM WITH TEMPERING AREA

- Special removable partitions for forming a tempering area in the drying shaft before cooling (optional).
- Tempering area protects the crop from sudden temperature changes that cause grain cracking.

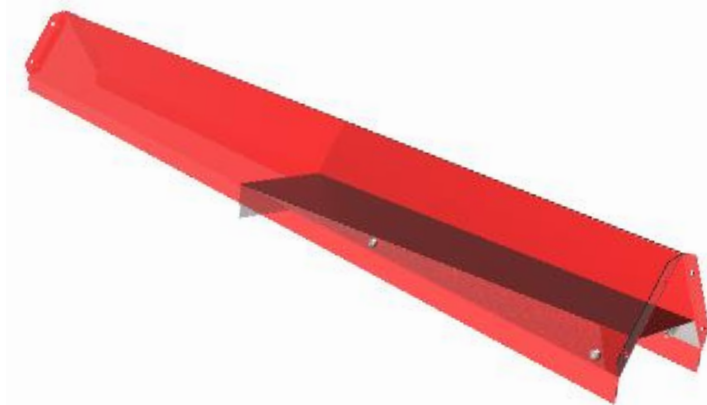
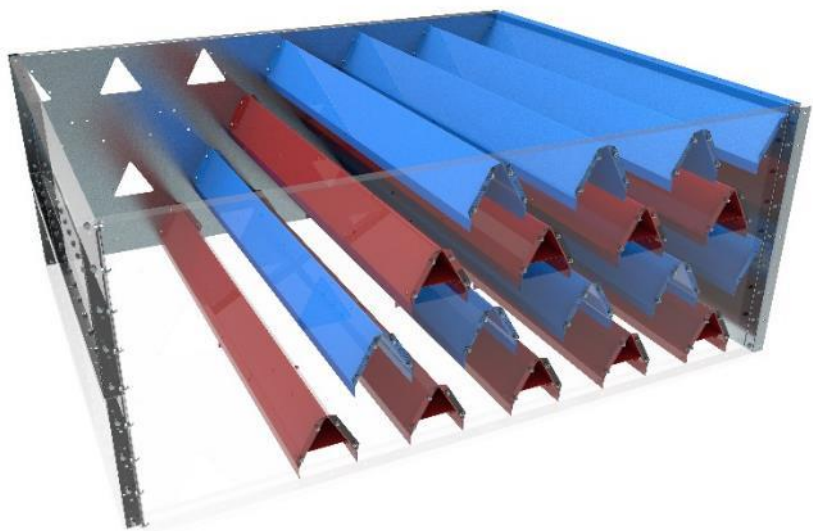




## ENGINEERING AND TECHNOLOGY FEATURES OF BRICE-BAKER GRAIN DRYERS

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## DRYING SHAFT WITHOUT STAGNANT AREAS AND LOCAL CURRENTS

- Made from S350GD high-strength galvanized steel of European origin, with 2 mm thickness (zinc coating up to 600 g/m<sup>3</sup>).
- Uniform heating of grain due to distribution of drying agent and special section ducts with a technological partition.
- Uniform grain loading and unloading is provided by the checkerboard arrangement of inlet and outlet ducts. Contributes better mixing of grain in the shaft and its free passage.

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# PNEUMATIC DRIVE DISCHARGER

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Is used for batch product discharge out from grain dryer:

- The pendulum unloading mechanism ensures uniform movement across the entire width of the shaft and eliminates grain damage
- Wide openings prevents clogging. Eliminates accidental loss of grain
- Guide boxes are above moving lower part which is chute shape,

Reliable automatic unloading control.

- Discharger is moved by pneumatic cylinder «Camozzi»
- Compressor «Balma» (Italy) for pneumatic system operation included in standard grain dryer delivery set.



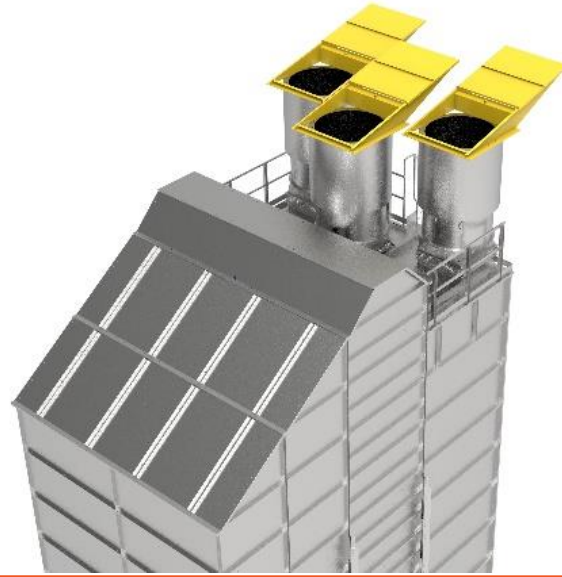
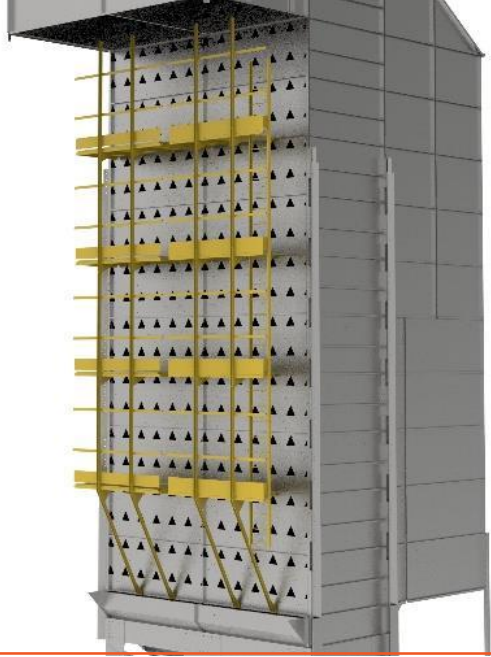
- Additional access hatch
- The ventilation system is equipped with gates to regulate the degree of air rarefaction. The presence of such gates is especially important when working with lightweight crops, which are blown out of the dryer by powerful ventilation. Belimo (Switzerland) actuators are located on wall panels of Brice-Baker grain dryers for easy operation and maintenance.
- External ladder with areas for rest

## CONVENIENCE OF SERVICE



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## CONVENIENT SERVICE

- Brice-Baker grain dryers can be equipped with internal service platforms that consist of ladders and platforms. The platform width is 1.0 m, which ensures easy and comfortable cleaning of the grain dryer
- Rain protecting covers for fans. Simple design and easy maintenance
- Loading conveyor service area

# 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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It lets control the grain dryer automatically or manually

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

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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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# DRYING PROCESS VISUALIZATION

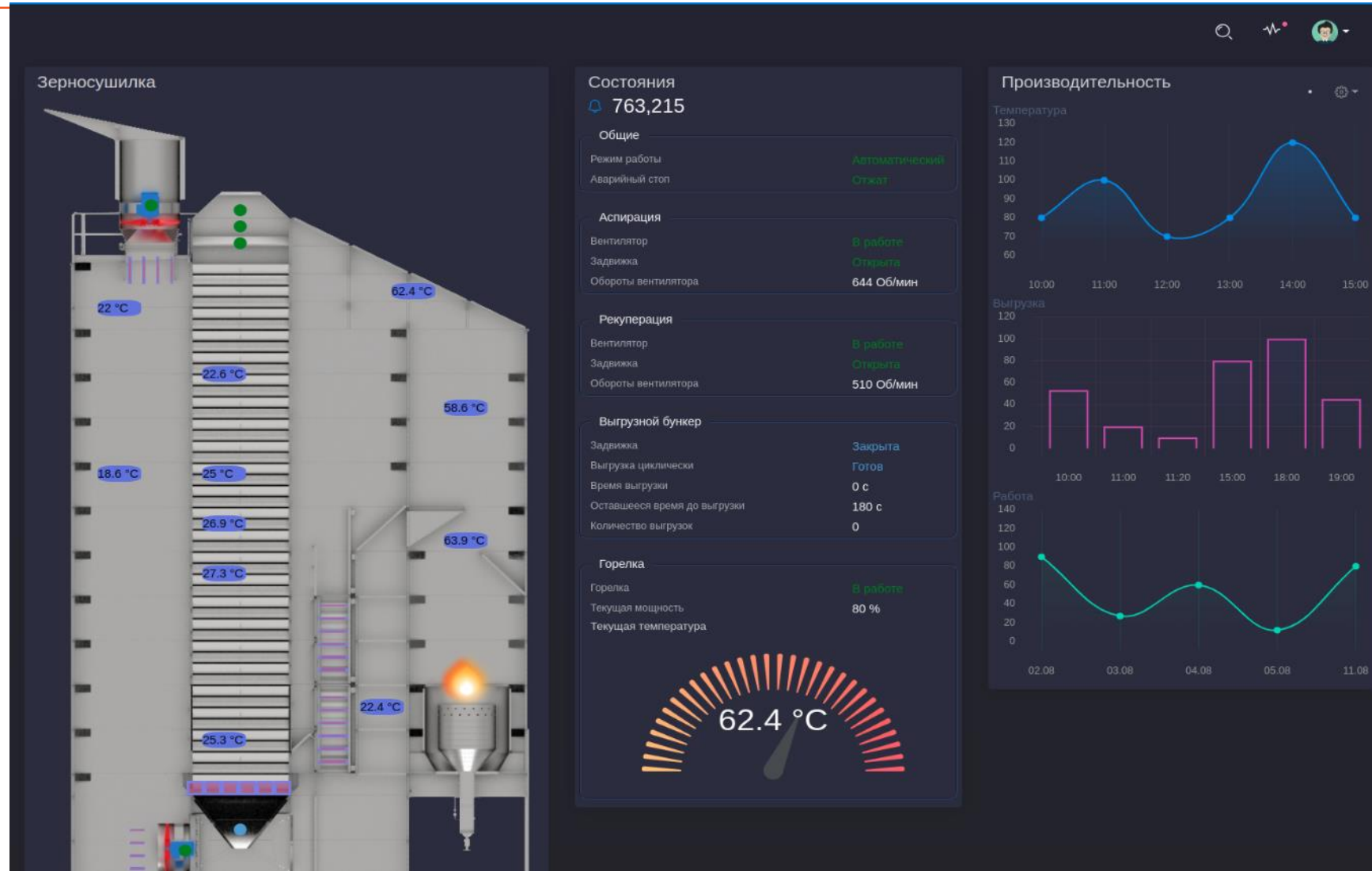
The opportunity to assign:

- 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.



## GRAIN DRYER CONTROL WITH PCS

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“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

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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.

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# 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.

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## OPERATOR'S AUTOMATED WORKPLACE

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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.





ONE OF THE MOST POWERFUL SOURCE OF POLLUTION  
AT A GRAIN STORAGE COMPLEX

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## HIGHLY EFFICIENT DUST REMOVAL (ASPIRATION)



- Dust separation by European-made cyclofans.
- Mounted on the exhaust air chamber, equipped with weatherproof covers that can be closed by the operator from the ground.
- Equipped with sound suppression. Noise index from the side of used drying agent is <math>< 53\text{ dBA}</math>

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# DUST REMOVAL TEST REPORT FOR BRICE-BAKER 16/72

- Tested 7<sup>th</sup> December 2018 by technological laboratory LLC Nibulon

Parameters	Value
Commodity	Korn
Impurity	1,8%
Moisture	17%
Productivity for 5% decrease	75 t/h
Drying agent temperature	61°C
Drying agent moisture after drying	82%

- Dust availability in the air according to the test report is  $18,32 \pm 4,58 \text{ mg/m}^3$
- Maximum dust availability in the air according to the Ukrainian laws is  $50 \text{ mg/m}^3$
- The Brice-Baker dust removal system let get out to air only 183 kg of dust comparing to 8,5 t of the dust that is inside the equipment



DUST REMOVAL EFFICIENCY WITH OUR ASPIRATION SYSTEM IS MORE THAN 97.85%

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# REFERENCE LIST OF BRICE-BAKER GRAIN DRYERS INSTALLED BY KMZ INDUSTRIES



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### First high-capacity grain dryer

- BB.SCN 21/96
- Its capacity is 294 t/h (wheat, 10% humidity reduction)
- The fuel is gas
- The gas consumption is 1.2 m<sup>3</sup>/ton-percent
- Was installed at Voronovyske Grain-Collecting Station (Alebor Group, Vinnytsya region) in 2015



### High-efficient grain dryer

- BB.SCN 12/48
- Its capacity is 14 t/h (maize, 10% humidity reduction)
- Runs on alternative fuel (wood chips and pellets)
- It needs 2,17 kg of pellets (maize, 1 t/% humidity reduction)
- Was installed at private agricultural company Zlagoda (Rivne region) in 2008

## CAPACITY AND EFFICIENCY RECORDS

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# ALL OVER UKRAINE



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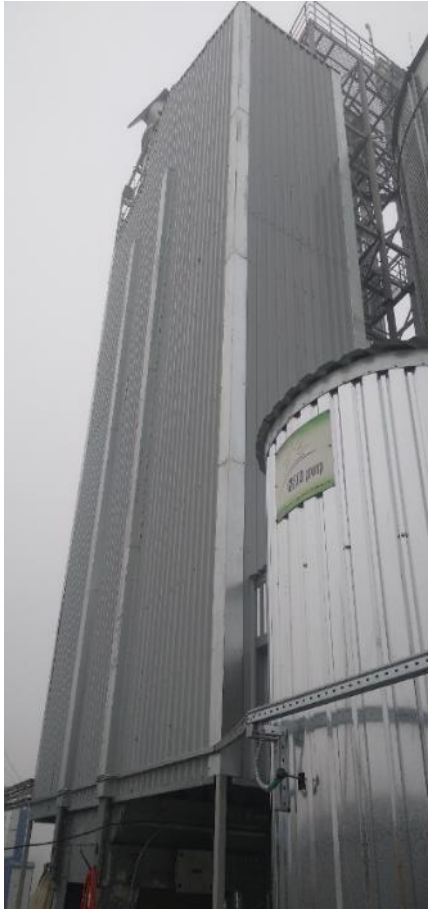
## WITH THE HEAT RECOVERY SYSTEM AND THE GRAIN TEMPERING ZONE

Fuels are gas and biofuel

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# THE DIFFERENT HEAT GENERATORS



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THEY HAVE ALREADY CHOSEN KMZ INDUSTRIES

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THANK YOU FOR THE ATTANTION!



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