

Industrial Automation



- ✓ Thirty years of experience in complex automation of enterprises
- ✓ The full cycle of automation - from design to commissioning
- ✓ Exclusively proven industrial OT & IT solutions
- ✓ Own SAKURA-IIoT cloud software platform
- ✓ Experience in the development and implementation of high-tech systems

**Innovative Projects of INNOVINNPROM
for Which it is Ready to Attract Investments**

INNOVINNPROM is a high-tech innovative company, the undisputed leader of Ukraine in the field of automation of large agricultural enterprises - grain port terminals, grain elevators (storages), oil pressing plants, etc.

Also, the company has great achievements in the fields of serial production of grain sampling systems and high-tech technologies, as well as in the implementation of Industry 4.0 technologies.

For example, the company has no competitors in the world in the field of robotic systems for grain sampling from railway hopper wagons. Therefore, our systems work in all seaports and beyond.

However, the company does not stop in its development and implements several innovative projects every year, creating high-tech startups. For each project, a creative team is assembled, the basis of which are full-time employees of INNOVINNPROM. We know how to create and sell innovative projects.

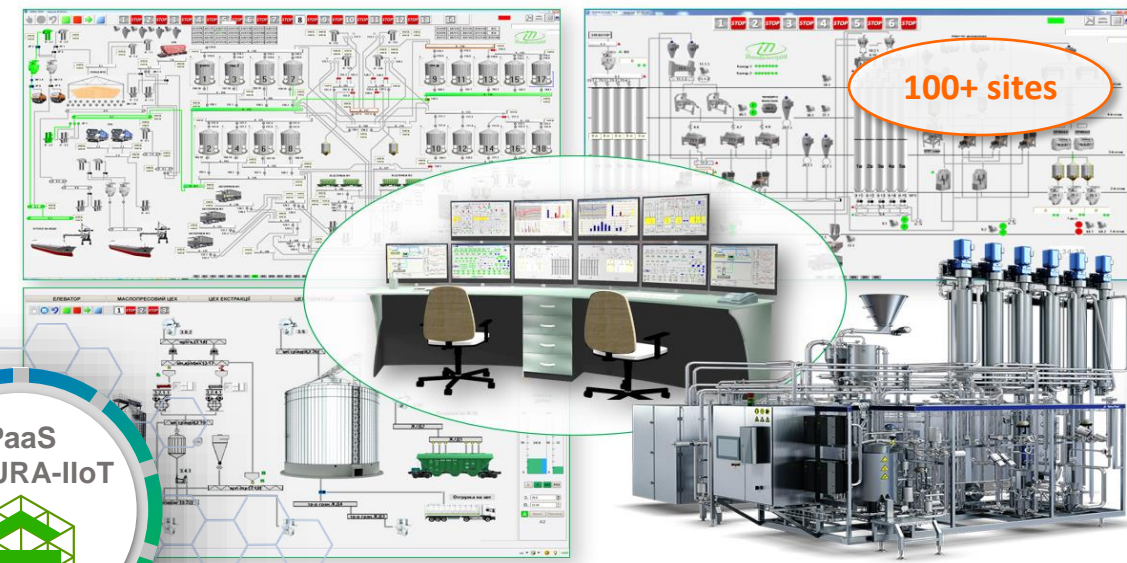


APM/MES/ERP/PLM



8 sites

Automated Design System "Route" / SCADA



100+ sites

Crystal Growing Systems



3 lines

Car Sampling Systems



45 sites

Hopper Railway Car Robotic Sampling Systems



4 sites

Monitoring Systems



50+ sites

INNOVATIONS

Operational Excellence

Reduction of air emissions

Energy efficiency

Digital product passport



PaaS SAKURA-IIoT INNOVINNPROM



SaaS

SACURA-APM

Asset Performance Management

ROUTE-ADC

Agro-Industrial Enterprises SCADA

SaaS

SACURA-ENEF

Energy monitoring system

- Industrial Internet of Things
- Big Data & Data Sharing
- Augmented Reality
- Cloud Computing
- Autonomous Factories
- Digital Twins
- AI & ML

SaaS

SACURA-M&R

Maintenance & Repair

SACURA-Business

ERP/PLM/MES

SaaS

SACURA-ECO

Environmental control

Shared databases

Open Source

Support for all OT and IT protocols

Application of modern IT technologies

Ability to integrate cheaper IoT devices and sensors

Cooperation with DIH and universities

Reasonable Simplification

Four systems into one

Flexible robotics Advanced robotics

Robotic grain sampling

Environmental impact analysis

Round-the-clock control

Customer Intimacy

Innovations in better adaptation

30 years of experience

Improving the system

Adding new features and capabilities

Automated Design System "ROUTE" for SCADA

Transfer to cloud services

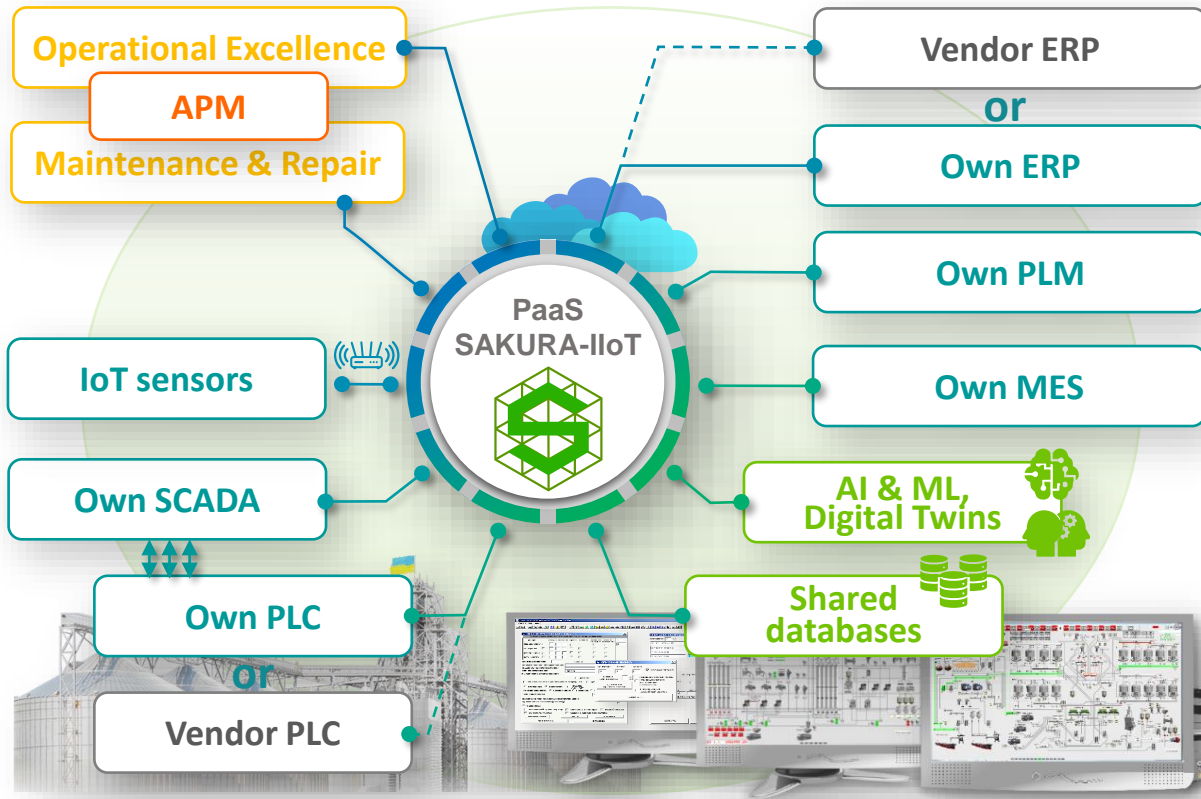
Provision of services as SaaS

Quantitative and qualitative accounting system

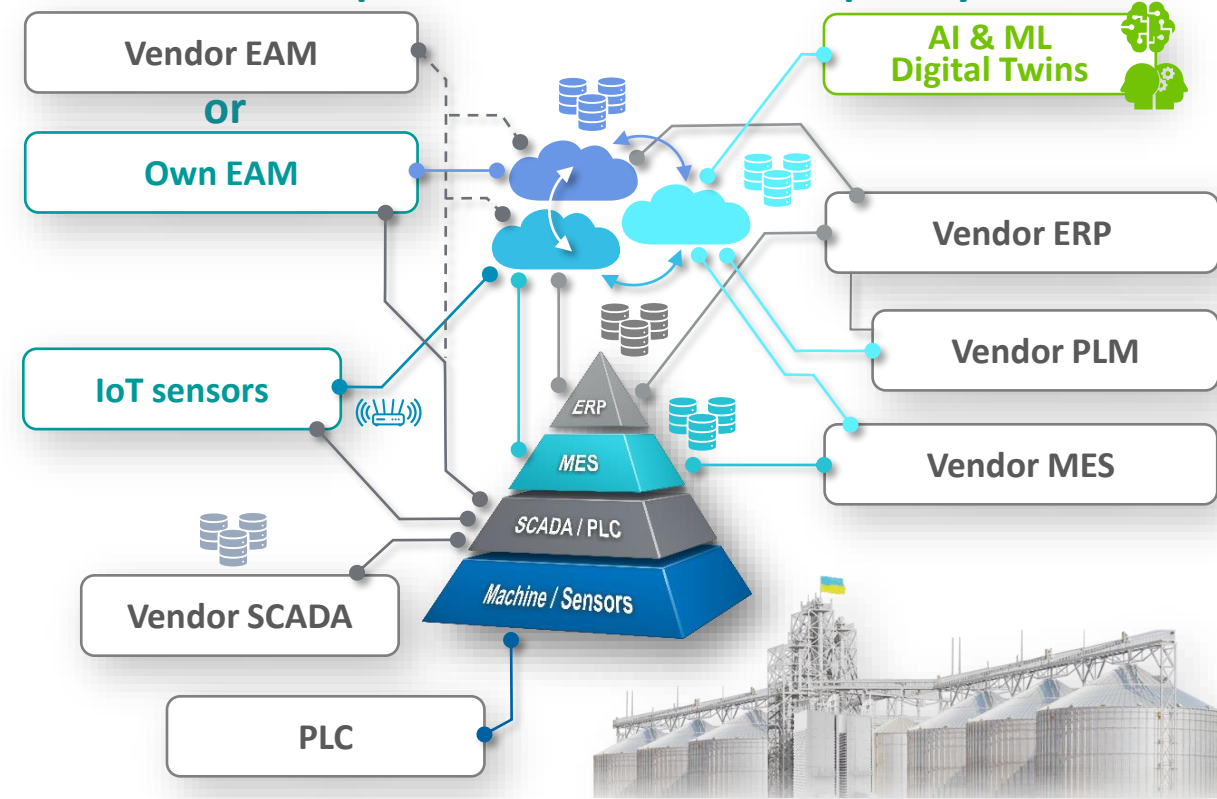
The Best Industry Solutions

of INNOVINNPROM are adapted to the conditions of the region

INNOVINNPROM – quality leap



Competitors – increased complexity



	INNOVINNPROM	Competitors
Architecture	Simplified: SCADA + Own Platform on a Cloud	Classic: SCADA + eclectically added ERP / PLM / AEM / MES
Industrial Internet of Things	As a component of the PaaS	Added solution
Data Sharing	Consolidated Enterprise Database	Disparate databases and systems
AI & ML, Digital Twins	As a component of the PaaS	Added solution
Technology ownership	Specialized PaaS, ADC SCADA, APM	Adaptation of vendor systems to customer requirements
Software implementation	SaaS	Hosted Software and applications

Our PORTFOLIO

Automation of grain elevators, port grain terminals, mills, sugar factories, feed mills, separate technological lines for processing of agricultural raw materials and products.



UKRAINE

KAZAKHSTAN

MOLDOVA



SCADA
> 1000 I/O



Car Samplers



Railway Samplers



SAKURA-B
MES/ERP/PLM



SAKURA-T
Energy Efficiency



SAKURA-ECO
Environmental monitoring

Pre-Seed Funding:

1. The Project of Developing of a Multifunctional Device for Flow Measurement of the Weight of Bulk Products and Sampling
2. The Project of Developing an Automatic Capsule for Bulk Products and a Module for Automatic Capsule Loading/Unloading for Air Tube Systems
3. Cross-Platform e-Commerce to connect farmers and individual agriculturalists with buyers and involve service providers

Seed Funding:

4. The project of full automation of the Automobile System of Grain Crop Sampling
5. SAKURA-APM Asset Performance Management system for Agricultural Enterprise & Holding

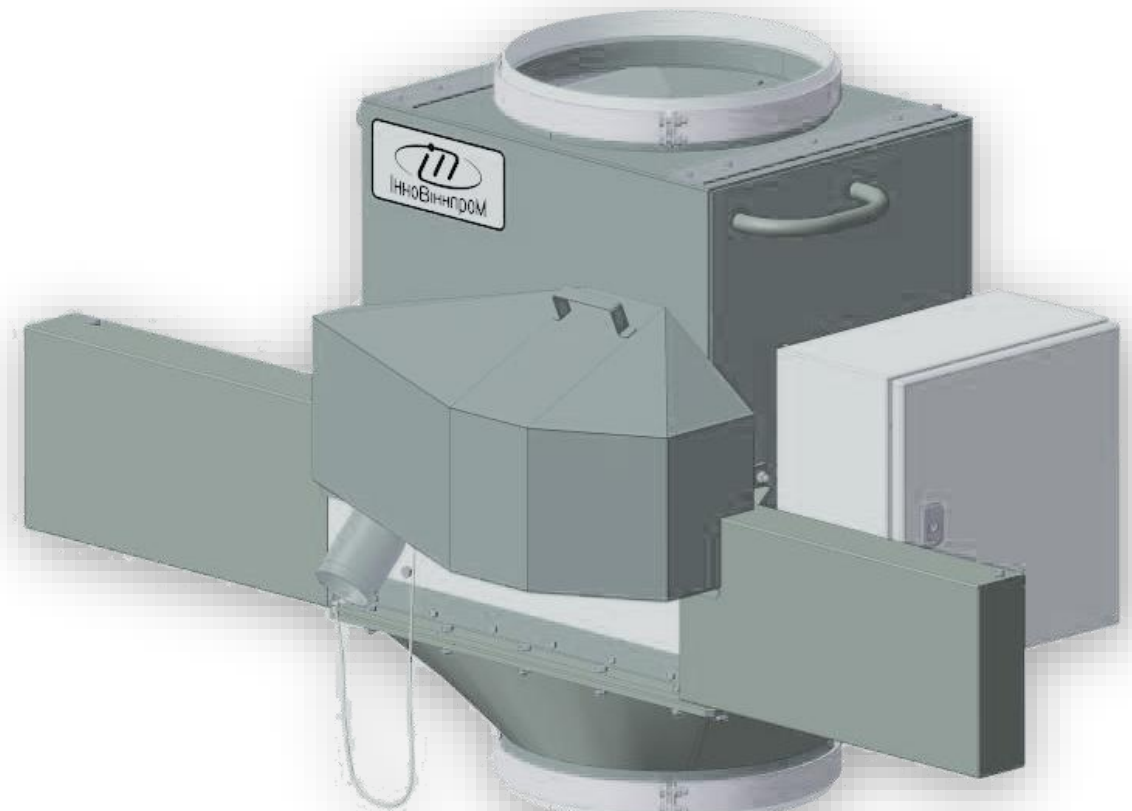
Series A, B Funding:

6. Introduction to the international market of Robotic Systems for Automatic Sampling of Grain Crops from railway hopper wagons
7. Organization of Sapphire Manufacturing



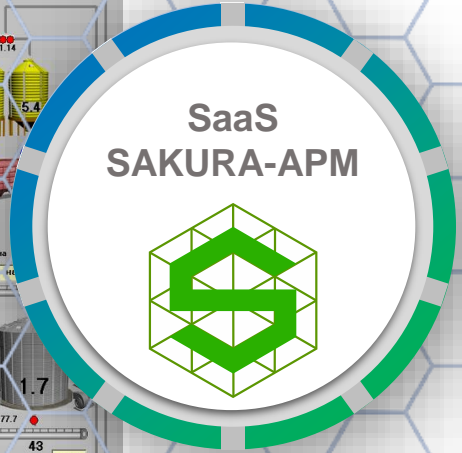
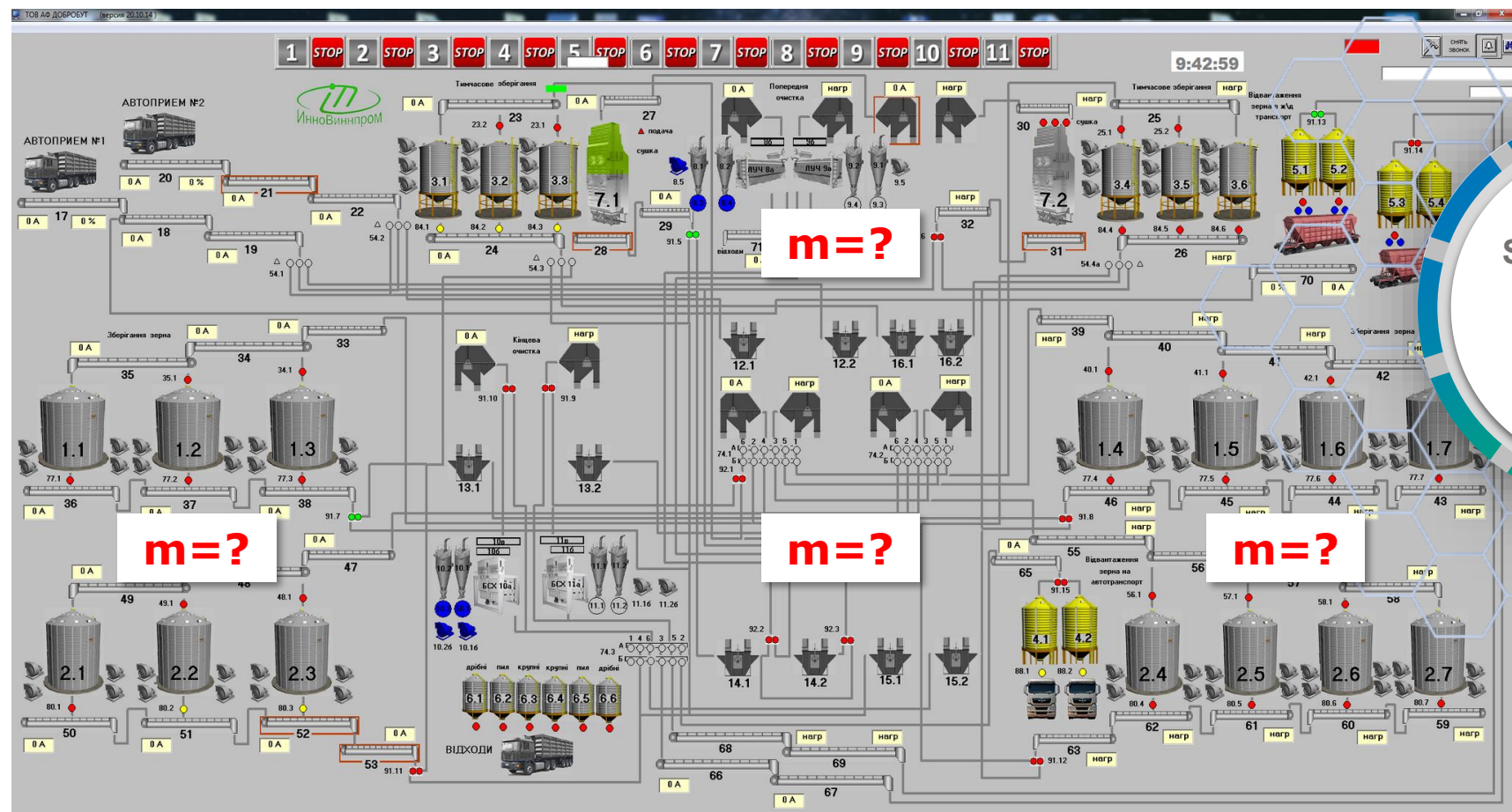
1. The Project of Developing of a Multifunctional Device for Flow Measurement of the Weight of Bulk Products and Sampling

Pre-Seed Stage, MVP



When we are deploying SAKURA-APM cloud services to control and optimize production efficiency in grain storages, we have a significant problem - the impossibility of measuring the weight of grain crops moved between grain storage warehouses. If there are automobile, railway, and bunker scales for receiving and shipping grain crops at grain storages, then there are no scales for internal movement of grain, for example, for drying.

Compact scales are needed for flow weighing of grain crops.



- Industrial Internet of Things
- Big Data & Data Sharing
- Cloud Computing
- Autonomous Factories
- Digital Twins
- AI & ML

SIEMENS

Ingenuity for life



There are high-quality high-precision flow meters for the weight of bulk, granular and powder products SIEMENS solids flow meter "SITRANS" and HENSE solid flow meter "FlowSlide" on the market.

These are excellent engineering solutions, but they have certain limitations for the implementation of our task, namely:

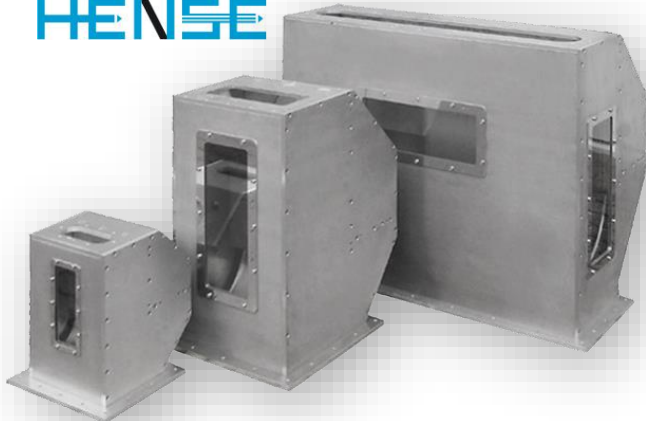
- ❖ the stations are calibrated for a specific grain crop, in the case of switching to another crop, they need to manually enter information about the crop or transfer information from the SCADA.

But in our situation, we sometimes do not know which grain is moving through the Flow Meter, its automatic recognition is necessary.

- ❖ the systems are very expensive, as well as their installation and calibration, which is performed exclusively by the manufacturer's engineers.

If a typical grain elevator in Ukraine with a capacity of 100,000 tons requires simultaneous storage of grain in at least 10 pieces of flow meter, the projected payback of such an installation exceeds 10 years, which exceeds the service life provided by the manufacturer.

HENSE



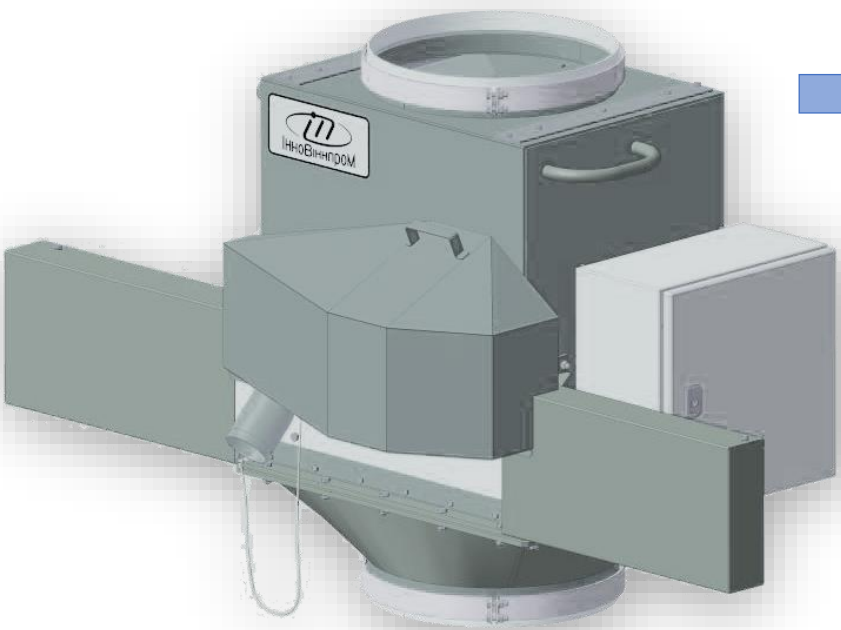
Our Own Experience

We have produced and successfully implemented dozens of the following autonomous systems with processor control:

- ❖ Automatic systems of weighing and regulating the flow of grain crops;
- ❖ Automatic sampling systems from the flow of grain crops;
- ❖ Sensor installation systems for express analysis of grain crop parameters.



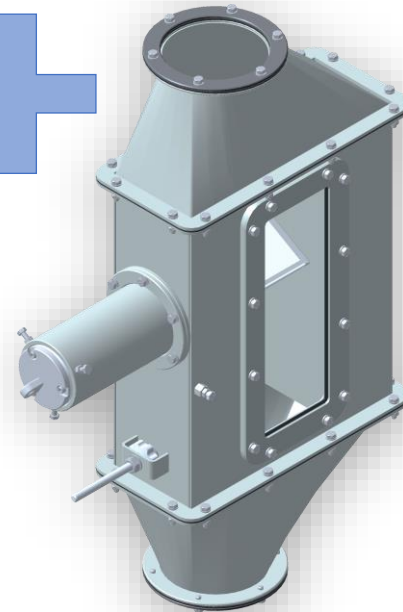
Combine the following systems in a single body:



Flow Sampler



Flow Meter



Sensor installation unit



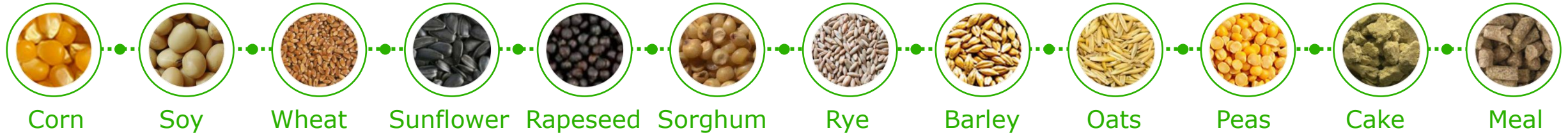
Machine Vision Camera



A universal smart device **Flow Weight Sampler** for stream recognition of the type of grain crops, measurement of key parameters (humidity and graininess), weight measurement and sampling in case of crop changes or inconsistency of parameters.

Basic Requirements for Flow Weight Sampler

❖ The ability to recognize, determine parameters, and take samples of the following grain crops:



- ❖ Automatic self-calibration for each crop.
- ❖ High dust resistance.
- ❖ Work in difficult environmental conditions:
 - Temperature range -40 ... + 60 0C
 - Humidity 0 ... 100%
 - Wind speed up to 25 m/s
- ❖ Minimal maintenance during operation
- ❖ Availability of self-cleaning equipment
- ❖ The controlling component of the system should be a serial programmable logic controller (PLC).

We focus special attention on the choice of Machine Vision Video Camera, thanks to its data, the device should be automatically adjusted according to the parameters of the grain crop that is in the process of operation.

The camera must be connected to the PLC of the FWS.



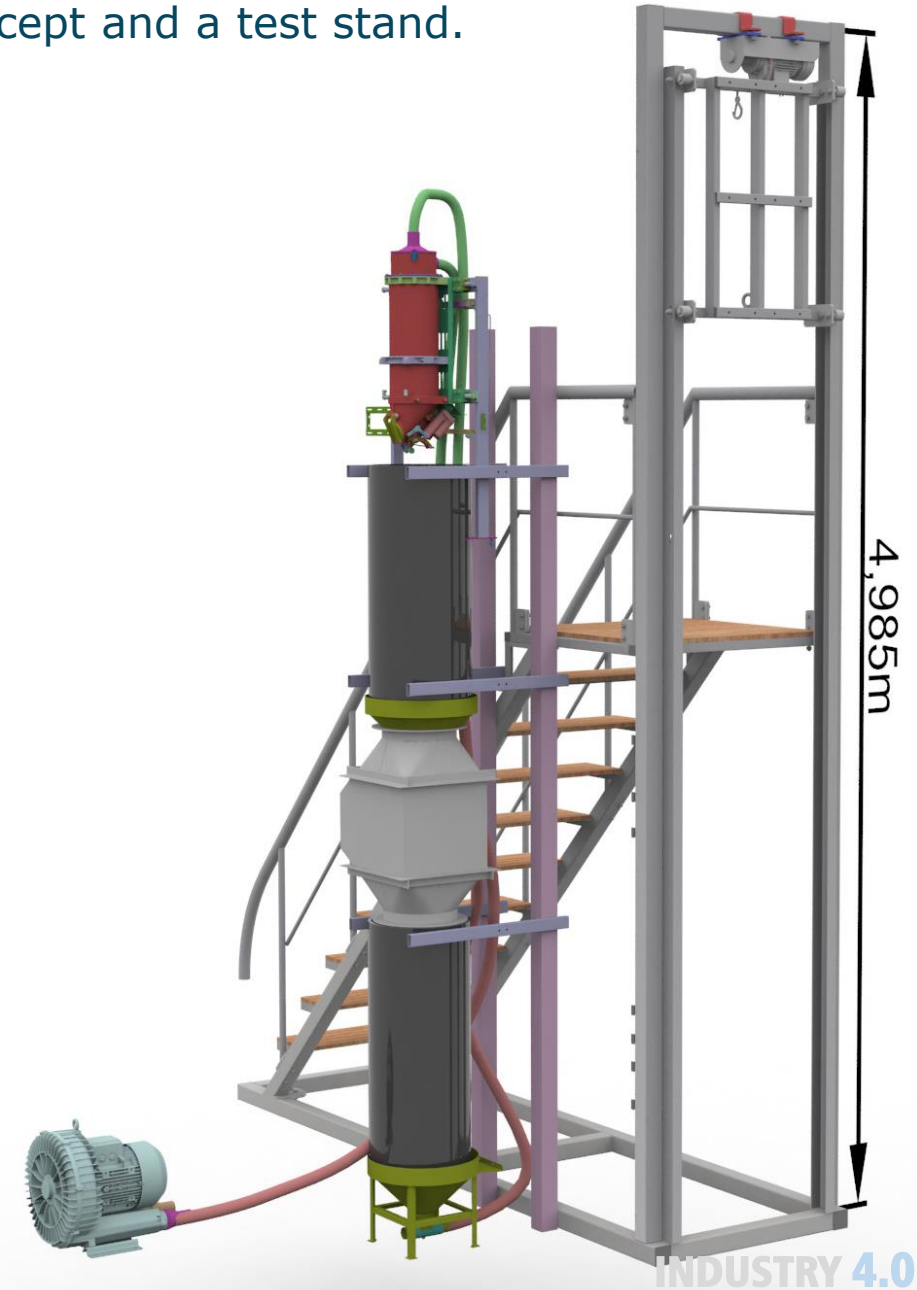
To test the idea, we developed and assembled several variants of the concept and a test stand.



The test stand includes:

- ❖ Hopper with product
- ❖ Test node
- ❖ Receiving hopper
- ❖ Pneumatic transport system

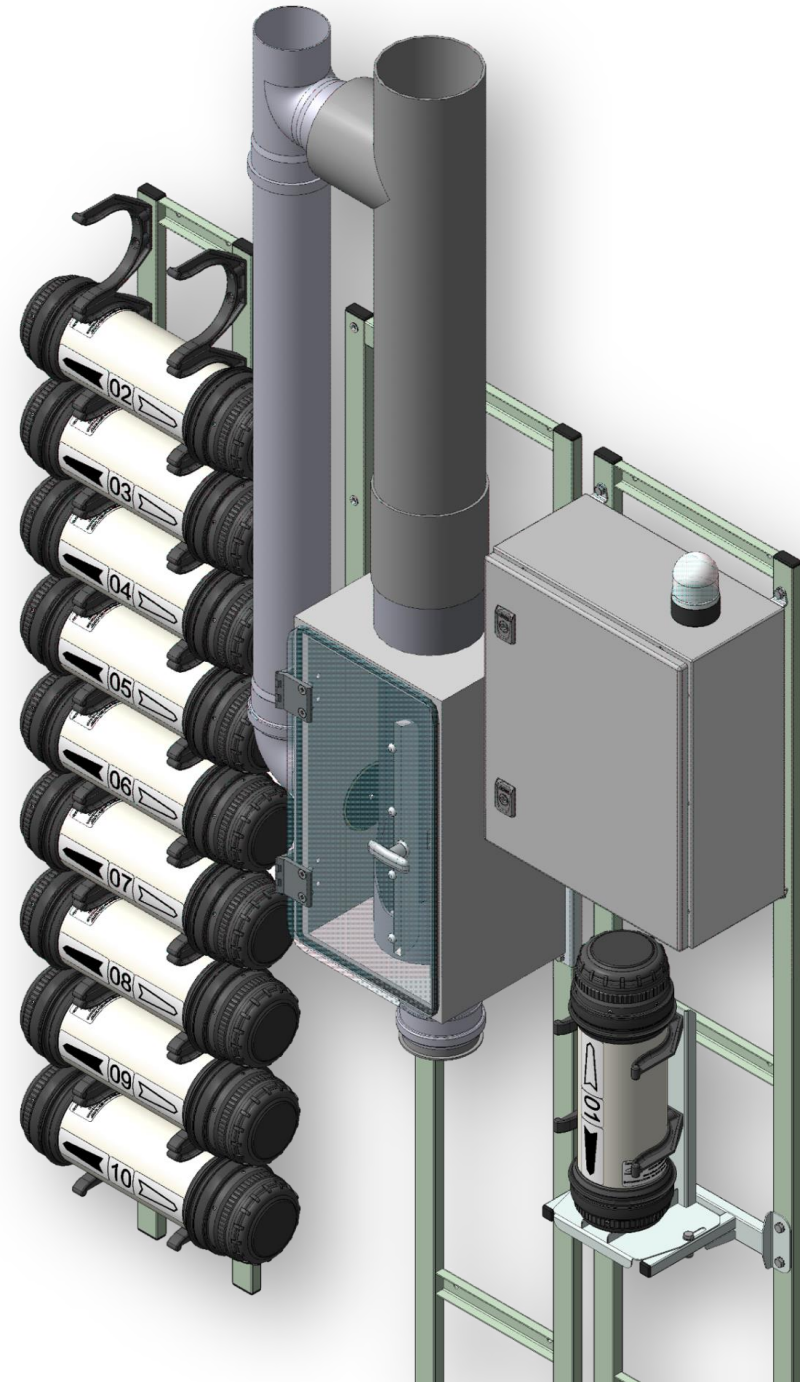
In this way, we managed to check and test several variants of the concept and be sure of the possibility of implementing it.



2. The Project of Developing an Automatic Capsule

for Bulk Products
and a Module
for Automatic Capsule
Loading/Unloading
for Air Tube Systems
(Pneumatic Systems)

Pre-Seed Stage, MVP

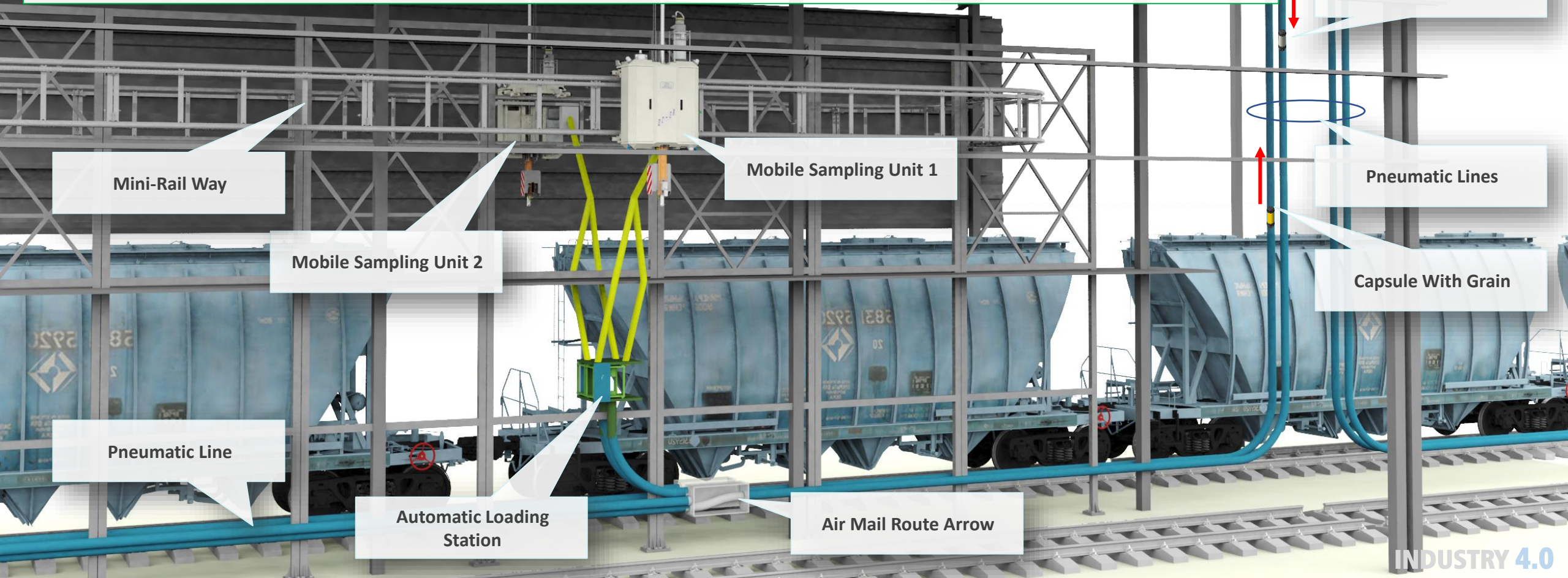


Our Current Project: Hopper Railway Car Robotic Grain Sampling Systems

In our projects, we encountered the problem of automatic loading and unloading of loose products into pneumatic air/pneumatic tube systems capsules.

We have not found any manufacturer of a simple reliable solution to the problem who can provide us with a large capacity capsule for our air tube systems.

Since the air main is located on the seashore outside the premises, our requirements for the quality and reliability of the capsule and its opening and closing mechanisms are very high.



Capsules for Loose Products

Therefore, we created a new team of designers to develop and test capsules for bulk products and automatic modules for opening and closing them. The team designed, manufactured, prototyped and tested a capsule that met all of our most strict requirements.

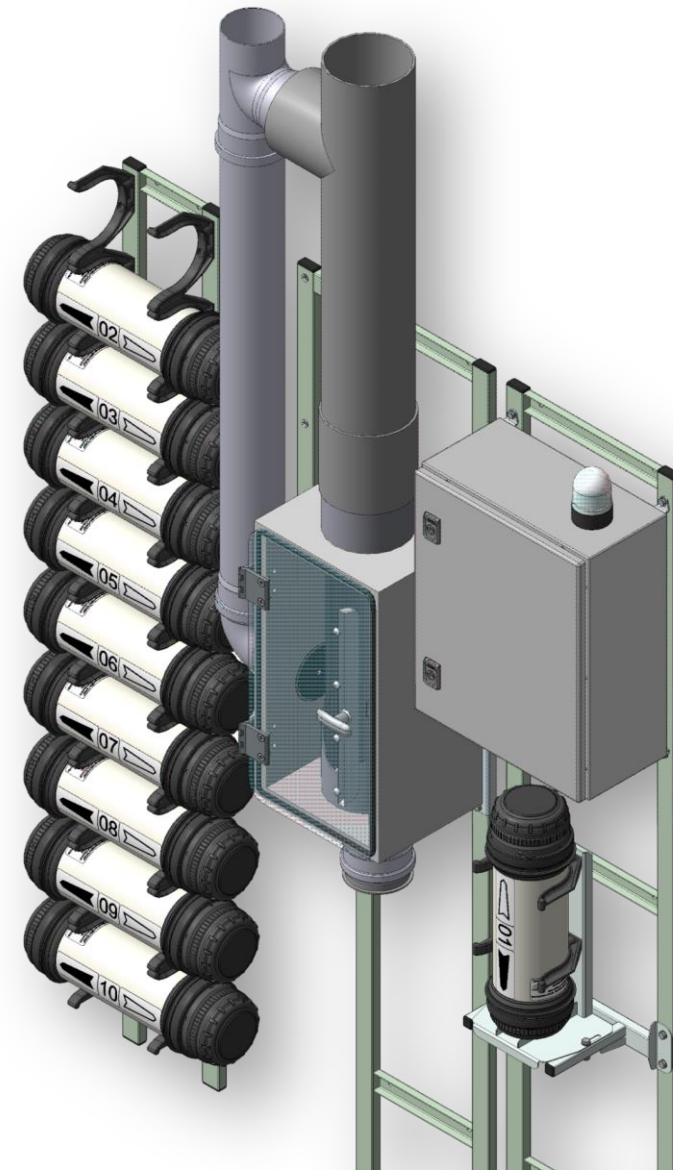
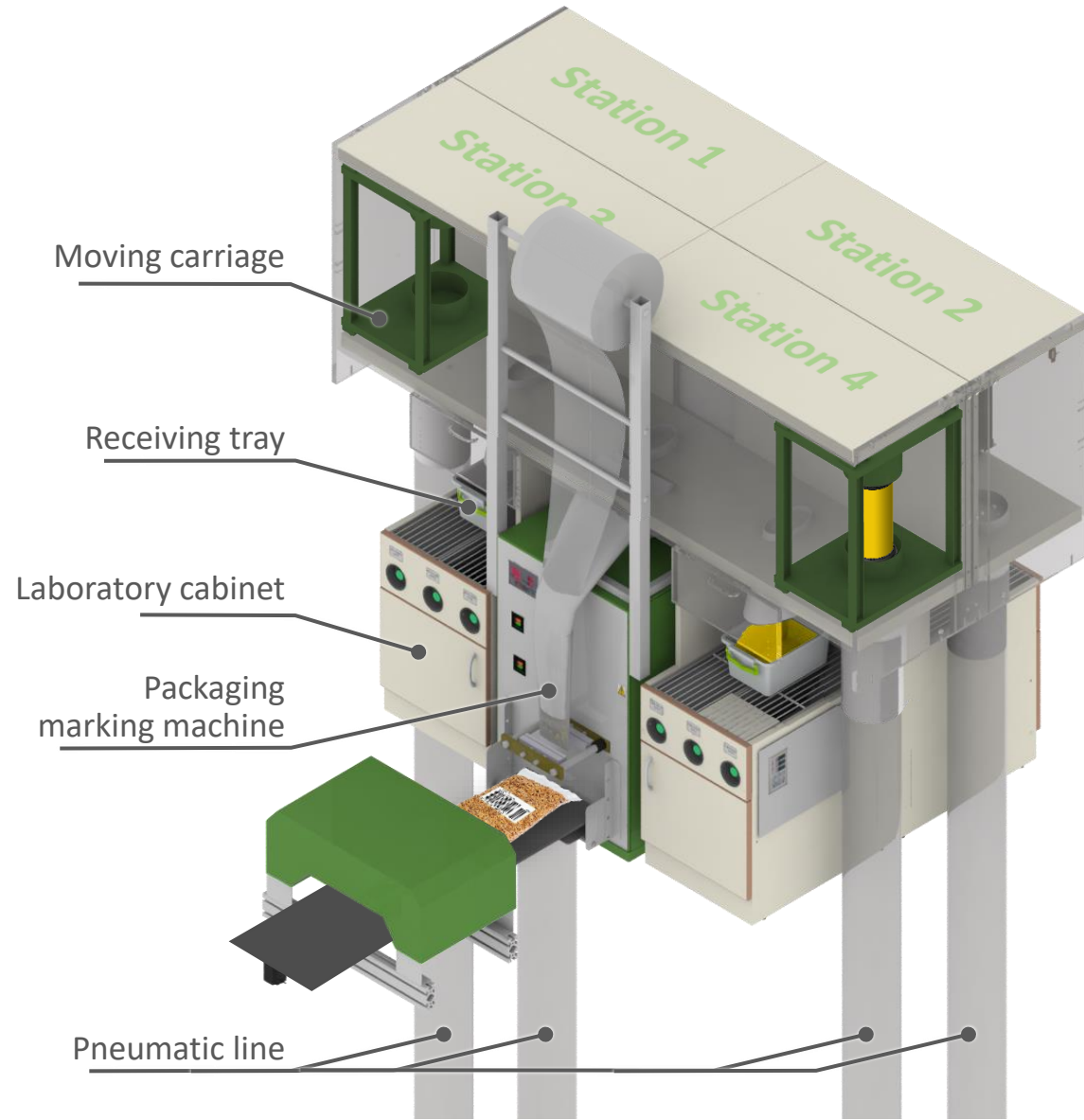
The capsules are equipped with an automatic opening and closing mechanism with a magnetic lock, as well as an RFID identifier.

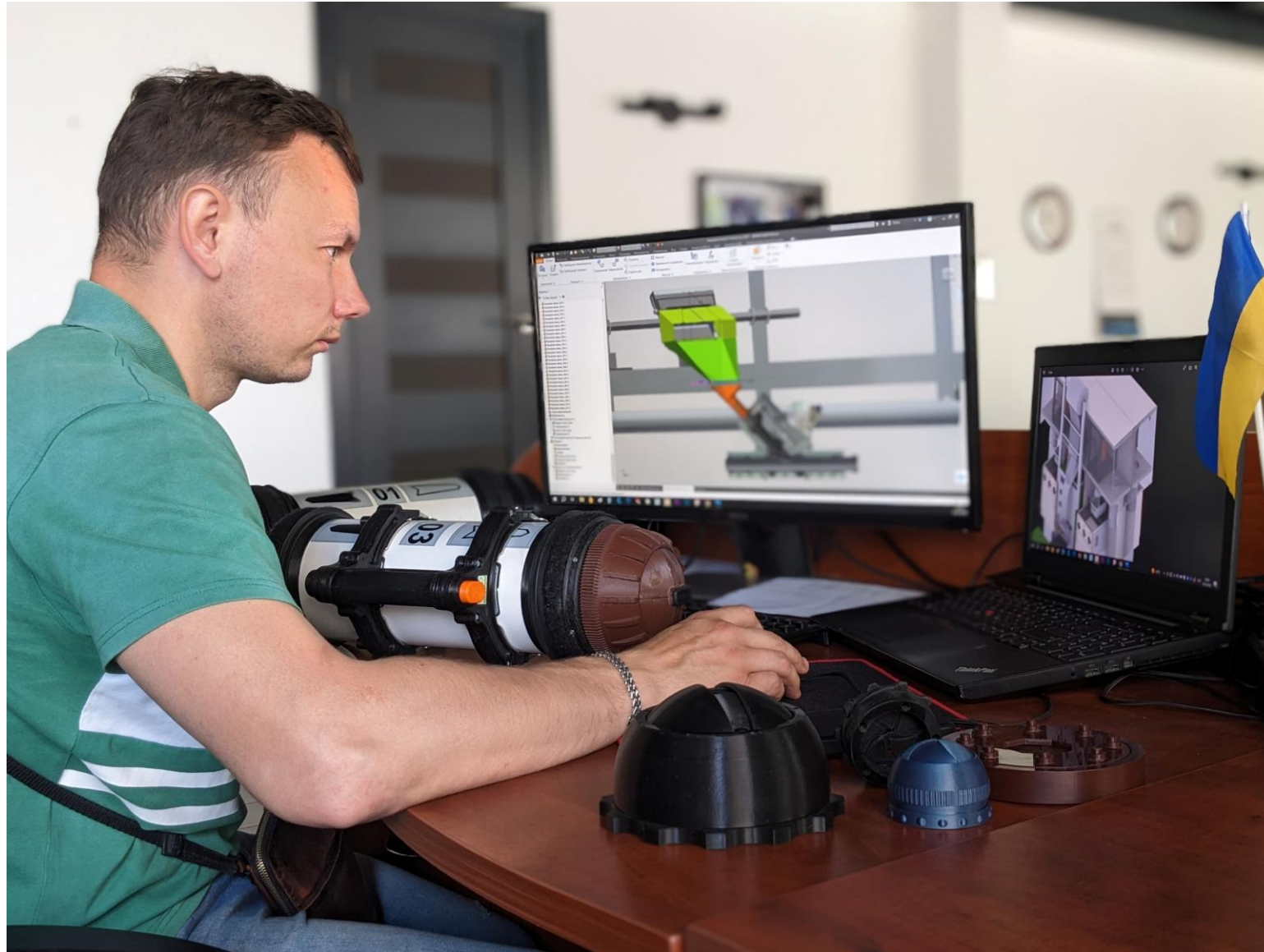
The capacity of the capsules is 5.4 liters.



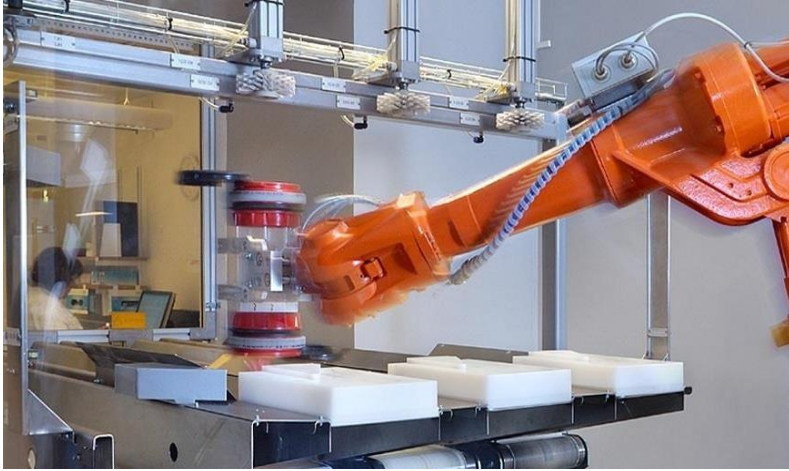
Receiving Unloading Station

Reliable **modules for opening and closing capsules** should be easily integrated to automatic stations for loading and unloading bulk products. In addition, the module must ensure reliable reading of RFID tags.





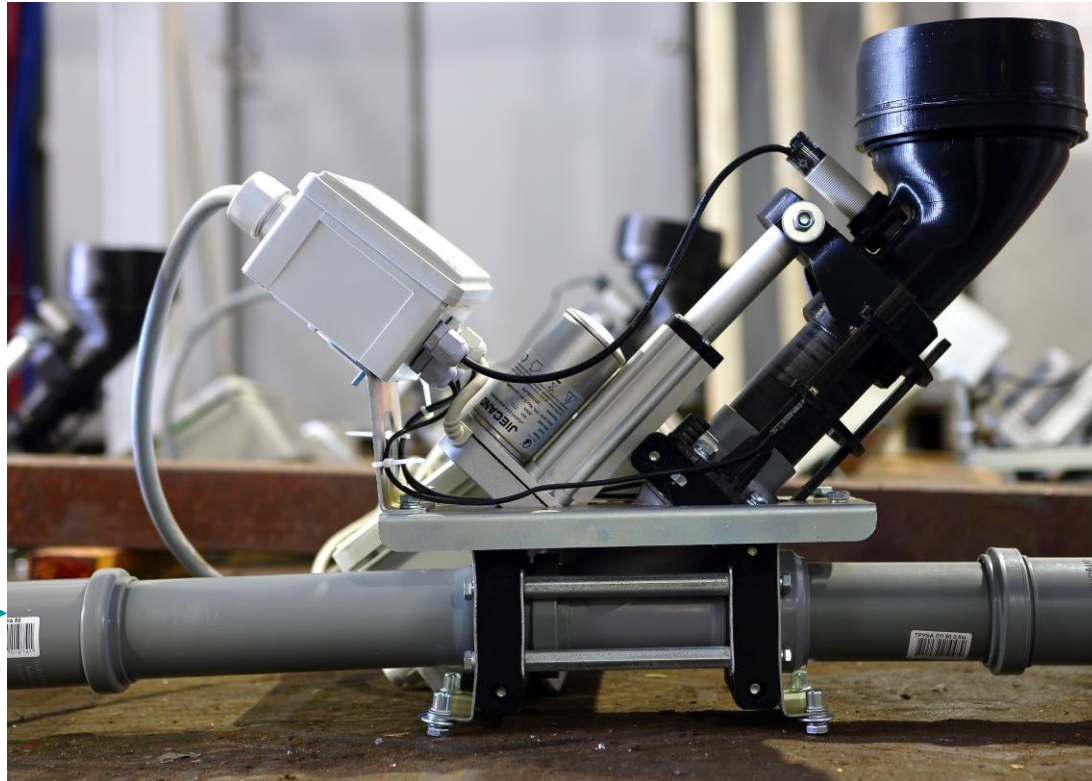
Since our customers do not want to pay for development, but want to buy ready-made solutions, we are looking for investment to develop and manufacture **reliable modules for automatic opening and closing of capsules.**



Some manufacturers offer a very expensive solution that has high requirements for operation and maintenance and cannot work in harsh environmental conditions.



We have developed and are testing several concepts of an engineering solution for automatic loading and unloading of capsules





Since our solution is a compact, less expensive alternative to the robotic arms currently used to open and close capsules, it has great prospects in the air tube system market. The advantages are not only in cost, but also in ease of installation and operation, resistance to difficult operating conditions.

Accordingly, our set of equipment can be used for automated warehouses, pharmacies, hospitals and shops for quick shipment of bulk and small products.

Therefore, we invest ourselves and are ready for negotiations with investors for testing and preparing of serial production of equipment, organization of an advertising company, establishment of partnership relations with suppliers of air tube systems.

We guarantee that with good investment and support we will be able to implement this project.

3. Cross-Platform e-Commerce

to Connect Farmers and Individual Agriculturalists with Buyers and Involve Service Providers

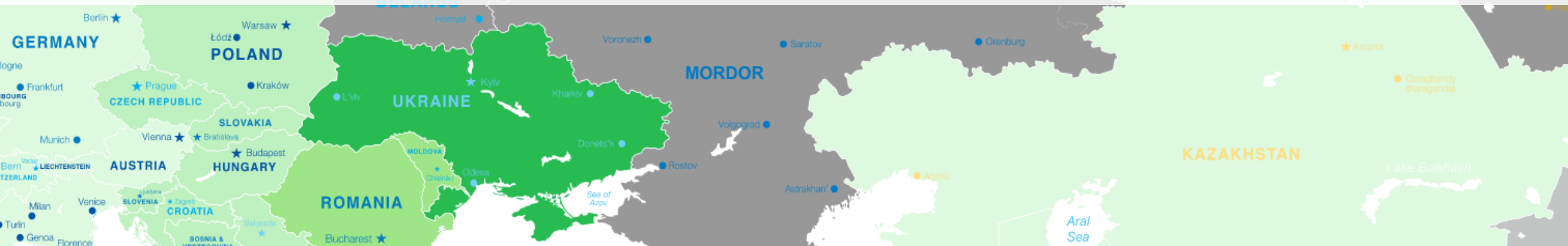
Pre-Seed Stage, MVP



Problem Description

According to UN data, farms around the world produce more than 85% of the volume of agricultural products, while in Ukraine this indicator barely reached 10% of GDP. One of the reasons for this was the focus of the Ukrainian agro-industrial complex on large holdings.

However, the main trend currently prevailing in the global practice of the agricultural industry is the development of small farms. According to the Food and Agriculture Organization of the United Nations about 97% of all EU farms should be considered family farms. The Netherlands has the largest share of such farms at 98%. In neighboring Poland, it is 90%. Only 27.5% of the area in the EU is cultivated by corporate farms, and the majority of the rest - by family farms.



Mordor's aggression showed the fallacy of such a state for Ukraine's food security. Currently, the Ukrainian food market is being actively restructured in the direction of increasing the number of small and medium-sized farms.

Our idea is to help farms grow and find buyers for their products, and buyers find quality products. We plan to connect 50,000 Ukrainian farmers and 200,000 individual agriculturalists with millions of buyers, as well as tens of thousands of service providers (fertilizers, seeds, vet services) on a single e-commerce platform.

In the future, we see the potential for entering markets of the countries of the former USSR & beyond.

A mobile e-commerce platform aims to connect farmers and individual agriculturalists with buyers and make service providers (fertilizers, seeds, veterinary services) closer to farmers.

Our goal is to build a network of trust between local farmers and agricultural buyers, providing convenience and fairness to both groups by stimulating business through innovation and advanced technology.

Farmers

Farm products



Individual Agriculturalists

Farm products



Cross-Platform e-Commerce

Processing enterprises

Raw material for processing



Hotels, Restaurants & Bars

Products for cooking



People

Products for cooking

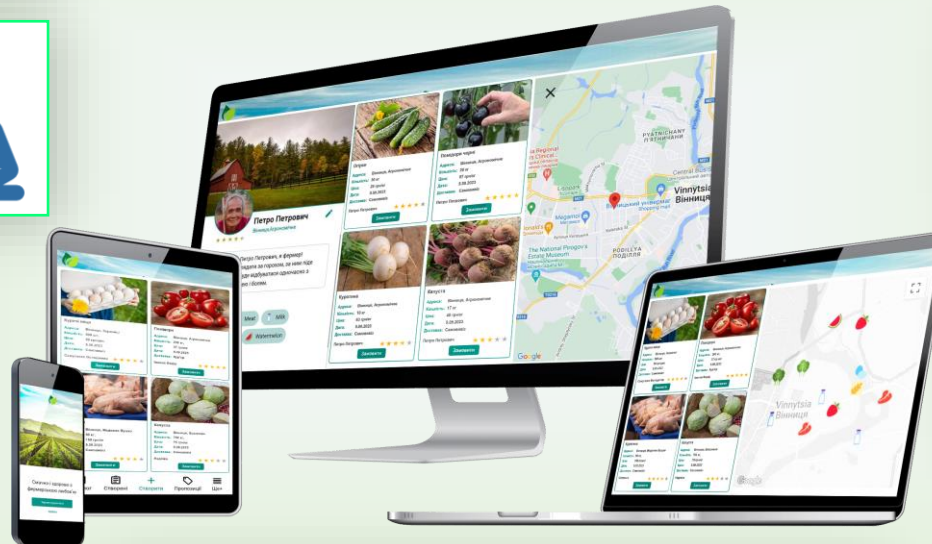


Service Providers

Fertilizers, Seeds, Vet services



The basis of the mobile e-commerce platform is PWA (Progressive Web Application). At the moment, the MVP is implemented.



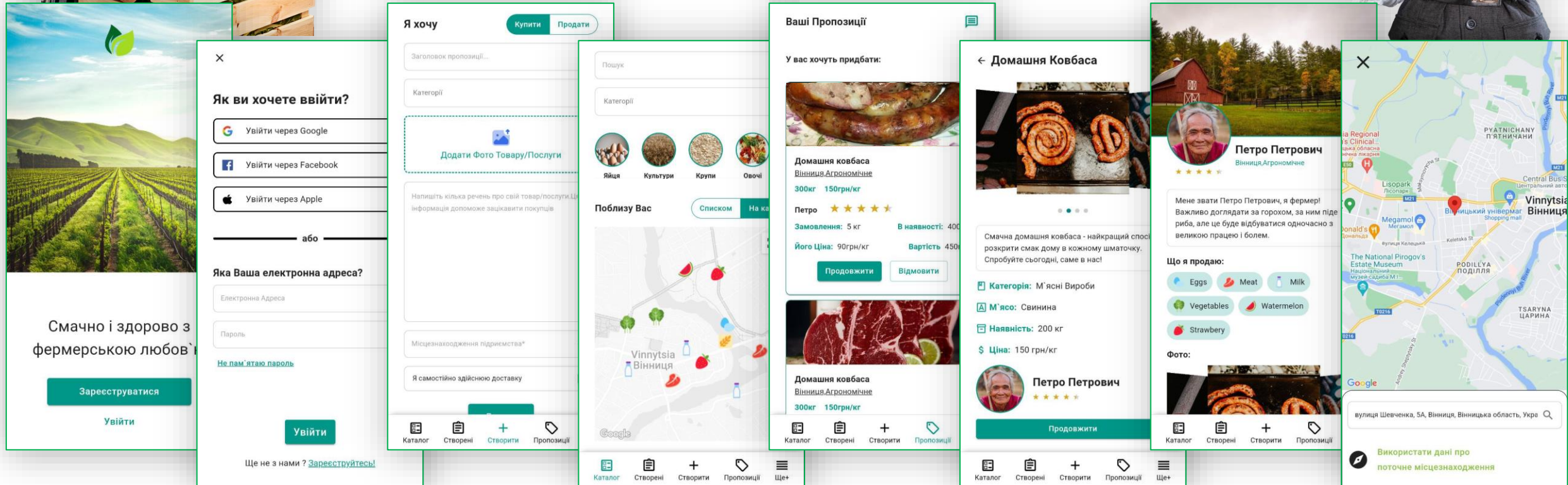


The farmer can:

- ✓ Create a personal account
- ✓ Advertise their products
- ✓ Find a buyer
- ✓ Provide delivery services
- Find services for your business
- Ban dishonest buyers

The buyer can:

- ✓ Create a personal account
- ✓ View the nearest products on the map
- ✓ Find the products they need
- ✓ Reserve selected products
- ✓ Use delivery
- ✓ Rate the seller's services



The collage displays several key features of the app:

- Registration:** A screen titled "Як ви хочете ввійти?" (How do you want to log in?) with options for Google, Facebook, and Apple. Below it, a registration form asks for an email address and password, with a "Зареєструватися" (Register) button.
- Product Listing:** A screen titled "Ваші Пропозиції" (Your Offers) showing a list of products. One listing for "Домашня ковбаса" (Homemade Sausage) includes a photo, price (300kg 150grn/kg), and a "Продовжити" (Continue) button.
- Map View:** A map titled "Поблизу Вас" (Near you) showing the location of various products in the Vinnytsia area.
- User Profile:** A profile for "Петро Петрович" (Petro Petrovich), a farmer, with a 5-star rating and a list of products for sale including Eggs, Meat, Milk, Vegetables, Watermelon, and Strawberry.
- Map Navigation:** A map showing the location of the user and nearby products, with a search bar and a "Використати дані про поточне місцезнаходження" (Use current location) option.

Project COVERAGE

In Ukraine:

50,000 farms

70,000 hotels and restaurants

200,000+ small grocery stores

(excluding networks of large retailers)

200,000 individual agriculturalists

Population 40,000,000

We estimate a potential market of
200,000+ app users in Ukraine alone



- ❖ Farms and MSMEs that grow fresh goods and want to attract new customers and increase sales are looking for an effective way to communicate with consumers.
- ❖ Large and small businesses such as hotels, restaurants, shops, supermarkets, processing plants and others looking for fresh and quality products.
- ❖ Ordinary people who appreciate diversity and want to have access to a wide range of fresh agricultural products.
- ❖ People with disabilities who look for services to order food online.

How we do it:

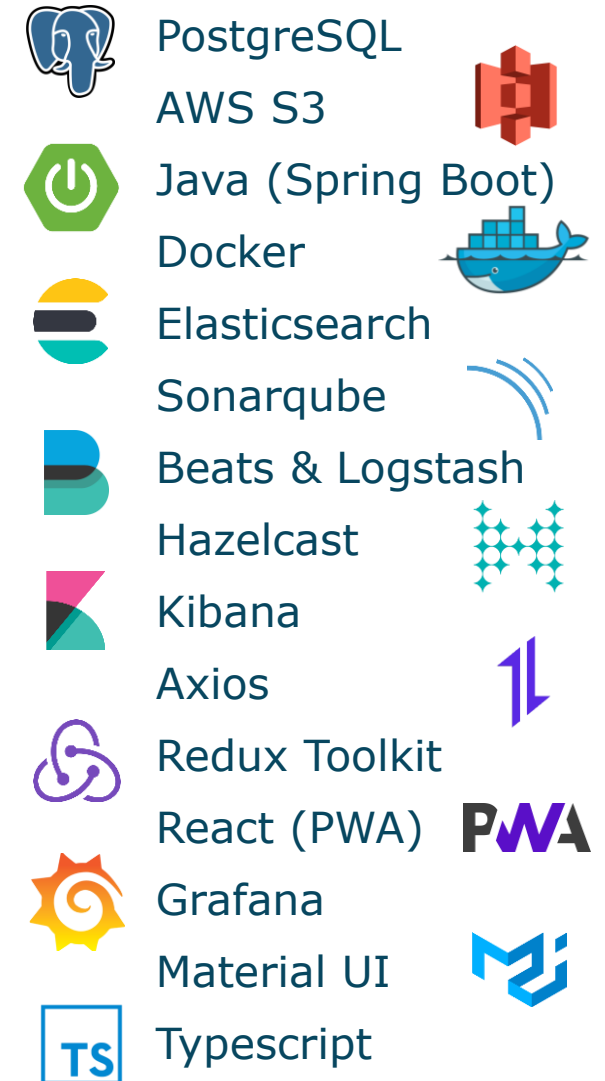
- ✓ We use 30 years of experience in the markets of Ukraine, Moldova and Kazakhstan
- ✓ We are advised by the best experts of the agricultural market of Ukraine and IT
- ✓ We use the most modern software
- ✓ We are advised by one of the best scientific teams of Ukraine in the field of AI
- ✓ We have a creative team of developers and top managers

What we expect:




- ✓ Financial support for MVP improvement and advertising
- ✓ Advice from the best European experts
- ✓ Help in project scaling
- ✓ To find reliable partners in the EU

We also need help in building the right business model. Since there is no similar service available in Ukraine, we estimate the number of our users at 100,000+. These are both sellers and buyers. We consider options for both subscription and the use of service fee, as well as payment for targeted advertising.

Technological stack of the project:



Project Plan

1. Researched the market ✓
2. Specified the idea ✓
3. Developed a preliminary technical task ✓
4. Approved technology stack ✓
5. Created a creative team ✓
6. Developed and are testing MVP 
7. Developing a complete technical task 
8. Developing design and branding 

Currently, the project is financed by the FFF.

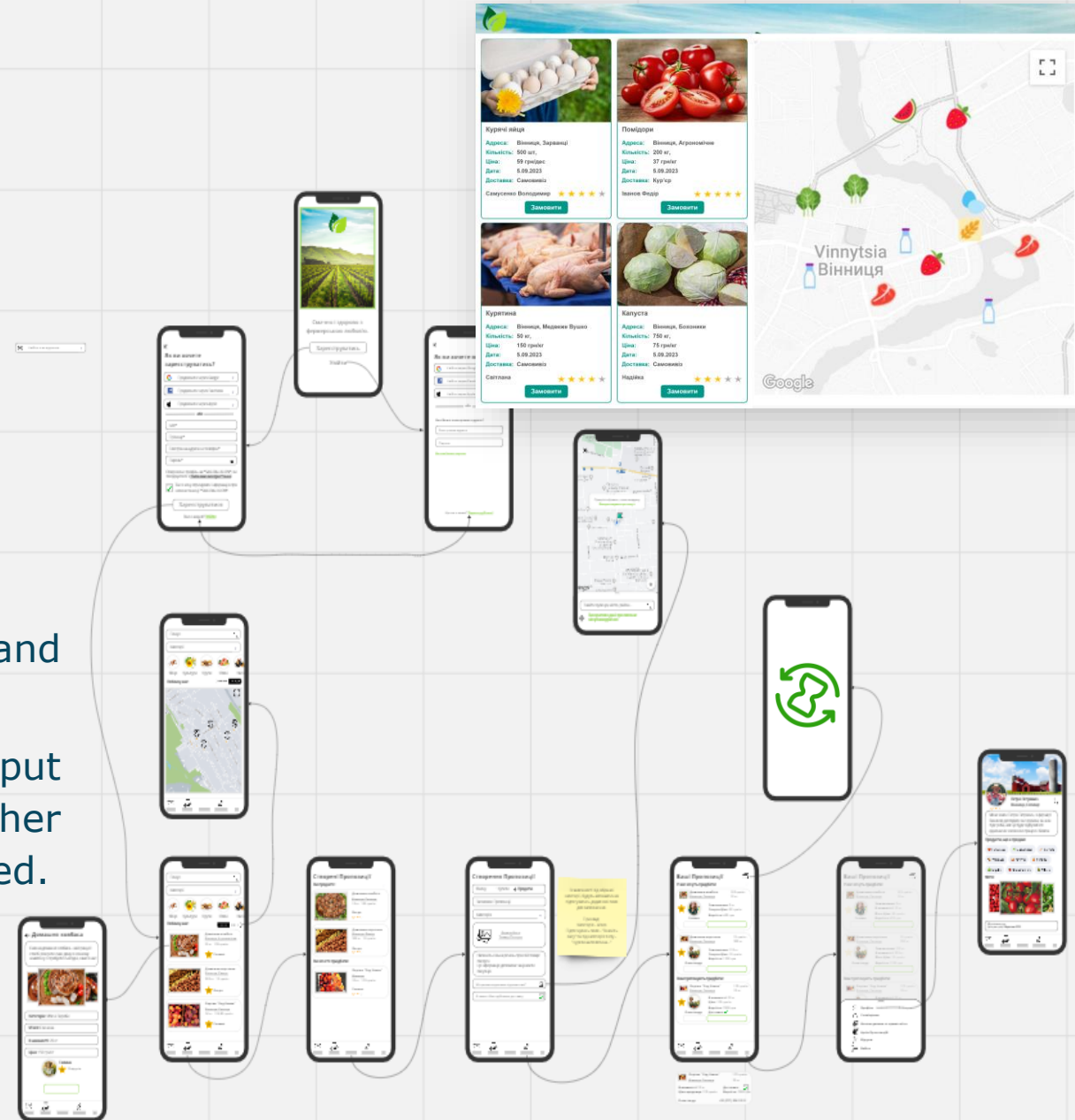
The task of the stage is to develop the technical task and design, to complete the work with the MVP.

In the absence of additional investments, the project is put on hold, staff are transferred to other projects, further market research and the search for investors are conducted.

When receiving the first round of investment:

alfa version - 3 months

beta version - 5 months



Due to the large expected number of platform users, we are considering using a combination of several payment options.

1. In-app purchases
2. In-app advertising
3. Affiliate marketing
4. Subscription fee
5. Data Monetization
6. Sponsorships
7. Crowdfunding
8. Mass messaging

Of course, the choice depends on the scale and quality of marketing and advertising activities, which in turn depends on the size of the financing of these companies.

Marketing Channels

- ✓ Through field officers/agents
- ✓ Through partnerships
- ✓ Social media and website
- ✓ Company awareness (road shows with partners and ex)
- ✓ Exhibitions
- ✓ Applications (Web, SMS, USSD, Android/iOS), website...
- ✓ Radio & TV adverts
- ✓ Branding & promotional materials

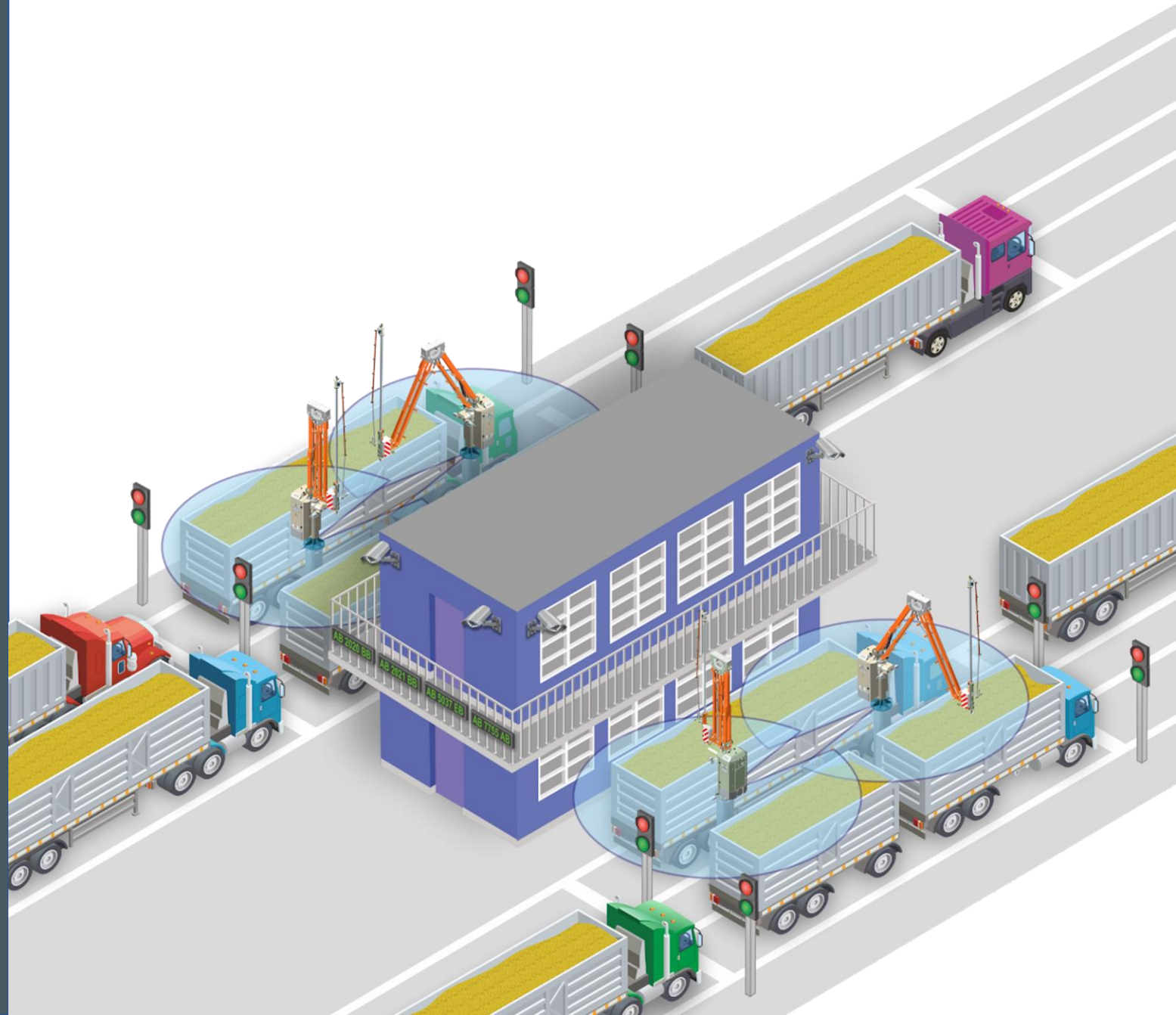
Customer segmentation

- ✓ Farmers
- ✓ Buyers
- ✓ Agrodealers
- ✓ Vet services
- ✓ Extensions service providers
- ✓ Government institutions
- ✓ Financial service providers



4. The Project of Full Automation of the Automobile System of Grain Crop Sampling

Seed Funding



Automobile Sampler DELTA INNOVINNPROM

We have produced and sold almost 50 grain sampling systems on the market of Ukraine. The main advantage of our robotic systems is that our systems are able to take samples of all crops, without excluding grain crops, from a depth of 3...3.5 m of the car body. This is ensured by the unique design of the movable probe drive and the rotation of the probe tip. No system of any manufacturer in the world can boast of such capacity and this is our main competitive advantage.

Radio Control System



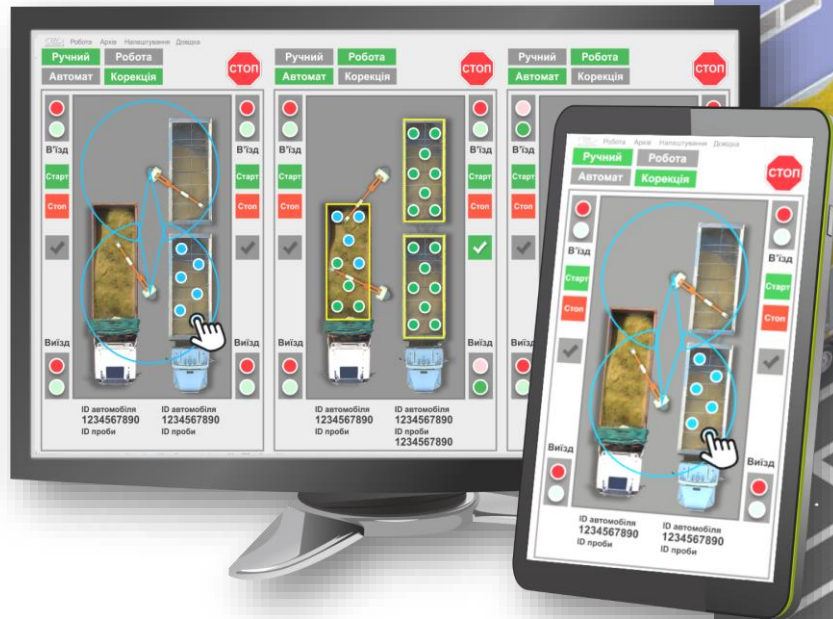
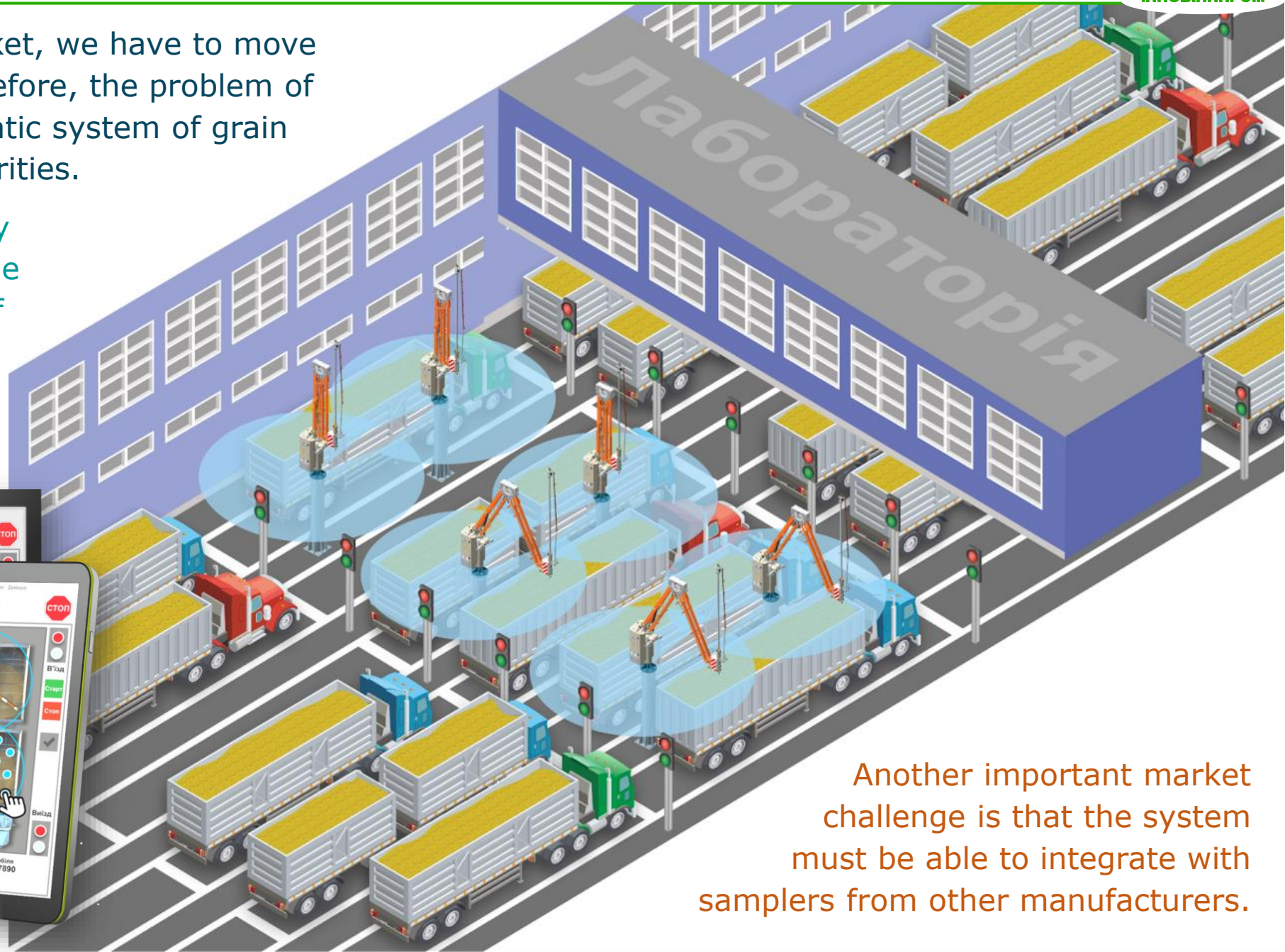
Video Control System



The Need for Automation

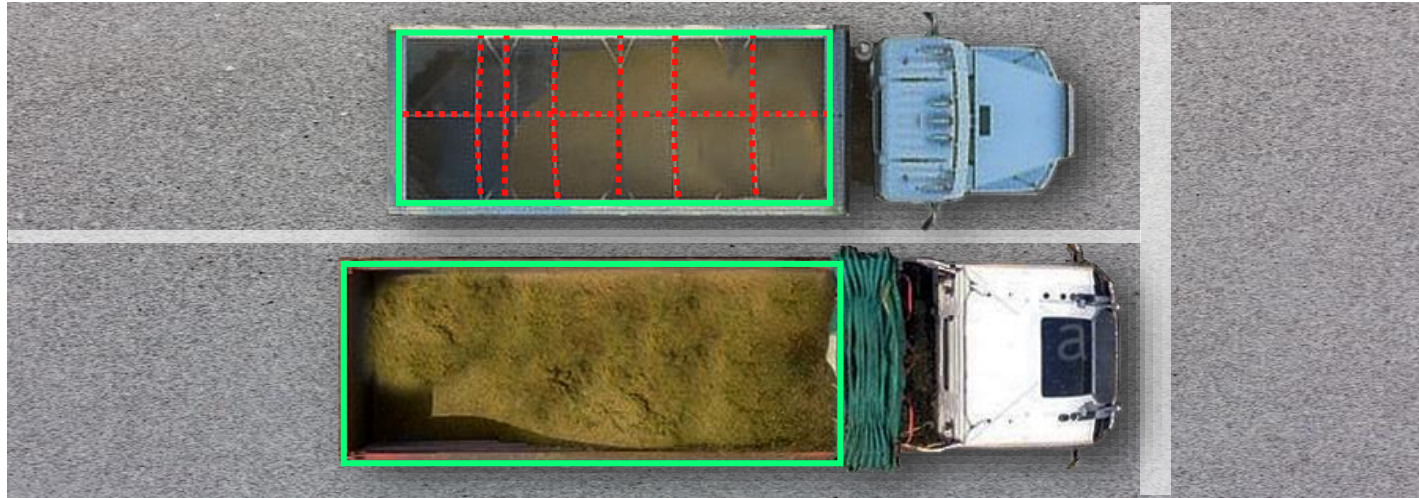
But in order to stay on the market, we have to move further in our innovations. Therefore, the problem of developing a completely automatic system of grain crop sampling is one of our priorities.

The system should automatically control traffic lights, use machine vision to recognize the bodies of cars and trailers, automatically take samples and send them to the laboratory

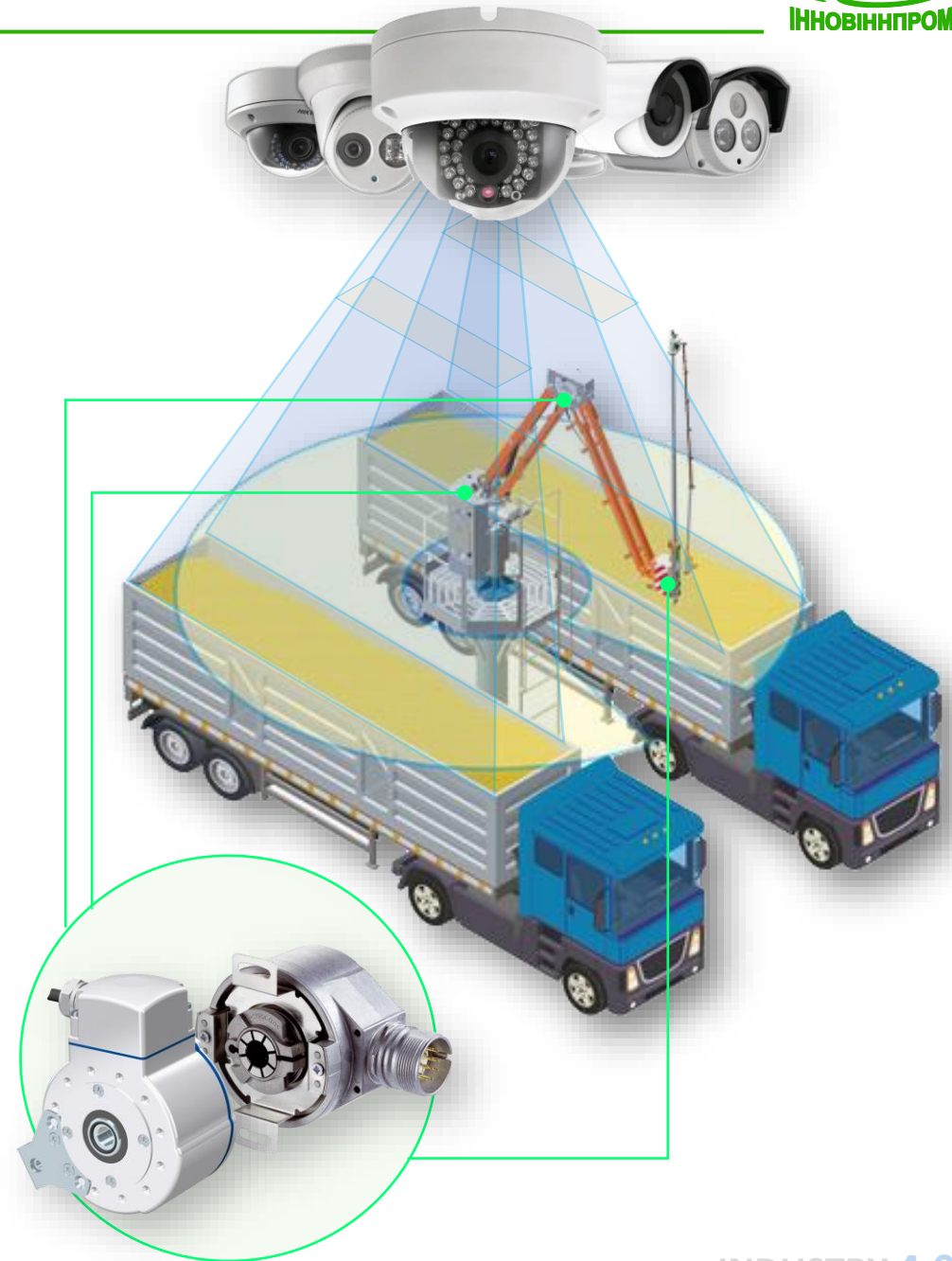


Another important market challenge is that the system must be able to integrate with samplers from other manufacturers.

1. Select a set of sensors and encoders for the position of the sampler probe in three coordinates, which can be easily integrated into existing systems.
2. Choose a smart machine vision camera that will recognize the geometric parameters of car bodies and trailers.
3. Write and test the software for controlling the sampler



The task of visual recognition of non-standard car bodies and trailers is quite difficult. All bodies differ in size, shape, color, the presence of an awning and its folding, non-standard metal or chain partitions. And we have to achieve almost 100% recognition in order to avoid equipment breakdown and ensure complete safety for personnel.



We are quite optimistic about the market:

Even if 50% of our customers agree to upgrade their existing systems. However, we hope to be able to offer automation of systems from other manufacturers, which is hundreds of potential customers. As a rule, such systems have exclusively manual control and do not contain a microcontroller and radio equipment.



Map of the introduction of DELTA samplers

5. SAKURA-APM Asset Performance Management System Seed Funding



This project received funding from the European Union's Research and Innovation Program Horizon 2020 within the framework of the BOWI project, financed under grant agreement No. 873155



Using 33 years of experience in the automation and digitization of agricultural enterprises, the INNOVINNPROM LLC company offers to make a qualitative leap in the field of information technologies of the agrarian sector of the economy.



The project is aimed at large grain elevators and agricultural holdings in general:

First of all, we plan to implement the project at enterprises where we have deployed INNOVINNPROM's production control systems. Among them are the two largest elevators of Ukraine in the Stepanivka and Zavodske of **UkrLandFarming** agricultural holding, 7 elevators of **ASTARTA** agricultural holding, a number of elevators and other agricultural enterprises of **NIBULON**, **AGROPROSPERIS**, **KERNEL**, **MHP**, **ZahidBug** agricultural holdings.

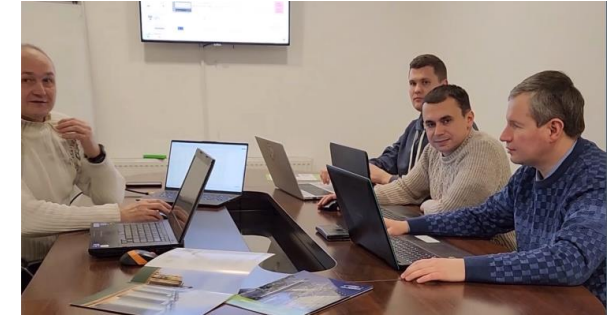
We made a presentation of the project and intentions for the head of the elevator sector of the majority of agricultural holdings and received high praise and interest.

The main goal of the project is:

- ✓ to reduce energy costs when receiving, storing, drying and shipping grain crops, to reduce the level of harmful emissions into the environment
- ✓ to increase the efficiency of production at grain elevators
- ✓ to provide owners and top management with a complete and integrated information picture about operational and technological processes at enterprises/holdings
- ✓ ensure full control over the quality and quantity of grain products
- ✓ to displace Russian software from the area of control of agricultural enterprises

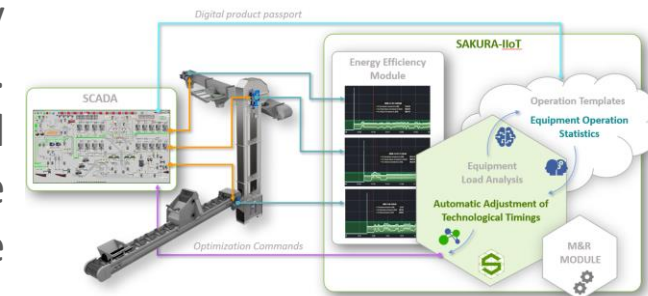


Our team, [together](#) with the scientific team of the Department of System Analysis and Information Technologies (SAIT) of the Faculty of Intelligent Information Technologies and Automation of the Vinnytsia National University, headed by [Vitaly Mokin](#) (Head of the Department of SAIT, Doctor of Science, Professor) within the framework of Horizon 2020 grant funding (grant agreement No. 873155), investigated the feasibility of using AI&ML to optimize the energy efficiency of grain elevators.



The essence of the project is to add to the existing SCADA production management inexpensive IIOT systems that will monitor the operation and energy consumption of each unit of grain elevator equipment. At the same time, this equipment is small-sized and is installed without reassembling the existing control cabinets.

In the project, we investigated the feasibility of using AI&ML for forecasting the energy efficiency of technological routes for moving grain and analyzing the operation of routes. We got results in the range of 3...5% savings. However, the general control of all technological processes due to the optimization of the SCADA operation and administrative measures results in savings of up to 15%. That's not all, with the organization of productive M&R, the overall energy efficiency of the enterprise can be increased up to 25%.



[We are looking for investments to continue our work in two directions:](#)

1. Deep analysis of the impact of AI&ML on all technological processes, taking into account weather conditions, time of day, personnel shifts, logistics chains.
2. Initial implementation of technologies at enterprises in Ukraine, Moldova and Romania with the aim of their further commercial support.

SAKURA-APM

Asset Performance Management is a system for managing the efficiency of production assets based on the technologies of the fourth industrial revolution (Industry 4.0).

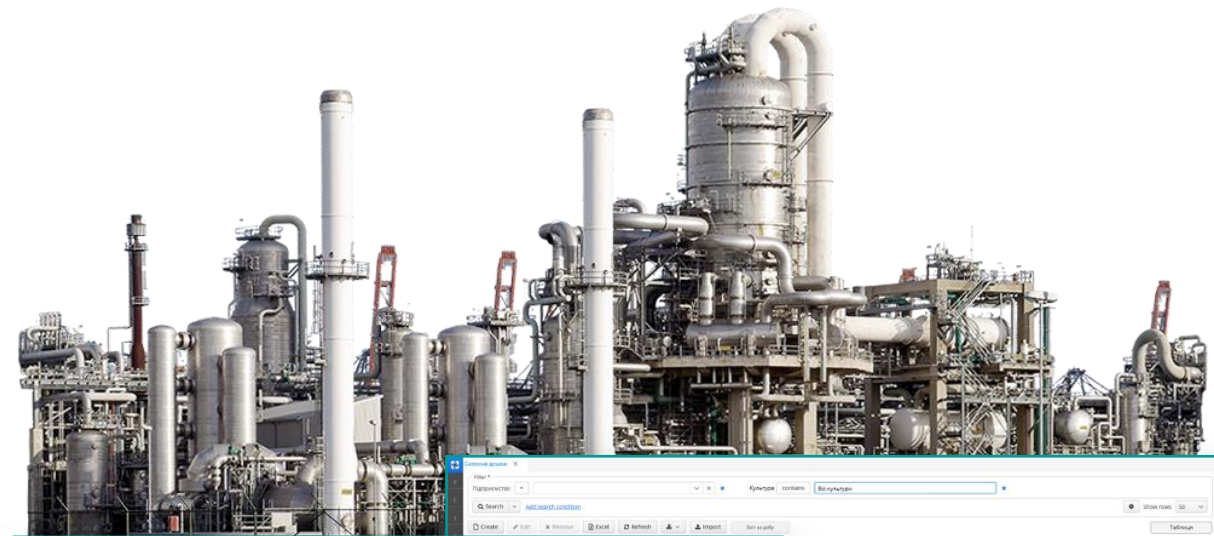


The term "assets" means any production equipment - both equipment that ensures the vital activity of enterprises (power grids, substations, boilers, compressors, ...) and that which carries out processing and production of products (furnaces, machines, dispensers, bottling or assembly lines, etc.).

SAKURA-APM contains two main components:

- ❖ Maintenance and Repair (M&R)
- ❖ Production management systems aimed at operational excellence (Operational Excellence).

Reduction of operating costs is achieved due to better reliability of assets, extension of their service life (life cycle), reduction of the cost of implementation and operation.



This project received funding from the European Union's Research and Innovation Program Horizon 2020 within the framework of the BOWI project, financed under grant agreement No. 873155



The General Concept of the SAKURA Project

The SAKURA project is large-scale and includes the following levels:



Intellectual level

Deployment and training of AI and ML neural networks

Engineering level (SaaS)

Deployment of control, analytics and visualization services

Cloud service level (PaaS)

Deployment of cloud services and shared databases



IoT level

Installation of IoT consumption meters and gateways

Field equipment level

Installation of modern energy-efficient electric motor controllers



SAKURA has a modular structure, each module of which is adapted to the needs of the customer.

Full Control and Analytics at All Levels - Holding / Enterprise / Production Line / Equipment

Control and Analysis of the Enterprise

Analysis of Productivity and Energy Efficiency

Analytics of Production and Business Processes

Control and Comparison of Holding Companies

Control and Analysis of Equipment Operation

Control and Planning of Maintenance & Repairs

INDUSTRY 4.0



Internet of Things



Artificial Intelligence



Machine Learning



Edge Computing



Big Data



Cyber Security



Digital Twin

Energy Efficiency of Production - SAKURA-Technology



- ✓ Total control of equipment operation
- ✓ Intelligent adjustment of technology
- ✓ A significant reduction of the human factor impact
- ✓ Increasing the efficiency of equipment use
- ✓ Increasing the energy efficiency of technology
- ✓ Significant increase in the efficiency of business processes

Internet of Things
Інтернет речей



Artificial Intelligence
Штучний інтелект



Machine Learning
Машинне навчання



Digital Twin
Цифровий двійник



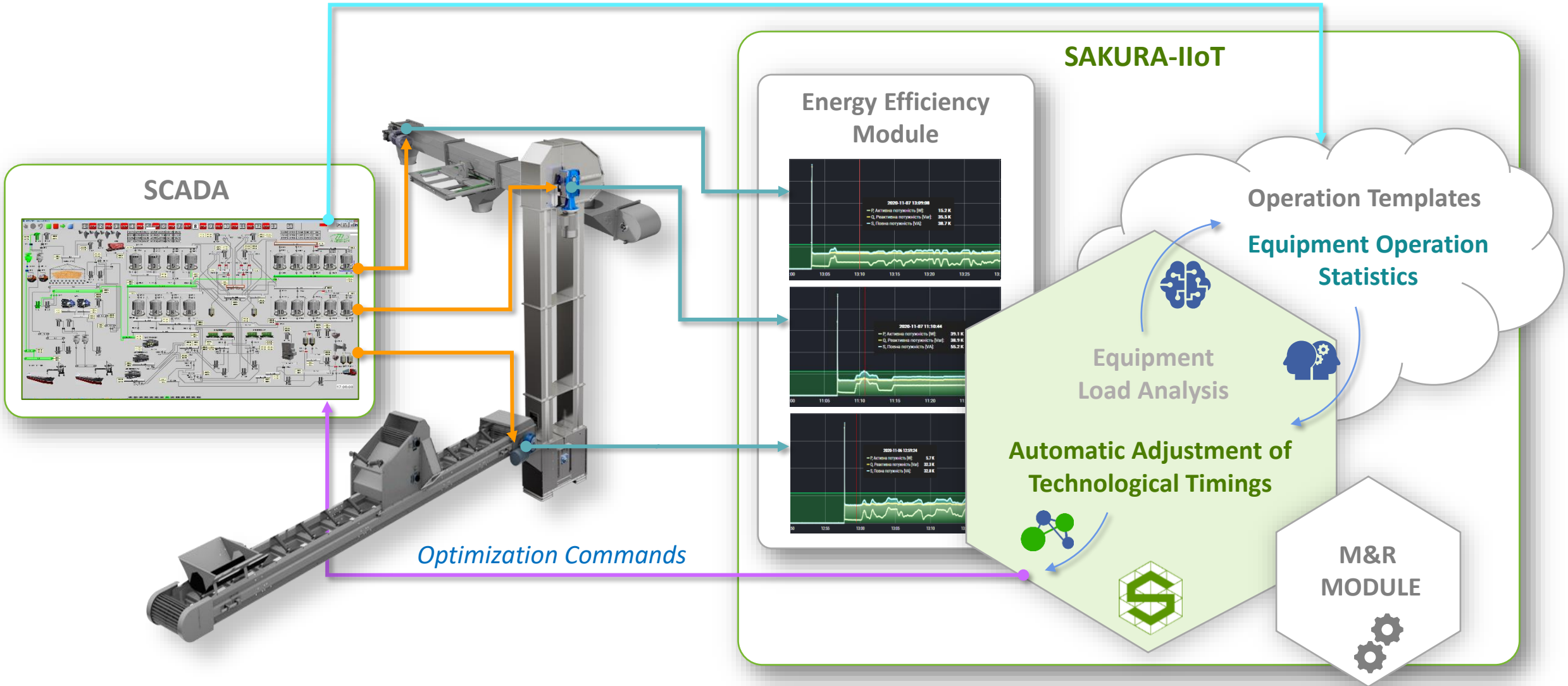
Big Data
Великі дані



Cyber Security
Кібербезпека



Digital product passport



Installation of IIoT Equipment Without Reassembly



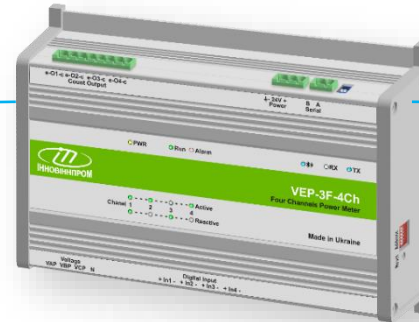
Installed:

Power Meters 17 units
Transformers 65 units
IoT Gateways 2 units

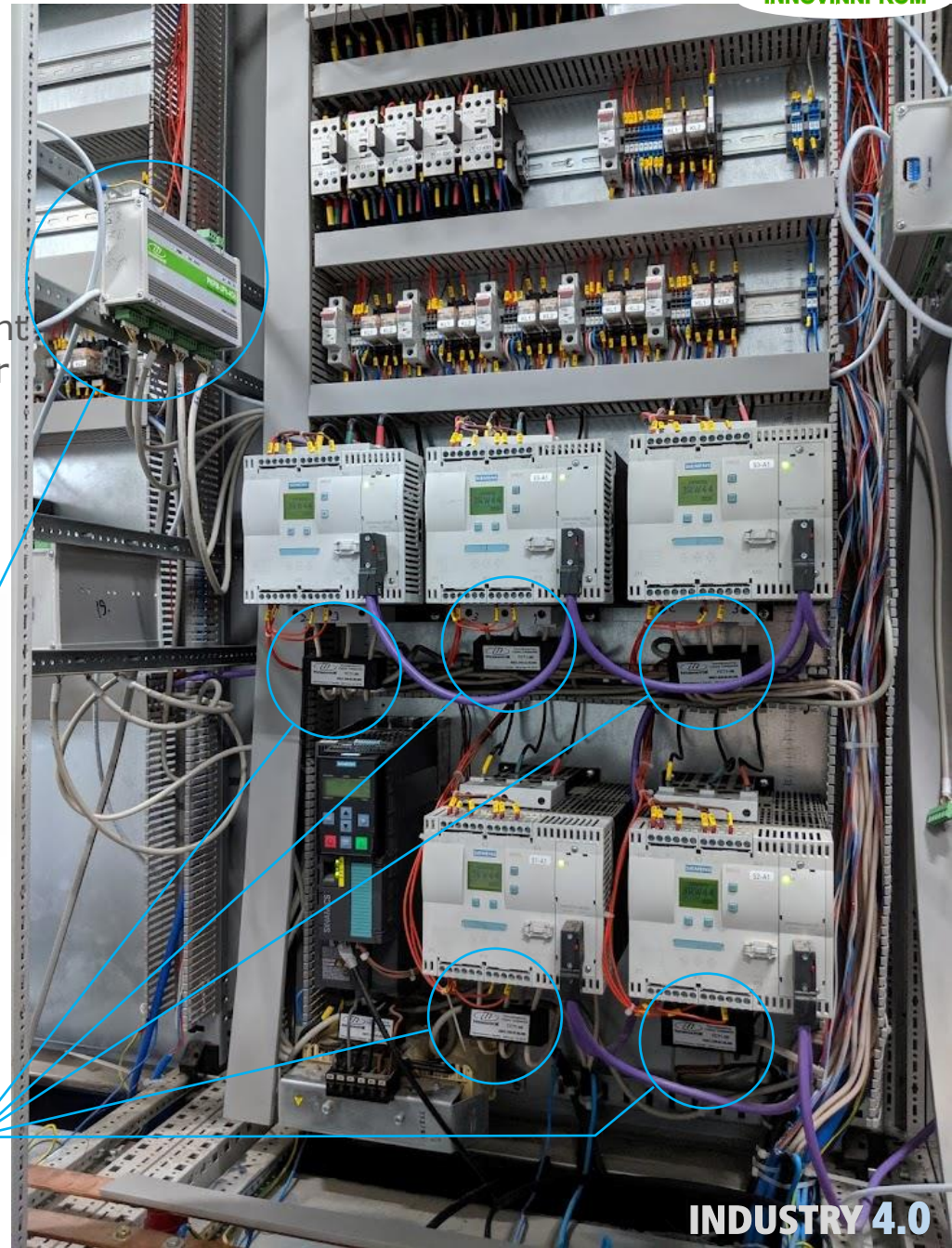
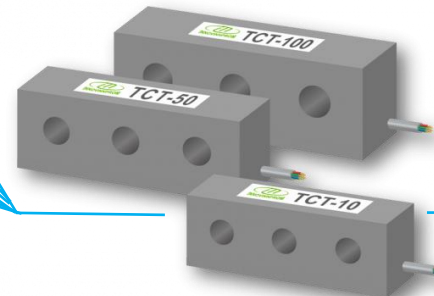
Total:

65 units controlled equipment
3,000 control channels per second

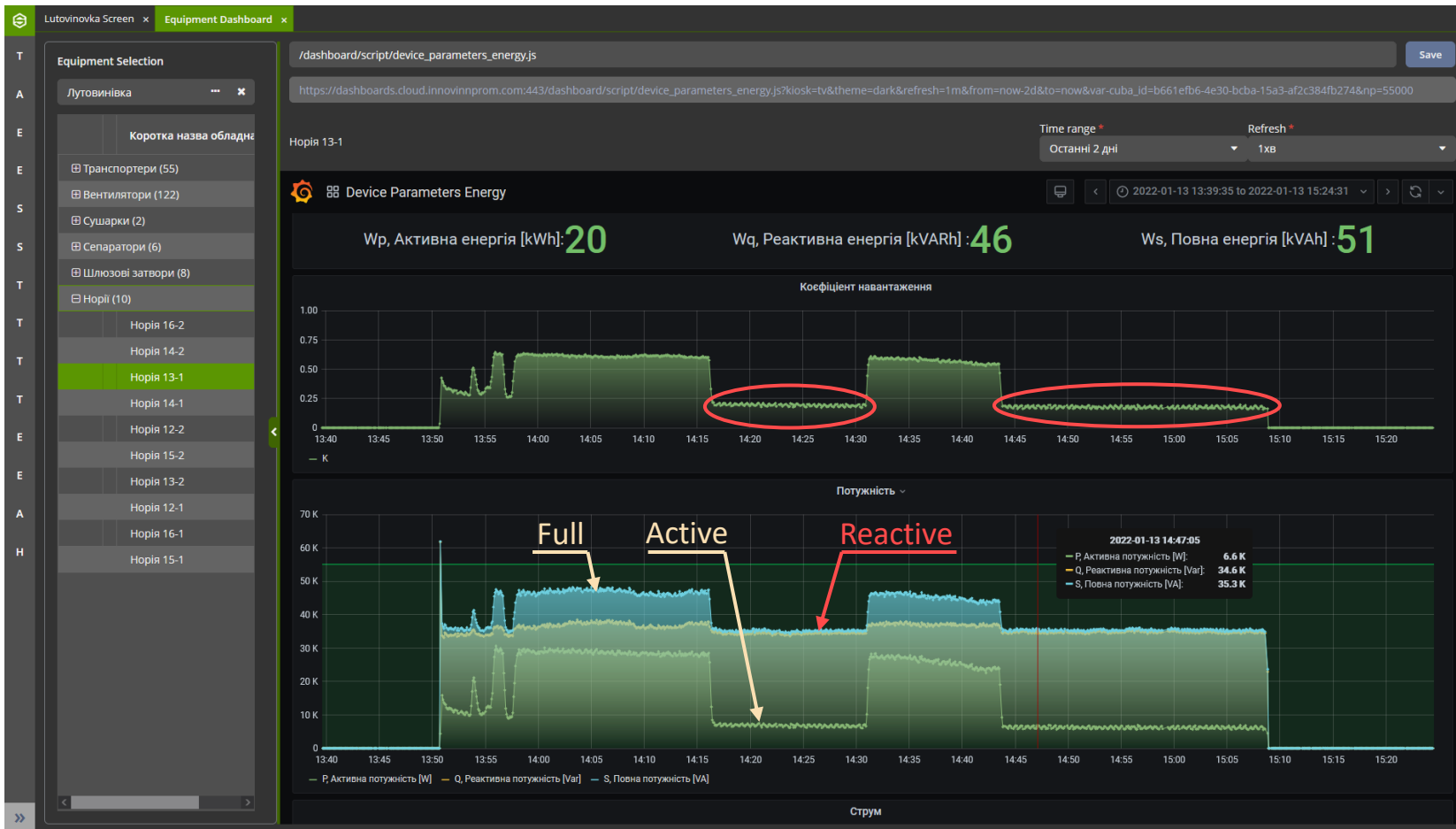
4 Channel Smart Power Meters INNOVINNPROM



Innovative 3 Phase Transformers INNOVINNPROM



Example of using one unit of equipment out of 65:



Test operation showed that more than 17% of the company's equipment was used inefficiently. Moreover, if electric motors were idling without load, the energy consumed by them dropped insignificantly. The reason is the high reactive component of energy consumption. As a result, energy is released into the air, contributing to cable lines over-heating. This is the main reason for excessive energy consumption by the company and excessive wear of equipment.

Equipment efficiency - 25%
during 50% of the
technological process

Electricity losses 37 kVA/h
prevalence of the reactive
component
direct electricity losses

Result:
More than 25 kVAh was lost during the technological process lasting 1 hour 20 minutes

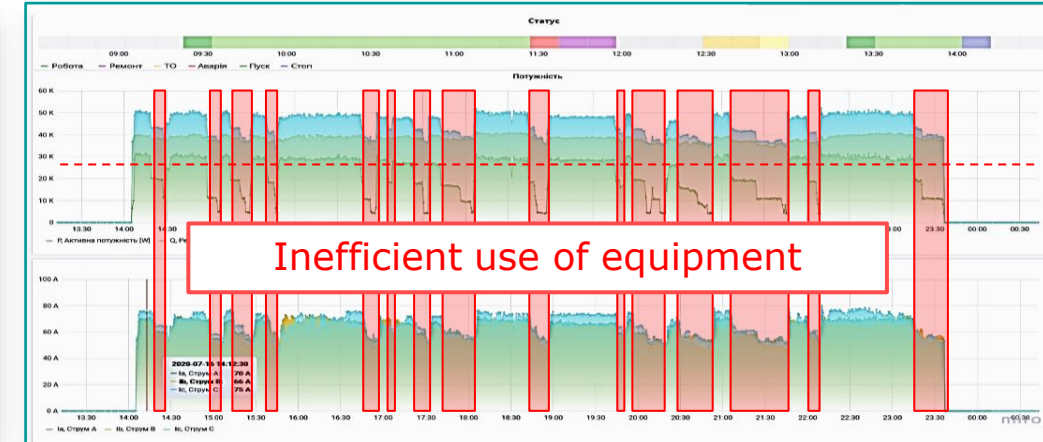
The task of the SaaS SAKURA-T:

Using AI & ML, automatically detect cases of suboptimal use of equipment and provide appropriate correction commands to SKADA

The Results of Proof of Concept

The period of test operation - from July 2020 to January 2022, only 16 months

	Wp, Active energy [kWh]	Wq, Reactive energy [kVARh]	Ws, Full energy [kVAh]
Consumed during the trial operation	388 238	772 376	934 885
On average, daily	808,83	1 609,17	1 947,68
Inefficient operation at load <40%	66 000,46	131 303,92	158 930,45
Losses, Euros			31 786,09



The table takes into account **only electricity losses**, excluding:

- ❖ operation of ventilation, aspiration and lighting systems;
- ❖ gas costs for drying products;
- ❖ related operating losses.

Altogether, total losses can be 3 ... 5 times higher.

The task of AI & ML:

- ❖ Optimization of technological delays
- ❖ Product life cycle control
- ❖ Adjustment of technological parameters depending on product quality
- ❖ Forecasting the cost of energy resources
- ❖ Recognition and correction of human errors

The result of the implementation of SAKURA-T in addition to financial costs will reduce emissions of pollutants.





Reduction of energy consumption of technological equipment - up to 10%

Achieved by selecting and exploiting the most energy-efficient modes of operation of the equipment and optimization of technological delays



Reduction of technological losses - up to 15%

Made possible by preventing violations of established algorithms and standards at all stages of production, continuous monitoring of technological operations and personnel actions



Improving energy efficiency of production - up to 20%

Attained through continuous monitoring and analysis of energy efficiency of production, control of accuracy and timeliness of completing technological tasks



Extend equipment service life - up to 25%

As a result of planning and monitoring the maintenance and repair of equipment, quality control of spare parts from different manufacturers



6. Introduction to the International Market of Robotic Systems

for Automatic Sampling of Grain Crops from Railway Hopper Wagons

Series A Funding



Engineering Achievement – Railway Sampler

The system received the distinction of Engineering Achievement 2017 from the National Maritime Rating of Ukraine



The systems are designed and manufactured specifically for the sea ports of Odesa, Mykolaiv and Chornomorsk. The systems provide automatic search for open hatches of wagons and sampling of grain crops and automatic delivery of samples to the laboratory, which significantly speeds up the unloading of railway trains in seaports of Ukraine.

In terms of the level of automation and innovativeness, the systems have no analogues in the world.



Hopper Railway Car Robotic Sampling Systems

- ✓ Unique own patented solutions
- ✓ A unique telescopic probe
- ✓ Automatic search for wagons and open hatches



Video Control System

Pneumatic Transport System

Mobile Unit

Mobile Units Movement System

Grain Return System

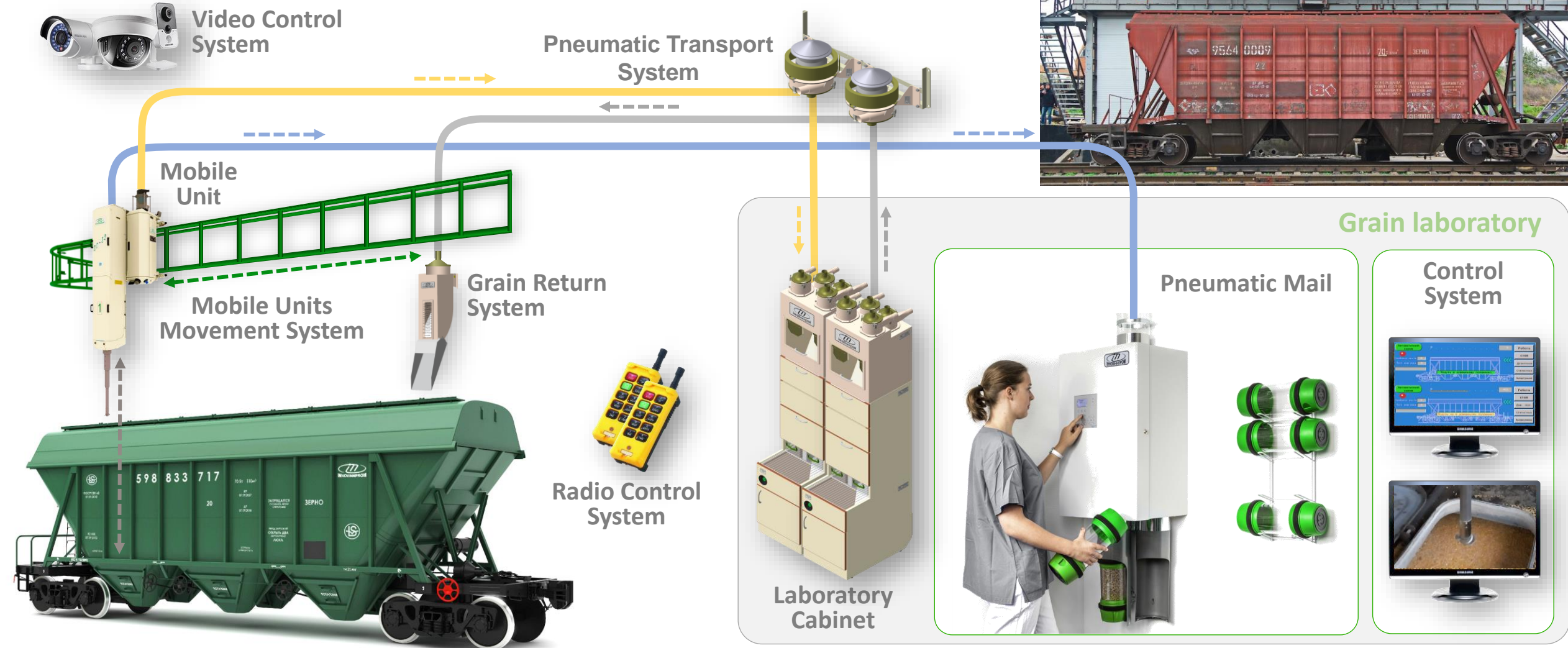
Radio Control System

Laboratory Cabinet

Pneumatic Mail

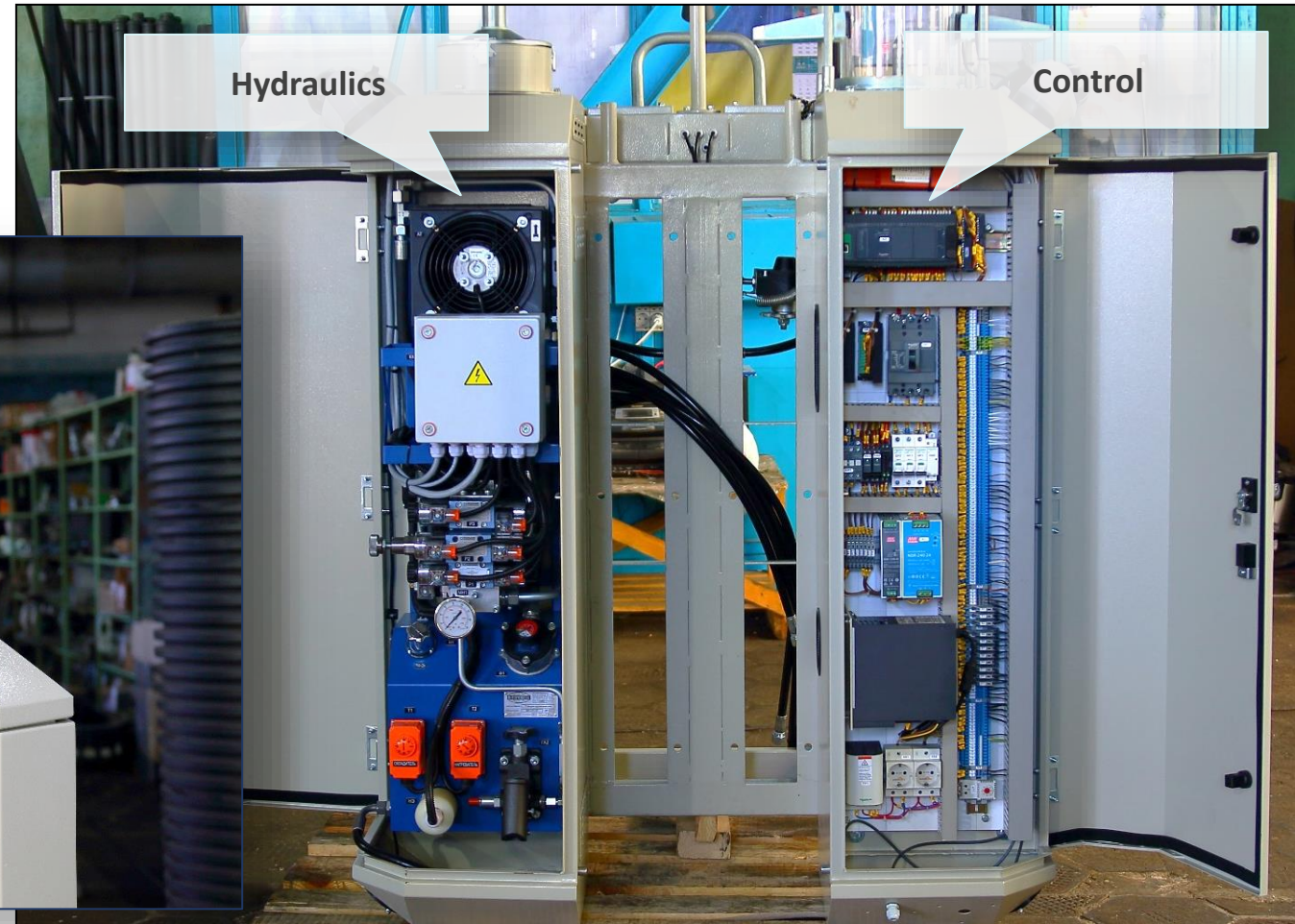
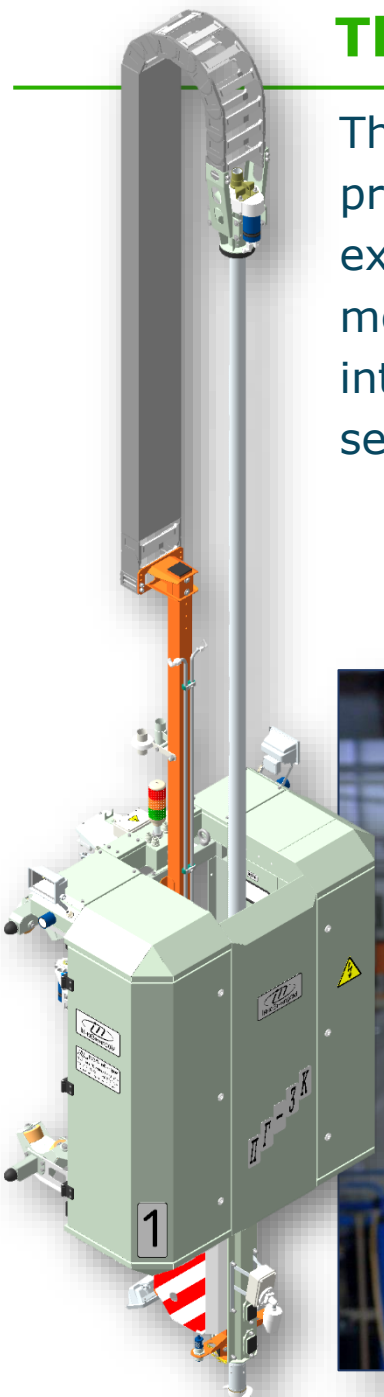
Grain laboratory

Control System



The Most Modern Solutions of Robotics

The mobile unit of the sampler is a complete self-contained electro-hydraulic unit equipped with a programmable logic controller. The composition of the mobile unit includes a hydraulic station, executive hydraulic cylinders, a grain probe and its movement mechanism, a hydraulic movement motor, blowers, a cyclone, a hopper with a mixing system, selection and dumping of a grain sample into the gravity flow. The mobile unit is equipped with position, movement, pressure and other sensors, light and sound indicators.



7. Organization of Sapphire Manufacturing

Series B Funding





According to the research data of the global market intelligence and consulting organization, further significant growth of the artificial sapphire market is predicted. At the same time, the withdrawal from the global market of Russian manufacturers of artificial crystals and, probably, Chinese ones is predicted.

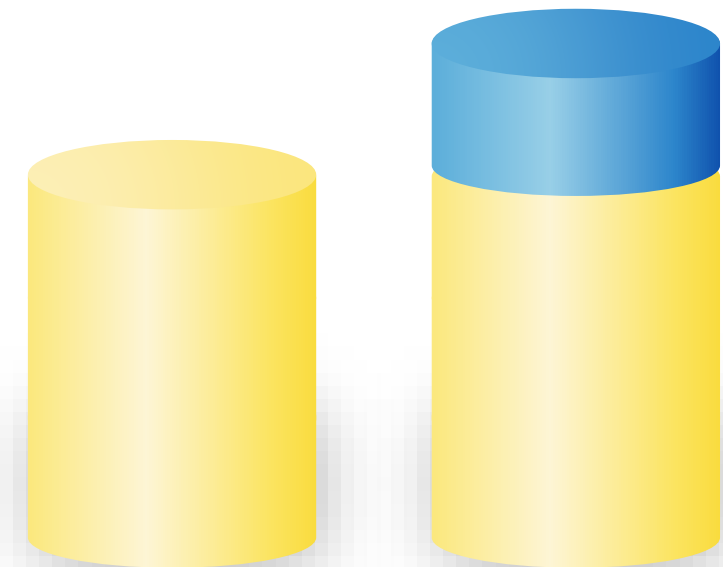
Main global players in this field are:

- Rubicon Technology (US)
- Sapphire Technology Company (China)
- Monocrystal (Taiwan, **in fact russian company**)
- Thermal Technology (US)
- CrystalTech HK (China)
- Namiki Precision Jewel (Japan)
- IntElorg Pte (Singapore)
- Shanghai Daheng Optics & Fine Mechanics (China)
- SF Tech (US)
- Omega-crystals (US)
- GT Advanced Technologies (US)
- Kyocera (Japan)
- Advanced Renewable Energy Company (US)

Market forecast to grow at a GAGR of 6.6%

USD 5.9 Billion

USD 8.2 Billion



2022

2027

Public data of SkyQuest Technology Group

This opens up great opportunities for Ukraine to restore the field of artificial crystal production, as Ukraine owns and develops technologies for growing artificial crystals, has the appropriate scientific and technical personnel, and manufactures equipment for growing artificial crystals.

Application of Sapphire Crystals



Security



Protection



Physics



Exploration



Aerospace



Safety



Gauging



Analysis



Environment



Industrial



Research



Medical

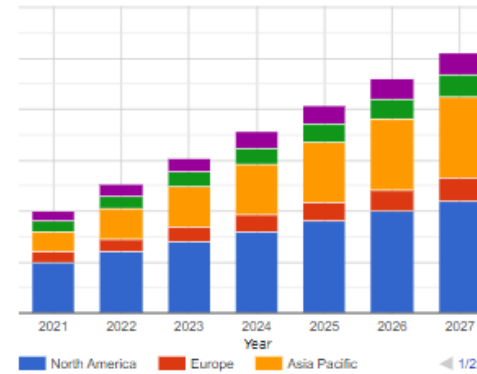
The sapphire market growth is primarily being driven by the rise in utilization in sectors including IT and communications, power, aerospace, and defense. Due to its excellent qualities, it is about to become a successful substance in semiconductors. The rising use of sapphire in RF applications and power electronics is also estimated to spur additional growth in the sapphire industry.

Numerous optical applications in the healthcare sector utilize sapphire. It is used for its robustness and optically clean hermetic characteristics. Applications for sapphire include tomography and co2 laser surgery equipment. Other uses include aiding in the production of orthopedic implants, scalpels, and optical probes. Because of its mechanical toughness, sapphire can tolerate blood as well as substances like chlorine and fluorine. Thus, the market expanded as a result of its many benefits, including hardness, optical transparency, strength, and chemical inertness.

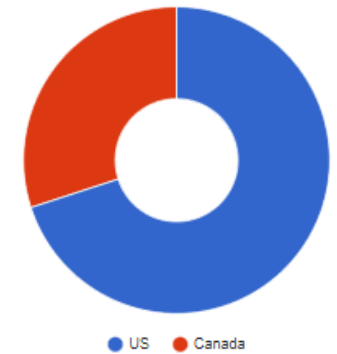
Market snapshot



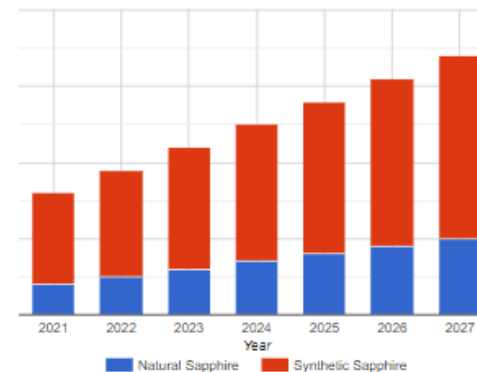
Global Sapphire Market 2021-2028 (\$ Mn)



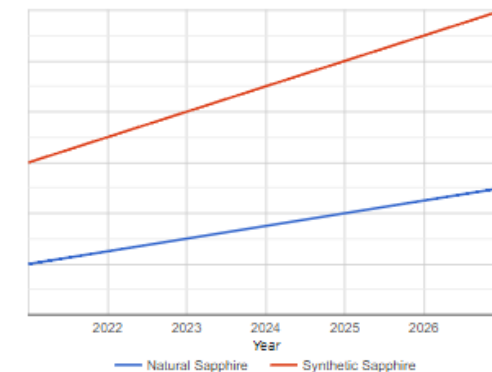
Country Share For North America Region- 2021 (%)



Global Sapphire Market Size By Type 2021-2028 (\$ Mn)



Global Sapphire Market Size By Type 2021-2028 (%)



The Essence and Purpose of the Project

Goals and Objectives:

The main objective is to establish the manufacturing and production of sapphire products in Ukraine, to enter the world market and gain 10 % niche of world sapphire production.

The main activities.

- Production and distribution of synthetic sapphire for high-tech industries
- Production and sale of various sapphire elements

It is proposed to grow sapphire crystals and to cut plates from them for wide range of possible usage. It is planned to manufacture boules, cores sapphire and sapphire plates. Manufacturing focus will depend on the market conjuncture.

The overall cost of the project amounts to \$44 millions for 5 years. Necessary investments about \$20 millions depending on global market pricing. Investments will be returned in the beginning of 5-6 years.

Profits generated in the initial stage will be poured to pay the investments with interests and then on the expansion and development of the manufacturing.



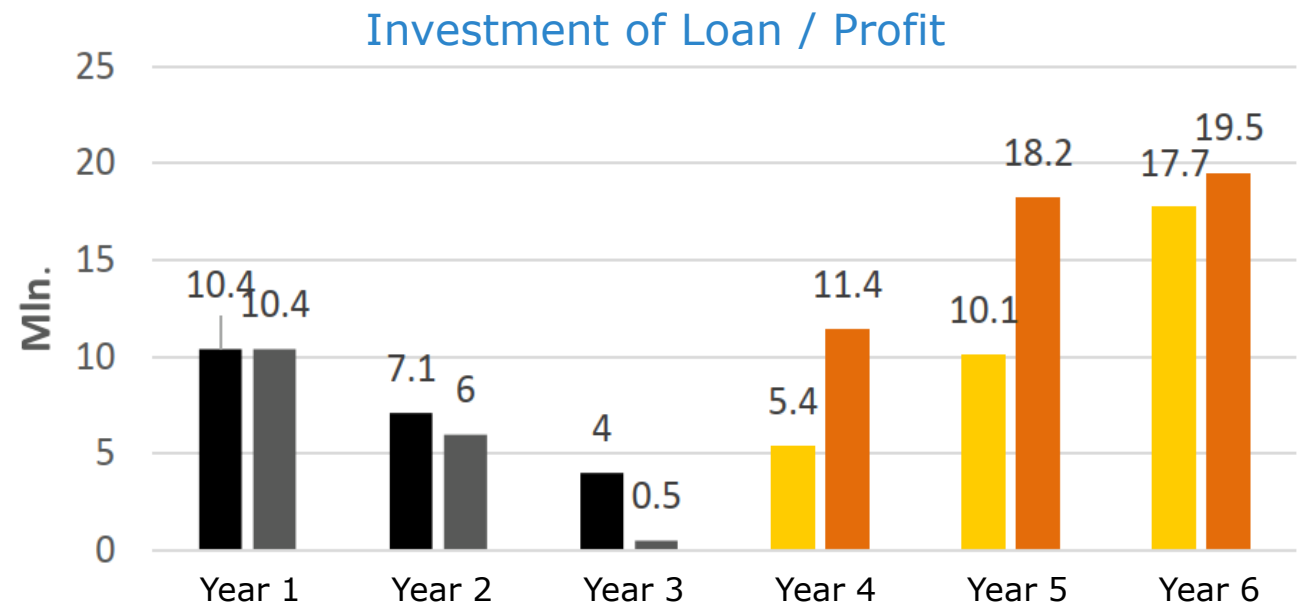
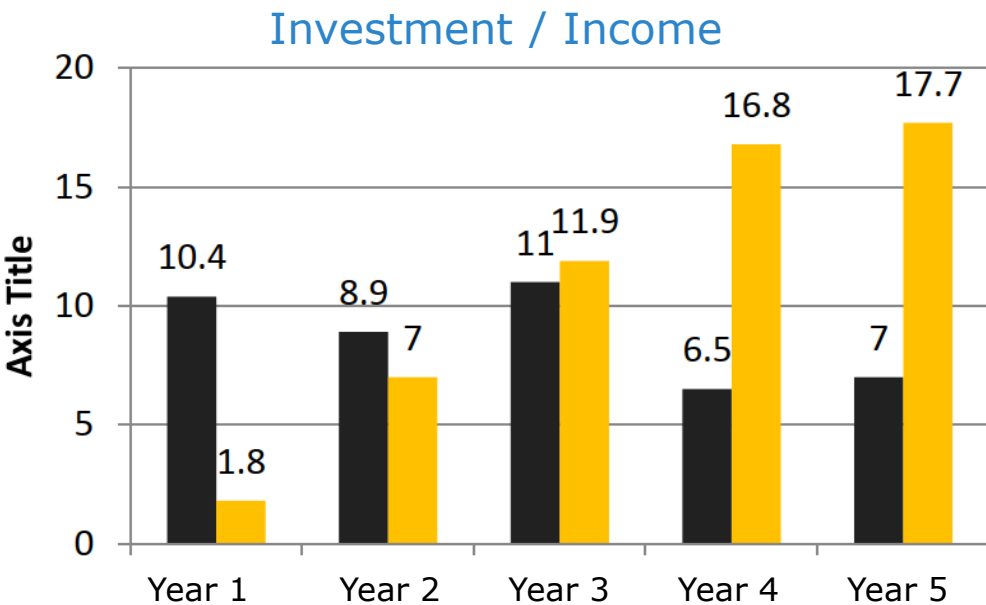
The chart below shows the investments in relation to incomes by years. It is obvious from the chart that starting from the year 4 the income will exceed investments more than twice, in the meantime investments will be fully returned.

The increase of income over the investments is significant and this is made for the worst case scenario when the set product prices are way below the market price in the worst consumption environment. With the market situation improving the given numbers will be outrun too.

If the income is reinvested in the manufacturing process then investment return can start from 4th year and be finished at the beginning of 6th year after the product sales are accomplished. In case of the considered selling price of \$400/kg the investments amount to \$21,5 millions. In case if the selling price is \$600/kg the investments accordingly amount to 16,9mln and can be returned at the end of the 5th year.

I.e. the project price is \$44 millions and the necessary investments are \$21,5 millions or approximately \$7 millions in case of \$600/kg sales. The chart below shows the investment/loan return dynamics. The left side columns show the sales prices of the sapphire \$400/kg and \$600/kg.

I.e. \$600/kg will require \$16,9 millions investments and they will be returned at the end of the fifth year. In any case the investment will be directed only for the purchase of the equipment.



Within the framework of cooperation between Ukrainian companies and scientific organizations (State Scientific Institution "Institute for Single Crystals" of the National Academy of Sciences of Ukraine), equipment for growing crystals using the following methods is developed and mass-produced:

- ❖ Equipment for growing crystals of synthetic corundum by the method of solidification in the horizontal direction (The photo below shows the equipment that was exported to China)
- ❖ Equipment for growing crystals of synthetic corundum by the Kyropoulos method.

In Ukraine, there are still highly qualified specialists - scientists and technologists who are capable of restoring lost production and scaling up the production of their own growing plants





Omega DM300
Omega PG350

Delta-K



PromCrystal-S2



Lost Production in Drohobych, Ukraine





INNOVINNPROM

Industry 4.0

