STATE COMMITTEE ON SCIENCE AND TECHNOLOGIES
OF THE REPUBLIC OF BELARUS

CATALOGUE

Issue 2

OF INNOVATION PROJECTS AND PRODUCTS

MINSK

2012

STATE COMMITTEE ON SCIENCE AND TECHNOLOGIES
OF THE REPUBLIC OF BELARUS

CATALOGUE

of innovation projects and products

Issue 2

Minsk
2012

UDC 001.895(476)
LBC 72
C 29

Edit group:
I. Voitau, D. E.
A. Silchenko, Candidate of Technical Sciences
S. Savitskiy
A. Sahaschik
M. Berzhanina
A. Obukhov
L. Efremenkova

Edited by I. Voitau, D. E.

C 29 **Catalogue** of innovation projects and products. Issue 2. — Minsk: SO "BELISA", 2012. — 180 p.

ISBN 978-985-6874-45-4

The Catalogue based on materials presented by organizations that have taken part in State scientific technical programs and innovations projects, realized in 2011.

UDC 001.895(476)
LBC 72

ISBN 978-985-6874-45-4

Dear friends!

State Committee on Science and Technologies of the Republic of Belarus represents the issue of innovation projects and products catalogue has made within the frames of state scientific and technical programs of the Republic of Belarus for 2007–2010.

The Catalogue to a greater degree reflects scientific, scientific and technical, innovation activity in the branches of industry favoring to modernization of the economy. This is primarily nanomaterials and nanotechnologies, information technologies, radio-engineering and microelectronics, laser technologies, new materials and protective coating.

Adequate consideration is also given to innovation projects in conventional for the republic branches such as: automobile manufacturing, tractor industry, agriculture machinery and others.

The presented projects make a good showing of technical and technological novelty, competitive ability on domestic and foreign markets, have a considerable export-and import substitution potential.

The experts are ready to render assistance in implementation of proposed projects.

Welcome to mutually advantageous cooperation!

Chairman of the State Committee on Science and Technologies of the Republic of Belarus ***Ihar V. Voitau***

Novelty: the products having no analogues or rank over foreign and domestic analogues

Project having patent protection

Export-oriented products, technologies

Import-substituting products, technologies

Resource-saving, energy-saving technologies

Secondary resources use and wastes utilization

Ecological safety

I-1. Nanograined composition for spintronic devices production

Application field	The development relates to electronics technology area, in particular to the materials the resistance of which is controlled by a magnetic field and can be used in the production of spintronic devices (sensors magnetic field).
Description of products	In nanocomposite films FeCoZr-Al_2O_3, synthesized in an oxygen atmosphere, there is set the structure of the magnetic particles "metal core — oxide shell" so that the material has a tunneling magnetoresistance in a wide range of compositions (31–64 atm. % FeCoZr). There has been revealed the composition of the oxidized film, which has an optimum combination of values of magnetoresistance (2–6 %),saturation magnetization (up to 1.300 kA/m), electrical resistivity (3.2–10 μΩ· m) and the coercivity (~ 10 A/m) for the use in the development of film sensors of magnetic fields.
Competitiveness	The optimum combination of practical importance properties; it's a cheaper way of producion if compared to the similar materials used in the development of spintronic devices.
Expected outcome	Spintronic sensor of the magnetic field wide temperature intertissue (2–400 K).
Offers on sale	Transfer of engineering specifications and specialist advice on development; introduction of technology.
Level of readiness	Experimental (model) sample.
The transfer of rights object	Invention.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

new P import

I-2. The automated complex for the study of friction, wear, and physical and mechanical properties of modified surfaces and thin coatings (AKIPT)

Автоматизированный комплекс для исследования процессов трения

Application field	The complex is used in the following spheres — tribology, physics of thin films, material science. There is the possibility to investigate patterns of small linear dimensions; investigate the tribological properties of the layers in the thickness range from tens of nanometers to microns, and the modified surfaces, changing the track length of wear from 5 up to 20 mm.
Description of products	Features: identification of friction in the load range from 0.01 up to 0.5 h, the adhesion strength of thin coatings with a maximum load of up to 2 h, the depth of wear track with a resolution of 0.2 microns, the penetration depth of the indenter in the measurement of microhardness of 200 nm, the indenter load of up to 2 h, the range of variation of wear track length — 5–20 mm, an automated control of the instrument with the output of measured data to a computer, a convenient variation of the load on the indenter without the use of precision loading mechanism, causing the high cost of such equipment.
Competitiveness	The complex by the study of friction, wear and physical-mechanical characteristics of the modified layers and coatings is up to the highest world standards. In Belarus and the CIS countries, instruments of this class are not made, there are only laboratory experimental plants.
Expected outcome	The developed system is intended for studies of micro-mechanical properties of thin coatings and modified layers used in various fields of mechanical engineering.
Offers on sale	Agreement on cooperation.
Level of readiness	Experimental model.
The transfer of rights object	Effective model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Welding and Protective Coatings Institute***

II-1. Information analysis system on development of strategic partnership of Belarus with the European states in social and cultural, research and technology spheres

Application field
Foreign economic activitiy, activities in the field of international scientific, educational and cultural cooperation; analytical support Belarus participation in the introduction of European and Eurasian programs in socio-cultural and scientific spheres.

Description of products	Database text and multimedia materials with a web portal access. It reveals the power of the intellectual heritage of Belarus, advanced research and development to improve the country's image and increase exports of high technology products and services. Here is given the estimation of the state and prospects of cooperation between Belarus and EU research and innovation, and cultural opportunities. Mechanism of overcoming organizational, informational, and cultural barriers and stereotypes are proposed.
Competitiveness	Information analysis system has a low maintenance cost with high information richness, easy to roll out in the Internet or private networks, edited and expanded. There is a possibilty to control the data with the help of specially designed software shell.
Expected outcome	Contribution to ensuring the full participation of Belarus in the cross-border and pan-European programs in scientific, technical and socio-cultural spheres. Development of theoretical and methodological tools to improve the country's image of Belarus as a significant intellectual and cultural center of Europe.
Offers on sale	Transfer of engineering specifications and specialist advice on development; partnerships or other arrangements; license agreement, contract.
Level of readiness	Idea, concept; experimental model.
The transfer of rights object	Software; database; others.
The transfer of rights form	License agreement.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Institute of Philosophy of the NAS of Belarus***

II-2. Software for drilling fire fighting activity in industrial sector

Application field	Software is worked out for improving of specialists training on fire fighting on industrial enterprises and senior officers training on management of fire fighting resque units by applying information technologies.
Description of products	Software comples allows to model: the occuring and development of fire on an industrial plant; firefighting actions on an industrial plant (the actions of personnel working with fire rescue equipment and tooling for fire fighting, the conditions of application of fire fighting means, interaction and decision-making management by senior officers and divisions for emergency management forces and means to extinguish fires on the modeled objects).
Expected outcome	Increase of level of expertise employees dealing with fire fighting activity, fire damage reduction in industrial sector by fire fighting activity improvement.
Offers on sale	Delivery by individual orders.
Level of readiness	Others.
The transfer of rights object	Software.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Institute for Command Engineers of the Ministry of Emergencies of the Republic of Belarus***

II-3. Technology and automated system of thematic identification of damaged forest area by space survey materials

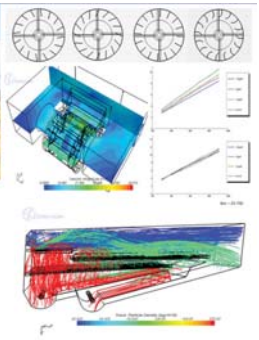
Application field	Forestry and forest management.
Description of products	Automated system of thematic identification of damaged forests based on space survey material is a program that allows to discover damaged forest area based on space materials survey based on program analysis functions of spectral brightness performance, identify their area, as well as using forest inventory data base to analyze the cost of damage forestry.
Competitiveness	Automatic system swiftly allows to discover damaged forest range and perform stumpage appraisal. There is no information about full-function analogs.
Expected outcome	Introduction of the designed technology and automatic system allows to discover damaged forest range, form subject maps of the damaged forest range and perform the resourse appraisal.
Offers on sale	Sale of products on a contractual basis; transfer of engineering specifications and specialist advice on development.
Level of readiness	Experimental model.
The transfer of rights object	Software.
The transfer of rights form	License agreement.
Organization-developer	***Belarusian State Technological University***

II-4. Computer system "EXTRA" for task solution support in the sphere of diagnosis with attachment in sporting traumatology and recreation therapy

Application field	The computer system is used for diagnosis and treatment of diseases in the spheres of sporting traumatology and recreation therapy, as well as in educational process while teaching developers of computer systems, doctors, and students of medical higher educational establishments.
Description of products	Technology and formal mathematic models have been developed for task solution of image recognition with insufficient information, as well as computer system "EXTRA" for task solution in the sphere of diagnosis with attachment in sporting traumatology and recreation therapy.
Competitiveness	There are no direct analogues. Computer system "EXTRA" is in compliance with the best models of software products of the CIS countries.
Expected outcome	Increase of effectiveness and treatment-diagnosis process. Economic, social and other effects after implementation of developed technologies conditioned by enhancement of engineering and operation of the systems for task solution of image recognition and artificial intellect while training developers of computer systems in higher educational establishments.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; delivery of the finished product; agreement on cooperation.
Level of readiness	Experimental model.
The transfer of rights object	Software; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

II-5. Electronic models and technique of computer modeling and analyzing the continuum streams for perfection of grain clearing processes in a combine harvester

Основные компоненты: двухроторный одноосный вентилятор и рабочий объем с решетным станом



Компьютерная модель системы очистки зерноуборочного комбайна

Application field
Agricultural mechanical engineering.

Description of products
Electronic models of basic elements (the fan and the working chamber of the clearing system) of a combine harvester in the form of volume final-element computational grids, and also a technique of computer modeling and analyzing the continuum streams in the clearing system of a combine harvester on the basis of the finite volume method and the equations of mathematical physics.

Competitiveness	Scientific and technical level of the project "Electronic models of clearing system elements of combine harvester KZS-1218 and a technique of computer modeling and analyzing the continuum streams inside the clearing system" corresponds to the best CIS samples.
Expected outcome	The use of agricultural machines in the course of development (first of all machines for harvesting and grain clearing) and research of their operating modes, a choice of an optimum operating mode; designing and research of the operation of designs having rotor parts (fans, turbines, turbo compressors, etc.).
Offers on sale	Transfer of engineering specifications and specialist advice on development; introduction of technology; agreement on cooperation.
Level of readiness	Idea, concept; design and budget documentation.
The transfer of rights object	Effective model; software; others.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***United Institute of Informatics Problems of the National Academy of Sciences of Belarus***

II-6. Image analysis program of computed tomography of retroperitoneal organs "RAMONAK"

Application field	Program "RAMONAK" can be used for complex processing of digital images in computed tomography. Program "RAMONAK" can be incorporated as an element in any software and hardware complex that works with 3D medical images.
Description of products	"RAMONAK" is meant for analyzing and monitoring of set of images obtained through medical research methods. The program is designed to automate the monitoring of diseases with ray-path testing methods. The program has an open architecture for data processing and analysis of ray-path methods of medical images. The program includes functions for image processing, interactive features of highlighting and calculating of the bulk characteristics of selected objects.
Competitiveness	Program "RAMONAK" does not have any domestic counterparts, but the scientific and technical level of basic technical and operational characteristics is not inferior to foreign analogues. The market value of program "RAMONAK" is significantly below their foreign counterparts in the global market.
Expected outcome	Implementation of image analysis program of computed tomography of retroperitoneal "RAMONAK" will significantly improve the monitoring of the disease; reduce the cost of medicines and the number of days of hospitalization.
Offers on sale	Delivery by individual orders; manufacturing and supply; delivery of the finished product.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***United Institute of Informatics Problems of the National Academy of Sciences of Belarus***

II-7. Program complex "Estimation and visualization of forest fire dynamics"

Application field	The program complex allows to estimate forest fire characteristics on the basis of the developed technique, the created databases of initial parameters and the prepared typical scenarios of the development of forest fires, to model dynamics of fire development, to visualize the results of estimation on an electronic card and export the results to geoinformation systems (GIS).
Description of products	The program complex allows to estimate the dynamics of forest fire spread, and also carry out the construction of burnt zone borders and a burning area of wood combustible materials, to put contours of these zones on digital cards with possibility of transmitting graphic pictures to operating GIS. The program complex of modeling and a computer model of forest fire spread allow to register the properties of wood combustible materials in concrete territory, physical and chemical characteristics of burning processes, a direction and speed of wind in a large forest. The carried calculation by the computer model yields the results including spatial distributions of mathematical solutions of fire spread for the successive occasions. The program complex provides: – input, updating of databases for the mathematical model; – estimation of fire characteristics and dynamics of its development (speed and direction of front spread, fire area, front perimeter, etc.); – formation and correction of the knowledge base of a computer model; – information search in databases and the knowledge base; – visualization of the estimation results on an electronic card; – export/import of cartographical layers into GIS.
Expected outcome	The program complex allows to carry out forecasting of forest fires development and their consequences.
Offers on sale	Delivery by individual orders.
The transfer of rights object	Software.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Organization-developer	***Belarusian State University***

II-8. Software of computer-aided design system of cross-wedge rolling instrument

Application field
The system is meant for engineering process automation of the instrument that should be used in to the hot flat cross-wedge rolling of divergent wedge of solid ferrous and nonferrous metals.

Description of products	The method of designing an instrument for cross-wedge rolling was developed and based on the allocation of individual elements (groups of elements) included in a roll part, the design of wedges for selected items with the subsequent solution of the synthesis (assembly) of the wedge-type instrument. The developed method, formal models and algorithms are implemented in the software-aided design tool for cross-wedge rolling.
Competitiveness	For the first time there was developed a method of a tool designing based on formal models of the elements of the instrument. The models allow a unified library of parameterized 3D models of wedge-type tools and formalized procedures of the synthesis of assembly modeling tool.
Expected outcome	Tests of the method in the test sample showed a significant reduction (by at least 50 %) in labor costs compared to traditional methods of design, and as a consequence, a significant reduction in terms of design. Promising market are the companies from Russia, Ukraine and Korea, which operate flat cross-wedge rolling mills.
Offers on sale	Sale of a license.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***United Institute of Informatics Problems of the National Academy of Sciences of Belarus***

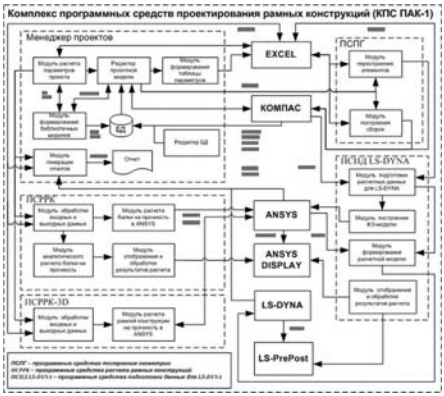
II-9. Program Informative Complex (PIC) "Cadastre-ERS" of integrated tools for co-processing of earth remote sensing data and updated or created digital maps

Application field	PIC "Cadastre-ERS" may be used for complex processing of digital aerospace pictures (DAP) of both domestic and foreign earth remote sensing aircraft (ERS) for being used in technologies of renovation/creation of digital terrain maps (CCM), modeling, and operational space analysis of the area conditions for the multiple tasks of decision making in operational and emergency situations on the basis of remote sensing data and digital maps, etc.
Description of products	PIC "Cadastre-ERS" is based on the use of GIS techniques, digital image processing, collaborative processing raster and vector models DN and DCW. PIC "Cadastre-ERS" has an ergonomically convenient user interface and includes a full-function complete set of integrated into a package of tools for co-processing of remote sensing data of ERS with DCW and implements various methods of improving the quality of the DN, the binding and orthotransformation of DN to DCW, thematic deciphering and formation of graphic and digital accounting documents and forms on the results of thematic deciphering of DN and others. The developed complex is designed primarily for ERS processing, which must come from the Belarusian spacecraft "Belka" realizing panchromatic imagery with a resolution of 2.5 m and multispectral imagery (4 channels: 0.54–0.6; 0.63–0.69, 0.69–0.72, 0.75–0.86) with a resolution of 10 m.
Competitiveness	PIC "Cadastre-ERS" does not have domestic counterparts; a scientific and technical level of basic technical and operational characteristics is not inferior to the best foreign analogues. The market value of PIC "Cadastre-ERS" is significantly below their foreign counterparts in the world market.
Expected outcome	PIC "Cadastre-ERS" is in demand for the national economy of Belarus and will import substitute in the domestic market, as well as competitive in the world, primarily on the CIS market.
Offers on sale	Delivery by individual orders; manufacturing and supply; delivery of the finished product.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***United Institute of Informatics Problems of the National Academy of Sciences of Belarus***

II-10. Standard software and hardware ESP IS server

Application field	At present, based on RFID technologies are widely used in world practice in various automation systems: identification and control of movements of returnable container, control system sales in retail outlets, supply chain of goods and services, monitoring of the cargo traffic movement on transport corridors, and control system of technological processes on factories.
Description of products	Logistics enterprise server EPC IS is a new modern means of fixing the events that occur in chains of work with objects that are marked by the means of automatic identification. Logistic Spy 2.0 provides the following functions: description of the configuration, used RFID equipment, management, setting and monitoring of RFID equipment, data gathering of RFID tags in the automatic mode, processing and filtering of information about RFID tags, the generation of relevant events, fixation of events in a database and its mailing, provides to an application software the access service to the event database.
Competitiveness	Domestic analogues do not exist.
Expected outcome	The designed logistics information enterprise server is a standardized program-technical complex. Logistics enterprise server Logistic Spy 2.0 is designed to reduce time, cost of developing new, and refining existing information systems in terms of RFID technology.
Offers on sale	Sale of a license.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Intersectoral Theoretical and Practical Centre for Identification Systems and Electronic Transaction***

II-11. System of software tools support of software tools of the design and engineering analysis of structural elements combined tillage aggregates (PCC PAC-1)



Application field

CAD system is created to automate the design and engineering analysis of combined tillage aggregates frame structures (CPA).

Description of products	The methodology and the automation software complex for design and modeling of uniform (basic) structural elements of the CPA were created in conditions close to real operation. SPC PAC-1 provides a continuous loop of automation design process and modeling of uniform (basic) CPA structural elements.
Competitiveness	A specialized method for engineering analysis of the structural elements of the CPA was developed. A single integrated design envelope, modeling and engineering design analysis of CPA was created.
Expected outcome	Tests of the method consisting of the engineering sample showed a significant reduction (at least 50 %) in labor costs in comparison with traditional methods for design and reducing the time of design and prototyping.
Offers on sale	Sale of a license.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***United Institute of Informatics Problems of the National Academy of Sciences of Belarus***

II-12. The software package "The calculation of the number and mode of cross-border transmission of petroleum products on water courses in emergency situations"

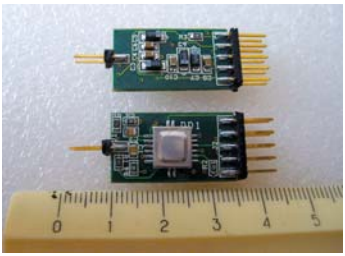
Application field	The software package is meant for calculating the parameters and characteristics of the transport and distribution of petroleum products across watercourses during related to the accidental flows emergency situations.
Description of products	The software package provides the calculations and construction of a dynamic model of the oil slick motion on the watercourse on the electronic map. The software tool is built in a modular approach and consists of the compatible modules MapInfo GIS. The model calculates the motion of the spot the following features and characteristics: – the zone of pollution time approach; – a maximum magnitude of petroleum pollution concentration in the area of the watercourse; – the length of the passage of high petroleum products concentrations in a given alignment of the watercourse; – the speed of the spot motion; – required time to reach the spot until the reference point; – maps of contamination at a certain time after the accident. The software module visualization of the dynamic model of the spot on the watercourse in GIS environment provides the formation of maps with the environment application in the area of emergency. The system includes electronic databases on the characteristics of streams, petroleum and petroleum products, oil and product pipelines.
Expected outcome	The software package allows to predict the effects of oil spills and petroleum.
Offers on sale	Delivery by individual orders.
The transfer of rights object	Software.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Organization-developer	***Institute for Command Engineers of the Ministry of Emergencies of the Republic of Belarus***

III-1. AD-1.16 — semicustom integrated circuit (IC) of discriminator-shaping amplifier with input voltage reduced to ± 3.5 V

Application field	In particle physics, high- and intermediate energy, in space, radiometric and medical equipment.
Description of products	Produced on the base matrix crystals ABMK1-3 consists of transresistance amplifier Ampl-1.16 amp and comparator Disc-1.16, with a separate power supply of ± 3.5 V. The amplifier has the polarity of the input signal +/–, conversion factor KIU = 36 mV/pA, input impedance 50 Ω, bandwidth level — 3 dB — 150 MHz, differential output, the output load is ≥ 2 k, the root mean square noise current in the detector capacitance CD = 10 pF — Inoise = 80 nA. Comparator Disc-1.16 has a propagation delay TD = 3.5 ns at a threshold current Ith = 1 mA and TD = 5.5 ns at Ith = 5 mA, duration of rise/fall output pulse 1.8/2.5 ns output load 110 Ω, voltage is ± 3.5 V.
Competitiveness	High electrical characteristics and reliability. Opportunity to locate in close proximity to the detector, with the reductionof inter-channel interference and increase the resistance to autoexitation, and thereby increase the accuracy of the measurements.It shows the possibility of Belarusian electronics industry to produce products that meet the high quality standards required for international experiments in particle physics and high-energy, as well as equipment used by space researches.
Expected outcome	The device for registration signals ADB-1.16 based on IMS AD-1.16 should be used in the construction of the muon detectors and new projects in particle physics, high and intermediate energies, in particular projects PANDA (Darmstadt, GSI, Germany), and the NICA-MPD (UINR, Dubna, Russia). Possibly can be used in space-based equipment and radiometric equipment.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

new P export

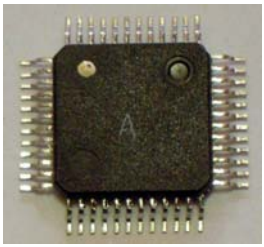
III-2. AD-1.3 — semispecialized integrated circuit of power assist discriminator



Application field
Muonic systems experimental setups on particle physics, high- and intermediate energies.

Description of products	Semispecialized single-channel integrated circuit (IC) AD-1.3 family of DOM (Dubna-D0-Minsk) consists of transresistant amplifier AMPL-1.3 and comparator Disc-1.4 on a dedicated analog base matrix crystals ABMK_1_3. AD-1.3 has a fast response (rise time and fall time of τf and τc pulse at the output of ~ 3 ns delay of channel of gain-discrimination TD = 6 ns, pulse-edge discriminator 110 Ω load τf = 2.2 and τc = 1.3 ns, respectively) and low noise (Inoise = 28 nA at the detector capacitance CD = 0 pF, Inoise = 39 nA at CD = 60 pF). AD-1.3 is installed on a four PCB ADB-1.3 size of 25×14 mm^2 and can be mounted inside a single muon drift tubes and in the trailer multichannel mini-drift tubes (MDT). ADB-1.3 module has been successfully tested in the layout of the muon detector at the MDT.
Competitiveness	IC AD-1.3 is optimized for work with gas-discharge drift tubes, embedded inside the single-channel and 8-channel limit switches mini-drift tubes, which increases the reliability and accuracy of the recorded data. This provides a preference to use it in the muon systems of modern and planned facilities for experiments in particle physics, high- and intermediate energies.
Expected outcome	Module ADB-1.3 is supposed to be used in projects PANDA (Darmstadt city, Germany), NICA-MPD (UINR, Dubna city, Russia). It's possible to use it in other new projects on particle physics of high- and intermediate energies.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

III-3. Ampl-8.3 — 8-channel high-speed integrated circuit low noise transresistant amplifier



Application field
Particle physics, high and intermediate energies.

Description of products	Head stage with a common base, the conversion factor KIU = 110–140 mV/mA, the input impedance of 50 Ω, the polarity of the input signal +/–, protection from high emissions (frequency of 10 Hz, 1 ms duration) the limiting current of positive polarity 4.5 I, the current limit of 20 A negative polarity, the delay time TD = 6 ns, the duration of the rise time of the pulse at the output cut τf = Tc = 7 ns, differential output, the output load ≥ 1 kΩ RMS noise current in the detector capacitance CD = 0 pF — Inoise = 35 nA and CD = 0 pF — Inoise = 60 nA; cross-talk δ ≤ – 48 dB dynamic range of 60 dB with ± 3–5; dissipated power is 160–640 mW/housing.
Competitiveness	It is extremely resistant to autoexitation, high-voltage breakdown and high radiation resistance. Does not have analogues. The only multi-channel amplifier with a cascade of a common-base input.
Expected outcome	This product has already been used and is used in the experiments D0 (National Accelerator Laboratory, Fermi — Fermilab, Batavia, the United States), "COMPASS" (CERN, Geneva, Switzerland, France), the SVD-2 (IPAS, Protvino, Moscow Region, Russia). Subsequent products will be sold for use in the UINR experiment "Panda" (Institute of GSI, Darmstadt, Germany). Can be used in the experiment at the future accelerator SPD NICA (Dubna, Moscow region, Russia).
Offers on sale	Delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

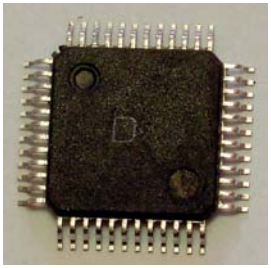
III-4. Automated visual verification unit EM-6015M

Application field
The unit is used for automated visual verification of photomasks, reticles with film protection and semiconductor wafers. The unit is designed to equip manufacturers of photomasks for integrated circuits with topological rules to 0.8 μm production.

Description of products	Automated visual topology verification unit operates by optical microscopy method, which provides quick defects verification with the assessment of their coordinates X, Y and deffect sizes. The unit allows to assess and store images of mask defects in the photolithographic transfer its image on the wafer, to automate the search and identification of the defect on the mask previously found on the wafer, provides a comparison of a multi-mode portion of the image on the wafer with a fragment of the mask image.
Competitiveness	The cost of the best foreign analogues at the international market is about 270 thousand US dollars. Average estamated cost of the developed processing unit of automated visual verification is 150 thousand US dollars.
Expected outcome	Expanding of enterprise export adapted potential; preserving of highly intellectual vacancies; reducing of costs by developing and producing equipment.
Offers on sale	Delivery by individual orders.
Level of readiness	Limited production.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Organization-developer	***"KBTEM-OMO" RUE***

export

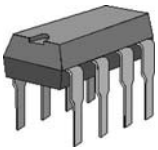
III-5. Disc-8.3 — custom 8-channel integrated circuit comparator family "DOM"



Application field
Particle physics, high and intermediate energies physics, nuclear powered electronic equipment.

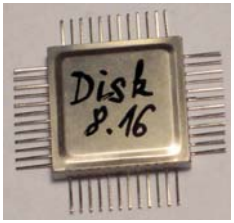
Description of products	Input current is ≤ 1 mA, the difference of input currents is ≤ 0.01 mA, the propagation delay in excess of 10 mV and 60 mV ≤ 36 and 15 ns, respectively, and the maximum difference in propagation delays through the channels in excess of 10 mV and 60 mV to 4 ns is no more than 1 ns, respectively. Edge 01/10 are respectively 2.2 and 1.8 ns, the permissible current output 4 mA ± 5 mA; dissipation capacity of 670 mW/housing.
Competitiveness	High reliability in long-life, low crosstalk, there are built-in chains of expanding output to 50 ns. On the moment of issuing 8-channel were not produced elsewhere in the world. Currently, there are analogues but not consistent with the amplifier Ampl-8.3.
Expected outcome	All previous products are sold to UINR for experimental D0 usage (National Accelerator Laboratory, Fermi — Fermilab, Batavia city, USA), "COMPASS" (CERN, Geneva, Switzerland-France), Moscow State University for the SVD-2 (High Energy Physics, Protvino, Moscow Region. Russia), "Pi Beta" (Institute PSI, Mr. Villigen, Switzerland). All subsequent products will be sold to the UINR for experimental usage "Panda" (Institute of GSI, Darmstadt, Germany).
Offers on sale	Delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

III-6. IN8563D — integrated circuit of real time clock with lower rail voltage



Application field	The circuit has following main functions: counting in real time mode seconds, minutes, hours, days, dates, months and years, data transmission by the 2-wire I2C serial interface, generate an interrupt signal on the alarm clock and timer; provide micropower mode.
Description of products	Circuit IN8563D contains the following main blocks: the control block, initialization circuit, generator control block, built-in generator,replicator, a serial interface compatible with I2C; power control scheme, the address register, the registers 16×8 bits. There is used 0.35 μm CMOS prosess with two levels of polysilicon and three levels of metallization.
Competitiveness	The nearest functional analogue of the IN8563D circuit is PCF8573 circuit produced by "PHILIPS". IN8563D corresponds to the level of the best foreign samples.
Expected outcome	Export.
Offers on sale	Delivery by individual orders; manufacturing and supply; serial production.
Level of readiness	Pilot lot; serial production.
The transfer of rights object	Production prototype; topology of an integrated microcircuit.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Investments.
Organization-developer	***Belmicrosystems Research & Design Center UE "Semiconductor device factory"***

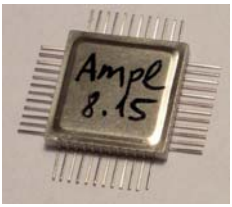
III-7. Disc-8.16 — integrated circuit of eight-channel comparator unit



Application field
In particle physics, high-and intermediate-energy, space for detecting signals from the scintillation detectors, using as photodetectors multypixel avalanche photodiodes operating in the Geiger mode, in nuclear physics instrumentation, space-based devices.

Description of products	Eight channels, switching delay TD 6 ns, rise time and fall time τf/Tc pulse output τf = 2.2 and Tc = 1.3 ns at 110 Ω load, voltage ± 3.5 V.
Competitiveness	High electrical characteristics and reliability, low input impedance and inter-channel interference, resistance to autoexcitation. It shows the possibility of Belarusian electronics industry to produce products that meet the high quality standards required for international experiments in particle physics and high-energy, as well as equipment used for space researches.
Expected outcome	ADB signal recording device based on IMS Ampl-8.15, shall be used in the construction of the muon detectors modernized and new projects in particle physics, high and intermediate energies, in particular projects PANDA (Darmstadt, GSI, Germany), and the NICA-MPD (JINR, Dubna, Russia). Can be used in space-based equipment and nuclear physics instrumentation.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

III-8. Ampl-8.15 — integrated circuit of eight-channel transresistive power assist



Application field
In particle physics, high- and intermediate energies, in space electronics for scintillation detector signal registration, which are used as photodetectors multipixel avalanche photodiodes operating in Geiger mode.

Description of products	Channels amount — 8, bandwidth W = 170 MHz, the conversion factor KIU = 10 mV/pA, root mean square noise current Inoise = 80 nA, cross-talk — 48 dB, power +3.5 ± 0.3 V.
Competitiveness	High electrical characteristics and reliability, low input impedance and inter-channel interference, resistance to autoexcitation. It shows the possibility of Belarusian electronics industry to produce products that meet the high quality standards required for international experiments in particle physics and high-energy, as well as equipment used for space researches.
Expected outcome	ADB signal recording device based on IMS Ampl-8.15, shall be used in the construction of the muon detectors modernized and new projects in particle physics, high and intermediate energies, in particular projects PANDA (Darmstadt, GSI, Germany), and the NICA-MPD (JINR, Dubna, Russia). Can be used in space-based equipment.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

new
import

III-9. Multichannel retransmittion equipment of signals of satellite navigation system and telemetry data of highly dynamic aircraft in developing a unified series of transceivers and antennas for communication channel at a distance of 1,000 km and transmission equipment telemetry signals in S-band

Application field
Transceiver for antenna for a link to 1,000 km and telemetry signals transmission equipment in S-band designed to relay satellite radio navigation system (SRNS) signals and signal beacon and telemetry from the board of the carrier in order to obtain information about the location of the carrier and its condition.

Description of products	There have been designed and fabricated experimental models of active antenna for reception of SRNS, the antenna with power amplifier and rebroadcast signals SRNS beacon, transmission equipment telemetry signals in S-band, the device antenna to receive signals relayed SRNS in S-band and on-board telemetry data, the device receiving telemetry signals of mobile measuring station.
Competitiveness	Developed and produced equipment is competitive in the Republic of Belarus. There are no analogues.
Expected outcome	The equipment is to be used on board of the carrier to get the information about the location and technical state of the carrier. The results are collected and processed by terrestrial mobile measuring station.
Offers on sale	Transfer of engineering specifications and specialist advice on development; partnerships or other arrangements; cooperation with the customer on application; agreement on cooperation.
Level of readiness	Experimental (model) sample.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"AGAT-SYSTEM — managing company of the holding "System of Communication and Management" JSC***

III-10. OKA-1M — eight-channel integrated circuit of discriminator-shaping amplifier

Application field	The prototype cirtuit "OKA-1M" is set to proportional chambers of VES instalation, it is tested in beam sessions and adopted as a working electronic track experiment system OKA. This development can be used in scientific and medical devices, as well as special-purpose devices. Currently, the odering customer and potential customer is IPAS, Protvino city, Russia.
Description of products	The equivalent noise charge — 900 e + 25 e/pF; formation time — 20 ns; the accuracy of the timestamp — 5 ns, LVDS-compatible outputs, supply voltage— 3.3 V; power consumption— 18 mV/channel.
Competitiveness	Development of domestic electronic devices of new level (absebce on the overt world market).
Expected outcome	The use of laboratory technology IZOPLANAR-II SEC "Belmikrosistem" for producing multichannel precision threshold schemes for nuclear physics experiments. Work to stabilize the individual operations (epitaxy, metallization)of technological process, which determine the final ratio of product yield, and its cost.
Offers on sale	Delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

III-11. On-board data management system on LCD panels on transport vehicles

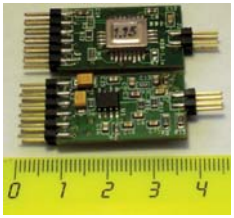
Application field	Automation of the processes of control, diagnostics, collecting and showing on the LCD panel data about node and machine status and video of the background scene of the transport vehicle.
Description of products	Technical inspection of units and units of the vehicle. On-screen display data in the following modes: before the start, start-up, idle, on motion. Information about controlled chassis sensors, speed and engine speed motor (16 analog, 47 digital and 2 frequency sensors). Data about faults or chassis disabling automaticaly appears on the display and speakers. Displaying the information stored in the processing block memory unit.
Competitiveness	There are no domestic and foreign analogues. For the first time in the country there is designed on-board data management system on LCD panels with its own software. The system is designed to equip both domestic machinery and machinery produced in Russian Federation.
Expected outcome	Improving working conditions of the driver by providing full information on the current state of the machine with minimal distraction from driving.
Offers on sale	Sale of products; sale of products on a contractual basis; delivery by individual orders; manufacturing and supply.
Level of readiness	Limited production.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***Institute of Digital Television "Horizont" RUE***

III-12. Projection aligner (repeater) with the definition of 0.35 mym EM-5584

Application field
Repeater is used for production of microelectronic pieces of technological level 350 nm.

Description of products	The basis principle of the repeater is gradual transfer (animation) of deminished original foto image on previously focused on semiconductor wafer, oriented on special alignment marks. The structure of the repeaterer includes: optical-mechanical unit, complex manager, pneumatic unit,lamp power supply.
Competitiveness	Cost of the projection aligner of such class is more than 4,000.0 ths US dollars. Minimal possible cost of the EM-5584 is 1,950.0 ths US dollars.
Expected outcome	Expanding of enterprise export adapted potential. Preserving of highly intellectual vacancies. Reducing of costs by developing and producing equipment.
Offers on sale	Delivery by individual orders.
Level of readiness	Limited production.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Organization-developer	***"KBTEM-OMO" RUE***

III-13. Set of semispecialized integrated circuit of power assist discriminator AD-1.14, AD-1.15 and AD-1.17



Application field

In particle physics, high- and intermediate energies, in space electronics, radiometric and medical equipment.

Description of products

Circuits are designed and produced on special analog base matrix crystals ABMK_1_3 three IC amplifier-discriminator: AD-1.14, AD-1.15 and AD-1.17 family DOM (Dubna-D0-Minsk), consisting of a wideband transimpedance amplifiers respectively Ampl-1.14 (conversion factor KIU = 20, F = frequency band of 150 MHz, the root mean square noise current ENI = 110 nA at a capacitive load at the input of 10 pF), Ampl-1.15 (KIU = 10, F = 170 MHz, ENI = 80 nA) and Ampl-1.17 (KIU = 1, F = 250 MHz, ENI = 170 nA) and a fast comparator Disc-1.4 with electrical parameters sufficient to signals discrimination registered in scintillation detectors. Through delay in channel AD-1.15 is 4.3 ns at a threshold voltage of 20 mV and 5.6 ns at a threshold of 100 mV for an input current of 100 uA at the amplifier input capacitance CD = 0 pF. Developed electronic modules ADB-1.14, ADB-1.1 and ADB-1.17, based on the three ICs and versatile four-layer printed circuit board.

Competitiveness	High electrical characteristics and reliability ,which allows location in close proximity to the detector and reduces inter-channel interference in this way and increase the resistance to autoexitation, the ability of Belarusian electronics industry to produce products that meet the high quality standards required for international experiments in particle physics and high-energy, and as for equipment used for space researches.
Expected outcome	Signal recording device ADB-1.14, ADB-1.15 and ADB-1.17 based on IMS AD-1.14, AD-1.15 and AD-1.17 should be used in the construction of the muon detectors modernized and new projects in particle physics, high and intermediate energies, in particular projects PANDA (Darmstadt, GSI, Germany), and the NICA-MPD (UINR, Dubna, Russia). Can be used in space-based equipment and radiometric equipment.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

III-14. Set-top box for receiving digital signal of high defenition (HD) "Vityaz HDR-826"

Application field	Receiving and pocessing digital terrestrial broadcasting signal DVB-T standart with compression to MPEG2/MPEG4 standart.
Description of products	Display menu languages: English and Russian. Digital Multimedia Interface HDMI to connect to the LCD-TV. Analog interfaces SKART (with RGB) and RCA. Support DVB services (EPG, subtitles, multiple audio languages). Digital LED display (display the current time in guard mode).
Competitiveness	Digital set-top box corresponds to the best foreing analogues.
Expected outcome	Digital set-top box allows the consumer to watch TV programes of high broadcasting quality which promotes digital set-top boxes to the market.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Joint production.
Organization-developer	***"Vityaz" JSC***

III-15. Comparison microscope "Peleng MC-04"

Application field
Used in expert divisions of power structures.

Description of products
Comparison microscope "Peleng MC-4" for the expert (including identification) research of micro-and macrotracks withdrawn from the scene of the ballistic trace evidence, handwriting expert studies and research documents, counterfeit drugs, forensic and forensic medical examinations. The increase in visual observation of 5, 10, 20, 40 and 80 times. The study of objects: in ultraviolet radiation, in the visible spectrum of radiation, in infrared radiation, in visible in polarized radiation. Overlay image or link in the field of view. Smooth movement across the field image lines of connected images partition. Surveillance Images in binoculars, on a computer monitor. Joined images of the objects from a digital camera "Olympus" (matrix 12 mega pixels). Registration of images of the test objects with the help of the digital camera "Olympus" (matrix 12 megapixels).

Competitiveness	Created comparison microscope "Peleng MC-4" is of the new generation with higher competitive performance. Comparison microscope "Peleng MC-4" with a new generation of visual resolution of 45 mm^{-1}, equipped with a digital camcorder, digital camera, coaxial illuminator, which will allow recording images in digital form with the ability to output it to the monitor, freeing the operator from the routine processing films, more quality shots. The developed software provides the investigation of volume scanning of objects (bullets, shells) in trace evidence and ballistic research, archiving of sweep surfaces, and a quick comparison with the available in memory ones.
Expected outcome	The main consumer of comparison microscopes "Peleng MC-4" of a new generation — the forensic division of near and distant foreign countries (Russia, Belarus, Uzbekistan, Kazakhstan, Ukraine, etc.).
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply; agreement on cooperation.
Level of readiness	Limited production.
The transfer of rights object	Invention; effective model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Joint production.
Organization-developer	***"Peleng" JSC***

P

export

import

III-16. High-resolution lenses for special technological and check-out equipment of new generation

Application field	High-resolution lenses assigned for work in special equipment for the production of photomasks with the level of detection capability 65 and 150 nm.
Description of products	Lenses "VOK-65", "VOK-150" and "VOLG-200" are diffraction limited lenses, working in UV- and DUV-light bands. Lenses "VOK-65" and "VOK-150" provide the ability to work effectively the devices of automatic control topology photomasks with the level of detection capability 65 and 150 nm; usage of lens "VOLG-200" in a multichannel laser image generator enables the production of intermediate photomasks VLSI of technological level from 0.18 μm.
Competitiveness	The cost of technological level lenses is 65 and 150 nm. In the international market reaches 900–1,000 thousand US dollars. The average estimated cost of lenses is 367 thousand US dollars.
Expected outcome	Expansion of the export's potential of the company. Preservation of intellectual work. Cost cutting in developing and manufacturing of equipment.
Offers on sale	Introduction of technology.
Level of readiness	Limited production.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Organization-developer	***"KBTEM-OMO" RUE***

IV-1. Applying granular asphalt from waste asphalt pavement, bitumen-concrete mixes of high deformational stability production technology and appliance


Application field	Road sector enterprises of the Republic of Belarus and near-abroad countries.
Description of products	The subeject-matter of the development is the usage of granular asphalt obtained by removal and further fragmentation or by cold milling of the old asphalt pavement, for new bitumen-concrete mixes preparation of high deformation resistance, which in future will be used for pavement layers.
Competitiveness	Using the old asphalt pavements can increase saving of road-building materials such as gravel, sand, mineral powder and bitumen, making less expensive bitumen-concrete mixes of high deformation resistance, and their use provides significant economic effect.
Expected outcome	Technology allows to get bitumen-concrete mixes with improved physical and mechanical characteristic and the technical and economic parameters on the basis of compositions complex optimization and modification considering structural features of the starting material (granular asphalt), which increases the service life of pavement.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; serial production; delivery of the finished product.
Level of readiness	Serial production.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production; joint enterprise.
Organization-developer	***Scientific technological park of the BNTU "Politechnik"***

IV-2. Environmentally sound solution compositions for copper-alloy pieces passivation, technology of its production and appliance.

Application field	It's used for degreasing of metal surfaces from rustproof grease and dirt removal performance by immersion, for clarification and passivation of brass to preserve the solderability of interoperable storage and protection of products against corrosion during exploitation.
Description of products	Designed passivating compositions do not contain hexavalent chromium. Spreading coefficient for brass is no less than 1.2, the compositions blocks corrosion phenomena in a moist atmosphere, provide the required quality of soldering. Advantages of the developed passivating solutions if compared to foreign analogues are improving of quality soldering through better solderability, increasing productivity (2 %), reducing energy consumption by reducing the heating temperature of the work solution.
Competitiveness	Designed passivating solutions are environmentally friendly (do not contain hexavalent chromium) and do not require expenses for purification facilieties. The cost of the developed compositions is to 30 % less than of those applied at enterprises. Application technology is cheaper, because the heating is twice reduced.
Expected outcome	Abandoning environmentally harmful compounds use. Imported expensive materials are excluded. Saving power by reducing the temperature of the solution to +70 °C and +35–40 °C. Improving the quality of exported products by providing good solderability products. Abandoning inflammable solvent before painting.
Offers on sale	Manufacturing and supply; organization of serial manufacture; cooperation with the customer on application; introduction of technology.
Level of readiness	Pilot lot.
The transfer of rights object	Invention.
Organization-developer	***"NIIEM" JSC***

IV-3. Technology of deriving modifying multicomponent additives by using secondary polymeric components, developing formulations to use in bitumen-concrete mixes. Mastering the production




Application field	Road sector enterprises of the Republic of Belarus and near-abroad countries.
Description of products	There has been developed energy-and resource-saving technology of multicomponent additives on the basis of secondary polymer components (hereinafter — additive) with the use of secondary and primary polymers of belarusian and russian production, solving the problem of secondary polymers utilization; optimal additive compositions have been developed, there has also been developed a legal framework for the use of . Additives are used to modify the bitumen-concrete mixes and effectively replace imported analogues.
Competitiveness	Multicomponent polymer modifying additives effectively replace imported analogues, so it reduces the cost of road construction products (modified bitumen-concrete mixes), their application gives a significant economic effect.
Expected outcome	This application improves the reliability of asphalt in all main indicators of the deformation resistance (shear resistance, temperature cracking, fatigue cracking resistance, corrosion resistance) and resistance to oxidative aging, allows to increase service life.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; serial production; delivery of the finished product.
Level of readiness	Serial production.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production; joint enterprise.
Organization-developer	***Scientific technological park of the BNTU "Politechnik"***

IV-4. Composite magnetic material on the base of ferrite iron powder

Application field	Mechanical engineering. New composite magnetic materials on the base of ferrite iron powder can replace laminated electromagnetic steel for many high-frequency applications in such products as transformers, throttles, modern valve high-speed electric motors and generators.
Description of products	The composite magnetic material on the base of ferrite iron powder has the following characteristics: – frequency — to 100 kHz; – induction — to 2 T; – power loss — to 2 %; – permeability — to 700 units.
Competitiveness	It is competitive. It has no analogues in the territory of the CIS countries. In technical parameters it corresponds to the best world samples made by companies "Hoganes" (Sweden) and "Micrometals" (USA). The cost price of manufacture of the material is 2 times lower.
Expected outcome	Expected economic benefit will make 30,000 US dollars a year at the expense of labor productivity increase by 12 %, power consumption decrease by 10 %.
Offers on sale	Sale of products; delivery by individual orders; serial production; agreement on cooperation.
Level of readiness	Pilot lot; limited production.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Investments; joint production; joint enterprise.
Organization-developer	***Theoretical and Practical Centre on Material Science of the National Academy of Sciences of Belarus***

IV-5. Development of composite material based on polyolefins and production technology of protective details of automotive and agricultural equipment units with increased resistance to alternating shock loads

Application field

The developed composite material based on polyolefins and some protective details of automotive and agricultural equipment units with increased resistance to alternating shock loads produced by the developed technology will be produced at JSC "Belvtorpolimer". Shock struck guards, manufactured from composite materials by the developed technology will be produced at JSC "Belcard". The developed technology will be implemented at JSC "Belvtorpolimer" obtained composite material by the developed technology will be used for various types of packaging, bags, packaging. In the future, to expand the market of the manufactured composite material by the CIS and near-broad countries it is planned to expand the range of products from reclamated and composite materials for the production of molded structural units, large diameter pipes and elements of small architectural forms. It is planned to supply details of the protective units of automotive and agricultural equipment to service points for servicing of the equipment for replacement of the out-of service protective elements. Field of development application — chemical industry, automobile industry, agro-industrial complex.

Description of products

The scientific novelty of the project is to use low-dimensional modifiers in the products form of mechanical and thermal dispersion technology geosilikates and industrial rejects for the intermolecular interaction melt stabilization of the based on polypropylene composite material. This provides the possibility of moldings obtaining with high strain-strength characteristics of the composite material by extrusion. The originality of the recycling technology of thermoplastic rejects with a high content of inorganic contaminants includes continuous mechanical and thermal effects on the half-finished product at various stages of closed process, which will reduce the level of decomposition and oxidative phenomena. The novelty of the proposed technical solutions was implemented in an application materials complex for invention patents.

Competitiveness

In relation to the best domestic designs the developed material has a tensile strength of 2 MPa Ball, indentation hardness of 4 MPa higher, frost resistance at 10 °C lower than that produced by JSC "Polymir".
In relation to the world's best developed material it has higher service performance.
The developed material and the manufacturing of products from it are environmentally friendly.

Expected outcome	The designed composite material will be used for various types of packing, bags, and packaging. In the future, to expand the market of composite materials developed by the CIS and near-broad countries it is planned to expand the range of products: the molded building blocks, large diameter pipes and elements of small architectural forms. The pilot batches of thermoplastic composite material based on polypropylene and cardan transmissions protective cover for automotive vehicles out of it were produced, preliminary and acceptance tests were held, composite material installation series and its qualification test was made, specifications for the based on polypropylene. Composite materials were developed. The enterprises involved in the implementation of this project have the necessary infrastructure and production capacity.
Offers on sale	Sale of products; manufacturing and supply; organization of serial manufacture; agreement on cooperation.
Level of readiness	Serial production.
The transfer of rights object	Invention; effective model.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works; joint production; joint enterprise.
Organization-developer	***Grodno State Agrarian University***

IV-6. Fire retardant lacquer for wood and wood materials of high resistance to aging and high decorative properties

Application field	Lacquer is meant for fire protection, protective and decorative coatings for wood and materials based on its base in order to achieve flammability of G1 and G2 and protective and decorative properties.
Description of products	Transparent, colorless to yellow liquid with density of 1,200–1,300 kg/m^3. Drying time — no more than 12 h. Flameproof efficiency of lacquer at rate of not more than 300 g/m^3 corresponds to Group I according to SS (ГОСТ) 16363. Retains its flameproof rating for at least 10 years of service when used in places that do not experience the impact of climatic factors and chemically aggressive environments. Under the influence of climatic factors and chemically aggressive media keeps flame retardant properties for at least 2 years.
Competitiveness	Fire retardant lacquer has high resistance to aging, excellent decorative properties and low cost in comparison with analogues.
Expected outcome	The development of production would eliminate the import of purchases of similar purpose, will reduce costs during construction; will provide access to export to neighboring countries and the currency resources inflow.
Offers on sale	Organization of serial manufacture; license agreement, contract.
Level of readiness	Pilot lot; limited production.
The transfer of rights object	Invention.
The transfer of rights form	License agreement.
Organization-developer	***Research Institute of Fire Safety and Emergencies of the Ministry for Emergency Situations of the Republic of Belarus***

IV-7. Heat pipes with powder capillary structures of inhomogeneous steam distribution with a high heat transfer capability

Application field	Creation of high heat transfer equipment to dissipate high heat fluxes of modern electronics, electrical engineering, and aerospace engineering. The perspective markets: Russia, India and Ukraine.
Description of products	The resource-saving technology of heat pipes with powder capillary structure of inhomogeneous steam distribution was developed. The usage of heterogeneous powder capillary structure, which has distributed over the volume small and large sizes pores in the range of 10–100 microns, can enhance heat transfer capacity of heat pipes in comparison with foreign analogues by 100 %, and increase efficiency and reduce material consumption of cooling systems correspondingly.
Competitiveness	The use of more efficient powder capillary structures provides more (no less than 100 %), heat transfer capacity of heat pipes without increasing their weight. It corresponds to the best domestic and foreign analogs.
Expected outcome	Application of the designed heat pipes in the cooling systems can significantly improve their heat transfer efficiency; reduce costs, save material, energy and human resources.
Offers on sale	Sale of products; sale of products on a contractual basis; delivery by individual orders; organization of serial manufacture.
Level of readiness	Pilot lot; limited production.
The transfer of rights object	Effective model; scientific and technical information; experimental model; others.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works; joint production; joint enterprise.
Organization-developer	***Powder Metallurgy Institute***

IV-8. High-heat material in the form of tablets based on cubic boron nitride

Application field

For creating an integrated circuit (IC) memory devices, microprocessors and microcontrollers, peripheral ICs, ICs for television and audio equipment, ICs for telecommunications, power electronics, standard analog ICs, standard logic ICs, ICs are resistant to external destabilizing factors are required for use material of high thermal conductivity, radiation, thermal, and chemical resistance.

Description of products	High-heat material in the form of tablets based on cubic boron nitride. Features: – thermal conductivity — 150 W/m·K; – hardness (Hv) — 30–45 GPa; – elastic modulus — 700 GPa; – crack resistance — 9–10 MPa·$m^{½}$. The use of such material as cubic boron nitride adds to the described features high strength characteristics.
Competitiveness	Hardness is 10 % higher, elastic modulus is 15 % higher than that of the known analogues. At the cost up to 50 % lowers than those of the known analogues.
Expected outcome	Updatable — 25.5 %, import substitution — 75 %. Energy intensity was reduced by 15 % by reducing the synthesis temperature. Material reduced by 35 % by reducing the consumption of hard metal. Cost of reduced by 15 % by increasing the service life of equipment serviceable product.
Offers on sale	Sale of products; organization of serial manufacture; sale of technology; agreement on cooperation.
Level of readiness	Pilot lot.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement; purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Centre on Material Science of the National Academy of Sciences of Belarus***

IV-9. Hydrophobic plasticizing additive for concrete-cement mixtures "Giplanan" and the technology of its production

Application field	Hydrophobic plasticizing additive for concrete-cement mixtures "Giplanan" raises and keeps up to 2.5 hours of its mobility reduces 2–4 times water absorption of concrete and increases its frost resistance, which increases the service life of concrete and reinforced concrete structures, that are operates in conditions of high moisture content.
Description of products	The additive for concrete "Giplanan" based on domestic raw materials of organic and mineral origin, is characterized by plasticizing and water-proofing effect during the introduction in concrete and mortar Portlar mixtures, and technology of its production. The use of hydrophobic plasticizer additive will allow to accomplish the deposing of concrete technology without energy consuming and labour intensive processes of concrete mixtures vibration.
Competitiveness	Improves the workability of concrete mix from P1 to P4, provides mobility conservation for 2.5 h, reduces water demand by 20 %, water absorption — 3-times, increases the frost resistance of concrete to 2 marks. When introducing additives branding durability of concrete is not only not reduced (in accordance with the STB (СТБ) 1112-98 is allowed to decrease to 5%), but on the contrary, it is increased by an average of 5–7 %, compared with control structures. According to its characteristics it is not inferior to foreign analogues, such as the addition of "Asolin DM" (Germany).
Expected outcome	The additive "Giplanan" is 2–3 times cheaper than its foreign counterparts. Especially effective is its use with the introduction of concrete used in the works of a zero circle, in road building and bridge construction, and construction of hydraulic structures.
Offers on sale	Manufacturing and supply.
Level of readiness	Pilot lot.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Institute of General and Inorganic Chemistry of the National Academy of Sciences of Belarus***

IV-10. Integrated water treatment complexes, aimed at work in service water systems and in household water supply of oil and chemical enterprises

Application field

Developed new water purification systems are designed to work in technical, household water supply, as in the oil and chemical industries, as well as in other industries.

Description of products

Water purification systems, which have no analogues in the national practice, are made on the basis of the sorption-catalytic composites and ceramic-polymer filter tracks. Manufactured modular unit of integrated water treatment, which benefits are determined by high performance, versatility and by operating characteristics complex, reduces the level of pollution by 95 %. Developed by plants design, depending on the source of water supply, operating conditions, the quality requirements for treatment include the possibility of equipping the modules with developed filter elements based on silica-alumina or ceramic-polymer compositions. Made modifications of plants require less than 1 % of water total consumption for regeneration. Construction of filter elements designed with a modular scheme of cleaning can create modified plants with capacity ranging from 10 up to 500 m^3/h. Increase of productivity is achieved by raising the number of modules. The modular cleaning circuit, implemented in modifications, allows to conduct routine maintenance without stopping the entire water supply system.

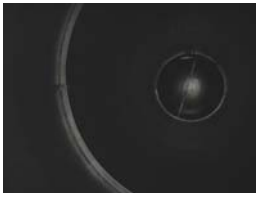
Competitiveness	Service life of the plant before the replacement of filter material is more than 100,000 m^3 or an average more than 2 years of operation, which is 50–60 % higher than the existing counterparts. In comparison with foreign analogues, the designed plant consumes two or more times less water to regeneration. The cost of plants manufacturing is up to 500 euro per 1 m^3/h capacity, which is 50–70 % below the market value of their foreign counterparts.
Expected outcome	The expected economic effect from the use of the developed treatment system within three years of development in comparison with foreign analogues "Flow-Atlantean" (Russia) — 525 million rubles, foreign counterparts "HONEYWELL" or "YAMIT.ELI" (Germany) — 617 million rubles.
Offers on sale	Manufacturing and supply.
Level of readiness	Limited production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization developer	***Institute of General and Inorganic Chemistry of the National Academy of Sciences of Belarus***

new

export

import

IV-11. The structure and technology for getting anticorrosive bifunctional composition "Antibes" with a combined function of products protection, designs and constructions of metal, concrete, reinforced concrete from static electricity, chemical, microbiological, particularly hydrogen sulfide, corrosion



Application field

Antibacterial, antifungal and antistatic protection of structures, products and storage equipment in the petroleum, oil-refining, chemical, gas and construction industries, underground tunnels, subway, underground main overpasses, the development of potassium and other natural deposits, municipal engineering: collecting system, treatment facilities.

Description of products

Bifunctional composition "Antibes" and coverage based on it have the high performance and flexibility by combining in one material antistatic properties that provide intrinsic safety covers, weather resistance and protective properties of the complex of many affecting factors: micaleal fungi, different strains of bacteria, corrosive acid, alkali and saline environments, produced water, stock oil and petroleum products, lignosulfonate, sodium thiocyanate, carbamide , ammonium sulfate, foamy emulsion for firefighting.

Competitiveness	There is no production of anti-corrosive composition, which combines the function of protecting metal products and structures from static electricity and microbiological corrosion in Belarus. In relation to foreign counterparts, in particular, "INERTA 50", "INERTA 60" ("TEKNOS"), the composition "Antibes" has a high antimicrobial activity of sulfate-reducing bacteria, which are the initiators of the most dangerous types of localized corrosion (pitting, rill, pit) in the oil, oil-processing and gas industries.
Expected outcome	The increase of the service life of products and constructions, saving metal by preventing its destruction due to biocorrosion, reliability and fire-explosion of oil and chemical industries.
Offers on sale	Delivery by individual orders; joint enterprise; cooperation with the customer on application; license agreement, contract.
Level of readiness	Idea, concept; pilot lot.
The transfer of rights object	Undisclosed information (know-how); scientific and technical information.
The transfer of rights form	License agreement; purchase and sale contract.
Offers for cooperation	Joint production; joint enterprise.
Organization-developer	***Institute of General and Inorganic Chemistry of the National Academy of Sciences of Belarus***

IV-12. The technological process of high-efficiency application of a functional coating on high-wear details for mechanical engineering and aviation engineering with reception of complex strengthening effect. A strengthening coating on high-wear surfaces of details for mechanical engineering and aviation engineering

Application field	Details for mechanical engineering and aviation engineering, working in the conditions of abrasive-mechanical wear and hostile environment.
Description of products	This technology is intended for formation of wear resistant coatings by the method of microplasmous influence with complex strengthening effect on the base of hard alloys on working surfaces of metal objects of arbitrary dimension types, configurations and function with creation of the functionally adapted coatings of the increased thicknesses (from 1 up to 500 microns).
Competitiveness	The hardness of coatings makes about 72–74 HRC, that it is more in comparison with the used laser processing. The roughness of a surface after strengthening is lower in comparison with the laser processing and at the level of the laser and ultrasonic strengthening. The coating cost is 4–6 times lower in comparison with the laser processing.
Expected outcome	As a result there is developed and implemented the technology of formation of protective coatings on a surface of details for mechanical engineering and the aviation engineering in OHP ISZP. Details for mechanical engineering with coatings will be implemented the "Metavtoservis" company and in the "Adipol" company.
Offers on sale	Transfer of engineering specifications and specialist advice on development; cooperation with the customer on application; introduction of technology; agreement on cooperation.
Level of readiness	Serial production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Welding and Protective Coatings Institute***

IV-13. Wear-resistant composite material based on fluoropolymer binders for brake pads of cable cars

Application field	Industrial enterprises of metallurgical profile, as well as plants producing synthetic, glass fibers, the textile industry.
Description of products	Formulations have been developed on the basis of wear-resistant composite fluoropolymer binders with high deformation resistance. Constructive design of a process of obtaining brake pads was proposed. A set of documents of typical production of the process of manufacturing wear-resistant composite material is based on fluoropolymer binder and the brake pads out of it was developed.
Competitiveness	Brake pads from the developed materials have a higher wear resistance, high deformation resistance; service life of brake pads is 1.5 times higher in comparison with similar products imported.
Expected outcome	The full import substitution by absolute replacement of imported parts for domestically produced parts.
Offers on sale	Sale of products; sale of products on a contractual basis.
Level of readiness	Serial production.
The transfer of rights object	Invention.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***V. A. Belyi Metal-Polymer Research Institute of the National Academy of Sciences of Belarus***

V-1. Crucibleless equipment with multilayer lining made from new fireresistant heat-insulating substances for storring and discharging non-iron metals liquid-alloys

Application field
Non-ferrous and alloys metallurgy. Producing significant machineri pieces.

Description of products	Crucible furnace of alloys storring and discharging provides direct heat transfer from the heater to aluminum alloys without losses through the use of reflective heating system. Duration of the furnace is increased, the purity of the metal is also increased by eliminating the use of iron-pot and storage container for slag removal usage. There has been created a multilayer lining with new fire resistant and heat-insulating substances. With furnace capacity of 350 kg unit consumes up to 15 kW/h.
Competitiveness	Energy-efficience, increasing of furnace operating duration (replacing iron-pot furnace, made from fireresistant materials).
Expected outcome	Uning furnaces in casthouse production gives on opportynity to perform refined conditioning with inert gas and fluxes, to prerform modifying conditioning and heat of metal.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply; cooperation with the customer on application.
Level of readiness	Experimental model.
The transfer of rights object	Effective model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Joint production.
Organization-developer	***Physicotechnical Institute of the National Academy of Sciences of Belarus***

V-2. Technology of forming hardwearing contact surfaces of friction mechanism of the tractor "Belarus" with the lazer fibre optic technique application

Application field	Developed technology of laser thermohardening can be introduced in different enterprises of the Republicof Belarus such as MAP, BelAP, Department on Motorways and Road Activities and other enterprises of the Republic of Belarus producing component parts tractors, vehicles and road machinery.
Description of products	There has been developed technological process of the laser thermal strengthening the contact surfaces of friction clutch assemblies of tractor "Belarus" by surface hardening of metal from the solid phase. Resource-saving, high-technology of component parts laser thermostrengthening enables to automate the process of heat strengthening repeatedly (2.5–3 times) to improve strength-nye and wear-resistant properties of component and tractors reliability.
Competitiveness	Laser system applied for the process of heat strengthening with the automated system with CNC model MLS-2-3DF-B with computer programming is a new generation equipment, the technology of strengthening is competitive.
Expected outcome	The consumer of the technology is MAP. Potentional consumers are enterprises of machinery and road machinery industry as well as other industrial branches.
Offers on sale	Sale of products; transfer of engineering specifications and specialist advice on development; sale of technology; introduction of technology.
Level of readiness	Experimental model; pilot lot; serial production.
The transfer of rights object	Invention; production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works; joint production.
Organization-developer	***Belarusian National Technical University***

V-3. Air purification filter

Application field	Air filter is designed to clean non-corrosive, non-explosive and not inclined to sticking and condensation of gaseous mixtures of fine dust at temperatures up to 100 °C.
Description of products	Performance of purified gas — no more than 8,000 m^3/h, filtration area — 120 m^2, allowable pressure (vacuum) inside the filter — 5 kPa, mass concentration of dust at the inlet — no more than 50 g/m^3, installed capacity — no more than 2 kW, degree of purification — no less than 99.5 %, hydraulic friction — 2.90 kPa overall dimensions: length — 4,550 mm, width — 2,450 mm, height — 6,200 mm, weight — no more than 4,400 kg.
Competitiveness	Competitive with the installation of the filter regeneration system of filter elements as with compressed air, so using the atmospheric pressure.
Expected outcome	Application the designed filter allows companies to use affordable high quality filtration equipment.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply.
Level of readiness	Experimental model; serial production; limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***Scientific Production Association "Center" RUE***

V-4. Antifriction powder material, modified with nanostructured particles in the form of oxide components, technology and equipment for the manufacturing of a two-layer anti-friction products with high wear resistance of the centrifugal method of inductive welding

Application field

Two-layer anti-friction products, manufactured with the use of developed antifriction material, modified by nanostructured particles in the form of oxide components, technologies and equipment are used in friction tribotechnical purpose machines and mechanisms operating in the regime of intense abrasive wear.

Areas of application development — enterprises of railway, engineering, road construction, petrochemical, agricultural, and other profile of Belarus and other countries.

An indicative list of products, manufactured by two-layer anti-friction: the details of the track machines for alignment, padding, finishing and cleaning gravel path (bushing tamping units and lifting electromagnets nut machines such as the CDF and HBO), running coupling nodes pickup dragline mining shovels, driving pair of road-building machinery, bearings, cartridge bushings, inserts, worm wheels, nuts, valves, rings, synchronizer, load and driving screws of machine equipment, boxes, hubs, gears, etc.

Description of products

Antifriction-layer products contain the powder consisting of copper-based alloy with nanomodifiers in the form of oxide components and the steel framework that enables high hardness and wear resistance of clad layers running mate parts of various machines and mechanisms operating under conditions of intense abrasive wear. Technology and equipment for manufacturing two-layer anti-friction products include inductive method in the field of centrifugal forces.

Main technical characteristics of the material, product and process of manufacture by centrifugal induction welding:

- dimensions of produced two-layer anti-friction components: the length of 40–400 mm, outside diameter — 20–400 mm, wall thickness — 5–80 mm;
- melting temperature of the material — 930–940 °C;
- layer thickness — 0.5–80 mm;

– hardness of the coating — 175–185 HB;
– porosity of the deposited layer — 1.5–1.7;
– the relative wear resistance in comparison with analogues — in 2–3 times;
– saving of non-ferrous alloys — 75–85 %.

Scientific novelty of the design is to establish the characteristics of melting of the powder layer with nanostructured modifiers for induction surfacing. At the same time there was studied the kinetics of moving front of phase transition properties of modifiers and sedimentation of nanostructured phases, as well as the influence of thermal regime on the structure, mechanical and performance properties of the resulting layers. Technical novelty is confirmed by four patents of the Republic of Belarus.

Competitiveness	In comparison with the known analogues of the CIS countries (e. g., products of Tambov factory "Bearing", Kostroma plant of Track Machines (Russia) and abroad (e. g., products of firms "Plasser and Toyer" (Austria) the development has the following advantages: – increasing the service life of parts; – manufacturing of parts of different sizes of repair; – it can provide details of the specified physical and mechanical properties and performance; – the lack of preliminary and final heat treatment; – the availability of equipment development and implementation of technology; – high return on investment and low cost of production; – significant savings of non-ferrous alloys.
Expected outcome	The developed material, technology and equipment for manufacturing two-layer anti-friction products with high wear resistance as compared with domestic and foreign counterparts can improve the hardness of clad layers running mate details of machines operating under conditions of intense abrasive wear by 1.3–1.4 times and the relative durability — by 2–3 times with an increase in productivity of the manufacturing process by 30–35 %.
Offers on sale	Delivery by individual orders; transfer of engineering specifications and specialist advice on development; introduction of technology; license agreement, contract.
Level of readiness	Experimental model; pilot lot; serial production.
The transfer of rights object	Effective model; scientific and technical information; experimental model; others.
The transfer of rights form	License agreement; purchase and sale contract.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works; joint production.
Organization-developer	***Joint Institute of Mechanical Engineering of the National Academy of Sciences of Belarus***

V-5. Creating of a family of high-tech four-cylinder diesel engines with power of 122 h. p. (90 kW) under the guidelines of international standards of environmental safety for Stage 3B of wheeled tractors with innovations that enhance consumers' quality of development

Application field
The engine is designed for mounting on tractors of class 1.4.

Description of products
The 4-cylinder diesel engine with the crank — con-rod mechanism of normal type, with the full-supporting cranked shaft, with the mechanism of gas distribution of valved type, adjustable by a system of gas-turbine inflate with boost air cooling of type "air — air", with fuel-supplying equipment of accumulator type with electronic control, providing the ecological characteristics complying with norms of ECE UN Stage 3A.

Competitiveness	The engine corresponds to the best world samples. Competitive.
Expected outcome	The engine will be used by RUE "MTW" on domestic tractor power units. Increase of environmental safety of the automotive engineering.
Offers on sale	Sale of products; serial production.
Level of readiness	Serial production.
The transfer of rights object	Production prototype; experimental model.
The transfer of rights form	License agreement; purchase and sale contract.
Offers for cooperation	Investments; joint production.
Organization-developer	***"Minsk Motor Plant" OJSC***

V-6. Magnetic pulse (MPP) and electro-hydro-impulsive (EHIP) press for low-cost and accelerated preparation of stamping and assembling

Application field

Developed presses are assigned for accomplishment of stamping and assembling operations and can be used on plants of automobile, aircraft, instrument making industry, in mechanical engineering and in powder metallurgy. Press EHIP can also be used in pile foundations' construction and anchors in building, in cleaning of pipeline systems from scales.

Description of products

MPP and EHIP include high-voltage generator of pulse currents (GPC), that consists of capacitive storage, high-voltage charger, high-current commutator (discharger), control unit and technological unit, equipped with inductor and form tool for MPP and with hydro camera with discharge electrodes for EHIP, where buttons and form tool can be installed.

While processing liquid concrete mix, a two-electrode emitter is a movable operating element that is installed in a hole to fill a bored pile. When the voltage failure of the inter electrode emitter gap takes place, shock wave generates in liquid, which causes plastic metal deformation or local broadening of pile diameter, filled with liquid concrete.

Competitiveness	Is provided with the use of the newest development of high voltage equipment and heavy currents: low-inductance pulse capacitors LIPC, thyratrons with arc-discharge form TADF1-150k/25 and vacuum controlled gap, which allow to raise impulse frequency characteristics and lower up to 5 times weight and size characteristics if compared with best foreign analogs.
Expected outcome	Cost reduction on die tooling in 5–10 times, reduction of energy consumption in 1.5–2 times, preparation terms' reduction of new production in 5–10 times, lower operating costs, reducing the cost of building materials up to 3 times.
Offers on sale	Sale of products; delivery by individual orders; manufacturing and supply; organization of serial manufacture.
Level of readiness	Experimental model; pilot lot; limited production.
The transfer of rights object	Invention; effective model; experimental model.
The transfer of rights form	License agreement; purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works; joint production.
Organization-developer	***Physicotechnical Institute of the National Academy of Sciences of Belarus***

V-7. Manufacturing technology and heat treatment of small dimension types crosspieces, and bearing housings made from steel 60PP of low hardenability by the surface volumetric quenching

Application field	Production of components for automotive vehicles.
Description of products	There was realized a process and developed the technology of manufacturing and heat treatment of small dimension types crosspieces and bearing housings made from steel 60PP of low hardenability by the surface volumetric quenching. According to the materials used in the project development, there were put in three tenders for the supposed inventions. Characteristics : – the number of manufacturing operations — 3 pieces; – coefficient of usage of equipment for heat treatment — 0.7; – coefficient of cost reduction of products — 1.3; – coefficient of reduction of installed capacity — 1.5.
Competitiveness	In the Republic of Belarus, for the manufacturing crosspieces and bearing housings alloy steels such as 20HGNTR, ShKh 15 and 15G1 with the technology of heat treatment by cementation and subsequent quenching are used. The developed technologies do not have analogues and correspond to world standards.
Expected outcome	Developed technological processes, tools and equipment can make crosspieces and bearing housings with three technological operations, coefficient of equipment for heat treatment — 0.7, coefficient of reducing the cost of products — 1.3, coefficient of reduction of installed capacity — 1.5.
Offers on sale	Sale of products on a contractual basis; transfer of engineering specifications and specialist advice on development.
Level of readiness	Pilot lot; serial production.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"BELCARD" JSC***

new

V-8. "BelAZ-75170" mine truck, a load-carrying capacity of 154–160 t, wheel arrangement 4×2, with electromechanical transmission, service life is no less than 900,000 km of run

Application field
It is intended for transportation of muck and other loose cargoes at opencast minings of minerals on technological roads in various climatic conditions.

Description of products	The mine truck with load-carrying capacity of 154–160 t is equipped with the diesel engine "CUMMINS QSK45-C" of power of 1,492 kW with an electronic control system. A frame from alloyed steel with use of cast elements in places of the greatest stresses, pneumohydraulic suspension with the new guiding device. The improved dynamic and propulsion parameters.
Competitiveness	In comparison with the best foreign analogues ("Terex MT3600B", "Komatsu 630E", "Caterpillar Cat-789B") the "BelAZ-75170" mine truck surpasses them in such parameters as a specific power (higher), laden mass and total mass (lighter by 0.7–2.3 t), overall dimensions (smaller height, length, loading height), and better parameters of smoothness of motion.
Expected outcome	Application of the new mine truck will increase an average operational speed of movement by 3–5 %, will decrease fuel consumption by 5–9 %, will decrease labour input of maintenance by 8–12 %, will increase useful life by 12–15 %, will decrease cost price of transportation of a tonne-kilometre of cargo by 15–18 %.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; organization of serial manufacture; serial production.
Level of readiness	Limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"BELAZ" OJSC***

V-9. "BelAZ-75310" mine truck, a load-carrying capacity of 240 t, with an electromechanical transmission of "alternating — alternating current", life is no less than 900,000 km of run

Application field	It is intended for transportation of muck and other loose cargoes on opencast minings of minerals on technological roads in various climatic conditions.
Description of products	The mine truck with a load-carrying capacity of 240 t is equipped with the diesel engine "CUMMINS QSK60-S" of a power of 1,864 kW, with an electronic control system. A frame from alloyed steels with use of cast elements in places of the greatest stresses, pneumohydraulic suspension with the new guiding device. The improved dynamic and propulsion parameters.
Competitiveness	In comparison with the best foreign analogues ("Terex MT4400B", "Euclid Hitachi EH4000", "Caterpillar Cat-793C"), the "BelAZ-75310" mine truck surpasses them in a load-carrying capacity (higher by 4–12 t), has the better parameters of smoothness of motion and propulsion-dynamic characteristics.
Expected outcome	The use of a new mine truck will increase an average operational speed of movement by 6–8 %, will decrease fuel consumption by 7–10 %, will decrease labor input of maintenance by 6–10 %, will increase exploitation resources by 9–11 %, will decrease the cost price of transportation of atonne-kilometre of cargo by 10–13 %.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; organization of serial manufacture; serial production.
Level of readiness	Limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"BELAZ" OJSC***

new

V-10. "BelAZ-75450" mine truck, a load-carrying capacity of 45 t, with hydromechanical transmission, wheel arrangement 4×2, axle suspension on trailing arms with central hinges and unilocular pneumohydraulic cylinders, useful life is no less than 600,000 km of run

Application field

It is intended for transportation of muck and other loose cargoes at opencast minings of minerals on technological roads in various climatic conditions.

Description of products

The mine truck with a load-carrying capacity of 45 t is equipped with the diesel engine "CUMMINS QSX15-C" of power of 448 kW, meets safety requirements for emission of exhaust gases EPA of class Tier III, with an electronic control system. A frame from alloyed steel with use of cast elements in places of greatest stresses, pneumohydraulic suspension with the new guiding device, multi-disk oil-cooled brakes. The improved dynamic and propulsion parameters.

Competitiveness	In comparison with the best domestic ("BelAZ-7547") and foreign ("Terex TR45", "Hitachi R50", "Caterpillar 773E") analogues the "BelAZ-75450" mine truck surpasses them in such parameters as a laden mass and total mass (lighter by 1.3–3.9 t), overall dimensions (smaller length, width, base), maneuverability (smaller radius of turn), and better parameters of smoothness of motion.
Expected outcome	Application of the new mine truck will increase an average operational speed of movement by 10–12 %, will increase the total coefficient of efficiency of transmission by 7–10 %, will decrease fuel consumption by 7–8 %, will decrease labour input of maintenance by 18–20 %, will increase useful life by 45–50 %, will decrease cost price of transportation of a tonne-kilometre of cargo by 11–12 %.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; serial production.
Level of readiness	Limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"BELAZ" OJSC***

V-11. The design and manufacturing technology of glasses lenses for work with a computer

Application field	Designed lenses are meant for use as glasses lenses for work with a computer.
Description of products	The developed lens is meant for matching the spectral characteristics of eyes' photoreceptors and computer monitors. The performed work includes the following milestones. 1. Research and development of spectral characteristics of the lenses for work with a computer. 2. Development of the construction and coating technology with given spectral characteristics. 3. Conversion of serial production of eyeglass lenses to work with a computer.
Competitiveness	In the Republic of Belarus, lenses for work with computer have not been manufactured, they comply with international standards. The lenses will not only protect your eyes from harmful monitor radiation, but also provide the conformation of spectral characteristics of retinal photoreceptors and the luminophors of the screen that reduces stress on the visual analyzer of the brain.
Expected outcome	Application of glasses with developed lenses will allow to reduce fatigue while working with a computer.
Offers on sale	Manufacturing and supply; organization of serial manufacture; serial production.
Level of readiness	Limited production.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"Plant "Optic" JSC***

V-12. The development of obtaining modes of a permeable composite material and manufacturing technologies of its clean filters of non-corrosive gases and air. The development of filter constructions and recommendations for their recovery

Application field	The technology of production of permeable composite material and production process of clean filters of non-corrosive gases and air. The design of filters and their production.
Description of products	There were developed technological regimes of obtaining a permeable composite material and filter element constructions. Pressing modes and sintering of titanium powder filter elements were perfected in order to obtain the desired properties: filtration efficiency, porosity and mechanical strength. The following characteristics of the filter element were obtained: porosity — 35–42 %, average pore size — 52–62 microns, filtration efficiency for particles of 50 microns — no less than 98 %.
Competitiveness	In comparison with foreign analogues ("Poral", France) with the equivalent porosity filtration efficiency above 10 %, the cost is 40 % less.
Expected outcome	The reduction of consumption of powdered material, reducing the sintering temperature and time of products. Saving resources and energy by 10–15%. The possibility of repeated regeneration in field conditions.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; cooperation with the customer on application.
Level of readiness	Limited production.
The transfer of rights object	Invention.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Powder Metallurgy Institute***

V-13. The gear shaving semiautomatic device with CNC for toothed gears processing with diameter up to 320 mm with a CNC level control system and the development of pattern making BCH-732 CNC23

Application field
Machine tool industry, automotive industry, agricultural engineering, electrical and war industry.

Description of products	Gear shaving semiautomatic device with CNC of CNC level is meant for cylindrical gears handling with diameter up to 320 mm in a serial, high-volume and mass production. It has an electronic mechanism of "barrel distortion", allowing to obtain different versions of tooth shape during processing.
Competitiveness	As a result of the realization of this project the competitiveness of tools has increased, the possibility of their delivery for export in countries near and far abroad is increasing, working staff conditions improved, production costs reduced.
Expected outcome	The labor content and energy intensity was reduced during the production, the processing productivity increased, the diagnostics improved, there appeared a possibility to get any modification during the tooth processing, reliability and durability increased.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Limited production.
Organization-developer	***Vitebsk Machine Tool Plant "VISTAN"***

export
import

V-14. The horizontal machining center with CNC MS1761F3

Application field
The horizontal machining center can be applied in small-scale production, series production at the machine-building enterprises The horizontal machining centers are intended for performance of turning works, drilling, tapping and millings.

Description of products	The MS1761F3 horizontal machining center is a base for a wide range of machine tools. A customer has a possibility to choose the model of the machining center optimal for manufacture with one or two supports and a counterspindle, chip conveyors.
Competitiveness	The MS1761F3 horizontal machining center corresponds to the world level in machine-tool construction. The main competitive advantage of the center is its price.
Expected outcome	The manufacture of the horizontal machining centers with CNC, produced by a block-modular method, will allow to satisfy a demand of the domestic enterprises in machine tools of such type.
Offers on sale	Delivery by individual orders.
Level of readiness	Pilot lot.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"P. M. Masherov Minsk Automatic Lines Plant" RUE***

V-15. The vertical machining center with CNC for five-sided machining of model of BYVER630

Application field
Various branches of mechanical engineering with individual, small-scale and series production.

Description of products	The vertical machining center with CNC for five-sided machining of model of BYVER630 is intended for serial machining of details for one process installation by a vertical spindle by means of drilling, core-drilling, boring of holes by co-ordinates, contour milling with linear and circular interpolation, tapping.
Competitiveness	In relation to the best domestic samples: there are no analogues. In relation to the best foreign samples: as of functional characteristics and quality it corresponds to the best analogues — to model of 500V/5 produced by "Sterlitamak Nachine-Tool Factory" (Russia) and to model C30 produced by "Hermle" (Germany).
Expected outcome	The vertical machining center with CNC for five-sided machining of model of BYVER630 does not influence negatively on environment ecology.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders.
Level of readiness	Limited production.
Organization-developer	***"StankoGomel" JSC***

import

V-16. The MP3-180 garbage truck

Application field	Objects of sanitary cleaning and improvement of cities and town settlements.
Description of product	The garbage truck consists of the unified loading device (handler) with capture of a container in any point of its position in radius ± 90° from a longitudinal axis of the garbage truck, the reception chamber, located in the butt part of the equipment, in which loaded firm wastes preliminarily are compacted and moved into the body where by means of the pressing plate the second stage of compaction is carried out. Unloading of wastes from the garbage truck is carried out with the lifted back cover at the expense of movement of the pushing out plate.
Competitiveness	In technical and operational characteristics it surpasses domestic garbage trucks with back loading at the expense of highly effective system of collection and compaction of wastes. It corresponds to the level of the foreign analogue produced by "FAUN" (Germany).
Expected outcome	Replacement of parks of refuse collectors of the enterprises of sanitary cleaning by more economical machines.
Offers on sale	Sale of products on a contractual basis; partnerships or other arrangements.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
Offers for cooperation	Investments.
Organization-developer	***"Zhilcommuntechnika" RUE***

VI-1. Curved blank light- and heat-shielding heat-strengthened windows for land public transport

Application field	Completing of import substitution programme on curved heat-strengthened windows produced and developed in the Republic of Belarus for public transport, agriculture and construction machinery. Export of the new production to the CIS countries.
Description of products	There has been developed new import substitution production of curved heat-strengthened windows (CHW) for produced in the country and advanced models of mobile equipment. There has also been developed and produced necessary for CHW processing equipment. Tests and certification of CHW in accordance with NHS requirements STB972 and ECE Regulation number 43 have been carried out.
Competitiveness	Production quality corresponds to the requirements of the Rules EEK UNO # 43. The accuracy of the shape and size of products corresponds to the designed documentation of the customers. Technical and economic indicators of production, its energy intensity correspond to the world analogues.
Expected outcome	Annual import substitution of the curved heat-strengthened windows on the sum of 1.5–2 million US dollars. Increase of hi-tech advanced processing of domestic heavy sheet glass.
Offers on sale	Manufacturing and supply; serial production; delivery of the finished product.
Level of readiness	Serial production; limited production.
The transfer of rights object	Production prototype; undisclosed information (know-how); scientific and technical information; experimental model
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Investments; joint production.
Organization-developer	***"KUVO" UPPE***

VI-2. "Belarus 3522" wheel tractor of general purpose of drawbar class 6 for performance of power-intensive works in agriculture, industry, building and other branches

Application field

The tractor is intended for performance of power-intensive agricultural works in tractive and tractive-driving modes in composition of wide-cut and combined units; for the basic and preplant processing of soil, sowing of crops and other cultures, laying-in of fodder, harvesting of root crops, grain and technical crops; for transport, cargo handling and stationary works, works in building and industry.

Description of products	The wheel tractor of general purpose of drawbar class 6, is equipped with the diesel engine with a turbo-supercharging of power of 261 kW, dry double-disk clutch, hydromechanical step-by-step gearbox, independent front and rear driving axle, hydrovolumetric steering, universal hydro-suspended system with a pump of variable productivity, distributor with a electrohydraulic control, with a power, positional and mixed methods of regulation of depth of soil processing.
Competitiveness	As the tests of the "Belarus 3522" tractor have shown, its application in agricultural production will allow to solve a number of problems of labor productivity increase with the least operational-technological expenses per a unit of the made product and will create preconditions to steady dominating positions in domestic tractor construction.
Expected outcome	As a result of product realization it is supposed to carry out updating of park of tractors in the Republic of Belarus, to increase export of tractors to the CIS countries and other countries (Poland, Lithuania, Latvia, Bulgaria, etc.). Improvement of ecological compatibility of the tractor (reduction of harmful influence on soil and decrease of emission of harmful substances) will promote environment preservation, increase of productivity and decrease of the cost price of agricultural crops.
Offers on sale	Sale of products; sale of products on a contractual basis; joint production; license agreement, contract.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***"Minsk Tractor Works" RUE***

VI-3. "BelAZ-75810" underground dump truck, a load-carrying capacity of 50 t, wheel arrangement 4×4, with hydromechanical transmission, diesel engine with a little toxicity for work in straitened conditions of underground mine openings (mines, tunnels)

Application field	The underground dump truck is intended for transportation of muck and minerals on routes of underground mine openings with a length to 8 km and average slopes to 12 %. The maximum level of mine water on separate parts of a route may be to 1 m.
Description of products	"BelAZ-75810" underground dump truck with load-carrying capacity of 50 t, wheel arrangement 4×4 is equipped with the diesel engine with a little toxicity and power of 535 kW, two-stage system of purification of exhaust gases, multi-disk brakes of driving axles with forced cooling of disks, comfortable single-seat closed cab with a modern design, which meets safety requirements of ROBS/FOPS.
Competitiveness	The technical characteristics correspond to the level of the best foreign analogues: "Atlas Copco MT5020 (USA)", "Sandvik Toro 50" (Finland), "DUX TD45" (Canada).
Expected outcome	The high technical-operational characteristics with the reasonable price will make the product attractive for buyers at home and abroad. The underground dump truck with a high technological level and price 1.5–2 times lower than foreign analogues will be quite competitive in the world market.
Offers on sale	Sale of products; manufacturing and supply; organization of serial manufacture.
Level of readiness	Limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"BELAZ" OJSC***

P

export

import

VI-4. "MoAZ-4055" load-haul-dump unit, load-carrying capacity of 9 t, wheel arrangement 4×4, for work in straitened conditions of underground mine openings (mines, tunnels)

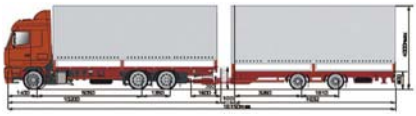
Application field	The development is intended for transportation of muck and minerals in underground mine openings and to load the underground dump trucks with a load-carrying capacity to 50 t in constrained conditions of mines and tunnels.
Description of products	"MoAZ-4055" load-haul-dump unit, load-carrying capacity of 9 t, wheel arrangement 4×4, is equipped with the diesel engine with a little toxicity and power of 179 kW with two-stage system of purification of exhaust gases, multi-disk brakes of driving axles with cooling in an oil bath, comfortable single-seat open cab with a modern design, which meets safety requirements of FOPS.
Competitiveness	The technical characteristics correspond to the level of the best foreign analogues: "Atlas Copco ST-1020" (Canada), "Sandvik Toro 400" (Finland), "Bumar LK-4" (Poland), "H.Paus PEL 50" (Germany).
Expected outcome	"MoAZ-4055" load-haul-dump unit with a load-carrying capacity of 9 t will successfully compete in the world market with the load-haul-dump units of the same load-carrying capacity that is the problem decision of import substitution for the domestic mining industry.
Offers on sale	Sale of products; manufacturing and supply; service maintenance.
Level of readiness	Serial production.
The transfer of rights object	Invention.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"BELAZ" OJSC***

VI-5. The articulated chip truck in composition of the triaxial automobile of 6×4 type and the biaxial trailer with the total volume of the fixed bodies of 60–80 bulked cubic meters

Application field
Transportation of wood loose materials (chips) and other various materials with a density from 0.3 up to 0.35 t/m^3 on public roads, timber-carrying roads and departmental roads with the load-carrying ability corresponding to technical characteristics of the automobile (articulated truck).

Description of products	"MAZ-6501A5 + MAZ-857102" articulated chip truck is equipped with the engine YaMZ-6582.10 with power of 240.6 kW, corresponding to requirements of ecological norms of Euro-3, and the 8-step transmission box YaMZ-2381-07 with power takeoff from the end face of the transmission box. The frame with longerons of a constant profile on the length, the strengthened base (4400 + 1400 mm). The cabin 6501 is short with the low roof, with the spring suspension. The automobile and trailer bodies are all-metal with lateral unloading. The total volume of the bodies is 72.5 m^3.
Competitiveness	Creation in a new generation of automobiles of the articulated chip trucks will allow to provide the market of the Russian Federation, the Republic of Belarus, the CIS countries with a high-efficiency vehicle of the big tonnage for transportation of chips in the forest industry.
Expected outcome	The specific productivity of the developed articulated trucks is higher than for the base (serial) variant by 65 %. Increase of life by 30 %. Expenses for maintenance and operating repair are less than for the base variant at the average by 25 %. More comfortable working conditions for a driver. Increase of protection of environment.
Offers on sale	Organization of serial manufacture.
Level of readiness	Limited production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Minsk Automobile Plant" JSC***

VI-6. The articulated trucks of a new generation with an increased truckload for the international and long-distance transportations, corresponding to international norms for ecology of Euro-4: the side tractor of 4×2 type with the triaxial trailer with the total volume of the bodies of 110–112 m^3 and the side tractor of 6×2 type with the biaxial trailer with the central axes with the total volume of the bodies of 115–117 m^3



Application field	International and long-distance transportations.
Description of products	The "MAZ-631019 + 837310" articulated truck: the engine — Daimler OM501 LA, V6 (Euro-4), a power of the engine — 320 kW (435 h. p.), the transmission — ZF16S221. "MAZ-534019 + 870102" articulated truck: the engine — OM501 LA, V6 (Euro-4), a power of the engine — 320 kW (435 h. p.), the transmission — ZF16S221.
Competitiveness	Due to application of up-to-date engines of the increased power with the optimized reduction ratio of transmission, tubeless tires with the reduced rolling resistance, the improved aerodynamics, the articulated truck possesses, the high propulsion, and speed characteristics, and fuel efficiency.
Expected outcome	The specific productivity of the developed saddle articulated trucks is higher than for the base (serial) variant by 20–25 %. Increase of life by 20 %. Expenses for maintenance and operating repair are less than for the base variant at the average by 15–25 %. Increase of protection of environment.
Offers on sale	Cooperation with the customer on application.
Level of readiness	Limited production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Minsk Automobile Plant" JSC***

VI-7. The city bus with a low floor of the second generation corresponding to international norms for ecology of Euro-4 and Euro-5

Application field
It is used for transportation of passengers on city and suburban routes.

Description of products
The city bus of the second generation has a completely low construction: the height of the saloon floor makes only 330 mm from a roadbed, that in combination with the system of kneeling provides the maximum convenience of an entrance and an exit from the saloon that is especially important for people with limited mobility; the power system of the framework based on bulkhead principle, provides the maximum durability and passive safety of the bus; the pneumatic suspension with electronic control gives additional stability to the bus, allows to carry out dynamic change of a road clearance, and also to carry out lowering of the body of the bus on stops; the additional multilayer noise isolation of the motor compartment with application of composite materials reduces to the minimum the noise level in saloon from the working motor; application on all wheels of disk brakes essentially increases efficiency of braking, and also increases life of the brake system. Application of the 6-step automatic transmission allows to optimize regimes of movement both in a city cycle and for trips for a long distance; the optimum microclimate in the saloon is provided by the conditioner.

Competitiveness	The modern design, rational lay-out of the saloon in combination with the big platform, semisoft seats and convenient hand-rails do a trip in the bus more comfortable; traditionally, much attention is given to the workplace of the driver: an ergonomic seat on the pneumatic suspension, a new dashboard, an individual heater and other elements improving working conditions of the driver are applied.
Expected outcome	Lineup expansion in the segment of middle city buses. Strengthening of positions in the traditional market of the CIS countries. Entry to the foreign markets, to the market of the European union.
Offers on sale	Serial production.
Level of readiness	Serial production.
The transfer of rights object	Invention; effective model; production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Minsk Automobile Plant" JSC***

VI-8. The container chip truck for transportation of containers with a capacity of 35–40 bulked cubic meters is equipped with the mechanism for replacement of containers of "multilift" type

Application field
Transportation of chips and wood waste for timber industry and at woodworking enterprises on the roads allowing a load of 20,000 kg on dual axles and on the public roads with fulfillment of requirements of technical standards (TNPA).

Description of products	"MAZ-6501AZ-9330" is equipped with the engine YaMZ-6562.10 with a power of 184 kW, corresponding to requirements of ecological norms of Euro-3, and with the 8-step transmission box YaMZ-2381-07 with power takeoff from the end face of the transmission box. On the automobile there is installed the MPR-3 handling mechanism cargo handling produced by "Velmash-Servis" company (Velikie Luki, the Russian Federation). The maximum load-carrying capacity of the mechanism (weight of the body with a cargo) makes 20,000 kg.
Competitiveness	Technical advantages of the "multilift" system consist in reduction of time for cargo handling operations in 2–3 times in comparison with the trucks with the fixed bodies. The technological level of the container chip truck corresponds to the best foreign analogues: Iveco 260E27KE, MAN 2628YDFK, Mercedes 2643.
Expected outcome	The specific productivity of the chip truck in comparison with the serial saddle articulated chip truck is higher 1.95 times. Increase of resource by 30 %. Expenses for maintenance and operating repair are less than for the base variant by 25 %. Increase of protection of environment.
Offers on sale	Organization of serial manufacture.
Level of readiness	Limited production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Minsk Automobile Plant" JSC***

VI-9. The low floor city bus of the second generation of average passenger capacity

Application field
Passenger transportation on city routes of average congestion.

Description of products
The city bus of the second generation of average passenger capacity with low level of a floor in a forward part of the saloon, with the big platform, small radius of turn, with the increased dimension on width and of apertures of the doors, corresponding to the last requirements of EEK OON (Rules No. 107), with necessary changes of the design, providing using by people with limited possibilities with a passenger capacity of 60–70 persons at a length of 8.5–8.8 m. The construction also includes modern decisions for brakes: installation of disk brakes on all wheels, and for a steering: installation of a steering of integrated type is provided. Implementation of such constructive differences allows to provide not only fulfillment of modern requirements for certification, but also gives a possibility to improve operational characteristics of the bus: to increase passenger capacity and speed of passenger exchange. Presence of disk brakes and a steering of integrated type do the bus more maneuverable and raise active safety.

Competitiveness	The modern design, rational lay-out of the saloon in a combination with the big platform, semisoft seats and convenient hand-rails do a trip in the bus more comfortable; traditionally much attention is given to the workplace of the driver: an ergonomic seat on pneumatic suspension, a new dashboard, an individual heater and other elements improving working conditions of the driver are applied.
Expected outcome	Lineup expansion in a segment of middle city buses. Strengthening of positions in the traditional market of the CIS countries. Entry in the foreign markets, the market of the European Union.
Offers on sale	Serial production.
Level of readiness	Serial production.
The transfer of rights object	Invention; effective model; production prototype.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Minsk Automobile Plant" JSC***

VI-10. The saddle average tonnage articulated trucks of a load-carrying capacity of 12.5 t for the suburban, regional and long-distance transportations, corresponding to ecology norms of Euro-3, Euro-4, Euro-5

Application field
Transportation of various cargoes (a foodstuff, clothes, footwear, fancy goods, home appliances, furniture, etc.) on public roads.

Description of products	"MAZ-447131 + 931020" articulated truck: a load-carrying capacity of 12.5 t, engine Deutz BF 4M1013 FC Code 140G/2 of a power of 140 kW (ecological class 3), transmission ZF 6S800TO. "MAZ-447137 + 931020" articulated truck: a load-carrying capacity of 12.5 t, engine Deutz TCD 2013 L04 4V Code C4SF140 (ecological class 4) of a power of 140 kW, transmission ZF 6S800TO and MAZ-4471V2 + 931020 articulated truck, a load-carrying capacity of 12.5 t, engine MAN D0834LFL64 of a power of 132 kW (ecological class 5), transmission ZF 6S800TO.
Competitiveness	Due to application of up-to-date engines of the increased power with the optimized reduction ratio of transmission, tubeless tires with the reduced rolling resistance, the improved aerodynamics, the articulated truck possesses the high propulsion and speed characteristics and fuel efficiency.
Expected outcome	The specific productivity of the developed saddle articulated trucks is higher than for the base (serial) variant by 20–25 %. Increase of resource by 20 %. Expenses for maintenance and operating repair are less than for the base variant at the average by 15–25 %. Increase of protection of environment.
Offers on sale	Organization of serial manufacture.
Level of readiness	Limited production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Minsk Automobile Plant" JSC***

VII-1. Equipment complex for automated distribution of all mash to pigs by complicated transportation routs

Бункер сухих комбикормов БСК-15

Приводная станции

Транспортирующие рабочие органы и кормовые трубы

Транспортирующие рабочие органы раздачи корма и поворотные блоки

Application field
Agriculture enterprises.

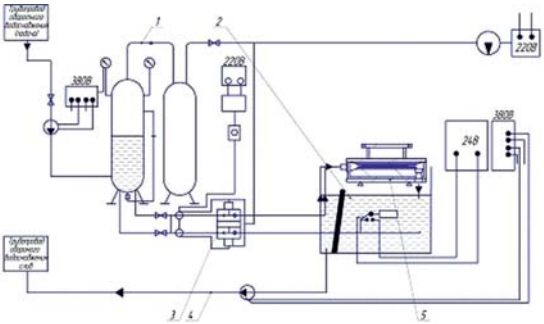
Description of products
The set of equipment for automated all mash distribution for pigs with complicated transportation routes, consisting of dry feed hopper, length lines of feed distribution, food distribution lines, monitoring and control systems will provide a dosage output of dry all mash to the group feeder and the simultaneous watering pig on rearing and fattening with complicated transportation routes.

Competitiveness	Application of the complex equipment for all mash distribution will provide productive pigs feeding with average daily gain on feed about 700–800 g.
Expected outcome	Approximate cost of the new equipment complex is about 18 thousand US dollars. Currency assets release will be 720 thousand US dollars.
Offers on sale	Transfer of engineering specifications and specialist advice on development; license agreement, contract.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Center of the National Academy of Sciences of Belarus on Agriculture Mechanization***

VII-2. Multifunctional tillager

Application field	Agricultural enterprises.
Description of products	Designed for peeling stubble, mulch tillage for planting post-cut, crop and winter grain crops, formation treatment of annual and perennial grasses before plowing, autumn process fields after the harvest of potatoes, corn, beets, early spring and fall plowing alignment termination of organic and mineral fertilizers, pre-processing soil for planting grains, legumes, potatoes, corn, beet, flax and grasses.
Competitiveness	The unit has a block-modular design that is provided by moving the blocks of actuating devices or replace them interchangeable blocks, composing machine design schemes that best meet the technological processing of various agricultural backgrounds.
Expected outcome	If compared to the existing set of tillage machinery, its operation will reduce labor costs by 17 %, the cost of mechanized operations — 37 % with an annual economic effect of 208 million rubles, which will provide return on investment from the new machine in 1.03 years.
Offers on sale	Transfer of engineering specifications and specialist advice on development; license agreement, contract.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Center of the National Academy of Sciences of Belarus on Agriculture Mechanization***

VII-3. Technology of impact harderning liquid cooling of changing parts of agriculture machinery



1-блок управления расходом ОЖ; 2-блок управления отводом ОЖ; 3-система управления клапаном «Бабочка»; 4-система оборотного водоснабжения; 5-закалочное устройство

Application field	It is used by producing changing parts (flat, spherical, fugurine-shaped, etc.) for tillage-planter and forage harvesting machinery.
Description of products	Technology of impact harderning liquid cooling allows to produce units of submicro-and nanocrystalline structural framework, characterized by high efficiency, without expensive alloy steels. High impact strength (at least 1 MJ/m2) remains in the hardening of a sufficiently high hardness (56–62 HRC) and strength (over 2,000 MPa).
Competitiveness	Units with such complex of mechanical-and-physical properties correspond to the world analogues in technical level, while their market cost is 20–30 % lower.
Expected outcome	This technology is enegy- and resourse-saving, high efficient, ecological friendly and corresponds to the innovation requirements of domestic poduction.
Offers on sale	Introduction of technology; license agreement, contract; agreement on cooperation.
Level of readiness	Limited production.
The transfer of rights object	Effective model; scientific and technical information.
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works; joint production; joint enterprise.
Organization-developer	***Belarusian State Agrarian Technical University***

VII-4. Tractor-mounted mower-conditioner

Application field	Agriculture enterprises.
Description of products	Disk mower — conditioner CIT-3, 1 is designed for cutting and further processing of legumes, grasses and legume — grass mixtures with laying the crop in the swath or windrow. To accelerate the water yielding cut grass mower has a set of replaceble adapters: roller. The mower is agregated with tractors of 2.0 ("Belarus 1221"). Productivity per hour shift time 2.16–3.7 ha/h, fuel consumption 5.5–6.5 kg/ha.
Competitiveness	Design charecteristics: cutting speed of over 90 m/sec, the device is equipped with a calender with herringbone rubber rollers, ensures gentle treatment of plants, especially legumes. Losses are no more than 4 %.
Expected outcome	Expected annual resources savings for anticipated needs (2,000 pcs.) Those are: fuel — 1.56 tons, 0.3 million live labor. Expected annual economic efficacy on the amount of implementation — 10.7 billion rubles. The machine has favorable export prospects to the CIS countries.
Offers on sale	Transfer of engineering specifications and specialist advice on development; license agreement, contract.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Center of the National Academy of Sciences of Belarus on Agriculture Mechanization***

VII-5. The base model of harvesting complexes with the engine of a power of 600 h. p.

Application field	The complex is intended for harvesting of corn in any phase of ripeness of corn, sunflower and other cultures, selection of natural grasses from rollers with simultaneous crushing and loading in vehicles.
Description of products	The complex is equipped by a six-rolling feeding device, a hydraulic drive of the feeding device and adapters, a stone-metal detector, a crushing device, a post of control, an onboard information-control system on the base of a computer, a final crushing device, a system of unloading of a crushed mass. The complex is equipped with a harvester for caulescent cultures with the width of capture of 6m; pickup with a width of capture of 3 m; harvester for harvesting of grasses with a width of capture of 6 m.
Competitiveness	Productivity increases at the expense of increase of engine power, of presence of the basic and additional fuel tanks, application of wide-cut replaceable adapters, improvement of passability at the expense of application of wide-profile wheels, increase of transport speed to 40 km/h.
Expected outcome	The smaller cost price of harvesting of forages. Conformity to modern ecological requirements is provided.
Offers on sale	Sale of products; organization of serial manufacture; serial production.
Level of readiness	Limited production.
The transfer of rights object	Invention; production prototype.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***GSKB for Grain and Forage Machinery***

VII-6. The beet-harvesting self-propelled combine on the base of the unit for harvesting of sugar beet

Application field	The combine is intended for single-phase harvesting of root crops of sugar beet, carries out cropping of beet tops with their scattering across the field, cropping of heads, excavation of root crops, separation and clearing of a pile from the soil and plant residues, loading of root crops in a bunker and unloading in a vehicle or a field pile.
Description of products	The combine design consists of a beet tops harvesting module, a root harvesting module, the receiving conveyor, a block of feeding rotors, a bunker with the system of conveyors (loading, bottom, unloading) and a screw distributing conveyer, a cabin with a platform of control and a workplace of the operator, a frame of the combine, a power unit, chassis with axels of the driving and driven wheels, electric equipment, a hydraulic system and mechanical transmissions.
Competitiveness	Rigging of the combine by the onboard computer, a mechanism of automatic driving on seedbeds, a system of automatic control of depth of digging, a bridge for swinging axis with the system of increasing stability, a system of video monitoring, cruise-control for determination and maintenance of speed of movement.
Expected outcome	The solution of the problem of effective harvesting of sugar beet due to reduction of expenditure of currency funds for purchase of combines abroad and due to reduction of cost price of harvesting.
Offers on sale	Sale of products; organization of serial manufacture; serial production.
Level of readiness	Limited production.
The transfer of rights object	Invention; production prototype.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***GSKB for Grain and Forage Machinery***

VII-7. The machine for high-precision applying of simple and mixed mineral fertilizers

Application field	Agricultural production enterprises.
Description of products	The rod machine for applying mineral fertilizers is intended for transportation and high-precision superficial application of simple and mixed mineral fertilizers. Machine coverage is 18 m. The range of doses for applying mineral fertilizers is 80–700 kg/ha. Productivity per 1 h of the basic time (at the application dose of 400 kg/ha and packed density of fertilizers not less than 1.1 t/m^3) is 18 ha. The capacity of the bulk body is 9 m^3.
Competitiveness	Non-uniformity of distributing fertilizers by coverage (between single sowing devices) of the machine for high-precision application of simple and mixed solid mineral fertilizers does not exceed 15 %, non-uniformity of applying fertilizers on the course of machine movement — no more than 10 %.
Expected outcome	Economic efficiency: expected annual economic benefit — not less than 36,943.2 thousand rubles, degree of reduction of the cost price of the mechanised works for the new machinery, taking into account a crop increase (due to decrease of non-uniformity of application) — by 1.53 centners/ha, percent — 62.38 %, degree of labour input decrease— 37.5 %.
Offers on sale	Transfer of engineering specifications and specialist advice on development; license agreement, contract.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Center of the National Academy of Sciences of Belarus on Agriculture Mechanization***

VII-8. Developing and introducing in manufacture a complex of machines for stone removal

Application field
Agriculture of the Republic of Belarus and the countries with similar soil-climatic conditioned, cultivation.

Description of products	As a whole the technology of stone removal includes extraction and removal of large and average stones in the size to 30 cm and removal of small stones in the size to 3–5 cm. Stone removal from a surface and the top soil layer at the field contamination less than 20 m^3/ha. There are about 1 million ha of such fields in the republic. It is technically and economically justified to spend by swathing with swath upsizing for 3–6 roller passes and removing stones out of swaths. At higher contamination with stones the removal should be carried out with a roller — stone collector.
Competitiveness	Launching the manufacture of a complex of stone removal machines reduces costs for soil processing, cultivation and harvesting at the expense of cost reduction by replacing and repairing movable operating elements of soil-cultivating and harvesting machines, increase of their productivity and decrease of combustive-lubricating materials consumption.
Expected outcome	The annual resource saving for the full volume of introduction (1,000 pieces) will make: fuel — no less than 8,000 t, labour — no less than 500,000 person-hours and metal — no less than 0.6 t. The saving of currency means at the expense of import substitution will make more than 25,000 c. u.
Offers on sale	Transfer of engineering specifications and specialist advice on development; license agreement, contract.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Center of the National Academy of Sciences of Belarus on Agriculture Mechanization***

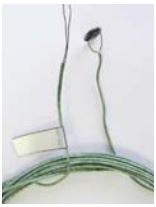
VIII-1. Raman spectrometer with a microscope

Application field

The spectrometer is designed for complex analysis of the molecular composition of different media (semiconductors, liquid crystals, polymers, pharmaceutical and biological agents, crystals, thin films and nanostructures). It can be used in a continuous scan by studying high-speed process.

Description of products	Raman spectrometer is produced on the based of double diffraction monochromator and equipped with a wide-U1000 microscope, giving an opportunity to carry out research of micro-objects. Movable microscope stage allows to map the surface of macrosample in order to determine the coordinates of micro-inclusions. Two ways of registering the spectra (photon counting with a photomultiplier, the summing up of charge CCD) significantly expand the feasibility of the device. Control of the spectrometer operations, processing of the experimental results by a computer program.
Competitiveness	High scientific and technical level of the spectrometer corresponds to the best world samples and has the possibility of registering the Raman spectra of macro-and micro-objects with a spatial resolution of 0.7 mm and a spectral resolution of better than 0.15 cm^{-1}. Raman shift is registered from 20 to 5,000 cm^{-1}.
Expected outcome	The equipment of such level is required for quality control of semiconductor materials and diamond-like films, as well as for advanced research facilities in biology, medicine and chemistry. It can be used in "NPC RB in materials", NP RUE "OPTIK", "Integral", IF of the NAS, scientific research institutes of the NAS of Belarus, and highereducational establishments of the Republic of Belarus.
Offers on sale	Delivery by individual orders; cooperation with the customer on application; agreement on cooperation.
Level of readiness	Experimental (model) sample.
The transfer of rights object	Effective model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

VIII-2. Temperature transducers for testing building construction fire resistance

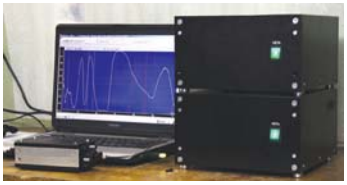


Application field

Temperature transducers are used to measure the temperature of gaseous, liquid and solid media, which do not destroy protective reinforcement, in mild climat operating conditions, and can be applied in various branches of industry and agriculture, in science. Temperature transducers are used for building constructions testing in accordance with the requirements of EN 1363-1:1999 "Fire resistance tests — Part 1: General requirements". Temperature transducers TCA(K)-101 are designed to determine the temperature of the sample, TCA(K)-102 — to determine the temperature in the furnace.

Description of products	Technical characteristics TC(K)-101: operating range of measured temperatures — from –40 up to +400 °C; class on STB GOST (national standart) R8585-2, index of thermal inertia — no more than 0.8 seconds; weight — no more than 0.12 kg. Technical characteristics TCA(K)-102: operating range of measured temperatures — 0 up to +1200 °C; class STB GOST (national standart) R8585-2, index of thermal inertia — no more than 5.0 seconds; weight — no more than 2.0 kg.
Competitiveness	Import substituting production,technology.
Expected outcome	Temperature transducers application will increase the accuracy and reliability of temperature measurements of the tested sample and the temperature in the furnace during the building constructions testing in accordance with EN 1363-1:1999. The test results for fire resistance of building structures, conducted in the Institute Safety and Emergency of Ministry for Emergency Situations of the Republic of Belarus, will be accepted in Europe that will allow producers to export products and to reduce the cost of its certification.
Offers on sale	Delivery by individual orders.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Research Institute of Fire Safety and Emergencies of the Ministry for Emergency Situations of the Republic of Belarus***

VIII-3. Universal high-speed widerange spectrophotometer for the study of thin films



Application field

Spectrophotometer is designed for multifunctional complex analysis of various media (semiconductors, liquid crystals, optical fibers, polymers, pharmaceutical and biological agents, crystals, thin films and nanostructures). It can be used in a continuous scan by control of deposition of films in the optical industry in the study of fast processes.

Description \of products	There has been designed and produced a fully automated high-speed wide-range universal spectrophotometer equipped with fiber-optic probes, computer, modern monochromators, electronic components and computer programs. The device combines the achievements of traditional optical photometry with the achievements in the field of high-sensitivity multi-element photodetector. Operating spectral range — 200–2,000 nm, spectral resolution — 0.5 nm, the registration of the spectrum) — 0.001–1.0 s.
Competitiveness	The cost of spectrophotometer by serial production will be 15–25 thousand c. u. (depends on the complete set) which is 3 times cheaper than imported equipment with similar engineering factors. The device is produced with the components of domestic production.
Expected outcome	The equipment of such level is necessary for control of parameters of thin-coat finishs in optical industry and microelectronics, as well as for modern scientific research of wide range of objects. It can be used in the Head "NPC RB in materials", NP RUE "OPTIK", OJSC "Integral", IF of the NAS, scientific research institutes of the NAS of Belarus, in the universities of the country.
Offers on sale	Delivery by individual orders; cooperation with the customer on application; agreement on cooperation.
Level of readiness	Experimental (model) sample.
The transfer of rights object	Effective model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State University***

VIII-4. Immittance meter E7-26

Application field
It can be used for research, quality electroradioelements control, for measuring nonelectrical quantities using transducers of nonelectrical quantities into one of the measured values of the instrument.

Description of products	The designed immittance meter E6-26 is meant for measuring the capacity, inductance, resistance and reactance, active and reactive conductivity, dielectric loss tangent, Q, modulus of complex resistance, modulus of complex conductivity and the angle of the phase shift of complex impedance in the frequency from 10 Hz up to 100 kHz. Working conditions for the use of immittance meter E7-26: – ambient temperature — from –20 up to +50 °C; – relative humidity at 25 °C — 90 %; – atmospheric pressure — from 84 up to 106.7 kPa (630 up to 800 mm mercury column).
Competitiveness	Strong demand for immittance meters in Belarus and other CIS countries will ensure the implementation of this device, as immittance measures of leading foreign firms have a high cost for the same or lower performance products.
Expected outcome	The immittance meter E7-26 can be a mass model of this type of meter, which will satisfy the needs of different users (mobile laboratories used in the oil and gas industries, the metrological service of the railway control services on industrial plants, etc.). This product may be of great interest for harsh environments and metrological services of the Russian defense complex, due to the lack of production of this type of meter in Russia.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-5. Limb for precision photoelectric angular-displacement sensors

Application field
Limbs for high-precision photoelectric angular-displacement sensors (PADS) are one of the most important components of angular-displacement sensors. These sensors are meant to solve one of the actual problems in the field of automation and control. They are used in measurement systems and systems of numerical program machine control for positioning blanks and tools and in printing equipment.

Description of products	PADS are meant to solve one of the most urgent tasks in the field of automation and control — the transformation of the angular displacement of the actuating devices(tool, object, etc.) into electrical signals containing information about the magnitude and direction of the displacement and suitable for further processing in measurement systems and CNC systems. PADS feature is to use as a measure of the length the radial scale on the circular limbs, which is carrier of code and regular raster and determining the accuracy of the sensors. High accuracy is ensured by an optical method for measuring the rotation angle. In the basis of the work of PADS there is a principle of photoelectric scanning barcodes rasters. As the lights, infrared LEDs are used, and as radiation detectors silicon photodiodes are served.
Competitiveness	High technical and economic characteristics of the product, low cost in comparison with foreign analogues ensure competitiveness in the markets of Russia and the CIS countries.
Expected outcome	Limbs for high-precision photoelectric angular-displacement sensors are one of the most important components of the angular-displacement sensors. Sensors are meant to solve one of the actual problems in the field of automation and control. They are used in measurement systems and numerical machine control systems for positioning blanks and tools and in printing equipment.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-6. Measuring antenna P6-66

Application field

The antenna together with measurement receivers and generators are used to measure flux density of electromagnetic field parameters of antenna devices, parameters, electromagnetic compatibility of radio resources, as well as excitation of an electromagnetic field with a given power density.

Description of products	P6-66 antenna is a horn-lens antenna in the form of a pyramidal horn in the H-shaped waveguide. The critical frequency of H10 and H20 of the waveguide at the beginning (neck) of the horn are determined in accordance with the operating frequency range antenna. Coaxial antenna input to the wave impedance of 50 ohms, section 2.92/1.27 mm (Type K). Working frequency range: from 12.05 up to 37.5 GHz. Standing wave ratio (VSWR) antenna input — no more than 2.5. Antenna gain, at least 14 dB. Maximum permissible error of the gain — no more than ± 2.0. The antenna should have a linear polarization. The signal level of orthogonal polarization with respect to the main polarization — no more than –20 dB. The level of side-lobe — no more than –8 dB. On the stability and durability under different climatic and mechanical influences antenna complies with SS (ГОСТ) 22261-94 Group 6.
Competitiveness	The competitiveness of antenna P6-66 in the international market is provided by the modern scientific and technological level of implementation options, which are not inferior to the best foreign devices of similar purpose, and relatively low cost.
Expected outcome	Specifications and price of antennas allow exports, as in the CIS countries and in Western Europe.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-7. Measuring unit H4-129

Application field	Organization of educational processes, experiments, diagnostics of automation units, computer engineering and computing linkage.
Description of products	Measuring unit H4-129 is meant for conversion of electrical signals into a digital code, its transmission to a PC for processing and measurement of signals parameters by means of the software in time and frequency domains. The module combines a number of measuring instruments: a spectrum analyzer, a digital oscilloscope, a digital voltmeter of RMS value, a recorder. Number of Channels — 2. Operating temperature — from +5 up to +40 ° C.
Competitiveness	Measuring units H4-129 correspond to the modern scientific and technological level and needs of the market.
Expected outcome	Due to its high functionality and an affordable price the module will be competitive in the market of the CIS countries. It is supposed to activate exports, increase of the inflow of foreign currency.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-8. Microvoltmeter B2-44

Application field
Metrological maintenance of measuring equipment.

Description of products
Microvoltmeter B2-44 is meant for measuring the DC voltage of positive and negative polarity. The microvoltmeter provides mathematical and logical processing of measurement results. Microvoltmeter is meant for work in information-measuring systems with interfaces, "Joint C2", and USB. The microvoltmeter consists of an isolated body of analog and non-isolated one and digital parts. The distinctive features of the microvoltmeter design include an input amplifier unit. Structurally the microvoltmeter is made in the original rectangular plastic case of the OKW company. To display the meaning of the measured values and supporting information a four-rowed (4×20) full-scale LCD displays are used. The whole scheme of the microvoltmeter is performed on four printed circuit boards. All controls are placed on the front panel. The microvoltmeter satisfies the requirements of SS (ГОСТ) 22261-94, and the operating conditions refer to group 2 SS (ГОСТ) 22261-94.
The operating conditions of the microvoltmeter:
– ambient temperature — from +100 up to +350 °C;
– relative humidity at 250 °C — up to 80 %.

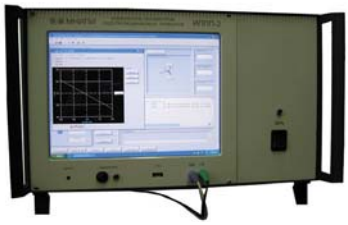
Competitiveness	Owing to sufficiently high sensitivity and resolution, with high technology and acceptable to most consumers' value, the microvoltmeter will be competitive in the markets of the CIS countries.
Expected outcome	Microvoltmeter B2-44 will provide the replacement of the main park of currently used instruments for the measurement of small DC voltages. Microvoltmeter B2-44 is a modern instrument that provides solutions to key problems of measuring customers aims at a cost less than the cost of domestic or foreign counterparts, combining high enough sensitivity and resolution with high technology and an affordable price for most consumers.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-9. Programmable DC power supplies B5-89, B5-89/1

Application field
Organizations involved in design, manufacture and operation of optoelectronic components and devices based on them; manufacturers of LED and laser technology, which is required to supply non-standard modes of products during their manufacture, research, and testing.

Description of products	DC power supplies programmable B5-89, B5-89/1 are intended to reproduce DC voltage and DC power during the inspection and testing of optoelectronic components and devices operating independently and managed by a computer. Power supplies have a control function output voltage and output current as the front panel and an external computer through an interface USB. Power supplies are a compensation voltage regulator with series regulating element and amplified feedback voltage and current. Power supplies can operate as a voltage stabilization and current stabilization mode, which is set automatically depending on load. To measure the output voltage and current power supply are applied built-in voltage and current indicators. For safety reasons, power supplies comply with SS (ГОСТ) 12.2.091-2002, protection class 1, category 2 of installation, pollution degree 2.
Competitiveness	With more functionality and an affordable price power supply will be competitive in the markets of the CIS countries. It is supposed to activate exports, to increase the inflow of foreign currency.
Expected outcome	Designed power supplies are devices that have big functionalities, a wide measurement range, modern design, as well as affordable for a wide range of consumer value. Serial production of the power will provide the organizations with modern devices.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-10. Semiconductor parameter tester SPT-2



Application field
Control of characteristics of semiconductor devices of higher-power equipment in the process of production, including the analysis of defects, research of volt-ampere (VAC) and capacitor-voltage characteristics (CVC) during the development of new semiconductor devices and technologies.

Description of products	Semiconductor parameter tester SPT-3 is assigned for measuring and monitoring of VAC and CVC characteristics of semiconductor devices, automation, measurement and control of their static parameters, storage and documentation of measurement results. The device has a base model SPT-3 and modifications from SPT-2/1 to SPT-2/5, with unified design concept, and different in number and completion sources — testers (ST), the presence of capacitometer. The device has from two to four ST (determined by modification). In measurement mode, the CVC each ST of the unit provides for the formation and measurement of the jump reamer signal in current (voltage) formation modes and voltage (current) measurement. Stages size change is made according to a linear law, on a logarithmic law to base 10 or to a value list. The duration of sweep stages is set in the range from 10 ms up to 60 s. In the CVC measurement the instrument provides for the formation of step sweep voltage signal according to a linear law or a value list and measures the capacity.
Competitiveness	Devices will be in demand in the CIS market as it has no analogs.
Expected outcome	The usage of the SPT-2 devices on plants of electronic and radio-electronic industry of the Republic of Belarus can automate and raise validity control in manufacture of electronic components
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-11. Semiconductor parameter tester SPT-3

Application field
Control of characteristics of semiconductor devices of higher-horsepower equipment in the process of production, including the analysis of defects, research of volt-ampere characteristic in the development of new semiconductor devices and technologies.

Description of products	Semiconductor parameter testers SPT-3 are assigned for automation of measurement and electrical parameters' control of higher-horsepower semiconductor devices, the research of its functional relations, memorizing and documentation of measured results. The device has its basic model SPT-3 and modification SPT-3/1 with integrated embodiment, built-in industrial computer, display and different ranges of output current through the collecting channel. The device provides high ranges of measuring of volt-ampere characteristic of current (from 1 nA up to 10 A for SPT-3, from 1 nA up to 20 A for SPT-3/1) and voltage (from 0 to 2,000 V). Measuring maximum permissible error: – of current — from 1 up to 9 %; – of voltage — from 1 up to 1.5 %.
Competitiveness	Devices will be in demand on the CIS market as it has no analogs.
Expected outcome	The usage of SPT-3 devices on plants of electronic and radio-electronic industry of the Republic of Belarus can automate and raise validity control in the manufacture of electronic components, including higher-horsepower components.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-12. The measuring multichannel recorder of PM-2202

Application field
The control of parameters of technological processes in various fields of power industry, oil and chemical industry, mechanical engineering, metallurgy, etc.

Description of products	The PM-2202 measuring multichannel recorder is intended for measurement of strength and voltage of a direct current, resistance to a direct current, frequency of impulses; measurements of not electric values converted into electric signals of a direct current or active resistance, and also for feed by voltage of a direct current for external sensors, registration and storage of the measured data on a hard disk and their display in real time on a built-in display. The recorder has the base of the model of PM-2202 and modifications (from PM-2202/1 to PM-2202/7), differing in quantity of measuring channels (12 or 24), and presence of a measuring instrument of frequency.
Competitiveness	The PM-2202 recorder surpasses the domestic analogue of PM-2201 and similar devices of the CIS countries in technical characteristics and functionality.
Expected outcome	The recorders allow to solve a wide range of problems for measurement, gathering and processing of information and also of continuous registration of emergency events at the enterprises of various branches. The recorders of the given class have a commodity market in the Republic of Belarus and in other CIS countries.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-13. The milliohm E6-30

Application field
The milliohm can be used in electrical instrumentation, technology, communications, metrology, control devices, electro safety control devices, technical diagnostics.

Description of products The milliohm is meant for measuring operation of the resistances from 0.0001 to 199 ohms, including checking the quality of the metallization of composite components and units of various designs. The milliohm satisfies the requirements of SS (ГОСТ) 22261-94, and the operating conditions refer to a group 3 according to SS (ГОСТ) 22261-94 with extended temperature range.
Operating conditions of use:
- ambient temperature — from –100 up to +500 °C;
- relative humidity — up to 90 % at 250 °C;
- atmospheric pressure — from 84.0 up to 106.7 kPa (630 up to 800 mm Hg. Art.)

Competitiveness The milliohm operation principle is based on measuring operation the milliohm voltage drop across the resistance measured at a given value of current flowing through its resistance. The measurements were carried out on four-wire circuit design.

Expected outcome The absence of competition from the CIS, as well as low price in comparison with foreign analogues provide The milliohm free movement as in the Belarusian market and abroad. The milliohm characteristics not inferior to foreign analogs and has no domestic ones.

Offers on sale Organization of serial manufacture.

Level of readiness Experimental model.

The transfer of rights object Scientific and technical information; experimental model.

The transfer of rights form Agreement on the creation and use of intellectual property.

Offers for cooperation Joint production.

Organization-developer ***"MNIPI" JSC***

VIII-14. The multifunction devices K2-91, K2-91/1

Application field

Repair, adjustment, maintenance of various electronic devices and units of instrumentation, automation, computing and communications.

Description of products

Measurement instrumentation was produced — the multifunction devices R2-91, K2-91/1. K2-91 device consists of a meter, generator, frequency meter, power supply. The device K2 91/1 additionally includes a module of oscilloscope. The devices comply with the requirements of SS (ГОСТ) 22261-94, and operating conditions are a group of 2 SS (ГОСТ) 22261-94, with extended temperature range from +50 up to +400 °C. The operating principle of the meter is based on the transformation of the measured value of the normalized dc voltage with subsequent measurement of the analog-digital integrating type converter. The generator is built in an oscillator scheme of an electronically controlled frequency analog. The work of meter is based on the pulse-counting method; consists of the counting unit that counts the number of arriving at its input pulses during a certain period of time. The structure of the power supply has four independent channels. All channels are made under the scheme of compensatory stabilizer with in-series regulating element. The principle of operation of the oscilloscope is based on digitization of analog signal and its subsequent withdrawal on the dot matrix LCD screen. Structurally, the instruments are made in the metal casing of rectangular shape. The scheme of the device R2-91 was implemented on five printed circuit boards, circuit device K2-91/1 — on five printed circuit boards in the instrument module and the four circuit boards in a module scope. The body consists of shroud, front and rear panels. The front panel has LCD, control buttons, connectors for external inputs and outputs. The rear panel has connectors for power supply, power switches.

Competitiveness	It's supposed to activate exports and to increase inflow of foreign currency.
Expected outcome	Due to a sufficiently high sensitivity and resolution, with high manufacturability and acceptability to most consumers, the cost of equipment will be competitive in the markets of the CIS countries. It is supposed to activate exports and increase inflow of foreign currency.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

VIII-15. The prototype of an astro-orientation sensor

Application field
Orientation of the spacecraft.

Description of products	The prototype of an astro-orientation sensor is a monoblock with the mass of 2.5 kg with a landing surface, where a fastening opening on the elements of the spacecraft construction is provided. The structure of astro-orientation sensor includes an aligner ring and an electronic module.
Competitiveness	The development has no domestic analogues, and has competitive performance: the penetrating ability is better than 6 m, standard deviation of the direction determining on the star is no more than 5″, weight — 2.5 kg, measuring frequency — 10 Hz.
Expected outcome	The prototype of an astro-orientation sensor is the basis for the development of astro-orientation of spacecraft hardware.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply.
Level of readiness	Experimental model.
Organization-developer	***"Peleng" JSC***

VIII-16. The unified precision orientation device

Application field

The unified precision orientation device (UPOD) is used for measuring the orientation of antennas on the azimuth angle, elevation angle and angle of plane polarization in the laboratory, factory and field conditions. Also, this device can be used for guidance systems of satellite dishes on their coordinates for mobile objects.

Description of products

UPOD of broadband measurement antennas provides high-precision guidance of 6 types of measuring antennas in frequency ranges up to 37.5 GHz, provides an opportunity to ensure prospective measurement of antennas with narrow radiation pattern in the range up to 118 GHz; can provide job guidance system for satellite receivers, will provide job of high precision positioned for different types of monitoring communications systems, radar systems, EMC measurements, etc. According to the stability and durability under different climatic and mechanical influences antenna complies with the norms of SS (ГОСТ) 22261-94 Group 6.
Average life of UPOD — at least 15 years.

Competitiveness	Competitiveness in foreign markets at the expense of modern scientific and technological level and relatively low cost.
Expected outcome	Radio industry, the Ministry of Communications and information and other departments that use the mobile tracking system satellite signals, the EMC testing of radar equipment, monitoring of the electromagnetic environment in the Republic of Belarus and the CIS countries. Assumed to export.
Offers on sale	Organization of serial manufacture.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Joint production.
Organization-developer	***"MNIPI" JSC***

IX-1. Heatproof ceramic brick, bonding mortar for low temperature heat producing device blocking in household and agroindustrial complex

Application field	Heatproof ceramic brick and mortar are used for building and fixing stoves in household, municipal and agroindustrial complex.
Description of products	There have been developed formulations and process parameters of heatproof ceramic bricks production on the basis of the high-melting and low-melting clay material of RB and formulation binder mortar to optimize the properties of brick mortar in accordance with the characteristics of heatproof ceramic bricks. The technical conditions for heatproof ceramic bricks used for masonry-temperature furnaces (TU BY 100354659.097-2011) and heatproof mortar (TU BY 100354659.096-2011) have been developed in the Republic of Belarus.
Competitiveness	In the Republic of Belarus and the CIS countries, masonry material for stoves similar to developed heatproof ceramic and binder materials are currently not being produced. Development corresponds to the best foreign analogues due to the complex high thermomechanical properties of materials.
Expected outcome	Heatproof bricks and mortar are used in the construction and repair of furnaces in the municipal and agriculture complexes, which allows to improve security and increase their service life. This product can be exported, since these products are not produced in the CIS countries.
Offers on sale	Transfer of engineering specifications and specialist advice on development; partnerships or other arrangements; sale of technology; agreement on cooperation.
Level of readiness	Experimental model; pilot lot.
The transfer of rights object	Invention; scientific and technical information; experimental model.
The transfer of rights form	License agreement; contract for assignment of rights.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Technological University***

IX-2. Grinding system for regrinding and activation of cement

Application field	Used in construction for cement manufacturing for solutions and concretes with increased strength by 45 %.
Description of products	The size of the finished product (adjustable) — is up to 0.08 mm (95 %), capacity — up to 10 t/h maximum piece size — not more than 5 mm, raw material humidity — no more than 0.5 %, the installed capacity of motors of the complex — 358 > 5 kW, the capacity of bunker whirler — at least 3 m^3, the average lifetime — 7 years. Dimensions: length — 17 m, width — 7.8 m, height — 9 m, weight — up to 30 t.
Competitiveness	Competitive, and it has no analogues.
Expected outcome	The complex helps to produce activated cement. With increasing activity of cement by 5 % it is possible to obtain solutions and concretes, the strength of which increases by 45 % on the strength of the control samples.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply.
Level of readiness	Experimental model; serial production; limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***Scientific Production Association "Center" RUE***

IX-3. The device foundation technology by indentation pile static load in difficult town planning conditions and high-density site development

Application field	The construction erection of foundations in dense urban development and complex town planning conditions.
Description of products	The developed technology allows to exclude dynamic effects on the environment when constructing pile foundations, which will expand the range of their use in the construction of various (including unique) buildings in complex and high density town planning conditions.
Competitiveness	In comparison with the bored piles the developed technology allows to increase the specific bearing capacity of bases by 10–15 %, reduce material costs by 15–20 % (in case of bored piles use for the device casing — 30 %), reduce the duration of work by 10–15 %.
Expected outcome	The introduction of technology will ensure compliance with the requirements of sanitary norms due to the vibrations and dynamic effects absence on humans and the environment; will allow performing construction work in cramped urban dense environment by residential units remodeling without the relocation of tenants, will enable the rational use of urban land for development.
Offers on sale	Partnerships or other arrangements; cooperation with the customer on application; agreement on cooperation.
Level of readiness	Design and budget documentation.
The transfer of rights object	Scientific and technical information; others.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***"Institute BelNIIS" RUE***

IX-4. Unbalanced-throw screen for products classification

Application field	Designed for mechanical separation into fractions of crushed stone, gravel and sand masses, of granite, marble, dolomite, porphyrite, quartz, and other bulk materials. Screens can be used both independently and as part of production lines of grinding and classification.
Description of products	Carrying power — from 130 up to 220 t/h, the maximum size of the material — from 100 up to 150 mm, the size of the screening surface — from 3.75 up to 8.75 m^3, the number of tiers of sieves — from 2 up to 4, the angle of slope — 15°, drive power — from 11 up to 15 kW, overall dimensions: length — from 3,617 up to 5,550 mm, width — from 2,023 up to 2,518 mm, height — from 1,431 up to 2,030 mm, weight — from 3.2 up to 5.14 m.
Competitiveness	Competitive due to the wide range of crushed material.
Expected outcome	Installation of special vibration resistant bearings with double centering separators substantially improved service life and reliability of the screen.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply.
Level of readiness	Experimental model; serial production; limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***Scientific Production Association "Center" RUE***

X-1. Industrial cleansing agents "NAVISAN-NM"

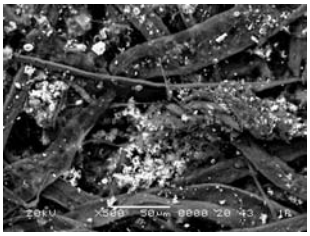
Application field
Food industry. Milk whey processing. New complex of enzymic, acid, alkaline agents is used for phased cleaning of ultrafiltration installation and milk whey nanofiltration and other foods.

Description of products	Highly effective ecological friendly complex of industrial cleansing agents "Navisan-NM" includes biodegradable products, that are much better than the best foreign analogue «Ecolab» (Germany) on a number of parameters: the processing time with their use is reduced by 1.5–2 times, used in lower concentrations (in 1.5), thermal processing modes are 1.5 times lower, shelf life is 1.5 times longer, the cost is 1.5–2 times lower. Technology of the industrial cleansing agents production is applied in industrial production by LLC "NPK "Navigator" (Grodno).
Competitiveness	Import substitution. There is no domestic analogue. Has better charachteristics than best foreign analogues together with the lower price. High export potential to CIS countries (Russia, Ukraine). An application for a patent has been filed.
Expected outcome	Import substitution is 2 million euro per year if introduced by dairy foods production on enterprises of the Republic of Belarus. Currency assets inflow by cleansing agents export to the CIS countries (Russia, Ukraine).
Offers on sale	Cooperation with the customer on application; introduction of technology; agreement on cooperation.
Level of readiness	Serial production.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Research Institute for Physical Chemical Problems of Belarusian State University***

X-2. Energy efficient technlogy of magnesium sulfate production from dolomith

Application field	Magnesium sulfate is widely used in greenhouse centres, vegetable plants and farms where they grow vegetables in greenhouses, and by detergents, antibiotics, paper fillers and textile industry materials production.
Description of products	Offered technology of magnesium sulfate production is cencentratingless and technological scheme itself and the main technical solutions are simple, sufficient reliabile and include a number of stages that are traditional for process scheme of salt production (stage of acceptance of raw materials and its supply to the production, stage of decomposition in the cascade capacitive reactors, filtration, crystallization, centrifugation, drying tube, dryer, dust collection system, the system of absorption stage packing of the finished product). At the same time, the proposed flow sheet is flexible, as it provides for the possibility of the production of other salts on the same technology, depending on customer requirements.
Competitiveness	Product produced by the proposed technology from dolomite, corresponds to the foreing analogues in its main physical and chemical characteristics,it also has lower costs. This is achieved by cencentratingless technology application.
Expected outcome	Reduction costs of 1 t of product active agent comparing to the active agent costs (magnesium) of foreign analogues.
Offers on sale	Agreement on cooperation.
Level of readiness	Pilot lot.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Technological University***

X-3. Fine fillers for receiving high grade paper and cartonboard



Application field	Obtained results can be used on paper and cartonboard enterprises to produce high grade paper and cartonboard with filler content.
Description of products	There have been explored the ways to get silicium and calcium content fillers and developed their compositions with the desired properties of the complex. The technology of application of the new fine-filler for the production of high-quality paper and cartonboard provides the receiving of cartonboard and paper products in accordance with the requirements. The use of fine filler can increase the degree of retention in the structure of a piece of paper up to 68–75 %.
Competitiveness	Fine filler if compared to the analogues has electrokinetic potential from 15.4 up to 34.0 mV, particle size is from 5 up to 15 mcm, whiteness is about 92 %, retention rate of paper and cartonboard in the structure is 68–75 %, prime cost is low.
Expected outcome	There has been developed filler with silicium and calcium content, with this filler competitive paper and catronboard products can be fabricated.
Offers on sale	Cooperation with the customer on application; Introduction of technology.
Level of readiness	Pilot lot.
The transfer of rights object	Invention.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Technological University***

X-4. Pressing technology pre-plasticizing thermoplastic compositions and waste glass by molding products

Application field	Utilization of waste products by forming products of technical and constructional purposes. Population, municipal, construction, engineering enterprises, etc.
Description of products	There has been developed technology of manufacturing molded parts from a mixture of sub-standard thermoplastics waste and their composites; waste fiberglass of contact molding, household textile waste. Typical products: tile, drainage systems elements, covers, boxes, sewer manhole elements, elements of fencing, formwork, insulation of pipes, containers and process containers pallets, small architectural forms, compost container.
Competitiveness	Competitiveness of products: low cost (less than 1 US dollar per 1 kg of the product), the performance characteristics are comparable with the indicators of large-scale production of polymers. Economic efficiency by the production of 50 t of products per year or more.
Expected outcome	Reducing the environmental load due to processing in competitive products nonutilizable waste. Replacing imported polymers and products.
Offers on sale	Transfer of engineering specifications and specialist advice on development; partnerships or other arrangements; introduction of technology; agreement on cooperation.
Level of readiness	Pilot lot.
The transfer of rights object	Undisclosed information (know-how); scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Technological University***

X-5. Pultrusion technology of reinforced thermoplastic production

Полуфабрикаты и профильные изделия из отходов термопластичных полимеров

Профильные гибридные изделия плоского и кольцевого сечений (трубчатые стержни)

Application field

Production of composite material and engineering articles on the base of thermoplastic polymers and glass fibers. Industrial waste utilization by composite materials and engineering articles product forming. Population, municipal services, constructions, machinry, etc.

Description of products

There has been developed a continuous process of obtaining semifinished and specialized goods by fibrous filler wetting-out with matrix polymer liquid alloy with further (continuous) forming of semifinished good. Typical goods: axial elements for building construction, electrical energy industry, transport engineering, sport equipment, householt purposed goods, reinforced pipes and tanks, specialized goods of flat and cicular section.

Competitiveness	Competitiveness of the product: low cost (4–6 c. u. per 1 kg), flexibility concerning the components, structure and compositiion material content of the produced goods, high productivity, low power consumption, little wastes and recycling possibility. Wastless production and 100 % product utilization.
Expected outcome	Reduction of ecological load by recycling industrial waste into competitive goods. Import substitution.
Offers on sale	Transfer of engineering specifications and specialist advice on development; partnerships or other arrangements; introduction of technology; agreement on cooperation.
Level of readiness	Pilot lot.
The transfer of rights object	Undisclosed information (know-how); scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Technological University***

X-6. Technology of producing printout paper using scrap paper

Application field	Paper-pulp industry. Production of printout paper.
Description of products	The main tendency in the printout paper production is the use of cheaper semi-finished fiber without depreciation of quality. The developed technology involves the use the secondary fibrous material — waste paper. The developed technology aiming at the resource safe includes a set of activities, such as: improved of waste paper paper-making characteristics, increasing the substitution degree of imported bleached pulp waste paper, increasing the filler content in the paper.
Competitiveness	Improving printout paper quality by containing waste paper is achieved through optimized grinding mode, which allows intentional changing of the fractional composition of the paper mass at the joint primary pulp such as bleached sulfate of coniferae and broadleaved species and recovered material — waste paper.
Expected outcome	50 % reduction of discharge intensity of primary wood pulp which is bleached sulfate from hardwood; refining process conditions optimization, which provides 10 % energy safe.
Offers on sale	Transfer of engineering specifications and specialist advice on development; organization of serial manufacture; sale of a license; introduction of technology.
Level of readiness	Serial production.
The transfer of rights object	Invention.
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Technological University***

X-7. Automatic modular membrane unit

Application field
Pre-water treatment for heat and power industry, fine water purification for housing and communal services.

Description of products	The principle of operation of a plant based on low-pressure dead-end ultrafiltration, which ensures complete removal of bacterial contamination and colloidal particles with sizes of 0.05 micron and above. When designing the installation, modular layout was used. The installation consists of the following blocks: chemical feeding unit, precleaning unit, ultrafiltration unit, regeneration backwashing unit and air scrubbing. Mode of operation: automatic.
Competitiveness	High quality water purification, reliable barrier filtration, low power-intensity, compact size equipment, ease of installation, and simplicity in treatment process control.
Expected outcome	High quality cleaning irrespective of seasonal fluctuations in the composition and temperature of purified water, reduction of need of coagulants up to 10–20 times, obtaining the necessary qualitative indicators for a single stage of water processing, opportunity to increase plant capacity due to its modular construction.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; cooperation with the customer on application; delivery of the finished product.
Level of readiness	Experimental model.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Institute of Physical Organic Chemistry of the National Academy of Sciences of Belarus***

X-8. Catalytic deaerating plant

Application field
Purification of water from oxygen for heat and power industry. For use at boilers, where there are no steam boilers (only water heating boilers for heating systems).

Description of products	A block-modular construction was created — Catalytic deaerating plant (CDP) — with available polymer materials. A reactor with radial input renovated water was designed and manufactured. The Palladium catalyst based on fibrous anion exchanger was developed and loaded into the reactor.
Competitiveness	The catalyst activity is superior to the best foreign analogues, ease of operation of the DCD. The work is protected by three patents of the Republic of Belarus.
Expected outcome	Practical realization of correcting motor set (CMS) for deoxygenation from feed and makeup water in boiler rooms can help to reduce capital costs and expenditure of energy compared with the processes of thermal de-aeration.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; cooperation with the customer on application; delivery of the finished product.
Level of readiness	Experimental model.
The transfer of rights object	Experimental model.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Institute of Physical Organic Chemistry of the National Academy of Sciences of Belarus***

X-9. Technological scheme of decontamination of equipment and processing of liquid radioactive waste in the production of isotope products

Application field	The technological scheme of equipment decontamination and spent decontamination solutions recycling and liquid radioactive waste (LRW), formed during the manufacture of radionuclide sources, can be used for equipment decontamination and cleaning of liquid radioactive waste at "Isotope Technologies" CJSC, specializing company "Ecores" PMC and "Polesie" RAUE, at a future nuclear power plant.
Description of products	Decontaminating compositions have low corrosion activity in relation to the construction materials; do not contain environmentally hazardous compounds, easy to use. Deactivating effect of the compositions is determined by the introduction in their proportion completing agents, surfactants and special additives KD50-200. The number of TPO is 40–100 g per 1 m^2 of treated surface while polymer coatings and decontamination pastes using. A combined method of purification of LRW with high salt content in the presence of completing agents was developed.
Competitiveness	Designed compositions have high deactivating characteristics corresponding to the best foreign analogues (e. g., "LPM" (Finland), "Alfa Laval" (International Corporation), "GI VNIPIET" (Russia) at a lower cost. There are no analogues in the Republic of Belarus.
Expected outcome	The introduction of technologies providing volume lowering of radioactive waste in the production of isotope products, will provide economic effect of about 30–40 million rubles/m^3 LRW only by reducing costs for the final isolation of radioactive waste.
Offers on sale	Cooperation with the customer on application.
Level of readiness	Pilot lot.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers or cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Joint Institute for Power and Nuclear Research — Sosny***

X-10. The method and flowsheet of liquid radioactive wastes of unknown chemical composition treatment

Application field	The organizations working with sources of ionizing radiation, "Ecores" CUE, "Polesie" RAUE, nuclear power and various industries.
Description of products	The method and flowsheet of liquid radioactive wastes treatment (LRW), the flowsheet and design documentation for reprocessing liquid radioactive waste, the LRW disposal methods, the LRW technological cond itioning rules, the method of producing granular sorbents and ceramic membranes were developed. The technology was worked out and tests of cleaning liquid radioactive waste were carried out in the laboratory conditions. A modular plant for processing liquid radioactive waste, on which the detention of radionuclide methods of filtration, selective adsorption and ion exchange, reverse osmosis are producing was created. The end product of processing: cemented into a metal barrel middle-active waste.
Expected outcome	The expected economic effect from implementation of this design is achieved by reducing the volume of liquid waste that have to be conditioned and delivered of long-term storage in "Ecores" CUE. High cleaning efficiency and reduction in liquid radioactive waste in a hundred times will allow to get 20–30 million economic impact rubles/m^3 liquid and from the processing of waste 250 m^3 — to 7.5 billion rubles.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; joint production; introduction of technology.
Level of readiness	Experimental model; pilot lot.
The transfer of rights object	Experimental model; others.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Joint Institute for Power and Nuclear Research — Sosny***

XI-1. Bacteria preparation "Cleverin" for increasing of producing capacity of meadow clover

Application field
Agriculture. For economic operators appliance on meadow clover.

Description of products	The basis of the preparation "Cleverin" — root medium bacteria strain *Pseudomonas fluorescens* AP267. Bacteria that the "Cleverin" contains colonize the roots of plants and stimulates the formation of root nodules present in the soil rhizobia, which enhances the activity of biological nitrogen fixation. The availability of *Pseudomonas fluorescens* AP267 on the roots of clover plants increases their resistance to root rot pathogens.
Competitiveness	There are no analogues in the CIS countries.
Expected outcome	Usage of the preparation provides herbage clover yielding capacity growth to 38 centner per 1 ha; clover seeds yielding capacity growth up to 25 %; decreases plant loss from fusarium root rot up to 60 %.
Offers on sale	Sale of a license; cooperation with the customer on application; introduction of technology.
Level of readiness	Experimental model.
The transfer of rights object	Others.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Genetics and Cytology of the National Academy on Sciences of Belarus***

XI-2. Biological preparation IM-B1

Application field	Cosmetics industry.
Description of products	Biological preparation IM-B1 contains bifidobacteria freeze-dehydrated cells in the amount of no less than 100 mln/g MI-B1, it's created for different formulations of perfumes and cosmetics, it is recommended for usage as an ingredient in cosmetic products in shampoos, conditioners, creams, etc.
Competitiveness	Holds out for quality if compared to the best worldknown samples. Corresponds to the level of analogues products of "CHR HANSEN" company.
Expected outcome	The usage of IM-B1 will privode import substitution of analogues components for domestic enterprises producing cosmetics.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply; organization of serial manufacture.
Level of readiness	Limited production.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-3. Microorganisms-based (produced by protease) biologic "Prophybact" for different fish species roe mucilage removal during factory incubation

Application field	Agriculture: pisciculture.
Description of products	Ppregnated roe mucilage removal with selected bacteria have been developed. Certain characteristics on impregnated roe have been developed together with the technology recommendations on the use of the biologic on the roe. Trade mark for the produced biologic has been registered in the Republic of Belarus. Testing lots of the biologic are being produced.
Competitiveness	Does not have any analogues.
Expected outcome	Roe mucilage removal with biologic "Prophybact" guarantees 10–20 % high embrio survival compared to traditional means.
Offers on sale	Sale of a license; cooperation with the customer on application.
Level of readiness	Experimental model.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Genetics and Cytology of the National Academy on Sciences of Belarus***

XI-4. Recommendations on ecoogical tourism development in the forestry of the Republic of Belarus


МИНИСТЕРСТВО ЛЕСНОГО ХОЗЯЙСТВА
РЕСПУБЛИКИ БЕЛАРУСЬ
ИНСТИТУТ ЛЕСА НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК БЕЛАРУСИ

РЕКОМЕНДАЦИИ
по развитию экологического туризма
в лесном хозяйстве Беларуси

Минск

Application field
Applicable for aggangement and development of ecological tourism in forestry and tourist-excursion service.

Description of products
Recommendations are introduced for forestry specialists and travel companies. They include five chapters with determination of forestry ecological tourism development activities, documents management while developing touristic services in forestry and cooperation of forestry establishments with travel agencies and tourists, data on ecological tourism development evaluation in forestry.

Competitiveness	The recommendations have been devepoled for forestry for the first time and allow to use natural and historical-cultural touristic objects for ecological routes, paths, tours organization on the base of forest hunting ranges.
Expected outcome	Recommendations appliance allows to have 50–60 % increase of annual income level from tourism oa forestry establishments, that will lead to increase of ecological education level, life standart level, population employment level, and will also lead to recreational and touristic industry development.
Offers on sale	Sale of products on a contractual basis; cooperation with the customer on application; introduction of technology; agreement on cooperation.
Level of readiness	Others.
The transfer of rights object	Others.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Forest Institute of the National Academy of Sciences of Belarus***

XI-5. Recommendations on forestry introduction floodplain forests of Belarus

Application field	Forestry: forest restoration and cultivation.
Description of products	There is presented a system of measures for the preservation, restoration and cultivation of oak woods, which allows to increase the area of plantings with predominance of English oak in floodplains by 20 % and to optimize the species composition of oak woods and increase their productivity by 10–15 %.
Competitiveness	Corresponds to high domestic and international level.
Expected outcome	Expected annual economic benefit from the activities introduction is 526.4 thousand rubles per 1 ha and 52.6 millon rubles for cutting period.
Offers on sale	Transfer of engineering specifications and specialist advice on development.
Level of readiness	Others.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Forest Institute of the National Academy of Sciences of Belarus***

XI-6. Recommendations on postfire forest succession in forest total area of the Republic of Belarus

Application field	These recommentadions set the requirements for the activitieds on forest restoration in the forest total area, provide forest ecological safety and biological diversiry preservation. Thesis of the methodic complex are to be used by legal bodies involved in forestry.
Description of products	It's new to Belarus that Recommendations on forest restoration of the total forest area have been developed. Introduction of these recommendations in the forestry will provide forests productivity and hadiness together with the biodiversity preservation.
Competitiveness	There are no analogues if compared to the domestic samples. Corresponds to the best european samples.
Expected outcome	Thesis of the methodic complex are to be used by legal bodies involved in forestry. Economic benefits are to be achieved by reduction of material and labour expenses for forest restoration and 15–20 % increase of forests productivity and hardiness. Promotes natural forests and biological diversity preservation, improves sanitary state of the forests in accordance with ecological requirements.
Offers on sale	Introduction of technology.
Level of readiness	Experimental model.
The transfer of rights object	Others.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Forest Institute of the National Academy of Sciences of Belarus***

XI-7. Recommendations on restoration and harderning of oak forests in Belarus on the area-typologic base

Application field	Forestry: restoration and cultivation of forests.
Description of products	There is established the order of farming in upland oak plantations, including: growing seed in nurseries, activities for natural and artificial restoration of oak forests, basic forestry and environmental requirements for cutting periods in oak woods, a set of activities for protecting the oak forests of wild animals and fires.
Competitiveness	Corresponds to the high domestic and world level.
Expected outcome	Expected annual economic benefit from the activities introduction is 1.2 million rubles per 1 ha and 119.5 millon rubles for cutting period.
Offers on sale	Transfer of engineering specifications and specialist advice on development.
Level of readiness	Others.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Forest Institute of the National Academy of Sciences of Belarus***

XI-8. Substrate from organo-mineral mixture and special-purposed additives "Composition "Agropolycor"

Application field	Forestry: forest nursery, forest restoration and cultivation, park and garden management.
Description of products	Substrate of organomineral mixture and special additives (TU BY 400070994.008-2010 "Composition "Agropolikor" to improve soil fertility forest nurseries") is made from waste wood. The composition is used as organic fertilizer for growing of planting material, in the open field and greenhouse and is produced by composting organic-conifer bark with additives of peat, chicken manure, polymer soil-aggregate stabilizers and water. The composition may increase soil fertility permanent forest nurseries in the next 2–3 years, to increase the yield of standard seedlings with a high degree of mycorrhizal roots by 15 %. The specifications for the substrate are included into the register of the state registration on 14.12.2010, No. 030745.
Competitiveness	The use of substrate organomineral mixture and special additives will improve soil fertility, increase the yield of standard planting material, improve the quality of seedlings, reduce the consumption of fertilizers. Correspond to the high domestic and international standards.
Expected outcome	Practical appliance in the Republic of Belarus forestry.
Offers on sale	Transfer of engineering specifications and specialist advice on development.
Level of readiness	Others.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Forest Institute of the National Academy of Sciences of Belarus***

XI-9. Technology for producing micropropagation cultures of English oak

Application field
Technology allows to obtain microplants culture in vitro, which are the basis for the production of vegetatively propagated planting material selection chosen forms of English oak.

Description of products	The point of technology is getting micropropagation cultures of English oak, which are test-tube microplants derived from seed or vegetative oak. The development is unique in the Republic of Belarus and corresponds to the best foreign analogues.
Competitiveness	The developed technology allows to get aseptic culture both of the juvenile material with a frequency of 80–100 % and mature trees with a frequency of 50–70 %.
Expected outcome	The obtained cultures of micropropagation oak are used to receive seed for reforestation and breeding. The development is aimed at the conservation of biodiversity of English oak.
Offers on sale	Organization of serial manufacture; sale of technology; introduction of technology.
Level of readiness	Experimental model; pilot lot.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works; joint production.
Organization-developer	***Forest Institute of the National Academy of Sciences of Belarus***

XI-10. Technology of recycling and utilization of organic waste with the help of compost worm technology

Application field
Ariculture, ecologically clean products and all mash production. Bioremediation of soils, horticulture, fish breeding, mediine, pharmacology.

Description of products	Recycling (utilization) of organic waste and agricultural industries, obtaining ecologically pure slow-release organic fertilizer and protein feed supplement. One ton of compost provides more than 600 and 100 kg of vermicompost biomass worms.
Competitiveness	Patent has been applied for. Trade mark has been received.
Expected outcome	Organic waste utilization, soil fertility increase, crop productivity increase, ecologic conditions improvement.
Offers on sale	Joint enterprise; joint production; sale of technology; introduction of technology.
Level of readiness	Others.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Joint enterprise.
Organization-developer	***SSPC "SPC of the NASB on bioresources"***

XI-11. Veterinary preparation "Enrofloxaferon"

Application field	Cattle stock and swine bacterial and mixed diseases prevention and treatment. Consumer organizations — livestock breeding complexes.
Description of products	Complex veterinary preparation of durable antibacterial and antiviral pluripotential action.
Expected outcome	Increase of survival and safety of stock by bacterial, mixed and bacteria-viral infections.
Offers on sale	Manufacturing and supply; organization of serial manufacture; serial production; delivery of the finished product.
Level of readiness	Serial production.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-12. Winter wheat cultivar for baking "Yadvisya"

Application field	Plantgrowing. The cultivar is included in the cultivar and hardy-shrub species register of the Republic of Belarus, it's cultivated in all regions of the Republic of Belarus. Since 2009 it has become a standart of the middle-late group.
Description of products	Winter wheat cultivar is of intensive type, dormancy class and hardiness, short-stalked, fungous diseases resistant. Average yield is 72.3 centner per 1 ha. Protein content is 13.1 %, fibrin content in grain is 29 % and 32.6 % in the meal.
Competitiveness	Cultivar "Yadvisya" perceeds domestic and foreign cultivars in economic traits (crop capacity, grain quality and disease resistnce).
Expected outcome	Cultivar Yadvisya provides additional grain yield of 4–5 centner per 1 ha if compared to the cultivated cultivars.
Offers on sale	License agreement, contract.
Level of readiness	Others.
The transfer of rights object	Plant species.
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Grodno State Agrarian University***

XI-13. Biopesticide "Ecogreen"

Application field
Protection of vegetable and green cultures in conditions of low-capacity hydroponics. Consumers: greenhouse and hothouse farms.

Description of products	Biopesticide "Ecogreen" is intended for protecting cucumbers, parsley and dill, cultivated on mineral cotton and peat in conditions of low-capacity hydroponics, from sulphur and root rot, caused by phytopathogenic fungi *Botrytis cinerea*, *Fusarium sp.* and *Pythium sp.*
Competitiveness	The biopesticide will allow to reduce losses of production and provide an increase of crop up to 10 %.
Expected outcome	Competitive. Import substitution.
Offers on sale	Manufacturing and supply.
Level of readiness	Serial production.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-14. Microbial disinfectant "Enatin"

Application field
Sanitation of premises of pig-breeding complexes and prevention of infectious diseases among agricultural animals. Consumers: pig-breeding complexes.

Description of products	Microbial disinfectant "Enatin" is intended for disinfecting premises of pig-breeding complexes and prevention of infectious diseases among agricultural animals caused by bacteria of colibacillus and staphylococcus-streptococcus groups.
Competitiveness	Competitive.
Expected outcome	Preparation application allows to reduce the number of sanitary-indicative microflora in the air and on the surface of premises of pig-breeding complexes by 81–100 % (for colibacillus group) and by 68–89 % (for staphylococcus-streptococcus group). Import substitution.
Offers on sale	Manufacturing and supply.
Level of readiness	Serial production.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-15. Microbial fertilizer "Gordebac"

Application field
Agriculture, plant growing. One of the ways to improve the quality of brewing barley, and also economic efficiency during its cultivation is introduction of biological preparations raising immunity to pathogens and stressful environmental factors, and besides, the elements of mineral nutrition improving digestion into the integrated brewing barley protection.

Description of products	"Gordebac" is a microbial fertilizer (liquid and peat-based) for preplant processing of seeds and vegetating brewing barley plants to obtain ecologically friendly grain with high technological properties and reduce doses of applied mineral fertilizers. "Gordebac" is created on the basis of nitrogen-fixing and phosphate-mobilizing bacteria. It is capable to increase the supply of plants with nitrogen and phosphorus.
Competitiveness	Competitive.
Expected outcome	It raises productivity by 5–10 %. Protein content in grain decreases by 0.2–0.4 %. "Gordebac" is an ecologically friendly preparation; it is safe for humans and animals.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; sale of a license; license agreement, contract.
Level of readiness	Pilot lot; limited production.
The transfer of rights object	Invention.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-16. Microbial fertilizer "SoyaRiz"

Application field
Agriculture, plant growing. Expansion of soya cultivation areas in the Republic of Belarus will allow to solve a problem of shortage of fodder protein in animal husbandry, and also will help to provide the population with qualitative vegetable oil.

Description of products	Dry biofertilizer based on a peat substratum-carrier is applied for preplant soya seeds processing to form symbiosis with soya nodule bacteria, which are absent in soil, with a host plant, provides obtaining high crop of ecologically pure soya seeds and verdurous mass, decreasing the doses of applying mineral fertilizers.
Competitiveness	Competitive.
Expected outcome	It improves nitric plant alimentation, provides decreasing the doses of applied mineral nitric fertilizers, raises technological properties of grain and soya verdurous mass. It promotes receiving increase of corn crop by 40 %, of protein per 1 ha — by 66 %.
Offers on sale	Manufacturing and supply.
Level of readiness	Pilot lot; limited production.
The transfer of rights object	Undisclosed information (know-how); scientific and technical information.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-17. Microbial preparation "Cleanbac"

Application field
The preparation is intended for intensification of clearing agricultural and municipal drains at biological treatment plants. It also possesses versatile consumer properties: at industrial enterprises, in housing and communal services, agriculture, and everyday life.

Description of products	Microbial preparation on the basis of nontoxic and nonpathogenic microorganisms.
Competitiveness	Competitiveness is based on preparation cost 3 times lower the price of market analogues, and more efficiency — 2 times lower the preparation consumption.
Expected outcome	It contributes to energy saving and preserving the environment.
Offers on sale	Manufacturing and supply; organization of serial manufacture; serial production; delivery of the finished product.
Level of readiness	Limited production.
The transfer of rights object	Undisclosed information (know-how); scientific and technical information.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-18. Probiotic "Bilavet"

Application field
Animal husbandry, veterinary medicine.

Description of products
"Bilavet" is a liquid probiotic preparation on the basis of lactic and bifidus bacteria, intended for young growth of farm stock and poultry. It is the alternative to fodder antibiotics.

Competitiveness	It contains highly effective bacteria strains with a high rate of viability; it has advantages by storage time.
Expected outcome	It stimulates growth and development of young growth of farm stock and poultry, possesses the immune-correcting effect, improves metabolism, and raises fodder absorbency. It reduces prevalence of disease by 40–45 %, reduces sickness period to 3–4 days. It provides increase of young growth preservation.
Offers on sale	Sale of products on a contractual basis; joint enterprise; manufacturing and supply; license agreement, contract.
Level of readiness	Serial production.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-eveloper	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XI-19. Probiotic preparation "Vetosporin"

Application field
Therapy of diseases of farm stock with purulent-necrotic defeats of their skin and hoofs.
Consumers: cattle-breeding complexes.

Description of products
The preparation possesses antagonistic activity concerning a wide spectrum of pathogenic and conditionally pathogenic microorganisms, including escherichia, salmonellas, mud puppy, staphyloccoccus, *Friedlander's bacillus* and other species causing purulent-necrotic diseases of farm animals.

Competitiveness	Competitive.
Expected outcome	While using preparation "Vetosporin", healing and also recovery of outlimb function of stock come on average 8 days earlier than before. Import substitution.
Offers on sale	Manufacturing and supply.
Level of readiness	Serial production.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Institute of Microbiology of the National Academy of Sciences of Belarus***

XII-1. Antitumour pharmaceutical substance "Tsemozolomid" and its synthesis technology

Application field
Pharmaceutical substance "Tsemozolomid" is used for receiving antitumour pharmacons, which can be used as a means of chemotherapy of celebral malignant neoplasms, etc.

Description of products
There has been developed a patent-pending circuit synthesis pharmaceutical substance "Temozolomide" and an original way to clean it in the selection. The technological process of synthesis of substance is environmentally safe and meets all sanitary and environmental regulations and standards. Chemical and biomedical tests proved their identity with the original domestic substance "Temozolomide" by chemical, toxicological and efficacy of antitumor action.

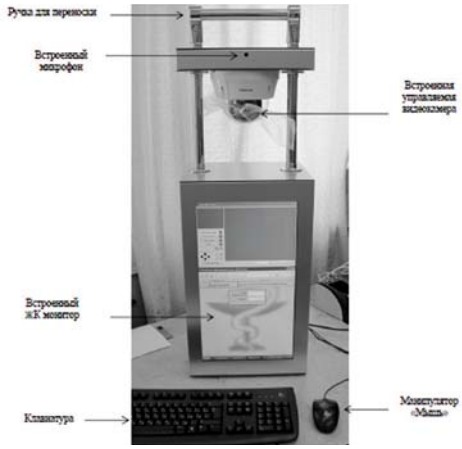
Competitiveness	Pharmaceutical substance "Tsemozolomid" has lower cost together with high quality factors if compared to foreign analogues. It is registered in the Republic of Belarus.
Expected outcome	Production of top quality antitumour pharmacons on the base of domestic substance "Tsemozolomid". Providing drug safety of the Republic of Belarus and reducing currency expenses by import substitution.
Offers on sale	Sale of products; organization of serial manufacture; delivery of the finished product.
Level of readiness	Pilot lot; limited production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Investments; joint production; joint enterprise.
Organization-developer	***Belarusian State University***

XII-2. Complex method for early detection of inherited malignant neoplasms by molecular genetic testing

Application field	Oncologic dispensaries, general care settings, sphere of demographic security.
Description of products	Complex method is represented for the following gradual actions: family oncology history taking, considering breast, ovarian, colon cancer, carrying out genealogical analysis and molecular genetic research to identify mutations (BRCA1, BRCA2, APC); formation of high oncology risks relatives probands (germinal mutation carriers),creation of regional oncogenetic register and medical monitoring of those with genetic oncologic risk.
Competitiveness	Early oncology detection (of breast cancer, ovarian cancer, colorectal cancer) gives an opportunity to annual save of 1.9 billion rubles which exceed the results of foreign analogues.
Expected outcome	The method allows to detect persons with high oncology genetic risks of breast , ovarian, colon cancer; reduce treatment costs, disability costs, reduce mortality from these forms of cancer.
Offers on sale	Introduction of technology.
Level of readiness	Others.
The transfer of rights object	Invention.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***N. N. Alexandrov National Cancer Centre of Belarus***

export
import

XII-3. Domestic complex of telehealth consultation. Neurological telehealth network. Telehealth technology patients counseling with cerebrovascular, demyelinating diseases and neurological vertebral osteochondrosis

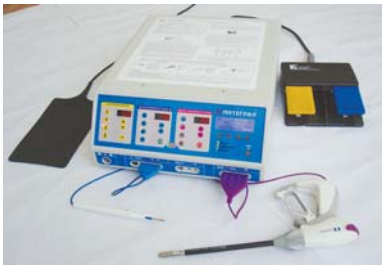


Application field
Telehealth, neurology, neurosurgery.

Description of products
The algorithm of holding teleconseling patients with main neurologic diseases has been created. There have been developed certain acts on information exchange for neurological teleconseling. Territorial (regional) telemedicine decision support system has been developed for the diagnosis and treatment protocol choice for patients with cerebrovascular, demyelinating diseases and neurological vertebral osteochondrosis.

Competitiveness	Preanalysis of the worldmarket shows that whole sum of features, software and hardware facilities price level will be attractive for export.
Expected outcome	Project implementation creates necessary conditions for full and widespread usage of telehealth modern teqniques for practical health care delivery to the population of the Republic of Belarus.
Offers on sale	Organization of serial manufacture.
Level of readiness	Limited production.
The transfer of rights object	Software; scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Medical University***

XII-4. Electrosurgical generator "EHG "INTEGRAL"



Application field
To equip surgeries, dressing examinations of hospitals, where traditional open, endosurgical, outpatient surgeries are performed.

Description of products	Electrosurgical generator "ESG INTEGRAL" (ESG) is designed for cutting and coagulation of tissue and blood vessels in the brewing operations on the organs and systems of patients with surgical, trauma, urology, oncology, gynecological, cardiac, neurosurgical and other pathology. ESG allows a doctor to perform surgery in the modes of monopolar cutting and coagulation and bipolar coagulation and brewing vessels.
Competitiveness	Developed ESG used in the establishments of the Ministry of Public Health the Republic of Belarus. The use of domestic development will reduce foreign currency expanses for the purchase of imported equipment. According to its technical characteristics the developed ESG corresponds to the best world analogues.
Expected outcome	Application of the ESG in medical establihments of the Ministry of Public Health of the Republic of Belarus will improve the quality of health services, provide medical staff with work, allow to perform traditional open, endosurgical and outpatient surgery quickly and effective.
Offers on sale	Sale of products; sale of products on a contractual basis; delivery by individual orders; cooperation with the customer on application.
Level of readiness	Serial production.
The transfer of rights object	Scientific and technical information; experimental model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***"Integral" OJSC***

XII-5. Fluorescence diagnostic technique allows to perform a differential diagnosis cancer and precancerous conditions in a non-invasive way. Photodynamic therapy technique allows to obtain a good functional treatment outcome of cancer of the oral mucosa and guttur

Application field	Early detection and treatment of the patients with oral mucosa and oropharyngeal cavity tumors Tis-T1N0M0.
Description of products	Methods of photodynamic therapy and fluorescent diagnostics involve intravenous injection of photosensitizer with further analysis of its accumulation in pathological tissues using electronic spectrum analyzer and the impact of laser light (660 nm) to destroy abnormal tissue. Advantage of techniques is the usage of the pharmacon Photolon hich allows to improve diagnosis efficiency and efficiency of cancer treatment through its high accumulation selectivity in tumor tissue.
Competitiveness	Responsiveness and specifity of fluorescent diagnostics are respectively 87.2 and 96.2 % (foreign analogues 83–90 and 60–89 % respectively). Frequency of complete tumour regression Tis-T1 is 100 % (foreign analogues — 80–95 %).
Expected outcome	Developed methods of photoradiation therapy and fluorescent diagnostics allow to improve early detection and functioal results of treatment of oral mucosa and oropharyngeal cavity tumors Tis-T1N0M0.
Offers on sale	Partnerships or other arrangements; cooperation with the customer on application; agreement on cooperation.
Level of readiness	Others.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***N. N. Alexandrov National Cancer Centre of Belarus***

XII-6. Generic antiplatalet technology for pharmacon "Clopidogrel, film-coated tablets 75 mg"

Application field	Medcine. Atherothrombotic diseases prevention.
Description of products	Clopidogrel is an antiplatalet pharmacon of the second generation, tyenpiridin class representstive. Certain tests of physicochemical characteristics have been carried out, quality control methodics on pharmacon "Clopidogrel, film-coated tablets 75mg " have been developed. The industrial production has been set.
Competitiveness	This generic is equal with the original pharmacon "Plavix" for quality and efficacy therewith it's of lower price level.
Expected outcome	Pharmacon "Clopidogrel" allows to reduce treatment cost for wide amount of patients, to satisfy the requirements of the Ministry of Public Health of the Republic of Belarus establishments in the pharmacon, which corresponds to the best foreign analogues in pharmacological efficacy.
Offers on sale	Sale of products; sale of technology.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

export
import

XII-7. Pharmacon "Lizinopryl", tablets 5 and 10 mg

Application field

Pharmacon is aimed at arterial hypertension treatment as a part of combined therapy caused by congestive heart failure, acute myocardial infarction, diabetic nephropathy.

Description of products	Pharmacon "Lizinopryl" is angiotensine converting enzyme inhibitor, reduces formation of angiotonin I and angiotonin II. Reduces total peripheral vascular resistance, system arterial blood pressure, preload, pulmonary capillary pressure, causes cardiac output increase and increases cardical muscle tolerance to stress by cardiac insufficiency patients. By long application there is myocardial and resistive type artery walls hypertrophy reduction. Blood supply of the stunned myocardium improves.
Competitiveness	Pharmacon "Lizinopryl" coppersponds to the foreign analogues in its potency and pharmacological action, though its price is lower.
Expected outcome	To satisfy the requirements of the Ministry of Public Health of the Republic of Belarus for pharmacon "Lizinopryl". Saving budget currency assets by import substitution. Pharmacon registration in foreign countries and its export.
Offers on sale	Sale of products; serial production; delivery of the finished product.
Level of readiness	Serial production.
The transfer of rights object	Scientific and technical information.
The transfer of rights form	License agreement.
Offers for cooperation	Investments.
Organization-developer	***"Borisovskiy zavod medicinckih preparatov" JSC***

XII-8. Phototherapeutic complex based on photodiode radiant of high power (10–40 W), manual for applying this complex while treating patients with trophic ulcers, pyoinflammatory skin and soft tissues diseases

Application field
Medicine, physical medicine, surgery.

Description of products
There have been developed phototherapeutic complex providing effective treatment of large and chronic purulent wounds, trophic ulcers, using the technologies of antibiotic treatment and photodynamic and photoregulating therapy. By the application of this complex a guide for treating patients was developed and introduced into clinical practice . The permission of the Ministry of Public Health of the Republic of Belarus for serial production has been received.

Competitiveness	Complex phototherapeutic "Calendula" is developed on modern base, with microprocessor control of radiation parameters and operating conditions. As medical factors there are used high power LED matrix (10–40 W). It is much better than foreing analogues.
Expected outcome	The economic effect of using a single "Calendula" complex can ensure the reduction of the period of treatment in a hospital for 2100 days per year, which will save expenditures by patients treatment with extensive purulent and chronic wounds, trophic ulcers of about 30,000 c. u. per year.
Offers on sale	Serial production.
Level of readiness	Serial production.
The transfer of rights object	Others.
The transfer of rights form	License agreement.
Offers for cooperation	Investments; cooperated research and experimental designing (technical) works.
Organization-developer	***B. I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus***

XII-9. Set of criteria for the early differential diagnosis and surgical treatment among young patients with intraarticular congenital and acquired orthopedic and rheumatologic diseases and injuries of the knee joint, with the development of prognostic index for their development dynamics

Application field	Introduction of the new developed techniques of interventitonal preventive measures of gonarthrosis among young patients of the Republican scientific and practical center of traumatology and orthopedics, Belarusian medical academy for further education, orthopedics and traumatology departments of different regional hospitals of the Republic of Belarus.
Description of products	Scientific research on creation of complete system of complex differential diagnosis, on development targets of the pathological process and the development of schemes of gonarthrosis surgical preventive measures among children and teenagers in the Republic of Belarus have not yet been carried out. The system of differential diagnosis and surgical treatment of intraartucular and knee diseases among young patients with clear recommendations for orthopedic trauma specialists and rheumatologists.
Competitiveness	New modern complex differential diagnosis and early surgical prevention schemes of gonarthrosis according to clinical and radiologic stage and pathological changes in the joint. With this system optimization of the diagnostic process is achieved together with reductinon of the time of treatment, time of temporary disability and reduction of the number of complications and unsatisfactory outcomes of surgical correction.
Expected outcome	Significant social and real economic benefit is expected by optimization of the diagnostic process, reduction of time of treatment, reduction of the time of temporary disability and reduction of the number of complications and unsatisfactory outcomes of surgical treatment of diseases of the knee among young patients.
Offers on sale	Introduction of technology.
Level of readiness	Serial production.
The transfer of rights object	Invention.
The transfer of rights form	Contract for assignment of rights.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Medical University***

XII-10. Technologies for hypotheriosis and hypoparathyroidism treatment by thyrocites and parathyrocites xenotransplantation

Application field	Endocrinology, transplantology, endocrine surgery.
Description of products	Postsurgucal hypotheriosis and hypoparathyroidism prevalence rate has been studied. Standard replacement therapy of hypotheriosis and hypoparathyroidism has been specified. There has been developed a method of getting functionally active cell culture of thyrocytes and paratirotsites for transplantation. There has been developed a method of xenotransplantation of macroencapsulated paratirotsites thyrocytes and in the bloodstream of the recipient. Clinical and laboratory criteria for the application of surgical treatment method of hypotheriosis and hypoparathyroidism have been set.
Competitiveness	The technology being developed does not have any domestic or foreign analogues.
Expected outcome	The results obtained will reduce budget expences for the purchase of essential medications (levothyroxine, parathyroid hormone, calcium supplements, vitamin D3), will serve as a powerful impuls to the development of a set of health care activitiess — sensitive surgical teqnique, autoimplantation of accidentally eleminated parathyroid glands and their cryopreservation, to intraoperative neuromonitoring and express-monitoring of PTH, endoscopic surgical thyroidology technologies that will contribute to the increase of recovery potential and life quality of the patients.
Offers on sale	Partnerships or other arrangements; sale of technology.
Level of readiness	Experimental model.
The transfer of rights object	Invention.
The transfer of rights form	License agreement.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Medical University***

XII-11. Technology of treating trophic ulcers by using autologous stem cells from the adipose tissue

Application field	Transplantology, purulent surgery, angiosurgery.
Description of products	A methodological framework for the adipose tissue intake has been prepared in experimental and clinical spheres. There have been develop a laboratory protocol for obtaining mesenchymal stem cells of adipose tissue. Experimental studies using mesenchymal stem cells of adipose tissue in the different simulated tracks have been carried out. Various options of local transplantation of mesenchymal stem cells of adipose tissue in the clinical setting have beenworked through.
Competitiveness	Treatment technology being developed does not have domestic analogues. Information on the application of cell-based technologies (including the use of autologous mesenchymal stem cells of adipose tissue) in the treatment of trophic defects caused by various factors is of sporadic character.
Expected outcome	Implementation in practical health of developed technique of local autologous MSCs speeds up the receipt of a positive treatment effect, reducing its total cost, will provide a significant increase in the level of specialized medical care and quality of life of patients with trophic ulcers of various etiologies (reducing the number of complications of trophic ulcers by 20–25 %, decreasing of term of preoperative period in patients with trophic ulcers of venous etiology for 7–10 days).
Offers on sale	Partnerships or other arrangements; sale of technology; introduction of technology.
Level of readiness	Experimental model.
The transfer of rights object	Invention.
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Belarusian State Medical University***

XII-12. Anti tumor drug "Oxaliplatin", powder for solution for infusion 50 and 100 mg, used for treatment of colon cancer, and the technology of its receipt

Application field	Medicine and oncology.
Description of products	A generic drug which has antitumor activity and used in combination with 5-fluorouracil and "Leucovorin" for the treatment of colon cancer has been developed. After-registration clinical researches of the developed drug in comparison with the original drug "Eloxatin" are being held (manufactured by "Sanofi Aventis", France).
Competitiveness	Generic drug "Oxaliplatin" has been developed, powder for solution for infusions 50 and 100 mg. The drug is registered by the Ministry of Health Care of the Republic of Belarus.
Expected outcome	Production of the domestic product will provide the Ministry of Public Health of the Republic of Belarus with the up-to-date drug which is not inferior to foreign analogues in its efficiency and quality, but more affordable for the consumer.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

XII-13. Anticancer drug "Paklitaxel, 0.6 % concentrate for solution preparation for infusions"; production technology

Application field	Medicine. Oncology.
Description of products	Pharmaceutical development of generic anticancer drug "Paklitaxel" used to treat breast cancer, non-small cell lung cancer, ovarian carcinoma, head and neck squamous cell carcinoma, transitional cell bladder cancer, Kaposi's sarcoma at patients with AIDS (second-line treatment).
Competitiveness	The generic drug has been developed — an analogue of medicinal agent "Taksol" (produced by "Bristol-Mayers Squibb", Italy). Issue of the domestic product will provide medicine with an up-to-date medicinal agent that is not inferior to foreign analogues in relation to its effectiveness and quality; but more affordable for the consumer.
Expected outcome	The developed drug will provide the Ministry of Public Health of the Republic of Belarus with an up-to-date generic medicinal agent.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

XII-14. Antiemetic drug "Tropisetron, 0.1 % solution for injections"; production technology

Application field	Medicine. Oncology.
Description of products	Generic antiemetic drug "Tropisetron, 0.1 % solution for injections" has been developed. The medicinal agent is registered in the Ministry of Public Health of the Republic of Belarus.
Competitiveness	The generic drug has been developed.
Expected outcome	Issue of the domestic product will provide the Ministry of Public Health of the Republic of Belarus with the up-to-date medicinal agent that is particularly used to minimize injurious effect of cytotoxic agents on the organism, to reduce significantly the risk of life-threatening complications, and to improve life quality of oncologic patients.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

XII-15. Antiemetic drug "Tropisetron, capsules"; production technology

Application field	Medicine. Oncology.
Description of products	Generic antiemetic drug "Tropisetron, capsules" has been developed. The medicinal agent is registered in the Ministry of Health Care of the Republic of Belarus.
Competitiveness	The generic drug has been developed.
Expected outcome	Issue of the domestic product will provide the Ministry of Public Health of the Republic of Belarus with the up-to-date medicinal agent particularly used to minimize injurious effect of cytotoxic agents on the organism, to reduce the risk of life-threatening complications, and to improve life quality of oncologic patients.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

XII-16. Antiviral drug "Nukleavir, 3 % eye ointment"; production technology

Application field	Medicine. Treatment of ophthalmic herpes (herpetic dendritic, geographic keratitis; keratoiridocyclitis with ulceration).
Description of products	Original antiviral drug has been developed for the treatment of ophthalmic herpes. Manufacturing of the drug has been arranged.
Competitiveness	The original antiviral drug has been developed that exceeds its analogues at antiviral activity in relation to acyclovir resistant strains.
Expected outcome	The developed drug will provide the Ministry of Public Health of the Republic of Belarus with an antiviral medicinal agent.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

XII-17. Antiviral drug "Nukleavir, 5 % eye ointment"; production technology

Application field	Medicine. Treatment of herpetic skin lesions and mucous membranes.
Description of products	The original antiviral drug has been developed for treatment of herpetic skin lesions. Issue of medicinal agent has been mastered.
Competitiveness	The original antiviral drug has been developed that exceeds ointment "Aciclovir 5 %" at antiherpetic activity in relation to acyclovir resistant strains.
Expected outcome	The developed drug will provide the Ministry of Public Health of the Republic of Belarus with the original antiviral medicinal agent.
Offers on sale	Sale of products.
Level of readiness	Serial production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

XII-18. Drug "Photopon, ointment for external use"; production technology

Application field	Medicine. Oncology. Stomatology.
Description of products	Original drug "Photopon, ointment for external use" in tubes 5 g that is used in the sphere of photodynamic therapy during treatment of neoplasms of external location and inflammatory diseases of periodontium.
Competitiveness	New drug "Photopon, ointment for external use" in tubes 5 g has been developed that is used during treatment of neoplasms of external location and inflammatory diseases of periodontium. The medicinal agent has selectivity and low phototoxity.
Expected outcome	Developed original drug "Photopon, ointment for external use" will provide clinical agencies of the Ministry of Public Health of the Republic of Belarus with the medicinal agent that is used in photodynamic therapy during treatment of basal cell carcinoma and inflammatory diseases of periodontium.
Offers on sale	Sale of products; sale of a license; cooperation with the customer on application; delivery of the finished product.
Level of readiness	Serial production.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	License agreement.
Offers for cooperation	Investments.
Organization-developer	***"BELMEDPREPARATY" RUE***

import

XIII-1. Information-measuring device of distributed control of substation and station electric universal power supply UPS-01

Application field
Power plants, substations and power system enterprises.

Description of products	UPS-01 performs the function of substation equipment distributed control and station electric part, measuring, registration and visualization of parameters, electrical equipment operating regime, power quality rating. In one device measuring instrument, power quality control device, fault location device, disturbance recorder, master controller, signals concentrator from microprocessor protection, WKS are concentrated.
Competitiveness	Domestic analogues do not exist.
Expected outcome	UPS-01 has a broader set of features compared to currently used similar devices.
Offers on sale	Sale of products on a contractual basis; manufacturing and supply; cooperation with the customer on application; delivery of the finished product.
Level of readiness	Limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***A. V. Lykov Heat and Mass Transfer Institute of the National Academy of Sciences of Belarus***

XIII-2. Installation for heating water by utilizing radioactive heat losses of high-temperature furnaces of bulk solids

Application field	The heating-utilizing unit is intended for heating of water, which can be used in DHW and for enterprise heating or for technological purposes.
Description of products	The heating-utilizing unit for water heating consists of two symmetrical parts, shielding the upper cylindrical surface of kiln, which includes heating take-up panel of metal pipes, a reflector of radiation flux, heat insulation of radiation flow reflector, protection of heating-utilizing unit from precipitations. The average plant capacity — 200 kW. The heating-utilizing unit can be equipped with a pump swapping of the heat-carrying agent and with a control system of controlling the temperature of surface elements, heat-carrying agent temperature, coolant flow, water level in the tank accumulator of hot water-supply of the company.
Competitiveness	In conducting patent searches, analogs were not found.
Expected outcome	The unit is repaid in 1.5 years on average.
Offers on sale	Delivery by individual orders; transfer of engineering specifications and specialist advice on development; cooperation with the customer on application.
Level of readiness	Experimental model.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	Agreement on the creation and use of intellectual property.
Organization-developer	***"Institute NIPTIS named after S. Ataev" RUE***

XIII-3. The technology and set of equipment for production of fuel pellets (pellets) of waste from the processing of grain and other crops

Application field	The production of clean fuels in the form of pellets by processing of unproductive waste, generated during processing and cleaning of cereals and cereal crops on cereal products' plants, formula-feed plants, as well as through the use of straw crops (canola), and flaxboons.
Description of products	The pellets are cylinders with a diameter of 6–10 and 30–50 mm in length with a calorific value 14–18 MJ/kg. The developed technology and production line of fuel pellet PLFL-2 provides processing of non-productive waste of grain, straw cereals crops (rape) by removal of impurities, drying, grinding, pelleting and getting out of this raw material pellet fuel (annual production is not less than 2,000 t, the performance line — 1.8–2 t/h, the installed capacity — 210 kW, the consumption of liquid or gaseous fuels is excluded). The manufacturer of wood pellets — Sole Proprietorship "Salvy".
Competitiveness	Corresponds to the technical level of development of the CIS countries. Compared with the traditional technology of fuel pellets from waste wood can expand the range of raw materials, non-productive use of waste from grain processing while reducing material consumption by 10–12 % and energy-intensive process — by 8–10 %.
Expected outcome	The technological process and equipment provides the reduction of energy consumption by 27,000 kW·h/year, with annual production of 2,000 t of annual production, reduces the specific energy process by 8–10 % compared to the production of fuel pellets from wood, improves environmental conditions through the utilization of unproductive cereals waste.
Offers on sale	Sale of products on a contractual basis; transfer of engineering specifications and specialist advice on development.
Level of readiness	Experimental model.
The transfer of rights object	Effective model.
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***Theoretical and Practical Center of the National Academy of Sciences of Belarus on Agriculture Mechanization***

XIV-1. Laser-pulse active vision system



Application field	Road, rail and sea transport, aircraft, security systems, emergency services. Is meant for driving for various purposes, monitoring of protected sites condition, long maritime observations.
Description of products	The vision system is used to obtain a clear image of the environment at night or in low visibility conditions (fog, dust, gas contamination, rain, snow, etc.). Images can be displayed on the screen, the windshield of the vehicle, monocular or binocular observation system.
Competitiveness	The cost of the system is much smaller than that of thermal imager. High image quality (is better than its analogs), high geometric resolving ability — more than 60 lines/mm, high-contrast image, the resolution of objects at a depth of 1–2 m, the possibility of distant measurement of an object with accurate within 5 m, regardless the distance to it.
Expected outcome	It is assumed to release at least 100 copies of the device for "BelAZ" needs.
Offers on sale	Delivery by individual orders; transfer of engineering specifications and specialist advice on development; organization of serial manufacture; sale of a license.
Level of readiness	Limited production.
The transfer of rights object	Effective model; undisclosed information (know-how).
The transfer of rights form	License agreement; agreement on the creation and use of intellectual property; purchase and sale contract.
Offers for cooperation	Cooperated research and experimental designing (technical) works; Joint production.
Organization-developer	***B. I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus***

XIV-2. Meter cloud SD-02-2006

Application field
Hydrometeorology, civil airports, airfields of the Ministry of Defence and the Ministry of Emergency Situations of the Republic of Belarus, helipads civil of aviation.

Description of products	Meter cloud SD-02-2006 consists of lasing emitter, lens, receiver and control circuit based on a microcontroller. Leveling of cloud base is achieved by measuring the transit time of the light pulse from the emitter to the cloudiness bottom and back, with subsequent conversion of the obtained time interval in a proportional value of the height of clouds.
Competitiveness	According to its performance characteristics meter cloud SD-02-2006 is at the level of mass-produced foreign models.
Expected outcome	The main consumers of cloud meter SD-02-2006: SA "National Hydrometeorological center", Aviation Committee of the CIS countries.
Offers on sale	Sale of products on a contractual basis; delivery by individual orders; manufacturing and supply; agreement on cooperation.
Level of readiness	Limited production.
The transfer of rights object	Production prototype.
The transfer of rights form	Purchase and sale contract.
Offers for cooperation	Joint production.
Organization-developer	***"Peleng" JSC***

XIV-3. The device for express optical diagnostics of cancer

Application field

Biology, medicine. Basic and applied researches on the diagnosis of cancer and other tumors, including those on early stages of their formation.

Description of products

The device is produced for non-contact and express optical diagnostics of cancer; its action is based on simultaneous recording of UV-induced autofluorescence of tissues and recording of the spectra of diffusely scattered light. It has the possibility of express recording of fluorescence kinetics, wide spectral range of measurements, high sensitivity and the possibility of processing the measurement results by using modern statistical methods.

Competitiveness	High speed and accuracy of obtaining experimental data. Compactness and mobility of the device. The use of safe sources of light makes it possible to use this device on living tissues. Ability to arrange researches in various types of tissues, including those with a high content of blood vessels.
Expected outcome	The project implementation will significantly reduce time and economic costs for pathological diagnosis of cancer. The developed devices can also be used for the diagnosis and localization of cancer directly during surgery, which would allow, in certain cases, to refuse from re-intervention and increase the probability of positive dynamics of the treatment process.
Offers on sale	Delivery by individual orders; transfer of engineering specifications and specialist advice on development; joint production.
Level of readiness	Experimental (model) sample.
The transfer of rights object	Undisclosed information (know-how).
The transfer of rights form	Agreement on the creation and use of intellectual property.
Offers for cooperation	Cooperated research and experimental designing (technical) works.
Organization-developer	***B. I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus***

XV-1. Manufacturing technologies of economical composite bundles based on carbonyl iron of a cutting segment tool for cutting building materials and pavements

Application field	Construction, landscaping, road work.
Description of products	Diamond-metal compositions, based on carbonyl iron and manufacturing technology of a diamond cutting tool were developed. Technological processes for the manufacturing of the instrument were developed. The manufacture of the tool on the experimental ground of the State Scientific Institution "Metal Powder Industry Institution" (SSI "MPI") was mastered.
Competitiveness	The product is competitive and corresponds to the best analogues of the CIS countries and abroad, as confirmed by the application for the invention and participation in international conferences.
Expected outcome	The usage as a bunch basis of carbonyl iron and higher concentrations of diamond powder provides high resource values of the tool work and low cost.
Offers on sale	Delivery by individual orders; joint enterprise; manufacturing and supply.
Level of readiness	Pilot lot.
The transfer of rights object	Invention.
The transfer of rights form	License agreement.
Offers for cooperation	Joint production.
Organization-developer	***Powder Metallurgy Institute***

Index of Participants

Grodno State Agrarian University 40, 126
Educational Establishment "Grodno State Agrarian University"
230008, Grodno, Tereshkovoy Str., 28
phone (+375 152) 74-06-08, fax 72-13-65
e-mail: ggau@ggau.by
http://www.ggau.info

GSKB for Grain and Forage Machinery 81, 82
Republican Design Unitary Enterprise "GSKB for Grain and Forage Machinery"
246035, Gomel, Efremov Str., 61
phone (+375 232) 59-34-18, fax 54-14-83
e-mail: gskb@mail.ru
http://www.gskb-selmash.gomel.by

"Institute BelNIIS" RUE 103
Republican Unitary Enterprise "Institute BelNIIS"
220114, Minsk, F. Skorina Str., 15B
phone (+375 17) 267-10-01, fax 267-87-92
e-mail: belniis@belpak.minsk.by
http://www.belniis.by

Institute for Command Engineers of the Ministry of Emergencies of the Republic of Belarus 8, 18
State Education Institution "Institute for Command Engineers of the Ministry of Emergencies of the Republic of Belarus"
220118, Minsk, Mashinostroiteley Str., 25
phone/fax (+375 17) 341-73-11
e-mail: guo@kii.gov.by
http://www.kii.gov.by

"Institute NIPTIS named after S. Ataev" RUE 153
Republican Unitary Enterprise "Institute NIPTIS named after S. Ataev"
220114, Minsk, Skoriny Str., 15
phone (+375 17) 263-81-91, fax 263-51-21
e-mail: notd@it.org.by
http://www.mas.by/niptis

Institute of Digital Television "Horizont" RUE 29
Private Research Unitary Enterprise "Institute of Digital Television "Horizont"
220029, Minsk, Krasnaya Str., 7
phone/fax (+375 17) 288-11-82
e-mail: ict@dtv.horizont.by
http://dtv.horizont.by

Institute of General and Inorganic Chemistry of the National Academy of Sciences of Belarus 44, 45, 47
State Scientific Institution "Institute of General and Inorganic Chemistry of the National Academy of Sciences of Belarus"
220072, Minsk, Surganova Str., 9
phone (+375 17) 284-27-42, fax 284-27-03
e-mail: secretar@igic.bas-net.by
http://www.igic.bas-net.by

“Minsk Automobile Plant” JSC 71, 72, 73, 74, 75, 76
Joint Stock Company “Minsk Automobile Plant”
220021, Minsk, Sotsialisticheskaya Str., 2
phone (+375 17) 217-93-89, fax 217-20-18
e-mail: office@maz.by
http://www.maz.by/

“Minsk Motor Plant” OJSC 55
Open Joint Stock Company “Minsk Motor Plant”
220070, Minsk, Vaupshasov Str., 4
phone (+375 17) 230-31-88, fax 230-11-24
e-mail: general@po-mmz.minsk.by
http://www.po-mmz.minsk.by

“Minsk Tractor Works” RUE 68
Republican Unitary Enterprise “Minsk Tractor Works”
220009, Minsk, Dolgobrodskaya Str., 29
phone (+375 17) 238-60-09, fax 230-21-11
e-mail: sales@tractors.com.by
http://belarus-tractor.com

“MNIPI” JSC 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100
Joint Stock Company “MNIPI”
220113, Minsk, Ya. Kolasa Str., 73
phone (+375 17) 262-21-24, fax 262-88-81
e-mail: oaomnipi@mail.belpak.by
http://www.mnipi.by/

N. N. Alexandrov National Cancer Centre of Belarus 135, 138
State Institution “N. N. Alexandrov National Cancer Centre of Belarus”
223040, Minsk region, Minsk district, Lesnoy
phone (+375 17) 287-95-05, fax (+375 17) 265-47-04
e-mail: oncobel@omr.med.by
http://omr.med.by

“P. M. Masherov Minsk Automatic Lines Plant” RUE 64
Republican Unitary Enterprise “P. M. Masherov Minsk Automatic Lines Plant”
220037, Minsk, Dolgobrodskaya Str., 18
phone (+375 17) 230-16-63, fax 230-33-30
e-mail: mzal@mail.ru
http://mzal.by

“Peleng” JSC 33, 99, 156
Joint Stock Company “Peleng”
220023, Minsk, Makayonka Str., 23
phone (+375 17) 263-77-02, fax 263-65-42
e-mail: peleng@peleng.belpak.minsk.by

Scientific-Technological Park of the BNTU "Polytechnic" 35, 37
Republican Innovation Unitary Enterprise "Scientific-Technological Park of the BNTU "Polytechnic"
220013, Minsk, Ya. Kolasa Str., 34/1
phone (+375 17) 296-67-22, fax 232-71-83
e-mail: post@metolit.by
http://www.polytechnic.by

"NIIEVM" JSC 36
Joint Stock Company "Research Institute of Electronic Computing Machines"
220040, Minsk, Bogdanovica Str., 155
phone/fax (+375 17) 334-47-42
e-mail: orion@ntc.niievm.by
http://www.niievm.by

"Vityaz" JSC 32
Joint Stock Company "Vityaz"
210605, Vitebsk, Brovki Str., 13-A
phone (+375 212) 22-92-13, fax 22-00-51
e-mail: ipk@vityas.com
http://ipk.vityas.com

"KUVO" UE 67
Unitary Private Production Enterprise "KUVO"
212016, Mogilev, Pervomaiskaya, 157-a
phone (+375 222) 28-77-77, fax 32-53-43
e-mail: kuvo@kuvo.by
http://www.kuvo.by

Subject Index

INFORMATION AND COMMUNICATION AND AEROSPACE TECHNOLOGIES

Production of communication facilities, computer aids and software,high-efficiency systems,transfer technologies and processing of information 27

Information aerospace technology, technological use of near-Earth space enviroment 9, 19, 26, 27, 28, 31

NEW MATERIALS

New materials 5, 36

Production of new materials for industry and health service 107

Production of new materials for construction 101

Metallurgical technology, metal welding, coating, hard-facing 51

ENVIROMENTAL MANAGEMENT, RESOURCE SAVING AND EMERGENCY PROTECTION

Water resources 117

Forest resources, increasing of productivity and sustainability of forests, improvement of their qualitative composition 9, 119, 120, 121, 122, 123

Environmental protection 118

Increasing of protection of population and territories from emergency situations of natural and technogenic character 8, 86

NATIONAL DEFENSE AND NATIONAL SECURITY

Economy, education, culture, society 7, 118

Content

For notes

Reference Book

Catalogue
of innovation projects and products

Issue 2

Responsible for publishing:	E. Sudilovskaya
Editor:	E. Sudilovskaya
Design:	M. Nedvetskaya

State Institution "Belarussion Institute of System Analysis
and Information Support of Scientific and Technical Sphere"
(SI "BelISA")

220004, Minsk, Pobediteley Ave., 7
Phone (+375 17) 203-14-87
Fax (+375 17) 226-63-25
License LB № 02330/05494624 of 22.04.2009 г.

Подписано в печать 26.12.2012 г.
Формат 60x84 1/16. Бумага офсетная. Гарнитура Myriad.
Печать цифровая. Усл. печ. л. 10,46. Уч.-изд. л. 9,87.
Тираж 150 экз. Заказ № 178.

Отпечатано в отделе — издательско-полиграфическом центре ГУ «БелИСА».

ISBN 978-985-6874-45-4