



TRINITI
ROSATOM

2021

PRODUCT CATALOGUE



The Joint Stock Company State Research Center of the Russian Federation Troitsk
Institute for Innovation and Fusion Research (TRINITI JSC)

108840, Moscow, Troitsk, Pushkovykh str., ow. 12

www.triniti.ru

Development and design - press service of TRINITI JSC

© 2021 TRINITI JSC
All rights reserved

THE JOINT STOCK COMPANY STATE RESEARCH CENTER OF THE RUSSIAN FEDERATION
TROITSK INSTITUTE FOR INNOVATION AND FUSION RESEARCH

TRINITI JSC product catalogue

Table of contents

	CEO's message	1
	MLTC	
	Mobile laser technological complex	4
	Underwater gas-laser cutting	6
	Fragmentation of equipment at NPP	6
	MLTC use in the oil spill clean-up in the Arctic conditions	7
	Carbon-13	
	Production of highly enriched isotope Carbon-13	10
	Functional coatings	
	Functional coatings deposition plant.....	14
	Materials processing and hardening	
	Laser hardening of materials.....	18
	Hardening of materials and items by pulsed plasma flow.....	20
	X-Pinch	
	X-ray device with high spatial resolution (microscope)	24
	Ozonation plants	
	New generation ozonation plants.....	28
	Research and training laboratories	
	Research and training laboratories	32
	Digital Laboratories.....	33
	Contact details	34



TRINITI

ROSATOM

CEO's message

The State Research Center of the Russian Federation Troitsk Institute for Innovation and Fusion Research is well known both in Russia and abroad for its results and achievements in the field of controlled thermonuclear fusion, physics of high and low temperature plasma, physics and technology of high-power gas-discharge lasers, creation and application of switching power supplies using superconducting materials.

Our catalog presents the technologies, products and services offered by TRINITI JSC.



Wishing you all the best and a good luck
on achieving your goals.

Dmitry Markov
General Director
TRINITI JSC

Laser technology

Currently, there is a problem of decommissioning large-sized thick-walled metal structures on the world market. To solve such issues, we offer a multifunctional mobile laser technology complex (MLTC).

When developing the MLTC, the main task was to create a unique complex that is able to cut metal and reinforced concrete structures at a long distance from the object. MLTC can be used to solve a wide range of tasks. The complex has no analogues in the market and allows for remote laser cutting during the disposal of thick-walled structures, as well as to eliminate man-made accidents and provide operational special technological work. Also, using the existing scientific and technical reserve TRINITI JSC in the field of laser technologies, develops the direction of gas-laser underwater cutting and the creation of a robotic complex for the decommissioning of nuclear and radiation-hazardous facilities. The complexes are developed and created in the Department of Innovative and Applied Research under the supervision of the Candidate of Physical and Mathematical Sciences Alexander Krasnyukov.

**Project Manager
Commercial
Department**



Aleksandr Petrovskiy

I am ready to answer your questions!

Phone: +7 495 851 15 52 ext. 49 04

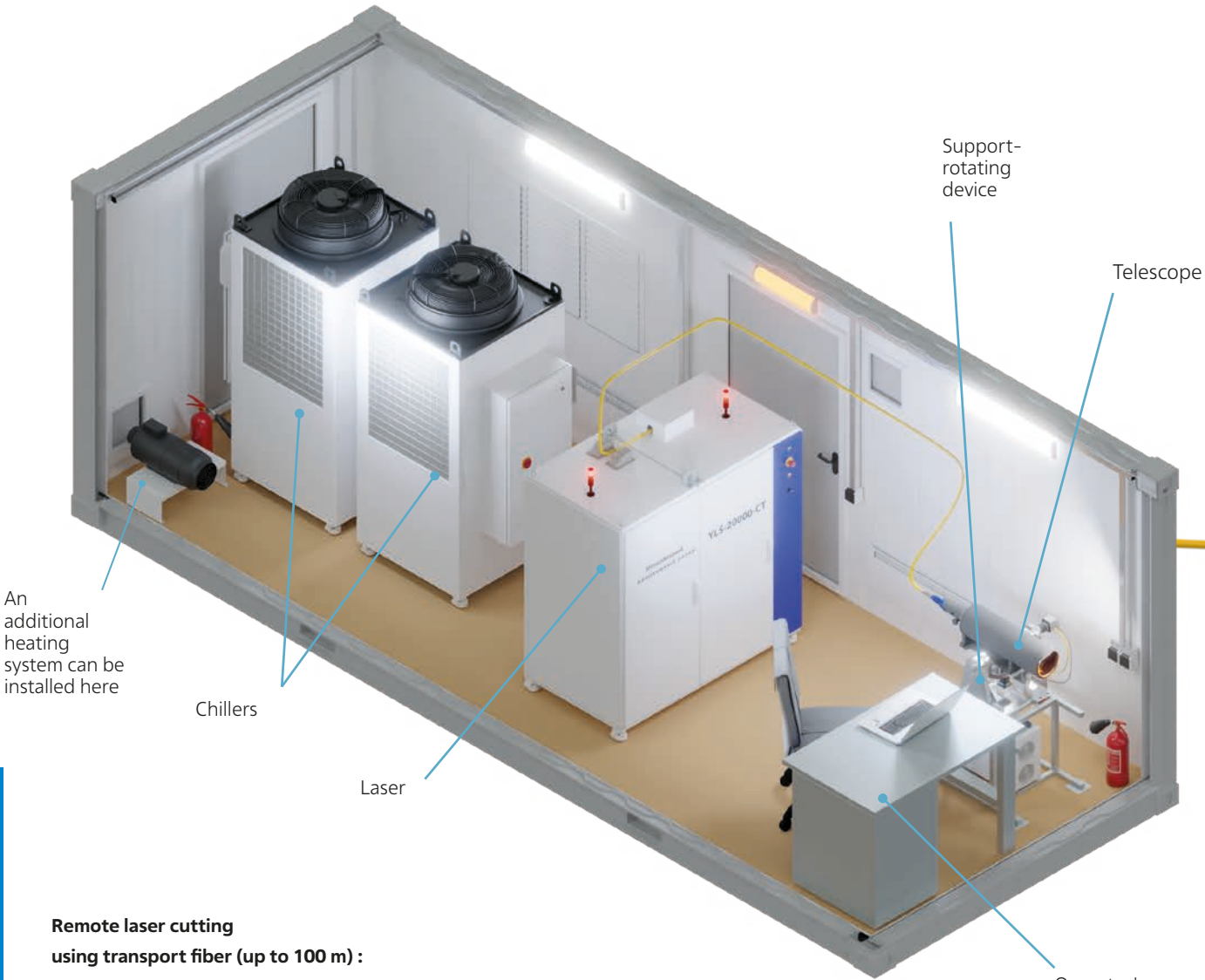
E-mail: liner@triniti.ru



Mobile laser technological complex

On the basis of a serial ytterbium laser the mobile laser technology complex (MLTC) has been designed. The MLTC is able to perform such types of work as:

- Remote laser cutting (up to 300 m);
- Remote laser cutting using transport fiber (up to 100m).



- Remote laser cutting using transport fiber (up to 100 m) :**
- Fragmentation of equipment (steam generators, condensers, reactor vessels) at the dismantled units of nuclear power plants;
 - Underwater gas-laser cutting of metal structures;
 - Elimination of pollution of the coastline and nearshore zone in case of emergency oil spills.



Block-container



Destruction of rocks



Forming telescope of the MLTC complex

Remote laser cutting (up to 300 m):

- Elimination of accidents, incl. with open flowing in oil and gas fields;
- Cutting and fragmentation of large-sized thick-walled metal and non-metal structures (including submarines and ships);
- Destruction of ice formations.



MLTK-20 complex, created in 2010 by order of Gazprom-gazobezopasnost, was first used in 2011 during elimination of the accident at gas well №506 at the operating field in the Yamalo-Nenets Autonomous District. After this accident the MLTK-20 complex was used for elimination of three more severe accidents:

August 2013-Samburg NGCM (Yamal-Nenets Autonomous District);

July 2014-Verkhnekolik-Yeganskoye oil and gas field (Khmao);

January 2015-Severgubkinskoye oil and gas field (simultaneous open gushing of an oil and gas well at temperatures up to -32°C).



The first MLTK-20 complex

MLTC



Up to 50 kW

Laser output power



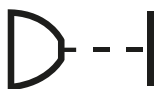
Up to 440 mm

Demonstrated cutting depth



Up to 300 meters

Remote exposure range



From 1 to 20 m / hour

Speed of laser cutting of structures up to 100 mm thick in automatic mode



Up to 150 kW

Power supply



-50 - + 40 °C

Climatic conditions



Transport container

Format

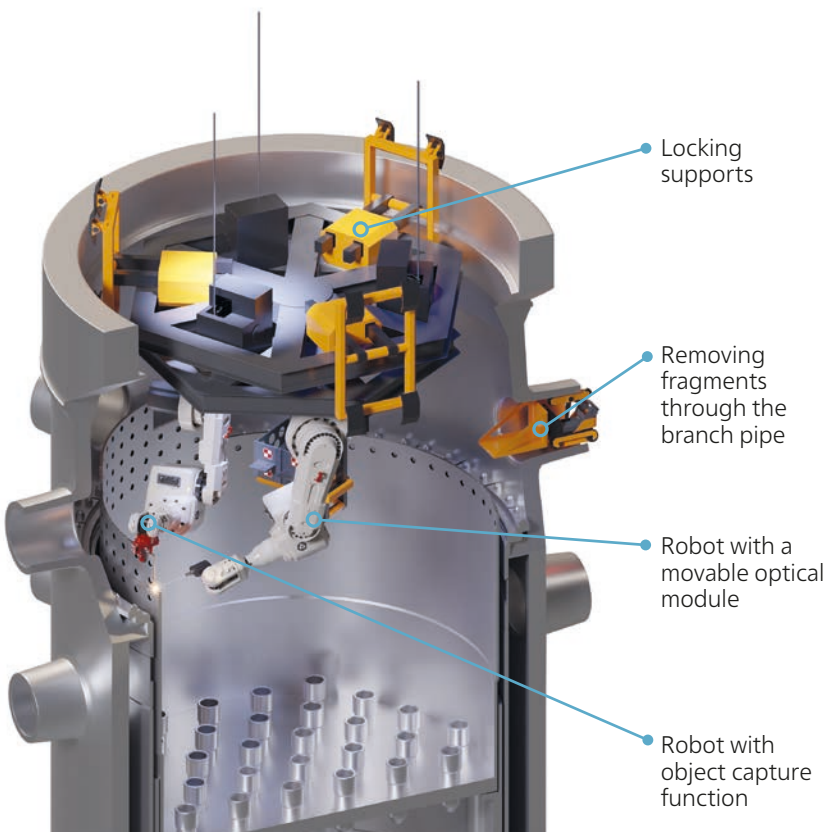


60 minutes

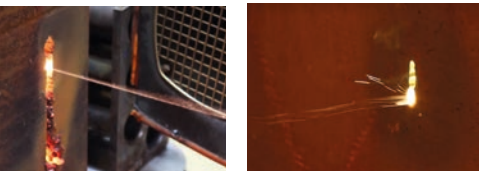
Complex setup time

Fragmentation of equipment at NPP

The technology of separation cutting of thick-walled (up to 440 mm thick) spatial metal structures has been developed. Cutting of metal structures is carried out at a distance of up to 100 m through transporting laser radiation via a flexible transport fiber, which makes it possible to locate all the equipment of the laser complex and the operating personnel in the "clean" zone. The energy efficiency of the complex reaches ≈35%.



For the dismantling of reactor vessel, it is planned to create a remote-controlled system, which will include a robotic arm able to capture objects, and a movable sealed remote optical module which will be used for the fragmentation of the dismantling object directly.



Cutting of thick-walled metal object imitating the body of an nuclear reactor

MLTC use in the oil spill clean-up in the Arctic conditions

TRINITI JSC presents a revolutionary method of ignition and maximal complete removal of the oil film from the water surface - the method of laser combustion.



Laser ignition of oil from a ship



Laser ignintion of oil from the air



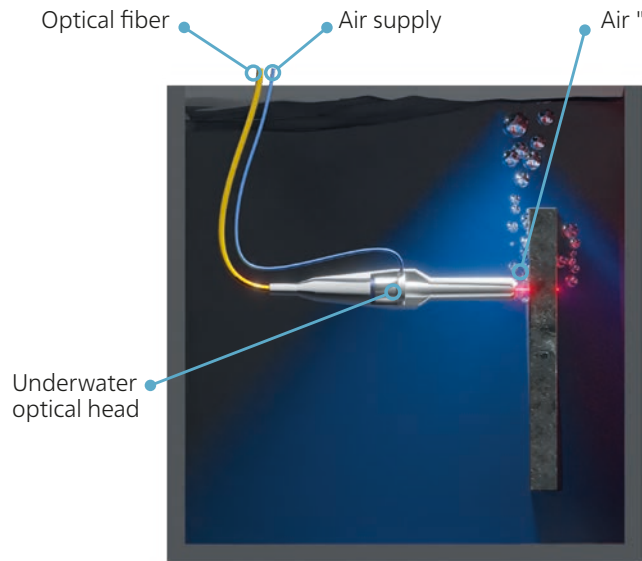
Shoreline cleanup

Advantages of laser incineration:

- 1
- Costs of application of this method is determined only by the insignificant pover consumption of the laser complex and the complex operators wage;
- 2
- Efficiency, since the described method does not require special preparatory work except for the installation of booms in the spill zone; the start time of the laser complex is determined only by the time required for the arrival of a vehicle (ship or helicopter) with the equipment of the complex on board in a given area;
- 3
- The described method is remote and non-contact, i.e. it does not require operational personnel to work directly in the incident area.

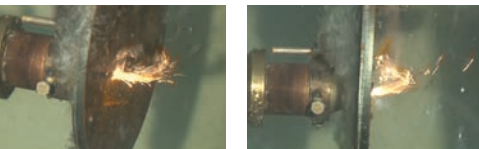
Underwater gas-laser cutting

One of the tasks solved with the help of MLTC is to provide highly efficient and safe underwater cutting of thick-walled and volumetric metal and reinforced concrete structures.



MLTC can be used to fragment objects such as:

- Radiation-infected metal structures of NPP in excerpt pools;
- Sunken ships;
- Underwater elements of port facilities;
- Offshore platforms for gas and oil production on the offshore shelf (including the Arctic).



Parameter	Value
Depth	up to 100 m
Thickness of the cut metal	up to 100 mm
Consumable materials	None
Active gas	Air, argon, etc.
Safety of works	No limitaion



Laser ignition and self-sustaining combustion on various surfaces: on ice, on water under snow, on open water and on sand

Parameter	Value
Distance of ignition	150 m
Maximum angle of exposure to laser radiation	50°
Radiation wavelength	1,07 μm
Laser power	≥ 3 kW
Minimum air temperature	- 60 °C
Maximum wind speed	35 km\h

Carbon-13

Laser technologies

Production of highly enriched Carbon-13 isotope

Laser separation and enrichment of stable isotopes is a promising direction in the use of laser technologies. Methods of treatment and diagnosis using stable isotopes are widely used all over the world, in particular, the diagnosis of gastroenterological diseases using respiratory tests using drugs containing the isotope ^{13}C (carbon-13).

The production of the ^{13}C isotope with an enrichment degree of 99.5% by laser isotope separation is being organized at TRINITI JSC. This project has no analogues in the world. On the basis of the institute, a pilot production of the highly enriched carbon-13 isotope is being created using the laser separation method, which is characterized by a minimum cost price as well as a high compactness of production capacities. The design of the laser unit is fully developed by our employees, most of the components are also produced on the territory of TRINITI JSC, the rest is purchased from Russian suppliers. This technology was developed by the team of the laboratory of isotope separation, headed by scientific director of the project Vladimir Mezhevov.

**Project Manager
Commercial
Department**



Aleksey Sheikin

I am ready to answer your questions!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru



Production of highly enriched isotope Carbon-13 by laser separation

A laser separation technology of carbon isotopes production has been developed in TRINITI JSC. This method has no analogues in the world and allows you to obtain a highly enriched isotope ¹³C which is widely used in medicine.

9

A pilot batch of carbon-13 isotope with a degree of enrichment of 30% will have been produced by the end of 2021. Production of highly enriched (min 99,5%) ¹³C isotope is scheduled for the end of 2022.

In addition to gastroenterology, the highly enriched ¹³C isotope is used in such areas as:



Geology and Geophysics



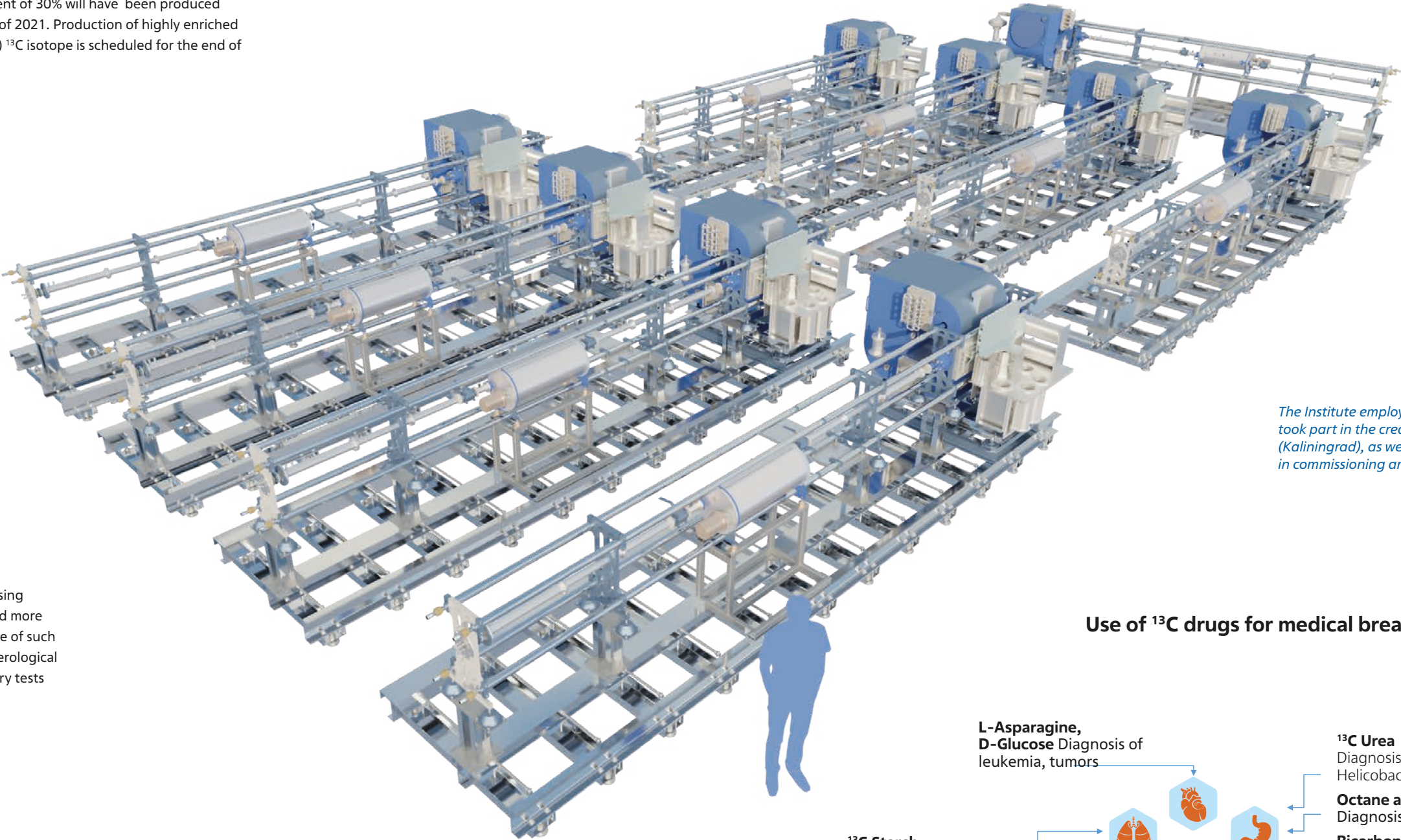
Forensic examination and forensic science



Ecology



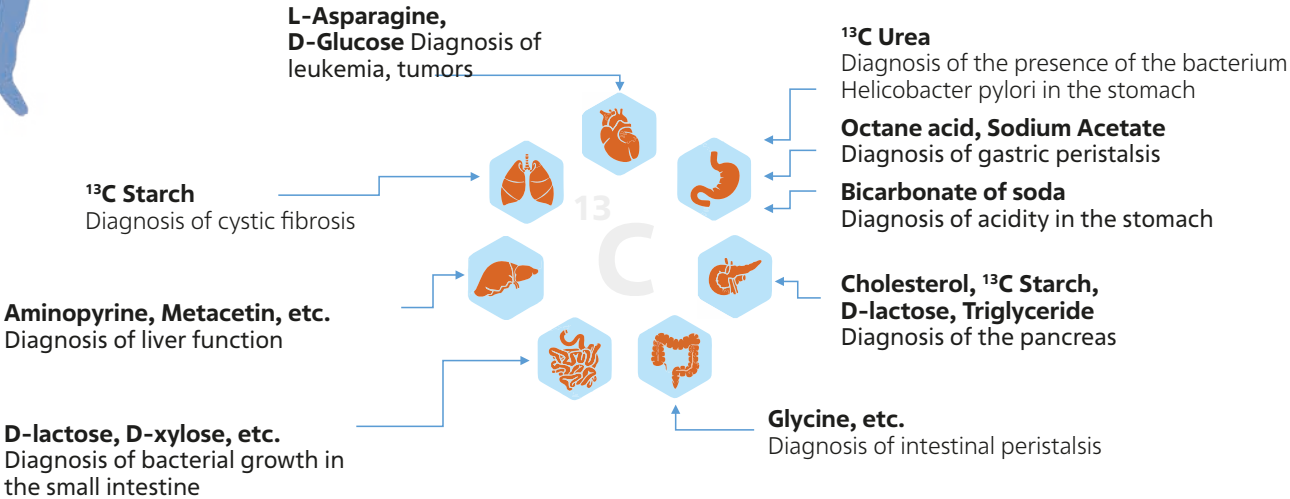
Research and standardization



The Institute employs highly qualified specialists who took part in the creation of the Carbon-13 complex (Kaliningrad), as well as those who have experience in commissioning and personnel training.

Diagnostics and treatment methods using stable isotopes are becoming more and more widespread throughout the world. One of such methods is the diagnosis of gastroenterological diseases (e.g. H.pylori) using respiratory tests containing the ¹³C isotope.

Use of ¹³C drugs for medical breath tests



1 hour

Process stabilization instant (getting the product in an hour after the start of the installation)



Product selection

Possibility of choosing the final product - CO or CO₂ depending on the customer's requirements



Ecological

Clean and eco-friendly production (no harmful waste)



Cost

Low production cost

Application of functional coatings in an extended magnetron discharge

The growing demand for different-purpose coatings has led to the emergence of equipment designed to solve specific production tasks. TRINITI JSC offers a new plant which performs functional coatings deposition and surface modification, thus qualitatively increasing the durability of items operating in difficult technological conditions. The plant is designed for items of any length, as the modularity of the system allows you to change its geometric dimensions based on the current needs of the customer. One of the main tasks to be solved at the moment is to extend the service life of critical components and mechanisms.

The plant was created by the team of the Department of Physics of Tokamak Reactors led by Alexey Yakushkin.

**Project Manager
Commercial
Department**



Gleb Tagirov

I am ready to answer your questions!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru



Functional coatings deposition plant

One of the main tasks at the moment is to extend the service life of critical components and mechanisms. Specialists of TRINITI JSC offer an innovative solution in the field of surface modification and application of functional coatings. The development is able to qualitatively increase durability of items operating in difficult technological conditions.

The system developed in TRINITI JSC has a modular structure. Each of the modules controls the diameter of the item, surface cleaning, nitriding of the surface, application of barrier layers and application of basic coatings. The independent operation of the individual modules makes the system easy to maintain. Performance is regulated by the number of modules that are integrated into a single system.

The plant consists of a vacuum chamber with a hollow cylindrical cathode, along the central axis of which the anode is placed. The required configuration of the magnetic field to create a discharge is formed by a magnetic system of permanent magnets.

This plant works in two modes:

- preliminary cleaning of the substrate surface;
- applying a protective coating to the substrate.

When applying the main coating in magnetron spray systems, targets are used, the utilization rate of which can reach 95%.

High-quality cleaning of the surface of the product is very important, as contamination has a significant impact on the properties of coatings. The plasma discharge cleans the entire surface of the product at the same time.

Chrome coating applied onto the 4 meters long item

200 MKM

20,5 MKM



A four meters long plant in operation

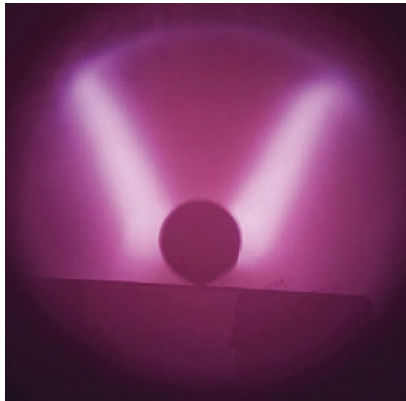
This technology can be used in the following areas of medium and heavy industry:

- 1 Oil-gas (pump rods, shafts and drives of drilling mechanisms, etc.)
- 2 Aerospace (long-length power elements subject to corrosion-frames, slats)
- 3 Mechanical engineering (passivation of power cables of bridge supports, power lines, underwater cables, etc.)
- 4 Nuclear (fuel rods of nuclear reactors)

Functional coatings



Clearing



Application

- The length of the processed product is not limited
- Cathode utilization factor $\approx 100\%$
- Uniform distribution over the entire surface of the product
- High maintainability
- Low cost of coating
- Easy adaptability to the production line
- High performance
- Ease of production scalability
- Modular system
- No chemical waste
- Large selection of coatings
- High adhesion of coatings

Materials processing and hardening

Materials processing and hardening

Laser hardening is currently one of the most promising and widely used methods of material surface strengthening. TRINITI JSC offers the service of strengthening materials and items by laser peening. The proposed method allows to improve the performance characteristics of products by 10-500 per cent (depending on the material and product characteristics). Our specialists have also developed a plant for processing fashioned items with pulsed plasma flows. This plant makes it possible to reduce defects and costs of products as well as eliminate the environmental pollution, and also allows you to replace difficult-to-obtain materials with more affordable ones, treated with plasma. These methods of hardening increase the threshold of fatigue strength and resistance to local loads and, thus, increase resource of work components used in the aviation, shipbuilding, oil and other industries. Research in the field of processing and strengthening of materials is carried out in the Department of Magnetic and Optical Research under the supervision of Candidate of Physical and Mathematical Sciences Anatoly Zhitlukhin.

**Chief specialist
Commercial
Department**

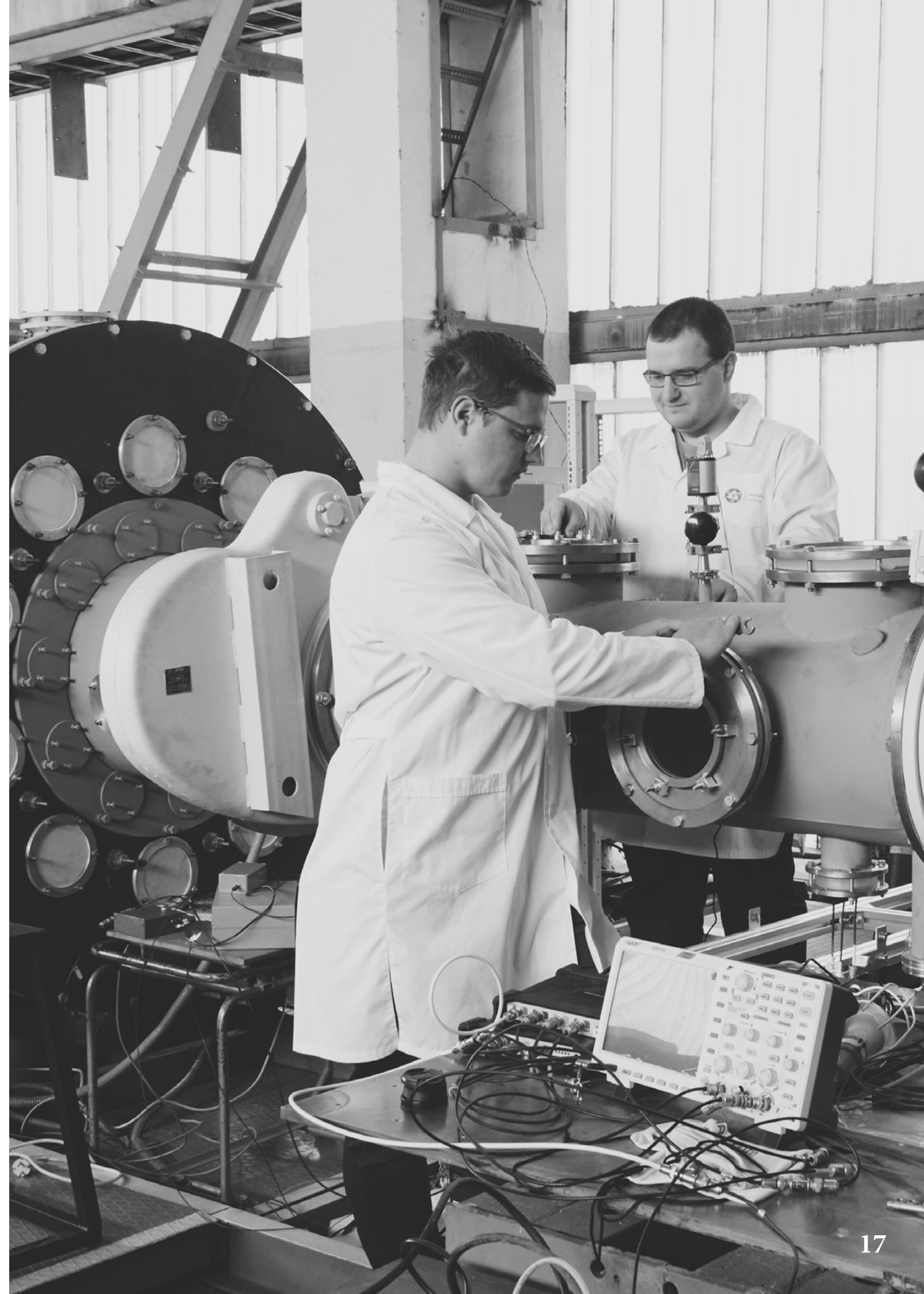


Vyacheslav Maksimov

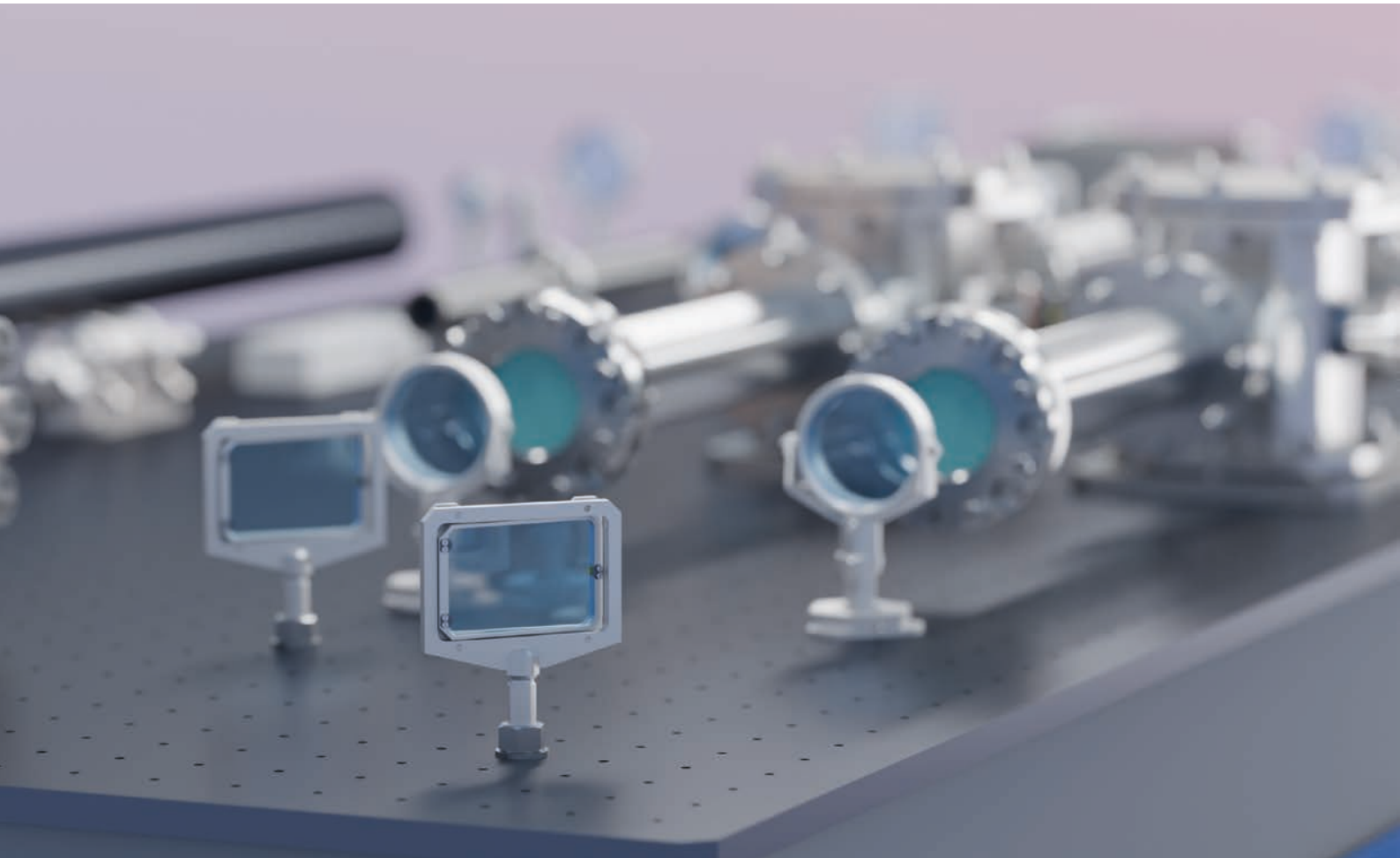
I am ready to answer your questions!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru

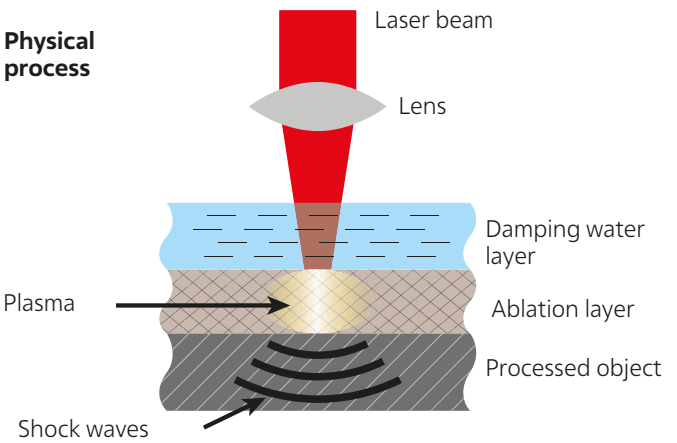


Laser hardening of materials



Laser hardening is a process of hardening materials by a shock wave, which is formed by the interaction of a laser pulse with an ablation layer on the surface of the processed object. The impact of the shock wave leads to a rearrangement of the crystal structure in the near-surface layer of the object, creating high residual compression stresses.

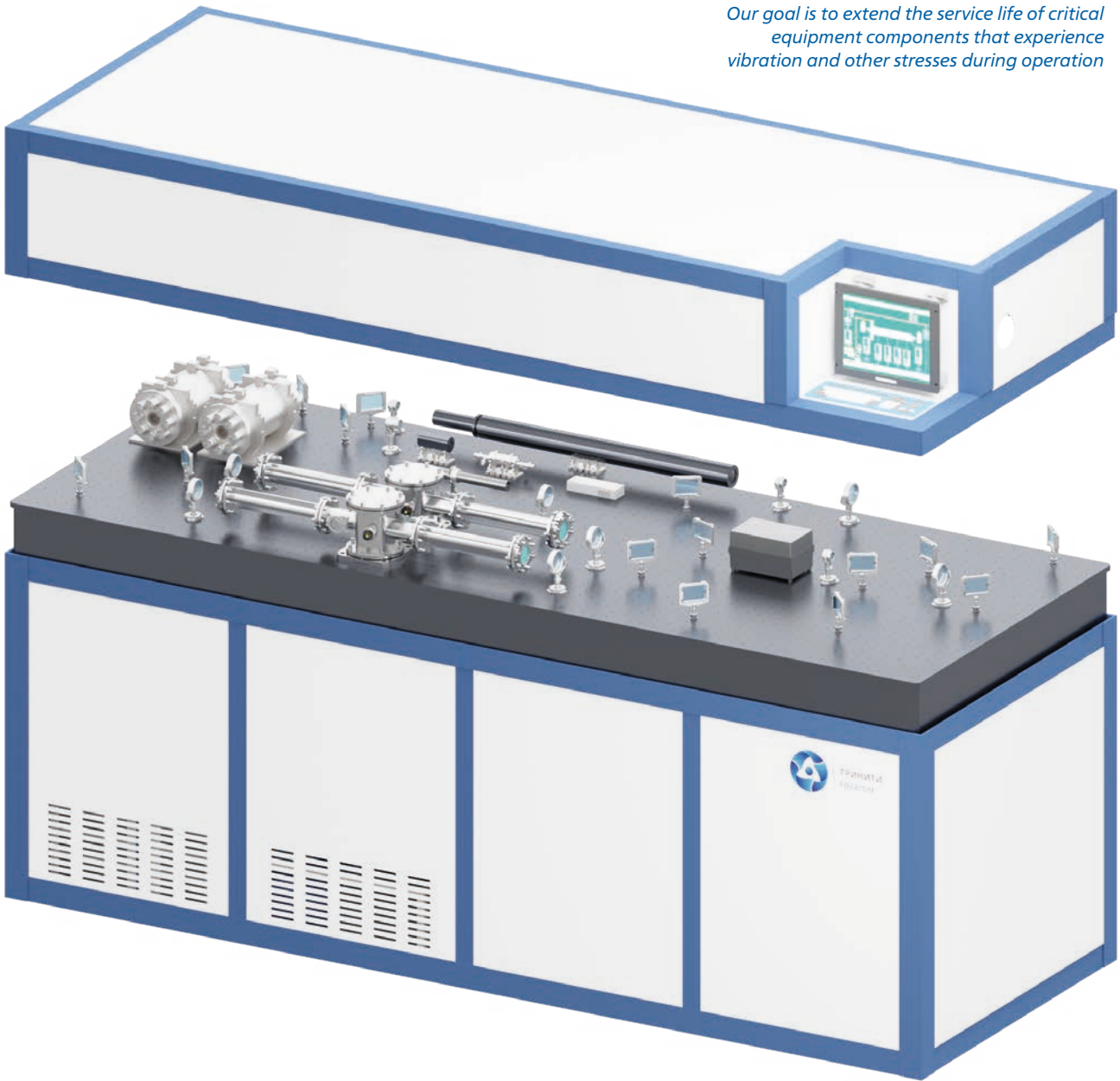
The compressive stress created by the shock wave, in the case of using a laser for this purpose, penetrates the material approximately four times deeper than in shot blasting.



Laser peening demonstrates a significant increase in fatigue strength in various metals, including titanium alloys, steel alloys, stainless steels, nickel alloys, aluminum alloys.

The proposed technology is suitable for processing items of complex geometric shapes due to full contact of the laser beam with the surface.

Our goal is to extend the service life of critical equipment components that experience vibration and other stresses during operation



TRINITI JSC has developed a laser peening system designed to increase fatigue resistance, corrosion cracking resistance, corrosion resistance, and wear resistance.

As a rule, the destruction of mechanism parts begins from the surface, so by ensuring a good quality of this layer, you can confidently predict the reliability of the entire mechanism. Depending on the composition and purpose of the workpiece, it can be subjected to various types of hardening treatment, such as: annealing, quenching, or using surface hardening with a laser.

Our institute offers a service for strengthening materials by laser peening, which will reduce the probability of microcracks' occurrence. In the course of a number of experiments, the proposed solution demonstrated high results on various products. Laser peening technology allows us to significantly enhance the performance characteristics of not only the surface, but also the main material of the parts.

Components requiring increased fatigue strength:

Camshafts and crankshafts

Connecting rods

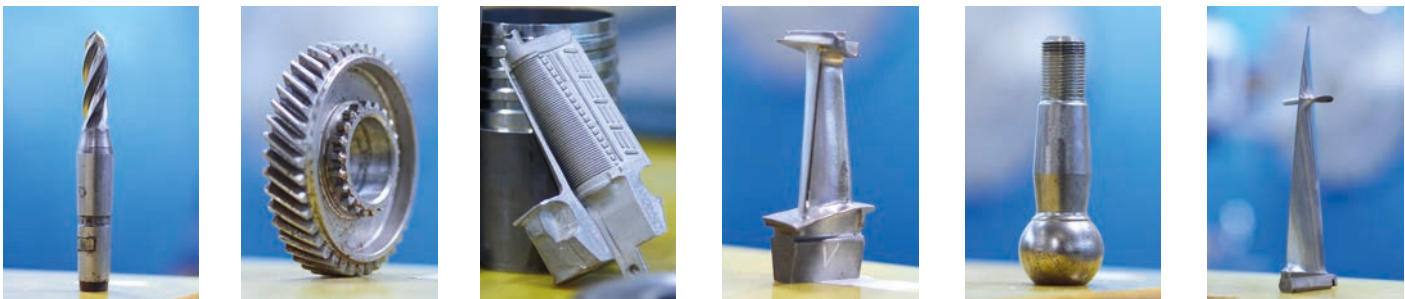
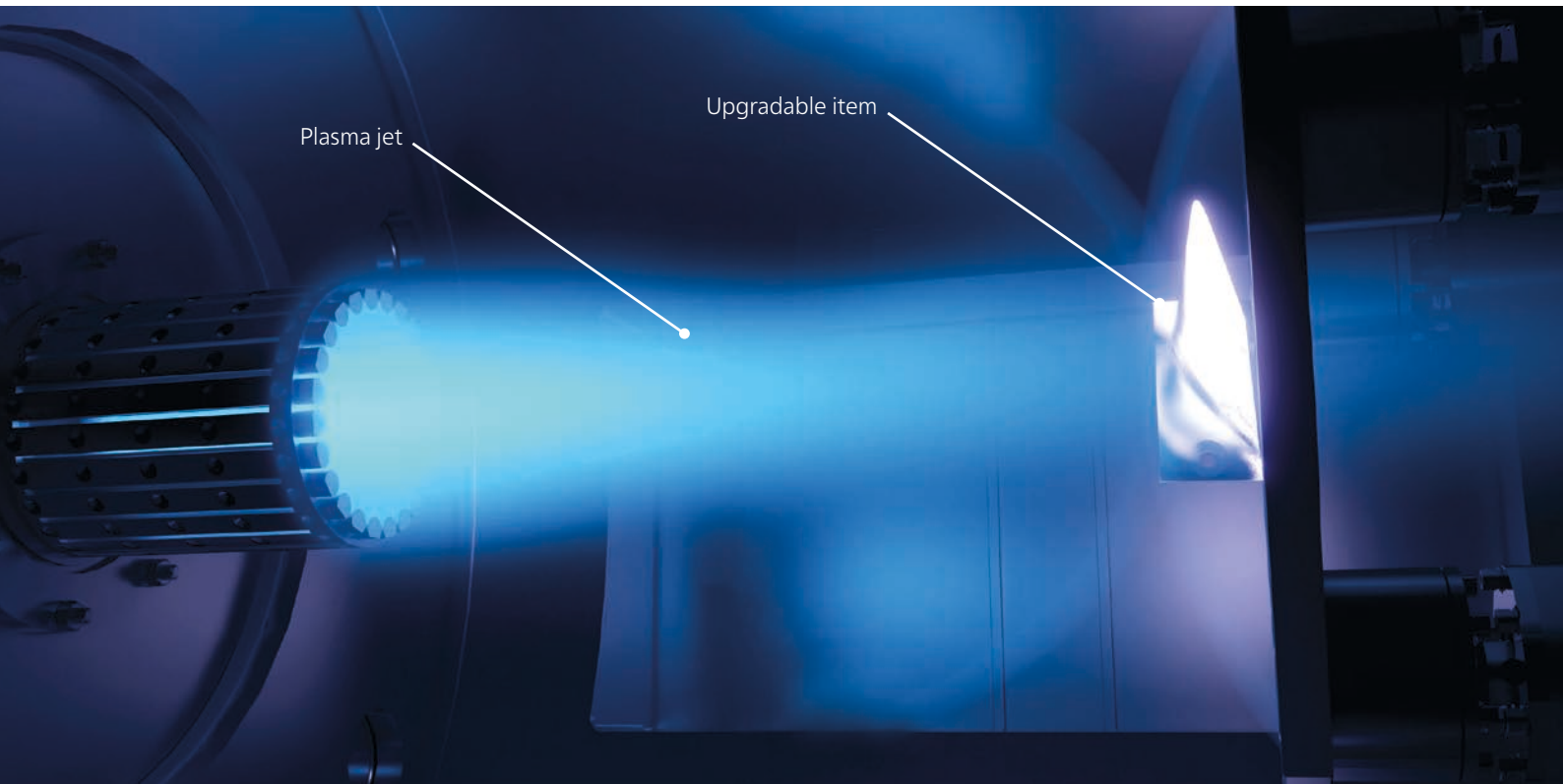
Engine components

Pumps

Cylinders and valves

Bearings

Hardening of materials and items by pulsed plasma flow



Examples of parts processed by pulsed plasma flow

The method is designed to improve the performance characteristics of the surface layers of products under the influence of a pulsed plasma flow.

Materials processing and hardening

Method of processing products by pulsed plasma flow has been tested in the machine-building, nuclear, oil, light industry, medicine, aviation, automotive, machine tool and other industries. At the same time, positive results were obtained when processing such parts and components as:

- Bearing parts (including support bearings);
- Threads (pipes and fishing taps) of drilling rigs;
- Various pipe fittings: gates, valves, diaphragms, seats;
- Pumping equipment: turbine components, pistons, seats and valves;
- Turbine blades, injectors, bearings of aircraft engines and electric units for power supply of drilling, mining and pumping stations;
- Turbine blades of steam-water power units of nuclear and thermal power plants;
- Cutting and stamping tools.

Advantages of the pulsed high-temperature plasma treatment process:

2 operations
Simplicity of the technological process

Tens of microseconds
Speed of process implementation

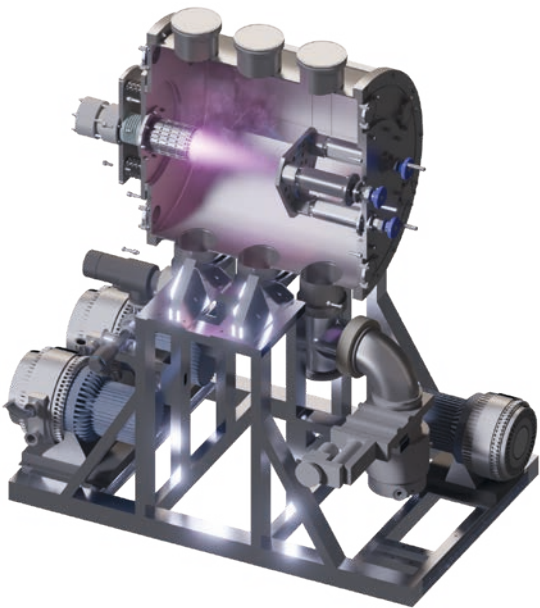
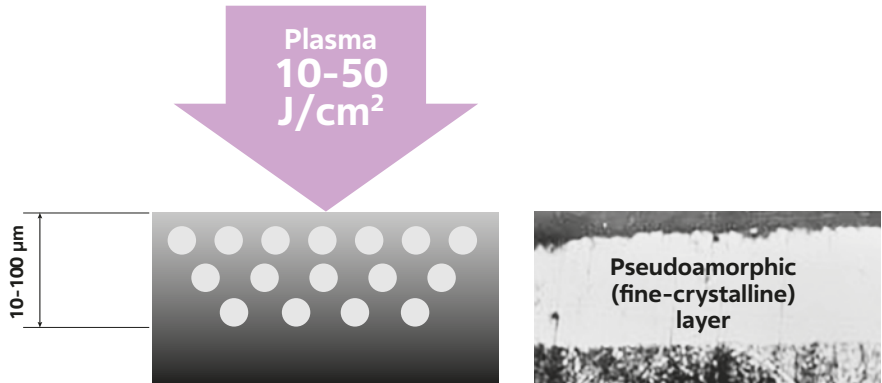
Up to 1000 cm²
Area of simultaneous surface treatment

Reliability
Significant reduction in the probability of microcracks

Strength
No thermal feedings of the main material

5-10 microns or more
Alloying additives

- Physical process:**
- 1) Fast (до 10^7 – 10^8 K/c) heating of the surface layer to high temperatures
 - 2) Rapid cooling of the heated layer due to the thermal conductivity of the base

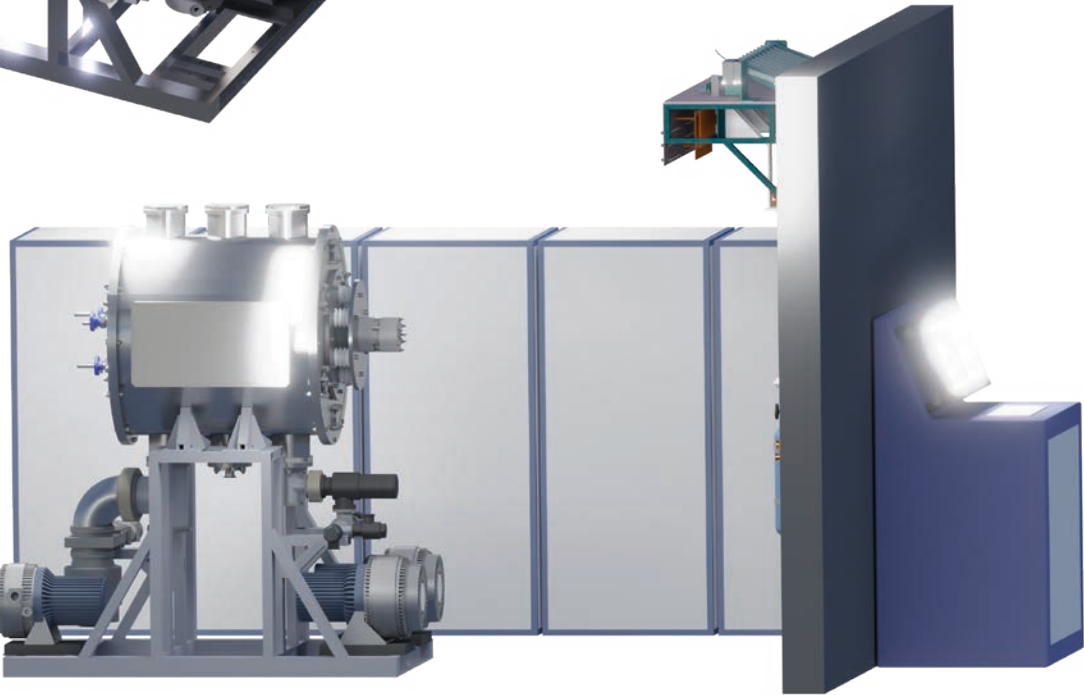


The ability to improve the following surface characteristics and consumer properties of parts:

- roughness;
- microhardness;
- corrosion resistance;
- coefficient of friction;
- abrasive resistance;
- heat resistance, etc.

It is possible to develop the plant to meet the needs of the customer

Version of the device for processing materials and parts by pulsed plasma flow



X-ray device with high spatial resolution

X-rays are electromagnetic waves photon energy of which on the electromagnetic wave scale is between ultraviolet radiation and gamma radiation. The most common use of X-ray radiation is radioscopy. "Translucency" of the human body allows you to get images of both bones and internal organs. Another application of X-rays is structural analysis, which is widely used in chemistry and crystallography. There is also X-ray flaw detection, which allows you to identify small internal hidden defects of products. As part of this development, an X-ray device for the study of biological objects was created with a user-friendly change of the emitter and the observed object. The capabilities of the microscope range from educational applications in biology and medicine to studies of dense high-temperature plasma.

Despite the fact that the X-ray device has a sufficiently strong power, it does not have a destructive effect on the objects being studied, including living ones. The device was created in the Department of Current-carrying Plasma Physics under the supervision of Candidate of Technical Sciences Eugeny Grabovsky.

**Project Manager
Commercial
Department**



Stanislav Kosarev

I am ready to answer your questions!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru



X-ray device with high spatial resolution (microscope)

X-ray device with a spatial resolution of 1-2 microns and a time resolution of 1 ns for the study of biological objects with a user-friendly change of the emitter and the observed object.

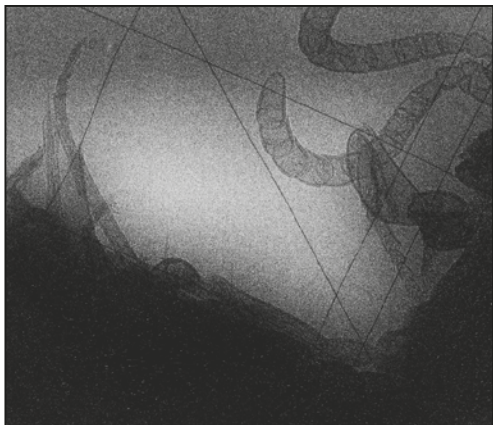
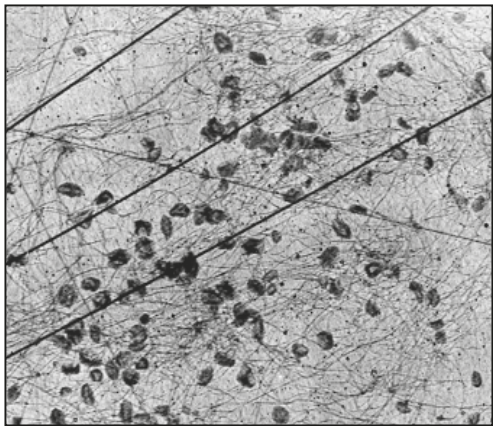


Image of a fly against a background of 6µm tungsten wire



Mucor (white mold) + 6µm test wires

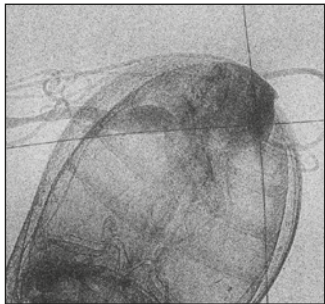


Experimental sample



Rendering of the projected device

The device is designed for X-ray sensing of various biological objects and obtaining their images with a high spatial resolution (not less than 2 microns). The samples are not placed in a vacuum, which makes it possible to study living objects in a safe mode for their vital activity. Also, the device does not have a destructive effect of electrons on the objects under study. The microscope can be used to develop diagnostic techniques for studying dense high-temperature plasma (X-ray cameras and spectrographs, RI spectrometers, pinhole cameras, semiconductor and vacuum RI detectors, X-ray shadow sensing, etc.)



Flour beetle + 6 µm wires with 2 µm resolution in the range of quanta up to 5 keV



Heterocera (mol) + 6 µm test wires

Application

- Research of living biological objects;
- Evaluation of the quality of thin coatings;
- Flaw detection by non-destructive testing;
- Conducting research in the field of studying thin coatings, their structure and adhesive properties;
- For educational purposes in biology, medicine, micromechanics, etc.



Rendering of the projected device



Rendering of the projected device

X-pinch

Key features of the device:

X-ray source size	Flash duration	High spatial resolution	Thickness of objects	Contrast ratio	Multiple objects	Living objects	Replaceable emitters
1-2 microns	1 ns	1-2 microns	Examination of non-dense tissues	High-contrast X-rays images	The possibility of simultaneous probing of several research objects at once	- No vacuum - No damage - No overcooling	One picture in a few minutes

Ozonation plants

Ozone technologies

Ozonation plants

Ozone, being a strong oxidizer, is widely used in various areas of our life. It is used in medicine, in industry, in everyday activities.

Ozone effectively destroys bacteria and viruses, eliminates organic pollutants, destroys odors, and can be used as a bleaching reagent.

Ozone is also used to purify the air. Polluted air has a gradual negative impact on the human body. Ozone destroys most of the volatile organic substances that pollute the air in enclosed spaces. The air is cleaned from unpleasant odors and suspended particles. A special role is given to ozone in medicine. As a strong oxidizing agent, it is used for the sterilization of medical products. The scope of its application in the treatment of many diseases is expanding. TRINITI JSC has developed a plant for production of concentrated ozone, which has many advantages over its analogues. Such ozonizer can be used not only for the sterilization of medical instruments, but also for the disinfection of premises, workplaces, workwear, etc.

**Project Manager
Commercial
Department**



Stanislav Kosarev

I am ready to answer your questions!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru



New generation ozonation plants



The plant for the production of concentrated ozone is a device with cooling of the capillary discharge chamber. It is designed to produce ozone with a concentration of up to 0.5 g / m³, which is at least 2 times higher than the concentration of ozone produced on world analogues.

TRINITI JSC has developed ozonators operating on the basis of 2 principles:

1 The principle of operation of ozone generator consists in the direct accumulation of oxygen from the air flowing with subsequent conversion to ozone. This method avoids the loss of ozone due to decomposition in the ozone generator itself and allows us to obtain ozone at the output with a higher concentration in comparison with analogues.

2 The principle of accumulation consists in the production of ozone by an industrial plant and the injection of ozone in a container with a sorbent. This method allows us to accumulate large concentrations of ozone, which can be used for disinfection of premises. Its main advantage is the presence of pure ozone without nitrogen impurities usually released during the operation of ozone generators, and the absence of heating of the plant.



Ozonation cabinet

Purpose: chamber disinfection (medical equipment, clothing, shoes).
The ozone source is an ozone storage container.

The main advantages of the plant:

- The size of the ozonator is much smaller than its analogues;
- The concentration of ozone produced is 2 times higher than its analogues;
- Mobility and ease of installation.



Atomic oxygen reactor (ozone generator)

Purpose: deodorization of gases (waste gases of enterprises, incineration plants, disinfection of industrial premises, solid waste).

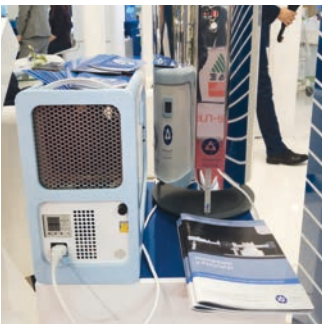
Depending on the application, the unit is equipped with additional modules:

- Pure Ozone production module;
- Deep oxidation module;
- Ozone production module from air for high humidity and low temperature applications;
- Mobile ozone storage and distribution modules.



Storage ozone container

Purpose: disinfection of premises (hospital wards, cinemas, metro halls).



Current samples of ozonators presented at the Army-2020 exhibition»

Ozonators



Medical institutions

Technology of medical sterilization and disinfection of both premises and equipment, tools and workwear



Oil industry

Technology of wastewater treatment of oil refineries



Waste water treatment

Technology of deep ozone oxidation of organic complexes in domestic and industrial wastewater



Nuclear power plants

Decontamination of decommissioned NPP equipment



Transport

Sterilization and disinfection of major transport hubs and subways



Disintegration of tires

Technology of ozone-mechanical disintegration of tires



Agribusiness

Technologies of pre-sowing fumigation, sterilization and seed protection



Metal industries

Leaching of sulfide ores

Research and training laboratories

Research and training laboratories

In accordance with the priorities of the state scientific and technical policy of the Russian Federation, TRINITI JSC offers the concept of a research and training Laboratory of plasma physics and laser technologies of the world scientific level. The primary tasks of the Laboratory are the development of scientific and technical potential, training of personnel to master advanced skills and research methods in the field of plasma physics and laser technologies, creation of scientific and engineering competencies. The research conducted in the Laboratory will ensure the development of practical competencies in a wide range of areas of scientific and applied nature. Training on world-class research equipment will prepare highly qualified specialists for various industries. Our specialists will develop and offer joint implementation of author's research programs. The implementation of the program will ensure the growth of such scientometric indicators as the number of defended dissertations for the degree of candidate and doctor of Sciences, an increase in the number of scientific publications in leading Russian and international media, and the creation of protected IP.

**Project Manager
Commercial
Department**



Gleb Tagirov

I am ready to answer your questions about research and training laboratories!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru

**Project Manager
Commercial
Department**



Mikhail Remizov

I am ready to answer your questions about digital laboratories!

Phone: +7 495 851 15 52 ext. 49 04

E-mail: liner@triniti.ru



Research and training laboratories



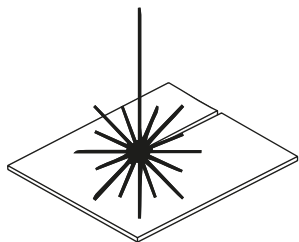
Stand "Magnetron discharge"

Designed for testing the technology of applying high-strength protective coatings made of various materials and composites in a magnetron discharge.



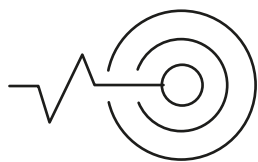
Stand "Discharge at atmospheric pressure"

It is intended for scientific research of nonequilibrium low-temperature plasma at atmospheric pressure and development of methods for its practical use.



Multifunctional laser stand

The stand consists of 4 devices (laser cutting of metal, laser processing of building materials, laser engraving and surface cleaning, installation for measuring the true surface temperature of materials for use in additive manufacturing) and allows you to conduct research in the field of practical application of laser technologies.



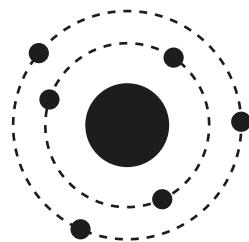
Electrical and pulse measurement stand

Production and testing of probes for measuring current and voltage pulses with a nanosecond response.



Stand "Glow discharge"

The stand allows conducting probe, electrical and spectral measurements of stationary plasma.



Laser Isotope separation unit

Device for laser excitation and photoionization of rare earth metals (Yb, Lu, Tb, etc.) and subsequent selective extraction of highly enriched isotopes from atomic vapor with high performance.

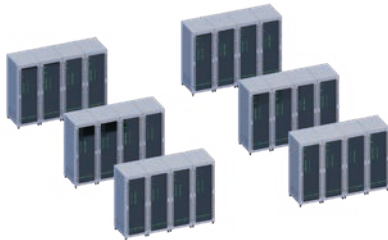
Digital Laboratories

The digital research and training center on the basis of TRINITI JSC is a virtual space with laboratory stands in the field of plasma physics and laser technologies.



The service is being created at the facilities of the TRINITI JSC

Virtual laboratory stands are developed on the basis of existing stands and installations.



Laboratory work in the digital center is carried out using VR technologies, which allows you to:

- improve the quality of training of specialists in a number of areas;
- remotely conduct training and laboratory work.



Russian remote service



At least 6 laboratory facilities for teaching students



Automated work evaluation system



Set of methodological materials

Laboratories TRINITI JSC



Contact details

We will be glad to answer your questions!

TRINITI JSC
108840, Moscow, Troitsk, Pushkov str., vl. 12



Azamat Bedanokov
Deputy General Director – Head of Foreign and Commercial Department

Phone: **+7 495 841 52 61**
E-mail: **liner@triniti.ru**



Alexandr Petrovskiy
Project manager

Mobile laser technology complex

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**



Gleb Tagirov
Project manager

Functional coatings

Research and training laboratories

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**



Stanislav Kosarev
Project manager

Ozone technologies

X-ray microscope

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**



Svetlana Vasilieva
Commercial department advisor

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**



Aleksey Sheykin
Project manager

Production of highly enriched Carbon-13 isotope

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**



Vyacheslav Maksimov
Chief Specialist

Materials processing and hardening

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**



Mikhail Remizov
Project manager

Digital research and training laboratories

Phone: **+7 495 851 15 52 ext. 49 04**
E-mail: **liner@triniti.ru**

Official website of the State Corporation Rosatom
www.rosatom.ru
Official website of the Management Company Science and Innovations
www.niirosatom.ru
ROSATOM Academy
www.rosatom-academy.ru
Official website of the State Research Center of the Russian Federation TRINITI
www.triniti.ru