GKMP
RESEARCH & PRODUCTION COMPANY

Turning ideas into reality

“RESEARCH AND PRODUCTION COMPANY” MACHINERY AND TOOLS ENGINEERING GROUP” LLC

From conception to solution

The “Research and Production company” Machinery and Tools Engineering Group” LLC is the Russian developer and manufacturer of special-purpose industrial equipment, high temperature gas and vacuum electric furnaces of different design and application, technological lines for thermal treatment, quenching, annealing and tempering of complex shape and size pieces, vacuum sputtering machines, thermal diffusion, thermal compression machines, machines for monocrystal growing, test benches, thermal vacuum chambers, vacuum shutoffs and other high-tech hardware.

250+

PRODUCTION UNITS.
Advanced machine pool and facilities

1000+

EMPLOYEES.
Highly qualified experts

130+

ENGINEERS.
Proficient team of expert engineers

HOME MANUFACTURE

Equipment is produced using our own production capacities subject to regular improvement

INSTALLATION AND COMMISSIONING

Construction and installation works, commissioning at Customer’s premises

DESIGN ENGINEERING

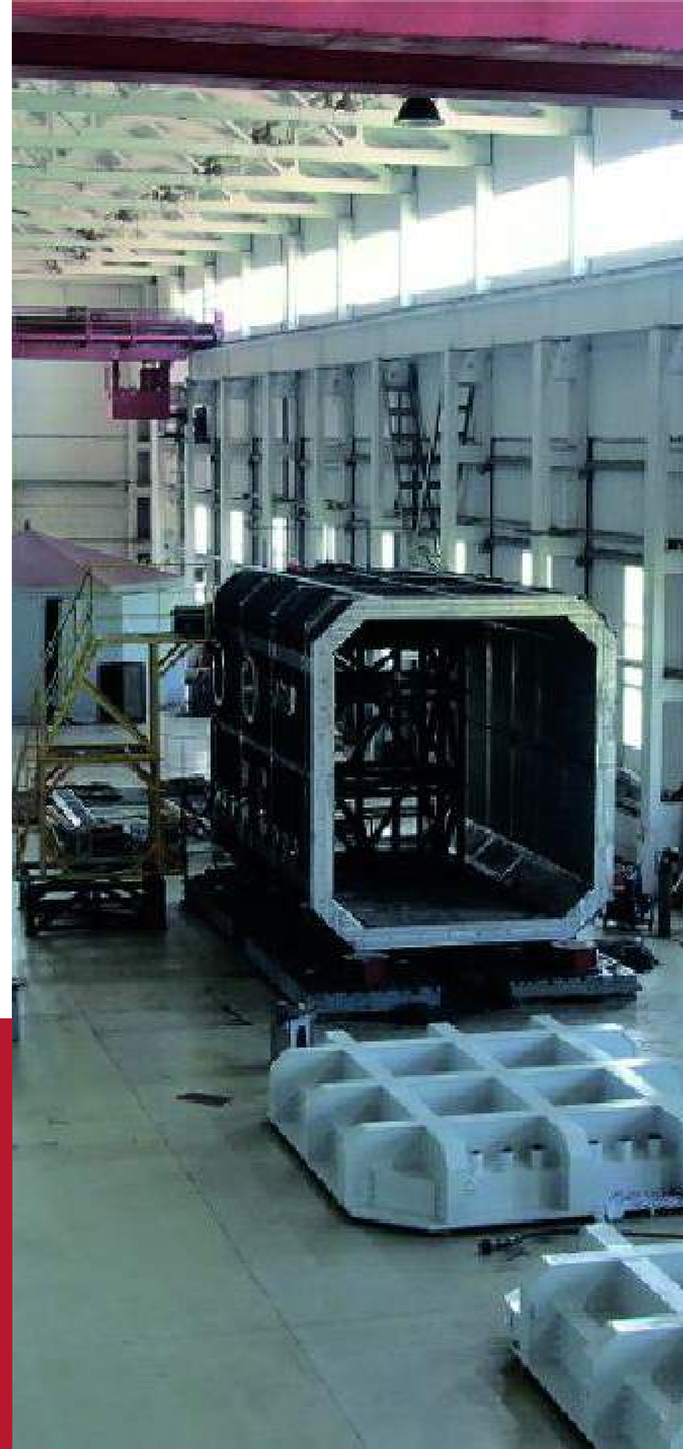
Elaborated design and engineering solutions with respect to Customer’s requirements.

COMPREHENSIVE SOLUTIONS

Full service cycle - from conception to construction, mounting activities and commissioning.

QUALITY ASSURANCE AND MAINTENANCE

Warranty and post-warranty maintenance as per agreements for delivery, installation and commissioning.



HISTORY OF THE COMPANY

2010

Foundation of the NPO “GKMP” LLC

2012

The Company engaged itself in search of domains to be developed and produced advanced prototypes of high-tech hardware

2013

The Company mastered specific winding technology to manufacture superconductive coils designed for electromagnetic systems of the Tokamak 15MD. The order was placed to manufacture a vacuum toroidal chamber for an upgraded thermonuclear fusion facility at the Kurchatov institute.

2015

Commercialized production of large-scale vacuum chambers (2000-6000 mm). A Moscow branch office is opened.

2016

The “IRMASH” JSC – the leading Russian manufacturer of road building machinery – merged with the “NPO “GKMP” LLC. The machine pool was upgraded to enhance production capacities.

2017

New thermonuclear cycling equipment was designed, including a state-of-the-art facility for carbothermal fusion of uranium and plutonium nitrides. The number of employees exceeded 500 persons. A new technological complex commissioned to perform thermal vacuum tests of space products.

2018

One-of-the-kind rectangular super high vacuum chamber produced to perform fundamental studies to surpass its global equivalents. The equipment is to be used to develop new aviation engines and study space processes.

2019

Horizontal thermal vacuum chamber TBK-110 is designed to test GLONASS spacecrafts. The project is aimed at enhancing reliability and quality of domestic space production.

2020

The competences of the “GKMP” are acknowledged by international partners: the Company joined the ITER project. The Company celebrated its anniversary.

2021

The competences of the “GKMP” are acknowledged by international partners: the Company joined the ITER project. The Company celebrated its anniversary.

2022

Further development of equipment that simulates space environment, including thermal nuclear facilities and solar radiation simulators. New Customers are engaged.

2023

Increased number of contracts placed by the State and scientifically engaged Customers. The Company signed a loan agreement with the Industrial development fund. The employees completed a training course on lean manufacture.

2024

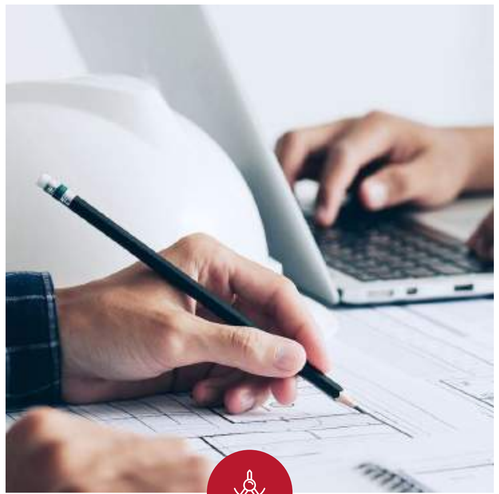
The first Russian delivery of the ITER equipment. A 5-axis Czech machine Fermat was commissioned. The Company embraced family-oriented initiatives and regular medical checkups.

2025

The number of employees reached 1000 persons. The metal bellows produced by the “NPO” GKMP” entered the Russian industrial production register. The first domestically produced road profiler and unmanned road paver are launched, including laser machine and overhead crane. The first Russian facility for ITER project delivered to the production site in France.

“NPO“GKMP” LLC

LINE OF BUSINESS



DESIGN, DRAFTING OF TECHNICAL ASSIGNMENTS, CALCULATIONS

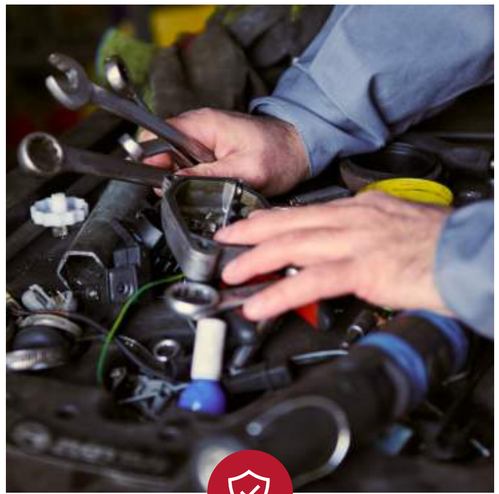
Full cycle of design and engineering activities. We rely on our own design bureau to provide a comprehensive solution

PRODUCTION CAPACITIES AND KEY COMPETENCES

In-the-house production basis that ensure the full cycle of metal processing, assembly and thermal processing. Advanced CNC machinery pool, quality assurance laboratories

DELIVERY

Our equipment can be delivered all over the Russian Federation. We propose the most efficient transportation and route with full supervision of the cargo and documentation package.



WARRANTY AND POST-WARRANTY MAINTENANCE

Warranty maintenance ensures reliable operation and longer lifetime of the equipment. Post-warranty maintenance ensures timely support and continuity of production.

INSTALLATION, SUPERVISED INSTALLATION AND COMMISSIONING

Advanced tooling and technical supervision for industrial equipment.
Installation and commissioning ensure reliable operation and successful commissioning.

“NPO“GKMP” LLC

PRODUCT LINES

01

VACUUM HARDWARE AND SPECIAL PURPOSE EQUIPMENT

Thermal vacuum facilities, super high vacuum, space environment simulation, ITER.

02

INDUSTRIAL THERMAL EQUIPMENT

Single or two-cover shaft furnaces, with closed or open cooling circuit to improve power consumption and reduce harmful effect to ecology

03

CRYSTAL GROWING EQUIPMENT

Facilities designed to grow monocrystals of silicon, leukosapphire, ruby, gallium/ indium arsenide and others per methods of Czochralski, Kyropoulos, Bridgman-Stockbarger, Bagdasarov and derived methods.

04

MAGNETIC COILS

Home produced electromagnetic coils up to 800 mm in diameter.

05

PRODUCTS FROM REFRACTORY METALS AND ALLOYS

Large-scale serial production of products and parts per Customers drawings from tungsten, molybdenum and their alloys, as well as heat-resistive ceramics (ZrO_2,Al_2O_3, BN, SiC).

06

STAINLESS STEEL METAL BELLOWS

Metal bellows for flexible connection of pipes designed to balance mounting, temperature and vibration induced stresses..

07

ROAD-BUILDING MACHINES

Road pavers of different modifications, road levelers, road patching machines, the first Russian cutter.

“NPO“GKMP” LLC

QUALITY MANAGEMENT SYSTEM

The Product quality management system of the “NPO “GKMP” LLC is certified per GOST P ISO 9001-2015 confirmed by respective certificates of conformity. The “NPO “GKMP” LLC performs external audits on yearly basis. Moreover, the Company is subject to regular internal audit of the quality management system.
The Company acts under licenses for engineering, design and production of the equipment for nuclear fuel cycle, fuel and disposal storage. We rely on our own patents for dedicated hardware.

DESIGN → PRODUCTION → IMPLEMENTATION → MAINTENANCE → REPAIR

4410 | 4420 | 4470 | 4480 | 4720 | 4920 | 4940 | 4960 | 4970 | 6636 | 6920 | 6930

PRODUCTION CAPACITIES

ООО "НПО "ГКМП”

VACUUM FACILITIES AND SPECIAL PURPOSE EQUIPMENT

THERMAL VACUUM FACILITIES, SUPER HIGH VACUUM, SPACE ENVIRONMENT SIMULATION, ITER.

We develop and produce the following vacuum equipment: automated control systems, cryogenic vacuum facilities, vacuum test chambers (СТВИ-2, ТБК-110), thermal vacuum test facilities, vacuum pumping systems, vacuum shutoffs etc.

01

ООО "НПО "ГКМП"

THERMAL VACUUM CHAMBER ТБК-110

Purpose

.Thermal vacuum chamber is designed to perform outgassing of objects, as well as for manufacture of honeycomb panels for spacecrafts (hereinafter referred to as S/C) and perform leak tests of S/C modules.

Parameters

OPERATING PRESSURE AT THE GIVEN TEMPERATURE OF NITROGEN CRYOGENIC SCREENS (-180 ±10)°C	< $1 \cdot 10^{-6}$ mmHg
OPERATING PRESSURE AT THE GIVEN TEMPERATURE OF NITROGEN CRYOGENIC SCREENS +20 °C	< $1 \cdot 10^{-5}$ mmHg
TEMPERATURE OF CRYOGENIC SCREENS	-180 ±10 °C
MATERIAL OF THE VACUUM CHAMBER	12X18H10T
TOTAL LEAKAGE	Not to exceed 5 l·μ mmHg/s
CONTINUOUS RUN TIME	46 full days
THERMAL FLUX DENSITY	Up to 1400 W/m²
INTERNAL DIMENSIONS OF THE CHAMBER, MM:	width 4000 mm; length 8100 mm; height 4500 mm.

“NPO”GKMP” LLC

THERMAL VACUUM TEST FACILITY СТВИ

Purpose

СТВИ-2 is a facility designed for optical and physical measurement of parameters while creating and on-ground qualification of on-board equipment, as well as other optical and electronic systems and facilities in simulated space environment.
The effective diameter of the vacuum chamber is 5000 mm, the height is 10000 mm. All components of the СТВИ-2 are controlled though an automated control system. The said ACS and its software develops and improves the operation of control systems by the user in course of its operation process by changing the hardware, devices, modules and SW.

Parameters

INTERNAL RESIDUAL OPERATING PRESSURE	$1x10^{-4}$ Pa
TVC DIAMETER (NO CONNECTION PIPES)	5300 mm
TVC HEIGHT	1000 mm
TVC INTERNAL DIAMETER	5000

“NPO”GKMP” LLC

LARGE VACUUM SHAFT RESISTANCE FURNACE

Purpose

The cylindrical vertical 8m diameter 4 m high furnace is designed for vacuum annealing of large welded constructions from martensite and austenite metals to relieve residual internal stresses. The chamber consists of a cylindrical body equipped by wore zigzag-shaped nickel-chromium and refractory brick heaters, including a cap equipped with ten screens from refractory metals. The chamber is divided into twelve thermal zones.

Parameters

MAX. HEATING TEMPERATURE, °C	Up to +1000
LENGTH, MM	16600
WIDTH, MM	15000
HEIGHT, MM	6100

“NPO”GKMP” LLC

VACUUM CHAMBER ПС-45

Purpose

The vacuum chamber PS-45 is a chamber extension section designed to test thrusters intended for space application. The section is made of stainless steel and has all required reinforcement beams, the internal diameter of 3800 mm, length 3870 mm.

Parameters

INTERNAL DIAMETER, MM	3800
LENGTH, MM	3870
XENON PUMPING SYSTEM FLANGES ДУ1250	5
OPERATING VACUUM LEVEL	10^{-6} mmhg

“NPO“GKMP” LLC

PORT PLUG TEST FACILITY FOR ITER PROJECT

Tests

In November 2025 the site of the International Experimental Thermonuclear reactor ITER in the South of France received the first (out of four) Russian facility designed for vacuum, functional and thermal tests of the future setup.
Test facilities are manufactured at the “NPO “GKMP” LLC premises using the most advanced state-of-the art domestic technologies and developments. According to the Supply Agreement signed in 2011, the Russian company shall produce and deliver to the ITER Organization all four test facilities.

ITER Project

The ITER is the world first thermonuclear experimental reactor of new generation created by the combined efforts of international community in Provence (France) near Marseille.
The Private Institution of State atomic Energy Corporation “Rosatom” of “ITER project center” acts as the Russian national ITER agency responsible for effective Russian contribution to the project.

“NPO“GKMP” LLC

INDUSTRIAL THERMAL EQUIPMENT

SINGLE AND DOUBLE COVER SHAFT FURNACES WITH CLOSED OR OPEN COOLING CIRCUIT

Single, periodic and small-batch production, as well as laboratory research, single cover furnaces appear to be the most convenient choice. For continuous or large scale production two cover furnaces are recommended to operate in swapping manner,

A convenient intuitive automated control system ensures better operation of few furnaces by one single operator. The furnaces can be equipped both with closed or open cooling system that enables to connect a dedicated chiller, or alternatively perform visual control of the cooling water break when the open circuit is concerned.

“NPO“GKMP” LLC

PERIODIC RESISTANCE FURNACE

Purpose

Shaft electric resistance furnaces produced by the “NPO “GKMP” LLC are distinguished by particularly low temperature gradient and high purity of the medium.
This furnaces are periodic and classified depending on design of the chamber (bell-type, shaft) and medium inside the chamber (vacuum or gas).

Advantages of bell-type furnace

- high output of defect-free items;
- can process small batches, energy and resource saving ;
- flexible technological process;
- enables to select the best conditions for processing, a wide range of technological applications.

Furnaces of this type are used for processes that require super high cleanliness in electronics, brazing in shielding atmosphere, thermal processing of high-precision parts, restoration of chemical powders etc.

ELECTRIC RESISTANCE THROUGH-FEED TYPE FURNACES

Purpose

Electric resistance furnace of through-feed type are based on resistive heating principle to perform thermal processing of materials inside the chamber with heating elements. Pusher-type hydrogen two cover furnaces are considered to be a variety of through-feed type furnaces with pushing device for moving items. Conveyor unpressurized furnaces with partly controlled atmosphere are designed to process large batches of products in shielding gas atmospehre and can operate permanently.

Benefits

- continuous operation and high efficiency;
- multiple functionality of the process;
- easy to use and flexible design.

Parameters

MAX. TEMPERATURE, °C	1400
OPERATING AREA. DIAMETER, MM	100
OPERATING AREA. LENGTH, MM	1000
OPERATING MEDIUM	nitrogen, hydrogen
QUENCHING TIME, MIN	5-20

THERMAL DIFFUSION AND THERMAL COMPRESSION FURNACE

Purpose

Electric resistance furnace of through-feed type are based on resistive heating principle to perform thermal processing of materials inside the chamber with heating elements. Pusher-type hydrogen two cover furnaces are considered to be a variety of through-feed type furnaces with pushing device for moving items. Conveyor unpressurized furnaces with partly controlled atmosphere are designed to process large batches of products in shielding gas atmospehre and can operate permanently.

Benefits

- continuous operation and high efficiency;
- multiple functionality of the process;
- easy to use and flexible design.

Parameters

OPERATING TEMPERATURE RANGE, °C	100-1850 °C
TRANSMITTED LOAD	0.1 - 630 kN and higher
DIAMETER, MM	100-400
HEIGHT, MM	120-600
HEATING/COOLING SPEED	1-20 °C/min

“NPO“GKMP” LLC

CRYSTAL GROWING EQUIPMENT

Facilities designed to grom monocrystals of silicon, leucosapphire, ruby, gallium/indium arsenide per methodes of Czochralski, Kyropoulous, Bridgeman-Stockbarger and derived methods.

03

“NPO“GKMP” LLC

SAPPHIRE MONOCRYSTAL GROWING FACILITY

Purpose

Facilities for sapphire and ruby monocrystal growing per Bridgeman-Stockbarger method enables to create leucosapphire and ruby monocrystals of any crystallographic orientation, including the C orientation 0001).

Benefits

- crystals can be grown along any crystallographic axic, inclung the C-axis (0001);
- automated growing process, etching;
- cameras, pyrometers and thermocouples are not required;
- qualified operators are nor required;
- minimized operator engagement - only for furnace maintenance (crystal
- unloading, cleaning, rough material loading).

“NPO“GKMP” LLC

LEUCOSAPPHIRE KY CRYSTAL GROWING FACILITY

Purpose

Leucosapphire crystal growing facilities per Kyropolous method (KY) are applied to create large (~500 кг) crystals with low dislocation density.
The Key benefit of this method lies in its technical simplicity and low temperature gradients within crystallization front.

Design details

- Single cover to avoid leakage and ensure more convenient access maintenance;
- Lateral location of current feedthroughs to protect the operator from
- electromagnetic emission:
- The column is equipped with the telpher that simplifies extraction of the crystal and
- crucible, ensures easy maintenance of the thermal nod.

SILICON CRYSTAL CZ GROWING FACILITY

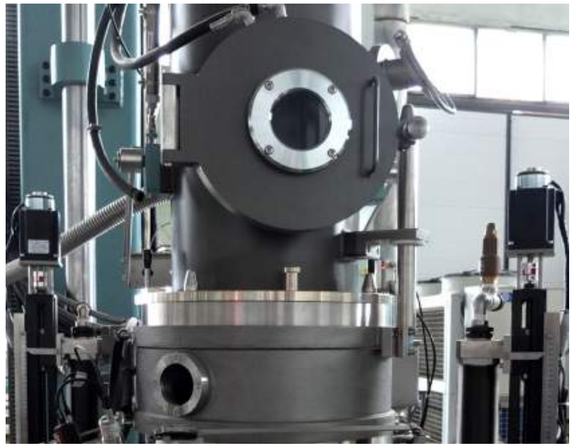
Purpose

This facility is designed to grow silicon monocrystals using the hot melt. Such machines are used to grow silicon monocrystals of “sun” and semiconductor quality 75-300 mm in diameter. Embedded videosystem controls diameter of the monocrystal.

To improve the growing speed (by 1.5-2 times) and characteristics of the crystal we propose a water-cooled pit equipped with electromagnetic drive and special heat absorbing coating.

As an option, a magnet can be installed to suppress convection of the melt while growing semiconductor crystals.

The process is fully automated, including the etching stage. The facility is equipped with self-cleaning dust filter for continuous growing process (up to 400h). The design can be customized for solar grade and semiconductor silicon.



GaAs AND InAs MONOCRYSTAL GROWING FACILITIES

Purpose

LEC method is one of the key methods applied to produce gallium arsenide(GaAs) and indium arsenide (InAs) monocrystals. To prevent components from migration, the hot melt is covered with a low-melting flux with a density less than that of the melt itself. Additionally, the excess pressure of argon is created.
In order to reach the required thermal field and to control temperature gradients three heaters are embedded into machine.
The main and the bottom heaters are stationary, and the upper one (background) is equipped with the motion drive.
The machine includes leak proof gas extraction system to withdraw gases from chamber prior to every opening. The vacuum chamber is designed to maintain vacuum and residual pressure up to 10 atm; along with the liquid encapsulation of the hot melt, the machine enables to grow gallium arsenide (GaAs)and indium arsenide.

InSb И GaSb crystal growing facility

Purpose

To grow gallium antimonide (GaSb) and indium antimonide (InSb) monocrystals the Czochralski method is widely used. As long as growing process takes place in hydrogen, the facilities are equipped with hydrogen generators and palladium diaphragm-based hydrogen filters with maximal throughput capacity equal to 100 l/h.

The chamber has few separate inlets for inert gas (below) and hydrogen (above). Thermocouples are mounted on every line; an infrared pyrometer is installed in the center of the heater.

The gas system can automatically extract (deflate) gas from the chamber to ventilation system when the actual pressure exceeds the operating one (1.0 kgs/cm2). Apart from that, the chamber is equipped with the burst diaphragm in case of pressure surge.

Diameter of the growing monocrystal is defined via TV camera. The mass sensor controls the weigh of the growing crystal.
The facility is equipped with the leak proof gas extraction system to relieve the gas from the chamber prior to any opening.
The hardware is manufactured on request under approved Technical assignment. Any parameters can be changed at your convenience.

“NPO“GKMP” LLC

MAGNETIC COILS

Purpose

Manufacture of various electromagnetic coils with diameter of up to 8000 mm, using our own devices for winding coils, devices for transporting sections and traverses for moving manufactured products.

A dedicated vacuum chamber has been developed to sinter electrical insulation; sets of equipment for crimping; a table for making and baking coils; specialized racks for storing sections.

“NPO“GKMP” LLC

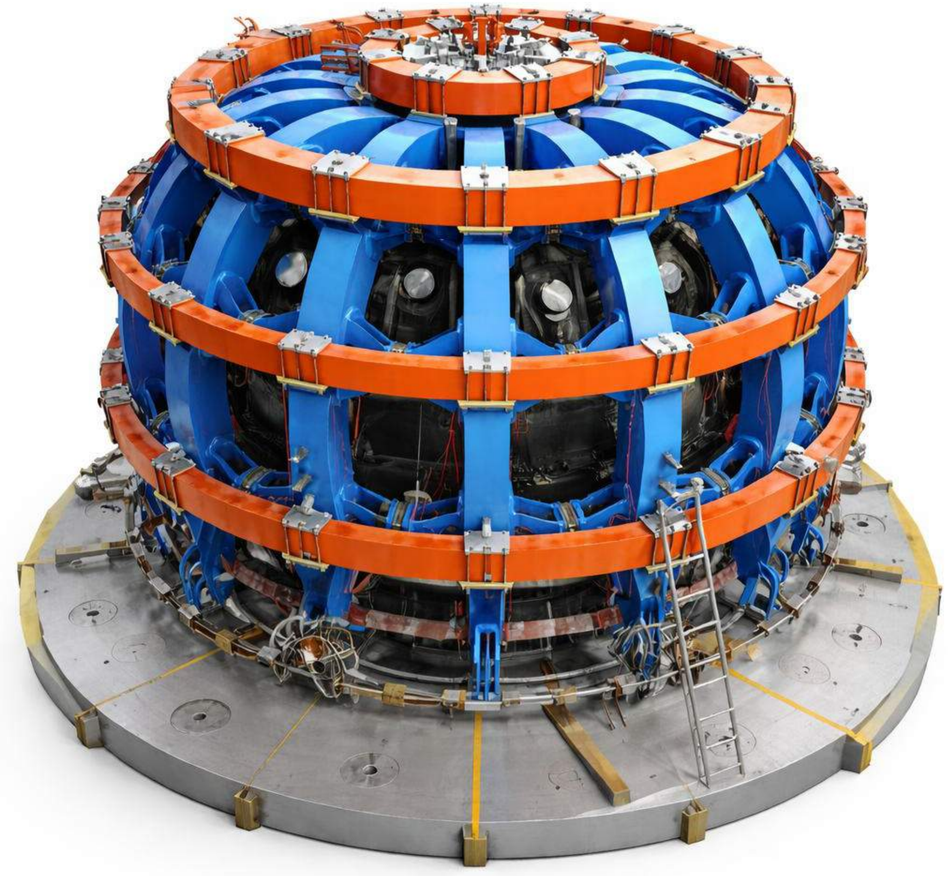
ТОКАМАК Т-15МД

Purpose

Tokamak is a toroidal shaped facility designed for hot plasma physics research, qualification of various reactor modules and triggering the thermonuclear fusion The magnetic system is supposed to ensure and hold the hot plasma of divertor configuration. Magnetic coils are made from rectangular sectioned argentic copper strand equipped with a through hole to supply cooling water; the copper wires are wrapped in specifically baked vacuum insulation and placed inside steel casing.

Parameters

INTERNAL DIMENSIONS OF THE CHAMBER (VERTICALLY), M	3,39
WALL THICKNESS, MM	5...8
CHAMBER VOLUME, M^3	47
MAX. BACKGROUND PRESSURE	1x10-5 Pa
INTERNAL DIAMETER, MM	from 5050 to 6322
OUTER DIAMETER, MM	from 5170 to 6640
HEIGHT, MM	from 210 to 277
MASS OF COILS, KG	from 4050 to 69



“NPO“GKMP” LLC

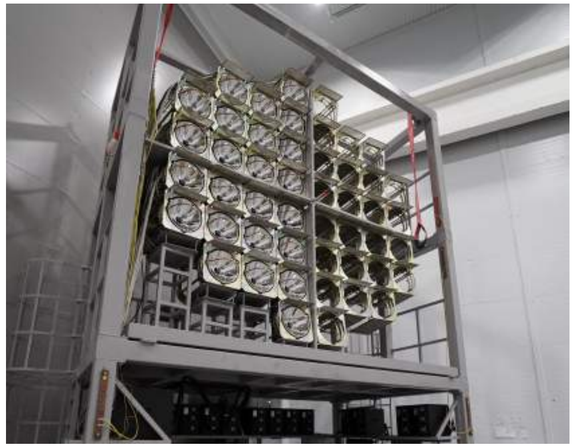
SOLAR RADIATION SIMULATOR

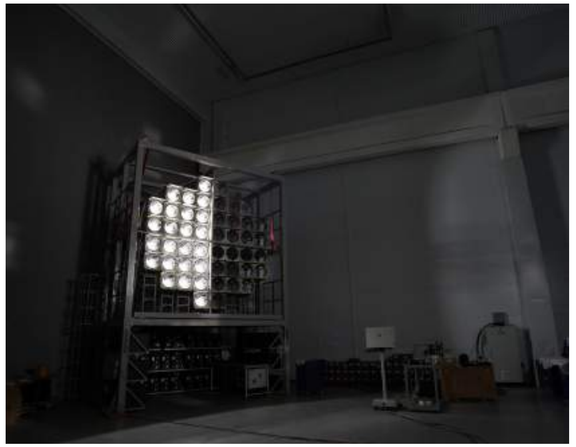
Purpose

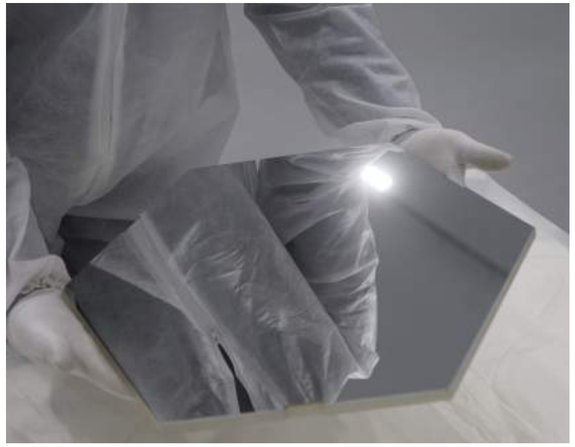
Solar radiation simulator is designed to supply to the vacuum facility almost parallel radiation beam with the spectrum as close as possible to the non-atmosperic spectrum of the Sun. The flux density of the latter in cross section is from 1350 to 1900 W/m2. The optical system that simulates radiation of point-shaped objects consists of two channel cooled collimator with its elements mounted on specific movable supports inside the vacuum chamber. The solar radiation flux simulator is made using custom-tailored IR lamps produced by the “NPO “GKMP” LLC.
This facility is used to create solar flux of dedicated power and direction that may affect the equipment and devices while nominal operation.

Parameters

SPOT SIZE, M	4x4
IRRADIATION, W/M2	200...2000
IRRADIATION SPECTRUM	non-filtered Xe
UNIFORMITY, %	±10
MISALLIGNMENT,°	±1.5







PARTS FROM REFRACTORY METALS AND ALLOYS

Purpose

Thanks to it unique properties, parts and items made from refractory metals and alloys are widely used in thermal processing domain as heat resistive fixtures for high temperature furnaces. Graphite felt cylinder is produced by combining graphite paper, carbon fiber and carbon fabric that are subject to further high temperature processing.

Parameters

DENSITY	0.16-0.20
CARBON CONTENT	≥99
PROCESS TEMPERATURE, °C	2300
OUTER DIAMETER, MM	200-1500
THICKNESS, MM	30-120
HEIGHT, MM	300-2000

GKMP
RESEARCH & PRODUCTION COMPANY

CENTRAL OFFICE

Adress: Moscow 121596,
10 Tolbukhina str. bld 2,
Tel.: +7(495) 150-14-50
E-mail: msk@gkmp32.com

www.gkmp32.com

PRODUCTION SITE

Location: 241022 Bryansk,
7 Shorsa boulevard
Tel.: +7(4832) 58-19-66
E-mail: gkmp@gkmp32.com