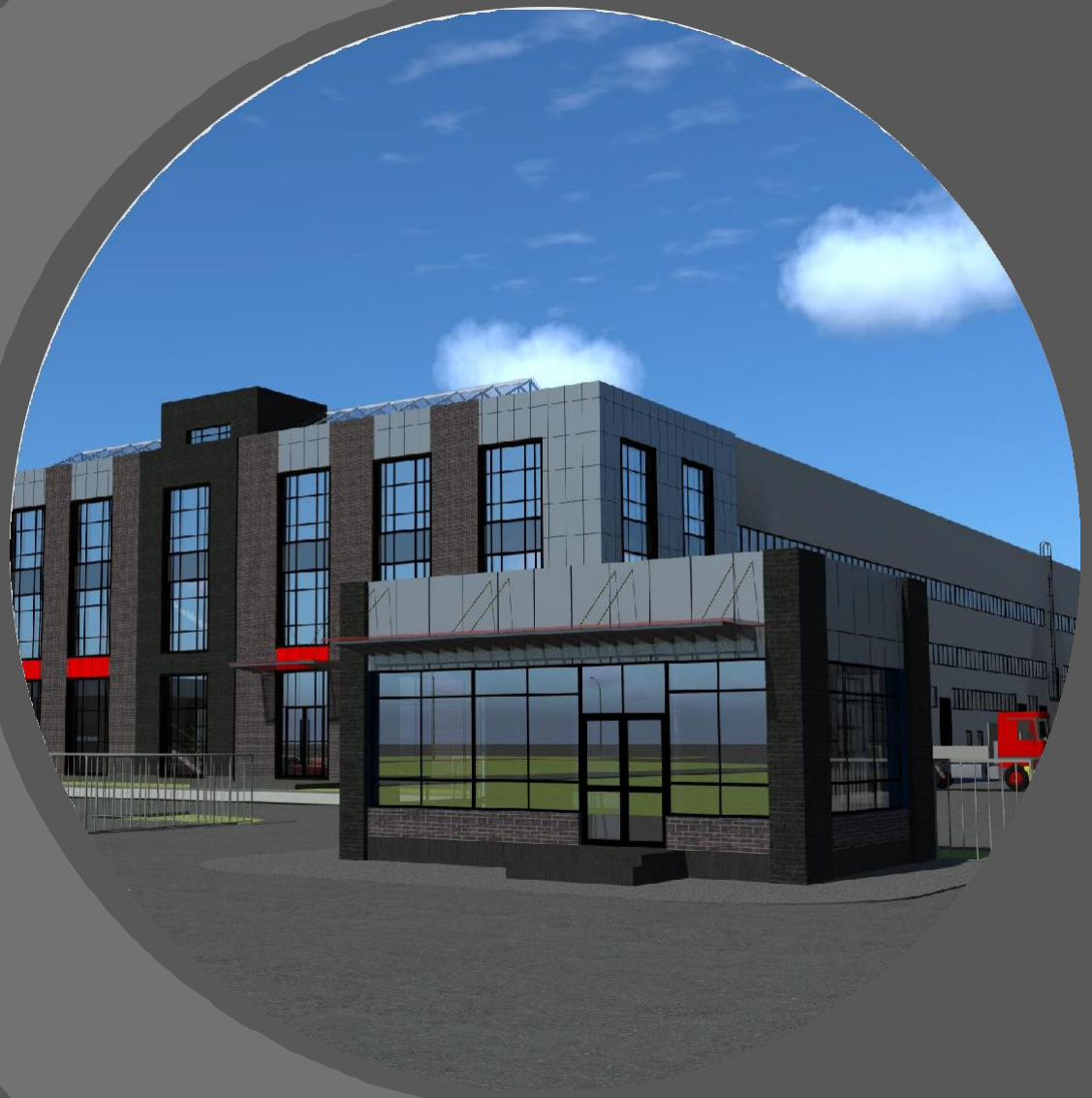
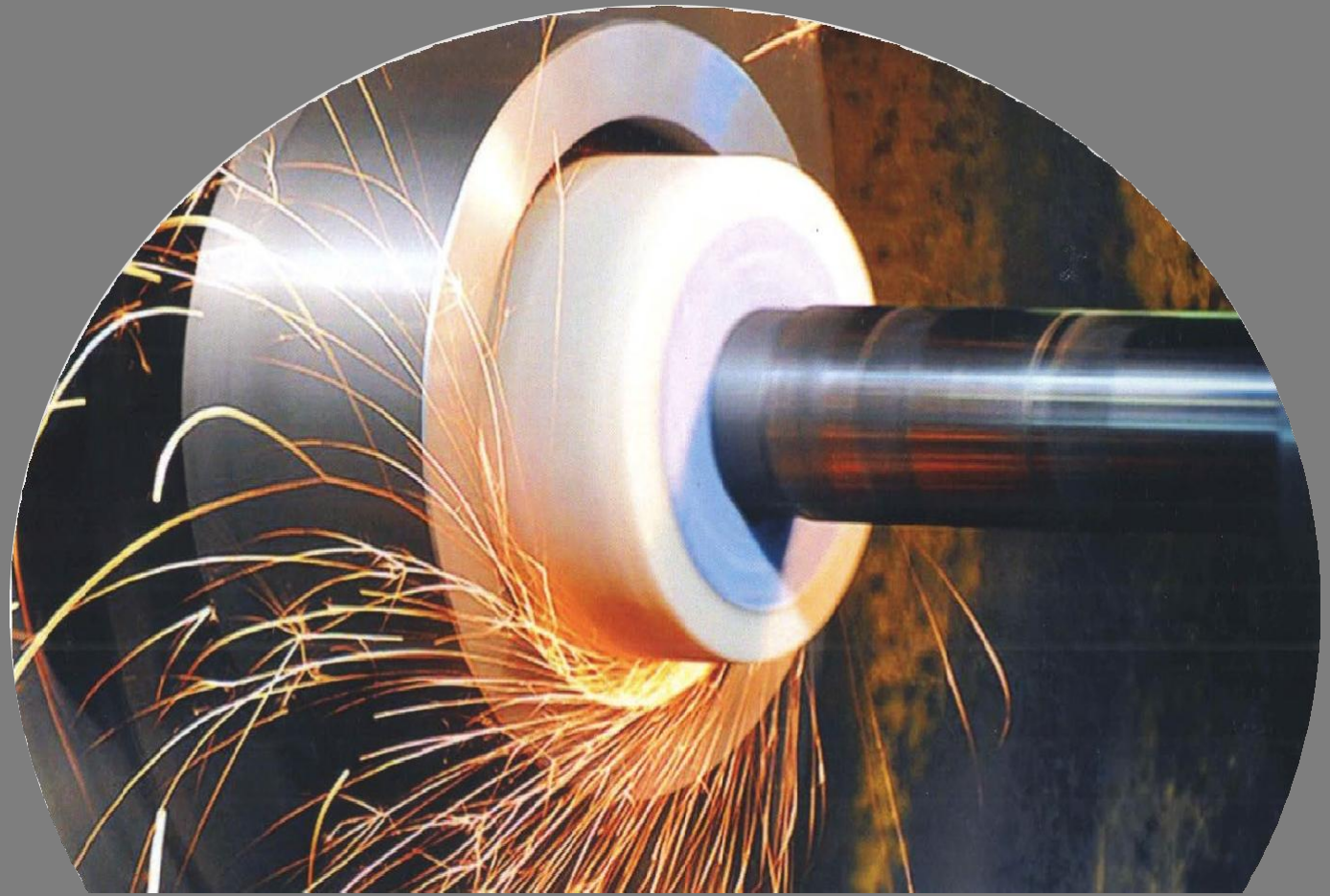


RUSSIAN COMPOSITE TECHNOLOGIES

IMPREGNATED ABRASIVE TOOLS

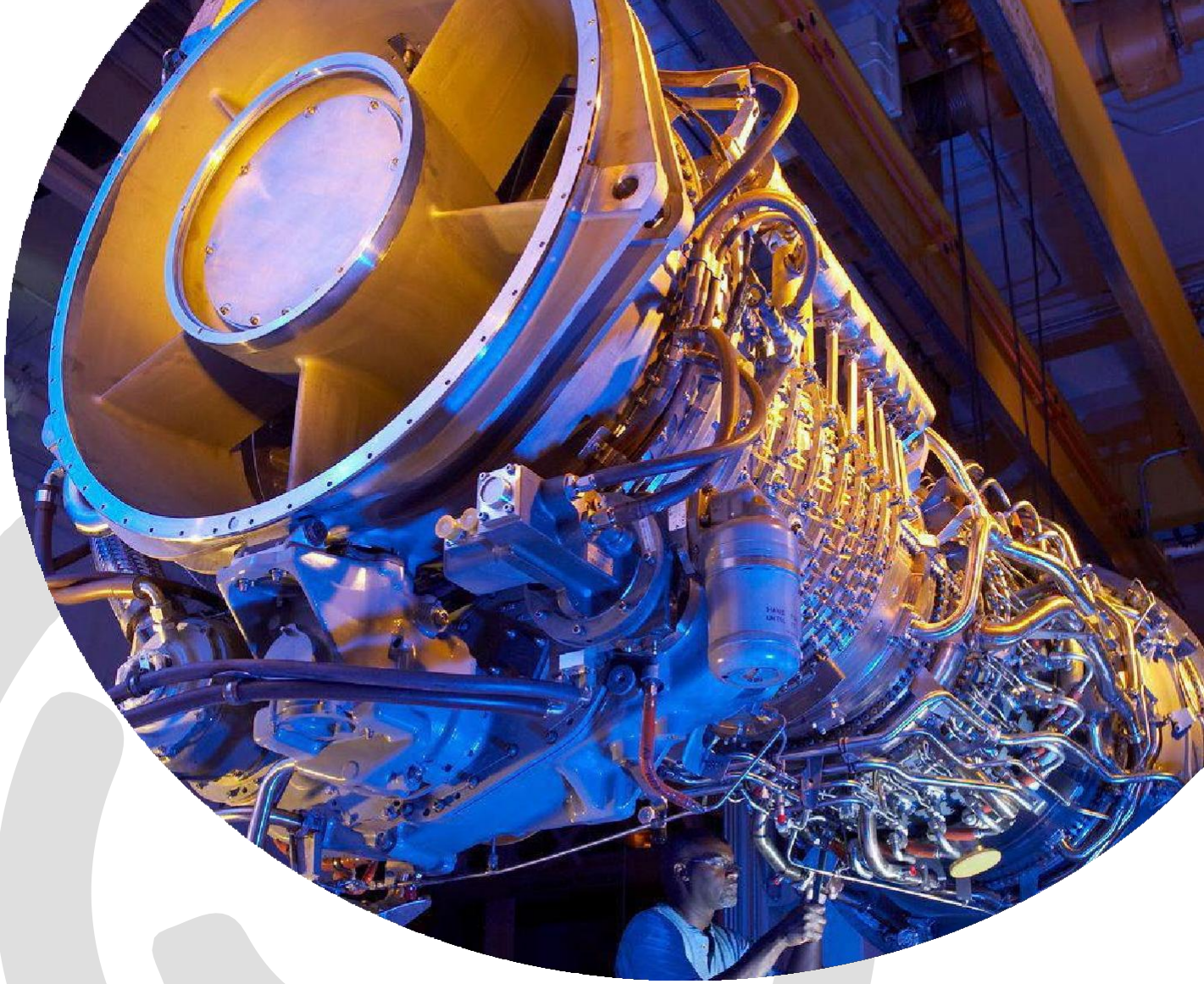
An abrasive tool whose pores are filled with substances that increase its cutting power and service life

ONE OF THE BEST TOOLS IN THE WORLD



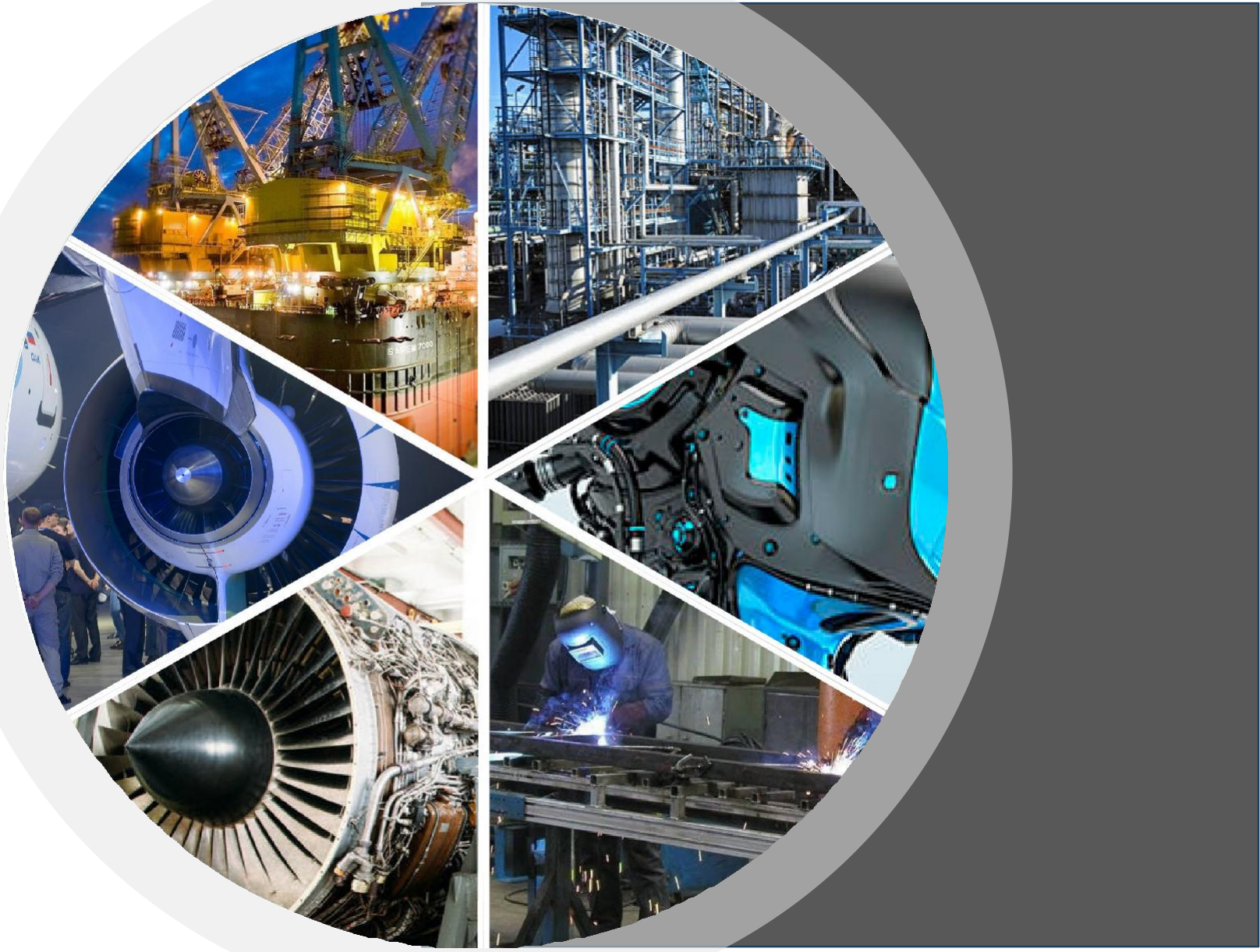
INNOVATIVE IMPREGNATION TECHNOLOGY

ABRASIVE GRINDING TOOL ON A CERAMIC BOND, WHICH HAS NO ANALOGUES IN RUSSIA AND ABROAD



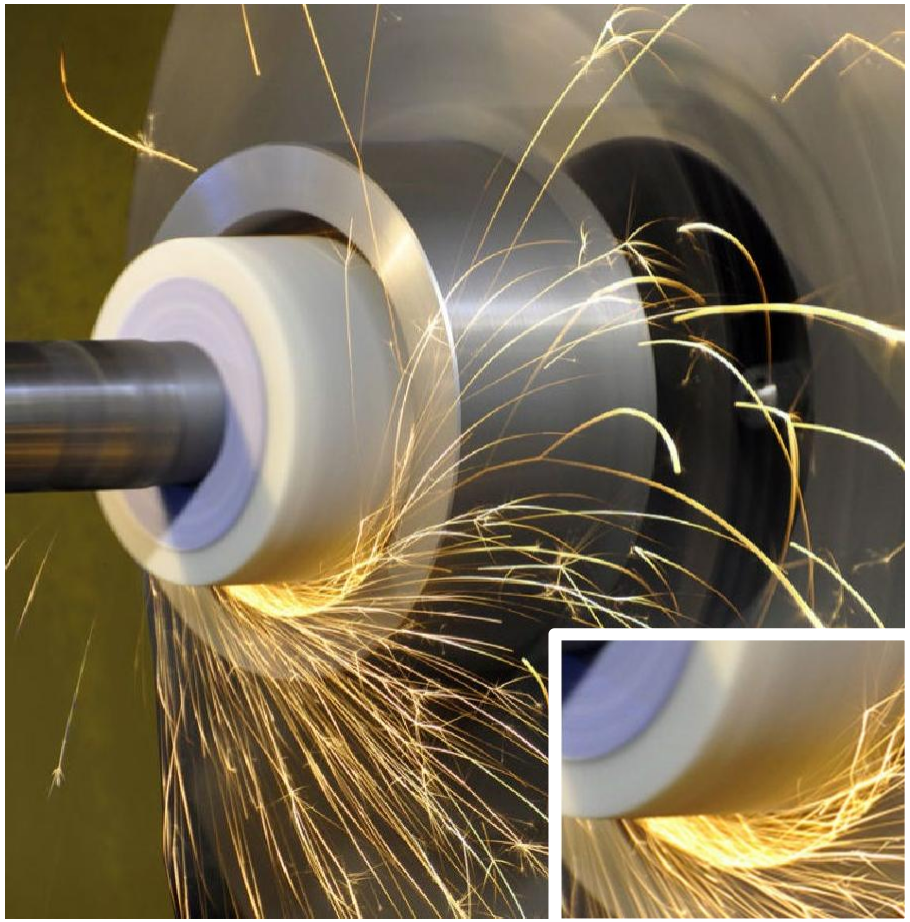
AREAS OF SUCCESSFUL APPLICATION

- BEARING INDUSTRY
- MECHANICAL ENGINEERING
- ROBOTICS
- SHIPBUILDING
- AEROSPACE
- ENGINE BUILDING
- PETROLEUM INDUSTRY



BEARING INDUSTRY

Bearings are one of the most popular mechanisms in various types of industry. The main type of machining in bearing manufacturing facilities is the GRINDING operation. Grinding is carried out on modern high-tech CNC grinding machines using abrasive grinding wheels with various types of impregnation (impregnant). The most common impregnant, which is used in many industries, is sulfur. Although the performance of abrasive grinding wheels is improved after being impregnated with sulfur, sulfur impregnation has serious disadvantages.



Impregnation of grinding wheels with sulfur does not give the high quality of products that bearing enterprises strive for. There is no tendency to reduce the percentage of defects on grinding lines. There is a risk of sulphuric acid in the working area of the machine. Also, when using abrasive grinding wheels impregnated with sulfur, sulfur itself and its combustion products get into the coolant, which can lead to emergencies in the workplace. Sulfur vapors lead to environmental pollution and negatively affect the human body.

We offer the introduction of impregnated abrasive grinding tools into the technological processes of the enterprise, which will significantly improve the quality of products, reduce the percentage of defects to a minimum, as well as improve the environmental situation at the enterprise.

ENGINEERING

In an industrial society, mechanical engineering is a key industry, the level of development of which shows the economic power of the country, as well as the military potential.

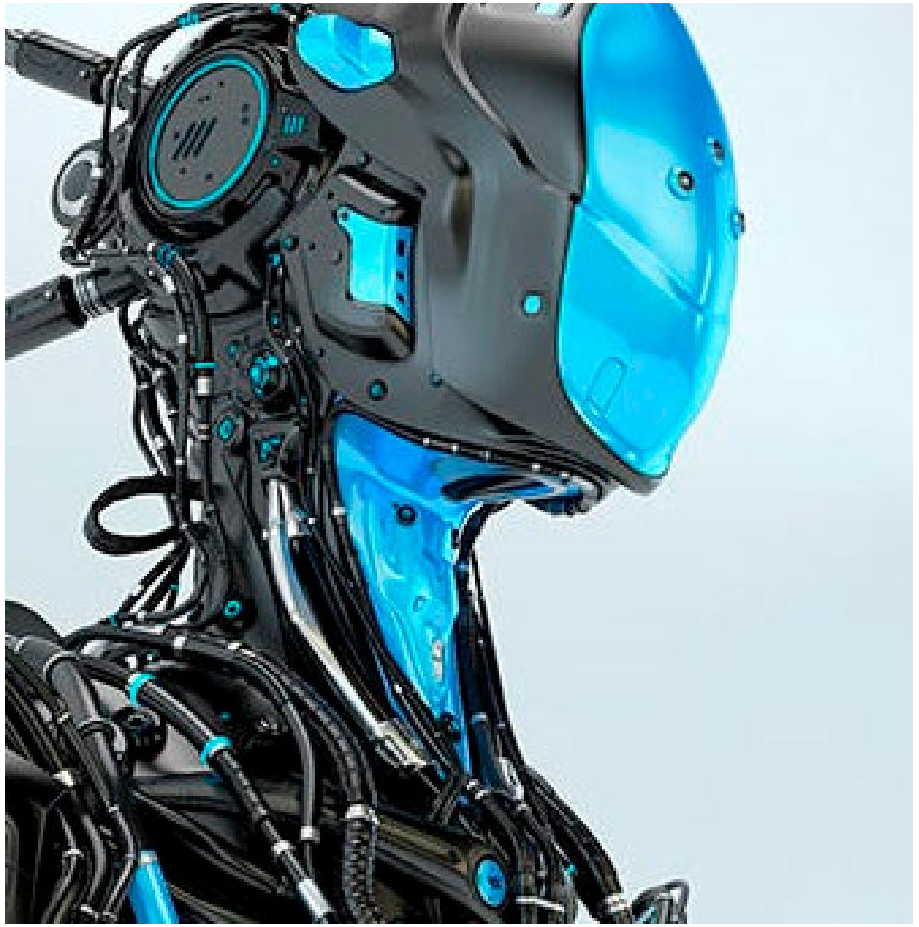
One of the common methods of high-performance pre- and post-processing of workpieces in mechanical engineering, made of different materials with different hardness (for workpieces made of hardened steels, this is the main method of processing), is GRINDING. It includes the treatment of round (internal and external), flat and complex (shaped) surfaces.

For a more effective increase in grinding productivity, in mechanical engineering enterprises, we offer the use of impregnated abrasive grinding tools, which leads to:

reducing the consumption of abrasive wheels due to their longer service life, improving the quality of the surface, eliminating burns, reducing the load on the tool and the operator, increasing work comfort and reducing tool wear

ROBOTICS

Robotics in the modern world is a new and promising direction in industry, which makes it possible to further develop existing industries and the emergence of new ones. Robotics is gradually becoming an integral part of human life. Robots are especially needed where it is too hard or dangerous for humans to work, and where every action must be performed with inhuman precision. In robotics, as in mechanical engineering, the same types of processing of various metal surfaces are used. This type of processing is GRINDING.



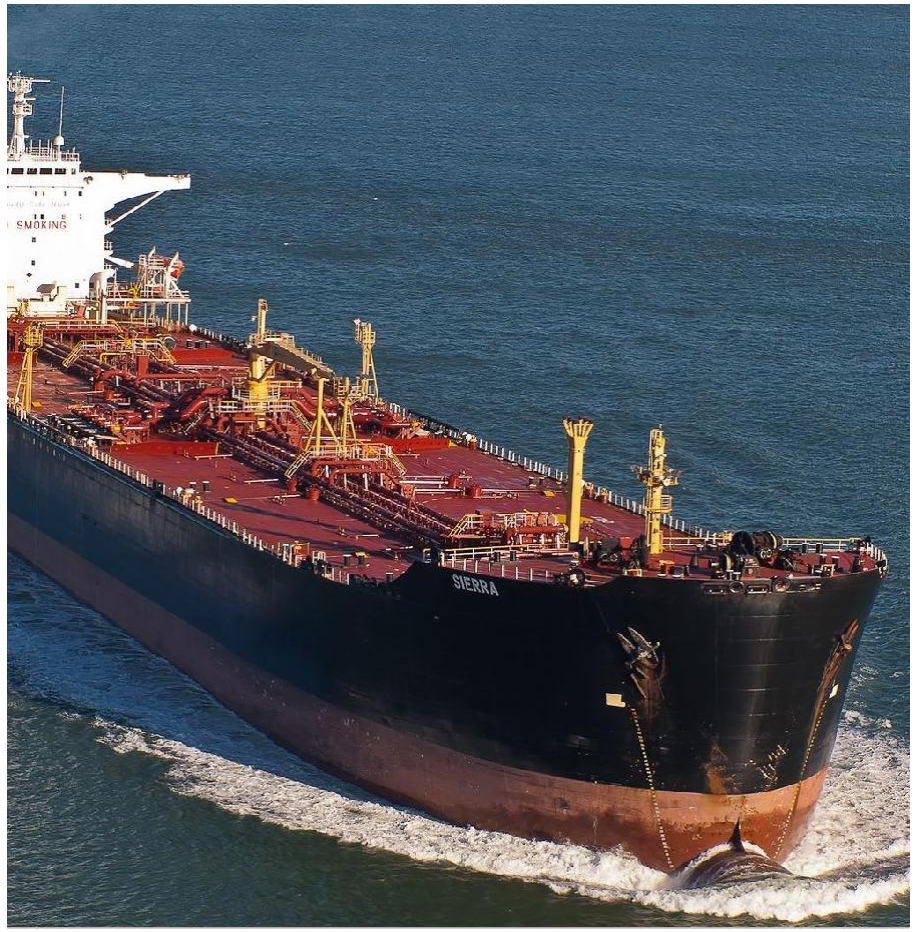
As a more productive and simple solution, we offer impregnated abrasive grinding tools to obtain high quality surfaces on the workpieces.

The use of this tool is different:

- **high processing speed,**
- **reduced costs for consumables**
- **comfortable and safe work of the operator**
- **Increased productivity of labor and equipment**

SHIPBUILDING

Building reliable vessels requires powerful, reliable tools that allow you to perform excellent quality machining. They will help you work efficiently, safely and accurately both in the factory and in the dock. Machining in shipbuilding is one of the main types in production processes. One of these types is GRINDING. This is not only smoothing the welds of ship plating, but also grinding parts for the main and additional units of ships.



In order to improve and increase the efficiency of technological processes in shipbuilding, we propose to introduce impregnated abrasive grinding tools for high-quality grinding of parts made of various metals, which will be able to:

- **significantly increase productivity, ensure high quality of the treated surface without burning, increase the comfort of the operator's work**

AEROSPACE

The aerospace industry is a high-tech industry that produces "aircraft, guided missiles, spacecraft, aircraft engines, propulsion systems, and related parts." This industry is a promising and innovative area that will help humanity in space exploration in the future. In the production of spacecraft, airplanes, power plants, etc., one of the types of machining is GRINDING.

For the development of such an advanced industry as the aerospace industry, we offer to introduce impregnated abrasive grinding tools at enterprises, which will help:

- **to increase the productivity of labor and equipment, to achieve high quality of treated surfaces, to improve the environmental situation at enterprises and to avoid environmental pollution**

ENGINE BUILDING

Turbine blade production is a very complex, multi-stage machining process, so reducing the number of operations and optimizing the process cycle is an important task. For example, blanks of one type of blades are produced by casting, and others are stamped, milled and then polished to a high class of purity.

GRINDING machining is one of the main types of machining, since during this process a high quality of the surfaces of the machined parts is achieved. Not only turbine blades, but also other components of engine working units in many industries.

Grinding is a rather labor-intensive process. To carry it out, it is necessary to carry out repeated, long-term treatment.

We offer to optimize the stage of grinding milled turbine engine blades using impregnated abrasive tools, thereby reducing the technological cycle to several operations.

OIL INDUSTRY

The oil industry is one of the main types of industry that requires huge expenditures of resources and their competent distribution. One of these resources is oil equipment. The production of lifting units, hydraulic wrenches of the GKSh series, LNG spiders, drilling rotors, elevators, swivels, pipe wrenches, as well as the repair of hydraulic wrenches and the manufacture of spare parts - all this requires mechanical processing in order to obtain high-quality and efficient working equipment at the output. One of the types of machining includes GRINDING.

In order to improve the quality of grinding machining, reduce the rejection rate and optimize the production processes for the production of petroleum equipment, we offer to solve these problems with the help of impregnated abrasive grinding tools to achieve the following results:

15x increase in productivity

High quality of the surfaces to be treated

Significant reduction in the cost of the operation

ADVANTAGES

TRADITIONAL ABRASIVE TOOLS

Nature of Market Abrasive Tools	Product price	Hardness/ hPa	Resource /grinding ratio/
Silicon carbide	200	29-30	3
Aluminum Oxide	100	19-20	1
Boron nitride, cubic (Elbor)	300	35-38	5

Traditional sulfur impregnation. One of the main disadvantages is toxicity

IMPREGNATED CERAMIC BONDED ABRASIVE TOOL

The nature of the tool	Product price	Hardness/ hPa	Resource /grinding ratio/
Silicon carbide	600	31-33	24-30
Aluminum Oxide	300	24-25	8-15
Boron nitride, cubic (Elbor)	900	39-40	30-32

Impregnated Abrasive
A tool without changing nature abrasive tools, improves physical and mechanical properties by **10%** and increases its service life*

8-15 times

*Depending on the types of surface to be treated

COST REDUCTION FACTORS

REDUCED
DEFECT rate
On **30%**

INCREASE
service life of the impregnated abrasive tool RAI
in **15** time

INCREASE
service life of diamond tools
in **10** time

INCREASED
productivity
Labor and Equipment
on **60%**

by reducing the time for straightening and setting up equipment after replacing abrasive wheels when they wear out

ADVANTAGES IN THERMAL AND ELECTRICAL CONDUCTIVITY

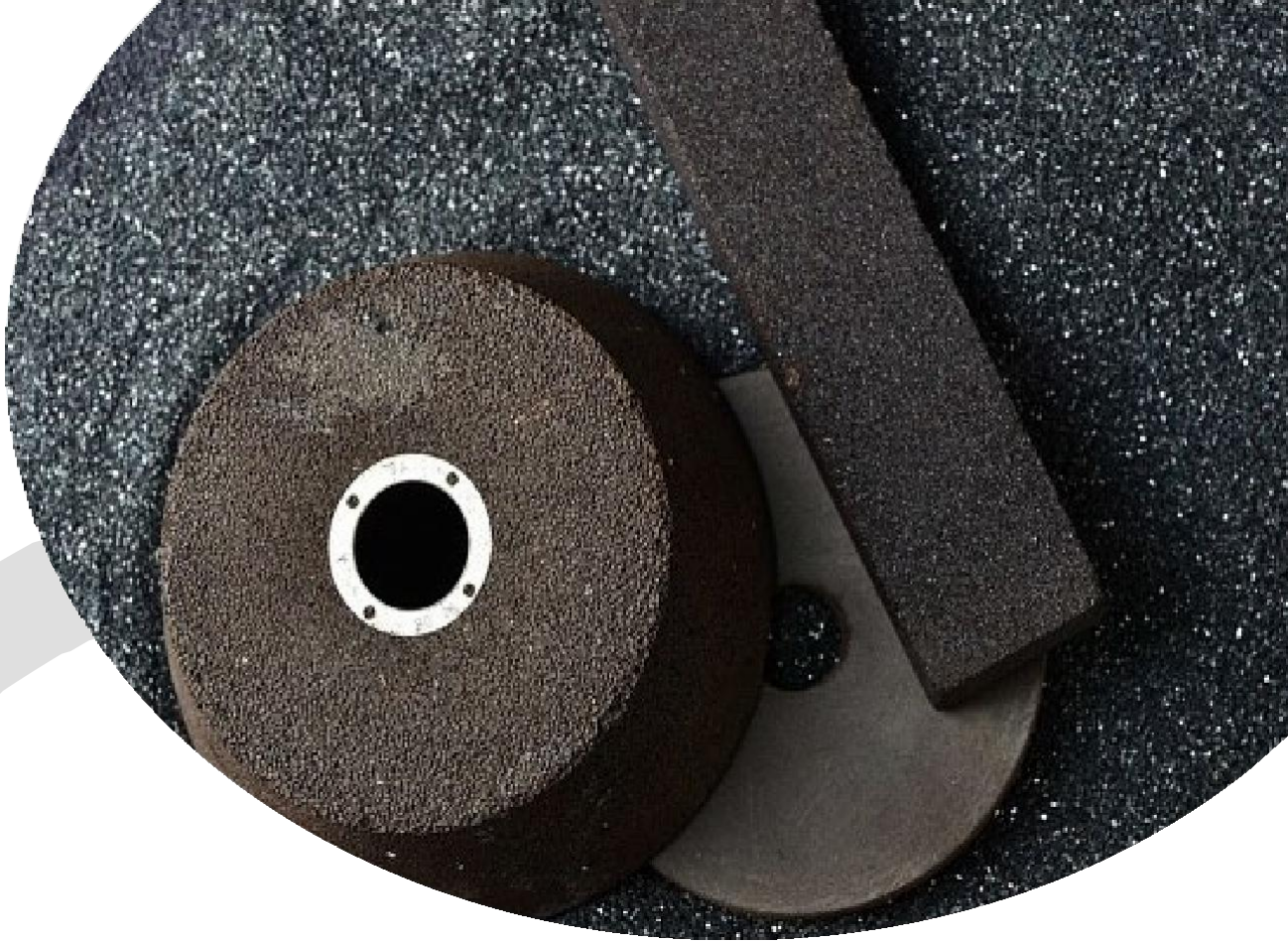
REDUCED
friction and temperature in the cutting area, eliminating burns

INCREASING
the retention strength of abrasive grains in the bond

REDUCING
the coefficient of friction and INCREASING the thermal conductivity of the tool and the quality of the treated surface

PROMOTES
better cooling of the cutting zone and chip removal without altering the pore structure of the abrasive wheels

THE RAI IMPREGNATED ABRASIVE TOOL HAS THERMAL AND ELECTRICAL CONDUCTIVITY, WHICH ALLOWS THE SUBSEQUENT INTRODUCTION OF ELECTROABRASIVE GRINDING TECHNOLOGY TO ACHIEVE

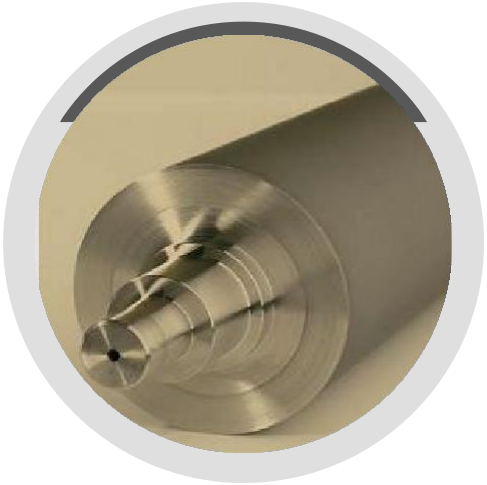


10X GROWTH

GRINDING RATIO AND INCREASE THE GROWTH OF LABOR PRODUCTIVITY on 1.5-3 TIMES

INCREASE IN THE QUALITY OF CLEANLINESS IN METAL PROCESSING

METAL PROCESSING



STEEL HARDNESS

35-50

STRUCTURAL STEELS: in automotive and mechanical engineering parts

STEEL HARDNESS

50-60

HEAT-RESISTANT STAINLESS STEELS: plain and rolling bearings, gears, shafts

STEEL HARDNESS

60-70

HEAT-RESISTANT, STAINLESS STEELS AFTER QUENCHING, NITRIDING, CARBONIZATION: space parts of jet engine building ROSCOSMOS and ROSATOM

ECONOMIC BENEFITS

REDUCED
tool storage costs

REDUCED
transport costs for the delivery of grinding wheels and diamond tools

REDUCING
the cost of servicing credit resources (if any)

REDUCED
need for equipment and skilled workers to execute the required production program

ENVIRONMENTAL BENEFITS

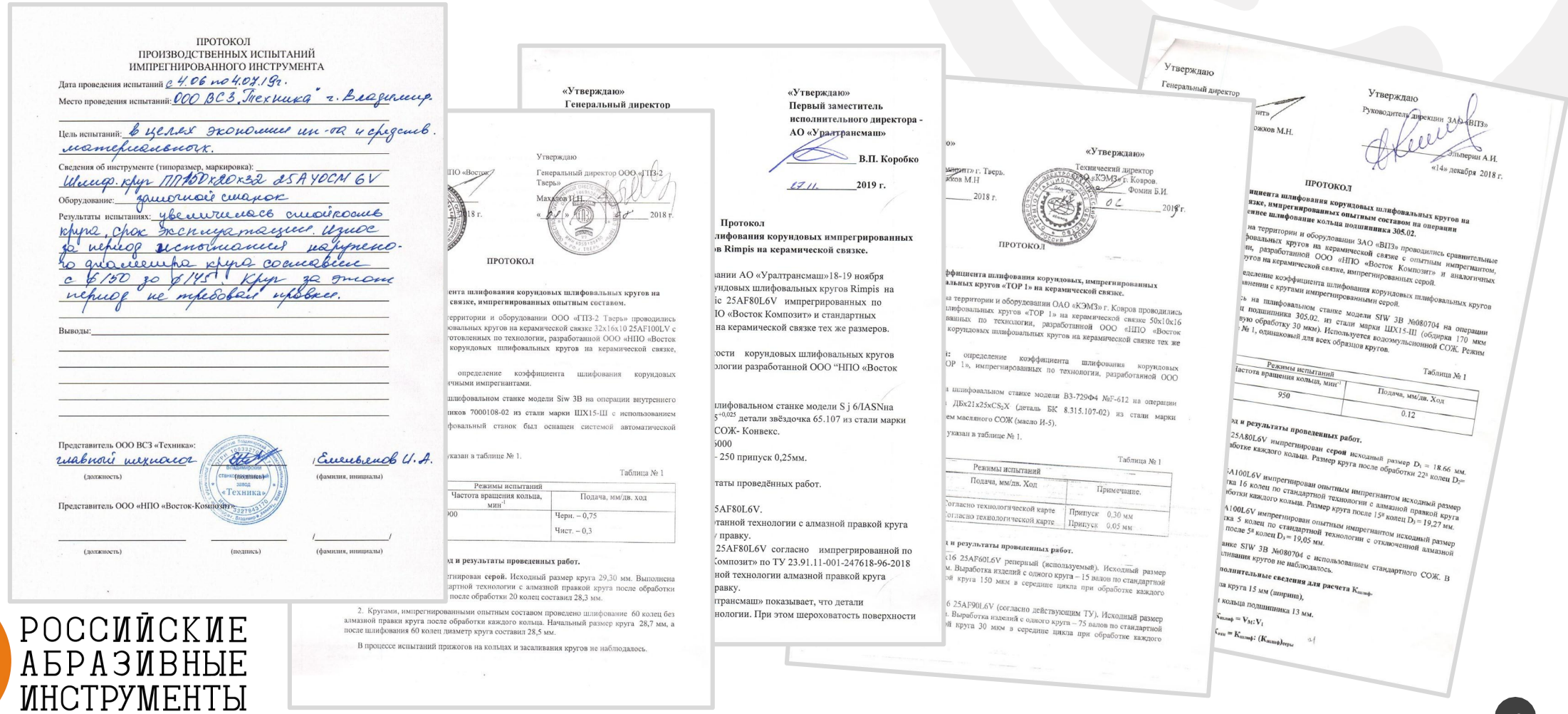
SOLUTION
to the problem of sulfur and its combustion products entering the coolant

PREVENT
the formation of sulfuric acid in the working area of the machine

NO toxicity
during impregnation unlike sulfur-impregnated abrasive tools

IMPROVING
the environmental situation at the enterprise due to the ability to work with coolants that do not contain mineral oils

ALL THESE ADVANTAGES ARE CONFIRMED BY TESTS IN REAL PRODUCTION CONDITIONS, THE DATA OBTAINED ARE RECORDED IN THE RELEVANT TEST REPORTS



ПРОТОКОЛ
ПРОИЗВОДСТВЕННЫХ ИСПЫТАНИЙ
ИМПРЕГНИРОВАННОГО ИНСТРУМЕНТА

Дата проведения испытаний с 4.06 по 4.07.19г.
Место проведения испытаний: ООО ВСЗ "Техника" г. Владимир
Цель испытаний: в целях экономии ин-та и средств. материалов.
Сведения об инструменте (типоразмер, маркировка): Шлиф. круг ПП600х80х32 25А40СМ 6V
Оборудование: заточной станок
Результаты испытаний: увеличилась стойкость круга, срок эксплуатации. Износ за период испытаний замерено по диаметра круга составил с ф150 до ф145. Круг за этот период не требовал правки.
Выводы:

Представитель ООО ВСЗ «Техника»: главный инженер (должность) (подпись) Емельянов И.А. (фамилия, инициалы)
Представитель ООО «НПО «Восток-Композит» (должность) (подпись) (фамилия, инициалы)

«Утверждаю»
Генеральный директор

«Утверждаю»
Первый заместитель исполнительного директора - АО «Уралтрансмаш»
В.П. Коробко
07.11. 2019 г.

Утверждаю
Генеральный директор ООО «ГПЗ-2 Тверь»
Махлаев Н.Н.
2018 г.

ПРОТОКОЛ

Протокол
лифования корундовых импрегнированных
в Rimpis на керамической связке.

Таблица № 1

Режимы испытаний	
Частота вращения кольца, мин⁻¹	Подача, мм/дв. ход
	Черн. – 0,75
	Чист. – 0,3

«Утверждаю»
Технический директор ООО «КЭМЗ» г. Ковров.
Фомин Б.И.
2018 г.

ПРОТОКОЛ

Утверждаю
Руководитель дирекции ЗАО «ВПЗ»
Эльперин А.И.
«14» декабря 2018 г.

ПРОТОКОЛ

Таблица № 1

Режимы испытаний	
Частота вращения кольца, мин⁻¹	Подача, мм/дв. Ход
950	0,12

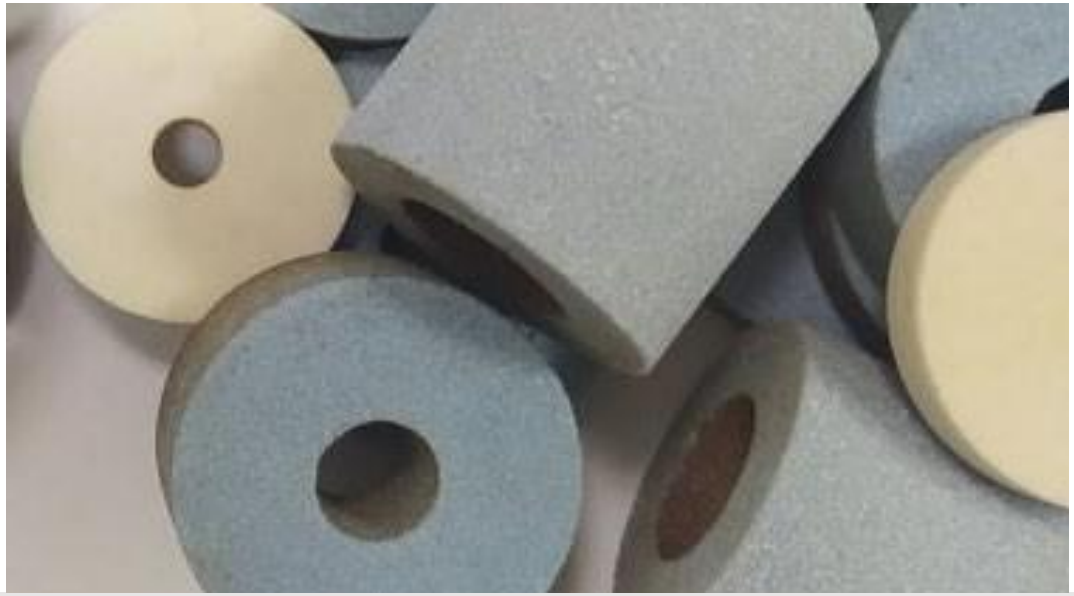
РОССИЙСКИЕ АБРАЗИВНЫЕ ИНСТРУМЕНТЫ

The use of abrasive grinding tools impregnated according to our technology will allow your company to significantly reduce the cost of production, improve its quality characteristics, create a basis for a subsequent technological breakthrough and, as a result, significantly strengthen your position in the market

Abrasive white alumina 25A raw grinding wheels

Impregnated abrasive grinding wheels made of white alumina 25A (finished products)

The use of abrasive grinding tools impregnated according to our technology will allow your company to significantly reduce the cost of production, improve its quality characteristics, create a basis for a subsequent technological breakthrough and, as a result, significantly strengthen your position in the market



25A Raw Abrasive Grinding Wheels

Impregnated abrasive grinding wheels made of alumina 25A (finished products)

WORK WITH US!

INDIVIDUAL APPROACH TO THE SELECTION OF TOOLS FOR YOUR COMPANY:

1. **IMPREGNATION OF YOUR INSTRUMENT**
2. **ПОСТАВКА АБРАЗИВНОГО GRINDING TOOLS**

THE TOOL IS ALWAYS AVAILABLE!

FINANCIAL INDICATORS OF THE PROJECT

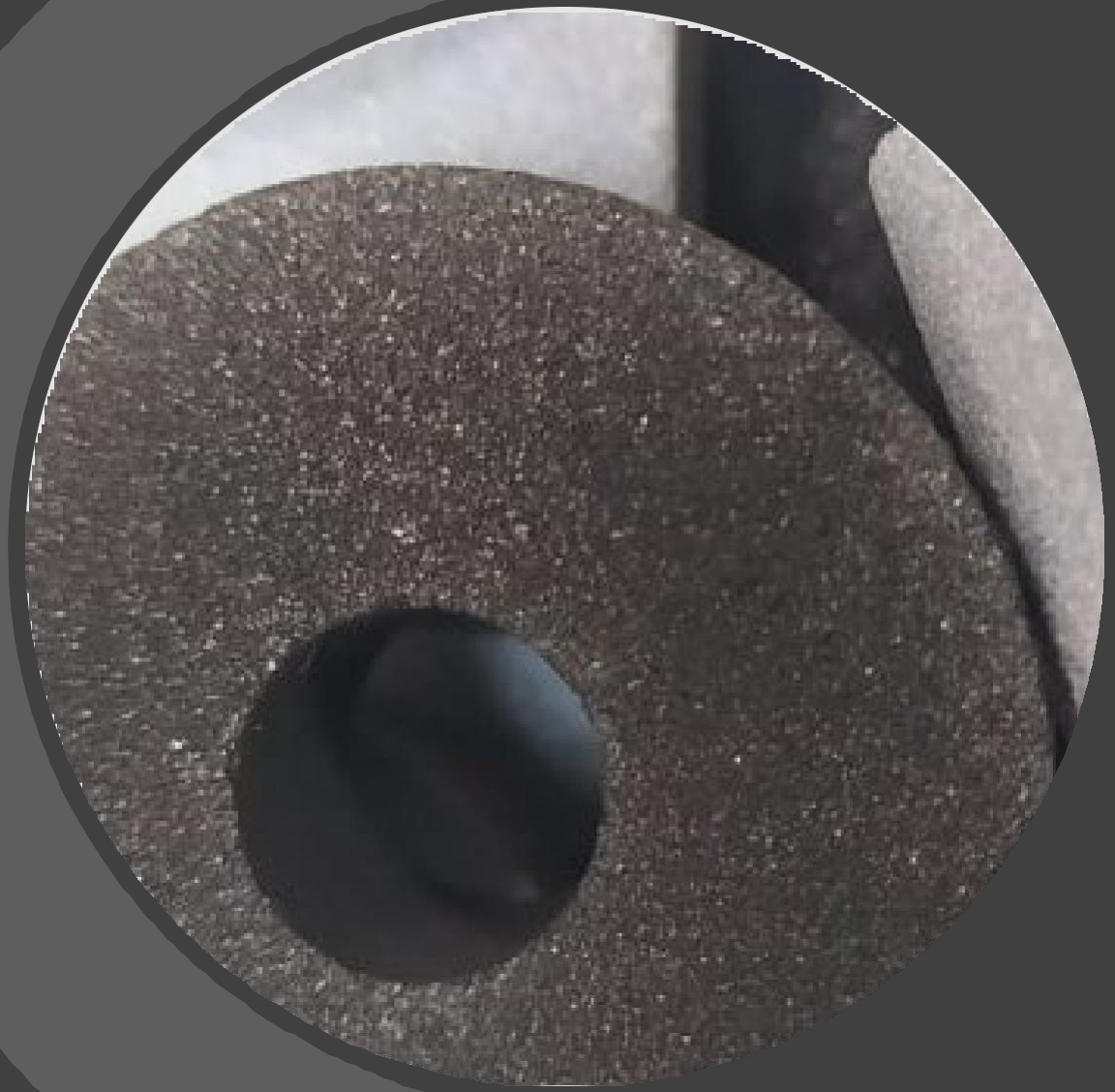
I. GRINDING TOOLS ON A CERAMIC BUNDLE CERAMICS PRODUCTS

Project profitability analysis

Indicator	2025	2026	2027
Net revenue	974 178	22199 854	25703 093
Investment volume	8454 526		
Net profit after interest	(1556 168)	7846 476	10105 566
Return on sales	0%	35%	39%
Return on invested capital	-18%	93%	120%

Calculation of project performance indicators with a planning horizon of 10 years:

Indicator	Value
NPV (Net discounted cash flow), thousand $	16193 981
IRR (Internal rate of return), %	59%
PI (Investment Profitability Index), %	191,54%
Payback period, one year	1,1



ONE OF THE BEST TOOLS IN THE WORLD