

Organization of production facilities and manufacturing of cutting plates from polycrystalline superhard materials based on cubic boron nitride KIBORIT.

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The way of problem solving

The prototypes of Kiborit 1 and Kiborit 2 are the materials AMB90 (Element Six) and MN-100 (Megadaymond), that are intended for the most severe operating conditions, contain 90 or more of weight percent of CBN, and the CBN fine grains of 8 - 10 microns in size. Such materials are obtained by sintering at high pressures and high temperatures in a form of single-layer plates (without a bottom layer). A binding of such materials contains the high-melting compounds of aluminum, that indicate the sintering of charge with aluminum or its alloys. The materials have high hardness, fracture strength and thermal conductivity. They are not electrically conductive and their cutting is carried out by the laser.

Basic publications

1. Buvaylo D.P., Gomenyuk S.I., Tolok V.O. FORTU – the descriptive language of the scheme solution of the mathematical physics problems // Bulletin of Zaporizhzhya State University. – Zaporizhzhya: ZSU. – 2000. - №1. – p.19-25

The main publications

1. Novikov N.V., Shulzhenko A.A., Bezhenar N.P. and others Kiborit: obtaining, structure, properties, application // Superhard materials. - 2001. N 2. - P. 40 - 51.

2. Novikov N.V, Shulzhenko A.A., Bezhenar N.P., Bozhko S.A., Borimsky A.I., Nagorny P.A. Kiborit superhard material and its use // Instrumentalny World. -2002. - № 1. - P. 10-12.

Innovative Aspects of the solution / development/ methodology, tool, prototype

Main advantages of the solution / development/ methodology, tool, prototype Financial and Economic Parameters

Prospective sales markets: EU, U.S.A., Israel, the UIS

The period of project self-repayment (months) - 24.

Time from accepting of the project to the start of production(months) - 12.

Investment Offer (*is not obligatory*)

Current stage of development

Intellectual Property Rights (*please, select*)

The development is protected by three patents of Ukraine

1. Pat. 25281A, Ukraine, MCI S04V35/5831. *Sposib spikannya kompozitsiyynogo materialu na osnovi kubichnogo nitridu boru* (The way of sintering of composite material based on cubic boron nitride / M.V. Novikov, O.O. Shulzhenko, M.P. Bezhenar, S.A.Bojko. - Appl. 21.07.97, Publ. 25.12.98, Bull. N 6.

2. Pat. 25282A, Ukraine, MCI S04V35/5831. *Shichta dlya keramichnogo materialu* (Charge for the ceramic material) / M.V. Novikov, O.O. Shulzhenko, M.P. Bezhenar, S.A. Bojko. - Appl. 21.07.97, Publ. 25.12.98, Bull. N 6.

3. Pat. 28827A, Ukraine, MCI S04V35/58. *Shichta dlya kompozitsiyynogo materialu na osnovi kubichnogo nitridu boru* (Charge for the composite material based on cubic boron nitride) / M.V.

Novikov, O.O. Shulzhenko, M.P. Bezhenar, S.A. Bojko, O.I. Borimsky, P.A. Nagorniy, M.O. Kuzenkova. - Appl. 02.10.97, publ. 29.12.99, bull. N 8.

Collaboration Details

Type of cooperation - the agreement on the transfer of technology, the license agreement.

Technology Key words

Choose as many keywords as are applicable to the solution / development/ methodology, tool, prototype.

Tip: somebody can search using keywords alone

The press equipment, high pressure apparatus, Cubic boron nitride, superhard PCBN composite, cutting tools

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<http://www.ism.kiev.ua>

Project (name): The industrial engineering of cBN cutting plates.

Project objective: The production in industrial scale of competitive cutting plates from polycrystal cubic boron nitride (PCBN) type Kiborit in the form of cylinders $D \equiv$ to 25,4 mm, and also the different form inserts used for tool equipment for roughing, medium machining and finishing of hardened carbon and a high-alloy steels, high-strength and wear-resistant cast irons, heat-treated high-strength and stainless steels, highly rigid fused and sprayed coatings, high-temperature nickel alloys, alloyed chromium, titanium, molybdenum, vanadium, etc. elements.

Specification of products being proposed for manufacture:

Cutting plates PCBN type Kiborit		
The characteristic	Unit measure	Value
Diameter	mm	6,35–25,4
High	mm	3,2–9,5
Density	g/cm ³	3,35–3,38
Knoop Hardness <i>HKN10</i>	GPa	28–30
Fracture Toughness <i>K_{Ic}</i>	MN/m ^{3/2}	10,5
Compressive Strength	GPa	2,9
Thermal Conductivity	W/(m·K)	70
Heat Resistance	K	to 1400

Project Advantage: Resources saving, replacement of import products, improvement of export capacity.

The brief characteristic of investment contributions (Thousands USD)

Name	Date of	Home	Foreign investments
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	performance month	investments Thousands USD	Thousands USD
Research investigations	6	30.0	30.0
Technology development	6	20.0	20.0
Equipment purchasing	9	75.0	150.0
Cost or rent of buildings and constructions	24		75
Money contingencies		5.0	5.0
Total	24	130.0	280.0

Availability of legal documents (patents, author's certificates and etc.)	100%
Investigation of scientific aspect of the project	80%
Availability of working areas	70%
Availability of necessary equipment	40%
Availability of necessary staff	50%

Countries for export of the products: USA, Israel, Commonwealth of Independent States

Project capital returning period (*months*) – 24.

Estimated time from the investment receiving to output of production (*months*) – 12.

Applications (photo, text): It is used for tool equipment. Cutters from kaborit are most effective at machining of large-sized details from cast irons and hardened steels with the big cutting depth, and also at semi-rough and finishing turning of hardened carbon, structural and alloyed steels, various grades cast irons.

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