

Name of the scientific solution / development/ methodology, tool, prototype

Construction of the stochastic theory of the process diamond dressing of abrasive wheels.

Contact information: Institute for Superhard Materials of National Academy of Sciences of Ukraine, Department of technology precision diamond abrasive and physico-technical processing and difficult-profile tool with SHM.

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Problem Description

According to modern ideas, diamond-abrasive processing, a particular case, which is the dressing in fact, the process of removal allowance by a large number of cutting, scratching individual grains, irregularly placed on the working surface of tools and having the wrong geometry. Unfortunately, few works on this subject in dressing see it as completely deterministic process. As a result the calculation of the thickness of a single cut – one of the main parameters of the process – at times gave low values. The scientific problem was neglecting stochasticity factor of the dressing process, and technology – the inability to develop tools with predetermined characteristics.

The way of problem solving

By constructing and applying the stochastic theory of the process of diamond dressing abrasive wheels solved scientific and technical problems to improve it and create dressing tools – diamond rollers and blocks – with a predetermined effective characteristics.

Found a new effective modes of diamond roll dressing wheels (cutting in one direction with a velocity ratio $q = 0,6$), which provides lower specific consumption of diamonds (by 64%), while increasing performance. Calculated and recommended number of parameters of diamond block dressing of profile wheels, including heterogeneous working surface. Some of recommended regimes and structural parameters of the dressing tools were pilot-industrial tested and implemented in a machine-building factory of Ukraine.

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

1. The software that implements the PC system, the original mathematical model of diamond-abrasive processing, and a powerful multi-tool study of dressing abrasive wheels by diamond rollers and blocks, as well as polishing abrasive and diamond wheels.

2. The method of testing intricate rollers under the scheme of so-called quasi-infeed dressing, simulating true mortise and not requiring expensive special equipment and be used universally.

Main advantages of the solution / development/ methodology, tool, prototype

1. A new effective area modes dressing of abrasive wheels by diamond rollers providing lower specific consumption of diamonds (64%) with an increase in productivity of processing .

2. For the dressing process of diamond blocks is recommended to observe the maximum possible both feed to the depth and length fence parts.

Financial and Economic Parameters

In many areas of the world machining (bearing, tool, optical-mechanical) the amount of the dress diamond rollers in the volume of production reaches 50% and cost per unit goes for \$ 1000 U.S.

Current stage of development of the offered solution / development/ methodology, tool, prototype (please, select)

Already on the market

Comments: geography case studies - Belarus, Russia, Ukraine, Moldova, Turkey, USA

Intellectual Property Rights (please, select)

others (registered design, plant variety right, etc.)

Comments: 32 works are published in professional journals of Ukraine

Collaboration Details (Type of collaboration sought; *more than one option can be selected*)

Commercial agreement with technical assistance

Comments: We can manufacture tools in conformity with your conditions. You will be completely satisfied with precision and performance of them.

Technology Key words

Diamond-abrasive processing, the grinding theory, dressing of abrasive wheels, allowance removal, stochastic process, statistical laws, the statistical mechanics.