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COMPARATIVE ANALYSIS GRINDING AND PROCESSES LEZVIYNOYI With PSTM processing tool BASED boron nitride

OV Sushko, Ph.D.
Taurian State Agrotechnical University

The article contains a comparative analysis of the grinding process lezviynoyi and processing tools based on the example of boron nitride hardened steels and cast irons.

Superhard materials, lezviyna processing tool, cutting conditions, grinding, modifications of boron nitride.

Formulation of the problem. The process of cutting tool lezviynym based superhard modification of boron nitride differs significantly from the cutting process diamond tool, due to its special physical and mechanical properties. Superhard materials based on boron nitride, a little behind the diamond in hardness, characterized by high thermal stability, high resistance to thermal shock and cyclic load and weak chemical mutually fashion with iron, which is the main component of most materials that are subjected to machining [1].

Hardened steel cutting tool lezviynym of boron nitride is accompanied by lower cutting forces compared to traditional processing tool. With increasing cutting speed reduction intensity reduced cutting forces. The intensity reduction coefficient of friction and impact urinesexual-conductivity tool material: the lower it is, the lower the coefficient of friction ceteris paribus. Thus, the friction of diamond brass (external friction) the impact speed is almost absent, while the friction of boron nitride brass (internal friction) speed as the heat factor has a great influence on friction [2].

The process lezviynoyi nitrydobornym handling tool for high quality are competitive abrasive treatment. Further research Installation impact of cutting speed on the quality of surface finish for the possibility of comparative analysis lezviynoyi process grinding and processing tools with PSTM based on boron nitride.

Analysis of recent research. In lezviyniy processing hardened steel cutters with boron nitride last exposed to all kinds of

wear, abrasion, diffusion, chemical, oxidative. However, the overall wear in different periods of exploitation Tool contribution of each of these species varies. The intensity of wear is different and depends on the cut

[2]. In wear resistance cutters nitride phase is very influenced by the structural features of the tool. When turning hardened steel cutters with boron nitride based sphalerite (ELBOR-P) optimum path length depending on the speed of cutting shifted in the direction of large values. And for optimum cutters based on wurtzite (heksanit-P) shifted towards smaller cutting speeds [3]. This explains the difference between physical and mechanical properties Elbor heksanitu-R and-R, and, above all, different heat resistance, thermal conductivity, different strength characteristics.

When boring dooptymalnyh hardened steels at cutting speeds and optimal wear on cutters PSTM is mainly on the back surface, and increase cutting speed leads to a deterioration of the tool on the back and on the front surface. A criterion blunt cutters with boron nitride at boring steel SHH15 should take the wear on the back surface no more than 0,4mm. If necessary, provide a high quality surface finish, the criterion of depreciation may vary. [4]

The connection V between cutting speed and stability when processing T hardened steel tools with PSTM. received generalized dependence, poliekstremalnu describing the structure stability depends on factors cutting, filing, depth and diameter of processing and fully reflects the patterns of physical phenomena at cutting [3].

The purpose of research is a comparative analysis lezviynoyi grinding processes and processing tools with PSTM based on boron nitride in the processing of hardened steels.

Results. Replacing the grinding process lezviynoyu of PSTM processing tools based on boron nitride in the processing of parts of hardened steel and cast iron are particularly promising. This benefit appears fully lezviynoyi processing.

For a detailed analysis of benefits processing lezviynoyi dis-cutting schemes take a look at shli-fuvanni, turning and boring. Grinding wheel contact area of detail far exceeds the contact area of the tool with the workpiece (Fig. 1).

This excess is tens or even hundreds of times. In this regard, the work of cutting and grinding heat at much more than the turning. So locality tool contact with the workpiece at lezviyniy processing and thus additionally locality heat to the treated surface is a distinctive feature of turning and milling compared to grinding. If we compare the length of contact with the circle cutter and processed detail in the direction of the velocity vector cutting, we can see that when turning it significantly lower.

Grinding Boring
(Internal)

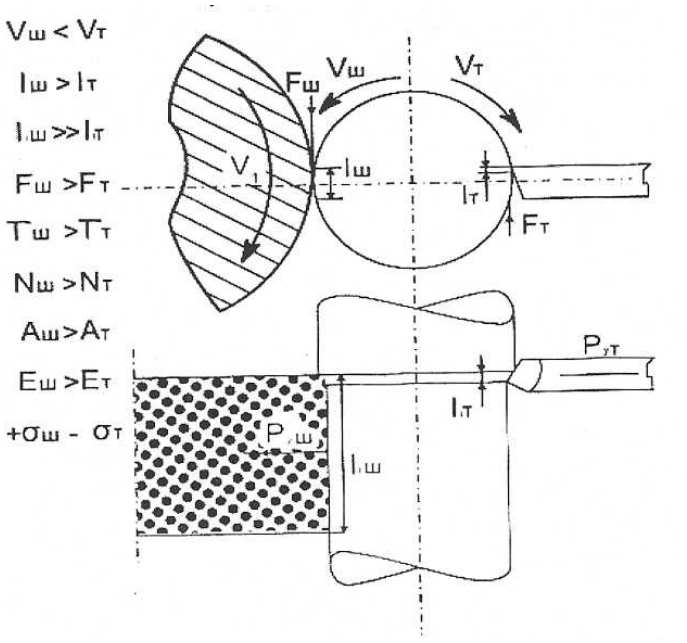

Fig. 1. Scheme contact tool from workpiece during grinding and turning.

County details at grinding speed is less than the turning and hence the action of heat on the surface of the grinding parts more than the turning. Therefore, another feature of the process of turning compared to grinding is brevity effect of high temperature on the treated surface. Thus, the action of heat when turning on a very small surface details of 0.00001 seconds.

Thus, the locality and the brevity of exposure to high temperature tours on the workpiece surface at lezviyniy furnish a guarantee that the heat does not penetrate to great depths and not "have time" to carry out essential structural phase changes in the surface layer parts. Thus, if the surface of the part with turning cutters of boron nitride hardened steel temperature reaches 1200 ° C, as studies show, at a depth of 10 microns from the surface it does not exceed 100 ° C. Thus, the high temperatures that occur during turning of the locality and short duration of action in very thin layers of detail, given the enormous gradients can lead to amorphization thinnest surface layer of detail, aided by contact with such intense amorfizatorom, which is boron nitride .

Grinding Boring
(Internal)

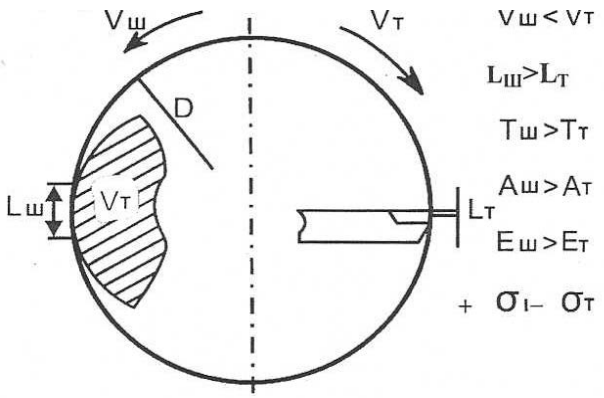

Fig. 2. Scheme contact tool from workpiece during grinding and boring.

As we know, the presence of amorphous thin film on the surface of the treated parts enhances the performance of the latter. When comparing internal grinding and boring lezviynoyi processing advantages are even brighter, because the value of contact of the grinding wheel is greater than the external grinding [4].

If you compare the quality characteristics of surface finish in grinding and turning, we can see that on the criteria such as roughness, turning not inferior grinding. Thus, when turning hardened steel cutters with boron nitride can provide roughness *Ra* = 0.3-0.4 microns. For roughness test - the relative length of supporting profile TR - inferior grinding application. Comparison of residual stresses in the surface layers of the treated surface after grinding and sharpening shows that lezviyna treatment gives a favorable compressive stresses in the while grinding - stretching.

It should be noted that the turning completely absent occurred, micro and macrocrack in the treated surface. Phase-structural changes in the surface layer at turning minimal separation surface is absent.

The advantages of the process of turning compared to grinding sometimes ignored on the pretext that the grinding process is more efficient than turning. An analysis comparing options machined surfaces, grinding is not always a more productive application. Thus, internal grinding, especially the surfaces of small diameter, often playing a boring process, and only the processing of large diameter, processes can be compared. When replacing grinding turning on the processing of many parts of hardened steel multiple benefits generated not only by less computer time but also by saving auxiliary time. The possibility of production on one machine, eliminating the grinding machine for processing, greatly reduces processing cycle.

In practice work, especially overseas, today more details of hardened steel processed lezviynym tool, not abrasive. This perspective is not only turning, but also milling. Thus, milling cast iron rails of

machine tools provides high quality at a very high performance (V = 900 m / min. At minute supply S = 200-600 mm / min.) With almost complete absence of thermal deformation [4]. Another advantage that distinguishes lezviynu process of grinding - the option not to use lubricating-cooling liquids (AB). Yes, lezviyna processing tools of synthetic superhard materials wide range processed materials, including hardened steels and cast irons, carried out, usually without the use of AB, which greatly improves environmental performance.

An analysis of energy processes, grinding is more expensive, and almost always as specific work and cutting power always more at polishing. Given the urgency of energy-intensive approaches in the evaluation process of machining, concluded that lezviyna less energy-intensive processing is very important.

Conclusion. Thus, a comparative analysis of processes of grinding and processing lezviynoyi suggests the merits before the last first. This proves that the most efficient and competitive in the processing of hardened steels, cast irons of different hardness, clad materials handled difficult, high-alloy steels and alloys is the use of tools lezviynoho boron nitride. This advantage superhard materials nitrydobornyh fully implemented.

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In Article predstavlenы Some results comparative analysis processes and shlyfovanyya lezvijnoj obrabotku tools based plotnыh modifications nytryda zakalennыh boron steels and Chugunov.

Sverhtverdые materials, lezvyynaya obrabotku, in-strument, rezanyya regimes, shlyfovanye, boron nitrides modyfykatsyy.

The paper presents some results of comparative analysis of the processes of grinding and blade processing tools based on dense modifications of boron nitride hardened steels and cast irons.

Supersolid materials, blade processing, tool, cutting modes, grinding, modifications of nitrides of boron nitride.