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RESEARCHES ON INFLUENCE OF CUTTING EDGE PARAMETERS ON TOOL LIFE AND CUTTING FORCES

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ДОСЛІДЖЕННЯ ВПЛИВУ ПАРАМЕТРІВ РІЗАЛЬНОЇ КРОМКИ НА СТІЙКІСТЬ ІНСТРУМЕНТУ ТА СИЛИ РІЗАННЯ

During machining there are high local pressures between the tool and the workpiece, high temperatures, cutting forces, etc. The cutting temperature, which is generated during cutting process, exposes the cutting tool to extreme thermal conditions. Heat, which is also generated by chip formation and by the friction on the rake face during high speed cutting, is adverse effect. This adverse effect can influence the tool life. At both discontinuous and continuous cut the cutting forces act unstable that is caused by small and very hard elements in the workpiece microstructure. That is why there are very strict requirements on the cutting material. The example of requirements is following: high hardness at elevated temperature, high fracture toughness, resistivity to tool wear and high strength. The user expects from the tool productive machining and very low tool wear. These requirements are possible to realize by better design of the cutting tool, new substrates, new deposited thin layers [1]. The design of cutting tool is possible to improve in the area of either macro-geometry (tool profile, reshaping, angles, etc.) or micro-geometry. Micro-geometry of cutting tool is influenced to a certain extent by the cutting material and the deposited thin layer, which influences the roughness of machined surface and also the edge radius. For the cutting edge preparation there are used different methods, for example: brushing, drag finishing, mirco-blasting dry, micro-blasting wet, magnet finishing, honing by hand, laser, etc. Most of these methods are based on the principle of abrasive elements effect. The effect is transmitted by suitable process media. The process media can be: air, paste, a fibre, a magnet, etc [2].

The aim of cutting edge preparation is: increasing the strength of the cutting edge, increasing the tool life, to reduce the internal stress of the coating, to reduce the risk of edge chipping, the preparation of the tool for deposition (smoother surface) and to create the defined shape and size of the cutting edge.

The roughness on the tool edge is higher and the surface of this tool may have defects. The defects can be: micro - defects (they arise during grinding process and they are also caused by manipulation among each step of production process. These defects can be seen both before and after coating), burrs (they are caused by the grinding process. Burrs can roll up over the cutting edge during the cutting process and they can destroy it. Definitely necessity for coating is the tool without burrs).

At a production process of a cutting tool it is necessary to follow the influence of inter-process preparation and also the influence of tool process technologies because right these factors have essential influence on the success of coated thin layer and the tool life.

References:

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