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Improving the properties of cutting blades through apply of WC+5Co+TaC-NbC nanocrystalline composite material

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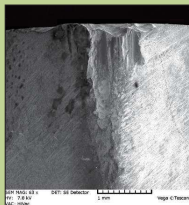
Abstract: The presented research concerns the most commonly used composite material, the WC-Co type, for cutting tool blades. In particular, the article presents the results of comparative research on the technological properties (hardness, structure) and operational properties (wear, durability) of blades made of WC+5%Co nanocarbidides and WC+5%Co nanocrystalline sintered carbides with the addition of TaC-NbC with various contents (0.5%, 2.5% and 4.5%). Nanocrystalline cemented carbides were sintered using the Pulse Plasma Sintering (PPS) method.

Test conditions

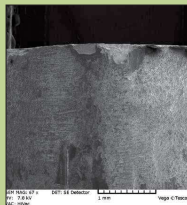
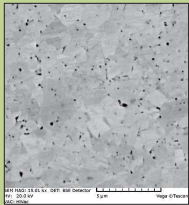
- Cutting inserts are made of:
- a) nanocrystalline sintered carbides type WC-5% by weight Co,
 - b) nanocrystalline sintered carbides type WC-5% by weight Co with the addition of TaC-NbC in the amount of:
 - b) 0.5% by weight,
 - c) 2.5% by weight,
 - d) 4.5% by weight,

The following processing conditions were used during wear and durability testing:

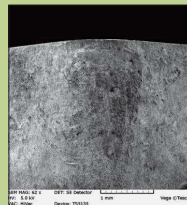
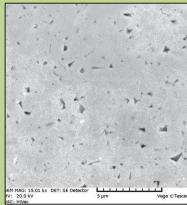
- cutting speed: $v_c = 110$ [m/min],
- feed: $f = 0.1$ [mm/rev],
- cutting depth: $a_p = 1.0$ [mm],
- processed material: acid-resistant austenitic steel EN 1.4571,
- cooling and lubricating fluid: Sulfofrezol 1.



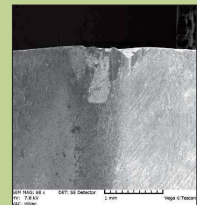
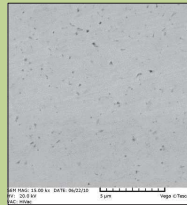
a) nanoWC-5Co



b) WC-5Co+0.5%TaC-NbC



c) WC-5Co+2.5%TaC-NbC



d) WC-5Co+4.5%TaC-NbC

