

Effect of Sintering Temperature and the Content of Nanoscale Tungsten Carbide on the Mechanical Properties of Polycarbide Based Hard Alloys

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Abstract In this paper there was investigated the effect of alloying tungsten nano-carbide and the sintering temperature on the mechanical properties of alloys of the TiC-5VC-18NiCr system with Ni:Cr=3:1, having used the experiment mathematical planning. The alloys were obtained by the powder metallurgy method, which included technological operations of the mixture homogenization, uniaxial cold pressing and sintering in vacuum. Eleven impact factors were found and they were fixed at a certain level. The variation factors were the following: the sintering temperature in the range of 1300-1400 °C and the content of alloying tungsten nano-carbide in the range of 5-15 % (wt). The Vickers hardness, the fracture toughness and the bending ultimate strength were the parameters of optimization. On the base of the analysis of the obtained regression equations and the constructed response surfaces there were found the optimal values of the variation parameters, which provided maximum values of the studied characteristics.