PROPERTIES AND USING POSIBILITIES OF WEAR-RESISTANT MATERIAL ON THE BASE OF TITANIUM CARBIDE

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The goal of this work is creation of tungsten-free hard composition material with high physical mechanical properties and operating characteristics. The material base is titanium carbide TiC which possesses the high melting temperature, hardness, mechanical strength, heat conductivity and corrosion stability. For strengthening of this properties in the composition material put in the additions of refractory carbides - VC, Mo_2C и NbC. The injection of metallic binder on the base of nickel and chromium in composition of material activates the densification process at hot pressing and also promotes the reduction of friction coefficient and increase the wear resistant of hot pressing composition material.

The listed powders were admixed in the proper proportions and at the same time were grinded in planetary-motion mixer in the environment of acetone (6 hours), were dried in drying box, were bolted (the average size of particles didn't exceed 3-8 micrometer). The specimens were obtained by hot pressing: temperature 1470-1520ºC, pressure 20 MPa, curing time 8-10 min after full shrinkage. The porosity of hot pressing specimens composed 4-9 %.

On mechanical finished specimens were determined the phase composition, density, mechanical strength, hardness, friction coefficient and wear rate.

On data of X-ray structure analysis (diffractometer DRON-3, Cu-k_α-emission) in hot pressing composition material except parent phases are present neogenic phases - intermediate constituent $CrNi_2$; Cr_7C_3; complex carbides Nb_4Ni_2C, Cr_2VC_2, $Mo_{24}Cr_7C_{19}$.

The density, mechanical properties and hardness by Rockwell were determined by standardized procedures. The amount of critical coefficient of stress intensity K_{1C} (crack resistance) were determined by IF-method at loading on indenter 100 N. The friction coefficient and wear rate were investigated by scheme "Axle - specimen" by the loading 2 MPa and velocity 12-14 m/sec. The obtained data are showed in table.

The data, which were showed in the table, indicate about sufficiently high values of mechanical properties, hardness, coefficient of crack resistance and also wear resistance at relatively low value of friction. The listed properties allow to recommend the developed material for the treatment by cutting and plastic deformation of wide class of steels and alloys and also as wear-resistant material of machines and mechanisms components which work in the conditions of friction at increased speed parameter.

Table

Properties of hot pressing wear-resistant material on the base of titanium carbide TiC

Composition of material, mas.%	Mech. strength, MPa		Hardness by Rockwell HRA, pressure. 50 kg	Crack resistance K_{1C}, $MPa \cdot m^{1/2}$	Friction coefficient	Wear intensity, mkm/km
	at bend	at compression				
(59-71)TiC-(4-6)VC-(4-6) Mo_2C(4-6)NbC-(12-20)Ni-(3-5)Cr	1220-1245	2125-2180	91,6-92,0	8,5-8,8	0,21-0,25	2,1-2,3