

Electro Discharge Compaction of WC-Co Composite Material Containing Particles of Diamond

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Abstract

In the present paper the formation of high hardness and large strength structure of WC-Co composite material containing particles of diamond is investigated and optimal operating parameters are defined. Tungsten carbide - cobalt - diamond composites was produced by the method of high voltage electrical discharge together with application of mechanical pressure to powder compact. It was found that the density and hardness of composite material reach its maximum values at certain magnitudes of applied pressure and high voltage electrical discharge parameters. We show that there is an upper level for the discharge voltage and applied pressure beyond which the powder WC-Co-diamond composite material disintegrates like an exploding wire. Near this level the cobalt particles are in a fused condition and are redistributed in the compact volume due to magnetic pressure of discharge current pulse. The distribution of magnetic pressure is defined by the distribution of a current density in the powder compact. The magnetic pressure is more homogeneous in powder compact volume when the skin effect is strong.