

Retention Properties of the Matrix Material Fe-Mn-Cu-Sn-C in Relation to Diamond Particles

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Abstract : In the presented work, the main goal was to investigate the retention properties, defined as the ability of the matrix material to hold diamond particles in relation to metallized (Ti, Si, Cr, Co, Cu, Ni) and non-metallized diamond crystals. For this purpose, diamond-impregnated specimens were tested for wear rate on abrasive sandstone using a test rig specially designed to simulate tool application conditions. The tests that involved 3- and 2-body abrasion ranked the alloys in different orders. The ability of the matrix to retain diamond crystals was determined using the electron microscopy (SEM, TEM). The specimens were also characterized by X-ray diffraction (XRD) and hardness. The conducted research has shown that Si and Ti metallized diamonds, apart from mechanical jamming in the matrix, are also connected in a metallurgical manner, ensuring the improvement of the retention properties of the matrix material.

Keywords : diamond, metallic-diamond segments, retention, abrasive wear resistance

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