

Comparison of wear resistance determined under different conditions of wear

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Wear resistance of powder materials and coatings depends on various factors: technological parameters and with them their properties, testing conditions etc. It is shown by different researchers, that hardmetals and hardmetal coatings of different type and composition behave themselves differently under different conditions of wear. To compare the wear resistance of materials and coatings determined in case of various wear conditions, tests of different hardmetals and hardmetal type coatings at different conditions of wear were carried out. The testing methods can be roughly divided into two groups:

- 1) low-speed (up to 2-3 m/s) wear testing methods by ASTM B611-85
 - sliding wear of materials and coatings against a steel counter-face (velocity 2.2 m/s);
 - abrasive wear of materials and coatings against a steel counter-face in the slurry of an abrasive (velocity 2.2 m/s);
- 2) high-speed (up to 80 m/s) wear testing methods
 - sliding wear of cermets/steel rubbing pairs under dry conditions by using a dual drum-type centrifugal tribometer (velocity 15 m/s);
 - abrasive erosion wear of materials in a jet of abrasive particles by using a centrifugal type tester (velocity 80 m/s).

Since the use of materials and coatings of different composition percentages would lead to incorrect results due to the great differences in carbide density (WC-15.6, TiC-4.9, Cr₃C₂-6.7 g/cm³) their volume loss was measured and the volumetric wear rate (mm³/kg) was calculated.

In case of sliding wear, the order by wear resistance is practically the same, but the differences are not as great as in the case of abrasive wear (sliding with abrasive or erosion wear).

The attempts to predict wear resistance of materials and coatings by some other characteristic that would be easier to determine have been made. The influence of the hardness-toughness properties of powder materials and coatings on the wear resistance was under the study also. The relation between wear rates of different types of wear and hardness was examined.