

Wear of PM HIP metal matrix composites –influence of carbide type

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The type of hard phase in combination with matrix material has a great influence on the wear properties of PM HIP Metal Matrix Composites. The hardness and toughness of the hard phase as well as its reaction with the matrix in combination with wear mechanism can cause significant differences in performance of the material. Three materials with the same matrix alloy but different carbide types have been studied with regard to tribological behavior in low stress abrasion, high stress abrasion and scratch testing against a quartz stylus.

In low stress abrasion testing the material has only very small differences in the performance between the materials. The materials containing crushed or spherical fused tungsten carbide had a higher initial wear that can be explained by the microstructure of the material. In the later stages of wear the three materials perform very similar.

In the scratch testing a clear difference can be observed between the materials. The material containing the fused tungsten carbide exhibits a higher degree of carbide damage at the exit side of the wear scar sliding over the carbide. This can be attributed to the much higher degree of carbide dissolution in the fused carbide compared to the macrocrystalline carbide.

The results from tribology testing are discussed and compared to wear mechanisms observed in parts that have been in service in a slurry pump and a crusher.

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Materials

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