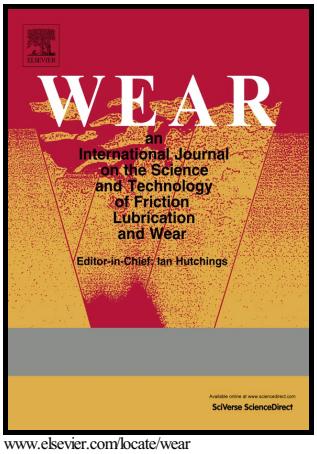

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Cavitation Erosion Behavior of HVOF CaviTec Coatings

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Abstract

CaviTec® is an alloy known for its high resistance to cavitation erosion. Under cavitation, this material absorbs impact energies and undergoes a structural phase transformation. This attribute gives rise to a long incubation period before erosion and material loss take place. In this work, CaviTec powders were prepared by water atomization and mechanical alloying. Coatings were deposited on 304-type stainless steel substrates using the high-velocity oxy-fuel (HVOF) technique and their mechanical properties were evaluated using indentation. The cavitation erosion properties were evaluated using an ultrasonic cavitation erosion tester. The microstructure was studied using X-ray diffraction and scanning electron microscopy (SEM). The cavitation erosion resistance of coatings prepared from atomized CaviTec powder was enhanced when powders were milled prior to deposition. The resistance was further improved by optimizing deposition conditions reaching performances comparable to Stellite-6 and WC-CoCr HVOF coatings. Inspection using SEM micrographs of the damaged surface of CaviTec coatings indicates that surface degradation and material loss initiated at defect sites such as pores and inter-splat boundaries. This preferential erosion led to the removal of CaviTec particles before significant phase transformation took place in the material.