

Wear of hot isostatically pressed (HIPed) thermal spray cermet coatings V. Stoica^a, R. Ahmed^a, S. Tobe^b



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OBJECTIVE

The objective of this investigation was to compare the wear and friction behaviour of as-sprayed and Hot Isostatically Pressed (HIPed) WC-12Co coatings, deposited by the HVOF process. These comparative studies were made using a Ball on Disc Reciprocating test machine . Test results were correlated with the changes in coating microstructure, hardness, fracture toughness and residual stresses of the coating during the HIPing post treatment.

EXPERIMENTAL PROCEDURE

The material selected for the evaluation was a sintered WC-Co powder with 12 weight per cent Co. The coatings were produced by HVOF process on discs with diameter of 31mm and thickness of 8mm. The HIP treatment was carried out at a fixed temperature and pressure of 850°C and 150MPa, respectively. The samples were encapsulated and heated at a rate of 50°C/h until the desired temperature was reached, after which, they were cooled at a rate of 30°C/h. Then, the pressure was released. Sliding wear tests were carried out using a reciprocating ball-on-plate apparatus instrumented to measure the frictional force via a load cell. 12.7 mm diameter balls fabricated from 440C steel and silicon nitride ceramic were slid against as-sprayed and HIPed coatings in dry and lubricated contact. The contact load was 6kg (contact stress 2.5~2.9GPa) and 14kg (contact stress 3.2~3.9GPa) for the dry and lubricated tests respectively.



EXPERIMENTAL RESULTS



The results of lubricated tests show slightly better resistance to wear of the as-sprayed coatings comparing with the harder and tougher HIPed coating implying an active role played by the lubricant in the contact area.

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