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Evaluation of Erosive Wear Resistance of Commercial Hard Coatings with Plasma Nitride and Without Plasma Nitride in Aluminium Die Casting

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Abstract : Commonly used coatings to protect tools in die casting were used. A heat treatment and then surface coating can have a large effect on erosion damage. Samples have been tested to evaluate their resistances to erosive wear and to assess how this compares with behaviour seen for untreated material. Five commercial (PN + TiN), (PN + TiAlCN), (TiN X 2), (TiN), and (TiAlCN) coatings have been evaluated for their wear resistance. The objective was to permit an optimized selection of coatings to be used to give good resistance to erosive wear. A test-Rig has been developed to study the erosive wear in aluminium die casting and provide an environment similar to industrial operation that is more practical than using actual machines. These surfaces were analysed using a Scanning Electron Microscope (SEM) and Optical Microscopes each with a different level of resolution. Examination of coating materials revealed an important parameter associated with the failure of the coating materials.This was adhesion of the coating material to the substrate surface. A well-adhered coating withstands wear much better compared to the poorest-adhering coating.

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