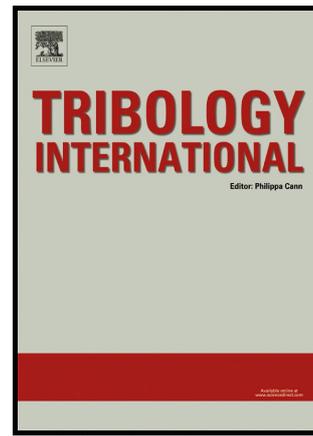


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Experimental study of the effect of coating thickness and substrate roughness on tool wear during turning

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Abstract

The effect of coating thickness and substrate roughness on the tool wear in turning is studied experimentally. TiAlN coating of various thicknesses is applied on tungsten carbide (WC) tool substrate having various surface roughnesses. The tool wear is measured following a fixed cutting distance and speed tests. In general, when plotting the wear vs. coating thickness alone or vs. substrate roughness alone a trend of decreasing wear with either increasing coating thickness or substrate roughness is observed. However, the scatter of the results is very large. On the other hand, excellent fit is obtained when the wear results are plotted vs. the dimensionless ratio t/R_{su} where t is the coating thickness and R_{su} is the average radius of curvature of the rough substrate asperities. An interesting correlation is shown between the present experimental results and some theoretical models for yield inception of a coated spherical asperity.

Keywords: Wear; Cutting tools; Coating; Surface roughness

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