

Abstract

The performance of HSS cutting tools was found to be dependent on the higher temperature developed at the interface between chip and tool. The contact temperatures accelerating tool wear shortened tool life. PVD coating on HSS tools reduced the maximum temperature development that prolonged the degradation of cutting during service and consequently better performance.

The present study focuses on the higher temperature distribution in the HSS turning tools coated with PVD-TiN, TiCN, and TiAlN compared to the uncoated tools under various cutting conditions related to wear mechanism. It was investigated that HSS turning tools were worn mainly by crater wear in combination of cracking and delamination of coating materials. Adhesive wear due to material transfer and abrasive wear due to hard and abrasive particles were observed. BUE formed on the uncoated tools under the experimental cutting conditions and also on all the coated tools at cutting speed 53 m/min and feed rate 0.22 mm/rev.