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Coated Tools with Crater-Like Surface Structures Have Enhanced Performance

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ABSTRACT

This paper presents the result of an investigation into the cutting characteristics of electrical discharge machined (EDMed) surface-modified carbide cutting tool inserts. The tool inserts were coated with Titanium Nitride (TiN) by physical vapour deposition (PVD) method. In this study, comparative cutting tests using TiN coated control specimens with no EDM surface structures and TiN coated EDMed tools with crater-like surface topographies were carried out on mild steel. Various cutting speeds, up to an increase of 30% of the tool manufacturer's recommended speed were investigated. Twenty five cuts (passes) were carried out for each inserts at the speeds investigated. After every five cuts (passes), microscopic pictures of the tool wear profiles were taken in order to monitor the progressive wear on the rake face and, on the flank of the insert. The power load was monitored for each cut using an on board meter on the machine. Results obtained confirmed advantages of cutting at all speeds investigated using EDMed coated inserts in terms of reduced tool wear. Furthermore, the surface finish on the work-piece was consistently better for the EDMed inserts. It is therefore concluded, that TiN coated EDMed crater-like surface structure on tool inserts can considerably improve tool performance.



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