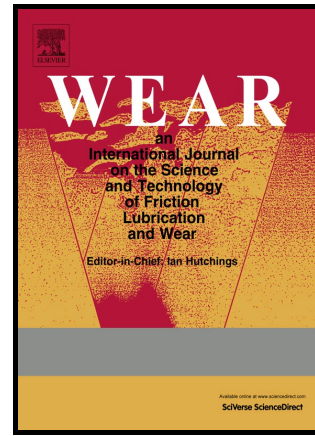


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Wear Behavior of Solid SiAlON Milling Tools During High Speed Milling of Inconel 718

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Abstract

Machining of Inconel 718 is a challenging process because of high hot strength and hardness, high reactivity with the tool materials and low thermal conductivity of Inconel 718 alloy. Although SiAlON ceramics in the form of indexable inserts are utilized successfully in turning and milling operations of Inconel 718, application of solid SiAlON milling cutters on high speed milling of superalloys is rare. In this study, SiAlON ceramics were manufactured in the form of solid milling cutters and tested in high speed milling of Inconel 718 in order to investigate the wear mechanisms during machining process. The wear based on the severe adhesion of the work-piece to the tool flank face and repeated formation and removal of an Al and Ti-rich diffusion layer was observed at the flank faces of the tools.

Keywords: Engineering ceramics; Cutting tools; Non-ferrous metals; Electron microscopy; Mapping

1. Introduction

Inconel 718 is a nickel-based superalloy with superior mechanical properties at high temperatures and high corrosion resistance which make it a suitable structural material for gas turbine engine parts such as disks, blades and shafts. This material is considered as one of the most difficult to cut materials due to its high shear strength, work-hardening tendency, highly

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