

Machining performance of reinforced alumina insert in end milling of AISI 1018 steel

Abstract

The main goal of this work is to investigate the performance of zirconia toughened alumina (ZTA) and ZTA reinforced with magnesium oxide (MgO) used as cutting insert in end milling of AISI 1018 steel with hardness of 27 HRC. Performances of the cutting insert were compared according to tool life and surface finish of workpiece. Insert flank wear that indicates tool life was studied carefully using Optical 3D Surface Metrology while surface roughness values were evaluated using SurfTest Sfrcom 130A. The cutting inserts failed to exhibit good performance in end milling operation. However, wear condition and magnitude of the ZTA reinforced with MgO insert was slightly better than ZTA insert. Addition of MgO may increase wear resistance.

Keywords — Alumina insert, ceramic cutting tools, end milling, ZTA insert