

Microstructural and process characterization on the Electrical Conductivity and Electrical Discharge Machinability of Al₂O₃-based ceramic composites

Mebrahitom Asmelash Geberemariam^a, Nur Amalina Sabuan^b, Azmir Azhari^c, Zamzuri Hamedon^d and Tamiru Alemu Lemma^e

^{a b c d} Faculty of Manufacturing, University Malaysia Pahang, Malaysia

^e Mechanical Engineering Department, Universiti Teknologi Petronas, Malaysia

^a Faculty of Manufacturing, University Malaysia Pahang, Malaysia, presenting Author, mebrahitoma@ump.edu.my

ABSTRACT:

Due to the inherent microstructural properties, ceramics have been viewed as insulating, dielectric or low conductive materials. Hence, the low electrical conductivity of ceramics makes the machining process using electrical discharge machining (EDM) very difficult as it is economical than machining using expensive high cost diamond and cubic boron nitride grinding tools [1]. Microstructural modification through the addition of conductive metallic particles would help improving the conductivity [2]. Hence, the electrical conductivity of ceramic matrix composite of Alumina reinforced with Titanium (Al₂O₃/Ti) with different weight (w) percentage (%) was investigated. The machining properties on die sinking-EDM and surface quality, microstructure, material removal behaviour were investigated. A new insight on the microstructural-process interaction for the improved conductivity was established. The influence of the reinforcement on the machining process was also investigated. The topography and microstructure of the machined surface were established