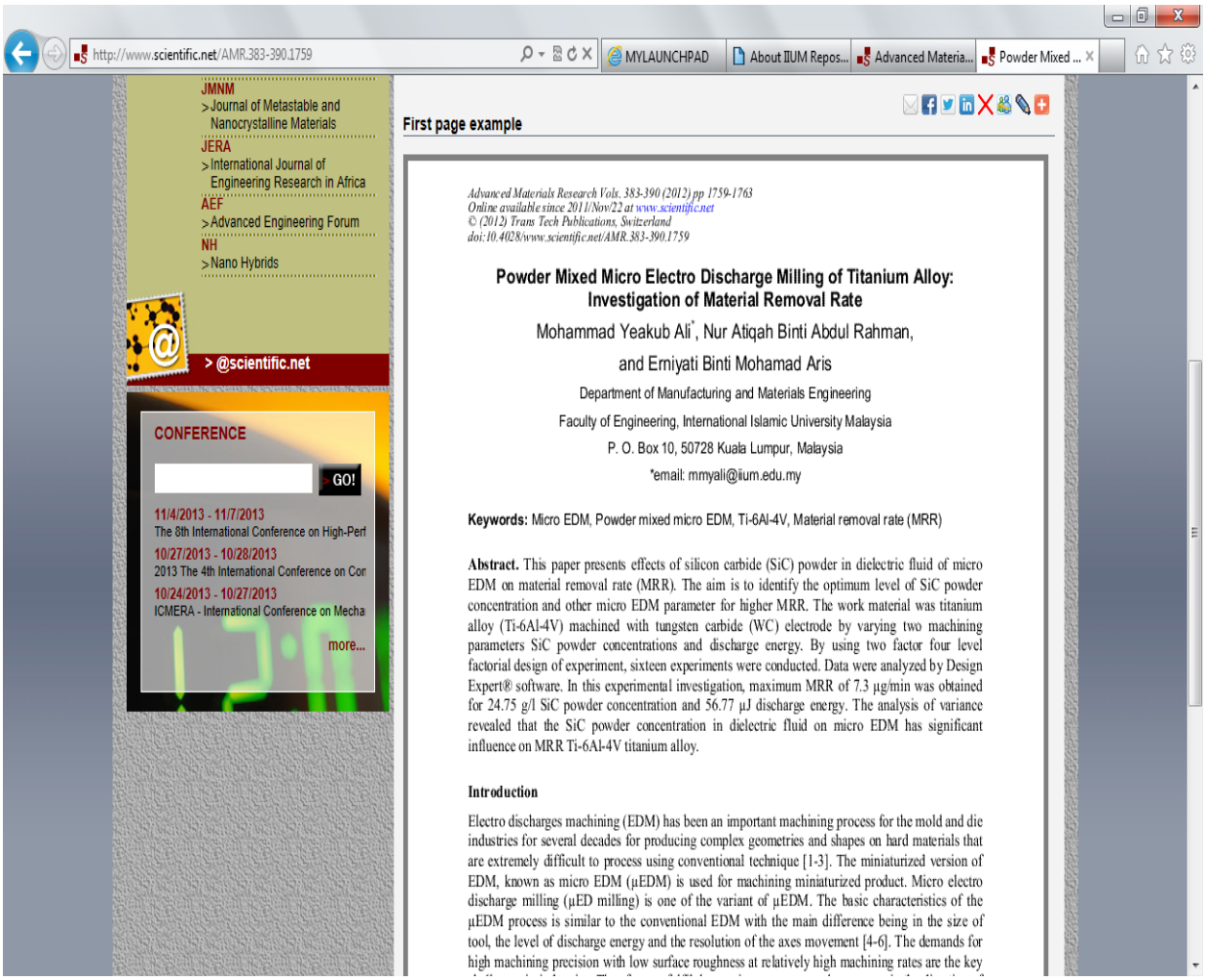

Advanced Materials Research Vols. 383-390 (2012) pp 1759-1763
Online available since 2011/Nov/22 at www.scientific.net

doi:10.4028/www.scientific.net/AMR.383-390.1759

Powder Mixed Micro Electro Discharge Milling of Titanium Alloy: Investigation of Material Removal Rate

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Keywords: Micro EDM, Powder mixed micro EDM, Ti-6Al-4V, Material removal rate (MRR)

Abstract. This paper presents effects of silicon carbide (SiC) powder in dielectric fluid of micro EDM on material removal rate (MRR). The aim is to identify the optimum level of SiC powder concentration and other micro EDM parameter for higher MRR. The work material was titanium alloy (Ti-6Al-4V) machined with tungsten carbide (WC) electrode by varying two machining parameters SiC powder concentrations and discharge energy. By using two factor four level factorial design of experiment, sixteen experiments were conducted. Data were analyzed by Design Expert® software. In this experimental investigation, maximum MRR of 7.3 µg/min was obtained for 24.75 g/l SiC powder concentration and 56.77 µJ discharge energy. The analysis of variance revealed that the SiC powder concentration in dielectric fluid on micro EDM has significant influence on MRR Ti-6Al-4V titanium alloy.

Introduction

Electro discharges machining (EDM) has been an important machining process for the mold and die industries for several decades for producing complex geometries and shapes on hard materials that are extremely difficult to process using conventional technique [1-3]. The miniaturized version of EDM, known as micro EDM (µEDM) is used for machining miniaturized product. Micro electro discharge milling (µED milling) is one of the variant of µEDM. The basic characteristics of the µEDM process is similar to the conventional EDM with the main difference being in the size of tool, the level of discharge energy and the resolution of the axes movement [4-6]. The demands for high machining precision with low surface roughness at relatively high machining rates are the key