Surface Roughness and Wear Properties of Al–Al_2O_3 Metal Matrix Composites Fabricated Using Friction Stir Processing

N. Fatchurrohman and Azriee Abdullah

Abstract Friction stir processing (FSP) involves the mixing reinforcement particles on metal surface and the control of its dispersion is more difficult to attain with conventional techniques such as casting. The objective of present work was to perform tribology characterization of Al alloys Al-6061 and Al-6061 with 5 weight % Al_2O_3 produced using FSP. The parameters involved were rotation speed 1000, 1200 and 1400 rpm and traversed speed constant at 25 mm/min. The results show that the surface roughness with the presence of the reinforcement demonstrated better surface roughness compared to specimens with no reinforcement. Furthermore, high increment of the tool rotation speed indicates the declined value of the coefficient of friction of the specimen material.

Keywords Metal matrix composites · Friction stir processing
Tribology · Al-6061 alloy · Al_2O_3 particles

1 Introduction

Friction stir processing (FSP) is a technique of changing the properties of metal through inserting a suitable reinforce particles into the work piece in order to achieved surface modifications of the work piece. It was known that this is a solid-state modification process formerly established for aluminum alloys by evolving technique of metalworking that involved localized heat treatment. This technique also controlled the microstructure of the near-surface layers of metallic modules [1].

FSP was used to improve of surface metal matrix composites properties including abrasion resistance, hardness, strength, ductility, corrosion resistance, fatigue life and formability. This can be done while unchanging the bulk properties

N. Fatchurrohman (✉) · A. Abdullah
Faculty of Manufacturing Engineering, Universiti Malaysia Pahang,
26600 Pekan, Pahang, Malaysia
e-mail: fatchurrohman@ump.edu.my

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