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Tribological properties of surface coated duplex stainless steel containing SiC ceramic particles

By: Lailatul, PH (Lailatul, P. H.)^[1]; Abd Maleque, M (Abd Maleque, Md)^[1]

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Abstract

This paper presents an experimental investigation on the tribological properties of coated duplex stainless steel (DSS) containing SiC ceramic particles. The preplaced SiC powder with 20 μ m particle size and TIG torch surfacing was conducted with energy inputs of 480, 768 and 1440 J/mm. The comparisons of the room temperature wear behavior of substrate DSS and coated SiC duplex stainless steel was carried out against alumina ceramic ball. The effects of the process parameters on the hardness and wear behavior were analyzed in this study. The coated surface of DSS produced hardness about 2 similar to 4 times higher than uncoated DSS. It was revealed that coated surface was improved significantly with lower wear weight loss and coefficient of friction (about 2 times lower) than the substrate material. The embedded SiC into the surface of steel has improved the wear behaviour of DSS. This is due to SiC dendrites structure that strongly bonded to the steel resulting the reduction of the friction between coated surface and the alumina ball. The wear worn surface was observed under SEM with a very mild abrasive wear for coated surface compared to severe abrasive wear for substrate DSS surface. The coated surface has showed lower surface roughness and wear depth penetration indicated that the presence of the SiC reduced the wear of the material.

Keywords

Author Keywords: TIG torch surfacing; Tribological properties; Duplex stainless steel; Wear; Surface coating

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Author Information

Reprint Address: Abd Maleque, M (reprint author)

+ Int Islamic Univ Malaysia, Dept Mfg & Mat Engn, Kuala Lumpur, Malaysia.

Addresses:

+ [1] Int Islamic Univ Malaysia, Dept Mfg & Mat Engn, Kuala Lumpur, Malaysia

E-mail Addresses: maleque@iium.edu.my

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