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Materials Science Forum

Volume 819, 2015, Pages 76-80

International Conference on Functional Materials and Metallurgy, ICoFM 2014; Pulau Pinang; Malaysia; 17 September 2014 through 18 September 2014; Code 160099

Wear behaviour of TiC coated AISI 4340 steel produced by TIG surface melting (Conference Paper)

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Abstract

Coating possesses superior wear resistance which makes the material suitable for components subjected to dynamic applications under severe wearing condition and high temperature applications. In this study, TiC coating layer was synthesized by preplacing a 1 mg/mm² of fine size (~40 μm) TiC powder on the surface of AISI 4340 steel. The composite layer was produced by rapidly melting TiC powder together with the substrate steel using tungsten inert gas (TIG) torch welding at a fixed heat input of 1344 J/mm. The wear behaviour of the coated steel was investigated using a universal pin-on-disc tribometer. The microhardness profile of the coating showed increment of the hardness value (almost 5 times higher) than the substrate material. The wear test results showed that the TiC coated steel has lower wear volume loss hence, higher wear resistance compared to the substrate AISI 4340 steel. Incorporation of TiC into the steel surface has improved the wear behaviour of the steel by reduction of plastic deformation and ploughing of the steel surface. The SEM micrograph of the wear worn surface showed mild type of abrasive wear for coated steel whereas, the AISI 4340 steel showed severe type wear with excessive plastic deformation and ploughing. © (2015) Trans Tech Publications, Switzerland.

Author keywords

Hardness; Titanium carbide; Tungsten inert gas torch; Wear

Indexed keywords

Engineering controlled terms: Coatings; Functional materials; Hardness; High temperature applications; Inert gas welding; Inert gases; Melting; Metallurgy; Plastic coatings; Plastic deformation; Titanium carbide; Tungsten; Tungsten carbide; Wear of materials

Dynamic applications; Microhardness profiles; Pin on disc tribometer; SEM micrographs; Substrate material; Substrate steel; Tungsten inert gas; Wear volume loss

Engineering main heading: Wear resistance

ISSN: 02555476 ISBN: 978-303835473-4 CODEN: MSFOE Source Type: Book series Original language: English

DOI: 10.4028/www.scientific.net/MSF.819.76 Document Type: Conference Paper

Volume Editors: Zakaria Z., Jamil N.H., Yunus N.F.D.M., Munusamy S.R.R.A.P., Ying L.B., Halif N.A. Sponsors: Alpha Instruments Supplies and Services, Koperasi UniMAP Sdn Bhd (Ko-UniMAP), Tenaga Nasional (Malaysia)

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