Scopus

Document details

Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More...

Full Text View at Publisher

Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science
Volume 228, Issue 18, 29 December 2014, Pages 3374-3380

Improving micro-hardness of stainless steel through powder-mixed electrical discharge machining (Article)

Zain, Z.M.[a], Ndaliman, M.B.[ab], Khan, A.A.[a], Ali, M.Y.[a]

[a]Department of Manufacturing and Materials Engineering, Kulliyyah of Engineering International Islamic University Malaysia, Kuala Lumpur, Malaysia
[b]Department of Mechanical Engineering, Federal University of Technology, P. M. B. 65, Minna, Nigeria

Abstract

View references (25)

Powder-mixed electrical discharge machining (PMEDM) is the technique of using dielectric fluid mixed with various types of powders to improve the machined surface output. This process is fast gaining prominence in electrical discharge machining (EDM) industry. The objective of this investigation is to determine the ability of tantalum carbide (TaC) powder-mixed dielectric fluid to enhance the surface properties of stainless steel material during EDM. The properties investigated are the micro-hardness and corrosion characteristics of the EDMed surface. Machining was conducted with 25.0-g/L concentration of TaC powder in kerosene dielectric fluid. The machining variables used were the peak current, pulse on time and the pulse off time. The effects of these variables on the micro-hardness of the EDMed surface were determined. Corrosion tests were also conducted on the samples that exhibited higher hardness. Results showed that the EDMed surface was alloyed with elements from the TaC powder. The highest micro-hardness obtained with PMEDM is about 1,200-Hv. This is about 1.5 times that obtained without TaC powder in the dielectric fluid. The loss in weight during corrosion test was found to be 0.056-μg/min for the PMEDM which was much lower than the lowest value of 10.56-μg/min obtained for the EDM without powder dielectric fluid. © IMechE 2014.

Author keywords

corrosion micro-hardness Powder-mixed electrical discharge machining SUS 304 stainless steel tantalum carbide powder

Indexed keywords

Engineering controlled terms: Atmospheric corrosion Carbides Corrosion Electric discharge machining Electric discharges Hardness Tantalum Tantalum carbide

Corrosion tests
Dielectric fluid
Electrical discharge machining
Loss-in-weight
Machined surface
Peak currents
Pulse on-time
SUS 304 stainless steel