

ANALYSIS OF TRAVELING WIRE ELECTROCHEMICAL DISCHARGE MACHINING OF HYLAM BASED COMPOSITES BY TAGUCHI METHOD

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ABSTRACT

Precision machining of electrically non-conducting engineering ceramics and composites etc. is an immediate need of the present industries. For cutting these materials Traveling wire electrochemical discharge machining (TW-ECDM) process is a useful process. TW-ECDM which is a complex combination of ECM and wire-EDM, has a good application for machining advanced non-conducting ceramic materials like zirconia, alumina, silicon nitride, diamond, glass, ruby and composites like FRP etc. The present research paper includes a hybrid approach of Taguchi method and principal component analysis (PCA) for multi response analysis of traveling wire electrochemical discharge machining process during cutting of groove on Hylam based fiber reinforced composite work-piece. Optimal combinations of operating parameters viz. pulse on time as a percentage of total time, frequency, applied voltage, concentration of electrolyte and wire feed rate were observed for optimal values. Initially Taguchi methodology based single response optimization was performed. The signal to noise ratios obtained from Taguchi methods have been further used in principal component analysis for multi response optimization. The responses at predicted optimum parameter level are in good agreement with the results of confirmation experiment.

KEYWORDS: TW-ECDM Cutting, Taguchi Method, Principle Component Analysis, Fiber Reinforced Composites, Multi Parametric Optimization