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INVESTIGATING THE MATERIAL REMOVAL RATE AND SURFACE ROUGHNESS IN ELECTROCHEMICAL MACHINING OF HIGH CARBON HIGH CHROMIUM DIE STEEL

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Abstract

Electrochemical Machining is one of the most exclusively used non-traditional machining processes for machining of materials with high hardness and poor mach inability. However, there is a critical need for exploration of the application of Electrochemical machining in cost effective machining of relatively harder materials such as high carbon high chromium die steel, stainless steel and super alloys. This paper deals with an exploration into the use of Electrochemical machining in the machining of commercially available high carbon high chromium die steel with hardness of 63 HRC. High carbon high chromium die steel belongs to that class of high hardness material whose use has been ever increasing since last few decades. In the present investigation, the effect of several process parameters of the machining characteristics of high carbon high chromium die steel on material removal rate and surface roughness has been reported. Three different process parameters were undertaken for this study; applied voltage, tool feed rate and electrolyte discharge rate. The results obtained were analyzed by using Analysis of Variance test (ANOVA) and the significant factors that contribute to variation in the machining performance have been identified. Taguchi's L-27 orthogonal array was used in this study to design the experiments statistically.

Keywords: Electrochemical Machining (ECM), High carbon high chromium die steel, Material removal rate, Surface roughness, ANOVA, Taguchi method.