

EXPERIMENTAL INVESTIGATIONS ON SPARK EROSION MACHINING OF HASTE ALLOY C-276 USING TAGUCHI'S APPROACH

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Abstract: Haste Alloy C276 is a hard to machine superalloy and extensively used in various engineering applications such as aerospace, nuclear reactor and gas turbine industries. Haste Alloy C-276 possess good strength and lower thermal conductivity results in decreased tool life and poor machinability by conventional machining methods. Advanced machining processes have developed over a period to fulfill such kind of demands and claimed to be an appropriate alternative method to traditional metal removal processes. Electrical Discharge Machining (EDM) is one of the advanced machining process which has been employed for machining of hard materials. Electrical Discharge Drilling is one of the variants in EDM process considered as an auspicious method in various engineering applications. This present article details an investigation on electrical discharge machining of nickel based superalloy - Haste Alloy C276 by Taguchi's methodology. The experiments are devised by Taguchi's design of experiments approach. A statistical tool Analysis of Variance (ANOVA) has been employed to ascertain the importance of independent process variables on the desired dependent variables.

Keywords: Electrical Discharge Machining (EDM); Haste Alloy; Taguchi's methodology; Form and orientation tolerances; Analysis of Variance (ANOVA)

1. INTRODUCTION

Superalloys are heat resistant materials and the mechanical, chemical properties of the materials are remains unchanged during high temperature applications [1-4]. The properties of superalloys such as high strength and hardness, lower thermal diffusivity makes them as hard to machine materials [5]. High strength and high hardness of these materials results in poor performance in machining and more tool wear by traditional machining processes. So there is a necessity to find a solution for machining of these superalloys which are electrically conductive hard materials with an aid of unconventional material removal process. Electrical Discharge Machining (EDM) is one of the advanced machining process extensively used for machining the components that are used in automobile, aerospace and biomedical industries [6]. A continuous repeated electrical discharges between the electrode and the work piece, results in removal of material from the work piece in the presence of dielectric fluid [7, 8]. The tool (electrode) moves towards the workpiece until

the gap between the tool and workpiece is close enough to ionize the dielectric fluid with the help of supplied voltage. Tool (electrode) and the work material are separated by the short duration discharges in dielectric gap. The removal of material takes place due to the erosive action. The material is removed with irrespective to the material hardness. The schematic of EDM process is shown in Figure. 1 [9].

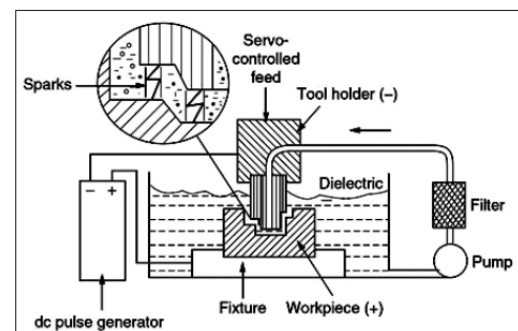


Fig 1. Schematic of Electrical Discharge Machine