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Abstract:

The present investigation focuses the effect of process parameters on material removal rate (MRR) and surface roughness (Ra) in wire electric discharge machining of Inconel 625. Machining was done by using a normal zinc coated wire and cryogenic treated zinc coated wire. The experiments were performed by considering different process parameters viz. tool electrode, current intensity, pulse on time, pulse off time, wire feed and wire tension. The thickness of work material and dia. of wire are kept constant. Taguchi L18 ($2^1*3^5$) orthogonal array of experimental design is used to perform the experiments. Analysis of variance (ANOVA) is employed to optimize the material removal rate and surface roughness. Based on analysis it is found that pulse on time, tool electrode and current intensity are the significant parameters that affect the material removal rate and surface roughness. The scanning electron microscopy (SEM) are used to identify the microstructure of the machined work piece.

Keywords: WEDM; Inconel 625; Taguchi method; material removal rate; surface roughness; SEM

1. Introduction

Electrical discharge machine (EDM) is one of the most prominently used advanced machining process. In EDM machining there is no contact between tool electrode and the work material which decreases the mechanical stress, chatter and vibration during machining of hard and super alloy material [1]. WEDM is a variant process of EDM. WEDM is a spark erosion process used to produce special geometrical shape and three dimensional profiles. In wire electrical discharge machine, a wire about 0.05 to 0.3 mm used as a tool electrode and
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