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ROLE OF CONDUCTIVITY IN IMPROVING CORNER ACCURACY AND SURFACE FINISH DURING WEDM OF AL 6061 ALLOY

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ABSTRACT

The conductivity of the deionised water significantly influences machining performance in Wire EDM. In this work, the effects of conductivity (k) of deionised water together with pulse-on time (T_{on}), servo sensitivity (SC), arc on time (A_{on}) and open circuit voltage (OCV) during WEDM of Al 6061. SEM and CCI analysis of the work-surface were carry out to found out the effect of conductivity of deionised water and other crucial input parameters on surface finish and corner accuracy. The experimental outcome reported appropriate conductivity setting of deionised water that is suitable for effective machining of Al 6061 during single pass cutting operation.

Main Highlights

Highlight of this work is as follows -

- i. Experimental findings shows that the conductivity setting of 12 $\mu\text{S}/\text{cm}$ gives an optimal result for single pass cutting operation.
- ii. Pulse-on time (T_{on}) and arc-on time (A_{on}) are the most significant process parameters that are affecting on both corner accuracy and surface finish while machining.
- iii. Pareto optimal solution have been carried out for single pass cutting operation and it is found that better surface finish and corner accuracy can be achieve at 6 $\mu\text{S}/\text{cm}$ conductivity setting.
- iv. SEM and CCI analysis shows that machined surfaces are more anisotropic in nature at higher dielectric conductivity settings.

Purpose

In this study investigating the influence of conductivity of deionised water, along with other key machining parameters i.e. T_{on} , A_{on} , SC and OCV, on corner accuracy and surface finish

Methodology

The experiments were conducted on an EX-40 WEDM system. The key machining parameters were selected as open circuit voltage (OCV), servo sensitivity (SC), pulse on time (T_{on}) and arc on time (A_{on}). Pilot experiments were carried out to validate the selected parameter ranges. L_{27} orthogonal array design technique was used for the experiments.

Findings