Optimization of Wire EDM Parameters for Fabrication of Micro Channels

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Abstract : Wire Electric Discharge Machining (WEDM) is thermal machining process capable of machining very hard electrically conductive material irrespective of their hardness. WEDM is being widely used to machine micro-scale parts with the high dimensional accuracy and surface finish. The objective of this paper is to optimize the process parameters of wire EDM to fabricate the microchannels and to calculate the surface finish and material removal rate of microchannels fabricated using wire EDM. The material used is aluminum 6061 alloy. The experiments were performed using CNC wire cut electric discharge machine. The effect of various parameters of WEDM like pulse on time (TON) with the levels (100, 150, 200), pulse off time (TOFF) with the levels (25, 35, 45) and current (IP) with the levels (105, 110, 115) were investigated to study the effect on output parameter i.e. Surface Roughness and Material Removal Rate (MRR). Each experiment was conducted under different conditions of a pulse on time, pulse off time and peak current. For material removal rate, TON and Ip were the most significant process parameter. MRR increases with the increase in TON and Ip and decreases with the increase in TOFF. For surface roughness, TON and Ip have the maximum effect and TOFF was found out to be less effective.

Keywords : microchannels, Wire Electric Discharge Machining (WEDM), Metal Removal Rate (MRR), surface finish
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