



**OPTIMIZATION OF WIRE CUT EDM PROCESS
PARAMETERS USING RESPONSE SURFACE
METHODOLOGY (RSM)**

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“I declared that this thesis is the result of my own work except the ideas and summaries which I have declared their sources. The thesis has not been accepted for any degree and is not currently submitted in candidature of any degree.”

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ABSTRACT

Wire-electro discharge machining WEDM is one of the important variants of electrical discharge machining (EDM) which uses the thermal energy generated between the electrodes for machining the electrically conductive materials. WEDM provides an effective solution for machining components made of difficult-to-machine materials. Material such as 1060 aluminum alloy are widely been machines by WEDM since its growing applications in various industries. The present paper presents optimization of WEDM process parameters for machining 1060 aluminum alloy using Response Surface Methodology (RSM). The aims of these experiment is to get maximum MRR and minimum Ra for machining 1060 aluminum alloy. Parameters machining such as cutting speed (CS) and spark gap (Gap) are investigates for its influences on performances features such as Metal Removal Rate (MRR) and Surface Roughness (Ra). This was due to less information on effect of spark gap and cutting speed towards MRR and Ra on performance quality of WEDM. Total 13 numbers of experiment were carried out based on Central Composite Design (CCD) in Design Expert 6.0. The deionized water is used as dielectric fluid. Process parameter such as wire tension, flushing pressure, discharge current, pulse on time and pulse off time are kept constant during the entire experiment. It was found that parameters of cutting speed and spark gap are independent to

each other. Based on result, optimal manufacturing parameters are at highest value of cutting speed at 19.59 mm/min and spark gap at 0.17 mm to produces maximum MRR which is 205.77 mm³/min and minimum SR at 4.2493 μm. Optimal parameter combinations have been verified by conducting confirmation experiments.

Keywords: WEDM, 1060 aluminum alloy, RSM, MRR, SR, Cutting speed, Spark gap