Effect of Process Parameter In EDM Process By Response Surface Methodology

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Abstract- *The Electro Discharge Machining is a widely accepted non-convection machining process. There are so many process parameters which are statistically affects the machining. Best combination of these parameters gives excellent result. For current research pulse on time, pulse off time, peak current and spark gap set voltage is selected to optimize material removal rate. Surface roughness and micro hardness is also optimizing for better result. The analysis is based on Response surface Methodology.*

Keywords- Electrode, EDM Machine, Work piece Material

I. INTRODUCTION

Electrical Discharge Machining is a one type of Non-convectional machining Process. Non-convectional processes are design to machine hard material and to produce complex shapes which are not economical to produce by convectional method. These methods become more popular with the employment of CNC facilities. Electrical Discharge Machining is most popular to make very fine hole. Die sinking EDM and Wire EDM are two widely used method of Electrical Discharge Machining. Generally Wire Electrical Discharge Machining is used to cut complex shape. These methods have found successful applications in several important industries for machining of components having complicated shapes made of hard materials like tungsten carbides, super-alloys, ceramics, refractory materials as well as common material.

II. WORKING PRINCIPLE OF THE EDM

The material erosion mechanism primarily makes use of electrical energy and turns it into thermal energy through a series of discrete electrical discharges occurring between the electrode and work piece immersed in a dielectric fluid. This causes a sudden reduction in the temperature allowing the circulating dielectric fluid to implore the plasma channel and flush the molten material from the pole surfaces in the form of microscopic debris. This process of melting and evaporating material from the work piece surface is in complete contrast to the conventional machining processes, as chips are not mechanically produced. Since the shaped electrode defines the area in which the spark erosion will occur, the accuracy of the part produced after EDM is fairly high. After all, EDM is a reproductive shaping process in which the form of the electrode is mirrored in the work piece.

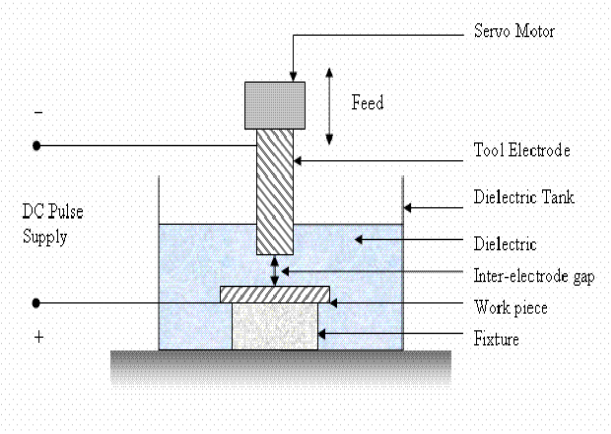

Figure 1. Working Principal of EDM

III. SELECTION OF ORTHOGONAL ARRAY

Three level of variable process parameter is chosen for convenience for experiment and analysis. Based on the literature survey the levels are decided. Table 1 show the process parameter called factor, their symbol, units and range as a machine units and actual units.

Process Parameters	Symbol	LEVEL 1	LEVEL 2	LEVEL 3
Pulse ON time	A	70	90	100
Pulse OFF time	B	50	60	90
Peak current	C	10	15	20
Servo Voltage	D	35	40	45

Table .1 Level of Process Parameter

Observation Table

	TON	TOFF	I	V	MRR	SR	MH
1	70	50	10	35	0.9878	2.23	171.6
2	70	50	10	35	0.9500	2.21	172.3
3	70	50	10	35	0.9697	2.15	170.5
4	70	60	15	40	0.9073	1.00	180.1
5	70	60	15	40	0.8859	1.81	181.2

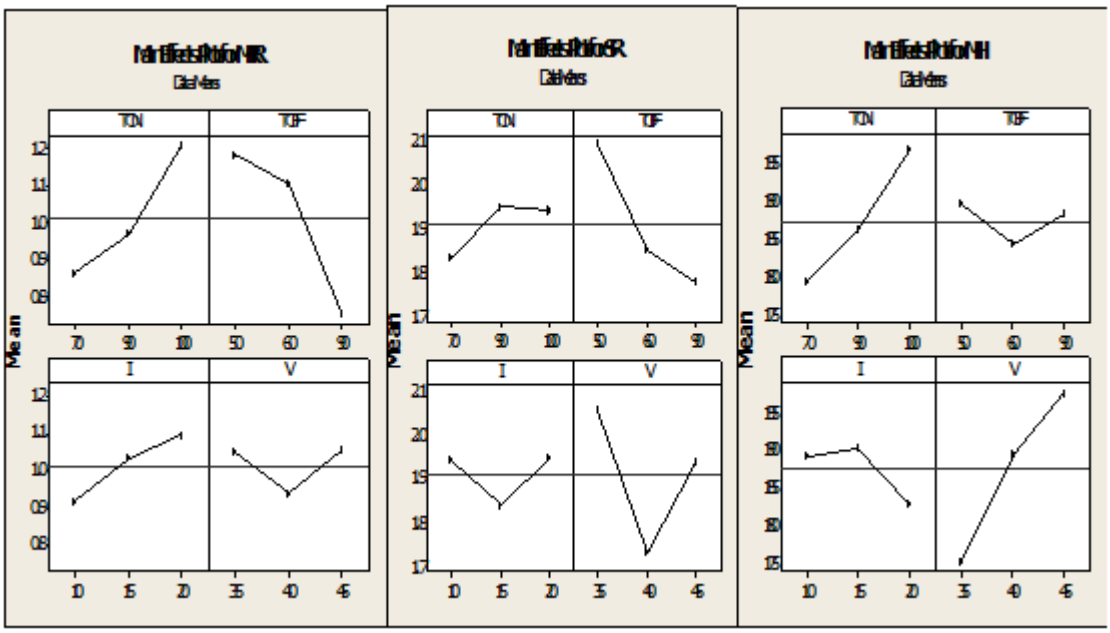

Figure. Main Effect Plot of MRR,SR,MH

IV. CONCLUSION

By this EDM process about the effect of process parameter and the optimization of Material removal rate, Surface roughness and Micro-hardness increasing by varying the input process parameter like pulse on time, pulse off time, peak current and servo voltage. We can increase the material removal rate and better surface finish of some complex job and reduce the timing of job work

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