

Sl No	Particulars	
1	Name of the Candidate	Dr. Nixon Kuruvila
2	Address of the parent institution	P.E.S. College of Engineering , Mandya.
3	PhD Thesis Title	Optimization and Influence of Process Parameters for Machining various Materials in Wire EDM.
4	Research guide Name	Dr. H.V Ravindra
	Department and Designation	Mechanical, Professor
5	Date of Registration for PhD	10/06/2006
	University /Branch	VTU, Belgaum
6	Date of Award of PhD degree	08/04/2012
7	<p><u>Brief synopsis</u></p> <p>Wire-cut Electro Discharge Machining (WEDM) is a special form of conventional EDM process in which electrode is a continuously moving conductive wire. The selection of optimum machine setting or cutting parameters in Wire-EDM is significant in achieving better surface finish, dimensional accuracy and cutting speed. An effective way to accomplish these responses is to determine the relationship between the performance indicators of the process and its controllable input parameters. The present study aims at determining parametric influence and optimum process parameters of Wire-EDM using Taguchi's robust design approach and Genetic algorithm. As far as optimization algorithms are concerned, the Taguchi's robust design approach for single response optimization and Genetic algorithm for multi-response optimization have been employed/attempted in this study. The variation of the performance parameters with machining parameters was mathematically modeled by Regression analysis method. In single response optimization using Taguchi's robust design approach, the objective functions are defined based on Taguchi's quadratic loss function for each performance parameters viz, Dimensional Accuracy (DA), Surface Finish (SF) and Volumetric Material Removal Rate (VMRR). Experiments were designed as per Taguchi's L₁₆ Orthogonal Array (OA) where in Pulse-on, Current, Pulse-off, Bed-speed and Flushing rate have been considered as the important input parameters. The matrix experiments were conducted for the three different materials such as Hot Die Steel (HDS), Oil Hardened Non-shrinking Steel (OHNS) and High Carbon High Chromium Steel (HCHCr) each having the thickness of 40 mm. The Heat Affected Zone (HAZ) characteristics of the eroded materials was assessed by Scanning Electron Microscope (SEM) and the microhardness of the materials was tested using Vickers microhardness tester. The results of the study reveals that HCHCr steel has to be machined with relatively low heat input and less flushing rate to maintain good productivity and surface integrity where as HDS requires high heat input and flushing rate. It is observed that OHNS demand high pulse-on time, medium current with high flushing rate. An important conclusion drawn from the present study is that all the three materials should be machined with minimum pulse-off duration with a view to avail good production and surface integrity. Finally the validation exercise performed with the optimum levels of the process parameters provide the best outcome there by confirm the efficacy of the approach employed for optimization of process parameters encountered in this study.</p> <p>Key words: Wire Cut Electro Discharge Machining (WEDM), Dimensional Error (DE), Surface Roughness (SR), Volumetric Material Removal Rate (VMRR), Regression Analysis (RA), Genetic Algorithm (GA).</p>	

