

OPTIMIZATION OF EDM PROCESS PARAMETERS USING TAGUCHI METHOD: A REVIEW

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Abstract

Electrical discharge machining is assessed on the basis of Material Removal Rate (MRR), Tool Wear Rate (TWR), and Surface Roughness (SR). Process parameters that mostly affected the EDM Process are Pulse on Time, Pulse off Time, Discharge Current, Arc Gap and Duty Cycle. This paper reviews research for the optimization and improvement of various performance parameters measured in the experimentation on EDM by using Taguchi technique. In the study the main objectives of optimization is to minimize the tool wear rate (TWR) and surface roughness, and to maximize the material removal rate (MRR). Taguchi Method is widely used in the industry to optimize and improve various performance parameters associated with different machining processes. This paper also deals with the review of some of the work reported with the use of Taguchi method in last two decades.

Keywords: - EDM, Wire EDM, MRR, TWR, TWR, SR, Taguchi Technique.

1. INTRODUCTION

A properly planned and executed experiment is of the utmost importance for originating clear and accurate conclusions from the experimental observations. Design of experiment is considered to be a very useful strategy for accomplishing these tasks. The science of statistical experimental design originated with the work of Sir Ronald Fisher in England in 1920s. Fisher founded the basic principle of investigational design and the associated data-analysis technique called Analysis of Variance (ANOVA) during his efforts to improve the yield of agricultural crops. The theory and applications of experimental design and the related technique of response surface methodology have been advanced by many statistical researchers as Box and Hunter, Box and Draper, Hicks. Various types of matrices are used for planning experiments to study several decision variables. Among them, Taguchi's Method makes heavy use of orthogonal-arrays. Dr. Taguchi of Nippon Telephones and Telegraph Company, Japan industrialized a method based on "orthogonal-array" experimentations which gives much concentrated "variance" for the experiment with "optimum settings" of control parameters. Thus the manage of DCM with optimization of control parameters to obtain BEST results was achieved in the Taguchi Method. "Orthogonal Arrays" (OA) provide a set of well balanced (minimum) experiments and Dr. Taguchi's Signal-to-Noise ratios (S/N), which are log functions of desired output, serve as objective functions for optimization, help in data analysis and expectation of optimum results. Now a days Taguchi's methodology is widely used methods all over the globe for research resolutions, specifically to optimise the machining characteristics. In this paper an attempt has been made to put together some of the work done with Taguchi's Methodology. [1]



Fig. 1.1:- processes in Taguchi methodology

2. LITERATURE REVIEW

Y.S Liao in 1997 premeditated on the machining-parameters optimization of wire electrical discharge machining. An approach to determine the parameters were performed. The design was based upon the taguchi quality approach with analysis of the variances (ANOVA). In the research the significant factors affects the machining performance factors such as Material removal rate (MRR), gap width, surface roughness (SR), sparking frequency, average gap voltage

Optimization Of Process Parameters By Taguchi Method

**Miguel Ángel Sellés Cantó, Samuel
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Optimization of Process Parameters in Sheet Metal Forming by Using Taguchi Method Mohd Amiruzamin Mohd Shaufi,2008 Sheet metal is one of the most important semi finished products used in the steel industry and sheet metal forming technology is therefore an important engineering discipline within the area of mechanical engineering The development of new sheet metal forming processes tooling and so on has up till now to a large extent been based on experience rules of thumb and trial error experiments without or with only little use of scientifically based engineering methods As mentioned above experience is not enough and trial error experiments are very expensive with regard to both money and time There is therefore great need for the development of both theoretical and experimental engineering methods In this case Taguchi method was selected to design of experiment using the statistica software version 7 which enables the problems to be tackled effectively the punching process has been chosen to form the sheet metal The objective of the project is to determine the optimize parameters The parameters to be considered in this study are punching tonnage the sheet thickness the sheet length and the sheet width

Proceedings of Mechanical Engineering Research Day 2016 Mohd Fadzli Bin Abdollah,Mohd Azli Bin Salim,Tee Boon Tuan,2016-03-31 This e book is a compilation of papers presented at the Mechanical Engineering Research Day 2016 MERD 16 Melaka Malaysia on 31 March 2016

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Advances in Welding Technologies for Process Development Jaykumar Vora,Vishvesh J. Badheka,2019-02-22 Within manufacturing welding is by far the most widely used fabrication method used for production leading to a rise in research and development activities pertaining to the welding and joining of different similar and dissimilar combinations of the metals This book addresses recent advances in various welding processes across the domain including arc welding and solid state welding process as well as experimental processes The content is structured to update readers about the working principle predicaments in existing process innovations to overcome these problems and direct industrial and practical applications Key Features Describes recent developments in welding technology engineering and science Discusses advanced computational techniques for procedure development Reviews recent trends of implementing DOE and meta heuristics optimization techniques for setting accurate parameters Addresses related theoretical practical and industrial aspects Includes all the aspects of welding such as arc welding solid state welding and weld overlay

Advances of Science and Technology Mulugeta Admasu Delele,Mekuanint Agegnehu Bitew,Abebech Abera Beyene,Solomon Workneh Fanta,Addisu Negash Ali,2021-07-15 This two volume set constitutes the refereed post conference proceedings of the 8th International Conference on Advancement of Science and Technology ICAST 2020 which took place in Bahir Dar Ethiopia in October 2020 The 74 revised full papers were

Carefully reviewed and selected from more than 200 submissions of which 157 were sent out for peer review. The papers present economic and technologic developments in modern societies in 6 tracks: Chemical food and bio process engineering, Electrical and computer engineering, IT computer science and software engineering, Civil water resources and environmental engineering, Mechanical and industrial engineering, Material science and engineering. *6th Int. Conf. on Nanomaterials, Materials and Manufacturing Engineering & 11th Int. Conf. on Nanomaterials and Materials Engineering* Kazuo Umemura, 2025-07-01. Selected peer reviewed extended articles based on abstracts presented at the 6th International Conference on Nanomaterials Materials and Manufacturing Engineering the 11th International Conference on Nanomaterials and Materials Engineering Aggregated Book *Process Optimisation of Injection Moulding Using Computer Simulation* Kyaw Lin, 2009-10. Research Paper postgraduate from the year 2008 in the subject Engineering Mechanical Engineering University of South Australia language English abstract. Determining optimal values of process control factors is critical in injection moulding process because of their influences on product quality, productivity and cost of production. In the past many researchers exploited traditional and artificial methods but the limitations of different methods prevented to achieve optimal level of process design variables for multiple input multiple output MIMO injection moulding process. To bridge the gap this study aims to develop a computer integrated optimisation system CIOS. In this research virtual reality VR technology is employed in the first phase for simulation purpose and combination of design of experiments DOE and SAPSO based ANN method is used for optimising the simulation results in order to achieve global optimal solution for the control parameters. Apparently the proposed approach is a new integration system that can help the users determine optimal parameter settings to accomplish the MIMO injection moulding process with competitive benefits of cost and production efficiency.

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