

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, 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

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