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# Parameter optimization of electrical discharge machining process by using Taguchi approach

**Sameh S. Habib**

Mechanical Engineering Department, Shoubra Faculty of Engineering, Benha University, Cairo, Egypt.

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**Electrical discharge machining (EDM) is one of the most extensively used non-traditional material removal processes for difficult-to-cut materials. The full potential of the EDM process has not yet been exploited due to its complicated discharge mechanism. Though a lot of research has been done to improve the process performance, optimal selection of process parameters for the best performance measures still remains a challenge. Parameter optimization is one of the techniques used in manufacturing processes to achieve best manufacturing conditions, which is an essential need for industries towards manufacturing of higher quality products at lower cost. In this paper, the cutting of hot work tool steel 2714 using electro discharge machining process with copper and graphite electrodes has been investigated. In this work $L_{27}$ (3*4) orthogonal array based on the Taguchi experimental design is utilized to plan the experiments. Raw data is assessed by the Analysis of Variance (ANOVA) to find optimal conditions for response parameters. The main machining parameters such as pulse-on time, pulse-off time, discharge current, average machining voltage are chosen to determine the EDM response parameters such as material removal rate, surface roughness and gap size. Response tables and graphs are used to find the optimal parameter levels in the EDM process.**

**Key words:** Electrical discharge machining (EDM), tool steel 2714, Taguchi approach, material removal rate, surface roughness and gap size.

## INTRODUCTION

Electrical discharge machining (EDM) is an extremely prominent machining process among newly developed non-traditional machining techniques for difficult-to-cut materials. EDM is a thermo-electric process in which material is removed from work piece by the erosion effect of a series of electric discharges (sparks) between two electrodes (tool and workpiece) immersed in a dielectric liquid. The location of the discharge is determined by the narrowest gap between the two electrodes (McGeough, 1998). The workpiece and the tool should be made of electrically conductive material. EDM is especially well-suited for cutting intricate contours or delicate cavities that would be difficult to produce with a grinder, an end mill or other cutting tools. Physical and metallurgical properties do not create any limitation for the materials to be machined on EDM as there is no physical contact between tool and work piece (Yan et al., 2000). The EDM process has a very strong stochastic nature due to the

E-mail: sameh.abadir@feng.bu.edu.eg.