

Improvement of Profile Accuracy in WEDM—A Novel Technique



Mukandar Sekh

Abstract A thorough investigation on wirelag phenomena was carried out in this study. Here, the effect of wire deflection or wirelag on geometrical accuracy has been explored. A proper control to improve dimensional accuracy of circular job is achieved here. A novel method is presented to measure the wirelag by geometrical analysis. A mathematical model is developed to measure the gap force. Experimental investigations are performed to verify the proposed model.

Keywords WEDM · Wirelag · Profile accuracy · Gap force

1 Introduction

Electrical sparks can erode metal that fact was first noticed by Sir Joseph Priestley in 1770, but it takes time to convert it into technology of machining. In the year 1943, two Russian scientists, B. R. Lazarenko and N. I. Lazarenko, invented the basic principle of electrical spark machining system called as electrical discharge machining (EDM) and subsequently they developed R–C type EDM machine. In the late 1960s, wire EDM was developed to replace the varying tool for different geometry used in EDM. Later, an optical system by D. H. Dulebohn was developed to auto control the geometry of the part to be machined by the WEDM process in 1974. After this development, the popularity of WEDM enhanced rapidly, as the process. In the end of 1970s, WEDM process has come up with computer numerical control (CNC) system and that was the massive invention in the WEDM process. Day by day, this machining process has become one popular non-traditional machining system in the manufacturing sector as it can produce complicated profile for the product.

Accuracy, surface finish and cutting speed are enhancing from inception of this process. But, product accuracy is hampering due to wire deflection or wire bending, and it makes various applications unacceptable. Thus, wirelag is defined as the wire

M. Sekh (✉)

Department of Mechanical Engineering, Aliah University, Kolkata 700160, India
e-mail: mukandar@gmail.com

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79