


Optimization of the effects of wire EDM parameters on tolerances

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Abstract

In this study, the effects of cutting parameters on the dimensions and shape tolerances of components were investigated. Nine pieces of cubes with dimensions 10×10 mm were cut by using DIN 1.2316 (M303 extra) plastic mold steel. A Sumitomo Denko SBG-type wire with a 0.25 mm diameter was used. Table feed rate, pulse-on time and pulse-off time were used as machining parameters. The pulse-off time adjustment, maximum current of the main power supply, auxiliary power supply network, main power supply voltage, servo reference voltage, wire feed rate, wire tension and dielectric fluid circulation pressure were kept constant during the experiments. Three-dimensional coordinate measuring equipment was used to measure the tolerances of dimensions and shapes. Wire electrical discharge machining (EDM) parameters were optimized by using the Taguchi optimization technique. In order to optimize the wire electrical discharge process, the gray relational analysis (GRA) optimization method was used. The optimal machinability of DIN 1.2316 plastic mold steel for the wire electrical discharge process was successfully determined in this study. With GRA, the obtained optimum values were 9 mm/min table feed rate, 8 μ s pulse-on time and 8 μ s pulse-off time.

Keywords: manufacturing material processing surface processing

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