Analysis of Wire Electrode Wear in the WEDM Machining of Inconel 625

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The aim of this study was to analyze the influence of selected electrical parameters on the wear of coated wire electrodes during the wire electrical discharge machining (WEDM) of high-strength Inconel 625. The experiment was carried out using two types of 0.25 mm diameter electrodes: Elecut X (coated electrode with a copper core) and SuperZinc (coated electrode with a brass core, CuZn37). Electrode wear was determined by a gravimetric method, comparing the weight loss before and after the cutting process using Kern analytical scales with a resolution of 0,001 g.

The experimental parameters included pulse width (A), pulse interval (B), servo reference voltage (Aj), ignition pulse current (IAL), and short discharge duration (TAC). The parameters during machining were monitored using a KEYSIGHT EDUX1002A oscilloscope. The experiment was designed using the Taguchi method with an L27 orthogonal array, and the influence of individual factors on electrode wear was evaluated using analysis of variance (ANOVA).

The results confirmed a significant influence of certain electrical parameters on the rate of electrode wear, while the differences between the electrode types highlight the need for optimization of WEDM process settings depending on the electrode type.

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