

عنوان مقاله:

Application of Taguchi approach and Simulated Annealing Algorithm in Surface Modification When EDM Hot Worked Steel

محل انتشار:

هفتمین کنفرانس دانشجویی مهندسی مکانیک (سال: 1392)

تعداد صفحات اصل مقاله: 4

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خلاصه مقاله:

Among the various non-conventional processes, electro discharge machining (EDM) is most widely and successfully applied for the machining of various workpiece materials. The material is removed by means of repetitive spark discharges that cause local melting and/or evaporation of the work piece material and the resulted surface is characterized by overlapping craters and features indicative of the intense thermal impact involved. The last decade has seen an increasing interest in the novel applications of electrical discharge machining process, with particular emphasis on the potential of this process for surface modification. This paper proposes an optimization methodology for the selection of best process parameters in electro discharge machining for surface modification of 40CrMnMoS86 hot worked steel parts. The experimental data are gathered based on Taguchi L36 design matrix. The tests are conducted under varying peak current (I), voltage (V), pulse on time (Ton), pulse off time (Toff) and duty factor (D). The effects of these input parameters are then determined on the most important process output response, surface roughness (SR). The relation between machining parameters and performance can be found out with the signal to noise analysis (S/N). Next, analysis of variance (ANOVA) and F-test have been used to evaluate the relative significance of process variables affecting process outputs. Developed multiobjective model is optimized by Simulated Annealing algorithm (SA) and machining optimal parameters setting is found. A confirmation test is also performed to verify the effectiveness of optimization procedure in determining the optimum levels of machining parameters. The consequences show that the combination of Taguchi technique, signal to noise analysis and simulated annealing algorithm is quite efficient in determining optimal EDM process parameters of surface finish in EDM.

کلمات کلیدی:

Taguchi technique, Signal to Noise analysis (S/N), Electrical Discharge Machining (EDM), Optimization, simulated (annealing algorithm (SA), Analysis of variance (ANOVA)

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