

عنوان مقاله:

Electro-Discharge Machining (EDM) Process Optimization Using Neural Networks

محل انتشار:

اولین کنفرانس بین المللی و هفتمین کنفرانس ملی مهندسی ساخت و تولید (سال: 1384)

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خلاصه مقاله:

In this paper an integrated approach is presented for modeling and optimal selection of input parameters of electro-discharge machining (EDM) process. First, a multilayered feed forward network-based back-propagation (BP) learning algorithm with three inputs, two outputs and one hidden layer has been developed to establish the process model. The inputs are current (I), period of pulse (T) and source voltage (V) as independent process variables and the outputs are material removal rate (MRR) and surface roughness (Ra) as performance characteristics. Training and testing of the network were carried out using experimental data. The results indicate that the neural model predicts process outputs with reasonable accuracy under varying input machining conditions. Once the process model is established, a second network, which parallelizes the augmented Lagrange multiplier (ALM) algorithm, determines the corresponding optimal input parameters by maximizing the material removal rate subject to appropriate operating and prescribed surface roughness constraints. The optimization procedure is implemented in each level of machining regimes such as finishing, semi-finishing and roughing, from which the optimum machining parameter settings are obtained. Simulation results validate the feasibility and effectiveness of this approach, and show a good agreement with theoretical considerations and experimental results for a wide range of machining conditions.

کلمات کلیدی:

Electro-discharge machining (EDM), Artificial neural network (ANN), Back-propagation (BP), Augmented Lagrange multiplier (ALM) algorithm, Process modeling, Optimal machining conditions

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