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Artificial intelligence model to predict surface roughness of Ti-15-3 Alloy in EDM process (Article)

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Abstract

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Conventionally the selection of parameters depends intensely on the operator's experience or conservative technological data provided by the EDM equipment manufacturers that assign inconsistent machining performance. The parameter settings given by the manufacturers are only relevant with common steel grades. A single parameter change influences the process in a complex way. Hence, the present research proposes artificial neural network (ANN) models for the prediction of surface roughness on first commenced Ti-15-3 alloy in electrical discharge machining (EDM) process. The proposed models use peak current, pulse on time, pulse off time and servo voltage as input parameters. Multilayer perceptron (MLP) with three hidden layer feedforward networks are applied. An assessment is carried out with the models of distinct hidden layer. Training of the models is performed with data from an extensive series of experiments utilizing copper electrode as positive polarity. The predictions based on the above developed models have been verified with another set of experiments and are found to be in good agreement with the experimental results. Beside this they can be exercised as precious tools for the process planning for EDM.

SciVal Topic Prominence

Topic: Electric Discharge Machining | Inconel (Trademark) | Tool Wear

Prominence percentile: 99.322

Author keywords

Copper | Multi-layered perceptron | Positive polarity | Surface roughness | Ti-15l-3

Indexed keywords

Engineering uncontrolled terms: Artificial neural network models | Copper electrodes | Developed model | Electrical discharge machining | Equipment manufacturers | Feed-forward network | Hidden layers | Input parameter | Machining performance | Multi layer perceptron | OFF time | Parameter setting | Peak currents | Perceptron | Positive polarity | Pulse on-time | Servo voltage | Single parameter | Steel grades | Technological data | Ti-15-3 alloy | Ti-15l-3

Engineering controlled terms: Automobile manufacture | Copper | Experiments | Network layers | Neural networks | Surface roughness

Engineering main heading: Titanium alloys

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