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Design of Fuzzy Logic Model for The Prediction of Tool Performance during Machining of Composite Materials

Abstract

Complexity of the machining process, the nonlinear relationship between parameters, and the random variations of material properties make the prediction of tool life during machining of composite material a challenge. Therefore, this article reports on the application of fuzzy logic technique for modelling of the useful life of the end mill cutter while machining under the aforesaid process. Dry end milling experiments were conducted to gather experimental data, followed by the design of Mamdani fuzzy inference system (FIS) so as to perform fuzzy logic correlation between the employed machining conditions with the tool life. Results showed remarkable prediction of tool life when compared to the experimentally determined values. Confirmation tests of randomly selected conditions were also undertaken to further demonstrate the effectiveness of the proposed model.

Keywords; Fuzzy logic model, Machining, Tool wear, Tool life, Composite material