Fuzzy logic predictive model of tool wear in end milling glass fibre reinforced polymer composites

Abstract

This paper presents development of tool wear prediction models in end milling of glass fibre reinforced polymer (GFRP) composites. Adaptive network based fuzzy inference system (ANFIS) was employed to accurately predict the amount of tool wear as a function of spindle speed, feed rate and measured machining forces. End milling experiments were performed with K20 tungsten carbide end mill cutter under dry condition in order to gather all experimental data. Results show that ANFIS is capable of estimating tool wear with excellent accuracy in the highly nonlinear region of tool wear and the machining forces relationships. Statistical analyses of the two tool wear-machining force ANFIS models reveal that the tool wear-feed force relationship has better predictive capability compared to that of the tool wear-cutting force relationship.