

Tool wear prediction models during end milling of glass fibre-reinforced polymer composites

Abstract

Composite products are often subjected to secondary machining processes as integral part of component manufacture. However, rapid tool wear becomes the limiting factor in maintaining consistent machining quality of the composite materials. Hence, this study demonstrates the development of an indirect approach in predicting and monitoring the wear on carbide tool during end milling using multiple regression analysis (MRA) and neuro-fuzzy modelling. Although the results have indicated that acceptable predictive capability can be well achieved using MRA, the application of neuro-fuzzy yields a significant improvement in the prediction accuracy. It is apparent that the accuracies are pronounced as a result of nonlinear membership function and hybrid learning algorithms. Using the developed models, a timely decision for tool re-conditioning or tool replacement can be achieved effectively.