#83 Abstract

Use of artificial neural networks in the evaluation of geometrical deviations in the dry machining of the UNS A97075 (Al-Zn) alloy

Advanced and innovations in manufacturing processes / Trends in manufacturing systems and automation

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Keywords: Light Alloys, Machining, Neuronal Networks, Expert Systems

Abstract Text
In this work, an analysis of the cutting parameters influence on macro and micro geometric deviations of dry machined UNS A97075 (Al-Zn) alloy has been carried out. Specifically, the cutting speed and feed rate influence on the arithmetic mean roughness, the straightness and the circular runout of cylindrical specimens have been studied. A shallow artificial neuronal network has been used to obtain a regression model that is able to predict the value of the output variables as a function of the cutting parameters, under the cutting conditions applied. The main novelty of this study lies in obtaining a regression model of the experimental results that considers several geometric variables simultaneously, on a micro and macro scale. For this purpose, the optimal number of neurons in the hidden layer, that gives rise to a minimum error, was analysed. After the network training, most of the results (around 80%) showed a prediction error lower than 10%. These results were compared with other regression models (potential and exponential) previously developed in similar research. In all cases, the use of artificial neuronal network gave rise to the best fit, for every output variable studied. Thus, the use of artificial neuronal networks has been shown as an effective tool in obtaining regression models that combine variables of different nature simultaneously, marking a starting point for future analyses related to the influence of cutting parameters on surface integrity variables on the sustainable machining of this alloy.