AN APPLICATION OF DISSIMILAR ANN ALGORITHMS TO IMPROVE THE SIMULATION PERFORMANCE OF FLANK WEAR EXTRAPOLATION IN GFRP COMPOSITE DRILLING

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ABSTRACT

In the recent past, almost all manufacturing and mechanical firms are aiming at reducing the machining cost of the mechanical components due to market competition. One of the ways to reduce the machining cost is to select the optimum machining parameters and their respective levels to get the best productivity. Therefore the research on finding the optimum selection of the machining parameters is gaining importance nowadays. In addition to this, it was observed that, by applying Artificial Intelligence (AI) techniques, the optimized machining parameters could be further fine-tuned and simulated to predict the output parameters accurately. Thus the present research paper applies the AI technique and compares different ANN algorithms to improve the prediction accuracy of the drill flank wear while machining GFRP composites. The flank wear data were generated by performing the drilling process on the GFRP composite in a CNC vertical machining centre by entering different drill machining factors and levels. Later, the neurons of the ANN are trained with drill input and output, experimental data for getting better output prediction accuracy. Following this, the simulation of the drill process parameters was done with different ANN algorithms to select the best algorithm by tuning the ANN architecture. In the next stage, the best selected ANN algorithm along with its tuned architecture is evaluated for different data randomization methods for fine – tuning the optimization. Thus obtained optimized ANN structural configuration is found to be capable of predicting the drill flank wear much efficiently and effectively under the specified work material, tool material and machining combinations and conditions.

KEYWORDS: Artificial Neural Network, GFRP Composites, Cutting Speed, Drill Diameter, Cutting Feed Rate & Drill Flank Wear

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