

# Multi-objective Optimisation of Machining Fibre Reinforced Composites

## Abstract

Since the inception of their wide use in the 1960s, advanced composite materials such as Fibre Reinforced Polymer (FRP) composites have seen an exponential growth in application for various engineering fields. FRP composites are normally produced near to net-shape, yet they are often subjected to final machining processes in order to meet the required geometric features and dimensional accuracies. Hence, this paper describes the use of Taguchi orthogonal array coupled with the Grey relational analysis to facilitate the optimisation of multiple machinability characteristics during end milling of Glass Fibre Reinforced Polymer (GFRP) composites. Based on the results of Taguchi experiments, the Grey relational grade was determined from the Grey analysis to solve the multiple machinability characteristics of tool life, machining forces and surface roughness. The results suggested that feed rate have the most significant influence on the multiple machinability characteristics. Confirmation test revealed that the Taguchi-Grey analysis can be effectively used to determine the multiple machinability characteristics and consequently improve the end milling of GFRP composites

**Keywords;** GFRP composites, Machining, End milling, Taguchi Method, Multi-objective optimization, Grey Analysis