

Optimization of Cutting Parameters on Delamination Using Taguchi Method during Drilling of GFRP Composites

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Abstract : Drilling composite materials is a frequently practiced machining process during assembling in various industries such as automotive and aerospace. However, drilling of glass fiber reinforced plastic (GFRP) composites is significantly affected by damage tendency of these materials under cutting forces such as thrust force and torque. The aim of this paper is to investigate the influence of the various cutting parameters such as cutting speed and feed rate; subsequently also to study the influence of number of layers on delamination produced while drilling a GFRP composite. A plan of experiments, based on Taguchi techniques, was instituted considering drilling with prefixed cutting parameters in a hand lay-up GFRP material. The damage induced associated with drilling GFRP composites were measured. Moreover, Analysis of Variance (ANOVA) was performed to obtain minimization of delamination influenced by drilling parameters and number layers. The optimum drilling factor combination was obtained by using the analysis of signal-to-noise ratio. The conclusion revealed that feed rate was the most influential factor on the delamination. The best results of the delamination were obtained with composites with a greater number of layers at lower cutting speeds and feed rates.

Keywords : analysis of variance, delamination, design optimization, drilling, glass fiber reinforced plastic composites, Taguchi method

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