

Investigation on the Effect of Welding Parameters in Additive Friction Stir Welding of Glass Fiber Reinforced Polyamide 66 Composite

Authors : Nandhini Ravi, Muthukumaran Shanmugam

Abstract : Metals are being replaced by thermoplastic polymer composites in automotive industries because of their low density, easiness to fabricate, low cost and good wear resistance. Complex polymer components consist of assemblies of smaller parts which can be joined by friction stir welding. This study deals with the additive friction stir welding of 15 wt.% glass fiber reinforced polyamide 66 composite which is a modified technique of the conventional friction stir welding by the addition of a filler plate for the heating of the composite work piece through the tool during the welding process. Welding at different combinations of tool rotational speed, travel speed and tool plunge depth was done after which the tensile strength of the respective experiments was determined. The maximum tensile strength obtained was 77 MPa which was 80% of the strength of the base material. The process parameters were optimized using the L9 orthogonal array and also the effect of individual welding parameter on the tensile strength was studied. The optimum parameter combination was determined with the help of ANOVA studies. The hardness of the welded joints was studied with the help of Shore Durometer which yielded the maximum of D 75.

Keywords : additive friction stir welding, polyamide 66, process parameters, thermoplastic polymer composite

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