

Load Bearing Capacity and Operational Effectiveness of Single Shear Joints of CFRP Composite Laminate with Spread Tow Thin Plies

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Abstract : Spread-tow thin-ply-based technology has resulted in the progress of optimized reinforced composite plies with ultra-low thicknesses. There is wide use of composite bolted joints in the aircraft industry for load-bearing structures, and they are regarded as the primary source of stress concentration. The purpose of this study is to look into the bearing strength and structural performance of single shear bolt joint configurations in composite laminates, which are basically a combination of conventional thin-ply and thick-ply in some specific stacking sequence. The placement effect of thin-ply within the configured stack on bearing strength, as well as the potential damages, were investigated. Mechanical tests were used to understand the disfigurement mechanisms of the plies and their reciprocity, as well as to reflect on the single shear bolt joint properties and its load-bearing capacity. The results showed that changing the configuration of laminates by inserting the thin plies inside improved the bearing strength by up to 19%.

Keywords : hybrid composites, delamination, stress concentrations, mechanical testing, single bolt joint, thin-ply

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