

Effect of Stitching Pattern on Composite Tubular Structures Subjected to Quasi-Static Crushing

Authors : Ali Rabiee, Hessam Ghasemnejad

Abstract : Extensive experimental investigation on the effect of stitching pattern on tubular composite structures was conducted. The effect of stitching reinforcement through thickness on using glass flux yarn on energy absorption of fiber-reinforced polymer (FRP) was investigated under high speed loading conditions at axial loading. Keeping the mass of the structure at 125 grams and applying different pattern of stitching at various locations in theory enables better energy absorption, and also enables the control over the behaviour of force-crush distance curve. The study consists of simple non-stitch absorber comparison with single and multi-location stitching behaviour and its effect on energy absorption capabilities. The locations of reinforcements are 10 mm, 20 mm, 30 mm, 10-20 mm, 10-30 mm, 20-30 mm, 10-20-30 mm and 10-15-20-25-30-35 mm from the top of the specimen. The effect of through the thickness reinforcements has shown increase in energy absorption capabilities and crushing load. The significance of this is that as the stitching locations are closer, the crushing load increases and consequently energy absorption capabilities are also increased. The implementation of this idea would improve the mean force by applying stitching and controlling the behaviour of force-crush distance curve.

Keywords : through-thickness stitching, 3D enforcement, energy absorption, tubular composite structures

Conference Title : ICCM 2016 : International Conference on Composite Materials

Conference Location : London, United Kingdom

Conference Dates : October 17-18, 2016