

Mechanical properties of hybrid composites laminates reinforced with carbon and glass fibers

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Abstract : Composite materials possess the characteristics of high stiffness and high fatigue strength, which are desirable for advanced aircraft components. However, the mechanical behavior of such materials depends upon a variety of factors such as fiber volume fraction, percentage of voids, lay-up order and reinforcement type, the effects of which are difficult to establish individually. The objective of the current study was to gain a better understanding of mechanical properties of hybrid composite laminate reinforced with weave carbon/glass fiber manufactured using vacuum assisted resin molding process with STR Midapoxy resin. Responses of weave carbon/epoxy and weave glass/epoxy laminates were also investigated to compare with that of hybrid samples. This experimental investigation was conducted to study the effect of hybrid composite specimen subjected to in-plane tensile, three-point-bending flexural and compressive loading on a universal testing machine according to ASTM standards. The failure modes were observed using an optical microscope, and the results show that the carbon/epoxy composite laminate had the highest mechanical strength and modulus and the hybrid composites increase with increasing relative carbon fiber volume fraction. It can be concluded that improvement in the balance of stiffness and toughness in composite laminates can be realized through hybridization.

Keywords : Woven fiber, hybrid effect, Composite laminate, mechanical properties