

Mechanical properties of fibre-metal laminates made of natural/synthetic fibre composites

ABSTRACT

Mechanical properties are among the properties to be considered in designing and fabricating any composite to be used as a firewall blanket in the designated fire zone of an aircraft engine. The main focus of this work was to study the tensile, compression, and flexural strengths of the combination of natural/synthetic fibres with metal laminates as reinforcement in a polymer matrix. The materials included flax fibres, kenaf fibres, carbon fibres, aluminium alloy 2024, and epoxy. The two-hybrid fibre metal laminate composites were made from different layers of natural/synthetic fibres with aluminium alloy of the same thickness. The composites were made from carbon and flax fibre-reinforced aluminium alloy (CAFRALL) and carbon and kenaf fibre-reinforced aluminium alloy (CAKRALL). Based on the results obtained from the mechanical tests, the CAFRALL produced better mechanical properties, where it had the highest modulus of elasticity of 4.4 GPa. Furthermore, the CAFRALL was 14.8% and 20.4% greater than the CAKRALL in terms of the tensile and compressive strengths, respectively, and it had a 33.7% lower flexural strength. The results obtained in the study shows that both composites met the minimum characteristics required for use in the fire-designated zone of an aircraft engine due to their suitable mechanical properties.

Keyword: Mechanical properties; Natural fibres; Synthetic fibres; Tensile strength; Compressive Strength; Flexural strength.