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Influence of stacking sequence and orientation of the fabric on mechanical properties of twill Kenaf/Kevlar reinforced unsaturated polyester hybrid composites

H T Sreenivas, N Krishnamurthy, M S Murali, G R Arpitha

1. Department of Mechanical Engineering, School of Engineering, Presidency University, Bengaluru, India

Abstract

The current study investigates on development of hybrid composite with Kenaf/Kevlar as reinforcement and unsaturated Polyester as the matrix considering stacking sequence, the orientation of fabric and twill 2x2 weave of the Kenaf fabric in particular. Five laminates (L1, L2, L3, L4, and L5) were developed by stacking the lamina's one over the other with the matrix and then cured in an autoclave. The laminates were subjected to experimental investigation to evaluate mechanical properties such as tensile strength, flexural strength, hardness, and impact strength. Results indicate that L5 shows good flexural strength and modulus, high hardness, and good impact strength, whereas L4 indicates the best tensile strength and tensile modulus. To summarize, the hybridization resulted in an average of 30% increased mechanical property for Laminate L5. The effect of stacking in L5 has a significant impact on the property of the composite. The results of the study were mainly focused on minimizing the use of synthetic fiber and replacing it with natural fiber. SEM analysis was performed on fractured surfaces of specimens which revealed that the failure of the laminated composite is due to poor interfacial bonding among fiber and matrix. Overall, the composite obtained from the combination of Kenaf and Kevlar fabrics had the best balance of properties finds appropriate application for car bumpers, fenders, boat hull, turbine blade etc

Keywords:

Hybrid composites, twill weave Kenaf, Kevlar, stacking sequence, orientation of fabric, mechanical strength

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