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Mechanical Properties Analysis of Glass Fiber/Balsa and Jute/Balsa Composites

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The incorporation of natural fibers in the composition of structural composites is an interesting alternative when seeking low production costs and reduced environmental impact, since these are recyclable materials. However, the use of these materials is viable only if their mechanical properties are equivalent or superior to those of synthetic composites, securing the mechanical reliability of the part. Among the materials used in structural components of aeromodeling and boats, the use of carbon fiber/glass composites with balsa wood is commonly seen so that the mechanical properties are amplified without a significant increase in weight in the final project. This article aims to analyze hybrid structural composites by comparing the mechanical properties of those using synthetic fibers with those using natural fibers. For this purpose, samples with glass fiber/balsa wood were compared to samples with natural fiber, in this case, jute fiber/balsa wood. To analyze the mechanical and dynamic behavior of these materials, tensile, impact, flexural, hardness tests and natural frequency were performed. The samples were manufactured by hand lamination, using balsa wood, glass fiber fabric (0/90) with 295g/cm², jute fiber fabric (0/90) and epoxy resin. The tests followed the standards indicated by ASTM, such as ASTM D3039 for tensile tests. The results showed values of 24.9 MPa and 12.78 MPa for the glass fiber/balsa and jute/balsa samples, respectively. They also indicated that the use of natural fiber improves impact resistance, and significant differences are expected in hardness and natural frequencies. In this way, it becomes possible to better evaluate the selection of materials for this type of component.