

Investigation of the effect of thermal, mechanical, and morphological properties of bio-composites prosthetic socket

Abstract

One of the major alternatives for lasting prosperity is the use of biodegradable natural fiber as reinforcements in the production of composites to tackle worldwide environmental problems. This study aims to address utilizing available and sustainable natural fibers to prevent injury to people engaged in the fabrication of prosthetic limb sockets while maintaining socket strength. An above-the-knee prosthetic socket of natural fiber-reinforced composites was prepared via the vacuum molding method. Linen, hemp, carbon, monofilament, and glass are the materials utilized. For assessing the degree of contact between the matrix and fibers, Fourier transform infrared (FTIR), scanning electron microscopy (SEM), differential scanning calorimetry (DSC), and tensile tests were utilized. The finding shows that no novel peak was seen in the FTIR, which indicates no new material was produced. It's related to the physical link between reinforcements and resin. SEM micrographs confirmed that the results corroborated those from the FTIR. DSC data indicated that as the number of layers rose, the glass transition temperature decreased, and mixing natural fibers with synthetics did not affect crystallization temperatures. The proposed tests have been conducted to characterize the interfacial strength, providing further information for the futuristic use of composites in various engineering applications.

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