

59c Low Density Microcellular Foam Wholly Thermoplastic Composite

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Supercritical carbon dioxide has been utilized to foam various amorphous polymers, such as polystyrene and poly(methyl methacrylate), in an environmentally friendly process. Saturation of the polymer matrix, followed by a rapid depressurization, leads to a closed microcellular structure of low density. This technique is used to improve the properties, such as increased impact strength, toughness, and stiffness to weight ratio, of a wholly thermoplastic composite. Spectra® fiber and low density polyethylene fibers are combined in a wet-lay process to form a thermoplastic composite. Through the use of supercritical carbon dioxide, the low density polyethylene matrix is foamed to produce a microcellular structure without affecting the physical properties of the Spectra® fiber. The closed cells of the microcellular foam and the reinforcing Spectra® fibers combine to yield a lightweight thermoplastic composite. Being an all thermoplastic composite, the resulting material is processable by compression molding and thermoforming.