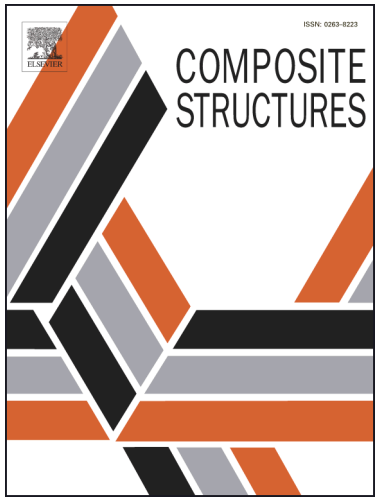

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Effect of the manufacturing process on the energy absorption capability of GFRP crush structures

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Abstract

Quasi-unidirectional E-glass/polyester semi-hexagonal composite structures manufactured by different processes (vacuum assisted infusion, hand lay-up and ultraviolet (UV) cured pultrusion) have been studied for automotive crash applications. In order to evaluate the effect of the manufacturing process in energy absorption capability of the material, the interlaminar shear strength (*ILSS*) and the specific energy absorption (*SEA*) capability of the material have been characterised. Hand lay-up and UV cured pultrusion samples have shown similar *ILSS* values, around 43 MPa. However, the *ILSS* of the infusion samples is 33 MPa due to the uneven distribution of the fibres along the thickness of the samples. Furthermore, the lower values of *ILSS* have resulted in the lowest *SEA* values for the infusion samples; 31 kJ/kg. Hand lay-up samples have shown the highest *SEA* values (52 kJ/kg) and UV pultrusion samples slightly lower (49 kJ/kg) values due to a higher void content. Nonetheless, the material manufactured continuously by UV curing pultrusion process has shown high energy absorbing capabilities for crashworthiness applications.

Keywords: Infusion, hand lay-up, pultrusion, UV curing, glass fibre, crush.