

AFFORDABLE MANUFACTURING OF THERMOPLASTIC MATRIX CFC / METALLIC FRAMEWORK STRUCTURES

Andrew Mills, Lawrence Cook and Aurele Bras
Cranfield Composites Centre, United Kingdom,

Many effective manufacturing processes have been developed for lightweight composite panel and shell type structures. When these are applied to highly loaded framework type applications many challenges arise which deter the use of composite materials. Hybrid material structures using metallic jointing pieces for load introduction and / carbon fibre composite framework sections may offer lightweight structures. Fibre orientations can be aligned with the principal loads through the framework and metal joints can be attached to simply and robustly.

Current techniques for fabricating metal / CFC hybrid structures rely upon either adhesive bonding or co-curing the frame section and joint to the metal together. The former technique generally requires fasteners to be added for safety and the latter requires many moulds tailored to individual joint geometry and has resin sealing challenges with the composite mould tooling overlapping the metal joining pieces.

This project has investigated a novel concept using constant section carbon fibre braided tubing with a thermoplastic matrix. The tube ends are joined to metal jointing pieces using a hot squeeze forming process. Various geometry metal joining pieces have been investigated including; ribbed, punched and spiky surfaces.

A demonstrator joint structure representative of an automotive B pillar and roof rail has been produced by the technique. The potential for the automation of these techniques is considered.



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