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## Compression moulding of composites with hybrid fibre architectures

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### Abstract

Advanced Sheet Moulding Compounds (ASMC) and unidirectional (UD) prepregs have been co-compression moulded to form a hybrid composite material. In-mould flow influences the UD fibre architecture in two ways. When UD fibres are aligned transversely to the ASMC flow direction, shearing occurs which causes local changes in fibre volume fraction and fibre waviness. When the UD fibres are aligned with the ASMC flow direction, ply migration takes place. In general, the composite stiffness follows a rule of mixtures relationship, with the stiffness proportional to the UD fibre content.

A grid analysis method has been developed to quantify distortion in the UD plies. Staging the resin to 50% cure was shown to reduce ply distortion during moulding, whilst maintaining suitable inter-laminar shear strength. Adding an interfacial prepreg ply between the reinforcing UD fibres and the ASMC charge successfully prevented distortion in the UD fibres, avoiding shear thinning and fibre migration.

### Keywords

Compression moulding, sheet moulding compound, Carbon fibre

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