

PROCESS MODELLING OF HIGH PRESSURE COMPRESSION RTM

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Abstract

Manufacturing high-volume structural automotive components using high pressure compression resin transfer moulding (HP-CRTM) requires resin flow and cure behaviour to be well understood. Predictive simulation enables process optimisation, leading to more robust and predictable processing, with reduced cycle time and lower scrap rate.

A numerical model of the process is therefore presented, which builds on previous work for an industrial customer at the National Composites Centre (NCC). The existing model was developed to include viscosity development, allowing its effect on flow to be simulated [1].

Material properties required in the model were characterised, including cure and viscosity development of a two component snap cure epoxy resin (3585/3475 Huntsman International LLC) and permeability of a 610gsm 50k carbon non-crimp fabric (NCF) (SGL Kumpers GmbH). An overview of the characterisation methodology is presented, with associated challenges and opportunities discussed.

HP-CRTM trials were performed on production tooling at the National Composite Centre and are reported. A novel Direct Current (DC) monitoring system (Synthesites Ltd) using in-mould sensors was used to measure flow and cure behaviour in real time. These trials highlighted a number of development opportunities for HP-CRTM process modelling which are presented and discussed.

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References

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