Thermomechanical behaviour of composites with embedded metallic pins

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BACKGROUND

- Increasing demand for functional through-thickness reinforcement (TTR)
- New static insertion TTR method exhibited that allows insertion of large pins (>1mm)
- Thermomechanical performance of pinned samples needs to be evaluated

AIM

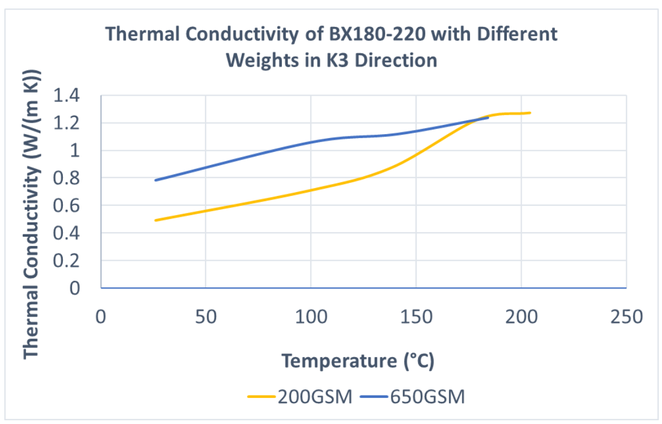
To investigate the influence of through-thickness metallic pins on local thermo-mechanical composite performance

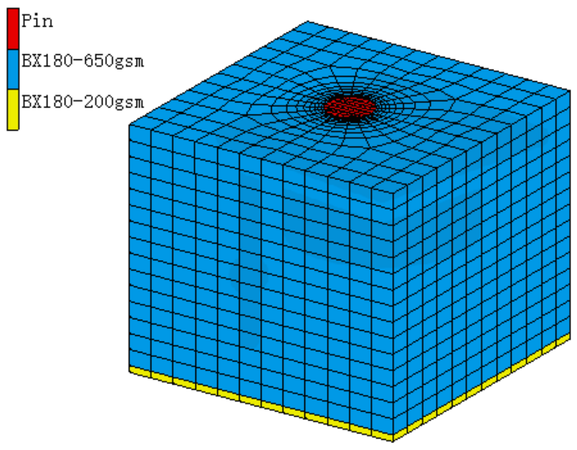
OBJECTIVE

- Thermomechanical characterization of the composite properties to feed into simulation
- Develop thermomechanical pinned composite model
- Validation of the model against experimental and analytical methods

METHODOLOGY

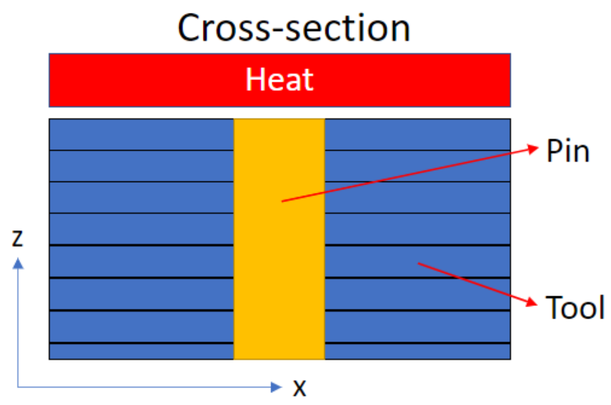
Thermal Conductivity of Composite

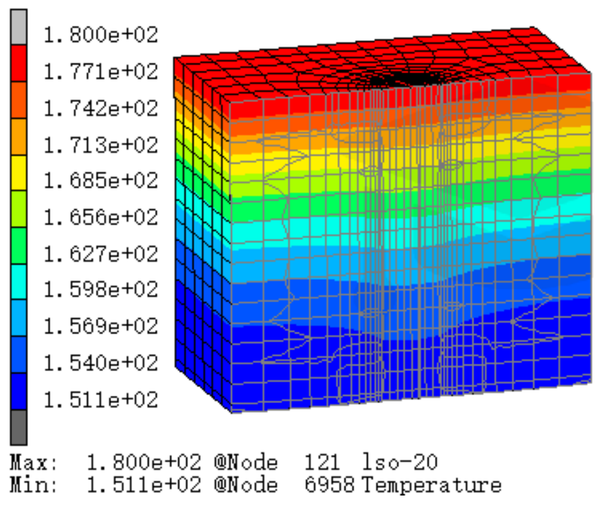




Modeling

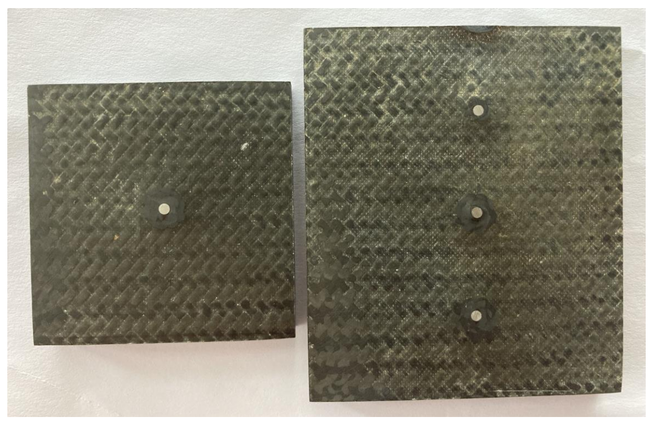
Simulation Strategy





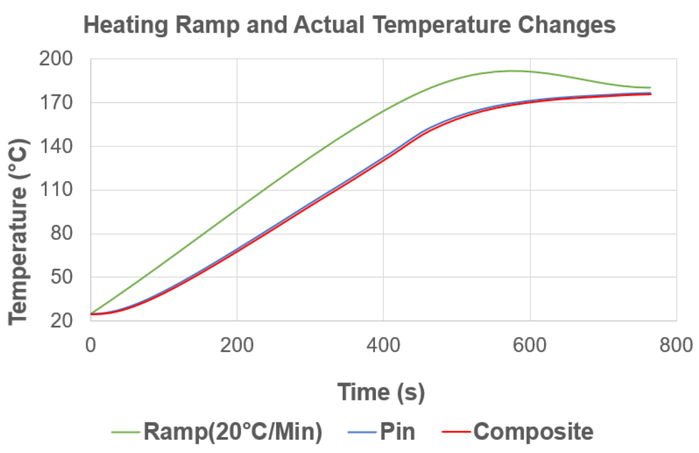
Simulation

Samples

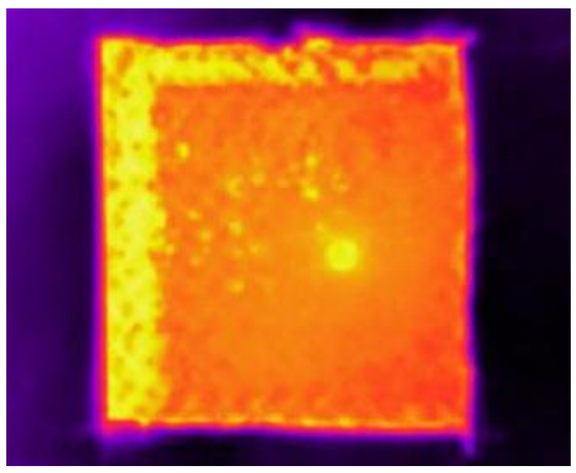


Validation Experiment

RESULTS



History Plot



Sample Thermogram

CONCLUSIONS

- Completed measurement of composite thermomechanical characterization data
- There is very little difference between the heat at the pin and the composite on top, but the contour plot shows a clear variation within the thickness.
- Based on macroscale model, in future need a mesoscale model to look at local effects of tow misalignment on the performance alongside and improve experimental setup.

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