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THE EFFECT OF SEMI-CURING ON INFUSED LAMINATE INTERFACIAL PROPERTIES

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Post cure joining operations and complex preform integration prior to resin infusion processes are two issues facing advanced composites manufacturing. A multistage cure process is seen as having the potential to remove post cure joining operations, inspect for quality as value is added to composite parts, and reduce misalignment between preforms. A set of simple structures containing elements which were initially semi-cured prior to a final infusion and full cure have been created for the purpose of investigating the effect of integrating these partially cured elements within composite structures. The set of simple structures take the form of carbon fibre panels which have had one half semi-cured before being integrated with the second half of their panel, which is then infused and cured, thus producing a fully cured panel which has undergone a multi-stage curing process. Prior to the manufacture of the panels, the thermoset resin used was characterised in order to control the cure kinetics and gelation. Preliminary results indicate that the addition of a partially cured element has limited influence on the mode 1 fracture toughness when compared to a baseline panel that was manufactured through a single infusion and cure cycle (Figure 1.). Gelation of the resin at a high degree-of-cure of roughly 0.7 seems to reduce interfacial properties in the panel. These results indicate this multistage curing process could be a viable manufacturing method if the reduction in performance is minimised. Further investigation is ongoing to investigate the fracture interfaces and crack behaviour in laminates cured by this new multi-stage process.

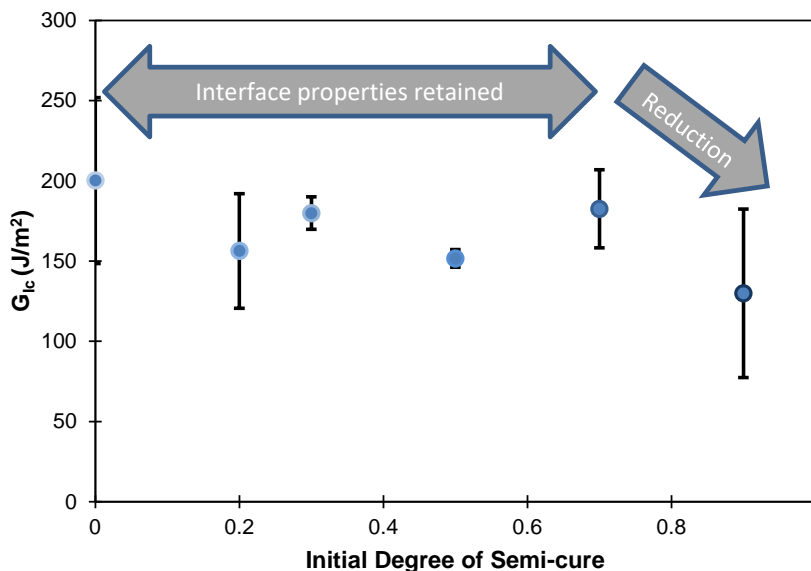


Figure 1. Mode I initial energy release rate measured by double cantilever beam testing. All panels were fully cure prior to testing.