DECONSOLIDATION IN THERMOPLASTIC LAMINATES UNDER INFRARED RADIATIONS

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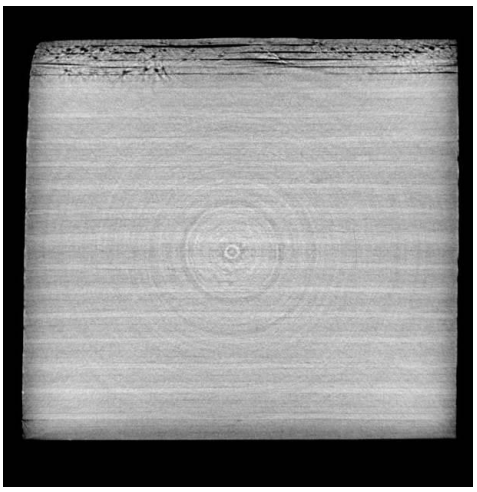
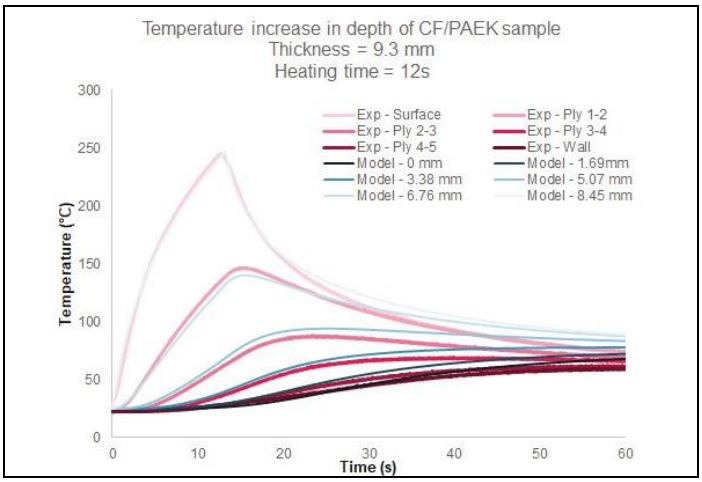
Abstract

Unidirectional (UD) thermoplastic laminates have a great potential for structural components of thermoplastic composites. Their use is widely deployed in the industry where processes such as forming and joining have demonstrated their applicability. However, particular attention must be paid to the ability of UD thermoplastic laminates to deconsolidate when heated at high temperatures. Studying and understanding the main drivers responsible for this deconsolidation allows to limit the occurrence of this behavior and to predict the thermal response of thermoplastic composites in the process when high heating stage is required. This work investigates the deconsolidation in CF/LM-PEAK UD laminates supplied by Toray Advanced Composites. The influence of moisture into the composite and moisture recovery after drying the composite is investigated through deconsolidation experiments under an infrared (IR) radiation. Microscopic observations of the exposed thermoplastic laminates as well as voids evolution through tomographic analyses can be correlated with the surface temperature of the laminates. The resulting thermal gradient has been analyzed through an internal developed numerical tool.



µ-computed tomographic image of a deconsolidated UD laminates



Thermal gradient prediction in thick composite laminates: 1D model