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Formation and suppression of volatile-induced porosities in an RTM epoxy resin

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Abstract

In this work, the formation of porosities in an RTM epoxy resin is investigated in the context of Resin Transfer Molding (RTM). First, differential scanning calorimetry and rheology analyses are carried out to model the cure kinetics and the viscosity, and to find the gel point. The critical time for the application of consolidation pressure is studied using an innovative experimental setup that allows visual observation of the curing resin and gelation as well as void formation and dissolution during the process. The desorption process begins with the melting of the curing agent. It is found that consolidation pressure is the key processing parameter to keep composite parts free of porosities. Applying a consolidation pressure before reaching the crossover point of the loss modulus and the storage modulus (i.e. $\tan \delta = 1$) allows dissolving all the gases into the bulk resin. In the present case, this happens when the conversion level reaches 94 %.

Keywords

- A. Resins
- B. Cure behavior
- B. Porosity
- D. Chemical analysis

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