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# Aerospace Composite Cured by Quickstep and Autoclave Processing Techniques: Evaluation and Comparison of Reaction Progress

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## Abstract

Quickstep is relatively a new technique for aerospace composite processing. Thermoset resins (prepregs) have been frequently designed by autoclave method requiring low ramp rate curing of 2-3 K min<sup>-1</sup>. However, ramp rate up to 15 K min<sup>-1</sup> have been achieved *via* Quickstep processing. This technique allows alteration in chemo-rheology of resin system and so influences the reaction progress. In this attempt, Fourier transform infrared spectroscopy (FTIR), differential scanning calorimetry (DSC), and dynamic mechanical thermal analysis (DMTA) were used to monitor the cure progress of 977-2A epoxy resin and carbon fiber reinforced composite. The curing reaction progress of 977-2A epoxy/carbon fiber was considered for the first time by comparing Quickstep processing and autoclave method. According to DSC results, the reaction progress in Quickstep technique was comparable to that of autoclave curing. Moreover, DMTA of Quickstep cured samples showed increase in glass transition temperature ( $T_g$ ) due to increased cross-linking density at greater hold time (upper cure temperature). FTIR was used to monitor the conversion of representative functional groups versus applied Quickstep and autoclave curing steps. The structural analysis depicted that the Quickstep

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