

In-situ Measurement of Loads During the Autoclave Moulding of Unidirectional Prepreg Components

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Abstract

In the autoclave moulding of structures from lay-ups of unidirectional prepreg there are several processes that can impose loads on the prepreg. These include any differential thermal expansion between tool and lay-up, resin cure shrinkage and consolidation processes, especially if fibre bridging is present. If components of reliable dimensions are to be manufactured these processes need to be fully understood. The work reported here is an experimental study of the mechanisms leading to loads being imposed on the prepreg and of the response of the prepreg to those loads. The uniformity of the prepreg's response to applied loads has been examined using conventional tensile test approaches. There is seen to be considerable non-linearity in the prepreg's response to load in the strain range of interest during autoclave processing. This non-linearity is seen to be associated with waviness in the tows within the prepreg and with differences in the level of waviness from tow to tow. The generation of loads in the prepreg during processing has been measured via an in-situ technique during autoclave moulding runs. Results will be presented for a range of cases from single plies in contact with flat aluminium tooling through to thick "U" channel parts in which a wide range of processes are at work.