

## **Effect of equi-biaxially fabric prestressing on the tensile performance of woven E-glass/polyester reinforced composites**

### **ABSTRACT**

The tensile properties of prestressed fabric-reinforced composites have been investigated. A method of applying an equi-biaxially fabric prestressing prior to and during the curing process of a plain-weave fabric composite was performed. A novel fibre prestressing equipment was built to apply and measure the tension load in the principal yarn directions of a fabric. The equi-biaxial fabric prestressing level, ranged from zero to 100 MPa, was used. Tensile tests were performed for the batches with different fabric prestressing levels to estimate the optimum level that gives the maximum tensile performance. The samples were also tested at different orientation angles, precisely from warp to bias direction. Prestressing the fabric enhanced the tensile performance such as elastic modulus and critical stress to first fracture of the composite by 10–20%. Most tensile properties, for instance tensile modulus and critical stress, reached their ultimate values at 50 MPa of prestressing level; however, the tensile-limited toughness was maximum at a level of fabric prestressing of ~75 MPa.

**Keyword:** Polymer-matrix composites; Fibre pretension; Biaxial fabric prestressing; Plain-weave fabric; Tensile properties; Residual stress