**Fibre prestressed polymer-matrix composites: a review**


ABSTRACT

This article reviews the literature studies based on improving the mechanical properties of fibre-reinforced composites using fibre-prestressing method. The idea is characterized by pretensioning the fibres either elastically or viscoelastically prior matrix curing. The beginnings of the studies in this field were focused on reducing fibre waviness and breaking the weaker fibres by pretensioning the fibres to a relatively high stress level prior moulding process. In the last three decades, the concept of fibre prestressing had been developed to include its ability to reduce the effect of undesired residual stresses existence accompanying manufacturing process of fibre-reinforced composites. The main advantage of fibre prestressing method is to generate a desired and controlled residual stress state within the matrix in order to obstruct the initiation and propagation of cracks. Various techniques of fibre prestressing have been reviewed to show their scope of applications, developments and limitations. Therefore, the findings drawn from this review can be used for further studies in the field of fibre prestressed composites in order to select the most suitable methodology and develop it to fit the manufacturing process requirements towards a production of high-performance composites without a considerable additional cost.



**Keyword:** Fibre pretension; Polymeric matrix composites; Prestressing method; Microcracks; Residual stresses