Weibull Analysis of Microbond Sear Strength at Sisal Fibre–Polyester Resin Interfaces

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Abstract

An analysis has been made of the tensile strength of sisal fibres and the interfacial adhesion between fibres and polyester resin droplets. Density and microscopy methods were used to determine the cross-sectional area of the sisal fibres. The average tensile strength of treated sisal fibres decreased by a modest amount following treatment with 0.06 M NaOH. However, this treatment resulted in a substantial increase in the interfacial shear strength at the sisal fibre to polyester resin interface. Weibull analysis has been used successfully to analyse variability in tensile strengths and interfacial shear strength using probability of failure plots. Scanning electron microscopy has revealed the shape of resin droplets on the surface of treated and untreated sisal fibres and contact angles are much lower for droplets on treated fibres. Damage to the surface of fibres has been examined following shear testing. Weibull analysis is an effective tool for characterising highly variable fibre properties and evaluating the level of adhesion between polymer resin and the fibre surface.

Keywords: Sisal fibre; alkali treatment; tensile strength; microbond test; interfacial shear strength; Weibull analysis.