

Effect of loading rates of severely thermal-shocked glass fiber/epoxy composites, Kishore K. Mahato, Dinesh K. Rathore, Krishna Dutta, Bankim Chandra Ray, Department of Metallurgical and Materials Engineering

Present investigation is aimed to study the effect of short term exposure of thermal-shock conditioning on the mechanical properties of glass/epoxy (GE) composites. The specimens were conditioned at $-60\text{ }^{\circ}\text{C}$ temperature for 36 h followed by further conditioning at $+70\text{ }^{\circ}\text{C}$ temperature for the same duration. In order to assess the effect of thermal-shock on the mechanical properties, tensile tests of the conditioned and unconditioned specimens were done with various loading rates viz. 1, 10, 100, 500 and 1000 mm/min. The ultimate tensile strength (UTS) as well as strain to failure were found to increase with increase in the loading rates at room temperature; the thermal-shocked conditioned specimens exhibited even higher UTS and failure strain as compared to the unconditioned specimens. It can be stated that different coefficients of thermal expansion during thermal-shock conditioning and significant amount of pre-existing residual stresses govern the stress distribution and ultimately the mechanical properties of glass/epoxy composite. Various dominating modes of failures in the composites were analyzed under scanning electron microscope. More in Composite Communications, Vol 3, 2017, pp7-10.

