

BII 11 Mechanical characterizations of epoxy and epoxy-soy resins for carbon fiber composite reinforcement and plywood production

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This paper presents the development of carbon-carbon fiber eco-composites and their basic mechanical properties. The characterization of two resin systems namely a commercial epoxy adhesive resin (Resoltech-1040) and a new environmental friendly, abundant and renewable soy starch blended with Resoltech-1040 on application to a "plain weave low modulus high-tensile type carbon fiber" (PW C-HT) and the evaluation of optimized conditions for the preparation is analyzed. Carbon fiber (PW C-HT) laminates were obtained by bonding with epoxy and epoxy-soy resins, laying-up of prepregs plies in three different orientations ($0^\circ/45^\circ/90^\circ$) and allowing and hardening at ambient temperature (30°C) for 24 hrs followed by post curing cycle at various temperatures ($40 - 100^\circ\text{C}$) for 6 hrs. Flexural characterizations of the carbon-carbon fiber composites were evaluated and the results showed that bond strength at higher temperature kept increasing till $\sim 60^\circ\text{C}$ to a value of ~ 12 kPa and then leveled off in the range of $\sim 10.5 - 11$ kPa for the epoxy (PW C-HT) composite resin system. For the epoxy-soy (PW C-HT) composite system the flexural strength data has been marginally lower than epoxy system and at 70°C it has reached the highest strength followed by a leveling effect. Further there is an increasing in the shear strength with the variation of the solid matter content of the epoxy-soy resin plywood systems.

Keywords: composites, epoxy resins, carbon fiber, mechanical

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