Abstract

Arenga Pinnata plants (aren trees) grow a lot in Indonesian forests, palm trees produce black fibers locally known as ijuk. Currently palm fibers has been used as materials for composite materials. However, several studies reinforcing in showed that they had natural fibers as reinforcing polymer composite materials low stress (σ_b), strain (ε_b), and modulus of elasticity (E_B). To overcome this, a hybrid composite made of Arenga pinnata fibers and glass fibers was investigated to obtained higher flexural property of the hybrid materials. The purpose of this study is to determine the effect of hybrid ratio (r_h) of the fiber, the effect of span-to-depth, and the characteristics of the fracture after being tested.

The hybrid composites were produced of randomly oriented Arenga Pinnata fibers/unidirectional glass fibers/epoxy using press mold. Constant of 30% fiber volume fraction with five hybrid ratios r_h, of 0.0, 0.1, 0.2, 0.3 and 0.4 was fabricated, bending tests are carried out according to ASTM D-790. The span-to-deep ratios of 16, 24 and 32 were used.

The results showed that the increasing volume of glass fiber resulted in increases of bending strength, stain of failure, and elastic modulus. The highest bending strength obtained at Span-to-deep ratios of 16with a hybrid ratio r_h = 0.1 that is equal to 109.6 MPa, while for the lowest bending strength obtained at span-to-deep = 32 with a hybrid ratio r_h = 0.0 namely at 30.3 MPa. The magnitude of strain decreases at span-to-deep of 16 and 24. In addition at r_h = 0.4 the highest bending strain was obtained at span-to-deep = 16 with a hyrid ratio r_h = 0,4 of 0.111 mm / mm and for the lowest bending strain was obtained at span-to-deep 32 with a hybrid ratio r_h = 0.0 that is equal to 0.0328 mm / mm. While the highest modulus of elasticity was obtained at span-to-deep = 32 with a hybrid ratio r_h = 0.2 that is equal to 5.421 GPa and for the lowest elastic modulus was obtained at span-to-deep 16 with a hybrid ratio r_h = 0.0 namely 1,633 GPa.

Keywords: Bending, Epoxy,Glass Fiber, Hybrid Composites, Palm Sugar Fiber.