

ABSTRACT

EFFECT OF FIBER LENGTH OF MECHANICAL AND PHYSICAL PROPERTIES OF COMPOSITE FIBERS WITH EPOXY MATRIX

By

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Palm fiber is a natural fiber derived from sugar palm (*Arenga Pinnata Merr*), and can be degraded naturally and cheaper than synthetic fibers. The purpose of this study to determine the effect of fiber length on the tensile strength of the composite of Fibers with epoxy matrix.

In this study, fiber extraction using a wire comb serves to separate the fibers from the fiber sheath. Then the selection of fiber diameter of 3 mm using a micrometer screw. Fibers soaked in 5% NaOH solution for 2 hours and dried for 15 minutes. Further cut to a length of 30 mm, 60 mm, and 90 mm. Furthermore, composite manufacturing using hand lay-up by mixing epoxy resin and hardener mixture with a ratio of 1: 1 refers to ASTM D638. Mixing matrix and fibers with a mass fraction of 80%: 20% used a variation of the fiber length. The test specimen is heated in an oven with a temperature of 70°C for 10 minutes. Tensile testing for pure epoxy resins for composites and a variety of fiber length of 30 mm, 60 mm, and 90 mm. Photo fracture area with Scanning Electron Microscope (SEM) was used to view the composite fracture mechanisms.

The test results showed that the tensile strength and ultimate strain achieved in composites with fiber length of 90 mm. Tensile strength obtained at 36.37 MPa and strain of 9.34%. Factors that affect the strength of the composite was holding capacity of fiber to matrix, a uniform fiber distribution and fiber critical length. SEM image results in the fracture of fiber composite showed the fiber breaking. This shows that the holding capacity between the matrix and the fibers are quite good but the uneven distribution of fibers in the matrix, resulting optimal composite tensile strength can not be achieved.

Keywords: tensile test, Fiber fibers, epoxy resins, NaOH, SEM