Bending Properties Of Banana Composite For Without Treated

Pramod V Badyanakal [(1)], Vargees A E[(1)]

Gouvisiddappa I Itagi[(2)], Krishna Huddar[(2)],Ravindra Nayaka R[(2)],Rijvansab Nagalapur[(2)].

1) Professor, Dept OF Mechanical Engg; Alva's institute of engineering and technology.
2) Students, Dept OF Mechanical Engg; Alva's institute of engineering and technology.

ABSTRACT: Natural fibers offer several benefits such as low density, low cost, environmental friendly and high specific mechanical performance. This work investigates the flexural properties of banana fiber reinforced epoxy composite. The banana fibers are extracted from the pseudo stem of the banana plant (Musa species). Sisal Fiber is extracted by a process known as decortications these fibers are used as it is. Banana fiber reinforced epoxy composite is prepared by using hand layup method and banana with respect to weight ratio fibers into epoxy matrix and this composite will subject flexural testing. Finally we are showing that Natural fiber reinforced polymer composites have better properties compared to synthetic composites fibers, thus providing advantages for utilization in commercial applications (automotive industry, buildings and constructions).

Section1: Introduction

Environmental awareness new rules and legislation are forcing industries to seek new materials that are more environmentally friendly. Over the past two decades, plant fibres have been receiving considerable attention as substitutes for synthetic fibres reinforcement. Unlike the traditional synthetic fibres, such as glass and carbon, these lignocellulose fibres are able to impart certain benefits to the composites including low density, high stiffness, low cost, renewability, biodegradability and a high degree of flexibility during processing.

Composite materials are those which are created artificially by combining two or more materials which usually have dissimilar characteristics, in other words, a composite material can be defined as material system composed of a combination of two or more constituents that differ in form and chemical composition and which are insoluble in each other.

Section2: Experimental details

Material

Natural banana fiber were purchased from the local dealer. Epoxy resin is a member of the epoxy logier class. It forms a three dimensional structure when it reacts with the hardener or curing agent. The epoxy resin with the hardener is used as matrix material. The blending ratio of the resin with the hardener is 10:1 by weight.

Extraction of banana

The banana fibers are extracted from the pseudo stem of the banana plant (Musa species). These are growing up to 5-10 feet, depending upon the region and climatic conditions. The length of the stalk depends upon the height of the plant and its width is about 3-5 cm with a thickness of 1-2 cm. The fibers are located at the outer sheath of the stalk. The qualified stalk of the plant is cut to a length of 100cm and its outer sheath is removed. Then these sections are crushed between 2 roller drums with scraping blades at its circumference to remove the pulpy material between the fibers. The process of stripping the fibers from the stalk is known as tuxes. Finally the fibers are completely cleaned in water to remove the waste materials and then dried in the sunshine for a few days to remove the moisture content.

Preparation of Epoxy resin and hardener

Epoxy may be named as oxides such as Epoxy resins, Epoxy resin has density of 1.15g/cm^3, is used to prepare the composite material.Hardener HY-951as shown in figure3.3 Hardener is high viscous liquid material, has density 1.25g/cm^3 mixed with resin in suitable proportion during the process of preparation of composites which helps in the solidification of the wet, smooth composite

Preparation of fiber- without treated

The banana fibers are extracted from the pseudo stem of the banana plant (Musa species). The qualified stalk of the plant is cut to a length of 100cm and its outer sheath is removed. Then these sections are crushed between 2 roller drums with scraping blades at its circumference to remove the pulpy material between the fibers. Finally the fibers are completely cleaned in water to remove the waste materials and then dried in the sunshine for a few days to remove the moisture content. Sisal Fiber is extracted by a process known as decortications, where leaves are crushed, beaten, and brushed away by a rotating wheel set with blunt knives, so that only fibers remain. The fiber is then dried. These fibers are used as it is.

Preparation of mould box

As the composite material specimen is subjected to flexural test, the specimen should be in rectangular shape. As the mould is prepared by cutting the metal by require measurement then holed and make slots for nut and bolt to hold the side square bar for easy to remove the composite material.

Preparation of laminates (Hand layup)

Randomly oriented fibers are mixed thoroughly over a period of 15 min and later were mixed with epoxy resin and hardener. The composite preparation process was performed in the following order using random mixing technique by hand layup. First the epoxy LY 556 resin and hardener HY 951 were mixed in the ratio of 10:1weight as recommended. One half of resin was placed inside the mixing chamber and the fibers were added over a period of 2 min. Then the other half of epoxy resin was added in to mixing chamber and the mixed for a period of 15 min. care was taken to ensure a uniform sample since practical have a tendency to clump and tangle together when mixed. The resulting material was compressed mould in a mould box for 24hrs. The result laminate are removed and dried.

Section3: Mechanical properties of natural fibers

The mechanical properties and physical properties of natural fibers vary considerably depending on the chemical and structural composition, fiber type and growth conditions. Mechanical properties of plant fibers are much lower when compared to those of the most widely used competing reinforcing glass fibers. However, because of their low density, the specific properties (property-to-density ratio), strength, and stiffness of plant fibers are comparable to the values of glass fibers.

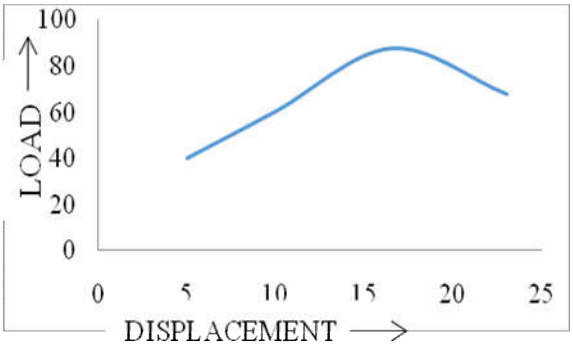
Flexural test

The three points bending flexural test of composite sample is carried out in **ASTM D790-03**test standard. In flexural test, a uniaxial load was applied through both the end.Three point bend test was carried out in an UTM machine in accordance with **ASTM D790-03** to measure the flexural strength of the composites.. All the specimens (composites) were of rectangular shape having length 128 mm, breadth 16 mm and thickness of 3-3.5 mm.

Section4: Result and Discussion

Flexural strength analysis

The sample force vs. stroke graph generated directly from the UTM during flexural testing. The maximum displacement observed is 19 mm. The flexural strength comparison of the banana fiber epoxy composites. The result indicated that the 60% banana fiber and 40% epoxy resin polymer composites are performing better than the other composite combinations tested which can withstand the flexural load of 88.2N.



GRAPH: LOAD V/S DISPLACEMENT

Section5: Conclusion

Banana fibers have shown high variability along the length and between fibers, which is a characteristic of natural fibers. The natural fiber reinforced epoxy hybrid composites are successfully fabricated using hand lay-up technique. Due to the low density of proposed natural fibers compared to the synthetic fibers, the composites can be regarded as a useful material in light weight applications.

References

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