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FABRICATION AND ANALYSIS OF MECHANICAL PROPERTIES OF DASHBOARD COVER BY USING COCOUNT GRASS, ELEPHANT GRASS AND E-GLASS FIBRE WITH VINYL ESTER

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1. INTRODUCTION

A composite material can be defined as a combination of two or more materials that results in better properties than those of the individual components used alone. In recent years, polymeric based composites materials are being used in many application such as automotive, sporting goods, marine, electrical, industrial, construction, household appliances, etc. Polymeric composites have high strength and stiffness, light weight, and high corrosion resistance. Natural fibers are available in abundance in nature and can be used to reinforce polymers to obtain light and strong materials. The natural fiber contains many advantages such as low density, appropriate stiffness and mechanical properties with high disposability and renewability. In this project we used the natural fiber of coconut, elephant grass. Moreover, these coconut and elephant grass fibers are recycle and biodegradable.

1.1 DASH BOARD COVER

Car industry plays an important role as the back bone for the economy of any country. Dash board is one of the main parts of the car interior component and plays a very important role in different aspects such as safety, reliability, user friendly, technology and appearance and so on. Dash board used for operating different functions in the car such as instrumental panel, audio and video devices, holders, switches and glove box, these function distributed inside a vehicle that communicate with each other. Car dash board like the other components of the car have lots of improvement in terms of quality, extra features, material, updating the existing product to take the dash board at the new level.

2. LITERATURE SURVEY

Tenholm et al. (1991) [40] studied the nature of adhesion in composites of modified cellulose fibers and polypropylene. Cellulose fibers were surface-modified with polypropylene maleic-anhydride copolymer and characterized by contact angle measurement, ESCA, FTIR, and SEM techniques. Salit [15] studied the background of the importance of natural fibers. The advantages and disadvantages of tropical natural fibers are listed. The information about fiber extraction process, the application of fibers and other important topics are discussed. Idicula et al.[14] studied the physical properties of natural fibers were mainly determined by their chemical and physical composition such as structure of fibers, cellulose content, angle of fibrils, cross section and the degree of polymerization. A number of investigations have already been carried out on several types of Natural rs such as hemp, flax, bamboo, jute and kenaf to study the effect of these fibers on the mechanical characteristics of composite materials. Banana fiber reinforced composites and obtained that the optimum percentages of banana fiber is 40%wt. Effect of fiber content on tensile and flexural properties of pineapple fiber reinforced poly (hydroxyl butyrate-covalerate) resin composites has been studied by Luo and Netravali. The fracture energies for fibers such as sisal, banana, pineapple and coconut fiber reinforced polyester composites using Charpy impact tests has been studied by Pavithran et al. They reported that, except for the coconut fiber, the fiber toughness increases due to increase in fracture energy of the composites. The mechanical properties of jute Fiber reinforced polyester composites were evaluated by Gowda et al. It is reported from their study that they have better strengths as comparison to wood based composites. The use of cotton fiber reinforced vinyl ester composites along with glass fiber reinforced polymers was done by Khalid et al. The effect of various loading rate on mechanical properties of jute/glass reinforced vinyl ester based hybrid composites has been studied by Srivastav et al. showed that chemical treatments (alkali, benzoyl chloride, KMnO4and silane treatment) of banana fiber based polypropylene composites improved the thermo physical properties (thermal conductivity and diffusivity) in each case. Kushwaha et al. have found the optimum alkali percentage for best results and have discussed the effects of chemical treatments on mechanical properties bamboo fiber composites. Hongwei Ma et al. effect of silane coupling under different types of radiation on the structural properties of bamboo fiber reinforced poly (lactic acid) bio composites.

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3. MATERIALS AND METHOD

Currently, in auto mobiles has two sharp choices in dash cover material. First is the smooth feel of non-shrink needlepoint carpet used on the Ultimate dash mat. If a luscious dash surface, go with one of our velour dash mats, which are aptly named Velour dash mats. It has high specific strength and modulus, low coefficient of thermal expansion and high fatigue strength. Graphite, when used alone has low impact resistance. Its drawbacks include high cost, low impact resistance and high electrical conductivity.

3.1 SELECTION OF COMPOSITE MATERIAL

The details of processing of the composites and the experimental procedures followed for their mechanical characterization. The materials used in this work are

- COCONUT FIBER
- ELEPHANT GRASS FIBER
- E-GLASS FIBER
- VINYLESTER RESIN

3.2 MATERIALS PREPARATIONS

The coconut, elephant grass and e-glass fiber which is taken as reinforcement in this study is collected from local sources. The vinyl ester resin and the hardener are supplied. Wooden mould having been first manufactured for composite fabrication. The fiber material is mixed vinyl ester resin by simple mechanical stirring and the mixture was poured into various mould, keeping in view the requirement of various testing conditions and characterization standard.

The composite sample of different composition are prepared .the composite of mixing ratio coconut 20 %, elephant grass 10 % and e-glass fiber 15% with mixing of vinyl ester resin 55%. The different type of fiber is used, while keeping the length of the glass fiber constant. The detailed composition and designation of composite materials. A releasing agent is used on the mould release sheets to facilitate easy removal of the composite from the mould after curing. The entrapped air bubbles are removed carefully with a sliding roller and the mould is closed for curing at a temperature Of 30 ^{0}C for 24 hours at a constant load of

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50kg .After curing the specimen of suitable dimension is cut using a diamond cutter for mechanical test as per the ASTM standards.

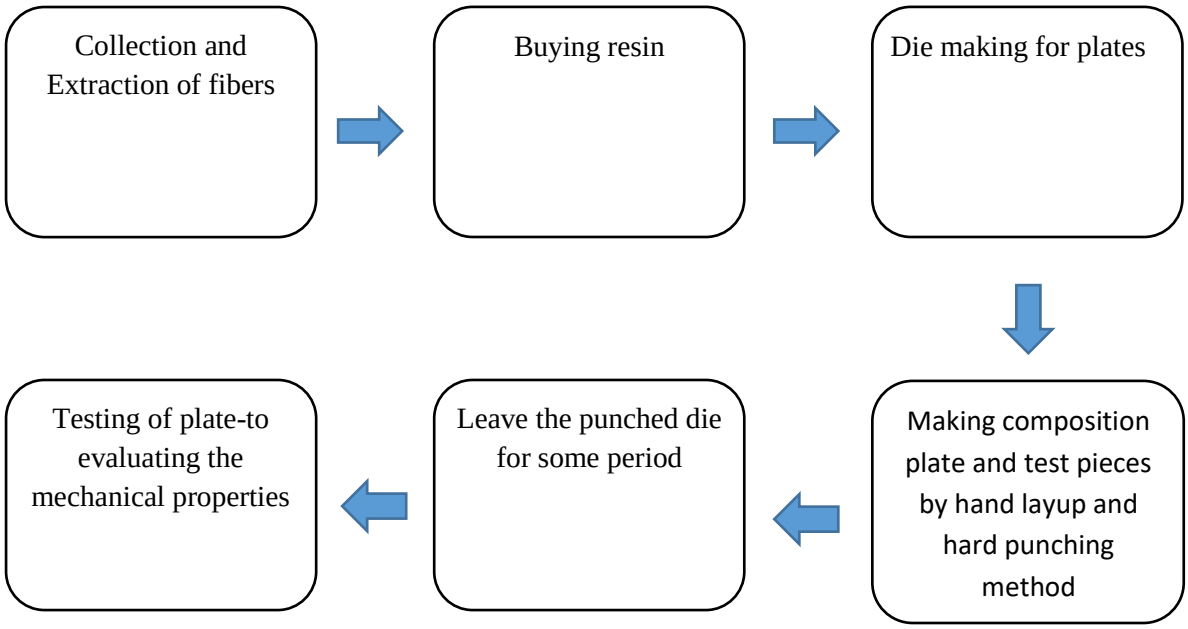

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Figure 1 Composite

4. MECHANICAL PROPERTY TESTS

4.1 TENSILE TEST

Tensile tests are performed for several reasons. The results of tensile tests are used in selecting materials for engineering applications. Tensile properties frequently are included in material specifications to ensure quality. Tensile properties often are measured during development of new materials and processes, so that different materials and processes can be compared. Finally, tensile properties often are used to predict the behaviour of a material under forms of loading other than uniaxial tension.

The tensile test of the composites was performed as per the ASTM D3039 standards. The test was done using a universal testing machine (Tinius Olsen H10KS).The specimen of required dimension was cut from the composite cast. The test was conducted at a constant strain rate of 2 mm/min.

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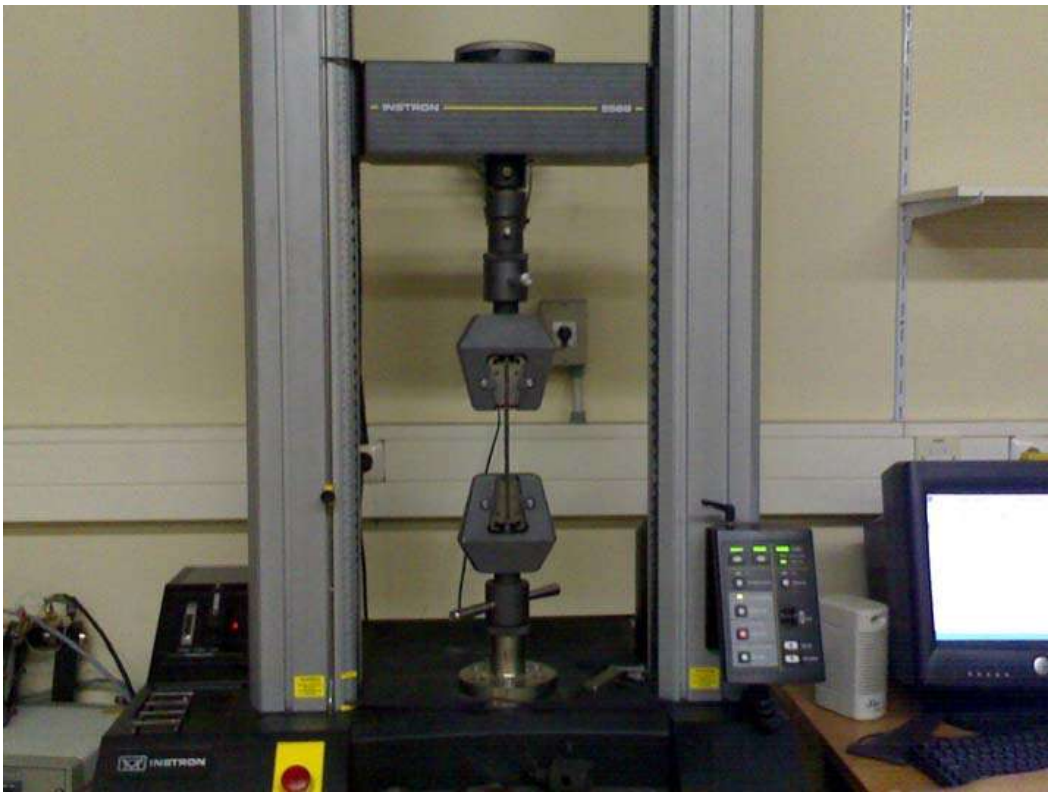

Figure 2 Tensile test

Tensile test is used to determine the tensile strength of the specimen, % elongation of length and % reduction of area. Tensile test is usually carried out in universal testing machine.

4.2 HARDNESS TEST

This gives the metals ability to show resistance to indentation which show it's resistance to wear and abrasion. Hardness testing of welds and their Heat Affected Zones (HAZs) usually requires testing on a microscopic scale using a diamond indenter. The Vickers Hardness test is the predominant test method with Knop testing being applied to Affected Zone testing in some instances. Hardness values referred to in this document will be reported in terms of Vickers Number, Hardness value.

4.3 TOUGHNESS TEST

The principal measurement from the impact test is the energy absorbed in fracturing the specimen. Energy expended during fracture is sometimes known as **notch toughness**. The energy expended will be high for complete ductile fracture, while it is less for brittle fracture.

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However, it is important to note that measurement of energy expended is only a relative energy, and cannot be used directly as design consideration. Another common result from the Charpy test is by examining the fracture surface. It is useful in determining whether the fracture is fibrous (shear fracture), granular (cleavage fracture), or a mixture of both.

The fracture toughness of the composite specimens was measured using Fracture Tester (MTS 810 material test system) as shown in Figure 7. The specimens were cut according to dimensions as specified by the ASTM E1820; this test method is for the opening mode (Mode I) of loading.

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Figure 3 Charpy test

5. CONCLUSION

Traditionally natural fibers are used to make high strength ropes in South India. The results found that the mechanical properties have a strong association with the dynamic characteristics. Both the properties are greatly dependent on the volume percentage of fibers. The composite having a coconut, elephant grass and e-glass fiber volume of showed a significant result compared to conventional dashboard cover. It has been noticed that the mechanical properties of the composites material such as tensile strength, hardness and toughness etc.

The fiber was in the order of microns under the described experimental parameters. Further studies are required to systematically examine the effect of numerical variables on the parameters

REFERENCES

1. Holbery, J., Houston, D., Natural-Fiber-Reinforced Polymer Composites in Automotive Applications, JOM, 2006, 11, 80-86.

2. Bledzki, A. K., Faruk, O., Sperber, V. E., Cars from Bio-Fibers, Macromolecular Material Engineering, 2006, 291, 449–457.

3. Mohantya, A. K., Misraa, M., Hinrichsen, G., Bio fibers, Biodegradable Polymers and Bio composites: An Overview, Macromolecules and Material Engineering, 2000, 276/277, 1-24.

4. Bledzki, A. K., Gassan, J., Composites Reinforced with Cellulose Based Fibers, Progress in Polymer Science, 1999, 24, 221–274.

5. Saheb, D. N., Jog, J. P., Natural Fiber Polymer Composites: A Review, Advances in Polymer Technology, 1999, 18 (4), 351363.

6. Li, X., Tabil, T. G., Panigrahi, S., Chemical Treatments of Natural Fiber for Use in Natural Fiber-Reinforced Composites: A Review, Journal of Polymers and the Environment, 2007, 15, 25–33.

7. P.F. Aubourg andW.W.Wolf, "ElephantGlass Fibers-Glass Composition Research," presented at Glass Division Meeting (Grossinger, NY), American Ceramic Society, Oct 1984

8. W.W. Wolf and S.L. Mikesell, E-Glass Fibers,Encyclopedia of Materials Science and Engineering

9. Malik M, Choudhary V and Varma IK 2000 J.M.S. Rev. Macromol. Chem. Phys. C40 (2&3) 139 Dusek K, Galina H and Mikes J 1980 Polym-vinyl. Bull 3 19

10. Then, L.; Thomas, S.; Neelakantan, N.R. Short banana fiber reinforced polyester composites: Mechanical, failure and ageing characteristics. J. Reinf. Plast. Compos. **1997**, 16, 744–765.

11. Ortega, Z.; Benítez, A.N.; Monzón, M.D.; Hernández, P.M.; Angulo, I.; Marrero, M.D. Study of banana fiber

12. Chen D.S., Gan Y.J., 2008, Lotus fiber and preparation method and products. China, Paten NO. CN 200610140888.4

13. Chen D.S., He J., Wang J.G., Gan Y.J., 2009, Research on the shape of lotus fiber. Journal of cellulose science and technology, 17(1), 57-60. DOI: 1004-8405(2009)01-0057-04

14. S.A.H. Roslan, Z.A. Rasid, M.Z. Hassan, The natural fiber composites based on bamboo fibers; A review, ARPN journal of engineering and applied science, Vol. 10, No. 15, Aug 2015.
15. Parnia Zakikhani, R. Zahari, M.T.H. Sultan, D,L. Majjid, Extraction and preparation of bamboo fiber-reinforce composites, Materials and design 63 (2014) 820-828ss
16. Nanayakkaza, N.H., Characterisation and determination of properties of Sri Lanka coconut, Journal of Natural Fibers, 2, (1), 2005, pp 69-81.
17. Bhowmick B.B. and Debnath C. R., Properties of coir, Indian coconut journal, 15, (5), 1984. p. 12