Journal of Engineering and Applied Sciences 13 (4): 835-836, 2018
ISSN: 1816-949X

Fabrication and Investigation of Hybrid Natural and Synthetic Composite

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Abstract: Researchers and scientist have challenge to decrease the immense use of synthetic fibre like glass fibre and carbon fibre and its composite's cost. Natural fibres alternative for synthetic fibre was reinforcement composites for good environment. Natural fibres have more benefits such as less money, renewability and etc. The spirit, enormous fabrication and economic properties of jute fibre selected us for this project. This study is focused on mechanical properties of jute fibre reinforced composites. The mechanical properties are obtained from the testing such as tensile, compression and impact. And all results are comparing with the other samples.

Key words: Mechanical properties, jute fibre, challenge, renewability, reinforcement, synthetic fibre

INTRODUCTION

A composite material can be defined as a combination of two or more materials that results in good properties than those of the own components used alone. The two materials work gives the composite specific characteristics.The ultimate aim of composite materials istheir get high strength with less weight. Strength and stiffness are increased by the reinforced material. In maximum cases, the reinforcement is very harder matrix. Particulate composites much weaker and less stiffthan other composites but they are commonly low expensive. The reinforced composites generally have less reinforcement due to machining's are complicated and brittleness. Although, full line-fiber composites are fabricate into laminates by OHP sheets offull line fibers in various orientations to get the more strength. The jute fiber is the reinforcement for get good density, bio degradability and less cost.

Literature review: Non synthetic fibers have been analysed for use in resinwith sugarcane, jute and banana by Campbell. Nowadays, there has been a greater studying onwards non synthetic fiber reinforced polymers composites are reason for environment and cost effective to non-natural fiber reinforced composites. In this research jute-glass fiber reinforced polyester composite is fabricated by hand layup method. Specimen fabricated and experimentally analysed by ASTM standards. The combo effect of composites made of e-Glass/jute fibers which are made by hand layup method using LY556 resin and hardener (Venugopal and Manoharan, 2015). In this study, the characteristics of this combo composite are testing like tensile, flexural and laminar shear strength which are findpractically by ASTM standards described in an interesting organic crystal for photonic and optoelectronic devices (Mohan and Manoharan, 2015). The values of the test shows that combo composite of e-Glass/jute fiber has good characteristics than the jute fiber composite (Srimurugan *et al*., 2015). However, it is found that the combo composite has good properties and also compared to jute fiber composite made randomly with synthetic fiber has been discussed in his study (Selvakumar and Manoharan, 2014; Heera and Balasubramanian, 2014). The properties of metal matrix composites have been analysed in detail (Sivaram *et al*., 2015).

MATERIALS AND METHODS

Fabrication: For jutefiber/e-Glassfiber/resin preparation, the jutefiber/e-Glass fibers were laid properlyon the mould when its laid by epoxy resin. After placing the both natural and synthetic fiber properly, they were pressed for a 5 min in the prepared mould. Then the pressed form of jutefiber/e-Glass fiber is relieved from the prepared mould. This was continued by applying the epoxy resin on the prepared mould. The pressed fiber was laid by the coat of resin, ensuring proper distribution of both natural and synthetic fibers. The resin mixture is then appliedon the fiberproperly and pressed for a day. After that the specimens were shaped to the correct sizes according to ASTM standards.

RESULTS AND DISCUSSION

From the above test results it is observed that the hybrid of jute and e-Glass fibre composites (Table 1) have three times higher impact value compared to the jute composite (Table 2) material. And also the tensile strength of the jute and e-Glass fibre hybrid composite material is increased twice the tensile strength of the jute composite

Table 1: Impact test results for jute epoxy resin composite

Sample No.	Impact energy meter in scale (J)
1	6.0
2	5.9

Table 2: Impact test results for Jute/e-Glass epoxy resin composite (hybrid)

Sample No.	Impact energy meter in scale (J)
1	18.0
2	18.4

Table 3: Tensile test results for jute epoxy resin composite

Sample No.	Load (N)	Tensile value (N/mm^2)
1	100	349.00
2	120	238.40
3	140	210.53
4	150	150.45

Table 4: Tensile test results for jute/e-Glass epoxy resin composite (hybrid)

Sample No.	Load (N)	Tensile value (N/mm^2)
1	100	421.23
2	120	400.19
3	140	380.53
4	150	365.72

Table 5: Compression test results for jute epoxy resin composite

Sample No.	Load (N)	Compressive value (N/mm^2)
1	100	4.615
2	120	6.153
3	140	4.687
4	160	6.254

Table 6: Compression test results for jute/e-Glass epoxy resin composite (hybrid)

Sample No.	Load (N)	Compressive value (N/mm^2)
1	100	4.437
2	120	6.675
3	140	5.893
4	160	6.786

material it is shown in Table 3-6. And there is the slight increase in the compression strength of the jute and e-Glass hybrid composite material when compared with the normal jute composite material. From the test results it is clearly seen that the hybrid composite material have higher strength.

CONCLUSION

The test values of the current study showed t utilitarian composites with good mechanical properties could be fabricatedby using the natural fiber (jute) and synthetic fiber (glass fiber) as a reinforcing agent for the resin. Mechanical strengths of the composites developed with raiseof fiber weight in the glass/jute/epoxy composite compared with the epoxy resin. Outer stratum including jute-jute having less mechanical characteristics as compared jute glass composites.

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