e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:01/January-2025 Impact Factor- 8.187 www.irjmets.com

FABRICATION AND EVALUATION OF MECHANICAL CHARACTERS OF JUTE FIBER POLYMER COMPOSITE AT DIFFERENT OREINTATIONS

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ABSTRACT

In present investigation hybrid composite is developed using jute/c-glass as reinforcing material and polyester as a matrix material. The fabrication is done using hand layup technique. The developed hybrid composite will be subjected to different kind of test to determine mechanical properties. And tested at three different angle of orientation 0°,30°,45 °tensile were carried out in order to evaluate mechanical properties of Jute fiber composite.

Keywords: Jute, C-Glass, Mechanical Properties, Orientation.

I. INTRODUCTION

The present study concentrates on the development of natural polymer hybrid composite and to utilize the advantages offered by renewable sources. Composites are developed by hand layup method using jute/c-glass, and reinforced with both epoxy and polyester resin. This natural polymer hybrid composite is developed at different orientation such as 0º, 30º, and 45 and Specimens are prepared according to the ASTM standard. Present study focuses on the reinforced composites which undergo various tests such as tensile, flexural, impact, hardness, specific gravity and sea water to evaluate the mechanical properties.

II. METHODOLOGY

Step 1: Personal preparation –

Before starting the work some initial preparation is to be carried out like Wearing safety gloves, goggles, wearing protection covers, cleaning the work area make it free of dust to ensure the safety of manufacturer.

Step 2: Mould preparation-

The bottom slab of the mould (granite slabs) is cleaned

Step 3: Cutting of Reinforcement materials or fibers-

The Fiber piles were cut according to dimensions from the c-glass and hemp fiber. The appropriate numbers of Fiber plies were taken that is two for c-glass fiber and three for natural fibers ((jute). Depending on the thickness required numbers of fiber plies were taken as shown in fig a & b

Step 4: Weighing reinforcement and matrix material-

The weight of fabrics is determined in accordance with the quantity of resin to be used is decided in such a way that the final laminated is made up of 45% resin and 55% reinforcement material.

Step 5: Mixing of Epoxy with its Hardener-

Epoxy and hardener were mixed by using brush in a bowl as shown in fig c. Care must be taken to avoid formation of bubbles because the air bubbles were trapped in matrix may result failure in the material.

Step 6: Appling the first resin coating –

The first resin coat is applied on the release film as per the size of the fabric is as shown in fig 5&6. Then first layer of fabric is carefully placed over the resin coat in and thorough compaction is achieved to prevent air bubbles entrapment is as shown in fig d after the final resin coat is applied, the lay-up is covered by another release film. The mould is closed by placing the top slab.

Step 7: Applied weight-

The top slab on account of its weight compresses the lay-up to the desired thickness, which is maintained using appropriate stoppers and the lay- up, is allowed to cure for 12-14 hours.

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Fig a Fig b Fig c

Fig d Fig e Fig g

Fig 1:

III. MODELING AND ANALYSIS

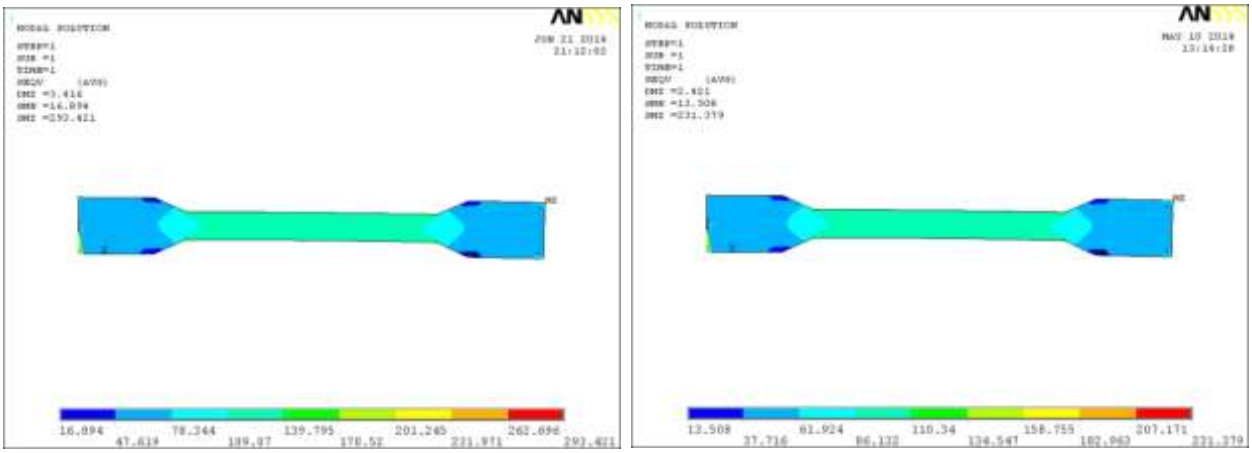

Fig 2: Von-mises stress for 0^0&30^0orientation of jute/c-glass polyester resin

IV. RESULTS AND DISCUSSION

4.1Tensile test result

The tensile strength of a material is the maximum amount of tensile stress that it can take before failure. The tensile test specimen is prepared according to ASTM standard D-638 as shown in fig 2 . The tensile test is performed in the universal testing machine (UTM) and results are analyzed to calculate the tensile strength of composite samples. The tensile test results are tabulated in the table1

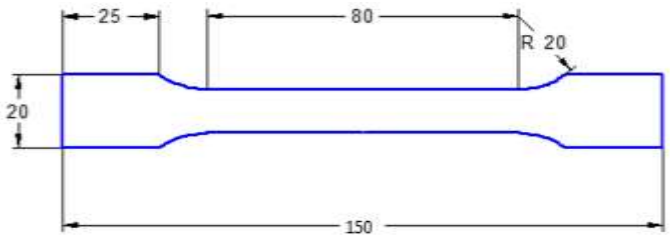

Fig 3: Dimensions of Tensile test specimen

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Table 1: Tensile test result at different orientation

Material	Maxim.Load KN(F)	Ultimate Tensile Stress Mpa(σu)	Young's Modulus Mpa(E)	% Elonionat Break
0^0 jute/polyster	2.90	52.41	5191.70	2.33
30° jute/polyster	2.22	47.08	4561.77	4.31
45° jute/polyster	2.60	45.16	4575.35	2.60

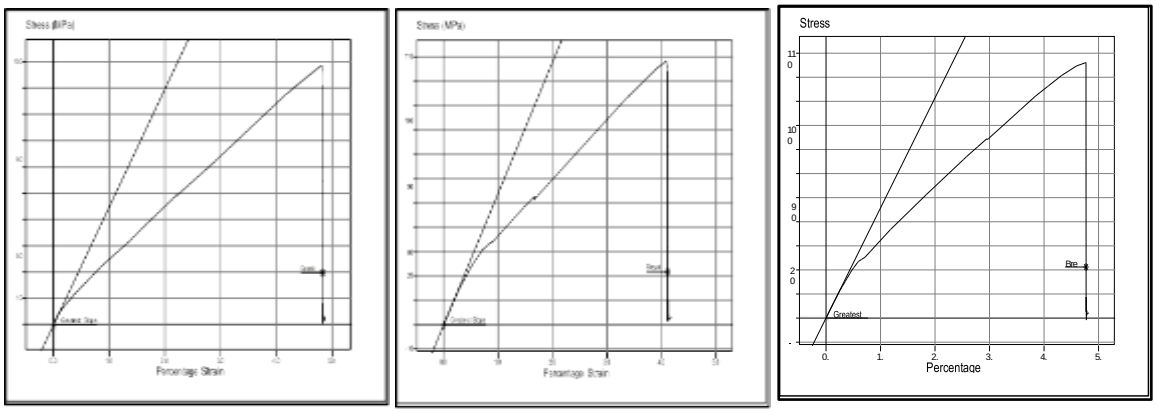

Fig 4: 0^0 jute/c-glass orientation 30^0 jute/c-glass orientation 45^0 jute/c-glass orientation

The experiment was conducted for the hybrid composite for 30°, 45°, and 90° orientation for polyster resin. The hybrid composite is fabricate using jute and C glass fiber as reinforcing fiber and polyster resin as a matrix material The above graph which shows the stress strain curve for the hybrid composite with different orientation for polyster resin. From the graph we can see that the hybrid with 0° orientation have high tensile strength of.52.41mpa

V. CONCLUSION

The effect of combination of one natural fiber and another is synthetic fiber is investigated. The hybrid composite, using C-glass, jute fiber and polyester resin is developed for 30^0, 45^0 and 90^0 fiber orientations. The experiments are carried out to understand tensile test at different orientations of composite are conducted.

The 0^0 orientations have a high tensile strength compared to 30^0 and 0^0 orientations. The 45^0 orientation that can withstand maximum strength of 52.41 MPa the 0^0 orientations have a high flexural strength compared to 30^0 and 45^0 orientations.

VI. REFERENCES

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