Variation in Heat Deflection Behaviour of Alkali Treated and Untreated Hybrid Fibre Reinforced Composites

C.M. Meenakshi, Sucharitha S, Srinivasan V

Abstract*: Regular Fiber fortified composites discovers place in numerous applications as they have the benefits of being light, solid, modest and progressively ecological well disposed. This investigation planned to decide the impact of antacid treatment on normal fiber and its effect on the warmth diversion conduct of the regular and glass fiber fortified cross breed composites ,in this work two kind of half and half composite are made with glass, sisal and flax fiber ,the crossover strengthened composite covers were manufactured by hand lay-up technique. Examples are cut from the manufactured cover and their warmth diversion conduct was tried by ASTM D648 benchmarks. From the outcome it is comprehended that the basic treatment has improved the warmth avoidance withstanding limit of flax/glass half and half composite and don't have much impact on sisal/glass mixture composite.

***Keyword* : Alkali Treatment, Heat Deflection Behaviour, Hybrid composites, ASTM D-648.**

I. INTRODUCTION

The composites are the promising materials of this century, among that various kinds of polymeric framework fortified with various materials discovered application in huge numbers of the administration businesses [1]. These days fiber Reinforced composites are broadly utilized for some, applications like auxiliary, marine, aviation, vehicle, windmill sharp edges and so forth., as a result of their high solidarity to solidness, weight to firmness proportion [2, 3]. The principle explanations behind the enthusiasm on these fortifications over manufactured fiber fortifications are their low natural effect, minimal effort, and high flexural quality, which supports their potential over a wide scope of uses [4]. Regular filaments show predominant mechanical properties, for example, adaptability, solidness and modulus contrasted with glass strands. In the ongoing days characteristic strands, for example, sisal and flax filaments are supplanting the glass and carbon filaments attributable to their simple accessibility and cost [5]. Starting at now, various examinations have been directed by breaking down various blends of fiber and gum materials [6]. The flexural quality estimations of the half breed fiber fortified composites are sensibly great. Sisal/Glass fiber composite is performing great with the ductile burden [7]. The properties of fiber-strengthened composites rely upon numerous variables, for example, the holding between the strands and the framework, the fiber volume division, the fiber angle proportion, fiber direction and productivity of burden move at the interface [8].

Regular fiber flax is an appropriate auxiliary swap to E-glass for comparable composite little wind turbine sharp edge applications [9]. Flax strands specifically have a Young's modulus similar to glass fibres[10].whereas rigidity and solidness of flax filaments answered to be as high as 1500 MPa and 90 GPa, respectively[11]. Flax has complex inward structure that outcomes in anisotropic versatile properties. Such highlights of the strands can likewise be considered in the direction averaging approach [12]. Ductile and weariness conduct of single sisal fiber at check length GL=20 mm. Ductile cyclic weakness stacking at eight stacking levels (from 0.6 to 0.95) has been completed. The test results lead to huge reliance of the hysteresis circles, vitality scattering of the sisal strands versus the cycle and stacking proportion levels. The qualities for rd= 0.60, scattered vitality (Ed) is practically steady at an incentive around 1.2 mJ. Be that as it may, for higher level at rd= 0.95 of scattered vitality are seen around to 3.2 mJ during the primary cycle [13].Sisal fiber's warm dependability isn't influenced by dewaxing treatment while the mercerization and methyl methacrylate uniting builds the most extreme disintegration temperature by 10ºC when contrasted with untreated strands [14].The elastic property of salt treated coir-polyester composite. From their outcomes it affirmed soluble base treatment gives better property and furthermore numerous scientists announced that antacid treatment expels hemicellulose and lignin viably from the cell divider. Substance treatment improves the mechanical and free vibration properties of polymer composites because of the upgrade of interfacial bond among fiber and network

II. MATERIAL AND METHOD

Four different typres of composite laminates are prepared using the following raw materials[17]:

- Epoxy resin
- Flax fibre
- Sisal fibre
- Glass fibre

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In this work the sap considers is Epoxy gum (LY 556) and the hardener utilized is Araldite HY-951, the lattice is set up by blending the gum and hardener in the proportion of 10:1 and the regular filaments utilized are flax and sisal strands as biaxial mats, The glass fiber utilized is 600 Gsm biaxial glass fiber tangle.

A. Alkali Treatment

The fiber surface is treated as pursues:

1. Flax and sisal fiber tangle were washed with refined water and dried.
2. Then the dried fiber mats were treated with 10% NaOH answer for 1hr at room temperature in a different plate.
3. The treated fiberswere washed with refined water again to expel abundance NaOH clung to the fiber tangle
4. The washed mats were sun-dried for 8 hr and were then stove dried at 50°C for 2 hr.

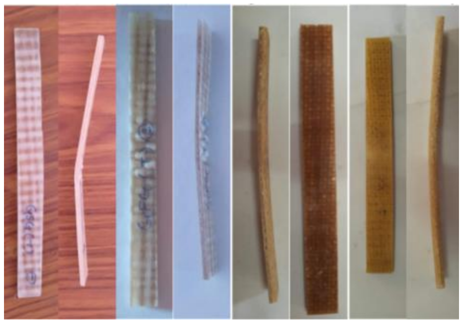
The salt treatment has been done on huge volume of flax and sisal filaments and required measure of that utilized for this work staying utilized for different works.

Figure 1- NaOH treatment of Flax and sisal Fiber

III. EXPERIMENTATION

The warmth avoidance temperature is a proportion of a composites capacity to shoulder a given burden at raised temperatures[18]. This strategy is utilized to decide the temperature at which the distortion happens when examples are exposed to characterized set of testing conditions. The component of the example were 63.0 mm × 12.8 mm × 3.2 mm (length × width × thickness).The heat redirection temperature was examined and estimated by the HDT Tester, and the rules were pursued according to the ASTM D648–01, with the stacking weight of 0.455 MPa, to the raising temperature of 2°C/min. Testing results were gotten from a normal of four examples[16].

Figure 2 - Heat deflection temperature test

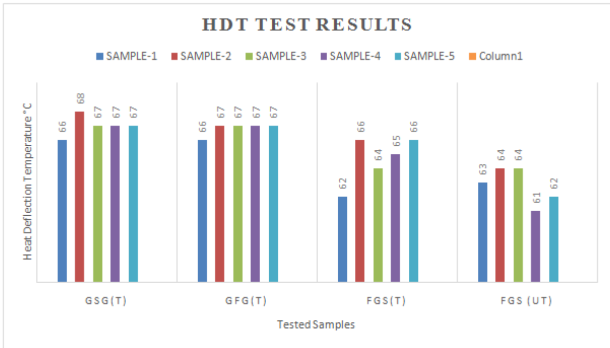


IV. RESULT AND DISCUSSION

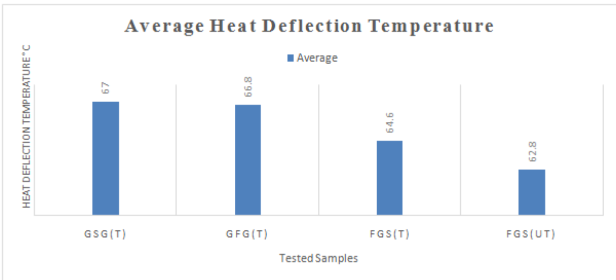
In the HDT test of the hybrid composite as well as natural fiber composite is showing almost good performance to glass fiber reinforced composite when treated with NaOH, results show that GSG (T) has slightly higher heat deflection temperature with an average of 67°C and others GFG (T), FGS (T), FGS (UT) at an average of 66.75°C, 64.6°C, 62.8°C respectively[19].

SPECIMEN NO.	GSG Treated with NaOH	GFG Treated with NaOH	FGS Treated with NaOH	FGS Untreated
1	66°C	66°C	62°C	63°C
2	68°C	67°C	66°C	64°C
3	67°C	67°C	64°C	64°C
4	67°C	67°C	65°C	61°C
5	67°C	67°C	66°C	62°C

Table-1 Results of HDT test



Graph-1 HDT Test Results



Graph-2 Average Heat Deflection Temperature

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V. CONCLUSION

Thus the following conclusion drawn from the study of heat deflection behaviour.

• Fabrication of fiber reinforced laminate by hand layup method is possible

• Four types of composite laminates have been fabricated successful they are flax and glass fiber composite, sisal and glass fiber composite, flax glass and sisal (treated and Untreated with NaOH) hybrid fiber reinforced composite respectively[14].

• The above-mentioned composites are tested for their compression strength and heat deflection temperature behavior according to ASTM standards.

• Heat deflection temperature of GSG (T) is higher when compared to other three composites[15].

Further this work can be extended to by doing more comparative study between mechananical behaviour like tensile,compression strength of alkali treated and untreated natural fiber composite to understand completly about the advantages of alkali treatment on natural fibers and their influence on composite bonding strength.

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