COMPARATIVE AND EXPERIMENTAL INVESTIGATION OF E -GLASS AND S-GLASS ARECA BANANA REINFORCED COMPOSITE

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Abstract - *The main objective of this project is to compare and experiment the investigation of E-glass and S-glass (reinforced with areca and banana). In this research, fiber reinforced polymer was prepared with E-glass and S-glass (reinforced with areca and banana) fiber thickness 30mm. The resins used in this study are epoxy. The resins were synthesized at 10:1 fiber-resin weight percentages. The prepared composites were tested under ASTM standards to study the mechanical properties of the FRP composites such as Tensile strength, Flexural strength and Impact strength.*

Key Words: High Strength, Cost reduction, Easy to make

1. INTRODUCTION

In the realm of composites, innovations are being carried out to improve the trends that are already there in order to achieve better results and use these results in a manner that is more effective. The use of composites as a substitute for traditional construction materials such as plastic, steel, aluminium, concrete, and so on is becoming increasingly common. They are portable, prefabricated, and utilized for the external panels and modular construction of buildings. Shuttering supports, ergonomics, unique architectural features that lend an aesthetic look, and other applications make use of it.

In spite of its extended life, low maintenance requirements, fire retardant qualities, and other benefits, its advantages include corrosion resistance and light weight, both of which have proven to be attractive for a variety of low stress applications. Although significant headway has been made toward achieving this goal, the use of fiber-reinforced polymer, sometimes known as FRP, in structural applications is not universally recognised. In order to achieve high strength, extended duration, and other desirable features, composite-based train panels and automotive body parts are currently in the process of being developed. In composites, the matrix and the reinforcements are both blended with different types of components to generate a material with a wide range of qualities. Reinforcement can be achieved through the utilisation of fibres, either synthetic or natural, with variable weight compositions and orientations.

The minerals, plants, and animals that make up the natural world are where natural fibres are obtained. Cotton, flax, areca, sisal, jute, banana, and coconut are some of the fruits and vegetables that are used as sources. Silk, wool, and mohair are all derived from animal sources. Sources derived from minerals, such as asbestos and metal fibres. Natural fibre is currently serving as one of the plentiful available materials for use in the reinforcement phase, and it possesses a wide range of qualities.

During the course of this research, a bidirectional woven areca fibre mat was utilised on the face side of the laminate, while a bidirectional woven banana fibre mat was utilised as the core material for sandwich composites.

With growing environmental awareness, new rules and legislations scientists and engineers are forced to seek new materials which are more eco-friendly in nature. Hence, the attention of the research community is focused toward finding an eco-friendly material which can give high performance at affordable costs. The keywords with which the eco-friendly materials focused are "biodegradable," "recyclable," "renewable" and "sustainable". Natural fiber composites are one such kind of materials. The usage of natural fibers in the composites is well-known, because of its inherited qualities such as lignocelluloses, renewable, and biodegradability.

However, when compared to studies on other natural fibre reinforced composites, relatively little effort and attention has been directed toward the areca fibre and its reinforced composites, and the amount of literature that has been published on the subject is likewise very limited.

2.Methodology

The methodology includes the process sequentially carried out; this project includes the process of composite laminate preparation and Conduct the mechanical tests like tensile, compression and Impact.

3.Laminate Materials Methods:

The methods and materials used in this process were given below and it represents its detail and characterizations.

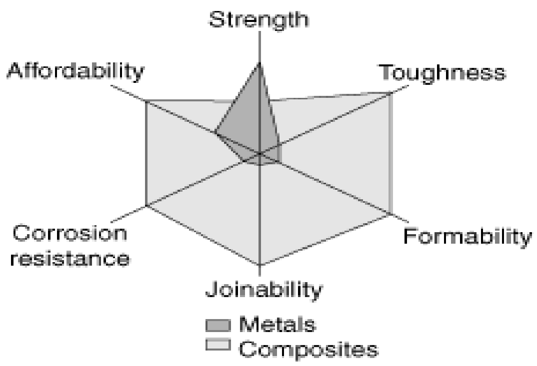

figure -1: PRIMARY MATERIAL SELECTION PARAMETER FOR A HYPOTHETICAL SITUATION FOR METAL AND COMPOSITE

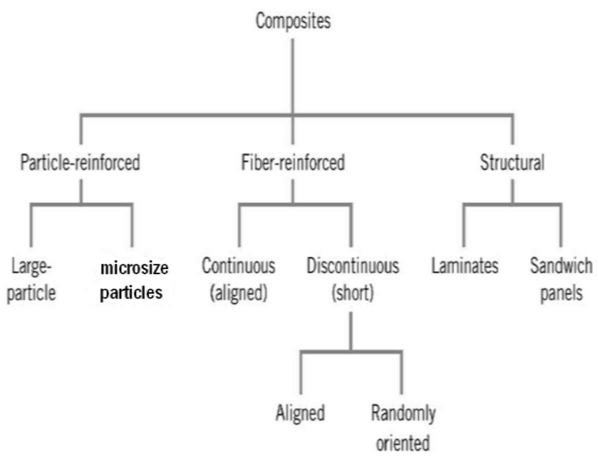

figure -2: CLASSIFICATION OF POLYMER COMPOSITES

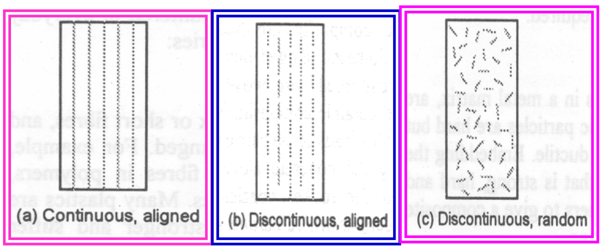

figure -3: TYPES OF FIBER REINFORCED POLYMER

4. CLASSIFICATION OF COMPOSITE

Composites are classified by

1.The geometry of the reinforcement as particulate, structural and fibers

2.The type of matrix as polymer, metal and ceramic

Composites can be categorized into three groups on the basis of matrix material. They are:

a. Metal Matrix Composites (MMC)

b. Ceramic Matrix Composites (CMC)

c. Polymer Matrix Composites (PMC)

4.1. Metal Matrix Composites (MMC)

For example, they have higher specific strength and modulus than monolithic metals and are more resistant to thermal expansion at high temperatures. There are numerous uses for metal matrix composites, such as nozzles in rockets, heat exchangers and structural components, because of these characteristics

4.2 Ceramic Matrix Composites (CMC)

The main objectives in producing ceramic matrix composites are to increase the toughness. Naturally it is hoped and indeed often found that there is a concomitant improvement in strength and stiffness of ceramic matrix composites.

4.3 Polymer Matrix Composites (PMC)

All of these can be found in almost any type of matrix. Polymers, in general, lack the mechanical characteristics necessary for many structural applications. These materials have a lower tensile and compressive strength and stiffness than metals and ceramics. Reinforcing other materials using polymers alleviates these issues.

For the second time, polymer matrix composites do not require high pressure and high temperature for processing. Polymer matrix composite production equipment is easier to use. So, polymer composites progressed quickly and quickly became popular in structural applications as a result of this. Polymer composites are utilized because the total qualities of the composites outweigh those of the constituent polymers. They have a higher elastic modulus than polymers, yet they're not as brittle as ceramics.

figure -4: PREPARATION OF LAMINATION

5.Testing:

In this method three test were conducted tensile test, compression test and impact test. These tests were discussed below.

5.1Tensile Test

Tensile tests are performed for several reasons. Tensile properties often are measured during development of new materials and processes. Tensile properties often are used to predict the behavior of a material under forms of loading other than uniaxial tension. It is to measure of how much it can be deformed before it fractures.

figure -4: UNIVERSAL TESTING MACHINE (UTM)

5.2 Compression Test

A compression test determines behavior of materials under crushing loads. The specimen is compressed and deformation at various loads is recorded.

figure -4: COMPRESSION TEST CONCEPT

5.3 Impact Test

Impact testing is testing an object's ability to resist high-rate loading. An impact test is a test for determining the energy absorbed in fracturing a test piece at high velocity. Most of us think of it as one object striking another object at a relatively high speed.

figure -4: IMPACT TESTING

Important of Impact Testing

Impact resistance is one of the most important properties for a part designer to consider, and without question, the most difficult to quantify. The impact resistance of a part is, in many applications, a critical measure of service life. More importantly these days, it involves the perplexing problem of product safety and liability.

6. Conclusions

S-glass areca banana reinforced composite and E-glass composite is prepared and compared using testing methods and final results were obtained. Hence proves S-glass areca banana reinforced composite is better in every aspects than E-glass composite.

7.Reference

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