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EXPERIMENTAL INVEGTIGATION OF MECHANICAL CHARACTERSTIC ON BIO-BASED COMPOSTICS (SISAL AND COIR FIBRE)

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ABSTRACT

Composite materials are widely used for different applications today. Most of the composites are to affect the environment whereas bio-based composites material are bio-degradable. There are lot of physical parameters such as elongation, moisture, and absorptionetc., compared with the other type of composites.This paper deals with preparation and investigationof bio based composites of natural fibres in epoxy resin. Naturalfibres used here are sisal and coir fibres which are mixed with is epoxy. This composite is manufactured using hand lay-up process. Mechanical properties of each composite are determined through tensile, flexural, impact tests.

Key words: Coir, Sisal, epoxy composites,

1. INTRODUCTION

Composites are formed by combining materials together to form an overall structure that is better than the individual components. Composite materials are made from two or more constituent materials with significantly different physical or chemical properties, that when combined, produce a material with characteristic different from the individual components. The individual components remain separate and distinct within the finished structure. The new materials may be preferred for many reasons: common examples include materials which are stronger, lighter or less expensive when compared to traditional materials.

Green composites

Fibre reinforced polymeric composites have been used for a variety of structural applications because of their high specific strength and modulus compared to metals. Initially developed for the aerospace industry, high-performance or 'advanced' composites are now found in applications from automotive parts to circuit boards, and from building materials to specialty sporting goods. Most composites end up in landfills, while some are incinerated after use, although there are some efforts to recycle and/or reuse them. Both these disposal alternatives are expensive and wasteful, and may contribute to pollution. Infact, most major manufacturers have plans to make their products 'green' or recyclable to the maximum possible extent and are working vigorously towards that goal.Undoubtedly,environment-friendly fully biodegradable reinforced plastics or 'green' composites materials will play a major role in greening the products of the future.

Materials

Natural composites consists of following elements are given below

- Natural fiber
- Filler material
- Resins

NATURAL FIBER (SISAL or COIRFIBER)

SISAL FIBER: Sisal plant belongs to the agave family (Agavaceae) .The composition of sisal fibre is 60–80% cellulose, 5–20% lignin and 5–20% moisture content. Sisal (Agave sisal Ana)

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looks like giant pineapple which can be extracted from its leaves by retting and mechanical extraction methods. Hand extraction machine is used to extract the fibres through

Serrated or non-serrated knives. . Sisal fiber is exceptionally durable and a low maintenance with minimal wear and tear. The fiber extracted is dried under the sun until it turns white in colour and then it is made ready for knotting. Fibre is separated to various sizes and knotting is done on the other side to form long continuous

Strands. It is mainly used for mats, carpets and many other reinforcement materials.

COIR FIBER: Coir (Cocas nucifera) is obtained from the husk of the fruit of coconut palm. Coir fibers are located in between the husk and outer shell of the coconut. Thefibers are made up of small threads ranging from 0.03-0.1 cm long and about 12-24 micro meter in diameter. Coir is composed of lignin, a woody plant substance, and cellulose. They are narrow and hollow with thick walls made of cellulose. The fiber is hydrophilic in nature and has high corrosive resistance against salt water. It is used in products such as doormats, brushes, mattresses etc.

EPOXY RESIN

Epoxy resin holds the good adhesive property with the materials. It is also known as polyepoxides a reactive class of pre-polymers and polymers that contains epoxy groups. Epoxide s are used in fiber reinforcement as it produces the stronger

EXPERIMENTAL WORK MOULD PREPARATION:

To prepare the composite, a mica sheeted table is used. The table isCleaned with distilled water to remove the impurities. Then a coat of wax layer is applied throughout the board to facilitate easy removal of the laminate. Prior to the moulding process, an acid solution of epoxy is applied on the surface of the table which acts as a releasing agent. This is followed by a dwell time of 5-10 minutes for the table to get dried. ACoat of mixed resin is applied on the cleaned surface before placing a layer of sisal and coir fiber. Alternate layer of natural fiber is kept with a coat of resin over it. Consequent layers of natural fiber are placed till the required thickness is obtained. The finished composite now is closed by wooden reapers and clamped at all the possible ends. Then a load of 50-60 kg is applied. The composite is made to cure for 24 hours under hot conditions. After curing the composites are sized according to ASTM standards.

Testing for 3mm	Izod impact value for 5mm thick specimen in J
Impact	0.25

Table; 1

Testing for 3mm	Izod impact value for 5mm thick specimen in J
Impact	0.25

Table; 2

TESTING OF COMPOSITES

- Tensile test
- Bending test
- Impact test

Testing For 5mm plate	CS area (mm)	Peak load [N]	Flexural strength (Gpa)	Flexural modulus (Gpa)
tensile	39	453.055	0.746	11.615
Bending	39	37.101	29.966	1917.383

Table; 3

Testing For 5mm plate	CS area (mm)	Peak load [N]	Flexural strength (Gpa)	Flexural modulus (Gpa)
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Bending	39	37.101	29.966	1917.383

Table; 4

LITERATURE SURVEY

Shakuntala Ojha, **Investigated that the Bio Waste Filler (Wood Apple-Coconut) Reinforced Polymer Composites,**during the last century natural fibres are used as reinforcementin polymer composite has been continuouslygrowing in the composite industry.An attempt has been made to compare the mechanical and tribologicalProperties of the both bio waste wood apple and coconut shell particulate polymer matrix composite.The results show that the wood apple particulate composite shows best erosion and mechanical properties than coconut particulate composite.

T. Panneerselvam**,Evaluation of Mechanical Properties of Coir-Sisal Reinforced Hybrid Composites UsingIsophthalic Polyester Resin,**Composite materials have occupied major part in current era due to its light weight, good stiffness, high specific strength and flexible nature. Due to large availability of naturally occurring fibres and their capability to hybridize with glass fiber, the applications of these fibres vary according to purpose**.**Natural fibres used here are sisal and coir fibres which are mixed with isophthalic polyester in volume fraction basis of 0.4 & 0.5. This composite is manufactured using hand layupprocess. Mechanical properties of each composite are determined through tensile, flexural, impact tests. The tensilestrength of sisal-glass composite is found to be better than the coir-glass composite. The flexural strength and impactstrength of sisal-coir-glass hybrid composite is found to be better than the remaining two combinations of composites.

Sanjeevamurthy,Sisal/Coconut Coir Natural fibres – Epoxy Composites: Water Absorption and Mechanical Properties,Natural fibre's (Sisal and Coconut coir) reinforced Epoxy composites were subjected to water immersion tests in order to study the effects of water absorption on the mechanical properties. Natural fibres like coconut coir (short fiber) and sisal fiber (long fiber) were used in hybrid combination and the fiber weight fraction of 20%, 30% and 40% were used for the fabrication of the composite.The percentage of moisture uptake increased as the fiber volume fraction increased because of the high cellulose content of the fiber. The tensile and flexural properties of Natural fiber reinforced Epoxy composite specimens were found to decrease with increase in percentage moisture uptake. Moisture induced degradation of composite samples was observed at elevated temperature. The water absorption pattern of these composites at room temperature was found to follow Fickian behaviour, whereas the water absorption properties at higher temperature did not follow Fick's law.

Pavithran, Mechanical and thermal properties of sisal fiber-reinforced rubber seed oil-based polyurethane composites,the development of high-performance composite materials from locally sourced and renewable materials was investigated. Rubber seed oil polyurethane resin synthesized using rubber seed monoglyceride derived from glycerolysis of the oil was used as matrix in the composite samples.

Rubber seed oil-based polyurethane composite reinforced with unidirectional sisal fiber were prepared and characterized.Results showed that the properties of unidirectional fiber-reinforced rubber seed oil-based polyurethanecomposites gave good thermal and mechanical properties.

Mohan Lal, **Mechanical property evaluation of natural fiber coir composite,** Natural fibers are not only strong and lightweight but also relatively very cheap. In the present work, coir composites are developed and their mechanical properties are evaluated. Scanning electron micrographs obtained from fractured surfaces were used for a qualitative evaluation of the interfacial properties of coir/epoxy and compared with glass fiber/epoxy. These results

Indicate that coir can be used as a potential reinforcing material for making low load bearing thermoplastic composites.

CONCLUSION

In our project reinforcement is sisal and coir fiber used when using reinforcement of sisal and sugarcance the result of flexural strength is less compared with sisal and coir fiber.when increasing the thickness of composite plate the tensile strength, flexural strength and impact strength is higher increased when compared with 3mm plate.so we have replace the reinforcement of sugarcance to coir for the further application.in future scope when replace is the reinforcement and thickness of plate strength of composites will be increased.

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