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STUDY OF JUTE/GLASS EPOXY BASED HYBRID COMPOSITES

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ABSTRACT

Recently there has been a greater inclination towards natural fiber reinforced plastic composites because these are environmental friendly and cost effective to synthetic fiber reinforced composites. The availability of natural fiber and ease of manufacturing have tempted researchers worldwide to try locally available inexpensive fiber and to study their feasibility of reinforcement purposes and to what extent they satisfy the required specifications of good reinforced polymer composite for structural application. Now a-days, the natural fibres from renewable natural resources offer the potential to act as a reinforcing material for polymer composites alternative to the utilize of glass, carbon and other man-made fibres. Among an assortment of fibres, jute is widely used natural fibre due to its advantages like easy of availability, low concentration, low fabrication cost and satisfactory mechanical assets. designed for a composite material, its mechanical actions depends on many issues such as fibre content, orientation, types, length etc. In this research paper, we will study the effect of fibre loading and orientation on the mechanical, physical and water absorption behavior of jute/glass fibre reinforced epoxy based hybrid composites. A hybrid composite is a combination of two or more dissimilar kinds of fibre in which one type of fibre stability the scarcity of an additional fibre.

KEYWORDS: hybrid composite, epoxy, natural fibre, synthetic fibre.

INTRODUCTION

Composite materials are extending the horizons of designers in all engineering branches, and yet the extent to which this is occurring can easily pass unperceived. In the field of composites, materials are united in such a way as to enable us to make better use of their virtues while minimizing to some extent the effects of their deficiencies. This process of optimization can release a designer from the constraints associated with the selection and manufacture of conservative materials. Complex shapes can be easily manufactured; the complete effort and rebuild the thinking of an established design in terms of composites can often lead to both cheaper and better solutions. The 'composites' concept is not a human invention. Wood is a natural composite material consisting of one species of polymer — cellulose fibres with good strength and stiffness — in a resinous matrix of another polymer, the polysaccharide lignin. Nature makes a much better job of design and manufacture than we do, although Man was able to recognize that the way of overcoming two major disadvantages of natural wood — that of size (a tree has a limited transverse dimension), and that of anisotropy (properties are markedly different in the axial and radial directions) — was to make the composite material that we call plywood. Bone, teeth and mollusc shells are other natural composites,

combining hard ceramic reinforcing phases in natural organic polymer matrices. Man was aware, even from the earliest times, of the concept that combining materials could be advantageous, and the down-to-earth procedures of wattle-and-daub (mud and straw) and 'pide' (heather incorporated in hard-rammed earth) building construction, still in use today, pre-date the use of reinforced concrete by the Romans which foreshadowed the pre-tensioned and post-tensioned reinforced concretes of our own era. But it is only in the last half century that the science and technology of composite materials have developed to provide the engineer with a novel class of materials and the necessary tools to enable him to use them advantageously.

LITERATURE SURVEY

This chapter includes a survey of the past research already available involving the issues of interest. It presents the research works on the hybrid composites and the effect of various parameters on the performance of composites studied by various investigators. The literature review is done based in the following points:

Natural Fibre Based Polymer Composites

Lignocellulosic natural fibres are excellent raw materials for production of wide range of composites for different applications. The interest in using natural fiber such as different plant fiber as reinforcement in polymers increased during last year's.

- The interest in natural fiber reinforced polymer composite materials is rapidly growing both in terms of industrial applications and fundamental research.
- They are renewable, cheap, completely or partially recyclable and biodegradable.
- These fibers are incorporated into a matrix material such as thermosetting plastics, thermoplastics or biopolymers.
- We can use Lignocellulosic materials in the structure of fibres or particles outcomes not only in a considerable increase in biodegradability of a composite but also change its properties, including flame retardancy characteristic.

Synthetic Fibre Based Polymer Composites

Synthetic fibers are made from synthesized polymers or small molecules. With the use of compounds, we can develop these fibers come from raw materials such as petroleum based chemicals or petrochemicals. Materials are polymerized into a long, linear chemical that bond two neighboring carbon atoms. Differing chemical compounds will be used to produce different types of fibers. Synthetic fibers account for about half of all fiber usage, with applications in every field of fiber and textile technology. Although many classes of fiber based on synthetic polymers have been evaluated as potentially valuable commercial products, four of them- nylon, polyester, acrylic and polyolefin - dominate the market. A great advantage of synthetic fibers is that they are more durable than most natural fibers. In addition, many synthetic fibers offer consumer-friendly functions such as stretching, waterproofing and stain resistance. Overtime, things like sunlight and oils from human skin cause fibers in various fabrics to break down and wear away. Natural fibers are much more sensitive to these elements than synthetic blends. This is mainly because natural products tend to be biodegradable. In addition, natural fibers often fall prey to moth and carpet beetles, whose larvae feast on things like cotton, wool and silk. Synthetic fibers are not a good food source for these fabric-damaging insects. As an added advantage, synthetic fibers do not break down easily when exposed to light, water, or oil. Compared to natural

fibers, many synthetic fibers are more water resistant and stain resistant. Some are even specially enhanced to withstand damage from water or stains. Some fabrics are also designed to stretch in specific ways, which makes them more comfortable to wear.

Study on Hybrid Fibre Based Polymer Composites

Hybrid biocomposites can be designed by the combination of a synthetic fibre and natural fibre (biofibre) in a matrix and a combination of two natural fibre / biofibre in a matrix. Hybridization with glass fibre provides a method to improve the mechanical properties of natural fibre composites and its effect in different modes of stress depends on the design and construction of the composites [6]. The effect of hybridization of glass fibre in thermoset biocomposites has been discussed in detail [7]. The tensile and impact behavior of oil palm fibre-glass fibre-reinforced epoxy resin was investigated by Bakar et al [8]. The hybridization of oil palm fibres with glass fibres increased the tensile strength, Young's modulus, and elongation at break of the hybrid composites. A negative hybrid effect was observed for the tensile strength and Young's modulus while a positive hybrid effect was observed for the elongation at break of the hybrid composites. The impact strength of the hybrid composites increased with the addition of glass fibres.

CONCLUSION

There is a wide scope for future scholars to explore the current research area. In this paper, we have study the use of all the composite materials that are very essential like natural fibre, hybrid fibre and synthetic fibre materials. This paper will tell the advantages of all these composite materials.

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