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APPLICATIONS OF COMPOSITES IN WASTE MANAGEMENT

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ABSTRACT : *The modern dynamic world can't imagine its development without bringing the concept of advancement in material composite. Various researches are going on in this field to achieve the desired standard. Natural fiber reinforced polymer composite has a huge affinity to replace the composite made up of synthetic fiber. This is primarily because of the advantages like light weight, non-toxic, non-abrasive, easy availability, low cost, and biodegradable properties. The synthetic fibers have higher end of mechanical properties like tensile strength and tensile modulus however the specific mechanical properties like specific tensile modulus and other specific properties (properties/specific gravity) of natural fiber gives a satisfying result for composites as compared to synthetic fiber based composites. The objective of the present study is to investigate the use of natural fiber reinforced polymer composite from the waste. In the waste many organic substances are thrown out without much concern that they are having a value to be used in the different way and providing their use in second way. The point in using this way of waste management to use the material to its fullest. The other thing which made me to work on this topic is a saying that WHAT APPEARS WASTE TO OTHERS IT APPEARS GOLD TO ME.*

INTRODUCTION : Composite material can be defined as the material which is composed of two or more distinct material on macro scale with different properties to form a new material with a property that is entirely different from the individual constituents. The primary phase of a composite material is called a matrix having a continuous character. In other words, matrix is a material which acts as a binder and holds the fibers in the desired position thereby transferring the external load to reinforcement. These matrixes are considered to be less hard and more ductile. The composite material consists of a matrix along with a fiber with some filler material. The reinforced material can be either synthetic or natural fibers. In the demand of increasing environmental security, several natural fibers reinforced polymer composites (NFPCs) are brought into the competitive market. NFPCs provide a wide range of advantages over synthetic fiber based composites. These advantages include high strength to weight ratio, high strength at elevated temperatures, high creep resistances and high toughness [1]. These advantages can also be in the form of their light weight, high durability and design flexibility. In NFPCs, the used matrices are either thermoset or thermoplastic. Polyester, Epoxy and phenolic resin are the commonly used thermoset matrix whereas polypropylenes, polyethylene and elastomers occupy the large scale position in thermoplastic matrix. Based on the matrix used, composite material can be divided into three types i.e. Metal Matrix Composite (MMC), Polymer Matrix Composite (PMC) and Ceramic Matrix Composite (CMC). The selection of any of the above composite material depends upon the type of application. The most commonly used composites are polymer matrix composite.This is primarily because of their light weight and specific properties compared to ceramics and metals. Besides, the polymer matrix composites can be processed at low temperature and pressure.

In the present study, polyester resin is as the matrix material. Generally, polyester resin has a glassy appearance with classic advantages like good adhesion to other materials, good mechanical properties, good electrical insulating properties, good environmental and chemical resistances etc [1]. The polyester resin when treated with natural fiber to synthesize a fiber reinforced polymer composite, there is an interface formed between the matrix and the fiber. The adhesion between the fibers and the matrix around this interface decides the properties of the composites based on which its further application is decided. There are numerous fibers provided by nature to the human mankind. Based on the source of origin, this natural fiber can be classified into three categories such as animal fiber, vegetable fiber and mineral fibers.

The natural fibre which is wasted in ton of weights is human hair. There are many barber shops which dump human hair as a waste material. The dumping is not done properly and the chances of bacteria formation in the dumped waste increases. The human hair is tested in various experiments for its tensile strengths and show excellent results and give a possibility to be used as a material in composite.

The second material from the waste which can be used as material is coconut hair or fiber. The coconut fiber have excellent tensile and moulded in resin in many shapes. The study of natural fibers also throws impact on the use of grass as a fiber material. The study gives the possibility of many natural fiber material to make composite. The method of processing and testing of composite will be presented in research paper.[2]

The purpose of this study to find the possibility of making composite from waste natural fibers and to find their applications as per their testing results.

OBJECTIVE

The knowledge gap in the present literature review has helped us to set the objectives of this research work which are pointy highlighted below:

a. Fabrication of a new class of epoxy based composites reinforced with different waste materials.

b. Evaluation of mechanical properties such as flexural strength, impact strength, tensile strength and micro-hardness etc.

c. To study the influence of fiber lengths and fiber content on mechanical behaviour of short bamboo fiber reinforced epoxy based composites.

PREPARATION AND TESTING

The waste materials are collected and mixed with the polyester resin with the appropriate proportions to make plates and then they are tested with various machines like universal testing machine, impact testing machine and hardness testing machine for parameters like tensile strength , breaking strength and hardness number.[3]

The result will be discussed in my conclusion and research paper

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