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Experimental Investigation of Mechanical Properties of Baggase Fibre and Baggase Powder Composite Material

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Abstract:In recent years , the natural fibres have attracted substantial importance as potential structural material.Natural fibres are very fast replacing the traditional manmade fibres as reinforcements they have several advantages over manmade fibres.The abundant availability of natural fibre in india such as Pineapple,Bamboo ,Banana , Baggase etc.Gives attention on the development of natural fibre composites primarily to explore value added application avenues .Thousands of tons different crops are produced but most of the wastes do not have useful utilization. These different crops wastes can be used with polymer to form natural fibre composites for many application.

Keywords: Baggase fibre , Composite material, Natural fibres Sugarcane.

I.INTRODUCTION

Composite is a material formed with two or more components,combined as macroscopic structural unit with one component as continous matrix,and others as filters or reinforcements.In the plastic based composites, the polymers,either thermoplastics act as a matrix and flour of wood or natural fibre reinforcement. The reinforcing flour is the main load-carrying component in the composites. It provides high strength and stiffness as well as resistance to bending and breaking under the applied stress. Interface bondingbetween the fillers and the matrix is the key to transfer the stress from the matrix intothe fillers across the interface. The interface adhesion between the polymer matrix andwood fillers can be improved using coupling agents. The coupling agents will form abond between the wood flour (reinforcement) and the thermo-plastic (matrix) through the improved comparibilityand developing a mechanical or chemical bonding. India endowed with an abundant availability of natural fibre such as jute, pineapple, bamboo, banana etc. has focused on the development of natural fibre composites primarily to explore value-added application avenues. Such natural fibre composites are well suited as wood substitutes in the housing and construction sector. The development of natural fibre composites in India is based on two pronged strategy of preventing depletion of forest resources as well as ensuring good economic returns for the cultivation of natural fibres. The developments in composite material after meeting the challenges of aerospace sector have cascaded down for catering to domestic and industrial Composites are applicatio are one of theMost widely used materials because of their adaptability to different situations and the relative ease of combination with other materials to serve specific purposes and exhibit desirable properties.

In surface transportation, reinforced plastics are the kind of composites used because of their huge size. They provide ample scope and receptiveness to design changes, materials and processes.

APPLICATIONS:

1.5.1 FRP Doors and Door Frames

With the scarcity of wood for building products, the alternative, which merits attention, is to promote the manufacturing of low cost FRP building materials to meet the demands of the housing and building sectors. The doors made of FRP skins, sandwiched with core materials such as rigid polyurethane foam, expanded polystyrene, paper honeycomb; jute/coir felt etc. can have potential usage in residential buildings, offices, schools, hospitals, laboratories. As structural sandwich construction has attained broad acceptance and usage for primary load bearing structures, the FRP doors can be manufactured in various sizes and designs using this technology.

The principal fabrication technique employed is contact moulding or hand lay-up process. The front and back sheets of the doors are fabricated separately. Wooden inserts are placed between two sheets for various fittings. The PU foam is sandwiched between the sheets by in-situ foaming process followed by painting and polishing to meet aesthetic requirement. Proper usage of additives imparts fire retardant properties to the doors. In addition, usage of composite

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material for the doors makes them totally water & termite resistant. FRP doors are much cheaper than the wooden ones. The FRP doorframes can also be fabricated by contact moulding.

The FRP doors and doorframes have been designed & developed using the aforesaid technology by the RV-TIFAC Composite Design Centre (CDC) at Bangalore under the Advanced Composites Mission programme of the Govt. of India. The FRP doors developed by CDC conform to BIS specifications (IS: 4020). After successful field trials and users' feedback, the technology for FRP door has been transferred to over 30 entrepreneurs for commercial exploitation.

The fibre glass veil facing used while moulding the panels for suspended ceilings increases panel stiffness and resists puncturing. Due to their easy printability, the veil imparts good panel aesthetics. The suspended ceilings are used to cover up electrical wiring, ducting, piping and fittings. The veil with an optimum porosity contributes to improved acoustical quality of the working or living space.

1.5.3 Natural Fibre Composites in Building Materials

Natural fibres, as a substitute for glass fibres in composite components, have gained interest in the last Composite Ceiling Panel decade, especially in the housing sector. Fibres like flax, hemp or jute are cheap, have better stiffness per unit weight and have a lower impact on the environment. Structural applications are rare since existing production techniques are not applicable and availability of semi-finished materials with constant quality is still a problem. Typical composite material

The moderate mechanical properties of natural fibres prevent them from being used in high-performance applications (e.g. where carbon reinforced composites would be utilized), but for many reasons they can compete with glass fibres. Advantages and disadvantages determine the choice. Low specific weight, which results in a higher specific strength and stiffness than glass is a benefit especially in parts designed for bending stiffness.

Recently the use of natural fibres for composite applications is being investigated intensively in Europe. As a result,

The rapid expansion of the use of composite construction in many fields has yielded a more precise knowledge of design methods, test procedures and manufacturing techniques of cost-effective composite products. A low-density core made of honeycomb or foam materials provides a structural performance with minimum weight.

Fig 1.2FRP Doors and Door Frames

many components are now produced in natural composites, mainly based on polyester or polypropylene and fibres like flax, bagasse or ramie. Until now however,

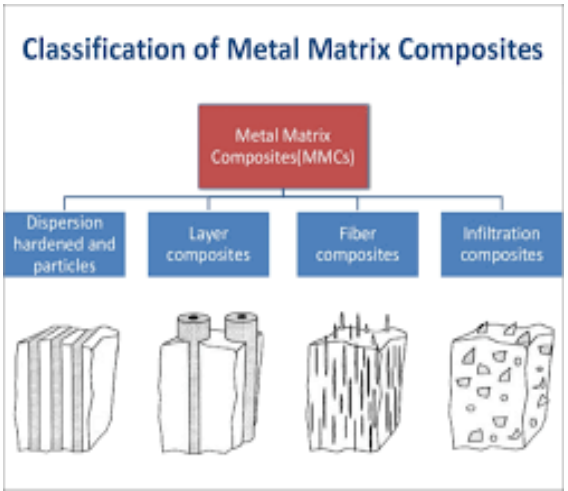
Kitchen Application:

An increasing number of studies performed in recent years to produce ceramic sink, ceramic coatings, marble kitchen
KITCHEN TYPICAL COMPOSITE

Energy cost is the main reason for the alternative composite material search in terms of ceramic material. Ceramic coatings are fired approximately .

TYPES OF COMPOSITE MATERIALS
Broadly, composite materials can be classified into three gro ups on the
basis of matrix material. They are

i.Metal Matrix Composites (MMC)
ii.Ceramic Matrix Composites (CMC)



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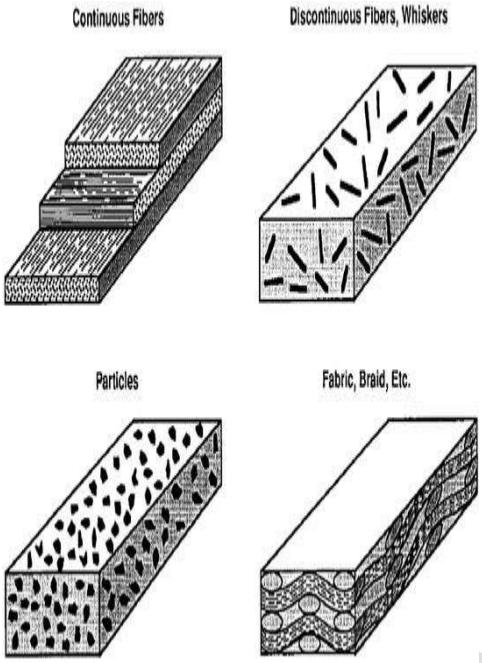
iii.Polymer Matrix Composites (PMC)

2.1.1 Metal matrix composites

Higher specific modulus, higher specific strength, better pro perties at elevated
temperatures and lower coefficient of thermal expansion are the advantages of metaMatrix Composites over monolithic metals. Because of these attributes metal matrixcomposites a re under consideration for wide range of applications viz. co mbustionchamber nozzle (in rocket, space shuttle), housings tubing, cables, heat exchangers, structural members etc.

CERAMIC MATRIX COMPOSITES :

Polymeric matrix composites are the most commonly used



matrix materials. The reasons for this are twofold.In general, the mechanical properties of polymers inadequate for many structural purposes. In particular, their strength and stiffness are low compared to metals and ceramics. By reinforcing other materials with polymers these difficulties can be overcome. Secondly high pressure and high temperature are not required in the processing of polymer matrix composites, also similar equipment is required for manufacturing polymer matrix composites for this reason polymer composites devolved rapidly and became popular for structural applications with no time. Polymer composites are used because over all properties of the composites are superior to those of the individual polymers.

TYPES OF POLYMER COMPOSITES
Broadly, polymer composites can be classified into three gro ups on the basis of reinforcing material. They are:

i. Fiber reinforced polymer (FRP)
ii. Particle reinforced polymer (PRP)
iii. Structural polymer composites (SPC)

FIBER- REINFORCED COMPOSITES

Reinforcing fibers can be made of metals,ceramics and glasses. Fibers increase the modulus of the matrix material. The strong covalent bond along the fibres length very high gives modulud in this the direction because to break orextend the fiber the bonfs must also be broken or moved. Fibers are difficult to process into composites which makes fiber reinforced composites relatively expensive. Body parts of race cars and some automobiles are compositew made of glass fibers (or fibreglass) in a thermo set matrix. Application involving totally multidirectionl applied stresses normally use discontinuous fibers,which are randomly oriented in the material. Considerarion of orientation and fiber length for particular composites depends on the level and nature of the applies stress as well as fabrication cost.

Production rates for short-fiber composites (both aligned and randomly oriented) are rapid, and intricate shapes can be formed which are not possible with continous fiber reinforcement.

PARTICULATE COMPOSITES:

Particulate composites consist of a matrix reinforced by a dis persed phase in
form of particles.
1. Composites with random orientation of particles
2. Composites with preferred orientation of particles, dispers ed phase of
these materials consists of two-
dimensional flat platelets (flakes), laid
parallel to each other.

LAMINATE COMPOSITES

When a fibrereinforced composites consists of serval layers with different fibre orientations, it is called multilayer or angle ply composites. Development of new composites and new applications of composites is acceleration due to requirement of materials with unusual combination of properties that cannot be met by the conventional monolithic materials. Actually, composite materials are capable of covering this requirement in all means because of their heterogeneous nature properties of composites arise as a function of its constituent material, their distribution and the inter action among them and as a result an unusual

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combination of material properties can be obtained.

MATERIALS USED

1.POLYPROPYLENE
2.EPOXY RESIN LY556
3.HARDENER HY951
4.BAGASSE FIBER&POWDER

POLYPROPYLENE

Propene undergoes addition polymerization to produce poly(propene) often known as polypropylene, which is one of the most versatile thermoplastic polymers available commercially mixture of propene and other monomers form a wide range of important co-polymers

PROPERTIES OF POLYPROPYLENE
1.Low density
2.High stiffness
3.Good transparency

Conclusion:

In this study comparison of mechanical properties bagasse fiber and bagasse powder composite material from this research bagasse powder have a high ultimate force, ultimate stress, total elongation, yield stress tensile test and flexural test than bagasse fiber composite.

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