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DRAINAGE PLATE BY USING COMPOSITE MATERIAL (EPOXY GLASS FIBER)

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ABSTRACT

Epoxy glass fiber is a composite material made up of at least two materials, and these two materials are combining to give properties superior to those of the individual constituents. This composite material is used to overcome the problems facing drainage plate of concrete The result of this material is lighter in weight, high strength, stronger and more durable solution compare to other materials. The primary reason for chose these materials are weight saving for its relative stiffness and strength. Epoxy glass fiber Composite materials are environmental friendly, low cost, corrosion resistant, good strength. Composite are a thermal insulator which is good for fire and blast protection. Composite product can be combined and designed with view to specific load bearing capacity.

Keywords: Drainage plate, Epoxy glass fiber

I.INTRODUCTION

In today's scenario, the drainage plate are made by cement concrete which has better strength but costlier and has low strength to weight ratio and stiffness to weight ratio. Since it is not capable to sustain drastic environmental conditions it fails by gradual fracturing. The main Moto of investigation is to reduce the weight to strength ratio and weight to stiffness ratio. To solve problem in this regard composite materials play an important role. As composites made up of various resins and fibers are less dense, high strength seem to resolve problems.Natural fibers composites are considered to have potential use as reinforcing material in polymer matrix composites because of their good strength, low cost, environmental friendly, high fatigue strength, good chemical and corrosion resistant. So in the end we select resins and various fibers for manufacturing drainage & manhole plates.

C.V. Srinivasa, K.N. Bharath et al. presented Impact and Hardness Properties of Areca Fiber-Epoxy Reinforced Composites. Natural Fibers composites are considered to have potential use as reinforcing material in polymer matrix composites because of their good strength, stiffness, low cost, environmental friendly and biodegradable. In present study, mechanical properties for natural fiber composites were evaluated. Here, areca fiber is used as new natural fiber reinforcement and epoxy resin as matrix. K. Devendra1, T. Rangaswamy2 presented Strength

Characterization of E-glass Fiber ReinforcedEpoxy Composites with Filler Materials In this research work, an investigation was made on the mechanical properties of E-glass fiber reinforced epoxy composites filled by various filler materials. Composites filled with varying concentrations of fly ash, aluminum oxide (Al2O3), magnesium hydroxide (Mg(OH)2) and hematite powder were fabricated by standard method and the mechanical properties such as ultimate tensile strength, impact strength and hardness of the fabricated composites were studied. The test results show that composites filled by 10% volume Mg(OH)2 exhibited maximum ultimate tensile strength and hardness. Fly ash filled composites exhibited maximum impact strength.
SushilB.Chopade1, Prof.K.M.Narkar, Pratik K Satav Design and Analysis of E-Glass/Epoxy Composite Mono leaf Spring for Light Vehicle. In today's scenario, the main weightage of investigation is to reduce the weight of product while upholding its strength. To solve problem in this regard composite materials play an important role. In this paper decreasing the weight of light vehicle is considered. The foremost component of the suspension system of vehicle is leaf spring, it has substantial amount of weight, and it is necessary it would have ample strength because it needs to resist vibrations and jolts during its working. The prominence of the paper is to reduce the overall weight of suspension system and improve load carrying capacity of the leaf spring by using the composite material. The design considerations for this study are stress and deflection.
Puneet Sharma, Vijay Kumar Bhanot et al given the Information About Composite Material. The objective of this research was to gain a better understanding of Mechanical properties of epoxy resin composites reinforced with carbon fiber. The effect of fiber orientation of laminates has been investigated & experimentation was performed to determine property data for material specifications, the laminates were obtained by hand layup process .The laminates were cut to obtain ASTM standards.
Naheed Saba Mohammad jawed presented recent advances in epoxy resin, natural fiber-reinforced epoxy composites and their applications. The versatile characteristic of epoxy and its diversity made it suitable for different industrial applications such as laminated circuit board, electronic component encapsulations, surface coatings, potting, fiber reinforcement, and adhesives. The applications in many high-performance field limited the epoxy use because of their delaminating, low impact resistance, inherent brittleness, and fracture toughness behavior. Currently modified epoxy resins are extensively used in fabrication of natural fiber-reinforced composites and in making its different industrial products because of their superior mechanical, thermal, and electrical properties.
Prashanth Banakar, H.K. Shivananda presented Preparation and Characterization of the Carbon Fiber Reinforced Epoxy Resin Composites. The objective of this research was to gain a better understanding of Mechanical properties of epoxy resin composites reinforced with carbon fiber. The effect of fiber orientation of laminates has been investigated & experimentation was performed to determine property data for material specifications, the laminates were obtained by hand layup process. This investigation deals with the testing of tensile and flexural strength on a universal testing machine. This research indicates that the mechanical properties are mainly dependent on the fiber orientation of laminated polymer composites.

II.THEORETICAL CALCULATIONS

1. Standard data collection from various resources
2. Survey of available materials
3. Choose best manufacturing process on basis of cost optimization.
4. Study of different bonding processes as per standards.
5. Proper selection of fiber orientation in matrix.
6. Calculate suitable dimensions

III.EXPERIMENTAL SETUP

3.1 UTM Machine

In testing, we are going to see actual response of plates to stresses on standard testing machine.

Fig.1: UTM Machine

The set-up and usage are detailed in a test method, often published by a standards organization. This specifies the sample preparation, fixturing, gauge length (the length which is under study or observation), analysis, etc. The specimen is placed in the machine between the grips and an extensometer if required can automatically record the change in gauge length during the test. If an extensometer is not fitted, the machine itself can record the displacement between its cross heads on which the specimen is held. However, this method not only records the change in length of the specimen but also all other extending / elastic components of the testing machine and

its drive systems including any slipping of the specimen in the grips. Once the machine is started it begins to apply an increasing load on specimen. Throughout the tests the control system and its associated software record the load and extension or compression of the specimen

3.2 Drainage plate

The most common manufacturing process for fiberglass is the wet lay-up or chopper gun spray process using an open mold. The shape of the part is determined by the shape of the mold, and the mold surface is typically in contact with the exterior of the part. Mold release is first applied to the mold to prevent the fiberglass part from adhering to the mold. Gel coat, which is pigmented resin, is applied to the mold to give the part color. Fiberglass and resin are then deposited onto the mold and the fiberglass is compressed by rollers, which evenly distributes the resin and removes air pockets. Multiple layers of fiberglass are deposited until the desired thickness is achieved. Once the resin is cured, the part is removed from the mold. Excess material is trimmed off, and the part is ready for paint and assembly. There are also closed mold processes for making fiberglass parts.

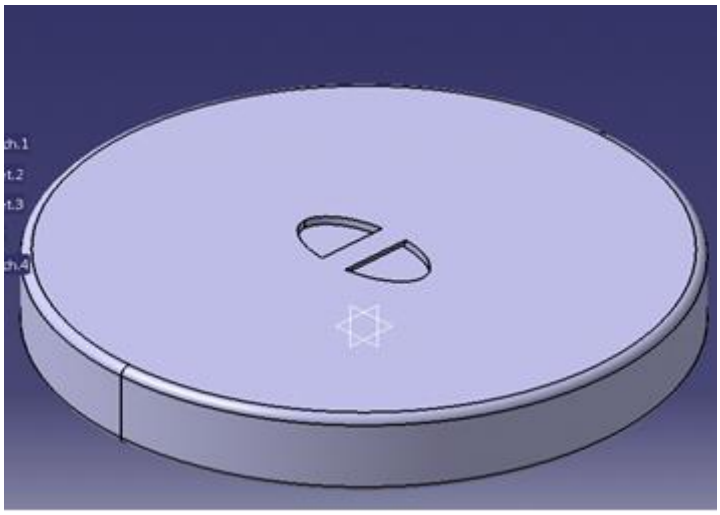

Fig.2: Drainage Plate

IV. EXPERIMENTAL PROCEDURE

1. The load pointer is set at zero by adjusting the initial setting knob.
2. The dial gauge is fixed and the specimen for measuring elongation of small amounts.
3. Measuring the diameter and thickness of the test piece by vernier caliper at least at three places and determine the mean value also mark the gauge length.
4. Now the specimen is gripped between upper and middle cross head jaws of the m/c.
5. Set the automatic graph recording system.

6. Start the m/c and take the reading.
7. The specimen is loaded gradually and the stress value is noted until the specimen breaks.

Advantage

1. Reduce weight of the Drainage plate
2. Better Strength as compare to Concrete Drainage plate
3. Environmental Friendly
4. Corrosion Resistant
5. Low Cost

Disadvantage

1. Initial cost is high
2. No maintenance

V. CONCLUSION

Epoxy resin and E-glass fiber composite materials plate have a good strength and toughness over concrete plate. It reduces weight of the drainage plate and better strength as compare to concrete Drainage plate. The composite material drainage plate is environmental friendly, corrosion resistant and low cost.

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