

Development and Evaluation of Mechanical Properties Glass Powder Filled Epoxy Composite

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ABSTRACT: Composite materials are the class of materials which has lot of scope in the field of several engineering applications. Lot of research and study is needed in this regard to develop the composite materials as promising materials that is comparable with conventional metals. Polymer Matrix Composite (PMC) has been fabricated from waste materials such as glass powder, ceramic powder, etc. An attempt has been made in this work to develop and characterize epoxy based glass powder composite by varying the glass powder in terms of weight percentage. i.e. 30%, 50% of glass powder in the epoxy matrix by compression moulding method.

KEYWORDS: Polymer Matrix Composite, glass powder, epoxy resin.

I. FABRICATION

The circular pipe is used as die. There are two plungers fabricated to compress the material at both the ends of the pipe. The plungers are turned from steel rods to the inner diameter of the pipe, so that tight fit can be obtained. The prepared die and plunger are shown in the fig.1



Fig. 1 Die and plunger

Two different composition samples are fabricated with the above combination of glass powder and epoxy. Sample 1 consists of 70% epoxy resin and 30% of glass powder. Then the hardener is added that composite. This mixture is mixed manually by using iron rod.

By using the plunger, one end of the pipe is arrested and the mixture is poured into it. During the filling of material care must be taken to avoid blow holes and porosity. After filling of material in the pipe the other end of the pipe is also shut by another plunger. Then it is fixed in the lathe, one end of the pipe is fixed to the chuck, and on the other end

compressive force is applied by the tail stock. Now the pipe is fully sealed against any movement. Then it is kept to dry in the same position for 1-2 days.

After two days of dryness, the tailstock is taken back and the plunger is removed. During removal of plunger, ensure that its dried completely. For removal of the composite material from pipe, turning operation must be done. By turning the pipe, composite material is taken out. The specimen with 70% epoxy and 30% glass powder for removing from the pipe is shown in fig.2



Fig. 2 Composite material taken out by turning operation

TABLE I
WEIGHT PERCENTAGE RATIOS

Material	Sample 1	Sample 2
Epoxy	70%	50%
Glass powder	30%	50%

II. MICRO STRUCTURE ANALYSIS

Micro structure analysis reveals the structure of the prepared surface of material as shown in the microscope above 25* magnification. Microstructure strongly influences physical properties. Distribution of metal materials all over the specimen. Microstructure of glass powder with epoxy resin in the ratio of 30:70 is shown in the below figure.3. The white spots in the image shows the presence of glass powder and other portion of the image shows the epoxy resin.

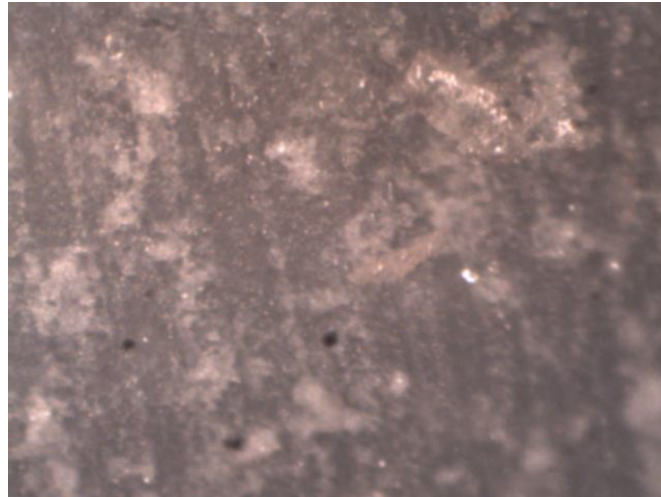


Fig. 3 Micro structure of glass powder filled epoxy composite

III. CONCLUSION

The glass powder is uniformly distributed in the epoxy resin, it will give a good mechanical property to the composite. The mechanical properties testings such as tensile test, impact test, hardness test are going to be carried out.

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