

**DETERMINATION OF EFFECT OF THE NUMBER OF LAYERS OF
COTTON REINFORCING FIBERS IN PLASTER OF PARIS COMPOSITE
LAMINATE**

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Abstract:

Plaster of Paris is used in making the composite material, which can be used as thermal insulator and decorative interiors. The false ceiling, roofing for decoration is mostly done by POP, for installation of Air conditioning it is one the requirement to have a false ceiling. The POP is acts like a matrix and a reinforcing fiber may be used to make POP slabs. In this paper it is aimed to find the effect of number of layers of cotton fibers in POP matrix (resin) POP is used as a binding material.

1. Introduction :

The impact strength of the POP alone i.e without the reinforcing material is about 72765 J/sq m. This will be improved with reinforcing with cotton fibers. As the number of layers increases the impact strength will increase to some extent and then it will decrease. The POP is a poor thermal conducting material and cotton fibers can also be used as the insulating material, hence a composite material with cotton fibers and POP can be used for thermal insulation with good impact strength. One of their major fields of application can be found in structural components for the automotive industry. The main advantage of using natural fibers is their high energy-absorbing capacity resulting from their low modulus of elasticity.

ASTM standards should be followed for testing the material, but generally the fabrication and testing is done at the conditions where they are supposed to be used, like POP false roofing, glass fiber polyester resin is used for making cooler bodies and ordinary fishing boats.

2. Experimental procedure :

2.1 Fabrication of samples

The samples are fabricated in hand layup process Hand lay-up is a simple method for composite production. A mold must be used for hand Lay-up parts unless the composite is to be joined directly to another structure. The molds can be as simple as a flat sheet or have infinite curves and edges. For some shapes, molds must be joined in sections so they can be taken apart for part removal after curing. Before lay-up, then mold is prepared with a release agent to insure that the part will not adhere to the mold. Reinforcement fibers can be cut and laid in the mold if necessary. A brush, roller or squeeze can be used to impregnate the fibers with the resin. The lay-up technician is responsible for controlling the amount of resin and the quality of saturation.

The samples are made in different forms like

1. POP is taken and mixed with water and one layer of cotton fiber is kept at bottom , then POP water mixture is poured on it and another layer of cotton fiber is kept at the top of the mixture, in this way 2 layers of cotton fiber , POP composite laminate is made
2. To make 4, 6, 8 and 10 layers of cotton fiber and POP mixture same procedure is followed , but in between the layers also POP water mixture is kept
3. They are cured in the atmosphere for 3 days and taken for the test.



Fig 3.1.1 Preparing POP water mix



Fig 3.1.2 Placing the POP in moulds

3.2 Charpy test:

3.2.1 Equipment and material

Impact testing machine

Specimen is hybrid composite material

3.2.2 Specifications

Charpy test

Pendulum drop angle 140°

Pendulum effective weight 210 N

Striking velocity of pendulum 5.346 m/sec

Pendulum impact energy min scale graduation 2J

3.2.3 Procedure

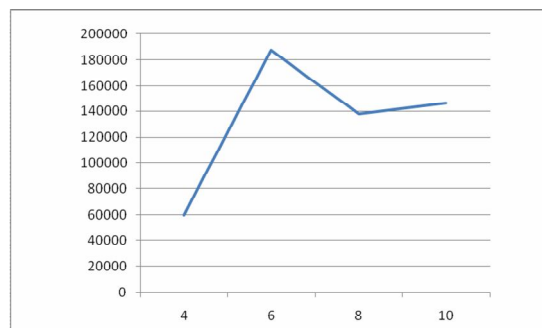
CHARPY TEST:

- With the help of clamping device firmly secure the charpy striker at the bottom of the hammer of the swinging pendulum
- Before conducting the actual test determine the friction loss in the impact testing machine by conducting Perrault test with no specimen fixed.
- For this test adjust the reading pointer along with the pointer carrier to 300J on the dial and then raise the hammer by hands and latch it with the angle fall being 140

- Now release the hammer by operating the latch lever if the pointer coincide with zero on the scale it indicates that there is no friction losses. but if the pointer shows the reading on the scale it indicate the energy loss due to friction .from this reading it is to be conformed where the friction losses more than 0.5% of the initial potential energy if it exit than the friction loss is added to the final reding
- After the friction losses determine adjust the pointer along with pointer carries 300j on the dial, when the pendulum I hanging freely vertical. now again race the hammer manually and latch it with the angle of drop being 140°
- Place charpy test specimen has simple supported beam on the specimen support. such that notch faces opposite to the striking edge of the strike
- After ascertaining there is no person in the range of swinging pendulum, is the pendulum by operating the latch lever so that it factures the specimen and than recesses to certain height. Note down the reading shown by the pointer on the scale which indicates the impact strength toughness of the material being tested in Joules.

4. Tabulations and calculations

S.N	Number of layers	area in sq m	Impact energy in J	Impact Strength J/Sq m
1	4	0.0007	42	60000
2	6	0.000874	164	187643
3	8	0.00081	112	138271.6
4	10	0.00039	57	146153.8



Impact strength in J/sq m V/s Number of layers

5. Conclusions :

1. As the number of layers increased the impact strenght increased then decreased
2. The sample having 6 layers of cotton fiber is having more impact strenght and the sample with 4 layers is having least strength

References:

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