

Flexural properties of phenolic resin reinforced with glass powder

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Abstract: Glass powder was used to reinforce phenolic resin to increase its flexural strength for structural engineering applications by a research centre on composites, University of Southern Queensland (USQ). Provided sufficient strength of the composites is maintained for structural applications, the centre wishes to add in as much glass powder as possible to reduce cost. This project varies the percentage by weight of the glass powder in the composites from 5% to 30% in step of 5 %. The specimens were then subjected to flexural tests. This is the second study on the same project with a view to confirming the results obtained in the previous study. The results show that composite with 15 % by weight of the glass hollow spheres produces the highest flexural strength and flexural modulus combined with a very good fluidity for casting. The maximum flexural strain achieved was with neat resin. The results on flexural strength, flexural modulus and maximum flexural strain coincided with those in the previous study.

Keywords: Flexural strength, flexural strain, flexural modulus, phenol formaldehyde, phenolic resin, glass hollow spheres and glass powder.

Figure 2 shows the flexural in action.

The equation used for calculating the flexural stress, $\sigma_f = \frac{3PL}{2bh^2}$ (1)

The equation used for calculating the flexural strain, $\varepsilon_f = \frac{6Dh}{L^2}$ (2)

The equation used for calculating the Young's modulus, $E_B = \frac{L^3 m}{4bh^3}$

$= \frac{\text{Flexural strength}}{\text{Flexural strain}}$ (3)



Figure 2: Three-point bending test on flexural specimen