

Effect of Permeability on Glass Fiber Reinforced Plastic Laminate Produced by Vacuum Assisted Resin Transfer Molding Process

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Abstract : Vacuum assisted resin transfer molding (VARTM) is one of the manufacturing technique that is viable for production of fiber reinforced polymer composite components suitable for aerospace, marine and commercial applications. However, the repeatable quality of the product can be achieved by critically fixing the process parameters such as Vacuum Pressure (VP) and permeability of the preform. The present investigation is aimed at studying the effect of permeability for production of Glass Fiber Reinforced Plastic (GFRP) components with consistent quality. The VARTM mould is made with an acrylic transparent top cover to observe and record the resin flow pattern. Six layers of randomly placed glass fiber under five different vacuum pressures VP1 = 0.013, VP2 = 0.026, VP3 = 0.039, VP4 = 0.053 and VP5 = 0.066 MPa were studied. The laminates produced by this process under the above mentioned conditions were characterized with ASTM D procedures so as to study the effect of these process parameters on the quality of the laminate. Moreover, as mentioned there is a considerable effect of permeability on the impact strength and the void content in the laminates under different vacuum pressures. SEM analysis of the impact tested fractured GFRP composites showed the bonding of fiber and matrix.

Keywords : permeability, vacuum assisted resin transfer molding (VARTM), ASTM D standards, SEM

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