

Using Eddy Current to measure 3d woven carbon fibre composite fibre volume fraction (fvf)

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The 3D woven carbon fibre composites are a relative new range of composite available. Their major advantage lays in the 3D woven fabric which makes up the composites. Because of their damage tolerance capabilities 3d woven are used in critical structures. To comply with the critical structures assembly, checks of the fibre volume fraction (fvf) of fabrics has to be confirmed before lamination. To do this Ether NDE and M Wright and Sons Ltd have developed an Eddy Current scanning methodology to measure the fvf of dry and infused fabrics. Prior knowledge indicates that as the fibre volume fraction increases, the conductivity of a particular composite increases. Also the laminate capacitance is inversely proportional to thickness therefore with increase in fvf there will be an increase in phase shift. An Eddy current NDT equipment was used to scan a range of 3D woven carbon fibre composite differing in areal weight and thickness. Plotting the results of the scans, a curvilinear relationship between phase shift and fvf was established. When compared against calculated values a close relationship was found. From this work it was possible to determined that: - the phase measurement is more accurate means of determining conductivity because amplitude measurement is dependent on the material thickness, -a method to measure fvf of carbon fabric/composites has been established.