



Failure Mode and Strength of FRP/Steel Joints Bonded with MWCNT Epoxy Adhesive

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ABSTRACT

In order to achieve a load bearing structure the quality of the adhesive bond between a metal and a composite substrate must be optimised. Surface preparation of the substrates and the adhesive properties are the two most vital parameters that need to be taken into account during the joint manufacturing to ensure a good bond without giving any rise to peel stresses.

The main objective of this study is to improve the bond of metal to composite joints by surface modification of the metal substrate accompanied by modification of the adhesive properties aiming to the mechanical interlocking of the adhesive within the metal substrate.

In this investigation steel is used as the metal substrate onto which carbon (CFRP) and glass (GFRP) reinforced epoxy composite are bonded. The surface preparation of the steel substrates is either shot blasting or chemical pre-treatment.

Co-cured CFRP/Steel and GFRP/Steel joints are manufactured using both pure epoxy resin and epoxy resin reinforced with MWCNTs (0.1 and 0.3 CNT wt. %) as the adhesive.

Lap shear tests and double cantilever beam (DCB) tests are conducted in order to investigate the two different surface preparation methods that were employed. Also, an evaluation of the shear strength and fracture toughness of the joints related to the effect of the addition of CNTs into the adhesive will be presented.

Keywords: Carbon Nanotubes, Nano-reinforced adhesive, Hybrid joints