Accepted Manuscript

In-situ repair of composite sandwich structures using cyanoacrylates

Jack F. Cullinan, Paul Velut, Veronique Michaud, Michael R. Wisnom, Ian P. Bond

PII: S1359-835X(16)30117-8
DOI: http://dx.doi.org/10.1016/j.compositesa.2016.04.029
Reference: JCOMA 4290

To appear in: *Composites: Part A*

Received Date: 1 December 2015
Revised Date: 25 April 2016
Accepted Date: 30 April 2016

Please cite this article as: Cullinan, J.F., Velut, P., Michaud, V., Wisnom, M.R., Bond, I.P., In-situ repair of composite sandwich structures using cyanoacrylates, *Composites: Part A* (2016), doi: http://dx.doi.org/10.1016/j.compositesa.2016.04.029

IN-SITU REPAIR OF COMPOSITE SANDWICH STRUCTURES USING CYANOACRYLATES

Jack F. Cullinan[a], Paul Velut[c], Veronique Michaud[b], Michael R. Wisnom[a] and Ian P. Bond[a]

[a]*Advanced Composite Centre for Innovation & Science (ACCIS), Department of Aerospace Engineering, University of Bristol, Bristol, BS8 1TR, United Kingdom*
[b]*Laboratory of Polymer and Composite Technology (LTC), Ecole Polytechnique Federale de Lausanne (EPFL), CH-1015, Switzerland*
[c]*Décision S.A., Lausanne, CH-1024, Switzerland*

Corresponding Email: jack.cullinan@bristol.ac.uk

Abstract

A novel method for the in-situ repair of composite sandwich structures using microvascular networks and cyanoacrylate (CA) adhesive systems has been presented. Upon a damage event, the vascules become ruptured, providing a route for the introduction of adhesive directly into the damage site. The efficacy of the two repair agents was first assessed under static and fatigue conditions using a modified double cantilever beam (DCB) method. Once baseline fracture behaviour of the cyanoacrylates has been established, they were further assessed by injection into a series of pre-damaged T-joint specimens. The presence of the vasculature was shown to have no detrimental impact on mechanical performance, whilst both of the cyanoacrylates were shown to be highly effective in the recovery of stiffness and ultimate strength of the T-joint specimens.

Keywords: A. Sandwich Structures, B. Fatigue, B. Damage Tolerance, Self-Healing