Accepted Manuscript

Determination of adhesion strength of pre-bond contaminated composite-to-metal bonded joints by centrifuge tests

M. Hoffmann, K. Tserpes, E. Moutsompegka, M. Schlag, K. Brune

PII: S1359-8368(17)34190-2

DOI: 10.1016/j.compositesb.2018.04.014

Reference: JCOMB 5622

To appear in: *Composites Part B*

Received Date: 3 December 2017

Revised Date: 21 March 2018

Accepted Date: 5 April 2018

Please cite this article as: Hoffmann M, Tserpes K, Moutsompegka E, Schlag M, Brune K, Determination of adhesion strength of pre-bond contaminated composite-to-metal bonded joints by centrifuge tests, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.04.014.

Determination of adhesion strength of pre-bond contaminated composite-to-metal bonded joints by centrifuge tests

M. Hoffmann[1], K. Tserpes[2,*], E. Moutsompegka[2], M. Schlag[1] and K. Brune[1]

[1]Fraunhofer Institute for Manufacturing Technologies and Advanced Materials
Wiener Str. 12 28359 Bremen, Germany

[2]Laboratory of Technology & Strength of Materials, Department of Mechanical Engineering & Aeronautics, University of Patras, Patras 26500, Greece

Abstract:

In the present work, the effect of pre-bond contamination scenarios related to production and repair processes on the adhesion strength of composite-to-metal joints is investigated by means of the novel centrifuge testing technology. The composite substrates have been subjected to contamination with release agent, moisture, fingerprint, thermal degradation and de-icing fluid before being bonded on the metallic stamp. Different contamination levels have been considered for each scenario. The standard deviation of adhesion strength values differs for each sample category and in some cases, is relatively high. The experimental results show a considerable decrease of adhesion strength for all contamination scenarios. The evaluation of the adhesion strength values is assisted by the characterization of the failure modes. In most cases, the transition between the failure modes explains the variation of adhesion strength. By taking into advantage the simplicity of the experimental process, numerous tests have been conducted within a very short time. Based on the practicality of the experimental process and the validity of the findings, it can be concluded that the centrifuge testing technology can be potentially used as a reliable testing method for the characterization of bonded joints.

Keywords: Composite bonded joints, Pre-bond contamination, Centrifuge testing, Adhesion strength, Kissing bonds

* Corresponding author. Tel.: +30 2610 969498, E-mail: kitserpes@upatras.gr