Accepted Manuscript

The effect of fibre dispersion on initial failure strain and cluster development in unidirectional carbon/glass hybrid composites

Yentl Swolfs, Robert M. McMeeking, Ignaas Verpoest, Larissa Gorbatikh

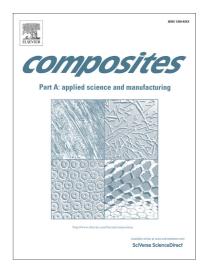
PII: S1359-835X(14)00384-4

DOI: http://dx.doi.org/10.1016/j.compositesa.2014.12.001

Reference: JCOMA 3800

To appear in: Composites: Part A

Received Date: 22 May 2014
Revised Date: 7 November 2014
Accepted Date: 3 December 2014



Please cite this article as: Swolfs, Y., McMeeking, R.M., Verpoest, I., Gorbatikh, L., The effect of fibre dispersion on initial failure strain and cluster development in unidirectional carbon/glass hybrid composites, *Composites: Part A* (2014), doi: http://dx.doi.org/10.1016/j.compositesa.2014.12.001

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

The effect of fibre dispersion on initial failure strain and cluster development in unidirectional carbon/glass hybrid composites

Yentl Swolfs*¹, Robert M. McMeeking^{2,3,4}, Ignaas Verpoest¹, Larissa Gorbatikh¹

Email addresses: R.M. McMeeking (rmcm@engineering.ucsb.edu), I. Verpoest (ignaas.verpoest@mtm.kuleuven.be), L. Gorbatikh (larissa.gorbatikh@mtm.kuleuven.be)

Abstract

By adding glass fibres to carbon fibre composites, the apparent failure strain of the carbon fibres can be increased. A strength model for unidirectional hybrid composites was developed under very local load sharing assumptions to study this hybrid effect. Firstly, it was shown that adding more glass fibres leads to higher hybrid effects. The hybrid effect was up to 32% for a hybrid composite with a 10/90 ratio of carbon/glass fibres. The development of clusters of broken fibres helped to explain differences in the performance of these hybrid composites. For 50/50 carbon/glass hybrids, a fine bundle-by-bundle dispersion led to a slightly smaller hybrid effect than for randomly dispersed hybrids. The highest hybrid effect for a 50/50 ratio, however, was 16% and was achieved in a composite with alternating single fibre layers. The results demonstrate that thin ply hybrids may have more potential for improved mechanical properties than comingled hybrids.

¹ Department of Materials Engineering, KU Leuven, Kasteelpark Arenberg 44 bus 2450, 3001 Leuven, Belgium

² Department of Mechanical Engineering, University of California, Santa Barbara, CA 93106, USA

³ Materials Department, University of California, Santa Barbara, CA 93106, USA

⁴ School of Engineering, University of Aberdeen, King's College, Aberdeen AB24 3UE, Scotland, UK

^{*}Corresponding author: Y. Swolfs (yentl.swolfs@mtm.kuleuven.be), Tel.: 003216321231

Download English Version:

https://daneshyari.com/en/article/7892172

Download Persian Version:

https://daneshyari.com/article/7892172

Daneshyari.com