

Accepted Manuscript

The analysis of the ultimate blast failure modes in fibre metal laminates

E. Sitnikova, Z.W. Guan, W.J. Cantwell

PII: S0266-3538(16)31159-9

DOI: [10.1016/j.compscitech.2016.09.006](https://doi.org/10.1016/j.compscitech.2016.09.006)

Reference: CSTE 6511

To appear in: *Composites Science and Technology*

Received Date: 25 April 2016

Revised Date: 1 September 2016

Accepted Date: 5 September 2016

Please cite this article as: Sitnikova E, Guan ZW, Cantwell WJ, The analysis of the ultimate blast failure modes in fibre metal laminates, *Composites Science and Technology* (2016), doi: 10.1016/j.compscitech.2016.09.006.

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.



The analysis of the ultimate blast failure modes in fibre metal laminates

E. Sitnikova^a, Z.W Guan^{b,c,*}, W.J. Cantwell^d

^aFaculty of Engineering, University of Nottingham, University Park, Nottingham NG7 2RD, UK

^bSchool of Engineering, University of Liverpool, Brownlow Street, Liverpool L69 3GQ, UK

^cSchool of Mechanical Engineering, Chengdu University, Chengdu 610106, PR China

^dDepartment of Aerospace Engineering, Khalifa University of Science, Technology and Research (KUSTAR), Abu Dhabi, UAE

Abstract

Finite element modelling has been applied to simulate various failure modes in fibre metal laminate (FML) panels under localized high intensity blast loading. A relatively simple material model, based on continuum damage mechanics, has been proposed to describe the constitutive response of the composite material in the FMLs. Simulations of the blast response of FMLs with various stacking configurations has been carried out, capturing both perforation and non-perforation failure modes. Blast loading was modelled by a pressure function applied on the front face of the FML panel. The definition of the pressure function accounts for both the temporal as well as the spatial distribution of the blast. The capability of the models has been assessed by comparing the predictions associated with both low and high intensity blast cases with published experimental data. Good qualitative and quantitative agreement has been observed for lay-ups with similar proportions of aluminium and composite. It is believed that the models can be employed for use in parametric studies that would facilitate the adoption of FMLs in wider engineering design.

Keywords: A. Layered structures; B. Impact behaviour; C. Deformation, Finite element analysis (FEA); D. Blast loading.

*Corresponding author.

E-mail: zguan@liverpool.ac.uk

Tel: +44 (0)151 794 5210

Fax: +44 (0)151 794 5218

Download English Version:

<https://daneshyari.com/en/article/5022428>

Download Persian Version:

<https://daneshyari.com/article/5022428>

[Daneshyari.com](https://daneshyari.com)