Accepted Manuscript

High-temperature high-velocity impact on honeycomb sandwich panels

W.H. Xie, S.H. Meng, L. Ding, H. Jin, S.Y. Du, G.K. Han, L.B. Wang, C.H. Xu, Fabrizio Scarpa, R.Q. Chi

PII: S1359-8368(16)33042-6

DOI: 10.1016/j.compositesb.2017.06.022

Reference: JCOMB 5129

To appear in: *Composites Part B*

Received Date: 9 December 2016

Revised Date: 1 May 2017

Accepted Date: 8 June 2017

Please cite this article as: Xie WH, Meng SH, Ding L, Jin H, Du SY, Han GK, Wang LB, Xu CH, Scarpa F, Chi RQ, High-temperature high-velocity impact on honeycomb sandwich panels, *Composites Part B* (2017), doi: 10.1016/j.compositesb.2017.06.022.

High-temperature high-velocity impact on honeycomb sandwich panels

W.H. Xie [a], S.H. Meng [a], L. Ding [b], H. Jin [a], S.Y. Du [a], G.K. Han [a], L.B. Wang [a], C.H. Xu [a], Fabrizio Scarpa [c], R.Q. Chi [d]

[a] Center for Composite Materials and Structures, Harbin Institute of Technology, No.2 Yikuang Street, Harbin 150080, China

[b] Center for Advanced Composite Materials, Shenzhen Academy of Aerospace, Keji South Ten Road 6, Shenzhen, 518057, China

[c] Advanced Composites Centre for Innovation and Science (ACCIS), University of Bristol, BS8 1TR Bristol, UK

[d] Hypervelocity Impact Research Center, Harbin Institute of Technology, No.2Yikuang Street, Harbin 150080, China

Abstract

This work presents an investigation on the damage and high-speed impact deformation mechanisms at elevated temperatures in honeycomb sandwich panels made from PM1000 and PM2000 alloys. The impact temperatures ranged from 22°C to 866°C. The investigation was performed experimentally using a custom-made gas gun rig, and by using Finite Element and developing a phenomenological analytical model to predict the residual velocity and ballistic limit equations for the case in which the diameter of the projectile is close or smaller to the honeycomb cell length. The sizes of the holes have been also evaluated by carrying out numerical thermal loading simulations on honeycomb sandwich specimen models impacted at high speed. The predictions provided by the Finite Elements and the analytical model give a good agreement with the results from the experimental tests. The hole diameters for the two idealized normal impact cases, in which the projectile hits the cell core and at the triple-wall intersection of the core, were also presented as a function of the projectile diameter and velocity in