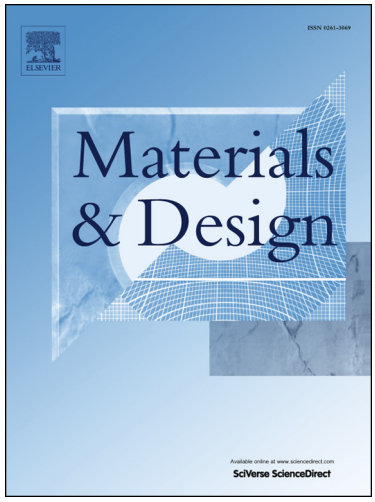

Technical report

An experimental investigation on the effect of strain rate on the behaviour of bare and foam-filled aluminium honeycombs

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PII: S0261-3069(13)00539-6
DOI: http://dx.doi.org/10.1016/j.matdes.2013.06.006
Reference: JMAD 5545

To appear in: *Materials and Design*

Received Date: 6 October 2012
Accepted Date: 6 June 2013

Please cite this article as: AlaviNia, A., Sadeghi, M.Z., An experimental investigation on the effect of strain rate on the behaviour of bare and foam-filled aluminium honeycombs, *Materials and Design* (2013), doi: http://dx.doi.org/10.1016/j.matdes.2013.06.006

An experimental investigation on the effect of strain rate on the behaviour of bare and foam-filled aluminium honeycombs

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Abstract

The effects of strain rate (in low-strain rate regime) on the compressive mechanical behaviour of bare and foam-filled honeycomb structures are experimentally investigated in this paper. Empirical tests show that unlike the existing theoretical formula for bare hexagonal honeycombs, the mean crushing strength of these structures is highly dependent on the strain rate, as an increase of the strain rate yields an increase in the mean crushing strength of up to 40% in some specimens. This effect would be less considerable when it comes to the case of foam-filled panels. The results also indicate that the strain rate has no effect on the densification strain but could change the plane of deformation and increase the number of folds, and consequently decrease their wavelengths.

Keywords*:* Honeycomb; Strain rate effect; Stress enhancement; Foam; Deformation pattern

1-Introduction

Honeycomb structures are widely used in aerospace and other industries due to their high strength/weight ratio. These structures can crush up to 70% of their initial height and absorb energy in compression [1]. Honeycombs are made from metallic and polymeric materials with different cell geometries; however, they are

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