

Accepted Manuscript

Characterization of metal grid-structure reinforced aluminum foam under quasi-static bending loads

Yukun An, Siyi Yang, Ertuan Zhao, Zongshen Wang

PII: S0263-8223(17)30775-4

DOI: <http://dx.doi.org/10.1016/j.compstruct.2017.07.031>

Reference: COST 8686

To appear in: *Composite Structures*

Received Date: 9 March 2017

Revised Date: 2 May 2017

Accepted Date: 12 July 2017



Please cite this article as: An, Y., Yang, S., Zhao, E., Wang, Z., Characterization of metal grid-structure reinforced aluminum foam under quasi-static bending loads, *Composite Structures* (2017), doi: <http://dx.doi.org/10.1016/j.compstruct.2017.07.031>

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.

Characterization of metal grid-structure reinforced aluminum foam under quasi-static bending loads

Yukun An, Siyi Yang*, Ertuan Zhao, Zongshen Wang

School of Mechanical Engineering, Shandong University of Technology, Zibo 255000, P.R. China

*Corresponding author: yangsiyichina@yeah.net, Tel: +86 13070603662

Abstract

This paper investigates the bending property of metal grid-structure reinforced aluminum foam (MGS-AF) prepared by a melt foaming technique. For this purpose, quasi-static three-point bending tests of aluminum foam with and without metal grid-structures (MGSs) were performed. Experimental results indicate that the failure mode of MGS-AF was transformed from a single tensile failure to a combination of both tensile failure and compressive failure. Yield stress improved from 2.92-3.81 MPa for traditional aluminum foam to 6.58-8.41 MPa for MGS-AF. Also, a wide amplitude of stress plateau was detected after yield deformation. Additionally, the existence of MGS significantly improved the energy absorption capacity from 3.0 to 37.1-53.1 J and enhanced the specific energy absorption from 0.15-0.17 J/g to 1.34-1.50 J/g under the same deflection of 25 mm.

Keywords

Aluminum foam, Metal grid-structure, Three-point bending, Deformation mode, Energy absorption capacity

1. Introduction

Closed-cell aluminum foam has attracted increasing attention because of its exceptional properties, for instance, high specific strength and stiffness, thermal insulation capabilities [1], energy absorption abilities [2], and sound insulation [3]. Because of this unique combination of superior properties, aluminum foam is expected to be used as both a structural material and a functional material [4]. Up until now, aluminum foam has been used in the automobile, aerospace, and military industries as a cost-effective lightweight structure [5,6].

Over recent decades, much research has covered the significant number of approaches for fabricating aluminum foam. Among the various fabrication methods, the direct melt foaming method [*i.e.*, adding foaming agent (7) and gas injection (8,9)] and the powder metallurgical

Download English Version:

<https://daneshyari.com/en/article/4911823>

Download Persian Version:

<https://daneshyari.com/article/4911823>

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