

International Conference on

Design and Production Engineering

July 25-26, 2016 Berlin, Germany

Fracture toughness and tensile strength of 316L stainless steel cellular lattice structures manufactured using the selective laser melting technique

Hamza Alsalla

Exeter University, UK

Selective Laser Melting (SLM) process is a metallic additive manufacturing technique that directly manufactures strong, lightweight and complex three dimensional parts in a layer-by-layer to scan and melt the metal powder for aerospace applications. However, there are still certain evaluation criteria such as fracture toughness and tensility of cellular structure made by SLM which were not reported before. This study presents new and novel methods in additive manufacturing and evaluates the local failure mechanism of 316L cellular lattice structures made by SLM under uniaxial tension and three point pending load. The effect of different build directions of the 316L lattice structure on the fracture toughness properties are compared to the Ashby and Gibson models. Also, the effect of different build directions on tensile properties of 316L cellular structures has been investigated. Microcomputer tomography (CT) reveals that the cellular structure parts with different build directions were manufactured free of defect by the SLM. The relative density of solid struts is revealed. The tensile and fracture toughness properties in vertical building direction samples and in horizontal building direction were addressed. There was no big difference between the Ashby and Gibson micromechanical model to predict fracture toughness.

Biography

Hamza Alsalla has got a high diploma in Renewable Energy and Mechanical Engineering from the Academy of Graduate Studies, Libya and has received his Master's degree in Aerospace Mmaterials from Sheffield University, Department of Material Science and Engineering, United Kingdom in 2012. Also he has started his PhD since September 2013 at the University of Exeter, College of Engineering, Mathematics and Physical Science. He is a Lecturer in the Technology College of Civil Aviation and Meteorology, Sbeah-Libya and Demonstrate Tutorial in Mechanics at Exeter University. He is Ex-lecturer in Alzzaytouna University-Libya. His research interests are in aerospace material (light weight), fracture mechanics and mechanical engineering.

alsallah@yahoo.com**Notes:**