

2nd International Conference and Exhibition on **Industrial Engineering**

November 16-18, 2015 Dubai, UAE

Effect of different building direction on fracture toughness of ultra-high strength aerospace components made by additive manufacturing

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Direct metal laser sintering (DMLS) and selective laser melting (SLM) are an additive manufacturing (AM) technique that produces complex three-dimensional parts by adding layer upon layer of powder materials from bottom to top. Recently, AM has received large amount of press and is set to have a large impact such as decreasing the cost of production, fast and flexible, design freedom, increase the innovation opportunities and develop new materials system for the consumption of Aerospace industries. Since major problems come across, the process is limited to surface quality, and residual porosity in SLM and DMLS parts may be undesirable for some applications where fatigue resistance and high strength are essential. This research aims to improve the fracture toughness, ductility and fatigue life for the metallic components, which is essential to entirely exploit potential of the SLM and DMLS of these alloys for Aerospace applications. The development in the additive manufacturing technology is not only limited to new machines and new materials and methods but also new processes, to offer high mechanical properties and performance. This research focus on DMLS and SLM of titanium and stainless steel alloys to investigate the effect of different building direction on strength, ductility and fracture toughness property. This investigation may create a strong need for a system that could contribution in the selection of the possible process chains, materials and finishing options and may extend the capability of AM process to generate high performance component for commercial application in Aerospace industries.

Biography

Hamza Alsalla has started his PhD in September 2013 at the University of Exeter, College of Engineering, Mathematics and Physical Science. He is a Lecture in the Technology College of Civil Aviation and Meteorology, Sbeah-Libya and Demonstrate Tutor in Exeter University. He is a member of the Association of Science and Knowledge, Libya.

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