Argon porosity in Additive Manufactured Ti-6Al-4V and/or IN718 parts

Background
Titanium and Nickel-alloys are widely used for aerospace application. Especially, Ti-6Al-4V and IN718 is frequently studied due to its high importance in said application.

The powder for the Additive Manufacturing is atomized in Argon and under high vacuum. However, due to its inert nature, Argon forms internal voids in the powder particles, which is then transferred to the final AM part. There is doubts whether these Argon voids can be removed by HIP and if they re-appear after final heat treatment.

The purpose of this study is to make AM-parts that will have voids (Ar-bubbles). The parts will be HIPed, and investigated if the void has disappeared by CT-scanning and/or light and scanning electron microscopy. Then a heat treatment step will be performed, and investigated again with CT-scanning to see if the voids re-appear or if the Argon has left the parts.

AM parts will be manufactured by EBM at Arcam in Mölndal and laser powder bed fusion by Chalmers and HIP trials will be made at Quintus Technologies in Västerås. Final heat treatment steps will be performed at Chalmers. Components (porosity, microstructure, defect state, fractography, etc.) in as-build, HIP and heat-treated state will be studied at Chalmers using advanced microscopy tools.

Requirements:
We are looking for a master student with a profile towards material science. A solid background in additive manufacturing is an advantage.

Extent and time plan:
• Period (January-June 2019)
• Number of credits 30 ECTS/högskolepoäng(hp).
• The thesis is intended for one student

More information:
Contact industrial supervisor – Anders Eklund (anders.eklund@quintusteam.com) for more information about the project. Apply with your CV, academic transcripts and a cover letter in English. Welcome to apply!

Supervisors and examiners:
Industrial Supervisor: Anders Eklund: anders.eklund@quintusteam.com
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