Contribution ID: **479** Type: **Contributed Oral**

M3Or2F-04: Mechanical tensile testing of 3D-Printed Titanium 6Al-4V at Cryogenic Temperature

Wednesday 12 July 2023 11:55 (15 minutes)

Titanium 6Al-4V is a highly desired material for use in space cryogenic applications; specifically structural applications where high strength-to-weight ratios are needed and thermal applications where thermal isolation is needed. Furthermore, components can be fabricated via 3D-printing using this material, which in addition to the cost and schedule savings is very beneficial in allowing parts to be made with geometries and features that are very difficult and sometimes impossible to fabricate via traditional machining methods. These newly possible geometries and features are used to increase the components'structural integrity and thermal capabilities. Although the alloy is known to have good mechanical properties at room temperature, there is little known about this material's mechanical properties at cryogenic temperature when 3D-printed. This testing investigates the mechanical properties of 3D-Printed Titanium 6Al-4V at cryogenic temperature through cryogenic mechanical tensile testing to failure and evaluation of the failed coupons. The elongation, yield strength, ultimate tensile strength, and break strength of the material is provided and analyzed here.

Author: Mr JAMES, Bryan (NASA Goddard Space Flight Center)

Co-authors: Mr MORENO, Antonio (NASA Goddard Space Flight Center); Mr FRANCOM, Matthew (NASA Goddard Space Flight Center); Mr SMITH, Nathan (NASA Goddard Space Flight Center); Dr BARFKNECHT, Peter (NASA Goddard Space Flight Center); Dr OTTENS, Richard (NASA Goddard Space Flight Center); Mr CALE, Steven (NASA Goddard Space Flight Center)

Presenter: Mr JAMES, Bryan (NASA Goddard Space Flight Center)

Session Classification: M3Or2F: Additive Manufacturing