Contribution ID : **75** Type : **Oral**

Neutron diffraction residual stress determinations on Intermetallic alloy components produced by wire-arc additive manufacturing (WAAM)

Tuesday, 20 November 2018 14:50 (20)

Intermetallic alloys such as aluminides of titanium, nickel and iron exhibit an attractive combination of physical and mechanical properties such as high melting point, low density, high strength, good oxidation, and creep resistance, due to their strong internal order and mixed bonding. However, the properties of these materials are often obtained at a cost in terms of ease of manufacturing. In recent years the WAAM process has been successfully applied to in-situ produce TiAl and Fe3Al intermetallic components with designed chemical compositions. One of the major concern is residual stresses (RS) distribution in the WAAM fabricated components as it not only influences the part tolerance but also cause premature failure.

The neutron diffraction technique has been recoganised as the most precise and reliable method of mapping sub-surface RS in components for both academic and industrial-economic relevance. Considering the outstanding capability of obtaining RS non-destructively deep within the interior of components, our study utilised neutron diffraction technique to conduct RS measurement by the angular scanning instrument KOWARI. Furthermore, an averaging method has been developed for the WAAM multi-bead buildup intermetallic alloys with large grain size. With the averaging method applied during experimental setup and data processing, reasonable residual stress results have been obtained from the acquired neutron diffraction data.

Topic

Engineering & Industry

Primary author(s) : Dr SHEN, Chen; Dr MA, Yan (University of Wollongong); Dr REID, Mark; Dr PARADOWSKA, Anna; Prof. LI, Huijun

Presenter(s) : Dr MA, Yan (University of Wollongong); Prof. LI, Huijun

Session Classification : Topical Session 6: Engineering & Industry

Track Classification : Engineering & Industry