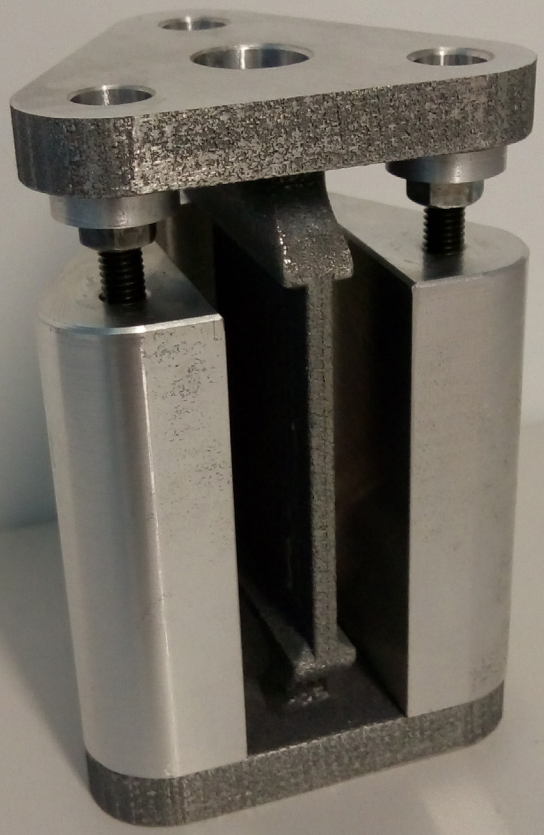
AMRC
ADVANCED MANUFACTURING RESEARCH CENTRE

The University Of Sheffield.

NAMTEC
Case study

Manufacturing limits identified for aerospace heat exchanger components

Manufacturing limits for complex aluminium alloys used in functional heat exchanger aerospace components have been identified by engineers at the University of Sheffield Advanced Manufacturing Research Centre (AMRC) in a project which looked into the processing of the metal using the laser powder bed fusion (L-PBF) additive manufacturing method.



The AMRC's National Metals Technology Centre (NAMTEC) undertook the project with aerospace company, and Tier Two member, Meggitt PLC to develop the processing of aluminium alloys through the L-PBF method. The project aimed to test three requirements of the components: pressure, heat transfer and fluid flow characteristics.

A team from NAMTEC, led by Project Engineer James Cantle, manufactured the complex alloy components for analysis at Meggitt's testing facility in Coventry, with pieces grouped into three work packages, categorised by the test requirements, WP1, WP2 and WP3.

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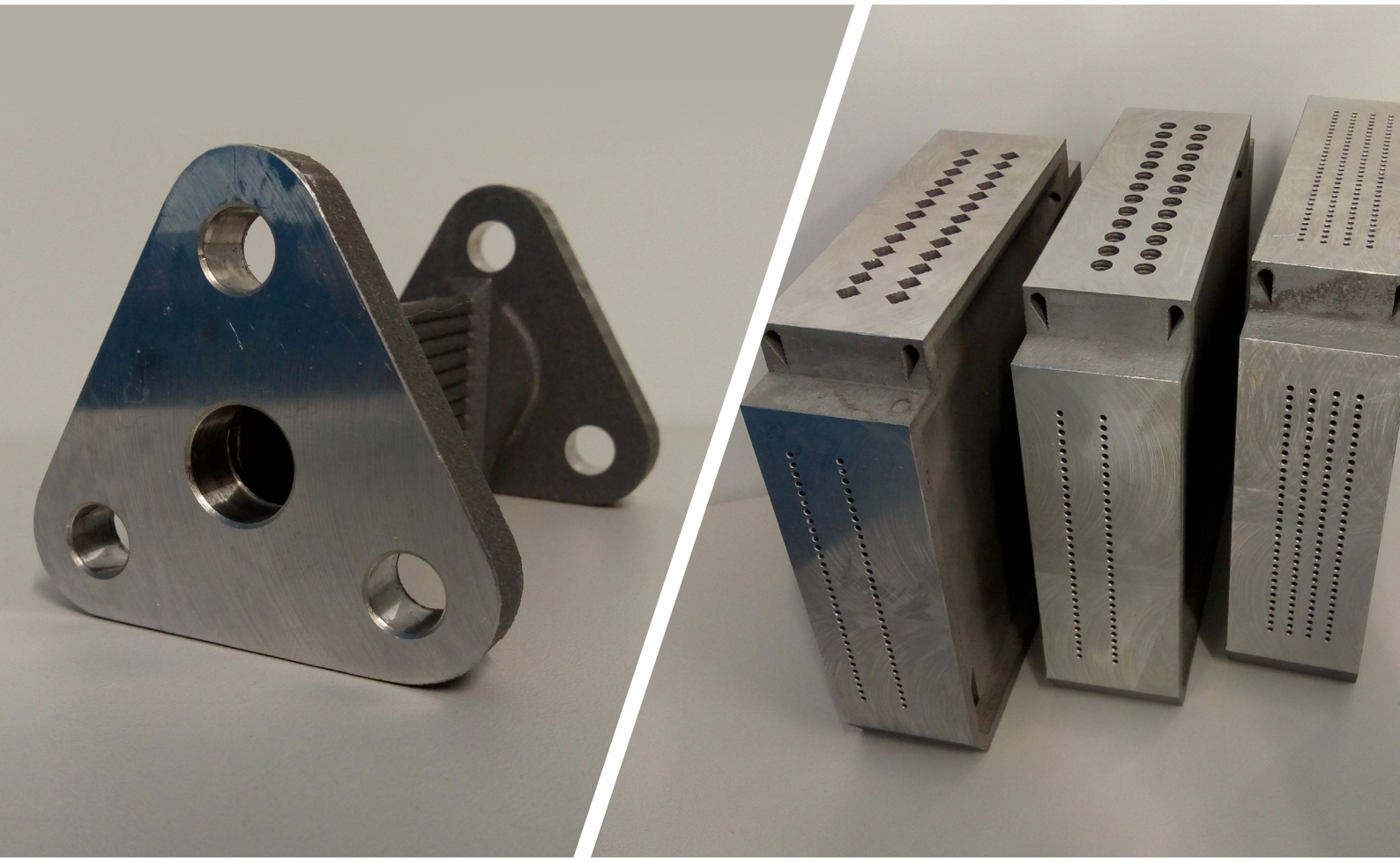

All components were additively manufactured on a Renishaw AM400HT unit, with subsequent post processing including stress-relieving heat treatment and face milling to produce a sealing face suitable for the testing equipment at Meggitt.

Following heat treatment, Vickers hardness was measured and compared against as-built AlSi10mg and Renishaw datasheet values.

Manufacturing limits were identified for complex aluminium alloy geometries produced through the L-PBF method. Additionally, novel solutions and considerations were required for the conventional machining of the complex component geometries. Soft jaws and a collar were produced to brace the component during machining to minimise vibration and deflection.

For further information please contact James Cantle:

0114 222 7672 | j.cantle@amrc.co.uk | amrc.co.uk

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