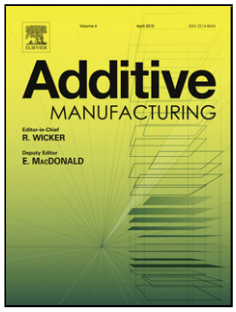

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Mechanical Properties of Additive Manufactured Nickel Alloy 625

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ABSTRACT

The mechanical, metallurgical and corrosion properties of Alloy 625 produced using the laser powder bed fusion (L-PBF) manufacturing process were investigated and compared with typical performance of the alloy produced using conventional forging processes. Test specimens were produced near net shape along with several demonstration pieces that were produced to examine the geometric complexity that could be achieved with the process. The additively manufactured specimens exhibited strength, fracture toughness and impact toughness that was equal to or better than properties typically achieved for wrought product. There was no evidence of stress corrosion cracking susceptibility in 3.5% NaCl solution at stress intensities up to 70 ksi-in$^{1/2}$ after 700 hours exposure. The microstructure was equiaxed in the plane of the powder bed build platform (X-Y) and exhibited a columnar shape in the Z direction although there was not any significant evidence of anisotropy in the mechanical properties.

KEYWORDS

additive manufacturing; Alloy 625; laser powder bed fusion; mechanical properties; fracture toughness