

PROCEEDINGS

Effects of Hold Time on Fatigue Crack Growth Behavior in PBF-EB Inconel 718

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ABSTRACT

Effects of hold time on the fatigue crack growth behavior in electron-beam powder-bed-fusion (PBF-EB) Inconel 718 alloy at 650 °C have been investigated in this study, with focuses on the anisotropic fatigue cracking resistance and fracture mechanism. The V-type specimen (which loading parallel to the columnar grain boundaries) gives better dwell-fatigue cracking resistance to the H-type specimen (which loading perpendicular to the columnar grain boundaries) due to its large deflections (nearly 90 °) on the crack path. These deflections are related to the change of crack growth mechanism. In both V-type and H-type specimens, when the dwell-fatigue crack tip reaches high angle grain boundaries, the crack exhibits a intergranular propagation behaviour. Besides, discontinuous secondary crack which associated with high angle grain boundaries can be seen in the H-type specimen, indicating that the crack mechanism may be predominantly creep damage.

KEYWORDS

Hold time; crack growth mechanism; powder bed fusion; anisotropism

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