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PROCEEDINGS

Influence of Synchronous-Hammer-Forging Force on the Microstructure and Properties of Laser Directed Energy Deposition 316L Components

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ABSTRACT

The plastic deformation assisted method plays a positive role in regulating the microstructure and mechanical properties of metal components in additive manufacturing. In this work, the effect of hammer forging force on the microstructure and mechanical properties of 316L stainless steel additive components were investigated by using synchronous-hammer-forging-assisted laser directed energy deposition method. The results show that when the hammer forging force is greater than 40 N, the grain refinement effect is obvious, the grain size decreases by more than 60 %, and the maximum strength of the polar diagram decreases by more than 75 %. In the molten area, a 67 % reduction in grain size can be achieved with a small hammer forging force of 25 N. Under different hammer forging processes, the microhardness and tensile strength of the sample increase with the increase of hammer forging force.

KEYWORDS

316L; additive manufacturing; hammer forging force; microstructure; property

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