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Material Science Path Toward Product Qualification

Abstract

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Powder-based 3-D additive manufacturing (AM) such as Direct Energy Deposition (DED) or Powder Bed Fusion (PBF), is capable of building complex engineering components. However, there is an industry wide consensus that the physical metallurgy and mechanical behavior of AM prints are complex and exhibit greater variability. For some alloy systems, the scientific rationale for the material variability is yet to be fully understood, and therefore mitigated, in order to be qualified for the intended application. In this talk, we will present the 3-D DED- and PBF-induced metallurgical characteristics and structural defects, found in the SS316L prototypes, printed by 3-D Laser-Engineered-Net-Shaping (LENS) process. In addition, we will discuss the root cause, formation mechanism, as well as mitigation strategy for the gross structural defect observed in the DED printed SS 316L prototypes.

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