

IN718 Additive Manufacturing Properties and Influences

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Abstract

The results of tensile, fracture, and fatigue testing of IN718 coupons produced using the selective laser melting (SLM) additive manufacturing technique are presented. The data has been “generalized” to remove the numerical values, although certain references to material standards are provided. This document provides some knowledge of the effect of variation of controlled build parameters used in the SLM process, a snapshot of the capabilities of SLM in industry at present, and shares some of the lessons learned along the way. For the build parameter characterization, the parameters were varied over a range about the machine manufacturer’s recommended value, and in each case they were varied individually, although some co-variance of those parameters would be expected. SLM-produced IN718, tensile, fracture, and high-cycle fatigue properties equivalent to wrought IN718 are achievable. Build and post-build processes need to be determined and then controlled to established limits to accomplish this. It is recommended that a multi-variable evaluation, e.g., design-of-experiment (DOE), of the build parameters be performed to better evaluate the co-variance of the parameters.