

Impact of parameter choice on microstructure and properties of Nickel super-alloys

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ABSTRACT

The challenge of process parameter development in laser powder-bed fusion (LPBF) is to find the best way to deliver the laser energy required to melt our material, whilst also meeting the productivity and quality goals for our application. This is not a simple task - we have a wide range of parameters that we can choose to modify, as well as multiple (sometimes conflicting) performance objectives. Multi-laser machines enable faster builds and the opportunity to explore new processing techniques, adding to the choices that we must make. Factors include layer thickness, part geometry, laser modulation, the number of lasers used and how these lasers are assigned to different parts of the build. We will review the impact of these processing choices on the microstructure and mechanical properties of Nickel super-alloys (NSA) 718 and 625.

PARAMETER SELECTION OVERVIEW

Process parameters determine how much energy is transferred to the powder bed and how fast. Critical parameters include laser power, spot size, scanning speed, hatch distance and layer thickness (Figure 1).

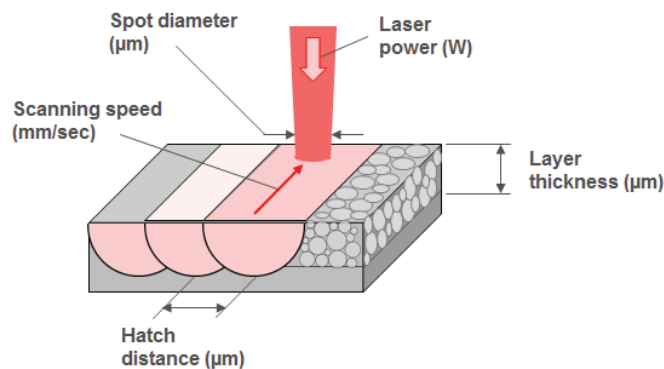


Figure 1. Critical process parameters