

## Effects of Processing Parameters on Shaping during Laser Engineered Net Shaping of Nickel-based Alloy Powders

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### Abstract

Rapid prototyping (RP) technology, which integrated computer, robot and material science, is a great invention in the last 20 years because it can be able to cope with rapid changes to product designs and continually reduce product costs. The principle of RP is a material additive process, where a 3D computer model is sliced and reassembled in a real space, layer-by-layer. Laser Engineered Net Shaping (LENS), as one of the important developments in rapid prototyping technologies, may directly fabricate metal function components whose form and structure are reasonably complicated. In this paper, processing parameters were used to investigate LENS of Ni-14.4Cu-1.6Sn powders with the size of 200-150 mesh and 150-100 mesh. By means of micro-hardness test and microscope observation, the effects scanning speed, laser power, and focus displacement on the shaping and microstructures of the thin-wall structures were investigated. Rapid cooling and quick densification microstructures such as dendritic structures marked the as deposited thin-wall structures. The optimized processing parameters were obtained. And the thin-wall parts were fabricated successfully by LENS.