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Investigation of pore structure in cobalt chrome additively manufactured parts using X-ray computed tomography and three-dimensional image analysis

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Abstract

Pore structures of additively manufactured metal parts were investigated with X-ray Computed Tomography (XCT). Disks made of a cobalt-chrome alloy were produced using laser-based powder bed fusion (PBF) processes. The additive manufacturing processing parameters (scan speed and hatch spacing) were varied in order to have porosities varying from 0.1 % to 70 % so as to see the effects of processing parameters on the formation of pores and cracks. The XCT images directly show three-dimensional (3D) pore structure, along with cracks. Qualitative visualization is useful; however, quantitative results depend on accurately segmenting the XCT images. Methods of segmentation and image analysis were carefully developed based, as much as possible,

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