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Tailoring microstructural features of wire arc additive manufacturing 2Cr13 part via varying inter-layer dwelling time

Jinguo Ge¹, Jian Lin¹, Hanguang Fu¹, Yongping Lei^{*1}, Rongshi Xiao²

1. School of Materials Science and Engineering, Beijing University of Technology, Beijing, 100124,

People's Republic of China

2. Institute of Laser Engineering, Beijing University of Technology, Beijing, 100124, People's Republic

of China

Abstract

The phase constitution, the microstructural growth behavior, and the anti-indentation performance of 2Cr13 thin-wall part were successfully tailored through inter-layer dwelling time alteration using cold metal transfer (CMT) technology. The short inter-layer dwelling time induced the presence of a low amount of γ -Fe phase, as well as extremely elongated ferrite grains containing ultrafine needle-shaped martensite throughout the entire part. This finally led to a narrow fluctuation in microhardness. The long dwelling time contributed to the α -Fe phase formation only and a periodic microhardness trendline, which was related to a periodic microstructure featured by martensite laths within the block-shaped ferrite matrix. This method, in an intentional manner, could be adopted to manufacture a particular component with local properties that are altered with location through a single material deposition.

Keywords

* Corresponding authors at: Number 100, Pingle Garden, Chaoyang District, Beijing 100124, PR China.

E-mail address: yplei@bjut.edu.cn (Y. Lei)

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