

Surface Engineering

Consolidation mechanism, microstructural evolution and corrosion resistance of Inconel 625 coatings

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Abstract

The inter-relationships between geometrical properties, microstructural characteristics and corrosion resistance on one hand and laser-material interaction parameter (a) on the other hand are examined. A laser-material interaction parameter within the range of $599 = a = 400$ J.s g⁻¹ mm⁻¹ imparted optimum characteristics of microstructure, microhardness and corrosion resistance. The consolidation mechanism of the coatings indicates that this parameter ensures the formation of a double 'burn-in' macrostructure into the substrate which imparts non-porous, crack-free and a fine interfacial microstructure. This study provides guidance in designing Inconel 625 coatings of desirable microstructures and corrosion resistance.