

The Temperature Effects on the Microstructure and Profile in Laser Cladding

Authors : P. C. Chiu, Jehnming Lin

Abstract : In this study, a 50-W CO₂ laser was used for the clad of 304L powders on the stainless steel substrate with a temperature sensor and image monitoring system. The laser power and cladding speed and focal position were modified to achieve the requirement of the workpiece flatness and mechanical properties. The numerical calculation is based on ANSYS to analyze the temperature change of the moving heat source at different surface positions when coating the workpiece, and the effect of the process parameters on the bath size was discussed. The temperature of stainless steel powder in the nozzle outlet reacting with the laser was simulated as a process parameter. In the experiment, the difference of the thermal conductivity in three-dimensional space is compared with single-layer cladding and multi-layer cladding. The heat dissipation pattern of the single-layer cladding is the steel plate and the multi-layer coating is the workpiece itself. The relationship between the multi-clad temperature and the profile was analyzed by the temperature signal from an IR pyrometer.

Keywords : laser cladding, temperature, profile, microstructure

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