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EFFECT OF PROCESS VARIABLES ON INTERFACIAL QUALITY OF LASER CLADDING ON SS-310 PLATE FOR POWER PLANT APPLICATIONS

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Abstract

The present work focuses on effect of laser cladding process variable on interfacial quality of clad and substrate. Laser cladding has been carried out with fiber-coupled diode laser and an off-axis powder injection under argon atmosphere. Clad processed under all variation shows good fusion and metallurgical bonding with substrate but Lower laser power (1500 watt), Lower scanning speed (5 mm/sec), High powder feed rate (23 gm/min) and Higher laser power (2000 watt), Lower laser scanning speed (5 mm/sec), Higher powder feed rate (23 gm/min) gives better result in terms of appropriate clad height, list dilution and better hardness. Development of residual stresses during laser cladding is major issue and penetration depth to width gives indirect measurement of residual stress. Higher laser power ultimate gives higher depth to width ratio means high thermal residual stresses. That hardness varies from about 650 to 300 $Hv_{0.1}$ respectively. The hardness of 650 $Hv_{0.1}$ that is achieved in the almost undiluted clad layer is in accordance with the intrinsic hardness of the applied coating material. A further increase of the melting depth and the dilution leads to a reduction of the hardness. The hardness is still 2-3 times higher than that of the substrate, but lower than the hardness in the pure coating.

Keywords: Laser Cladding, Process parameters, Clad parameters, Hardness, Residual Stress.
Subject Classification: Laser Material Processing.