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The Role of Transverse Speed on Deposition Height and Material Efficiency in Laser Deposited Titanium Alloy

Rasheedat M. Mahamood, Esther T. Akinlabi, Mukul Shukla and Sisa Pityana

Abstract

The most commonly used aerospace titanium alloy, Ti6Al4V, was deposited on Ti6Al4V plate of dimension 72 x 72 x5mm. The laser power of 3 kW, powder flow rate of 1.44 g/min and gas flow rate of 4 l/min were used throughout the deposition process. The transverse/ scanning speed was varied between 0.005 to 0.095 m/sec according to established result of the preliminary study that produces full dense and pore free deposits. The mass of the deposited powder was obtained by weight the substrate before deposition and reweighing after deposition. The substrate and the deposits were thoroughly cleaned using wire brush and acetone to remove unmelted powder particles from the surface of the substrate and the deposit. The height and width of the deposits were measured with Venier Caliper and the material efficiencies were determined using developed equations. The effect of the scanning speed on the material efficiency and deposit height were extensively studied and the results showed that for the set of processing parameter used in this study the optimum scanning speed is approximately 0.045 m/sec.