

Laser Welding of Titanium Alloy Ti64 to Polyamide 6.6: Effects of Welding Parameters on Temperature Profile Evolution

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Abstract : Composite metal–polymer materials, in particular titanium alloy (Ti-6Al-4V) to polyamide (PA6.6), fabricated by laser joining, have gained cogent interest among industries and researchers concerned with aerospace and biomedical applications. This work adopts infrared (IR) thermography technique to investigate effects of laser parameters used in the welding process on the three-dimensional temperature profile at the rear-side of titanium, at the region to be welded with polyamide. Cross sectional analysis of welded joints showed correlations between the morphology of titanium and polyamide at the weld zone with the corresponding temperature profile. In particular, spatial temperature profile was found to be correlated with the laser beam energy density, titanium molten pool width and depth, and polyamide heat affected zone depth.

Keywords : laser welding, metals to polymers joining, process monitoring, temperature profile, thermography

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