

Wobbled Laser Beam Welding for Macro-to Micro-Fabrication Process

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Abstract : Wobbled laser beam welding, fast oscillations of a tiny laser beam within a designed path (weld geometry) during the laser pulse illumination, opens new possibilities to improve the macro-to micro-manufacturing process. The present work introduces the wobbled laser beam welding as a robust welding strategy for improving macro-to micro-fabrication process, e.g., the laser processing for gap-bridging and packaging industry. The typical requisites and relevant equipment for the development of a wobbled laser processing unit are addressed, including a suitable laser source, light delivery system, optics, proper beam deflection system and the design geometry. In addition, experiments have been carried out on titanium plate to compare the results of wobbled laser welding with conventional pulsed laser welding. As compared to the pulsed laser welding, the wobbled laser welding offers a much greater fusion area (i.e. additional molten material) while minimizing the HAZ and provides a better confinement of the material microstructural changes.

Keywords : wobbled laser beam welding, wobbling function, beam oscillation, micro welding

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