

SYNCHRONOUS OR ANTI-SYNCHRONOUS WELDING: THE MODUS OPERANDI FOR STRESS MINIMIZATION IN LASER BEAM WELDING OF Al-Mg-Sc ALLOY

NIKHIL KUMAR CHANDRASHEKARAI AH^{1,2*}, K. VENKATESWARLU^{1,2}
AND KAUSTAV BARAT^{1,2}

Distortion analysis of T joints of Al-Mg-Sc alloy welded using dual beam laser welding (DBLW) with Gaussian heat source has been carried out with the help of thermomechanical modelling of the laser welding process. As Part of analysis, the associated thermal field variables, i.e. temperature, heat flux, and mechanical field variables, from this parameters stress and strain evolution have been mapped to rank the optimum beam configuration. It has been found that if an anti-synchronous beam configuration, i.e. two beam starts welding from opposite ends of the job, the distortion is much lesser compared to its synchronous counterpart, another set of two beam starts welding from the same ends. The effects of weld power and speed have been analyzed. It has been concluded that low power and high welding speed during laser welding are beneficial for the minimal distortion.

Keywords: Laser Beam Welding, Thermo-Mechanical Modeling, Weld Trajectory Path, T-joint Distortions
