

Some defects induced by laser beam

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The topics of presentation cover (1) surface rippling and humping and root spiking after solidification during laser processing, and (2) capability of laser drilling. Owing to accompany with porosity, cold shuts, undercut, segregation and stress concentration, spiking, rippling and humping seriously reduce the properties and strength of the joint. The effects of the beam focusing characteristics, volatile element and scanning speed on spiking, rippling and humping in keyhole mode welding can be interpreted from scale analysis. A keyhole is produced during laser beam drilling. The keyhole surrounded by a thin liquid layer is filled with vapor and droplets which are entrained by the vapor flow in the keyhole. The approach is to probe the flow behavior of the two-phase vapor-liquid dispersion in a vertical keyhole of varying cross-section, paying particular attention to the transition between the slug and annular flows. The keyhole can be collapsed and responsible for not only pore formation but also efficiency of drilling quality encountered in materials processing, packaging and manufacturing technologies.

Biography

Peng-Sheng Wei received Ph.D. in Mechanical Engineering Department at University of California, Davis, in 1984. He has been a Professor in the Department of Mechanical and Electro-Mechanical Engineering of National Sun Yat-Sen University, Kaohsiung, Taiwan, since 1989. Wei has contributed to advancing understanding of and to the applications of electron and laser beam and resistance welding through theoretical analyses coupled with verification experiments. Investigations also include studies of their thermal and fluid flow processes, and formations of the defects such as humping, rippling, spiking and porosity. He has published more than 70 journal papers. He is a fellow of AWS (2007), a fellow of ASME (2000), and a senior member of IEEE (2008). He also received the Outstanding Research Achievement Awards from both the National Science Council (2004), and NSYSU (1991, 2001, and 2004), the Outstanding Scholar Research Project Winner from National Science Council (2008), and Adams Memorial Membership Award from AWS (2008), Warren F. Savage Memorial Award from AWS (2012). He holds the position of the Xi-Wan Chair Professor of NSYSU in 2009.

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