



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : AJIT KUMAR SAHU

Roll Number : 156103006

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Thesis Title: Laser and Micro-Plasma Arc Welding of Thin Sheet Inconel 718 and AISI 316L Stainless Steel at Similar and Dissimilar Combinations

Name of Thesis Supervisor(s) : Dr. SWARUP BAG

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SHORT ABSTRACT

Fusion welding of Inconel 718 and AISI 316L stainless steel at similar and dissimilar combinations are challenging due to the formation of micro fissure or solidification crack that often adversely affects the mechanical properties of the welded joint. In the present work, this takes as an opportunity to address all the issues aiming at a successful weld of 700 μm thick sheet using both micro-plasma and laser welding processes. High transients and gradients affects the solidification behavior of fusion-welded structure. The welding of highly alloyed material like Inconel 718 invites different microstructural complexity during the solidification and may end up with formation of solidification cracking. The improper solidification parameters can trigger solute redistribution in the fusion zone and may cause chemical inhomogeneity in the welded structure. It leads to precipitation of different intermetallic secondary phases in the fusion zone by consuming a significant amount of strengthening alloying elements from the metal matrix. In this context, micro-segregation of Nb leads to the formation of brittle intermetallic Laves phase in the solidified interdendritic region. The present thesis is primarily motivated in the direction that address the factors influencing the micro-segregation and intermetallic formation in similar and dissimilar configuration of welding Inconel 718.