

OP 389

The effect of welding and strain conditions on the susceptibility to solidification cracking of a fully austenitic stainless steel

Yang Shaowei, Ito Tamaki, Yamamoto Michimoto, Shinozaki Kenji
Hiroshima University, Hiroshima, Japan

Cracks can occur during solidification of alloys such as stainless steels, nickel-based superalloys, aluminum alloys, known in welding as solidification cracking. It becomes a serious problem when various materials and fastest welding speed are recommended to increase productivity. However, there is a limitation to obtaining the high temperature strain curve with high precision, causing difficulties in predicting the range of temperature and strain where the solidification cracking occurs. This study developed a novel technology called In-plane constraint and relaxation type hot cracking test system to evaluate solidification cracking with high precision. Experiments of cracking test of a fully austenitic stainless steel using highly magnified in-situ observation method were conducted to investigate the effect of welding speed and strain conditions on the susceptibility to solidification cracking during laser welding. The proposed technique in the present study has proven to obtain the critical strain more precisely and flexibility than previous testing methods.