World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Experimental Investigation on Effects of Carrier Solvent and Oxide Fluxes in Activated TIG Welding of Reduced Activation Ferritic/Martensitic Steel

Authors : Jay J. Vora, Vishvesh J. Badheka

Abstract : This work attempts to investigate the effect of oxide fluxes on 6mm thick Reduced Activation ferritic/martensitic steels (RAFM) during Activated TIG (A-TIG) welding. Six different fluxes Al_2O_3, Co_3O_4, CuO, HgO, MoO_3, and NiO were mixed with methanol for conversion into paste and bead-on-plate experiments were then carried out. This study, systematically investigates the influence of oxide-based flux powder and carrier solvent composition on the weld bead shape, geometric shape of weld bead and dominant depth enhancing mechanism in tungsten inert gas (TIG) welding of reduced activation ferritic/martensitic (RAFM) steel. It was inferred from the study that flux Co_3O_4 and MoO_3 imparted full and secure (more than 6mm) penetration with methanol owing to dual mechanism of reversed Marangoni and arc construction. The use of methanol imparted good spreadabilty and coverability and ultimately higher peak temperatures were observed with its use owing to stronger depth enhancing mechanisms than use of acetone with same oxide fluxes and welding conditions.

Keywords : A-TIG, flux, oxides, penetration, RAFM, temperature, welding
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020