

Investigation of Distortion and Impact Strength of 304L Butt Joint Using Different Weld Groove

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Abstract : The aim of present investigation was to carry out Finite element modeling of distortion in the case of butt weld. 12mm thick AISI 304L plates were butt welded using three different combinations of groove design namely Double U, Double V and Composite. A full simulation of shielded metal arc welding (SMAW) of nonlinear heat transfer is carried out. Aspects like, temperature-dependent thermal properties of AISI stainless steel above liquid phase, the effect of thermal boundary conditions, were included in the model. Since welding heat dissipation characteristics changed due to variable groove design significant changes in the microhardness tensile strength and impact toughness of the joints were observed. The cumulative distortion was found to be least in double V joint followed by the Composite and Double U-joints. All the joints have joint efficiency more than 100%. CVN value of the Double V-groove weld metal was highest. The experimental results and the FEM results were compared and reveal a very good correlation for distortion and weld groove design for a multipass joint with a standard analogy of 83%.

Keywords : AISI 304 L, Butt joint, distortion, FEM, groove design, SMAW

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