

Experimental Validation of Numerical Analysis of T-joint Fillet Welds Using Thermography

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Abstract

This paper presents a numerical and experimental study of residual stresses and distortions induced by the T-joint welding of two plates. Within the framework of numerical investigations a thermo-mechanical finite element analysis is performed by using a shell/three-dimensional modelling technique to improve both the computational efficiency and the accuracy. The influence of the choice of the local 3D model size on the temperature distribution, residual stresses and displacements is investigated. A minimal 3D zone size that had both appropriate convergence of the solution and accuracy is defined. In order to validate numerical model, a series of experiments using fully automated welding process are conducted. Thermographic camera and optical measurement system is used to measure temperature and displacement distributions. The numerical results are in a good agreement with the experimental measurements.

