

# ANALYSIS OF TEMPERATURE FIELD AND RESIDUAL STRESS OF API-5L X52 BUTT WELDED JOINT

O. Mircea, D. Visan

“Dunarea de Jos” University of Galati, Manufacturing, Robotics and Welding Engineering Department, Romania  
47 Domneasca St., 800008 – Galati, Tel. +40336130208  
[octavian.mircea@ugal.ro](mailto:octavian.mircea@ugal.ro)

## ABSTRACT

*The aim of this paper is to present a comparative study between theoretical and experimental thermal fields as well as residual stresses on butt welded joints. Welded joints were made by a single pass on ceramic support. The thermal field and residual stresses were numerically modelled through the finite element method and compared to the experimentally determined data obtained by means of infrared thermography and tensometry measurements. The simulation conditions used in the finite element analysis were similar to the welding conditions. The finite element analysis was carried out in two steps. First, a non-linear transient thermal analysis was conducted with a view to obtaining the global temperature history generated during the welding process. Secondly, a stress analysis was developed using the temperatures obtained from the thermal analysis used as loadings in the structural analysis. The differences between the measured and calculated temperatures resulted in acceptable limits.*

**KEY WORDS:** Temperature field, residual stress, finite element analysis, thermography method, butt welded joints API-5L X52.

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