

X-Ray Diffraction Evaluation of Dislocation Density and Crystallite Size in the HAZ

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Abstract : The aim of this work is to study the effect of successive welding process on microstructure and mechanical properties of the heat affected zone (HAZ) in welded HSLA steel, employed in petroleum and gas transport. The analysis of the diffraction pattern profiles by the Rietveld refinement method (X-ray Diffraction Line Profile Analysis XRDLPA), allows obtaining detailed information on the evolution of the microstructural parameters such as the sizes of the domains consistent with diffraction (crystallite size), micro-deformations and dislocation densities. Based on the X-ray diffraction analysis (XRD) using Material Analysis Using Diffraction (MAUD) software, the results show an outstanding evolution of microstructural parameters in the HAZ, which means an increase in the crystallite size and a decrease in the dislocation density according to the number of welding process.

Keywords : HSLA, XRD, dislocation density, HAZ.