

The effect of successive repairs on the weldment quality of API 5L X-70 pipeline steel H.S.L.A

B. MAAMACHE¹, M.BOUABDALLAH², H.BRAHIMI³, Y.YAHMI¹, B.MEHD¹.

¹Welding and NDT Research Center, Algiers (Chéraga) - Algeria.

²ENSP. Ecole National Supérieure Polytechnique Elherrach, Alger, Algérie

³University of SAAD DAHLAB. Blida

Abstract

The aim of this work is to study the influence of successive repairs on the microstructure and mechanical properties of HAZ in a welded HSLA steel API 5L X70, used in crude oil or natural gas transport. Due to the regeneration of the HAZ microstructure after each repair, the results show that the succession of repairs in the same area has no influence on the microstructure morphology for all the welded joints samples. However, based on the X ray diffraction analysis (XRD) using the MAUD software to characterize the crystallite sizes, the micro-strain and the dislocation density, the results show an outstanding evolution in microstructural parameters in the HAZ, i.e. an increase in the coherent domain sizes of diffraction and a decrease in the micro-strain and dislocation density according to the repairs number. The obtained values of the tensile strength of the various welded pipes are acceptable by the standards which imply the qualification of the welding process for all the repairs. Therefore, the previous investigations lead to the conservation of the same mechanical properties, i.e. the possibility of making more repairs that the standards specify.

Keywords: *Welding, Heat affected zone, XRD, thermal cycles, HSLA*