

Pitting corrosion resistance of friction stir welded lean duplex stainless steel UNS S82441 evaluated by cyclic potentiodynamic polarization and critical pitting temperature (CPT)

Antonio Marcos dos Santos Leite¹, Maysa Terada¹, Eduardo Bertoni da Fonseca², Victor Ferrinho Pereira², Isolda Costa¹

¹Instituto de Pesquisas Energéticas e Nucleares, ²Centro Nacional de Pesquisa em Energia e Materiais

e-mail: amdsleite@gmail.com

Abstract:

Duplex stainless steels have been widely used in the manufacture of equipment and piping for different segments, such as chemical, pulp & paper and oil & gas. The major limitation of these steels is the precipitation of deleterious phases whenever they are exposed to high temperatures. This fact drastically reduces the corrosion resistance and mechanical properties of these materials. The friction stir welding (FSW) has been considered an alternative to replace fusion welding processes. FSW is a solid state welding process avoiding many of the weldability problems associated to conventional fusion techniques. In this paper, the corrosion resistance of friction stir welded lean duplex grade 2404 (UNS S82441) was evaluated by cyclic potentiodynamic polarization and critical pitting temperature (CPT) in Cl⁻ containing media. The results indicated that for the conditions adopted the FSW process did not have a significant effect on the pitting corrosion resistance of the steel studied.

Acknowledgements:

I would like to address special thanks to Francis Zippa from Gea, Rafael Maia from Laboratory of Microstructural Characterization "Hubertus Colpaert" and Edison Dorea from Arotec.

References:

- [1] TWI. Wayne M. Thomas, Edward D. Nicholas, James C. Needham, Michael G. Murch, Peter Temple-Smith, Christopher J. Dawes. Friction welding. US 5460317 A. 27 nov. 1992, 24 out. 1995.
- [2] MAGNANI, M.; TERADA, M.; LINO, A. O.; TALLO, V. P.; FONSECA, E. B.; SANTOS, T. F. A.; RAMIREZ, A. J. Microstructural and electrochemical

characterization of friction stir welded duplex stainless steels. International Journal of Electrochemical Science, v. 9, p. 2966-2977, 2014.

[3] SANTOS, T. F. A.; LOPEZ, E. A. T.; FONSECA, E. B.; RAMIREZ, A. J. Friction stir welding of duplex and superduplex stainless steels and some aspects of microstructural characterization and mechanical performance. Materials Research, n. 19, n. 1, p. 117-131, 2016.