Investigation of Influence of Microstructure on FH32 Steel Corrosion Properties using Gleeble Simulation of Heat-Affected Zone and Electrochemical Methods

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doi: 10.20964/2019.10.50

Received: 15 June 2019 / Accepted: 30 July 2019 / Published: 30 August 2019

The corrosion behavior was investigated for each heat-affected zone (HAZ) comprising a FH32 steel immersed in 3.5% NaCl solutions. To research the corrosion behavior of each HAZ sub-region, HAZ thermo-mechanical simulations were performed prior to the electrochemical tests. The results revealed that the corrosion resistance of the fine-grained HAZ (FGHAZ) comprising the steel is superior to that of other HAZ sub-regions. Moreover, the coarse-grained HAZ (CGHAZ) exhibited the worst corrosion resistance of the weld joint. The changes in the corrosion resistance of the HAZ sub-regions were attributed to variations in the microstructural sensitivity to corrosion behavior. Furthermore, the results indicated that the number, size, and distribution of martensite/austenite (M/A) constituents, as well as the grain size of the relevant phase can affect the resistance.

Keywords: C-Mn steel; heat-affected zone; EIS; microstructure; corrosion behavior

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