

Effect of Retained Austenite Stability in Corrosion Mechanism of Dual Phase High Carbon Steel

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Abstract : Dual-phase high carbon steels (DHCS) are commonly known for their improved strength, hardness, and abrasive resistance properties due to co-presence of retained austenite and martensite at the same time. Retained austenite is a meta-stable phase at room temperature, and stability of this phase governs the response of DHCS at different conditions. This research paper studies the effect of RA stability on corrosion behaviour of high carbon steels after they have been immersed into 1.0 M NaCl solution for various times. For this purpose, two different steels with different RA stabilities have been investigated. The surface morphology of the samples before and after corrosion attack was observed by secondary electron microscopy (SEM) and atomic force microscopy (AFM), along with the weight loss and Vickers hardness analysis. Microstructural investigations proved the preferential attack to retained austenite phase during corrosion. Hence, increase in the stability of retained austenite in dual-phase steels led to decreasing the weight loss rate.

Keywords : high carbon steel, austenite stability, atomic force microscopy, corrosion

Conference Title : ICSMSS 2018 : International Conference on Sustainable Materials and Structural Systems

Conference Location : Amsterdam, Netherlands

Conference Dates : January 22-23, 2018