Short Communication

Corrosion Resistance and Mechanical Property Enhancement of SPCC Steel Using an Induction Heat Treatment

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Rapid quenching and subsequent tempering treatment are used extensively to enhance the performance of steel in the manufacture industry. The effect of an induction heat treatment on the microstructure, mechanical properties and corrosion resistance of SPCC (Steel Plate Cold-rolled Commercial) steel is discussed in this study. The surface profile of the SPCC steel was analysed using AFM (atomic force microscopy), which showed that grain growth occurred after the induction heat treatment. The corrosion behaviour was investigated using potentiodynamic measurements in the presence of a 5 wt% NaCl solution. The corrosion current density of the SPCC steel specimens with and without a quenching treatment were 6.66×10^{-5} and 3.78×10^{-4} A/cm², respectively. It was demonstrated that the grain refinement effectively enhanced the corrosion resistance of the SPCC steel. The stress-strain diagram, upper yield point, ductility and yield elongation shifted due to the induction heat treatment. Hence, the experimental results showed that the hardness and the tensile properties of these specimens were clearly correlated to the microstructures. A comparison between the analytical and experimental results exhibits consistent agreement. The proposed methodology improves the performance of the SPCC steel and helps to promote its development in the near future.

Keywords: SPCC steel, induction heat treatment, corrosion, grain growth, yield elongation.

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