World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:12, No:08, 2018

Austenite Transformation in Duplex Stainless Steels under Fast Cooling Rates

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Abstract : Duplex Stainless Steels are well known for its good mechanical properties, and corrosion resistance. However, when submitted to heating, these features can be lost since the good properties are strongly dependent on the austenite-ferrite phase ratio which has to be approximately 1:1 to keep the phase balance. In a welded joint, the transformation kinetics at the heat affected zone (HAZ) is a function of the cooling rates applied which in turn are dependent on the heat input. The HAZ is usually ferritized at these temperatures, and it has been argued that small variations of the chemical composition can play a role in the solid state transformation sequence of ferrite to austenite during cooling. The δ → γ transformation has been reported to be massive and diffusionless due to the fast cooling rate, but it is also considered a diffusion controlled transformation. The aim of this work is to evaluate the effect of different heat inputs on the HAZ of two duplex stainless steels UNS S32304 and S32750, obtained by physical simulation.

Keywords : duplex stainless steels, HAZ, microstructural characterization, physical simulation
Conference Title : ICHSAMPT 2018 : International Conference on High Strength Alloys and Material Processing Technology
Conference Location : New York, United States
Conference Dates : August 27-28, 2018