World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:16, No:08, 2022

Effect of Quenching Medium on the Hardness of Dual Phase Steel Heat Treated at a High Temperature

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Abstract : Dual phase(DP) steel consists essentially of fine grained equiaxial ferrite and a dispersion of martensite. Martensite is the primary precipitate in DP steels, it is the main resistance to dislocation motion within the material. The objective of this paper is to present a relation between the intercritical annealing holding time and the hardness of a dual phase steel. The initial heat treatment involved heating the specimens to 1000oC and holding the sample at that temperature for 30 minutes. After the initial heat treatment, the samples were heated to 770oC and held for a varying amount of time at constant temperature. The samples were held at 30, 60, and 90 minutes respectively. After heating and holding the samples at the austenite-ferrite phase field, the samples were quenched in water, brine, and oil for each holding time. The experimental results proved that an equation for predicting the hardness of a dual phase steel as a function of the intercritical holding time is possible. The relation between intercritical annealing holding time and hardness of a dual phase steel heat treated at high temperatures is parabolic in nature. Theoretically, the model isdependent on the cooling rate because the model differs for each quenching medium; therefore, a universal hardness equation can be derived where the cooling rate is a variable factor.

Keywords : quenching medium, annealing temperature, dual phase steel, martensite
Conference Title : ICMSE 2022 : International Conference on Materials Science and Engineering
Conference Location : Amsterdam, Netherlands
Conference Dates : August 08-09, 2022