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Comparative Study of Mechanical and Corrosion Behaviors on Heat Treated Steel Alloys

Authors : Mario Robinson, Moe Rabea

Abstract : This research examines the effects of heat treatment processes on the mechanical properties and corrosion resistanceof1045 and 4140 Steel Alloysfor industrial applications. Heat treatment processes of full annealing, normalizing, quenching, and tempering are carried out on the alloy samples. The mechanical and corrosion resistance tests of the heat treated samples are carried out, and the results obtained are related to their SEMmorphologies analysis. The results show that the heat treatment processes have an effect on the tensile strength, impact, and a significant effect on the corrosion resistance of the alloy samples. With respect to the strain characteristics, significant improvement in the ductility of the samples is recorded in the full annealing and alloy tempered samples. Thus, for application requiring strength and ductility, such as in aerospace industries, this tempered heat treated alloy could be used. In addition, the quenched sample shows a significant improvement in hardness.

Keywords : heat treatment, corrosion resistance, steel, industrial appilcations
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