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Experimental work on analyzing the effect of heat treatment on mechanical properties and microstructure of NST 37-2 steel

Fadare and Nibore

Abstract

The authors did extensive experimental work on analyzing the effect of heat treatment on mechanical properties and microstructure of NST 37-2 steel. Normally engineering materials like steel are subjected to heat treatment under controlled process of heating and cooling, for changing the physical and mechanical properties, for meeting required engineering applications under heat treatment. The authors have considered annealing, normalizing, hardening and tempering and also studied microstructure and mechanical properties. The steel samples were heated in electric furnace at different temperature levels and holding times. After this, the specimens were cooled in different media. The mechanical properties like tensile strength, yield strength, ultimate tensile strength, young's modulus, percentage reduction in cross section, percentage elongation, toughness and hardness of the heat treated and untreated samples were measured. The microstructure for above specimens were studied through metallographic microscope. Their results indicated that the mechanical properties of above steels can be easily changed and improved by suitable heat treatment methods. They also found that the annealed samples exhibited lowest strength and hardness value and highest ductility and toughness value. They also observed that hardened samples with martensite structure exhibited the highest tensile strength and hardness values and lowest ductility and toughness values. The authors have indicated the chemical composition of steel they have used. The heat treatment temperatures are annealing-910⁰c, normalizing-910⁰c, hardening-910⁰c and tempering-90 minutes. The cooling medium used by them was furnace, water and air for annealing, normalizing, hardening and tempering respectively.