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Heat Treatment Effect on the Microstructural, Hardness and TribologicalBehavior of A105 Medium Carbon Steel

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Abstract: The present work is a contribution in investigating the effect of heat treatment on microstructure, hardness, and friction wear of A105N steel. Samples of 25x25 mm² cross-section and15mm thickness have been prepared from the as-received material and then heat-treated. The samples were austenitized at 1050°C for 60 minutes followed by water quenching, then tempered at 500 and700°C for 120 minutes. Microstructural changes and their effect on the wear resistance and hardness were investigated according to the applied heat treatments. The main results show that after quenching the structure is mostly composed of quenched martensite, which confers high hardness and friction resistance to the steel. While the tempered structure is composed of tempered martensite and ferrite.As the temperature rises to 700°C, the tempered martensite decreases and is fully transformed to ferrite and cementite. A good wear resistance is expressed by a low friction coefficient and a low wear rate is achieved by tempering at 500°C.

Keywords : tempering, Quenching, friction, A105, hardness, heat treatment, wear