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Enhancing the mechanical properties of carbon steel (AISI 1040) by optimized heat treatment process

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This research aimed to enhance the mechanical properties of carbon steel (AISI 1040) by an optimized and controlled heat treatment process. It is well-known that some mechanical properties such as hardness and toughness are inversely related to each other. Thus, the target objective of the work was to find the best possible heat treatment for carbon steel to get an optimum combination of tensile strength, hardness and toughness. Experimental samples (108 specimens) were prepared and divided into four groups which were subjected to different heat treatment conditions and different mechanical tests. The mechanical properties of the groups were evaluated for comparison and analysis after the series of heat treatment processes. The procedure started by heating the specimens to 860 °C to harden the carbon steel and then quenching them in oil or water, next tempering processes were carried out at several tempering temperatures. It was found the quenching agent and the tempering temperature had considerable effect on the mechanical properties while the optimum parameters depended on the properties that were preferred.

Biography

Khaled Alrashdan has completed his PhD in Mechanical Engineering from Brunel University London and MSc and BSc degrees in Mechanical Engineering from Kuwait University, College of Engineering and Petroleum. He has obtained International/European Welding Engineer from SLV-DVS Germany. He is an Assistant Professor in the Department of Manufacturing Engineering Technology at the College of Technological Studies. He has published a number of international journals and conferences in the areas of manufacturing systems, modelling and simulation.

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