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INFLUENCE OF DIFFERENT HEAT TREATMENTS OF SPHEROIDIZING IN THE MICROSTRUCTURE AND HARDNESS OF A STEEL SAE 1045 COMMERCIAL

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The metals and its alloys present a wide range of microstructures with a variety of mechanical properties. One of the most common procedures utilized for changing the properties are the heat treatments. Therefore, this study presents the influence of different types of spheroidizing treatments over a microstructure of commercial SAE 1045 steel received in the rolled and annealed condition. This steel is widely used in projects of machine elements, such as: gears, shafts, pins and screws. Thus, the main objective of this work was to study the relationship between spheroidizing cycles and the changes in the microstructures and mechanical properties, evaluated by microhardness tests. The characterizations were done by chemical analysis, Vickers microhardness, optic microscope and scanning electronic microscope with EDS. Initially, it was done a normalizing treatment for homogenization of the microstructure of the samples. After that, spheroidizing treatments were done during 20h with temperature increased by 10°C and varying between 650°C up to 710°C. The steel as received presented a microstructure with coarse grains of ferrite and pearlite nodules, which resulted in higher hardness value, (187.7±5)HV. There was a decrease in the steel hardness values after the normalizing treatment due to the refinement of the grains, (173.5±4.5)HV. The replacement of the pearlite lamellae by spheroidized carbides resulted in a significant decrease in microhardness values, around 152HV for the temperatures below 680°C. There was no significant change in steel hardness values (around 145HV), as well as its microstructure for the temperatures of 690°C, 700°C and 710°C.