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Effect of Silicon Inclusion Carbonaceous Composite Particulate on the Thermal-Ageing Characteristics and Mechanical Performance of Low Carbon Steel

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Abstract

This study focus on the effects of silicon inclusion carbonaceous particulate on the hardness and microstructural properties of carburized low carbon steel, at constant temperature of 900 °C with different holding time from 2 to 5 h. The cow bone and coal dust composite particles were varied with 20% CaCO₃ used as the energizer. Hardness and microstructural testing of the various specimens were then carried out using Vickers hardness machine and metallurgical scanning electron microscope. From the result, it was noticed that there was an increase in microhardness performance on both cow bone and coal dust reinforced matrix compared to the as-received samples. For coal dust carburized carbon steel, the hardness value improved from 286 HVN control samples 434.55 HVN in 5 h. It was seen that the introduction of cow bone composite particulate also provides a reasonable mechanical hardness improvement to 418.2 HVN although a little short fall against the coal dust

metal matrix. From the microstructure and macrostructure studies highly pearlitic matrix steel was observed with grain refinement of CB and CD found at the interface providing an effective nucleation site along the boundaries.

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