

Improvement of Microstructure, Wear and Mechanical Properties of Modified G38NiCrMo8-4-4 Steel Used in Mining Industry

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Abstract : G38NiCrMo8-4-4 steel is widely used in mining industries, machine parts, gears due to its high strength and toughness properties. In this study, microstructure, wear and mechanical properties of G38NiCrMo8-4-4 steel modified with boron used in the mining industry were investigated. For this purpose, cast materials were alloyed by melting in an induction furnace to include boron with the rates of 0 ppm, 15 ppm, and 50 ppm (wt.) and were formed in the dimensions of 150x200x150 mm by casting into the sand mould. Homogenization heat treatment was applied to the specimens at 1150°C for 7 hours. Then all specimens were austenitized at 930°C for 1 hour, quenched in the polymer solution and tempered at 650°C for 1 hour. Microstructures of the specimens were investigated by using light microscope and SEM to determine the effect of boron and heat treatment conditions. Changes in microstructure properties and material hardness were obtained due to increasing boron content and heat treatment conditions after microstructure investigations and hardness tests. Wear tests were carried out using a pin-on-disc tribometer under dry sliding conditions. Charpy V notch impact test was performed to determine the toughness properties of the specimens. Fracture and worn surfaces were investigated with scanning electron microscope (SEM). The results show that boron element has a positive effect on the hardness and wear properties of G38NiCrMo8-4-4 steel.

Keywords : G38NiCrMo8-4-4 steel, boron, heat treatment, microstructure, wear, mechanical properties

Conference Title : ICMME 2018 : International Conference on Metallurgical and Materials Engineering

Conference Location : Amsterdam, Netherlands

Conference Dates : November 05-06, 2018