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IMPROVING WEAR PROPERTIES OF HIGH-CHROMIUM CAST IRON BY MANGANESEALLOYING

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Abstract: High-chromium cast irons are widely needed by severalindustrial areas where wear is the dominant environment.They are used in mining, cement- and steel-making plants,and many others. Their microstructure consists of nettedeutectic carbides embedded in an austenitic or martensiticmatrix. The wear behaviour is mainly controlled by thecarbides shape and also matrix type. Several scientificworks try to improve the wear behaviour and to optimizethe life service of this cast iron by using various techniques.In this work, we intend to study the effect of manganesecontent on the microstructure properties and wearbehaviour of a 15 % chromium white cast iron used forball mill production. The present work treats the wearbehaviour, after heat treatment, of a manganese-alloyedhigh-chromium cast iron. A set of specimens were melted inan induction oven by varying the manganese content in therange 0–3 %. Heat-treated samples were analysed byoptical microscopy, MEB (SEM) scanning electronmicroscopy, differential scanning calorimetry, and X-raydiffraction and were wear tested by abrasion and friction.Increasing the manganese addition gave a structural evolutionand a wear resistance improvement. The best wearbehaviour is obtained with samples containing 3 % Mn.

Keywords : Chromium cast iron, carbide-forming elements, eutectic carbides, secondary precipitation, abrasion, friction