Effect of erodent properties on erosive wear behaviour of high chromium cast irons

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Abstract. This study investigated the effect of the erodent particles properties on solid particle erosive wear of some high chromium cast irons containing 12-27 wt% Cr. The solid particle erosion tests were conducted using three different erodent particles of 810 μm and 800 HV cylindrical shaped round cut wire, 770 μm and 810 HV irregularly shaped steel grits and 750 μm and 705 HV spherical steel shots, with impact angles between 30 ° and 90 ° and a particle velocity of 100 m/s. the experimental revealed that in the case of spherical shaped erodent, the erosion rates reached the maximum values at middle angles of 60 °, and with increasing of Cr contents the erosion rates were decreased. Interestingly there has little impact angle dependency for 27 chromium cast iron. There have observed similar impact angle dependency but higher erosion values in the case of cylindrical and irregularly shaped erodent particles.

Hardness measurement and the observation of the eroded surface by scan electron microscopy were undertaken to analyse the erosion behaviour. EPAM and XRD analysis also used to determine the carbide volume fraction and retained austenite in structure.

All these indicated that the erosion rates of high chromium cast irons were closely related to not only the relative hardness of erodent and matrix hardness after working hardening but also the volume fraction of chromium carbides in matrix.

Keywords: erosion, high chromium cast iron, erodent, carbide volume fraction, work hardening