



Erosion characteristics of high chromium cast iron at high temperature of 1173K

Kazumichi Shimizu^{1,a}, Xinba Yaer^{1,b}, Hiroya Hara^{1,c}, Masahito Tanaka^{2,d}

¹ Muroran Institute of Technology, 27-1, Mizumoto-cho, Muroran city, Hokkaido, 050-8585, Japan

²Sankyo Alloy Casting Co., Ltd. Tsukuda 5-10-7, Osaka Nishiyodogawa-ku, Osaka, 555-0001, Japan

^a shimizu@mmm.muroran-it.ac.jp

^b xinbayar@@mmm.muroran-it.ac.jp

^c h-hara@mmm.muroran-it.ac.jp

^d m-tanaka@ksh-sankyo.com

Abstract. This study investigated the high temperature erosion characteristics of Fe-3wt%C-27wt%Cr high chromium cast iron (27Cr cast iron) comparing with some stainless steels. High temperature solid particle erosion tests using a test temperature of 1173 K were performed using 1 mm alumina particles, with impact angles between 30 ° and 90 ° and a particle velocity of 100 m/s. Erosion rates, especially at shallow angles of 30 °, were dramatically increased by 2~6 times comparing that at room temperature. High temperature hardness measurement and the observation of the eroded surface by scan electron microscopy were undertaken to analyse the erosion behaviour.

Well-developed ripple patterns lying transverse to impact direction of erodent for all materials at high temperature erosion also indicated that materials was softened by high temperature, showing ductile characters to be dominated by cutting wear, especially at shallow angle of 30 °. High temperature hardness tests indicated that an increase in the erosion rate of the specimens was related to a decrease in high temperature hardness. Although the hardness was reduced to approximately 70 % at 1173 K for all specimens, this suggested that the wear resistance of 27Cr cast iron was improved by restraining the plastic flow because it was harder at higher temperatures.

Keywords: erosion, high temperature, high chromium cast iron, high temperature hardness