ANALYZES OF INCREASING THE IMPACT VISCOSITY OF STAINLESS STEELS

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Abstract. The corrosion resistance and other useful properties of the steel are enhanced by increased chromium content and the addition of other elements such as molybdenum, nickel, and nitrogen. There are more than 60 grades of stainless steel. The results collected from this study are validated with the morphological analysis of erosive surfaces which is attributed to the real wear mechanism. To characterize the eroded surfaces, this mechanism is associated with the micro-cutting, micro-plowing, plastic deformation and several other materials removal processes. Stainless steel is stable steel against rusting (corrosion) in atmospheric conditions and some harmful environments; type of alloy steel. The main alloying element that improves the corrosion resistance of steel is chromium (12–20%) (see Corrosion of Metals).

Key words. Steel surface, mechanism, erosive surfaces, plastic deformation, equipment, velocity.

Introduction. The presence of elements that form a protective film on the steel surface – aluminum, silicon, nickel, etc. – increases the resistance of steel to corrosion. In addition to these, the homogeneity of the metal resulting from the state of the surface, intercrystalline corrosion, the properties of not being prone to decay under the influence of extremely high (creating cracks in metal and weld joints) stresses are important. There are chrome, chrome-nickel and chrome-nickel-manganese varieties. Furnace equipment, elements of heating furnaces are made from chrome 3. p. However, the erosion varies differently with the variation of impact angles for different tested materials. The erosion rates under impact velocity 40, 50 and 60 m/s are tested. The higher the impact velocity, the higher the erosion rate is noted despite the levels of erosion changes are different for different materials. The enhancement of erosion with the impact velocity is linked with the increase of kinetic energy which in turn is responsible for the increase of temperature. The combined impact of kinetic energy and temperature effects the location of the examined surfaces of stainless steels. But as the stainless steels have the better mechanical and physical properties, these show better erosion resistance in comparison of other polymer and composite materials.

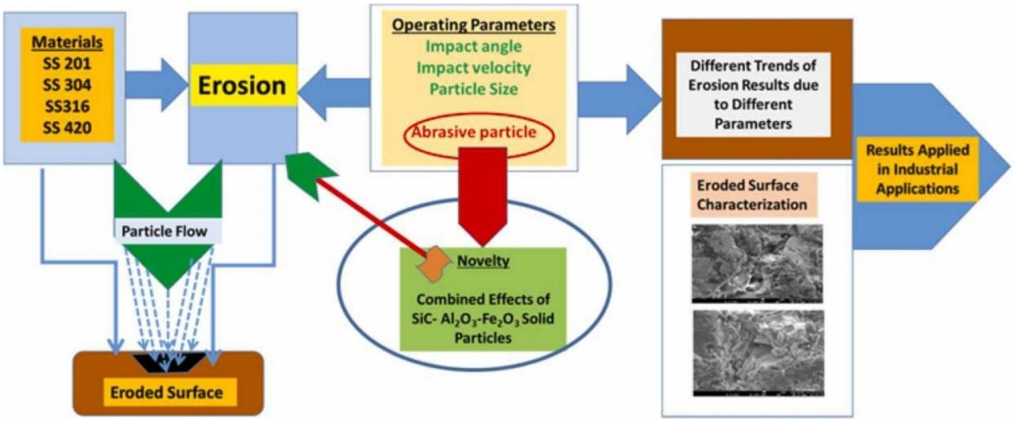

Figure 1. Processing of the steel surface.

During the eco-slag process, the slag composition is significantly changed by adding Al dross and by reducing FeO. The change in slag composition affects the erosion of the EAF refractory. During the EAF process, MgO from the refractory is soluble in the molten slag. As refractory erosion can shorten the service life of the EAF system, MgO saturation in the EAF slag is maintained by the external addition of calcined dolomite or calcined magnesite. Previous studies have investigated the solubility of MgO in CaO–SiO2–FeO–Al2O3 systems [11,12,13]; these studies have shown that MgO solubility in the molten slag system is mainly affected by the equilibrated phase of the slag, such as magnesiowüstite ((Mg, Fe)O) or spinel (MgAl2O4). In addition, the change in the thermodynamically equilibrated phase affects the ionic state and slag structure of the network-forming oxide. Using the thermodynamic calculation software FactSage 8.1 (Thermfact and GTT-Technologies, Montreal, QC, Canada), the thermodynamic equilibrium phases of the molten slags were evaluated. In the CaO–SiO2–MgO ternary system, the determined liquidus temperature was 1823.39 K and the equilibrium phase was merwinite (Ca3MgSi2O8). It can be inferred that this system showed the highest activation energy because merwinite has a rigid structure between cations and silicate anions.

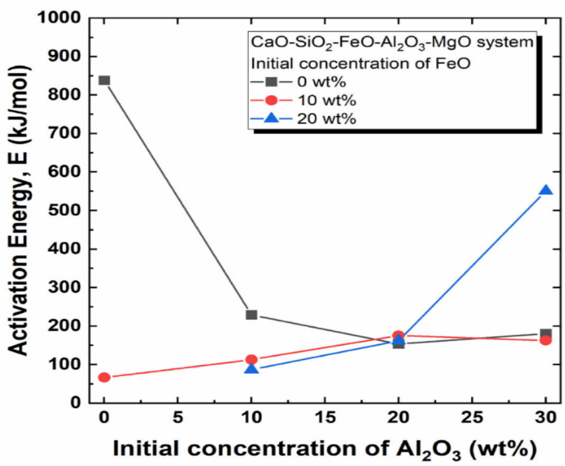

Figure 2. Activation energies of CaO–SiO2–FeO–Al2O3–MgO slag system with varying FeO and Al2O3 concentrations.

Conclusion. It is also observed the higher test duration and larger particle size have some role to increase the erosion rate. The results of this work are compared with the works of other researchers and the trends of these results are explained with the possible causes. The results of this work can be used as a reliable source for the applications of advanced technology in industry

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