

Tribological behavior and microstructural characterization of austenitic stainless steel stabilized with Nb and V

A. GHARBI, A. Himour, O. GHELLOUDJ, K. BOUHAMLIA, S. Abderrahmane, T. CHOUCANE, C. E. RAMOUL, D. BERDJANE

Abstract: This study deals with the influence of the addition of vanadium and niobium with concentrations of 1.2% and 0.14%, respectively, on the variation of the microstructure, and the tribological behavior of an AISI309 austenitic stainless steel. The studied specimens were structurally characterized by optical microscopy, scanning electron microscopy (SEM) X-ray diffraction and differential scanning calorimetry (DSC). These samples were also subjected to a tribological study using the friction wear test. The results show that the addition of vanadium and niobium causes precipitation of stable carbides (VC, NbC) which in turn causes a decrease of the chromium carbide precipitation rate. Tribological test results have also shown that the addition of these two elements improves the wear resistance of AISI309 austenitic stainless steel by decreasing the coefficient of friction from 0.824 to 0.554.

Keywords : Vanadium, niobium, tribological, wear, friction, AISI309