

Tribocorrosion Behavior of Austempered Ductile Iron Microalloyed with Boron

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Abstract : The work presented in this paper studied the tribological characteristics (wear resistance, friction coefficient) of austempered ductile iron (ADI) with different combinations of structural composition (upper bainite, lower bainite, retained austenite) in dry sliding friction. A range of structural states of the metal matrix was obtained by changing the regimes of isothermal quenching of high-strength cast iron. The tribological tests were carried out using two sets of isothermal quenched cast irons. After austenitization at 900°C for 60 minutes, the specimens from the first group were isothermally quenched at the 300°C temperature and the specimens from the second set - at 400°C. The investigations showed that the isothermal quenching increases the friction coefficient of high-strength cast irons. The friction coefficient was found to be in the range from 0.4 to 0.55 for cast irons, depending on the structures of the metal matrix. The quenched cast irons having lower bainite demonstrate higher wear resistance in dry friction conditions. The dependence of wear resistance on the amount of retained austenite in isothermal quenched cast irons has a nonlinear characteristic and reaches its maximum value when the content of retained austenite is about 15-22%. The boron micro-additives allowed to reduce the friction coefficient of ADI and increase their wear resistance by 1.5-1.7 times.

Keywords : wear resistance, dry sliding, austempering, ADI, friction coefficient, retained austenite, isothermal quenching

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