Surface modification of low carbon martensitic stainless steel by current heating technique in graphite

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Surface modification of low carbon martensitic stainless steel by current heating technique in graphite

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Abstract

The tribological and corrosion behaviors of the AISI 420 martensitic stainless steel treated by the current heating technique were studied for tribological and corrosion applications. The steel was treated at the applied electric powers of 100 – 300 W, and characterized by scanning electron microscopy, energy dispersive spectroscopy, hardness test, pin-on-disk tribological test, potentiodynamic polarization test, and electrochemical impedance spectroscopy. The hardness, the coefficient of friction, and the wear rate were improved with the increasing applied electric power, caused by the increase in the formation of M_2O_3, $M_{23}C_6$, and M_7C_3. The corrosion behavior of the treated steel tended to improve at the high applied electric power. The steel treated by the current heating technique, in the appropriate condition, is suitable for tribological and corrosion applications.

Keywords: Current heating technique; Tribology; Potentiodynamic polarization; Electrochemical impedance spectroscopy; Martensitic stainless steel; M_2O_3.

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