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İlyas Hacisalihoğlu, Fatih Yildiz, Ayhan Çelik

PII: S0301-679X(18)30023-9

DOI: 10.1016/j.triboint.2018.01.023

Reference: JTRI 5054

To appear in: *Tribology International*

Received Date: 7 December 2017

Revised Date: 4 January 2018

Accepted Date: 9 January 2018

Please cite this article as: Hacisalihoğlu İ, Yildiz F, Çelik A, Tribocorrosion behavior of plasma nitrided Hardox steels in NaCl solution, *Tribology International* (2018), doi: 10.1016/j.triboint.2018.01.023.

# Tribocorrosion Behavior of Plasma Nitrided Hardox Steels in NaCl Solution

**İlyas HACISALİHOĞLU[a], Fatih YILDIZ[a]*, Ayhan ÇELİK[b]**

[a] *Erzurum Technical University, Department of Mechanical Engineering, Erzurum, Turkey.*
[b] *Atatürk University, Department of Mechanical Engineering, Erzurum, Turkey*

[*] *Corresponding Author: F. Yıldız (Tel: +90442 666 2527 ext. 2070, Fax: +90442 666 2537, fatih.yildiz@erzurum.edu.tr)*

## Abstract

In this study, the effect of plasma nitriding treatment on structural, wear, corrosion and tribocorrosion properties of different type Hardox steels (400, 450 and 500 type) was investigated using X-ray diffraction, microhardness tester, scanning electron microscope, 3D profilometer and reciprocating wear tester coupled with electrochemical corrosion cell. The plasma nitriding treatments were performed in 50%$N_2$-50%$H_2$ gas mixture at 500°C for 1 and 4 h. The tribological tests were carried out in dry and open circuit potential conditions at 10 N normal force in 3.5% wt. NaCl aqueous solution at room temperature. Nitriding changed the electrochemical degradation mechanism of surface to pitting corrosion. Plasma nitriding time of 1 h significantly improved the corrosion and wear resistance of the Hardox steels.

**Keywords:** Plasma nitriding, Tribocorrosion, Wear, Hardox steel