

**Mechanical and corrosion behavior of TiN coatings deposited on nitrided
AISI 420 stainless steel**

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TiN coatings are widely used in different applications for extending components lifetime due to their high hardness and good wear resistance. However, it is not convenient to deposit them on soft stainless steels. In this work, the wear and corrosion behavior of commercial TiN coatings deposited by Arc-PVD on nitrided and non-nitrided martensitic stainless steel was studied (duplex and coated samples respectively). Two different nitriding conditions were used, one at high temperature (HN) and other at low temperature (LN). Nanohardness and microhardness were measured. The microstructure was characterized by OM, SEM and XRD. Pin on disk and erosion tests were carried out in order to evaluate the wear resistance. To analyze the corrosion behaviour, electrochemical tests in NaCl solution were performed. The adhesion was assessed by means the Scratch and Rockwell C Indentation tests.

The coating thickness was about 1.5 μm and its hardness of 34 GPa. The nitrided layers were 12 μm and 19 μm thick for LN and HN, hardness was 12 GPa and 17 GPa, respectively. The nitrided layer improved the adhesion in both conditions in Scratch and Rockwell C Indentation tests. But for high loads, the adhesion was better for the HN group. The wear loss volume was similar for both duplex samples and also for only coated samples in pin on disk tests. Nevertheless, in the erosion tests, the mass loss was lower for HN than LN samples. In severe tests, a hard and thick nitrided layer as pre-treatment improved the mechanical resistance of the system.

Regarding the corrosion behavior, all samples presented active dissolution; the corrosion potential was slightly nobler for the duplex samples. This behavior could be related to the presence of porous defects which allow the solution to reach and attack the substrate producing the coating detachment around the pits.