

WEAR RESISTANCE OF NITRIDED AND DLC COATED PH STAINLESS STEEL

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Precipitation hardening stainless steels are extensively used as a material for plastic injection dies, because of its dimensional stability during hardening, impact strength and wear and corrosion resistance. Plasma surface engineering can enhance even more the working life of these components preserving it from wear and corrosion damage by means of surface modification or coatings. In this work PH stainless steel Corrax(R) was ion nitrided and coated with DLC in a CVD process. DLC films are known not only for their hardness but also for their low friction coefficient, avoiding adhesion and material transfer. Adhesion test were performed, wear resistance was tested in a pin on disk machine with different counterparts and in the abrasion ASTM G65 test. A nitrided sample was compared in all tests with a DLC coated sample and a duplex one (nitrided+coating).

The nitrided case was 12 microns width, and the coating, 1,8 microns. In the abrasion test, the relative mass loss was 0,04 in the duplex sample compared with the non treated material, 0,06 for the only coated and 0,6 for the nitrided one. In the pin on disc test the friction coefficient was measured under 1000 MPa hertzian pressure. In the nitrided sample was around 0,7 against alumina and steel, but it was only 0,04 in the coated samples, and no wear loss was detected in this case after 1000 m distance. In the Scratch test, the coated sample suffered delamination and the duplex resisted without damage 35 N load.

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