

# Plasma Nitriding **vs.** Hard Chrome

Comparison of surface hardening processes for components under demanding conditions

## Plasma Nitriding

## Hard chrome plating

Very high, thanks to diffusion-hardened layers



WEAR RESISTANCE



High, but prone to microcracking

Metallurgical bond (diffusion-based layer)



ADHESION



Mechanical bond (may detach under stress)

Can be preserved or even enhanced (depending on the material)



CORROSION RESISTANCE



Variable, depends on substrate and coating quality

Clean process, no toxic chemicals



ENVIRONMENTAL IMPACT



Uses hexavalent chromium (Cr<sup>6</sup>): toxic and heavily regulated

No distortion (low temperature, no build-up)



DIMENSIONAL STABILITY



May require post-machining

Permanent (diffused into the surface)



DURABILITY



Wears over time; may require re-plating

Preserved or improved (no post-polishing needed)



SURFACE FINISH



Requires polishing after plating

High (automatable, recipe-controlled)



PROCESS REPEATABILITY



Variable (depends on bath and manual factors)

No line-of-sight required (uniform diffusion)



GEOMETRY SENSITIVITY



Requires line-of-sight to ensure full coverage