



HARDion

plasma technology

Uses

- ▲ **Automotive** : reduction of the wear and the friction factor of motive components, avoids the appearance of micro-cracks.
- ▲ **Aeronautics** : replacement of the hard chrome, resistance to oxidation of the super-alloys, ice-phobic, elimination of the electro-statics loads, reliability raise of the electric connectors.
- ▲ **Connectors** : considerable increasing of copper's corrosion resistance. The treatment of gold electroplated porosities permits to consider the reduction of the gold coating thickness.
- ▲ **Elastomers** : increase of the hardness, better friction and higher wear resistance.
- ▲ **Matchmaking – Jewellery** : treatment allowing the decrease of the scratch appearance while keeping the brightness aspects, increasing of the mechanisms life.
- ▲ **Biomedical** : prosthesis treatment for a biocompatibility: diffusion barrier avoiding the release and better cell colonization.
- ▲ **Cutting tools** : treatment resulting in a decrease of the tools frictions whence an increase of hardness and wear resistance under load.

Technology

A micro-accelerator of particles generates an ion beam able to penetrate the material. The implantation is up to 10µm deep and the effects are measurable until 1mm.

The choice of the implanted ions permits to obtain a surface amorphization, a re-alloy or a nano-restructuring. The part temperature never exceeds 80°C: a cold metallurgy.

Micro-implanter

The treatment machine is mainly composed of a particles micro-accelerator and a vacuum chamber (10-3 mbar). The accelerator power and the size of the vacuum chamber respectively determine the treatment time and the size of the treated part. Depending on the requested surface quality, we will determine the gas which will permit the ion beam.

IONICS' know-how permitted to develop a range of machines which make possible the components treatment in "batch" or continuously.

Gains on materials

- ▲ **Steels** : superficial hardening (x4 for stainless steels), strong decreasing of the friction coefficient and exceptional abrasive wear resistance.
Stainless 316L: from 400 to 1800 Hv on 10µm in digressive profile, friction coefficient divided by 2, pitting resistance multiplied by 10.
- ▲ **Aluminium** : superficial hardening (x7), strong decreasing of the friction coefficient, higher corrosion resistance.
- ▲ **Copper and copper alloys** : strong resistance to oxidation and abrasive wear, superficial hardening (x4).
- ▲ **Gold** : superficial hardening (x7), strong decreasing of porosity for electroplated layers.
- ▲ **Titanium** : superficial hardening (x7), decreasing of the friction coefficient.
- ▲ **Magnesium** : superficial hardening(x3), cracking resistance and higher corrosion resistance.
- ▲ **Platinum** : surface nano-restructuring (catalytic properties), reduction of the friction coefficient.
- ▲ **Polymers (PC,PEEK,PMMA,PP,PU...)** : hardness increasing (x10) and creation of antistatic properties.
- ▲ **Elastomers (NR,CR,EPDM...)** : hardness increasing and reduction of the friction coefficient.

Process Advantages

- ▲ Low temperature treatment : reservation of the materials' original mechanical and electrical characteristics
- ▲ Impossible delamination : sturdy link of the layer with the substrate
- ▲ Maintaining of the piece geometry : no machining resumption
- ▲ Treatment limited to the zones to be treated : optimized treatment time :
- ▲ Few surface preparation of the substrate : simple grease removal

Environment Respect

The Hardion® treatment is totally environmental friendly (absolutely no rejection). It permitted to Quertech Ingénierie to obtain the Pierre Potier Prize 2006, which awards a chemical innovation preserving the environment.

