

Surface treatment by ion implantation

Lifetime of mechanical parts can be significantly increased through surface modification by ion implantation. This process enables the hardening of parts, it can also significantly improve metal resistance to corrosion, decrease friction losses, or tune hydrophilicity of glass, to give only a few benefits. Countless applications can now be envisioned at a competitive cost for a wide range of materials. Our technology and installation is perfectly suited for the surface treatment of small and medium sized parts like those found in watches or in medical implants.

FEATURES AND BENEFITS

Ion implantation finds a wide variety of applications in surface treatment of parts made out of **metal**, **polymer**, **glass** or **sapphire**. Hereafter is a short list of possible improvements:

- **Metal hardening**
→ steel, aluminium, copper, brass, gold
- **Reduced friction coefficient**
→ steel, aluminium, silicone, elastomer, polymers
- **Abrasion resistance** of titanium alloys for aeronautics
- **Non-corrodible**, highly conductive copper connectors for electronics
- **Anti-reflective** sapphire glass used for watch glasses, smartphone screens
- **Biocompatibility** for medical devices: anti-bacterial polymers, biocompatible titanium implants
- Modification of the water **contact angle** on elastomers (sealing-ring, windshield wiper)

OUR OFFER

idonus proposes two categories of solutions depending on your production needs:

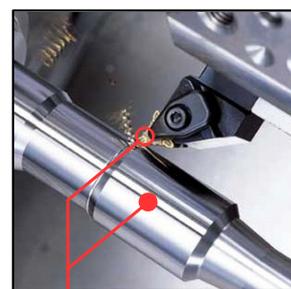
- **Subcontracting services** for surface treatment of semi-finished parts for small series production. Our technical services include processing, process optimization, material characterization, etc. Send us your models or specifications and we will provide you with a quotation.
- **Equipment manufacture:** customized and industrialized turnkey machine. Our team adapts the associated fabrication processes to your needs, and performs on-site installation and training of your team.



- Friction coefficient reduction
- Hydrophobic or hydrophilic
- Hardening
- Antistatic



- Reduced friction (gears, escapement)
- Condensation-free
- Anti-reflective sapphire
- Scratch-free case



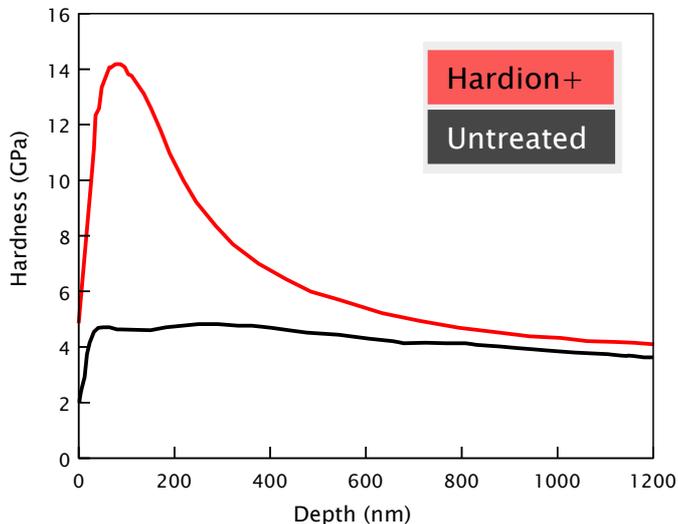
- Metal hardening
- Increased lifetime
- Resistance to corrosion / high temperature oxidation



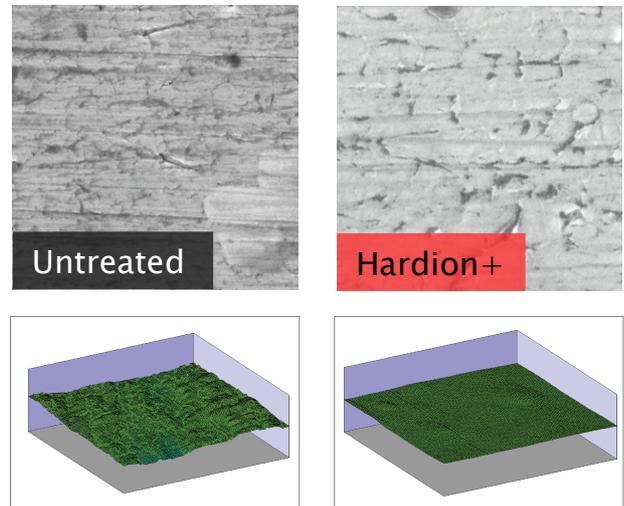
MEASUREMENT RESULTS

Surface hardening is used to improve the **wear resistance** of mechanical parts without affecting their softer, tough interior. This combination of hard surface and resistance to breakage upon impact is useful for critical parts that are highly solicited during operation. Metal hardening is commonly found in gears, bearings, shafts, turbine blades or automotive components.

Hardening of 316L stainless steel



Roughness smoothing of Al 1050 by nitridation



Examples: reduced friction losses by a factor of 10 for elastomers; increased surface hardening of polycarbonate by a factor of 8; increased lifetime of cutting tools by a factor of 3; reduced abrasive wear of titanium alloys by a factor of 100; 98% light transmission through sapphire.

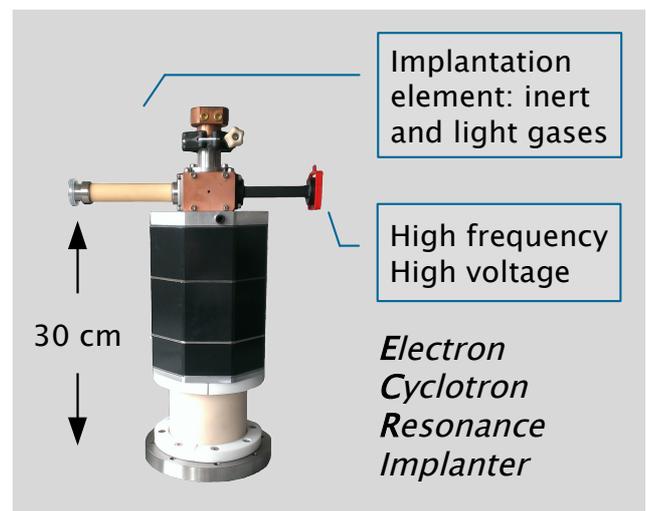
ION IMPLANTATION TECHNOLOGY – The CERN in small !

At idonus, surface treatment is achieved by use of an Electron Cyclotron Resonator (ECR). The samples are placed in a vacuum chamber and ion implantation is realized by scanning under the ion beam.

Ionic bombardment of materials modifies their surface thanks to atomic rearrangement.

With *Hardion+* technology, which is a cold process, the implantation depth is typically 1 μm .

Hardion++ combines ion implantation with diffusion for an increased effect of 10 to 20 μm .



idonus is the official retailer of Quertech's ECR implanter for Switzerland. *Hardion+* and *Hardion++* are the trademarks for these ion implantation associated manufacturing processes.

At idonus, we also have a large park of machining equipments. Our facilities allow us to produce your parts and assemblies in a timely fashion: CNC machine tools and electro-discharge machining (EDM). Our engineering team will advise you throughout your project.