

# Hardening of Stainless Steel

## The challenge

Stainless steel is used when manufacturing components and equipment require some level of corrosion resistance. In most applications, corrosion as well as wear, due to abrasion, cold welding or cavitation, appear and pose new challenges to engineering and final production.

The wear concern is not resolved without suitable surface hardening. Traditional methods, such as nitriding, help against mechanical wear, but simultaneously destroy the corrosion resistance of the stainless steel due to the precipitates of chromium nitrides during the process. High temperature processes involve the risk of dimensional and shape change. Lastly, overlay and surface coatings tend to flake off, cannot be applied with contour fidelity and provide insufficient wear protection due to the "eggshell effect."

## Our solution – your benefit

The innovative and patented BORINOX<sup>®</sup> process produces a wear and corrosion resistant surface on stainless steel. The interstitial solid solution of carbon and nitrogen generates compressive stresses in the component's peripheral zone. The precisely coordinated process effectively suppresses the formation of chromium nitrides and carbides. BORINOX<sup>®</sup> diffusion layers remain corrosion stable and successfully protect against wear from abrasion, cavitation, cold welding and fatigue.

BORINOX<sup>®</sup> is suitable for work pieces of only a few grams up to large components of several hundred kilos per piece. The treatment provides very uniform diffused surface layer with high accuracy maintaining tight tolerances, and the low temperature process eliminates the risk of deformation during processing. Cracks, cavities and complex geometries typically represent no problem. If necessary, masking and partial surface hardening is also possible.

Let us show you how you can ensure the essential competitive advantage for your product by using our know-how!





BORINOX® diffusion zone on austenite



Cross-section of a connection (austenitic nut and bolt) shows the uniform treatment with BORINOX®. The diffusion zone produced protects against cold welding.



Surface hardening without and with BORINOX®

# BorTec

Experts For wear protection

### **BORINOX®** Properties

- Surface hardness up to 1,500 HV0.05
- Diffusion layer no coating
- Protection against abrasion, cold welding, cavitation
- Increased fatigue strength
- Improved coefficient of friction
- Corrosion resistant
- Dimensionally stable

#### Materials

- Austenite (AISI 303, AISI 304, AISI 316LN, AISI 319L, AISI 316Ti, AISI 904L, ...)
- Duplex steels (AISI 318LN, Alloy F255, AISI 2304...)
- PH steels (17-4 PH, 17-7 PH, 15-5 PH, ...)
- Martensite (AISI 420, AISI 440A, 1.4922, ...)
- Nickel-based alloys (Inconel<sup>®</sup>, Hastelloy<sup>®</sup>, Haynes<sup>®</sup>, ...)
- Stellite®

### **Applications**

- Automotive
- Turbocharger construction, bearings, coupling rods
- Fittings
- Valves, dampers, impellers, pumps
- Mechanical engineering
- Fasteners
- Mixer systems
- Filling and dosing lines
- Food technology

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