



surface
technologies

Nitrotec[®]

making steel wear and
corrosion resistant and
increases strength

Nitrotec®

Nitrotec® (nitriding-oxidising-protection) is a patented thermo-chemical diffusion process, during which the surface of steels is nitrocarburised and next oxidized, cooled and - if requested - sealed. Nitrotec® combines the useful properties of the nitrocarburising (improved surface hardness and wear resistance, enhanced fatigue strength, nihil distortion) with the high resistance against atmospheric corrosion, increased yield strength and an attractive black finish.

Properties

- Corrosion and wear resistant surface
- High surface hardness
- Possibility of weight reduction by using thinner steel sheet metal (enhanced yield strength)
- Aesthetic anthracite black surface
- Very good sliding properties, reduction of the friction coefficient
- Alternative for hard chromium plating
- High fatigue strength
- Nihil distortion



How does Nitrotec® work?

Nitrotec®-layers are created in nitrogen and carbon submitting gaseous atmospheres at temperatures between 540-740°C.

The treatment generates compound layers, supported by nitrogen rich diffusion zones in the base material. The choice of process temperature, time and nitrogen potential of the atmosphere in relation to the type of steel, controls the structure, composition and hardness of the compound layer and the diffusion zone underneath. The innovative oxidation technique and the special water based quenchants, as well as the organic sealing are based on the technical demands for the application.

Composition of the layers

At the surface an iron oxide layer (Fe_3O_4) is formed for improvement of the corrosion resistance of the material. Underneath the oxide layer a compound layer is present, which exists of iron carbonitrides, carbonitrides of alloying elements. At process temperatures above 590°C, a nitrogen-rich austenite layer is formed between the compound layer and diffusion zone. The transition to the core is formed by the diffusion zone, which consist of iron (ferrite)matrix, supersaturated with nitrogen and possibly precipitated nitrides.

Hardening depth and hardness

Diffusion depth:	0.1 - 1.0 mm
Thickness iron oxide layer (Fe_3O_4):	1-4 μm
Thickness compound layer:	5 - 50 μm
• Cast iron:	5 - 20 μm
• Steel:	15 - 50 μm

Surface hardness: 300 - 1200 HV

The hardness and layer thickness depend on the applied material.

Suitable materials

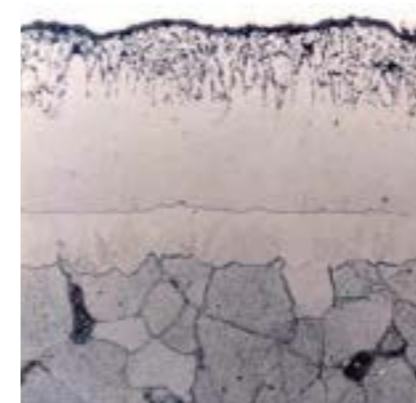
- Unalloyed steel: DC01, C15, St37, free-machining steel
- Alloyed steel: 1.6582, 1.7225, 1.7131
- Cast iron

Suitable materials

Nitrotec® can be applied to unalloyed and low-alloyed types of steel. Nitrotec® can also be applied to cast iron. Stainless steel is not suited for a Nitrotec® treatment; Stainihard is the typical treatment for stainless steel.

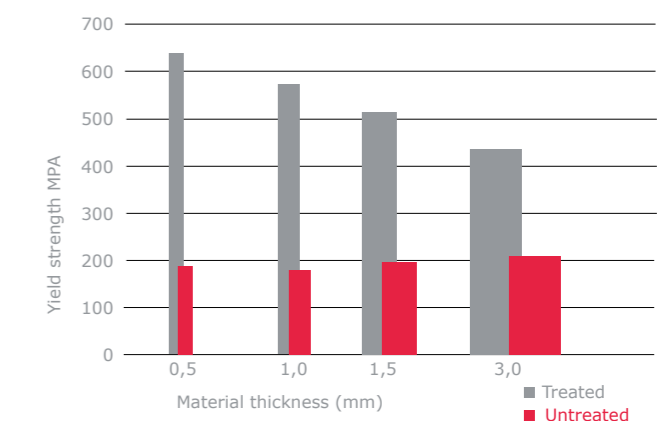
The advantages for Nitrotec® are effected, particularly at unalloyed steel.

Micro-structure



Yield diagram

Example of strength profiles of non-alloy steel after Nitrotec® treatment





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