

Nitrotec Surface Engineering



Nitrotec is a surface engineering process for the treatment of steels and cast irons carried out in the temperature range 550-740° C (1020-1350° F) using a gaseous nitrogen bearing atmosphere. The treatments develop iron nitride surface compound layers between 5-50 μm (0.0002"-0.002") thick, supported by a nitrogen rich diffusion zone in the substrate.

Through selection of treatment temperature, time and nitrogen potential of the atmosphere, the structure, composition and hardness of the compound layer and the subsurface diffusion zone are controlled.

An innovative oxidation technique, combined with specially formulated aqueous quenchant and organic sealant, are incorporated when corrosion resistance is required.

We Welcome the Opportunity... to review your requirements and discuss how HTG can become your technological partner. For more information, visit us on the web at www.hitecmetalgroup.com, or call HTG's National Sales Office at (216) 881-8100.

Wear Resistance & Lubricity

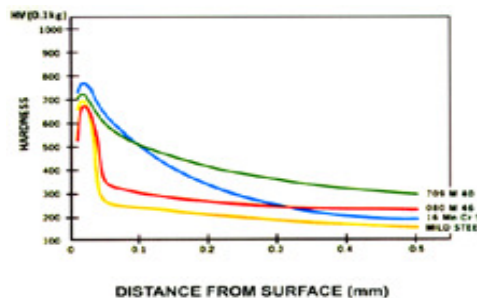
The high surface hardness of the compound layer, and the presence of surface microporosity capable of retaining lubricant, produce an excellent wear resistant surface.

Bearing Characteristics

Because of the ability to retain oil and the inherent wear resistance, Nitrotec treated surfaces may operate in contact with one another without the need to employ individual ball bearings.

Indentation Resistance

Specific hardness profiles indicate the capability of Nitrotec treated components to resist indentation from point contact surface loading.

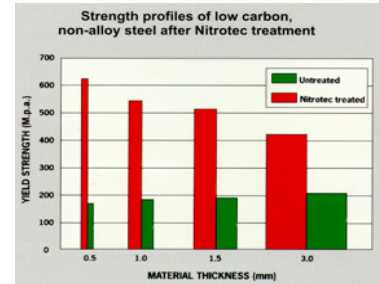


Strengthening

When non-alloyed steels are rapidly cooled after Nitrotec treatment, strengthening of thin sections occurs. This results in an increase in both the yield strength of the base material and its fatigue strength.

Dimensional Control

Traditional hardening practices may result in distortion and poor dimensional control because of metallurgical phase changes when rapidly quenching from high treatment temperatures. During Nitrotec treatment these changes do not occur, therefore allowing the treatment of close-tolerance precision parts, especially thin cross section and precision components.



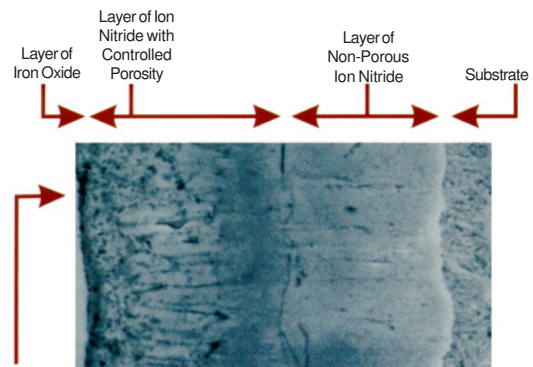
Aesthetic Finish & Corrosion Resistance

Nitrotec treatment produces an aesthetically pleasing black surface finish, and combining this with an organic sealant retained in the microporous layer, imparts corrosion resistance superior to that of electroplated components, and comparable to that of medium grades of stainless steel.

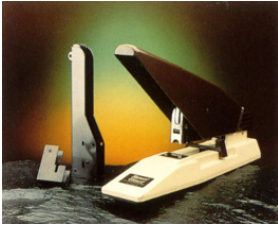
A combination of Nitrotec finishes with a range of organic sealants give salt corrosion resistance of up to 400 hours.



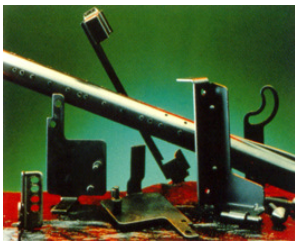
Fifteen microns of hard chromium plating corrodes after 24 hours. Nitrotec S exhibits no corrosion after 240 hours.



Application of sealant produces salt corrosion resistance (ASTM B117) in excess of 250 hours.



The design requirements for the magazine of a hand stapler machine are wear resistance, good dimensional control and corrosion resistance. The traditional processing route for this application had been low temperature carbonitriding followed by chromium plating, but this left quality problems due to excessive distortion of components. An aluminum-stabilized, plain low-carbon steel was used, and the Nitrotec process fulfilled all the design requirements.



A traditional technique for manufacturing of gas piston rods is to machine the piston rod from hard chromium plated low or medium carbon steel bars. Pressure for change arose because of the high cost of chrome plating and the need to improve corrosion resistance of the rods. A Nitrotec S surface treatment provides a cost effective solution in an aesthetically pleasing black surface finish.

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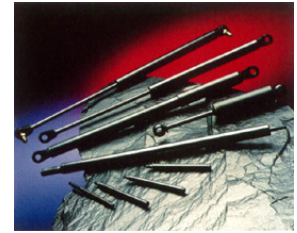
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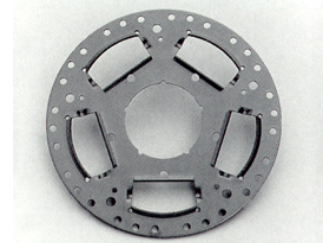
Traditionally, the cutting blades for lawn edgers would have been manufactured from medium to high carbon steel, followed by hardening and tempering prior to zinc plating for corrosion protection. Finally, a further heat treatment would be carried out in order to prevent hydrogen embrittlement. The new blades were blanked from niobium-vanadium fine grained steel, and treated by the Nitrotec process. This treatment produces a hard sub surface that is capable of resisting indentation from stones while the surface layer provides good wear and corrosion resistance.

HI TecMetal Group Mission Statement

We are committed to customer satisfaction through Quality, Service, Productivity, Education, Communication & Teamwork.



A variety of components for the appliance industry are now Nitrotec treated including door hinges, flame guards and gas grill burners. The advantages offered by the Nitrotec process are that components can be produced from materials of thinner cross section while still retaining the required strength and corrosion resistance. The flame guard was also previously made from stainless steel and hence an additional cost saving was achieved.



An automotive clutch backing plate is used in a broad range of automotive aftermarket and OEM applications. Distortion during manufacturing and limited wear resistance in conventional heat treated conditions are major problems for manufacturers. Application of Nitrotec surface treatment improved wear resistance of the part while also reducing distortion. Additional Nitrotec benefits included increased corrosion resistance, attractive black matte finish and improved yield strength.