

Ultimate Surface Performance for Precision Components used in Industrial Equipment

HEF Group is the exclusive global supplier of both Liquid Nitriding treatments and PVD/DLC coatings for engineered components.

Through its global network of jobbing facilities, HEF Group is one of the world's largest suppliers of wear, friction and corrosion reduction treatments and coatings. Precision components enhanced by HEF surface technology are widely used in industrial equipment applications, including mining, farming, material handling, automation, powergen, fluid power, oil and gas equipment and others.

Liquid Nitriding (LN) / Salt Bath Nitriding (SBN) / Nitrocarburizing

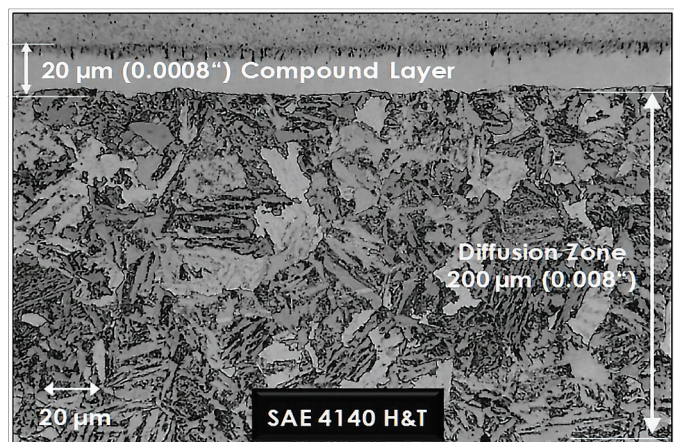
Liquid Nitriding is a thermo-chemical **diffusion** treatment that enriches the surface of steels and cast iron with Nitrogen.

The surface **Compound Layer** is composed of iron nitrides + special nitrides. The area below the compound layer is the **Diffusion zone**, where Nitrogen diffuses into the iron lattice to form a solid solution.

HEF Group's trademarked family of Liquid Nitriding processes:

ARCOR® : ARCOR V, ARCOR C, ARCOR N, ARCOR DT, SURSULF®

MELONITE® : TF1, QP, QPQ, TENIFER® TUFFTRIDE



Liquid Nitriding Benefits

- Hard (600-1200 HV) surface layer provides very good wear resistance
- Good frictional properties
- Excellent scuffing / seizure protection (adhesive wear)
- Excellent corrosion protection
- Good surface fatigue resistance
- Decorative black surface

Liquid Nitriding Applications

Replacement of Hard-Chrome & Nickel Plating



Liquid Nitriding is an excellent replacement for hard-chrome & nickel plating:

- Significantly higher corrosion resistance in Salt Spray Test (SST)
- Prevents peeling and flaking (because the nitrided layer is an integral part of the base steel)
- Adequate Impact & bend resistance thanks to the ductile surface
- Seals and guiding components similar to those used in hard chromium plating, with potentially longer seal life
- Lower friction due to post-nitriding impregnation of the surface microporosity
- Lower cost option than nickel plating

Chrome
Liquid Nitride
+ Polish +
Impregnate



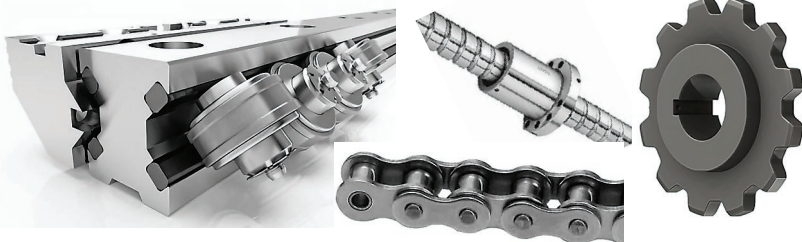
500 hours Salt Spray

Industrial Gears



- Reduced friction
- Improved scuffing resistance
- Superior corrosion resistance
- Improved fatigue resistance

Motion Transfer



- Reduced friction on sliding & rolling surfaces such as rails, guides
- Enhanced wear resistance

Shafts, Mandrels, Pins, Bushings

Surface Treatment (+++ Best)	Wear resistance		Corrosion resistance	Ductility under flexion	Friction properties
	Abrasive	Adhesive			
ARCOR Liquid Nitriding	++	+++	+++	+++	+++
Induction Hardening	++	0	0	-	0
Case hardening	++	0	0	-	0
Nickel Plating	+	++	++	+	+++
Chrome Plating	+	++	+	+	++
Gas nitriding	++	++	++	+	++
Zinc Plating	0	0	+++	+++	+



Other Components



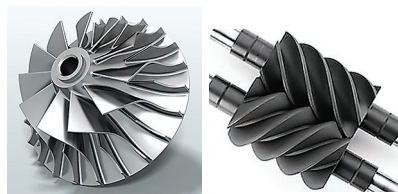
Cams



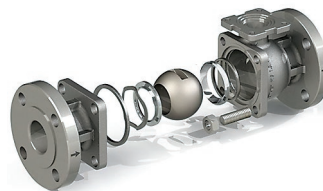
Swash Plates



Mechanical Seals



Compressor Components



Valve Components

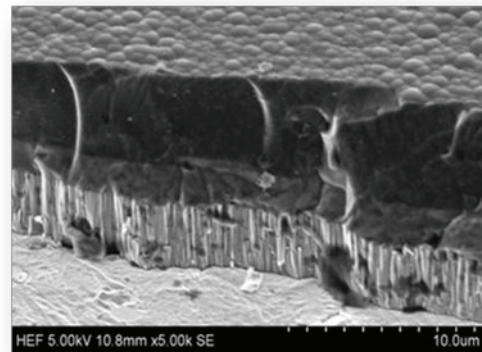
PVD / Diamond-Like-Carbon (DLC) Coatings

While Liquid Nitriding is a surface modification technology, Physical Vapor Deposition (PVD) involves the deposition of very hard, thin (2-4 microns; 0.0001”-0.0002”) films on the surface of components.

The PVD process, conducted under high vacuum conditions, involves the extraction of material, in atomic or ionic form, from a high-purity solid source, such as Titanium or Chromium. This extraction is done by bombarding the source material with high-energy inert gas ions. The extracted ions/atoms react with gases such as Nitrogen to form thin and very hard coatings such as Titanium and Chromium Nitride. If a source material such as a hydrocarbon gas, is used, a very hard, ultra low-friction Diamond-Like-Carbon (DLC) coating can be deposited.

PVD / DLC Coating Benefits

- Very hard (1500-4500 HV): high resistance to wear, abrasion and erosion
- Thin (2 to 5 microns) coatings
- Low friction coefficients (0.1-0.5)
- Low coating temperatures (150-250° C)



DLC Coating Applications



- Very high wear resistance
- Significant friction reduction
- Ideally suited for tight-tolerance components



www.hefusa.net
sales@hefusa.net



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