

ATRA-FLEX® is committed to bringing value and cost savings to your operations



MELONITE® Nitro carburizing Process provides cost effective alternative to stainless steel

- Increased surface Hardness
- Lower coefficient of friction
- Enhanced surface lubricity
- Improved running wear performance
- Enhanced corrosion resistance

MELONITE is a thermochemical treatment for improving surface properties of metal parts. It exhibits predictable and repeatable results in the treating of low and medium carbon steels, alloy steels, stainless and austenitic steels, tool and die steels, cast and sintered iron.

Melonite Processing

Melonite™ is a thermochemical processes intended for the case hardening of iron based metals. These processes are categorized as molten salt bath ferritic nitrocarburizing. During these processes, nitrogen, carbon, and small amounts of oxygen are diffused into the surface of the steel, creating an epsilon iron nitride layer (ϵ - Fe_xN).

A degraded form of this nitride layer (gamma prime: γ' - Fe_4N) is obtained during plasma or gas nitriding. The nitride layer is composed of two principle zones. Zone 1, called the compound or "white" layer, extends to a case depth of ~ 0.0004 " to 0.0008 ". The compound layer is porous, which lends to the lubricity of the finish, and hard ($\sim 700\text{HV}$ to 1600HV). Zone 2, called the diffusion zone, extends to a case depth of $\sim .004$ " to 0.008 ".

In addition, small quantities of substrate carbon are pulled from deeper within the substrate toward the surface. The diffusion zone demonstrates a decreasing gradient concentration of carbon and particularly nitrogen as the gradient extends deeper into the surface of the substrate. This property yields a tough outer surface or shell, yet alloys the material to retain ductility, thereby lending to the overall strength of the material.

Resulting properties from these chemical and structural composition changes are increased surface hardness, lower coefficient of friction, enhanced surface lubricity, improved running wear performance, increased sliding wear resistance, and enhanced corrosion resistance. Naturally, the alloy of the substrate will influence which properties are principally affected and to what extent they are affected.