aalberts surface technologies

FERRITIC NITROCARBURIZING (FNC)

Benefits

Ferritic nitrocarburizing produces a hard case suitable for parts that will experience high torque, high wear, compressive strength, or corrosive environments while resulting in very little distortion compared to other heat treatment options.

Process

Ferritic nitrocarburizing is a thermochemical diffusion process that introduces nitrogen and carbon into the surface of a ferrous alloy forming a wear and corrosion resistant case, commonly called a white layer.

Aalberts offers gas ferritic nitrocarburizing. This process uses an atmosphere that consists of ammonia gas as the nitrogen source and a carbon-bearing gas (such as carbon dioxide or methane) as the carbon source. The atmosphere results in the formation of nitrides, carbides, and carbo nitrides in the case. The table below compares some gas nitriding and gas nitrocarburizing.

	Gas Nitriding	Gas FNC
Process Time	5-100 hours	2-4 hours
Process Temperature	500-520°C (930-970°F)	560-580°C (1040-1075°F)
Surface Hardness	450-1200 HV	450-1200 HV
Case Depth	0.05-0.20 mm	0.05-0.80 mm

The corrosion resistance of ferritic nitrocarburized parts can be markedly increased by the application of a post-oxidation process. This post-ox cycle can be performed as a final step in the same furnace as ferritic nitrocarburizing takes place, reducing part handling. Post-oxidation cycles produce a surface that is dark gray or black. In many cases FNC-treated parts outperform chrome-plated steels in corrosion tests.

Materials

Ferritic nitrocarburizing does not require nitriding forming elements (e.g. Cr, Mo, V, W) to produce a case. Materials such as alloy steels, powder metallurgy steels and cast irons are commonly processed.

Applications

Parts with a ferritic nitrocarburized surface are used in the aerospace, automotive, tooling, and industrial applications. Some examples of ferritic nitrocarburized parts are listed below:

- Automotive: cast iron brake discs, piston rods, gears, crankshafts and camshafts
- Firearms: barrels and slides
- Tool and die cutting blades
- Machine parts: rocker arms, valve guides
- Bearings: races and cones