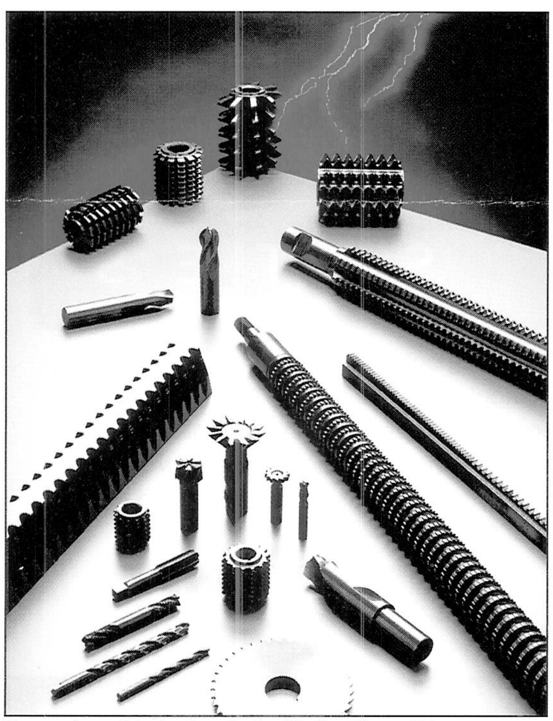
EXTENDED TOOL LIFE WITH NITROCARBURIZING

By Loren J. Epler

An advanced process of ferric nitrocarburizing in fluidized bed furnaces is increasing the life of tools and components by up to 10 times in many applications.

Treating workpieces imparts high wear resistance and lubricity, reducing friction and edge buildup with anti-galling and anti-sticking properties. It also increases yield, tensile and fatigue strength, with negligible distortion, and improved corrosion resistance.

This process is effective for all types of steels, including carbon, alloy, tool, high-speed and stainless. It is also effective with cast iron, carbide and titanium alloys. Because it uses temperatures as low as 800°F., the process is well below the tempering temperatures of all high-speed and other types of steel. Surface hardness up to RC 75-80 can be achieved.



Examples of hobs treated with the Dyna-Blue process.

Versatility

Ferritic nitrocarburizing in fluidized bed furnaces is increasingly replacing conventional processes. It is less costly than titanium nitriding or ion nitriding, plus it tolerates more flex, impact and abuse. It extends component and part life longer than carbonitriding, low case carburizing, chrome plating, black oxiding and other proprietary methods. Also, the process provides an alternative to flame and induction hardening, galvanizing, painting and oyaniding.

Nearly any wear surface can be treated, such as machine ways, guides, wear plates, feed and knurling rolls, conveyor components, mining tools, construction equipment, pump parts, hydraulic parts, robot fingers, rails, gears, cutting tools, dies, molds, chain automotive components and transfer rails.

Development

Different versions of the ferritic nitrocarburizing process are marketed as Nitrowear®, Dyna-Blue® and other trade names. Nitrowear was the first, invented and patented in 1982. Dyna-Blue is particularly suited to tooling because it retains mold release agents and outing fluids. Case depths up to 0.010" to 0.015" can be achieved with very little buildup, and it can maintain a 5 to 6 micron finish. Areas can be welded, blended back into the surface, and treated again. The process also puts wear resistance back into areas softened by welding.

The various forms of this process all utilize fluidized bed furnaces that house a bed of dry, uniform-sized particles of inert aluminum oxide. Unlike salts used in conventional surface treating and hardening, the aluminum oxide particles are non- abrasive, non-corrosive and non-toxic. Air, or a blend of gases for specific treatment processes is introduced through a diffusion plate, microscopically separating and mobilizing the minute particles to give them fluid-like characteristics. Typically, they are heated electrically by silicon carbide elements between the furnace's inner and outer insulated walls.

Process Control

Heat is rapidly distributed, giving temperature uniformity and heat transfer to pieces being treated. Because temperature uniformity is controlled to within ±5°F., the workpieces are processed with less distortion than in conventional processes. Added control comes from another process feature. Gases for surface treatment are not used until the tool is up to heat and ready to accept them.

Nitrogen, an inert gas, is used to start until the tool is thoroughly heated. Then the bed is fluidized with a combination of nitrogen, ammonia and carbon-producing gases. In addition to varying the temperatures and gases, varying the cycle times works to produce different surface hardness and

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