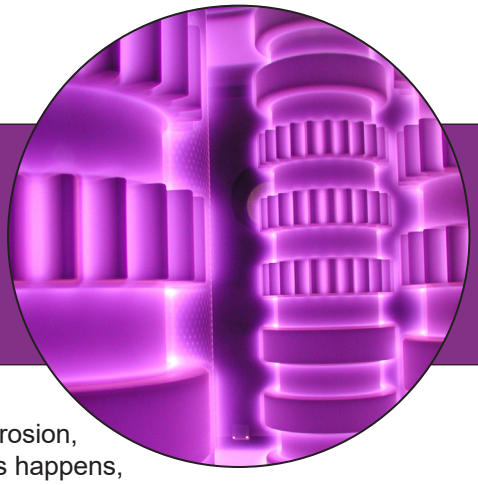
Advanced Heat Treat Corp.

Why You Should Protect Your Parts with a Compound Zone Instead of a Coating



While there are many surface coatings available to protect parts from wear and corrosion, they are more susceptible to pitting, flaking and peeling from the surface. When this happens, the part either needs to be scrapped, or the surface needs to be stripped and re-coated; in some circumstances, this requires the disposal of hazardous chemicals. This is not only time-consuming, but can be very costly for the manufacturer.

For instance, chromium plating, a popular surface treatment across many industries, is a coating- it is not diffused in the material surface; it is added on top of the material. Thickness varies based on requirements, but typically ranges from 15-100µm. The image on the right shows how the surface chromium layer is added on top of the material. There is little to no diffusion occurring, sometimes resulting in poor adhesion.

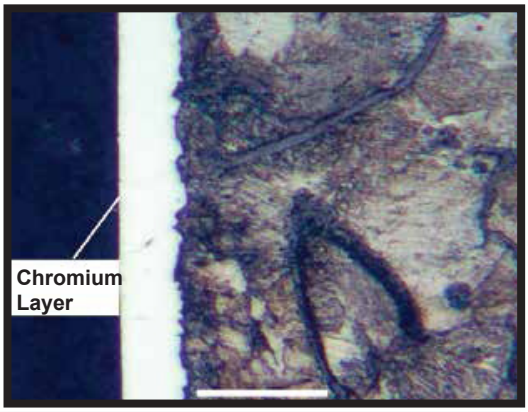


Photo micrograph of chromium-plated G25HP cast iron.

Compound Zone

Nitriding (plasma/ion or gas) and Ferritic Nitrocarburizing (FNC), on the other hand, creates what is called a “compound zone” (aka white layer). The layer typically ranges from 5-25µm thick, depending on the material and processing parameters. Diffusion of nitrogen into the material increases its specific volume, which results in a very small expansion and growth of dimensions. There is an additional protective layer called the diffusion zone below the white layer, further enhancing the material properties.

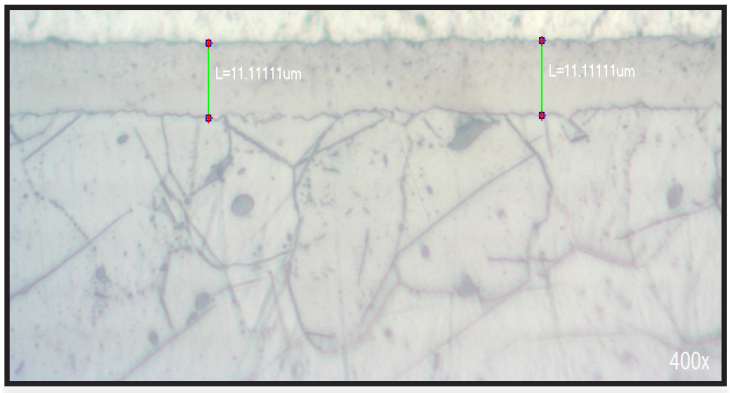


Photo micrograph of ferritic nitrocarburized low carbon steel showing compund zone (aka) white layer.

Nitriding and FNC are superior alternatives to coatings for several reasons. The nitrided layers are diffused into the surface, resulting in less chance for pitting, surface peeling or flaking. In many cases, the process lasts the life of the part, reducing the need for re-surfacing/recoating, saving the manufacturer money in the long run. In many applications, such as automotive stamping dies, hydraulic cylinder bar, firearms and many others, Advanced Heat Treat Corp. customers have witnessed the nitriding processes outperforming chrome plating and extending the life of their parts.

Looking to save your company time and money by converting to a diffusion process? Visit www.ahtcorp.com or contact the AHT team of metallurgists to learn more.

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