

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

By Jake McCann, Metallurgist, Advanced Heat Treat Corp.

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 into 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
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“Ion/Plasma Nitriding Improves Die Life”

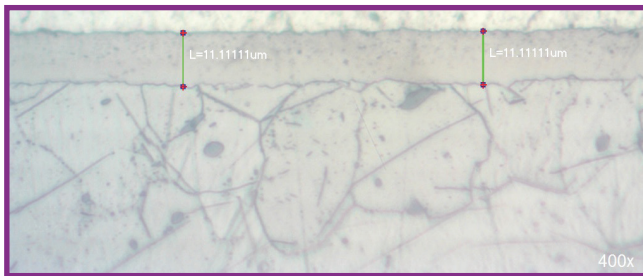


Photo micrograph of ferritic nitrocarburized low carbon steel showing compound zone (aka white layer)

Nitriding (plasma/ion or gas) and Ferritic Nitrocarburizing (FNC), on the other hand, create 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.

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 / re-coating, 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.

About the Author



Jake McCann

Jake McCann has been with Advanced Heat Treat Corp. since 2011. He started at the Burton facility in Waterloo, IA as the Process Metallurgist. In 2015, he transferred to the Michigan facility, also as the Process Metallurgist, where he currently is today. Jake

has his Bachelor's degree in Materials Engineering from Iowa State University and helps AHT customers solve their wear and corrosion issues every day!

The AHT team of metallurgists would be happy to provide a consultation on ways to save your company time and money by converting to a diffusion process if you are currently using a coating. Or, if you have a new application that might be a good fit for nitriding or FNC, give us a call today at 319-232-5221 or visit our website www.ahtweb.com.



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