

BOROCCOAT®

Diffusion Coating

The challenge

Mechanical wear in the form of abrasion and adhesion (cold welding) affects the lifespan of high-quality machinery, assemblies and components. The undesirable consequences include changes in geometry, wear particles within the surrounding structure, frictional heat, vibrations and noises that can lead to a deterioration in functionality or the sudden failure of the respective machine components. The outcomes often involve substantial damages, production downtime and risks to personal safety due to the failure of safety-critical parts.

Our solution - your benefit

With the aid of the proprietary BOROCCOAT® diffusion process, we create boride layers on the surfaces of your components that are two to three times harder than hardened tool steel.

The outcome is an exceptional resistance against most forms of wear, as demonstrated by independent studies (see Fig. 1) and practical experiences from our clients. This significantly extends the lifespan of treated components and reduces maintenance intervals.

This not only saves costs but also decreases the demand for raw materials and energy, thereby contributing to greater resource efficiency and a reduction in your carbon footprint.

The Process

BOROCCOAT® or boriding is a thermochemical diffusion process in which boron, usually at temperatures between approximately 1472 – 1742 °F (800 – 950 °C), diffuses into the surface of the material and forms hard, wear-resistant boride layers. Treating complex contours, inner coatings, bulk parts and partial treatments are all easily achievable within this process.

Following the boriding process, borided components can be further treated to adjust not only high surface hardness but also the desired supporting effect for the edge zone and core strength.

The combination of boriding and case hardening is a well-established method. Components can initially be carburized, then borided and finally fully heat-treated.

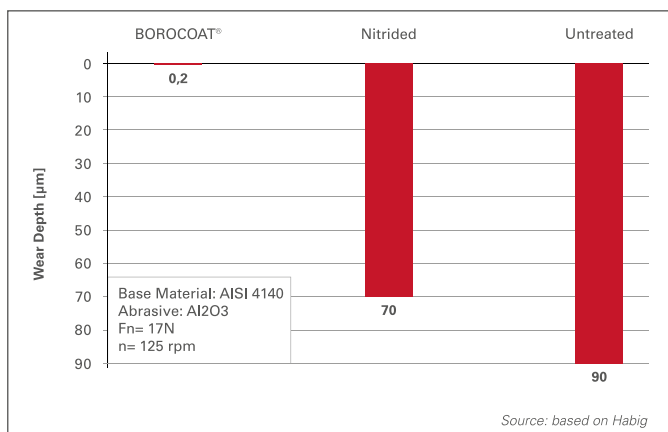


Fig. 1: Wear behaviour of BOROCCOAT® layers

BOROCCOAT® Properties

- Layer hardness of 1,500 – 2,600 HV0.02
- Layer thicknesses ranging from 5 – 200 µm (0.000197 - 0.00787 in)
- 1,500 HV0.02 layer hardness for mild steel
- High thermal resistance
- High resistance against adhesion (galling) and abrasion
- Better adhesion compared to applied layers due to the diffusion nature of the coating
- Good resistance against non-ferrous metal melts (Al, Zn, Mg) and acids (HCl, H₂SO₄, H₃PO₄)

Materials

- Gray cast iron, ductile iron, Ni-Resist
- Steel castings
- Mild steels, case hardening steels, quenched and tempered steels
- Stainless steels (austenitic, ferritic, martensitic)
- Tool steels
- Nickel-based alloys, Nimonic®, Inconel®, Hastelloy®, Haynes®, Stellite®

Applications

- Agricultural machinery technology
- Hydro energy and power plants
- Oil & Gas industry
- Valve technology
- Power tools
- Mining technology
- Components from additive manufacturing and sintered parts
- Automotive engineering
- Mechanical engineering

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