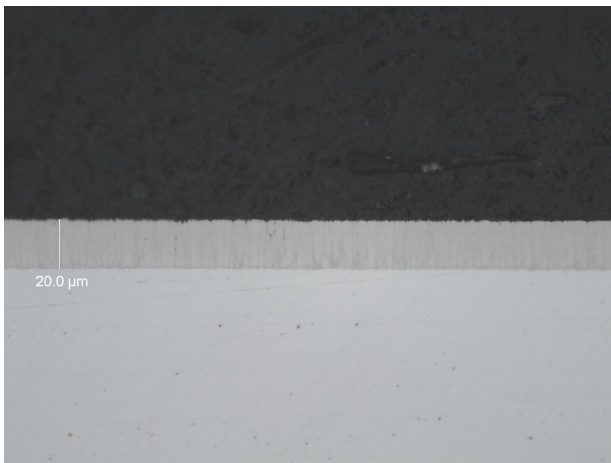


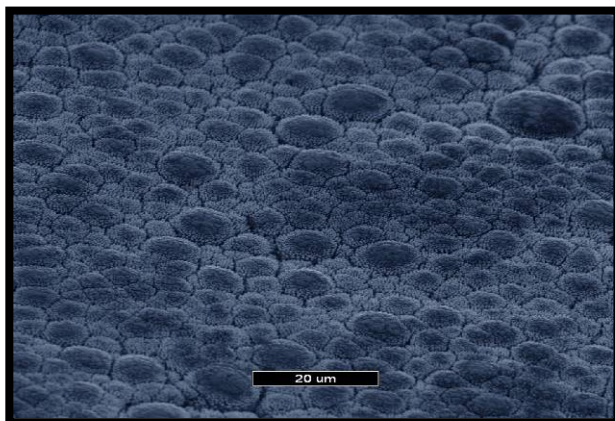
PST – EXO - Technology

The Technology

Praxair EXO – Technologies (Nickel-Boron) coatings are primarily used in applications that benefit from a relatively high hardness and wear-resistant coating. The coating process includes cleaning techniques typical for bath coating processes followed by an electro less (autocatalytic) deposition of nickel with a high co-deposition of boron. Deposition of the coating is non-line-of-sight so all surfaces are coated with an even thickness including inside and outside corners and blind holes. Post-deposition heat treatment transforms the coating to a crystalline form that increases hardness and wear resistance. However, the as-deposited (non-heat-treated) nickel-boron coating is often used for many applications as well. The choice between these two conditions is driven by the performance and metallurgical requirements of the component to be coated. The coating may be surface-finished although the inherent geometric uniformity of the coating allows the coating to be used, in many cases, without further surface finishing. Praxair EXO – Technologies (Nickel-Boron) coating is comparable to hard chrome plating with the added benefits of improved coefficient of friction, more uniform deposition, and increased wear resistance.



NiB on 1018 C-Stahl



NiB – Surface texture

NiB-process Characteristic Features:

- NiB electro less (autocatalytic) process
- Non-line-of-sight, uniform deposition
- Columnar, Nodular Structure
- Corrosion-resistant under layer for enhanced protection (optional)

Process Advantages:

- Applicable to many alloys
- Hardness as plated: 750-850 HV; precipitation hardened: 1200HV
- Temperature resistance: -100°C - +600°C
- Optimum damping qualities
- Uniformity on sharp edges +/- 5 µm

NiB Layers:

- 5-6 Wt% B ; 94-95 Wt% Ni
- Density: 8.25 g/cm³
- Bond Strength > 69 MPa after precipitation hardening; 48 MPa as plated
- Typical thickness: 15-100 µm
- Roughness: original surface roughness + 30% (unfinished 2-1.5 µm Ra; finished 0.03 µm Ra)
- 180°-bend test → free of separations
- Coefficient of Friction: 0.08 (NiB vs. NiB); 0.12 (NiB vs. Steel)