

Surface hardening of nickel-based austenitic alloys

Improving wear and galling resistance in both austenitic Ni- or Co-based alloys such as Inconel 718 and Monel K500 is a main problem in many industries. Expanite provides various solutions for hardening different products in Inconel and Monel achieving a surface hardness of approx. 1000HV on Inconel 718 while the outcome on Monel K500 is approx. 500HV.

Advanced surface hardening

Even where special coatings may be applied in certain environments, heating and cooling cycles normally introduce a high risk of spallation due to different coefficients of thermal expansion. The unique diffusion-based hardening technology of Expanite is applicable to conventional stainless steel (1.4404/AISI 316, Duplex 1.4462, Nitronic, 1.4980/Alloy A-286), Ni-based alloys (e.g. Monel® K500, Inconel® 718 and Hastelloy®) and Co-based alloys such as Stellite®.

The technology is proven to improve product performance while getting greater wear and corrosion resistance and extend lifetime of parts compared to other solutions.

Benefits

The Expanite hardening technology represents significant advantages:

- Surface hardness values in the area of 500 to 1200 HV
- Effectively preventing galling and wear
- Considerably increased component life-time
- Absolutely non-toxic treatment
- Significantly increased corrosion resistance

Typical applications

Stainless steel is, in many cases, used in valves for food and pharma applications, whereas Monel & Inconel are widely applied in chemically aggressive and harsh environments. Especially on relatively large valves used in the chemical industry and power plants, galling on shifting shafts (opening and closing the valve) made of Inconel and Monel has previously caused severe problems.

Research method and results

This has been impressively demonstrated by a test method for galling resistance (according to ASTM G98 test procedure) on an austenitic stainless steel (1.4404/AISI 316L), with and without Expanite surface treatment (cf. Fig. 1 & 2).



Shifting shaft



Ice cream manufacturing



Stainless steel in chemical industry