

## Expanite –Improved galling and corrosion resistance on fittings for oil & gas

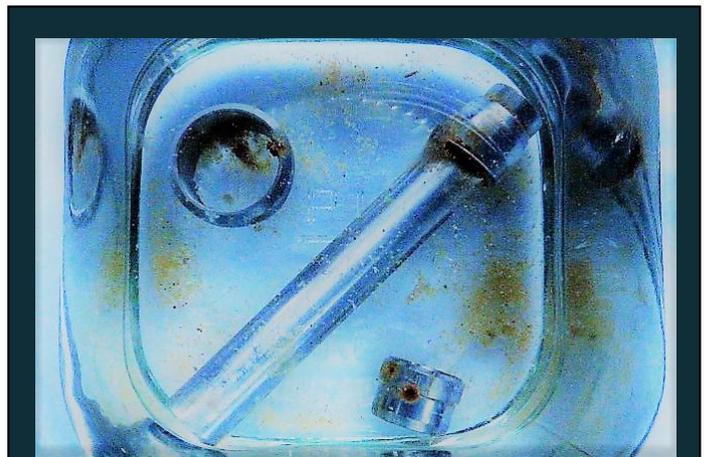
*The processes for surface hardening of stainless steel from the Danish pioneer Expanite, has in recent years been used more and more frequently when it comes to improving galling and corrosion resistance of stainless steel fittings. The results of a long-term corrosion test show in particular the superiority of the Expanite technology over traditional methods.*

A horror for every assembler: galling of stainless steel fittings. A drop of lubricant on the thread helps; but what if, due to for example hygienic requirements, no lubricants may be used, or it is simply forgotten? Stainless steel, with its excellent corrosion resistance, has the disadvantage that when having steel-to-steel contact, it tends to gall. Applying coatings such as DLC or diffusion processes such as Kolsterising® carburizing, nitrocarburizing or plasma nitriding have proven effective in counteracting this effect. However, these processes are not only very costly but also generally have a negative effect on corrosion resistance.

### Improved Corrosion Resistance

With its processes specially developed for stainless steel, Expanite has overcome this dilemma, using its patented technology to improve corrosion resistance of components during hardening and at the same time make them resistant to wear and galling. In this context, TCW Anlagenbau located in Germany recently carried out extensive long-term corrosion tests on different stainless steel grades.

While the traditionally hardened components made of 316Ti (1.4571) (pic 2) show a comparatively strong corrosion attack in the salt bath after a short time, the fittings 316Ti (1.4571) and cutting rings 316Ti (1.4571 & 1.4462) treated with the SuperExpanite show no corrosion even after two months in 10% salt bath solution. In the case of 303 (1.4305), which is basically less resistant, a tendency towards improvement in corrosion resistance could be demonstrated: the unhardened nozzle (pic 4) shows a significantly stronger corrosion attack than the component treated with the Expanite process (pic 5).



Pic 1: Components in 316Ti (1.4571) treated with traditional hardening process



Pic 2: 316Ti (1.4571) fittings without and with Expanite treatment



Pic 3: Cutting rings in Duplex (1.4462) hardend with/without SuperExpanite

## Sustainable against wear and galling

"Galling of stainless steel components is a well-known problem and we regularly hear from our customers about cases where the galling of a classic screw connection means that entire component have to be replaced at great expense", e explains Dr. Holger Selg, Expanite Sales Director DACH and application expert, and adds: "Ideally, both friction parts are treated with the SuperExpanite, but hardening only one component already provides a significant improvement in terms of galling resistance."

The relatively low hardness of stainless steel also makes corresponding components susceptible to abrasive wear. Here, too, the surface hardening of Expanite provides a remedy and extends the service life compared to unhardened stainless steel components. "Sustainability is playing an increasingly important role," says Dr. Selg "Expanite also scores points over comparable wear protection processes with a significantly more energy-efficient and environmentally friendly gas-based diffusion process that does not require time-consuming cleaning of the parts, e.g. with aggressive chemicals after hardening."

## Broad spectrum of materials

The Expanite technology, specially developed for corrosion-resistant materials, offers a solution for austenitic, martensitic, ferritic and duplex stainless steels as well as for nickel-based alloys such as Inconel® and Hastelloy®. Moreover, ExpaniteHard-Ti, which the Expanite team of experts has developed to market maturity in recent years, is used for titanium grades.



Pic 4: 303 (1.4305) nozzle without treatment



Pic 5: SuperExpanite treated nozzle out of 303 (1.4305)

Expanite was founded in 2010 by leading experts in material and surface hardening whose research dates back to 2000. The company is headquartered in Hillerød near Copenhagen and has treatment centers in the USA, Germany, Korea and China. Expanite's solutions are flexible and can be tailored to the customer's own product line within the framework of a license agreement.