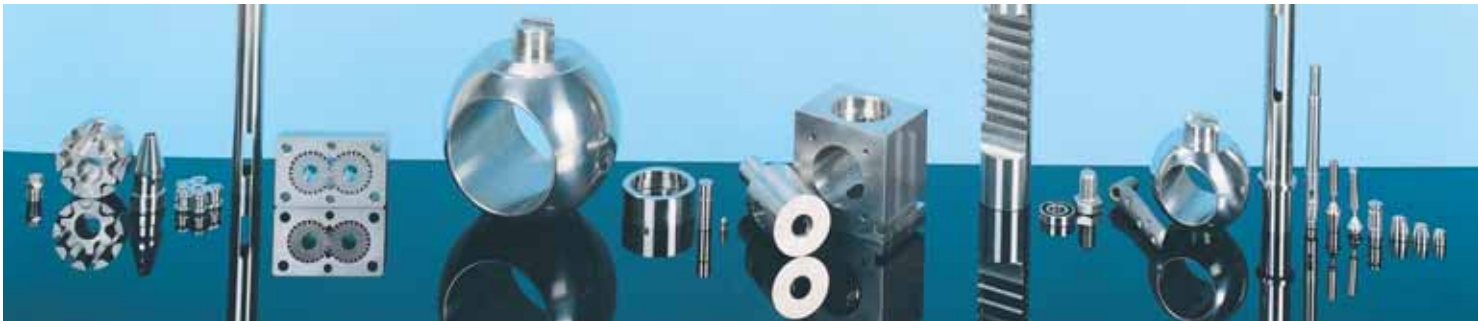


# Kolsterising<sup>®</sup>

Corrosion resistant surface hardening  
of austenitic stainless steel



AISI 316

AISI 304

Duplex

Hastelloy<sup>®</sup>

Inconel<sup>®</sup>

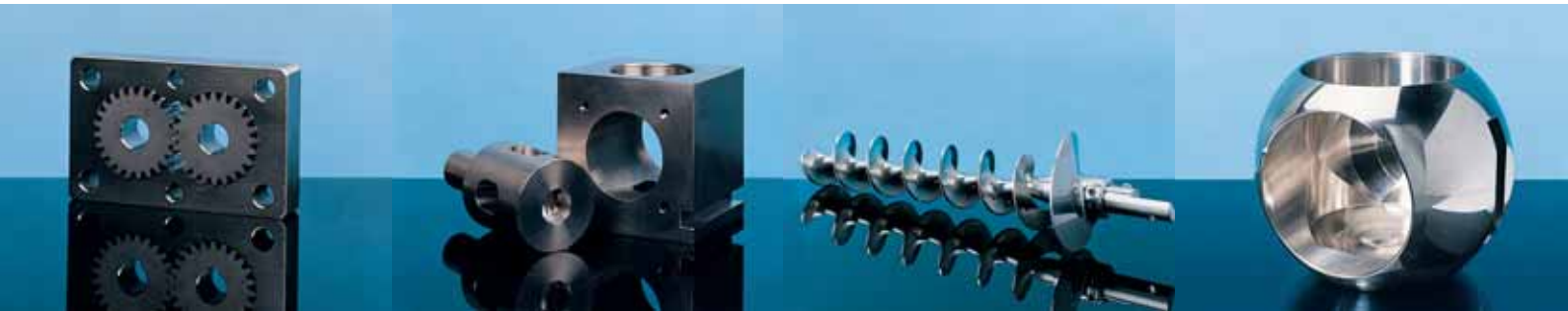
Bodycote

## Kolsterising®

Many tribological applications demand that the components be highly resistive to wear and corrosion. Austenitic stainless steels meet the corrosion resistance required in most environments.

However the use of austenitic stainless steels is limited due to the low hardness and low wear resistance with the risk of galling. Since these steels cannot be

surface hardened by conventional heat treatment processes without reducing their corrosion resistance. Moreover, there is limited scope to extend their application range. In such cases, Bodycote's specialised Kolsterising® surface hardening treatment can be applied to meet most application requirements.



### Purpose of treatment

Kolsterising® improves the wear resistance of austenitic stainless steel parts, without affecting the corrosion resistance.<sup>1)</sup>

### Advantages

- Improves wear resistance
- Prevents "galling"
- Improves mechanical and tribological properties
- Retains corrosion resistance<sup>1)</sup>
- Preserves non-magnetic properties
- No other chemical elements other than carbon is added during Kolsterising®

<sup>1)</sup> Maintaining resistance to corrosion is dependant upon the base material, the pre-processing and pre-treatment stages.

Kolsterising® does not apply a coating to surfaces but produces a pure carbon rich diffusion zone from the surface inwards, with excellent toughness and no risk of delamination or peeling. Kolsterising® increases the surface hardness of most austenitic stainless steels to a level of about 1000 to 1200 HV<sub>0.05</sub> (depending on base material and surface conditions). Moreover, kolsterised components exhibit excellent fatigue properties due to high compressive stresses produced during the surface hardening of parts. Kolsterising® is a low-temperature process causing minimal changes to geometry and shape.

*Kolsterising® is a treatment that involves diffusion of large quantities of carbon into the surface without the formation of chromium carbides. No additional chemical elements are introduced during the process that was not already present prior to Kolsterising®. The risk of peeling is absent since Kolsterising® neither adds a coating nor introduces brittle phases in the material.*

Kolsterising® is a registered trademark of Bodycote plc.

Hastelloy® is a registered trademark of Haynes International Inc.

Inconel® is a registered trademark of Inco Alloys International Inc.



# Kolsterising®

*Kolsterising® offers an ideal surface hardening solution for austenitic stainless steels by improving mechanical and wear properties without adversely affecting corrosion resistance.*

*Kolsterising® is a proven process extending the life time of products thereby imparting economic and technical advantages.*

*Kolsterising® is the chosen treatment for many applications in most industrial areas including food, marine, engineering, medical, chemical, nuclear and petrochemical industries. Wherever components are subjected to severe wear and corrosion, Kolsterising® is the most technically advanced process offering the required quality to meet the cost effective needs demanded by industry.*



## Materials selection

In principle, any austenitic stainless steel can be kolsterised. However, the preferred type is one containing molybdenum and is ferrite free, since this results in greatly increased resistance to pitting, crevice, and stress corrosion.

Kolsterising® of duplex stainless steel and a number of nickel base alloys is also possible.

## Properties of the kolsterised products<sup>2)</sup>

- Retention of corrosion resistance
- Geometrically stable, stable colour and dimensions
- No change in surface roughness
- No machining after treatment required
- Increased surface hardness to 1000 - 1200 HV<sub>0.05</sub> (depending on base material and surface conditions)
- No chemical elements are added to the material other than carbon
- The non-magnetic behaviour of austenitic materials is unchanged after treatment
- Insensitive to "galling"
- Highly resistant to surface wear environments (e.g. by sliding plus abrasive wear and cavitation-erosion)
- Produces a uniform hardened surface, inside bores, cavities and at sharp edges

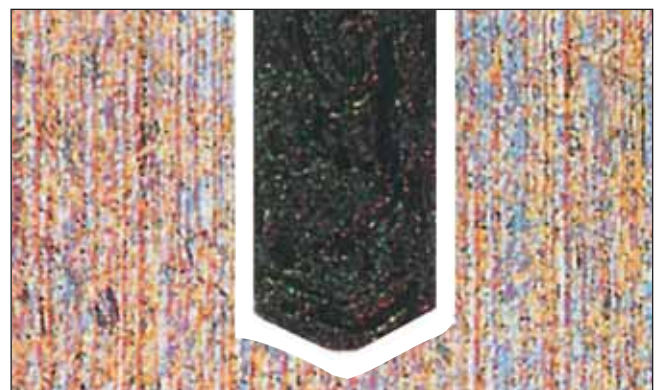
<sup>2)</sup> The listed properties are dependant on the base material, the pre-processing and pre-treatment stages.

## Examples of treatable alloys

- 304, 304L
- 316, 316L
- Duplex stainless steel (e.g. 2205®, 2507®)
- Hastelloy C22 and C276®
- Hastelloy®
- Inconel 625 and 718®

If the alloy to be treated does not appear on the above list, our technical specialists would be pleased to advise their recommendations.

*Kolsterising® results in a wear resistant surface all over the part, irrespective of geometry. Moreover, very small bores ( $\varnothing < 0,1$  mm) and sharp edges can be kolsterised.*



Bodycote Kolsterising® is part of Bodycote plc, the Thermal Processing group.

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