

S<sup>3</sup>P-

Specialty Stainless Steel Processes



**Bodycote**

What you need. **Exactly.**

Bodycote offers a complete portfolio of treatment services – Heat Treatment, Surface Technology and Hot Isostatic Pressing (HIP).

**We will match your requirements with the proper treatment.**

Our **quality** meets your standard.

We maintain the highest production standards for quality, safety and efficiency, earning ISO 9001, ISO 14001, ISO 50001, TS 16949, OHSAS 18001, Nadcap and AS 9100 accreditations.

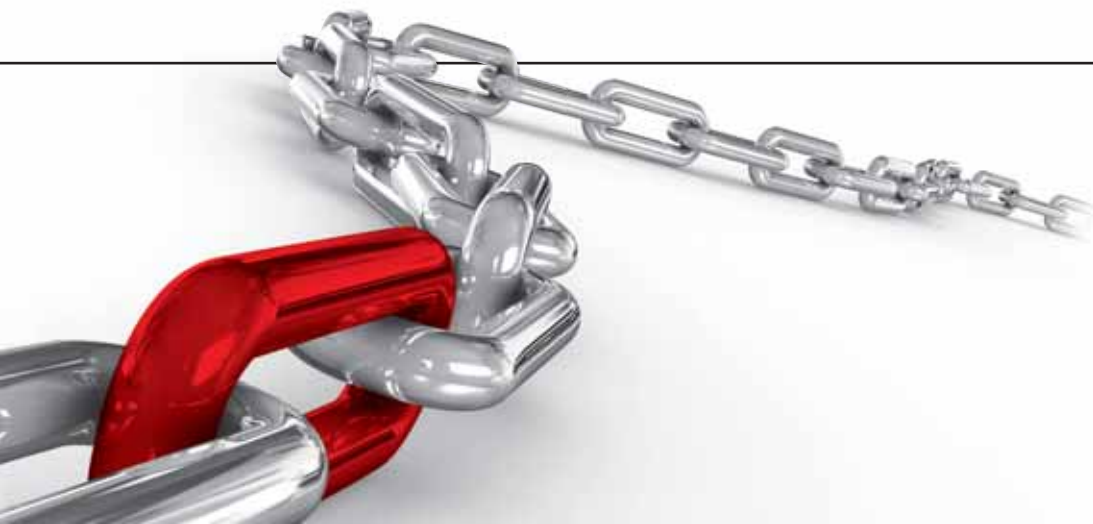
**Anywhere** in the world.

With quality processes, consistent on-time delivery and an international network of accredited facilities, Bodycote provides what you need, when you need it.

We deliver on time. **Anytime.**

Our customers count on us for a broad range of reliable services, but they also turn to Bodycote because we offer 24/7 support in every region of the globe. With more than 189 facilities in 23 countries, Bodycote is the world's largest provider of thermal processing services and the partner of choice for the most respected and innovative engineering companies.

the **vital** link



# THE NEXT GENERATION OF STAINLESS STEEL TECHNOLOGY

When stainless steel meets the corrosion resistance of your challenging environment, but falls short on other properties, S<sup>3</sup>P processes offer improvement that performs.

- Hardened threads that offer a cutting edge and resist galling
- Driving performance in demanding automotive applications
- Stainless steel medical devices that offer improved mechanical properties



## Market Applications

- **Food Manufacturing and Production**  
Food and other manufacturing equipment parts on production lines resulting in decreased downtime and cost savings
- **Industrial Fluid Handling**  
Non-galling wear resistant industrial pumps, valves and fittings
- **Industrial and Consumer Fasteners**  
Fasteners that maintain their corrosion resistance, but are non-galling and wear resistant, and may be disassembled easily
- **Automotive Components**  
New fuel and efficiency challenges in today's automotive applications require corrosion resistant, hardened components that resist wear and provide longer part life
- **Medical Devices**  
Medical devices that require improved wear resistance, fatigue resistance, and maintain a hard, sharp edge
- **Marine Applications**  
Wear and scratch resistant parts and fasteners that maintain corrosion resistance
- **Consumer Goods**  
Stainless steel consumer goods with a tough, scratch and wear resistant surface



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## Technical Information

**S<sup>3</sup>P processes, featuring Kolsterising<sup>®</sup>, offer unique surface hardening solutions for stainless steel, nickel-based and cobalt-chromium alloys producing increased mechanical and wear properties without adversely affecting corrosion resistance.**

From small bulk parts, like nuts and bolts, to large pipeline components such as gate valves, S<sup>3</sup>P processes extend the lifetime of products adding both engineering and cost advantages.

## Properties of S<sup>3</sup>P-treated products

- Increases surface hardness to 900-1 300 HV<sub>0.05</sub> (depending on base material and surface conditions)
- Properly selected and designed materials and parts maintain corrosion resistance
- Treated parts offer color and dimensional stability
- No post treatment necessary
- No risk of delamination
- The paramagnetic properties of austenitic materials remain unchanged after treatment
- Eliminates fretting and galling
- Highly resistant to surface wear environments such as sliding in combination with abrasive wear and cavitation erosion

*For applications in the medical and food & beverage sector, a FDA master file is available for Kolsterising<sup>®</sup>.*

## Material Selection

All stainless steel as well as nickel-based and cobalt-chromium alloys can be treated by various S<sup>3</sup>P processes. Contact your S<sup>3</sup>P representative for details on optimal material selection and part design.

*From small components treated in bulk to large components up to 2 metres in length.*



## Bodycote S<sup>3</sup>P – Specialty Stainless Steel Processes

### Examples of treatable alloys

- **Austenitic stainless steel**  
AISI 304, 304L, 316, 316L, 904L
- **Duplex stainless steel**  
UNS S32205, S32750
- **Martensitic stainless steel**  
AISI 430, 440
- **Precipitation hardened stainless steel**  
PH 17-4, PH 13-8 Mo
- **Nickel-based alloys**  
Hastelloy<sup>®</sup> and Inconel<sup>®</sup>
- **Cobalt-chromium alloys**  
BioDur<sup>®</sup> CCM Plus<sup>®</sup> alloy
- **Stellite<sup>®</sup>**

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







## A greener, cleaner environment

**Acting responsibly to minimise one's environmental impact has become a growing focus of industry around the world. Engineers and designers are driving for energy efficiency and seek new solutions to reduce emissions.**

Bodycote can assist with the drive for carbon footprint reduction and providing environmentally friendly approaches in a number of ways.

At the forefront of technology, Bodycote has developed specialised, environmentally friendly processes offering unrivalled solutions for engineers and designers. The S<sup>3</sup>P group is leading the way in the replacement of older, less environmentally friendly processes, such as hard chrome plating, and is opening new solutions for stainless steel applications.

Environmentally aware designs increasingly specify S<sup>3</sup>P processes for high performance, environmentally friendly "next generation" applications. Results have shown that in addition to the environmental benefits, S<sup>3</sup>P processes outperform hard chrome plating for wear and corrosion resistance in many cases.

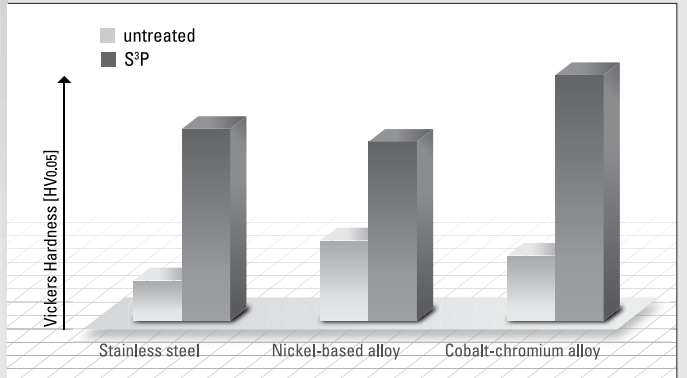
Bodycote has also been involved in a number of automotive initiatives to reduce emissions and improve fuel efficiency. Results have shown that, in addition to the environmental benefits, S<sup>3</sup>P processes open new design and engineering opportunities for stainless steel.

**We recognise that long-term economic growth depends upon preserving a healthy environment.**

S<sup>3</sup>P operations are certified to ISO 14001.



*S<sup>3</sup>P offers treatments that involve diffusion of large quantities of carbon and/or nitrogen into the surface without the formation of chromium precipitations. No additional chemical elements are introduced during the process that were not already present prior to the treatment. There is no risk of delamination because S<sup>3</sup>P processes neither add a coating nor introduce brittle phases in the material.*



*Comparing the surface hardness, S<sup>3</sup>P-treated materials show higher levels of hardness, resulting in improved wear resistance.*



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Hastelloy® is a registered trademark of Haynes International Inc.

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

Stellite® is a registered trademark of Deloro Stellite Holdings Corporation

BioDur® CCM Plus® is a registered trademark of Carpenter Technology Corporation

*The contents presented here are based on experiences and laboratory testings and are not a warranty of the performance of any product of any company.*

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