

In the SPOTLIGHT:

S³P M TREATMENTS FOR SURFACE HARDENING OF MARTENSITIC AND PRECIPITATION HARDENED MARTENSITIC STAINLESS STEELS

Martensitic and precipitation hardened martensitic stainless alloys possess excellent mechanical properties, such as high strength, and good corrosion resistance. However, martensitic hardening does not always provide sufficient abrasive wear resistance to meet demanding requirements for component durability in tough applications. Bodycote's S³P M surface treatment provides a solution for these applications. S³P M is a unique process that results in extremely high wear resistance and an elimination of galling, while maintaining the corrosion resistance of the base material.



The S³P M surface treatment involves a low temperature diffusion of carbon and nitrogen into the material. This results in an extremely hard and wear resistant surface that maintains its corrosion resistance. Depending on the material and alloy composition, a surface hardness up to 1400 HV_{0.05} can be achieved to a case depth of 20 - 40 µm. Unlike conventional nitriding, S³P M treatment does not result in the formation of chromium nitrides and chromium carbides which would make the material more susceptible to corrosion. S³P M is suitable for both martensitic and precipitation hardened martensitic alloys.

Advantages

- Surface hardness up to 1400 HV_{0.05}
- Improve wear resistance
- Homogeneous diffusion layer
- S³P M is not a coating – does not flake or peel
- Increased fatigue resistance
- Retention of corrosion resistance

Material Selection

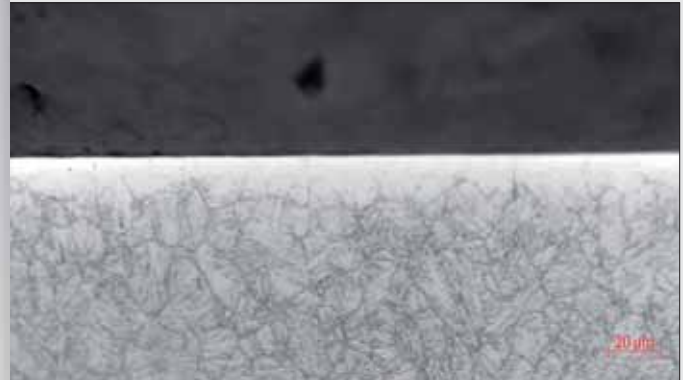
Any martensitic stainless steel is suitable for S³P M. The final treatment result depends on the alloying elements, heat treatment before S³P M, and the condition of the machined surface. Individual components as well as serial parts weighing up to 4.0 t and in length of up to 2.0 m, can all be treated. If you have further questions please contact your S³P representative for a feasibility study.

Examples of treatable alloys

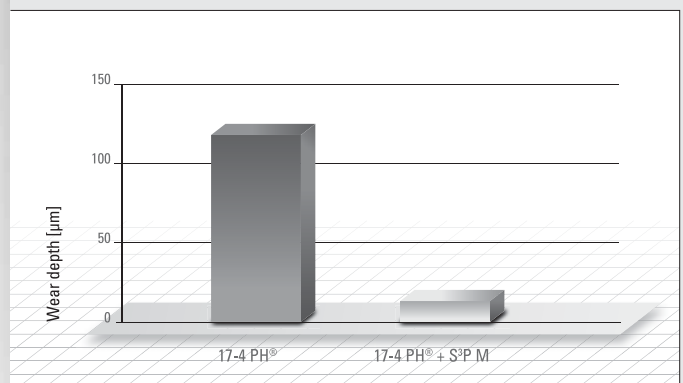
- **Martensitic steels**
AISI 410 (1.4006), AISI 420 (1.4021), AISI 432 (1.4057),
AISI 440B (1.4112)...
- **PH-steels**
17-4 PH[®] (1.4542), 15-5 PH[®] (1.4545)...

17-4 PH[®], 15-5 PH[®] are registered trademarks of AK Steel Corporation

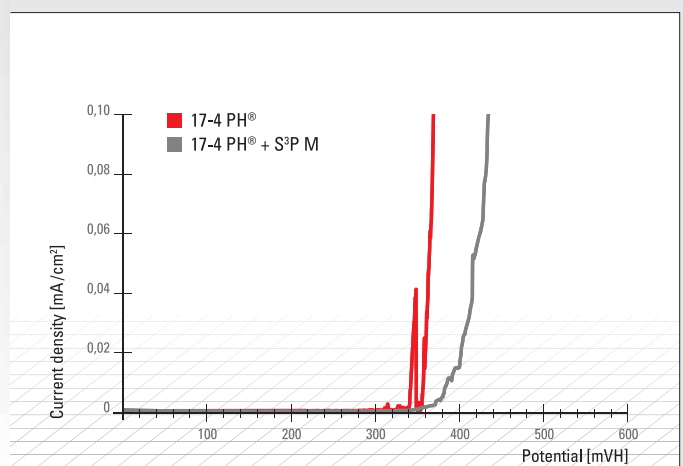
The contents presented here are based on experiences and laboratory testings and are not a warranty of the performance of any product of any company.



Microsection of S³P M treated 17-4 PH[®]. The bright area represents the hardened diffusion zone.



Results of ball on disc test for 17-4 PH[®], indicating significant reduction of abrasive wear with S³P M.



Electrochemical corrosion tests show that the pitting corrosion potential of 17-4 PH[®] has not been compromised after S³P M.