

PO2082

## **Wear resistance and corrosion properties of plasma nitrided austenitic stainless steels**

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Austenitic stainless steels are used in medical and food industries due to their good corrosion resistance. Unfortunately their applications are limited by their weak wear properties. Therefore, plasma nitriding processes have been successfully applied to improve the mechanical and tribological behavior of these steels in respect to the formation of a very hard diffusion layer, the so-called S-phase. To avoid decay in corrosion resistance, phenomenological guidelines for plasma nitriding treatments exist. Nevertheless, industry still suffers from severe corrosion damage of plasma nitrided austenitic steels, although the existing guidelines were fulfilled. For a sustainable application, which guarantees both, wear and corrosion resistance, a refinement of the guidelines is necessary, which consider the complex interactions of steel properties (e.g. chemical composition, microstructure, surface properties) and plasma nitriding process parameters. Therefore, the austenitic stainless steels AISI 304 (1.4301) and AISI 316 (1.4401) were used in different microstructures (solution annealed, strain-hardened and deformation induced martensite) and surface properties (mirror polished, grinded/milled and shot peened) to examine their influence and interaction on the corrosion and wear properties of the plasma nitrided steels. Also the influences of the plasma nitriding parameters (T, t, pulse ratio, gas mixture) were examined. The samples were analyzed concerning their microstructure, chemical composition and micro-hardness, in special respect to the formation of the S-phase. For tribological properties, pin-on-disc measurements were conducted. Corrosion properties were examined by sophisticated electrochemical methods. Taking all these parameters and effects into account, a new model of plasma nitriding in respect to ensure tribological and corrosion properties will be provided.

### **Keywords**

plasma nitriding

austenitic stainless steel

corrosion and wear resistance