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## **FORMATION OF DUAL LAYER IN AUSTENITIC BASED STAINLESS STEELS AFTER PLASMA NITROCARBURIZING FOR HIGHER SURFACE HARDNESS AND CORROSION RESISTANCE**

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Stainless steels play vital role as materials of construction for many industrial applications where corrosion resistance is an essential requirement. However, low hardness and the consequent poor wear resistance of these steels have hindered their use in applications also needing good tribological properties. Among the thermochemical diffusion techniques, plasma nitriding and nitrocarburizing are considered as emerging technologies for surface modification, for providing high wear resistance combined with corrosion resistance, under optimized process conditions. Under these optimized conditions, the plasma delivers chemically reactive nitrogen species to the substrate surface such that CrN formation is avoided, leading to high surface hardness, retaining or even enhancing corrosion resistance. In this paper an attempt is made to enhance the surface hardness without compromising on the corrosion resistance of plasma nitrocarburized AISI 304L and A286 (AISI 660) stainless steels. Plasma nitrocarburizing process was carried out using 78 vol. % nitrogen, 20 vol. % hydrogen and 2 vol. % acetylene gas mixture. The treatments were done at 350, 400, 450 and 500 °C for a duration of 4 h. Plasma nitrocarburizing process produced dual layers on AISI 304L and A286 (AISI 660) austenitic stainless steels where the top layer was found to have enriched with nitrogen and carbon and the bottom layer only with carbon. The surface hardness of these plasma nitrocarburized stainless steel specimens increased by a factor of two compared to the untreated specimens. In addition a raise in hardness, a marginal improvement in the corrosion resistance was found of these stainless steels, when treated at temperatures below 400 °C. This improvement was attributed to the presence of expanded phases saturated with nitrogen and carbon. The advantages of having high surface hardness along with good corrosion resistance after plasma nitriding and nitrocarburizing process were exploited commercially by Inst. Plasma Research for various applications.

### **Keywords**

plasma nitriding

plasma nitrocarburizing