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An investigations of kinetics for 304 austenitic stainless steel

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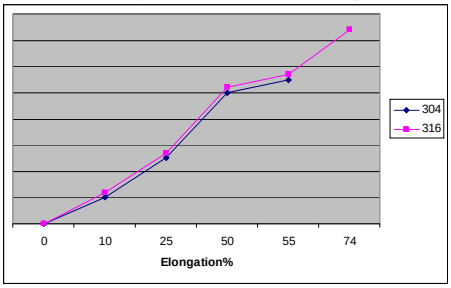
This paper deals about the effects of cold work on the nitriding kinetics and micro-hardness for the 304 austenitic stainless steels.

Nitriding is a thermo chemical treatment based on the diffusion nitrogen and, under some specific circumstances, carbon in lower quantities in to a ferrous matrix. The nitriding process improves particularly high cycle fatigue resistance, wear resistance, and corrosion resistance for carbon steels.

To study the cold work effect on the material, samples were strained in tension tests to conventional deformation of 10%, 25% and 50% prior to the nitriding.

The nitride processes will be the salt nitriding by sulsufir process with a two hour treatment to 570°C.

Chart 1 – Percentage of deformation prior to braking

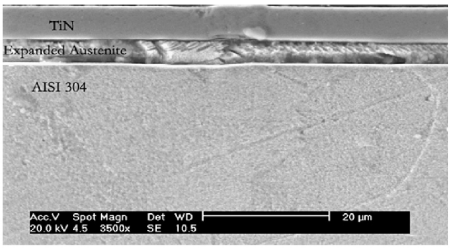


Results show that a 55% elongation was needed on the 304 samples before rupture and 74% on the 316 (used as a comparison material). These results were expected since the 316, due to its molibdenium contents, is more susceptible to form metastable martensite thus elevating the resistance to cold work deformation.

The samples will now be submitted to x-ray diffraction pattern test to determine the fazes developed during cold work process as well as the nitriding effects.

The formation of expanded austenite, structure related to a very high surface hardness, will also be studied in order to understand the whole kinetics involving cold work and nitriding process.

Picture 1– 304 nitrited surface with TiN film deposited with Triodo Magnetron Sputtering



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