The influence of heat treatment on the nitriding layear on AISI 304 austenitic steel

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Nitriding is a technology that leads to an increase in the utility value of the product. It's most important benefits include increased corrosion resistance, abrasion resistance, wear resistance, increased resistance to fatigue failure under cyclic loading, and many others. The design of a suitable nitriding technology not only on the basis of empirics requires a closer study of the relationship between the structure of the nitriding layer, its properties and the course of a particular degradation process. Because the life of most components is related to abrasion on the surface, the occurrence of fatigue cracks and corrosion effects, it is crucial to influence the mechanical and other properties in this surface area [1].

Plasma nitriding is the technological peak of the nitriding procedure and provides considerable advantages as compared to the salt bath and gas nitriding. Components and tools with a plasma nitrided surface show improved wear resistance, better friction and sliding properties, and higher fatigue strength values [2].

The article will be focused on the analysis of the influence of heat treatment on the nitriding layer, which will be applied on austenitic steel. AISI 304 austenitic steel delivered without heat treatment will be used as experimental material. The nitriding layer will be applied to the austenitic steel samples by plasma nitriding. Then, after plasma nitriding, samples will be subjected to heat treatment. Solution annealing and sensitization will be chosen as heat treatment.

Experiments deal with microstructural material analysis, fractographic analysis, mechanical and fatigue tests. The microstructure of the testing sample was examined using a light microscope. Fatigue properties of austenitic steel were tested by three-point bending cyclic loading. The fracture surface of the testing sample was examined using a scanning electron microscope, where samples were observed on various stages of the fatigue process, their characteristics and differences of fracture surfaces. An important indicator will also be the measurement of hardness, or the change in the course of hardness.

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