Importance of Diffusion Process on the Fatigue Life of Steel

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Evaluation of the diffusion process is the plasma nitriding technology in connection with an increase of fatigue life of steel. For experiments steels 41CrAlMo7-10 and 34CrNiMo6 were selected. The equivalent of mentioned steel is material no. 1.8509 and no. 1.6582. Plasma nitriding technology belongs to the group of chemical-heat treated process. This process includes the saturation of nitrogen to the core of material. Plasma nitriding technology is effective method usage in practise especially in order to increase the surface hardness, corrosion resistance and fatigue strength. The experimental material samples were heat treated and subsequently plasma nitride. Fatigue bending rotation tests were the major part of the experiments. According to the principle of the experiment the rotation velocity was determined as constant and the load of samples was going down. The experimental measurement were stopped in case of fracture or after 10^7 cycles without damage. Fatigue life of the steel depends on the thickness of a diffusion nitrided layer. This thickness was evaluated by using the microhardness measuring from the surface to the core of the material. The results of experiments shows that these steels are suitable for increasing fatigue life after the plasma nitriding process.

Keywords: Fatigue live, plasma nitriding technology, Wöhler curves

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