

WEAR RESISTANCE OF NANOCRYSTALLINE X37CRMOV5-1 STEEL AFTER HYDROGEN CHARGING

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Abstract

The aim of this study was to examine the frictional wear resistance of X37CrMoV5-1 steel with nanobainitic structure before and after cathodic hydrogen charging process. The nanobainitic structure was obtained by use of austempering treatment at the temperature of bainitic transformation. Detailed information on the nanobainitic structure is given in a separate paper [1]. The results obtained for the nanobainitic steel samples were compared to the wear resistance of the same steel with tempered martensite obtained by use of conventional quenching and high tempering treatment. The samples were investigated before and after hydrogen charging.

Nanobainitic steel sample before hydrogen charging displays better wear resistance, as compared to the steel sample with tempered martensite. After cathodic hydrogen charging the frictional wear resistance of the X37CrMoV5-1 steel significantly decrease, regardless of its microstructure. However, the decrease of the wear resistance of steel with nanobainitic structure is greater than this of steel with tempered martensite. This may be related to the nature and course of the cracks formed in the material as a result of cathodic hydrogen charging.

Keywords: Nanocrystalline structure, carbide-free bainite, wear resistance, hydrogen charging

REFERENCES

- [1] E. Skołek, S. Marciniak, P. Skoczylas, J. Kamiński, W. A. Świątnicki, Nanocrystalline steels' resistance to hydrogen embrittlement, Archives of Metallurgy and Materials, 60, (2015)

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