The Assessment of Tribiological Properties and the Condition of the Surface of Tool Steel for Hot Work 55nicrmov6 Subjected to the Process of Friction

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The paper presents the evaluation of tribiological properties and condition of the tool steel surface for hot work 55NiCrMoV6 (WNL). Due to the fact that the steel 55NiCrMoV6 is used for components operating at high temperature, the tribological tests were performed at the room temperature as well as higher temperature (150 °C). The wear tests were performer with help of ball-on-disc tribotester, according to the standard ASTM G-99. The applied load was 5 N and 20 N. The counter specimen consisted of balls with the diameter of 6 mm made of steel 100Cr6. Steel samples 55NiCrMoV6 undergone thermal improvement. The average hardness amounted to 57 HRC. The test was performed with the slip speed of the friction pair 0.15 m/s and sliding distance 200 m. During the test, one registered the friction coefficient, frictional force, temperature and the depth of friction. Then, one calculated the wear rate for the friction agents. The evaluation of friction was performed after tribiological tests. For the load of 5 N the average friction coefficient in the room temperature amounted to μ=0.46. At the temperature of 150 °C it increased up to μ=0.69. The wear rate for the sample subjected to tests at room temperature was 3.618×10^{-5} $mm^3N^{-1}m^{-1}$. At the temperature of 150 °C it increased up to 8.058×10^{-5} $mm^3N^{-1}m^{-1}$. The maximum Herzian stress was 1.099 GPa.
For the load of 20 N an average friction coefficient at the room temperature was μ=0.69. At the temperature of 150 °C the friction coefficient was μ=0.57. The wear rate for the sample subjected to tests at the room temperature amounted to 2.136×10^{-5} $mm^3N^{-1}m^{-1}$. At the temperature of 150 °C it increased up to 2.737×10^{-5} $mm^3N^{-1}m^{-1}$. The maximum Herzian stress was 1.741 GPa. The wear of the steel 55NiCrMoV6 increased with the increased temperature. It has been confirmed by application of two different loads. The basic wear consisted in abrasive wear.

Keywords: tribological properties, friction, tool steel for hot work 55NiCrMoV6, condition of the surface

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Paper number: M201614