Comparative Tribological Tests for Face Impulse Seals Sliding Surfaces Formed by Various Methods

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Abstract

The article shows the analysis of change of face impulse seal rings, which are completely made of expensive wear-resistant materials, such as tungsten carbide, silicon carbide, various kinds of graphite on rings, which are made of less expensive but not less qualitative materials. It has been established that the seal rings surfaces are in contact for a very short time, only at the time of starting and stopping the unit. Therefore, it is proposed to use metal base-coating composite materials for such surfaces, which combine the protective properties of coatings and the mechanical strength of the surface base. Metallographic and tribological research were carried out on samples of heat-resistant steel 38X2MUA (41CrAlMo7), high-speed steel P6M5 (HS6-5-2C) and stainless steel 12X18H10T (X6CrNiTi18-10KT). Various variations of the samples heat treatment were used: steel 38X2MUA after thermal treatment, thermal treatment + ion nitriding, thermal treatment + carbonitriding; steel P6M5 after thermal treatment, thermal treatment + condensed ion bombardment; steel X6CrNiTi18-10KT after thermal treatment; thermal treatment + condensed ion bombardment. It was found that the greatest thickness of hardened layers (up to 500 μm) is achieved with hardening of 41CrAlMo7 steel by ion nitriding and carbonitriding methods; the greatest of the surface layers microhardness for samples of steels HS6-5-2C and X6CrNiTi18-10KT, which were subjected to hardening by the method of condensed ion bombardment (18.3 and 16.4 GPa, respectively); The lowest frictional force was shown in samples of steel 41CrAlMo7, slightly higher in high-speed steel HS6-5-2C, and the highest in steel - X6CrNiTi18-10KT.

Keywords

Face seal Strengthening Ring Wear Surface layer Tribological tests

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