

Methodology. The studies were carried out through analysis of conditions and reasons for their formation and consideration of impact level compared to a static load.

Findings. Characteristic oscillograms of transient processes are shown in the lines of the main drive of the rolling stands, when reverse impacts occur during the capture and exit of the strips from the rolls. The conditions and reasons for their formation are considered. The impact level is commensurable with the static load during rolling. A weak correlation is established between the maximum dynamic load when the strip is grasped by the rolls and the level of the return stroke. It is proposed to use the phenomenon of back blows for diagnostic purposes, in calculations for strength and durability.

Keywords: rolling mill, drive line, strip grip, output, back blows, diagnosis

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THE INFLUENCE OF PRECIPITATION PARAMETERS OF VACUUM-ARC NANOCRYSTALLINE COATING TI-MO-N ON NANOHARDNESS AND WEAR RESISTANCE OF PISTON RINGS

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Purpose. It has been investigated the influence of multi-layered vacuum-arc nanostructure coating Ti - Mo - N on wear resistance of piston rings. The influence of vacuum-arc coating parameters on nanohardness has been set.

Methodology. The material on the multi-layered coating was applied by means of vacuum-arc method was the grey cast-iron widely used in different branches of engineering. Multi-layered two-phase nanostructural coatings TiN - MoN were precipitated in the vacuum-arc plant "Булат-6". Nanoindentation was conducted by means of a pyramid of Berkovich at loading 0,5 Н with loading and unloading executed automatically. Metallography researches were conducted by means of electronic microscope, study of the structural state of coverages was performed on

a scanning microscope. The quantity of residual stresses in near-surface layers was determined on the plant ДРОН-2 by means of procedure of multiplied inclined shootings in radiation of copper anode with graphite monochromator. The tests for wear resistance were performed on the plant СМІІ-2.

Findings. Received dependences testify that nanohardness and given Young's modulus are of maximal in surface layers. The analysis of deflected mode has demonstrated that the highest value of compression (2.2 %) corresponds to the depth ~ 10nm. And maximal value of nanohardness takes place on the depth ~10 nm. The reason of residual stresses is an impact of ionic bombardment.

Research of the structural state of coatings showed that at the layer thickness about 2 nm there is no interface border and that's why a spectrum is revealed on diffractive spectrums that is typical for monophasic state and material is hardened not much. The hardness increases at occurrence of the second phase. Thus, as follows from the results of studying the coatings by means of the scanning microscope, the cells on the coating surface are expressed in relief, that can be explained by means of the processes of their dispersion by the ions of molybdenum and titan during precipitation.

In case of studying the layers of thickness ~ 10 nm it is observed the forming of two-phase structural state. The interfaces occupy a large specific volume, that is accompanied by the increasing of compressive stresses. It must result in hardening. The research of layers of thickness ~ 20 nm showed more washed out interface border that leads to the reduction of specific deposit of borders.

Summary. Linear wear of cast-iron sprayed with coating Ti-Mo-N decreases in 8 times. Nanohardness increases on proximately 40 % in the same conditions of spraying at continuous rotation with the increasing of amount of layers from 1800 to 2700. Nanohardness increases on proximately on 25% at increasing of vacuum for all identical parameters of spraying the coating. The vacuum-arc precipitation performed at impulse voltage on a base U_{nu} , equal to 2000 provides the increasing of nanohardness on 30 % as compare to without impulse one at all other equal conditions for conducting the experiment.

They contain the researches? With were conducted within the project GP -516, 18/04/2016.

Keywords: vacuum-arc coating, nanohardness, wear resistance, piston rings

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ELASTIC TORSION OF COMPOUND PRISMATIC BODIES WITH CROSS-SECTIONS OF COMPLEX SHAPE

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Purpose. Study the stress state of composite prismatic bodies with biconnected domain under torsion

Methodology. The studies were carried out through the usage of the method of the integral (potential) representation of the Airy stress function.

Findings. For the considered boundary problem the Green function has been constructed. The problem has been reduced to the integral equations, and this affects the accuracy of the approximate solutions. The studies have been carried out for the regions which boundaries do not fully coincide with the coordinate lines of the original system that allows showing more saliently the advantage of the method. Represented the results of the numerical implementation of the algorithm. The analysis of the shear stresses has been carried out.

The researches were conducted within the project GP – 498, financed by Ministry of Education and Science of Ukraine.

Keywords: elastic torsion, stress, two-dimensional boundary problem, methods of integral representation

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