

The mechanism of coverings formation received at non-stationary temperature conditions is also considered in this article. The system includes  $\text{Cr}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$ , Al,  $\text{NH}_4\text{Cl}$ , NaF. The duration of saturation process by aluminum and chrome changed from 15 till 60 minutes. The covering structure consist from intermetallide compounds FeAl,  $\text{Fe}_2\text{Al}_5$ , carbide  $\text{Fe}_3\text{C}_4$  and  $\alpha$  -solid solution of chrome and aluminum in  $\alpha$  - Fe. The influence of temperature and time of saturation on the aluminized layer thickness received on carbon and a doped steel is analyzed. Therefore the investigated materials can find wide application in chemical mechanical engineering and automobile industry. This method provides high surface quality and it is the simplest and most suitable one in laboratory practice being well reproduced in production condition. The empirical results showed that increasing the saturation duration from 15 to 60 minutes causes the thickness increase of the layer at heating temperature of  $1000^\circ\text{C}$  on a sample of 45 steel from 35 to 85 microns, on a sample of U8A steel from 50 to 101 microns. We have thus shown that the outer zone in the aluminized layer is formed in the process of saturation by co-deposition of iron and aluminum from saturating medium. Phase composition of coatings is a serial arrangement of FeAl,  $\text{Fe}_2\text{Al}_5$ ,  $\text{Fe}_3\text{C}$ . Microhardness of the aluminized layers is within the limits of 11000 - 12500 MPa.

## OBTAINING WEAR-RESISTANT COATINGS ON COPPER ALLOYS UNDER SHS CONDITIONS

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**Purpose.** Obtaining wear-resistant coatings on copper alloys under shs conditions.

**Methodology.** The studies were carried out under the conditions of high-temperature synthesis method.

**Findings.** The choice of node construction material details development of friction while trying to get high performance characteristics is one of the base problems in machine building. The main aim is a selecting known and creating new materials, possessing optimum characteristics, providing necessary resources for a given node development of friction. In this connection it's important that for node material development of friction to be obtained from available undeficit components using technology, requiring standard equipment, high vacuum, cryogenic temperatures and expensive technologies. While selecting node material development of friction it must be taken account their compatibility, especially it's property of dripping and the following edge fin those are connected with chemical affinity, proximity to constitution and value of parameter of crystal lattices.

One of the most efficient methods of the creation covering, possessing high mechanical and physic-chemical characteristic, is diffusion surface saturation of a

metal in the condition of self-propagation high-temperature synthesis (SHS). The alloys based on copper: C95510, C62300, C95200, C85800 served the source data for study. As saturating ambiances are used the mixture powders following material: oxides of chromium ( $\text{Cr}_2\text{O}_3$ ), alumina ( $\text{Al}_2\text{O}_3$ ), metallic molybdenum and aluminum, chloride ammonium ( $\text{NH}_4\text{Cl}$ ) and iodine ( $\text{I}_2$ ). Processing conducted at the temperature 800...1000 °C during 0,5...1,5 hour.

The diffusion method of the surface saturation from hard phase in active gas ambience on the basis of analysis of the requirements, presented to copper covering and the way of the metal saturation for defensive covering obtaining has been chosen. This method provides for high surface quality and it is the simplest and most suitable one in laboratory practice being well reproduced in production condition and it does not demand for special complex equipment while it's realizing.

Research of reliability of mechanisms is proved in most cases quick wear-out of the details, made from bronze C62300 (the bushings, anything numbered six), occurs because of roughness of the associate detail. Most wear-out of the bronze details occurs at period of the wear-in, during which value break-in wear-out can form 60-70 % general tolerance for wear-out. Research of the influence of the nickel covering on a wear-out sample ( $V = 2,5 \text{ m/s}$ ,  $P = 1,0 \text{ MPa}$ ) were made on installation for test material on detritions. As rear body was used the bar from fast-cut steel R6M5, hardened to hardness HRC 62 - 65. To two parties samples of 10 pieces each were subjected to the test: the first party was without covering, the second was with nickel and silicon covering by thickness 10 - 65  $\mu\text{m}$ .

Using nickel saturation of allows in 1,5 - 2 times raises wear capability a sample in consequence of reduction of the factor of friction. Herewith improve the steady-state factors to resistivity of the surfaces sample to detritions. The Analysis shows that using on sample of the nickel covering promotes increasing to reliability of the product as a whole. Thereby, executed studies point to perspective using silicon saturation and nickel saturation as a efficient tribotechnical covering.

## **STUDY OF THE FORMATION OF MULTICOMPONENT TITANIUM COATINGS ON STEELS UNDER NON-STATIONARY TEMPERATURE CONDITIOS**

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**Purpose.** Study of the formation of multicomponent titanium coatings on steels under non-stationary temperature conditios.

**Methodology.** The studies were carried out under the conditions of chemical-thermal surface treatment method.