

XVII INTERNATIONAL CONFERENCE

CONFERENCE

MCM 2012

BOOK OF ABSTRACTS

**MECHANICS
OF COMPOSITE MATERIALS**

MAY 28 - JUNE 1, 2012

RIGA, LATVIA

EXPERIMENTAL EVALUATION OF THE HARDNESS AND ELASTIC PROPERTIES OF WEAR-RESISTANT NANOSTRUCTURAL ION-PLASMA COATINGS BY NANOINDENTATION

M. Urbaha, A. Urbahs, and K. Savkovs

Riga Technical University, LV-1658, Riga, Latvia
e-mail: margarita.urbaha@gmail.com

The analysis of different methods of increasing wear resistance shows that the most perspective method is related to the improvement of part surface properties by creating special protective coatings [2]. Innovative nanostructured coatings (KJONBOMU), which are created on the basis of ion-plasma sputtering technologies, differ by technological effectiveness and a wide range of physico-mechanical and service properties.

The characteristics obtained during nano-indentation are used for the evaluation of wear resistance of ion-plasma coatings. During nano-indentation, one of the basic characteristics of material is the relation of its hardness H to the modulus of elasticity $E - H/E$. Another quantitative comparative characteristic of resistance to plastic deformation is relation H^3/Er^2 where is E_r a modified modulus of elasticity in the contact "indenter - product coating".

The results of nano-indentation on the example of the two-layer coating of one of the plungers are presented in Fig. 1.

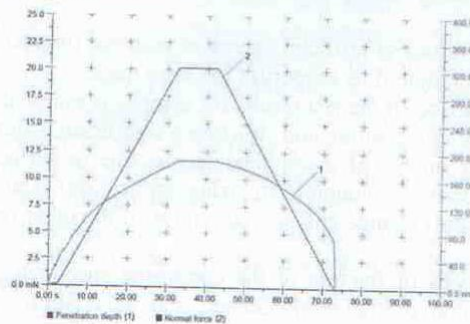


Fig. 1. The results of nano-indentation of the plunger coating KJONBOMU:
1 – time curve of indentation depth h ; 2 – time curve of normal force P .

For the plungers with coatings created by the combined method (KJONBOMU), the values of hardness were 37... 41 GPa with modulus of elasticity 440... 475 GPa. The average value of the relation H/E was 0.085, while H^3/Er^2 was – 0,283 GPa. The range of received values of parameters H/E and H^3/Er^2 confirms the presence of nanostructure of the coating and is an indicative of its high wear resistance and ability to resist plastic deformation [1].

REFERENCES

1. Urbaha M. "Creation of nanostructured wear resistant ion-plasma coatings for restoration and protection of machine parts", *Summary of Doctoral Thesis*, pp.1-37, 2011.
2. Savkov K., Doroshko S., and Urbaha M. "Gas Turbine Aero Engine Compressor Blade Erosion and Heat Resistant Coatings", *Proceedings of 15th international conference „Transport Means 2011*, pp.274-278, 2011.