

PO2100

**Wear behaviour of PN+CrN, PN+CrAlN and PN+TiCrAlN layer composite during ball-on-disk tests in higher temperature**Jerzy Smolik<sup>1</sup>, Joanna Kacprzyńska<sup>2</sup><sup>1</sup>Institute for Sustainable Technologies, Radom, Poland <sup>2</sup>Institute for Sustainable Technologies, Radom, Poland

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One of the most perspective directions of the development of surface engineering is related to hybrid technologies, which best fulfil the expectation of the industry concerning obtaining expected properties of the surface of tools and machine components. The mostly known and widely used surface treatment hybrid technology is a combination of gas or glow-discharge nitriding process with the process of deposition of hard antiwear coatings by means of PVD methods. The effect of the hybrid technology with such a configuration is a layer composite, consisting of a nitrided layer and a PVD coating deposited directly on it, which can be use for increase of durability of tools working in high mechanical and temperature loads, e.g. forging dies or moulds for pressure casting of aluminium. One of the main important parameters of the PN+PVD layer composite is the wear resistant in higher temperature.

This paper presents the results of materials investigations and ball-on-disk wear test of three different layer composites PN+CrN, PN+CrAlN and PN+TiCrAlN. The designed layer composites were obtained with the use of the hybrid technology, which consist of plasma nitriding (PN) followed by arc-evaporation coating deposition. For all created layer composites the material properties like microstructure, phase structure, chemical composition, adhesion and mechanical properties were investigated. The paper also demonstrates the results of ball-on-disk tribological tests carried out for ENX32CrMoV3.3 hot working steel covered by investigated layer composites, in two different temperatures i.e. 25°C and 500°C.

Basing on the obtained results authors proved that the proper chemical composition and phase structure of thin PVD coatings, is the effective way for increase of stability of wear resistant of layer composites type "PN+PVDcoating" in high temperature.

**Keywords**

duplex treatment

layer composite

wear resistant in higher temperature

ball-on-disk tribological test

nitrides coatings