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Application of Calotest and Scratch test for evaluation of structure and quality of multilayer coatings - the Recatest method

Marek Betiuk

Institute of Precision Mechanics, Warsaw, Poland

betiuk@imp.edu.pl

The examinations were discussed of selected properties of hard coating materials obtained in PVD processes. Three examination methods were used: spherical microsection (Calotest), scratch test and Recatest (scratch test + spherical microsection). The author present the methodology for revealing thin coating structures on spherical microsection surface, particularly in the scratch area and the method for evaluation of their quality. Based on the example of TiN and CrN/CrCN WCC/TiAlN coatings strained during scratch test, the measuring methodology is presented along with the analysis of information that can be obtained from the surface of spherical microsection

The method is applicable to areological systems like coating – substrate, multilayer coating – substrate and coating – diffusion layer – substrate, obtained using PVD and CVD techniques and thermal, thermo-chemical and electroplating processes. The core of Recatest method is that the spherical microsection on the examined material is made in the area of previously made scratches. The spherical microsection within the scratch area allows performing precise analysis of selected structural features of strained and unstrained areological system as a function of distance from the surface. Quantitative data are provided by accurately defined points and geometry of analysed images of structures. The analysis of coating structure on spherical microsection within the area of scratches.

The combination of scratch test and spherical microsection techniques offers new methods for precise quality evaluation of coatings and layers subjected to strong elastic and plastic strains.

The capability of quick quality assessment of coatings and layers obtained in thermo-chemical and electroplating processes indicates that the examination methods based on Recatest technique should be implemented.

Keywords

Recatest

Scratch test

Calotesy

CrN/CrCN

WCC TiAlN