Hard coatings for woodworking tools – a review


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Received 18.09.2009; published in revised form 01.12.2009

ABSTRACT

Purpose: The paper presents thorough analysis of the state-of-the-art in the field of woodworking tools durability improvement. In comparison with the achievements of global leaders in the field, the technologies developed so far at the Institute of Mechatronics, Nanotechnology and Vacuum Technique, as well as the latest research works undertaken by the authors are presented.

Design/methodology/approach: The specificity of machining conditions of wood and wood-derivative materials consists in simultaneous occurrence of very high working speed, extremely sharp cutting edges and high working temperature – on the one hand, and high anisotropy and low thermal conductivity of the machined material – on the other. The paper summarizes various ways, including selection of both tool materials and surface treatments, applied in order to increase the productivity of wood machining.

Findings: A systematic analysis has been made on the type of tool materials suitable for machining of different sorts of solid wood and wood-derivative materials. It was shown that all woodworking tool types, except for satellites, require development of dedicated surface engineering technologies improving significantly their durability. The main features of CVD and PVD surface treatment technologies were compared in relation to their application for wood machining.

Research limitations/implications: Based on the achievements to date IMN&VT undertook a project aimed at development of a new generation of surface treatment technologies for both cemented carbide and high speed steel tools. It is planned to develop three packages of PVD technologies for deposition of multilayer and duplex anti-wear coatings based on TiAlN, CrN and carbon.

Originality/value: The paper constitutes concise but in-depth description of the contemporary trends in surface treatment of tools for woodworking.

Keywords: Surface treatment; Tools for woodworking; Multilayers