Abstract

The wood industry has a current need for tools which combine high performance with a fine cutting finish of the wood surface. Woodworking tools coated with superhard layers like diamond, tetrahedral amorphous carbon (ta-C) and composites consisting of titanium carbide and amorphous carbon (TiC/a-C) are very promising in this respect. Submicron cemented carbide inserts were used for the investigations reported here.

The coatings were prepared by different techniques such as hot-filament CVD for deposition of diamond films, plasma-assisted CVD for TiC/a-C composites and laser-arc PVD for ta-C films. High performance of coated tools demands sufficient layer adhesion, low surface roughness and small cutting edge radius. Only thin films with a thickness lower than 5Å 1/4m lead to no or low increase of cutting edge radius. The adhesion of diamond films is improved by an initial treatment of the substrate.
diamond films determined by scratch test was improved by etching of the substrates before coating. The etching of the tungsten carbide phase with Murakami's agent leads to better adherence of diamond films and improved wear resistance of the coated tools. Acid etching of the cobalt binder also increases the adherence but leads to lower performance of the coated tools.

The wear behaviour was studied by milling tests with melamine laminated particle board. Tools with layers of TiC/a-C, diamond and ta-C have an up to 2.5-fold lifetime compared with uncoated inserts.

Keywords
Amorphous carbon; Diamond; Tool coatings; Wear
Preparation and wear behaviour of woodworking tools coated with superhard layers, according to the decree of the Government of the Russian Federation, the development of a media plan recognizes the parameter.

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