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Oxidation resistance of AlCrVN coatings prepared by arc technology

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High-temperature lubricant PVD coatings based on vanadium are very promising for cutting and forming applications.

The problem is narrow functional temperature interval of these coatings. The effect of vanadium content on the oxidation stability, the residual internal stress and friction properties of the AlCrVN coating prepared by low voltage arc were studied. The ratio of chromium to vanadium was varied in the range from 0 to 100 %.

The deposited coatings were annealed in air at temperatures of 550 - 700°C. Change in hardness and oxidation rate were determined. Also the structures were examined on coating fractures using SEM.

Face-turning test, approaching the real conditions more than standard tribological tests, was used to assess the friction properties. The parameters of the cutting test were set to achieve the thermal load from 550 to 700°C. The results were determined on the basis of cutting forces.

The effect of vanadium on the properties of CrAlVN coating is significant and enables the optimization for conditions of specific industrial applications.

Keywords

PVD coating

CrAlVN

high temperature lubricant

annealing test

cutting test