

The Properties of Multilayer CrCN/CrN Coatings Dependent on Their Architecture

Bogdan Warcholinski,* Adam Gilewicz

CrN based multilayer coatings are possible replacements for chromium nitride monolayer coating because of their good mechanical and chemical properties. This paper reports an investigation of CrCN/CrN coatings deposited on HS6-5-2 steel substrate using cathodic arc evaporation. The investigated coatings of the total thickness of ca. 2.5 μm were composed of six bilayers, each of them with alternating CrCN and CrN layers. The thickness of the bilayer was ca. 400 nm and the ratio of layer thickness partition (CrCN/CrN) was 1:5, 1:2 and 1:1. The chemical composition was determined with the EDS method. The microstructure of thin films was examined with the SEM. A micro Vickers hardness tester and pin-on-disc wear tests were used to determine the hardness and tribological properties of the coatings: the coefficient of the friction and wear rate. In order to assess the adhesion of the coatings to the substrate, the scratch test and Rockwell test were applied. All the coatings investigated are characterized by a good adhesion which decreases with the rise of the CrCN layer thickness in the bilayer. When the CrCN layer thickness in bilayer rises, the hardness and compressive stress increase, but the wear rate decreases.

