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PII: S0040-6090(17)30448-0
DOI: doi: 10.1016/j.tsf.2017.06.013
Reference: TSF 36020

To appear in: *Thin Solid Films*

Received date: 3 October 2016
Revised date: 1 June 2017
Accepted date: 6 June 2017

Please cite this article as: Kalyan C. Mutyala, E. Ghanbari, G.L. Doll , Effect of deposition method on tribological performance and corrosion resistance characteristics of CrxN coatings deposited by physical vapor deposition, *Thin Solid Films* (2017), doi: 10.1016/j.tsf.2017.06.013

Effect of deposition method on tribological performance and corrosion resistance characteristics of Cr_xN coatings deposited by physical vapor deposition

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Abstract

Cr_xN thin film coatings are technologically attractive due to their desirable wear and corrosion resistance attributes. However, the tribological and corrosion performances of these coatings greatly depend upon their material properties and deposition processes. Environmental regulations concerning electro electro-deposited and electro-less chromium have motivated the development of PVD Cr_xN coatings as a replacement for electroplated hard chrome. In this study, two types of PVD processes were used to apply the Cr_xN coatings on bearing grade AISI 52100 steel specimens: a closed-field unbalanced magnetron sputtering system (CFUMS) and an ion beam assisted e-beam deposition (IBAD) system. Tribological performances of coated specimens were evaluated under boundary layer lubrication in sliding contact tribometers, and corrosion resistance properties were determined by Electrochemical Impedance Spectroscopy (EIS) and salt

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