

Evaluation of Sliding Wear Resistance of PVD Coatings by the Ball-Cratering Test Method

P. Vijayasarithi¹, S. Ilaiyavel² and P. Suresh Prabhu³

¹ Assistant Professor, Mechanical Engineering, Jeppiaar Institute of Technology, Sriperumbudur, Tamil Nadu, India, 600025.

² Associate Professor, Mechanical Engineering, Sri Venkateswara College of Engineering, Sriperumbudur, Tamil Nadu, India, 602117

³ Director, Research section, Karpagam University, Coimbatore, Tamil Nadu, India, 641021

¹ Corresponding Author/E-mail: vijayasarithiprabakaran@gmail.com, TEL: 09894479240, 09710266805

Abstract

In order to study the microstructure and wear characteristics of Uncoated, TiAlN, AlCrN and TiCN multilayer coated AISI 410 stainless steel. Tribological properties of the coatings were investigated by high carbon steel ball friction in dry sliding, and sliding velocity of 0.3927 ms^{-1} , and sliding distance of 248.43 m, and under a load range of 2N to 4N at room temperature. Among all the multilayer coatings tested, TiCN gave the superior wear resistance, followed by TiAlN and AlCrN. This indicates the presence of C in TiCN coating leads to increase the wear resistance. At 2N to 3N load in which oxidation was present, AlCrN coating shows the excellent wear resistance followed by TiAlN and TiCN coating. The coating with a TiAlN proven good to acceptable wear resistance between 3N to 4N load. The wear rates and worn surfaces were investigated with scanning electron microscopy (SEM) (with EDS attachment), XRD and Talysurf profilometry analysis, which demonstrates that the grooved regions, pits, ploughing ridge and cavities were found along the worn surface of the Uncoated, TiAlN and AlCrN coated surface. This result exposed hard coated particles were observed on the high carbon steel ball surface.

Keywords: PVD coating, friction and wear, SEM-EDS, XRD, Talysurf profilometry analysis.

1. INTRODUCTION: