

A PVD Coating Method Comparison of C-Steel and H-Steel Tool Steels for Mold Industry in the age of VUCA World

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Abstract. This research aims to improve the physical and mechanical properties of materials. to the rapid changes in technology, competition, business environment, economy, both internally and externally. make organizations significantly affected These situations are known as “VUCA World” for the machining industry using C-Steel and HSteel tool steels with PVD anodizing for the machining industry. In the experiment, two types of experimental materials were used: cold-worked and hot-worked tool steel. Using the CrN coating method, PVD coatings at three thicknesses 1,2 and 3 μm were tested for coating thickness. After analyzing the results, it was found that the H-Steel was subjected to the reheating temperature in the range of 530 – 580 C0. The microstructure of H-Steel was enlarged by 500 times, resulting in a homogeneous and consistent structure throughout. The average hardness is 729 HV (0.2), giving PVD good adhesion and even surface collapse. The microstructure of C-Steel at 500 times magnification shows a solid carbide cluster at 1092–1166 HV (0.2) and an adjacent sheet of martensite at 837 HV, micro-hardness (0.2). which typically averages 58.5 HRC on the macro hardness scale. Different results show when microhardness analysis via CSteel may cause inefficient PVD adhesion. while the substrate material unequal collapse resulting in low service life.

Keywords: Cold Work Tool Steel (C-Steel), Hot Work Tool Steel (H-Steel).