Wear and Friction Behavior of Zr Implanted D3 Steel

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Abstract

Ion implantation has become a commercial tool to modify the surface properties of materials. We have investigatd the effect of Zr ion implnatation of the tribological properties of a conventional tool steel. Multicharged, pure, high current and pulsed ion beams of Zr have been extracted from a metal vapour vacuum arc (MEVVA) source and implanted into AISI D3 (C: 2-2,35%, Mn: 0,60%, Si: 0,60%, Cr: 11-13,50%, Ni: 0,30%, W: 1%, V: 1%) tool steel samples at the $3{,}6x10^{16}$, $5x10^{16}$ and $1x10^{17}$ ions/cm^2 doses. The wear resistance and friction coefficient have been estimated using pin-on-disc wear tests. Implantation of Zr decreased the wear loss and friction coefficient. RBS, AES and SEM Microprobe analyses was used as a guide for explanation for the observed implantation effects.

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