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The Study of the Residual stresses and Wear performance of WC-Co thin film deposition by Magnetron Sputtering

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Control and manipulation of residual stresses in thin films is key in attaining coatings with high mechanical and tribo-logical performance. This work, therefore, focused on investigating residual stresses generated in WC-Co thin film coatings, deposited on mild steel substrates by magnetic sputtering. The effect of deposition parameters on the generation of these stresses was analyzed on the thin film coating by $\sin 2\psi$ X-ray diffraction. The X-ray spectra of the surface revealed an amorphous phase of the thin film, as a result, the measured stresses were of the substrate surface. Compressive stresses were identified within all samples studied. These compressive stresses are mainly attributed to the atomic shot peening of the surface during deposition, which was observed to be greatly influenced by sputtering parameters. Investigation was further extended to study the wear performance of the coating which was remarkable compared to the as-received substrate.

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