

EVALUATION OF THE RESIDUAL STRESSES IN WEAR PROTECTION COATINGS USING X-RAY DIFFRACTION, ULTRASONIC AND FINITE ELEMENT TECHNIQUE

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This paper is presented an overview of the evaluation techniques of residual stresses in wear protection coatings. The main experimental techniques for measurement of residual stresses are briefly described, with particular attention given to the methods of X-Ray diffraction, ultrasonic and finite element techniques. Boundary conditions satisfied by all residual stresses distribution are identified and expressions derived for the X-Ray diffraction, ultrasonic and stress distributions arising from a uniform misfit strain between wear protection coating and substrate. It is noted that stress distribution in thick wear protection coatings rarely correspond to the imposition of such a numerical method becomes essential for quantitative prediction of residual stresses values and stress distributions. Relationships are presented between residual stresses and corresponding strain energy release rates during interfacial debonding. The effect on this of superimposing stresses from an externally applied load is outlined. The initiation of debonding is then considered, covering edge effects and other geometrical consideration. Finally, some specific case histories are briefly outlined to illustrate how the various theoretical and experimental concepts involved relate to industrial practice and applications.

Biography

Adel K Mahmoud has completed his PhD from University of Technology, Baghdad, Iraq and was awarded Professor Degree in 2015 from University of Diyala. He is a Visiting Professor currently in Ankara Yildirim Beyazit University, Ankara, Turkey. He has published more than 30 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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