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Contact fatigue performance of cobalt boride coatings

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Abstract

This work presents an experimental-numerical study on the resistance of cobalt borides (CoB/Co₂B) to contact fatigue. The boride layers were formed at the surface of a CoCrMo alloy using the powder-pack boriding process at temperatures of 1123 K for 3 h and 1223 K for 1 and 5 h of exposure times, in order to obtain three different thicknesses. The contact fatigue tests were performed with a servo-hydraulic universal testing machine by cyclic loading of a sphere on the layer-substrate system. The methodology of the contact fatigue test consisted of two main stages. Firstly, a critical load under monotonic loading was determined, where circular cracks were considered as the failure criterion. Secondly, fatigue conditions were conducted in low-cycle using sub-critical monotonic loads with a frequency of 6 Hz. A comparison of the results showed differences in the characteristics of the hard coating degradation in each case. The stress affiliated to the contact damage modes in the coating was obtained by the finite element method. The results of this study showed

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