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☐ 23. Fatigue behaviour of HVOF coated M50 steel rolling elements

<u>Ahmed, R.</u> (Brunel Univ); <u>Hadfield, M.</u> **Source:** *Surface Engineering*, v 14, n 6, 1998, p 473-480 **ISSN:** 0267-0844 **CODEN:** SUENET

Publisher: Inst of Materials

Abstract: An experimental approach using a modified four ball machine has been used to investigate the rolling contact fatigue (RCF) performance and failure modes of WC-12Co coated rolling elements deposited by the high velocity oxyfuel (HVOF) process. The rolling elements were in the form of 12.7 mm diameter M50 bearing steel rolling element balls. The RCF tests were conducted under various tribological conditions of contact loading in conventional steel ball bearing and hybrid ceramic bearing configurations. Results indicate that the rolling elements failed at contact loads above 2.4 GPa and that the failure mode was coated delamination at the coating/substrate interface. Moreover, an appreciable amount of surface wear was observed on the surface of the rolling elements after the RCF tests. The test results and failure modes are discussed in the context of the coating/substrate microhardness results, elastohydrodynamic lubrication (EHL) regimes, surface observation of the failed areas using scanning electron microscopy (SEM), slip analysis, frictional torque measurements, and stress contours developed by finite element modelling of the coated rolling element ball. Solutions to resist interfacial delamination are also discussed. (11 refs.) (Author abstract)

Ei controlled terms: <u>Bearings (machine parts)</u> | <u>Steel</u> | <u>Ceramic materials</u> | <u>Fatigue testing</u> | <u>Failure analysis</u> | <u>Tribology</u> | <u>Load testing</u> | <u>Delamination</u> | <u>Microhardness</u> | <u>Elastohydrodynamic lubrication</u> | <u>Friction</u> | <u>Stress analysis</u> | <u>Finite element method</u>

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