## ROLLING CONTACT FATIGUE PERFORMANCE OF HVOF COATED ELEMENTS

## ABSTRACT

An experimental approach using a modified four ball machine was used to study the Rolling Contact Fatigue (RCF) performance of High Velocity Oxy-Fuel (HVOF) coated rolling elements in the geometrical shape of a cone. The RCF tests simulate the configuration and motion of a deep groove rolling element steel ball bearing. The thermally sprayed coated cone replaces the upper drive ball of a modified four ball machine and represents the inner race of a rolling element ball bearing in the contact model. The Hertz contact stress and the test lubricants are varied to provide various tribological conditions for the tests. Tungsten carbide-cobalt (WC-12%Co) is thermally sprayed on the surface of rolling element steel cones in three different coating thicknesses. The coatings are ground and polished to attain a good surface finish. The effect of substrate hardness and coating thickness on the RCF performance have been investigated.

Fatigue failure modes are analyzed using the scanning electron microscope. The results are discussed with the aid of the microhardness and residual stress measurements of the test cones. Test results reveal that the performance of the coating is dependent upon the combination of the substrate and the coating properties, moreover the substrate hardness can be critical to the RCF performance. The coatings can fail from within the coating microstructure or just above the interface.