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EVALUATION OF DLC COATINGS FOR FOIL BEARING APPLICATIONS

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ABSTRACT

A critical component in oil-free air foil bearings is the tribological coating system that must be used on the journal/runner and the foil pads to ensure reliable operation during transient periods and start-stop cycles. The purpose of the present investigation was to evaluate the performance characteristics of hydrogenated diamond like carbon coatings (H-DLC) for foil bearing applications. Tribological tests were performed using a single thrust foil bearing in contact with a rotating flat disk at room temperature. While the performance of H-DLC coating on the foils tested against disks coated with MiTi[®] Korolon[™] 900 was acceptable, the reverse coating combination provided an excellent performance. Although the H-DLC film had suffered some wear along narrow scratches, both coatings survived the 500 start/stop cycles. The liftoff speed, which is an important design parameter, was less than 1,000 rpm, much lower than uncoated foil and disk combination. It is, therefore, concluded that the combination of H-DLC foil coating with the Korolon[™] 900 coating on the disk will provide excellent performance for foil bearing applications at room temperature.