

2000-GT-0387

CAPABILITIES OF LARGE FOIL BEARINGS

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Keywords: Foil Bearings, Gas Turbines, Experimental, Bearings

ABSTRACT

An experimental program was conducted on a large compliant surface foil bearing to document its performance. This large single pad foil bearing is 100 mm in diameter, and was operated at speeds of up to 30,000 RPM. Operation at 22,000 RPM with a measured load of 4190 N was also demonstrated. During coastdown runs from 30,000 RPM, maximum amplitudes of shaft vibration did not exceed 7.6 μm while passing through the two rigid shaft modes of the system. Thermal performance of the bearing was also in accord with previously documented foil bearings. This testing also demonstrates the practicality of scaling smaller foil bearing designs to the large bearings required for larger turbomachinery. To enhance the practical application of the results, the test rig shaft was designed to simulate a small gas turbine engine rotor.