

# **New-Generation Development Rigs for Testing High-Speed Air-Lubricated Thrust Bearings**

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## **Abstract**

A major advantage of compliant air-lubricated bearings is their excellent performance at very high rotational speeds and operating temperatures. Successful development of these bearings requires experimental testing of new bearing designs under equally extreme conditions. Traditionally, high-speed thrust bearing test rigs have utilized rotors supported on precision ball bearings, and were unable to fully cover the operating speed and temperature range of the tested air-lubricated bearing. This paper describes the design and performance of two new-generation thrust bearing test rigs, which are completely oil-free, and can operate at significantly extended range of speed and temperature. The new test rigs were designed for thrust bearings up to 0.102 m (4 in) outer diameter, operating speeds up to 80,000 rpm, and temperatures up to 650 °C (1,200 °F). Over 350 tests performed to date have demonstrated successful rig operation at thrust loads up to 1,330 N (300 lbs), speeds up to 82,000 rpm, and temperature range from room temperature to 540 °C (1,000 °F).