

Operation of Foil Bearings Beyond the Bending Critical Mode

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A series of experiments were conducted to determine a foil bearings ability to operate in the region of the bending mode of a flexible rotor. Three different bearings, spaced at three different positions along the shaft, were tested in order to make super-bending-critical operation possible. This was achieved with a proper bearing design located at an optimum position with respect to the bending nodes. After proper trim balancing the bearings passed the 34,100 rpm first bending critical and went on to operate up to 85,000 rpm, 2.5 times the bending critical. Throughout, the amplitudes of vibration remained small. The documented ability of these bearings to operate in the domain of a flexible rotor's bending mode makes these bearings a prime candidate for the high-speed machinery of modern technology.

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