Paper 15: Active and Passive Magnetic Bearings for Large Variable Speed Motors

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Abstract:

Due to the rise of electronics and controls during the 1960s, the first active magnetic levitation bearings were developed during the 1970s, a century and a half after the invention of mechanical bearings. Fifty years later, these bearings are experiencing a boom. The first part of this paper describes the limitations of antifriction bearings and hydrodynamic lubricated bearings for large variable speed motors. The second part explains the principle of radial and axial active magnetic bearings with focus on 2 types of control, and the principle of passive magnetic bearings which do not require control. The advantages of these lubrication-free bearings are explained in terms of rotordynamics, maintenance and system integration notably for electric motor-compressors. The third part provides recommendations for factory acceptance testing of high-speed machines on magnetic bearings and conclusions on the technology coverage and trend for large high-speed motors.