

THE DEVELOPMENT OF A HIGH SPEED SOLID/POWDER LUBRICATED AUXILIARY BEARING

Hooshang HESHMAT and Rita G KAUR

Mohawk Innovative Technology, Inc.,
1037 Watervliet-Shaker Road, Albany,
New York, NY 12205
USA

ABSTRACT

Self-Contained Auxiliary Bearings are needed for magnetic bearing supported rotors in space mechanisms, Flywheel Energy Storage Systems, Auxiliary and Integrated Power Units and Gas Turbine Engines. A state of the art technology of a high speed, self-acting, solid/powder lubricated journal bearing was recently tested up to a record breaking DN value of 3 million (DN = shaft diameter in mm x speed in rpm). The two major technology components for this system were the powder pelletized lubricant delivery system and the 100mm diameter prototype journal bearing. The prototype bearing was tested in a magnetically suspended rotor bearing test rig. The tests conducted on this prototype bearing were short duration low speed testing, high speed testing and transient shock testing. The acquired test data spanned the range of the expected operating conditions, including lubricant feed rate, bearing temperatures and operational dynamic performance, thus, validating the design analysis of the bearing and lubricant delivery system.

Keywords

Solid Lubricated Bearing, Molybdenum Disulfide (MoS₂), Active Magnetic Bearing (AMB), Powder Lubricated Quasi-Hydrodynamic Bearing (PLQH).