



Continuation Project Year II

EXPERIMENTS ON THE PERFORMANCE OF LARGE DIAMETER METAL MESH FOIL BEARINGS: RADIAL AND THRUST (YEAR II)

Gas foil bearings (GFBs) are compliant surface hydrodynamic bearings using ambient air or process gas as the working fluid. GFBs currently enable oil-free microturbomachinery (MTM<400 kW) to operate at high speed and high temperature with significant reduction in power loss and increases in system thermo-mechanical efficiency. Oil-free systems have a lesser part count, footprint and weight and are environmentally friendly with demonstrated savings in long-interval maintenance schedules. There is no bearing manufacturer company in the USA offering the technology of foil bearings at a low cost.

Metal mesh foil bearings (MMFBs) are simple geometry mechanical devices whose underspring structure is simpler and more cost effective to manufacture than typical bump foils. Research at TAMU has paved the way for a growth of interest on MMFB technology. In year II of the research on thrust and radial metal mesh foil bearings, the tasks for completion are:

- (a) Construct metal jigs to manufacture identical metal mesh pads.
- (b) Determine a more accurate means of classifying metal mesh pad dimensions and verification of assembled bearing clearances.
- (c) Design and construct a novel thrust metal mesh foil bearing.
- (d) Overhaul an existing test rig to statically load the thrust metal mesh foil bearing.
- (e) Measure rotor lift-off speed and break away torque, touchdown speed and stall torque, load versus minimum film thickness, and drag power losses, over a range of shaft speed to 25 krpm.