DESIGN AND FABRICATION OF A MICROBEARING METROLOGY TOOL.

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In the field of Microsystems Technology microactuators often contain surfaces that must roll or slide over other surfaces. A micromotor consisting of a movable rotor set on a fixed bearing shaft is a prime example. Currently, because very little is known about the wear characteristics of microscopic rotors and bearing surfaces, it is difficult to optimize their performance. In this study a metrology tool for the study of microbearing wear was designed, fabricated, and demonstrated. The critical component of the tool was a micromachined silicon test bed consisting of a bearing shaft and a set of microchannels to direct a gas stream onto a rotor. Finned test rotors were machined separately and then manually placed onto the bearing shaft. A custom aluminum chuck was used to seal the test bed and connect the microchannels to a pressurized gas source. Test rotors were successfully actuated with an input gas pressure as low as 0.5 psi. Rotational speeds exceeded the measurement capability of a high-speed 2000 fps camera.