

Measurement of Vertical Stiction (Adhesion) Forces in a Head-Disc Interface

One of the applications of the CETR UMT Micro-Tribometer is the precision measurements of pull-off forces. This paper describes a test procedure for the measurement of pull-off forces between magnetic head slider and a disc.

Instrumentation: UMT-series Micro-Tribometer provides precision measurements of forces and displacements, simultaneously in all three directions. It can accommodate specimens of a wide variety of shapes and dimensions.

Experimental procedure: Figure 1 shows the schematic of the pull-off setup. A magnetic disc is positioned on a horizontal stage. A suspension with magnetic head is assembled on the carriage and is brought onto the disc surface by linear vertical motion system. A load sensor provides feedback to the closed-loop vertical motion control, which controls the load. The sensor accurately measures both vertical compressive and tensile loads, as well as horizontal friction forces.

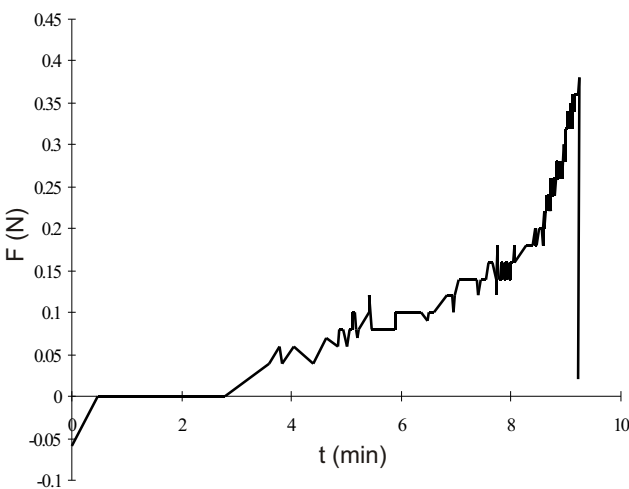


Fig. 2. Pull-off force in a head-disc interface

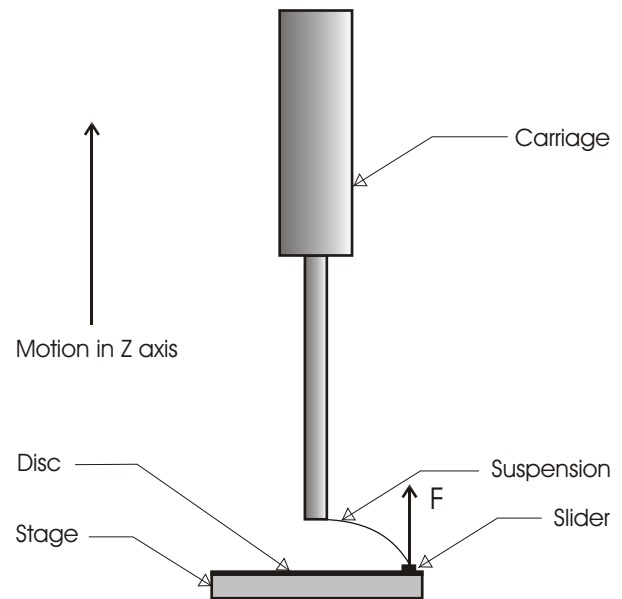


Fig. 1. Schematic of the Pull-off test setup

The head rests on the disk surface for 10 minutes under the constant vertical load of 7 cN.

After rest, the carriage starts lifting up with the vertical speed 0.005 mm/min. Pull-off force F is determined as the maximum force before the slider is pulled off the disk surface. Figure 2 presents the data for a pull-off test of a so-called 30% head slider from a laser-textured carbon overcoated disk; the pull-off force was found to be 38 cN.

The Micro-Tribometer allows to investigate effects of vertical speed, time of stationary contact (rest), head and suspension design, head and disc materials, lubricant, etc. on vertical stiction (adhesion).

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