

Friction Tests of Retaining Rings on CMP Tester mod. CP-4

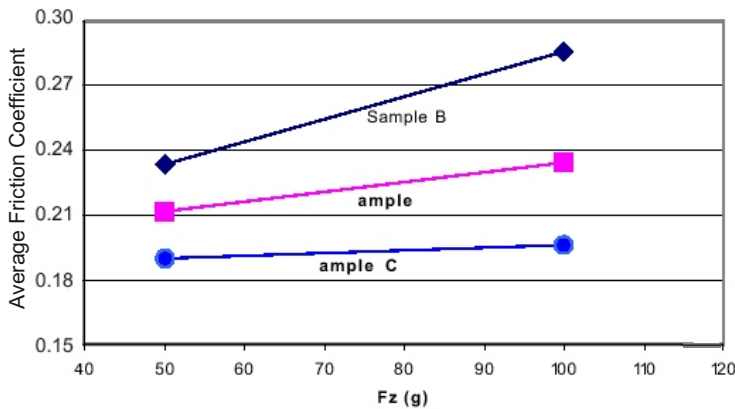
Testing Procedure and Parameters:

The contact interface was a 2" retaining ring coupon as the upper specimen on a 6" polishing pad as the lower specimen. A normal load was maintained constant using a closed-loop servomechanism. During the test, the upper specimen had an oscillating lateral sliding by 10 mm back and forth with a linear speed of 5 mm/s, while the lower specimen rotated at a constant speed 120 rpm. Tests were conducted in both dry conditions and with the slurry. Fresh pads were used for every test.

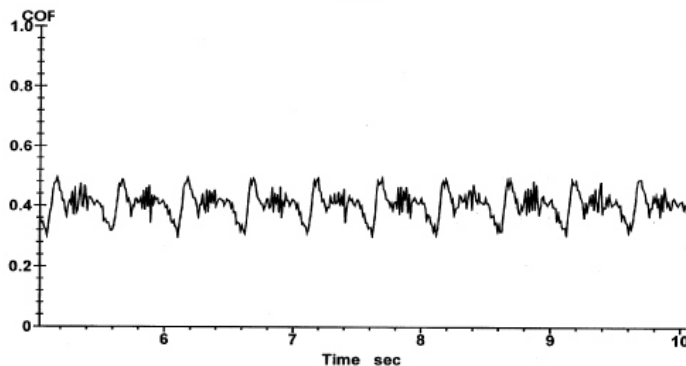
Observations:

1. The Bench-Top CMP Tester was confirmed to be capable of differentiating friction and durability of various retaining ring materials.
2. All three materials showed different friction behavior, with B having the highest friction coefficient in both dry and wet conditions, C having the lowest friction in dry conditions, A having the lowest friction with the slurry.
3. B and C materials showed vibrations (50 to 70 Hz) at some specific locations on the polishing pad, related to the surface structure of the pad.

Data Examples:



Average friction for Rings A, B, and C, in dry conditions.



Example of friction instability of Ring C in slurry.