

## MST-I Application Information

### Cyclic Compression Tests of Silicon Wafer Polishing Pads

As an example of cyclic compression test, the lifetime evaluation test for a silicon wafer polishing pad is introduced here.

By carrying out cyclic compression tests on CMP (Chemical Mechanical Polishing) pads for silicon wafers, the difference in characteristics between old and new polishing pads was evaluated.

#### Test conditions

Indenter	Diamond flat indenter with tip diameter 500 $\mu\text{m}$
Control	Constant stress of 1 $\text{kg}/\text{cm}^2$ (20 mN test force) at maximum compression
Number of cycles	500
Speed	Approx. 1.2 Hz

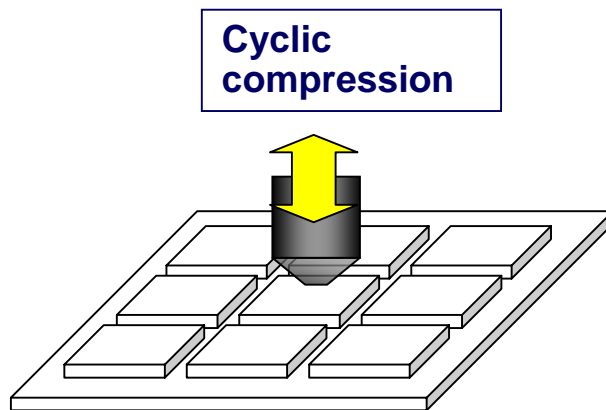


Figure 1 and 2 show the time – stroke (displacement) data for new and old polishing pads, respectively.

The new polishing pad shows a displacement of approximately 0.5  $\mu\text{m}$  immediately after the start of the test, and afterwards the displacement increases to 0.7  $\mu\text{m}$  by the time 500 cycles are completed. The amplitude is constant at 3.1  $\mu\text{m}$  throughout the test, suggesting that the elasticity modules do not change.

The old polishing pad shows a displacement of approximately 0.7  $\mu\text{m}$  immediately after the start of the test, and afterwards the displacement increases to 0.8  $\mu\text{m}$  by the time 500 cycles are completed. The amplitude was 3.1  $\mu\text{m}$  immediately after the start of the test, but it decreased to 2.5  $\mu\text{m}$  toward the end of the test, suggesting the increase of elasticity modules, i.e., decrease in flexibility.

The MST-I Microautograph also can be used for cyclic compression tests of micro springs and other elastic bodies.

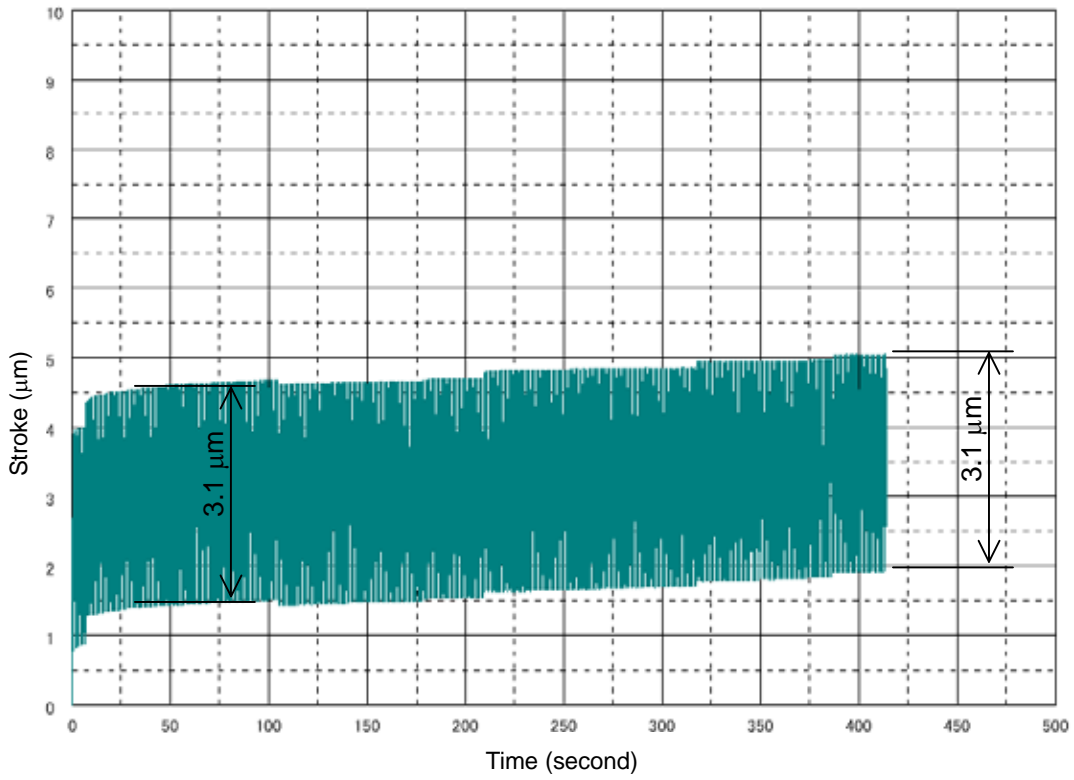


Figure 1 Time - Stroke Graph for New Polishing Pad

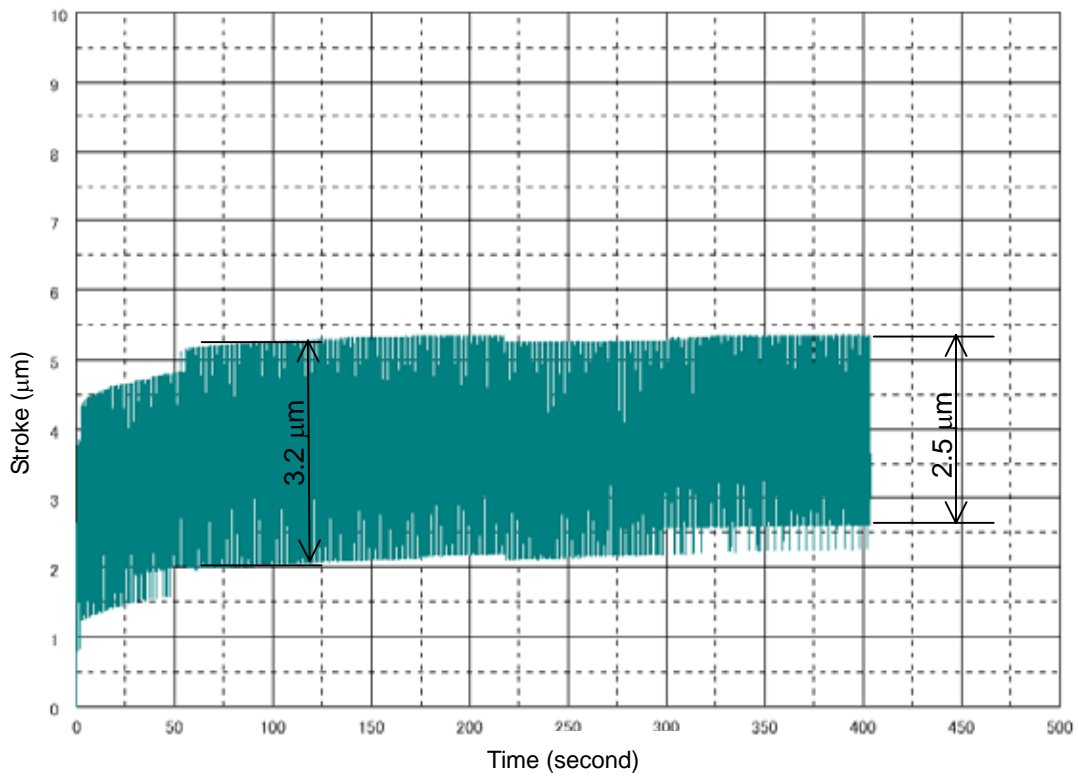


Figure 2 Time - Stroke Graph for Old Polishing Pad