

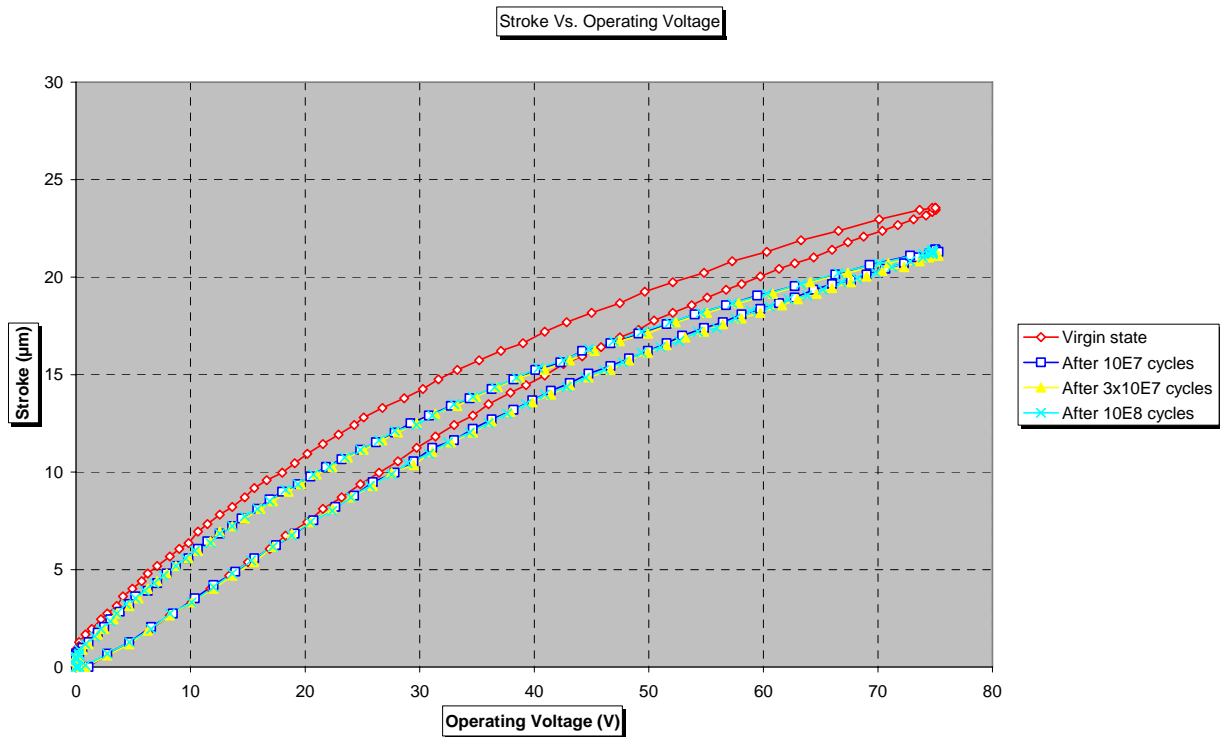
Technical note: Aging

Aging is the change of material properties with time. During dynamic operation of a piezoelectric actuator, the PZT material will encounter a certain degree of aging, which will be observed as a small loss of displacement and blocking force, when comparing a virgin actuator with an actuator that has undergone a certain amount of actuations. The loss of performance is primarily encountered for the initial cycles, after which the aging becomes almost negligible. Aging is thus a logarithmic function of time.

The below voltage-stroke diagram shows an example of a stacked actuator that has been measured for performance at four steps during an accelerated lifetime test:

- in the virgin state
- after having undergone 10^7 cycles
- after having undergone 3×10^7 cycles
- after having undergone 10^8 cycles

The loss of performance is in the order of 10%.



Upon request Noliac can supply "pre-aged" actuators that have been driven dynamically up to 10^7 cycles.