

Lifetime Durability of Ovation M Pipette

Abstract

As one of the most frequently used tools in the lab, pipettes are often exposed to a wide range of corrosive chemicals, as well as normal wear and tear from repeated use. The materials used in the construction of the Ovation M pipette were specifically chosen to withstand the harshest lab conditions and to minimize the lifetime maintenance costs.

Pipette Materials

- Main Body, Counter wheels, Plunger Button = Special Grade **Nylon 6/12** with reinforcing, lubricated additive.
- Hook and Top Cover = High impact, drop resistant **Polyphenylsulphone**
- Volume Display Window = High clarity, steam resistant **Polysulfone**
- Nozzle and Ejector Sleeve = Robust, chemically resistant **Kynar**
- Nozzle Filter = Porous **Polyethylene** with protective self-sealing additive

Life-Time Durability

Method: A custom electro-pneumatic testing apparatus (Figure 1) was developed to simulate heavy pipette use; including mounting and ejecting of tips, aspirating and dispensing liquid, changing volumes, and adjusting the hook. Calibration scales as well as force and torque gauges were used to periodically measure the performance of an Ovation M 1000 μL pipette throughout the testing.

Results: After ~1000 hours of extreme testing, including 1×10^6 tips, 1.5×10^6 aspirate and dispense cycles, 23×10^3 volume adjustments, and 6×10^3 hook adjustments, to simulate 5 years of extremely heavy use, the pipette continued to aspirate and dispense as accurately as the unused unit (Figure 2). Plunger and volume adjustment forces remained stable throughout and the hook did not become loose. Most importantly no leaks ever developed.

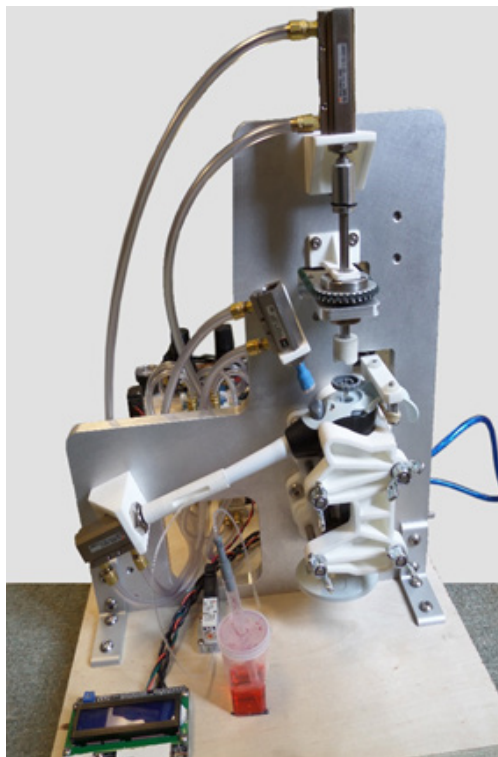


Figure 1. Life Testing Apparatus

Structural Integrity

The Ovation M was designed to be fully autoclavable for convenient sterilization in the lab. Typically, repeated exposure to high temperature and pressure environments of a standard steam autoclave can structurally weaken most pipettes and alter their performance.

Method: To determine the effects of autoclaving on the Ovation M, units were autoclaved 16 times for 20 minutes using steam sterilization at $121^\circ\text{C}/1\text{ atm}$, followed by a 20 minute drying period at 121°C , followed by a 30-60 minute cooling period outside of the autoclave. Calibration and functionality was tested after every 4th autoclave cycle at the low and high volumes.

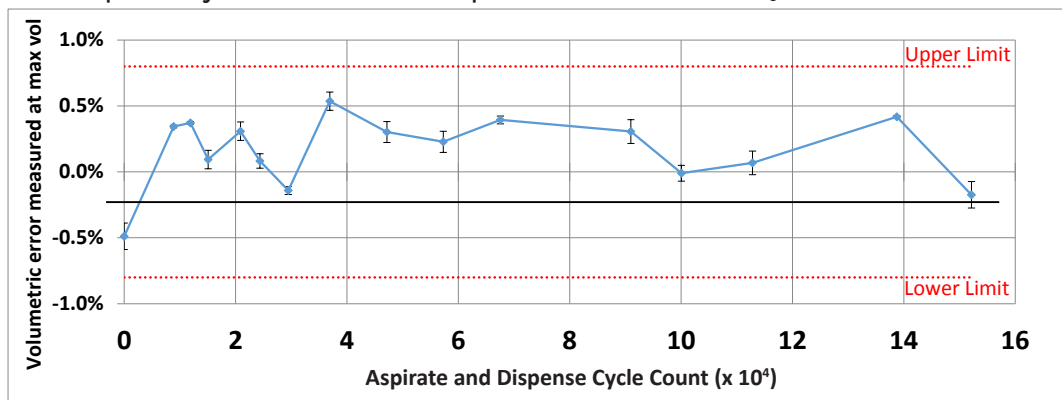


Figure 2. Accuracy drift over lifetime of 1000 μL Ovation M without recalibration

Results

After verifying the post-autoclave calibration, structural integrity of the pipette was tested by repeatedly dropping from 48" (122 cm) onto a concrete floor. Each of the 24 drops was performed with a different pipette orientation at impact in order to try to capture as many outcomes as possible (Figure 3). After every drop, the unit was tested for leaks and full functionality.

Conclusion

The results of the extensive durability testing performed on the Ovation M pipette proves that it can withstand extreme repeated use and handling with minimal effects on the performance, functionality and structure of the pipette. The Ovation M is not just the most ergonomic pipette on the market, but also one of the most resilient. Ovation M can be frequently used and autoclaved for 5+ years without any major part replacement or repairs necessary, making it one of the most affordable pipettes in terms of Lifetime Cost of Ownership. The Ovation M will not only be the most comfortable, easy to use, and unique pipettes you will ever own, but also the most durable and affordable pipettes in your lab!

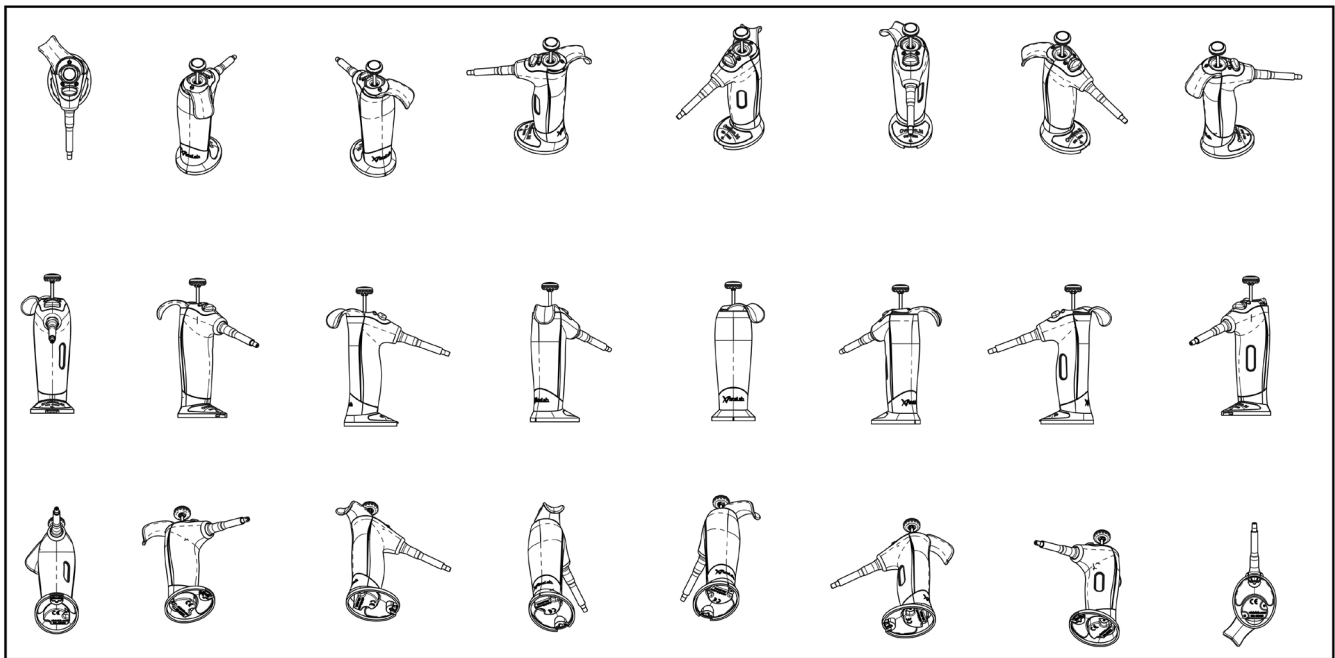


Figure 3. Drop testing chart of 24 different pipette orientations.