

Filling and Capping 15mL glass vials



Glass vials, used in a variety of biomedical applications, require uncapping, filling, and recapping. Ideally this would be done in a hygienic, sterile process. Our resource limitations will require us to waive the hygienic goal.

Essential specifications for system:

- In sequence,
 1. uncap a vial
 2. fill vial with 0-15mL of glycerin (+/- 0.1mL accuracy)
 3. recap vial, tightened to specific torque

Goals:

- minimize spillage
- minimize cycle time
- minimize variability of fill
- minimize human labor (refilling, cleaning, intervention)

"Stretch goals":

- remove vial from cardboard carton before uncap/fill/recap sequence (rather than from gravity feeder)
- put filled vial into cardboard carton (rather than into arbitrary storage)
- apply an adhesive label to the vial after filling or recapping

Vial specifications:

- Supelco 27159 15mL glass vial
- phenolic cap with teflon liner
- 21mm diam x 70mm height (with cap)
- 21mm diam cap
- 18-400 GCMi thread (1 thread turn, 3mm pitch)

Resources available:

- Robots: up to two teams may use Motoman MH5L 5DOF manipulators
- Indexing turret: up to two teams may use pneumatic indexing turrets
- Stepper motor actuators: many stepper driven linear actuators are available, plus individual steppers
- Controls: AutomationDirect BRX plc, Motoman DX100 controllers, LinuxCNC motion controllers

Teams

Team Morris:

Blake Morris, leader
David Porco
Andrew Wilber
David Minden

Team Miler:

Garren Miler, leader
Steffan Misseghers
Will Howard
Caleb Tol

Team Bame:

Clinton Bame, leader
Elizabeth Butikofer
Katelyn Huesby
Ivan Wu

EE Team:

Luke Chilson
Jeffrey Grange