Robust Resin Filtering Station for 3D Printer Maintenance

Team Steven and Vedad
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Steven Nguyen, Vedad Bassari
Department of Mechanical Engineering, UC Santa Barbara

Filtering Resin from 3D Printers is difficult and Time-Consuming

- SLA 3D printers selectively polymerize liquid resin that is stored in resin tank.
- Cleaning the resin tanks after failed prints or when changing materials is difficult since the viscous resin must be filtered out.

Figure 1. Formlabs SLA printers are frequently used for rapid prototyping and operate with a resin tank.

Automated Filtering Station Simplifies Cleaning 3D Printers

- Automated solution must filter resin in timely manner without spilling.
- Introducing a motor to rotate cartridge can achieve pouring via the built-in resin tank spout.
- Filtering station frees user to work elsewhere as it runs.

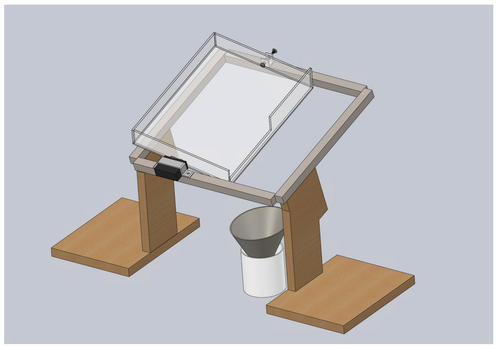

Figure 2. The proposed solution was first modeled to brainstorm the design

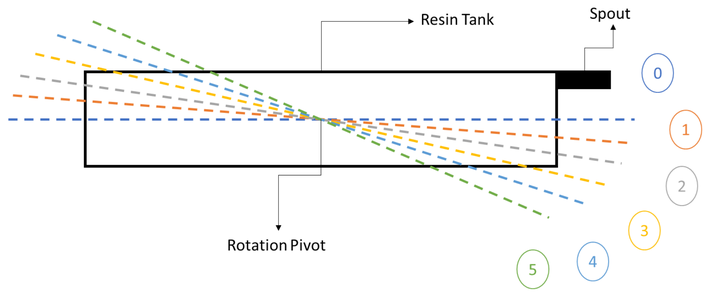

Figure 3. Incremental pouring routine allows controlled flow. The pivot point was selected to minimize torque requirements.

Functional Requirements Guided the Engineering Decisions

- A maximum motor torque of 1.6 Nm was calculated to ensure rapid response (5 deg/s^2) for a 1kg load.
  - Motor is capable of 2.5 Nm: SF 1.5 (worst case)
- The motor takes 5 steps to provide a predictable flow.
- Fixed tilt angle of 16 degrees was determined to bias flow towards cartridge spout.
- Button and LCD provide an intuitive user interface.

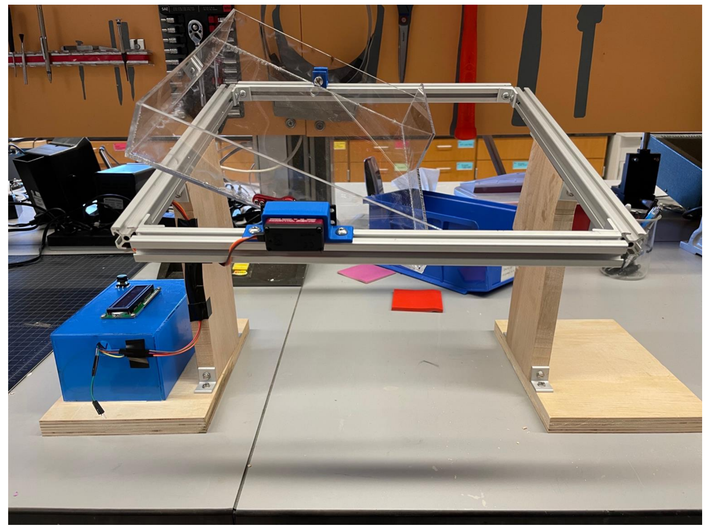

Figure 4. The simple fabrication of the final prototype allows the device to be cost-efficient and effective,

Testing Demonstrated Robust Filtering Performance

- Optimal pouring routine was tuned for speed and to avoid filter overflow.
- Testing was carried out using Flexible V2 Resin (Formlabs, Somerville MA) and 125 micron filtering mesh.
- Pouring routine set to pause for 10 seconds at 5 intermediary steps to gradually pour resin.

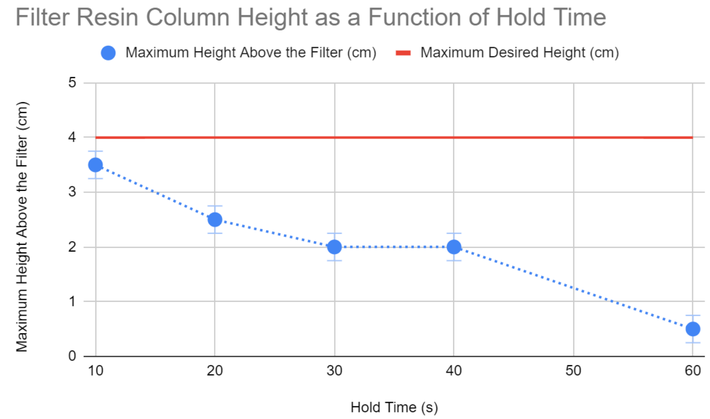

Figure 5. Pouring test results highlight the device's ability to pour resin quickly and safely.

The Proposed Solution Helps the User Save Time and Resources

- This solution allows the user to clean tanks quickly and use multiple materials with the same resin tank.
- The station will include a commercially available UV-canopy to prevent spontaneous curing of the resin.

Acknowledgments

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