

# Progressive Supranuclear Palsy Assistive Drinking Device

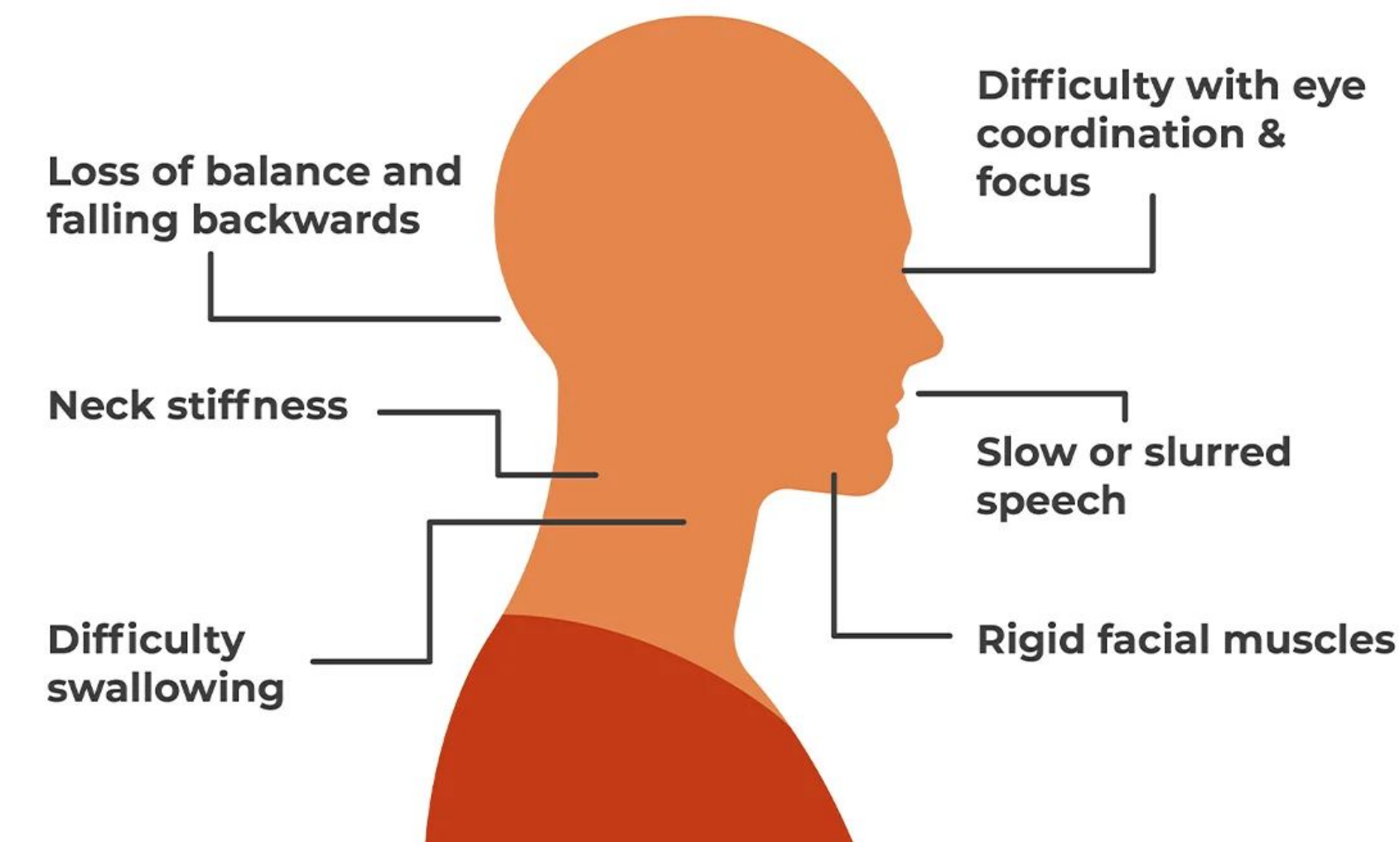
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## Clinical Significance

### Progressive Supranuclear Palsy (PSP):

- Rare neurodegenerative disease
- Impacts 20,000 Americans<sup>1</sup>
- No cure or treatments available
- Average length from diagnosis to death is only 5 to 8 years<sup>2</sup>

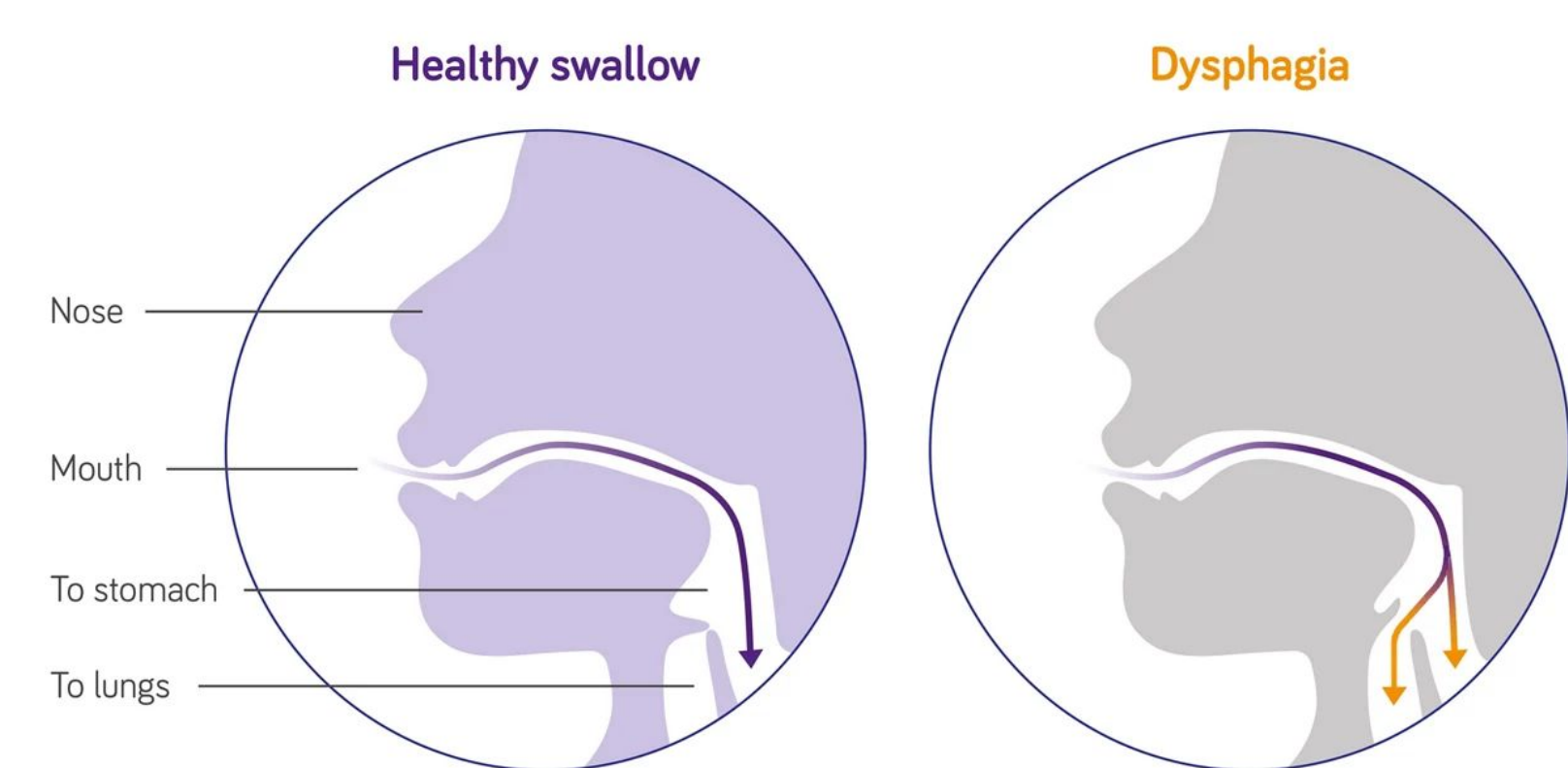
Figure 1. PSP Clinical Features<sup>3</sup>



### Dysphagia, i.e. difficulty swallowing:

- Over 90% of patients develop dysphagia
- Dysphagia complications (aspiration pneumonia, asphyxiation, malnutrition) is the leading cause of death<sup>4</sup>
- Frontotemporal dementia makes it infeasible to independently adhere to speech pathologist's recommendations

Figure 2. Schematic of Healthy vs Dysphagia Swallow<sup>5</sup>



## Design Objectives

Figure 3. Design Needs and objectives

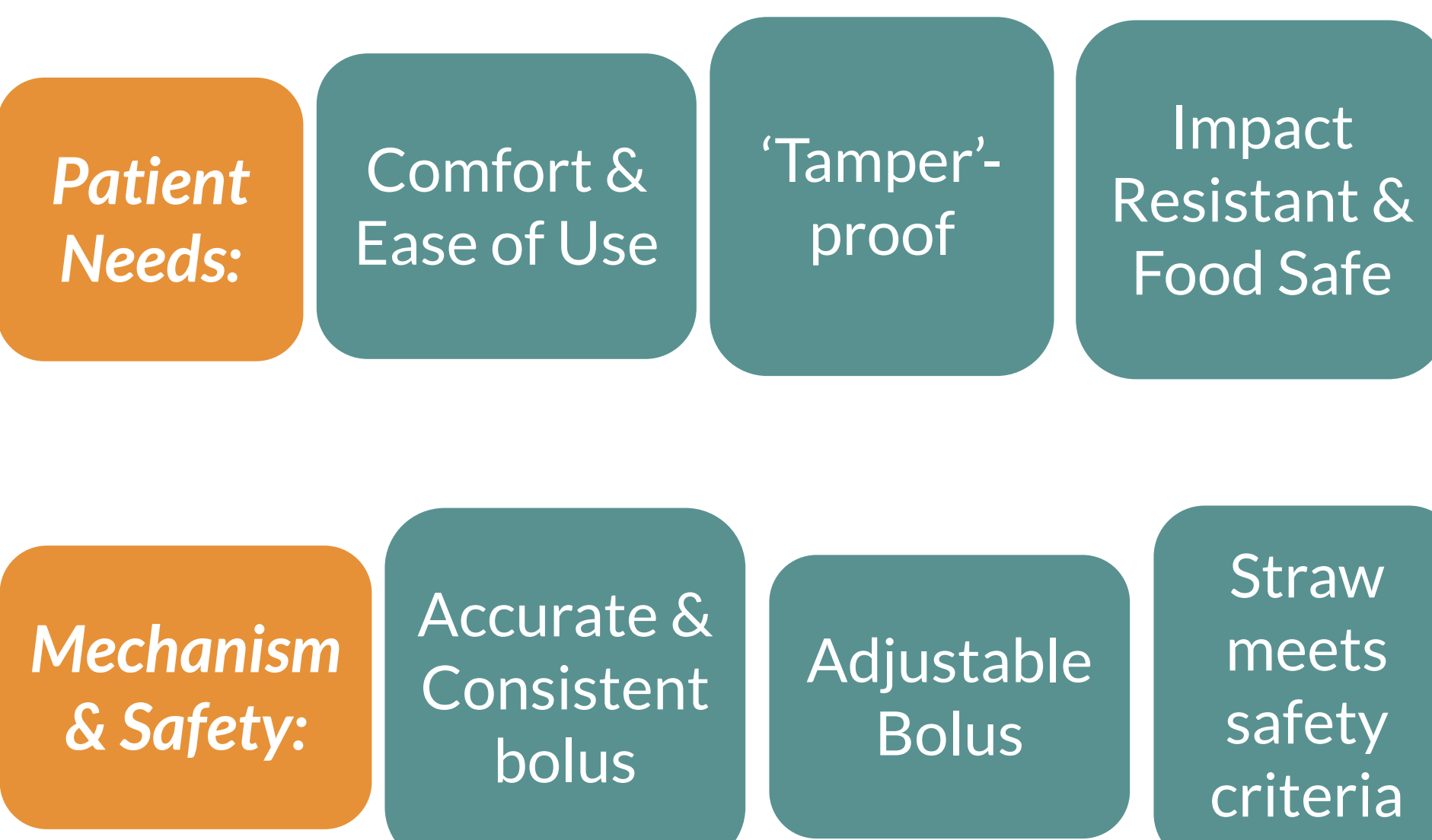
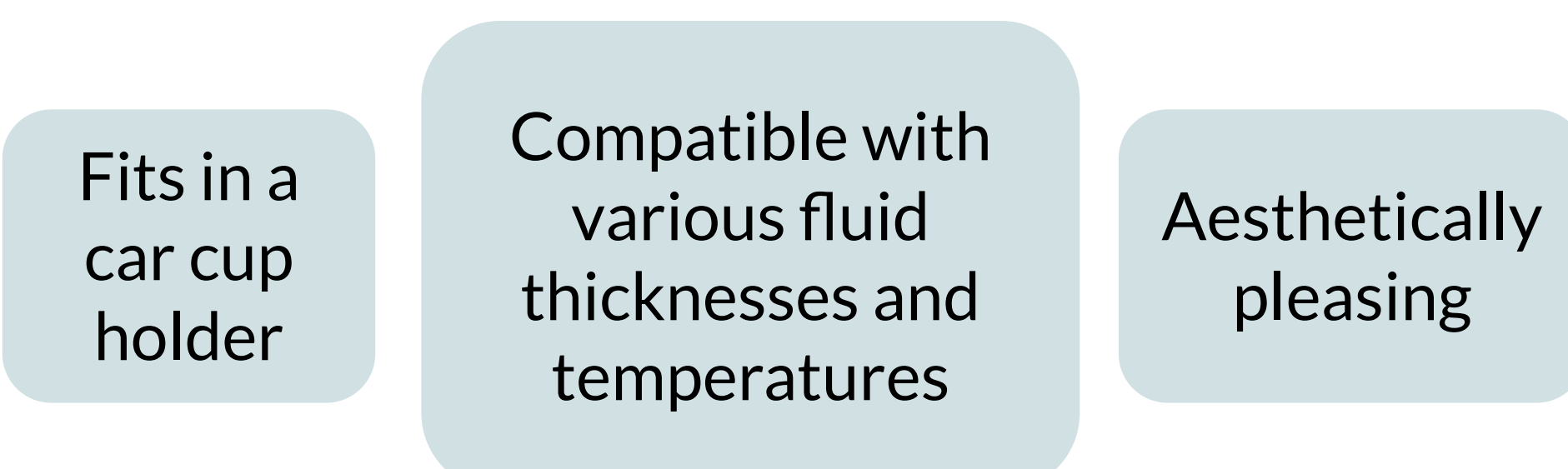


Figure 4. Patient Wants for Product



## Final Design

Figure 5. Schematic of Fluid Delivery Mechanism

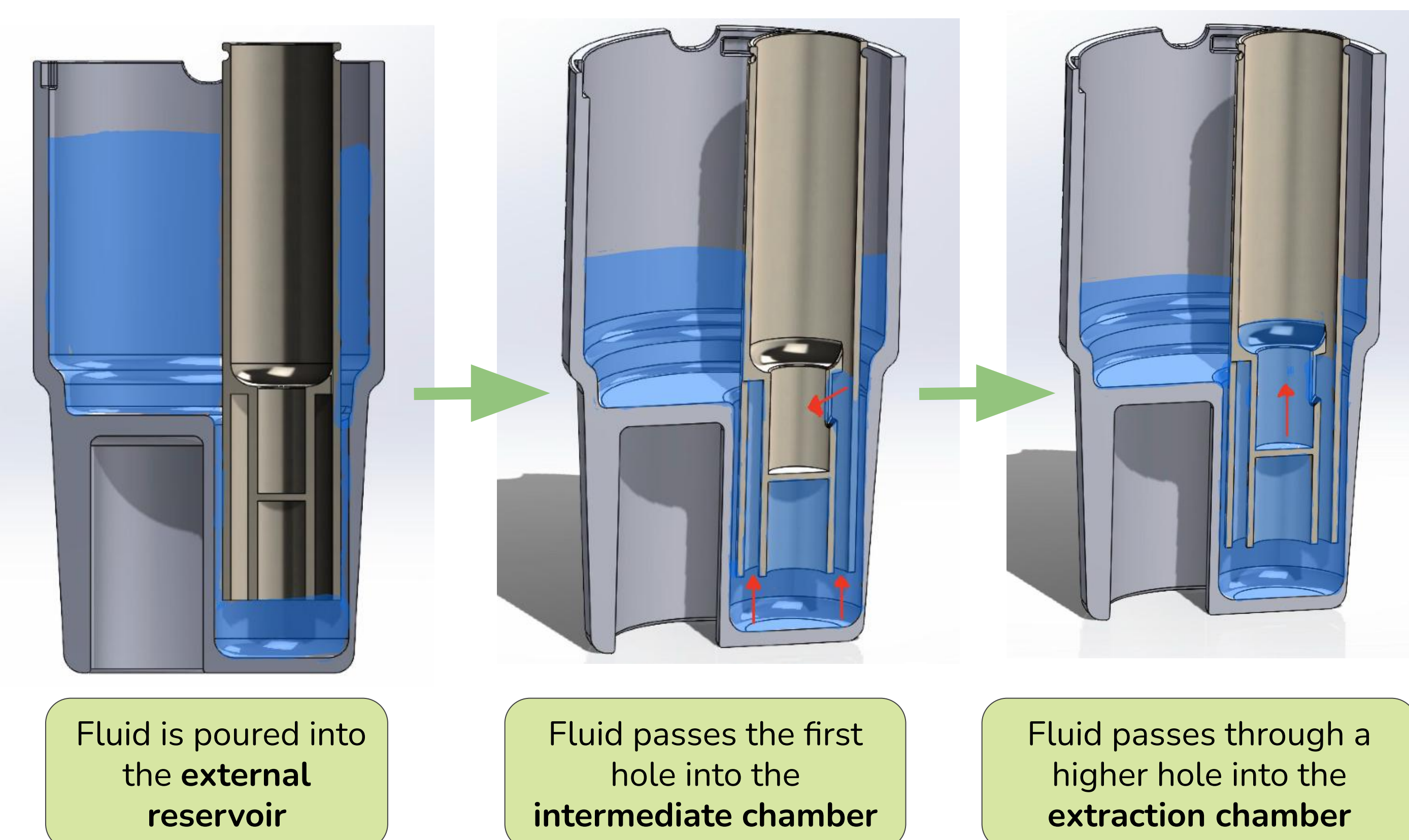


Figure 6. Final Design Assembly of Lid Mechanism

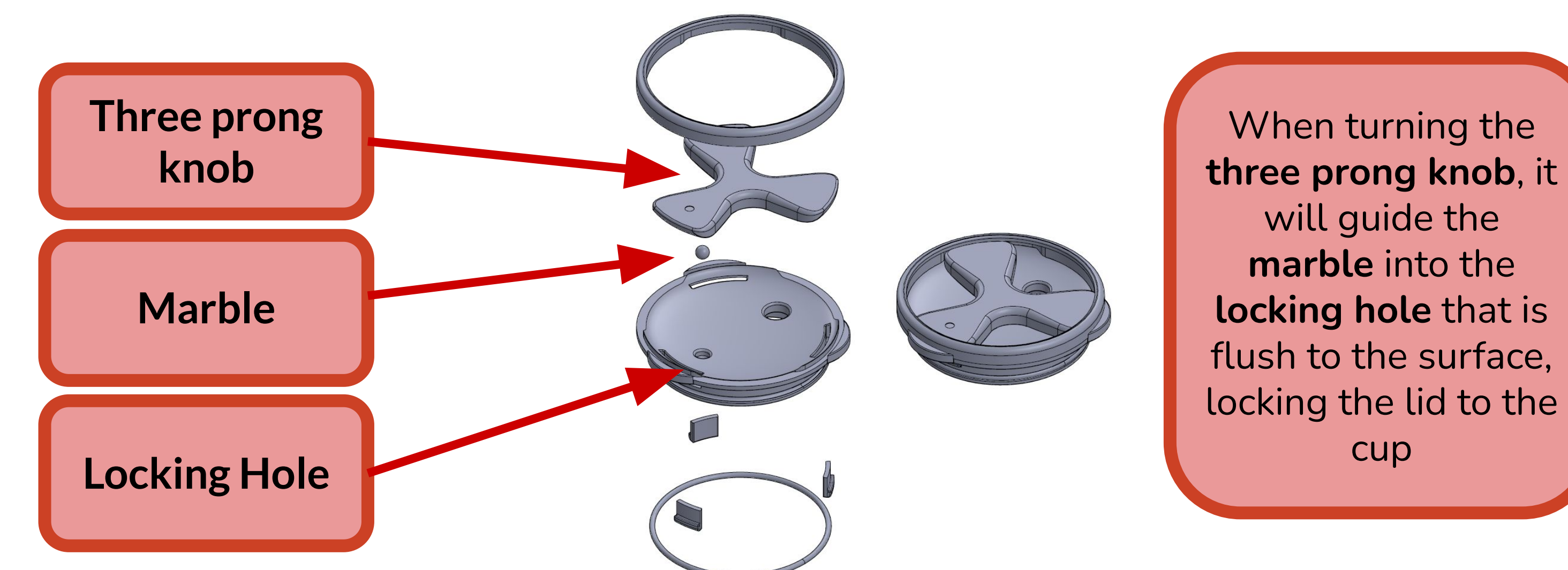


Figure 7. Final Design Assembly in Solidworks

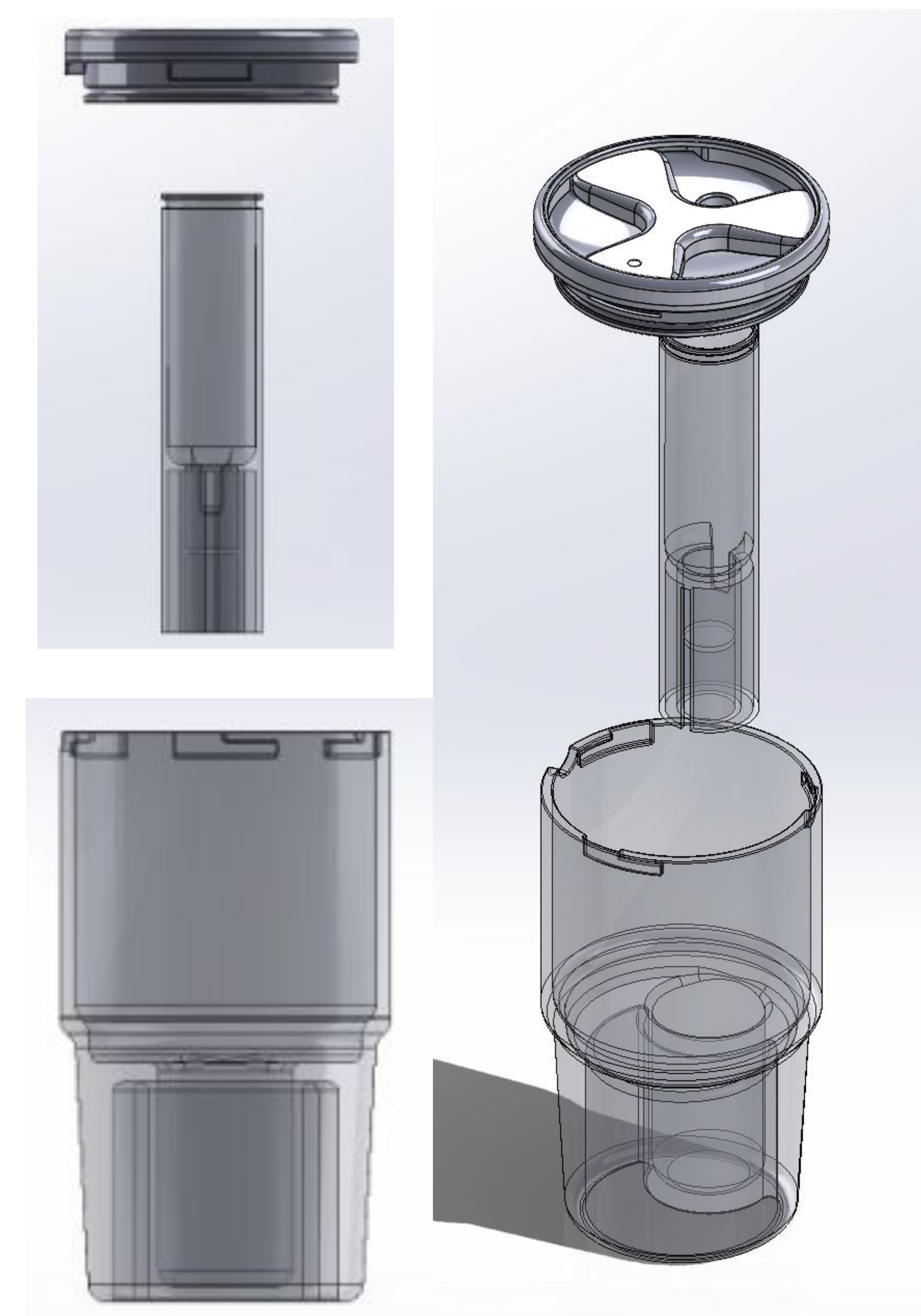


Figure 8. Final Straw Design

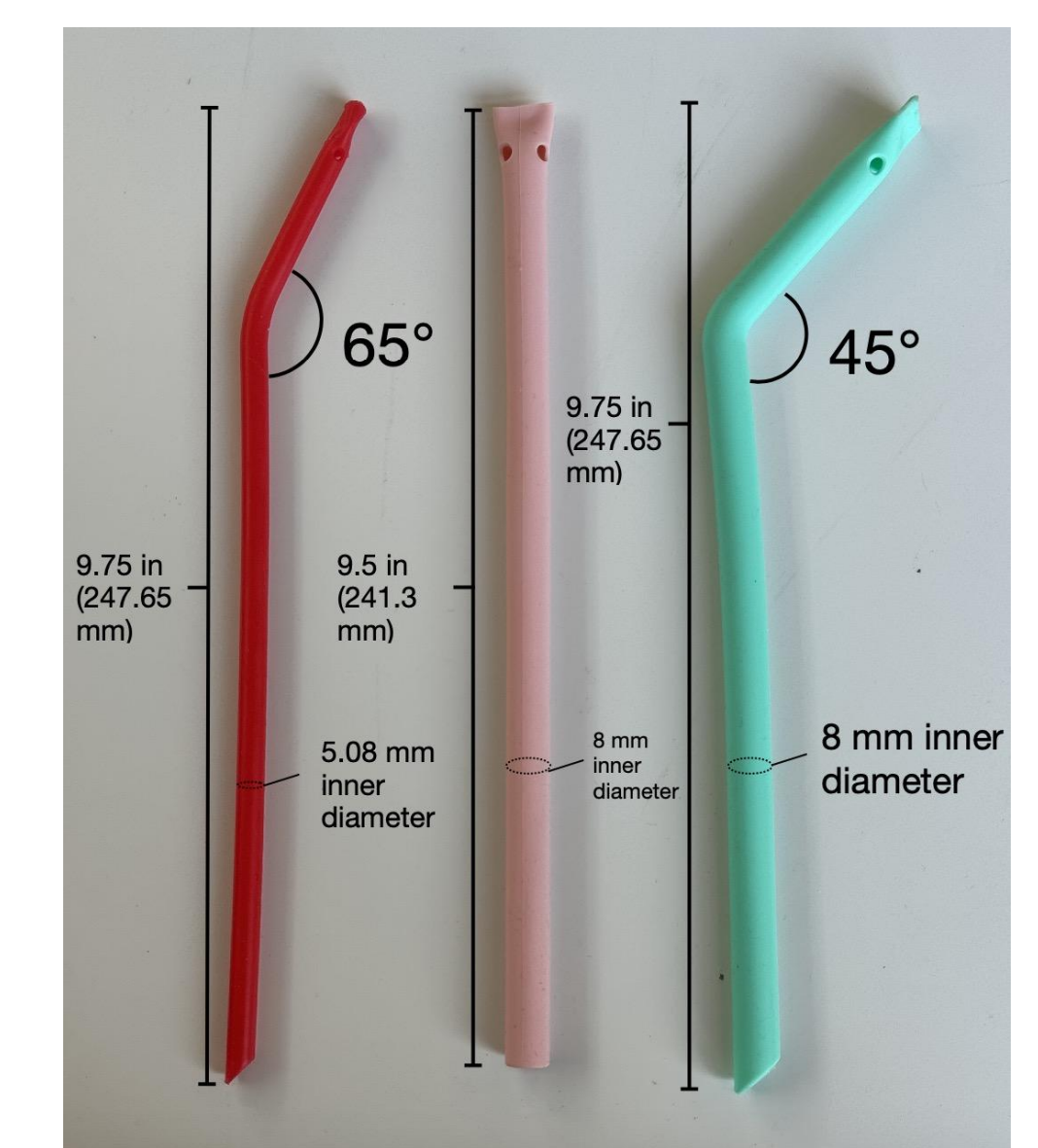
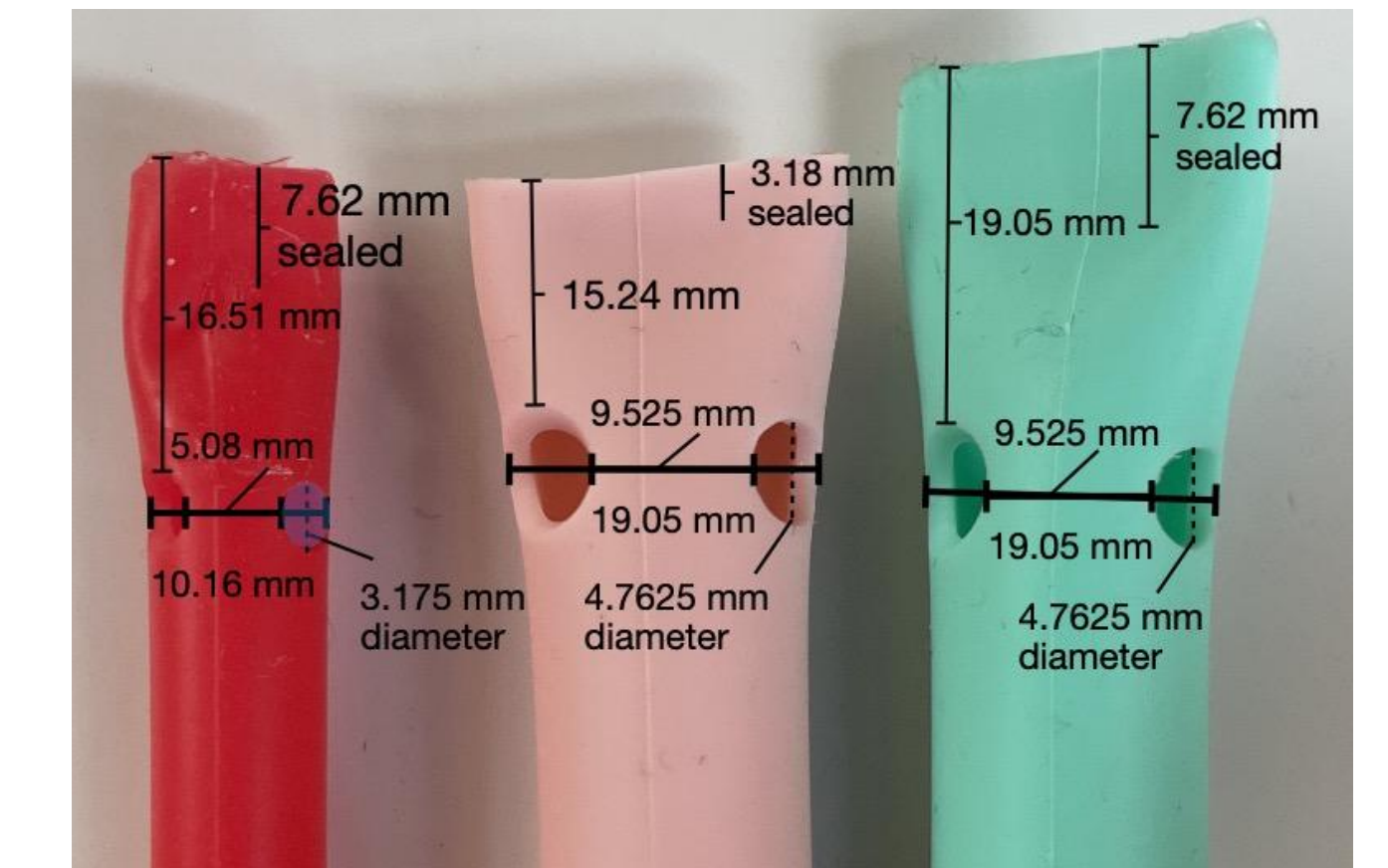
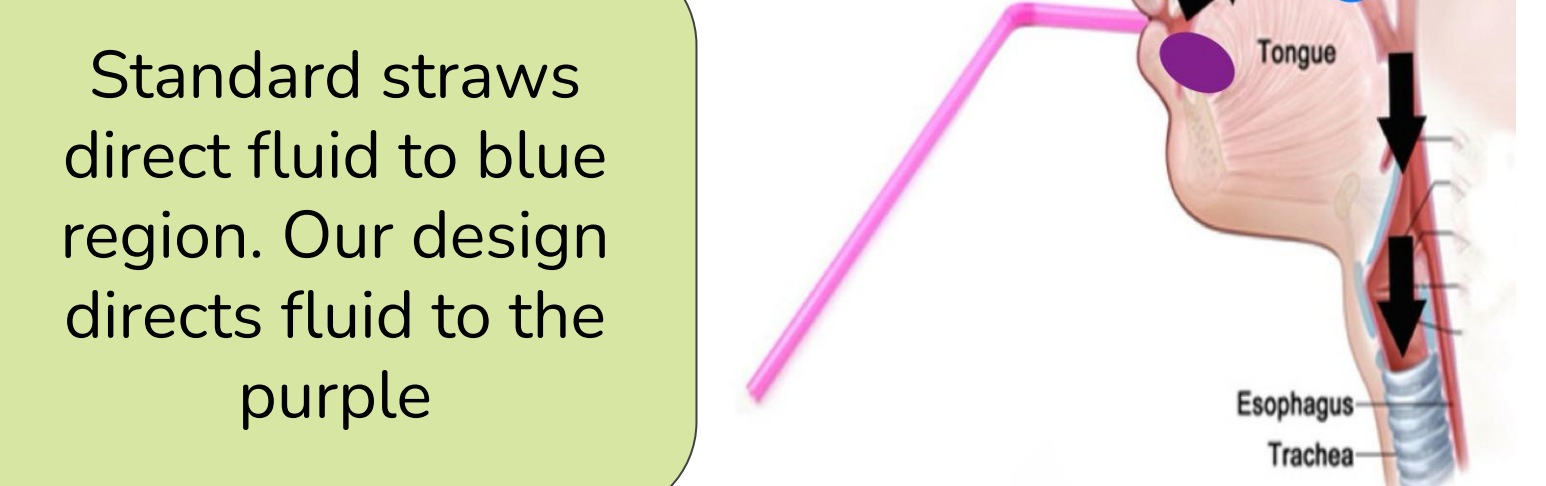


Figure 9. Straw Design Rationale<sup>6</sup>



## Prototyping and Testing Results

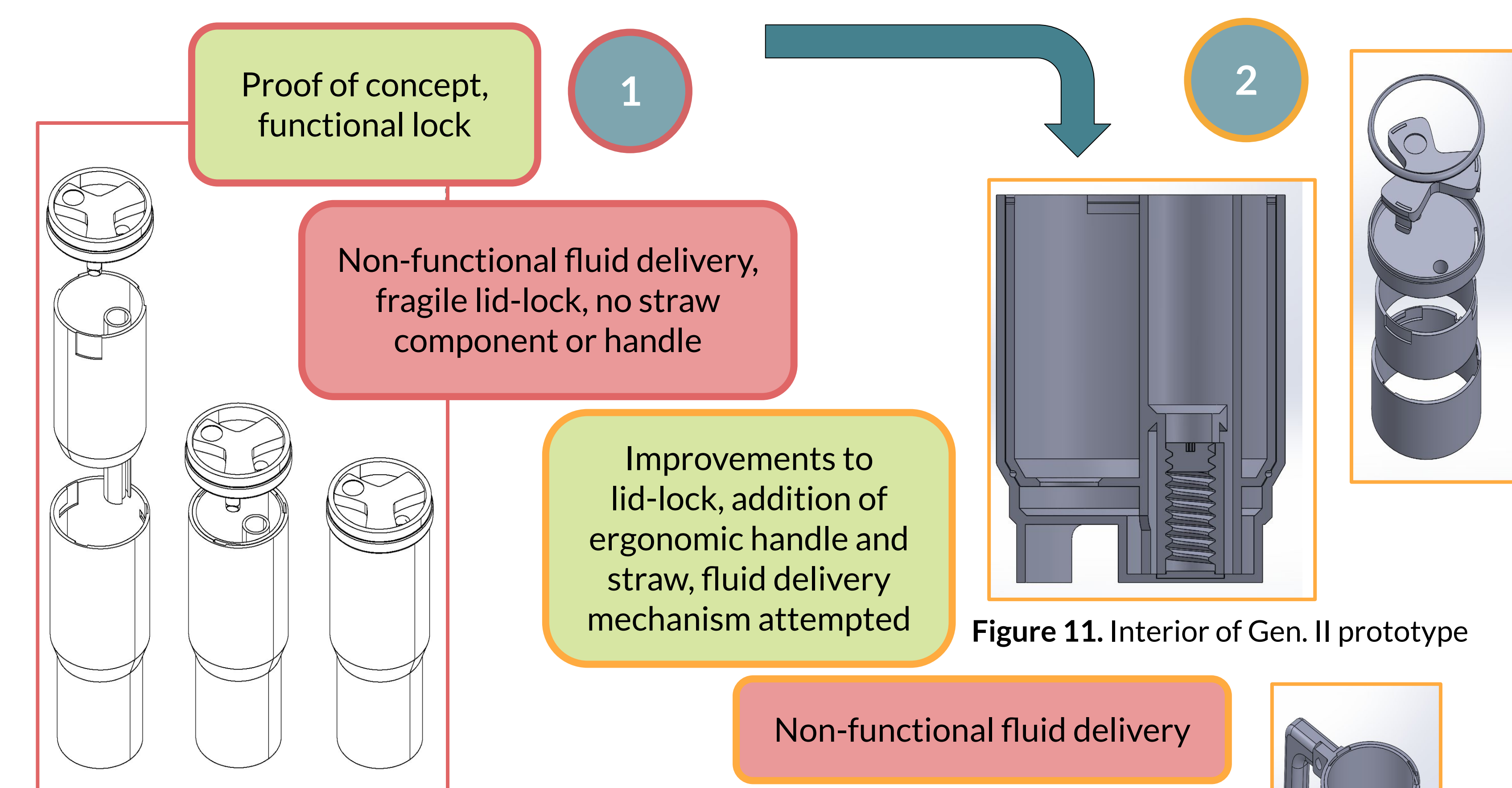


Figure 10. Schematic of Gen I. prototype

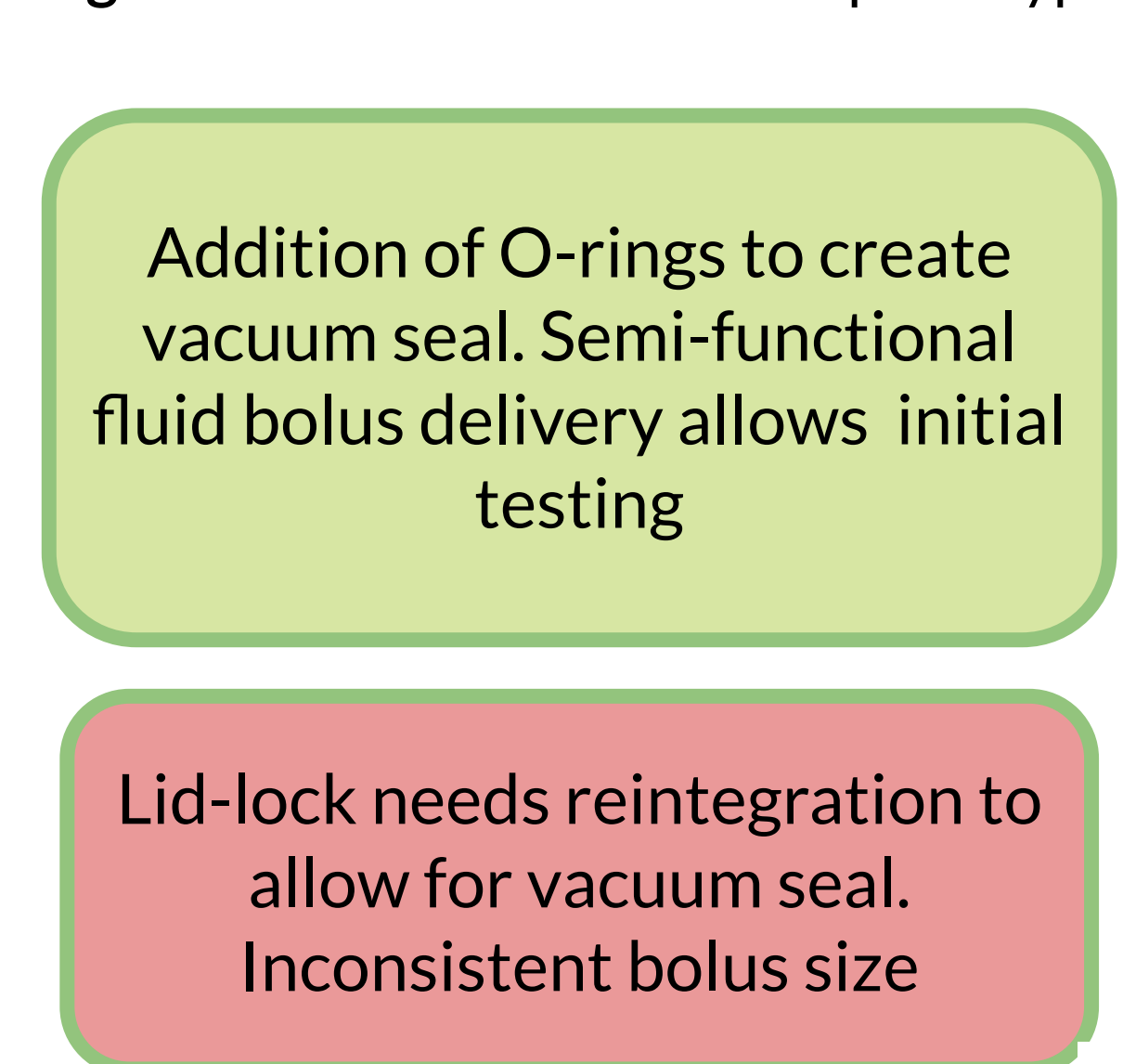


Figure 11. Interior of Gen. II prototype

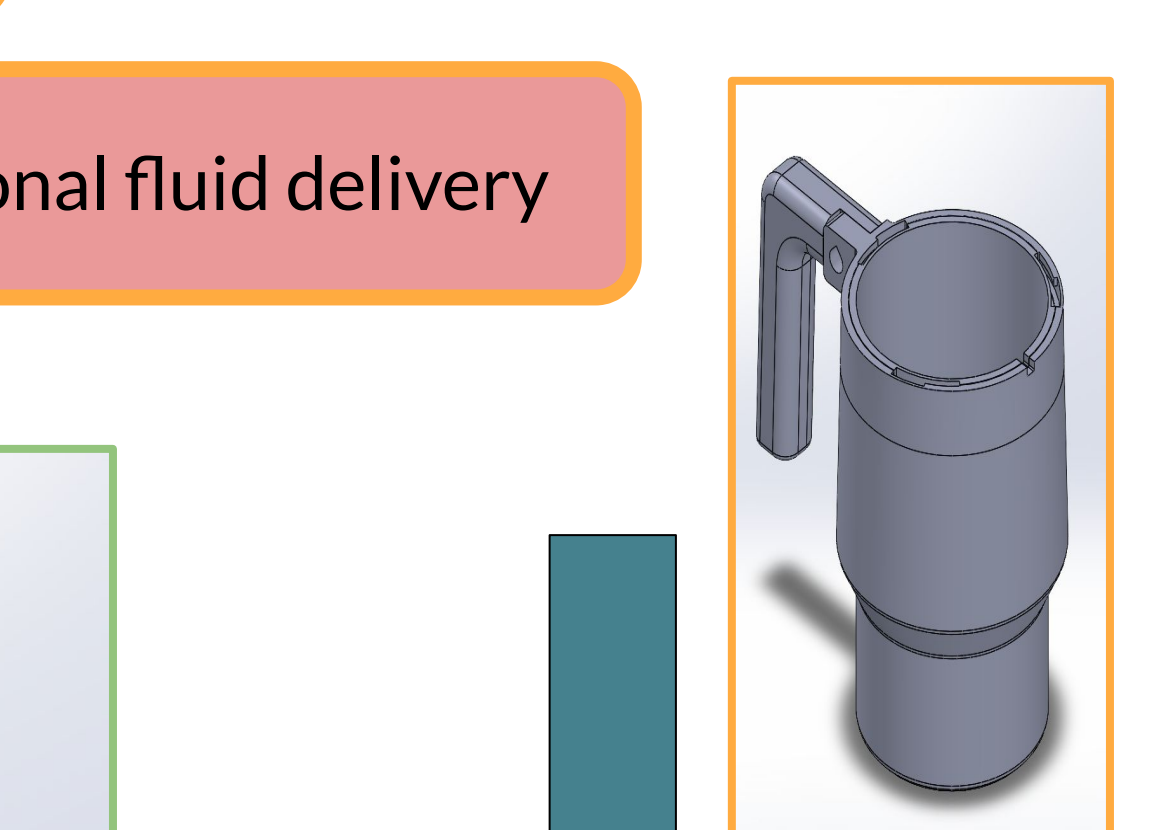


Figure 12. Interior of Gen. III prototype

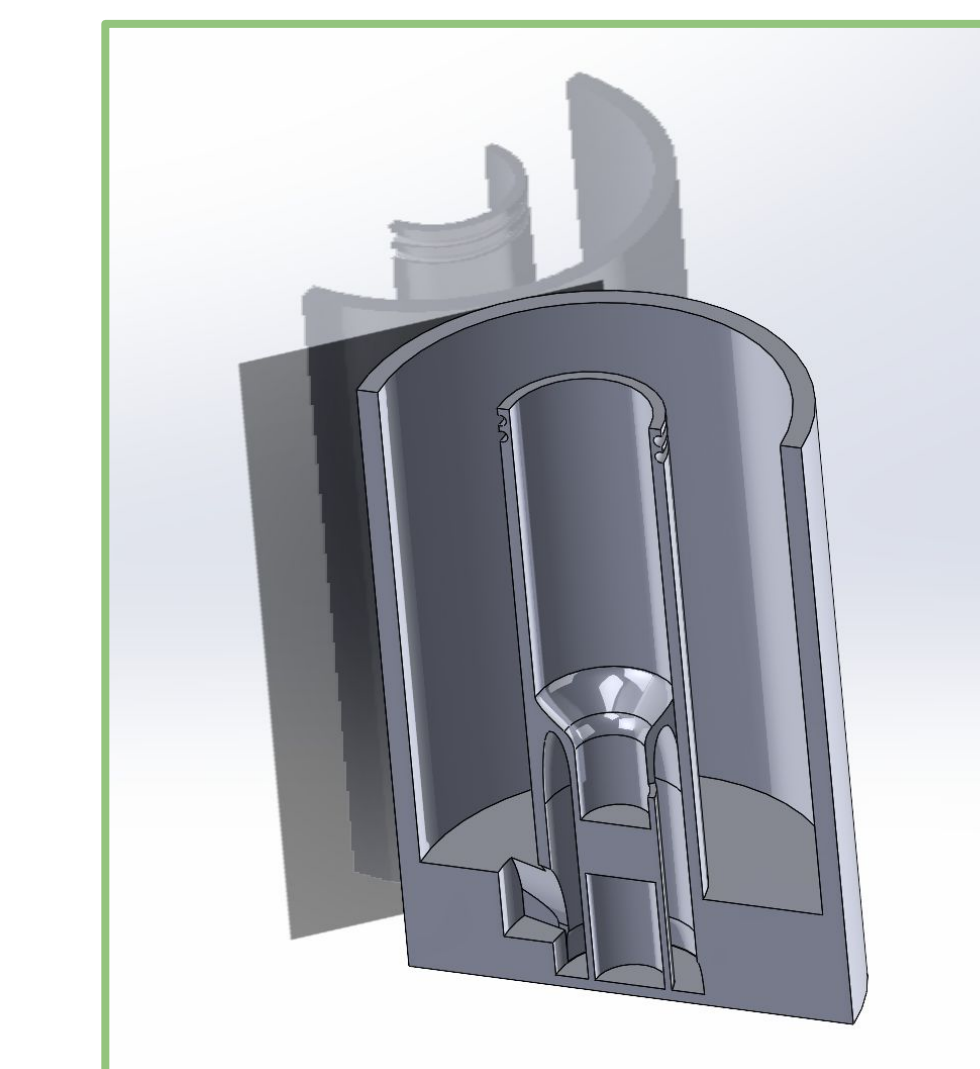


Figure 13. Bolus Assessment

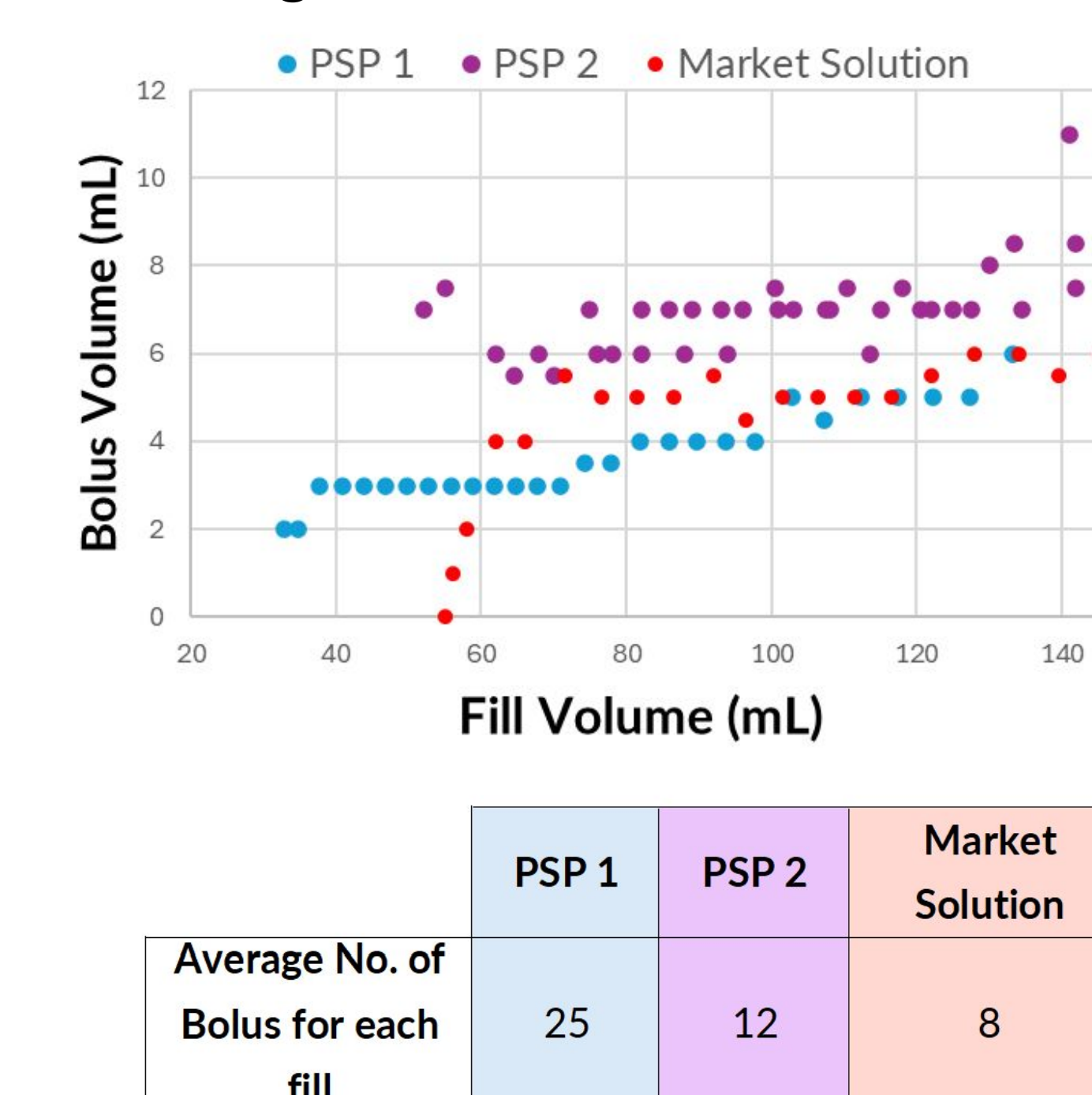
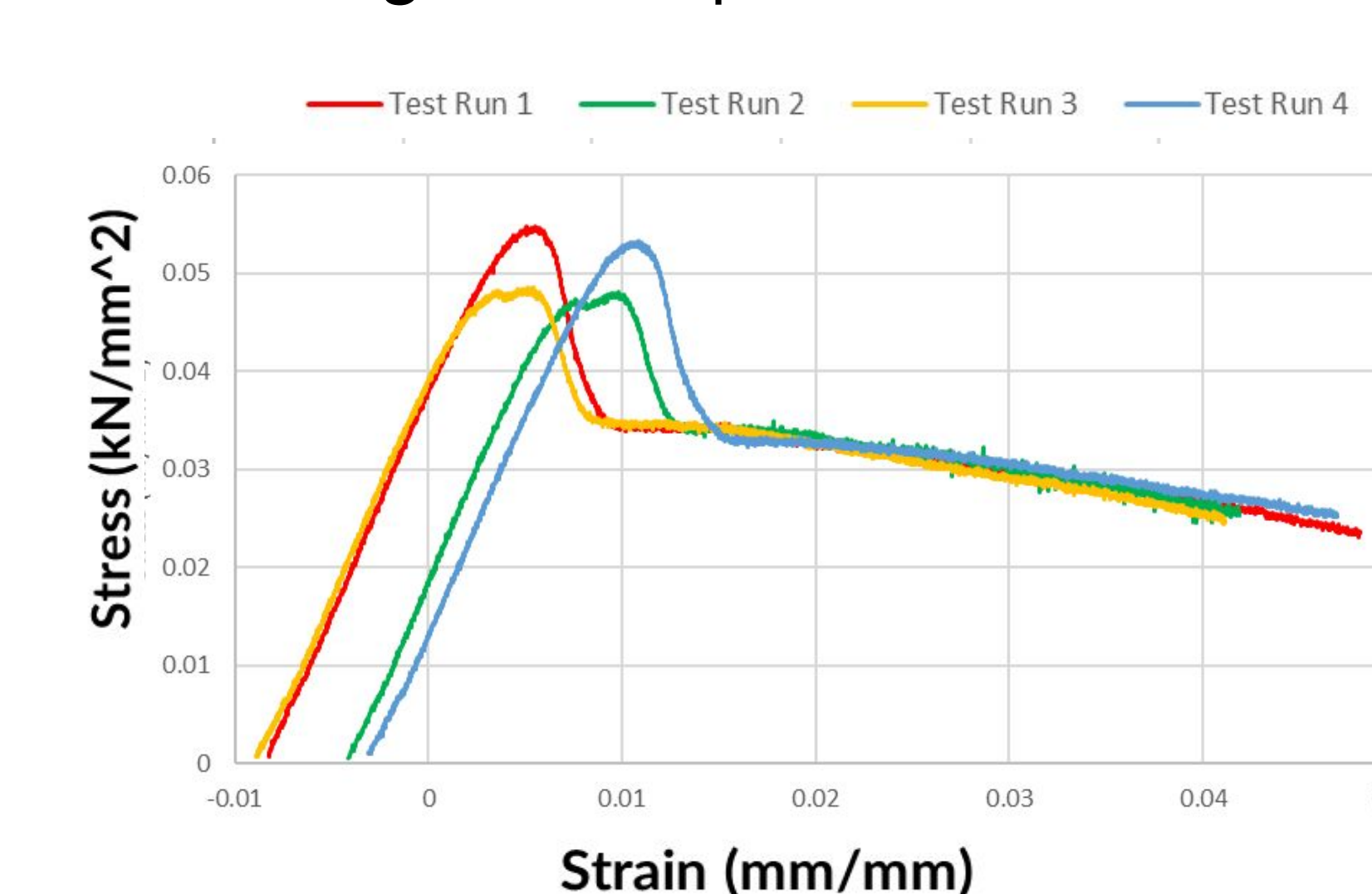


Figure 14. 3-point bend test result



**Material:** Polylactic Acid (PLA), 40% infill, Ender-3 3D Printer  
**Durability Testing:** conducted drop tests at range of standard table heights

## Acknowledgements

Thank you to our professors Dr. Zapanta, Dr. Palchesko, Mr. Chung, our Teaching Assistant Cara Jaroenkunathum, and our clinical advisor Dr. Burton for their support and feedback throughout this process! Thank you to the BME Department and OURSD for funding our project!

## Reference

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