Ergonomic Nutritional Laboratory Container Opener

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Overview

- Problem Statement
- Client Requirements (PDS)
- Background Material
- Design Alternatives
- Design Matrix
- Future Work

Problem Statement


[1]

- Commercial food testing laboratory requests an ergonomic container opener
- Technicians repeatedly uncap up to 100 containers/day
    - Causes significant hand and wrist strain

Client's main concern:

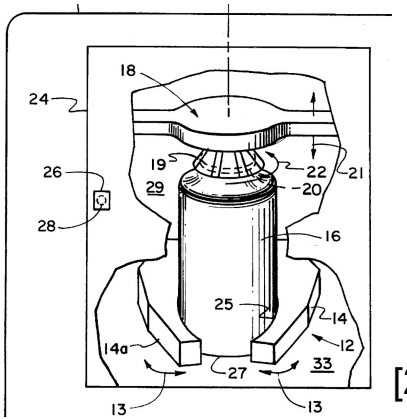
- Device should not interrupt workflow
- Device should noticeably reduce hand strain

Summary PDS

- Minimal manual intervention
- Not disrupt workflow
- Variety of sizes
- Reasonable cost
- Excessive use (50-100 containers per technician per day)
- Safe
- Sterile
- Accessible

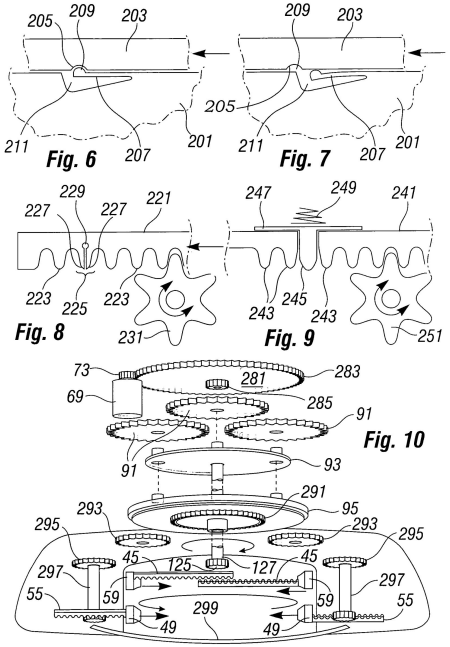
Background Material

- Several containers openers currently on the market
- Few laboratory-specific container openers have been developed



[2]

[3]



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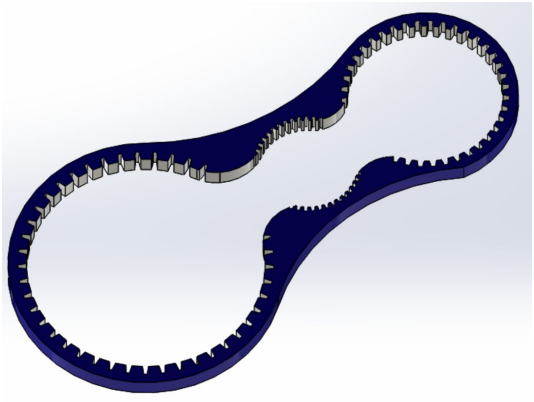
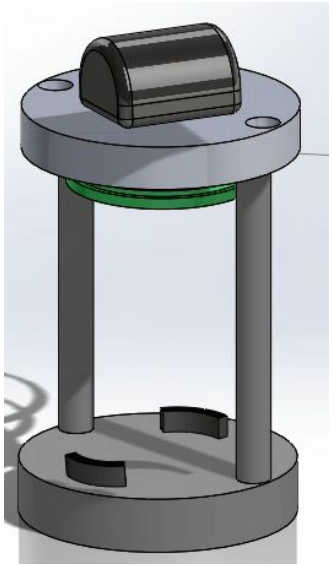
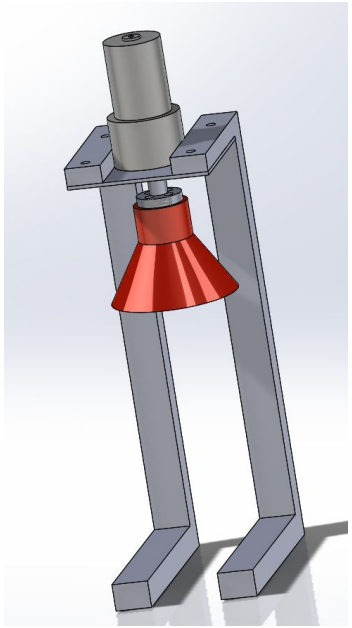
Design Alternatives



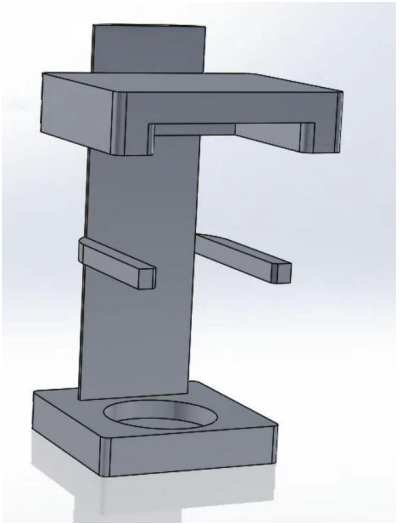
Manual Opener



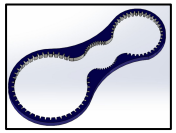
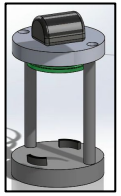
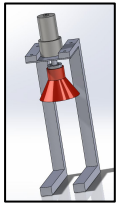
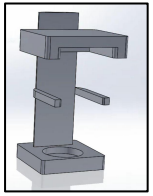
Height Adjusting Automatic Opener (Clamp Hold)



Semi-Automatic Opener (Friction Hold, Cone)



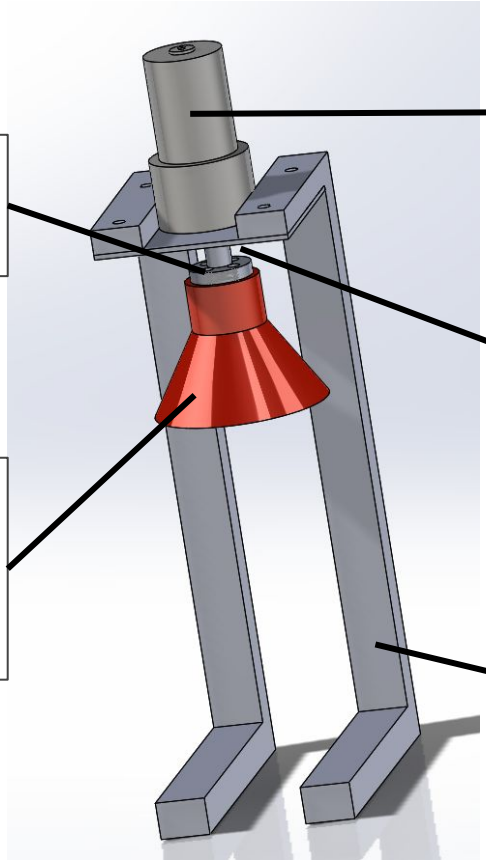
Height Adjusting Pneumatic Opener

Design Matrix

	Manual Opener	Height Adjusting Automatic Opener (Clamp Hold)	Semi-Automatic Opener (Friction Hold, Cone)	Automatic Opener (Pneumatics)
Hand Strain Relief (25)	(2/5) 10	**(4/5) 20**	(3/5) 15	**(4/5) 20**
Impact on Workflow (20)	**(4/5) 16**	(3/5) 12	**(4/5) 16**	(3/5) 12
Safety (10)	**(5/5) 10**	(4/5) 8	(4/5) 8	(3/5) 6
Sterility (10)	**(4/5) 8**	(3/5) 6	(3/5) 6	(3/5) 6
Durability (10)	(1/5) 2	**(4/5) 8**	(3/5) 6	**(4/5) 8**
Range of Jar Sizes (10)	(3/5) 6	(3/5) 6	**(4/5) 8**	(3/5) 6
Cost (5)	**(4/5) 4**	(2/5) 2	(3/5) 3	(2/5) 2
Ease of Fabrication (5)	**(4/5) 4**	(2/5) 2	(3/5) 3	(2/5) 2
Ease of Use (5)	**(4/5) 4**	(3/5) 3	**(4/5) 4**	(3/5) 3
Total (100)	64/100	67/100	**69/100**	65/100

Semi-Automatic Opener (Friction Hold, Cone)



Extended Use AC Compact Gear Motor **($60)**

Parallel Shaft Coupling **($4)**

8020 Aluminum Stock (**$21** for ~ 4 ft)

[5]

Fabricated Aluminum Hub **($12)**

Purchased Cone **($15)**
Fabricated Cone - 6061 Aluminum with inner silicone coating **($84)**

Current Cost Estimate:

W/ purchased cone - $112*

W/ fabricated cone - $181*

*does not include bolt costs

Device Installment

Future Work

Potential Roadblocks:

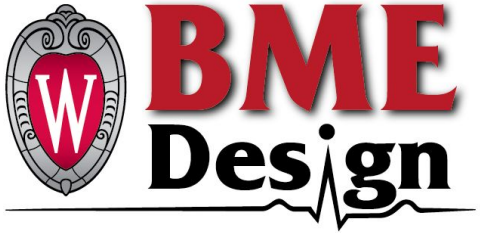
- Failure to meet safety checks by lab's Health and Safety Department
- Fulfilling all of client's requests during course of semester

Design:

- Polish design
  - Dimensions, materials, precise cost evaluation
- Client approval
- Testing
  - Time to open ~20 containers, user input required

Acknowledgements

- Dr. Radwin
- Dr. Puccinelli
- Dr. Yen



References

[1] https://www.walmart.com/ip/2PCS-300mL-Capacity-Chemical-Container-Graduated-Clear-White-Plastic-Lab-Bottle/157809395

[2] https://patents.google.com/patent/US5647251A/en?q=cone&q=jar&q=ope

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[5]http://www.globalindustrial.com/p/building-materials/struts-and-framing/8020/101072-1-x-1-tslotted-profile-72-stock-bar?infoParam.campaignId=T9F&gclid=Cj0KEQjw4fy_BRCX7b6rq_WZgI0BEiQAI78nd9eCZcC1JUBIROGLul0GBdvJxgU-bxIY-WaEVbtKqM4aAs5X8P8HAQ

Questions