



Guidewire Organizer for Endovascular Catheter Procedures

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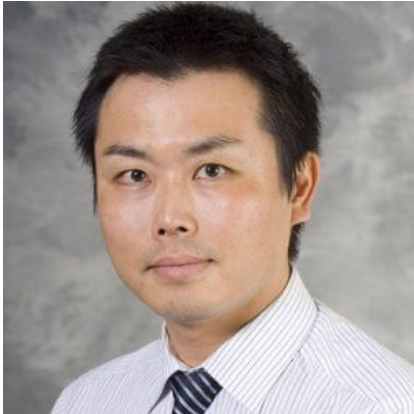
BPAG: Victoria Heiligenthal

Rachel 1

Client & Advisor

Client: Dr. Dai Yamanouchi

- Specialties: Vascular and Endovascular Surgery



Advisor: Dr. Darilis Suarez-Gonzalez

- Biomedical Engineering



Problem Statement

- Use multiple guidewires during a single procedure.
- Guidewires are hard to manage (tangled and disorderly).
- Aiming to increase procedure efficiency and safety.
 - Each minute lost is ~\$60 for patient [1].
- Must be easy to remove the wire while in the operating room and while on stand.
- Device will consist of two parts (wheels and stand).

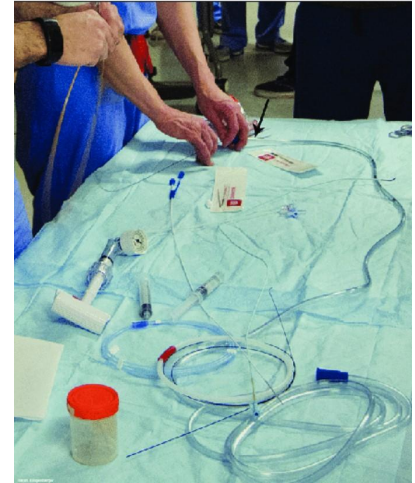


Figure 1: Unorganized guidewires. [2]

Background

Competing Designs

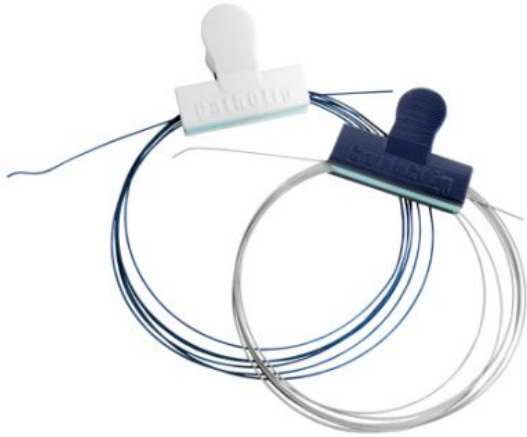


Figure 2: Cath Clip [3]



Figure 3: Medline Guidewire Bowl [5]



Figure 4: Wet Towel

Key Product Design Specifications

- The device consists of two parts - wheel(s) and stand
- Successfully load guidewires of varying stiffnesses
- Guidewires must be able to be removed from wheel while on stand
- The final market device will be injection molded and the wheel is single use

BME 400 Summary

- 3 Final Designs

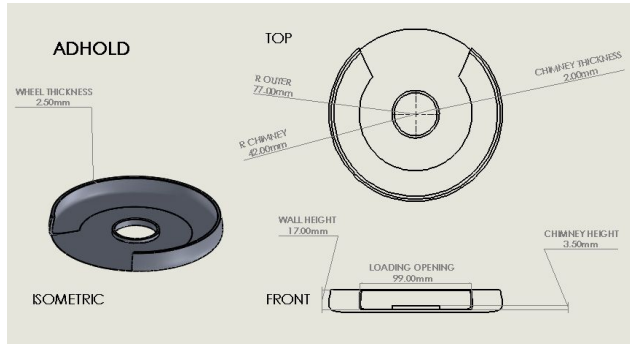


Figure 5: AD Hold wheel design and dimensions

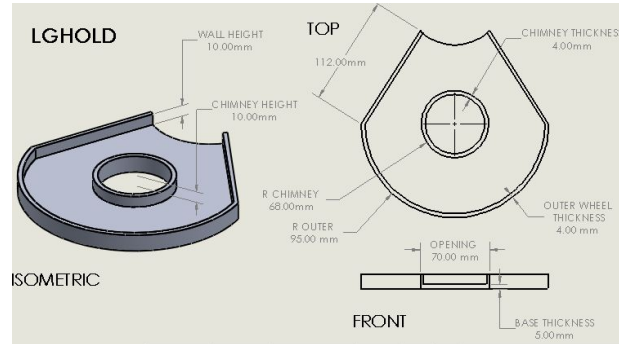


Figure 6: LG Hold wheel design and dimensions

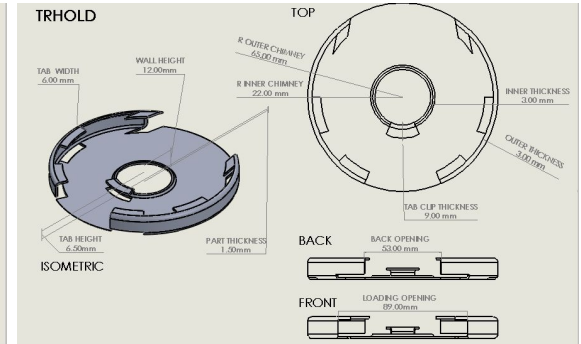


Figure 7: TR Hold wheel design and dimensions

Evaluation/Testing Results

- **Goal:** Testing by all team members to determine which design to move forward with as the finalized design
- **Loading Times:**
 - XSHold had the most efficient loading times (avg 12.29s +/- 2.53s)
- **Data Significance:**
 - Significant difference between XSHold and TRHold & LGHold ($p = 0.028$, $p = 0.036$)
 - No significant difference between XSHold and ADHold ($p = 0.473$)
- **Lessons Learned:**
 - **XSHold and ADHold most efficient**
 - **Final wheel design will be a combination of the two**

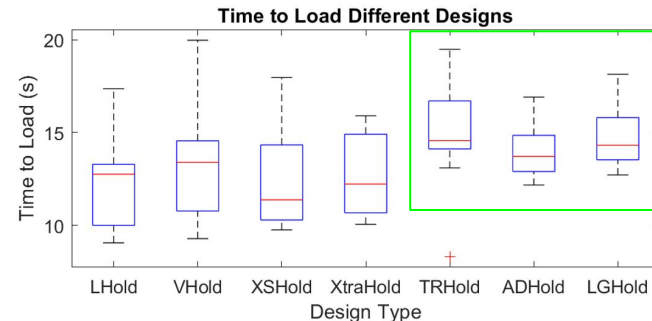


Figure 8. Data distribution of loading and unloading times comparing all designs. Highlighted box includes injection moldable designs.

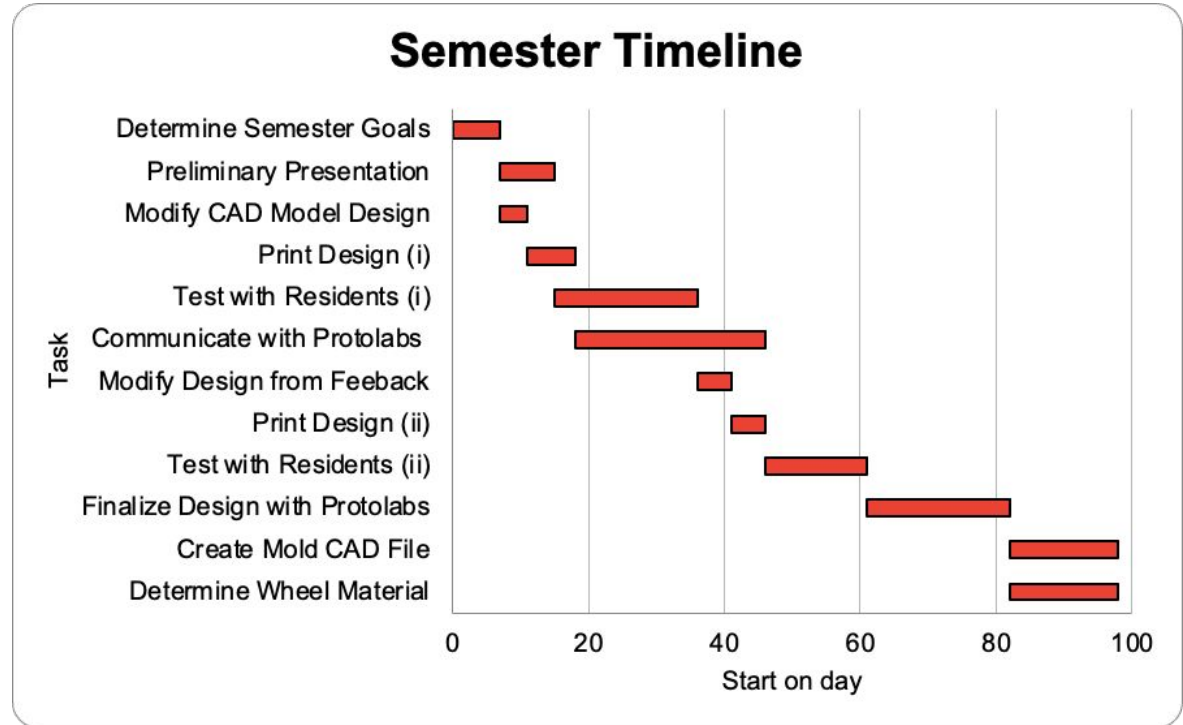
GOAL

An injection moldable wheel will be finalized and tested. The mold for this design will be created (via CAD).

Timeline

Day 0: January 23

Day 100: May 3



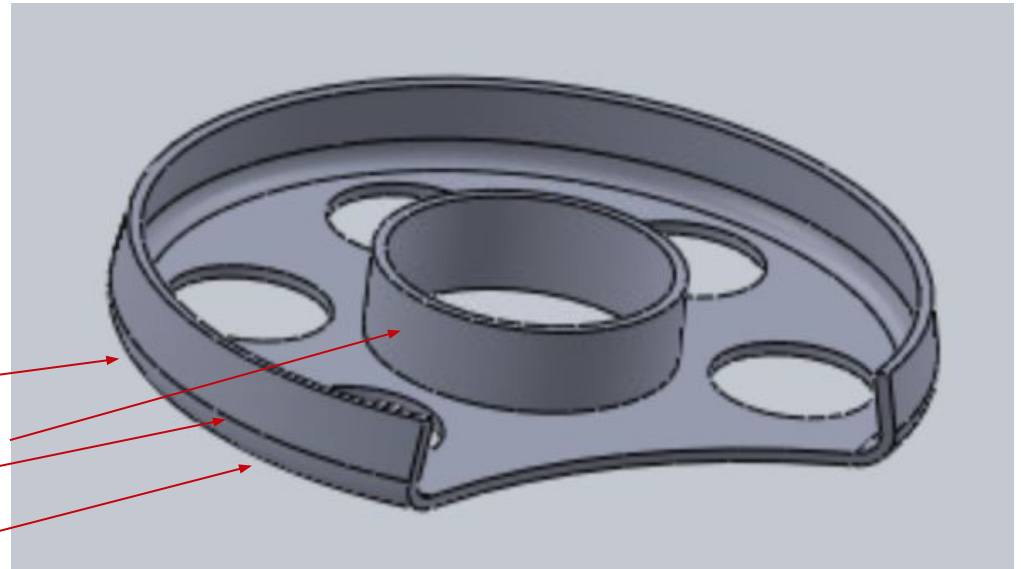
Fabrication and Final Design

Changes from ADHold

- Holes for saline flow
- 17mm chimney

Final Design: FRIS

OD: 154mm
Chimney OD: 60mm
Height: 17mm
Thickness: 2.5 mm



Planned Testing/Evaluation (BME 402)

What tests: Loading and unloading of guidewires using residents and cath lab technicians

Why: Shows efficiency and performance of design

Data Generated: Loading/unloading times of guidewires, user ratings, and human factors

Analyzation of Data: MATLAB code to determine significance of collected data

Result Demonstrate: Indicate if the injection moldable wheel is successful

Packaging and Documentation

- Sterile packaging and FDA approved labeling to be created
 - 3 wheels per package
 - Assembly, sterilization and packaging in a clean room environment
- User manual for product user
 - Including pictures indicating how to use the device
 - No more than one page

Budget

Previous: \$73.20

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link	
Wheel Iteration 1	Modification of current design	UW MakerSpace	N/A	10/19/22	1	\$12.44	\$12.44	UW-MakerSpace	
Wheel Iteration 2	Modification of current design	UW MakerSpace	N/A	10/20/22	1	\$8.14	\$8.14	See above	
Wheel Iteration 3	Modification of current design	UW MakerSpace	N/A	10/20/22	1	\$11.76	\$11.76	See above	
Wheel Iteration 4	Modification of current design	UW MakerSpace	N/A	10/21/22	1	\$11.46	\$11.46	See above	
Wheel Iteration 5	Modification of current design	UW MakerSpace	N/A	11/7/22	1	\$5.82	\$5.82	See above	
Wheel Iteration 6	Modification of current design	UW MakerSpace	N/A	11/10/22	1	\$5.65	\$5.65	See above	
Wheel Iteration 7	Modification of current design	UW MakerSpace	N/A	11/15/22	1	\$5.61	\$5.61	See above	
Wheel Iteration 8	Modification of current design	UW MakerSpace	N/A	11/17/22	1	\$7.12	\$7.12	See above	
Wheel Iteration 9	Modification of current design	UW MakerSpace	N/A	11/29/22	1	\$5.20	\$5.20	See above	
TOTAL:								\$73.20	

Expected:

Item	Description	Quantity	Expected Cost	Total
Wheel iteration 1	Modify final design from last semester	1	>\$5	\$5
Wheel iteration 2	Modify iteration 1 based on resident/cath lab and ProtoLabs feedback	1	>\$5	\$5
Stand iteration 1	Modify stand to match wheel	1	>\$5	\$5
Mold CAD file/quote	Get quote and negatives from ProtoLabs	1	Stand: \$5,820 Wheel: \$5,595	\$11,415
Total				\$11,430

Acknowledgements

We would like to thank our client, Dr. Dai Yamanouchi, and our advisor, Dr. Suarez, for their support and guidance throughout this project.

References

- [1] Strate, C., 2020. The Cost Of A Lost Minute In The OR. [online] Accesefm.com. Available: <<https://www.accesefm.com/blog/the-cost-of-a-lost-minute-in-the-or>>
- [2] “Figure 2: Interventional Radiology fellow shows various types of...,” *ResearchGate*.
- [3] “Dropped and damaged devices? Cathclip can help.,” CathClip. <https://www.cathclip.com/>
- [4] “Guidewire & Catheter Accessories,” Qosina.
<https://www.qosina.com/vascular-access-guidewire-catheter-accessories#gref>.
- [5] Medline Industries, “Guidewire Bowls,” *Medline Industries, Inc.*
<https://punchout.medline.com/product/Guidewire-Bowls/Safety/Z05-PF157858#mrkDocumentation>.