Guidewire Organizer for Endovascular Catheter Procedures

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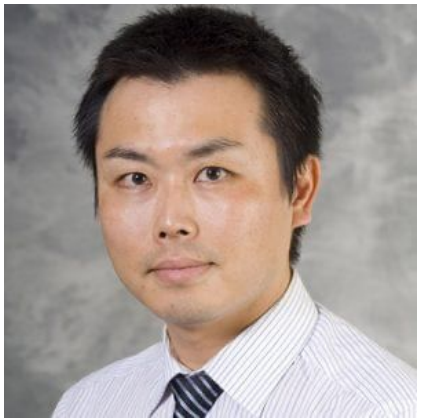
Client & Advisor

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.
- Device will consist of two parts.

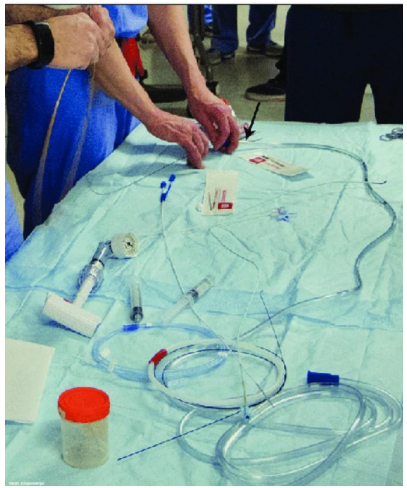


Figure 1: Unorganized guidewires. [2]

Product Design Specifications

- The project consists of two pieces - wheel and stand
- Determine and finalize the dimensions of the current guidewire wheel design
    - The average male surgeon's hand circumference is 21.35 cm and female is 18.95 cm
- Sucessfully load guidewires of varying stiffnesses
- The wheel stand will stack three guidewire wheels
- 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

Background

Current Situation

Figure 2: Cath Clip [3]

Figure 3: Original Dispensing Tubing [4]

Figure 4: Wet Towel

Competing designs

- Cath Clip

Figure 5: Cath Clip [3]

- Medline Guidewire Bowl

Figure 6: Medline Guidewire Bowl [5]

Control Wheel Design: VHold

$d_w = 19cm$

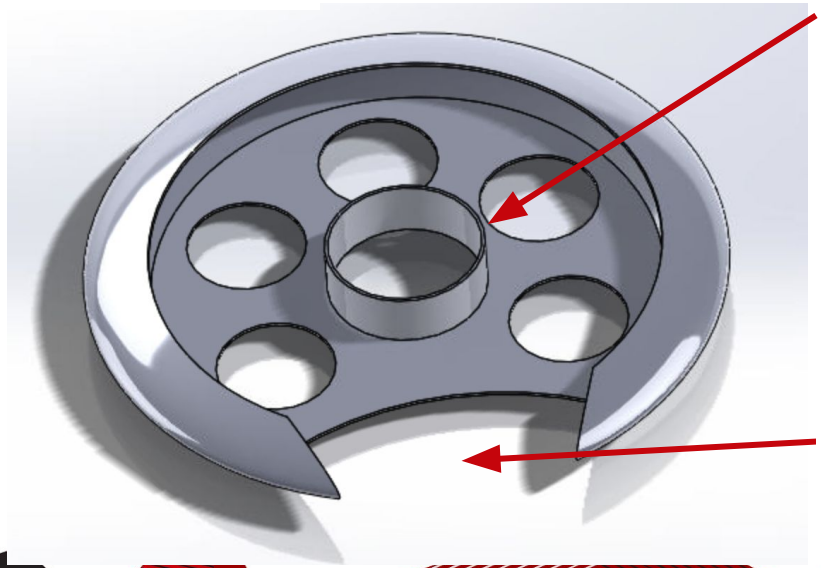
$t = 1mm$

$h_w = 1.5\ cm$

Chimney

$d_c = 4.5cm$

$h_c = 1.7\ cm$



$L_{HO} = 7\ cm$

Figure 7: Control wheel design in SolidWorks

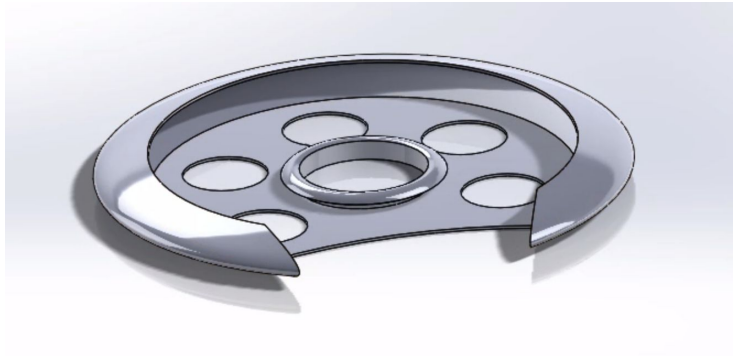
Design Variation #1: XtraHold

Dimensions:

Outer Diameter (OD): 190mm

Height: 15mm

Chimney Height: 7.5mm



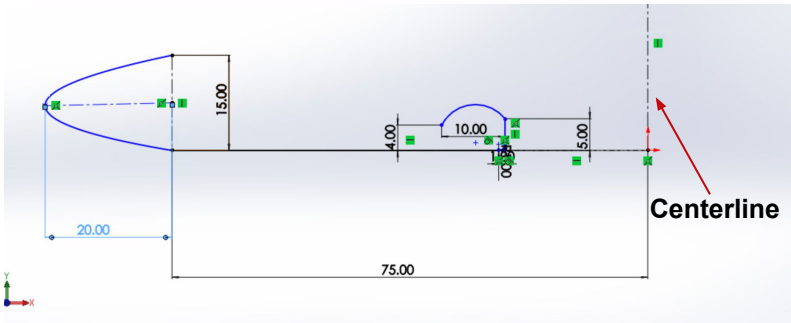


Figure 8: Cross-section view of XtraHold; revolved around center line

Design Variation #2: XSHold

Dimensions:

Outer Diameter (OD): 150mm

Height: 15mm

Chimney Height: 17mm

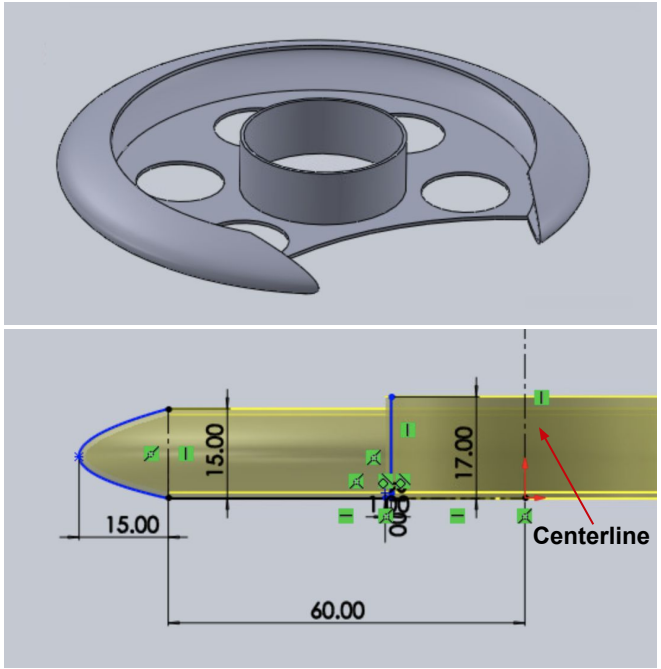


Figure 9: Cross-section view of XSHold; revolved around center line

Design Variation #3: LHold

Dimensions:

Outer Diameter (OD): 190mm

Height: 15mm

Chimney Height: 5mm

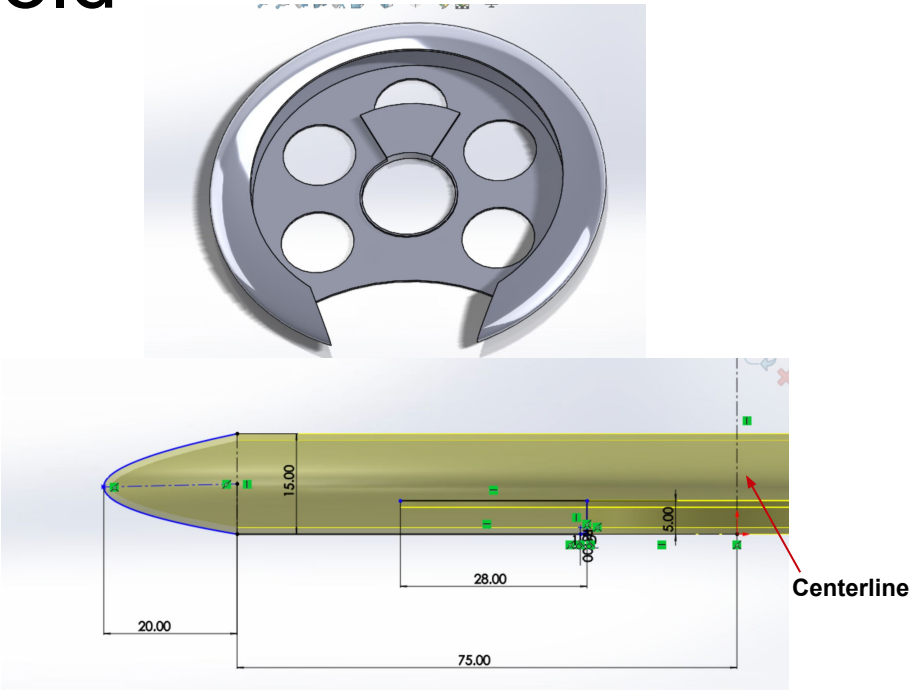
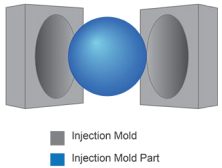
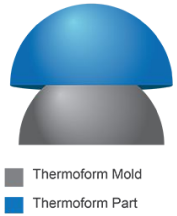


Figure 10: Cross-section view of LHold; revolved around center line

Manufacturing Methods

Table 1: Manufacturing matrix

	Injection Molding [6]	3D Printing	Thermoforming [6]
			
Production Efficiency (25)	**25**	5	20
Ease of Manufacturing (20)	12	**20**	15
Cost Per Part (20)	**15**	10	**13**
Material Compatibility (15)	**15**	10	10
Lead time (10)	5	**10**	7
Accuracy (10)	**10**	5	5
Total	**82**	**60**	**70**

Injection Molding

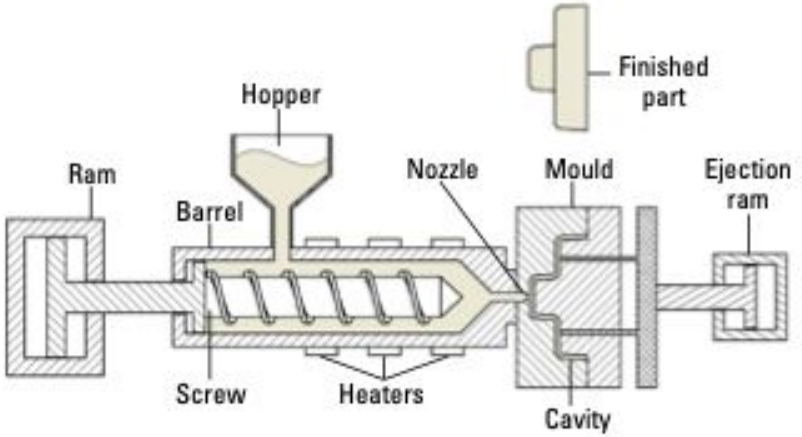


Figure 11: Typical Injection Molding Machine [7]

Figure 12: Core and Cavity of a Frisbee Mold [8]

Future Work

- The wheel diameter will be finalized
- The injection molding source will be decided
- The design variation will be chosen to match injection molding criteria
- The manufacturing material of the design will be determined
- Prototype the stand design to ensure it is suitable for wheel design
- Testing of the whole device with physicians
- Market the device

Acknowledgements

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