Arterial coupler re-design: Adjustable stent/cuff anastomosis

Client: Dr. Jasmine Craig and Dr. Weifeng Zeng

Advisor: Prof. Justin Williams

Team:

Simon Fetherston (Leader)
Catie King (communicator)
Megan Lee (BWIG)
Lydia Miller (BSAC)
Drew Hay (BPAG)

Date: October 10, 2026 - October 15, 2026

Problem statement

Microsurgical arterial anastomosis is a cornerstone of reconstructive surgery, enabling tissue transfer and limb salvage. Current techniques are highly time-consuming, technically demanding, and highly dependent on surgeon expertise. Suturing vessels as small as 1 mm can take even the most experienced surgeons 30-60 minutes, extending operating times and jeopardizing tissue viability. Existing stent-based approaches introduce complications by contracting the vessel lumen and lack adaptability across the wide range of vessel diameters encountered in clinical practice. There is a critical need for a biocompatible, adjustable, and easy-to-use device that can reliably reduce operative time while maintaining vessel integrity and minimizing complications.

Brief status update

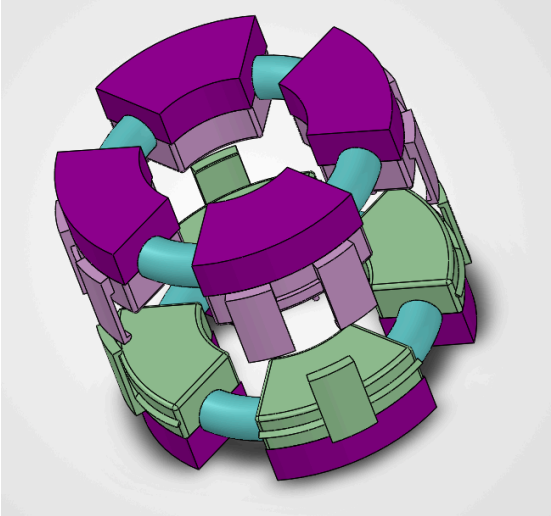
The team met to discuss fabrication plans and 3d printed an initial scaled-up prototype. Multiple printing materials were discussed, including PLA for initial prototypes and a flexible TPU for the expandable ring. We also searched for silicone ring suppliers online.

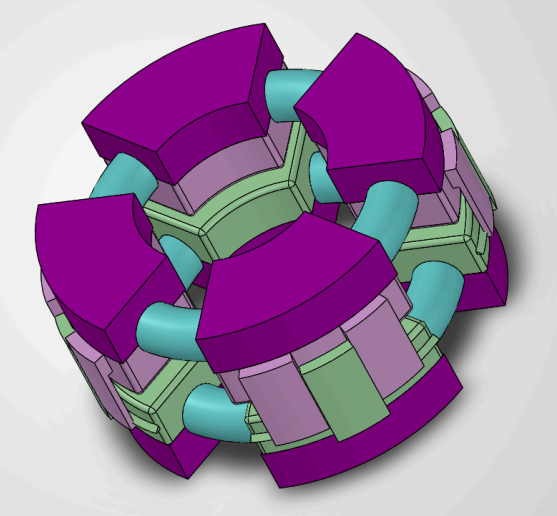
Difficulties/advice requests

The team is currently developing a fabrication plan. Guidance on ordering materials and fabrication payment options would be helpful.

Current design

The team has chosen a preliminary design based on feedback and ideation from Dean. The SolidWorks snapshots below show an expanded and clamped view of the final design pieces





Materials and expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									$0.00	
									$0.00	
Category 2										
									$0.00	
									$0.00	
								TOTAL:	**$0.00**	

Major team goals for the next week

1. Continue prototyping
2. Finalize fabrication protocol
3. Brainstorm testing plan

Next week's individual goals

- Simon Fetherston
    - Revise SolidWorks model

    - Fabricate more prototypes
    - Iterate design
    - Begin brainstorming what tests should be conducted
- Catie King
    - Design iteration
    - Fix up fabrication plan
    - Begin brainstorming compression tool
- Megan Lee
    - Help to revise SolidWorks model
    - Print more prototypes
    - Meet with client to get feedback and discuss how to change future iterations
- Lydia Miller
    - Make edits to fabrication plan
    - Modify solidworks based on initial prototype feedback
    - Continue prototyping
- Drew Hay
    - Complete fabrication plan
    - Order necessary supplies
    - Continue prototype iteration

Timeline

Task	Sep			Oct					Nov				Dec
	10	17	24	1	8	15	22	29	5	12	19	26	3
Project R&D													
Empathize	X	X	X										
Background…	X	X	X	X	X	X							
Prototyping						X							
Testings													
Deliverables													
Progress Reports	X	X	X		X	X							
Prelim presentation				X									
Final Poster													
Meetings													
Client		X		X									
Advisor	X	X	X	X	X	X							
Website													
Update	X	X	X	X	X	X							

Filled boxes = projected timeline
X = task was worked on or completed

Previous week's goals and accomplishments

- Individual:
    - Simon Fetherston
        - Scaled Solidworks design for 3D printing
        - Met with team to go over 3D printing
        - Researched ring materials
    - Catie King
        - Created fabrication plan
        - Printed and assembled first prototype
        - Researched circular/ring forceps
    - Lydia Miller
        - Created fabrication plan
        - Printed first prototype
        - Research materials for rings
    - Megan Lee
        - Printed first prototype
        - Researched how to make silicone rings
    - Drew Hay
        - Met with team to begin fabrication of prototype
        - Researched 3D printing materials available at MakerSpace
        - Researched suppliers for expandable silicone ring
- Team :
    - Met to go over design and 3D print a scaled prototype

Activities

Name	**Date**	**Activity**	**Time (h)**	**Week Total (h)**	**Sem. Total (h)**
Simon Fetherston	10/9/2026 - 10/15/2026	- Worked on SolidWorks model - Met with team to 3D print model - Researched materials and fabrication capabilities	0.5 0.5 1	2	22
Catie King	10/9/2026 - 10/15/2026	- Met with team to 3D print model - Picked up prints and assembled prototype - Drafted fabrication plan - Researched circular forceps	1 0.5 0.5 0.5	2.5	21
Megan Lee	10/9/2026 - 10/15/2026	- Met with team to 3D print model - Researched how to fabricate silicone rings	1 1	2	21
Lydia Miller	10/9/2026 - 10/15/2026	- Researched silicone rings - Met with team for 3d printing/solidworks modifications	.5 1	2.5	20.5

		- Pick up prints, glue together - Write fabrication plan	.5 .5		
Drew Hay	10/9/2026 - 10/15/2026	- Met with team to begin fabrication of prototype - Researched 3D printing materials available at MakerSpace - Researched suppliers for expandable silicone ring	1 .5 .5	2	21.5