

Improving the precision of small human tissue biopsy processing

Date: 3/12/26 - 3/18/2026

Client: Dr. Angela Gibson

Advisor: Dr. Tracy Jane Puccinelli

Team:

Ruhi Nagarkatte (Team Leader)

Ella Lang (Communicator)

Gianna Inga (BSAC)

Simon Nam (BWIG)

Sarah Raubenstine (BPAG)

Grace Spiegelhoff (MedTech)

Problem Statement

In the treatment of extensive burns or wounds, patients rely on emerging treatment research in the field of tissue growth and healing. Currently, studies into the healing properties of porcine skin are conducted to visualize how viable epidermis cells migrate over the site of the wound to promote cell regrowth. However, once in a culture, the porcine tissue samples cannot remain viable unless all fat is removed and the cells are able to absorb the culture media. Additionally, this process of creating samples is not standardized, resulting in samples of varying sizes with jagged edges, which limits the efficiency of sample preparation. To solve this, fabricating a tool that incorporates multiple sample slots, with uniform sizing, and a fixed blade will help to streamline research efficiency and produce more viable samples that can be successfully imaged.

Brief Status Update

The team has been testing the finalized design over the past week. The latest testing results showed an average of thickness variation within ± 0.5 mm, which indicated better outcomes than previous designs. The final design will now incorporate nylon for the base component with few additional modifications based on its material property for improved, secured assembly based on previous design evaluation and feedback obtained.

Summary of Weekly Team Member Design Accomplishments

- Team
 - Conducted more device testing with clients
 - Revised the journal draft from the preliminary report feedback given
 - Reprinted the final design with nylon
 - Conducted further analysis of survey data and FEA
- Ruhi Nagarkatte
 - Conducted design testing with clients
 - Started to analyze usability testing data
 - Began simulating forces on the components of the biopsy press

- o Started the nylon print for the final design choice
- Ella Lang
 - o Began to perform sterilizability testing
 - o Helped coordinate testing and material drop-off/pick-up
 - o Revised the journal based on advisor feedback
- Gianna Inga
 - o Updated the CAD file based on the lasting testing conducted
 - o Revised personal sections of the journal article
 - o Updated labarchives
- Simon Nam
 - o Participated in testing with clients and further analysis
 - o Updated the labarchives with testing results
- Sarah Raubenstine
 - o Conducted further testing with client and recorded data
 - o Received device from client for sterilizability testing
 - o Assist with further sterilizability testing

Weekly/Ongoing Difficulties

The team is hoping to move forward with other areas of testing such as sterilizability and structural analysis. Additionally, the report will continue to be refined and edited.

Upcoming Team and Individual Goals

- Team
 - o Continuously update the journal based on feedback
 - o 3D print the base in nylon
 - o Conduct further testing on sterilizability and structural analysis
 - o Begin working on Executive Summary for BME 402 design deliverable requirement
- Ruhi Nagarkatte
 - o Finalize the usability results and FEA analysis
 - o Complete 3D printing the base in nylon
 - o Assign and work on executive summary
- Ella Lang
 - o Analyze sterilizability data and include in the journal article
 - o Test with the nylon printed base
 - o Continue working on the journal and executive summary
- Gianna Inga
 - o Continue updating labarchives
 - o Continue updating the journal article
 - o Present testing findings with advisor
- Simon Nam
 - o Continue working on further analysis of testing results
 - o Work with team on Executive Summary

- o Update the journal article with new additions of testings/results
- Sarah Raubenstine
 - o Update journal article with new data and revisions
 - o Print newest design in nylon and continue testing with new print
 - o Work on executive summary draft

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Preliminary Oral Presentation	Friday, 02/06/2026	All	100%	X
Preliminary Deliverables	Wednesday, 02/25/2026	All	100%	X
301 Show and Tell Feedback	Friday, 03/20/2026	All	0%	
Executive Summary Draft	Friday, 04/03/2026	All	0%	
Executive Summary Final	Friday, 04/17/2026	All	0%	
Poster Presentations	Friday, 04/24/2026	All	0%	
Final Deliverables	Wednesday, 04/29/2026	All	0%	

Materials and Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	2/10/26	1	\$2.81	\$2.81	N/A
BME Clear Resin	3D printed polymer through Makerspace design budger	Makerspace	N/A	UW-Madison	N/A	2/18/26	1	\$11.42	\$11.42	N/A
0.236 in PC	Polycarbonate Sheet: 0.236 in Thick, 12 in x 12 in, Colorless, Clear, 9,500 psi Tensile Strength	N/A	PS-PC-SR-189	Grainger	1ET Y6	2/20/26	1	\$21.20	\$21.20	https://www.grainger.com/product/Polycarbonate-Sheet-0-236-1ETY6

0.118 in PC	Polycarbonate Sheet: 0.118 in Thick, 12 in x 12 in, Colorless, Clear, 9,500 psi Tensile Strength	N/A	PS-PC-SR-181	Grainger	1ET Y4	2/20/26	1	\$14.36	\$14.36	https://www.grainger.com/product/Polycarbonate-Sheet-0-118-1ETY4	
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	3/4/26	1	\$1.12	\$1.12	N/A	
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	3/11/26	1	\$2.06	\$2.06	N/A	
								TOTAL:	\$41.55		