Improving the precision of small human tissue biopsy processing

Date: 4/15/26-4/22/26

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

In the past week, the team worked on analyzing the results from the usability, sterilizability, thickness consistency, and FEA testing. Additionally, the team completed final versions of the executive summary and poster presentation. A new PLA base was printed to demonstrate the final design during the poster presentation. The team is ready to wrap up the semester and pass the final design off to the client in the next week.

Summary of Weekly Team Member Design Accomplishments

- Team
    - Completed and analyzed testing results
    - Completed final executive summary
    - Completed and printed final poster presentation
    - 3D printed new PLA base
- Ruhi Nagarkatte
    - 3D printed new PLA base
    - Completed assigned portion of the final poster presentation
    - Analyzed FEA results on the assembly and applicator

    - Prepared progress report #12
- Ella Lang
    - Completed sanitization analysis and added appropriate figures to the final poster
    - Created a side presentation of sanitization images to include at the poster presentation
    - Uploaded completed statistics and associated code to the notebook
- Gianna Inga
    - Completed assigned poster sections
    - Took quality photos of the final design
    - Dimensioned and analyzed final design figures
- Simon Nam
    - Completed assigned portion of the final poster presentation
    - Revised and submitted the final executive summary
    - Prepared for the final presentation
- Sarah Raubenstine
    - Competed usability and thickness results analysis for poster figures
    - Completed assigned portion of final poster presentation
    - Printed and picked up final poster

Weekly/Ongoing Difficulties

The team is preparing for the final poster presentation and award pitches for this Friday, 4/24/26. The team will coordinate a time to drop off the design for the client. In the two weeks, the final report (journal article) and notebook will be completed.

Upcoming Team and Individual Goals

- Team
    - Prepare for the final poster presentation and award pitches
    - Coordinate a time with the client to drop off the design
    - Complete the final report and notebook
- Ruhi Nagarkatte
    - Complete assigned portion of the final report
    - Update Lab Archives with testing, results, and meeting notes
    - Prepare for the final poster presentation.
- Ella Lang
    - Work towards completing the final report, specifically, on how to portray sanitization testing results
    - Organize and upload documents to the notebook
    - Plan final client meeting
- Gianna Inga
    - Continue uploading design iterations and organizing documents in the design notebook
    - Practice and present the final poster
    - Work towards assigned sections of the final report and journal article
- Simon Nam

    - Finish the poster presentation
    - Update Lab Archives for team folder section
    - Begin working on the final report/journal for publication
- Sarah Raubenstine
    - Update LabArchives with meeting notes, documents, testing, and personal notes
    - Present at final poster presentation and hand off device to client
    - Work towards finishing final journal article

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	100%	X
Executive Summary Draft	Friday, 04/03/2026	All	100%	X
Executive Summary Final	Friday, 04/17/2026	All	100%	X
Poster Presentations	Friday, 04/24/2026	All	90%	
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 budget	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	N/A	PS-PC-SR-189	Grainger	1ETY6	2/20/26	1	$21.20	$21.20	https://www.grainger.com/product/Polycarbonat

	Strength									e-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	1ETY4	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
Nylon	3D printed polymer through the BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	3/19/26		$8.00	$8.00	N/A
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	4/15/26	1	1.12	1.12	N/A
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	4/20/26	1	$1.61	$1.61	N/A
								TOTAL:	$52.28	