

Improving the precision of small human tissue biopsy processing

Date: 3/18/26-3/25/26

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

The team finalized the print in nylon and is waiting for the print to finish. Sterilizability testing was conducted on the polycarbonate pieces using GloGerm and a UV light. A final testing date with porcine samples was scheduled for April 10th with the client. Additionally, the team started analyzing data from the usability test and FEA.

Summary of Weekly Team Member Design Accomplishments

- Team
 - Completed sterilization testing on the PC pieces
 - Scheduled a final testing date with porcine samples with the nylon base
 - Starting analyzing results from the completed testing
- Ruhi Nagarkatte
 - Finalized 3D nylon print at the makerspace
 - Updated LabArchives with protocols, reports, and other team activities
 - Assisted in selecting a final testing date with the client
 - Conducted preliminary FEA testing
- Ella Lang

- o Conducted sterilization testing for polycarbonate components
- o Conducted research on polycarbonate and ways to reduce scratching
- o Coordinated further porcine tissue testing with the client
- Gianna Inga
 - o Finalized CAD design
 - o Presented testing findings with advisor
 - o Analyzed testing results
- Simon Nam
 - o Updated LabArchives with testings, results, and more research on analyzing new substitutes of materials
 - o Conducted preliminary FEA testing
 - o Organized and labeled all the design iterations fabricated up to current point
 - o Began drafting Executive Summary for deliverable requirements
- Sarah Raubenstine
 - o Assisted with imaging sterilization testing
 - o Assisted with printing finalized design in Nylon at the Makerspace
 - o Assisted in coordinated final testing plan and client meetings

Weekly/Ongoing Difficulties

The team is waiting on the nylon print to finalize usability and sterilizability testing. The makerspace has not started printing yet due to protocols they need to follow with nylon printing. The data from the other areas of testing will start being analyzed this week and will hopefully be completed by April 10th.

Upcoming Team and Individual Goals

- Team
 - o Receive the nylon base from makerspace
 - o Analyze testing results from the sterilization and FEA tests
 - o Begin executive summary
- Ruhi Nagarkatte
 - o Finish analyzing FEA and usability results
 - o Divide and complete assigned portion of the executive summary
 - o Assemble the final design for client testing on April 10th
- Ella Lang
 - o Complete sterilization testing with the nylon base
 - o Analyze sterilization data using ImageJ
 - o Complete final testing with the client
- Gianna Inga
 - o Begin analyzing sterilization data on ImageJ
 - o Continue updating the report article
 - o Assemble final design

- Simon Nam
 - Continue working on Executive Summary
 - Analyze testing results
 - Participate in final testing session with clients for the latest design with nylon printed components
 - Begin finalizing the journal article
- Sarah Raubenstine
 - Analyze sterilization testing using ImageJ
 - Finalize executive summaries for design presentations
 - Conduct final testing with client

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	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 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 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
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
								TOTAL:	\$49.55	