Safe Shower Solution for Below-the-Knee Amputee
Progress Report 3

September 21 – September 25, 2026

Client: Mike DeGrave

Advisor: Dr. Murphy

Team:
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Ben Willihnganz - bwillihnganz@wisc.edu (Co-Team Leader)
Claire Matthai - cematthai@wisc.edu (Communicator)
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Kimberly Jarrard - kjarrard@wisc.edu (BPAG)
Marcus Wentzel - mfwentzel@wisc.edu (BSAC)

Problem Statement

Below-the-knee amputees are unable to wear their prosthetic in the shower, as most prosthetic legs are not waterproof and are prone to corrosion and slippage. This forces individuals to either remove their prosthetic and shower while seated, or attempt to stand on one leg using unsafe workarounds - both of which carry significant fall risk. The objective of this project is to design a device that gives below-the-knee amputees the autonomy to safely enter, stand, and bathe in the shower without their prosthetic, restoring independence and reducing injury risk during a daily activity. This project is being developed in partnership with Mike DeGrave, a below-the-knee amputee whose personal experience with this challenge is the driving inspiration behind the work.

Brief Status Update

During Tuesday's meeting, each team member presented two initial concepts, which the group narrowed down to three distinct designs representing a broad range of approaches. The team then established criteria weightings and completed the design matrix. These results will be reviewed with the client and advisor; their feedback, combined with the matrix analysis, will drive the final design selection.

Difficulties / Advice Requests

N/A

Current Design

N/A

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**	

Goals

Major team goals for the next week

1. Use the design matrix and feedback from the client to fill out an encapsulation preliminary presentation.
2. Gather as a group to break down presentation information and discuss areas of focus for each team member
3. Improve team knowledge through research.

Next week's individual goals

- Sam Dudek
    - Complete my section of the preliminary design presentation, and review each section to polish before turning it in
    - Continue to research and focus on means of fabrication for this device after getting feedback from the client
    - Gather specifics on material, ways to distribute weight, and other topics to address faults in our final designs matrix score
- Ben Willihnganz
    - Complete individual section of the preliminary design presentation
    - Facilitate a team meeting to discuss presentation specifics and go over presentation expectations for the advisor team
    - Review the preliminary presentation for errors and correct it based on advisor feedback
- Claire Matthai

    - Complete my section of the preliminary design presentation and practice with the team
    - Continue researching materials for the final design
    - Share design ideas with the client and receive feedback
    - Redraw my design idea with measurements for the final design matrix
- Katelyn Williams
    - Finalize my section of the preliminary design presentation and look over to enhance any details
    - Adapt my initial design sketch to a professional format for the design presentation
    - Continue to research materials to be used and how the manufacturing process would work
- Kimberly Jarrard
    - Complete my section of the preliminary design presentation
    - Continue to improve our 3 designs based on the client's feedback and additional research
    - Finish "Intro to Machining" and get shop access
- Marcus Wentzel
    - Meet with the team to discuss the preliminary design presentation
    - Learn more about the preliminary design presentation and its requirements from the 300s
    - Gain our client's feedback on the 3 design ideas to see if he has a preference and continue research based on that

Timeline

Task	September				October					November				Dec	
	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11
Project R&D															
Brainstorm	X	X	X	X											
Research		X	X	X											
Prototyping & Fabrication															
Testing & Validation															
Deliverables															
Progress Reports		X	X	X											
PDS			X												
Design/Decision Matrix Criteria				X											
Prelim Presentation															
Show and Tell															
Final Poster															
Meetings															
Client			X												
Advisor	X	X	X												
Website															
Update	X	X	X	X											

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

Detailed Accomplishments

We have chosen three main designs that we believe have good things to pull from for our final design. We have enough specifics from the client to accurately depict his needs in our matrix, and we will continue to research and evaluate his needs through each engineering change for our design.

Previous Week's Goals and Accomplishments

We gathered questions for our client in our internal kickoff meeting. We have started communication with our client to find a meeting time. We have begun our research entries to understand and empathize with our client and his situation.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Sam Dudek	9/20/26	Created two designs for the creation of our design matrix	2	3.5	11
	9/22/26	Worked with team to develop a design matrix that included all of the clients main needs	1		
	9/23/26	Wrote an individual portion of the design matrix and reviewed the final work once everyone finished	.5		
Ben Willihnganz	9/22/26	Brainstormed and illustrated design ideas to discuss with the team	1.5	4	12
		Connected with the team to discuss design ideas and create a design matrix that the team believes reveals a well thought out design process	1		
		Wrote an individual portion of the design matrix highlighting both cost and ease of fabrication	1.5		
Claire Matthai	9/20/26	Completed additional research on TPU, silicone, and hardcoat finishes	1	4.5	11

		for the aluminum.			
	9/21/26	Brainstormed and drew two design ideas to discuss with the team.	2		
	9/22/26	Met with the team to share design ideas, create our design matrix criteria, and rank designs.	1		
	9/23/26	Defined the “environmental resistance" section of the design matrix and explained why each design gained their respective score.	0.5		
Katelyn Williams	9/21/26	Utilized my research on competing designs to draft two initial sketches of potential designs.	1.5	4	9.5
	9/22/26	Took client feedback and some additional material research to determine which materials best suited my designs.	1		
	9/22/26	Met with the team to present my initial design sketches and discuss all the ideas. Collaborated to develop a design matrix to score the three selected designs.	1		
	9/23/26	Wrote the practicality definition and explanation of scores for the design matrix.	0.5		
Kimberly Jarrard	9/21/26	Brainstormed two preliminary designs individually.	1.5	3.5	8.25
	9/22/26	Met with the team to share design ideas as well as picking our top 3 designs. Based off of those designs, we created a design matrix to score the three designs with different criteria.	1.5		
	9/23/26	Wrote a description on our scoring for the“longevity” criteria.	0.5		
Marcus Wentzel	9/22/26	Brainstormed two unique designs for a prosthetic suitable for our client	1.5	3	9

		Met with team to share design ideas, decide our top three, and finally create a design matrix to weigh in important considerations Wrote the reasoning behind our scores for the hygiene section of the design matrix	1 0.5		