

Safe Shower Solution for Below-the-Knee Amputees

Progress Report 1

September 4 – September 10, 2026

Client: Mike DeGrave

Advisor: Dr. Murphy

Team:

Sam Dudek - dudek4@wisc.edu (Co-Team Leader)
Ben Willihnganz - bwillihnganz@wisc.edu (Co-Team Leader)
Claire Matthai - cematthai@wisc.edu (Communicator)
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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

The team set up internal roles, set up our team lab notebook, and started researching for relevant information on below the knee amputations, competing devices, and material selection. We met outside of class to establish a detailed list of questions for our client kickoff meeting. Those questions include shower dimensions, current mobility routines, difficulties, and other logistics. We have emailed our client to set up a time to meet.

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. Complete the client kickoff meeting with Mike to gather all relevant needs and information
2. Draft version 1 of the Product Design Specification (PDS)
3. Continue researching competing designs, anatomy, standards, etc.

Next week's individual goals

- Sam Dudek
 - Continue research on competing designs, waterproof prosthetics, and different materials
 - Compile client feedback and research into our future PDS document
 - Use Product Design Specifications to brainstorm ideas for our prosthetic in our clients specific environment
- Ben Willihnganz
 - Complete preliminary research on amputee specifics and troubles typical encountered while showering
 - Utilize client feedback into directed research towards PDS documentation
 - Brainstorm and sketch any initial designs and ideas
- Claire Matthai
 - Continue research on existing products for waterproof prosthetics and materials for wet/corrosive environments
 - Communicate with client to find a meeting time for our introduction/questions

- Brainstorm 1-3 shower prosthetic designs
- Katelyn Williams
 - Draw on client feedback to decide on further direction of research
 - Complete initial research on competing designs
 - Begin to sketch potential designs based on client requirements and requests
- Kimberly Jarrard
 - Brainstorm a few more questions to ask the client. If the client has already answered initial questions, ask follow-up questions to get a better understanding of the client's needs
 - Continue research on competing designs and learn more about amputees and prosthetics
- Marcus Wentzel
 - Continue researching competing designs, specific materials, and prosthetics designed for water.
 - Gain insight from our client about his desire with our project and how we can best engineer a water proof prosthetic to improve his quality of life
 - Begin to brainstorm potential designs for the prosthetic

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													
Research		X													
Prototyping & Fabrication															
Testing & Validation															
Deliverables															
Progress Reports		X													
PDS															
Design/Decision Matrix Criteria															
Prelim Presentation															
Show and Tell															
Final Poster															
Meetings															
Client															
Advisor	X	X													
Website															
Update	X	X													

Filled boxes = projected timeline

X = task was worked on or completed

Detailed 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.

Previous Week's Goals and Accomplishments

- N/A

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Sam Dudek	9/9/26	Met with the team to develop a list of questions for our client during our first meeting.	1	3.5	3.5
		Looked into a PU material for implementation into our prosthetic. Researched the functional capabilities of lower limb amputees.	2		
		Helped complete formatting for the first Progress Report and our Lab Notebook.	.5		
Ben Willihnganz	9/9/2026	Met with the team to discuss in-depth client questions to ensure the first meeting is productive.	1	3	3
		Looked into competing designs for shower assisting amputee devices.	1		
		Helped contribute to notebook updates for meeting notes and project description.	1		
Claire Matthai	9/8/26	Met with the team to develop a list of client questions for the meeting + organized notes for readability afterwards.	1	3	3

	9/9/26	Looked into the two shower prosthetic designs provided by the client, took notes, and identified what aspects do and do not work for the client. Helped format first progress report and put important dates in timeline	1.5 0.5		
Katelyn Williams	9/8/26	Met with the team to compile a list of starter questions for the meeting with the client.	1	2.5	2.5
	9/9/26	Researched competing designs and the differences in the iterations of one of the competing designs that the client utilized.	1.5		
Kimberly Jarrard	9/8/26	Met with the team and came up with potential questions for the client as well as project concerns to ask our advisor. Researched competing designs provided by the client and wrote down aspects of the competing design we can implement and brainstormed new components that could be added to our design.	1 0.75	2.5	2.5
	9/9/26	Researched lower limb prosthetics and prosthetic design issues. Also did some background reading about amputees.	0.75		
Marcus Wentzel	9/9/26	Met with the team to come up with potential questions for the client during our first meeting Researched two different competing designs for shower proof prosthetics and other similar devices	1 1.5	2.5	2.5