Inconspicuous Ankle Foot Orthosis (AFO) for teen - BME 301

February 13th, 2026 - February 19th, 2026

Client: Debbie Eggleston

Advisor: Dr. Monica Ohnsorg

Team Members:
Alex Conover (Team Leader)
Avery Lyons (Communicator)
Sierra Loosen (BSAC)
Kalob Kimmel (BPAG, BWIG)

Problem Statement:

Ankle-foot orthoses (AFOs) are designed to support dorsiflexion during the swing phase of walking. They are commonly used in managing muscular dystrophies, and for this project, our focus is specifically on adolescents with Facioscapulohumeral Dystrophy (FSHD), the most prevalent form of muscular dystrophy. Our goal is to create a brace that helps teens achieve safer walking by assisting ankle dorsiflexion, while remaining discreet, lightweight, and flexible enough to allow natural ankle motion. The main design priorities are to position the ankle in proper dorsiflexion, keep the brace slim and unobtrusive, and provide enough flexibility to reduce movement restrictions. This project has been ongoing throughout three semesters, and this semester, spring 2026, will be the final semester of the project; the team is hoping to create a device that fulfills all requests, as well as displays significant data.

Status Update:

The team continues to work on material choices for both dorsiflexion and inversion/eversion elements of the design, and are presenting in class tomorrow afternoon at 1:35 pm CST. MTS testing was performed on the dorsiflexion material choices, and the data will be analyzed in the following weeks.

Summary of Weekly Team Member Design Accomplishments (Include time spent):

<u>Alex:</u>

- Attended BME 301 lecture on 2/18/26 (50 mins)
- Attended team meeting on 2/16/26 (1 hour)
- Worked on preliminary presentation (1.5 hours)
- Performed MTS testing Thursday Morning (1.5 hours)
- Lab archives updating (1 hour)

<u>Avery:</u>

- Attended BME 301 lecture on 2/18/26 (50 mins)
- Researched materials and University of Michigan labs to work with (1.5 hours)
- Attended team meeting on 2/16/26 (1 hour)
- Communicated with client (30 mins)
- Worked on mediolateral side design matrix and preliminary presentation (1.5 hours)

Sierra:

- Attended BME 301 lecture on 2/18/26 (50 mins)
- Attended team meeting on 2/16/26 (1 hour)
- Worked on preliminary presentation (1.5 hours)
- Attended advisor meeting on 2/13/26 (30 mins)
- Attended BSAC Meeting with Faculty on 2/13/26 (50 mins)

Kalob:

- Attended 301 Lecture 2/18/26 (50 min)
- Worked on and practiced presentation (2 hours)
- Lab archive research (2 hours)
- Print out dog bone for MTS testing (30 min)
- Look into past CAD (1 hour)
- Updating Website (15 min)
- Attend advisor meeting 2/13/26 (30 min)

Weekly/Ongoing Difficulties

The team is still working on contacting professors at the University of Michigan, as well as some of Avery's friends to see if we can get our client in for testing.

Upcoming Team and Individual Goals

Team:

- Give the preliminary presentation this friday
- Analyze the MTS testing results
- Create the preliminary report

Individual:

Alex:

- Attend preliminary presentation
- Work on preliminary report
- Analyze the MTS testing data

Avery:

- Attend preliminary presentation
- Work on preliminary report
- Continue client communication

Sierra:

- Attend preliminary presentation
- Complete assigned section of preliminary report
- Assist with MTS testing/analyzing results

Kalob:

- Complete sections of preliminary report
- Analyze MTS results
- Continue Research
- Attend meetings

Project Timeline

Project Goal	**Deadline**	**Team Member Assigned**	**Progress**	**Completed**
Meet with Client	02/05/2026		100%	
→ email client with dates	01/27/2025	Avery	100%	
→ receive update from client	02/03/2026	All	100%	
→ write summary and put in notebook	02/03/2026	All	100%	
PDS Draft	02/05/2026		100%	
→ submit draft		Kalob		
Design Upgrades	02/12/2026		75%	
→ Medial/Lateral Design Changes		All		
→ Dorsiflexion Material Changes		All		
Preliminary Design Presentation	02/20/2026		00%	
→ upload to website		Kalob		
Preliminary Deliverables	02/27/2026		00%	
→ email report and notebook		Avery		
→ upload report to website		Kalob		
→ peer/self evaluations		All		
Decide on Final Design	03/06/2026		00%	
→ get feedback from client on design		All		
Show and Tell	03/20/2026		00%	
→ create an initial prototype		All		
Final Poster Presentation	04/27/2026		0%	
→ invite client		Avery		

→ post on website		Kalob		
Final Deliverables	04/29/2026		0%	
→ submit final notebook and report		Avery and Kalob		
→ submit peer/self and client evaluations		All		

Full Expense Report

Item	Description	Manufacturer	Date	QTY	Cost Each	Total
Fall 2024						
Ankle Brace - Component 1						
Ankle Brace	Cloth brace	**Abiram**	10/10/2024	1	$14.88	$14.88
Gel padding	medical grade padding	**Shechekin**	10/10/2024	1	$15.81	$15.81
Gel sock	Compressive sock to support the carbon fiber	**KEMFORD**	10/10/2024	1	$15.95	$15.95
Plastic cord locks	End of the bungee	**Heado US**	10/10/2024	1	$3.98	$4.20
Nylon Fabric	fabric/cloth to sew carbon fiber	**MYUREN**	11/6/2024	1	$12.61	$12.61
Bungee pt 2	stronger bungee to support better dorsiflexion	**LuckyStraps**	10/23/2024	1	18.99	$20.03
Bungee	thinner bungee	**Huouoo**	10/25/2024	1	$6.32	$6.32
Mini caribener	small sized caribener to hold bungee	**REI**	11/4/2024	1	$6.00	$6.00
Shock cord	thinner and stronger bungee	**REI**	11/4/2024	1	$5.95	$6.61
Lock laces	lock laces to fix the slipping problem of the plastic cord lock	**Lock Laces**	11/4/2024	1	$12.65	$12.65

Fabric Glue	glue to attach the cord locks to the fabric	**E6000**	11/08/2024	**1**	$8.14	$8.14
Needles and Thread	Stronger needles and thread to attatch various fabrics	**Basic Home**	12/03/2024	**1**	$8.43	$8.43
Carbon Fiber piece - Component 2						
3D printing prototype	3D printing of back support	**Bambu printer**	11/8/2024	1	1.4	$1.40
3D printing prototype - 3 variants	3D printing of back support	**Bambu printer**	11/12/2024	1	3.8	$3.80
3D printing prototype	3D printing of back support	**Bambu printer**	11/13/2024	1	1.71	$1.71
Lock lace piece	3D printing the lock lace piece	**Bambu printer**	11/18/2024	1	0.23	$0.23
3D Printing Final Prototype	3D printing of back support	**Shen Printer**	12/3/2024	1	1.57	$1.57
Epoxy Mold - Component 3						
Epoxy	Take cast of the leg	**Easy Pour Epoxy**	11/14/2024	1	$39.97	$39.97
Mold release Agent	PVA release agent - Prevent bonding to the cast	**Mrealeazy**	11/14/2024	1	0	$0.00
					TOTAL:	**$189.02**
Spring 2025						
Category 1 - Rigid Support						
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	2/28/2025	1	$0.86	$0.86
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	3/5/2025	1	$2.42	$2.42
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	3/14/2025	1	$3.66	$3.66
CF-PLA (red)	Carbon Fiber PLA 3D Print	Shen Printer	4/4/2025	1	$3.92	$3.92
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	4/4/2025	1	$1.94	$1.94
Category 2 - Straps and Padding						
Carpet Tape		Capitol	4/2/2025	1	$7.36	$7.36

Mesh Padding	3D Air Sponge Mesh Fabric	Tong Gu	3/7/2025	1	$16.99	$16.99
Velcro	Velcro pieces		2/28/2025	2	$0.40	$0.80
Fall 2025						
Category 1 - Rigid Support						
CF-PLA	3D printing for testing	Design Innovation Lab	10/27/2025	$2.00	$2.25	$4.50
CF-PLA	3D printed for testing of mediolateral support	Design Innovation Lab	10/27/2025	2	$2.25	$4.50
CF-PLA	3D printing for final product	Design Innovation Lab	11/17/2025	$1.00	$1.90	$1.90
CF-PLA	3D printing for final product	Design Innovation Lab	11/17/2025	1	$2.18	$2.18
CF-PLA	3D printing to send to client	Design Innovation Lab	11/19/2025	1	$2.17	$2.17
CF-PLA	3D printing to send to client	Design Innovation Lab	11/19/2025	1	$2.50	$2.50
Category 2 - Straps and Padding						
Elastic Strap	1 inch wide Polyester and Rubber blend. 10 yd in length	Cisone	10/10/2025	1	$7.99	$7.99
TPU	TPU Test Strip for testing apparatus	Makerspace	10/22/2025	1	$0.39	$0.39
Padding	Air Sponge Mesh Fabric	Tong Gu	10/24/2025	1	$16.99	$16.99
Superglue	Superglue for fabrication	Makerspace	11/4/2025	1	$1.15	$1.15
Superglue	Superglue for fabrication	Makerspace	11/5/2025	1	$1.15	$1.15
Nylon Fabric	Fabric used for straps and padding	Xtreme Sight Line	11/20/2025	1	$0.00	$0.00
Velcro	Velcro pieces	Myuren	11/20/2024	1	$0.00	$0.00
					TOTAL:	**$45.42**
					TOTAL:	**$272.39**