

Meeting Activity Agenda

15001

Attendees:

- Adam Podolec: Electrical Engineer / Project Lead
- Megan Ehrhart: Senior Electrical Engineer
- Tyler Leichtenberger: Mechanical Engineer
- Noah Schadt: Mechanical Engineer / Team Facilitator
- Jared Green: Senior Mechanical Engineer
- Geni Giannotti: Biomedical Engineer / Treasurer
- Dr. Debartolo: Customer / MSD Faculty

Current Meeting	
Location:	MSD Area / GLE 4435
Start Time:	11:15am
End Time:	12:00pm
Meeting Date:	Thursday 11/25/14

Topic A: New Strain Concern

- Present recent strain testing data
- Present muscle limitations
- Ask how concerned she is
- Present MSD II plan options
- Discuss integration testing

Topic B: Plantar-Flexion Customer Requirement

- Propose definition: Full dorsiflexion and plantar-flexion is defined as while walking
- Discuss permanent elastic
- Discuss pulley concepts to present an alternative

Topic C: Miscellaneous

- What should we do about quick connects for the final design?
- Can you give Geni a little more direct information about the IRB?
- Megan has toe strike working

MSD II Test Plan Ideas:

- Test using the new strap design
- Test on someone walking (slow motion video)
- Pair it with muscle and perform integrated testing
- Test 100 times for repeatability
- Annoyance test

Brainstorm Possible Solutions:

- Bigger tank
- Wider tubing
- Different sleeving
- Multiple muscle
- Muscle straps
- Pulley system

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- Custom sleeving
- Wire the valve
- Recycle the air
- Grow new nerves
- Muscle orientation
- Tethered on the back
- Mounted on a dog
- Get taller clients
- Elastic

Meeting notes (also reflected in MSD I Meeting Minutes for 11/25/14)

- Electrical:
 - Sensor component housing
 - The smaller dimensions the better
 - An O-Ring is not a bad idea
 - Tyler can help Jared with the O-Ring
 - As long as the final design is a shape that can be injection molded or thermoformed
 - One team had to waterproof a 3D printed part so they covered it in Loctight to meet requirements
- Mechanical
 - *Presented strain testing data*
 - *Presented muscle deflection limitations*
 - *Asked about full dorsiflexion customer requirement*
 - AI: add to comments that this is for clients with no spasticity
 - *Discussed that required integrated functional strain may be lower than 1in*
 - There are some average angle data
 - Jared has access to hip angle data – long Excel data in ME Research
 - Put it on our private SVN folder
 - Working Model (in MechE labs) similar to MatLAB for kinematics and dynamics
 - Make a model with the hip relative to the ground and joint angles during walking
 - Do a sensitivity analysis through the simulation during walking
 - *GG mentioned that the actual lift requirements may only be 11°*
 - The joint angle data might help, treat the body segments as rigid
 - Dr. Walter - it's called Working Model – MechE lab
 - *Since we are running out of time in MSD I can this wait?*
 - *Yes, this was taken as an action item*
 - The model can deal with height differences

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- Develop a sensitivity model
 - If we can demonstrate full integrated feasibility with the sensors and a larger muscle, then that is preferred over meeting the tank requirements since we are already not worrying about that as much
 - Walking is good way to get a lot of consecutive tests
 - *One concern about not including Plantar flexion is that the client may not be able to stretch their foot:*
 - We may want to develop a quick release on Tyler’s upper muscle attachment so that the user may take the tension off the muscle
 - The quick release will still need to hold the muscle somewhat so that it doesn’t fall down completely
 - *This could also be part of the lower attachment*
 - Christmas lights might be a good example of waterproof electrical connections
 - Dr.D can help Geni find the IRB documents
 - Don’t change the ER but make a comment that we may not be able to reach the marginal value
- Quick Connects:
 - She likes the idea
- Closing question:
 - *Do you feel comfortable with our mitigation plan?*
 - Yes
- Discussed the Geneseo business class and workshop opportunity
 - Event: January 15, 16 and 24, 2015
 - Location: Campus House, 17 Main St, Geneseo, NY
 - Adam sent the flier to the team
 - Jared, Geni, and Adam may be available

Customer Meeting Action Items 11/25/2014					
Item #	Description	Responsible	Due Date	Close Date	Comments
CM01	Comment in the customer requirements	Noah	DDR		FT2 “does not include spasticity”
CM02	Move hip angel data to private SVN	Jared	DDR		In ME Research
CM03	Develop a Working Model with sensitivity analysis	Noah/Tyler	MSD II wk2		In MechE labs
CM04	Formalize MSD II Test plans	Noah	DDR		As outlined in Agenda
CM05	Comment Engineering Requirements	Noah	DDR		“May not be able to reach
CM06	Begin IRB permissions	Geni	MSDII		Deadline flexible
CM07	Consider easy plantar flexion release	Tyler	MSDII		Manual support too?

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Appendix:

Customer Requirements Sample:

Category	Customer Rqmt. #	Importance	Description	Comments/Status
Functional	FT2	3	range of motion to allow full dorsiflexion and plantar flexion	Based on no spasticity

Engineering Requirements Sample:

rqmt. #	Importance	Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Direction of improvement: Minimize (▼), Maximize(▲), or Target(x)	Test (how are you going to verify satisfaction)	Mapping to Functional Decomposition
ER5	3	FT2, FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	90	80	▲	protractor	(ABBB) Articulate Foot

Add comment in ER