MSDII Testing – Muscle Attachment Fatigue Testing

Team: P15001: Active Ankle Foot Orthotic
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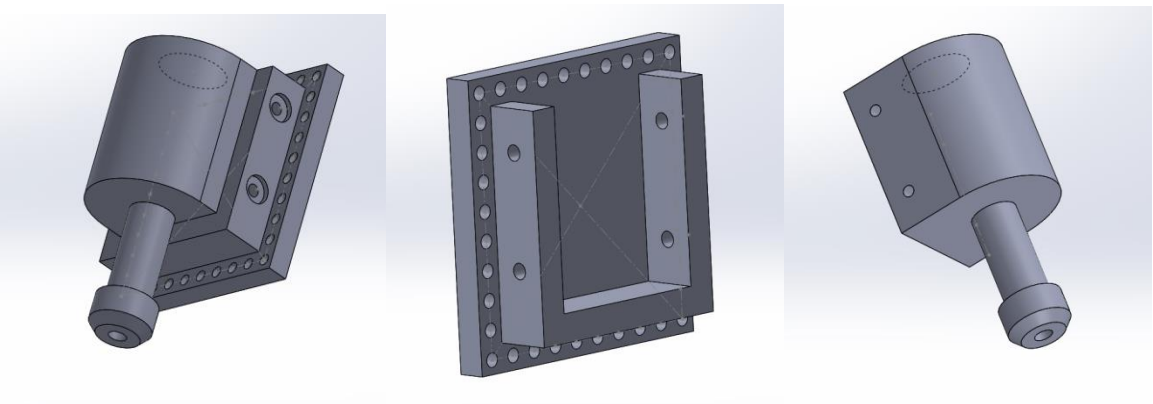
Related System: ABBB- Articulate Foot

This test would help determine if the plastic material we are using for the muscle attachment piece is strong enough, or whether another material will need to be considered. Theoretical fatigue calculations during MSD 1, Phase 5 will also help drive this test. The integrated plug design currently being used combines the plug for the air muscle used to fill the muscle with an attachment piece to the brace. The plug connects to the base piece by sliding in the desired groove and being screwed together. Testing the fatigue of the piece will be critical, because the piece needs to be designed to last for nearly infinite life. The picture of the design is shown below.



Engineering Requirements

ER2- Design Failure Factor of Safety

ER4- Torque to lift foot by McKibbon air muscle

ER5- Dorsiflexion mobility with McKibbon air muscle

ER6- Number of muscles flexes untethered

Testing Plan

There are 2 valuable tests to do for to test the fatigue of the muscle attachment piece.

The first test would be to attach the piece to a something stationary, like a table, and attach our final muscle design, with weights attached to simulate the function of our AFO. This could be done with approximately ten pounds, which gives us a factor of safety. The muscle then could be articulated many times to see if there is any wear and tear on the piece or if the piece has lost function or moved at all. This muscle could be articulate with air from the air compressor over a long period of time, like multiple weeks, to see the effect on the attachment piece.

The second test could be to overload the piece and see how much loading it could take before it would snap, if it would snap at all. This would be a failure test and, even though it may not have an application to our actual design because the loading is small, it could be a good test to validate our theoretical calculations. We should have a prototype of the plug that was used before our final design to do a failure test on.

Start Date: February 2015

End Date: March 2015

Budget

Equipment	Price	Quantity
Integrated Plug	-	1
Base Plate	-	1
Total:	-	