P15001 - Active Ankle Foot Orthotic

Engineering Requirement

Fruition Plan - MSD II

Updated: 5/7/15 - Week 14 - Phase 5

Phase 1 Week 1

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decomposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 1 Week 2

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decomposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 2 Week 3

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decomposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 2 Week 4

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 2 Week 5

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 3 Week 6

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 3 Week 7

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 3 Week 8

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 4 Week 9

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 4 Week 10

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 4 Week 11

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 5 Week 12

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 5 Week 13 Imagine RIT

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decomposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Phase 5 Week 14

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic

Week 15

Engineering Requirements Fruition Plan | P15001 5/7/15

rqmt. #	Importance	CR Source	Engr. Requirement (metric)	Unit of Measure	Ideal Value	Marginal Value	Test #	Mapping to Functional Decompposion
ER1	9	S1,CF1,CF2	Pressure to leg of AFO	mmHg	20	40	(T1), T11	(AAA) Secure Foot
ER2	3	S1,CF4	Design failure factor of safety	FOS	1.3-1.8	1.3-4	(T1), T15, (T8)	(AAA) Secure Foot
ER3	2	S1,CF4	Average skin temperature increase from use	°F	1	3	T11	(AAA) Secure Foot
ER4	9	FT1,FT3,ST5	Torque to lift foot by Mckibben air muscle	Ft-lbs	3.7	2.2	T1, T12, (T15)	(ABBBBB) Apply Torque
ER5	3	FT2,FT3	Dorsiflexion mobility with Mckibben air muscle	degrees	50	30	(T12), T11	(ABBB) Articulate Foot
ER6	3	P1	Number of muscle flexes untethered	#	1500	1000	T6, (T14), T15	(ADA) Supply Compressed Air
ER7	9	S2,D2	Battery in water repellant case	IP Code	54	54	T5	(AABA) Connect Electronics
ER8	9	S1,S2,D2	Sensors/controls water repellant	IP Code	54	54	T5	(ADC) Wash AFO
ER9	9	S1	Immediate max current	mA	200	400	T2	(AB) Use AFO
ER10	3	P1	Time between charges	hours	8	6	T2	(ADB) Recharge or Replace Batt
ER11	3	ST3	Response time of Terrain Sensor	ms	100	200	(T9), T10	(ABBAC) Send Output or Singal
ER12	9	ST1,ST2,ST4	Percentage of time object detected by sensors	percentage	90	80	T9	(ABBAB) Interpret Data
ER13	3	C3	Average Time to put on AFO	min	3	5	T3, (T11)	(AA) Apply AFO (Easily)
ER14	9	FT4	Weight of AFO on leg	lbs	1	2	T11	(ABB) Provide Active Support
ER15	9	FT4	Weight of total AFO	lbs	8	13	T11	(AB) Use AFO
ER16	9	CF1,CF5	Difference in knee flex	degrees	0	0	T11	(AB) Use AFO
ER17	1	CF1,CF6	Aesthetically pleasing	Better/Same/Worse	Better	Same	T4	(AA) Apply AFO (Easily)
ER18	9	CF1,CF7	Total running noise	dB	<40	<60	T7	(ABB) Provide Active Support
ER19	9	C1	Added foot width	inches	0.19685	0.295	T11, (T13)	(AAA) Secure Foot
ER20	1	FT5	Audible Low Battery Alert	dB	70	100	T7	(ABD) Provide Interface System
ER21	1	C4	Easy to interface system	1-5 scale	1	3	T4	(ABD) Provide Interface System

Legend	Complete
	Pending
	Problematic