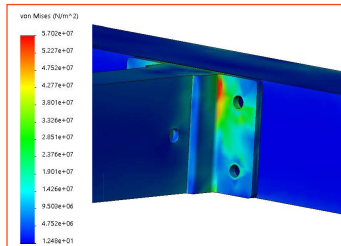
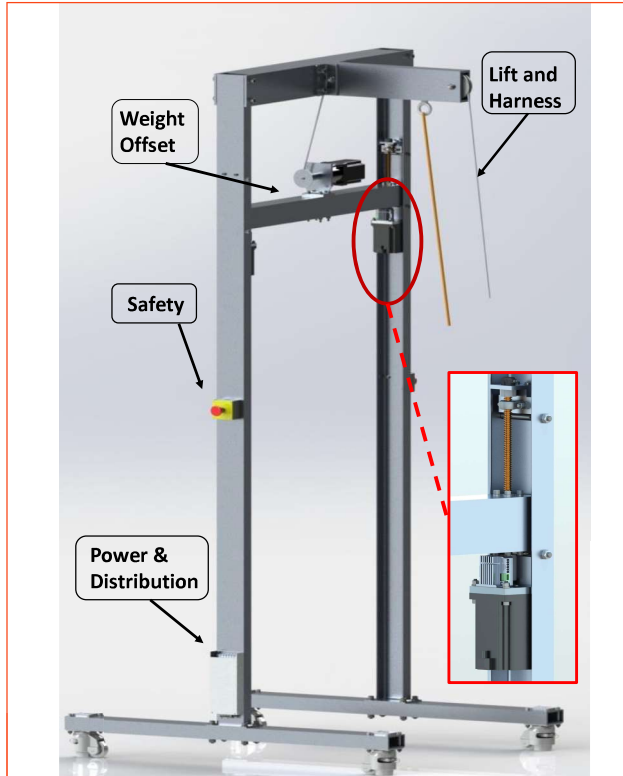
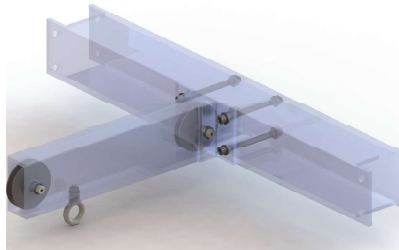


**Product Abstract & Functionality**

The Gait-er Aid System is powered by three Nema 34 motors that dynamically and continuously offset user weight using a closed loop feedback system and tension applied through the Kevlar rope. The design is a lightweight frame with leveling caster wheels for lifting the participant from seated to standing position and then moving them over to the elliptical for securing into the device. A COTS tablet is mounted with an Arduino Nano to interface with the feedback system to provide seamless participant to device interaction. For safety, the device contains accessible E-Stop buttons and a magnetic reed switch attached to the patient in the event of a fall.

**Lift and Harness**

- 2.43" max swing of system at 0.2 m/s<sup>2</sup>
- Pulley system situated within cantilever beam attached to main frame
- Load cell to measure extension and ensure proper tension
- COTS harness maximized for safety and comfort
- Design capable of interacting with other exercise machines due to compatibility



**Cantilever Beam Deflection**

- Max Stress: 53.4 MPa
- Max Deflection: 1.35 mm
- Safety Factor: 4.49



User Interface

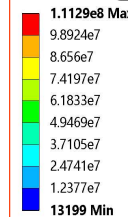
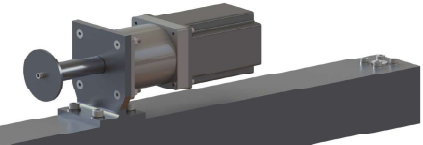
**Cost**

OTS	\$2546.55
Raw Material	\$1158.56
Manufacturing	\$30.69
Assembly	\$52.80
Energy Consumption	\$0.28
<b>Total</b>	<b>\$3788.88</b>

**Weight Offset Mechanism**

- Kevlar rope attaches participants to frame
- Cross beam with lead screws for weight offset adjustment – connect mounted Nema 34 (Nema-C) for continuous weight offset
- Dual mounted side Nema 34 (Nema-S) to close loop feedback
- Power Supply Specs: 753 W at 15.7 A
- System Motor Specifications

Motor	Nema-C	Nema-S
RPM	50	600
Current [A]	6	4.24
Torque [oz-in]	1161	1001



**Motor Mount Analysis**

- Nominal Max loading plus sustained loading in multi-step analysis
- Max Stress: 116.9 MPa
- Max Deflection: 0.85 mm
- Safety Factor: 2.05

**Structure**

- Lightweight Aluminum 6061 Frame with Cantilever beam attachment
- Ø2.5" leveling caster wheels for movement and stability with attached bubble level
- C-Channel legs to maintain slim design for motor attachment and lead screws
- Footprint: 1 m x 2.5 m footprint & Weight: 76.3 kg

Need	Size (1, 13, 30)	Power (2)	Interferences (3,9, 29)	Height & Weight (4, 15, 18)	Fall Prevention (10,11)	Safe and Comfortable Lifting (7, 8, 12, 13, 14, 17,)	Continuous Weight Offset (16, 19,20, 21)	Safety (5, 6, 25, 26, 28)	Programmable/ Intuitive (22, 23, 27)
<b>Quantification</b>	Volume: 2.4' x 3.1' x 2.74' Moveable: 2.43 x 3.05 x 2.7m	120 VAC 15 amps	25" Lifting Height >81.5" x 7" exercise clearance, # cables in clearance zone	59.3" – 74.1" >350 lbs. weight limit	5° Sagittal 15° Transverse	<18" Swing Lift Speed: 0.2 ft/s <sup>2</sup> Subjective user comfort ± 3" positional tolerance	Controller: S.S Error <5%,PO < 7.5%, 2% Settling Time 0% - 100% Variable control	Number features & visual indicators Safety Factor > 2, Fail-Safes, Max load exceed, 6,000,000 cycles	1-minute start time 4 control features
<b>Features</b>	1 m x 2.5 m x 2.7 m	753 W at 15.7 A, COTS Power Supply – Product: Meanwell	30" Lifting Height, 3 cables, cables attach behind participant	59.3" – 80" 500 lbs. Weight limit	COTS Harness, Reed Switch, Tipping Analysis confirmation	2.5" Swing, 0.2 ft/s <sup>2</sup> ± 2" positional, COTS harness, Kevlar ropes and hooks, Pulley system	Nema 34, Stepper Drivers, Arduino Mega, Load Cell, Kevlar rope tension, Closed-Loop Feedback	Frame mounted-stops, Magnetic reed switch, Tablet emergency stop	30 second start time, all control features visible on tablet, simplistic user interface
<b>System</b>	Overall	Power & Distribution	Weight Offset/Lift	Lift and Harness	Lift and Harness	Lift and Harness	Weight Offset	Safety	User Interface