

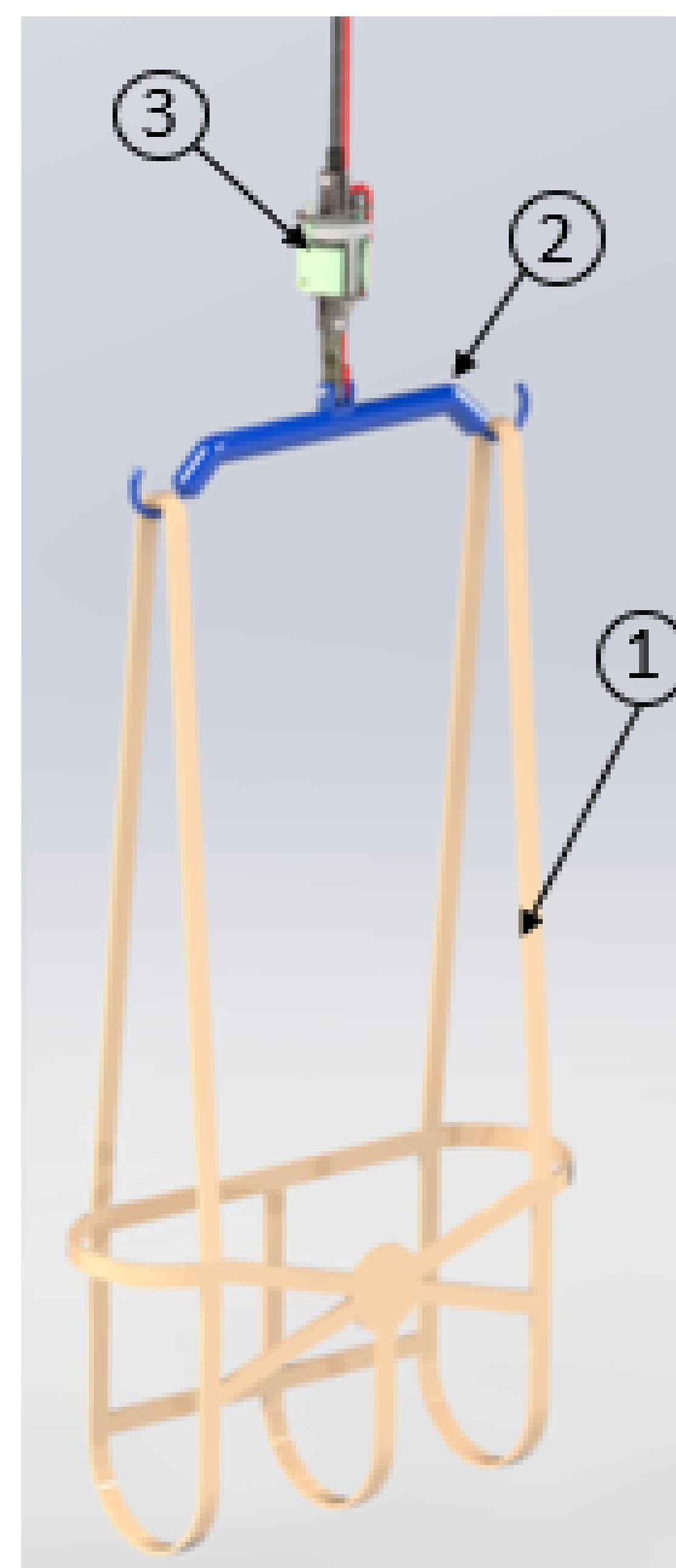
Product Overview

EZ Lyft was designed as a body weight support system (BWS) to support up to 300lbs with variable body weight reduction. This device will provide user defined partial-to-full body weight support while automatically adjusting their vertical height to compensate for movement by the participant. The entire system was calculated to cost less than \$4000.

Abstract Overview

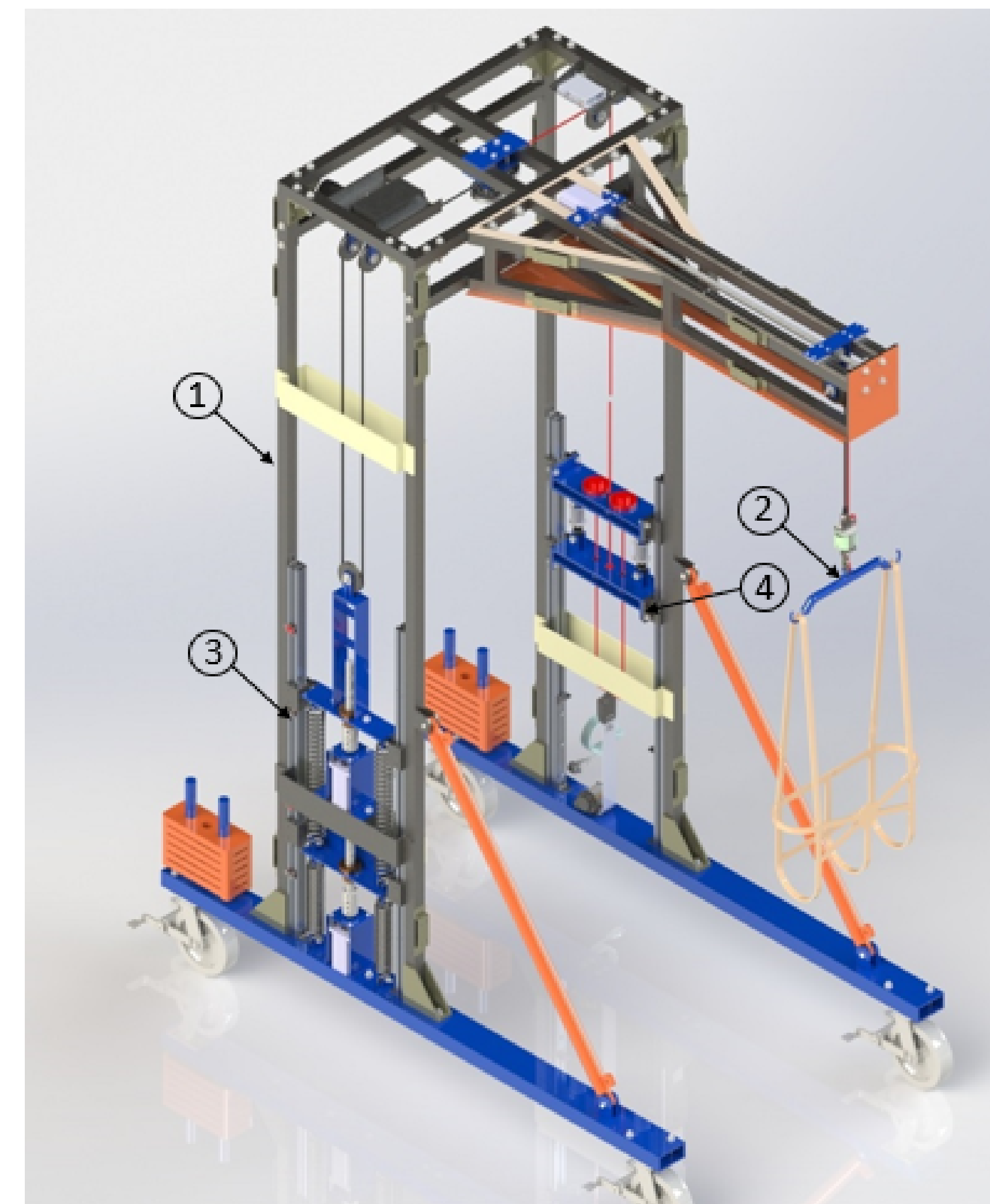
The system incorporates a modular frame capable of fitting through a standard size door and is less than 9ft tall. The system is mounted on caster wheels and can be rolled on a flat surface to a desired position. The design features an automated system, which allows a patient to use the machine without the assistance of an operator. To use the system, a patient rolls their wheelchair to the back of the system. Once in position, the patient can be hoisted into position above the elliptical via a winch and dual NEMA 23 Stepper motor driven power screw. The system was designed to have a maximum power draw of 1200 watts.

Harness System



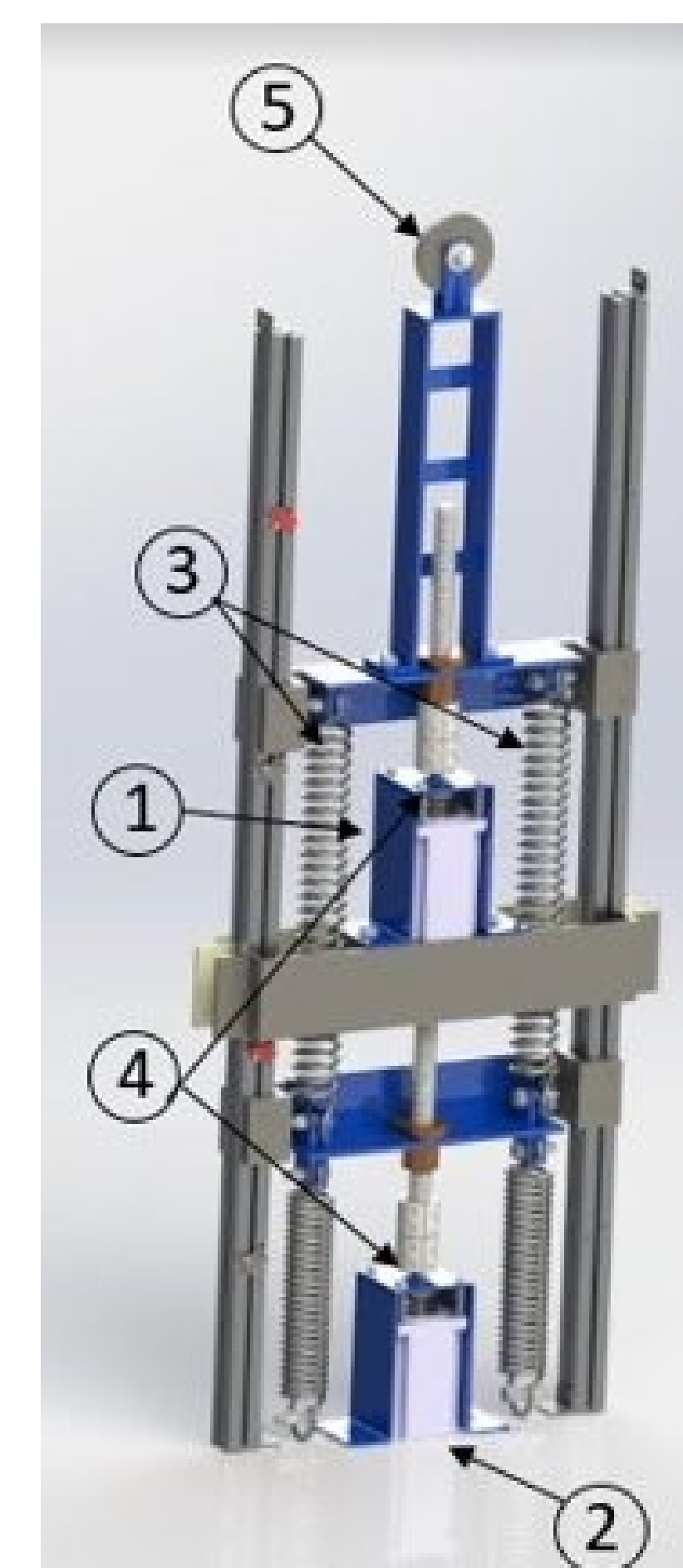
- (1) **Harness** - Medical grade polyester harness that is fully adjustable.
- (2) **Horizontal Crossbar** - Provides two attachment points for the harness and increased stability for the patient
- (3) **Force Sensor** - detects load of patient and connects crossbar to steel lifting cable

Renders



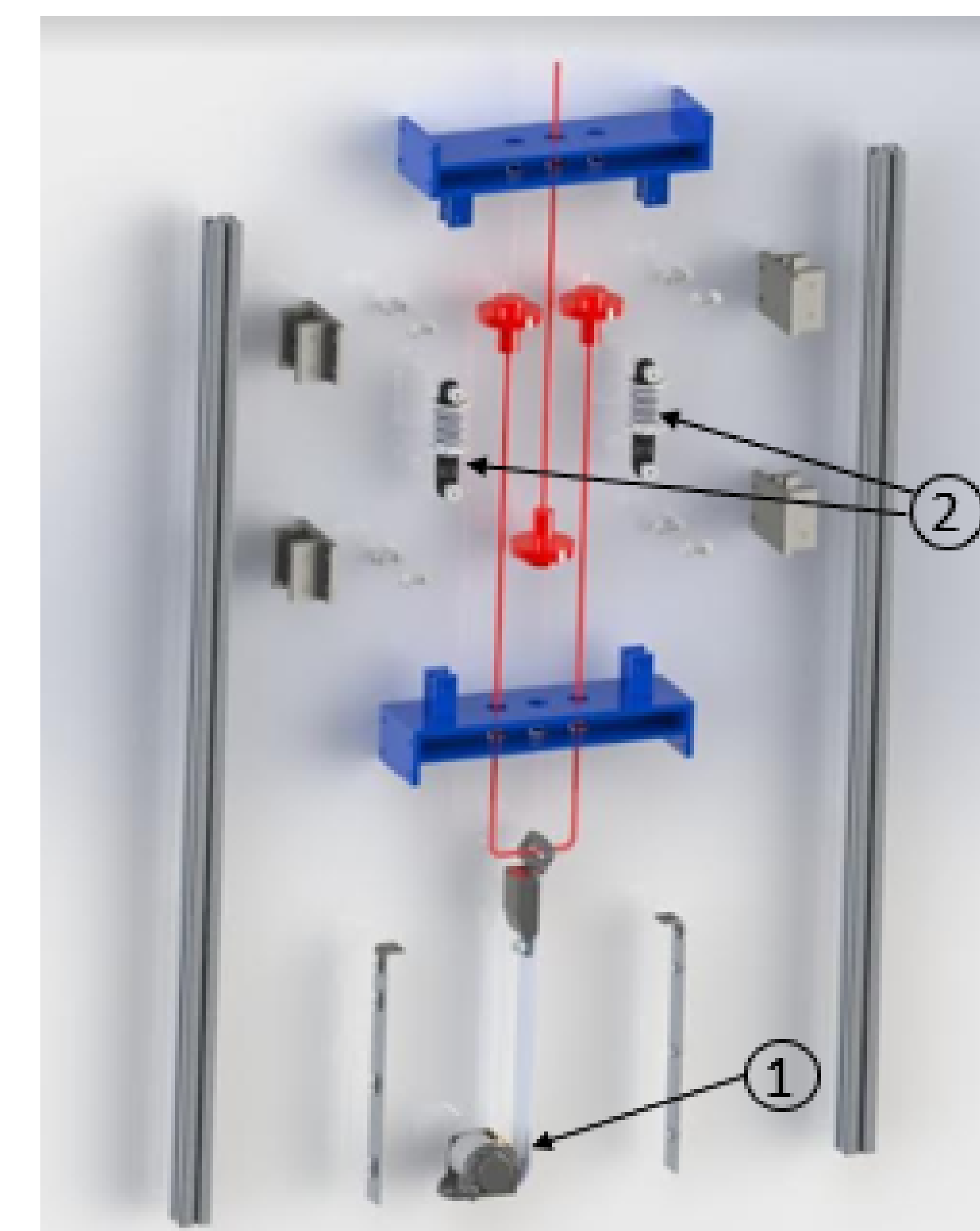
Left: Render of Design without Covers. (1) Frame System. (2) Harness System. (3) Controller System. (4) Safety System. Right: Render of Design with Covers.

Controller System



- (1) **Top Motor** - The top motor keeps the force constant accounting for motions of the patient.
- (2) **Bottom Motor** - Offsets the patient weight to minimize load on motor 1.
- (3) **Tensioning Springs** - Tensions the pulley to offset body-weight.
- (4) **Axial Load Support** - Ensures no axial loading is experienced by the motor.
- (5) **Pulley** - The pulley system halves the force experienced by the motors.

Safety System



- (1) **Seat Belt Lock** - Locks when the acceleration of the patient becomes too high.
- (2) **Spring Dampers** - Prevents large forces in the cable limiting the acceleration the patient experience.

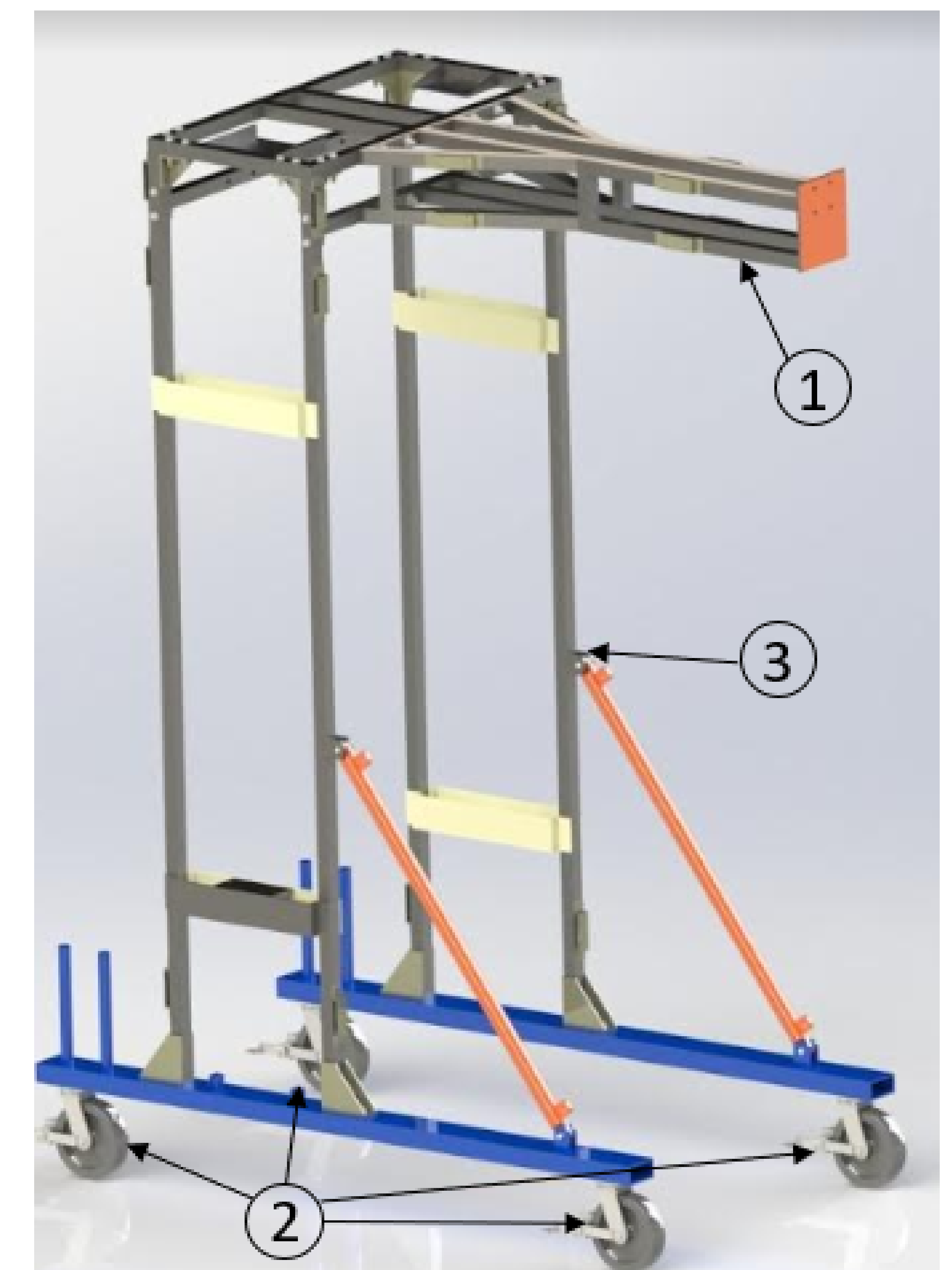
Cost

| | |
|---------------------------|------------------|
| Off the Shelf Parts: | \$3,541.49 |
| Raw Material Cost: | \$673.71 |
| Manufacturing Labor Cost: | \$574.18 |
| Energy Consumption: | \$24.53/year |
| Assembly Labor Cost: | \$68.35/unit |
| Total: | \$4882.46 |

Cost Analysis

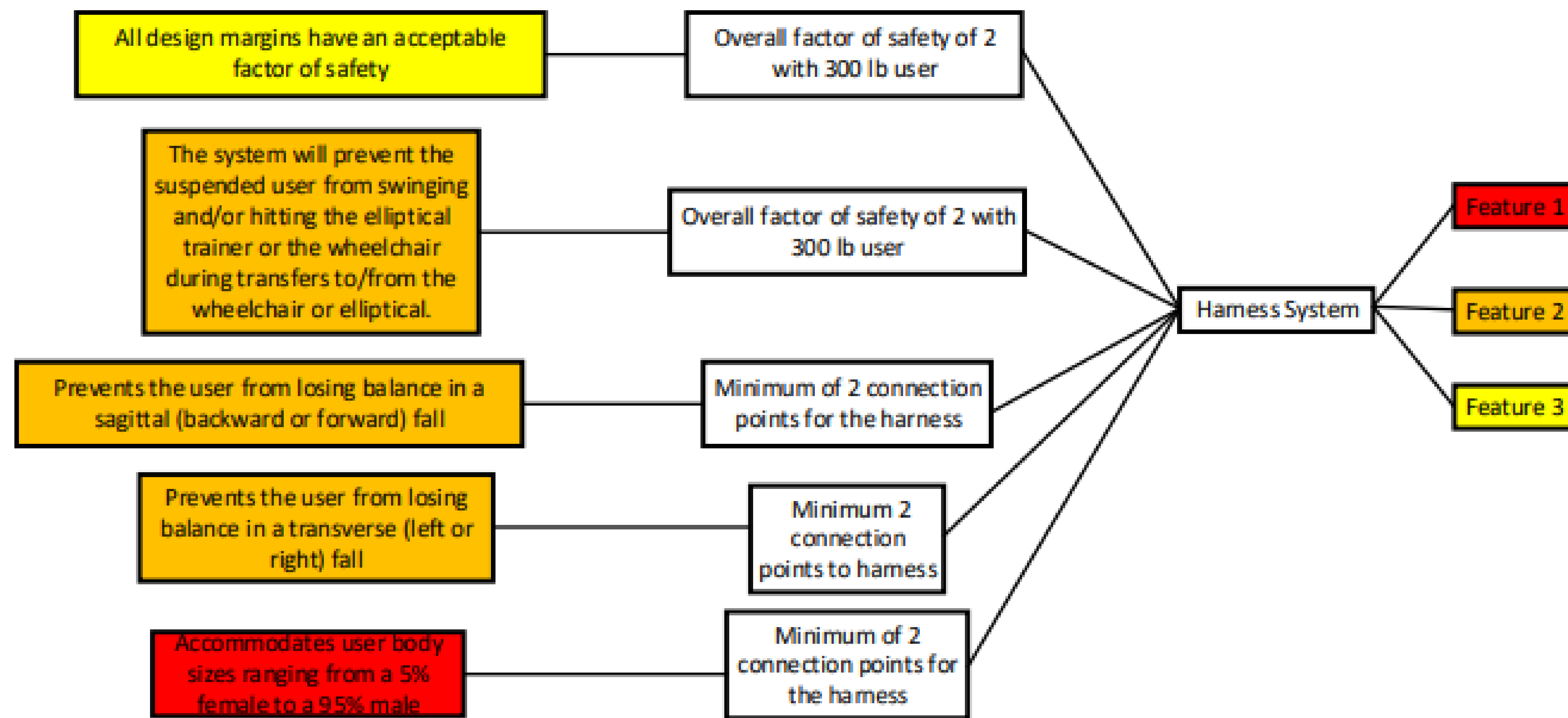
Off the shelf part costs were calculated based on sourcing parts for McMaster Carr. Raw material costs were estimated based off sourcing from online resources. Using the current electricity costs in Florida, the cost per hour for operating this machine is 1.34 cents. Assuming this machine was used five hours a day for a year, then the yearly cost would be \$24.53. Assembly labor cost is based on per unit quantity assembled and was calculated based on the standard average assembly hour pay of \$9.50 in the state of Florida with the number of fasteners and parts to be assembled estimations.

Frame System

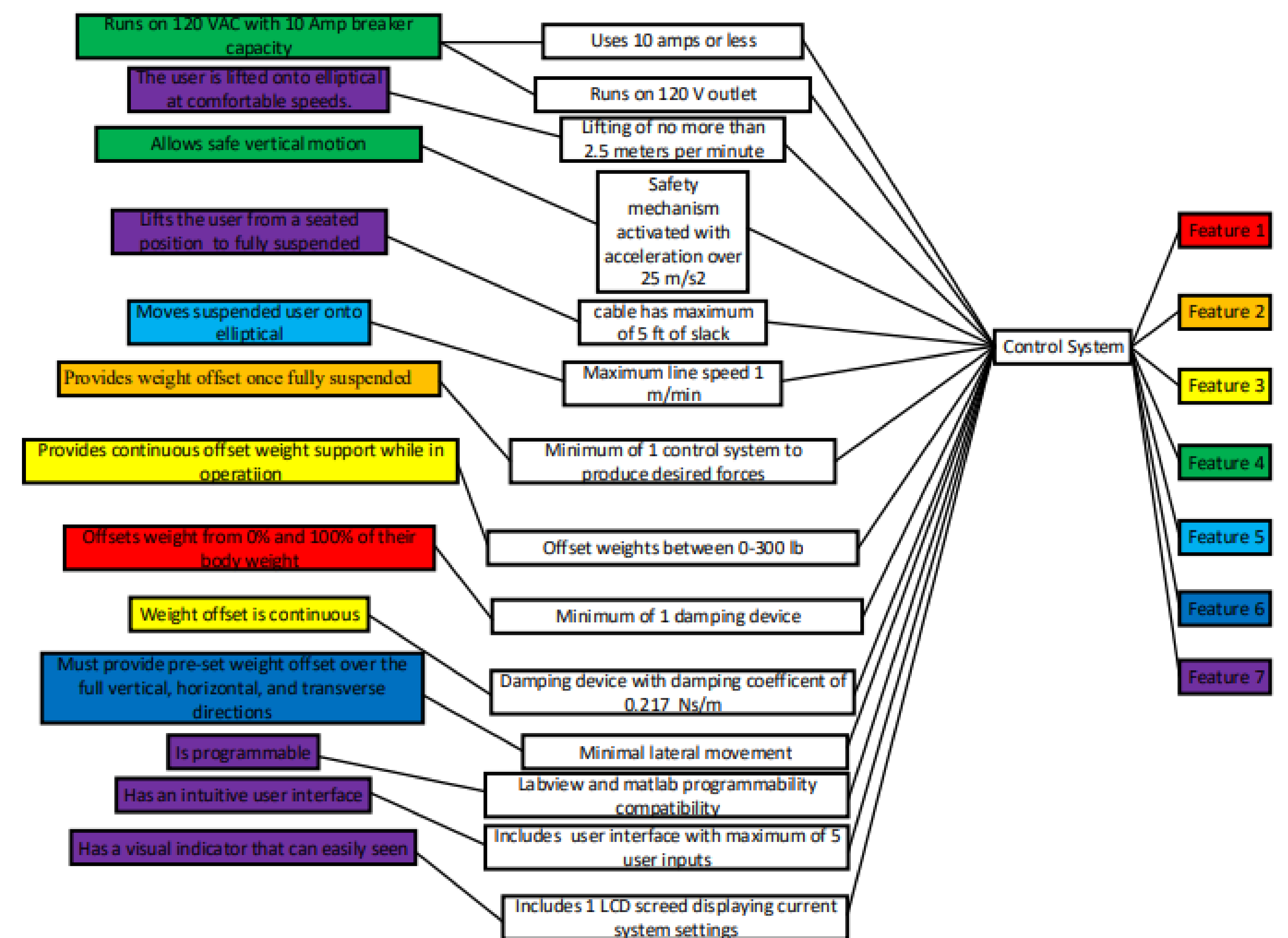


- (1) **Support Arm** - Suspends the user over the elliptical.
- (2) **Caster Wheels** - Allows for the easy movement of the BWS system.
- (3) **Frame** - Has an overall factor of safety of 3.

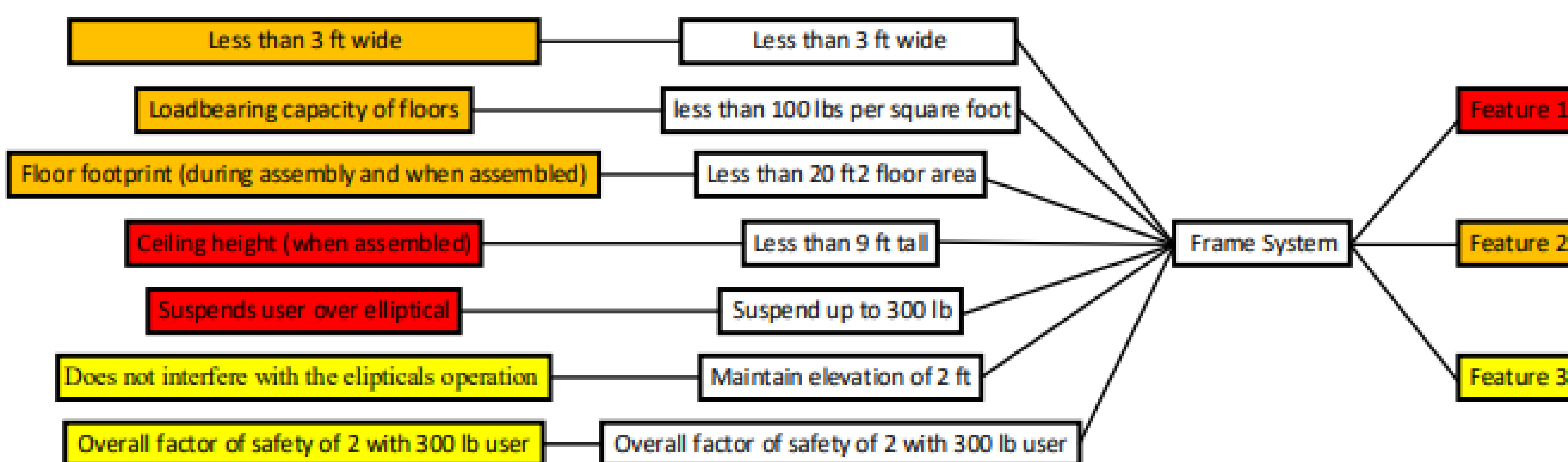
Harness System



Controller System



Frame System



Safety System

