STANDING PARAPLEGIC OPERATING ROOM DEVICE

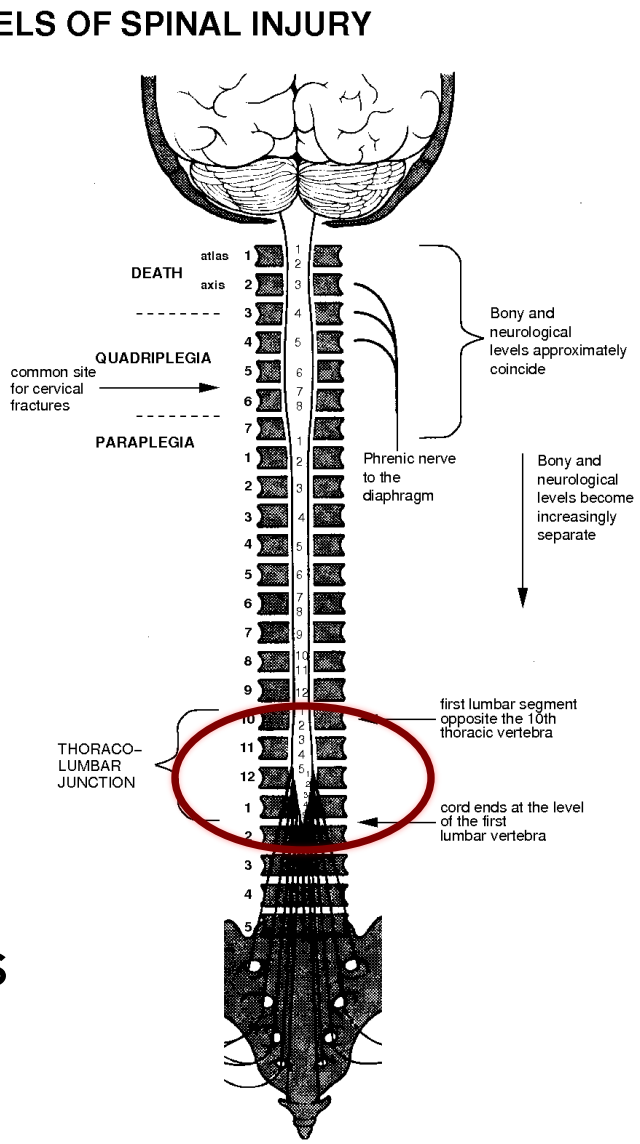
B.M. Olson, James Madsen, Blake Marzella, Michael Konrath, and Justin T. Cacciatore

Advisor: Professor Amit Nimunkar

Clients: Dr. Cuppels, Dr. Jones

Background

- Orthopedic Surgeon
  - Shoulder and hip replacements
- T12 paraplegic
- Lost Job
  - Inability to perform surgeries
- Desire to return to work
  - Berlin Memorial Hospital
- Needs to perform standing surgeries



primary-surgery.org

Client Requirements

- Standing O.R. procedures
  - Stable, compact, portable
- Rotate clockwise/counterclockwise
- Allow vertical, horizontal translation
- Easily cleanable
  - Sterile O.R. environment
- Comply with hospital O.R. standards
- Instill confidence in patients

Problem Statement

To design and construct a device that will enable our client, a T-12 paraplegic, to perform standing orthopedic surgeries in the O.R. for up to three hours. The device should allow the client to cover a range of motions including: clockwise and counterclockwise rotation, as well as vertical and horizontal translation. It must be stable, serviceable, compact, cleanable, portable, safe, comfortable, affordable, and comply with hospital standards. Our intention is to design and construct a device for our client over the timeline of two semesters.

Current Devices

- Standard wheelchairs

http://www.amazon.com/Duro-Med-Standard-Wheelchair-Silver-Black/dp/B000BO4T9S

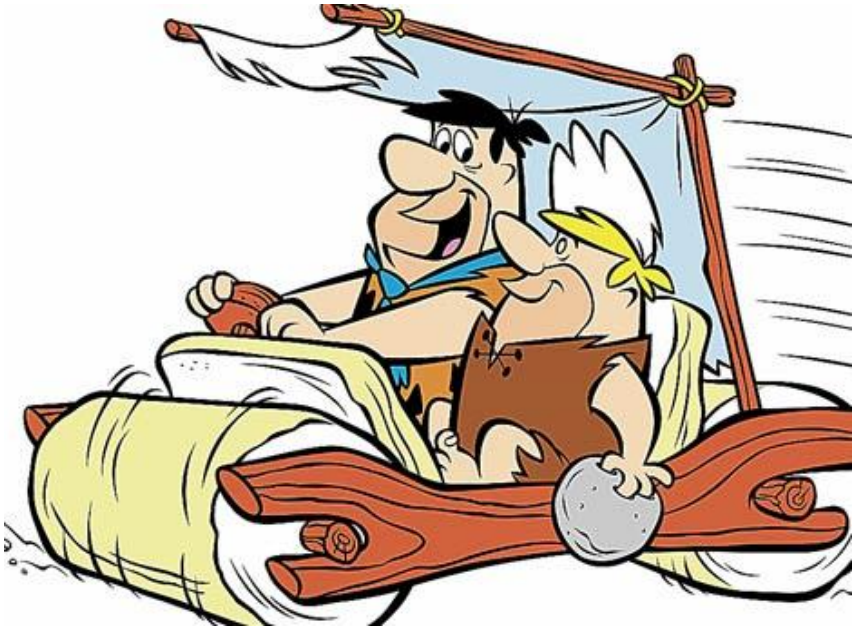
http://www.christopherreeve.org/site/c.mtKZKgMWKwG/b.4453477/k.3D3E/Wheelchairs_Seating_Positioning.htm

- Dynamic parapodium

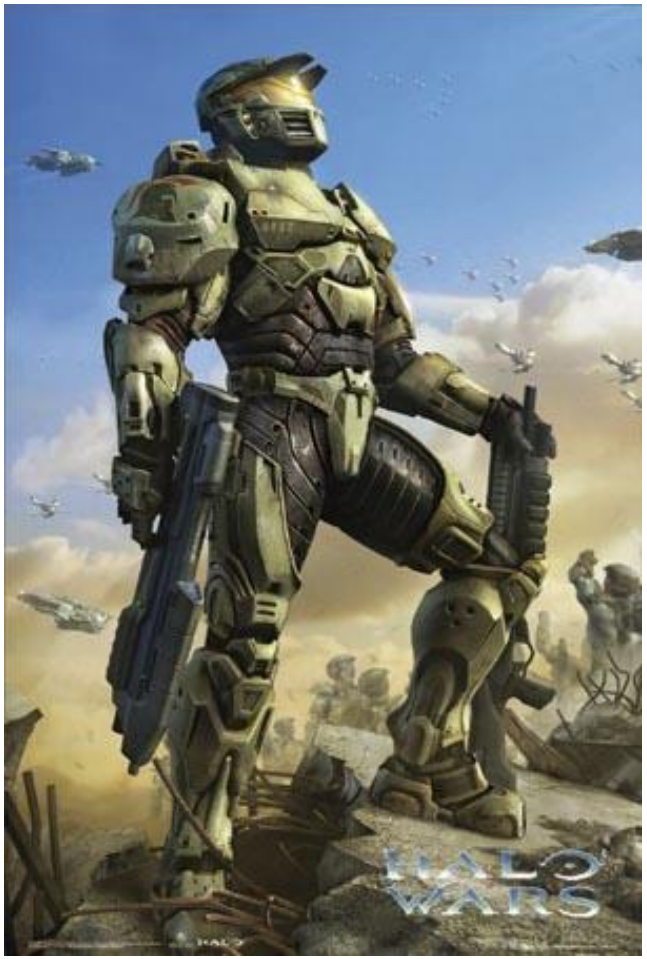
http://t-mgi.com/

- Standing wheelchairs

Deciding whether or not to include electronics in the design



Mechanical



Electro-Mechanical

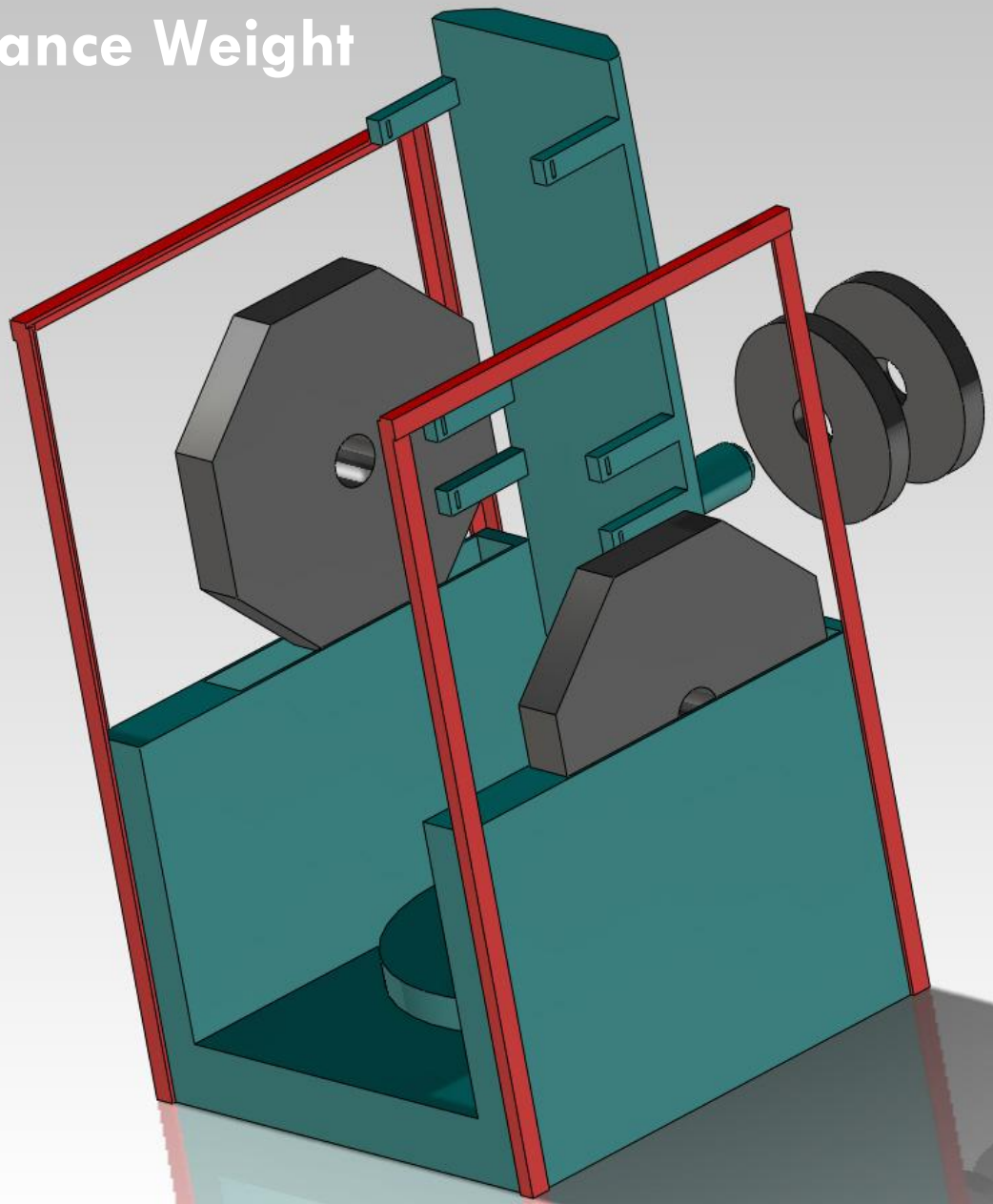
Building device to provide stability within the OR or to provide mobility to the client

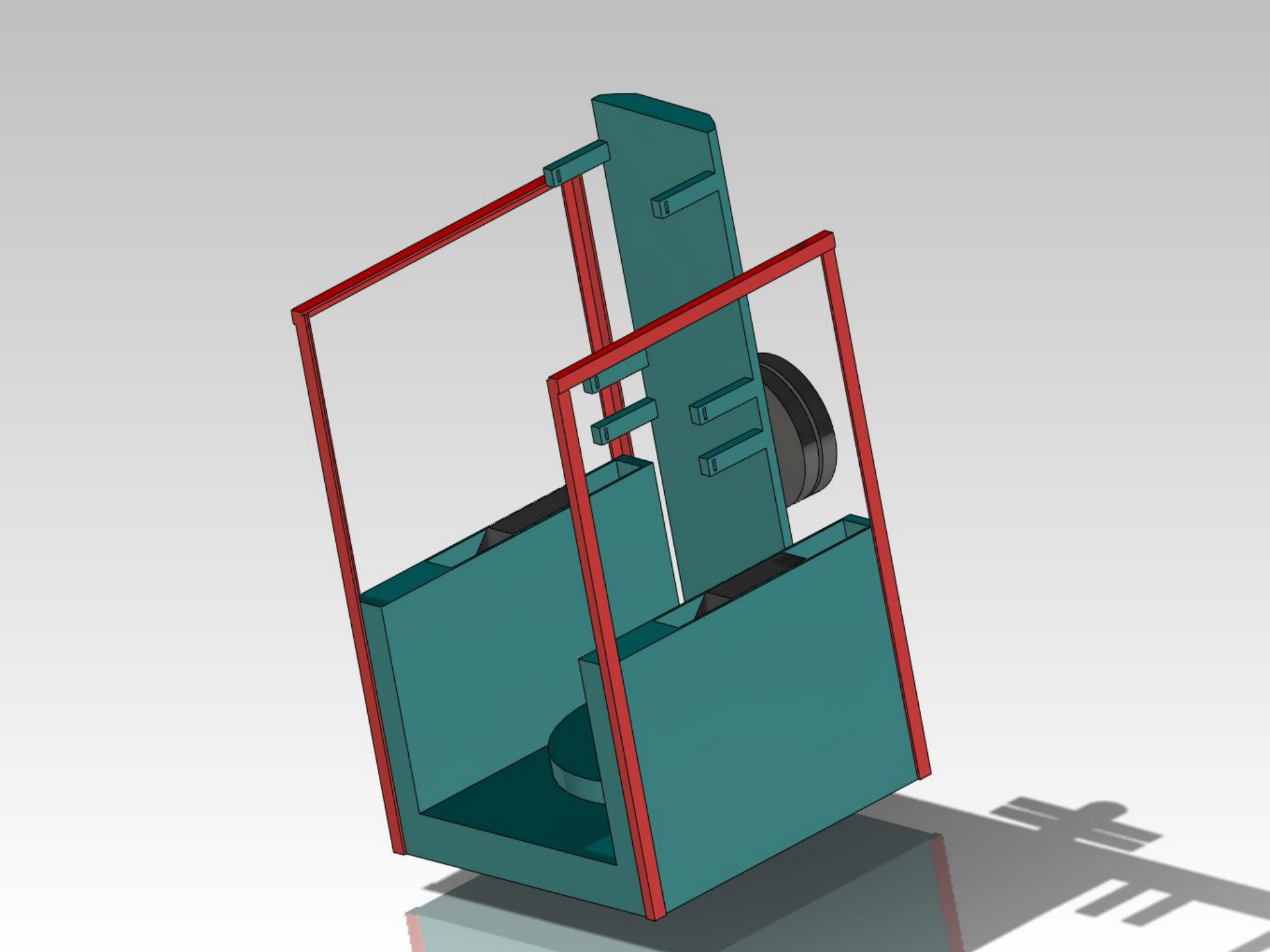
Operating Room

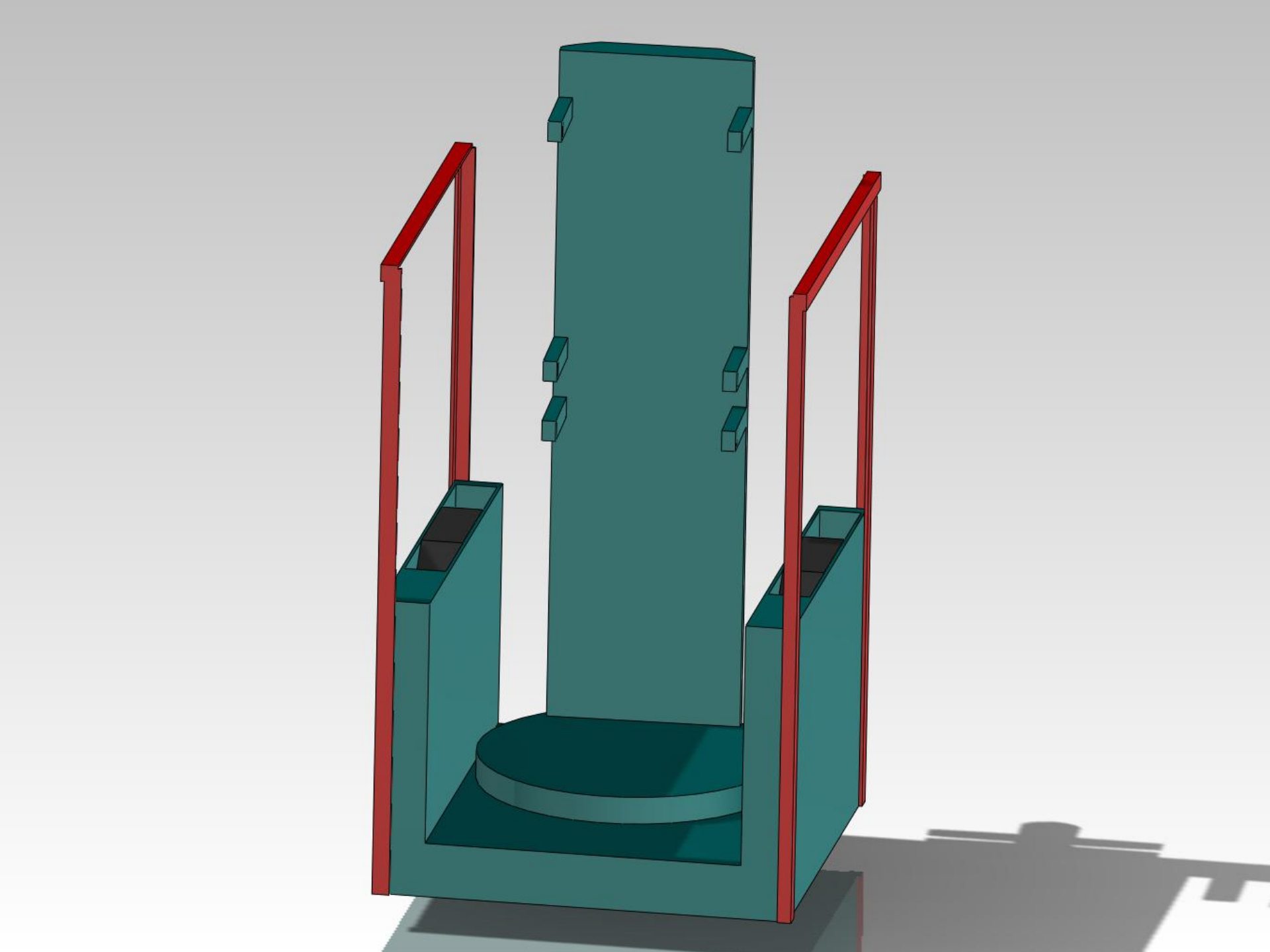
Segway

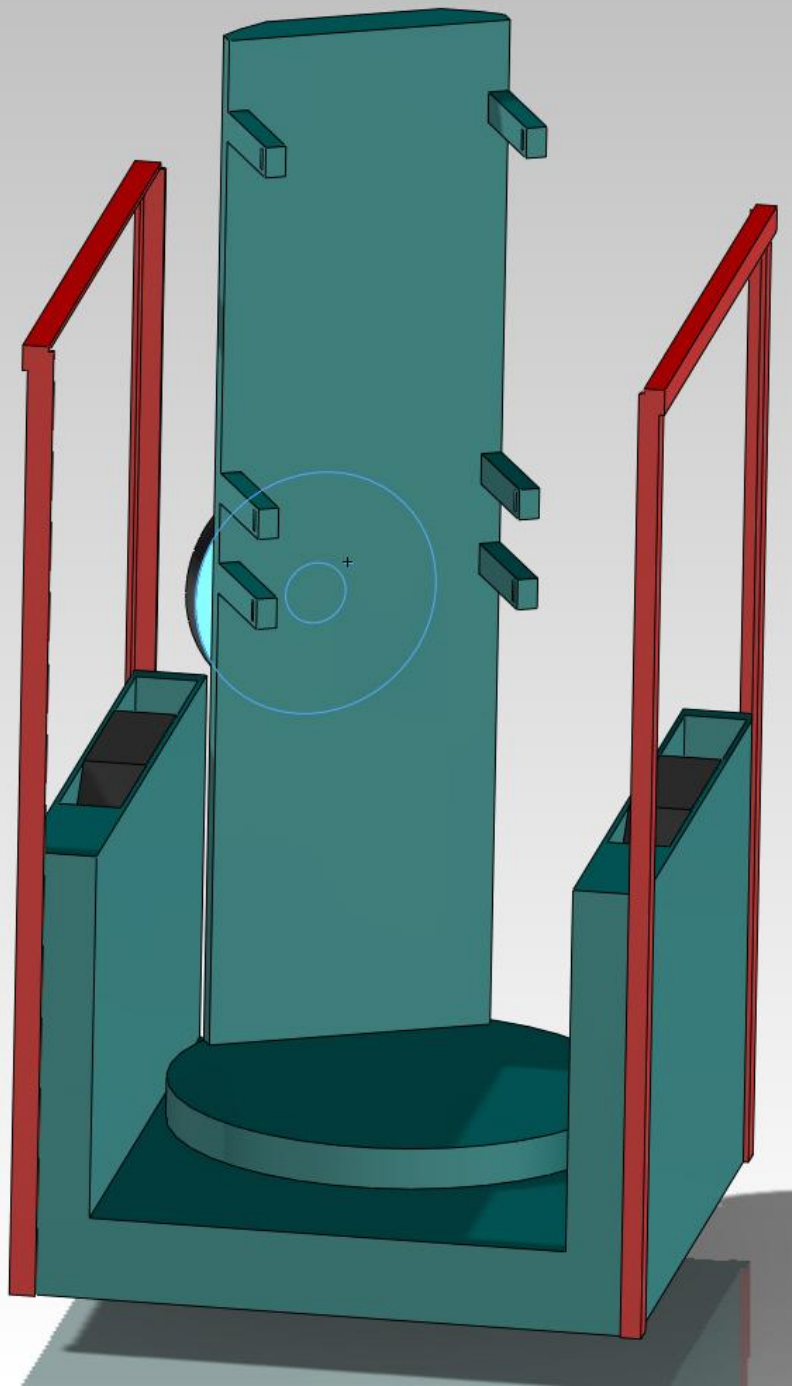
POTENTIAL STABILITY MECHANISMS

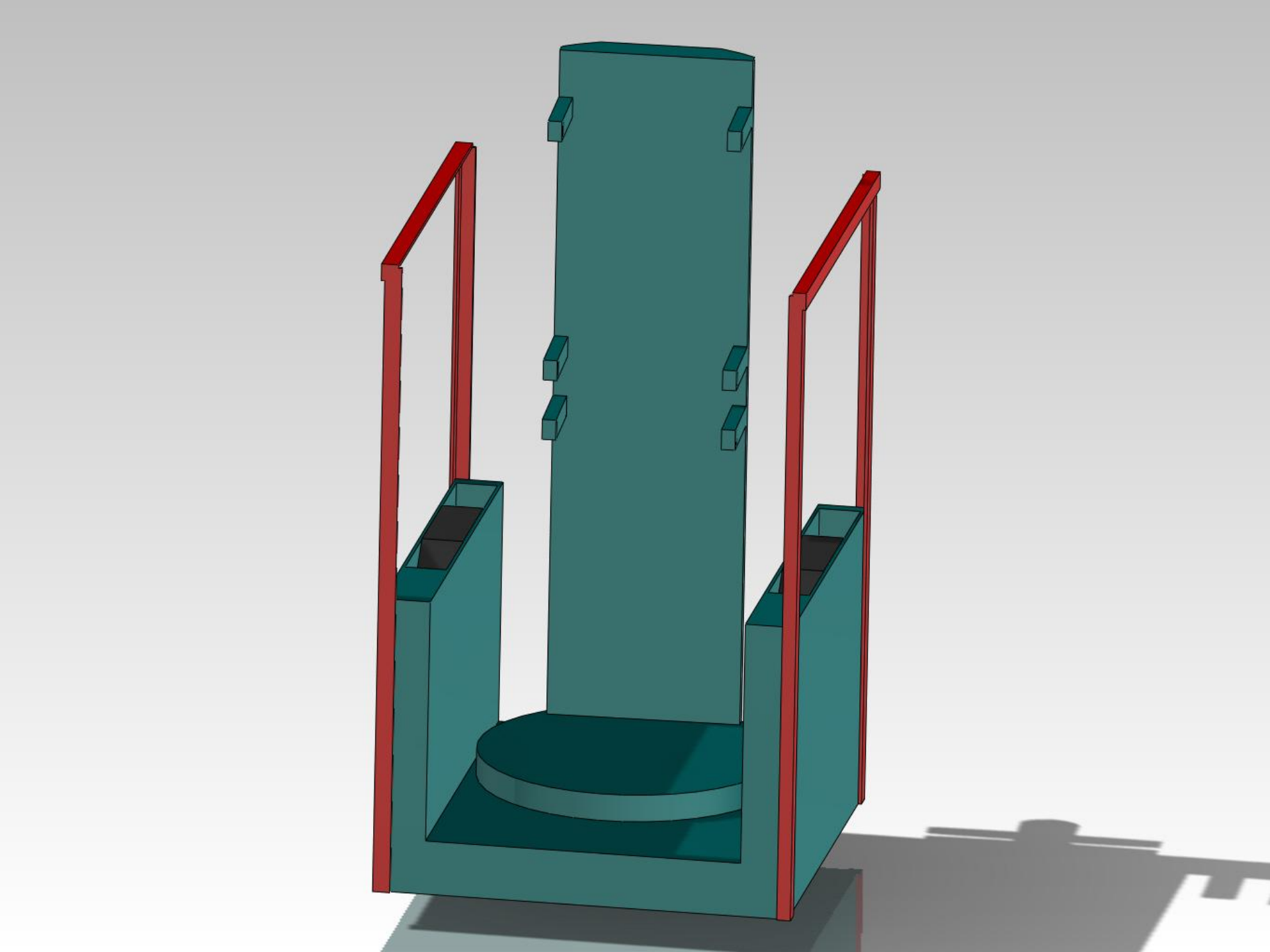
Counter Balance Weight System

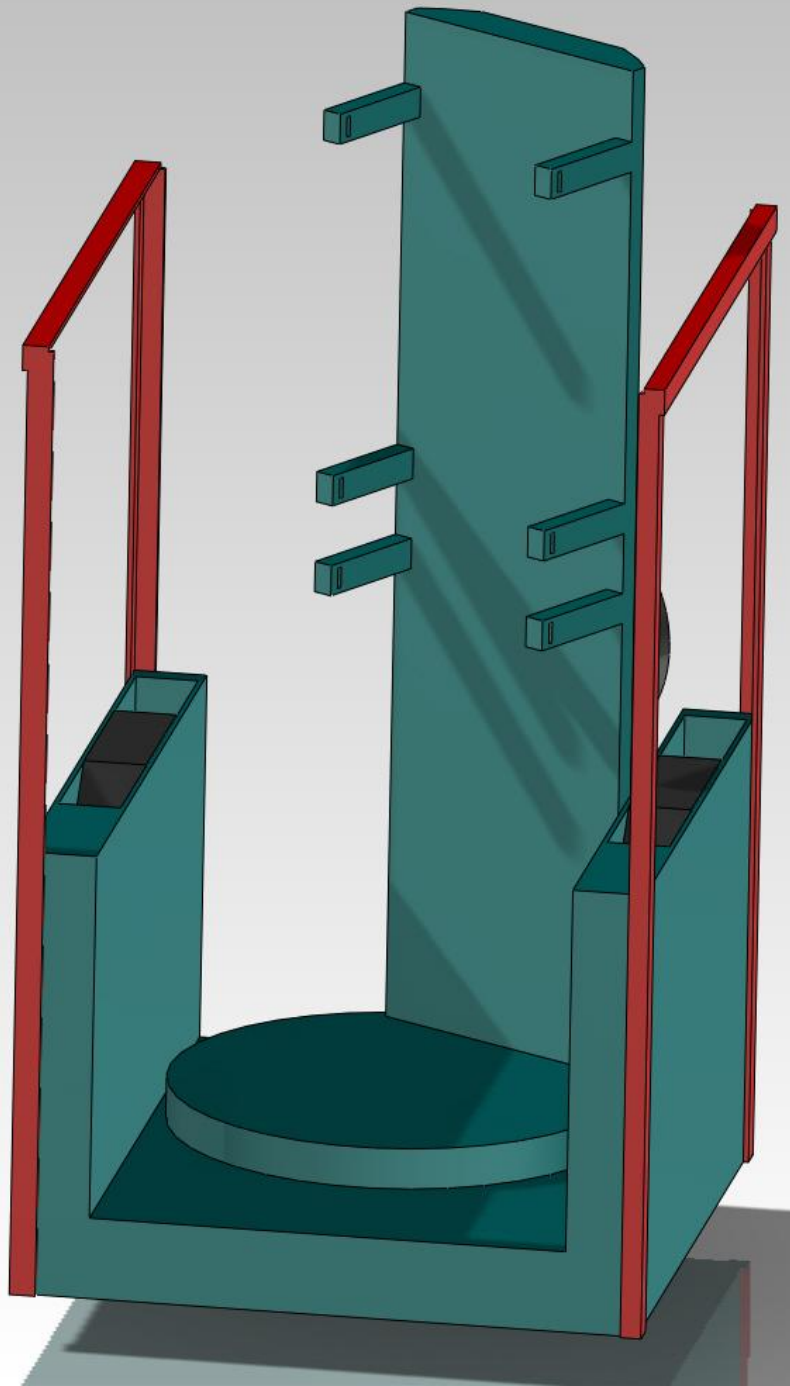




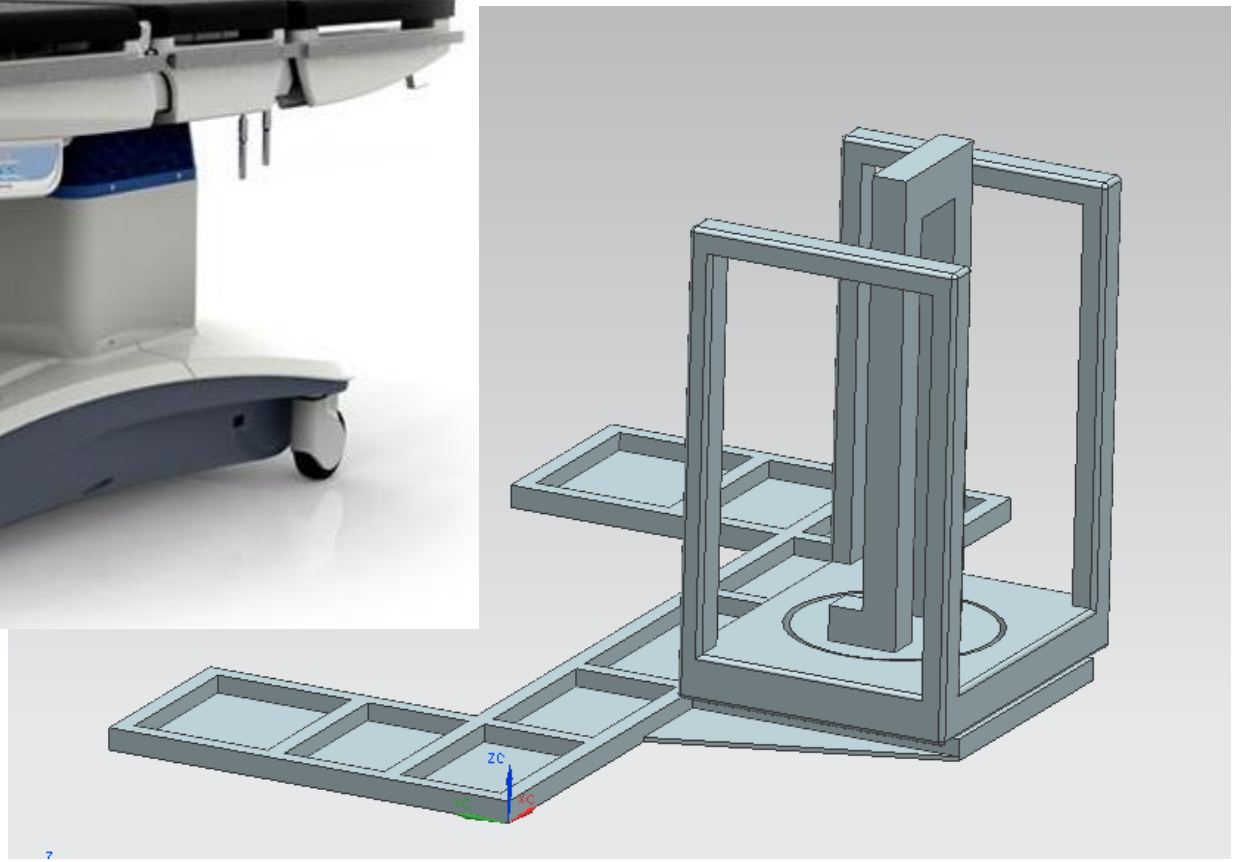


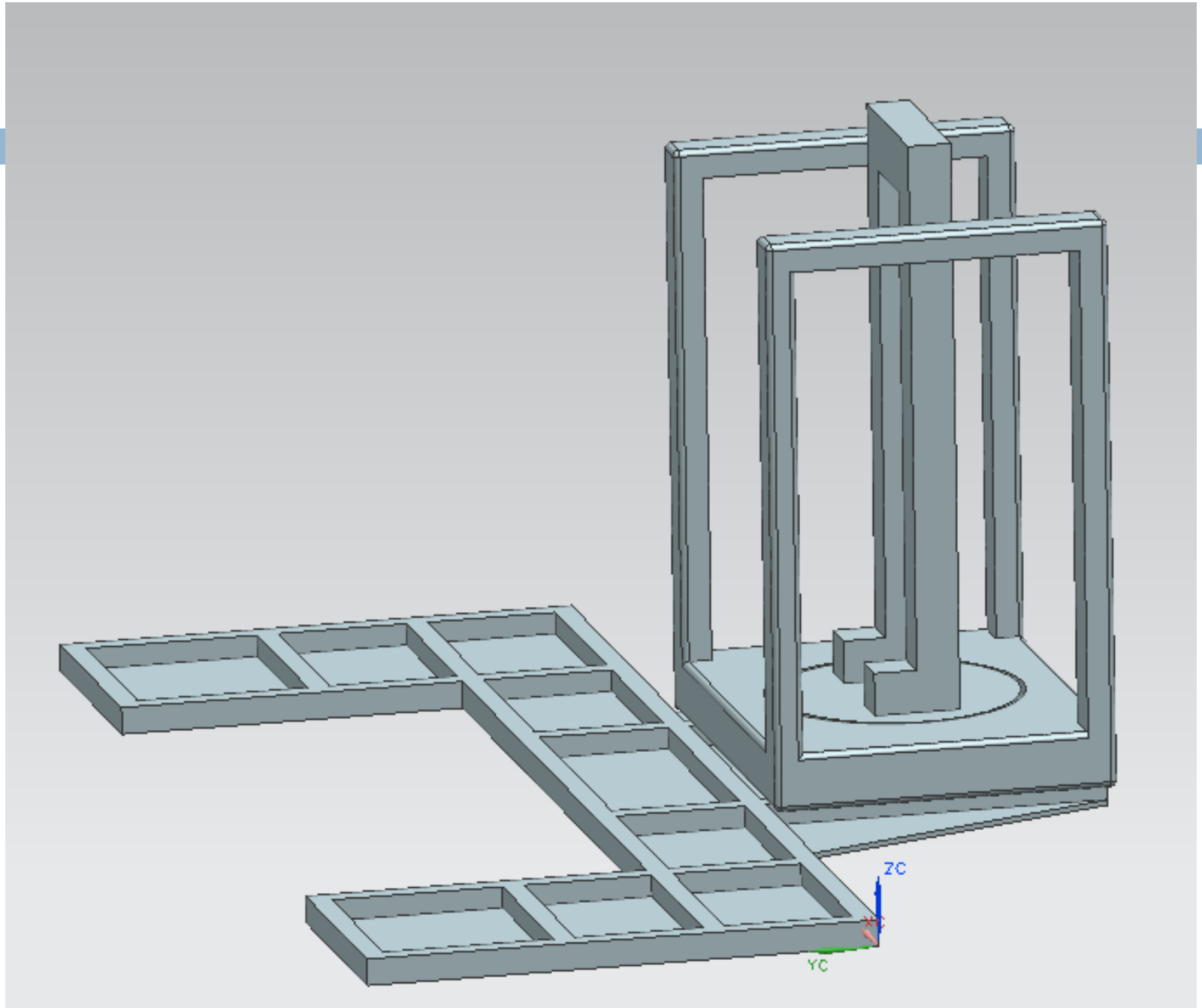






Concealed Base Design

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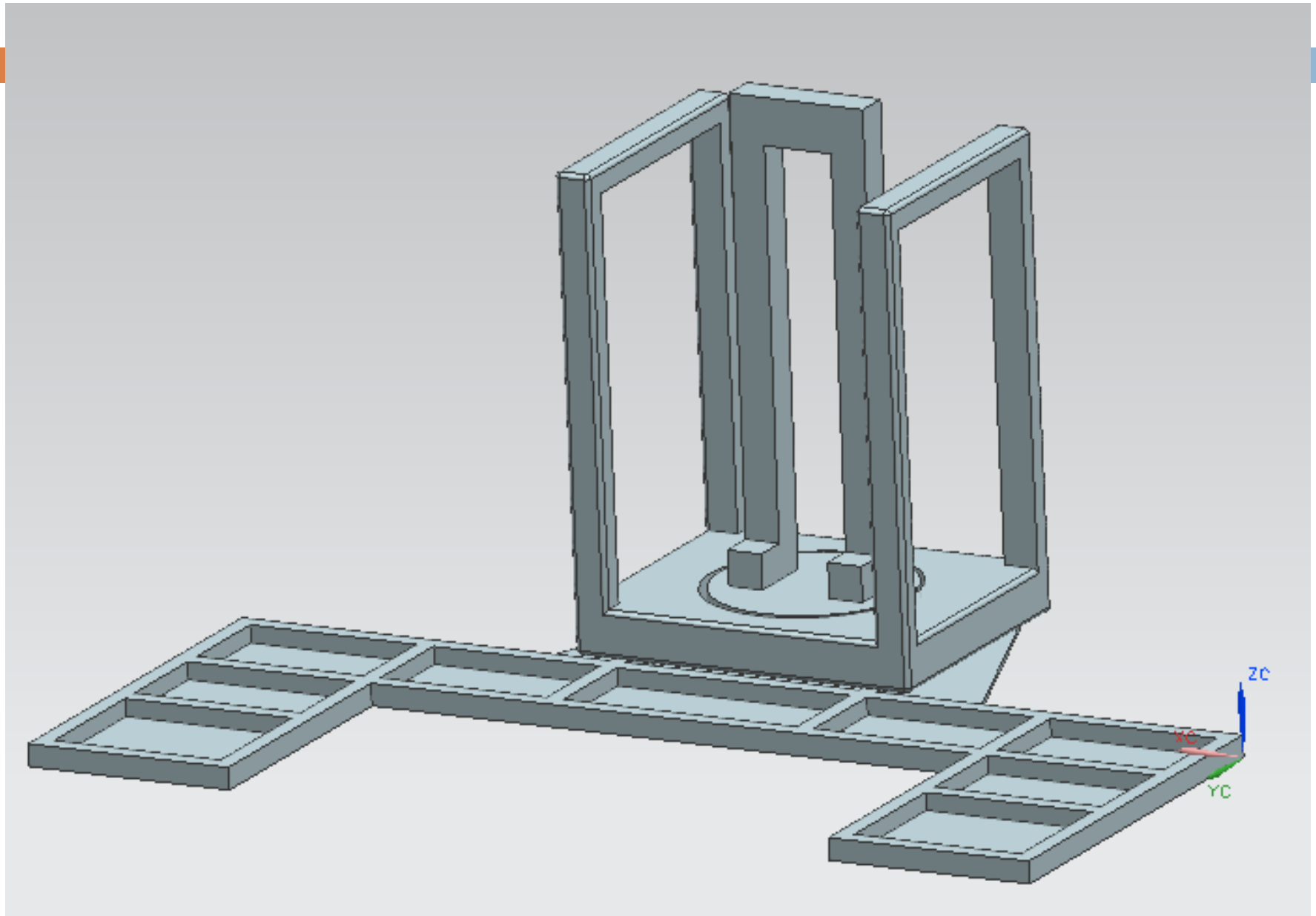
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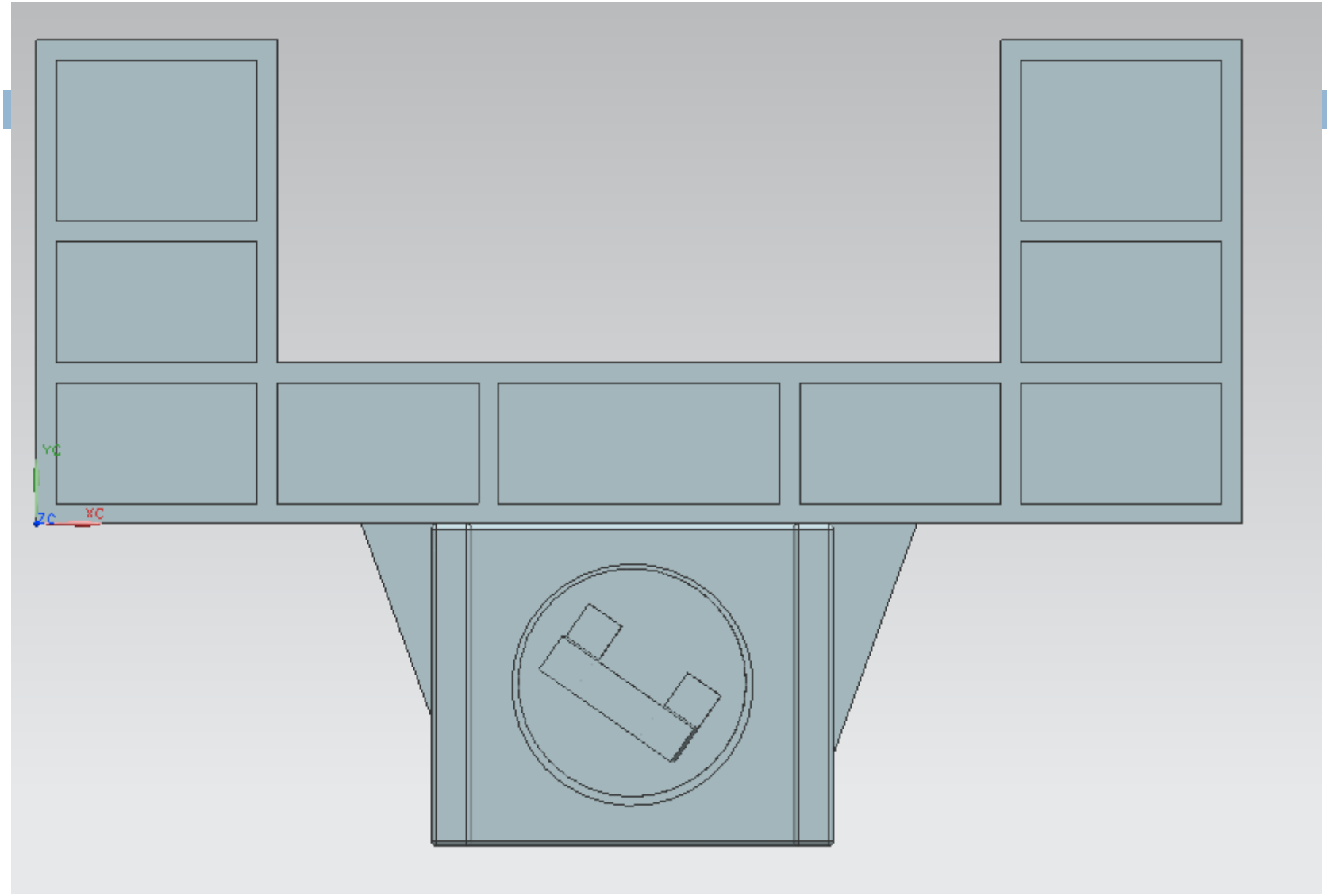
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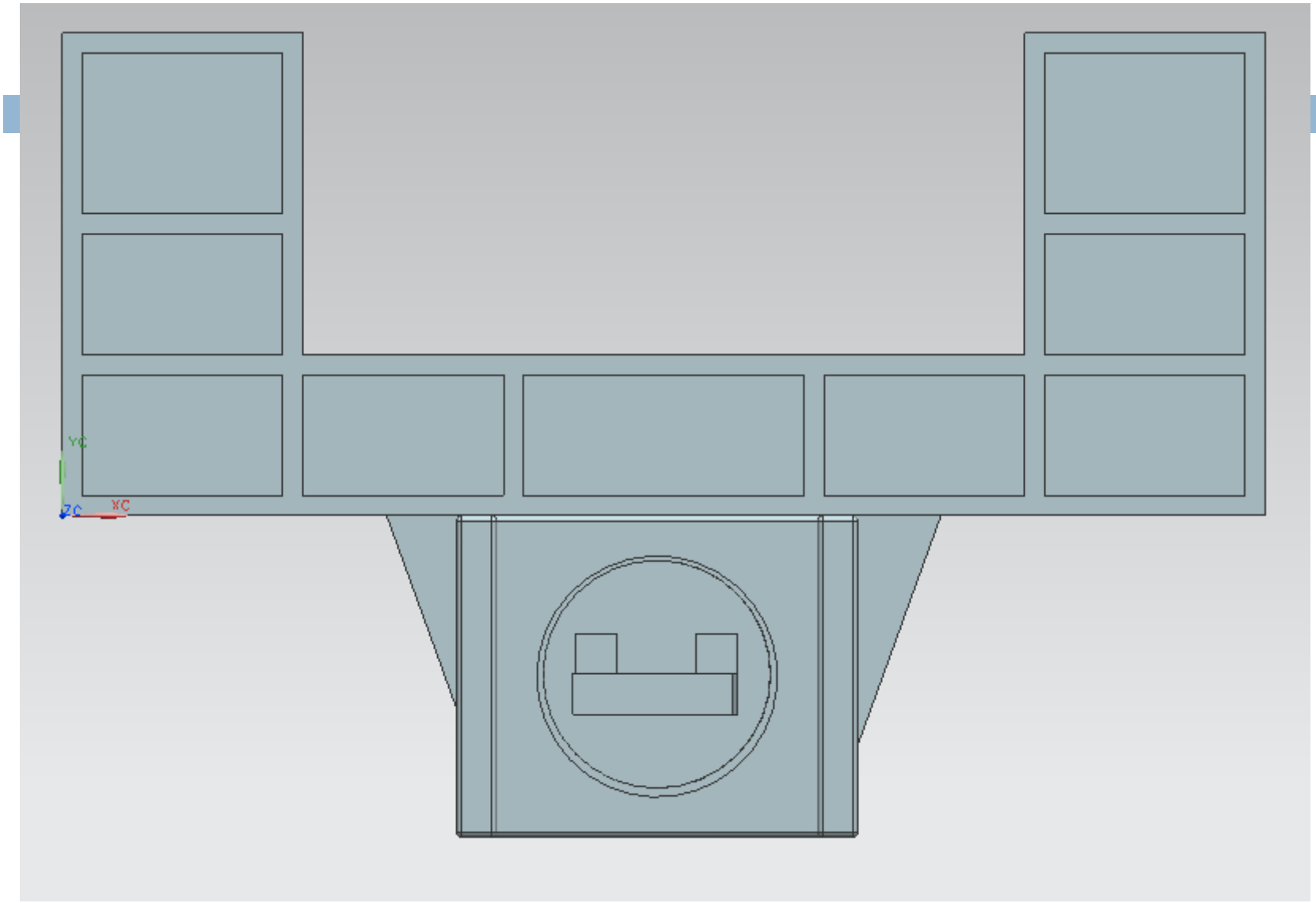
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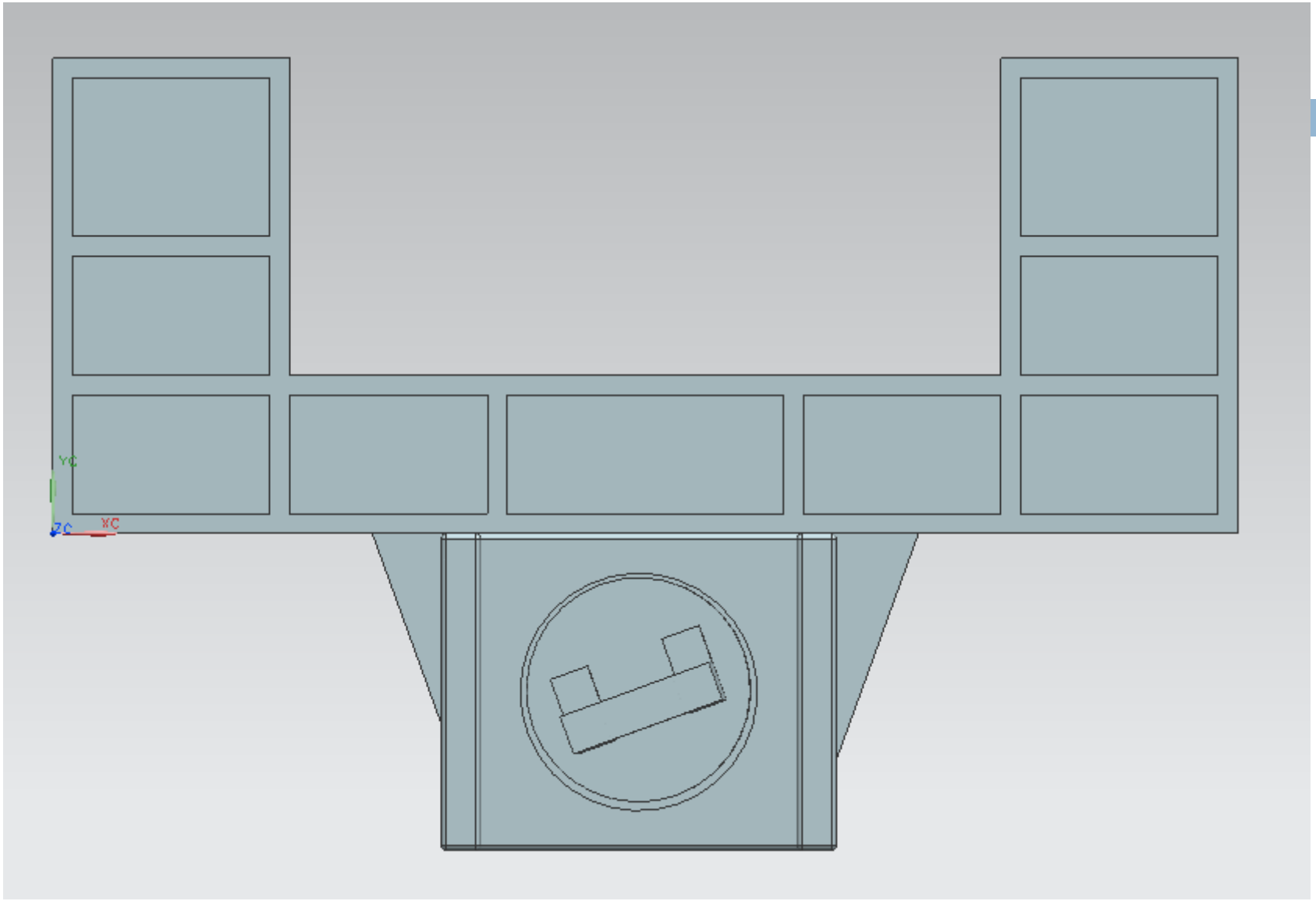
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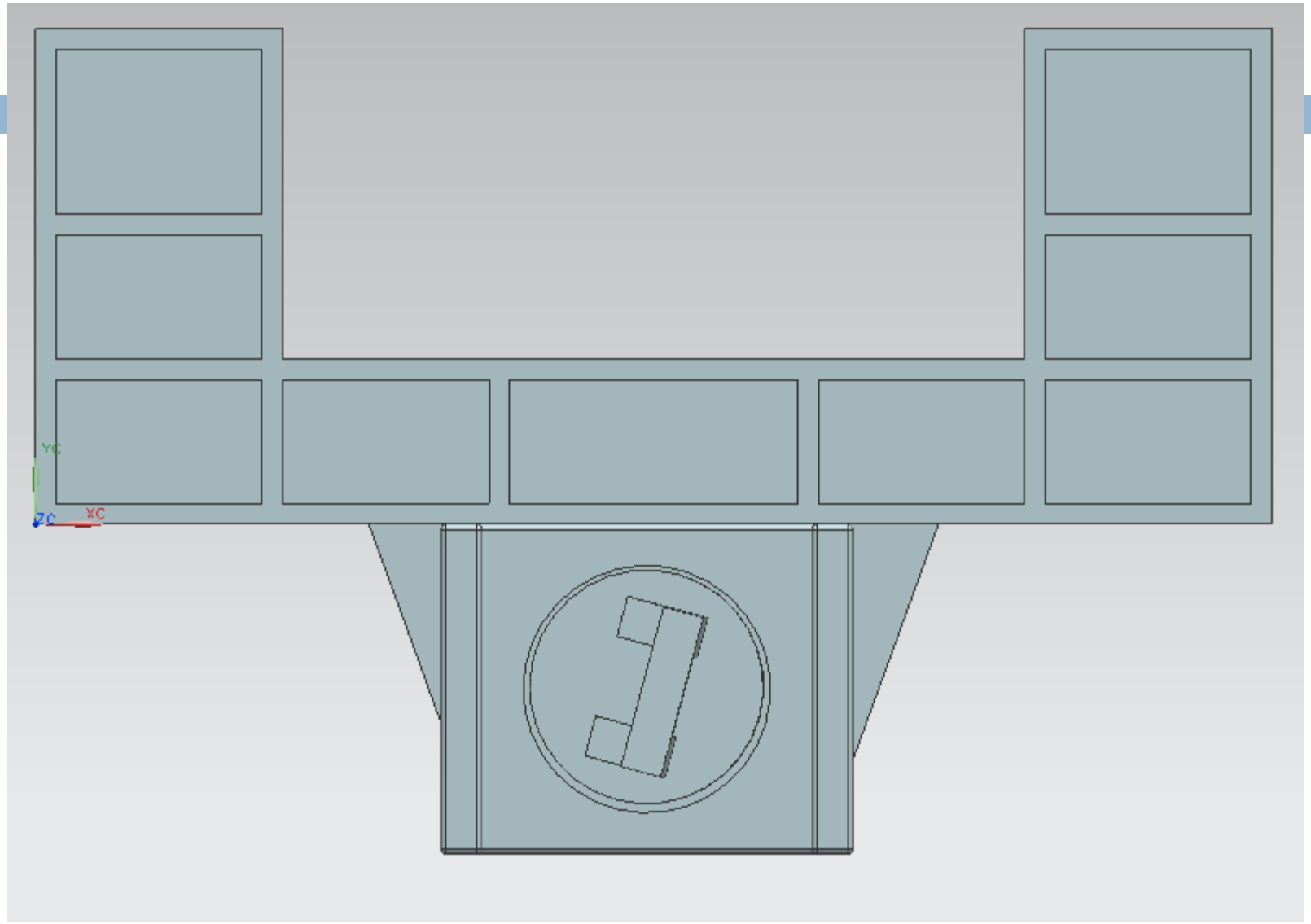
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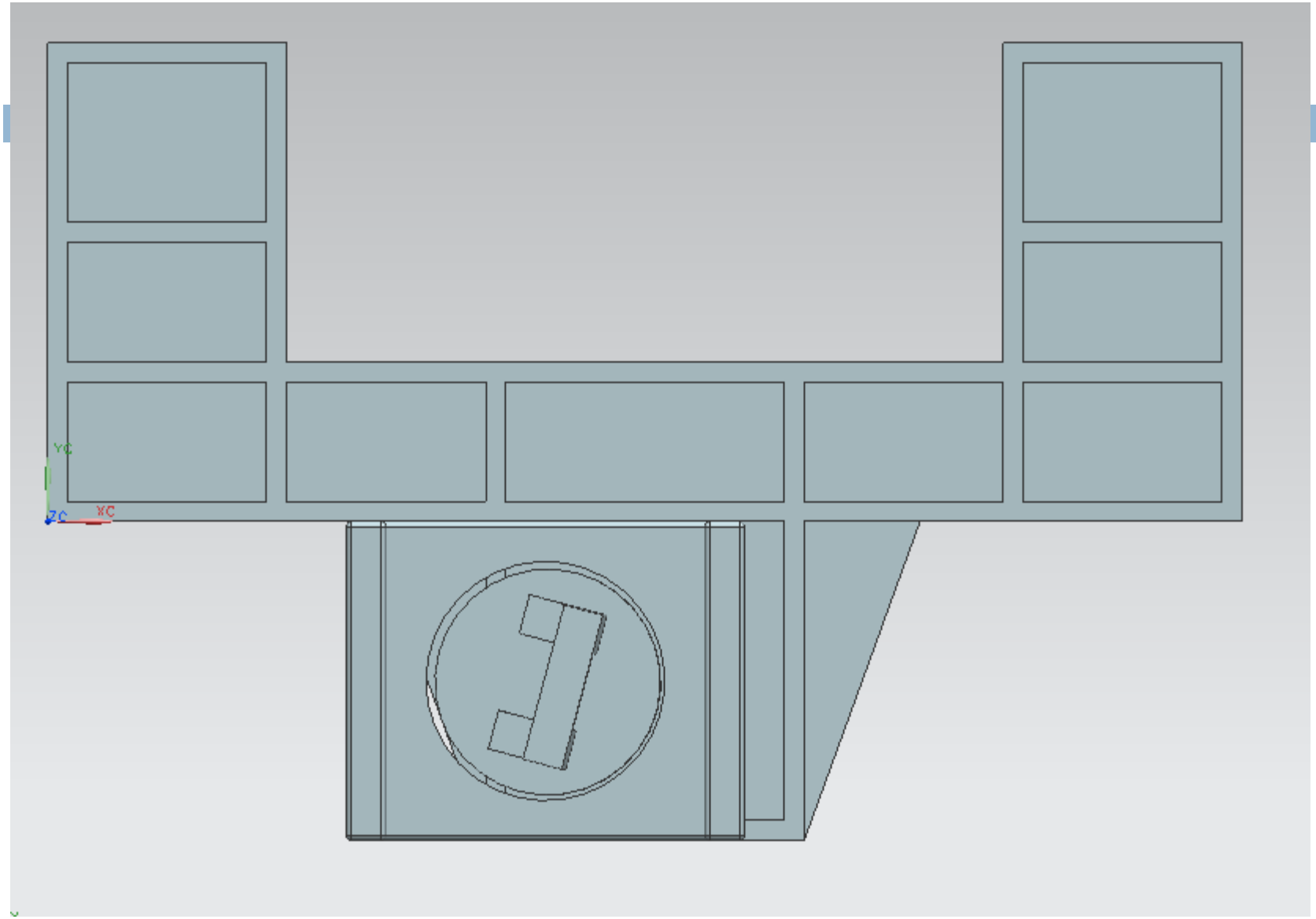
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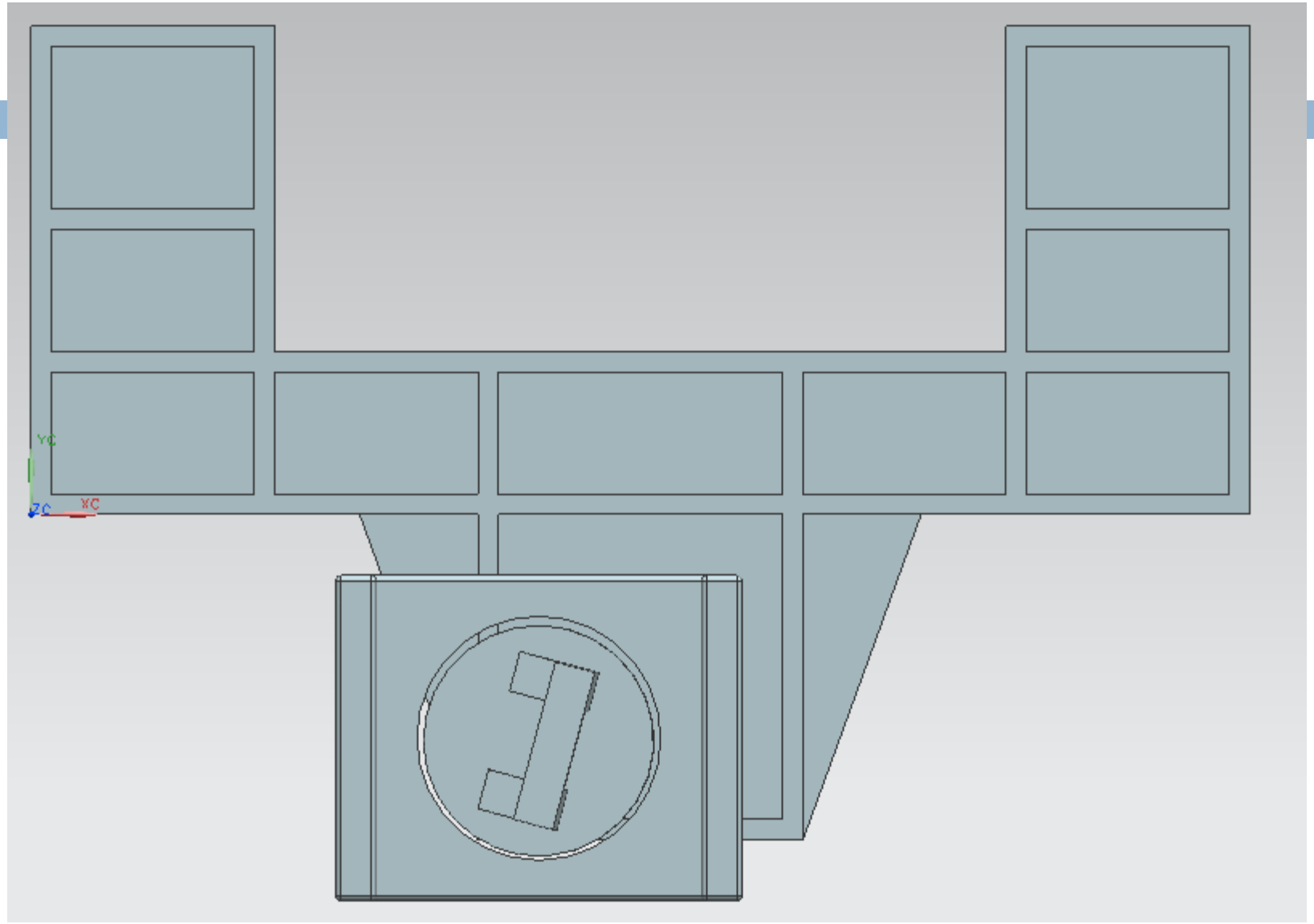
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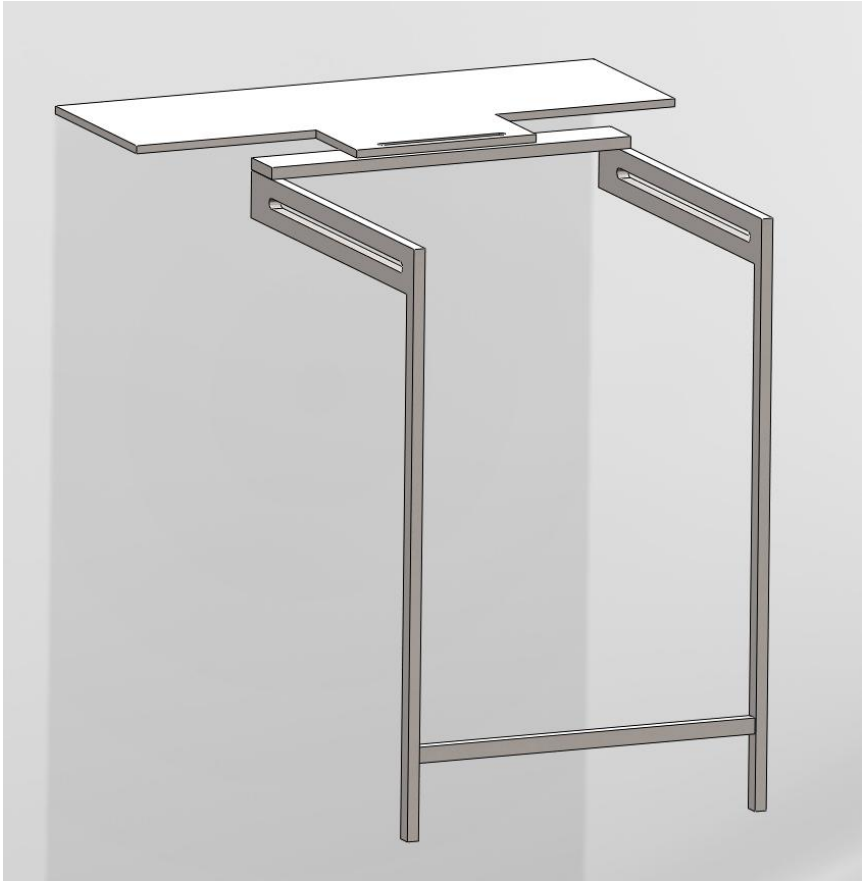
Under Mattress Design

- Purely mechanical
- Supported by the weight of the patient
- Harness connected to slots; allows forward and backward movement
- Adjustable mount allows side-to-side movement



REGULATIONS

FDA Regulations

- Not required for our device
  - Individual device
  - Not commercially sold
- We still want a high degree of safety and reliability
- FDA guidelines may help with other regulation and patient concerns

FDA U.S. Food and Drug Administration

Regulations: Insurance

- Malpractice liability insurance
  - MMIC Insurance Company

- Healthcare facility/Hospital insurance
  - Myron Steves Insurance Company

MYRON STEVES

Regulations: Hospital

- The device must be sterilized with Virex
- Cannot permanently attach device to OR floor
- Device must fit through OR doors (6’5” tall, 5’ wide)
- FDA approval?

Acknowledgements

- Prof. Amit Nimunkar – Advisor
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- Dr. David Jones – Client
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- John Feeney – CEO of Community Health Network

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- http://www.amazon.com/Duro-Med-Standard-Wheelchair-Silver-Black/dp/B000BO4T9S
- http://t-mgi.com/

Questions?