



Initial Design Review

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Goals:

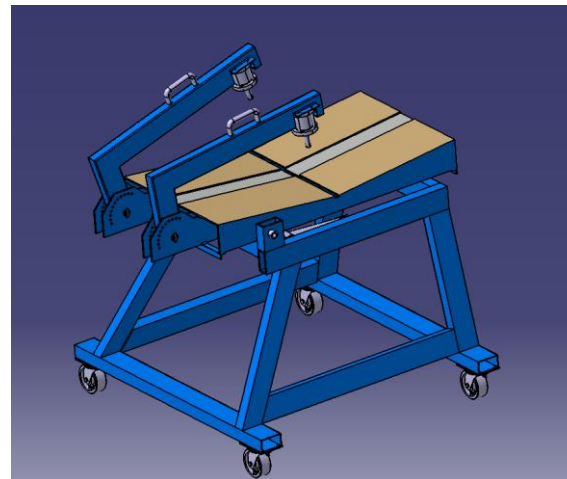
Collaborate on a design for rotation of table platform

Collaborate on design for alignment mechanism to hold drain pans securely and accurately

Proof of Concept

Assess potential problems

- Trevor's Prospective? Design aspects
- End User Feedback



Current method of rotation

Rotation Structure Design #1

Key Features:

Gas charged shocks for force relief

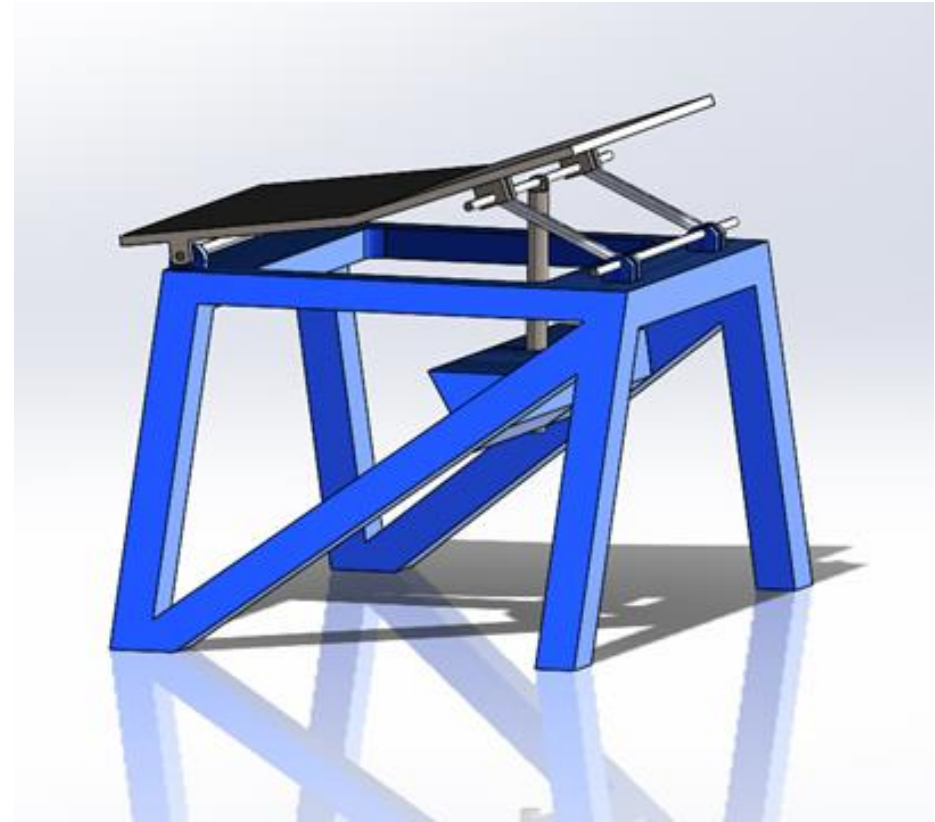
Rack and Pinion motor

or

Hydraulic/Pneumatic Advantage

Efficient changeover time by reducing range of rotation

Pivot positioned closer to center to reduce moment arm



Rotation Structure Design #1

Pros:

Minimal moving parts

Changeover time reduction

Easy to Manufacture

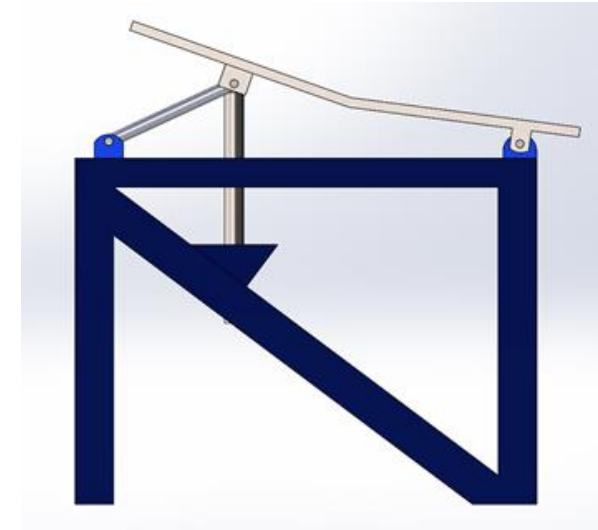
Most alignment systems are compatible with this design

Minimal pinch points for safety

Cons:

Possibly difficult to maneuver drain pans

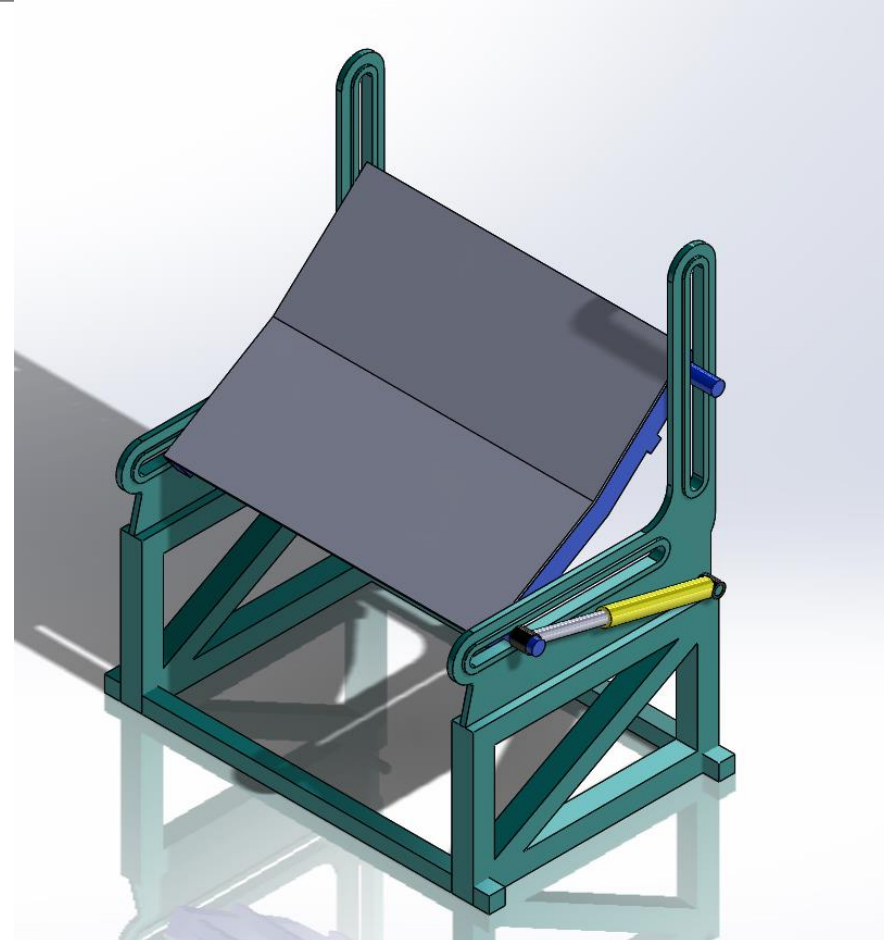
Limits rotation speed



Rotation Structure Design #2: Virtual Pivot

Key Features:

- Pivot is not stationary
- Pneumatics move the backing plate, changing the orientation
- Rollers allow backing plate to slide
- Locking mechanism for safety



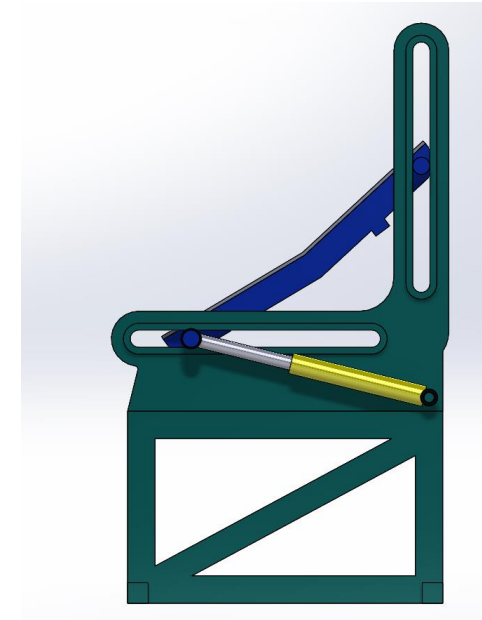
Rotation Structure Design #2: Virtual Pivot

Pros:

- Easy alterations to the angle of the welding surface
- Frame provides enough area to implement a safety locking feature
- Drain pans are easy to put on/off backing plate
- Works well with any of the clamping methods
- Multiple structures would be easy to put in series

Cons:

- Sides of the frame may get in the way
- More moving parts compared to other designs



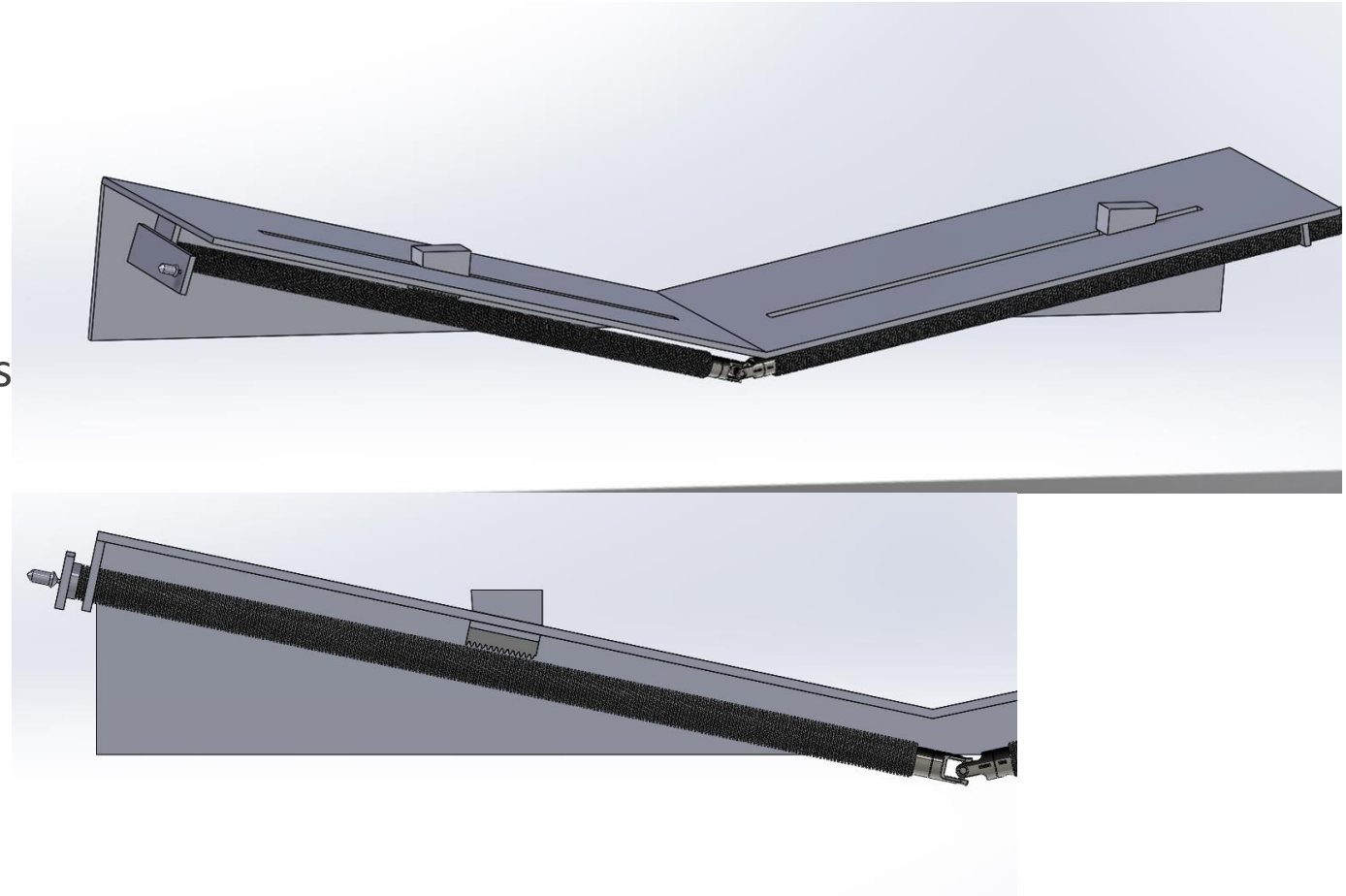
Alignment Support #1: Lead Screw

Key Features:

Simple self centering fixture

Highly adjustable to various pan sizes

Edge of pan alignment



Alignment Support #1: Lead Screw

Pros:

Keeps Symmetry

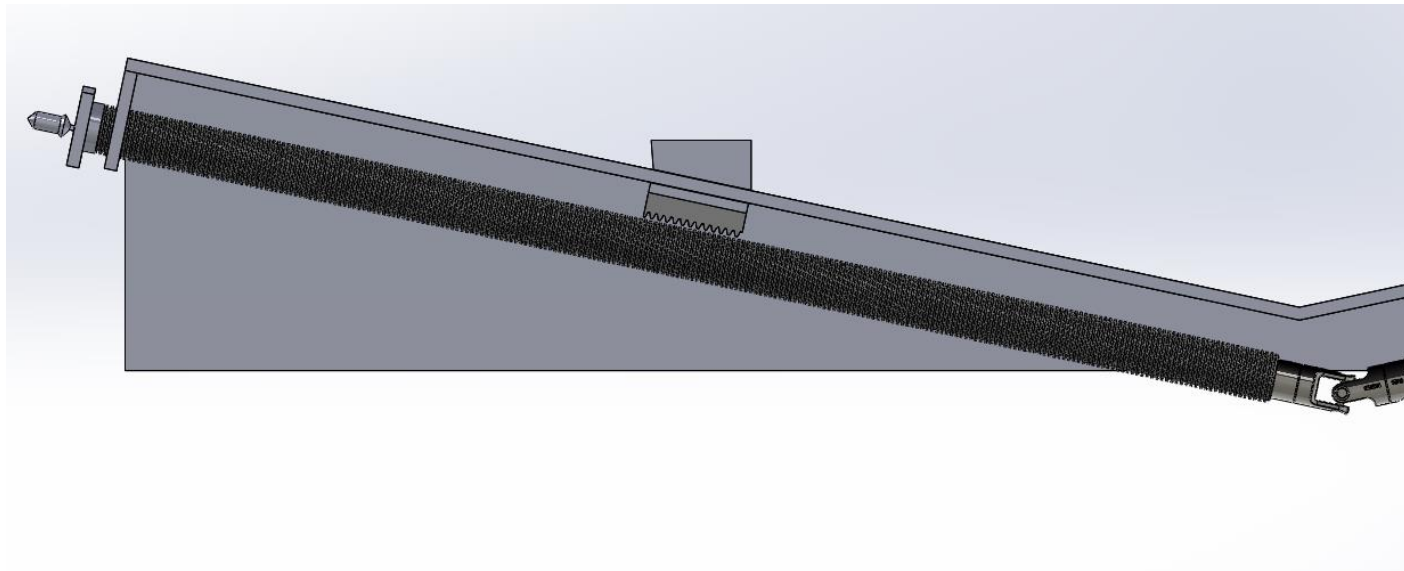
Easy to operate and train new operators

Durable

Cons:

Multiple failure points due to debris

Non-Locking at current state

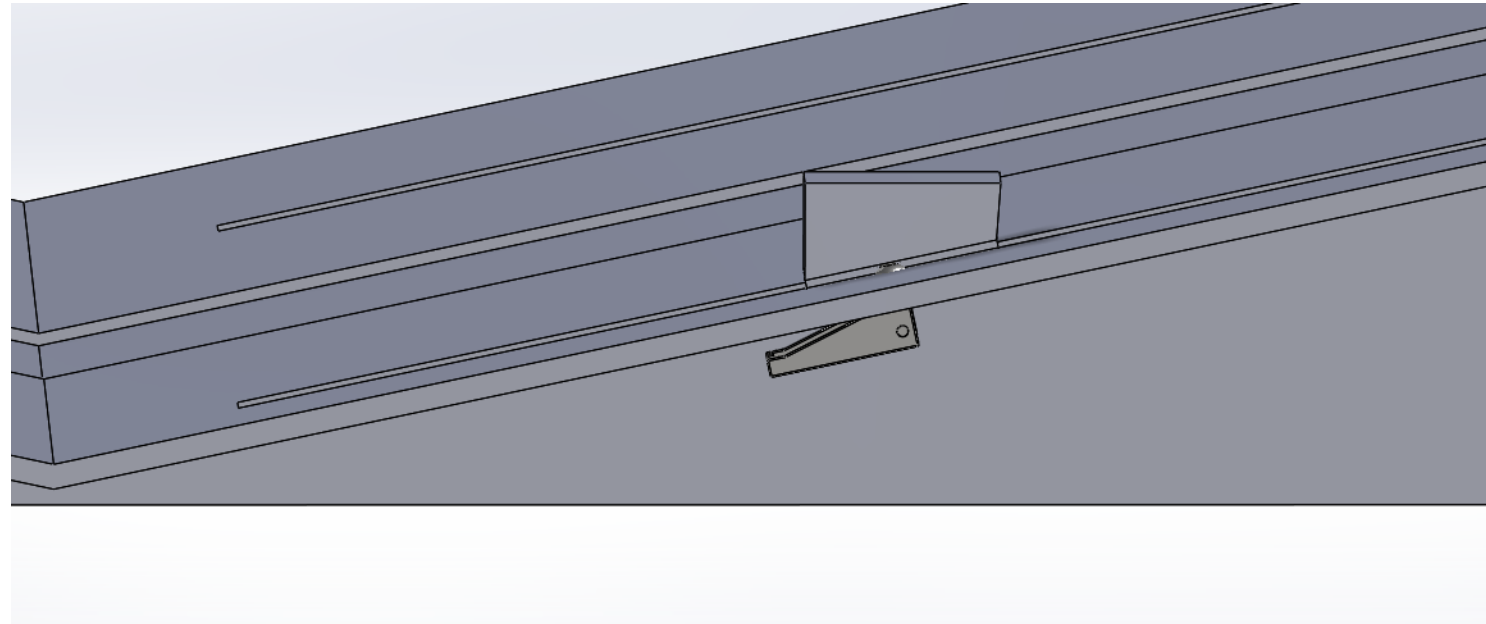


Alignment Support #2: Free Floating

Key Features:

Cam lock friction mechanism

Infinitely adjustable to fit small variances in drain pans



Alignment Support #2: Free Floating

Pros:

Infinitely adjustable

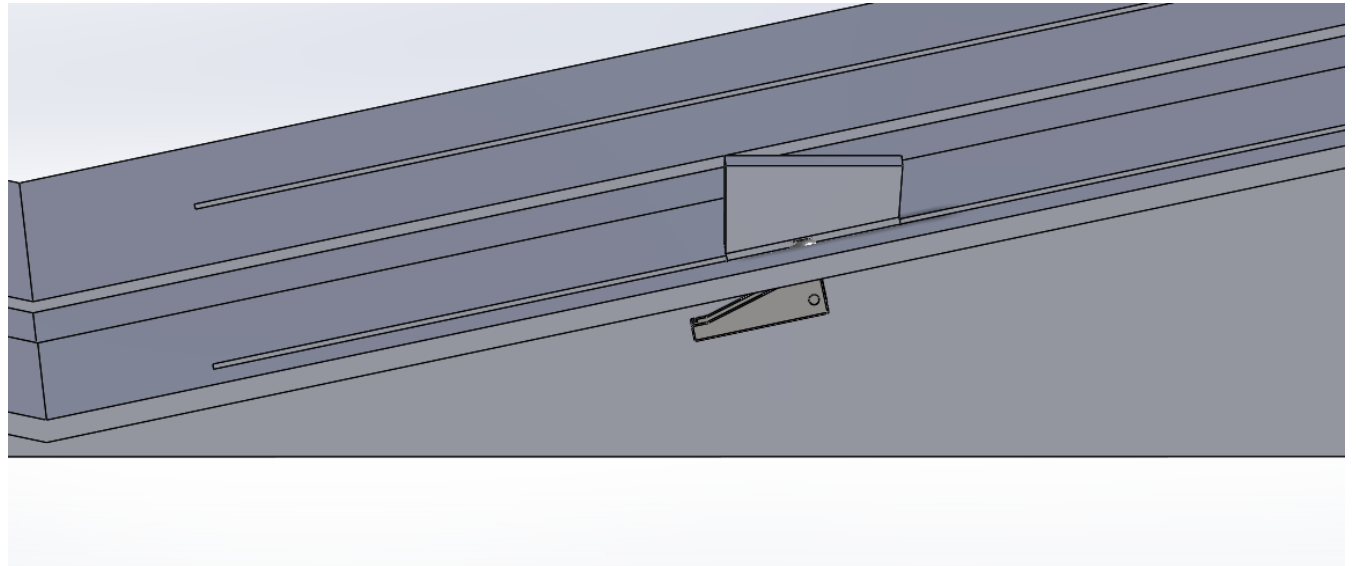
Simple to manufacture

Locking mechanism for stability

Cons:

Changeover time increased with fine tuning

Easier to damage



Alignment Retention #1: Spring-loaded Arm

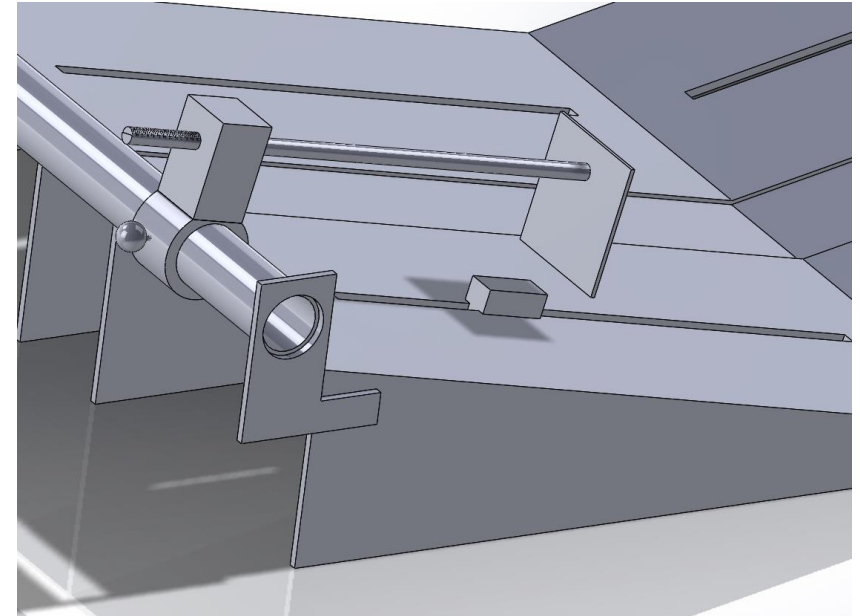
Key Features:

Arm slides along track lengthwise on the table

Arm can raise or lower, allowing drain pan to be lifted on and off table

Arm is secured by spring system or ratchet operation

Rotation can be locked by twisting knob on rear of pivot



Alignment Retention #1: Spring-loaded Arm

Pros:

- Arm is compact in size compared to current arm size
- Can rotate up and down so that drain pan can be inserted and removed easily
- Slides along track so can hold at different places along pan
- Holds pan from top, side, and bottom
- Locking mechanism on slide can hold it in place along track

Cons:

- May not be the most secure method of holding pan in place
- More difficult to manufacture

Alignment Retention #2: Magnetic Clamp

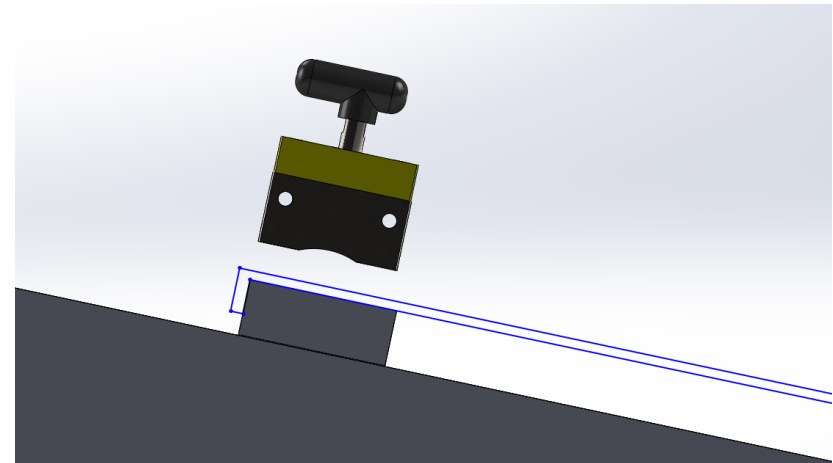
Pros:

- Simple concept, no fabrication needed to integrate magnets into design.
- User friendly, a quarter turn locks the magnet into place.
- Magnets are small size and open up a lot of working space.



Cons:

- Magnet holding strength may suffer when metal gets hot from welding.
- Magnets may not hold pan securely when table top is rotated.
- Magnets can get misplaced easily due to their small size.



Budget

Initial Budget: \$6000

Clamp)

Meter)

-\$68.26 (Magnet

-\$118.71 (Force

Future Costs:

Manufacturing cost of Jig structure

Clamping Systems

Motors, hydraulics, pneumatics

Rollers, hydraulics, torsion spring

Scale Model Material

\$5813.03

Remaining:

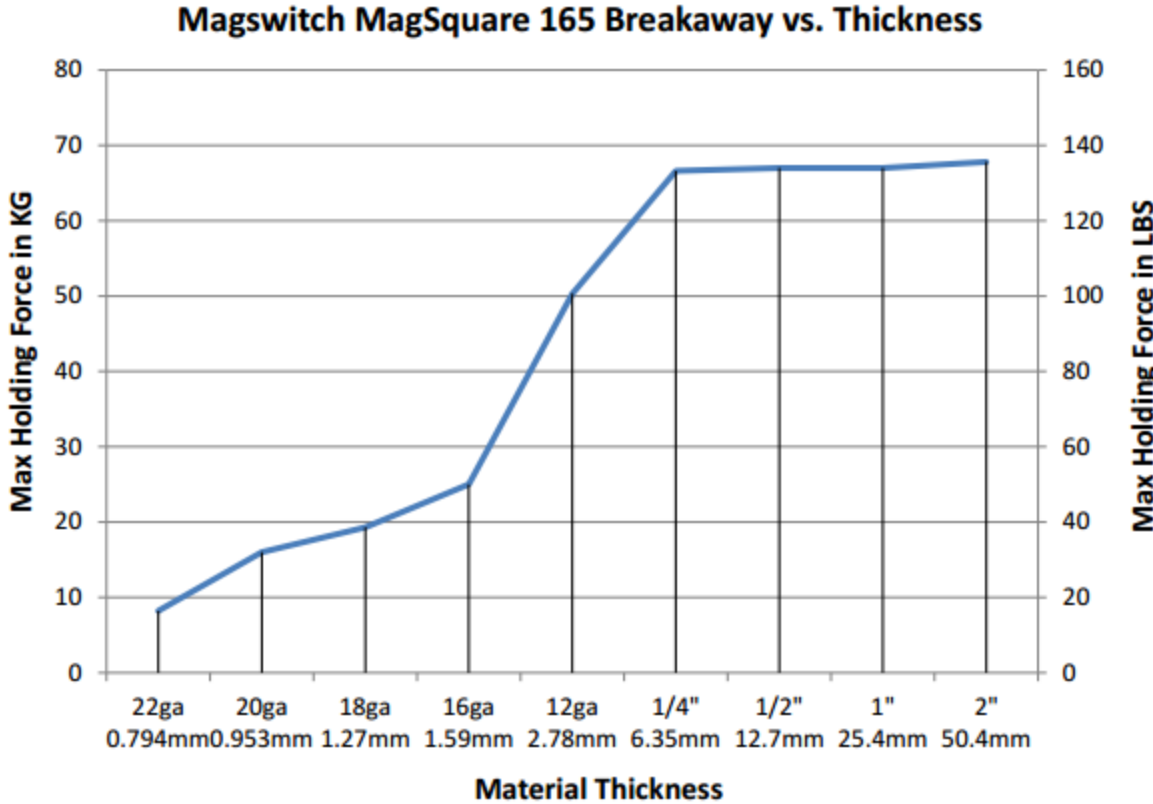
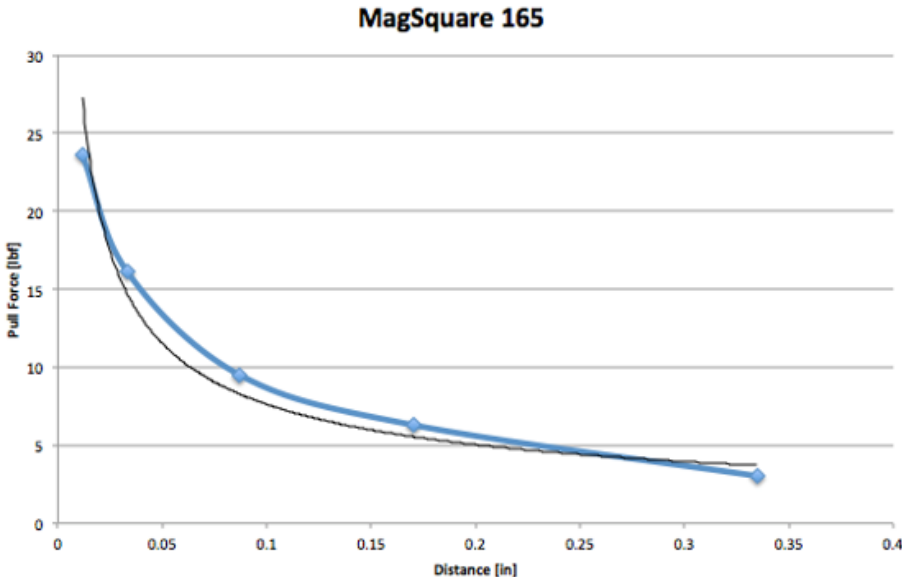
Initial Magnet Testing

Magnet Clamping

- We tested the magnet and compared the amount of force it took to pull the magnet from to surface vs the distance between the magnet and the surface.
- More independent variables will be added to future experiments such as temperature and backing plate distance



Results



Project Schedule

Fall 2016

Concept Finalization (Dec. 1st-5th)

Beginnings of Manufacturing Plan and Design (Dec. 5th-16th)

Spring 2017

Manufacturing Plan and Design Final (Jan. 16th-27th)

Detailed Design Review (Jan.30th)

Order Materials(Jan. 30th- Feb. 3rd)

Build Scale Model for Expo (1:4) (Feb.-Apr)

Manufacture Full Scale Product (Feb.-Apr.)

Design Expo (April 29th)

Questions for Colmac

Would we be manufacturing final product at the University?

Questions for us?

Which concept will best fit the specs?

Would it be possible for us to acquire a test pan for testing in the jig and clamping system?