6 - Finalizing Intermediate, Starting Output Design

March 9, 2021 11:02 AM

Mar 9/21

START: 3:30 PM + 15 min

END: 5:00

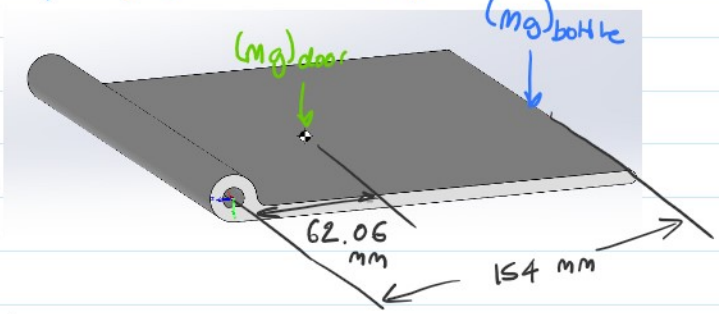
Revisiting torque calcs using slightly modified trap door:

Mass = 356.05 grams

Volume = 284382.93 cubic millimeters

Surface area = 113465.36 square millimeters

Center of mass: (millimeters)
X = 150.00
Y = 5.10
Z = -62.06



$T = (mg)_{DOOR}(62.06 \times 10^{-3}) + (mg)_{BOTTLE}(154 \times 10^{-3})$

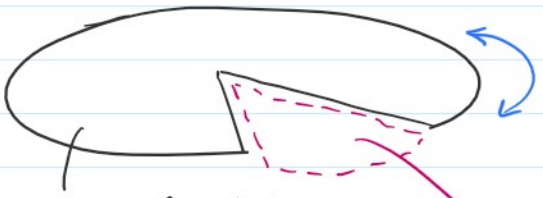
$= (356.05 \times 10^{-3})(9.81)(62.06 \times 10^{-3}) + (0.275 \times 9.81)(154 \times 10^{-3})$

$= 0.63222$ Nm $\approx$ 632 mNm

With a 4:1 reduction ratio:

$\frac{632}{4} = 158$ mNm < 197 mNm rated holding torque of motor

OUTPUT DESIGN



rotates to position opening above appropriate bin before recyclable is released

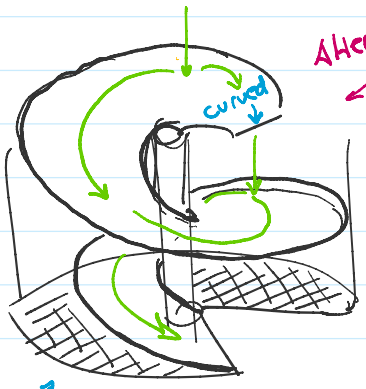
gap that allows recyclables to go into appropriate bin

* for now, assuming same stepper motor as for intermediate stage

→ needs some sort of slanted surface so that it's not a direct drop
  → glass could break
  → objects might fall on top of rotating divider and stay, without actually being directed through slot/opening into output bin

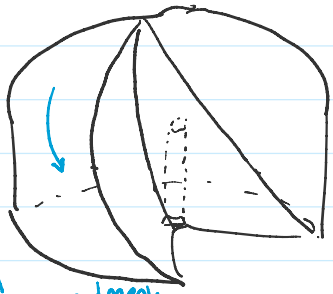
Sorting Mechanism:

Recall from earlier

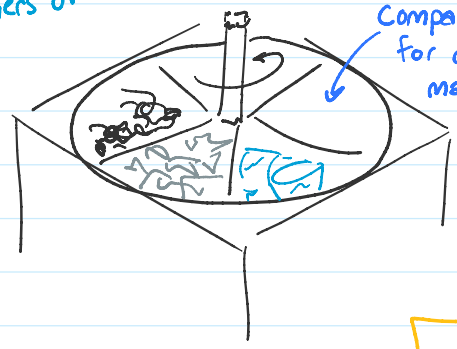


too gentle an incline for paper products?

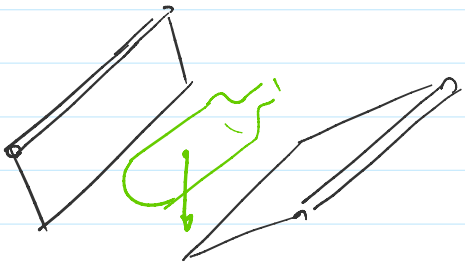
Alternative design

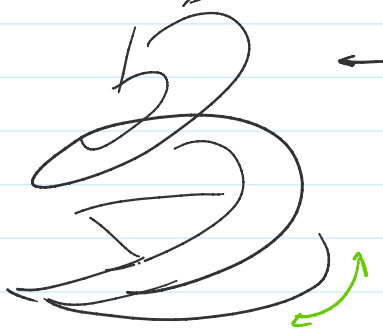


curved ramp; rotates to reveal correct compartment, covers others



Compartments for different materials



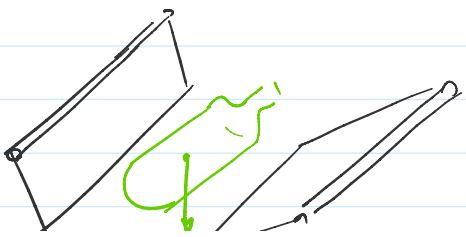


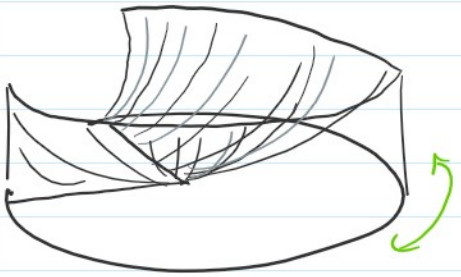
← slide-like form?

— what if light objects get stuck mid-way (like a piece of paper)

↓

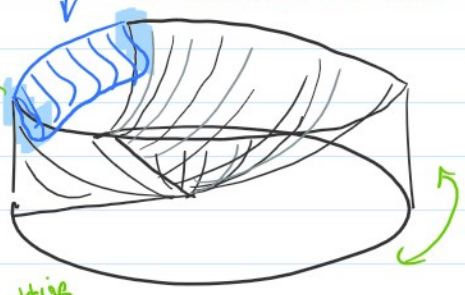
should limit distance travelled once contact is made





← curved lily-pad shaped structure
- still concerned about direct drop
  - if object is released right above opening

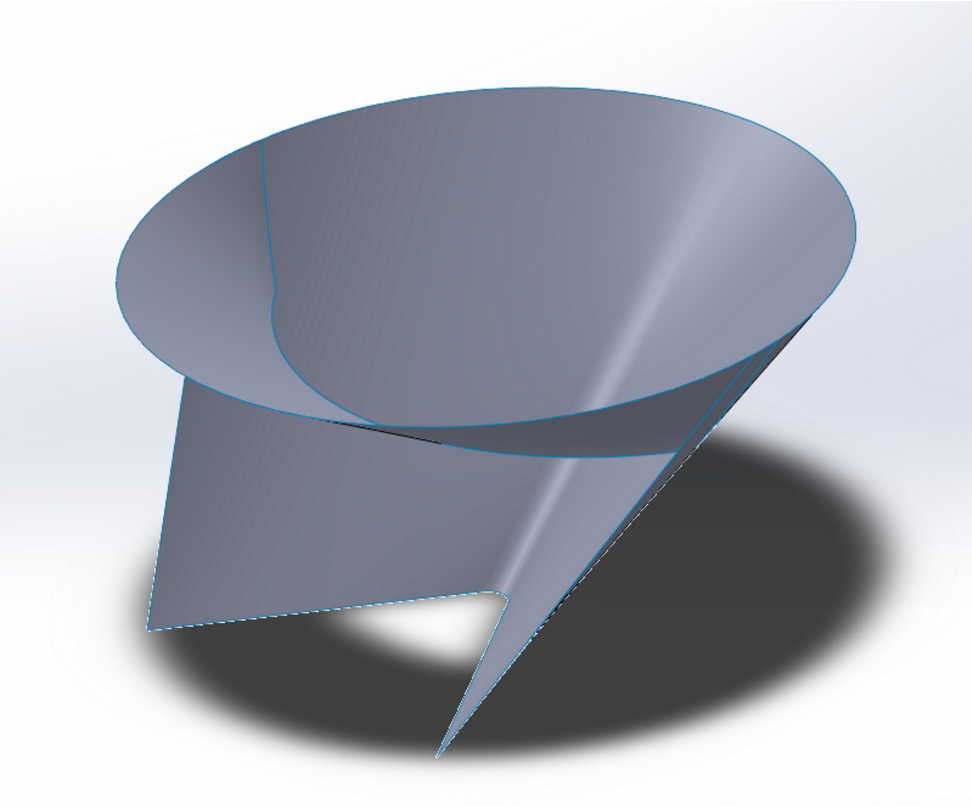
could attach intermediate ramp to decelerate it a bit



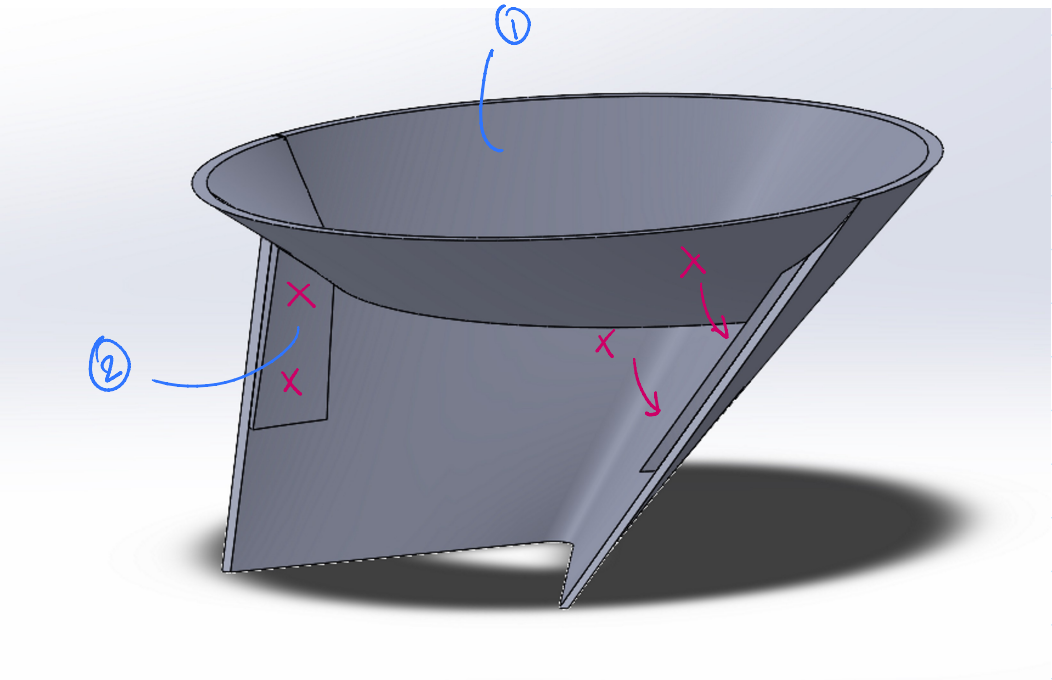
fillet any sharp corners → reduce stress and reduce chances of something getting stuck

BREAK (DINNER)

START: 6:30
END: 11:30



- surface model, just to establish some geometry



- modelled as 2 separate components for ease of printing
- fasteners will be placed where red X is to fasten 2 shells to each other

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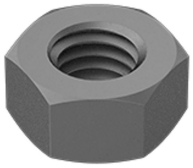

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