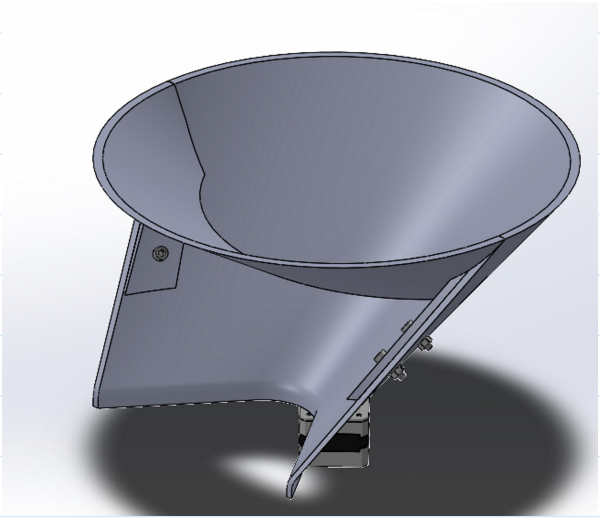
7 - Output cont'd, Drawings, Size Constraint Justification

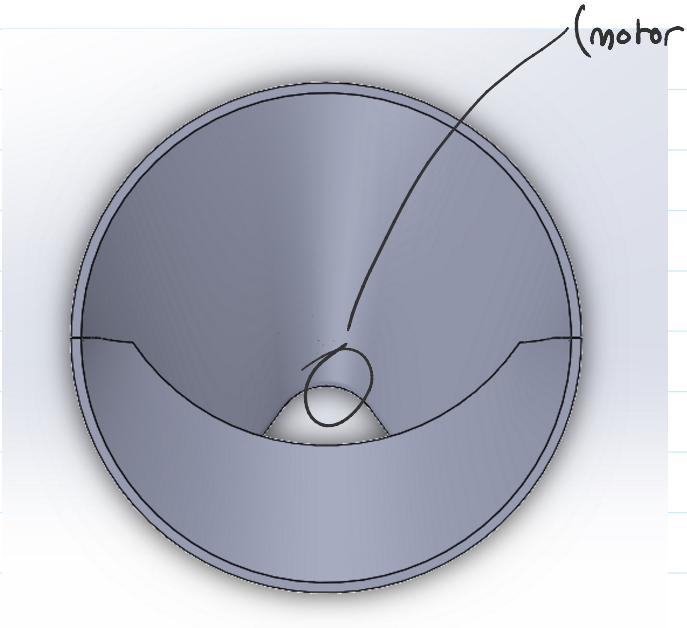
March 10, 2021 10:51 AM

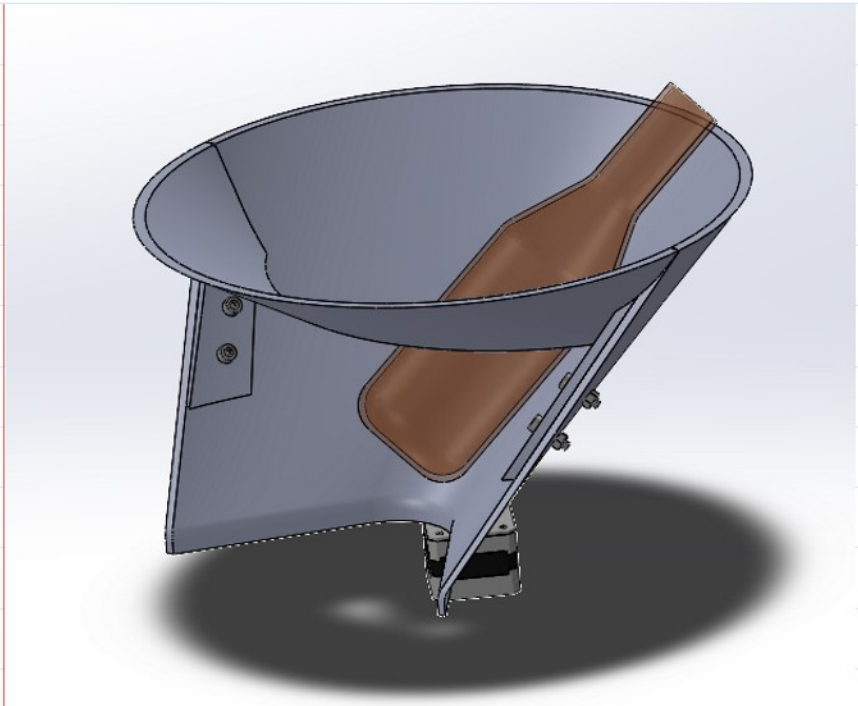
START: 10:15 AM

END: 12:45 PM



- added hub for motor mounting
- adjusted geometry of ramp to ensure motor is covered (see below)





- rough beer bottle model fits

BREAK

START: 1:00 PM

END: 2:00 PM

CHANGE

SIZE CONSTRAINT JUSTIFICATION

- output system would have to start getting very large
  - eg. for several-chute design, each chute would have to be min. 15x15 cm
    - for 5 categories, this could be up to 5 chutes of this size
      - starts to get cumbersome
  - for single-chute design (preferred, because only requires 1 motor)
    - for 5 categories, need $\frac{360^\circ}{5} = 72^\circ$ angle opening
    - curved surfaces & damping lip ensure softer landing for materials such as glass — glass cannot break ⇒ unsafe
      - complex geometry (72° opening and curved surfaces)

- complex geometry (72° opening and curved surfaces) means that output would also have to be larger to accomodate 15x15x30 cm block
  - cumbersome
  - also unnecessary:
    - by observation, many recyclables come in organic/broken/crushed shapes anyways

New size constraint: 75 mm x 75 mm x 22.5mm

↳ accommodates beer bottles, pop cans, skinny milk cartons, small bunches of crushed paper

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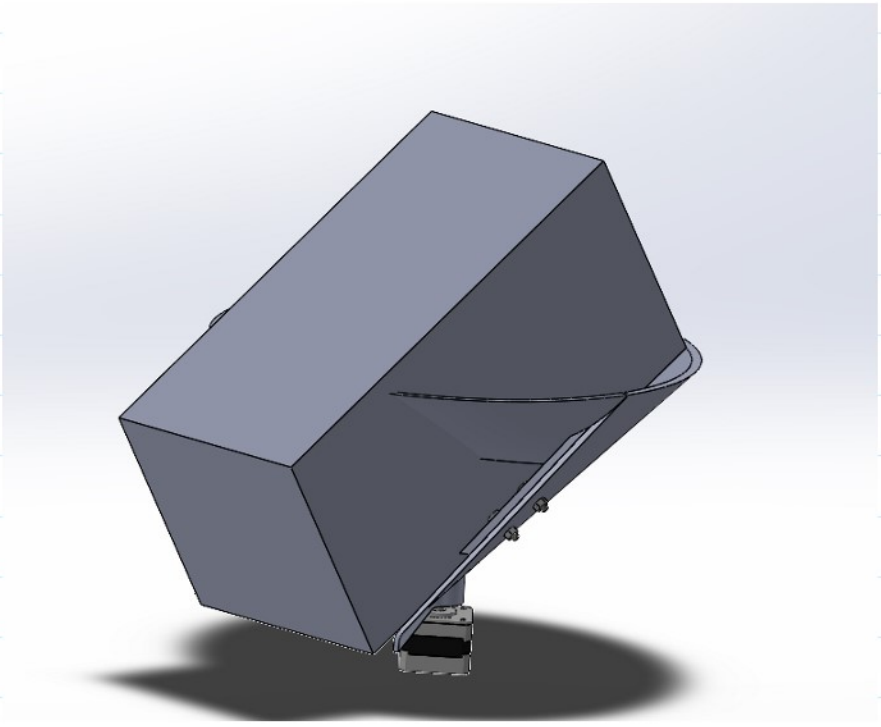
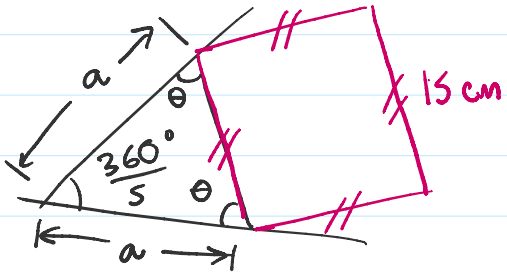
BREAK: LUNCH

START: 3:30

END: 4:30

For example, using the old size constraint:





$$2\theta + \frac{360}{5} = 180$$

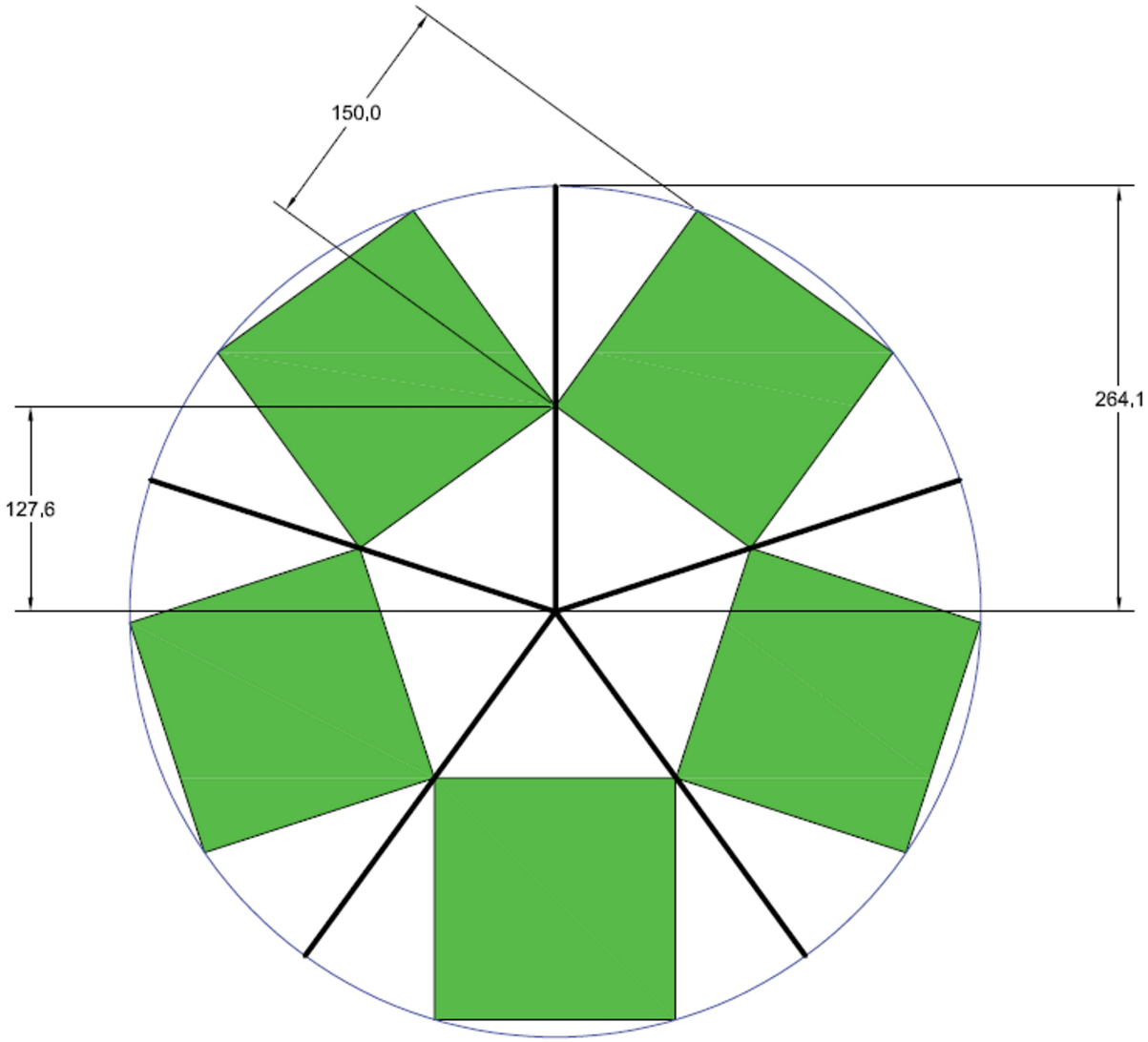
$$\theta = 54°$$

$$\frac{a}{\sin 54} = \frac{15}{\sin(360/5)}$$

$$a = 12.75976 \text{ cm}$$

$$= 127.5976 \text{ mm}$$

* Assuming straight drop (no curved surface on chute) and 15cm x 15cm cross section:



Entire output assembly would have a footprint of at least
264.1 x 2 mm = 528.2 mm in diameter
→ over half a meter!

→ this is also a very conservative estimate
→ assumed straight-drop chute instead of ramp
→ didn't take deceleration lip component into consideration
→ actual footprint would be larger still
→ too cumbersome.