FERMILAB-SLIDES-20-095-AD

Radioactive Cleaning Robot

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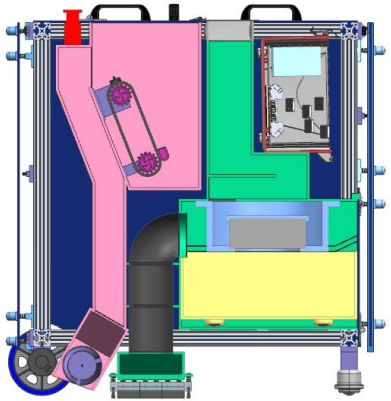
AD Robotics Initiative - CCI
5 August 2020

Radioactive Cleaning Robot

Problem

- Particle Accelerator Gives off Radioactive Dust
  - Dust build up can be harmful
- Dust requires yearly, expensive cleaning
  - Area must be shut down during this

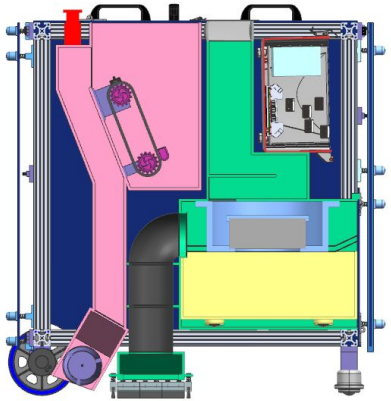


Solution

- Radioactive Cleaning Robot can be used attract and contain the harmful dust
- Can be ran year round to ensure constant cleaning

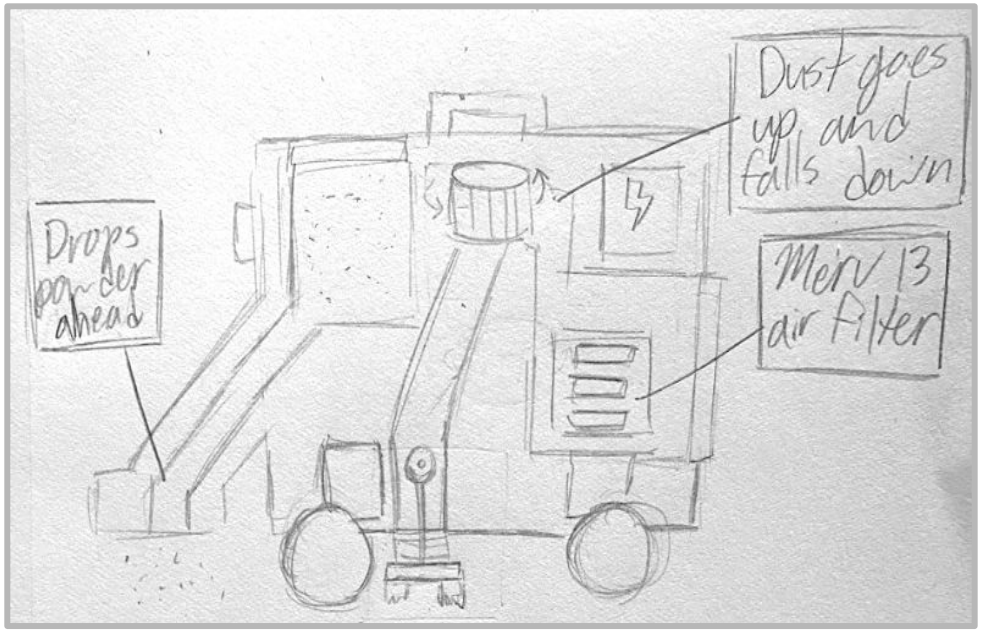
Radioactive Cleaning Robot

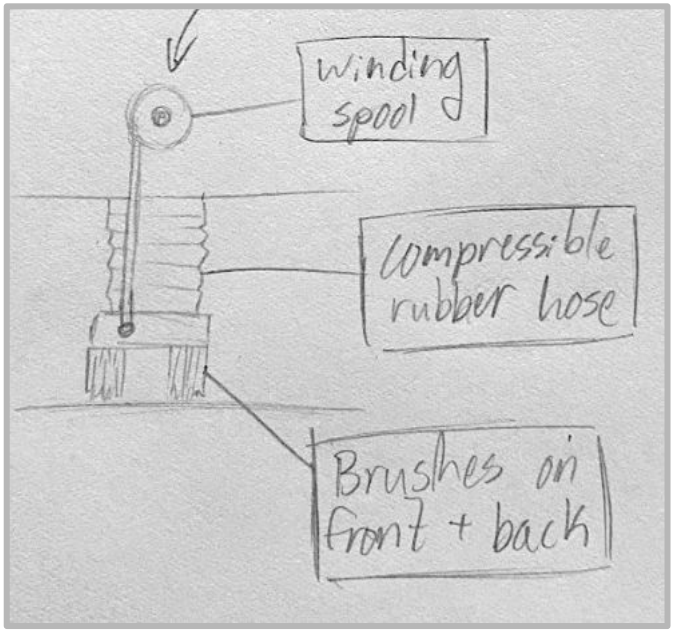
Functionality

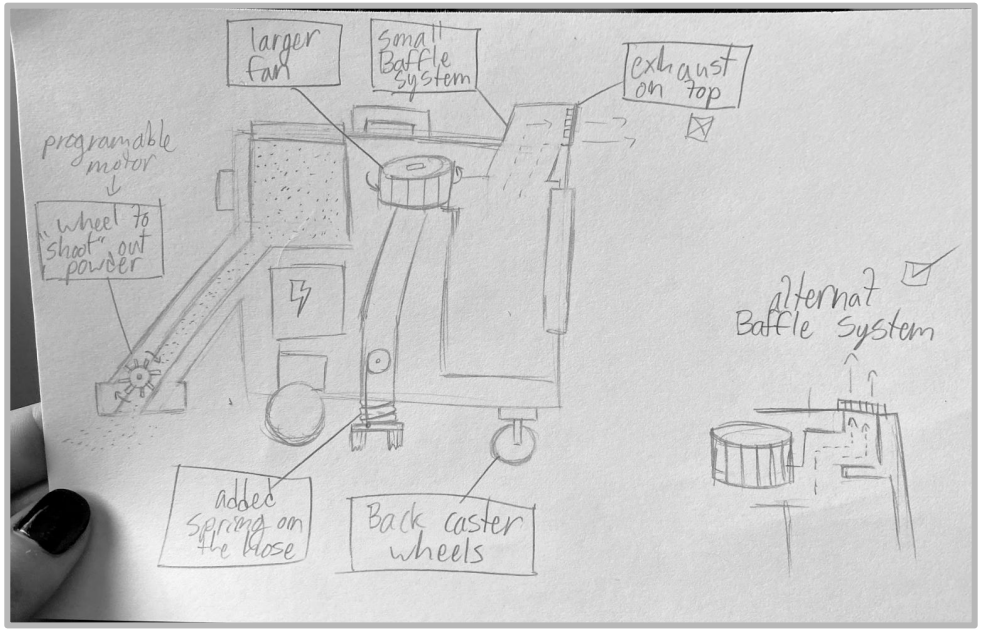


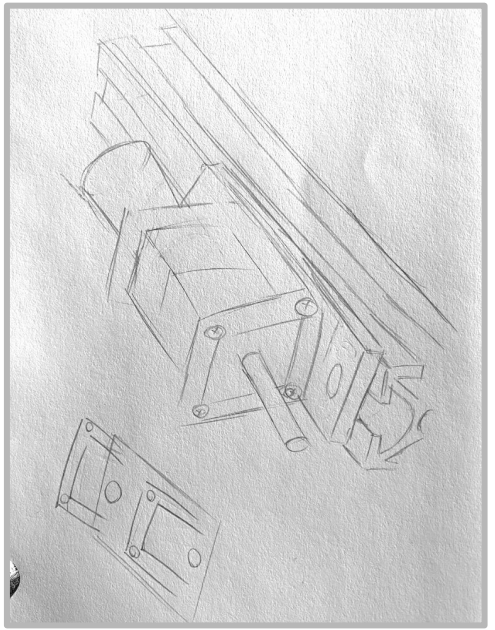
- Distributes “Tough Guy” powder
  - Special powder attracts radioactive dust
- Sucks up powder and dust combination
- Air flows through the vacuum into the reservoir
- Dust falls downward while air passes through the vacuum fan and filter
- Remaining dust settles in the baffle system
- Dust reservoir is removed and emptied via hatch/ramp combination
- Powder is refilled through top hatch

Concept Sketches


Dust goes up and falls down
Drops powder ahead
Merv 13 air filter


winding spool
compressible rubber hose
Brushes on front + back


larger fan
small Baffle system
exhaust on top
programable motor
wheel to shoot out powder
alternat Baffle System
added spring on the hose
Back caster wheels



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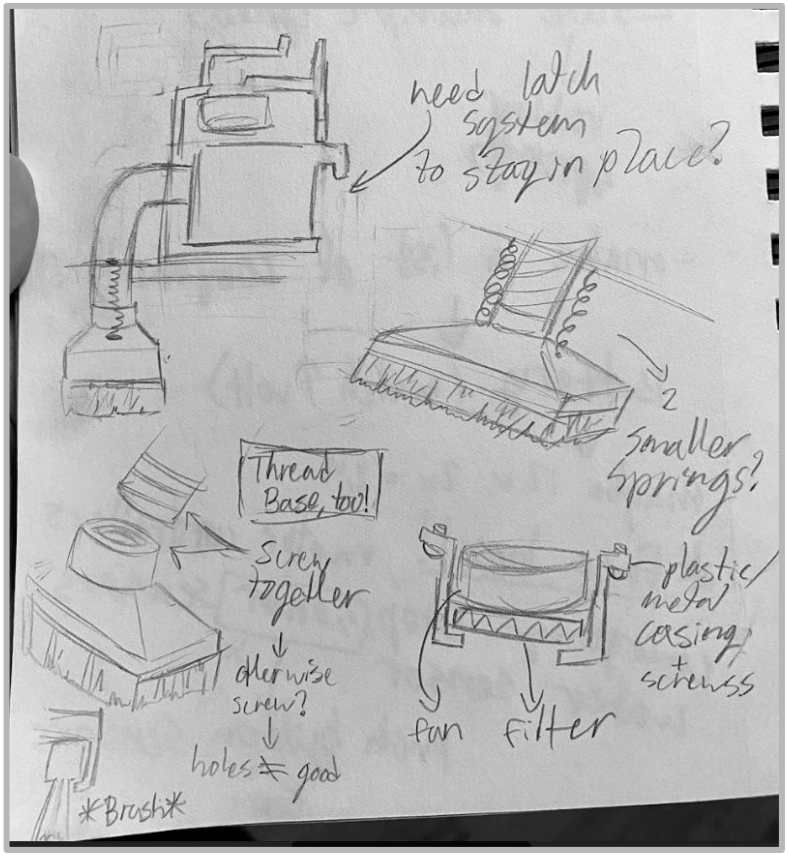
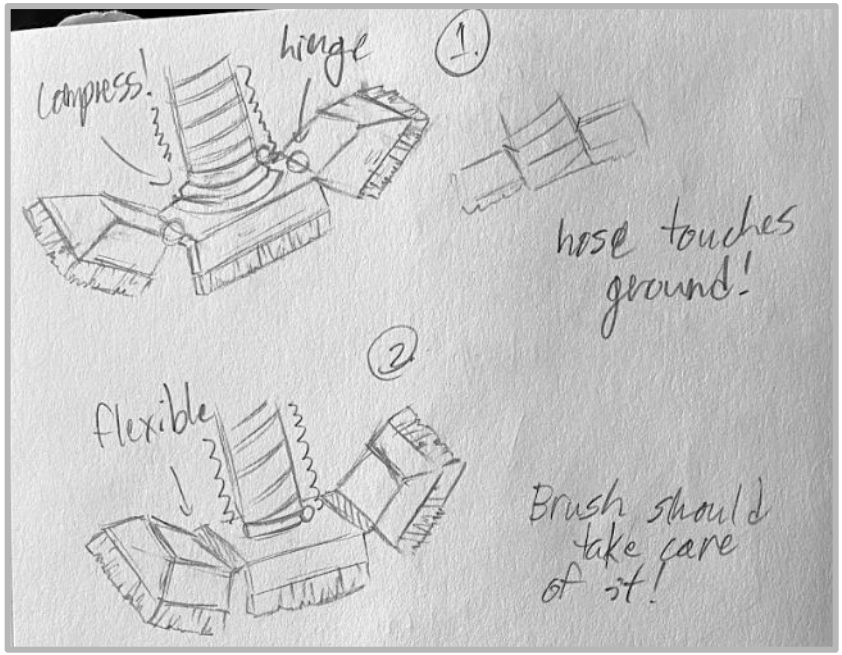
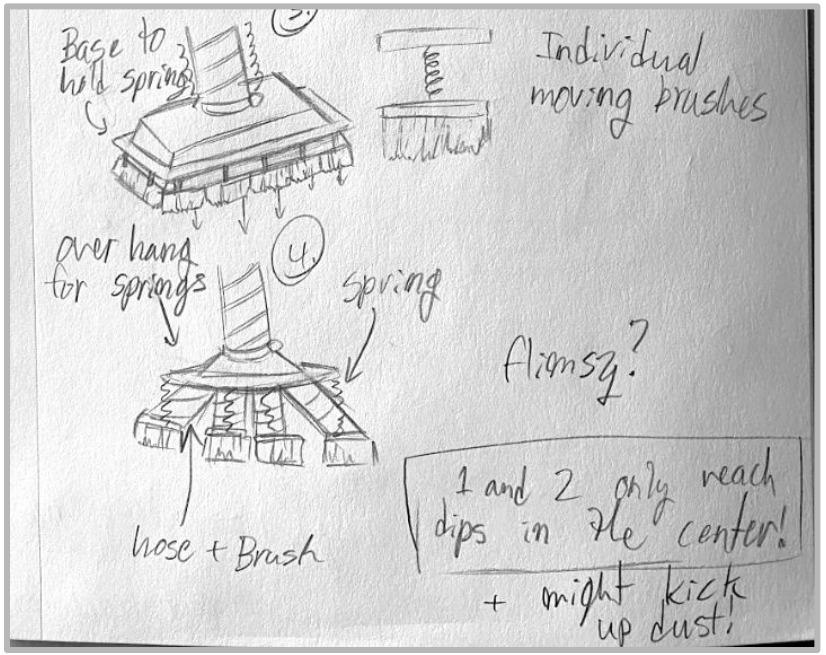
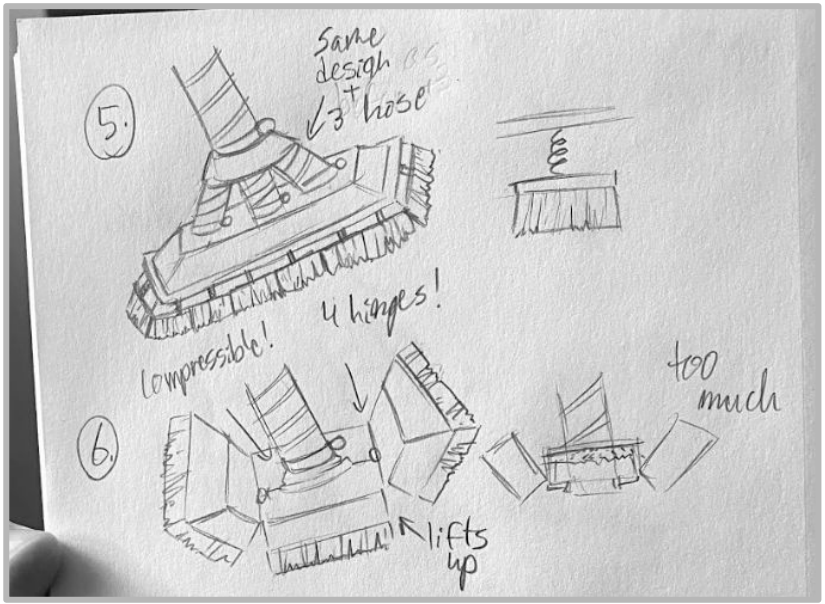
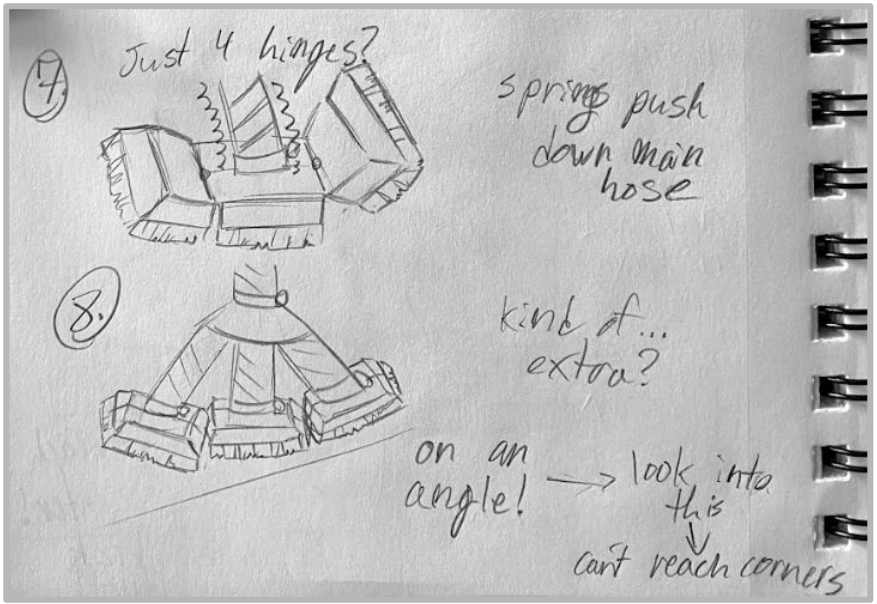

need latch system to stay in place?
2 smaller springs?
Thread Base, too!
Screw together
otherwise screw?
holes ≠ good
Brush
plastic/ metal casing + screwss
pan
filter

Fermilab


Compress!
hinge
1.
hose touches ground!
2
flexible
Brush should take care of it!


Base to hold springs
Individual moving brushes
over hang for springs
4
spring
flimsy?
hose + Brush
1 and 2 only reach dips in the center!
+ might kick up dust!


5.
same design
3+ hose
4 hinges!
compressible!
6.
too much
lifts up


7.
Just 4 hinges?
springs push down main hose
8.
kind of... extra?
on an angle!
look into this
can't reach corners

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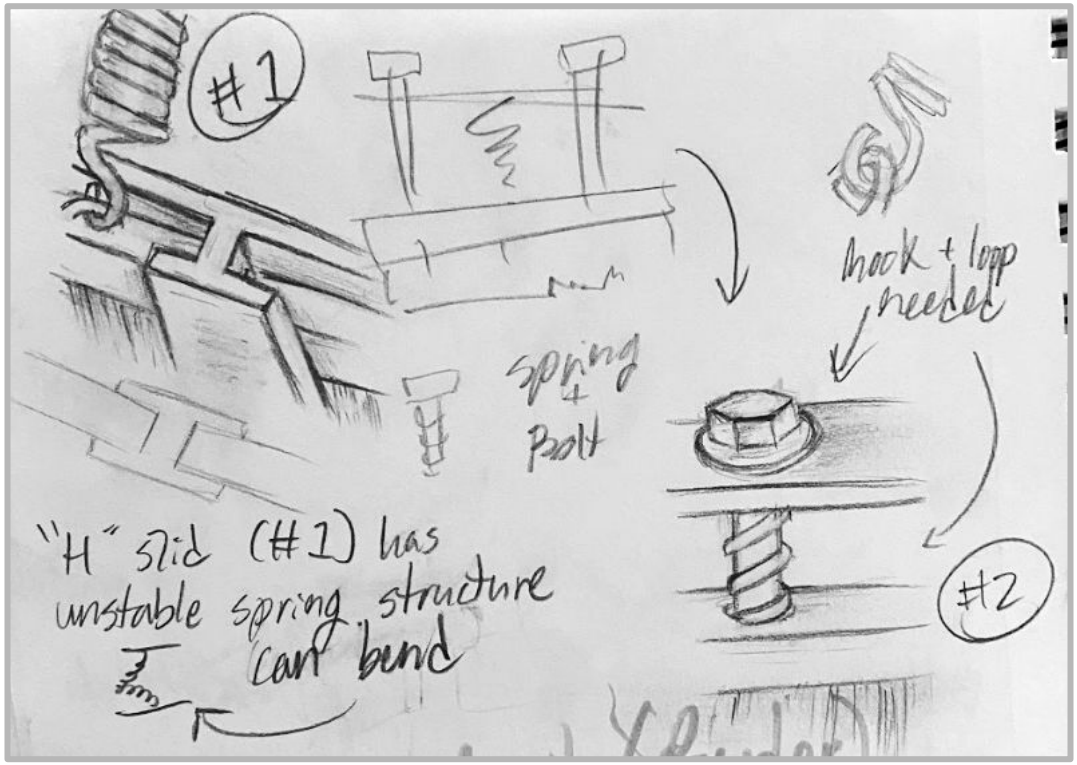
#1
spring + bolt
hook + loop needed
#2
"H" slid (#1) has unstable spring structure can bend

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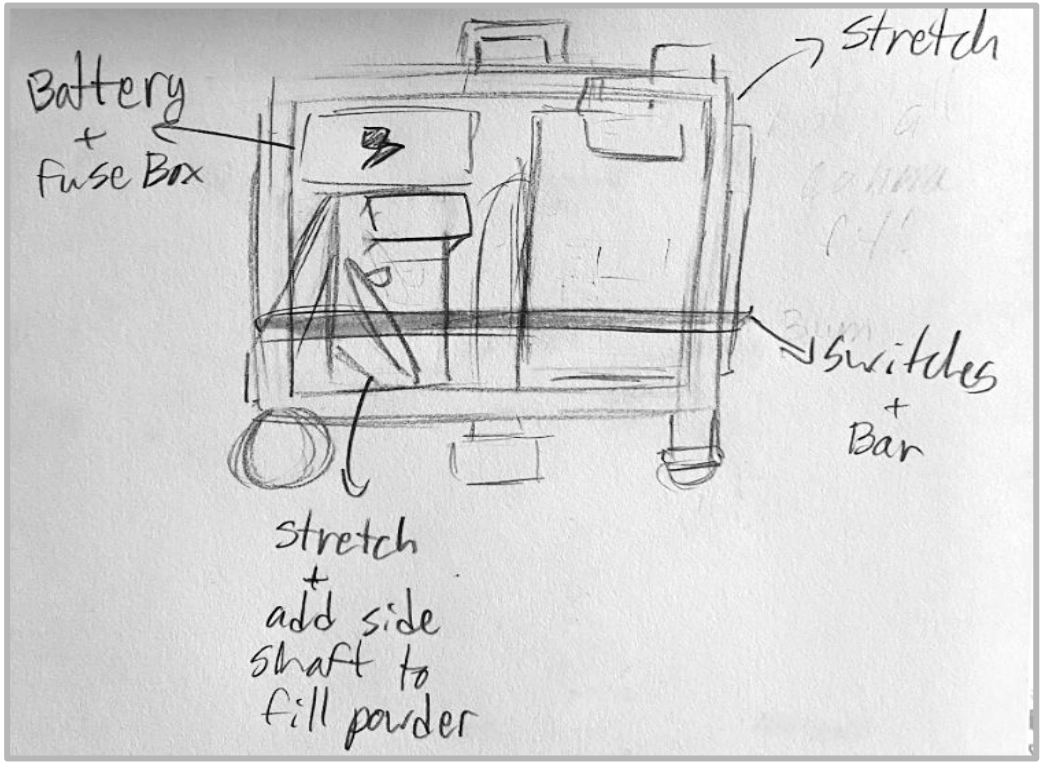
Battery
+
fuse Box
Stretch
Switches
+
Bar
Stretch
+
add side
shaft to
fill powder

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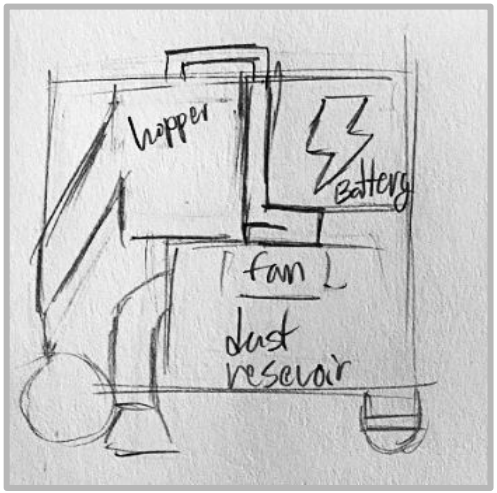

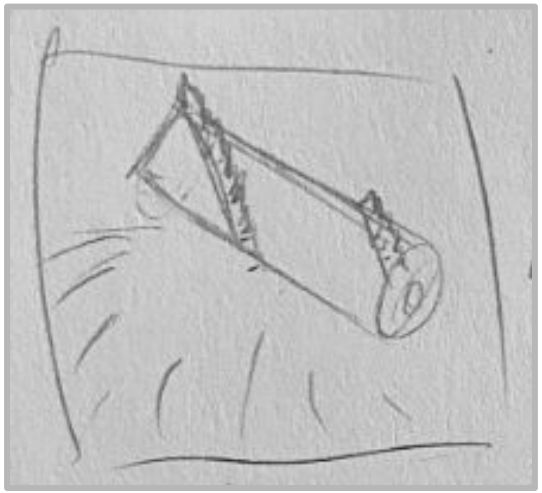

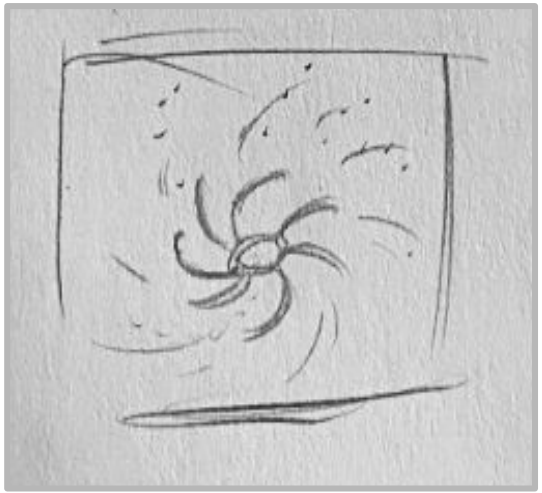

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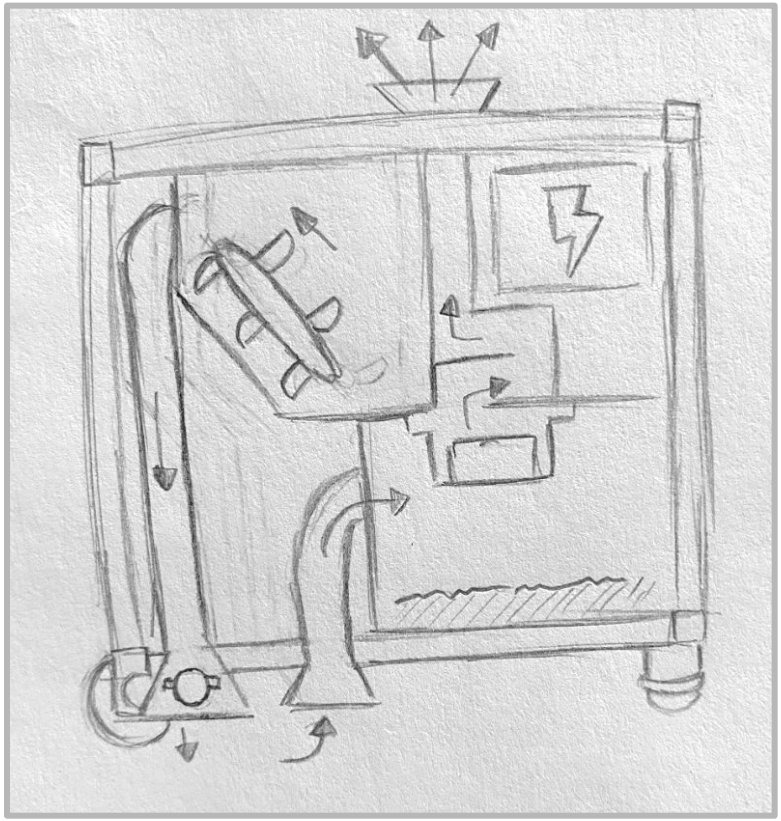
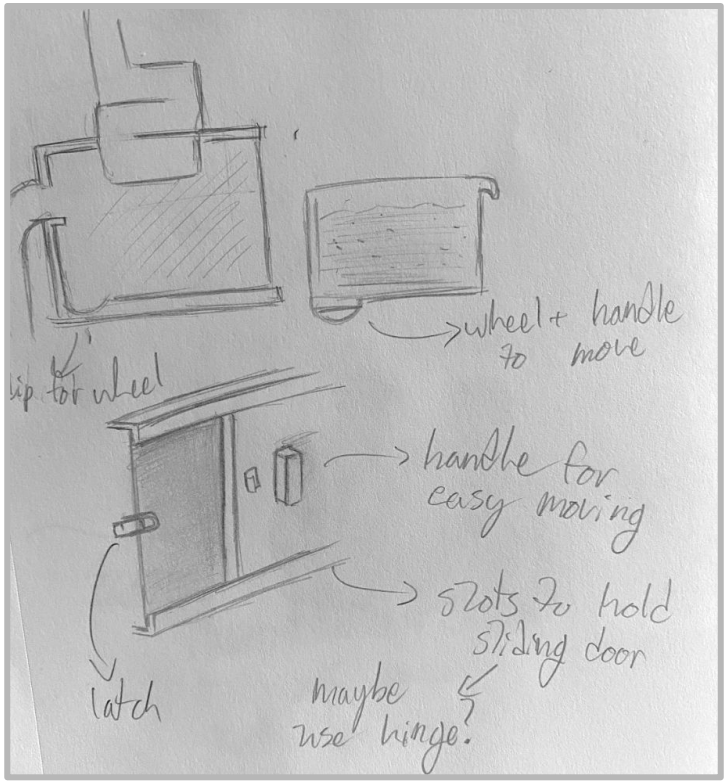
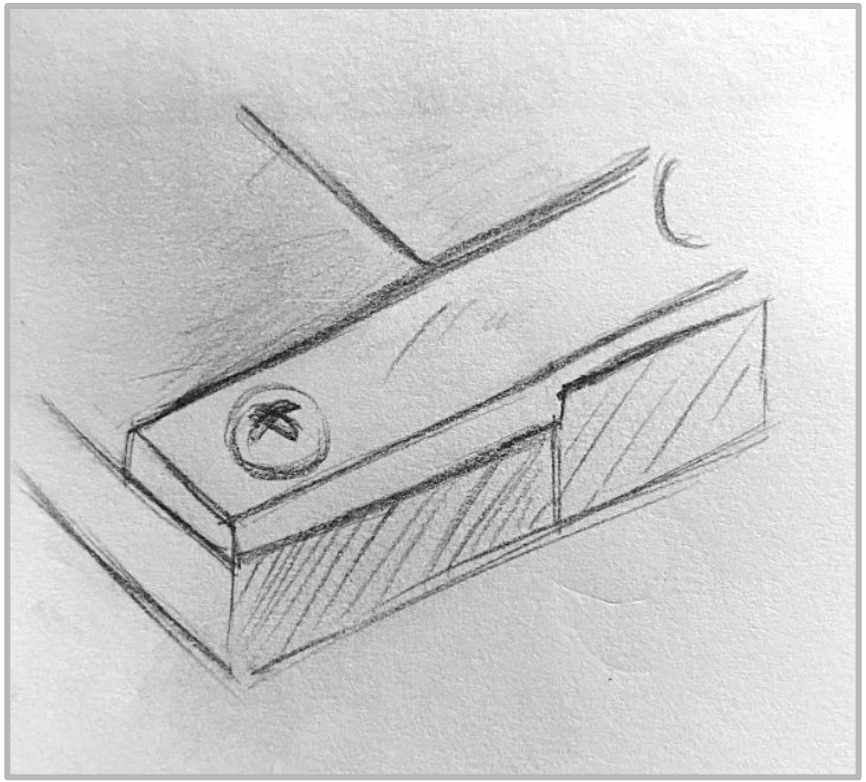



wheel + handle to move
lip for wheel
handle for easy moving
slots to hold sliding door
latch
maybe use hinge?



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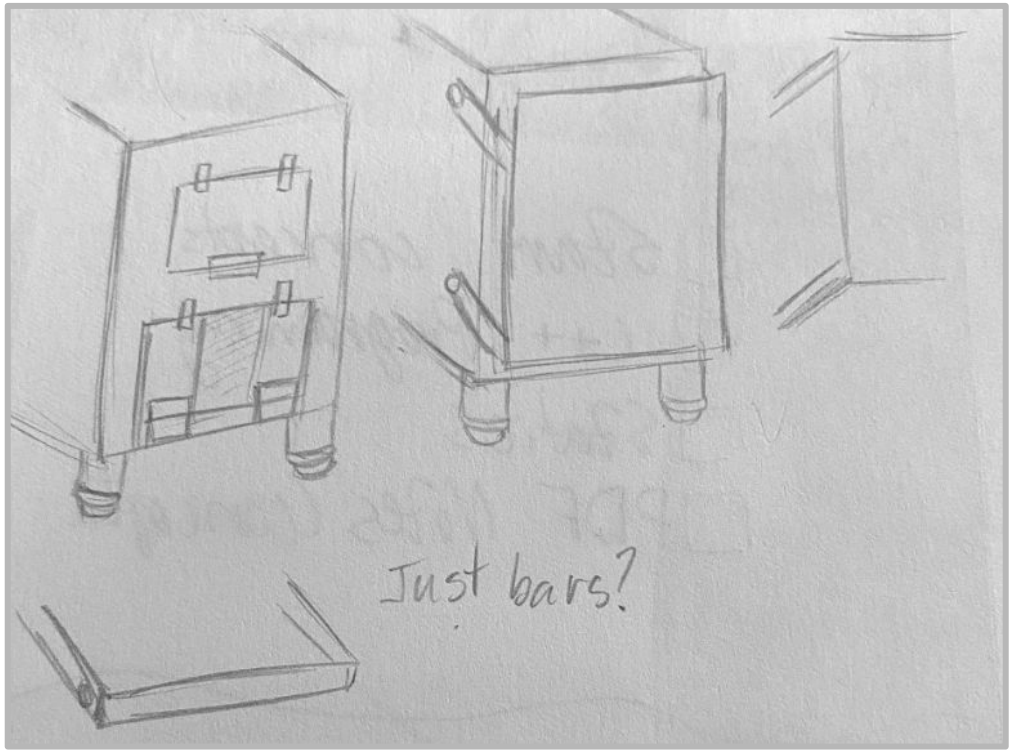

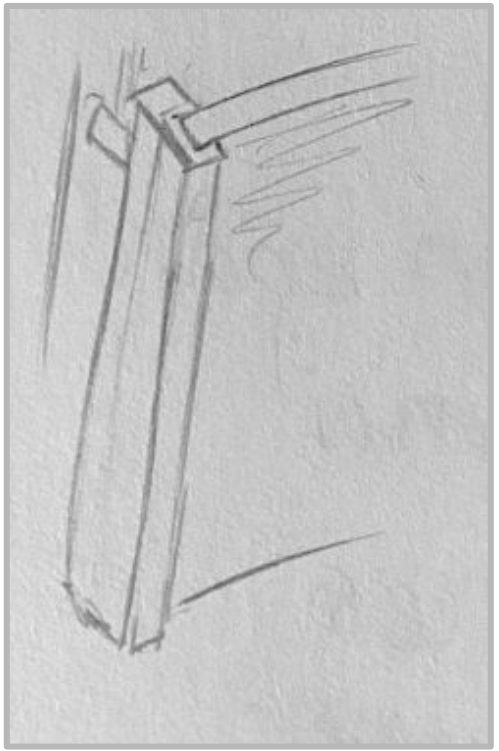

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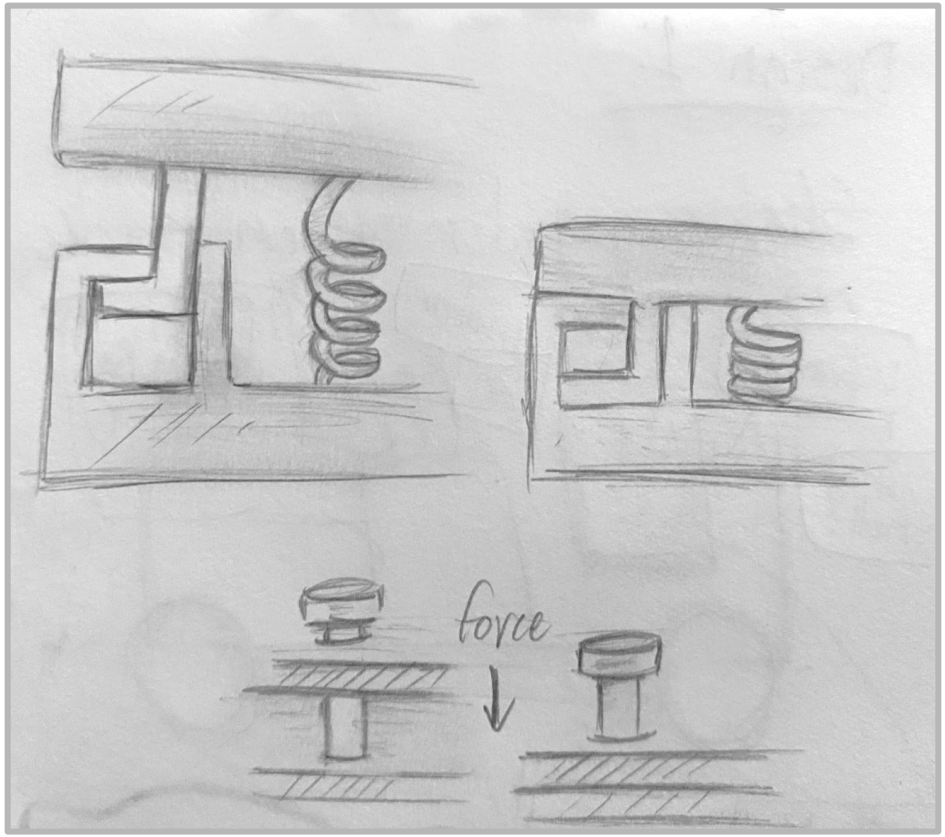

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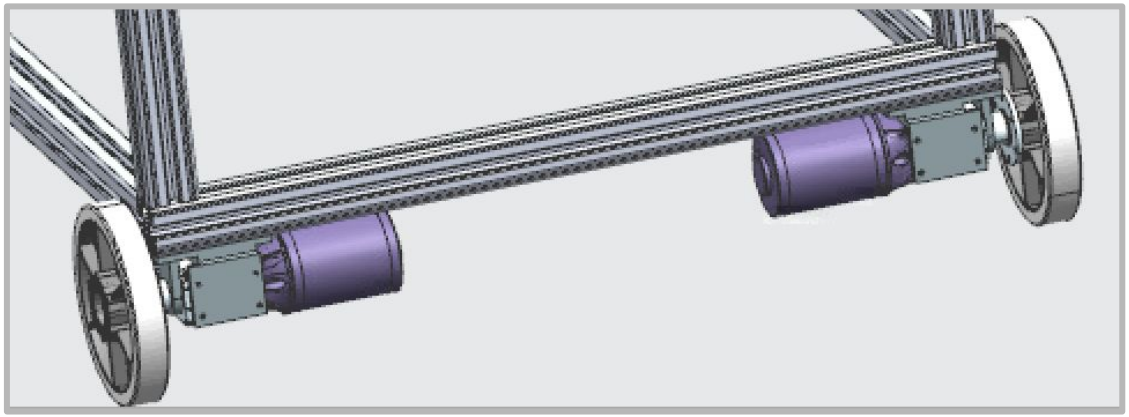
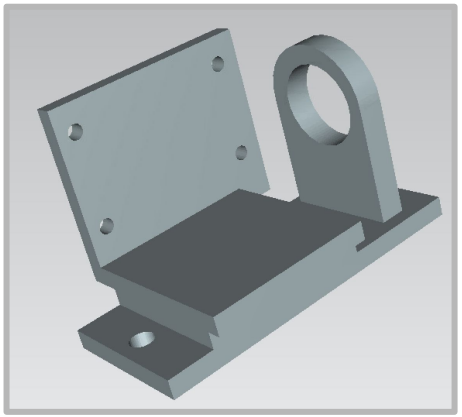
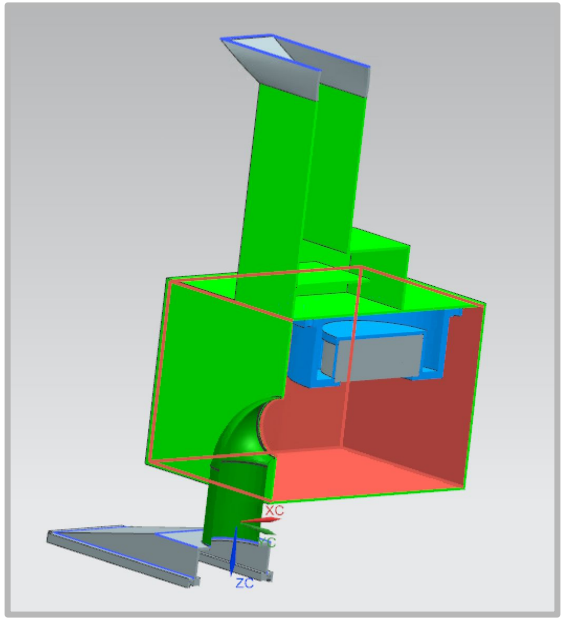
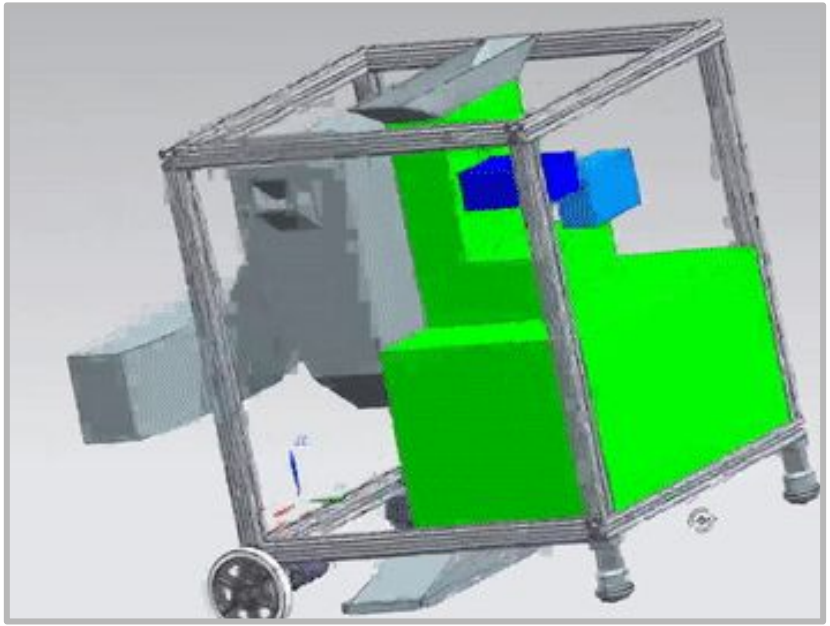
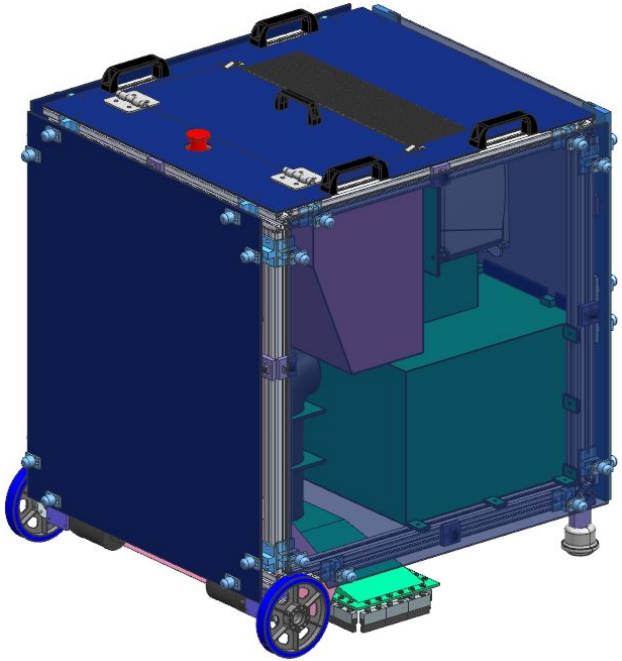
CAD Models

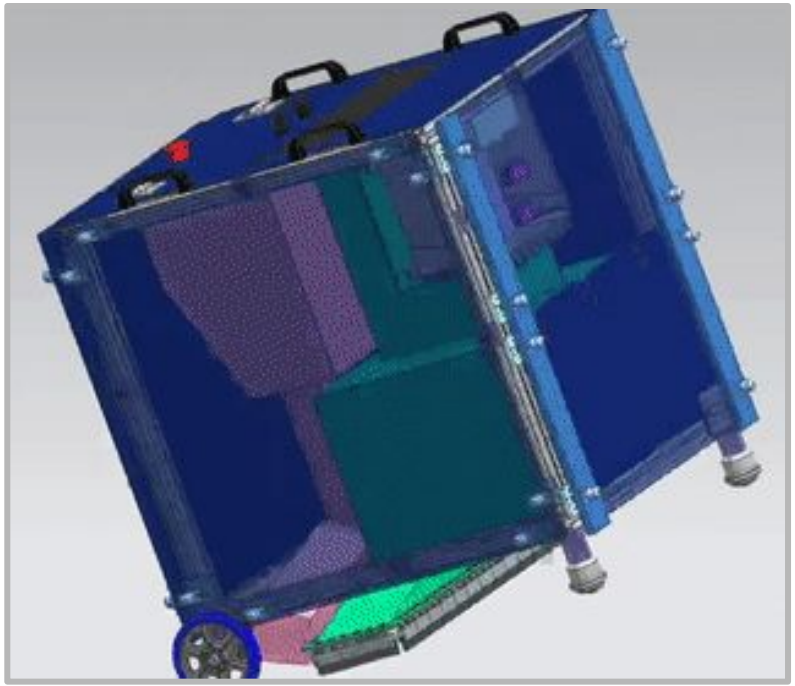


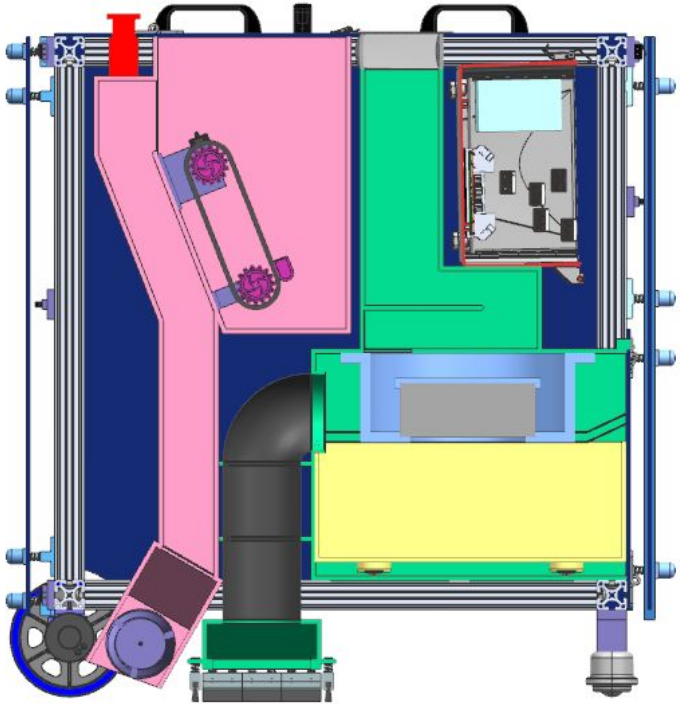


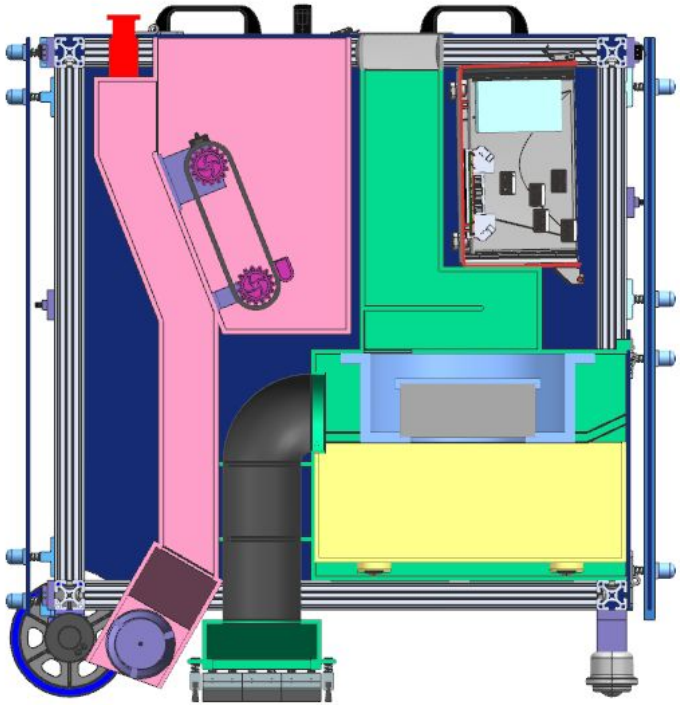

XC
ZC

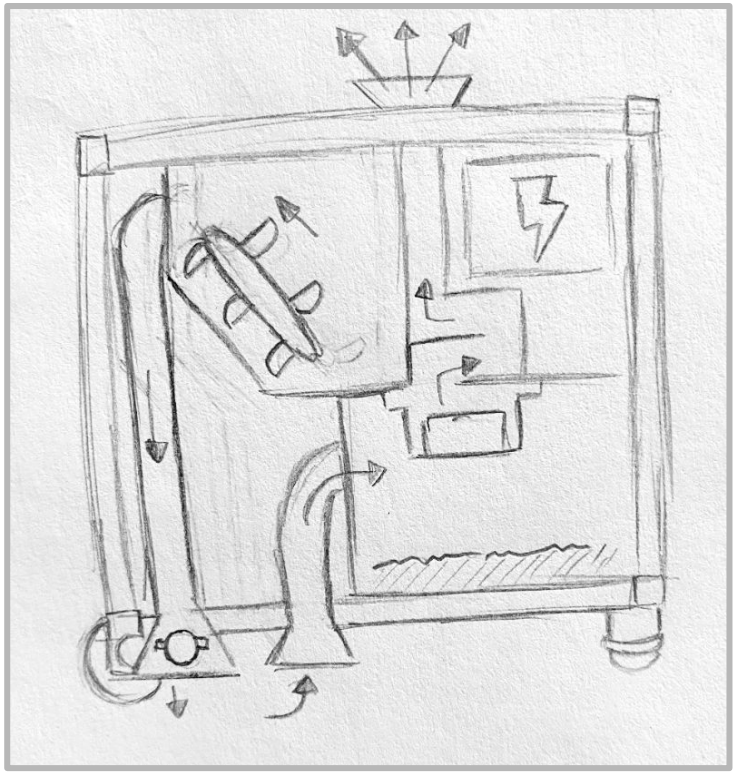












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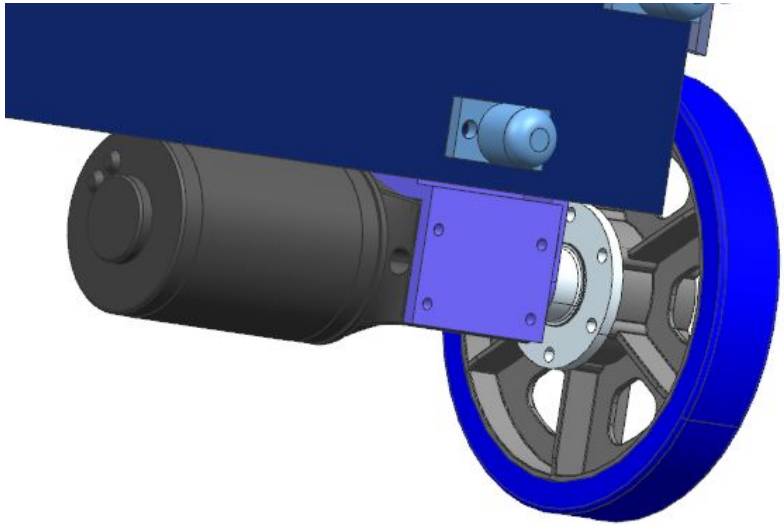

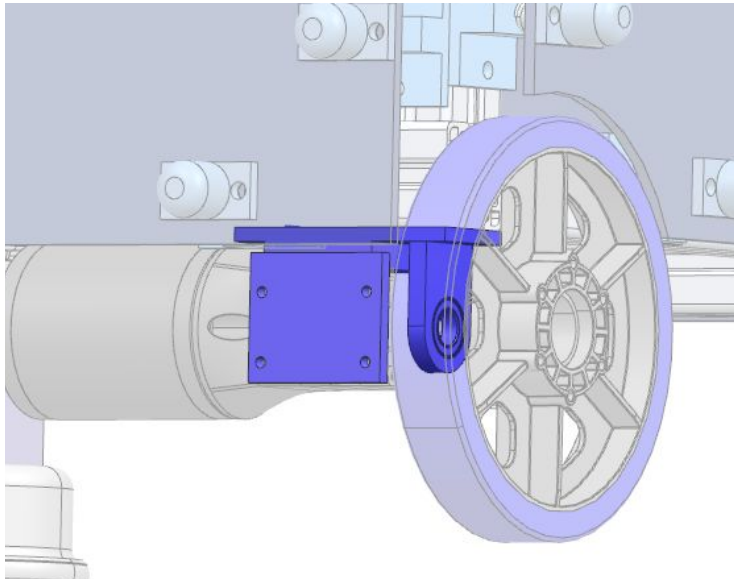

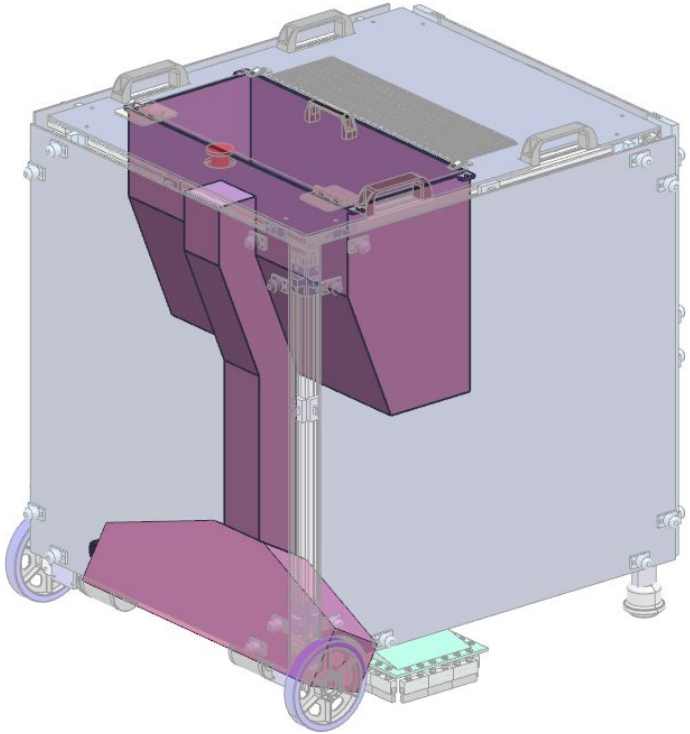

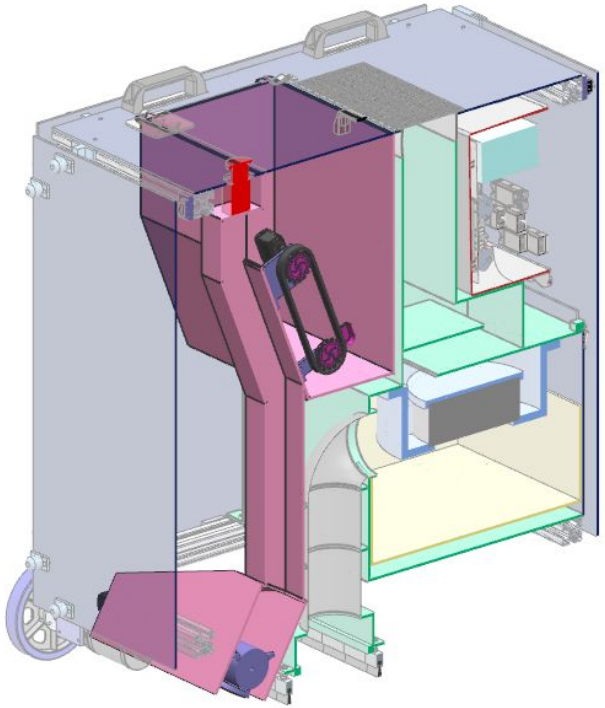

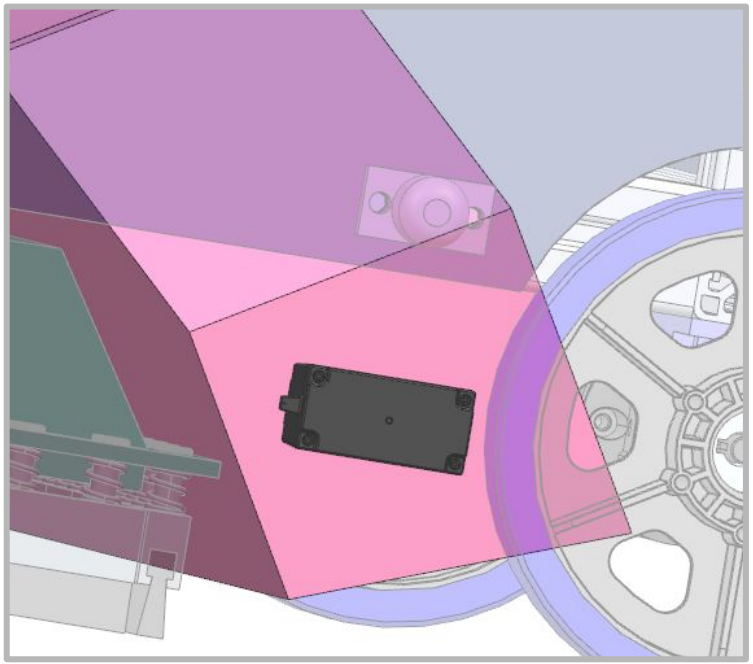

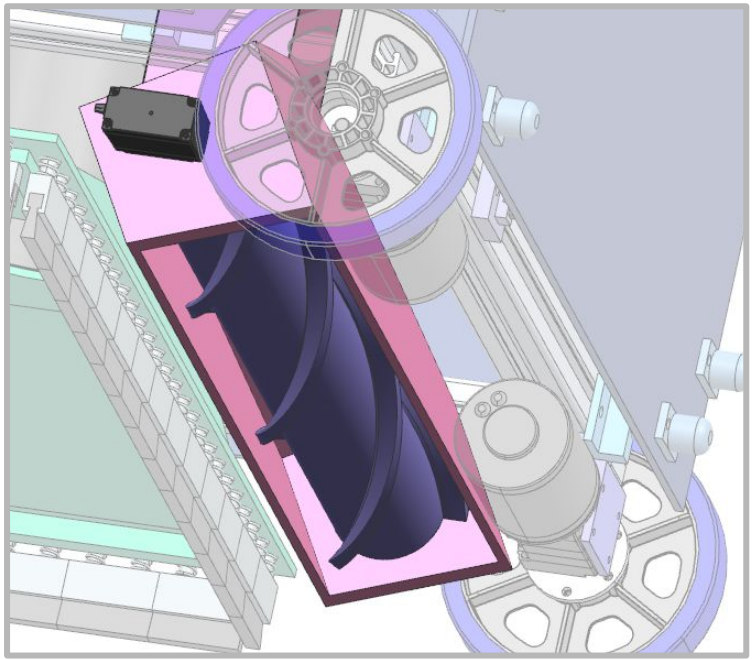

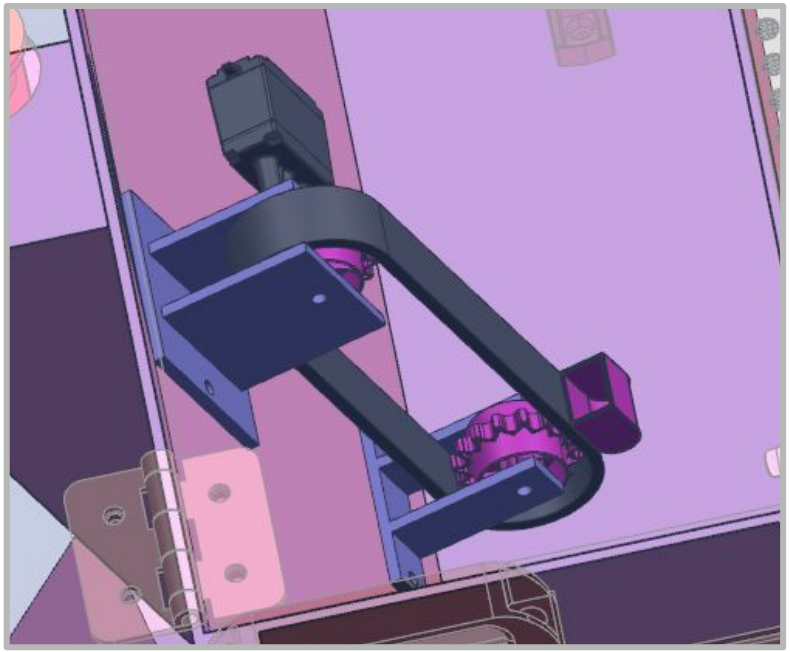

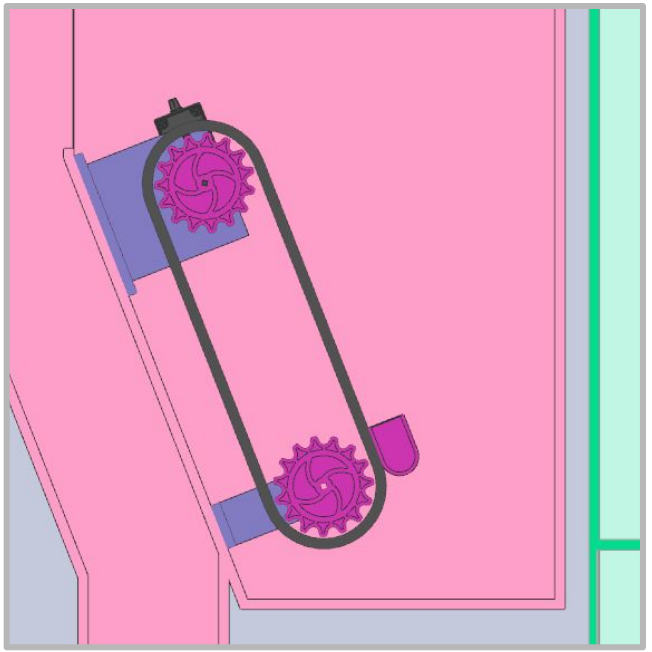

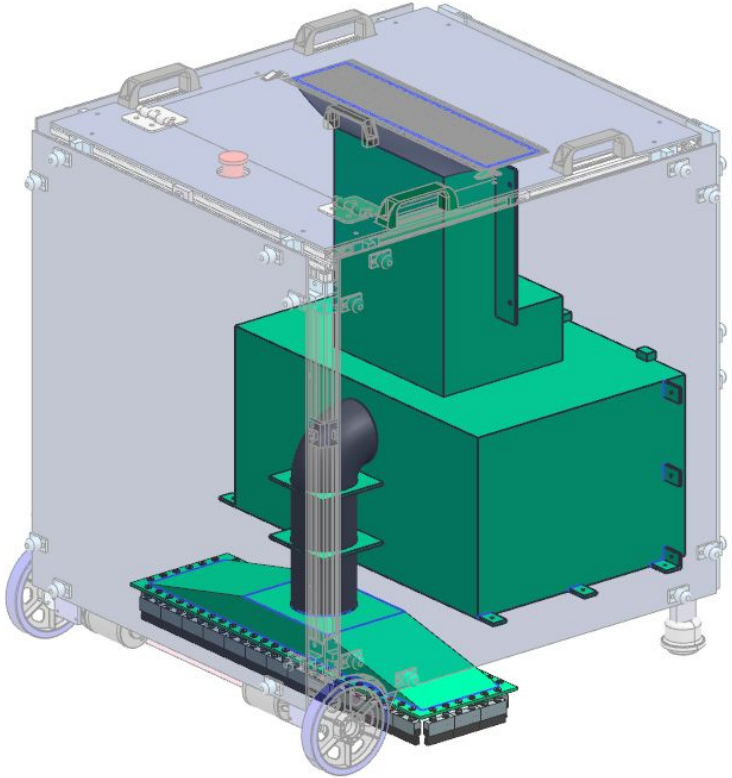

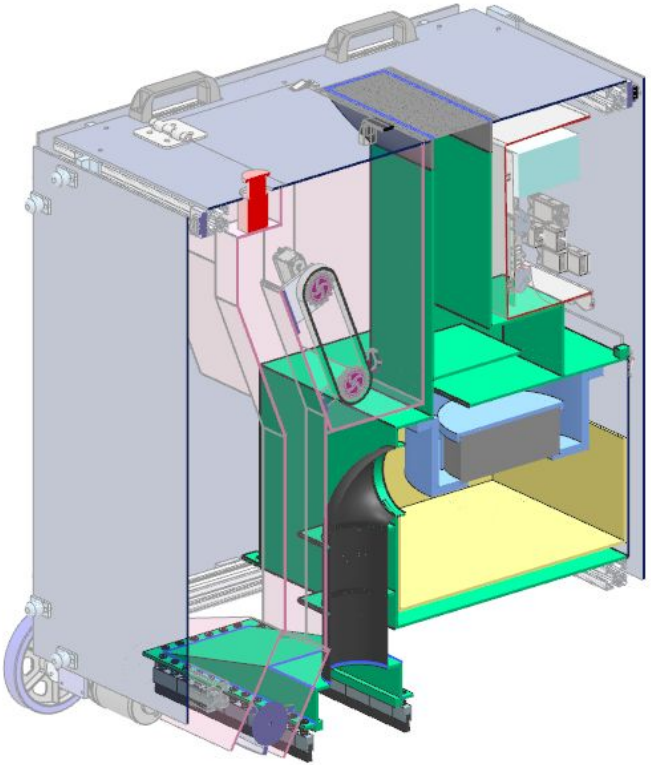

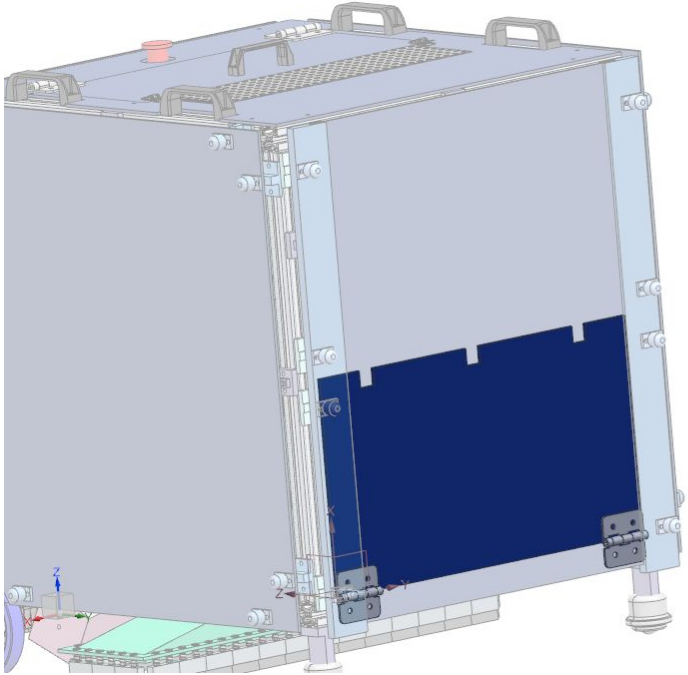

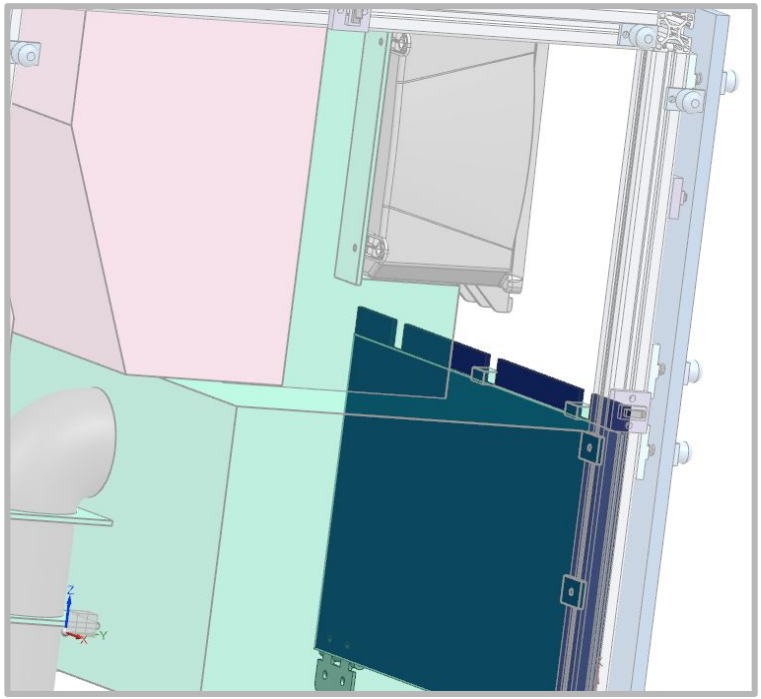

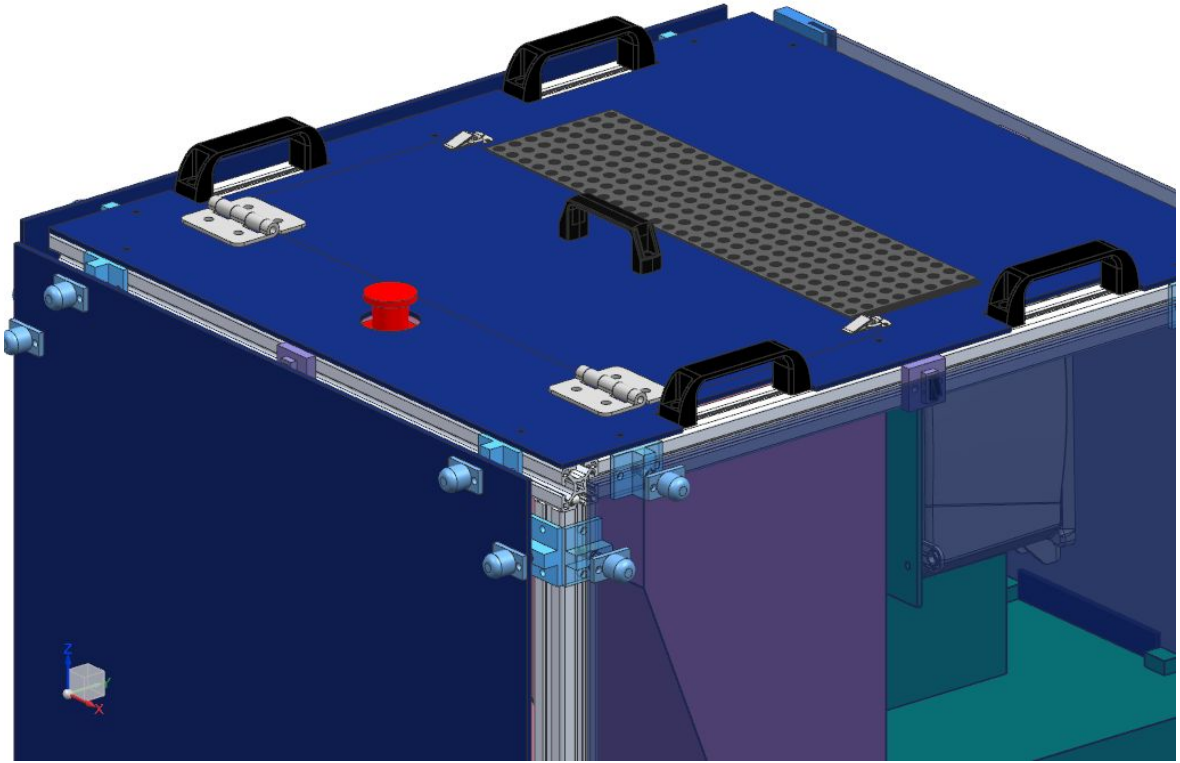

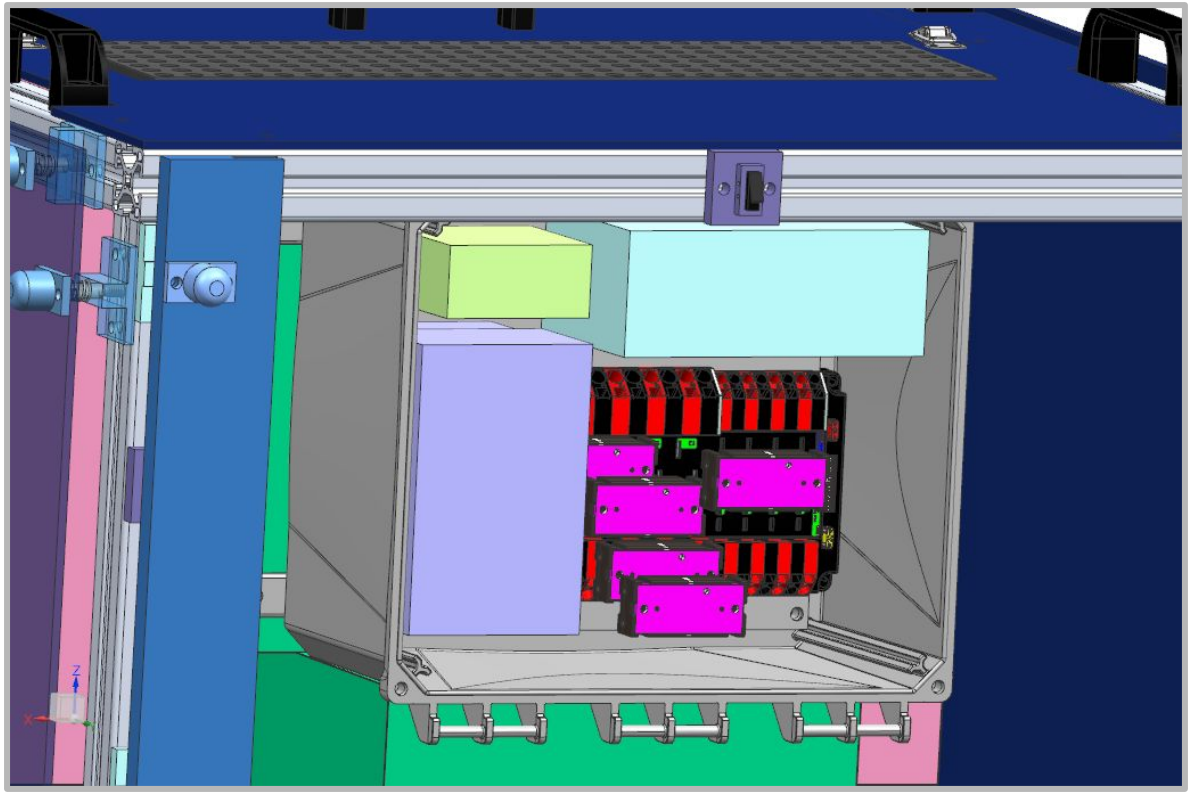

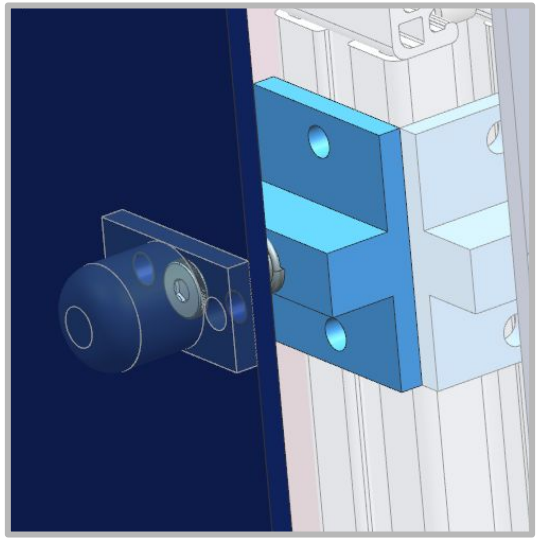

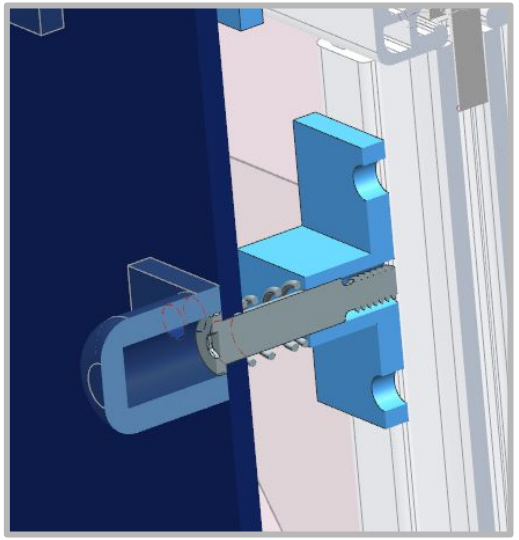

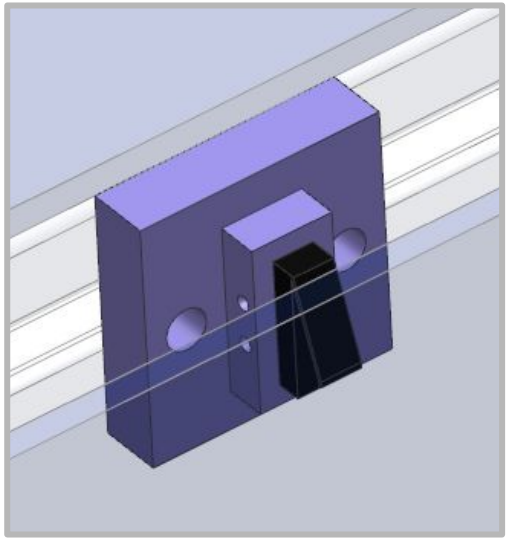

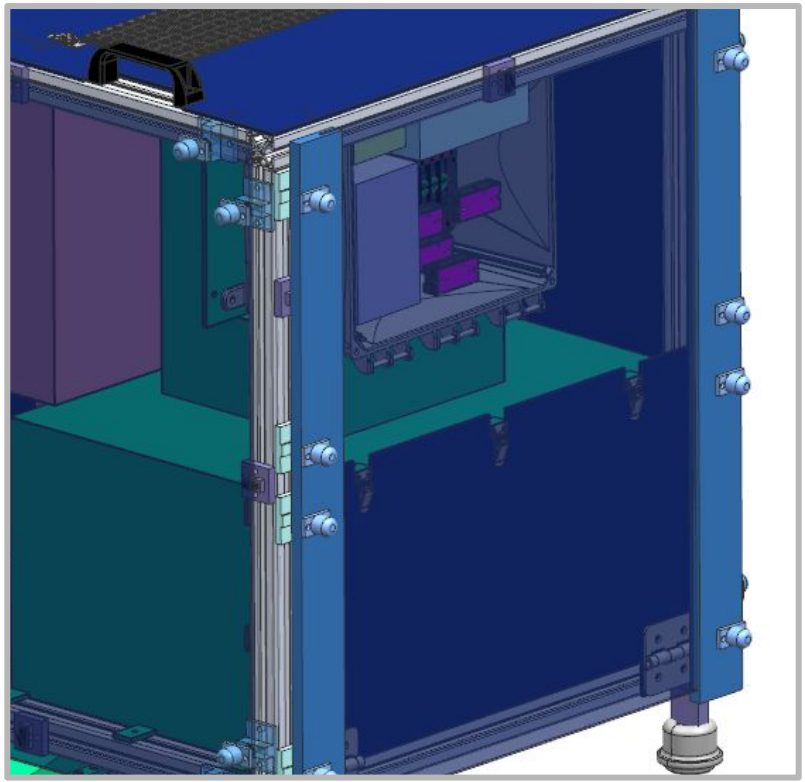

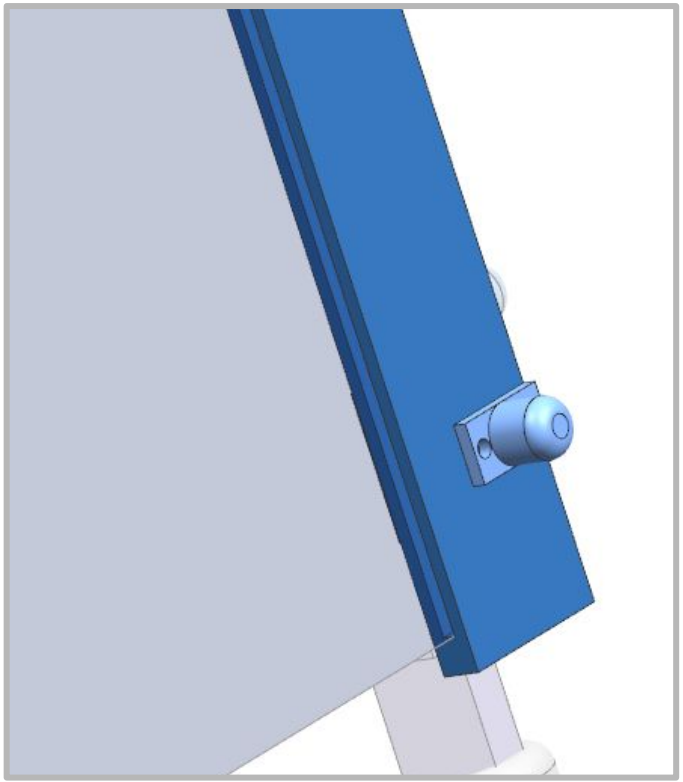

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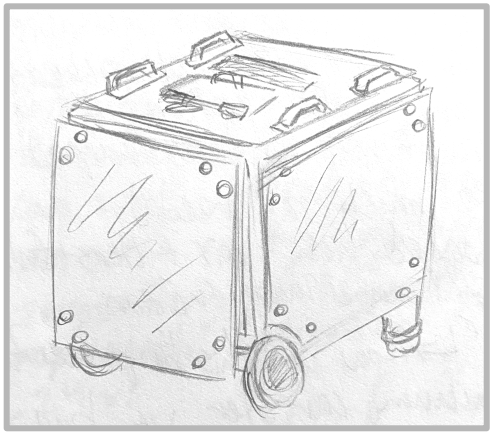
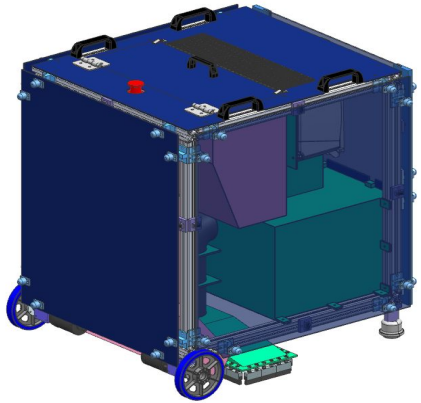
Thank you for attending!

Any questions?





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