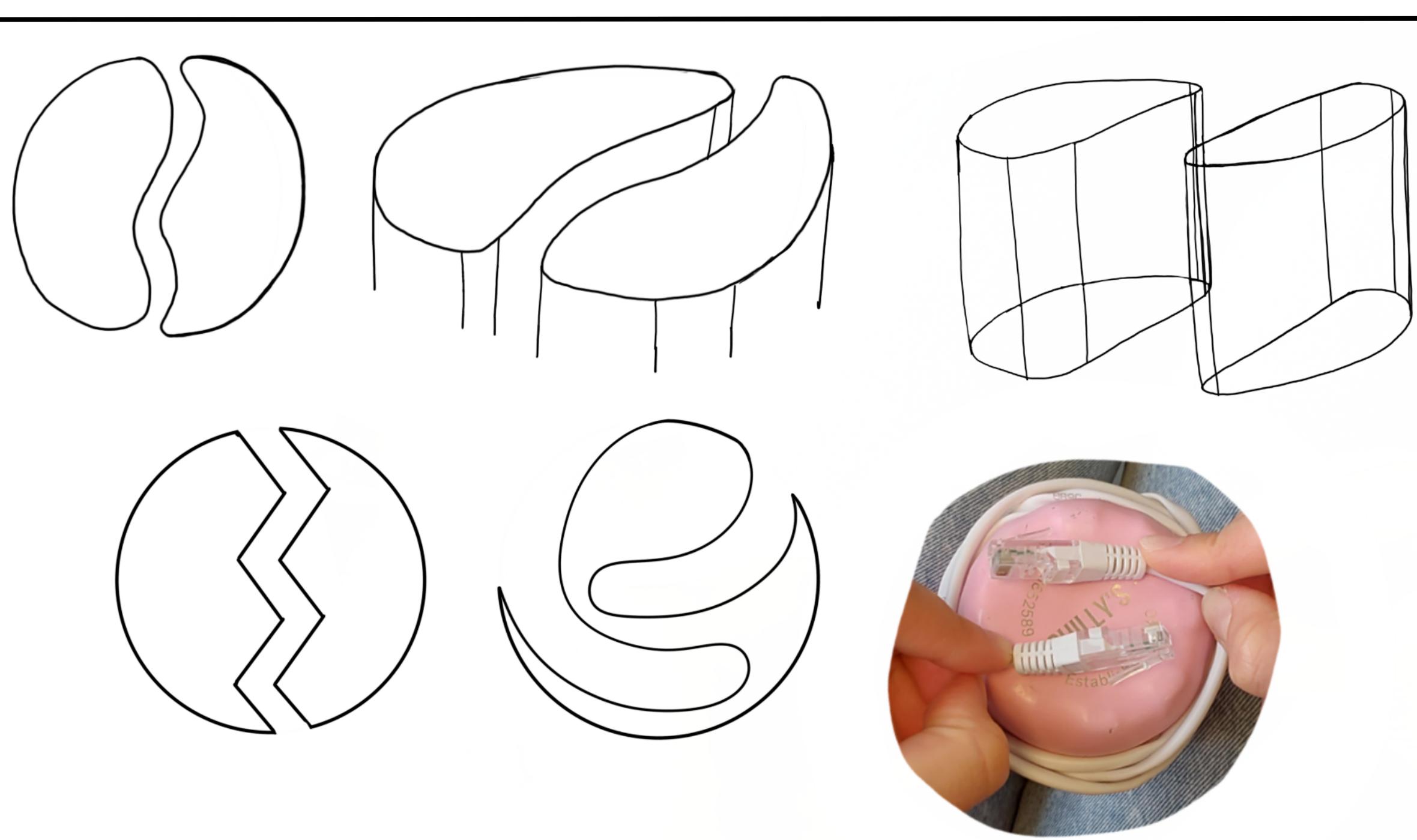
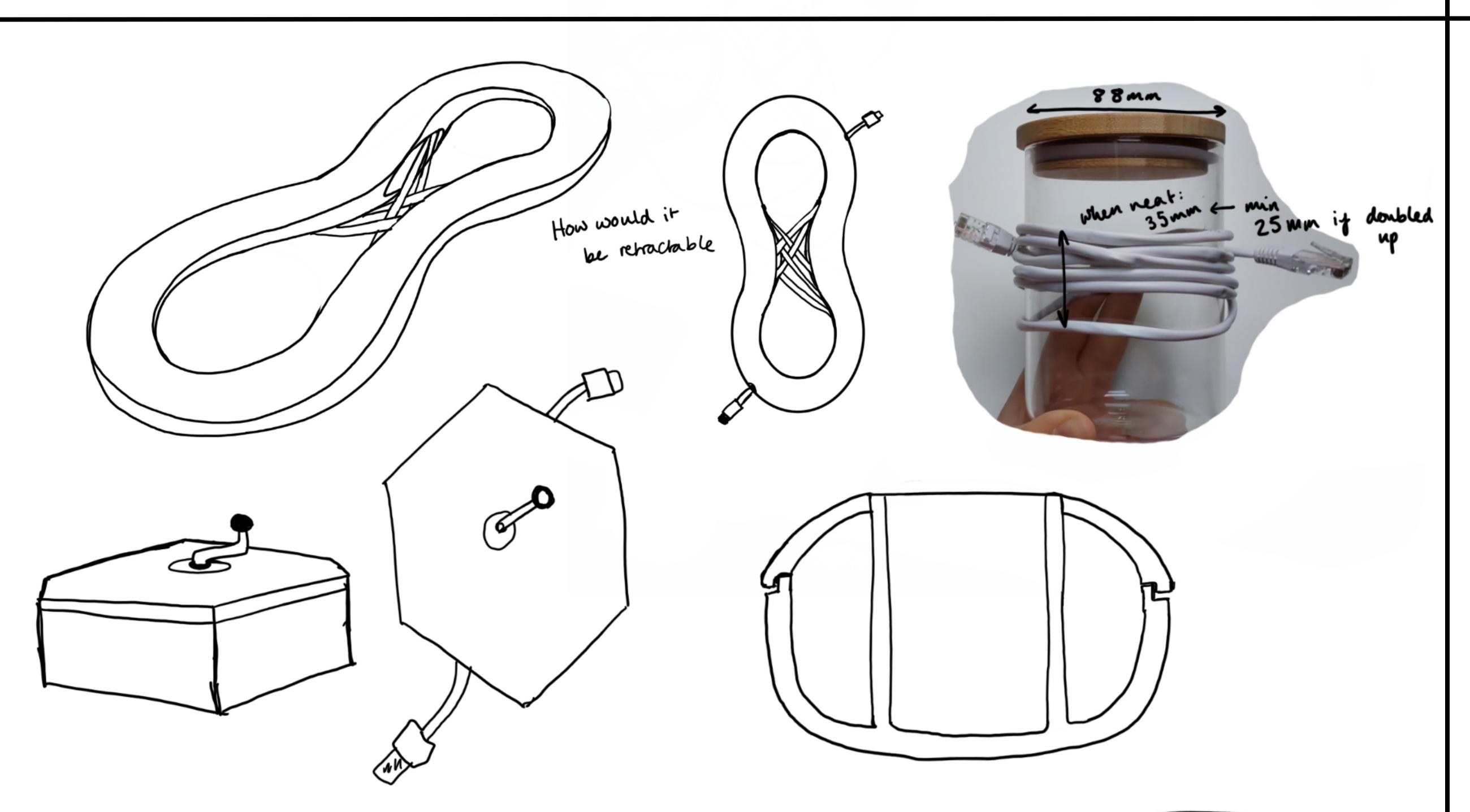
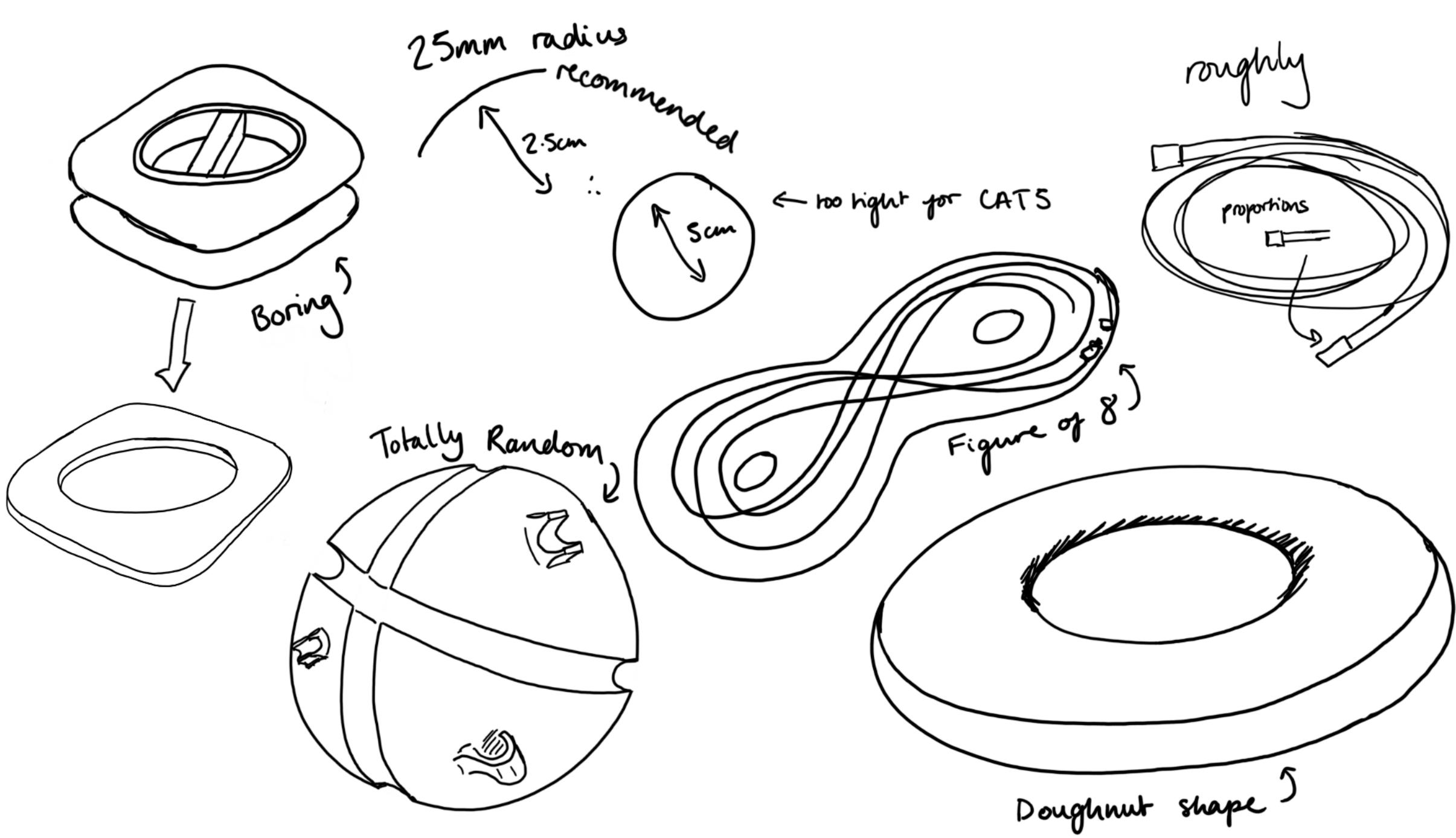
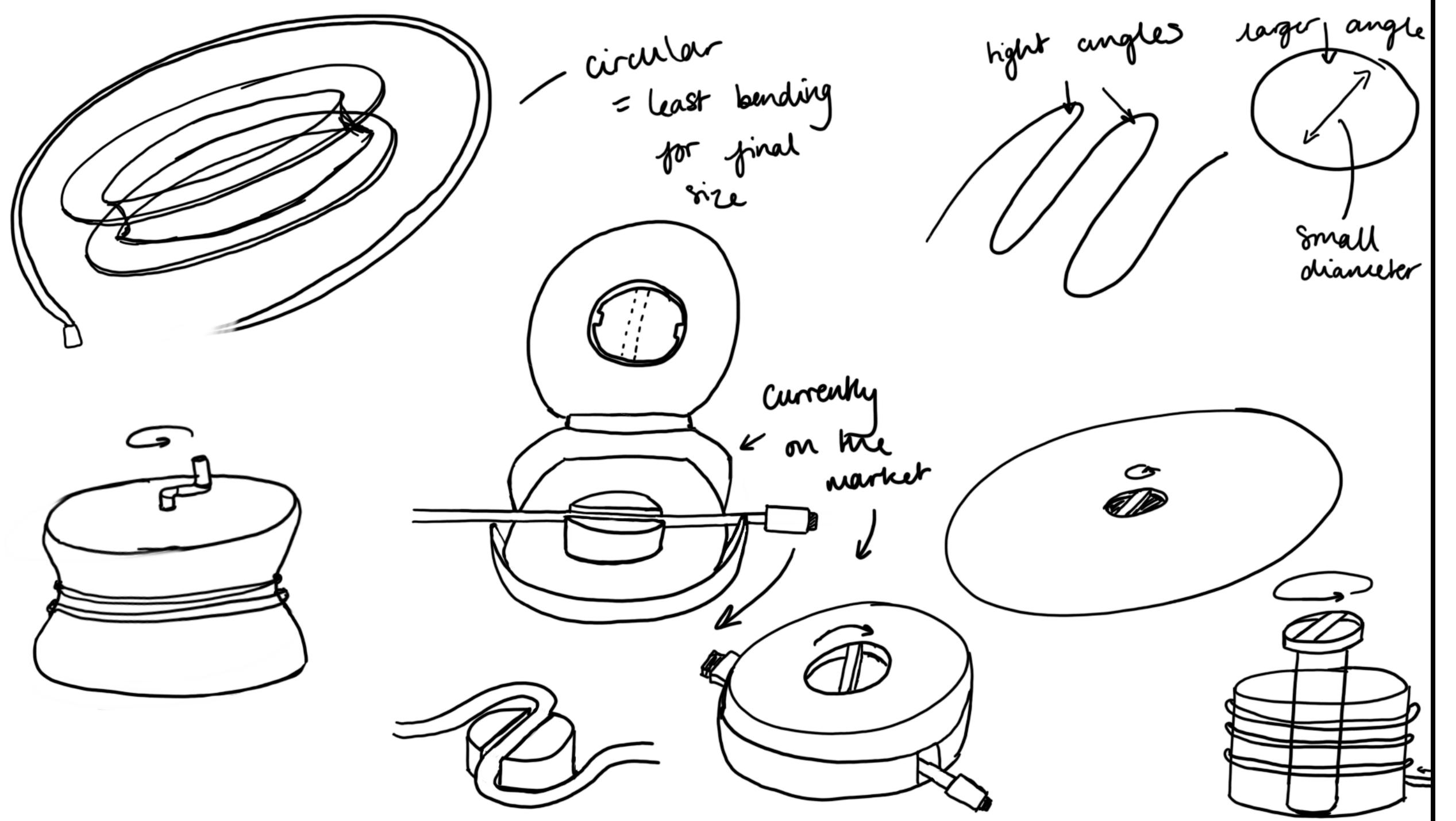
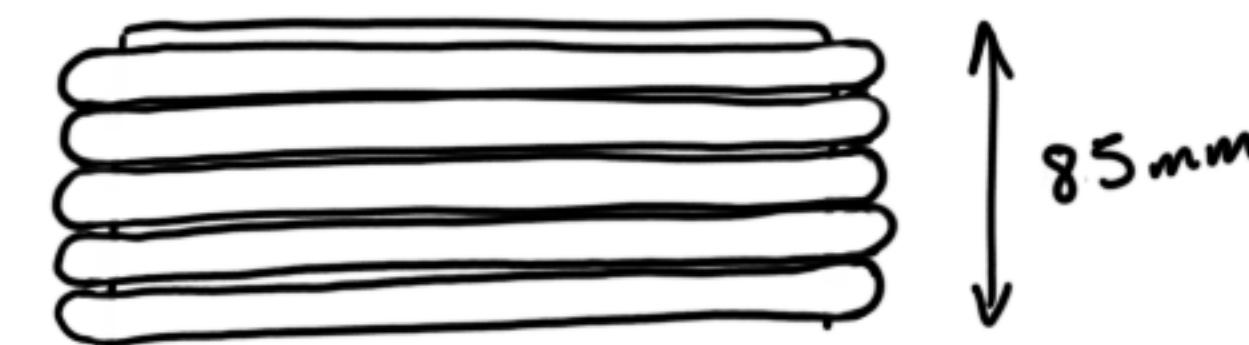
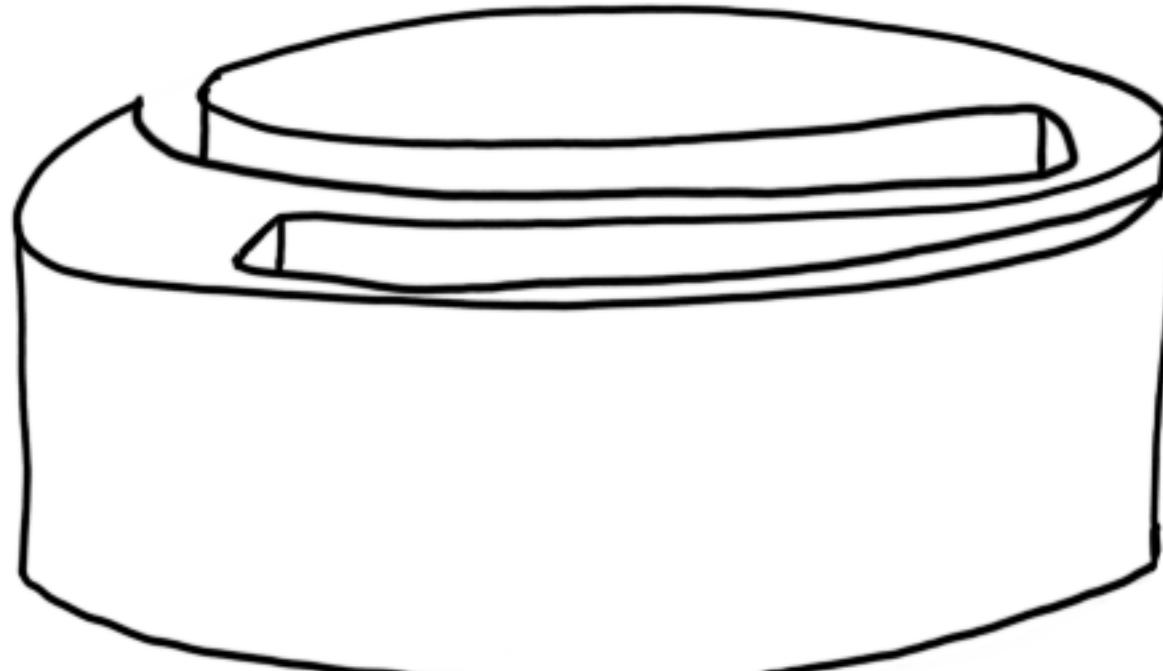
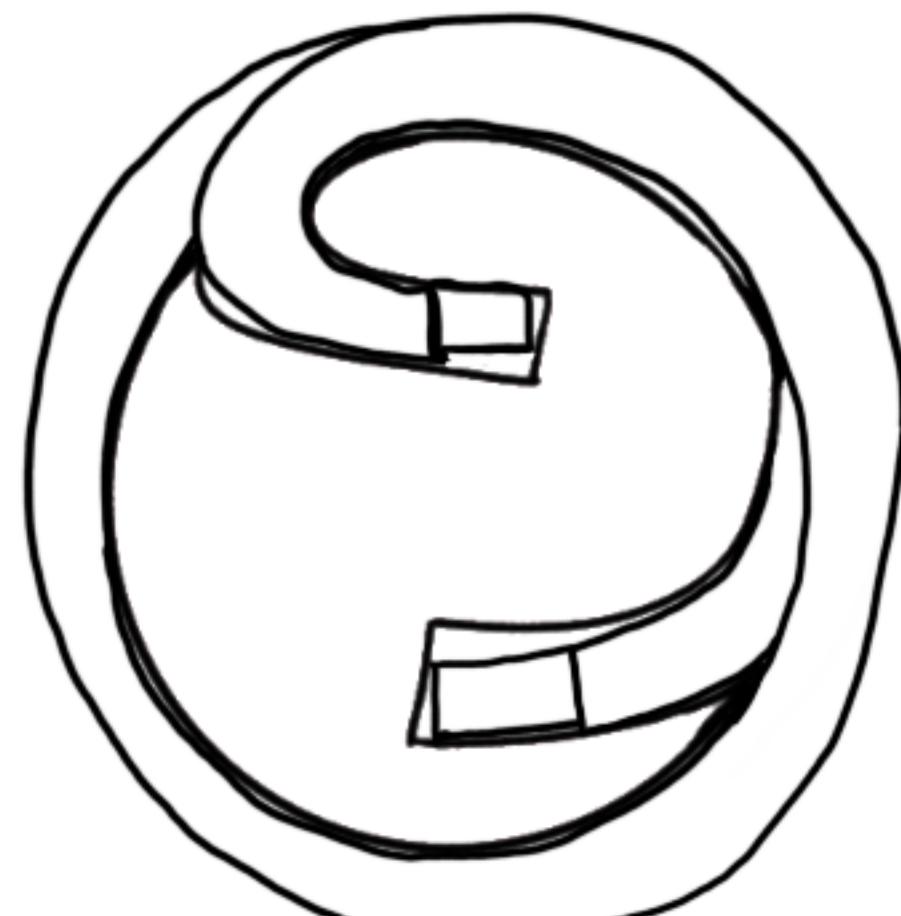
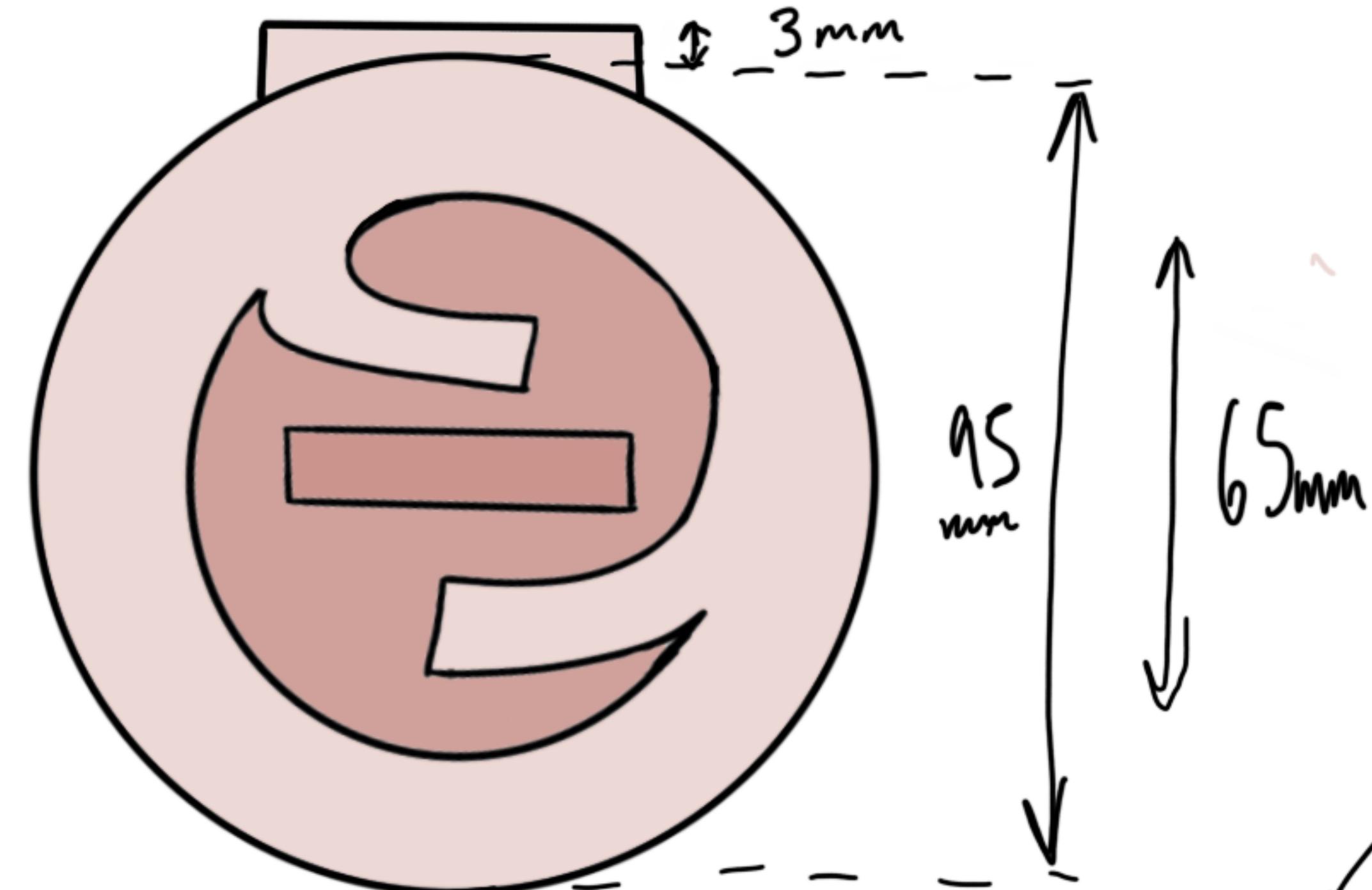
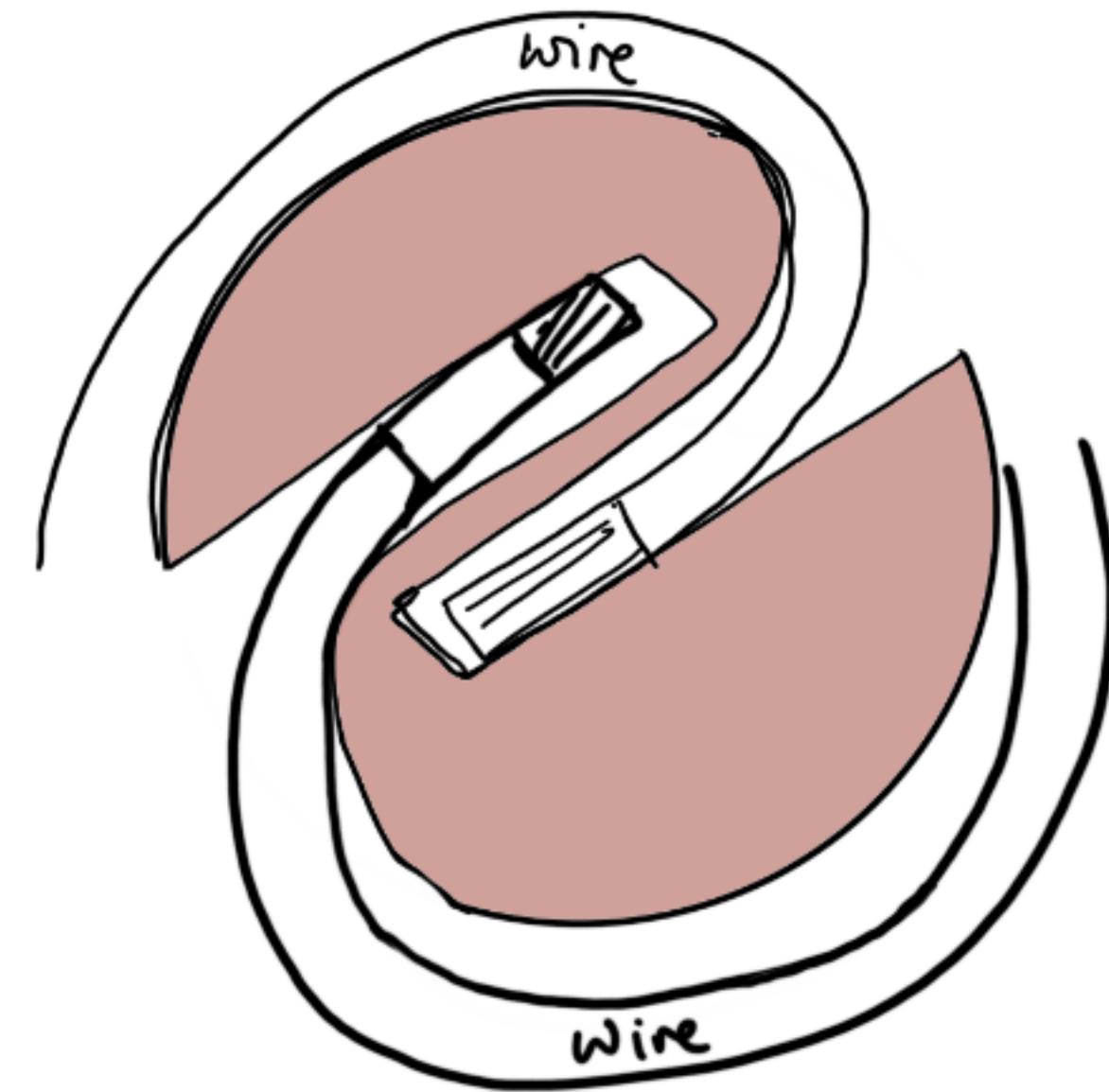


Cable Wrap Project

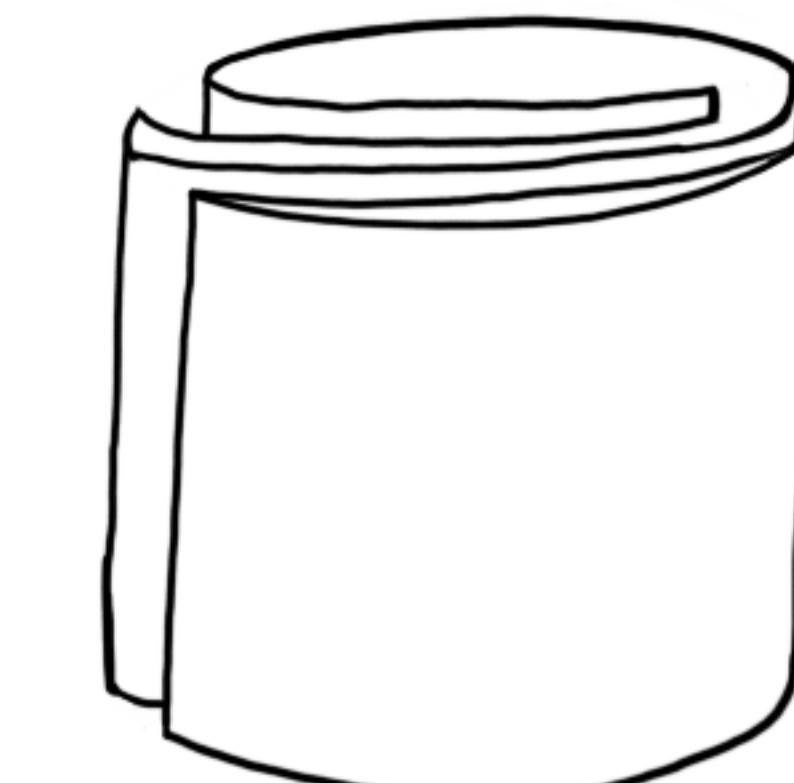
Lily Pointon

25/10/2023

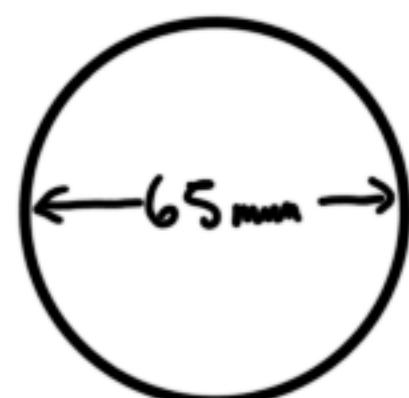




$10 \times 7.5 = 75\text{mm}$
 \therefore I'll make it
 85 mm so it has
 some extra space.



not very aesthetically pleasing...



$$\begin{aligned} \text{Circumference} &= 2\pi R \\ &= \pi D \\ &= 204.2 \end{aligned}$$

$$2000 \div 204.2 = 9.7 \approx \underline{10}$$

A 2m cable will need to wrap around a 65 mm diameter roll 10 times.

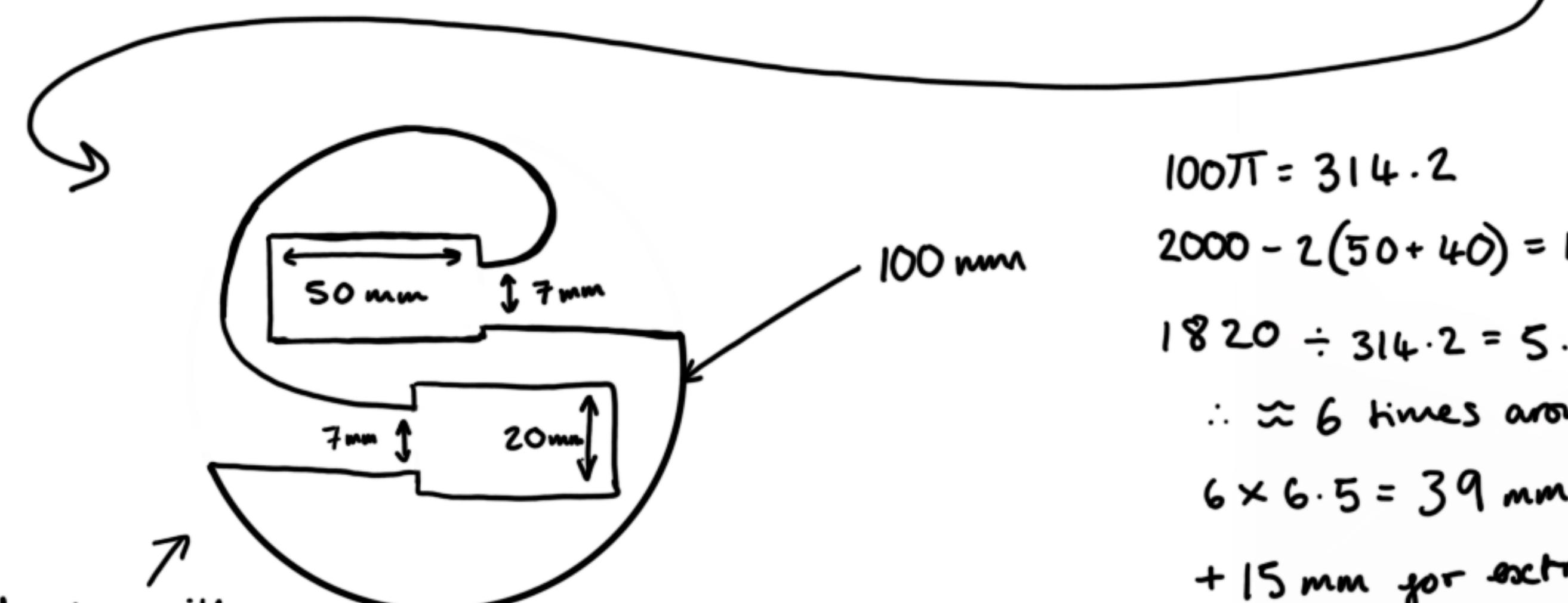
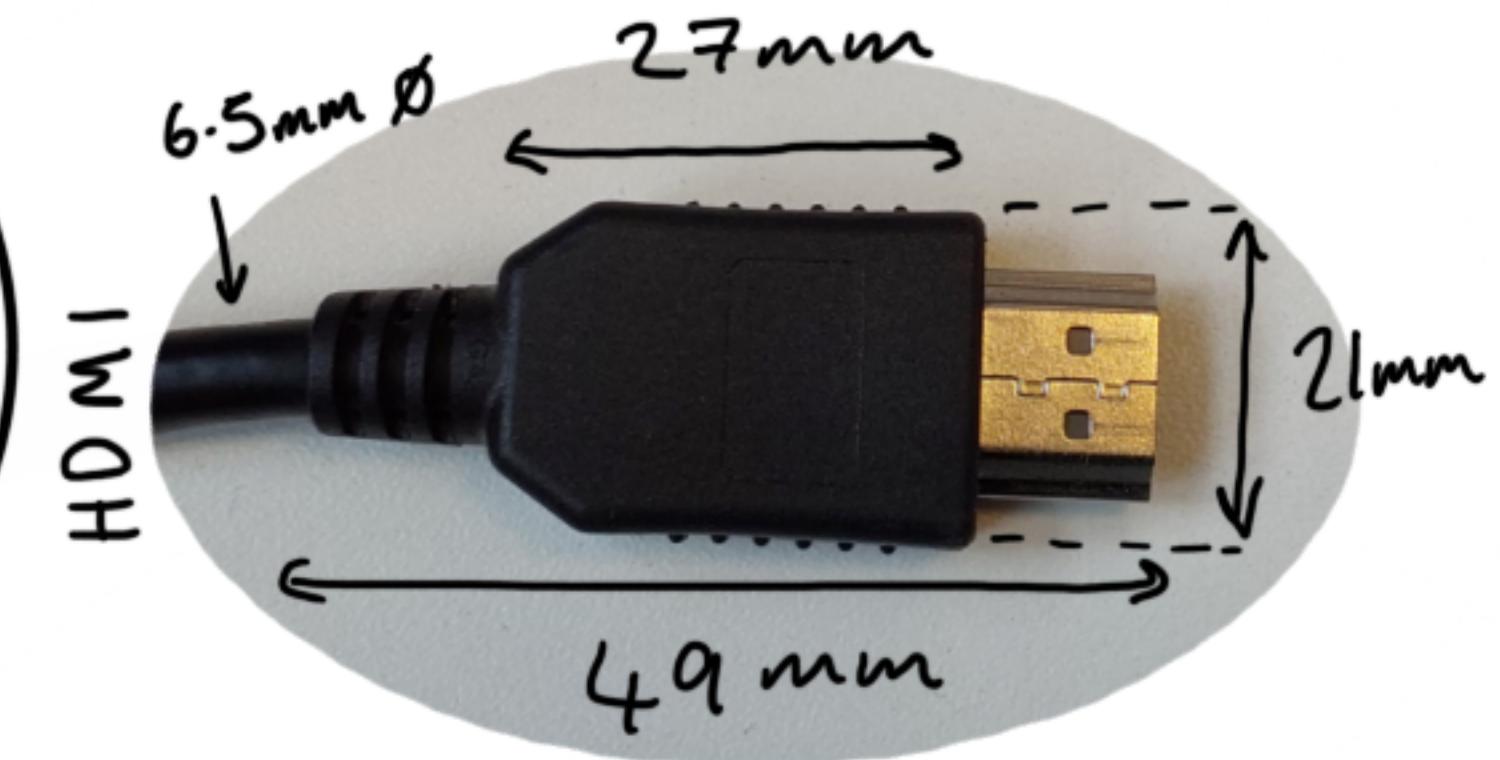
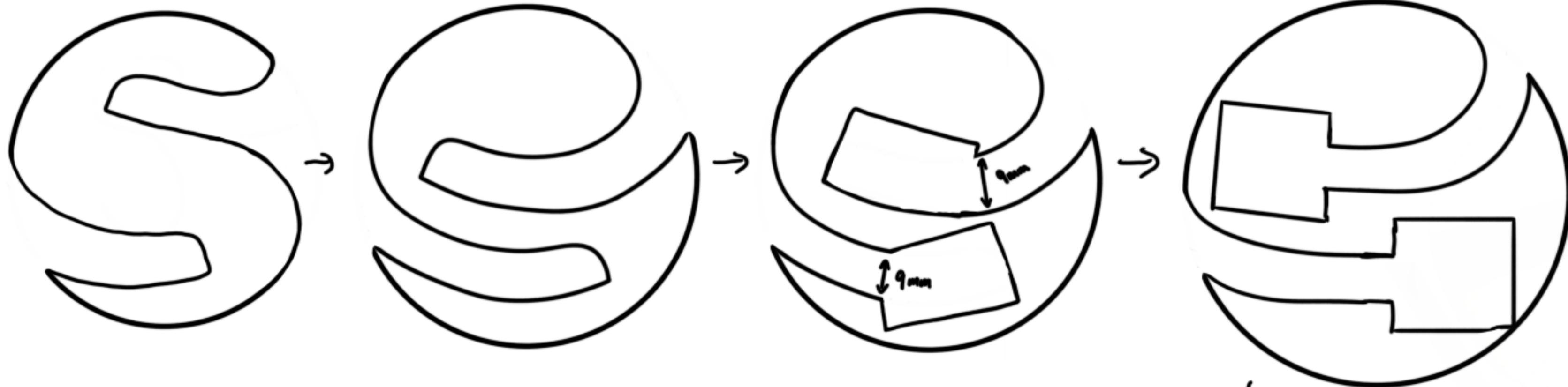
I will need to be careful about the ends lining up \therefore maybe change it to:



looks cool
but wouldn't
work

HDMI is the
thickest cable
 $= 7.5\text{mm}$

\therefore design



$$100\pi = 314.2$$

$$2000 - 2(50 + 40) = 1820$$

$$1820 \div 314.2 = 5.79$$

$\therefore \approx 6$ times around the outer diameter

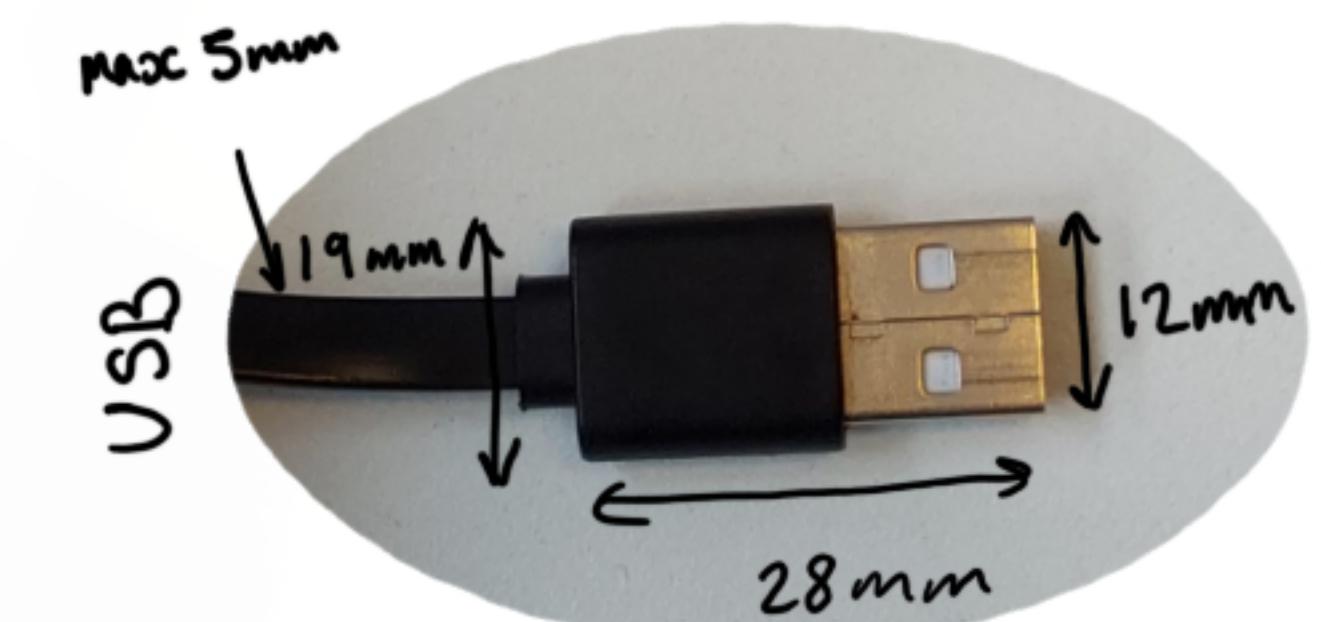
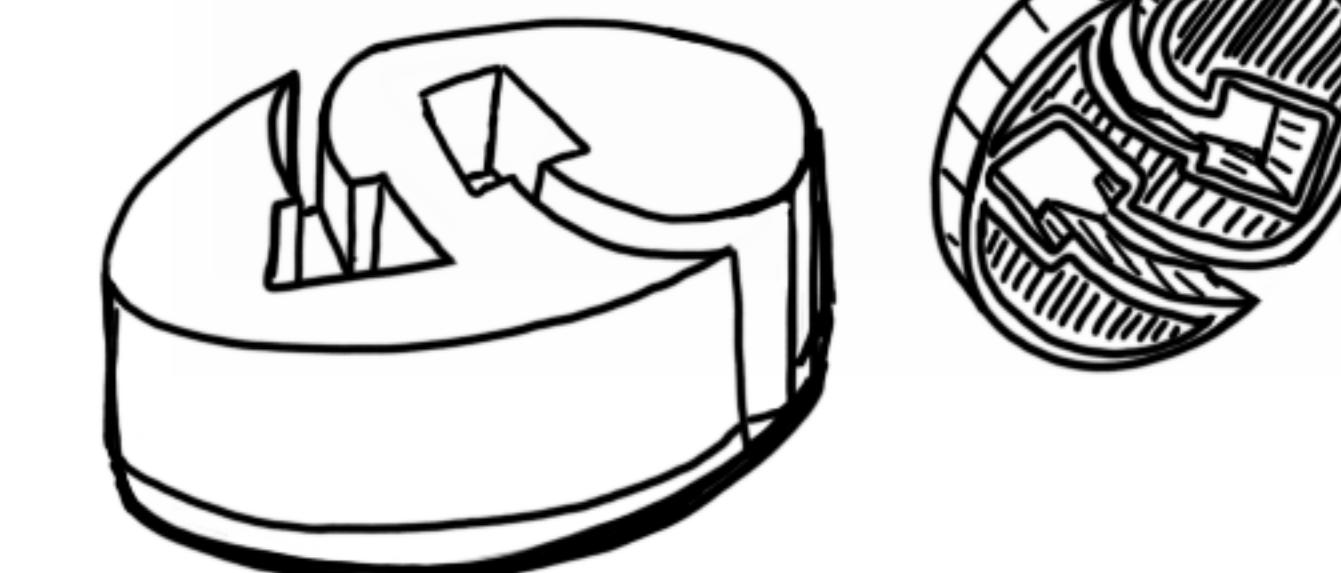
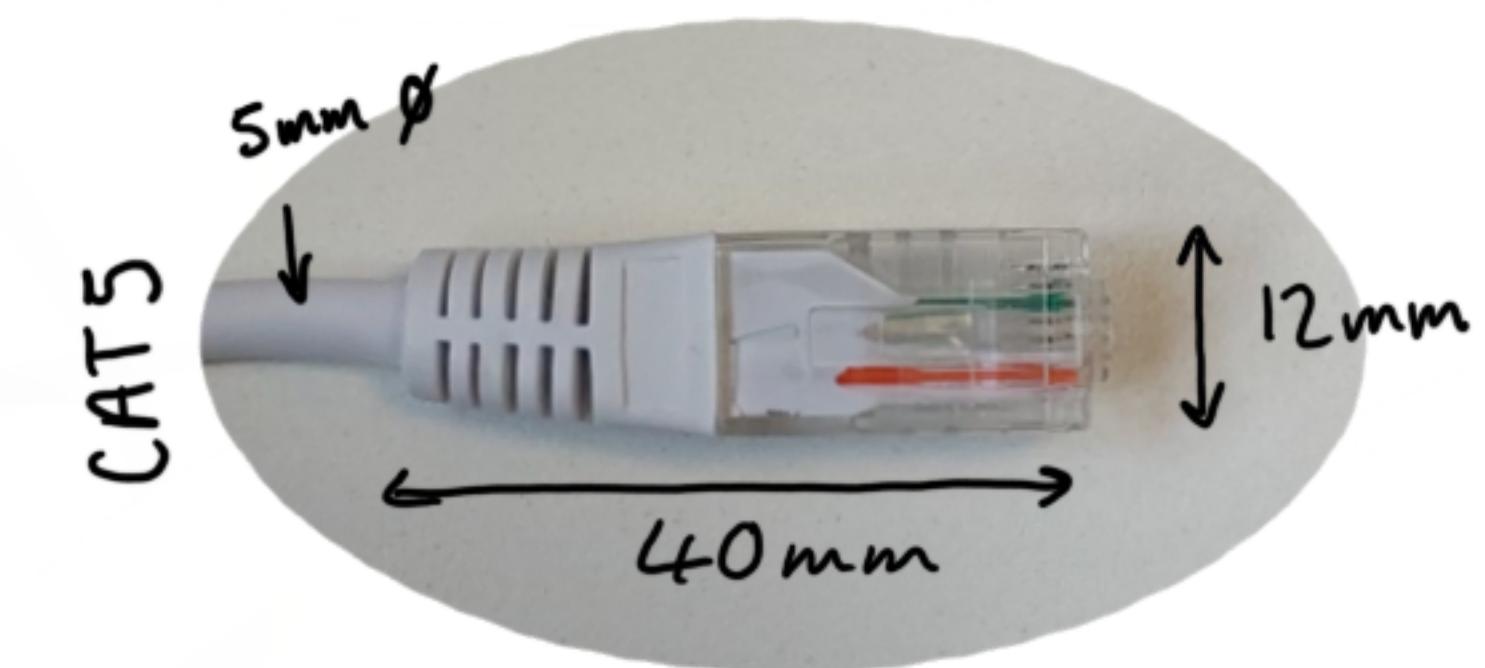
$$6 \times 6.5 = 39 \text{ mm}$$

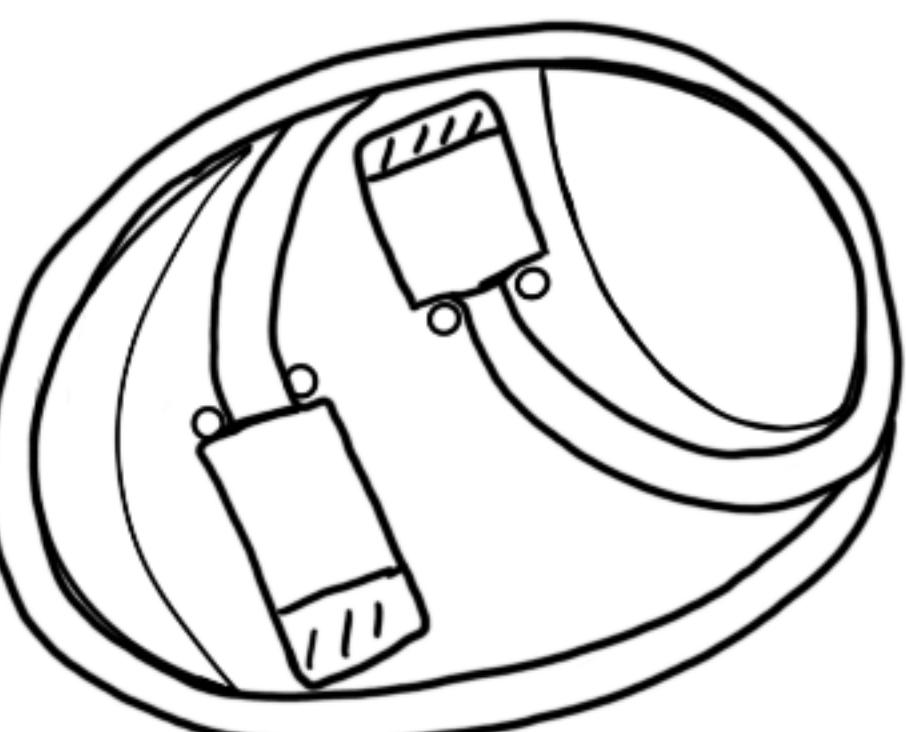
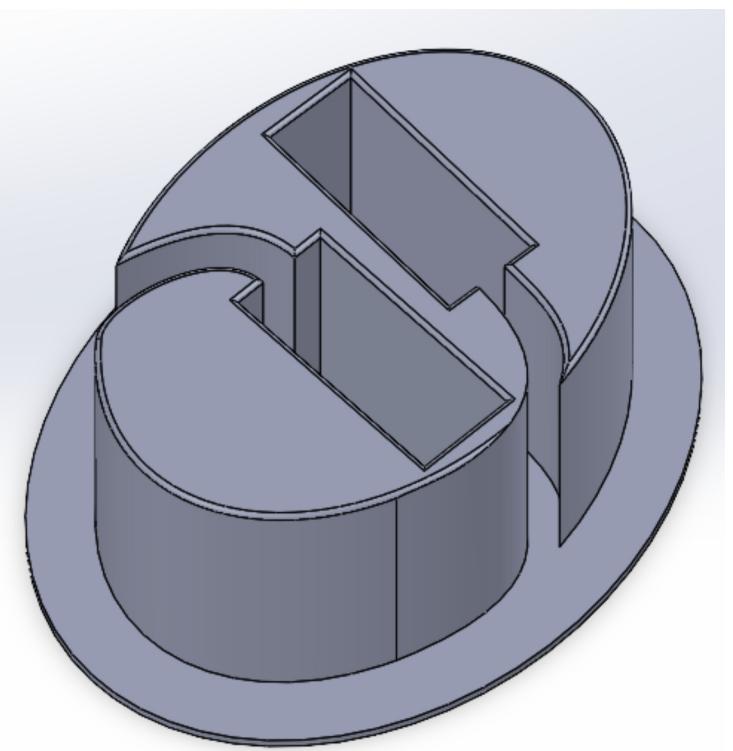
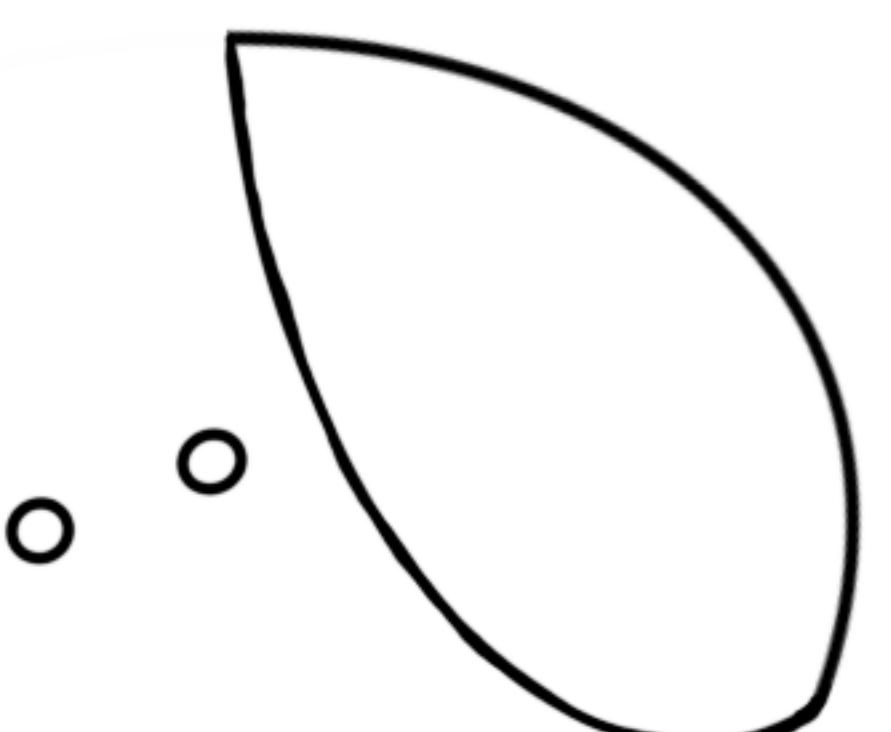
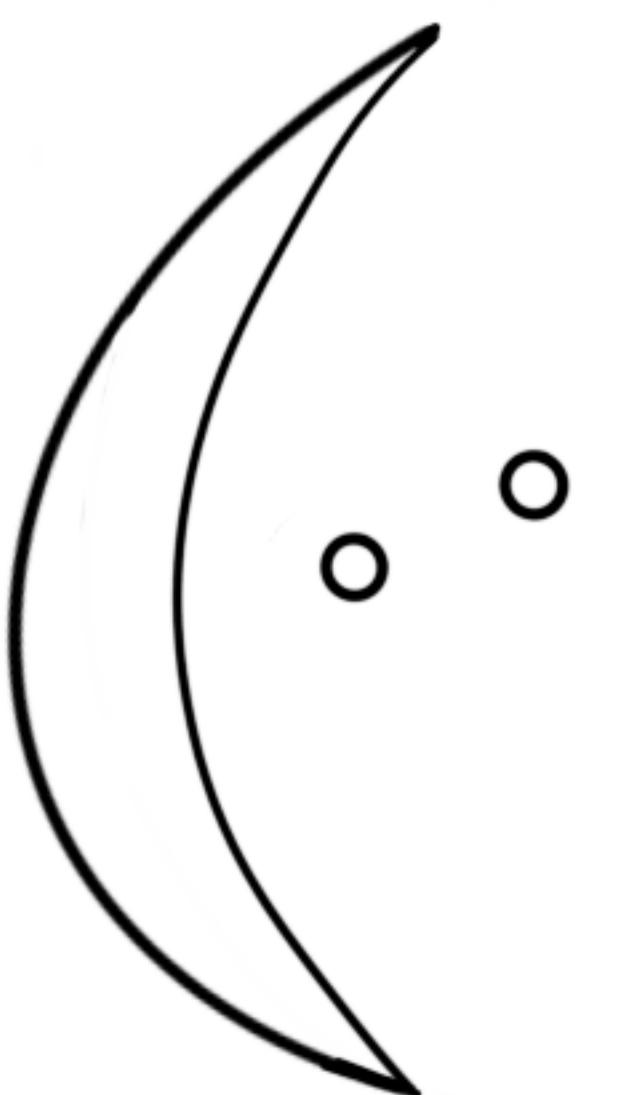
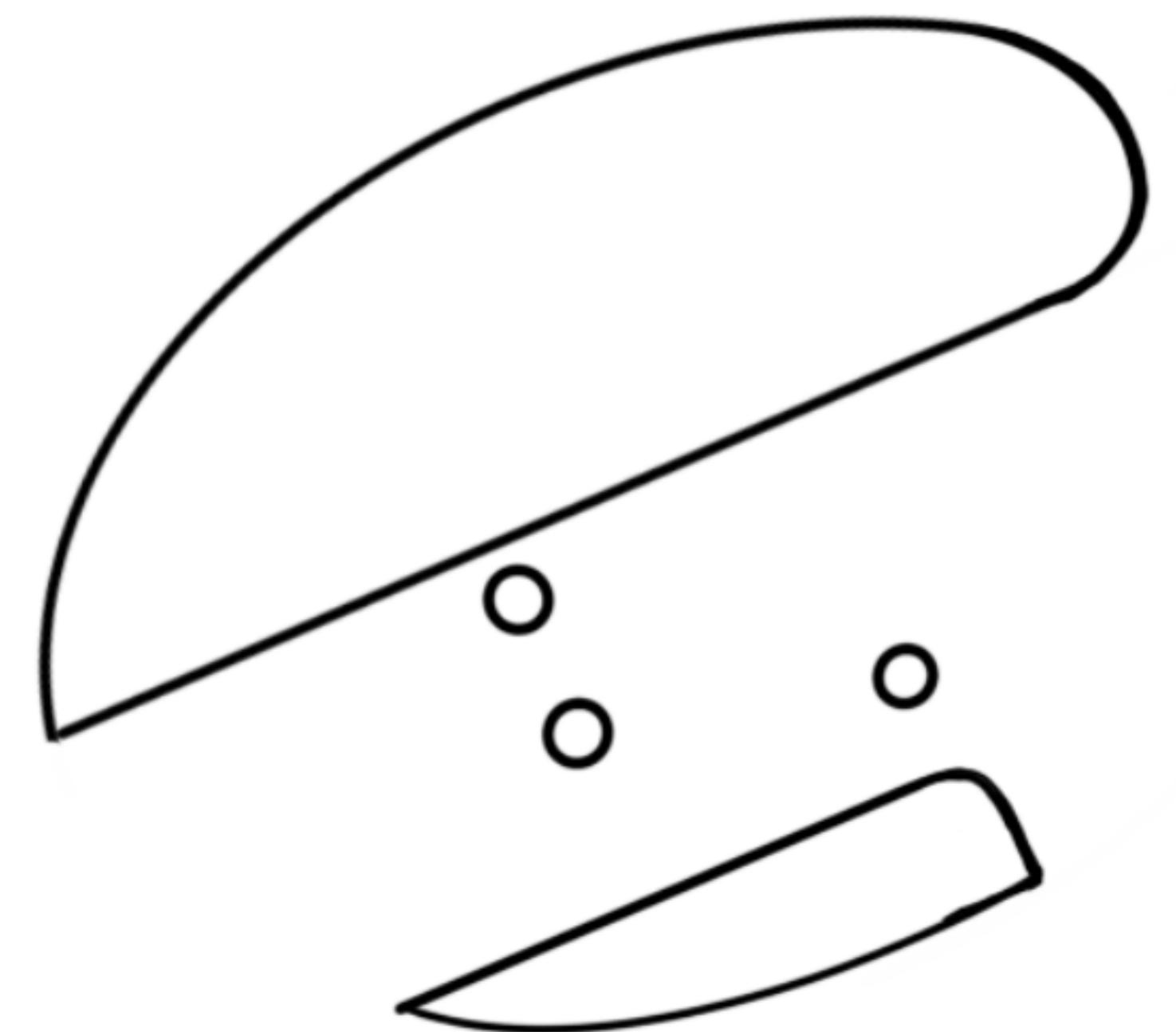
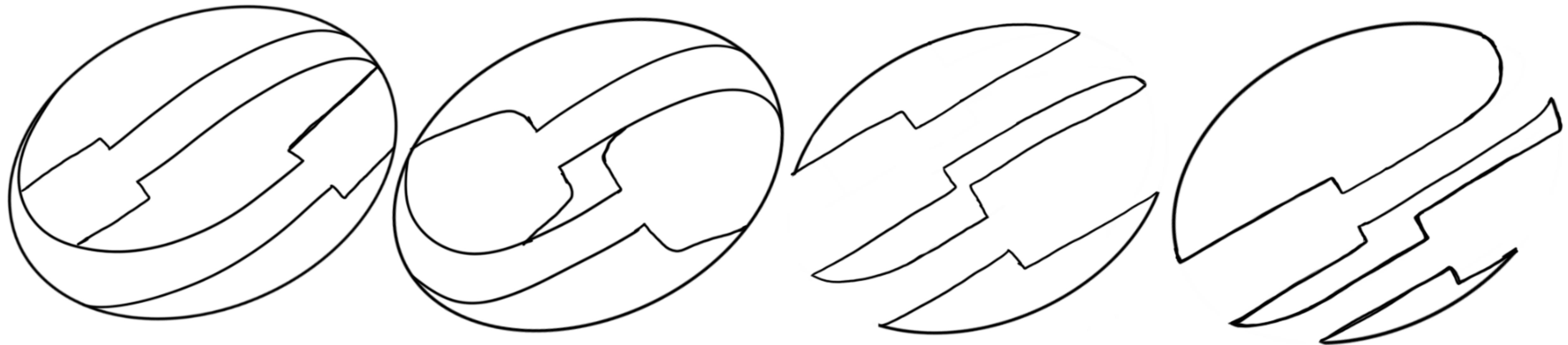
+ 15 mm for extra space

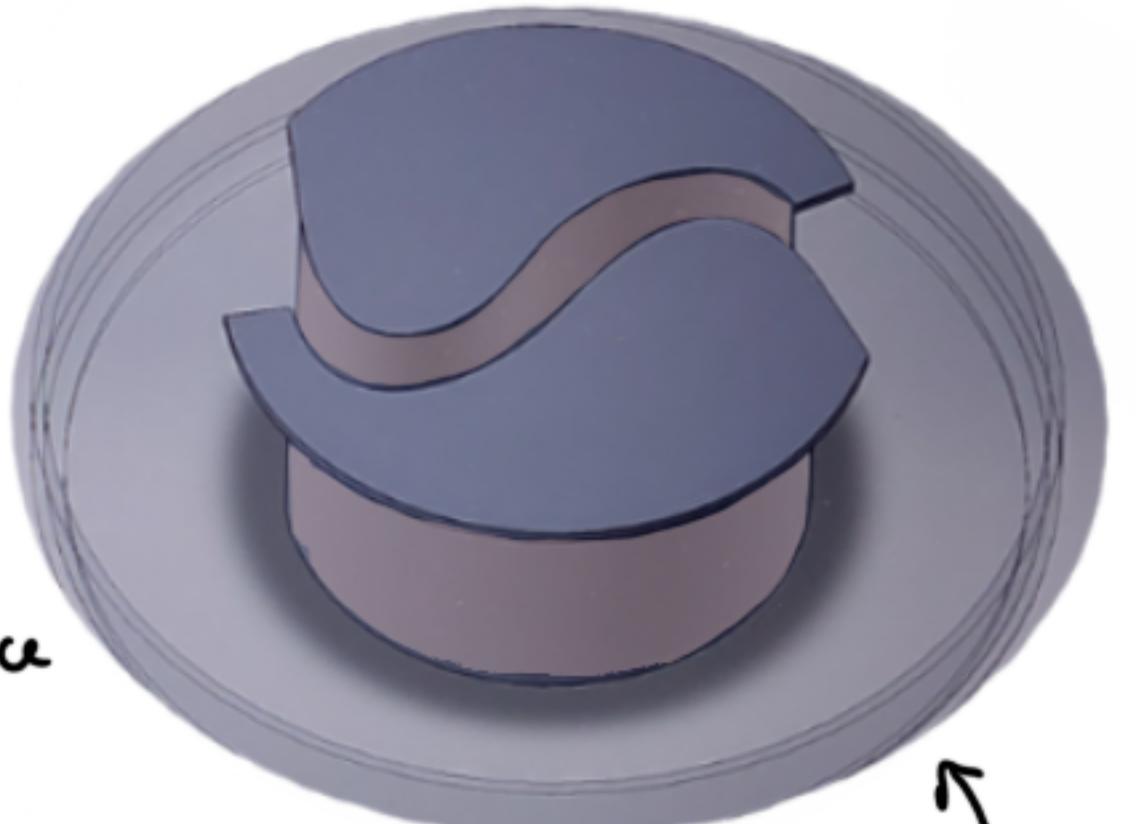
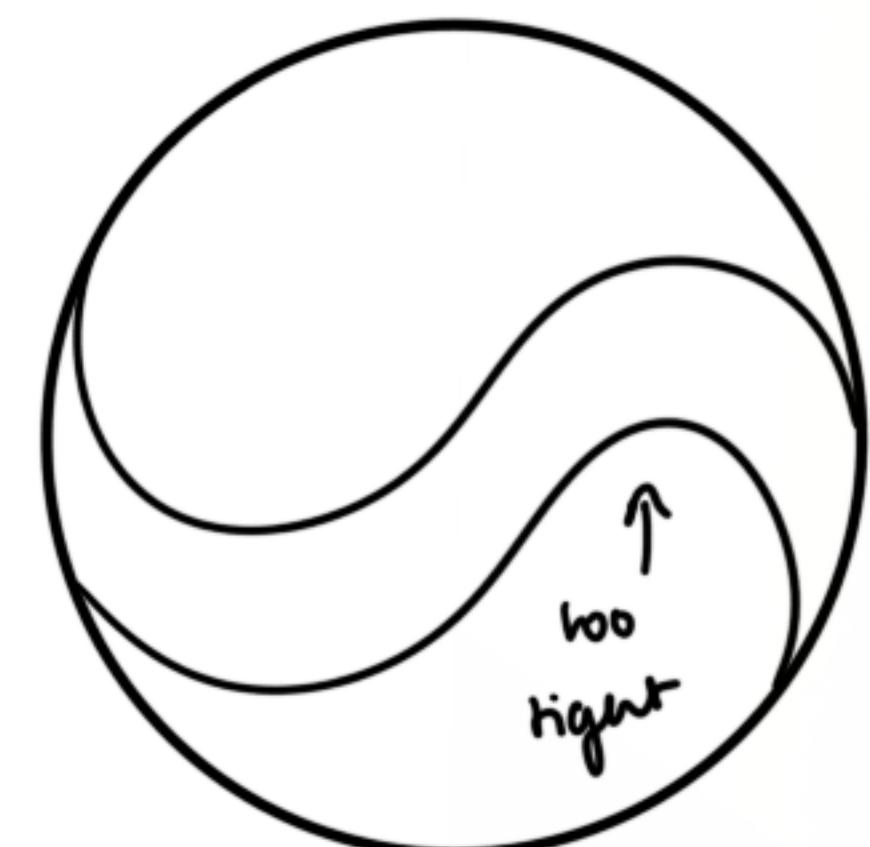
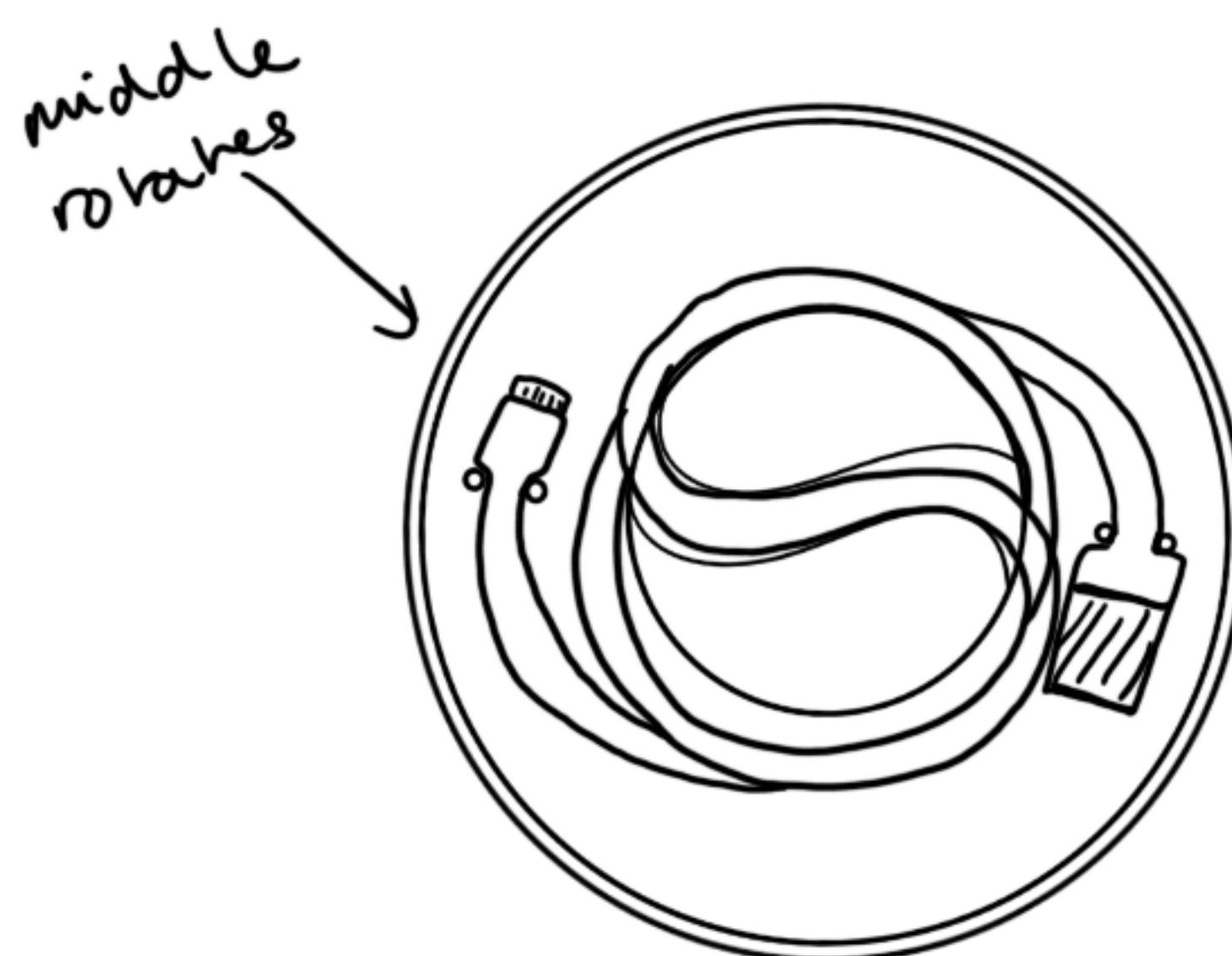
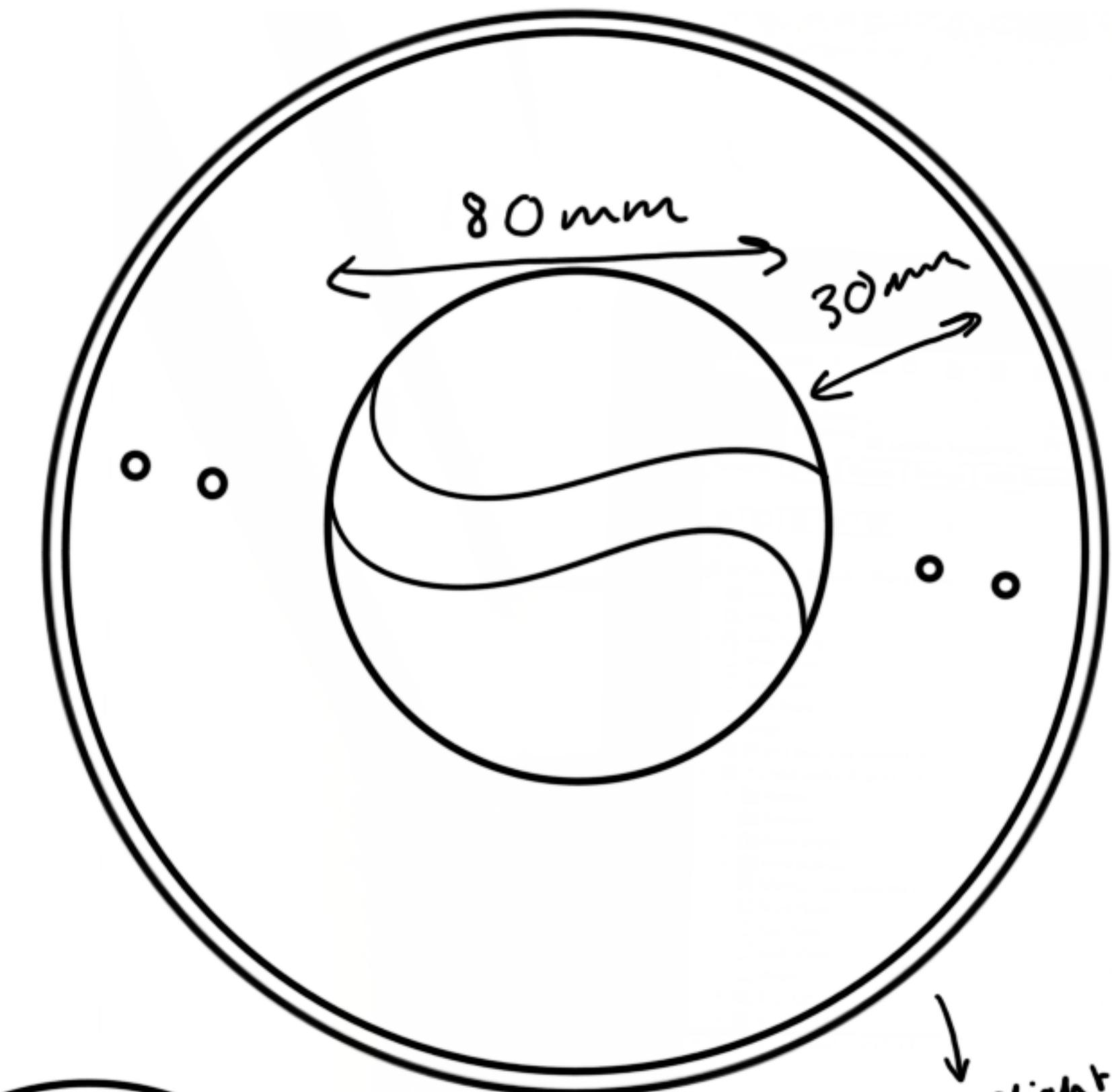
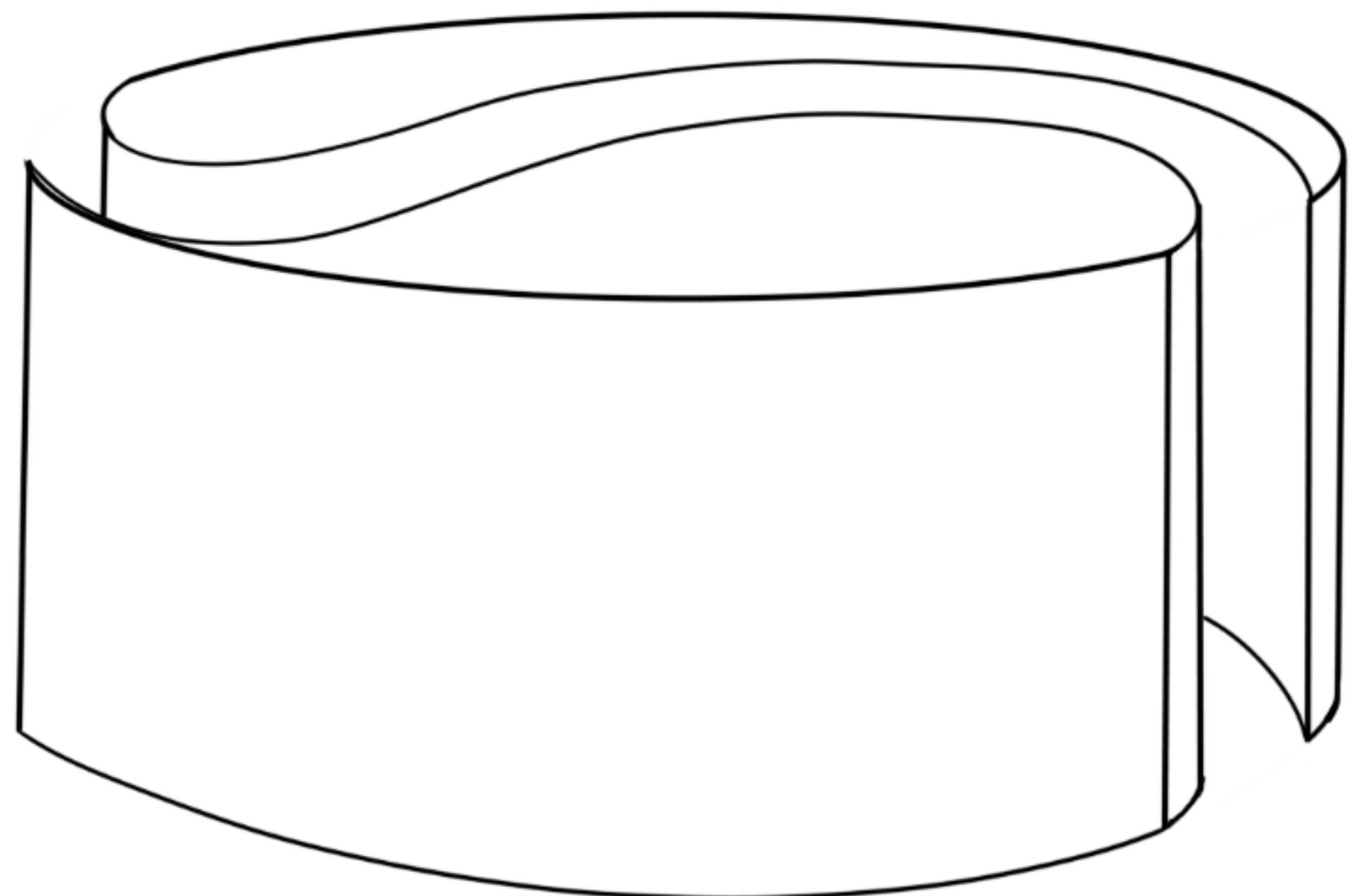
$\approx 55 \text{ mm deep}$

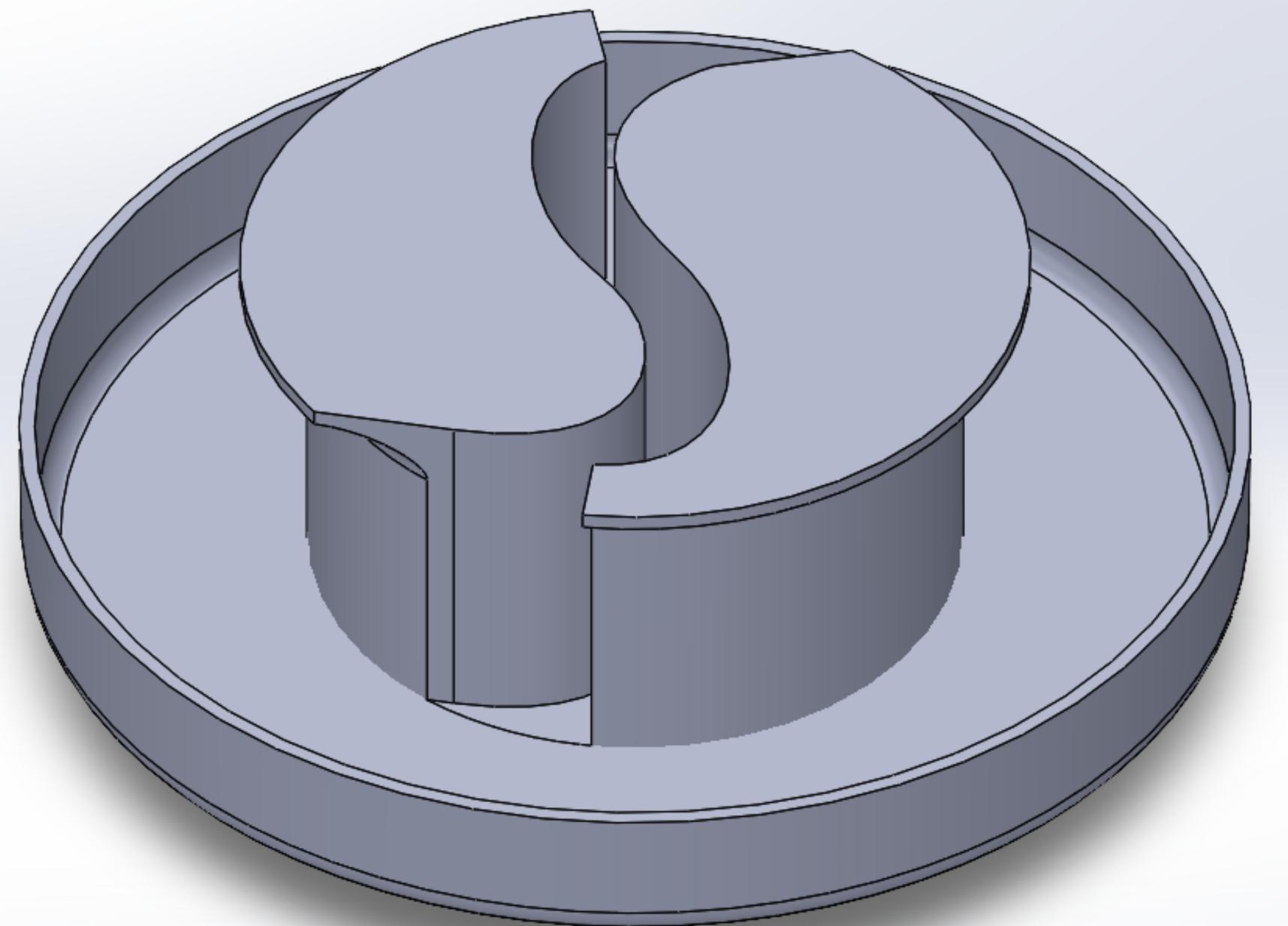


Could do with a greater radius where the wire initially goes:

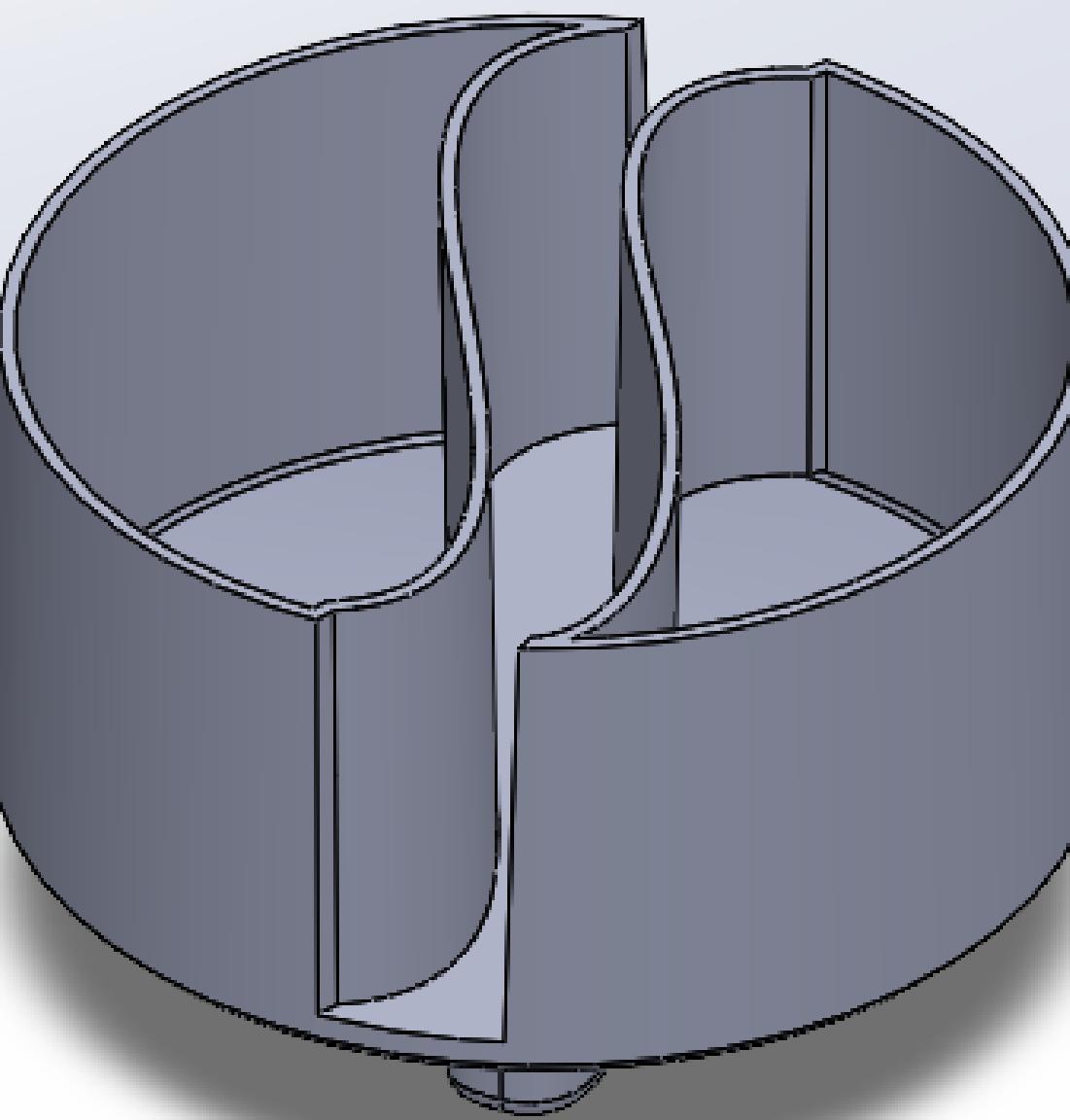




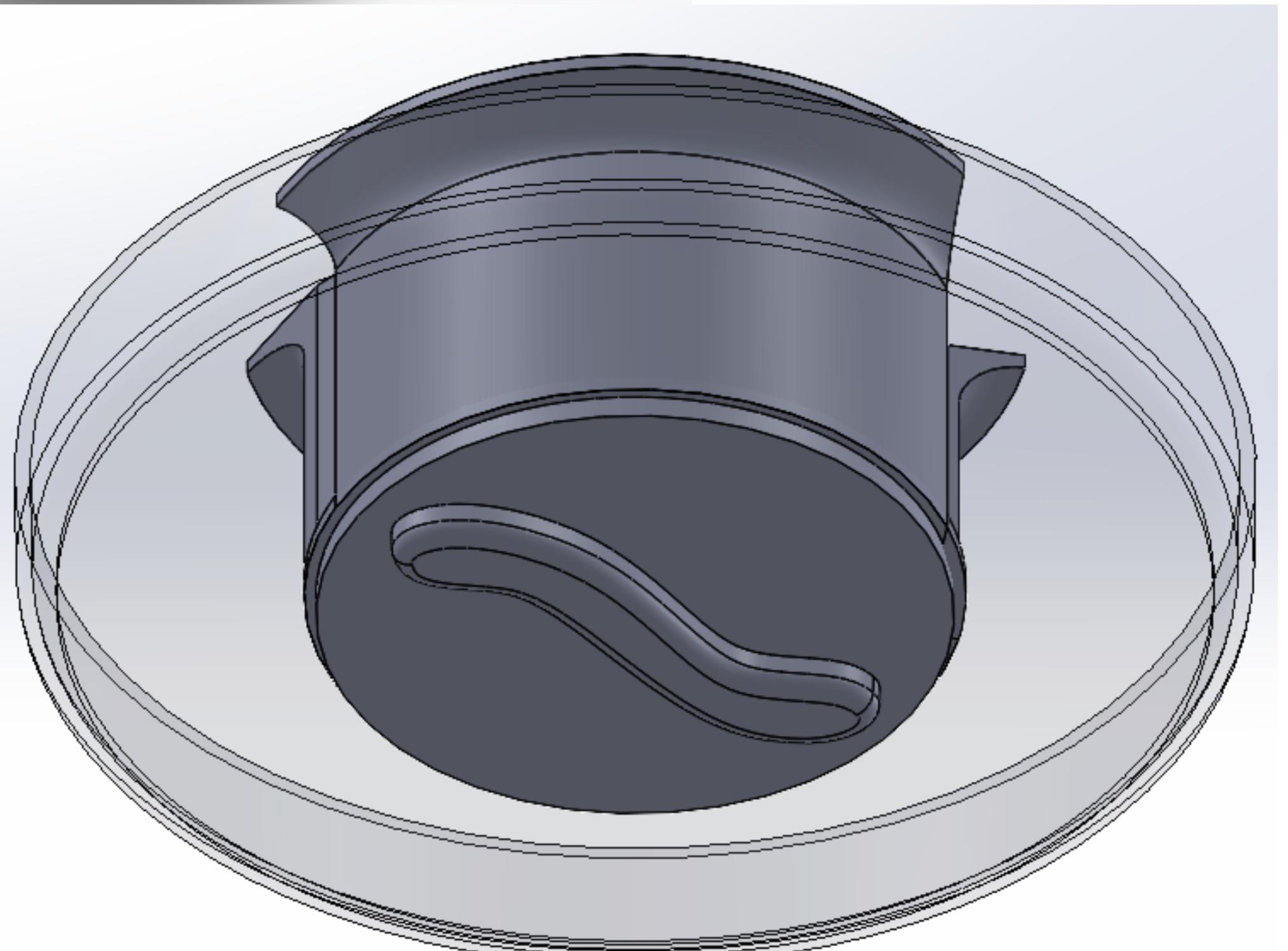




Initial concept
Sharp angles
Modelled in
an inefficient
way
How would it
be made -
hollow
insides?

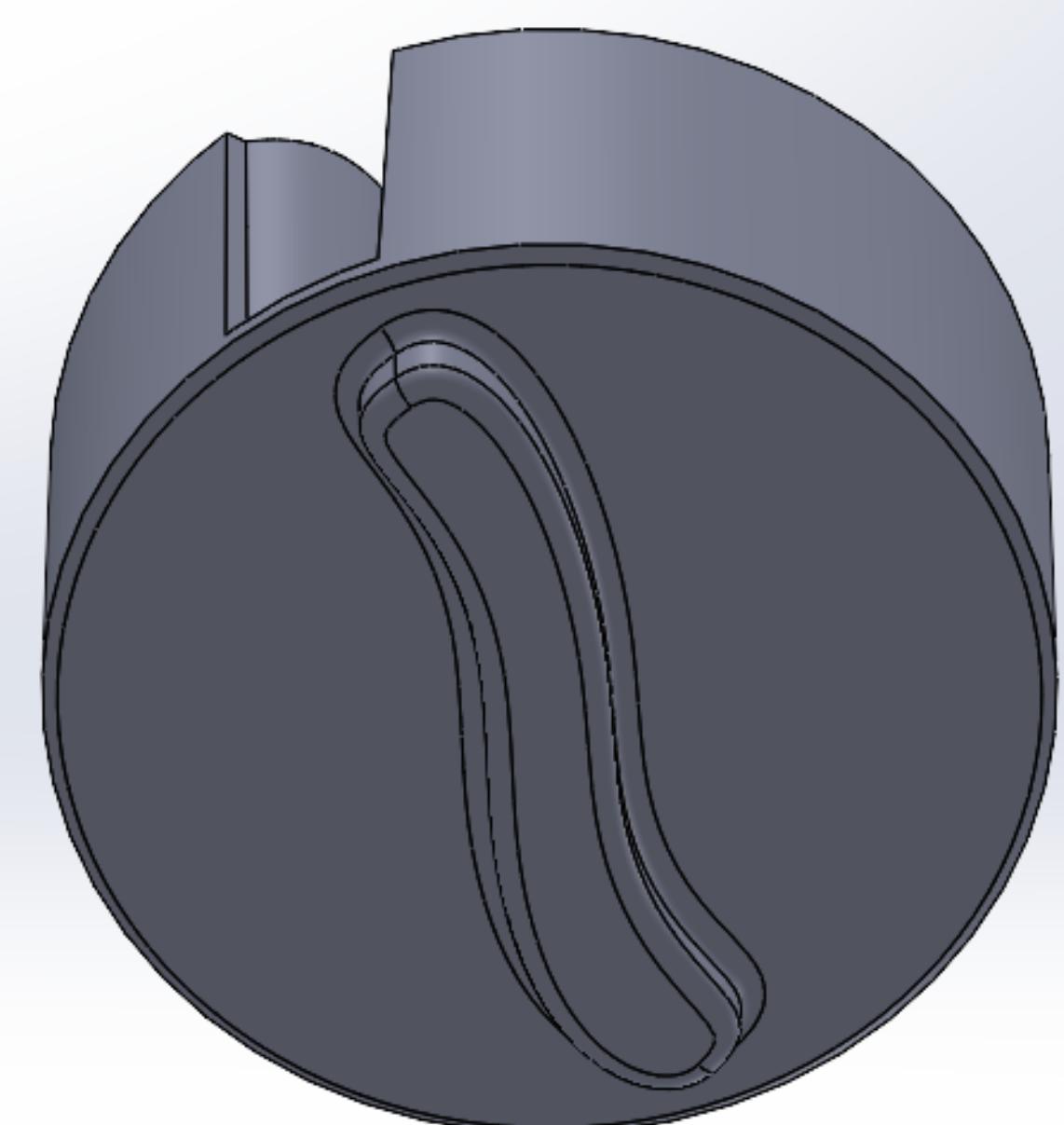


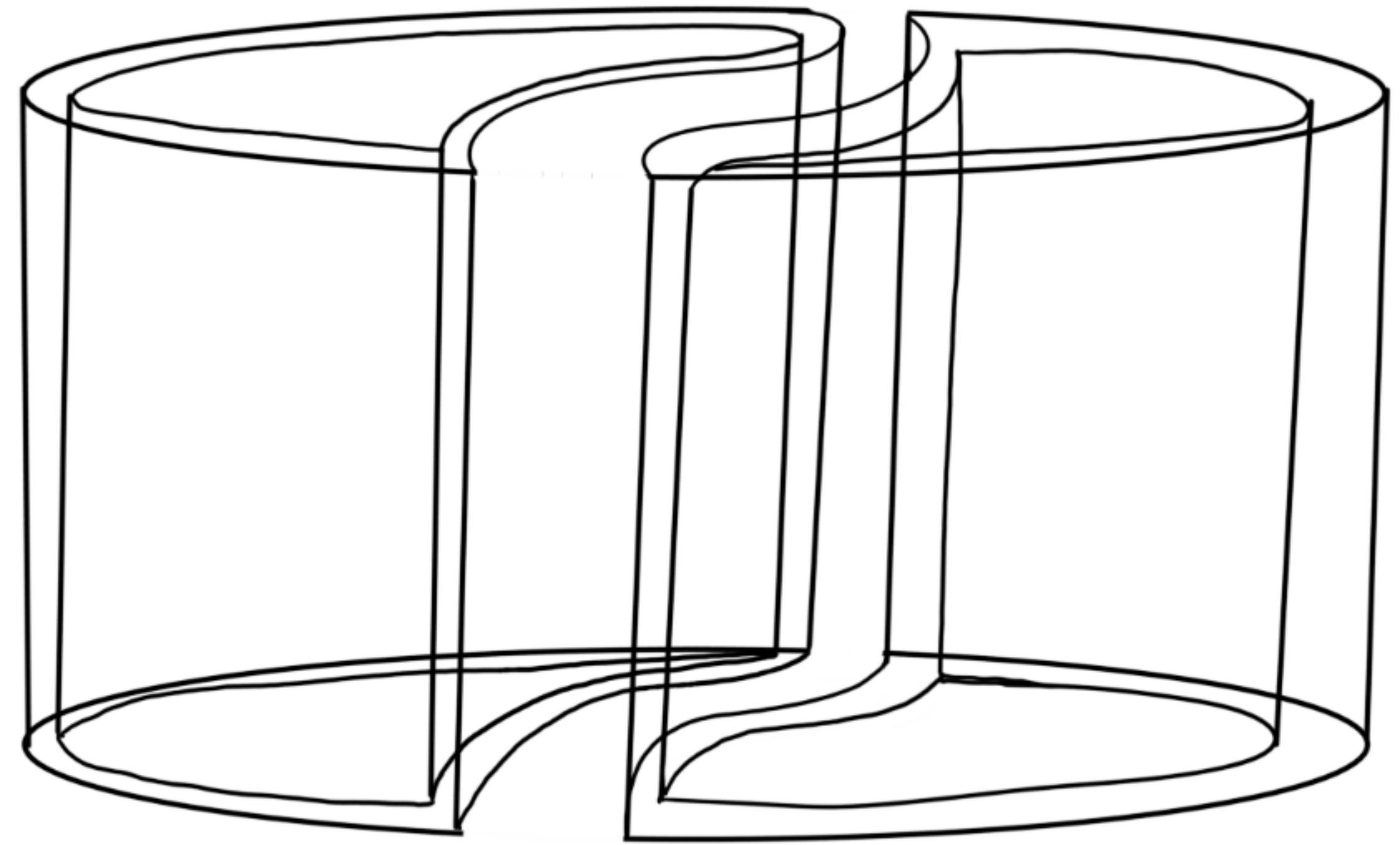
Redesigned
part
Base of dial
and wrap
walls joined
to reduce
part no.
Open top,
caps?



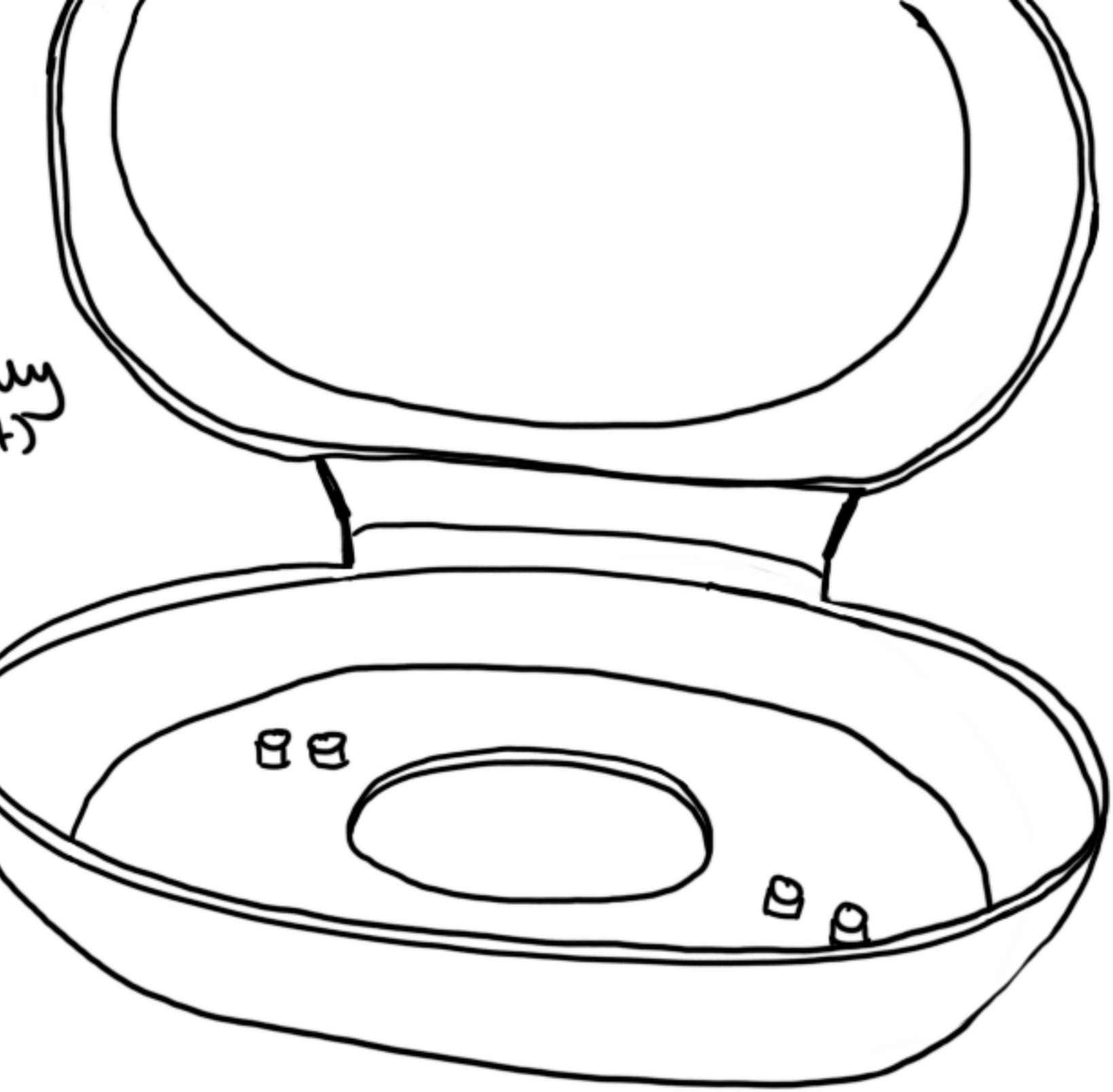
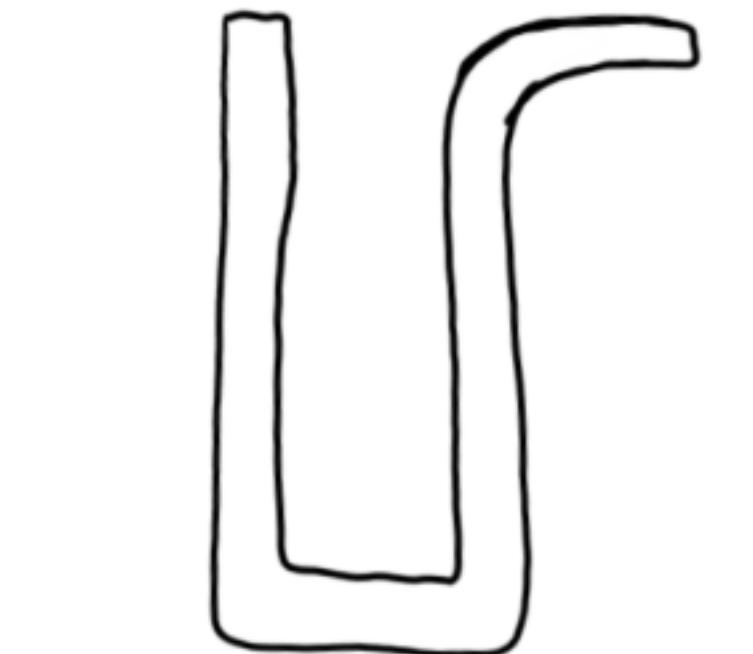
Dial that is
wavy rather
than straight
Gives a hint
as to which
way to turn it
Too thin, hard
to grip with
enough force

Thicker dial
for more
traction



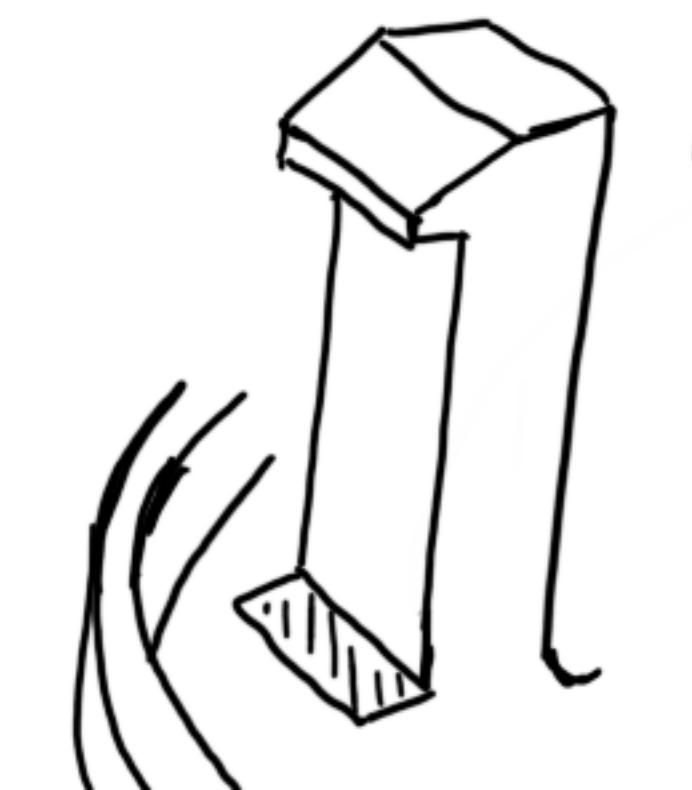
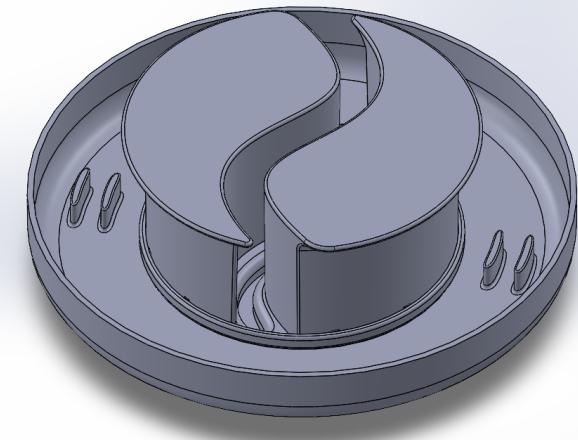


these two parts
need to be
identical
∴ same mold.
(technically
1 part)



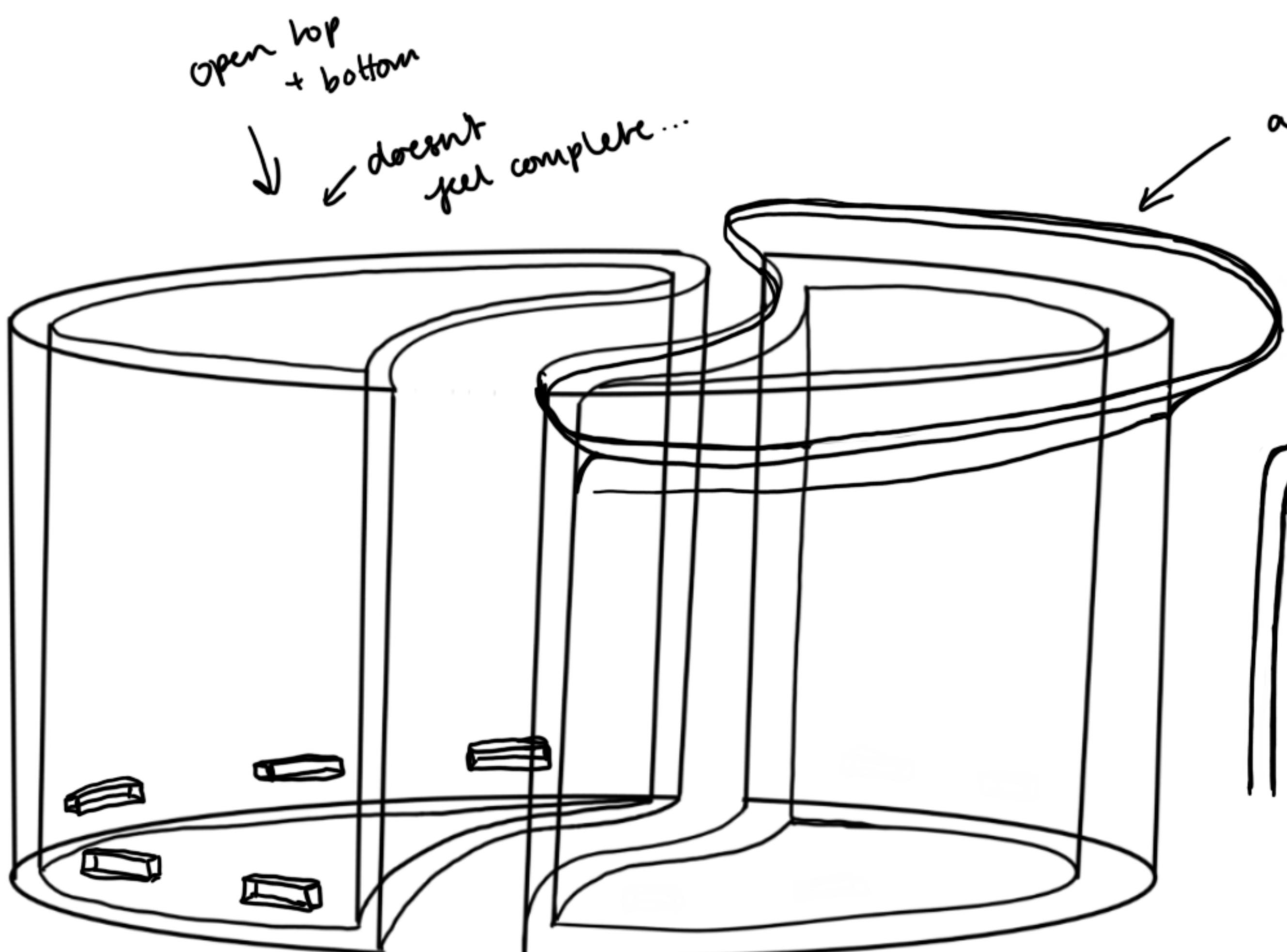
parts clip into
here.

needs a stronger connection



→ snap fits?



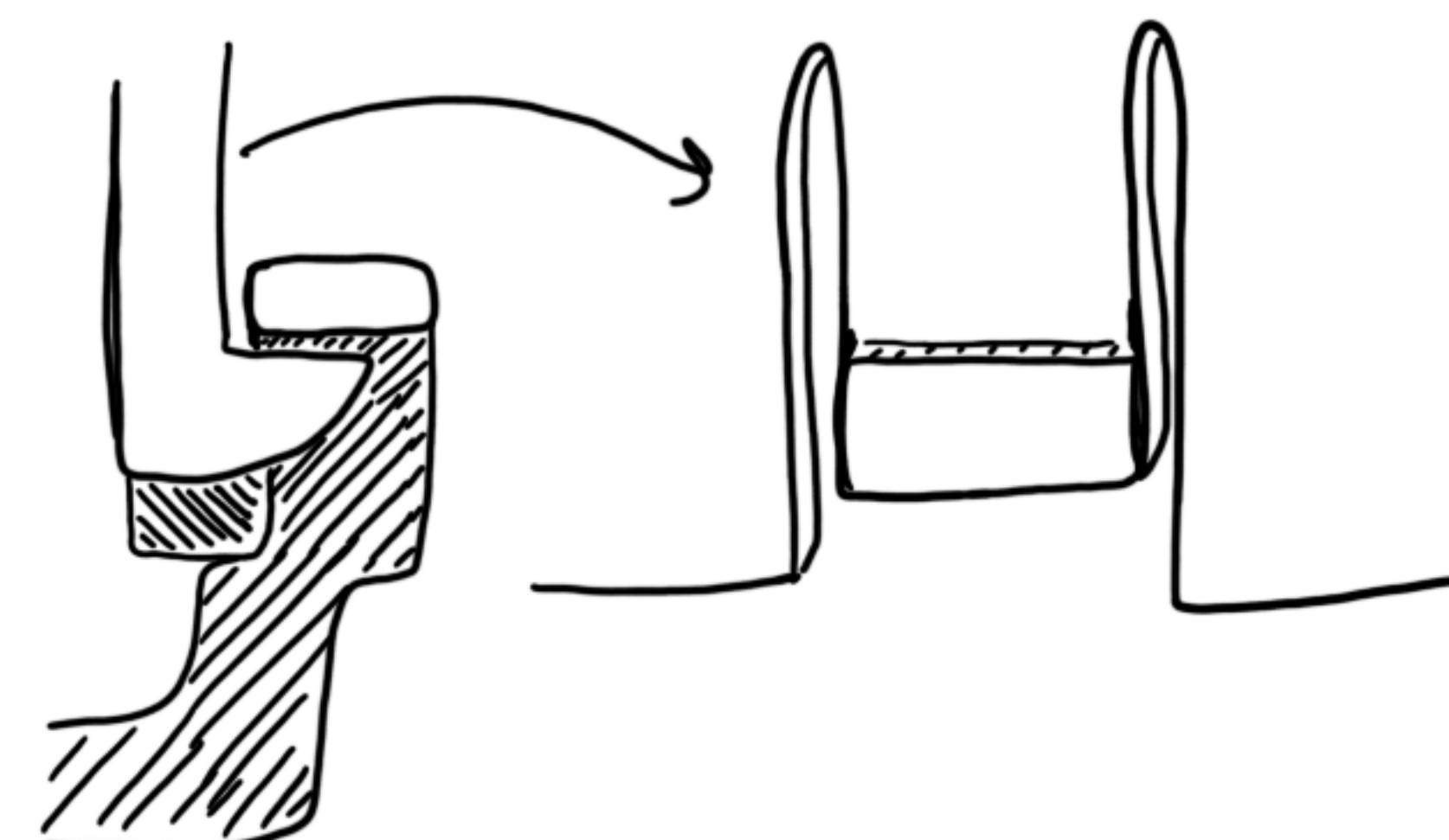


Previous design
would actually not work.
small bits of metal would
bend under pressure.

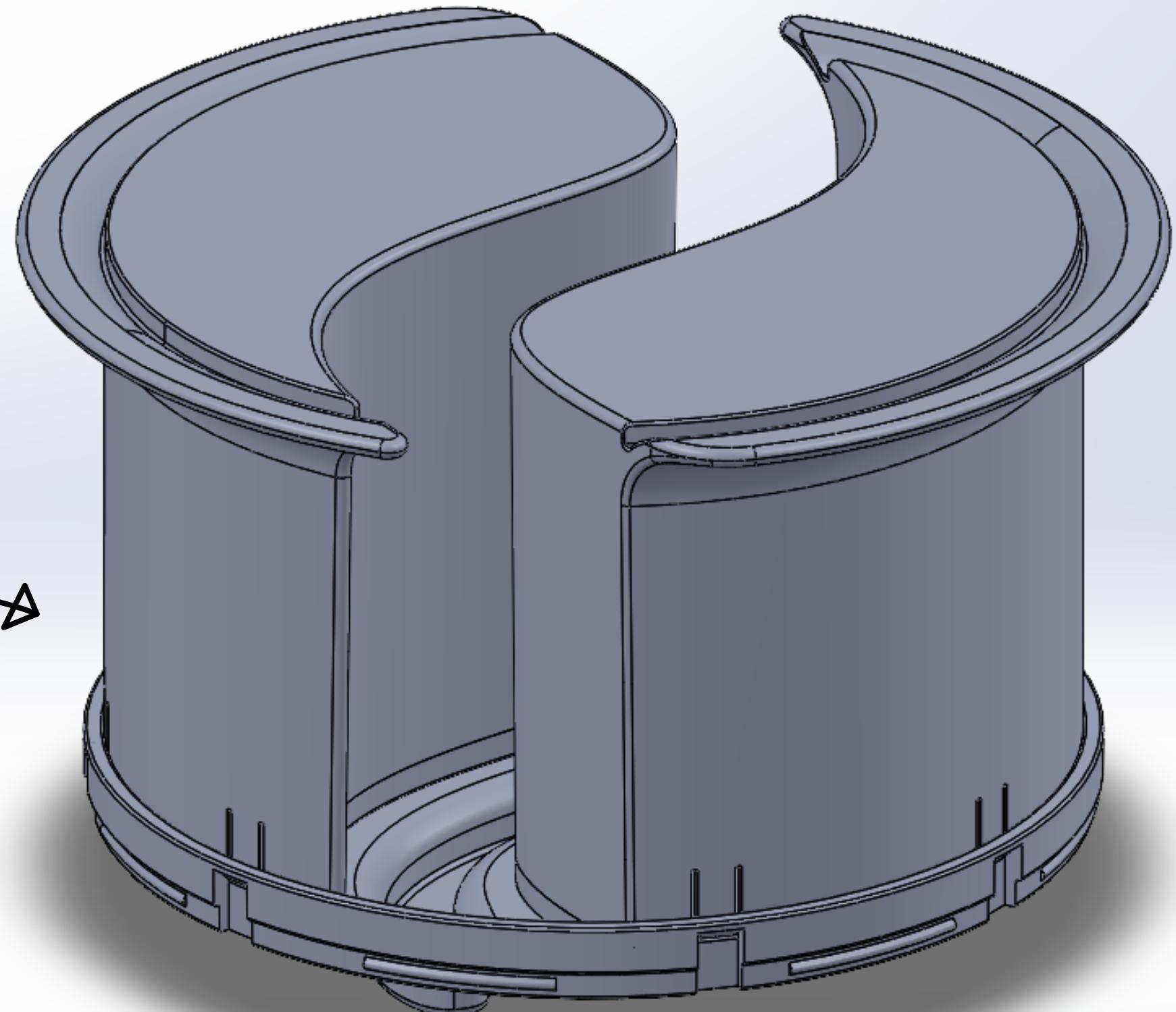
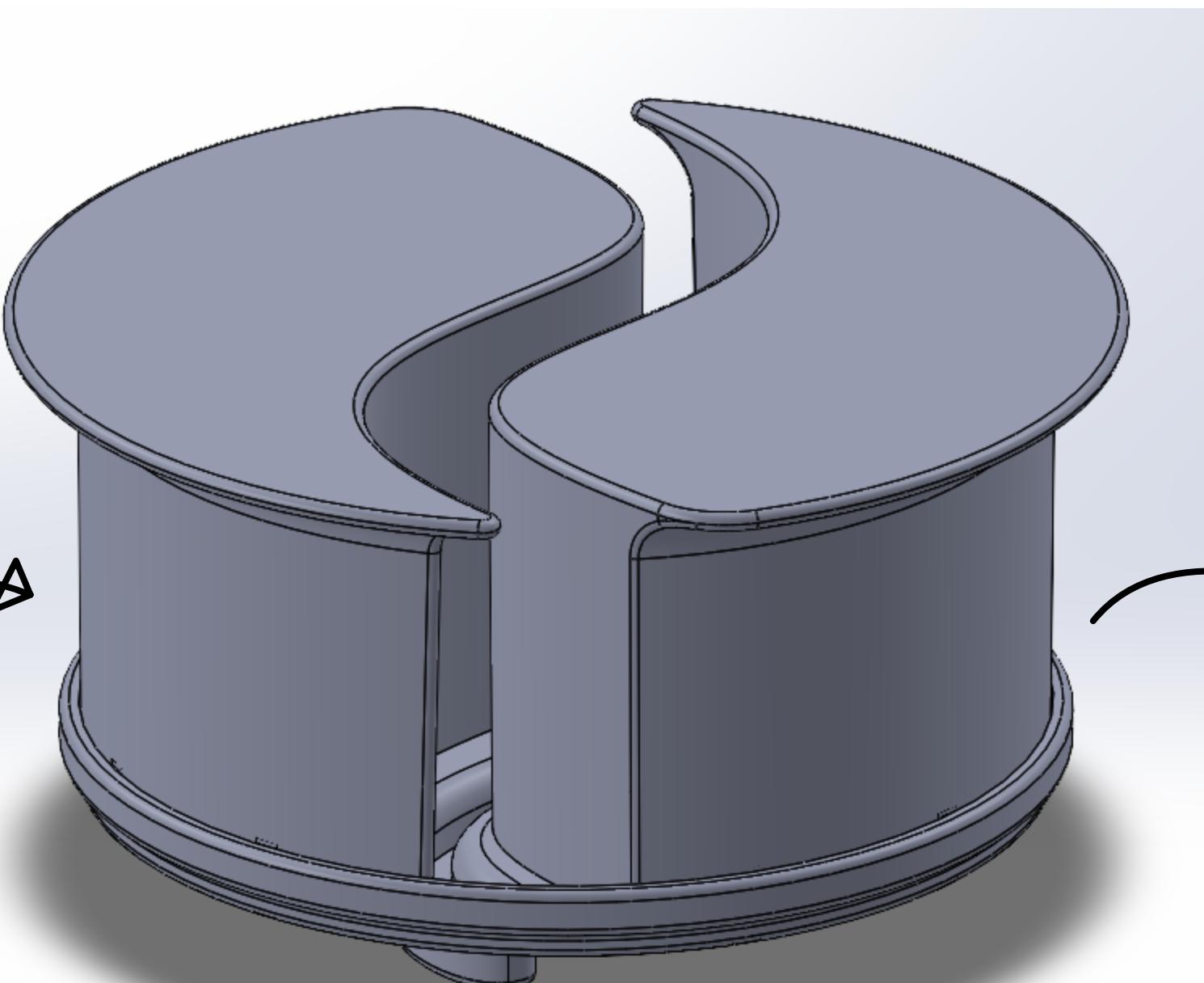
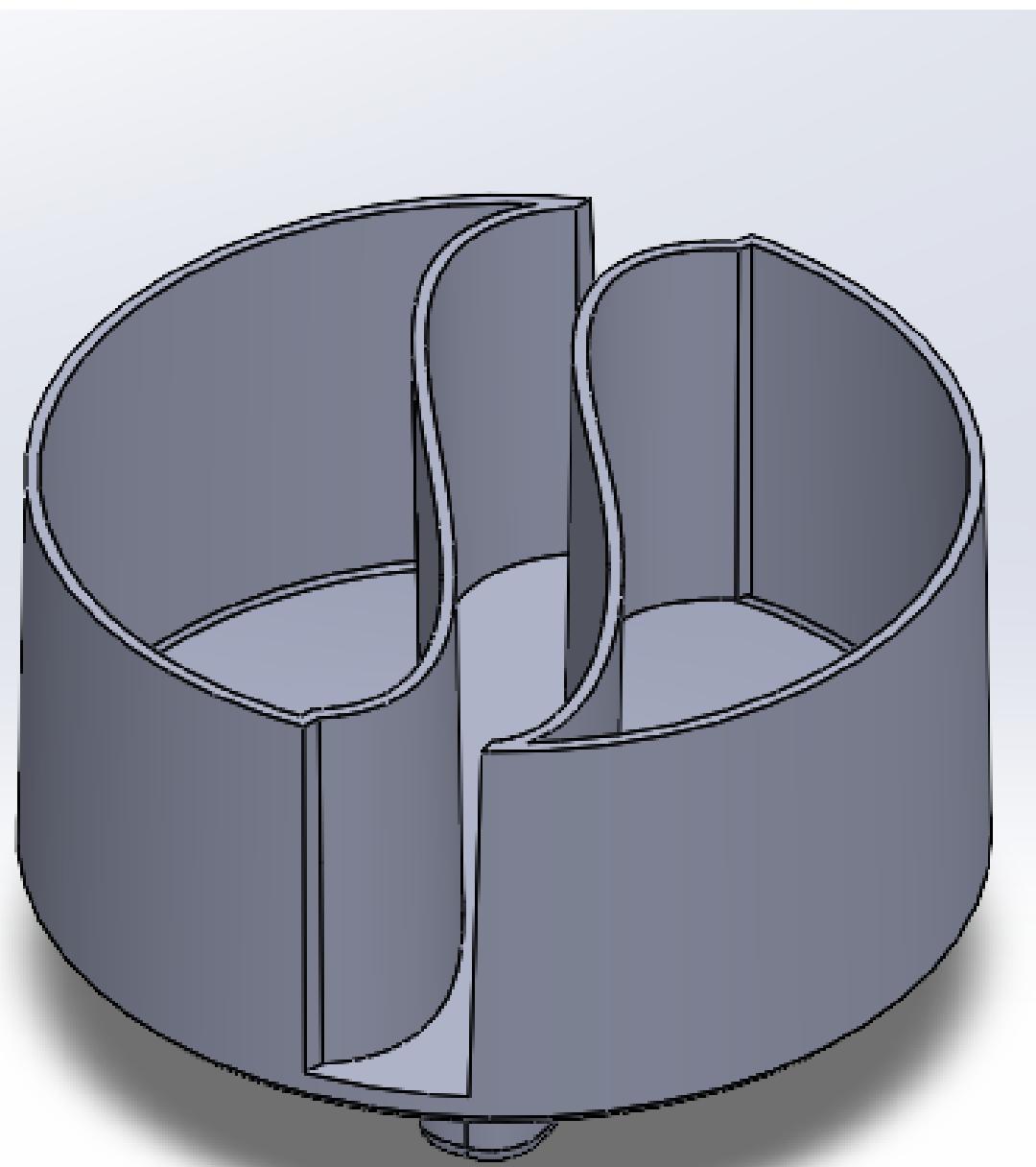
This is the part
which actually needs
to have the snap fits.

add a slight
thickness to top,
blend it out
to walls of part

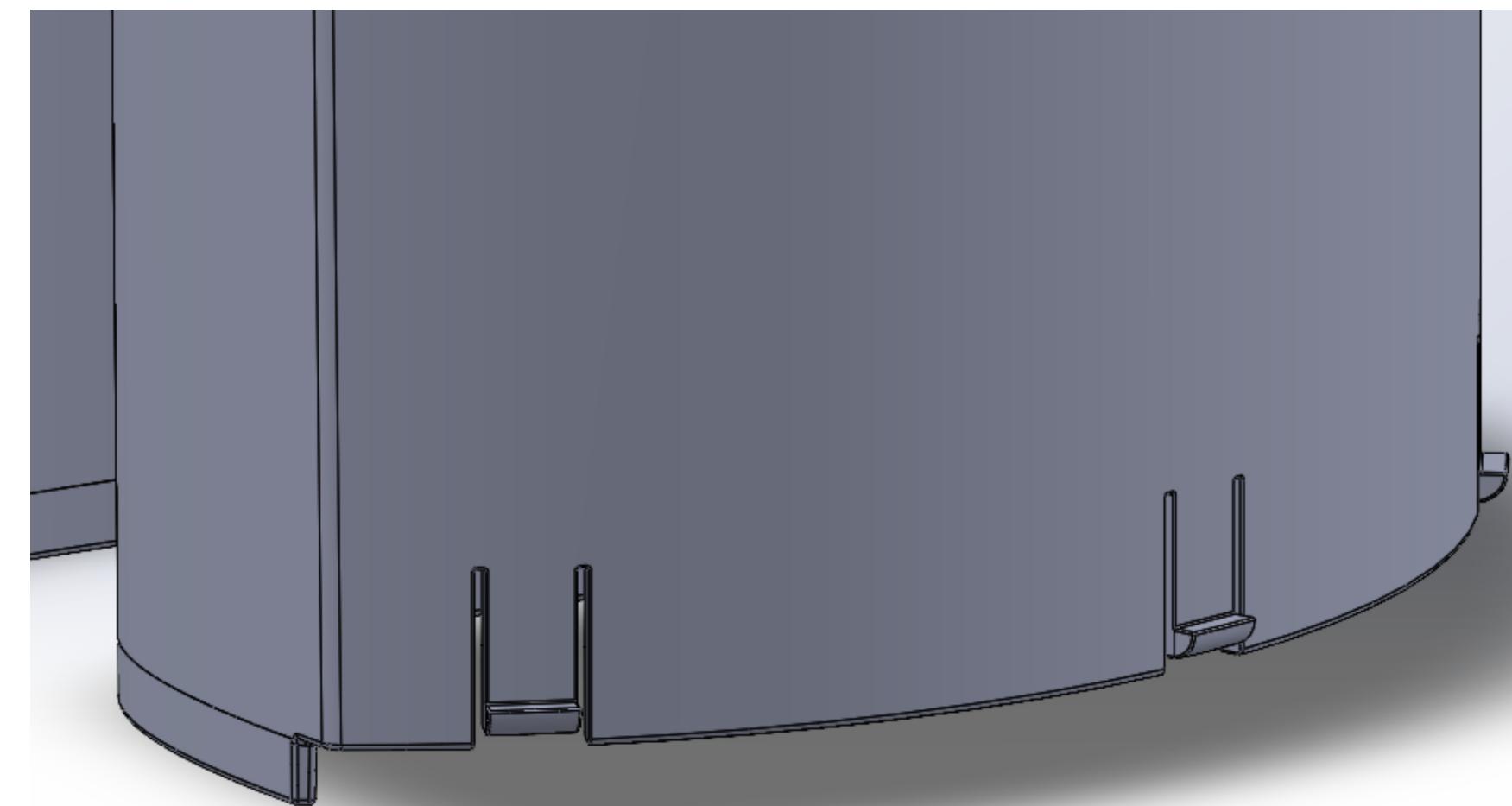
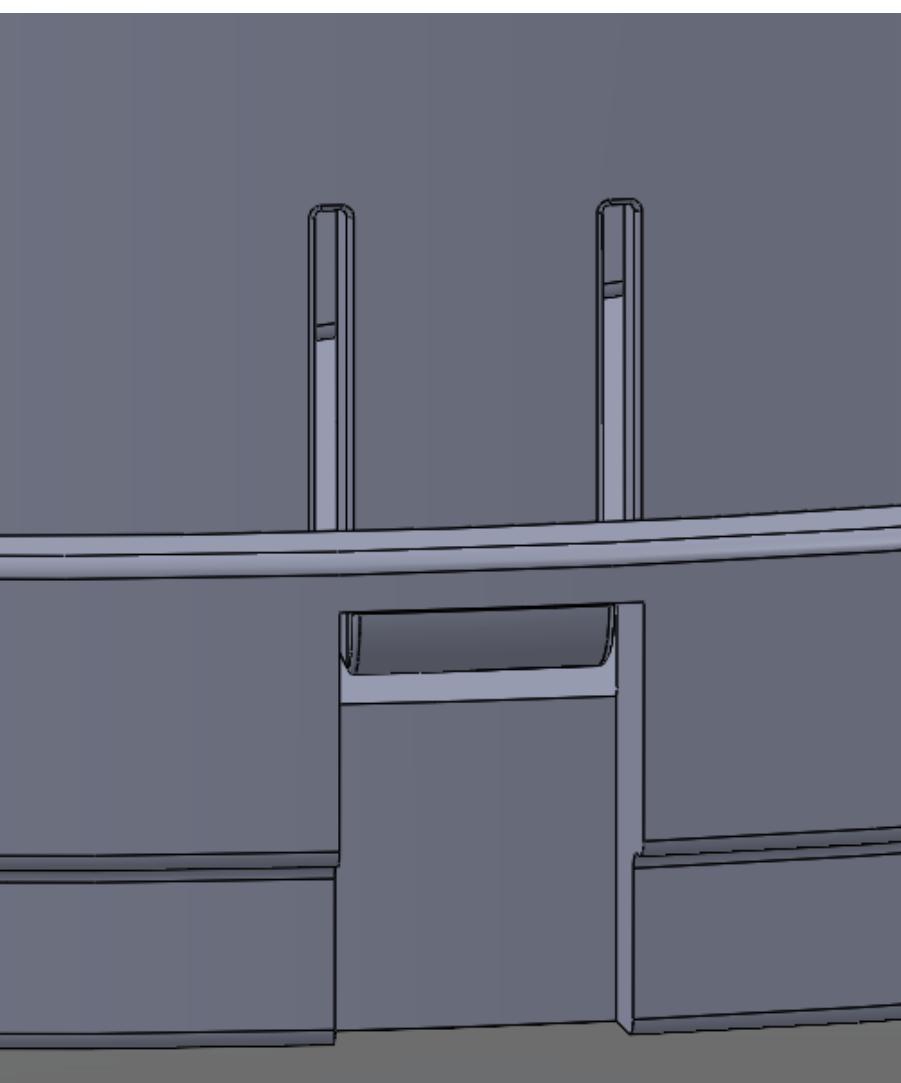
a should be
okay!



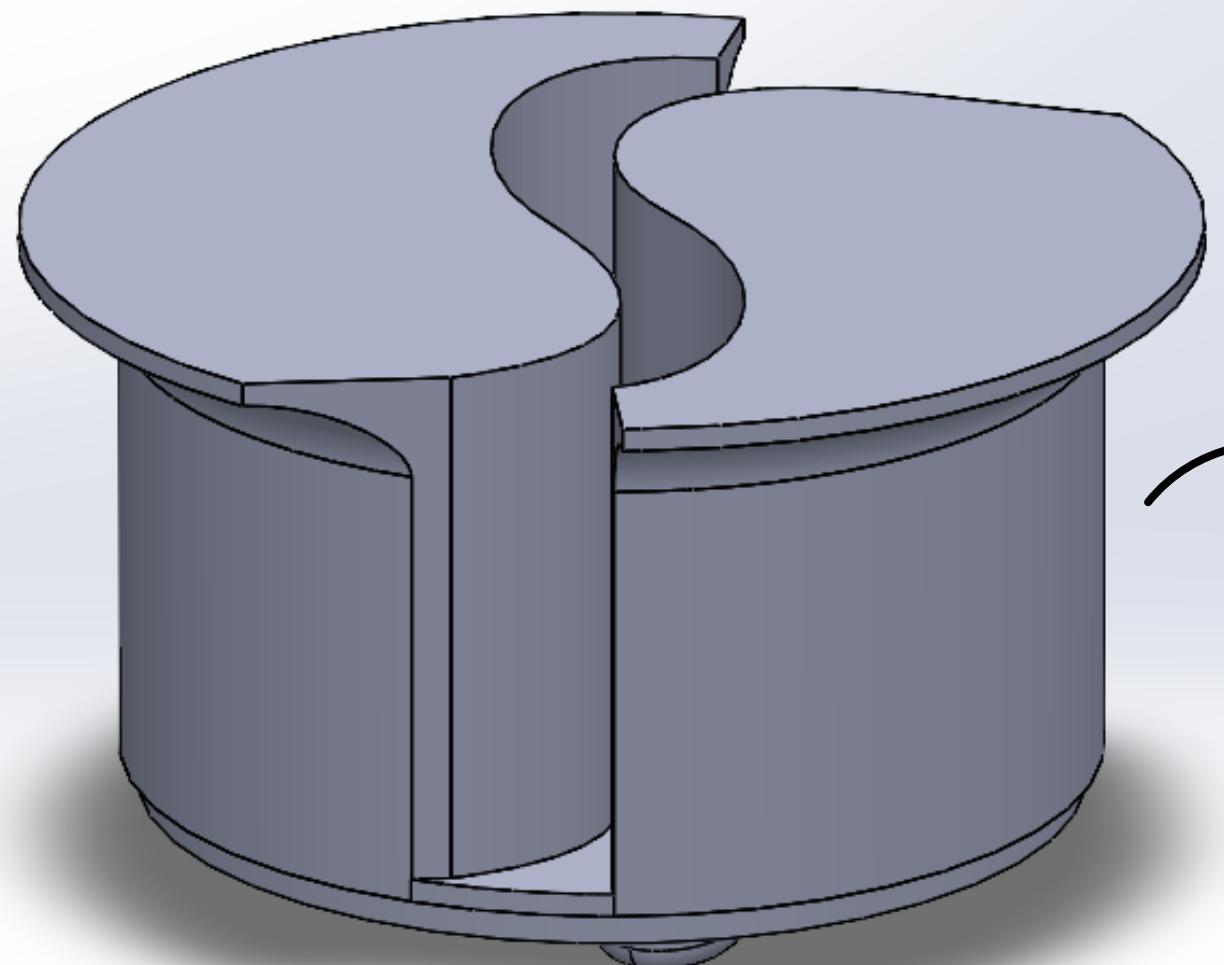
Evolution of the middle of the cable wrap



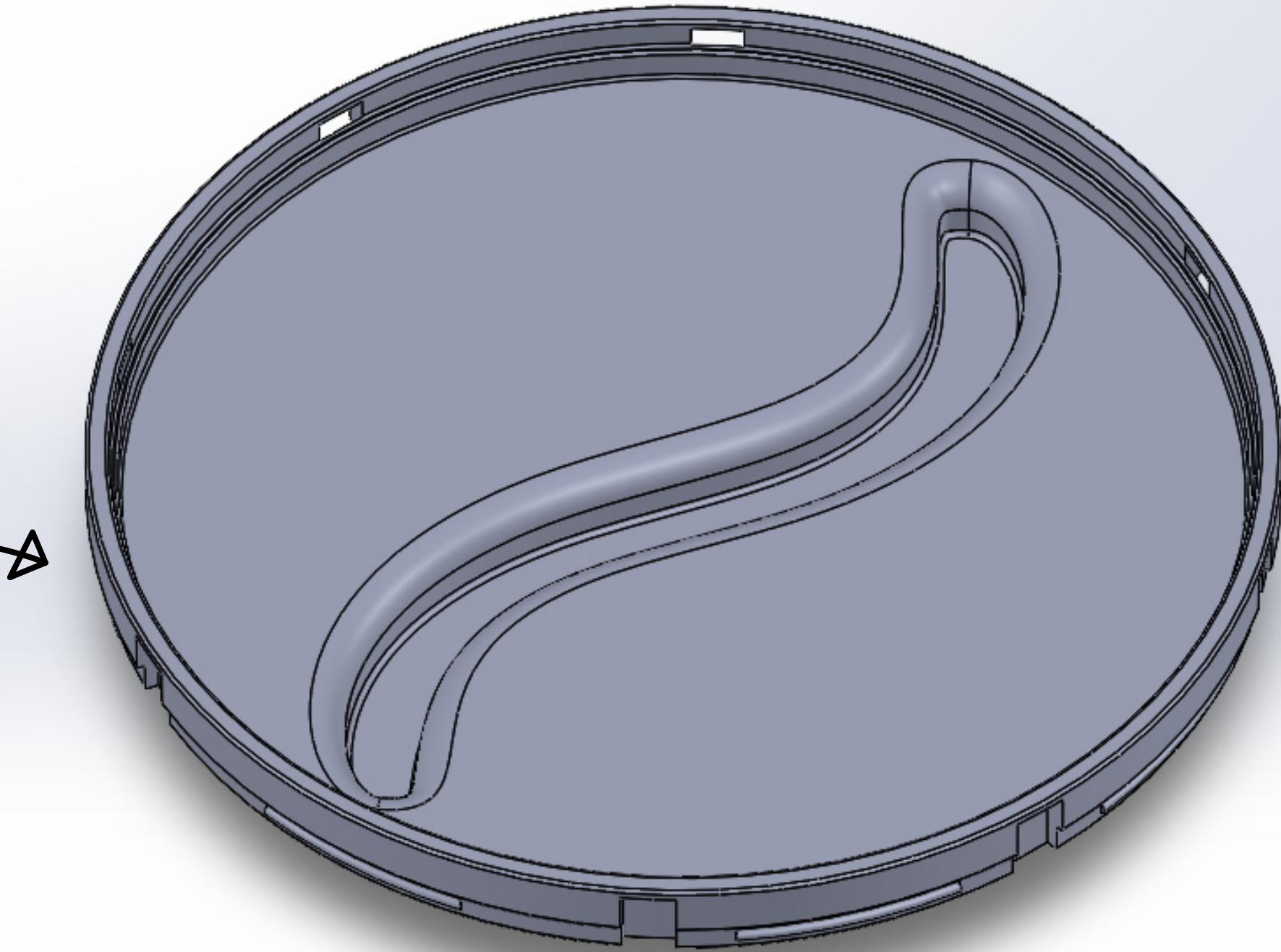
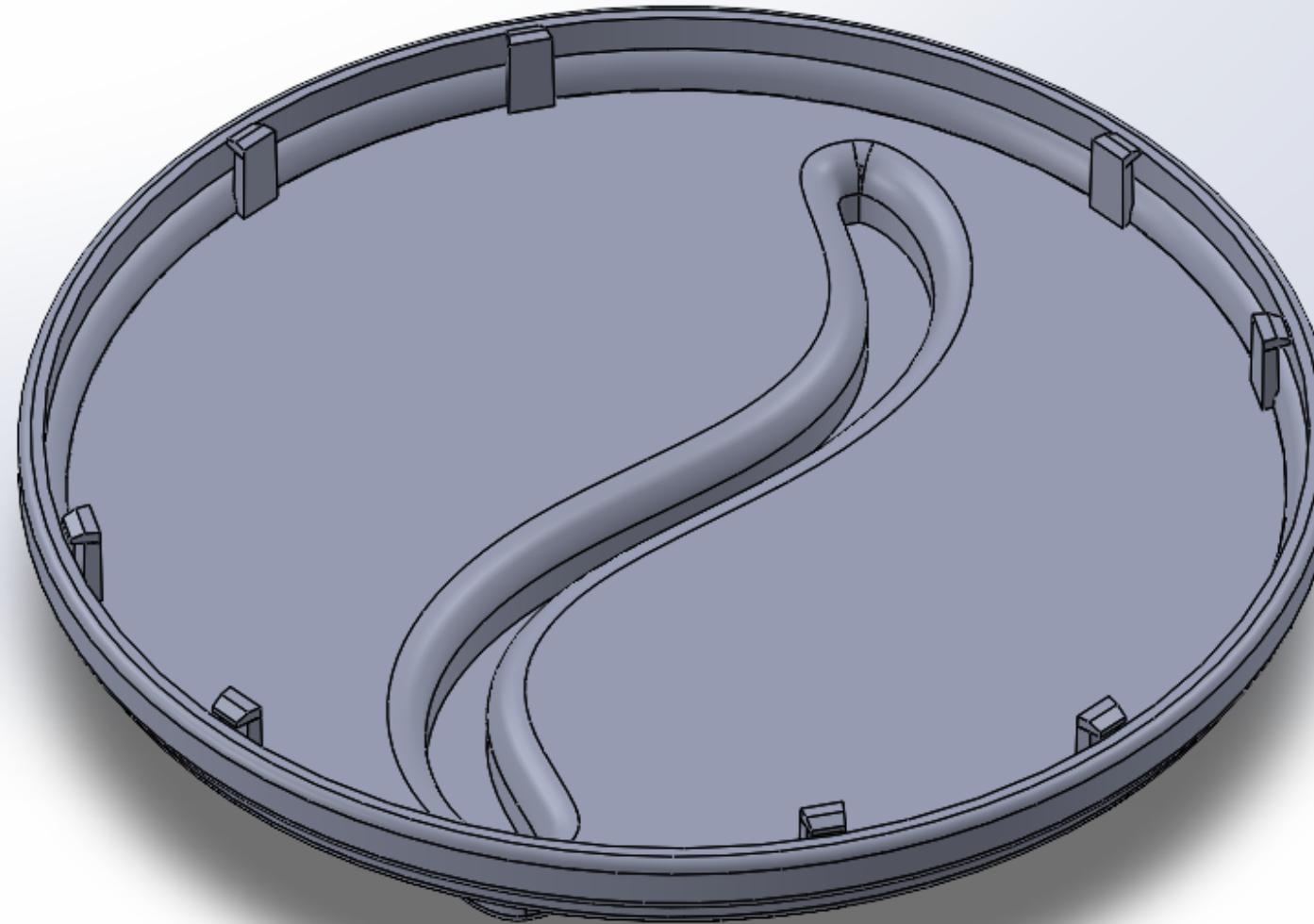
Close up of the snap fits I added



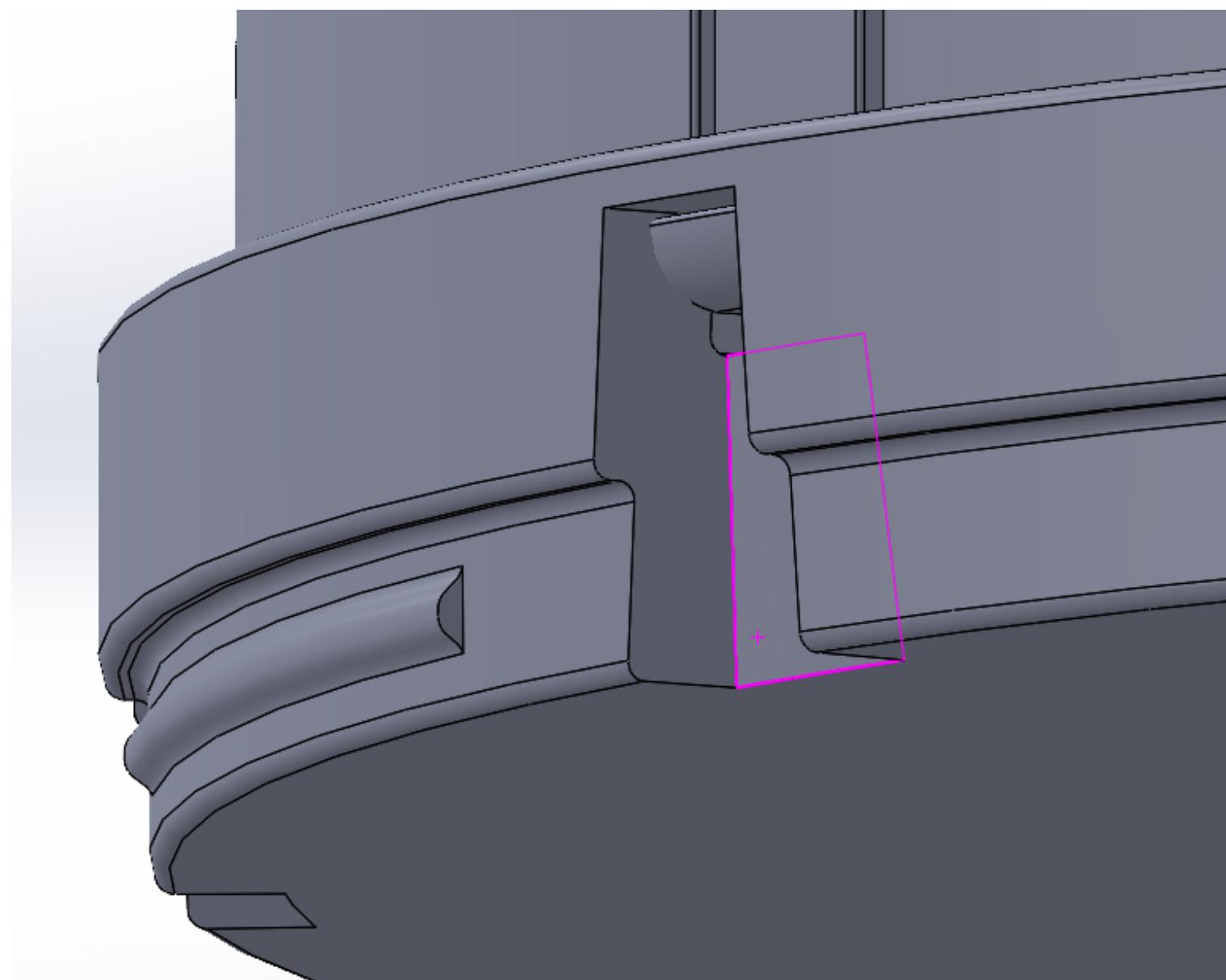
All one piece - either solid and expensive or hollow and impossible to make!



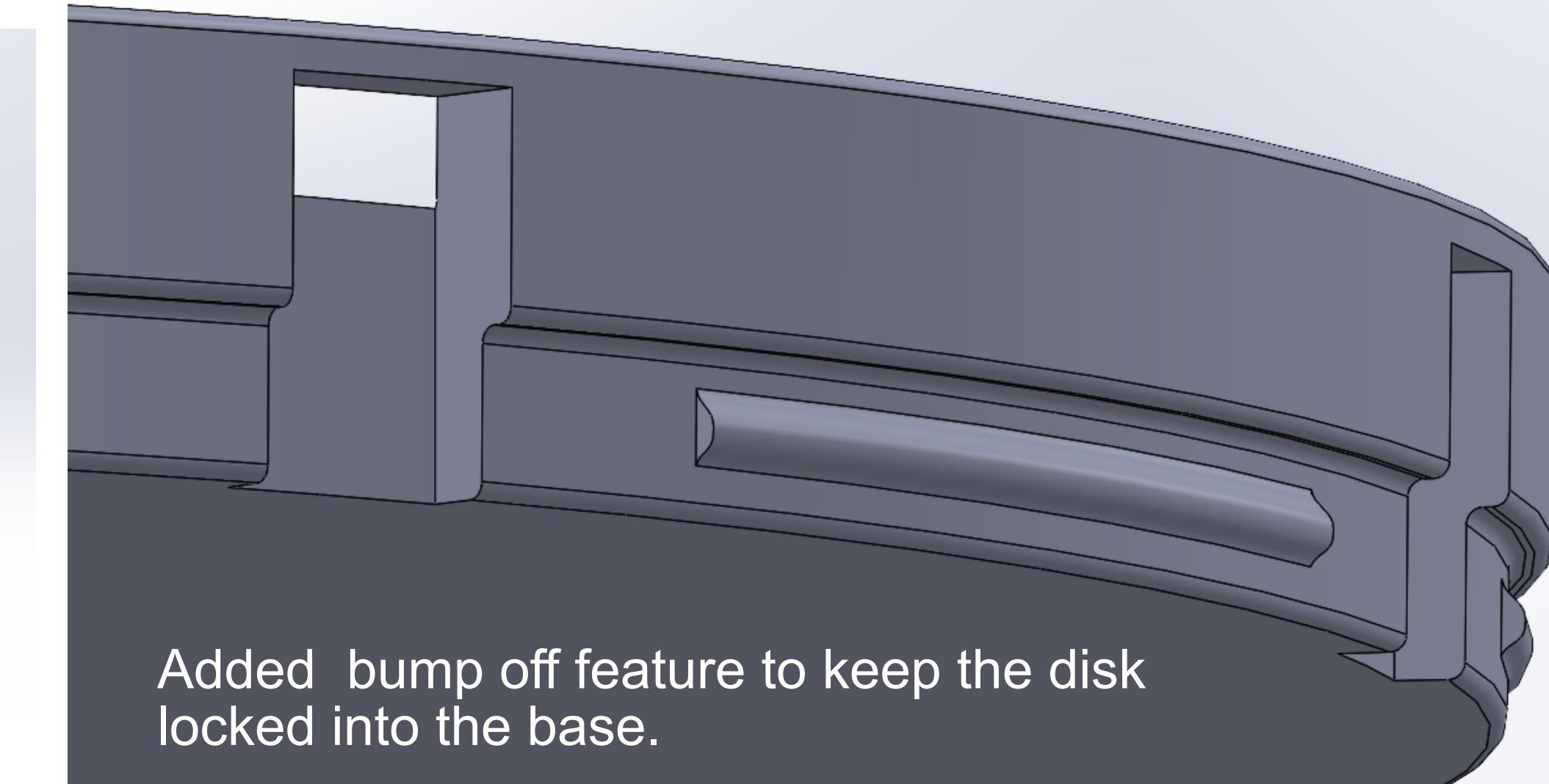
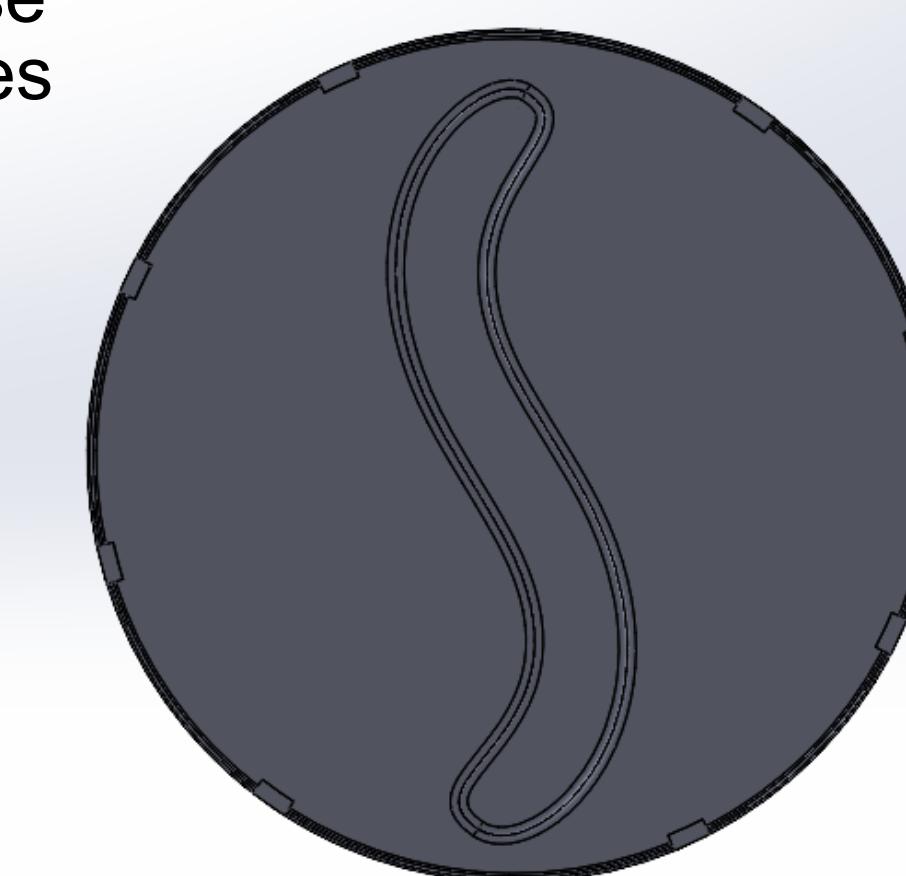
Made into two parts for manufacture snap fit joining.



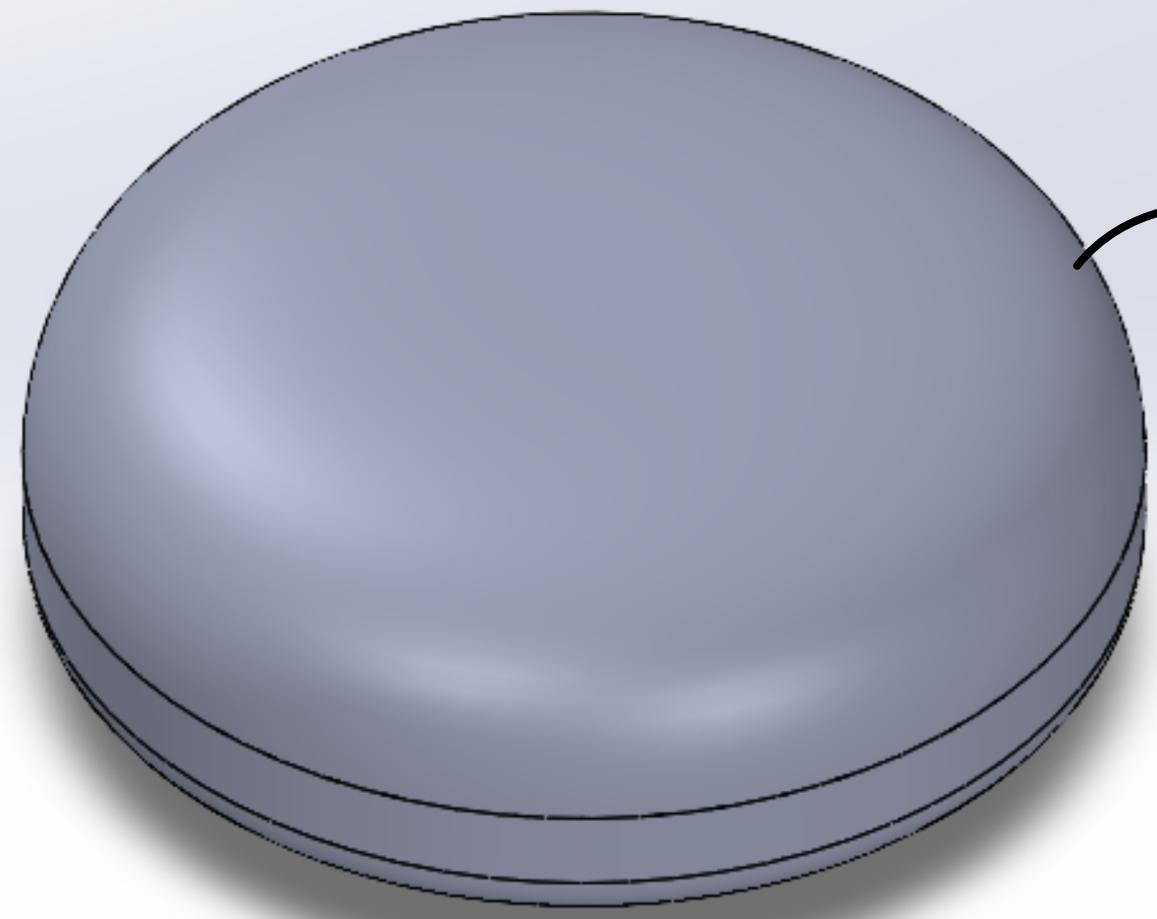
Previous method with snap-fits wouldn't work, reverse the way they would work/ direction of snap fit.



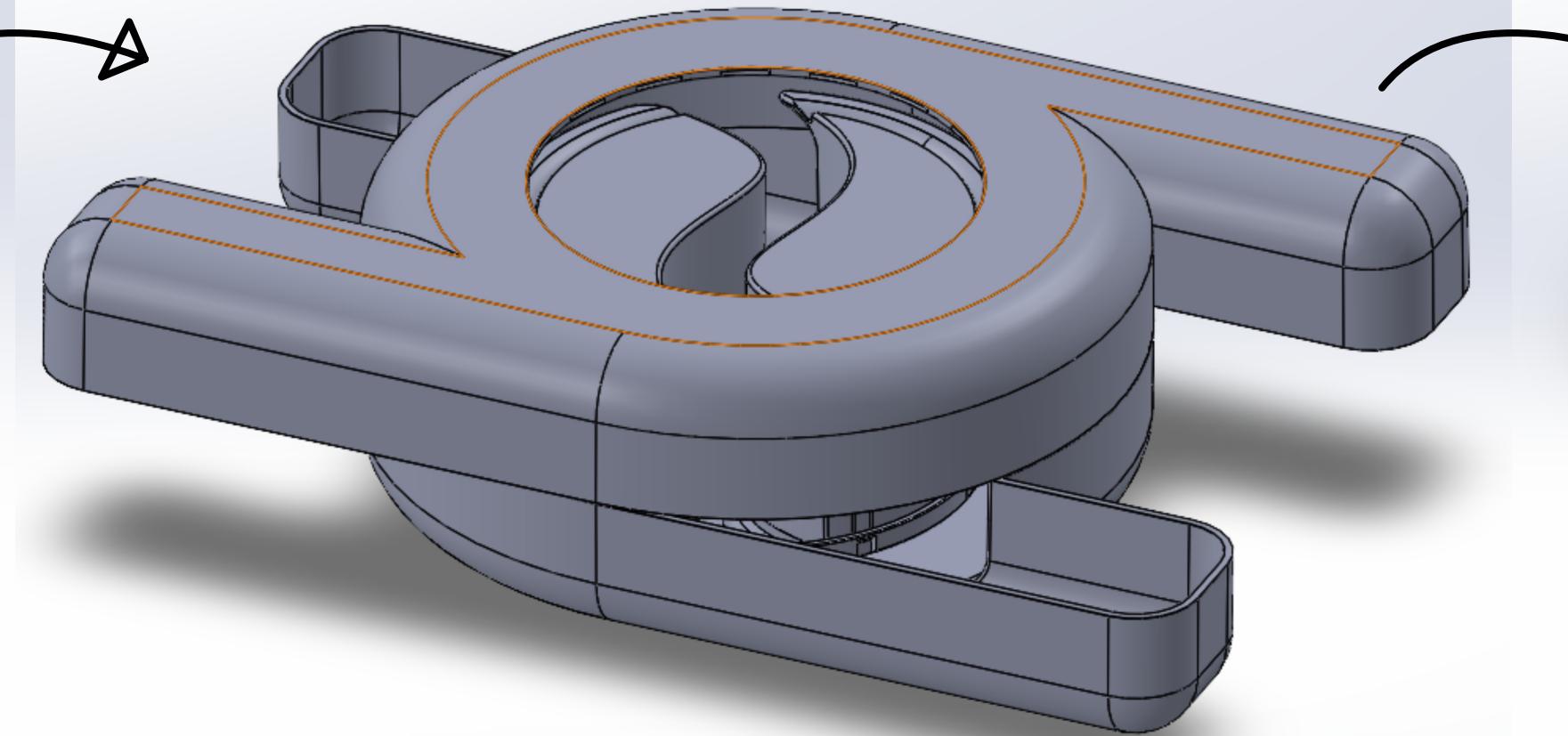
Added 5 degree draft to these shut off faces



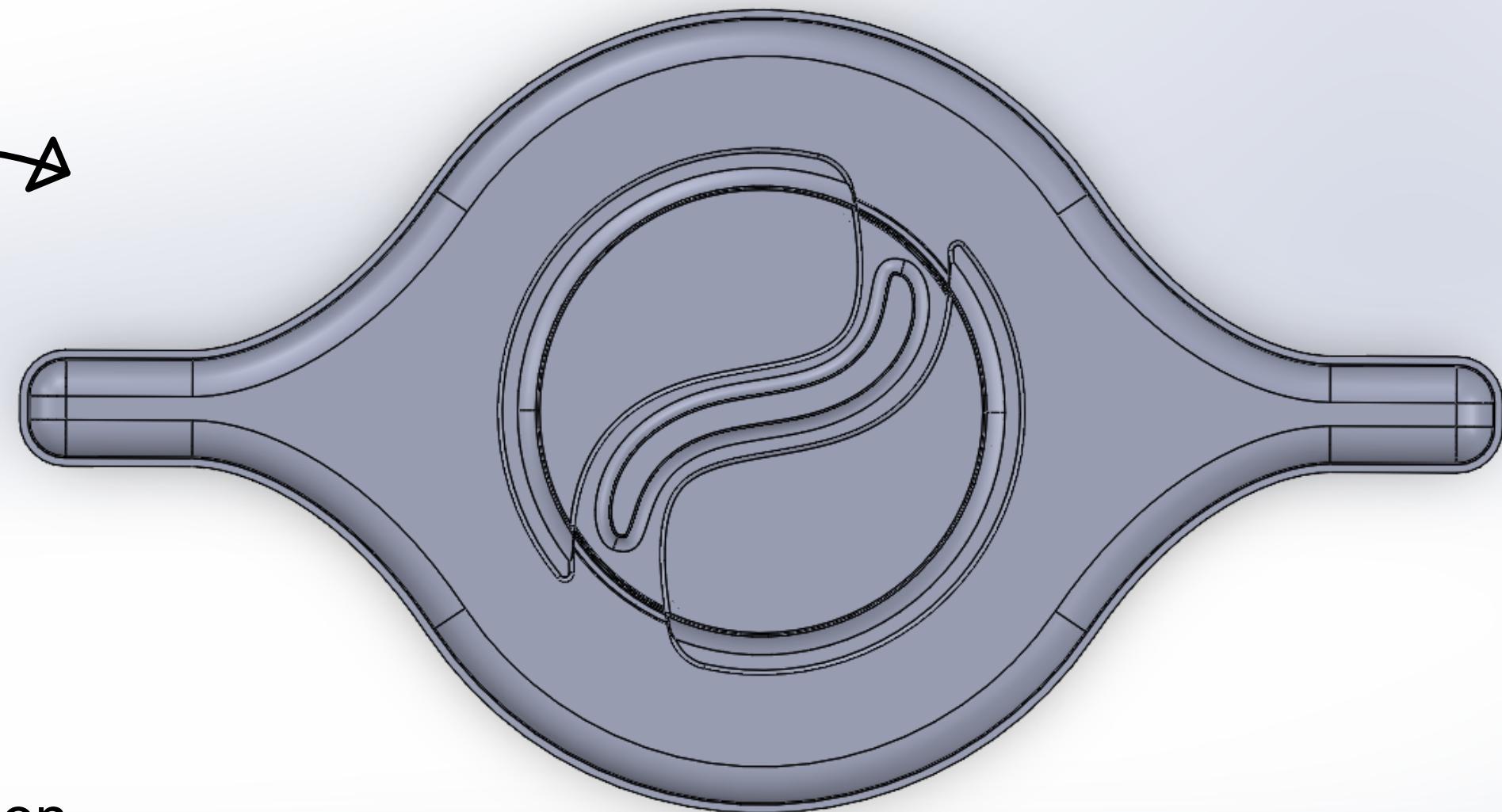
Added bump off feature to keep the disk locked into the base.



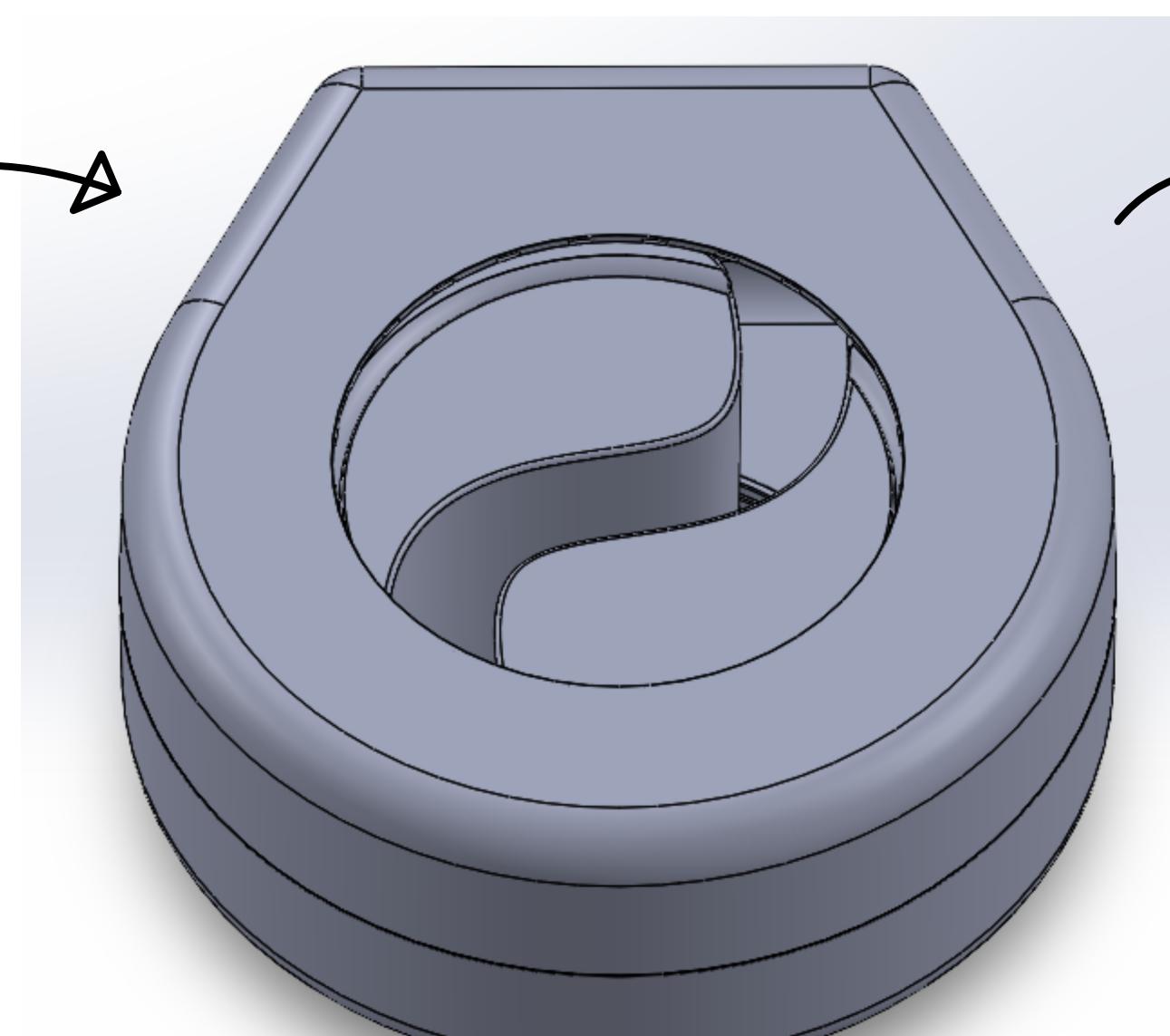
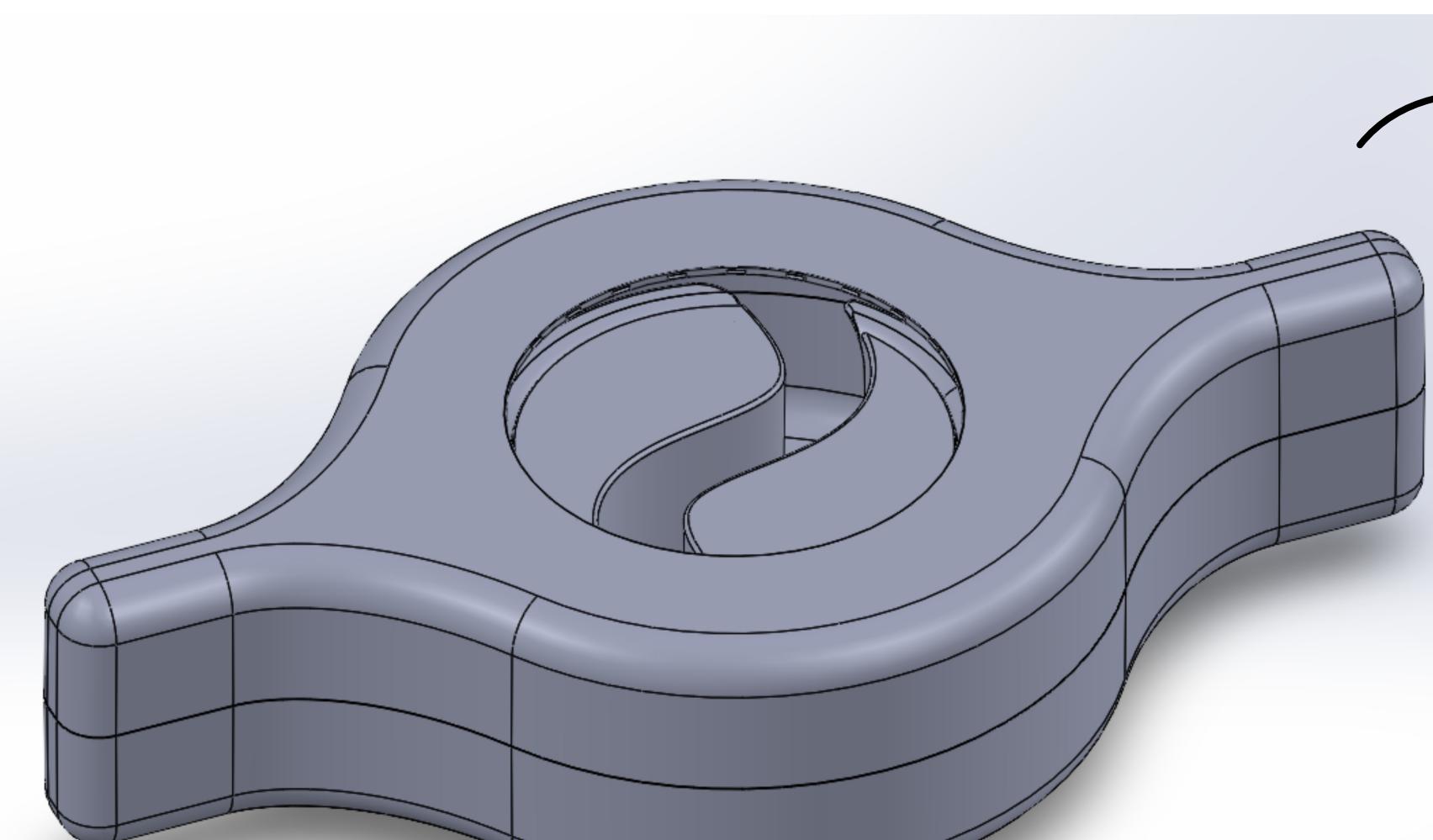
Basic starting point of shape.



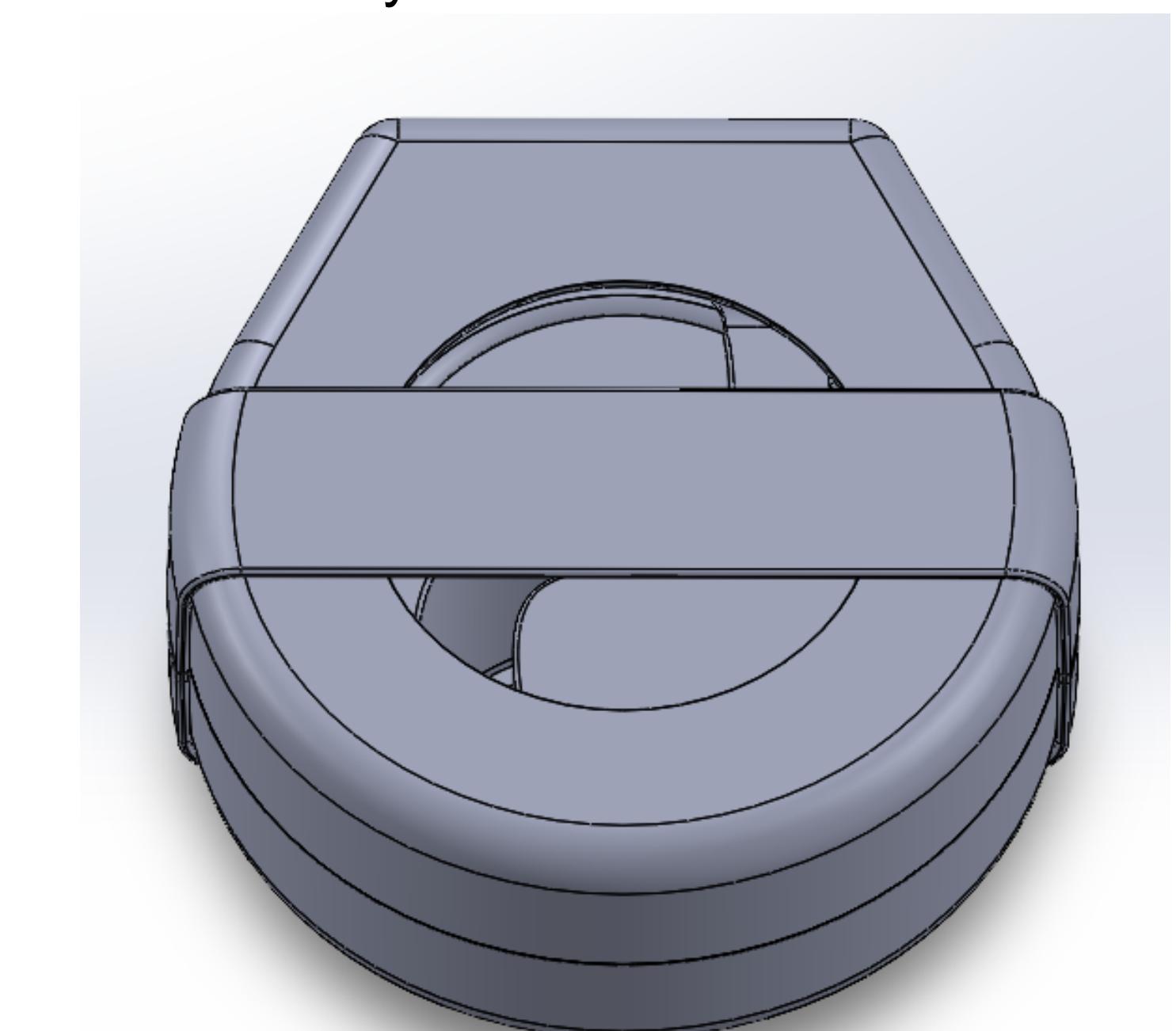
Tried having ends for the cables to go in for protection but didn't work when flipped as not symmetrical.



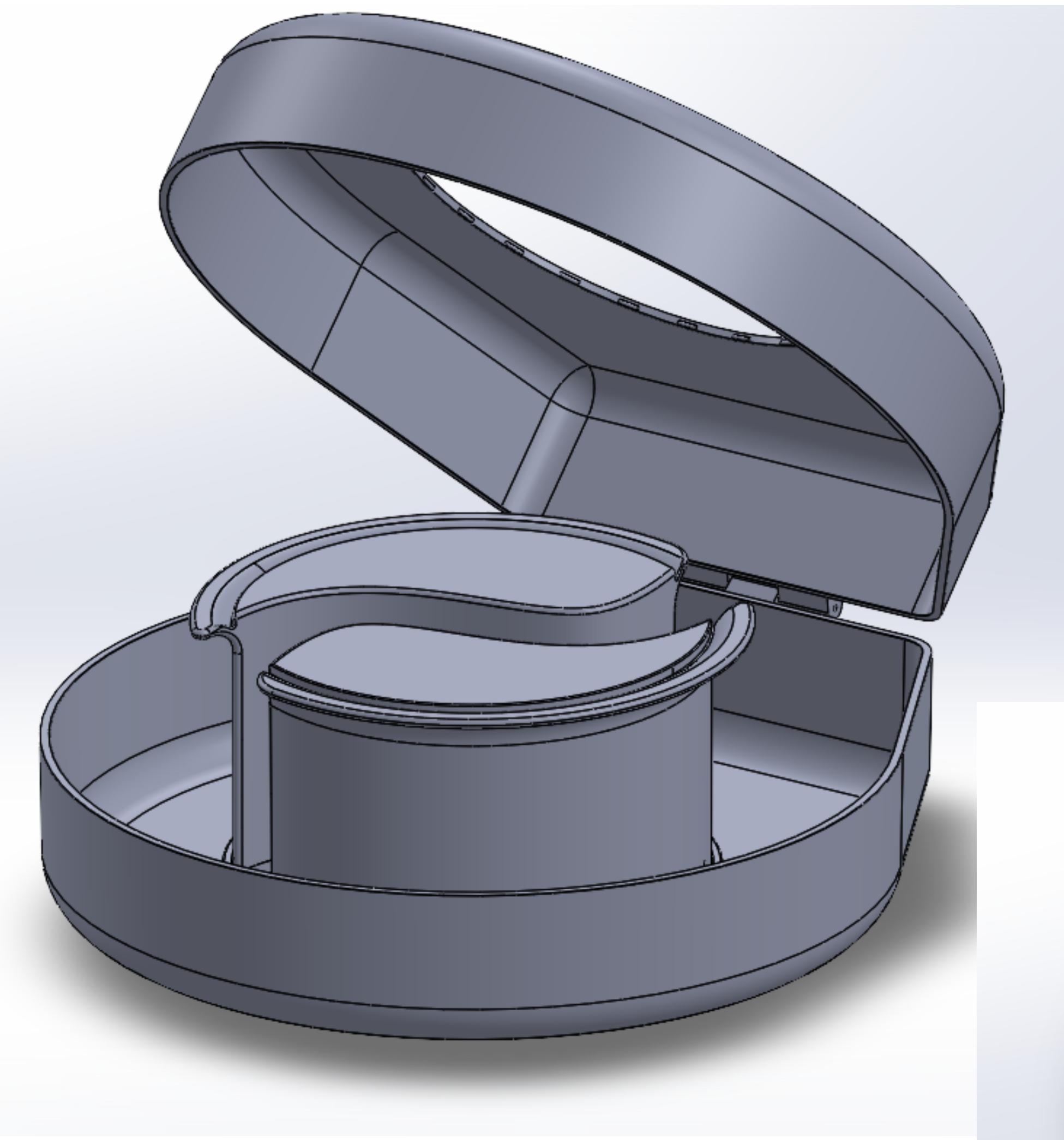
Made a symmetrical version - looked weird.



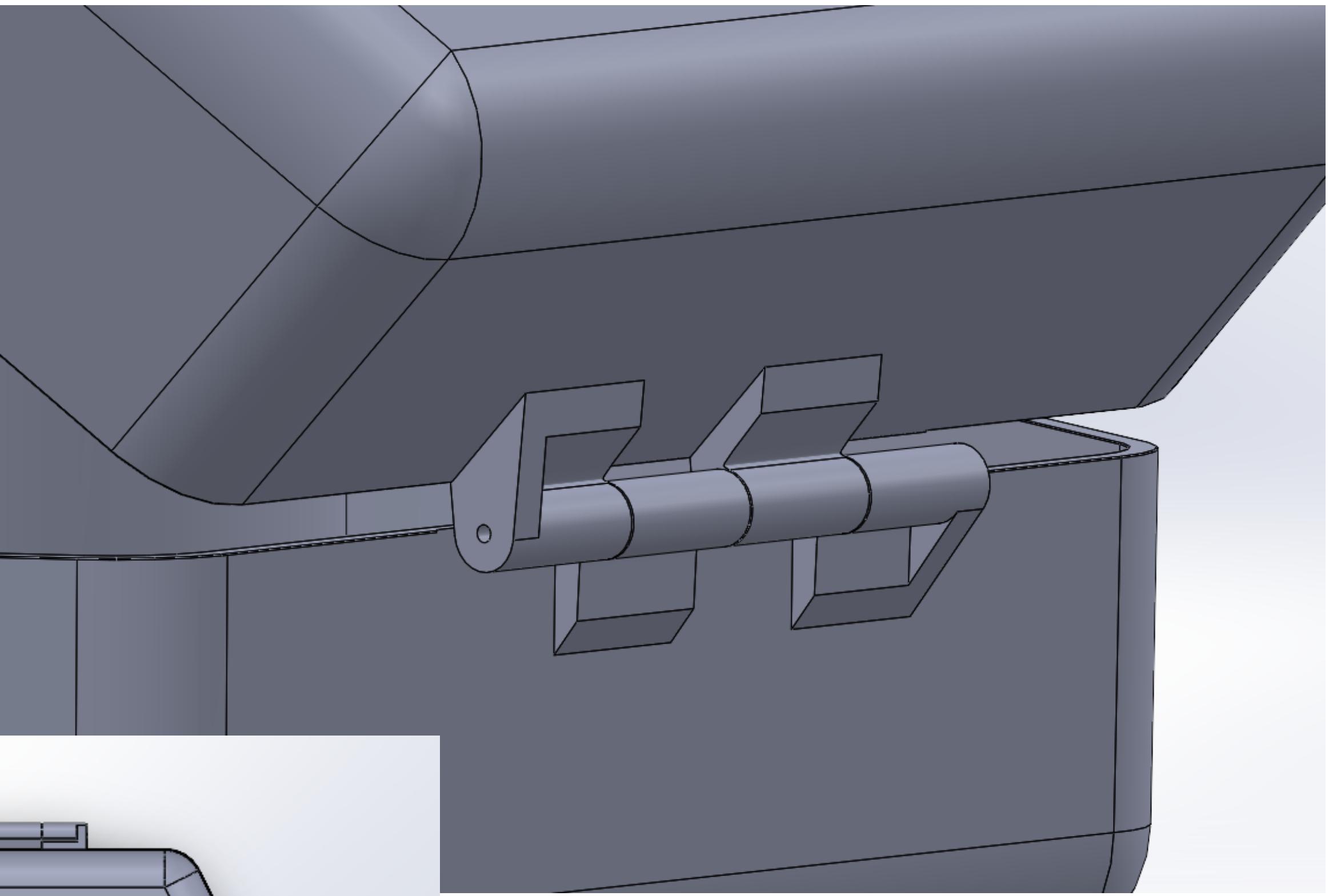
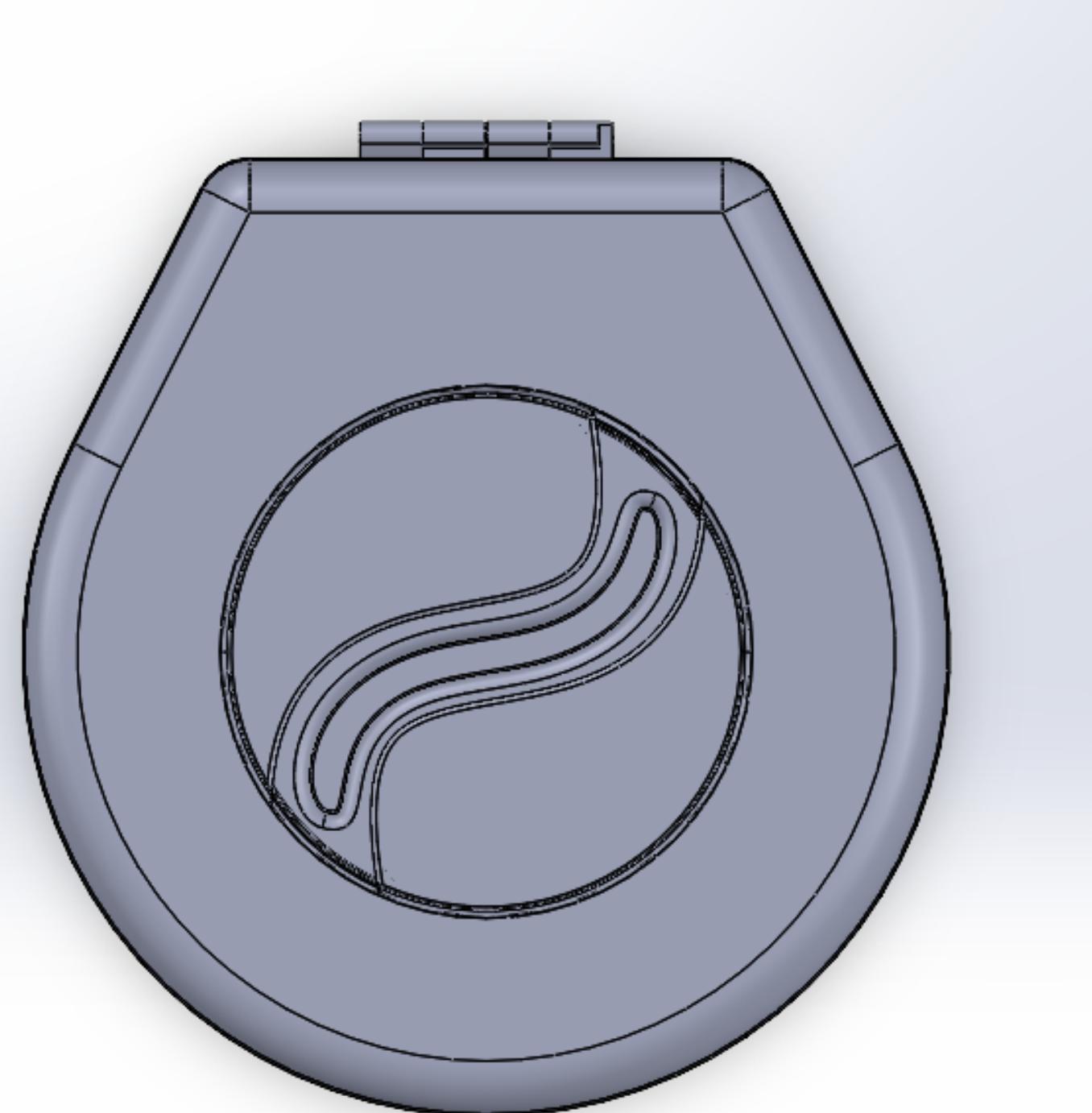
Reverted to the round shape but added a flat side for the hinge.

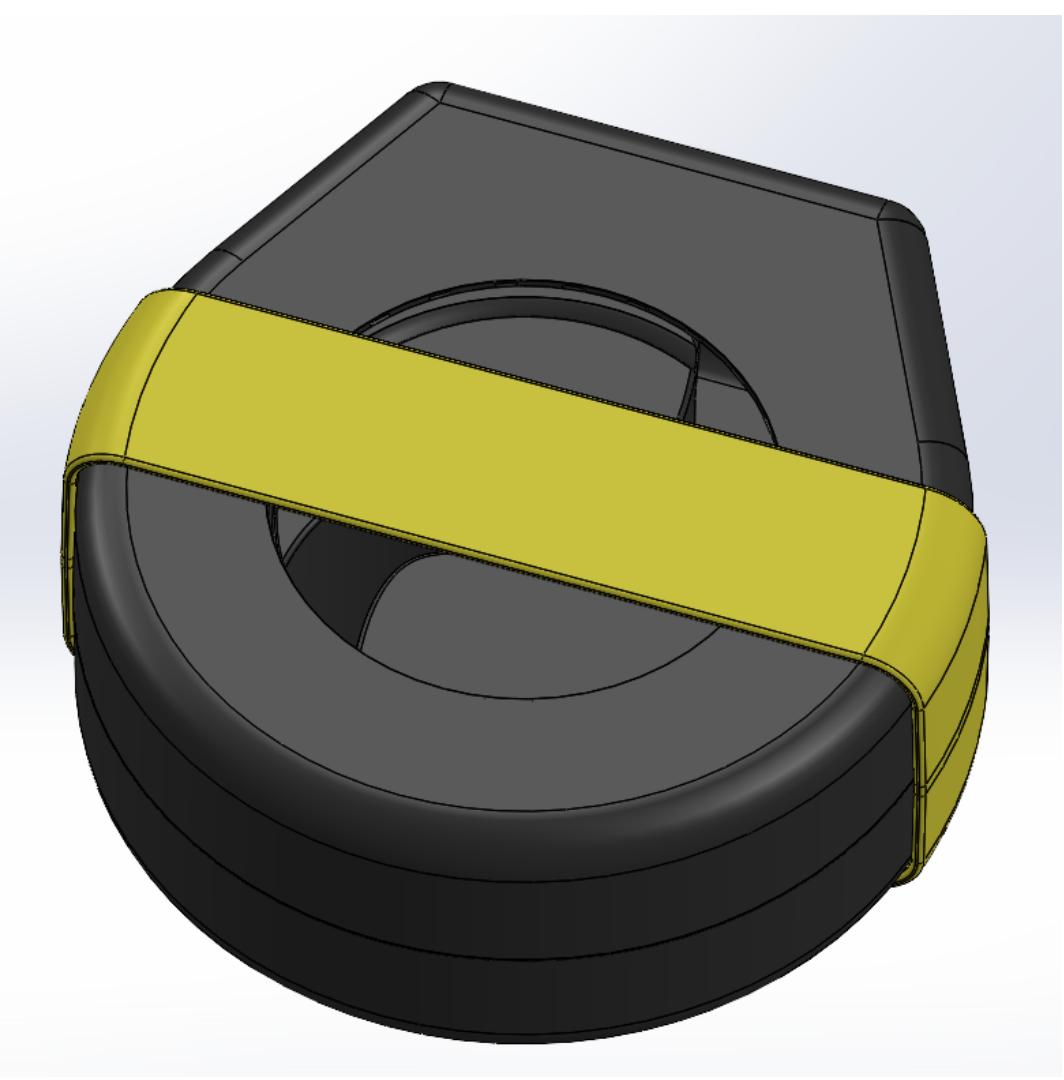
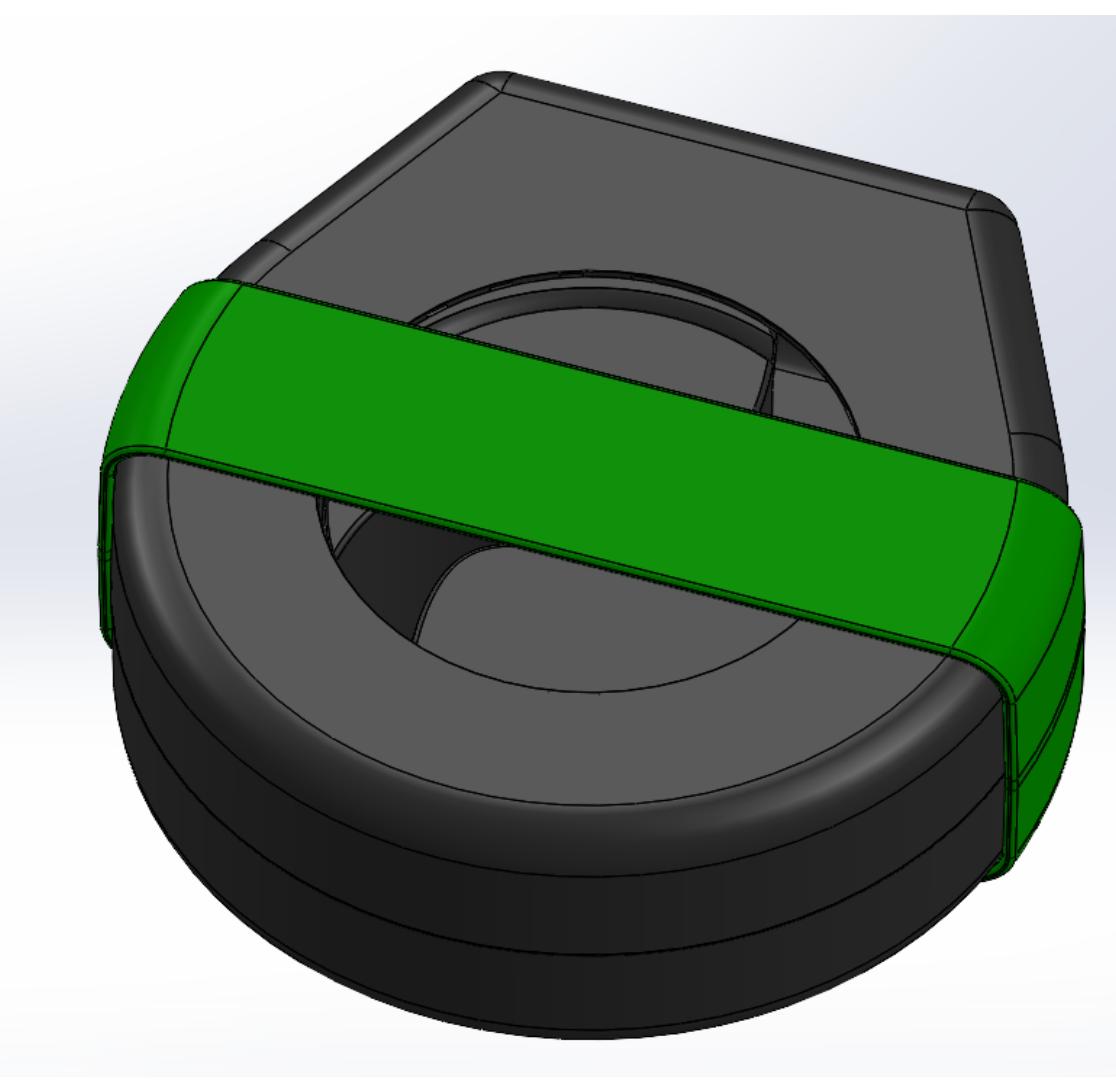
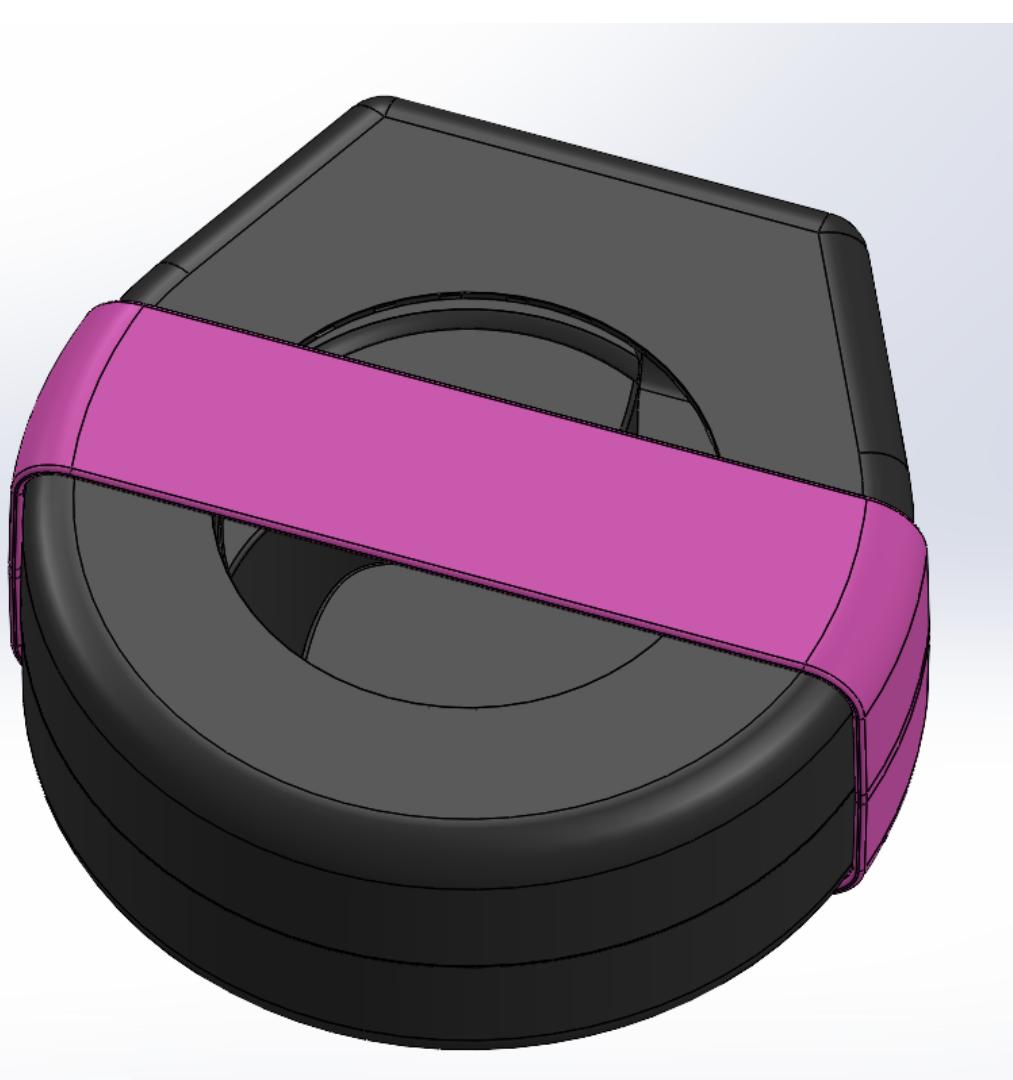
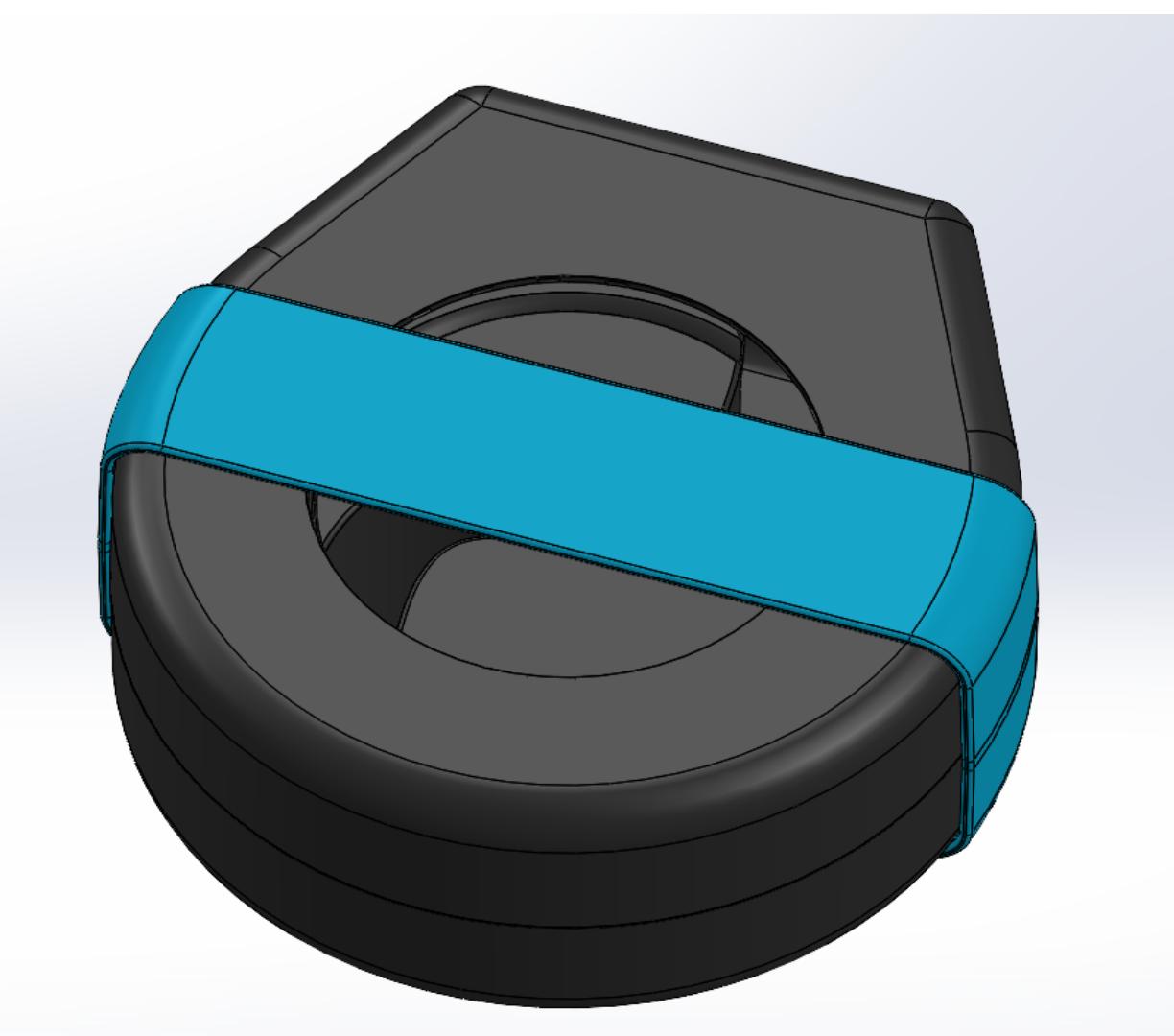
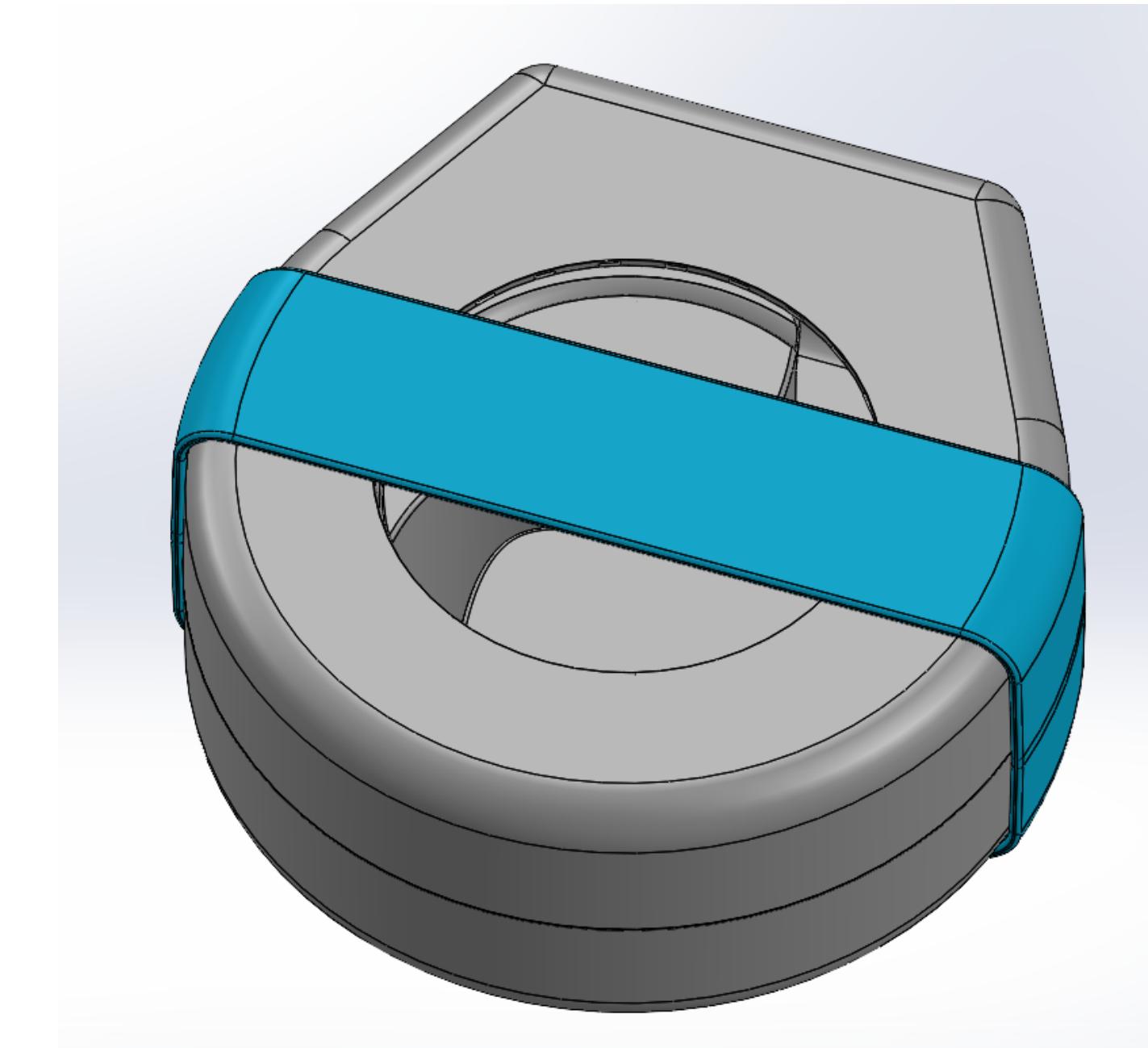
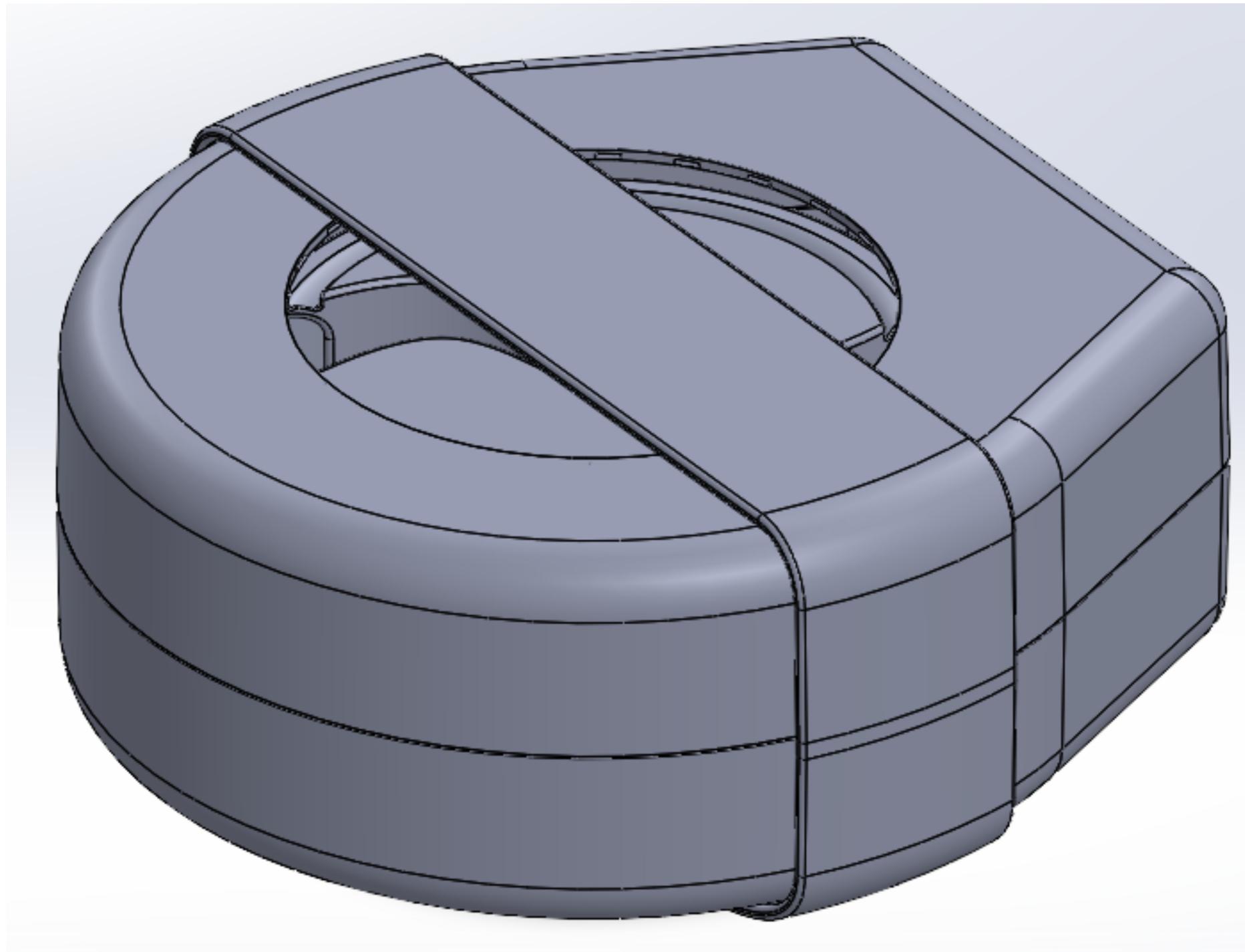
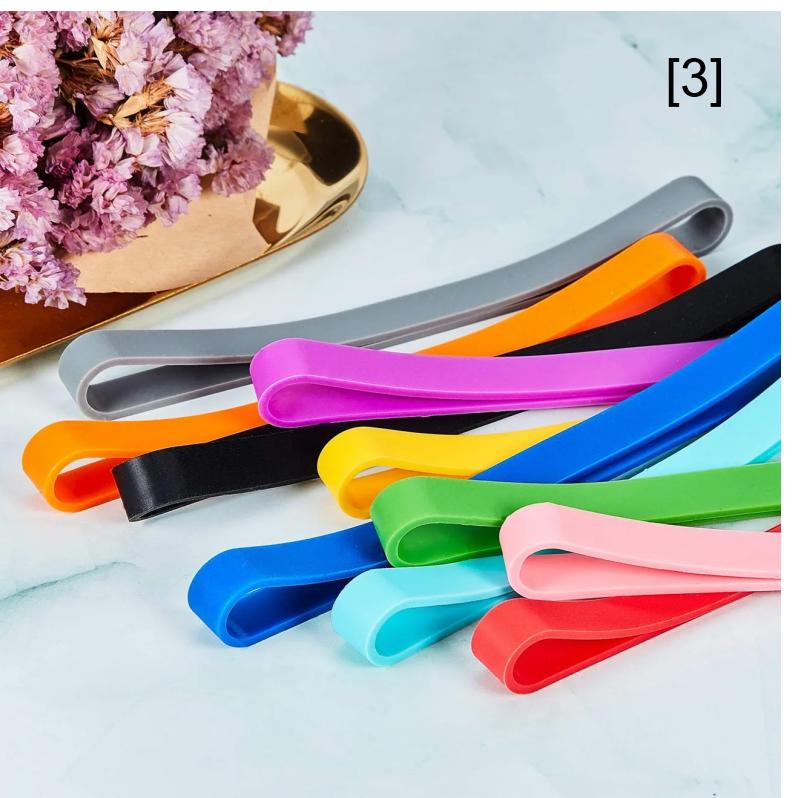


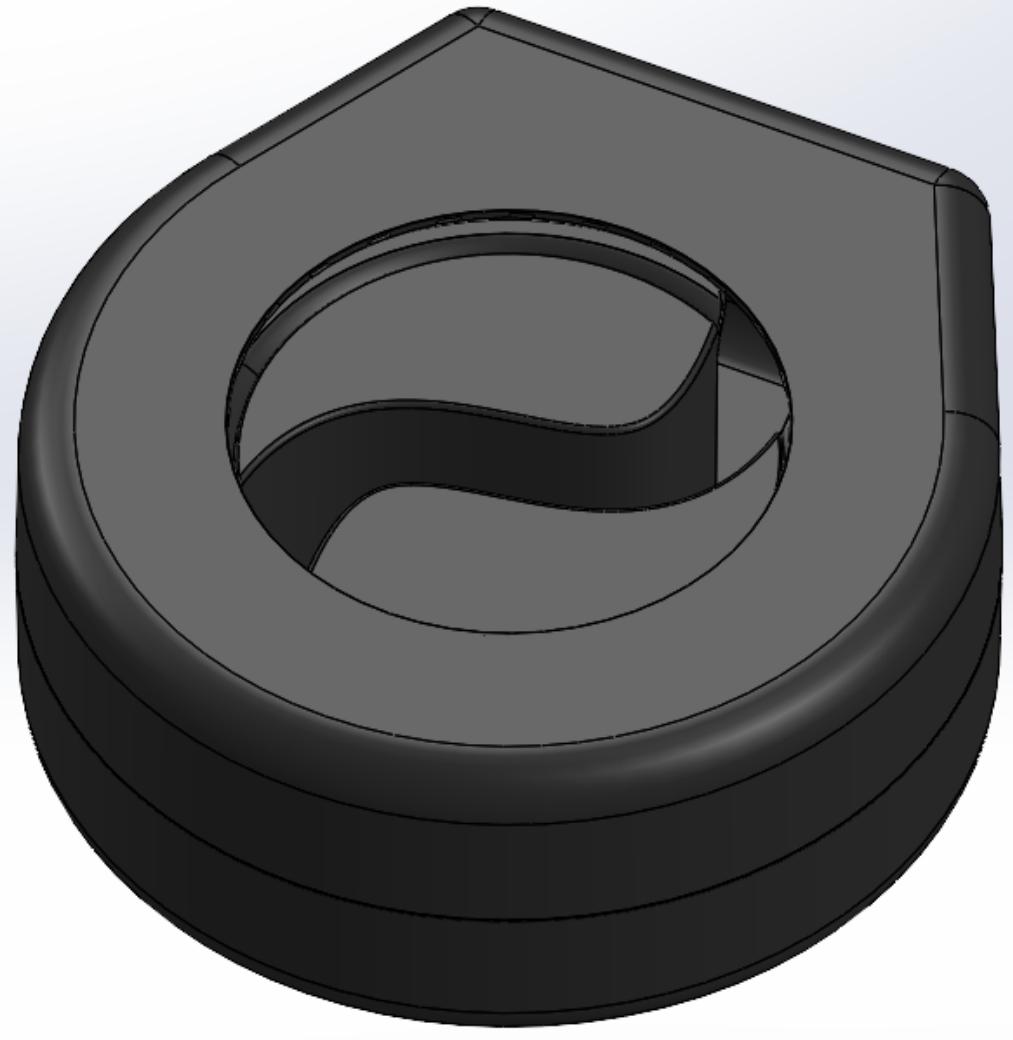
Couldn't think of how to keep it closed if both top and bottom are made with the same mold - thought of using a rubber band to keep the parts closed.



Added a symmetrical hinge design so that only a 24mm length of 1mm diameter wire is needed to keep hinge together.



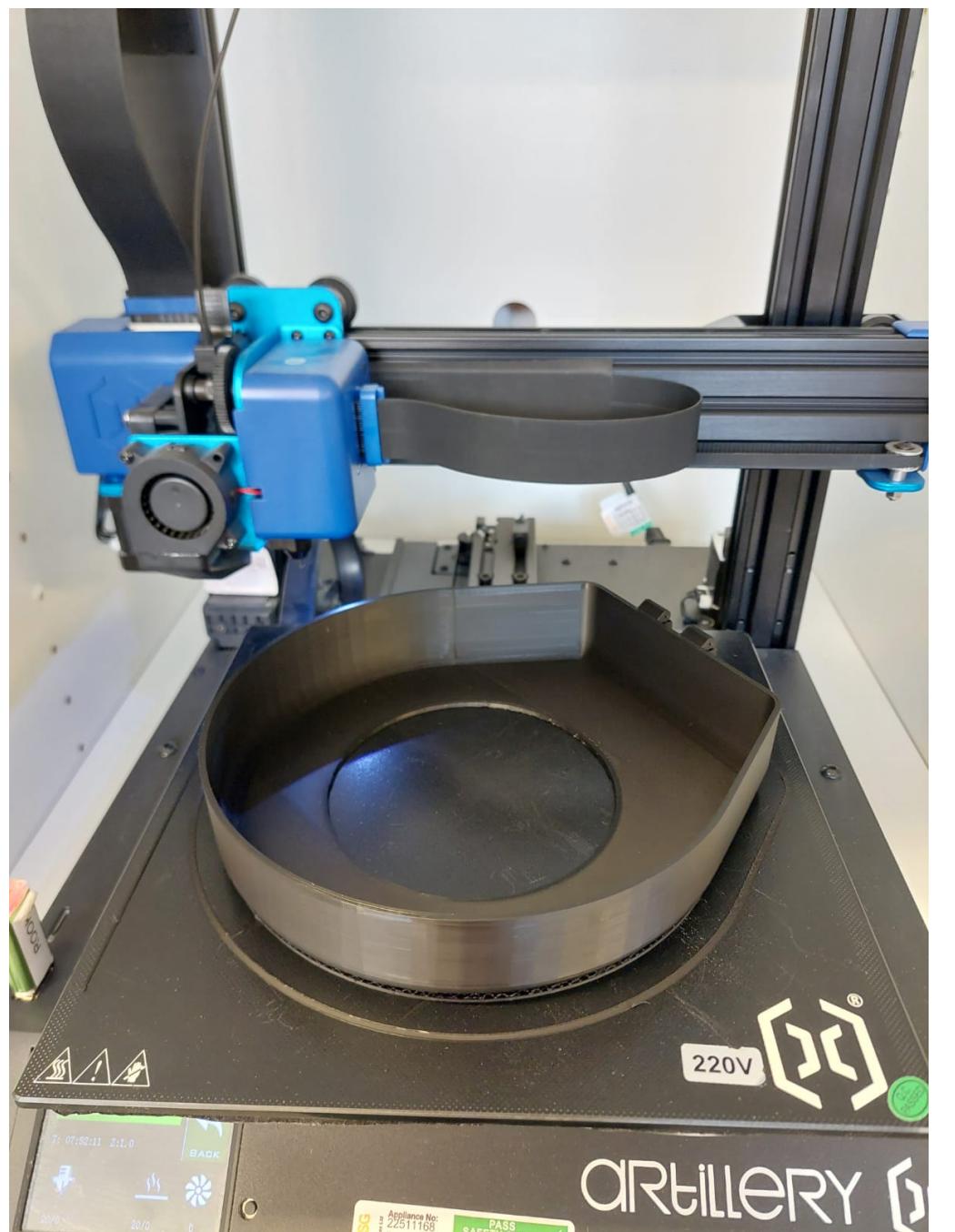
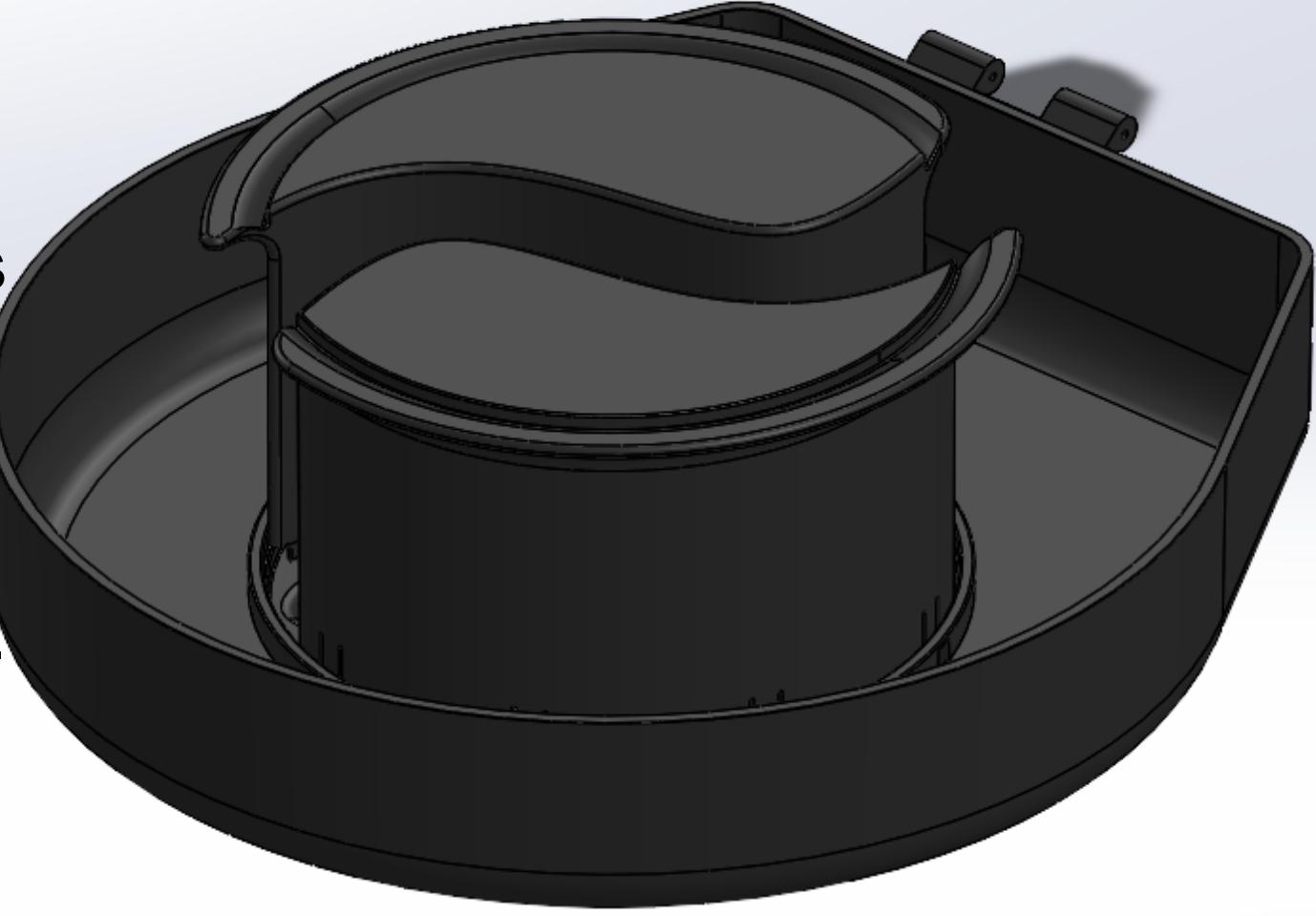




My first 3D print was of this model. From making this model, I realised that the resolution one can achieve from 3D printing is far lower than injection moulding, so some of my intricate details didn't work.



For example, the rotary part didn't fit into the hole it was supposed to, and definitely would not be able to rotate when in place.



Also, since PLA is a much more rigid and inflexible polymer than PS the snap fits would not bend and the middle inserts would not stay clipped in place.



This was aided by the fact the tension created by them was not enough to keep the parts in position so they slipped easily and would definitely not be able to support the force of the wire being wrapped around them.

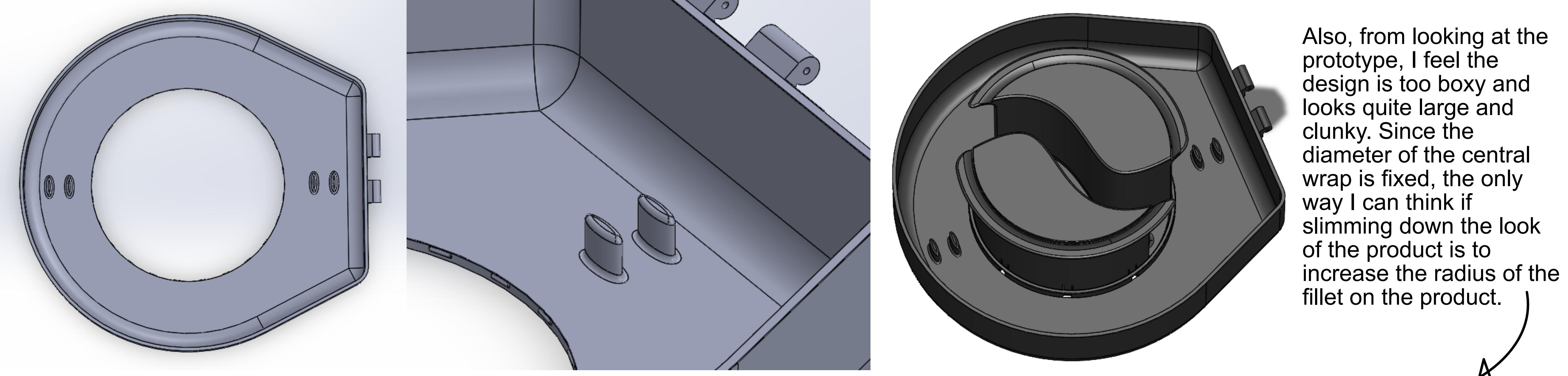


Demonstrating rough use with a 1m HDMI cable..

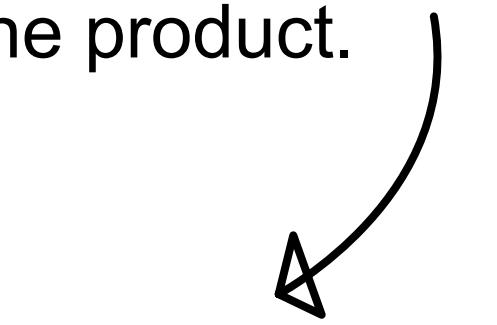


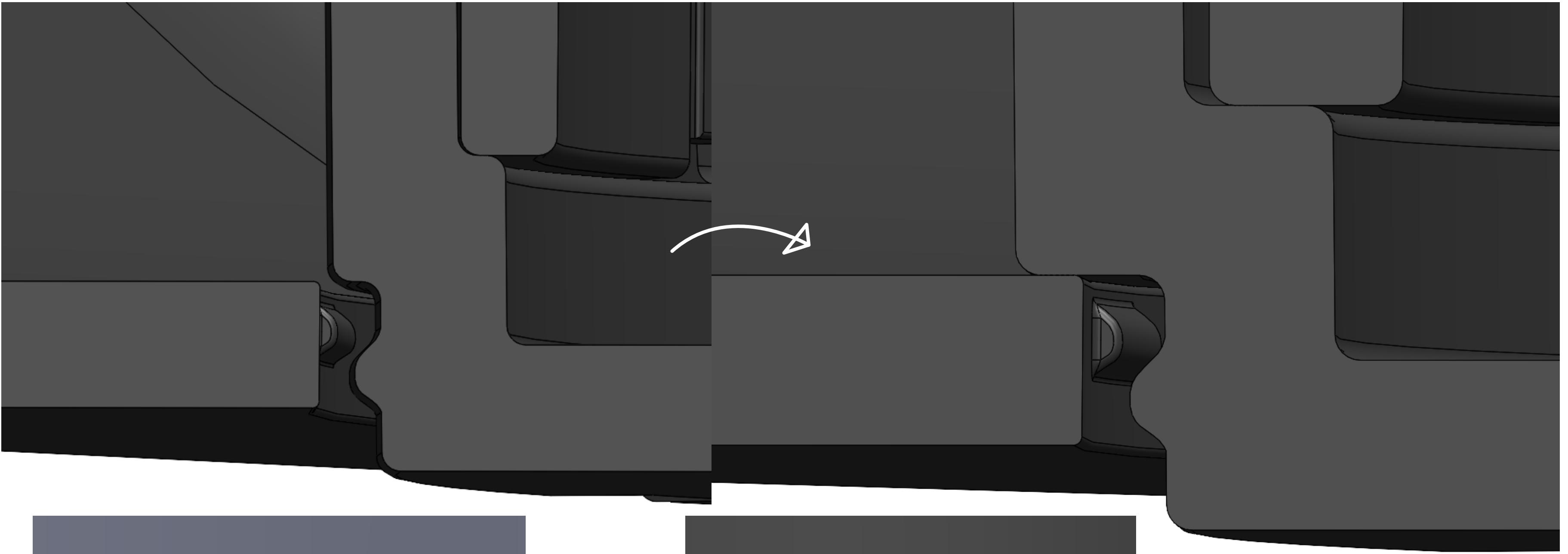
Changes:

- Improve support for snap-in features
- Add clips for ends of wires
- Enlarge hole in base slightly for next prototype

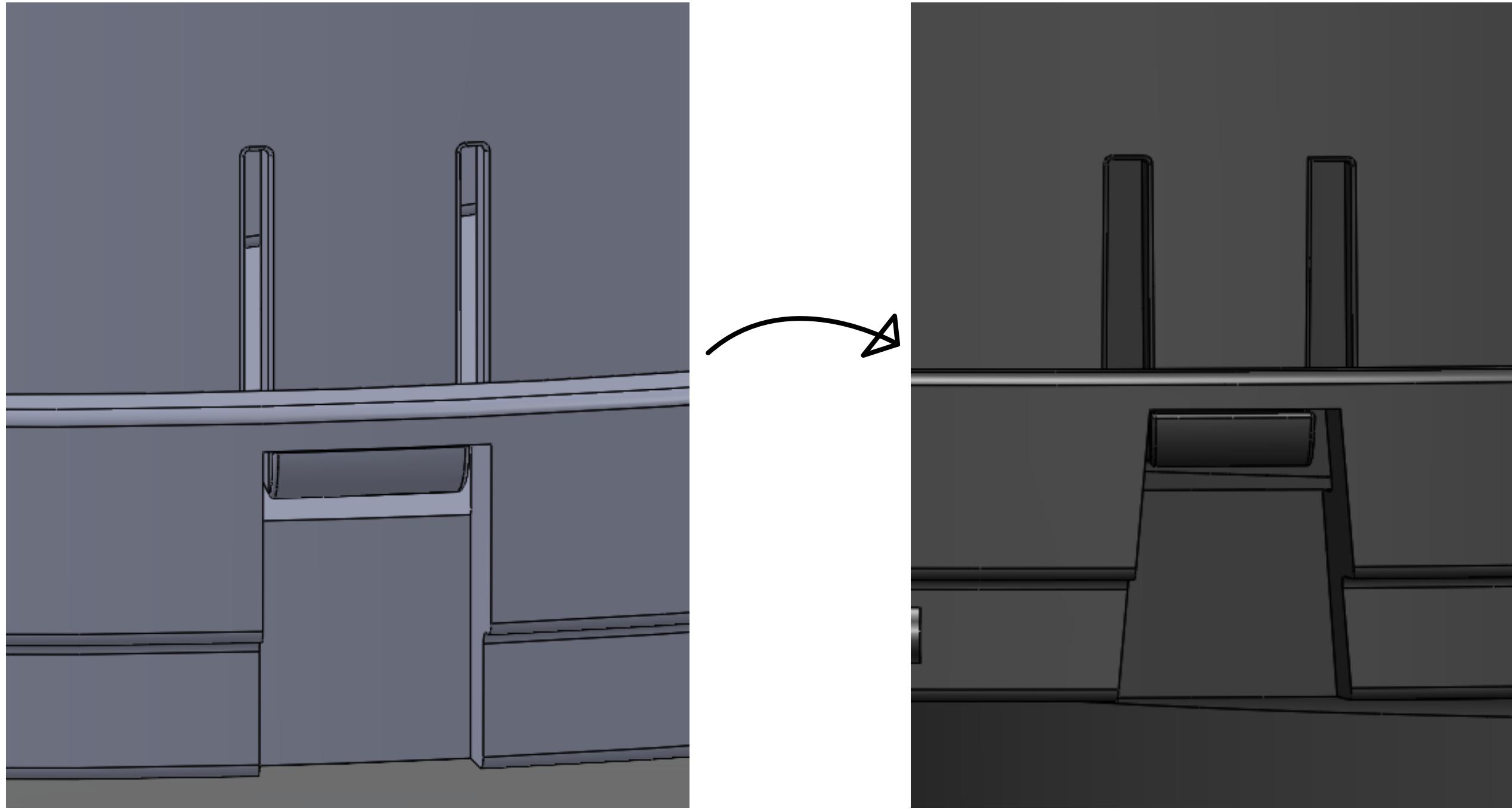


Also, from looking at the prototype, I feel the design is too boxy and looks quite large and clunky. Since the diameter of the central wrap is fixed, the only way I can think if slimming down the look of the product is to increase the radius of the fillet on the product.

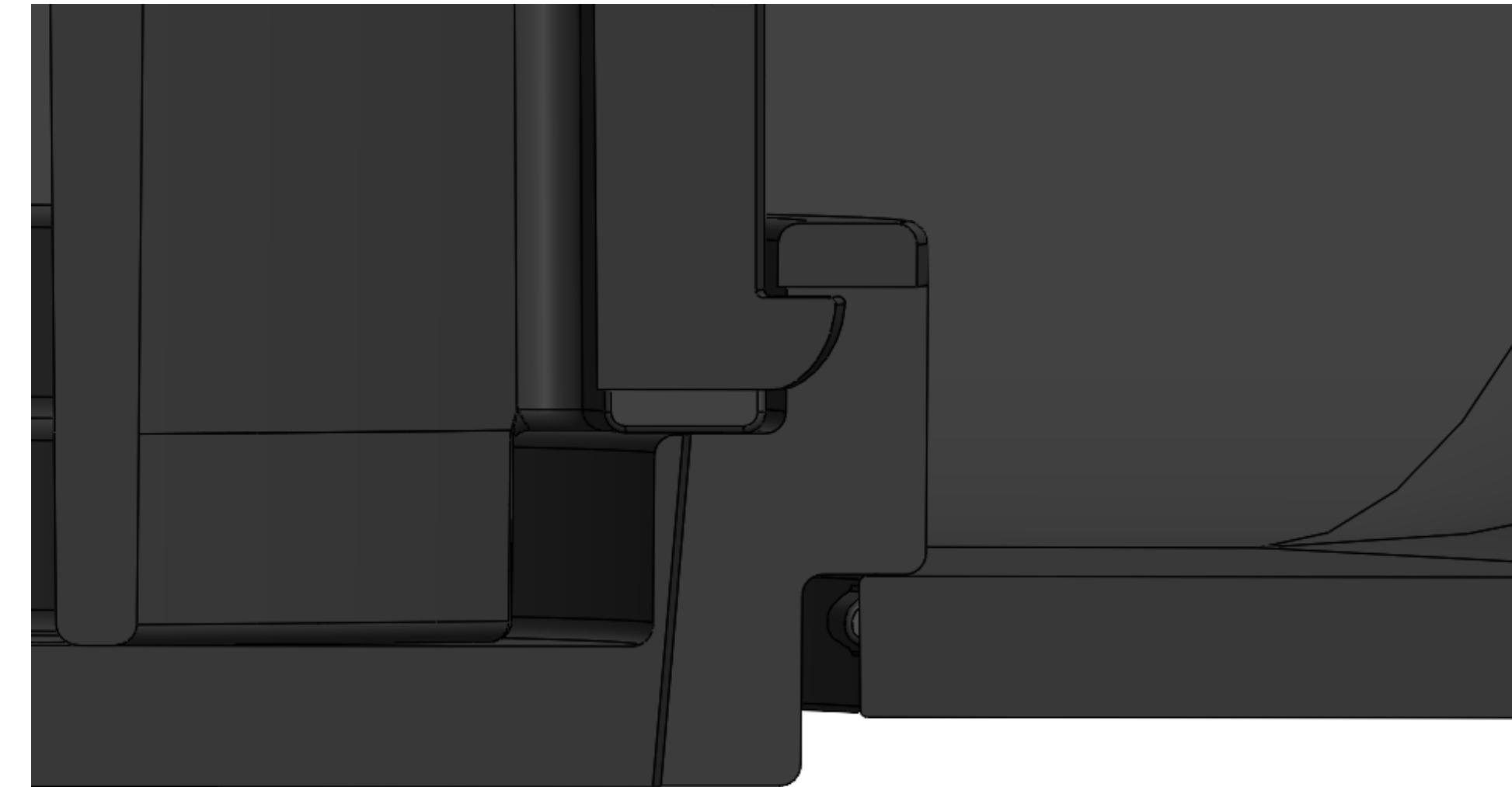




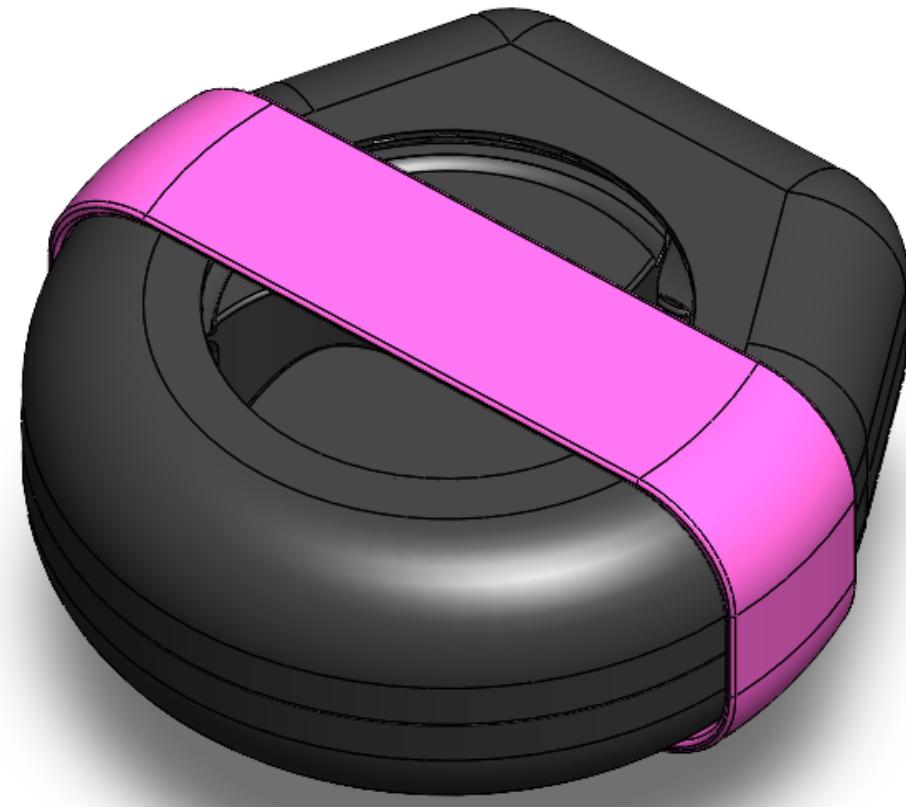
I widened the hole in the casing part and made the lip of the dial part more pronounced so that assembly would be more intuitive

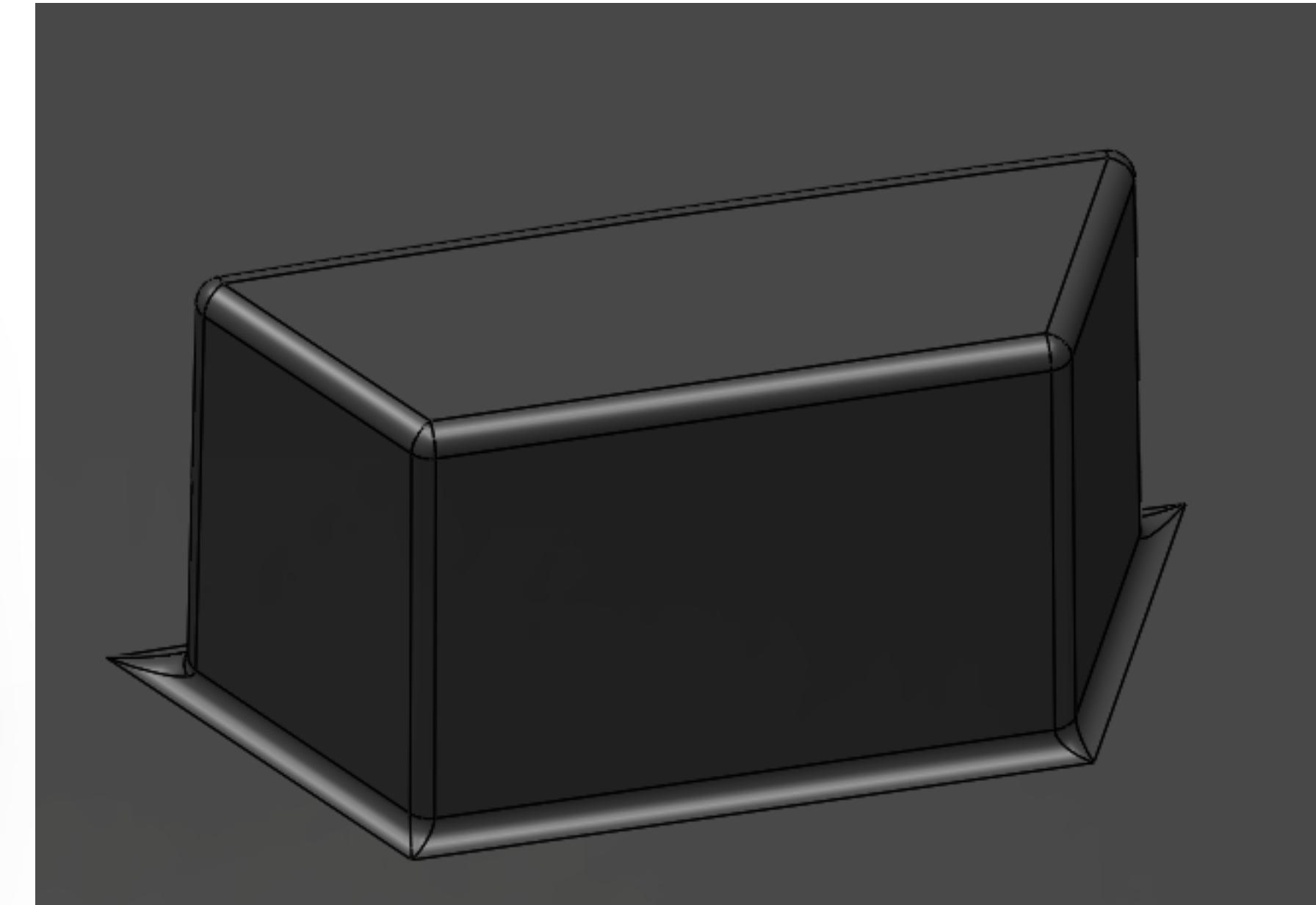
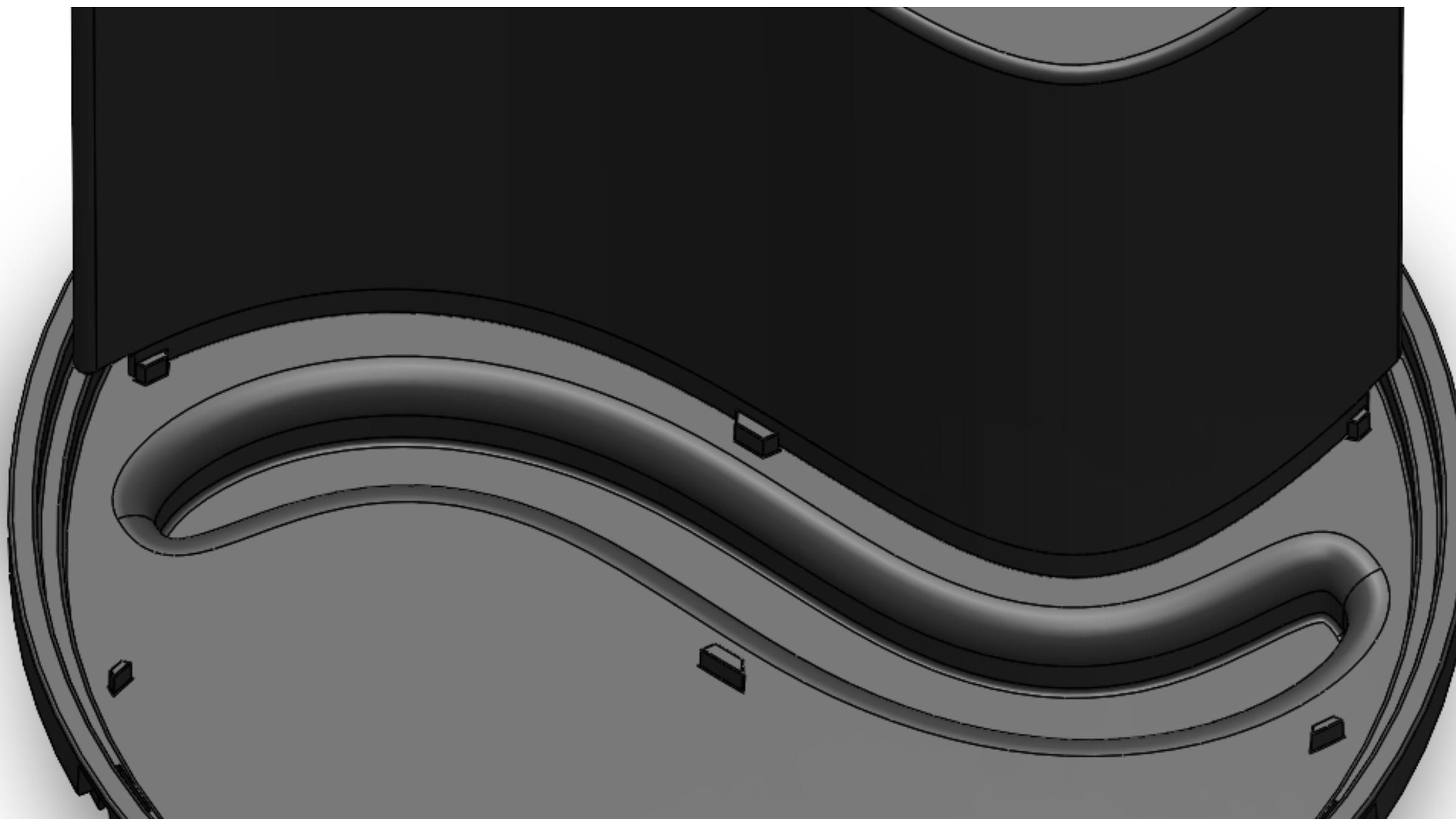


Draft added to the snap fit for increased flexibility and manufacturability.
Also 5 degree draft added to the features that will be shut off faces



Protruding part of snap fit arm made larger and made to extend further into the space to create more tension and keep the part in place.



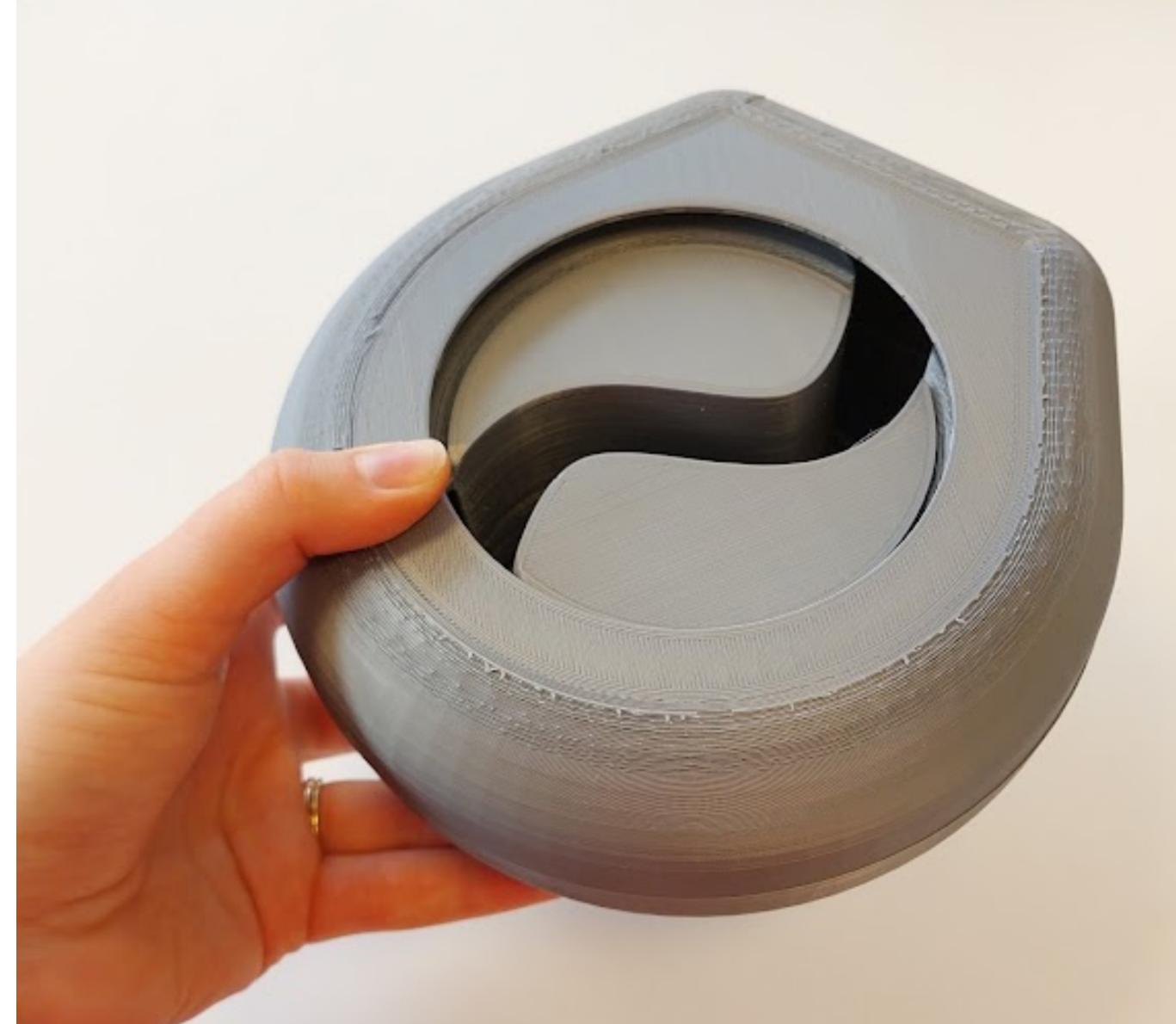




From this second prototype I discovered a few more details the needed changing. First of all I realised that the inner diameter of the casing would be formed using a kind of shut off face so it would be necessary to add a 5 degree draft rather than the 0.5 one that already existed. An image of this change is shown below.



I narrowed the clearance between the dial base and the casing as shown above. The enlarged radii on the edges of this version made the product look and feel a bit smaller and more cohesive. Unfortunately the print quality was very poor on this prototype so it looks quite scrappy and felt cheap and flimsy however since the first model was much stronger feeling I have no concerns that this product will actually feel fine when injection moulded.

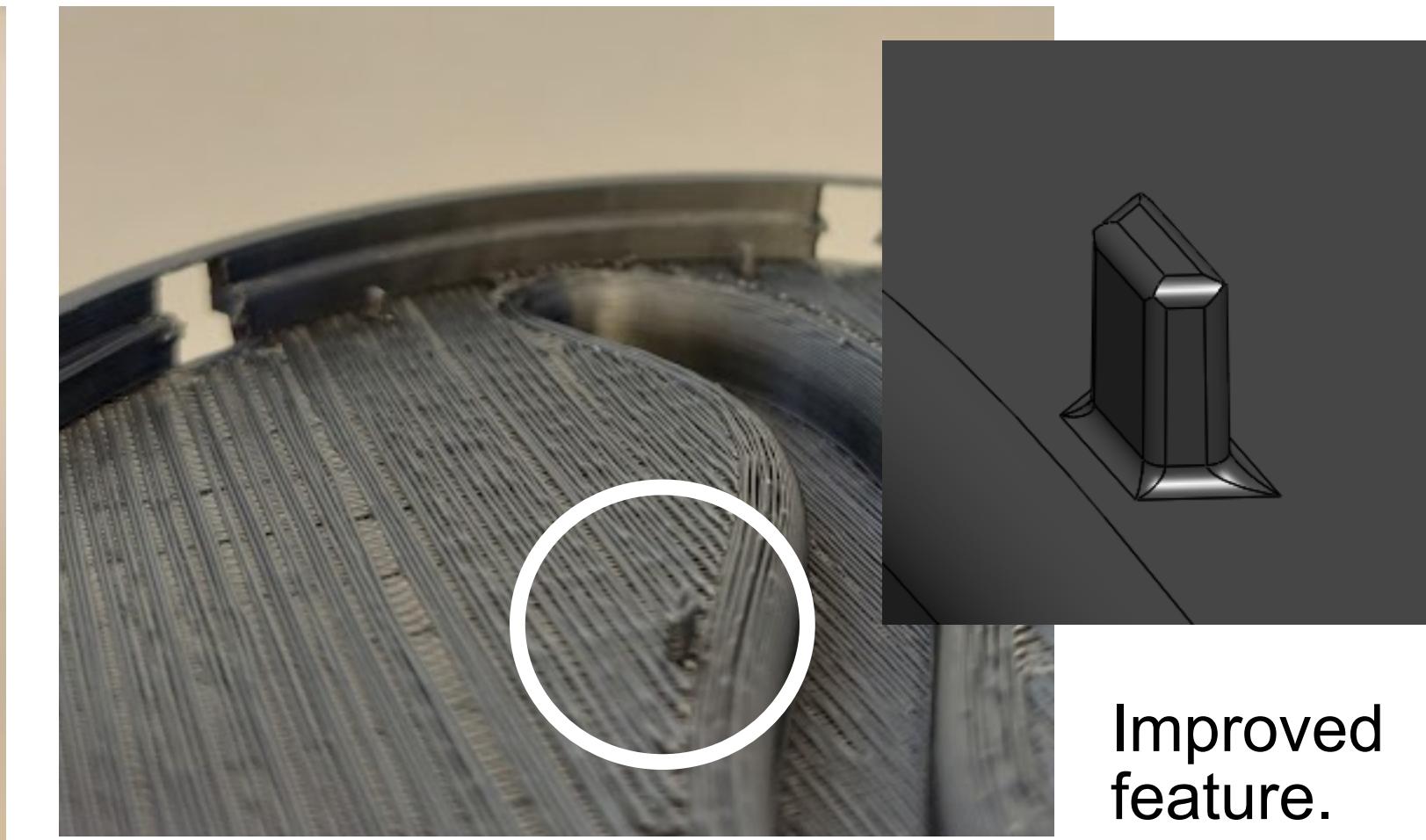


This one worked with the diameters of the dial base and the casing giving enough clearance to allow the middle part to spin however it was a bit loose and so would just come out (upwards) very easily (hence why this photo has the middle part sitting in the wrong position as it lifted up when placed on the table)



I love the way the hinge works in such a simple was and I look forward to seeing how the purse clasp works in reality.

The snap fits also worked better this time and the little blocks I added to keep the parts in place really helped however they could definitely do with being larger and taller. Shown above is how small these features turned out and therefore they could go a lot bigger.

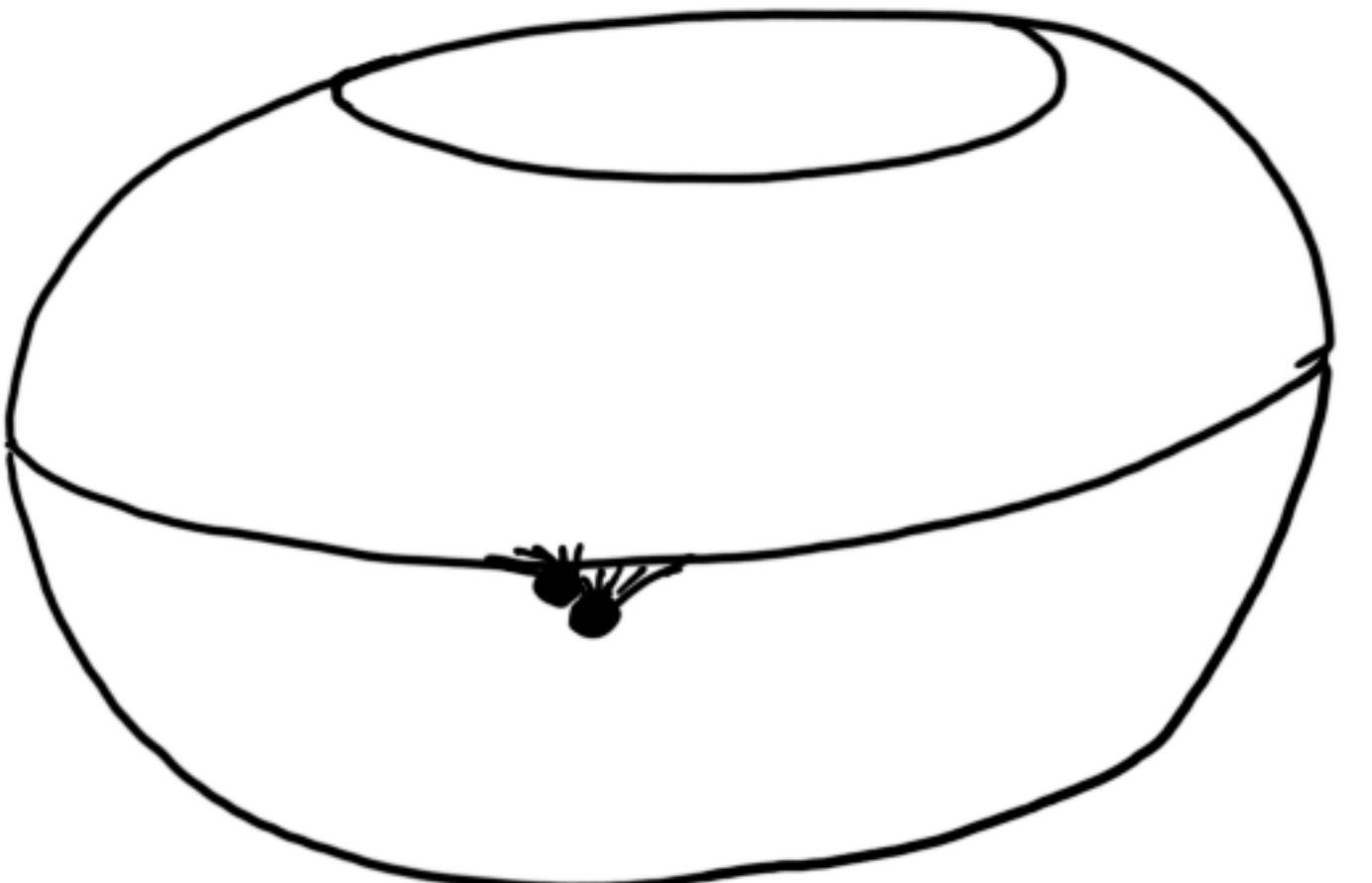


Improved feature.

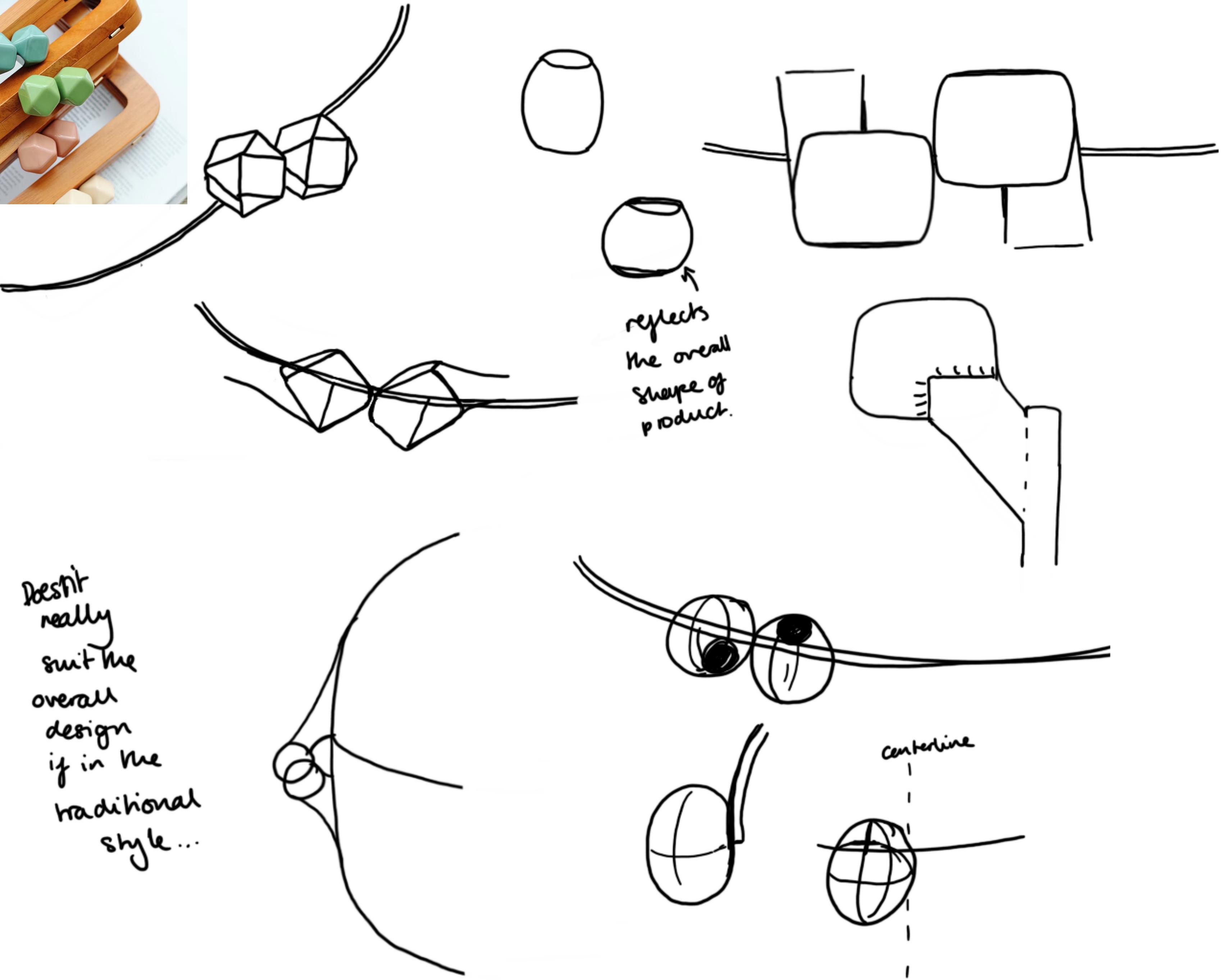


Rubber bands in the right size, shape and colours would be hard to procure ∴ I need to consider how to make a symmetrical clasp.

Maybe a purse clasp →



Doesn't really suit me overall design if in the traditional style...

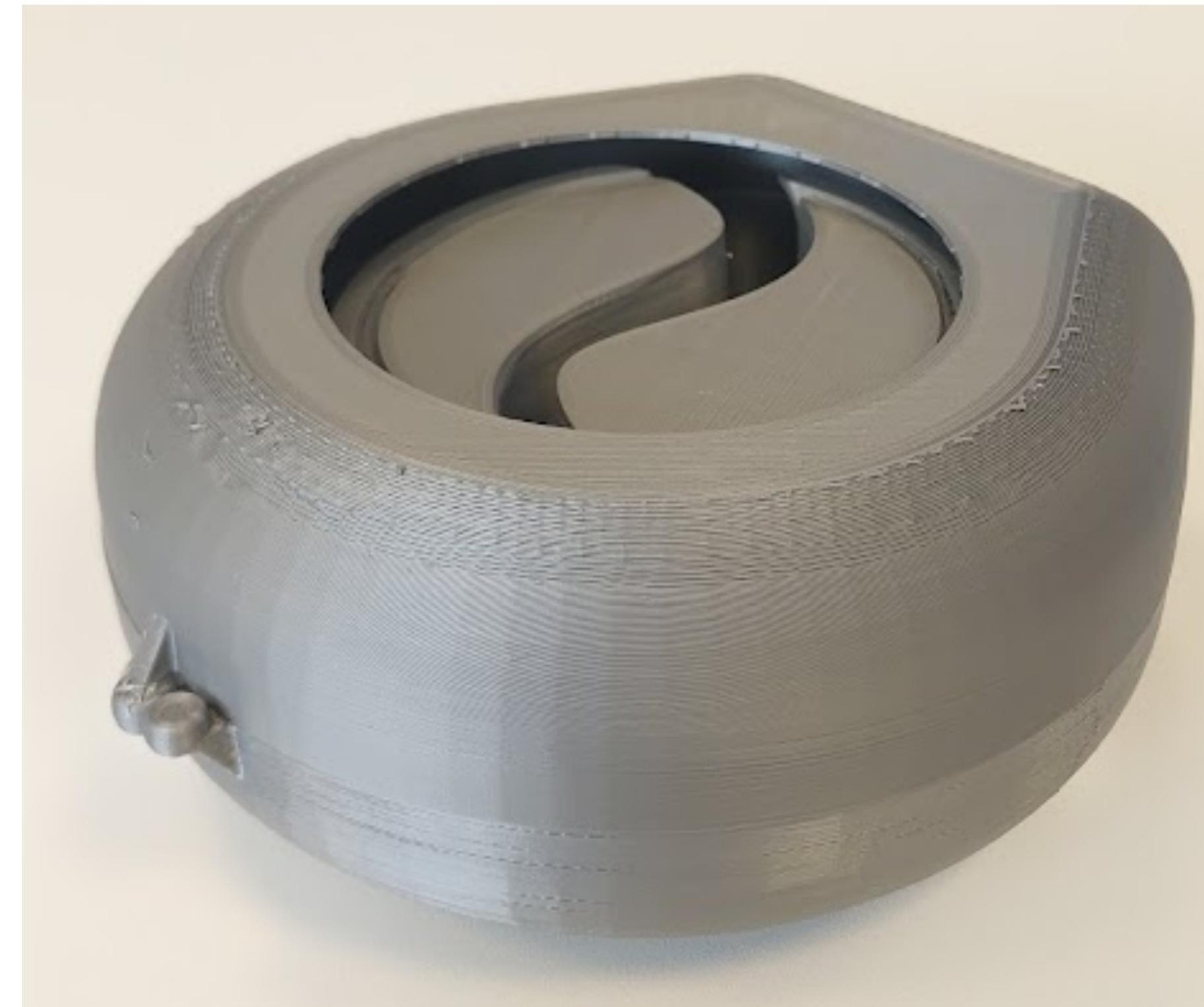




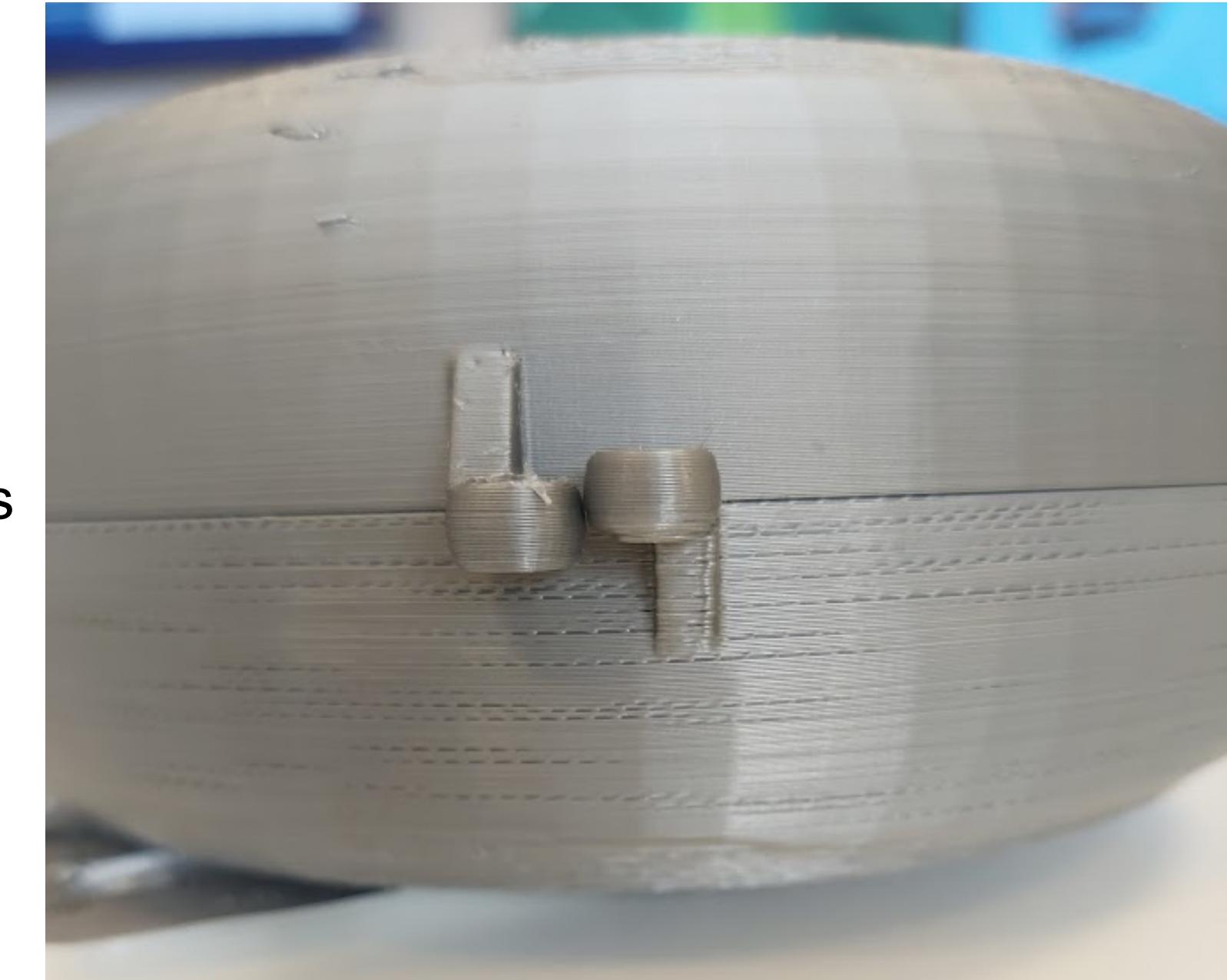
This was my last prototype and whilst I was slightly disappointed with the quality of some areas, overall it showed me that the changes I had made were positive.

It was hard to assess the success of the enlarged support blocks on the surface of the dial base as they printed very poorly and some even snapped off with the support structures that were printed.

As well as this one of the snap fits also broke off whilst I was post processing the parts so whilst the coffee bean shaped components could snap in place, the strength of this connection was as weak as the prototype previously made.



The overall finish of the parts was also unfortunately low despite attempting to increase the quality so the surfaces were rather rough in places and therefore not particularly comfortable to hold however this would not be an issue if the part was injection moulded.

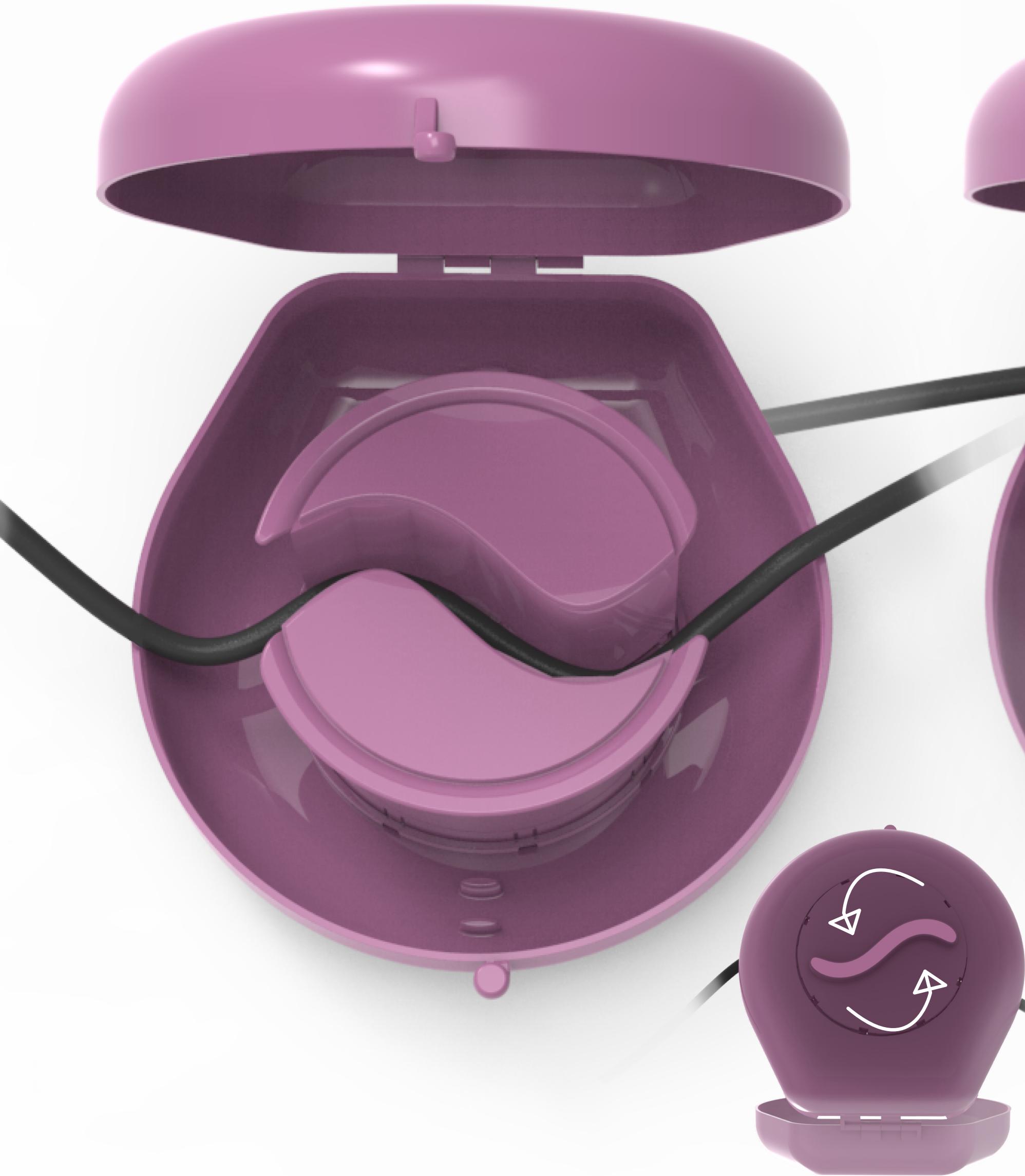


Last but not least the purse clasp clearly had potential but due to the flexibility of the low infill print and the lack of secure rigidity in the hinge it struggled to actually keep the part shut.

Again however I feel that this would be much less of an issue when made from a stronger polymer, in a more precise and reliable process. Therefore I will keep my Solidworks model the same.



Place wire in the gap



Clip in the cable ends



Twist the dial







[1] Reminderband *Custom Rubber Wristbands & Silicone Bands*. [online,] Accessed 25/10/2023 Available at: <<https://www.reminderband.com/wristbands/>>

[2] Reminderband *Custom Rubber Wristbands & Silicone Bands*. [online], Accessed 25/10/2023 Available at: <<https://www.reminderband.com/wristbands/>>

[3] Temu *10pcs Large Silicone Rubber Bands 17.78 Cm Elastic Rubber Wrapping Bands Extra Large Rubber Bands For Notebook Office Outdoor Gear Gifts Packing Christmas(Multicolored)*. [online], Accessed 25/10/2023 Available at: <https://www.temu.com/uk/10pcs-large-silicone-rubber-bands-17-78-cm-elastic-rubber-wrapping-bands-extra-large-rubber-bands-for-notebook-office-outdoor-gear-gifts-packing-christmas-multicolored-g-601099518155961.html?rps=10012&r_pid=1452&r_idx=81&_x_sessn_id=lzcvhia8c8&refer_page_name=bgn_verification&refer_page_id=10017_1698232256676_86z5pxal1&refer_page_sn=10017>

[4] Etsy - Jenny *20cm (8") Retro Purse Frame Wood Purse Frame Come With Screws 20x8cm Pick Color*. [online], Accessed 25/10/2023 Available at: <https://www.etsy.com/uk/listing/1059964349/20cm-8-retro-purse-frame-wood-purse?gpla=1&gao=1&&utm_source=google&utm_medium=cpc&utm_campaign=shopping_uk_en_gb_a-craft_supplies_and_tools-fabric_and_notions-notions-purse_notions-bag_frames&utm_custom1=_k_CjwKCAjw-eKpBhAbEiwAqFL0mjB_3qbnXVnxO2DSA5G6Jj97p-b0-MoRmgIkaWhJ0A7JSDFLArMQ-RoCLXUQAvD_BwE_k_&utm_content=go_12603393752_120630337660_508814299835_pla-296758885122_c_1059964349engb_554820841&utm_custom2=12603393752&gclid=CjwKCAjw-eKpBhAbEiwAqFL0mjB_3qbnXVnxO2DSA5G6Jj97p-b0-MoRmgIkaWhJ0A7JSDFLArMQ-RoCLXUQAvD_BwE>