

# MARY SUTTLE

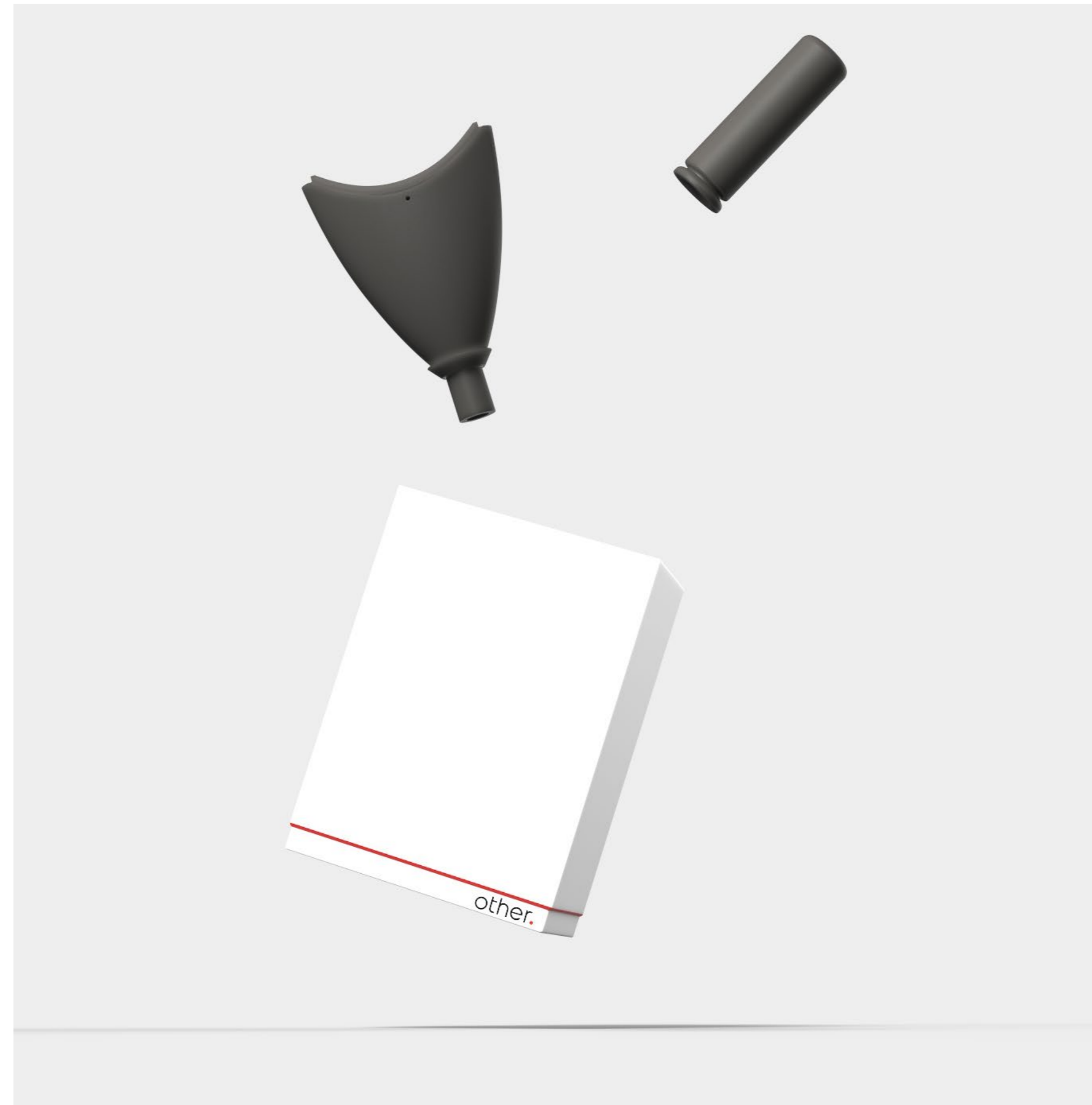
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## JUPITER SCALP BRUSH

A Brush for Scalp Exfoliation  
& Hair Detangling



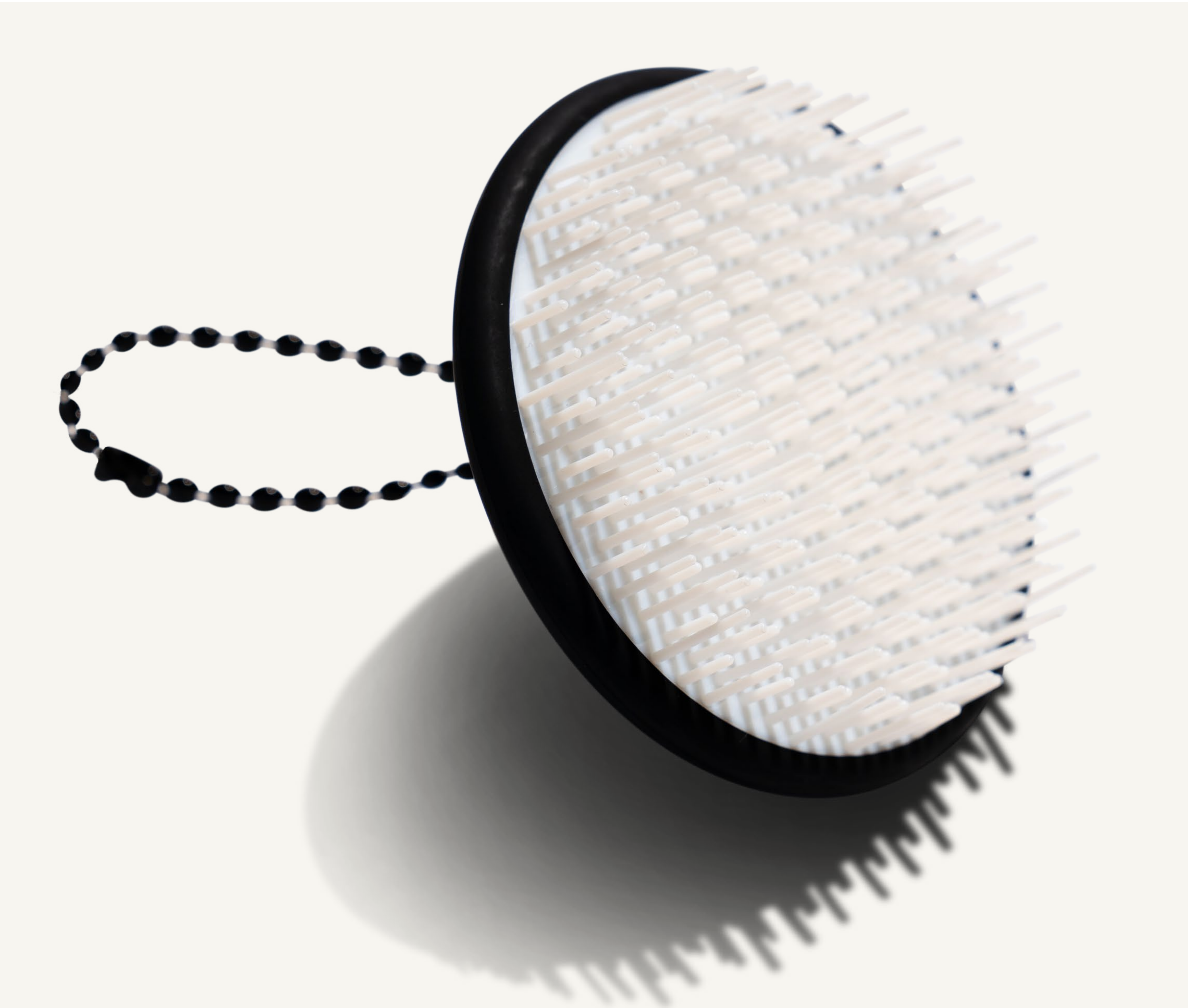
## OTHER

The Menstrual Cup for  
Anyone With A Uterus



## CLIDRO

The Ultimate Surf Drone



# JUPITER SCALP BRUSH

A Brush for Scalp Exfoliation  
& Hair Detangling

By Mary Suttle for Jupiter

Photography from Jupiter

## Why is scalp health important?

Up to 75% of people experience dandruff at some point in their lives. 1 in 5 people experience dandruff chronically (all day every day). Even with such a large portion of the population experiencing dandruff, current solutions are outdated and rely on shame-based marketing.

Jupiter's line of dandruff products tackles both the root of dandruff and alleviates the symptoms. **The Exfoliating Scalp Brush is one of the six products in the debut line of the brand.**



# Existing Scalp Brushes & User Testing



## ABS Plastic Scalp Brush

A cult favorite scalp brush is a simple design with few frills. It is a size that can be easily held, and the bristles are thin and flexible enough to be gently exfoliating. **The feedback from the testing participants was generally positive.**

**Pros:** Bristles were **firm but flexible**. The weight of the brush was lightweight and not cumbersome.

**Cons:** Some of the **bristles were scratchy** due to flaws in the manufacturing process. Depending upon the handle style, there was no way to store in the shower.



## Silicone - Hollow Bristles

This style of scalp brush is usually used for massaging the scalp rather than exfoliating. The bristles are usually incredibly soft and not very stimulating. **The feedback from the testing participants was generally negative.**

**Pros:** The shape was easy to grip.

**Cons:** This style of brush has an ABS top, with a pressure fit silicone bristle portion. This style of assembly allows for **water and mildew to collect** in the cavity between the top and the bristle base. The bristles are also prone to tearing.



## Silicone - Solid Bristles

This style of scalp brush has an ABS top and solid base of silicone bristles. This brush is usually permanently assembled via ultrasonic welding. This ensures a water-proof assembly. **The feedback from the testing participants was generally neutral.**

**Pros:** The shape was easy to grip.

**Cons:** The brush was heavy. The bristles were solid, which meant they could be **painful on the scalp**.

# Necessary Design Features



## Comfortable Size & Diameter

Jupiter's customer base does not skew to one gender in particular. Because of this, it was important the brush was easy to hold for many different hand sizes.



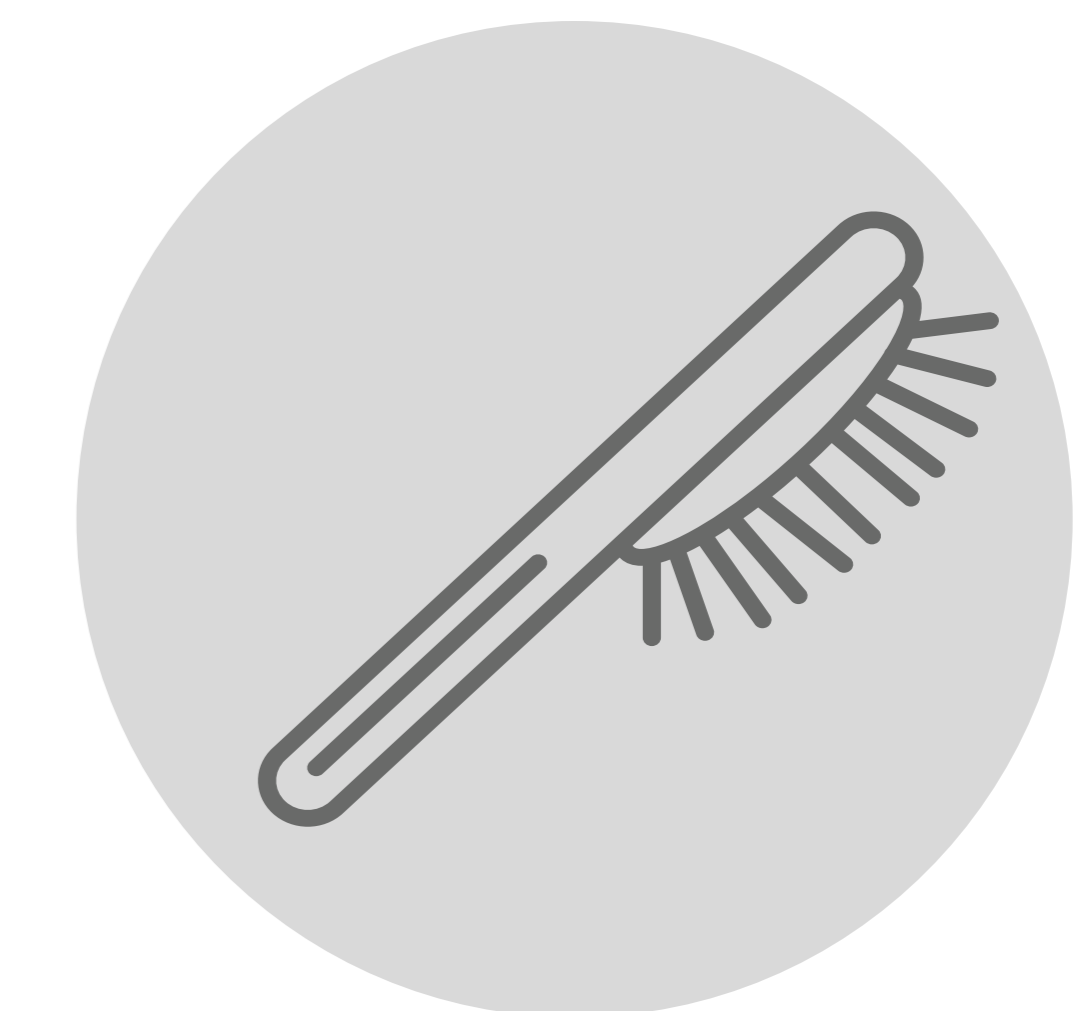
## Matches Jupiter's Brand Language

Like all of Jupiter's products, the brush needed to be attractive and not look medical, clunky, or like a typical dandruff product.



## Built in Hook or Storage Feature

After testing competitive products, many of our participants had issues with storing the products in their limited shower space or did not want to store the brush on the edge of their shower in a puddle of still water.



## Effective & Gentle Bristle Design

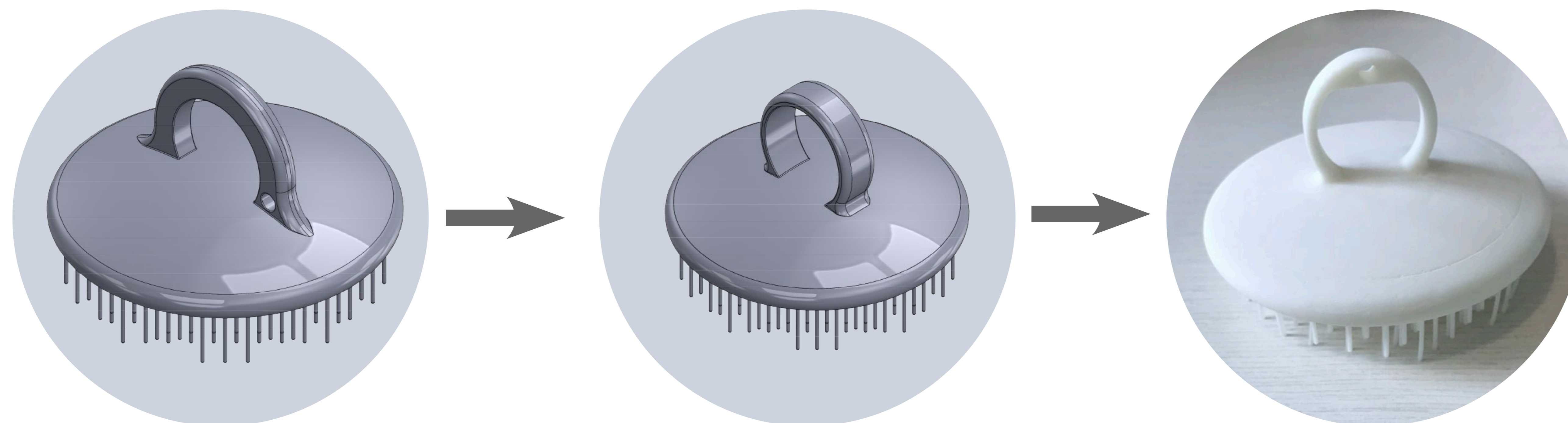
Bristles need to be soft but not ineffective. The bristles need to be carefully molded to avoid any potential sharp points or flaws during the manufacturing process.



Version 1

Version 2

Version 3



Version 4

Version 5

Final Version  
& 3D Print

## 3D Form Development

After determining all of the features we wanted in the brush, I began rough form exploration. We went through several rounds of refinements and physical mockups.

I ultimately 3D printed two versions of the final form to test the shape and size of the brush. After developing **production ready CAD files**, I worked with the factory and their engineer to **tool a custom mold** for injection molding.

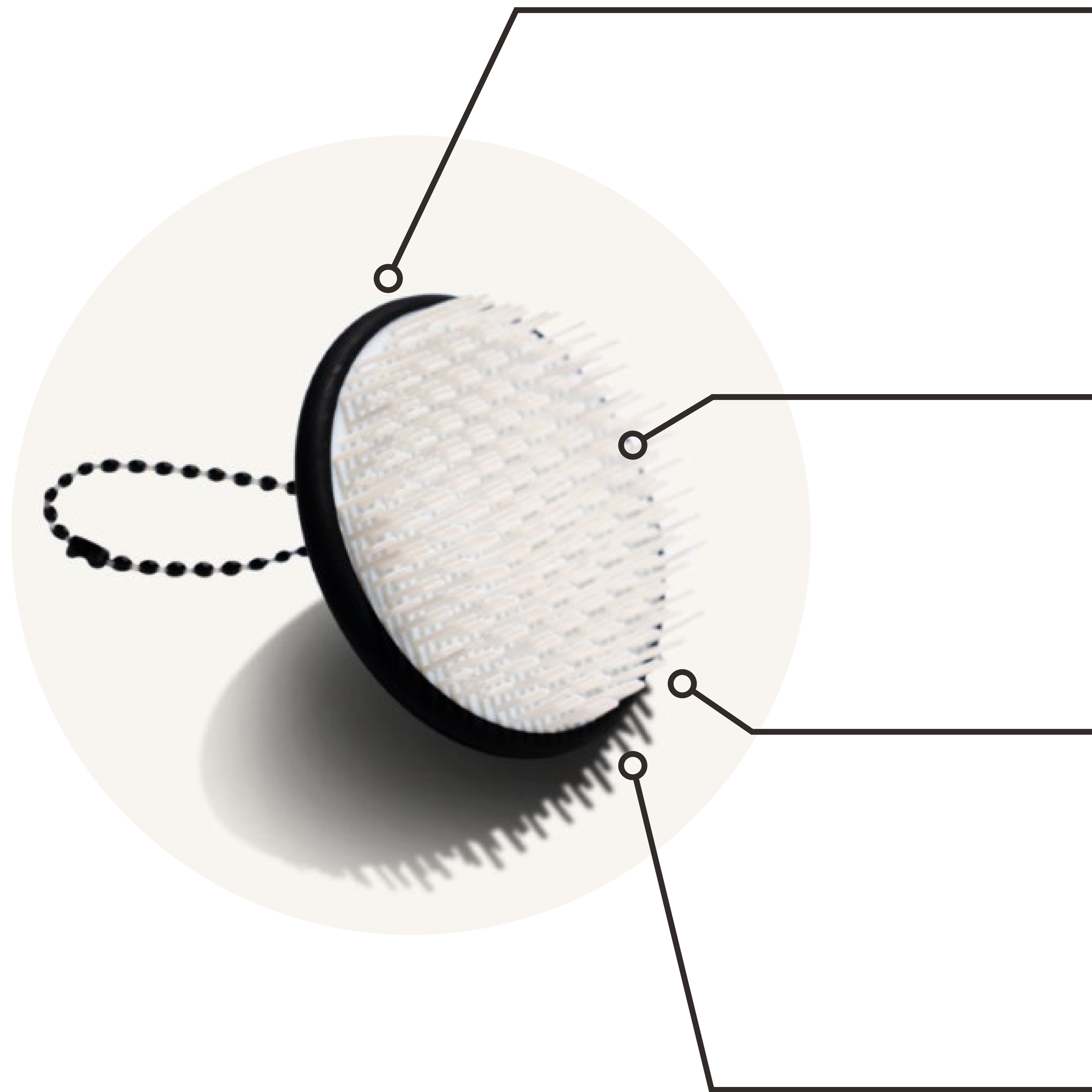
## Exfoliating Scalp Brush

As part of a holistic dandruff solution, **the Jupiter Exfoliating Scalp Brush helps loosen scalp build up, so it can be washed away by shampoo.** It also allows the active ingredient of the anti-dandruff shampoo to **penetrate the scalp** more effectively. It can be used in and out of the shower!



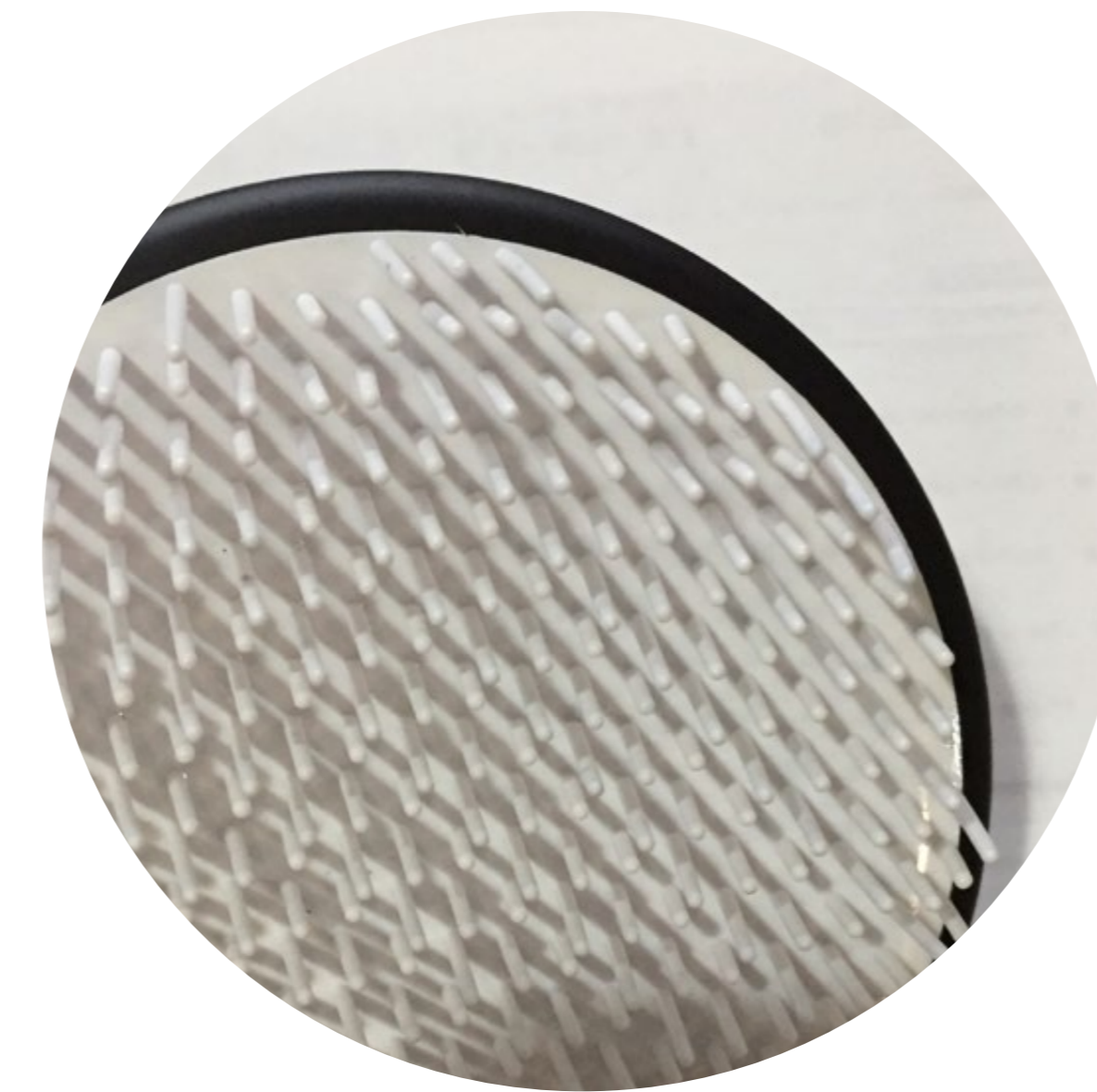


# Product Features



## Materials

The brush is a two part assembly. The top portion is **ABS plastic with a soft touch finish**. The bristles are **PPE**, which allows them to be firm but flexible.



## Bristles

The bristles were designed to have round edges to avoid any sharp edges. **I also designed the bristles to be multi-functional: both exfoliating and detangling.** The multi-tiered bristles allow for detangling while you are in the shower.



## Gates

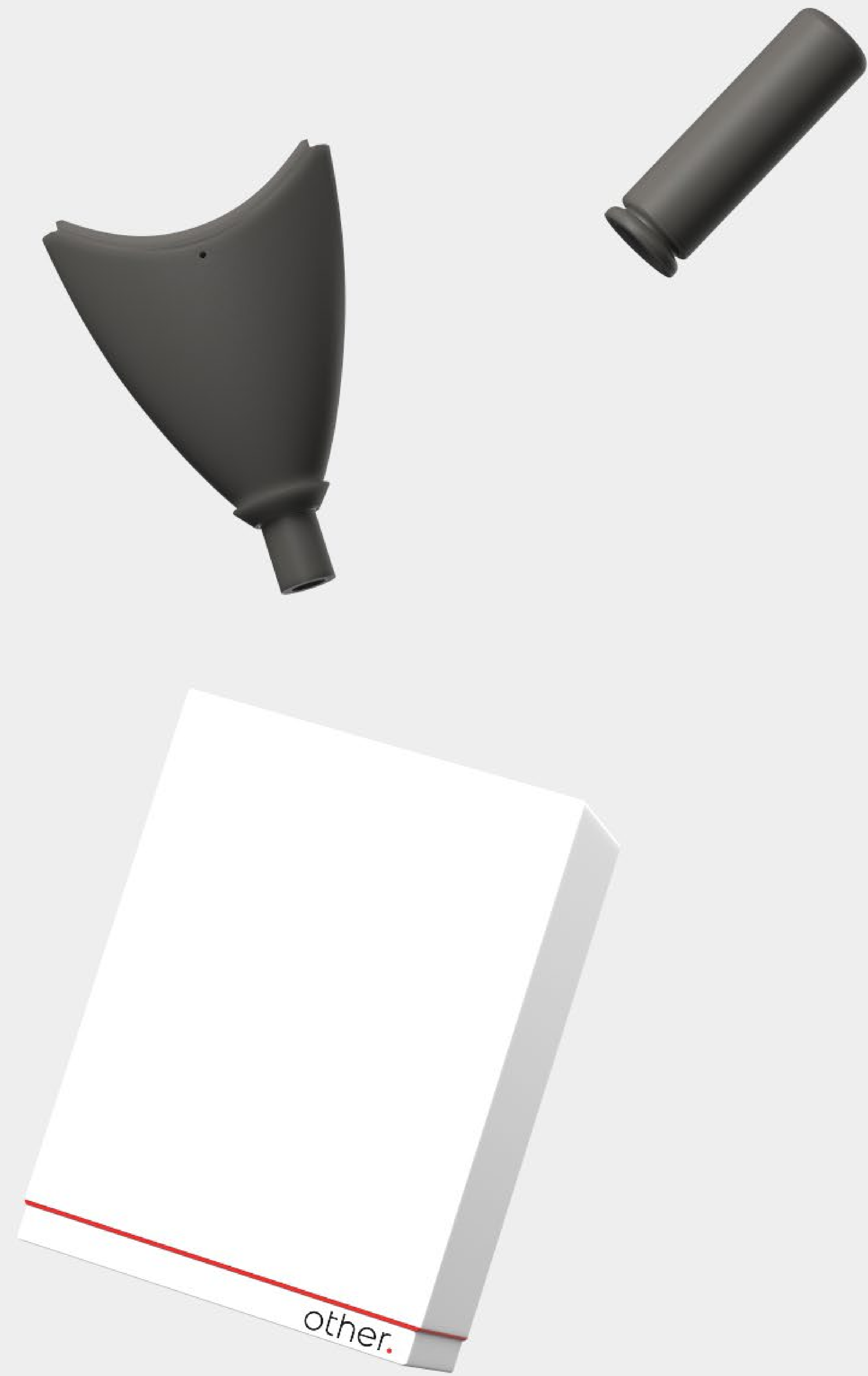
I designed the brush so **the gates were on the rear of each part**. I wanted the surface of the brush to be as smooth as possible. It was important to me and the Jupiter team that **the surface not show any evidence of the injection molding process.**



## Watertight Feature

In order to have a soft touch finish (which was applied post molding), we could not ultrasonically weld the top and base together. This would have damaged the finish. **I worked with the factory and engineers to develop an unique mechanical locking feature.** This mechanically fastened the top and bottom together and made the brush **watertight.**





# OTHER

The Menstrual Cup for  
Anyone With A Uterus

By Mary Suttle



## What's up with the term "feminine hygiene"?

When I began this project, I wanted to tackle the social issues surrounding menstruation. I specifically focused in on the term "**feminine hygiene.**" Not everyone who menstruates is a woman, so the term "feminine hygiene" can be alienating and dismissive of other genders. If you have a uterus, and are not taking hormones to suppress menstruation, you can menstruate regardless of your gender identity.

**Other is a menstrual product that does not assume the gender of the person using it. Regardless of your gender, the Other Cup is a new menstrual experience. The Other Cup is designed to minimize the interaction with menstrual fluid, both physically and visually.**



## Primary Research

I interviewed and surveyed over **two hundred people** to find out how they feel about their periods. The number one used period product was tampons (58%), followed by pads (23%), and menstrual cups (13%).

**In both my survey and interviews, I heard overwhelming negative things about currently available products and the experience surrounding them.**



### Standout Quotes

"Tampons were always uncomfortable or painful despite being very careful to put them in properly. Due to dysphoria I also couldn't handle sticking my hands around or up that area, which is why I never tried cups."

- Anonymous Survey Respondent



"I hate my period and cannot wait for menopause."

- Helen (she/her)



"One time I had to change my tampon in a public bathroom, but there was no place for me to put it. I had to wrap it up in a wad of toilet paper. I waited, like, fifteen minutes until everyone left the bathroom to leave the stall."

- Case (he/him)



"It's incredibly gender dysphoric when they aren't discreet. They (pads and tampons) don't feel discreet, they're loud to open particularly in a men's bathroom, they're overly feminine in packaging (pinks/purples and traditionally feminine patterns)."

- Anonymous Survey Respondent

## Secondary Research

I dug deeper into the technical problems surrounding the current period products, their branding, and their history. Aside from being extremely gendered, alienating, and sexist; menstrual products pose a danger to an individual's health and the health of our planet.



**\$18,000**

The average cost for someone's period over their lifetime is \$18,000. This does not include cost of doctor visits or insurance.

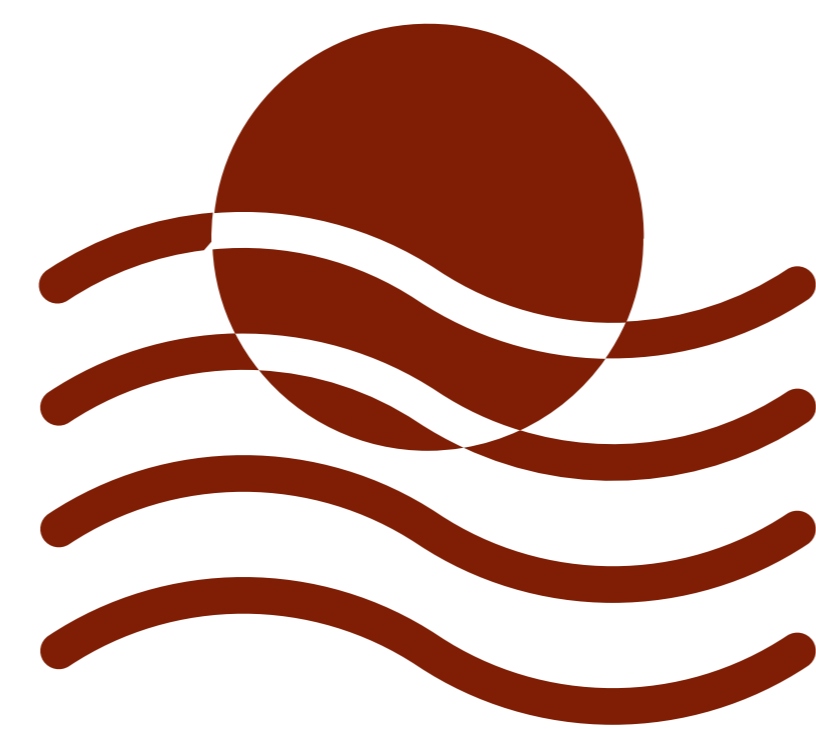
**16-25%**

Conventional menstrual products use cotton. Cotton uses 16-25% more pesticides than any other crop.



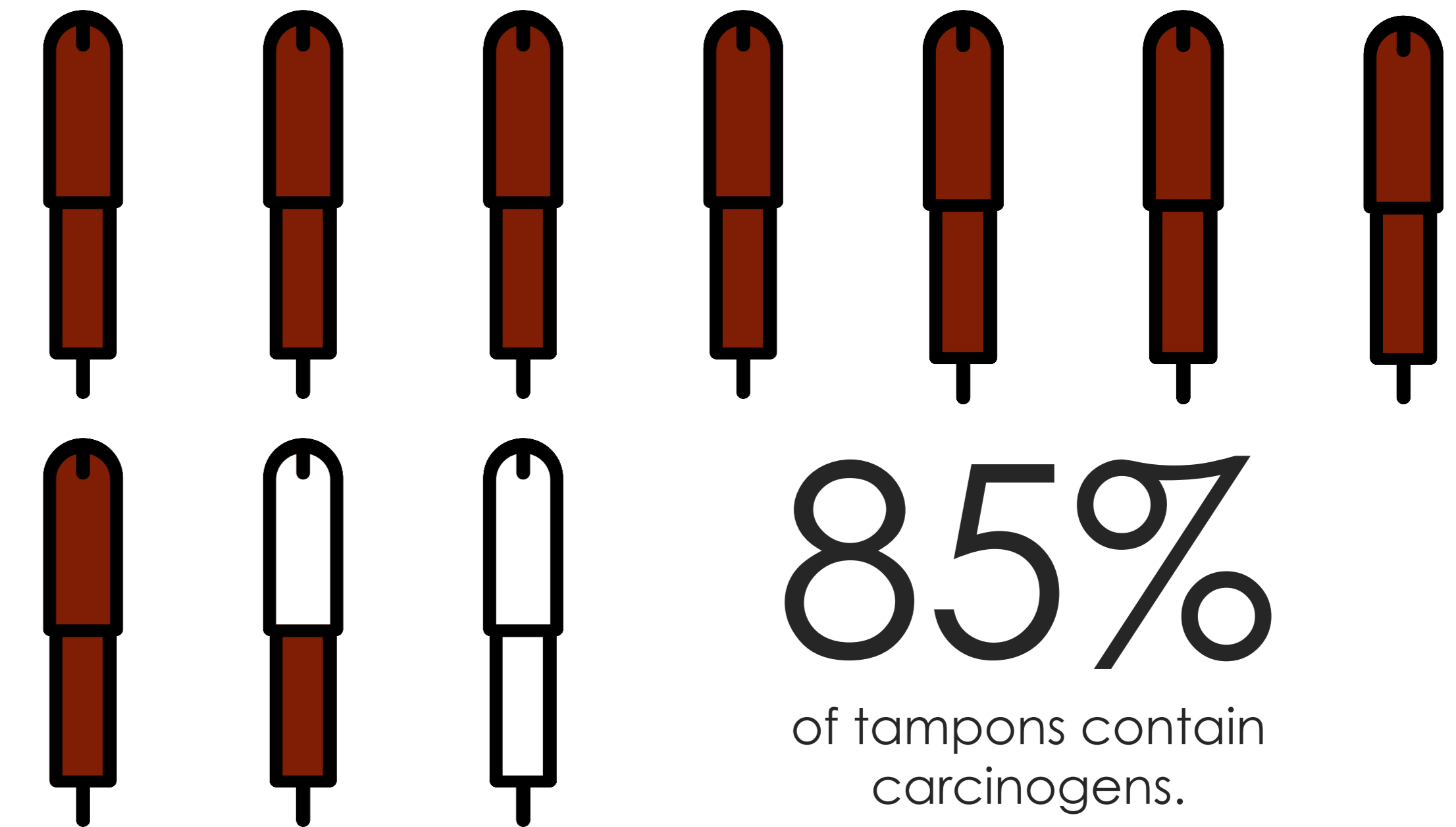
**20 BILLION**

disposable menstrual products are put into North American landfills every year.



**10x**

The vagina absorbs chemicals at 10 times the concentration than if a chemical was taken orally.



**85%**

of tampons contain carcinogens.

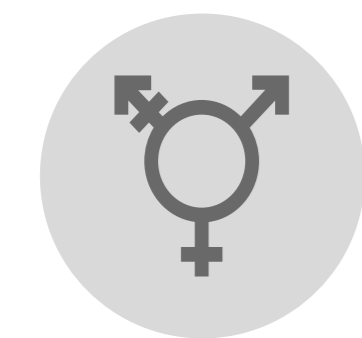
# Design Objectives



Change pre-conceived notions about menstruating and who is able to menstruate.



Create a new color palette and design language for menstrual products.



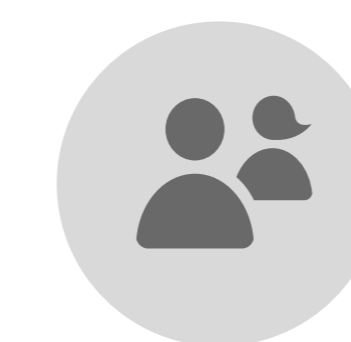
Validate everyone who menstruates with gender neutral and inclusive product/branding/experience.



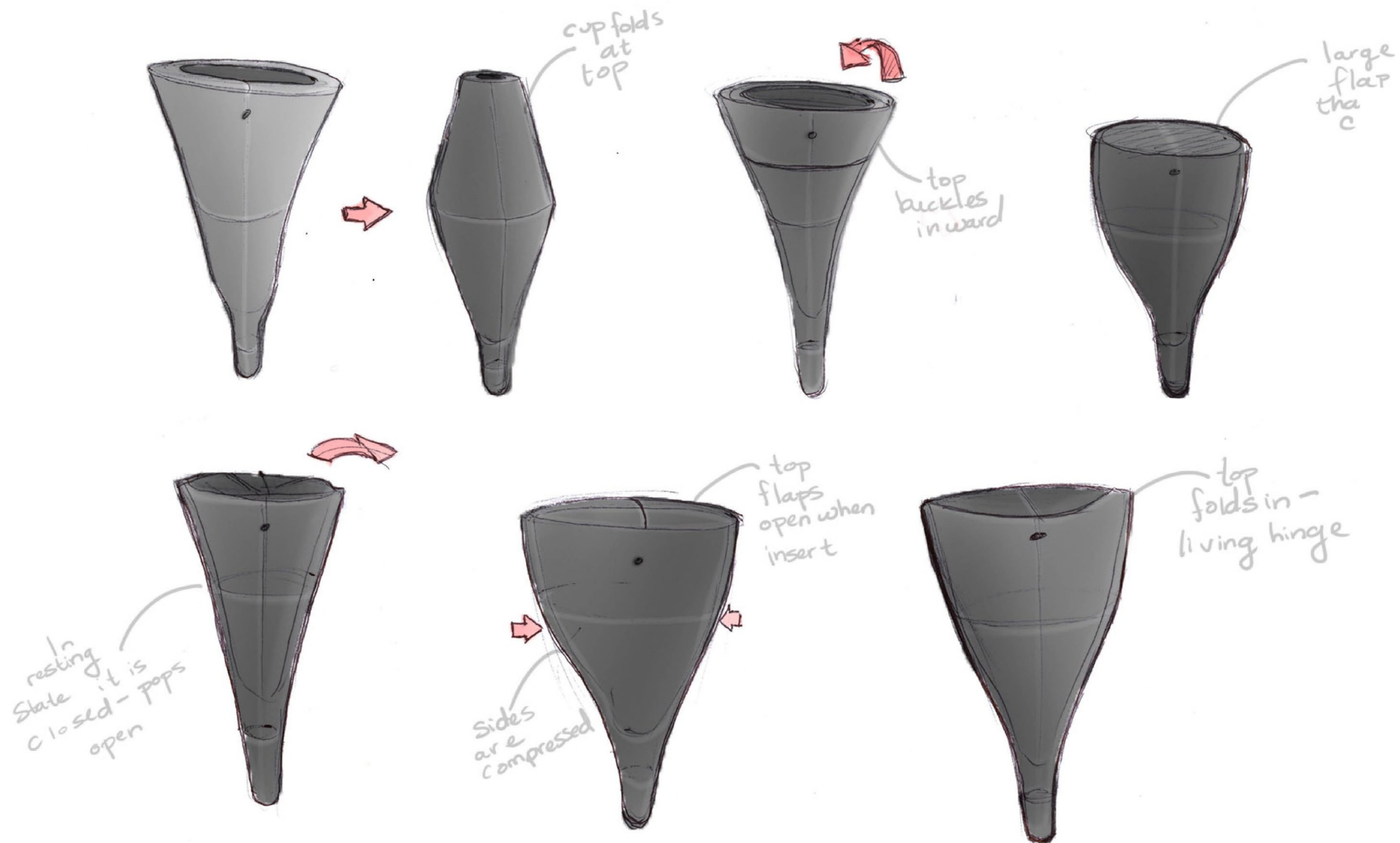
Design a reusable product that is appealing.



Design packaging that is efficient, can multi-task, and is user friendly (not loud, can be used for disposing used products, and is eco-friendly).



Design a product that does not involve excessive physical contact with genitalia to insert or use.



## Concept Development

Taking all of the pain points and problems into consideration, I wanted to design a menstrual product that would **reduce the physical confrontation to blood and one's genitalia**, have materials that do not **pose a danger to one's health**, had discreet secondary packaging, and had **branding that was not "feminine"** or dismissive of other genders aside from "female."





## Prototyping

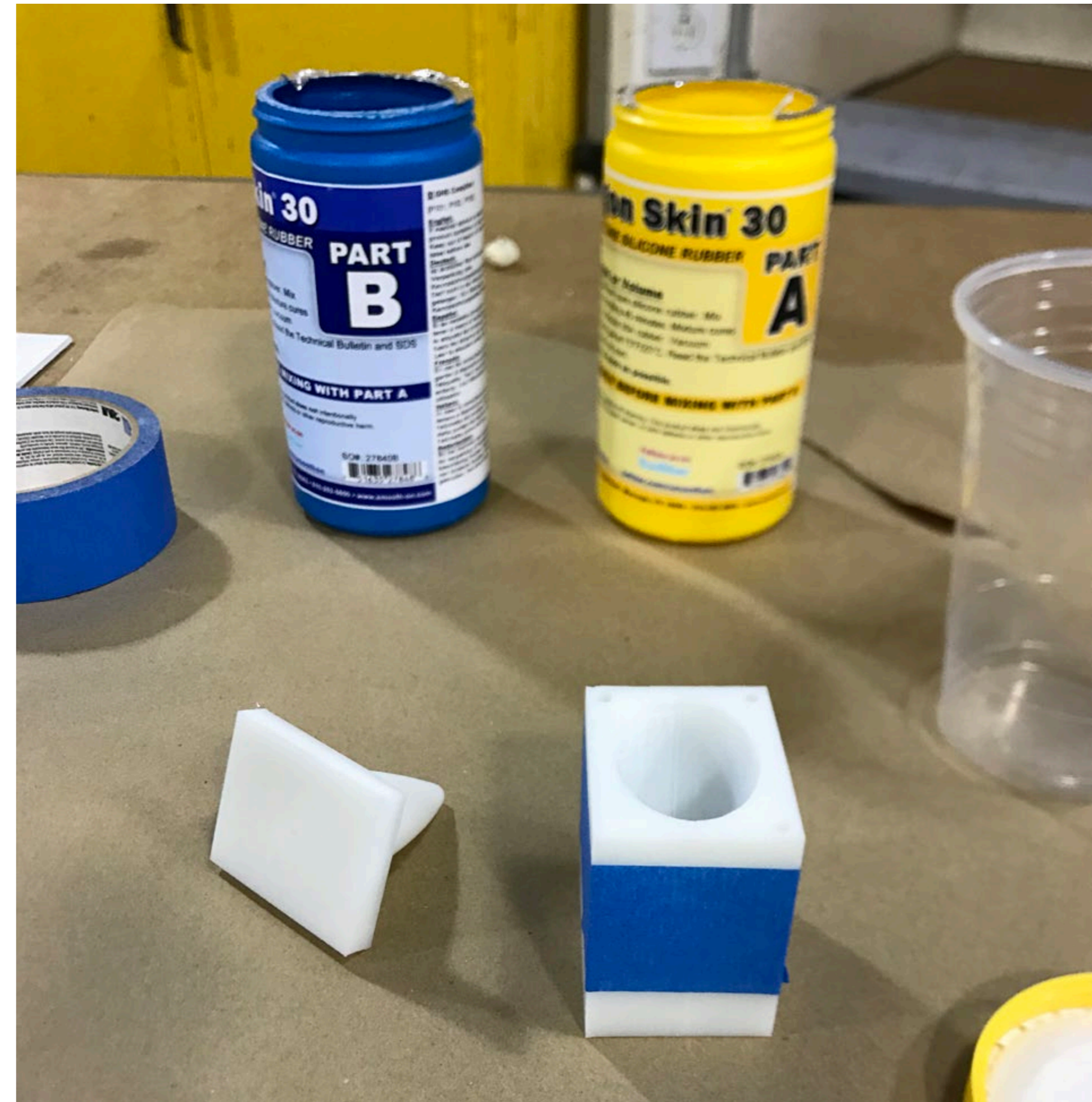
After testing a variety of menstrual cup 3D mockups, I **developed molds** based on the CAD model I developed. In total I printed 8 low fidelity FDM molds to **test the functionality of the cup and refine the features of the mold.**

Each mold was a slight adjustment based on refining the capacity, shape, and functionality. Once final specs were determined, I printed a high fidelity mold for final prototype production.

# Prototyping



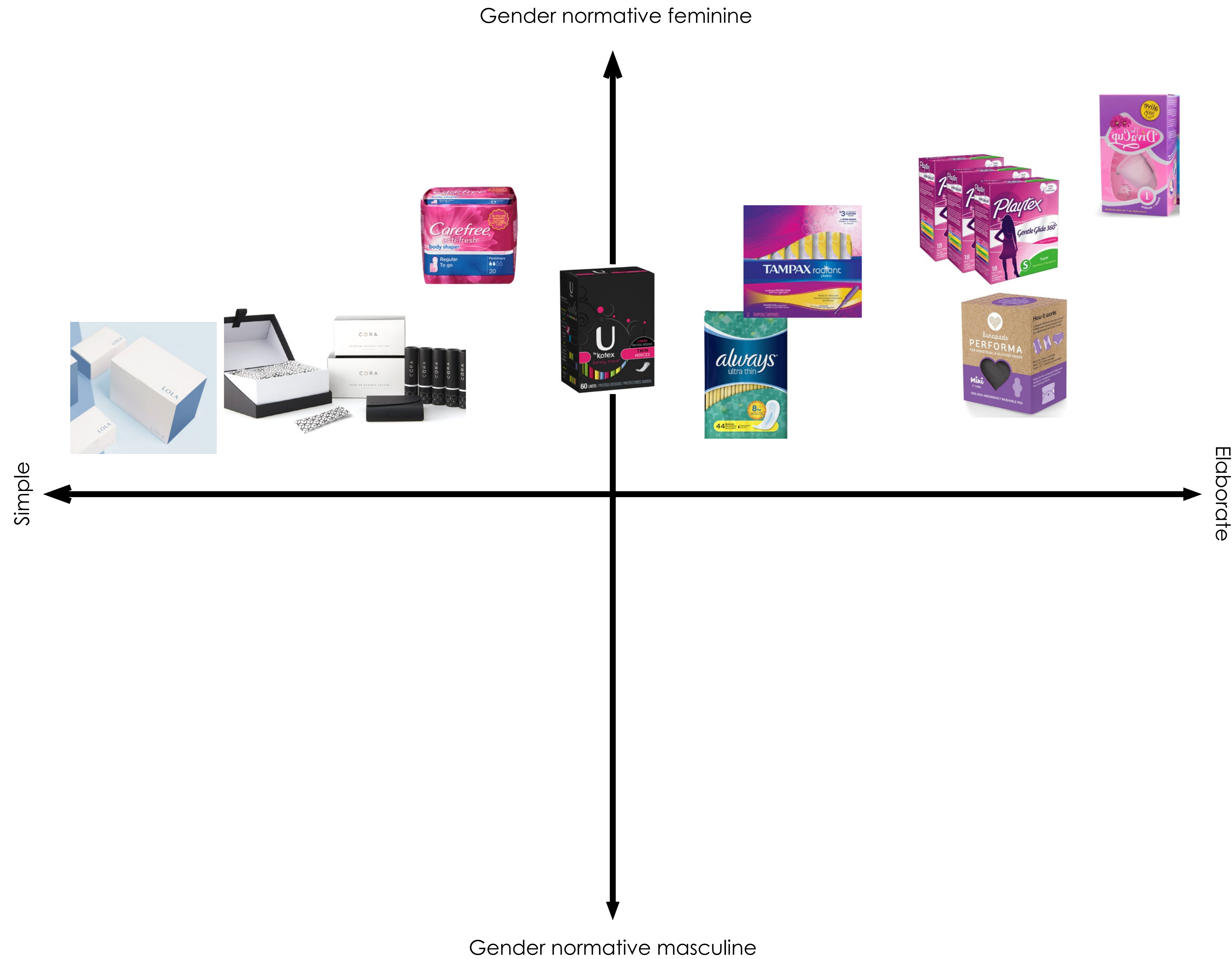
Menstrual cups are usually made of **medical grade silicone**. I used silicone designed for special effects to test the cup designs. I selected 20A, 30A, and 40A durometer silicone for testing.



The prototype molds were manually filled and allowed to cure in a pressure pot for the best results. In the end I **cast 37 cups** across the various molds.

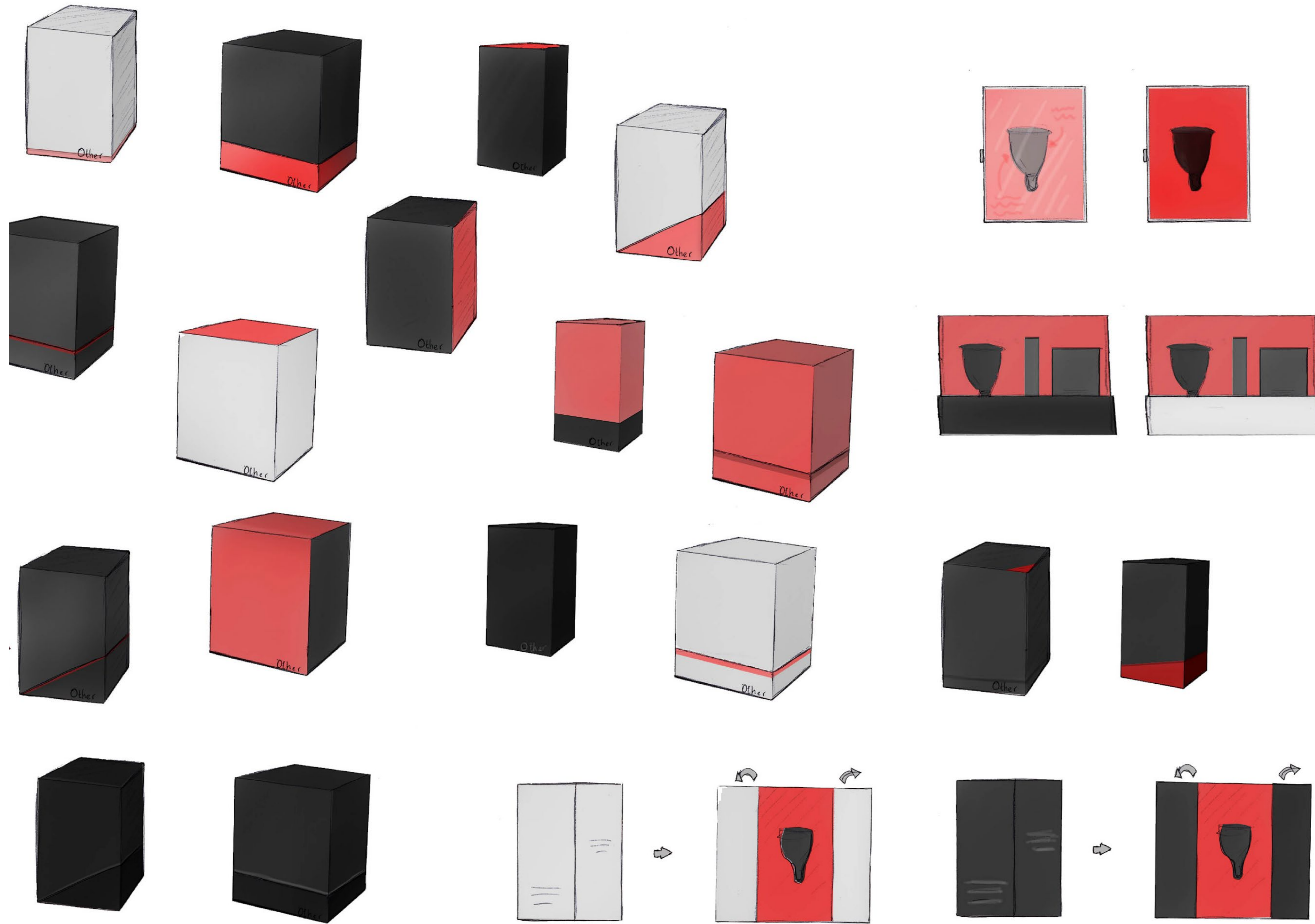


After testing the different durometers of silicone, I settled on 30A. **30A silicone allowed for the cup to deform** while still being “springy” enough to open when inserted.



## Packaging Development: Market Analysis

Of the major brands analyzed, **most had feminine-normative colors.** Many companies used colors like pink, purple, and turquoise. The more gender neutral packaging utilized shades of blue, or black and white.



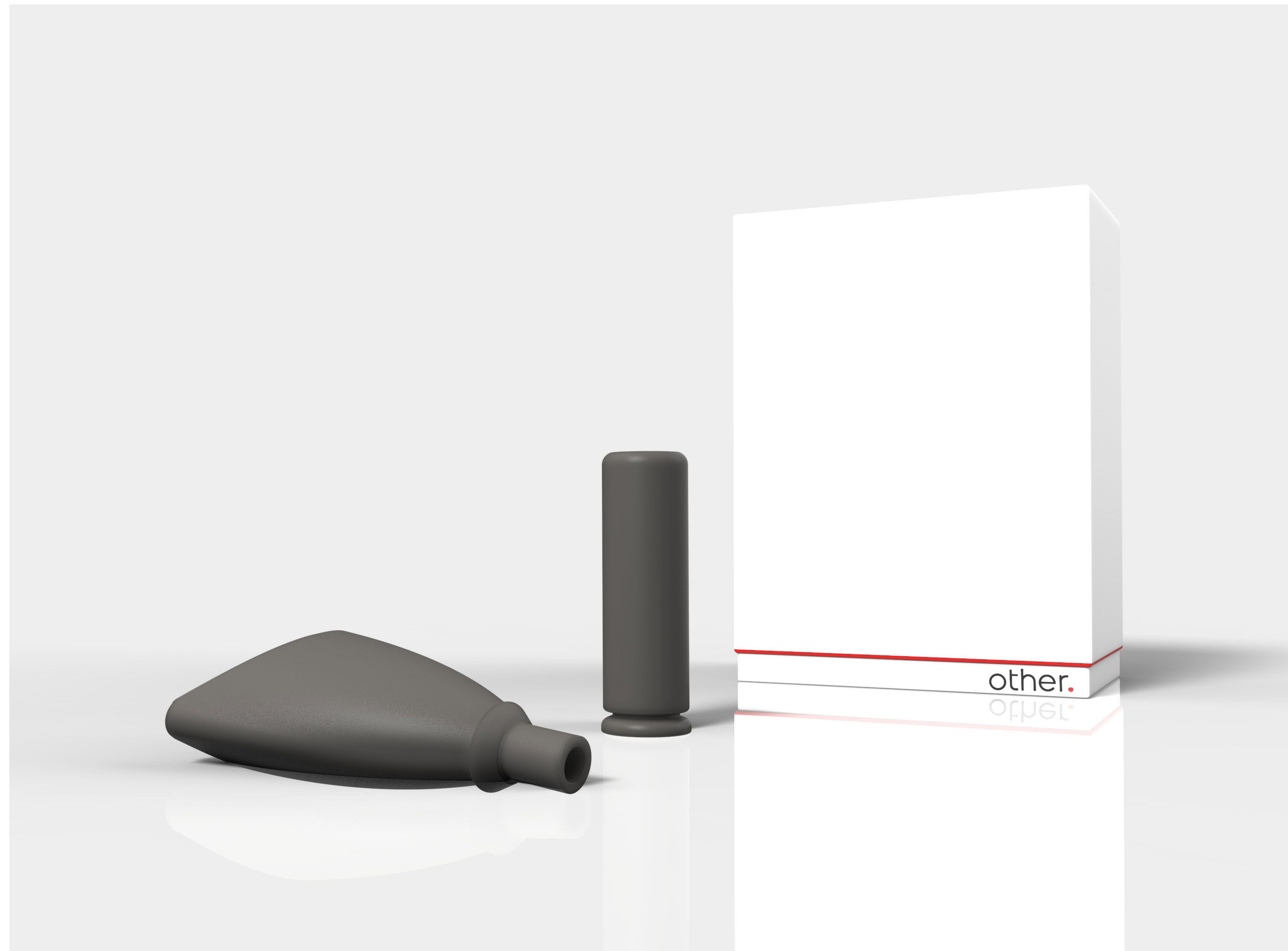
## Packaging Concept Development

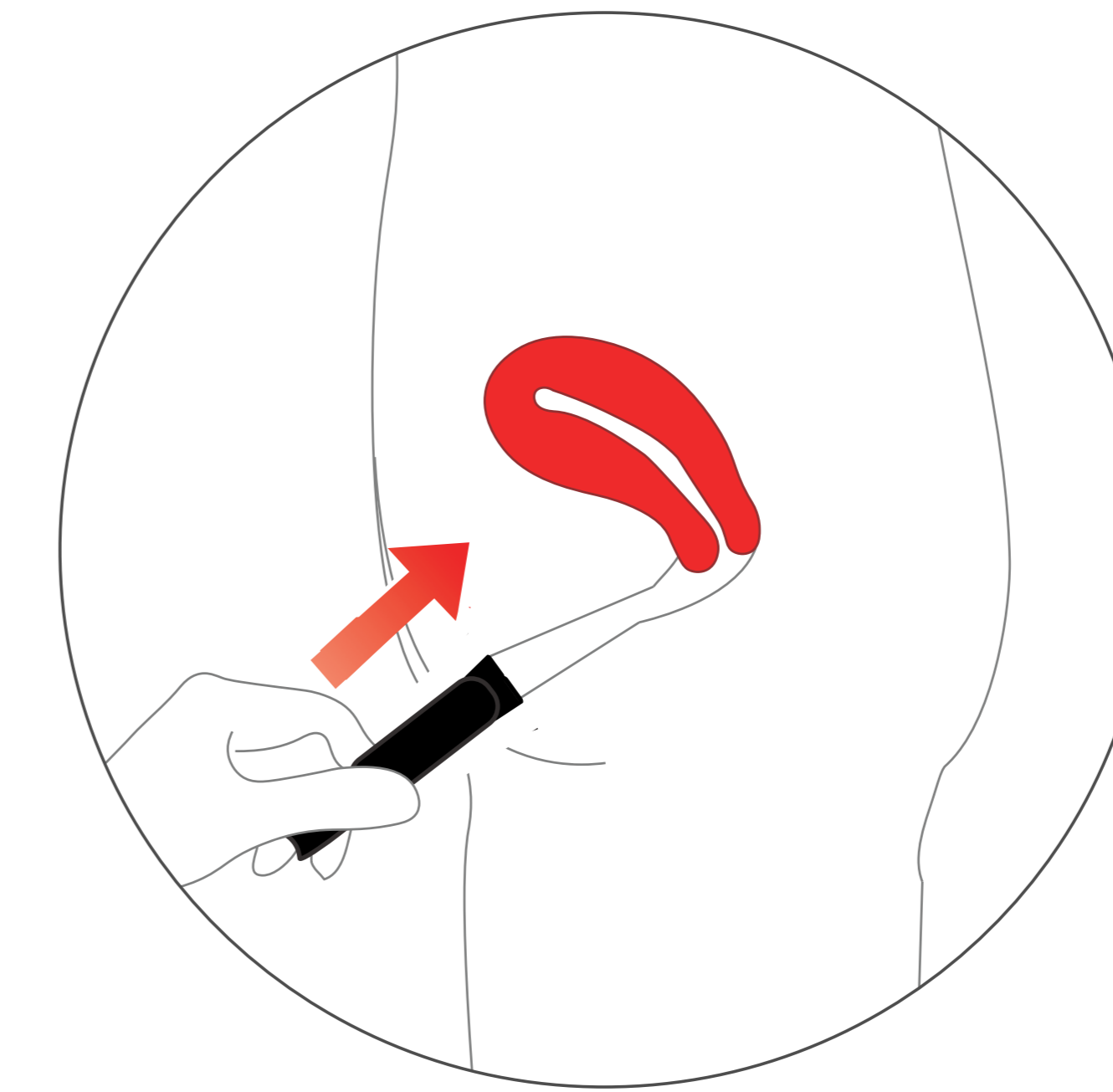
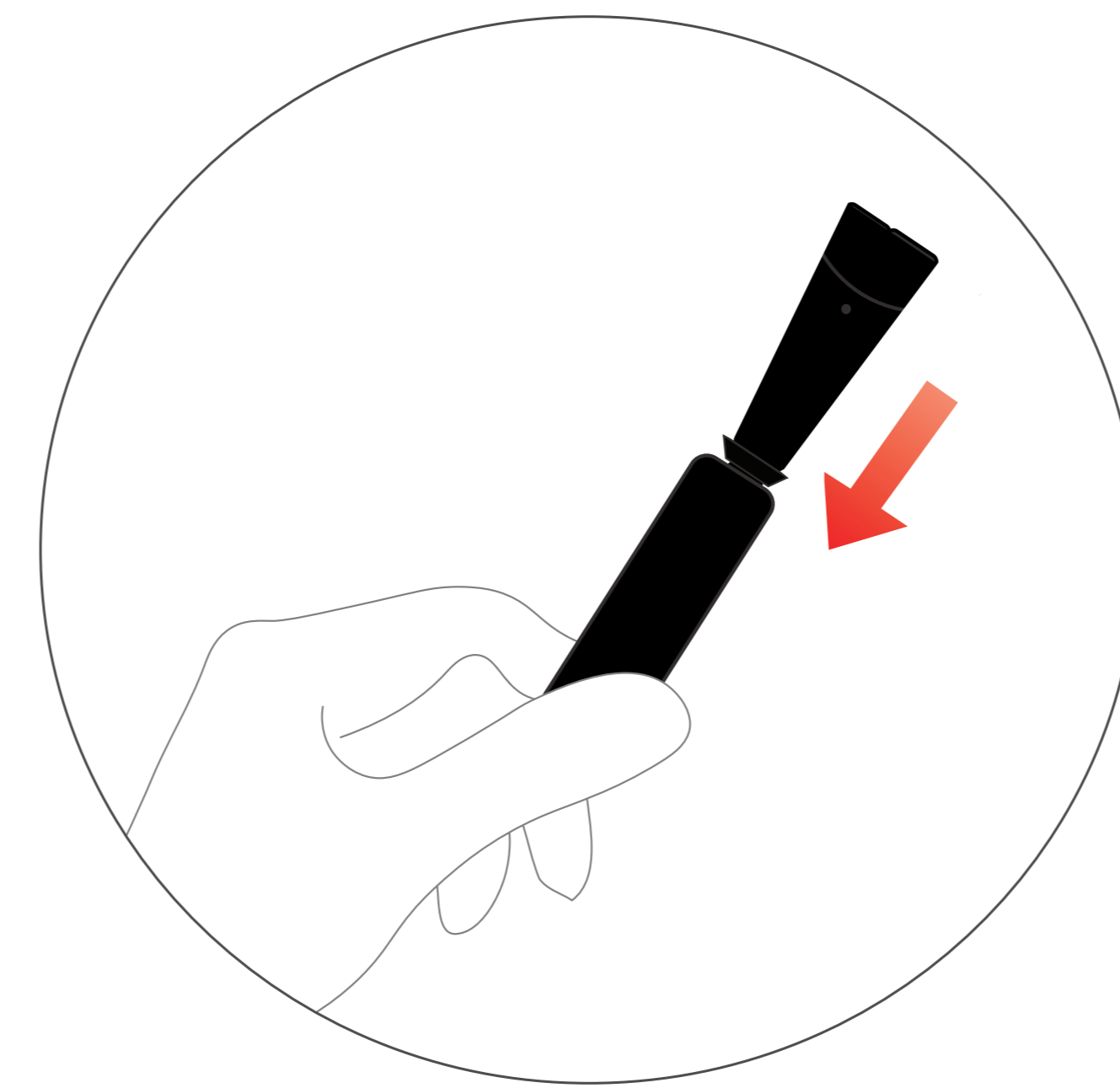
The packaging concepts were designed to be **completely unrecognizable as menstrual care packaging**. The experience of opening the packaging and interacting with it was to **feel luxurious and high end**, rather than cheap and disposable like current interactions with existing menstrual care packaging.

## other

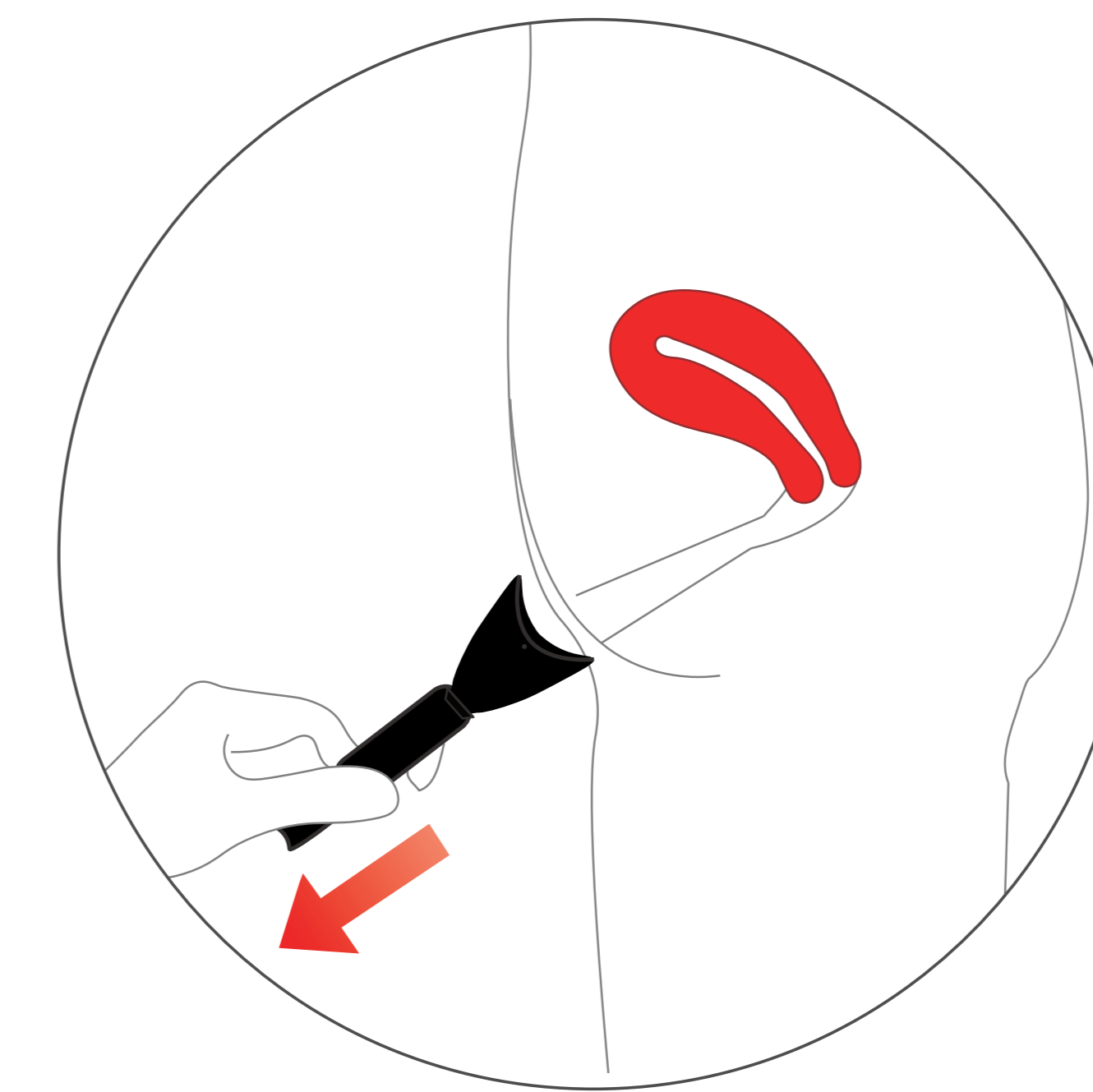
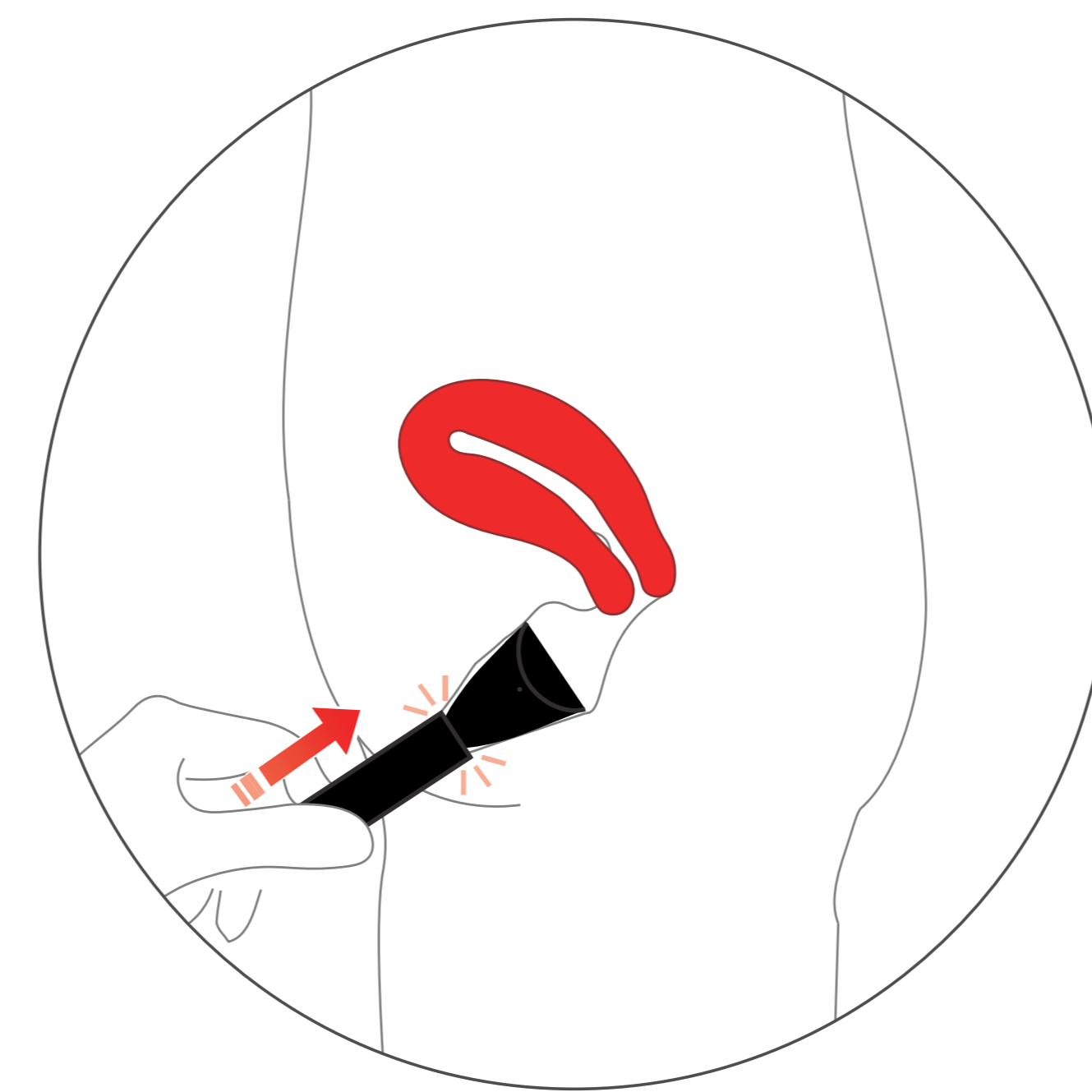
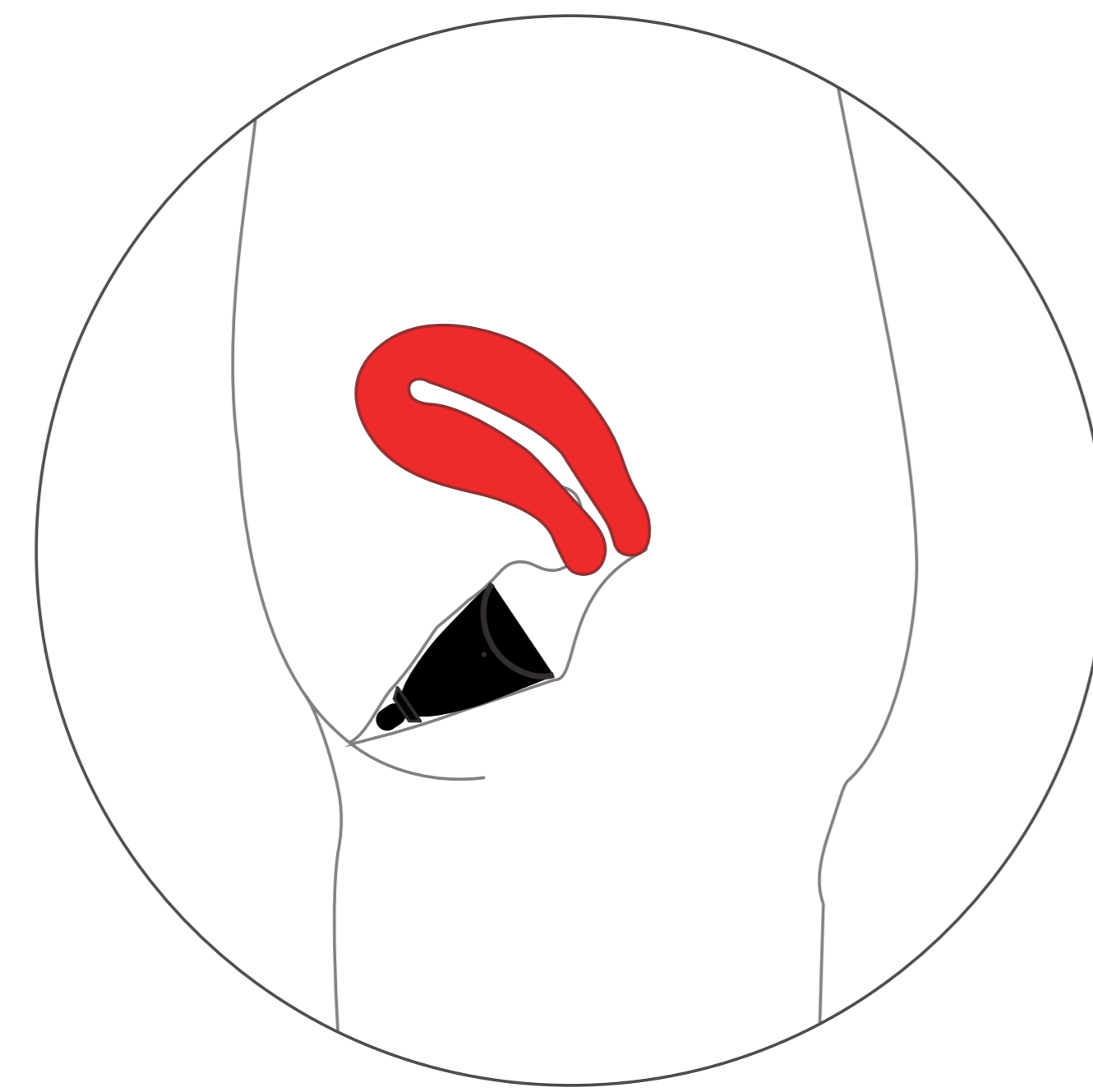
The Other Cup is **designed to minimize the interaction with menstrual fluid, both physically and visually.**

The Other Cup is inserted with an applicator, then opens to collect menstrual fluid once inserted, after twelve hours the cup is removed with the same reusable silicone applicator, and a new clean cup is inserted. The Other Cup comes in a two cup pack.





The menstrual cup is rolled up, inserted into the applicator, and the applicator is inserted into the vagina. The plunger on the applicator is pressed, and the cup stays inserted in the vagina for up to 12 hours.



The top of the applicator is inserted into the vagina and pressed against the rib on the stem. The applicator snaps onto the cup, and the cup can be removed. The dirty cup and applicator are placed in disposable packaging and a fresh cup is inserted.

## Secondary Packaging

Most menstrual products have very bright, loud, and colorful packaging. This packaging is designed to be subtle with a playful invitation to open the box.

The disposable packaging functions as a **carrying case** for the clean cup, and it is the disposable packaging for the blood. The cup and applicator are then deposited into **hemostatic packaging** that absorbs the menstrual fluid as you go about your day. The cup can be rinsed later at your convenience at home.



other.







# CLIDRO

The Ultimate Surfing Drone

By Mary Suttle, Keith Costa, Lu Pan, and  
Aaron Brinks

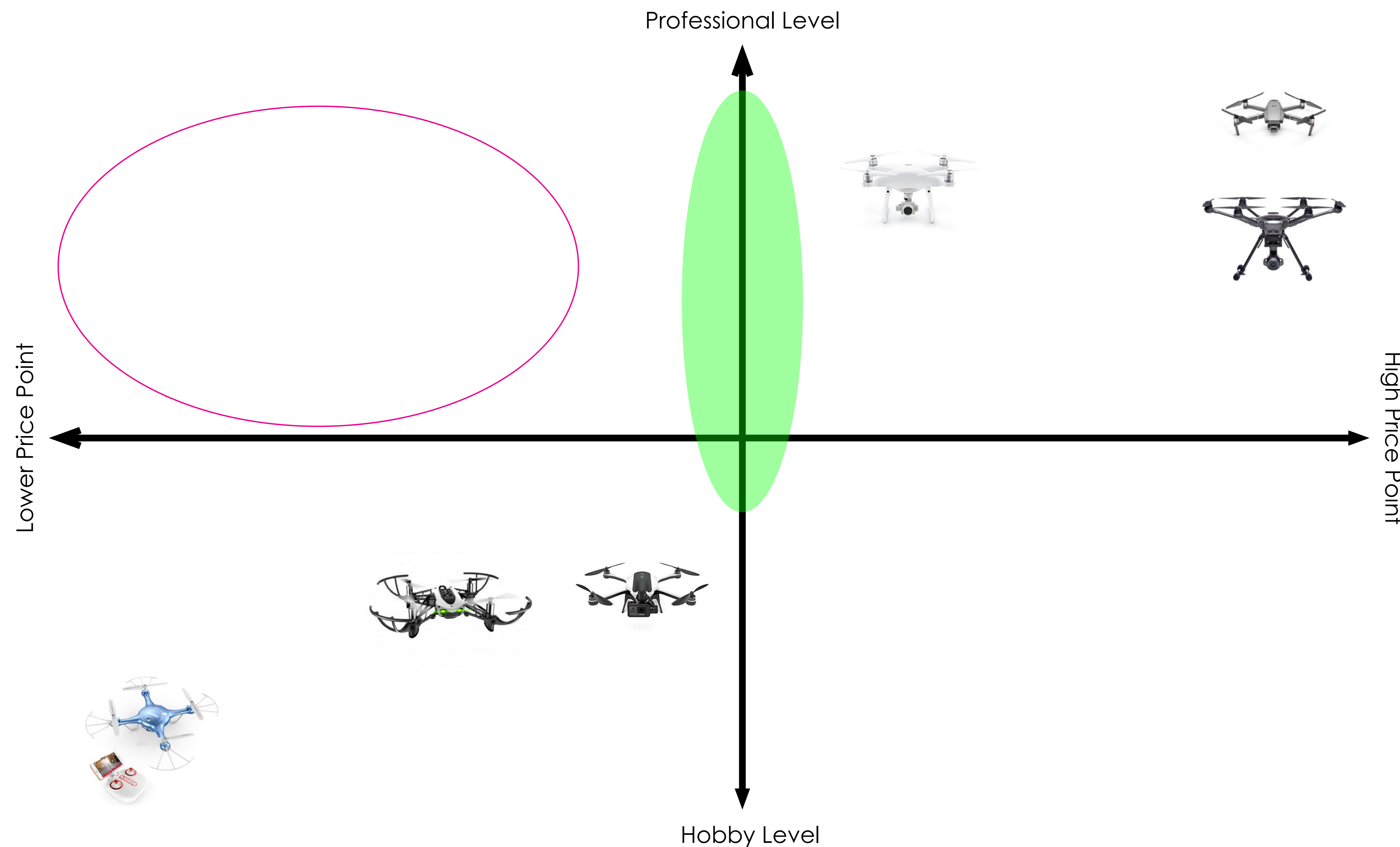
Research, manufacture-ready CAD  
model, project plan, and sketches by  
Mary Suttle

# What is so different about this drone?

For surfers looking to gain a sponsorship or following, having **high quality video footage is vital**. The surf world (like other high-performance sports) is driven by visuals that help sell the lifestyle. Surf shops, brands, and followers need proof of your abilities in order to buy into your brand.

**Clidro is a waterproof drone designed to be used by surfers to capture their most epic moments out on the water. The motion tracking technology and convenient surfboard mounted charging cradle allows for surfers of all levels to take high quality and dynamic footage.**



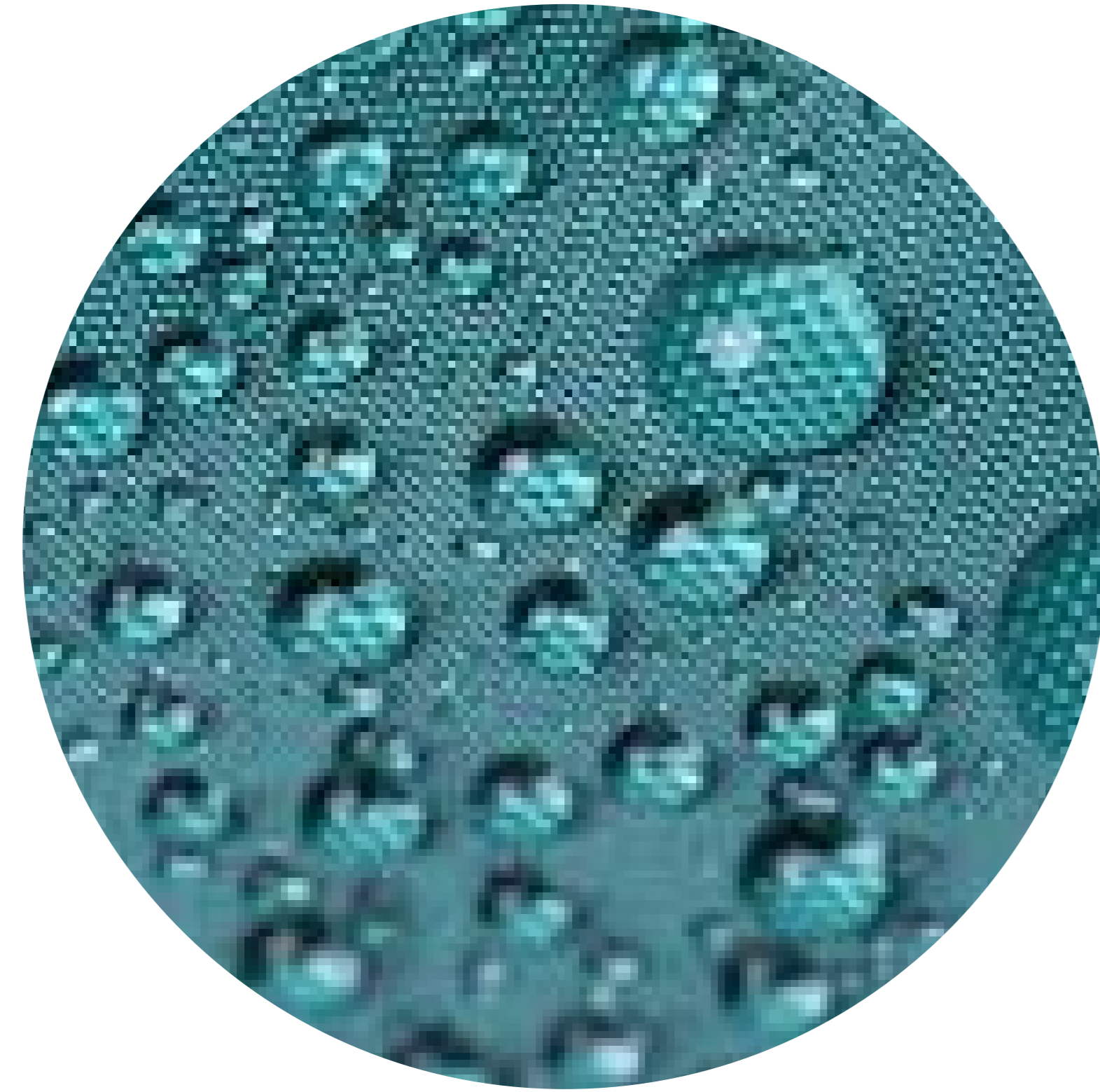


## The Current Solutions

The high-performance drones that can withstand high stress environments and capture high quality video are at a high price point. The lower priced drones are usually intended for less experienced users or hobbyists rather than for capturing video of a high-performance sport such as surfing. **There is a gap in the market for a mid-tier drone with easy to learn controls that can capture high-quality video.**

While there is also a gap in the market for a low price high-quality drone, the quality of drone we would be looking to create would eliminate the low cost high-performance drone. **The high-performance aspect requires more expensive components than a lower priced drone can justify.**

# Necessary Design Features



## Waterproof

This feature is the basic requirement. The drone would be exposed to a corrosive (salt water) and high humidity environment.

**We also wanted to make sure the electronics in the drone would be safe** in the event of a failure (wipe-out) or an accident such as dropping it in water.



## High Video Quality with Subject Tracking

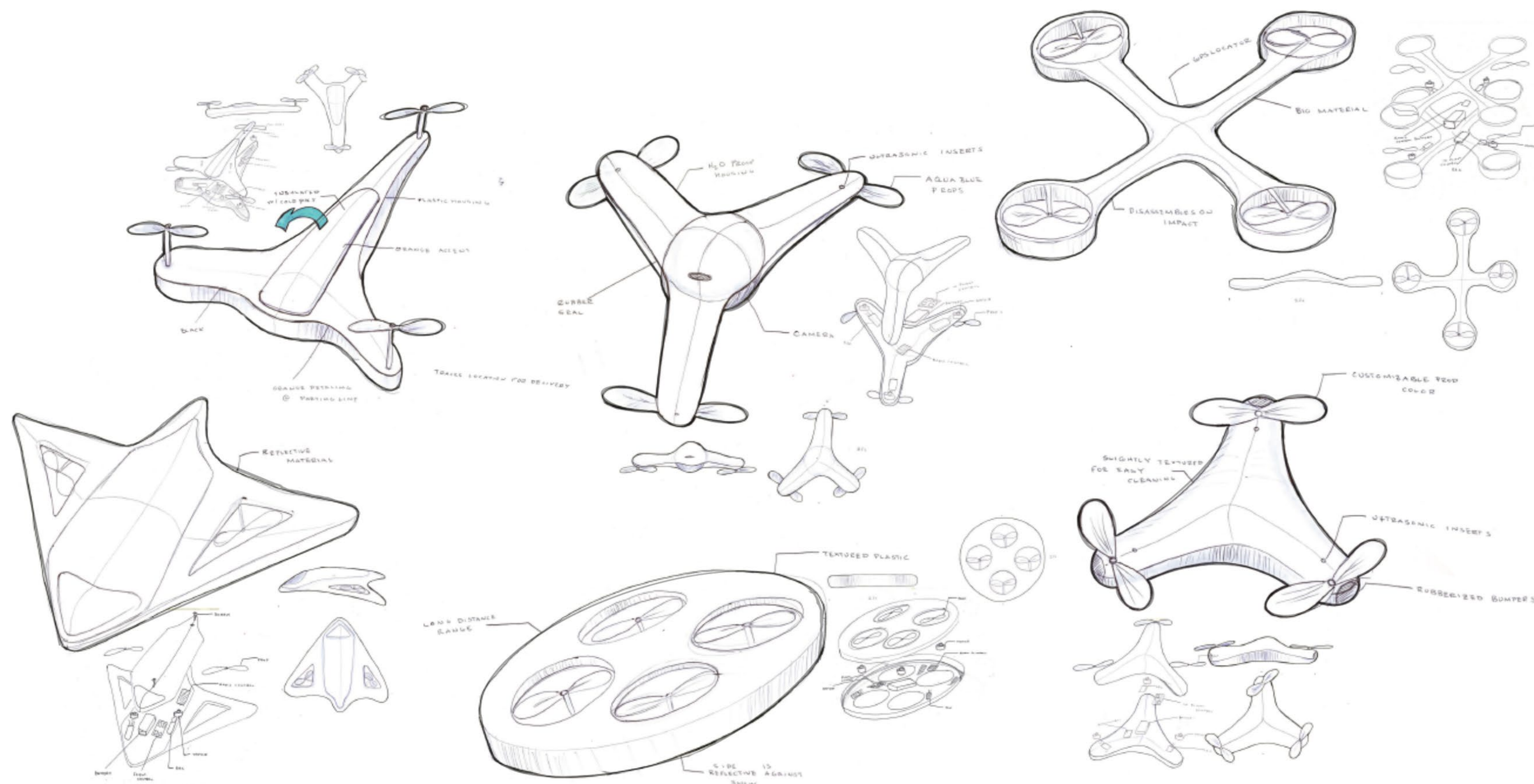
The camera would need to be capable of capturing high quality video that is worthy of an epic surf promo. In addition, the drone would need to be capable of “locking” on to subject and tracking them for their set.

The controls and settings would need to allow for **solo operation** and not need a team or videographer.



## Nimble

The shape and style of the drone would need to be such that it is nimble and **able to follow the twists and turns of a surfer**. This was taken into consideration for the shape and components of the drone.



## Concept Development

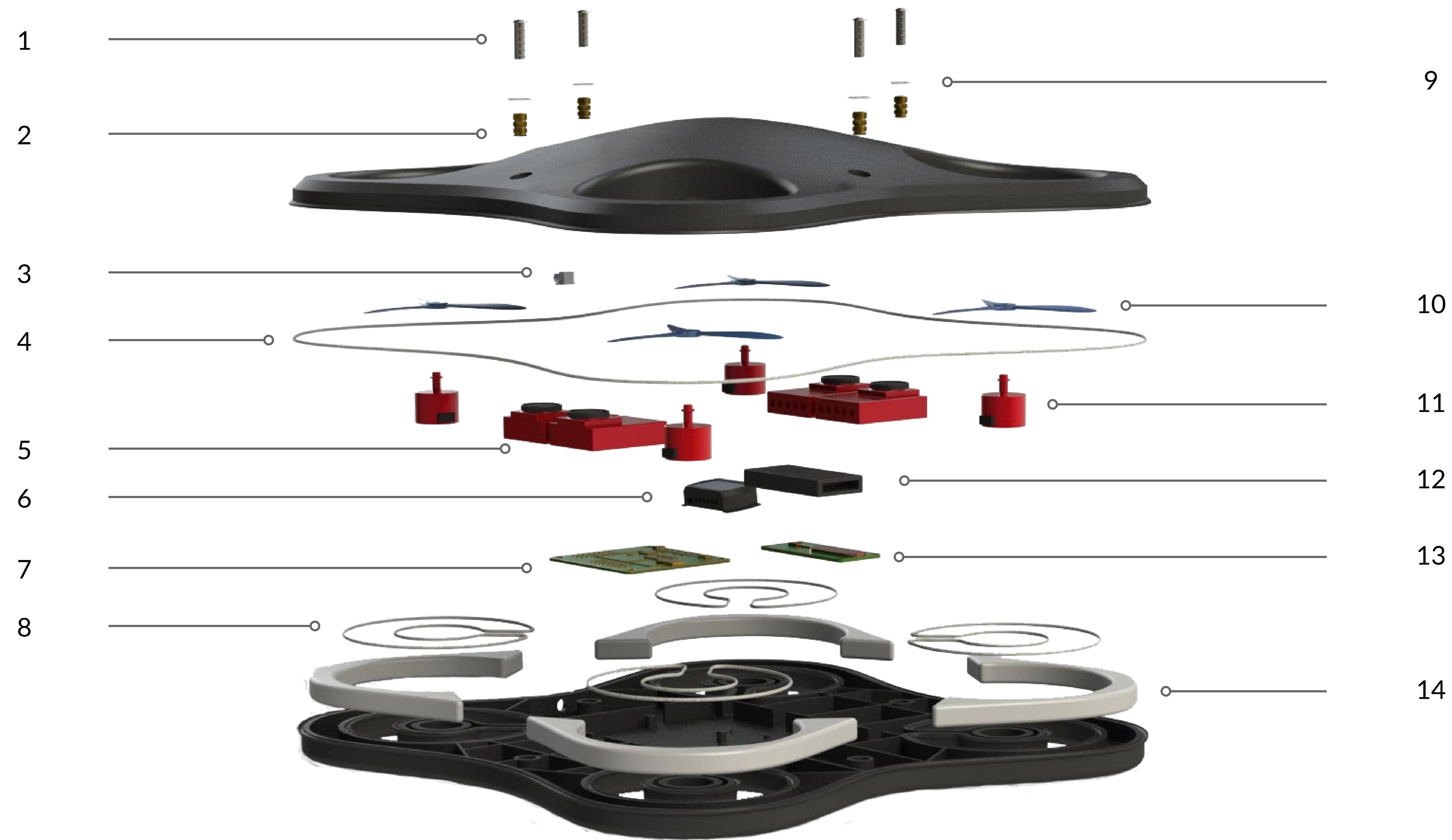
Surfers would need to use a drone with **very few features**. They would need a drone that can track a subject, is waterproof, and is nimble. With this in mind, we began exploring concepts for the external housing and style of drone for our surfing drone. We determined a quadcopter design would allow for the most maneuverability and the slimmest profile.

## Clidro

The Clidro surf drone is a quadcopter drone with a slim profile. The **low weight and 4 propellers** allow for quick turns and maneuverability while following a surfer on the water. The **HD camera** can capture every epic moment on the water.

The drone can be recharged on a **solar powered induction charging cradle** that can be mounted on the surfboard. This charging cradle functions as the **tracking point** for the drone to follow while filming. The components and materials were carefully selected to reduce weight and increase performance.





- 1. Screws (4)
- 2. Ultrasonic inserts (4)
- 3. HD camera (wifi enabled)
- 4. O-ring: housing
- 5. Electronic speed controller (4)
- 6. Solar charge controller
- 7. In-flight control/radio control

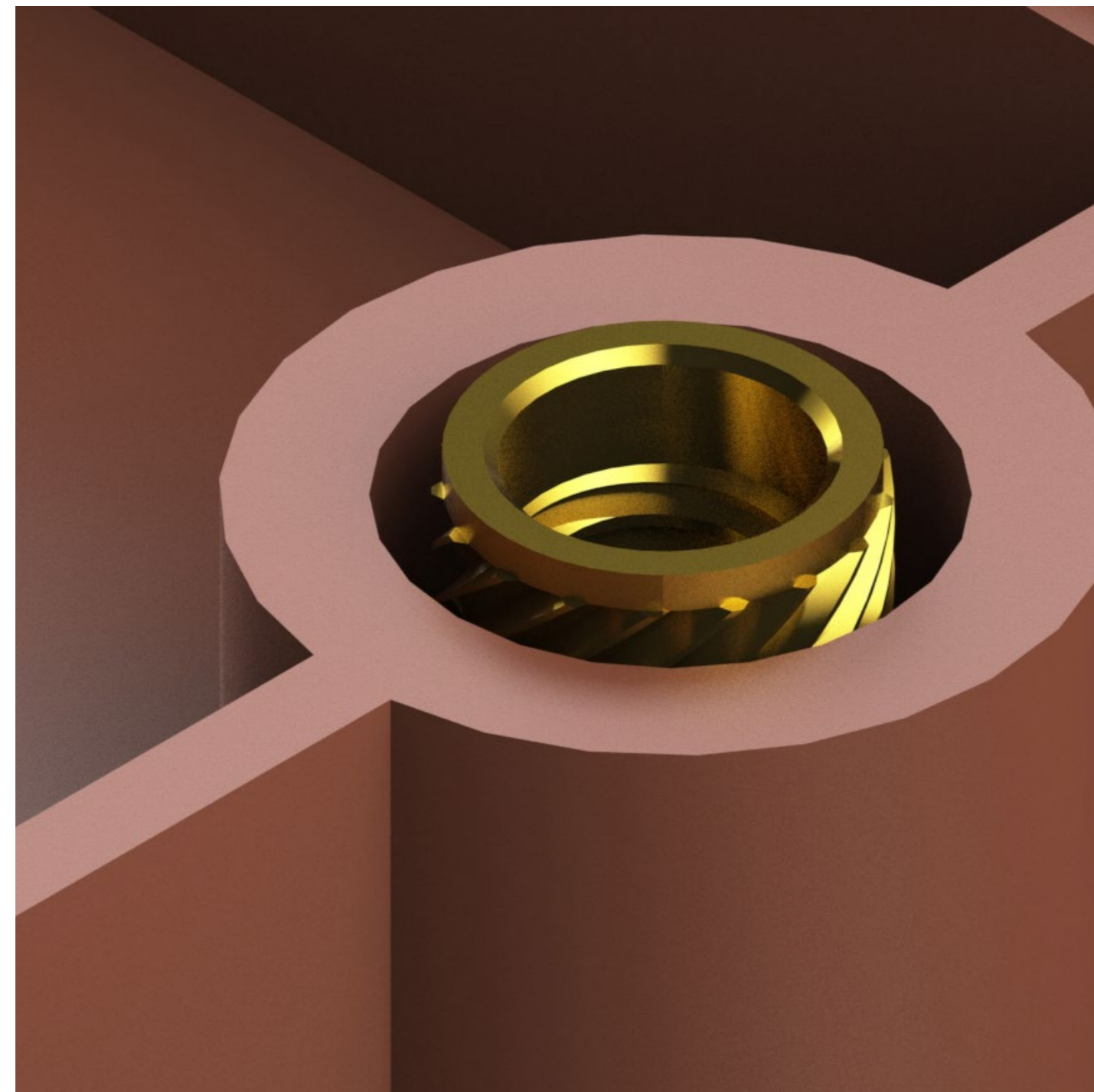
- 8. O-ring: propeller housing (4)
- 9. O-ring: screws (4)
- 10. Propeller (4)
- 11. Waterproof brushless motor (4)
- 12. Battery
- 13. Induction charger
- 14. Flotation inserts (4)

## Drone Components

The design features **four waterproof brushless motors** which are more durable than typical motors. In case the drone fails on the water, custom molded floats ensure the drone will **float and not sink** to the bottom of the ocean.

The battery is connected to a **solar charge controller and induction charging coil**. This allows for the drone to wirelessly charge on-the-go. Induction charging was chosen to allow for quick recharges in between sets. The drone did not need to be in flight for very long, so a slightly slower charging method was acceptable.

# Design for Manufacturability



## Injection Molding Features

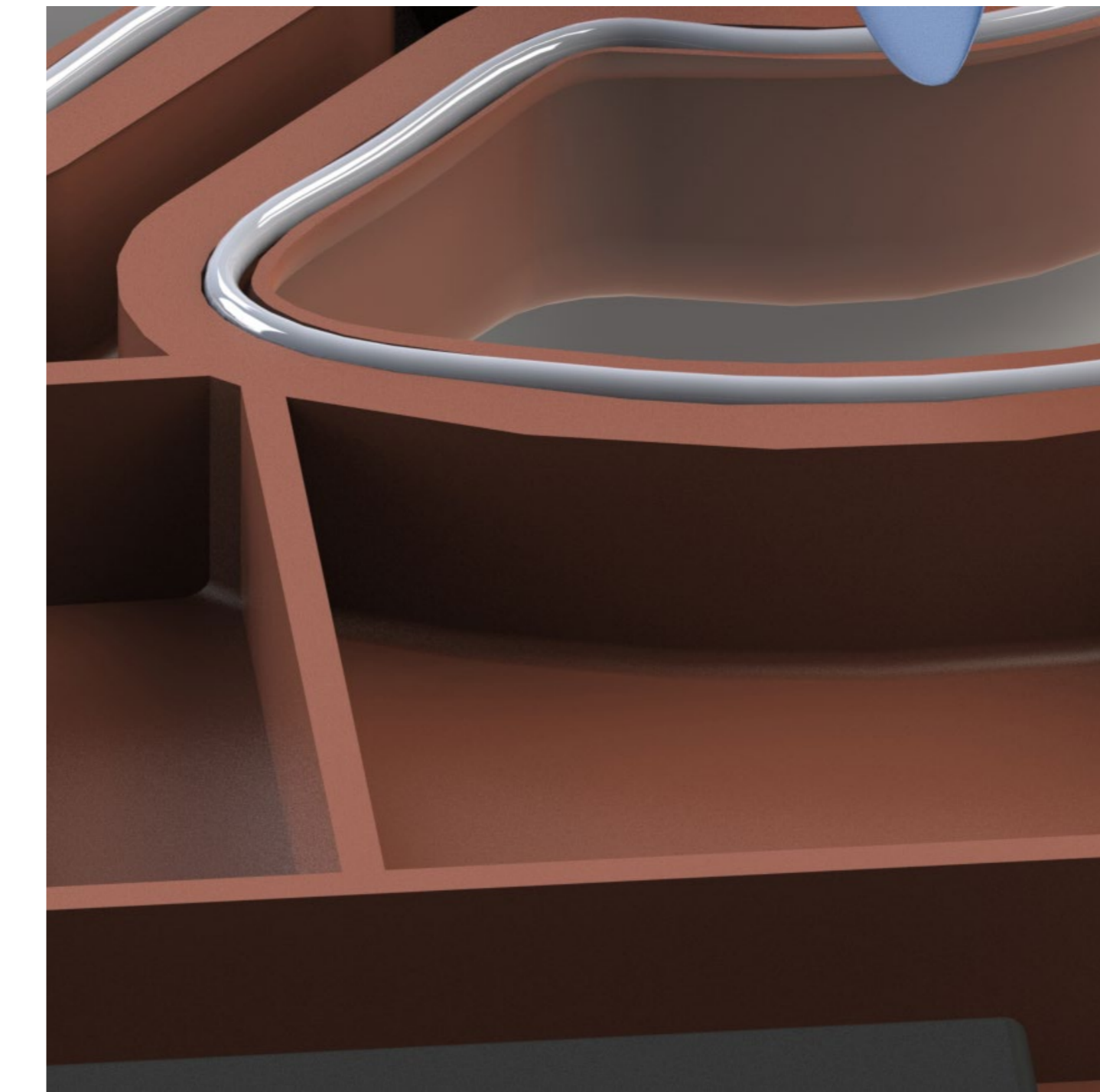
The drone housing was designed to include the necessary **ribs** and bosses to allow for successful injection molding. The wall thickness and tolerances were considered for the selected material.



## Material Choice

The internal components are encased in an ABS plastic housing. ABS has good **impact resistance**, is inexpensive, has a low weight to strength ratio, and has a good appearance when molded.

ABS has low **chemical reactivity**, is ideal for **saltwater exposure**, and is resistant to **UV damage**.



## Waterproof

Many electronic devices and drones are permanently assembled with ultrasonic welding. In order for the drone to be **opened up and repaired**, a **silicone custom o-ring** was added around the entire perimeter, the propeller mountings, and the screw openings.



## Permanent Features

Components that needed to be permanently attached were secured via **heat staking**. The threaded **ultrasonic inserts** were chosen to make sure the screws can tighten the housing together very securely.





**THANK YOU!**