Retail Therapy 11

Kai Porter

pde collection

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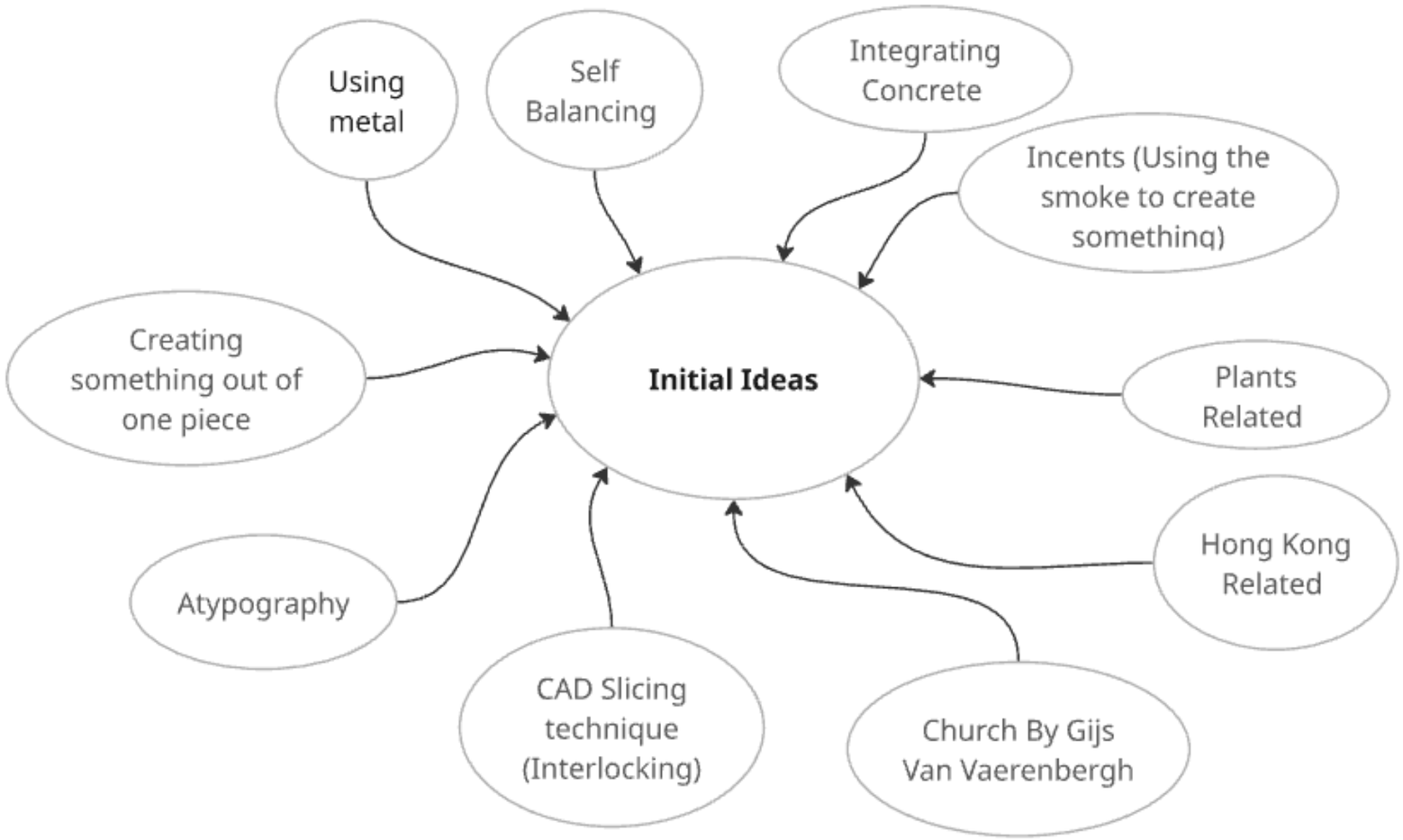
Initial Ideas

Thoughts

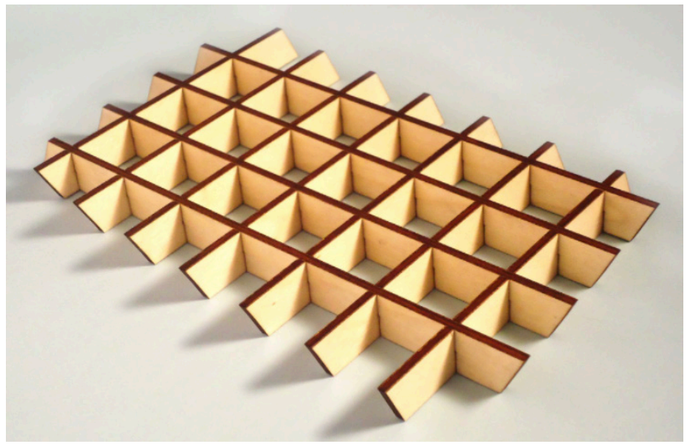
I'm really excited to start this project, as I feel it's going to push my abilities while also allowing me to experience the full process of developing a product from start to finish. I already have a few ideas of areas I'd like to explore, but for this first week I want to keep an open mind and properly explore all of my options. One of the main things I'm interested in is working with metal, as it's a material I haven't really used before. I'm also interested in the slicing techniques available in CAD for laser cutting, as working in different orientations could allow me to create some visually interesting outcomes.

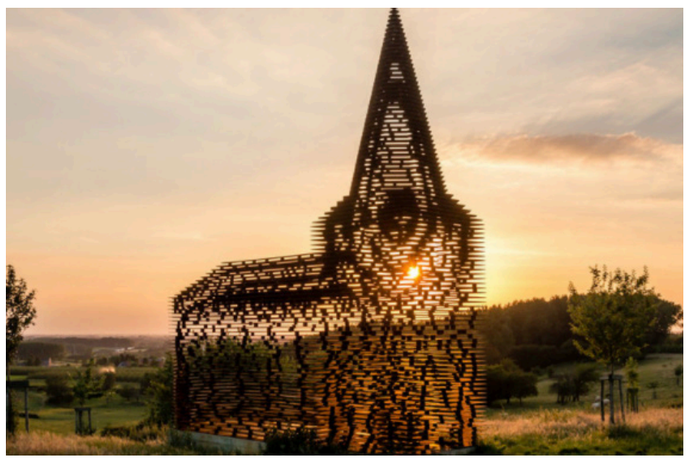


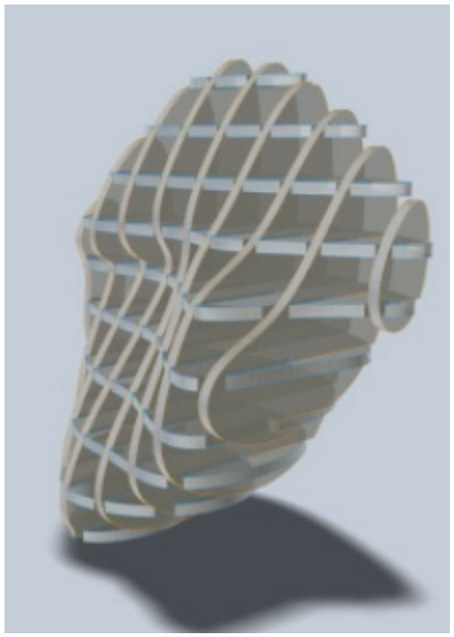
Initial Ideas

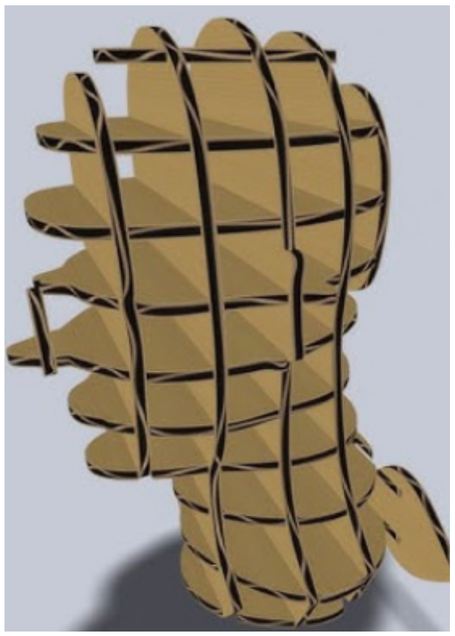
Examples of Interlocking Slicing Technique

What I like about this church is that from certain angles it looks solid but from others it looks transparent









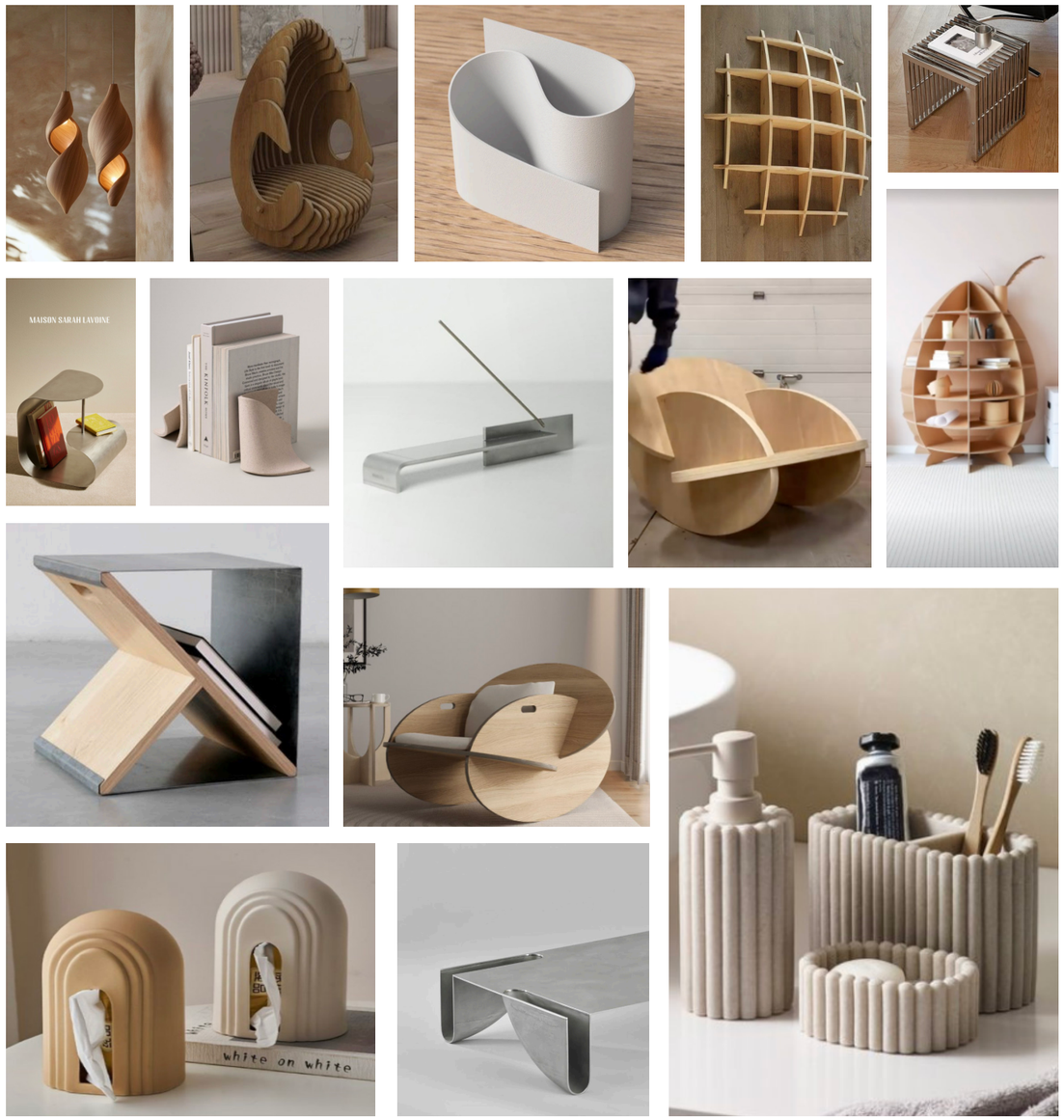
I'm still quite unsure about what I want to make at this stage, but I'm focusing on exploring different possibilities and seeing how things could actually look by using the slicing technique.
I think using light alongside this method could be really interesting, as the layered forms have the potential to create strong shadows where the pieces criss-cross and interact with each other.

What do I want the product to be?
- Well weighted and stable
- Simple, clean aesthetic
- Flat Pack design
- Made using an interlocking construction method
- Preferably metal (with wood or acrylic as alternatives)
- A functional product with a clear purpose

Initial Ideas

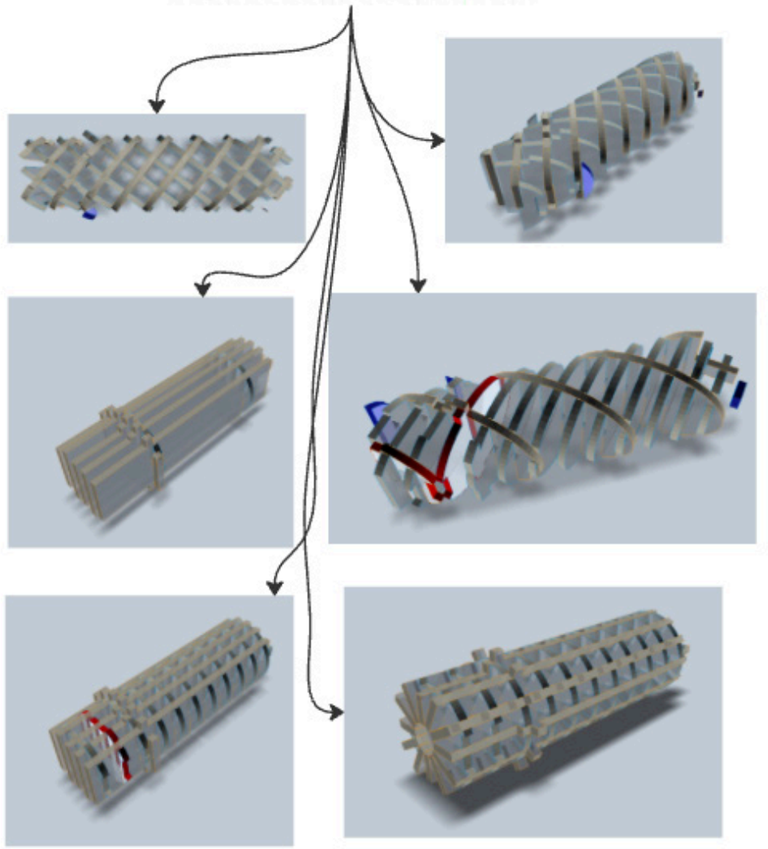
Mood Board

I created a mood board that reflects a minimal, clean aesthetic, with a focus on simple forms and geometric shapes.



Different Interlocking Orientations

Here I was testing different interlocking techniques using the same CAD model, and I found that the circular slicing approach was the most interesting.



Initial Ideas

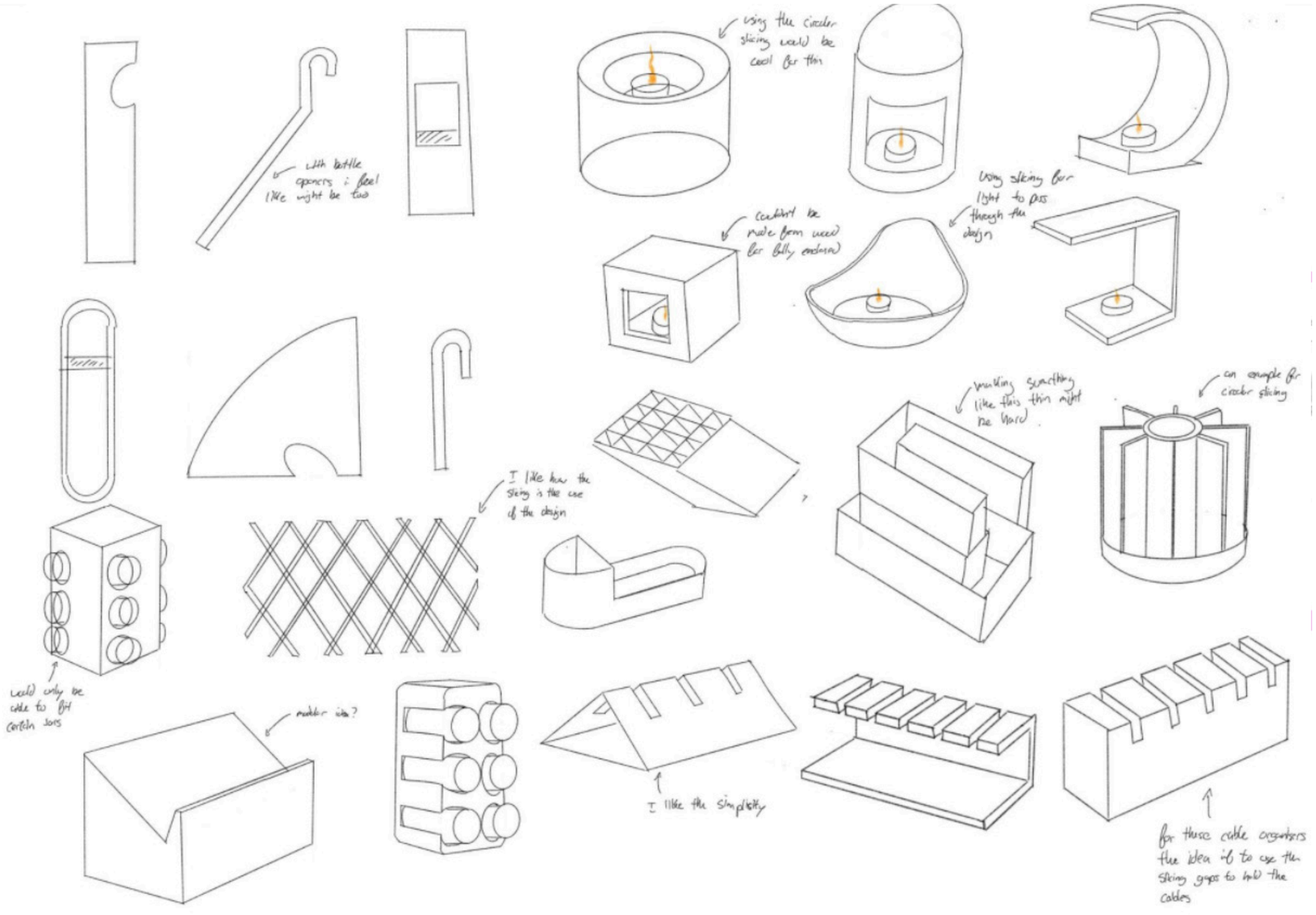
Mind Map

I needed to start thinking more clearly about what I actually wanted to make.

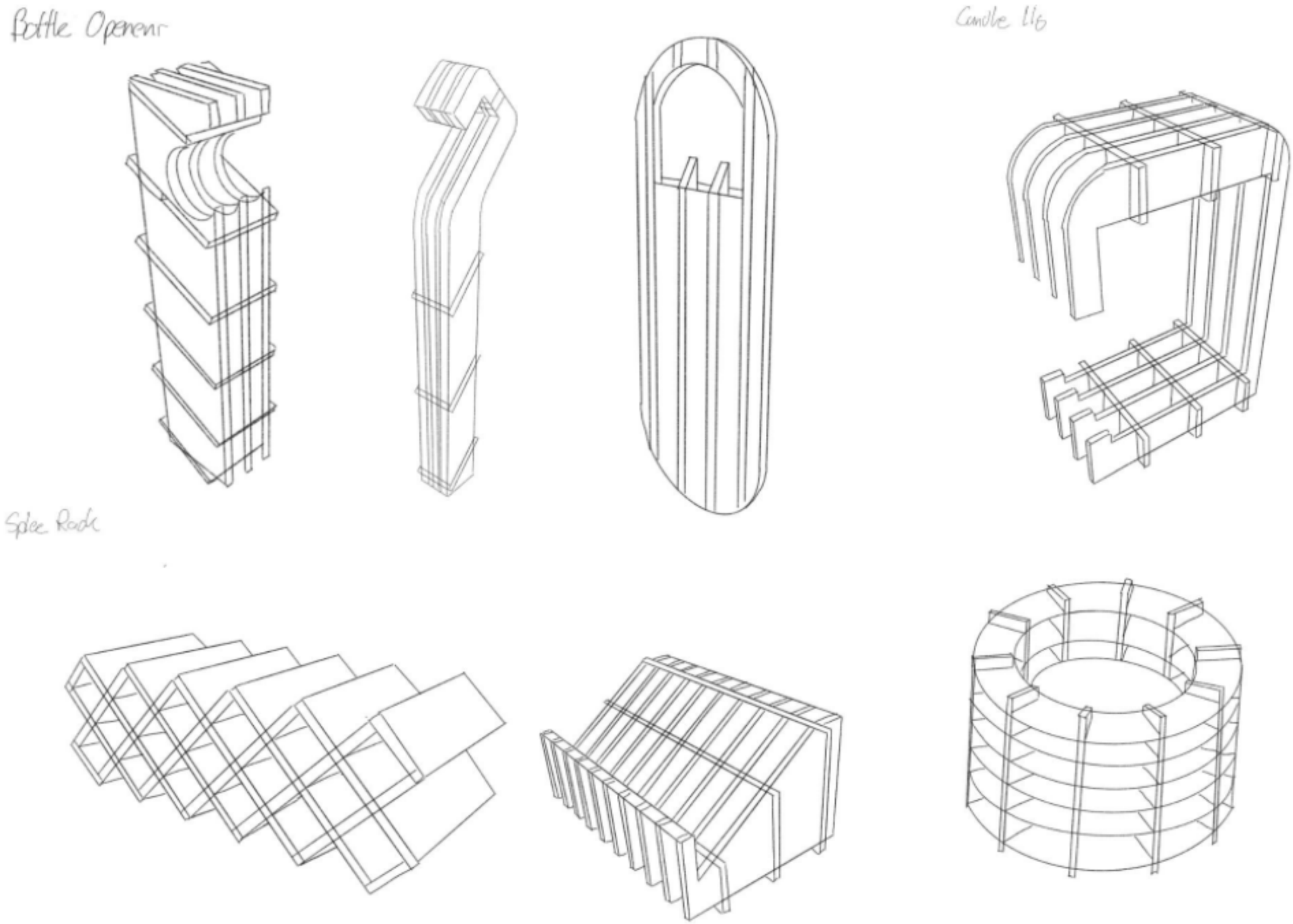
Initial Ideas

Initials Sketches

After creating a mind map of different product ideas, I selected a few to develop further and produced some initial sketches to explore how they might look. I tried to focus on ideas where the slicing technique would play an active role in how the product functions.



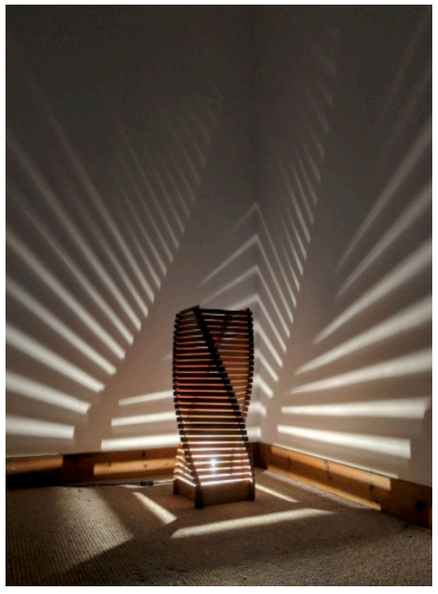
Initial Ideas



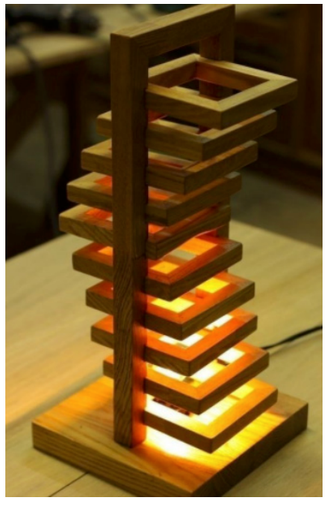
Initial Development 1

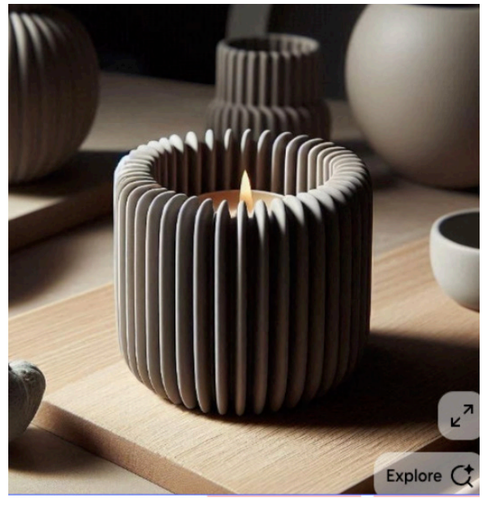
Thoughts

I looked further into candle holders and, after developing these sketches in a sliced form, I really liked the idea of the slicing creating patterns through shadows by allowing light to pass through the gaps. After discussing this with Hugh, the next step was to start laser cutting and creating some physical prototypes. I am slightly concerned, as there have been quite a few tea light holders made before, but I want this design to look visually interesting before it is even recognised as a tea light holder.





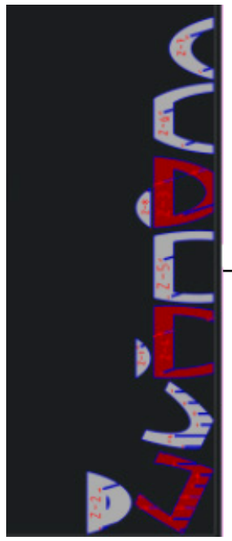



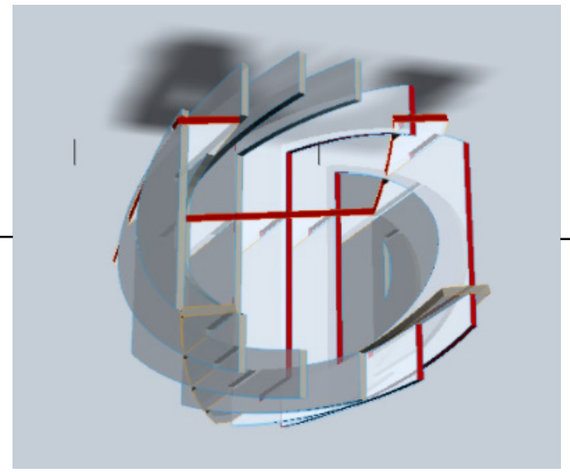


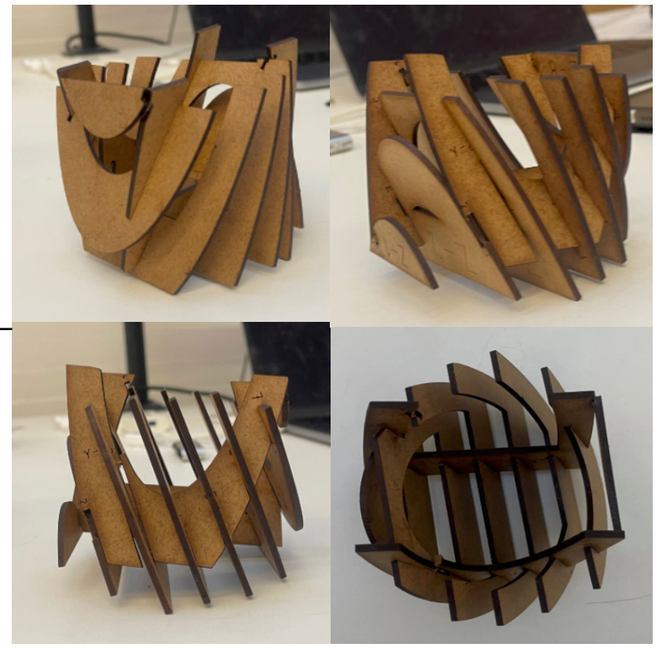
Initial Development 1

Testing CAD Models

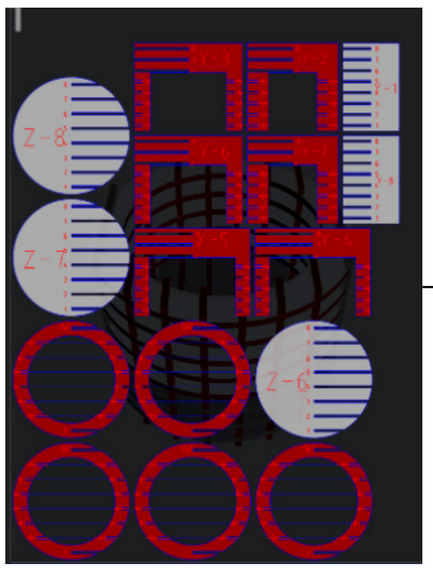
I decided to laser cut four different orientations of a simple tea light holder to see how each one would look in person.

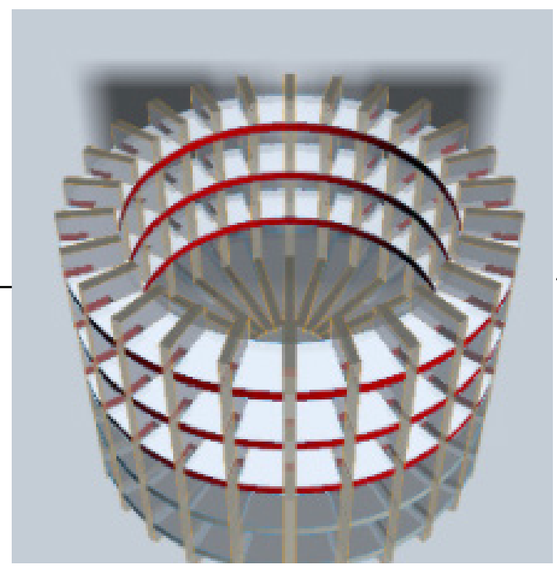


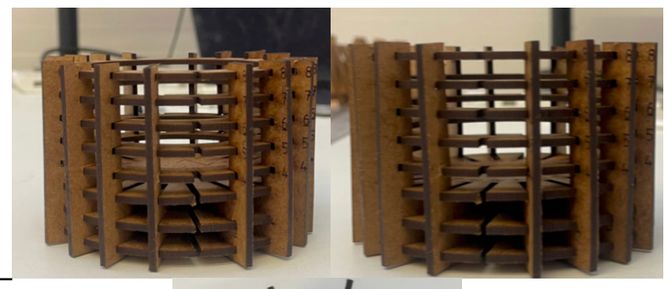




This one is my favourite, as the different angle gives the tea light a completely different look.

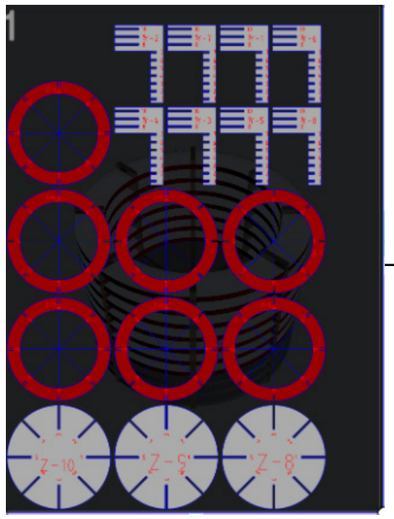


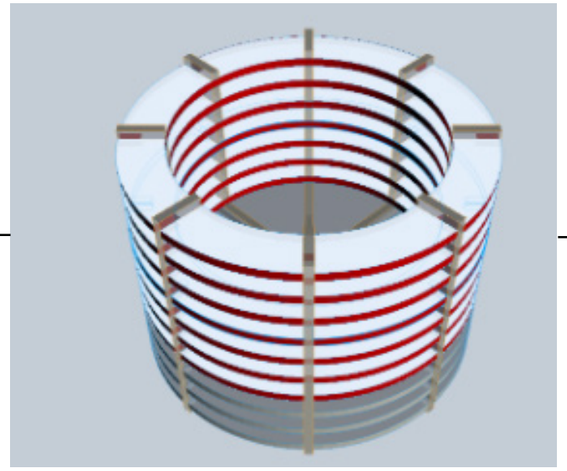


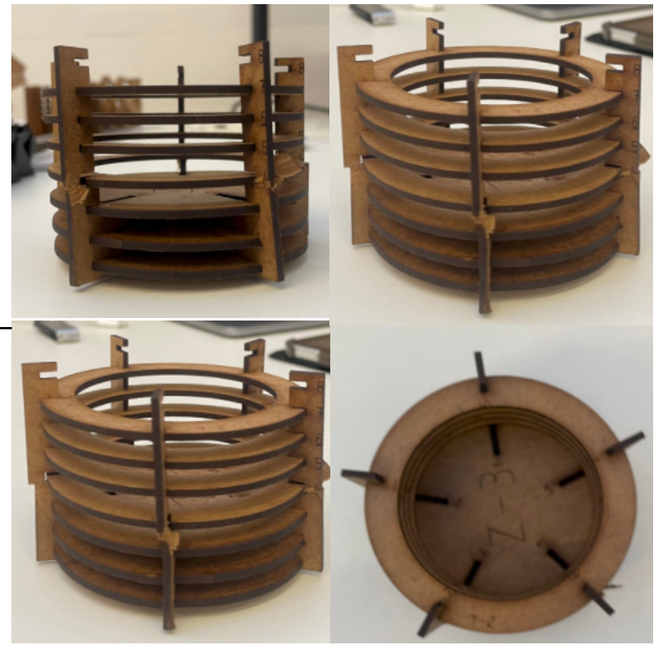


I do think there is more of an effect when there are more pieces, compared to designs with fewer vertical elements.

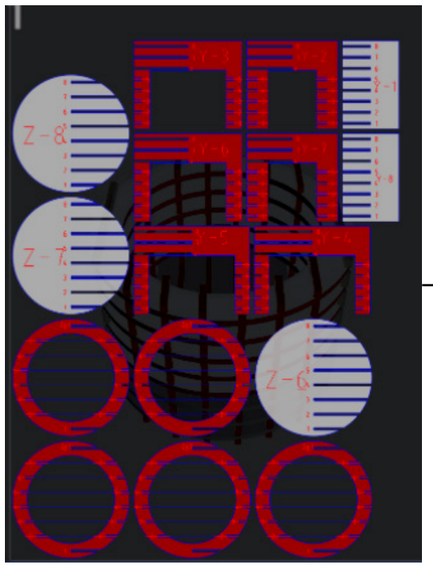
Initial Development 1

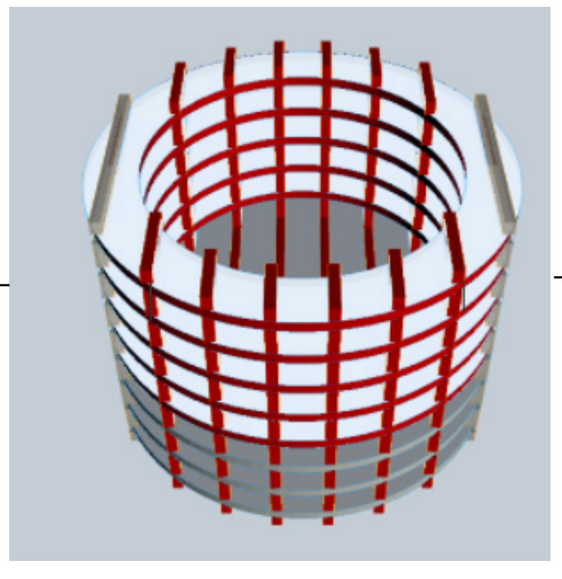


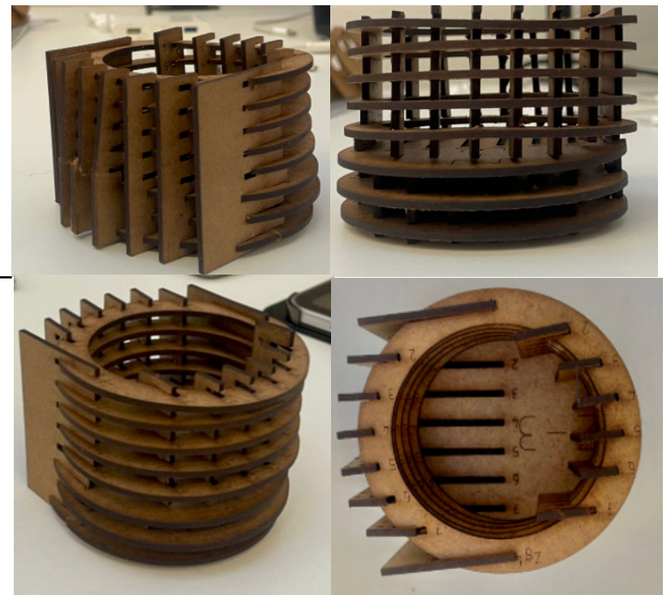




Having fewer pieces made it quite brittle, and the thinner parts of some of the elements broke.





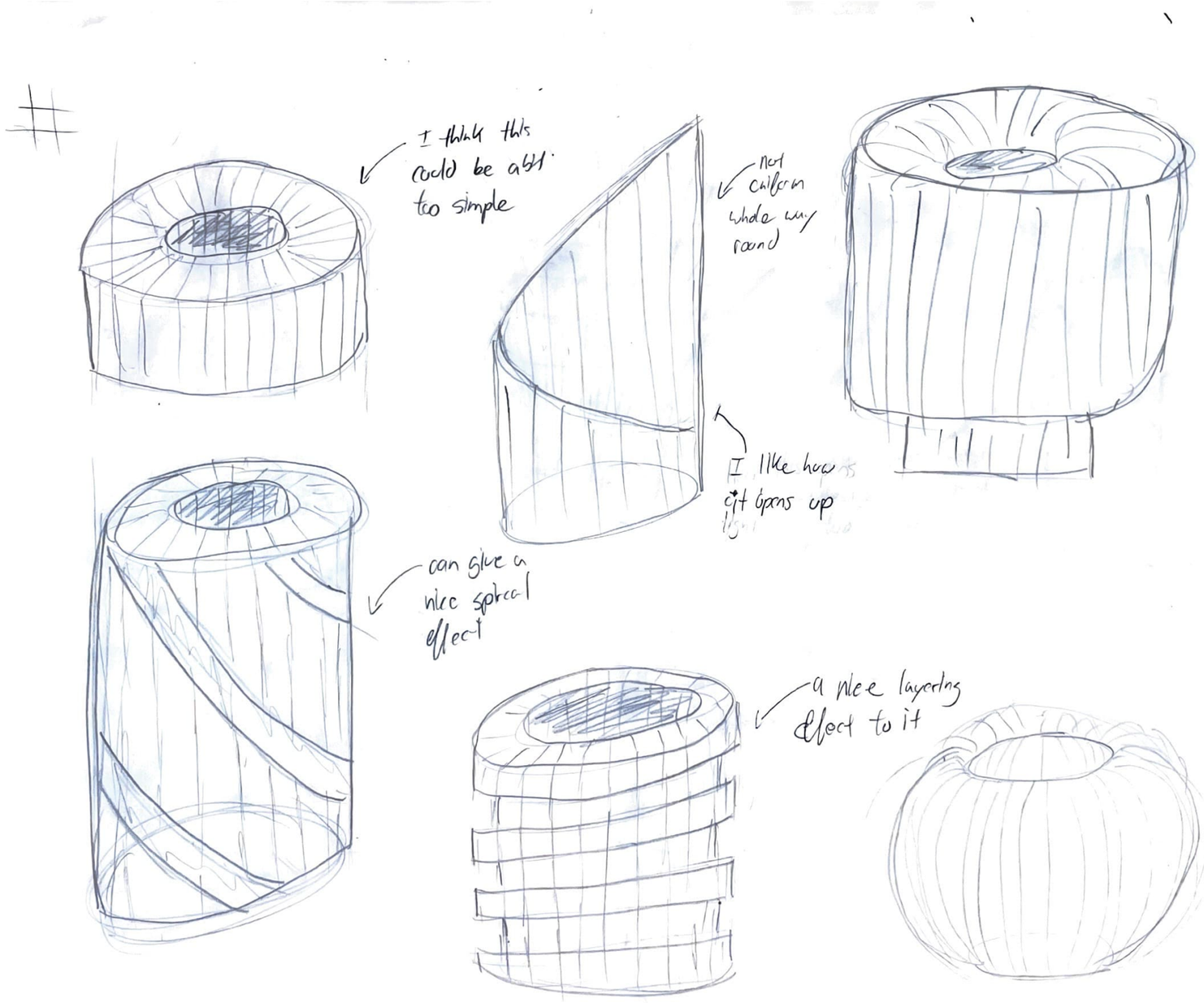


I like how this one creates a really cool effect, almost as if it's moving or leaving a trail.

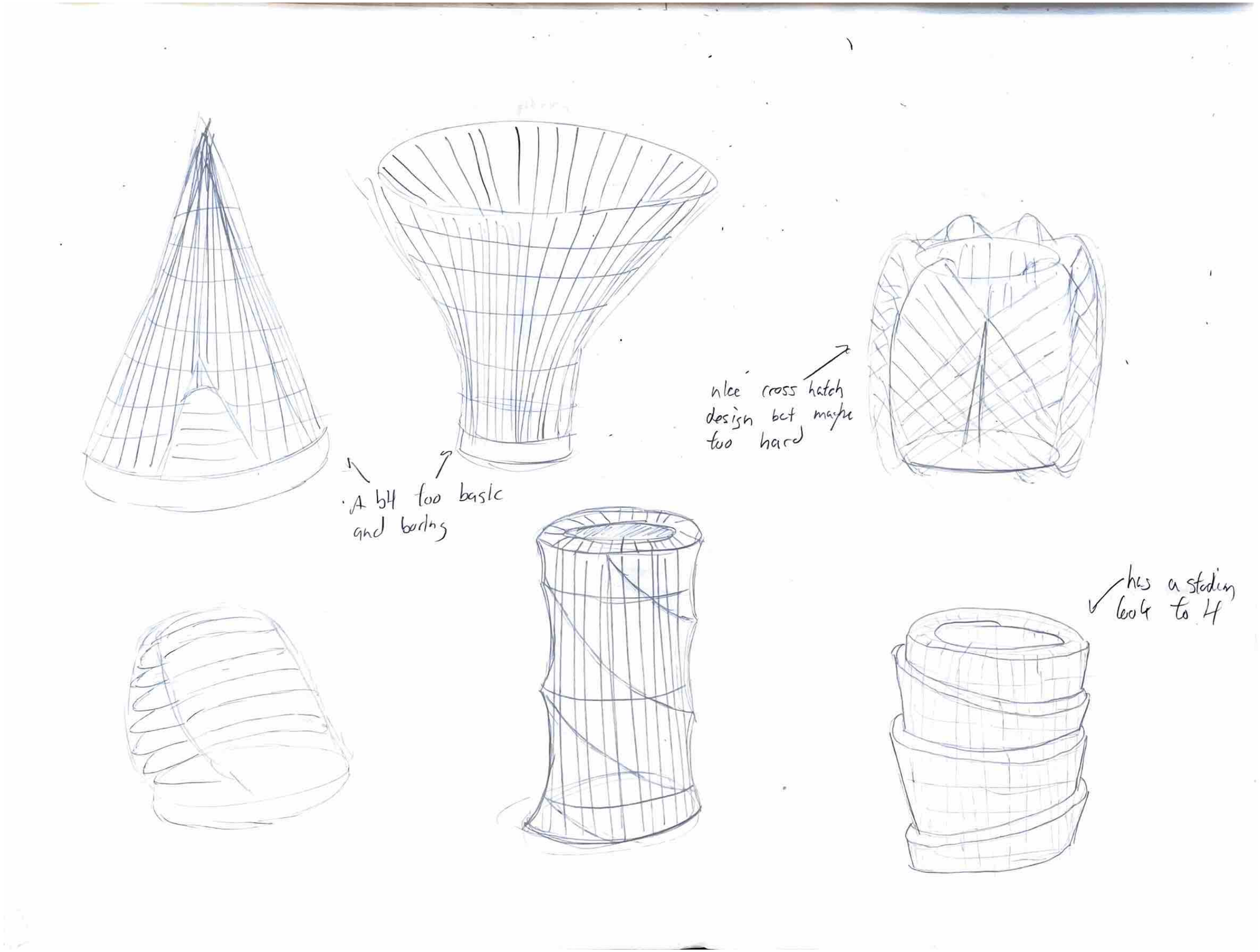
Initial Development 1

Tea Light Idea Exploration

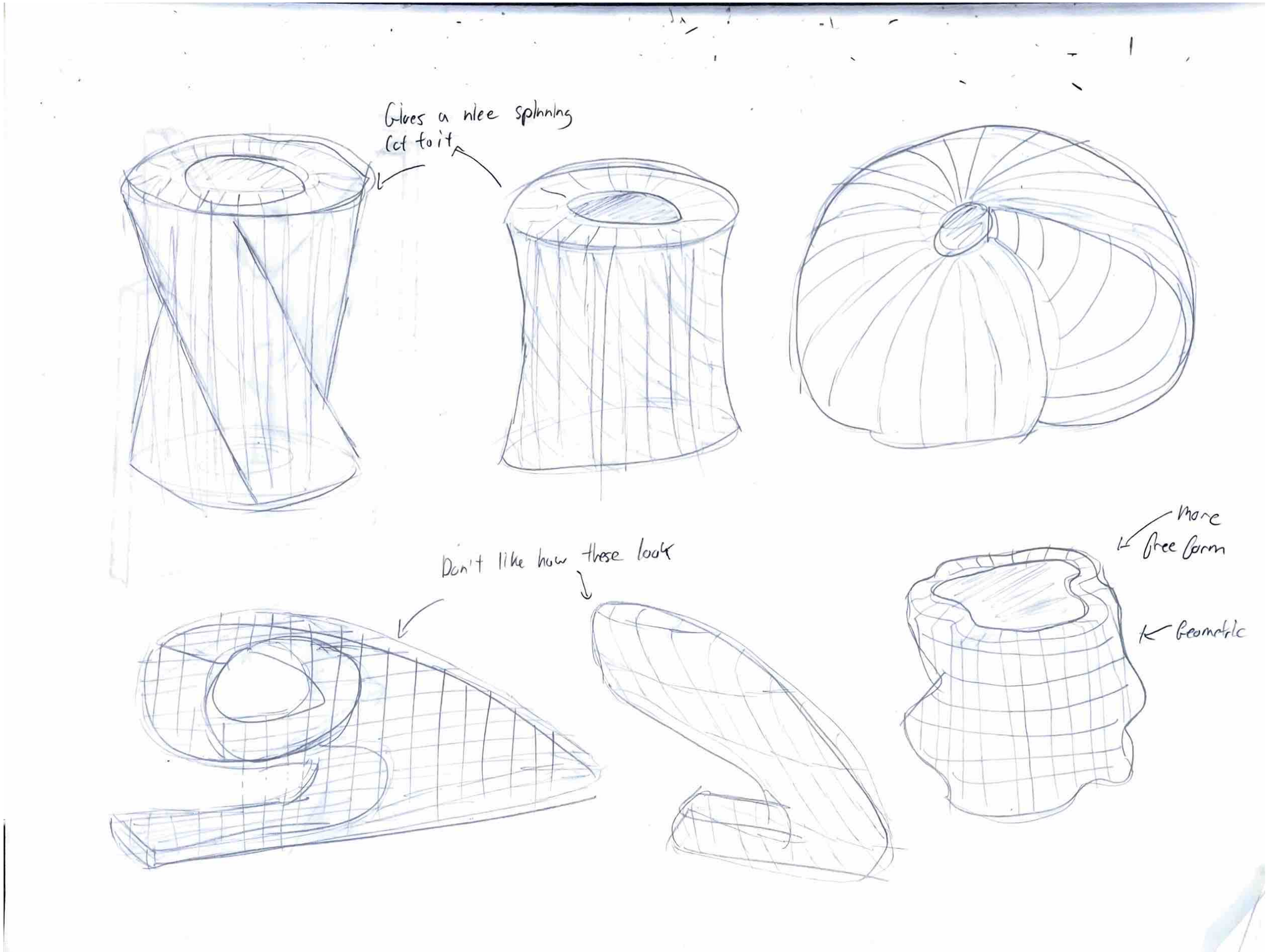
I started sketching some alternative tea light ideas and thought about using the circular slicing technique to help disperse the light more evenly.



Initial Development 1



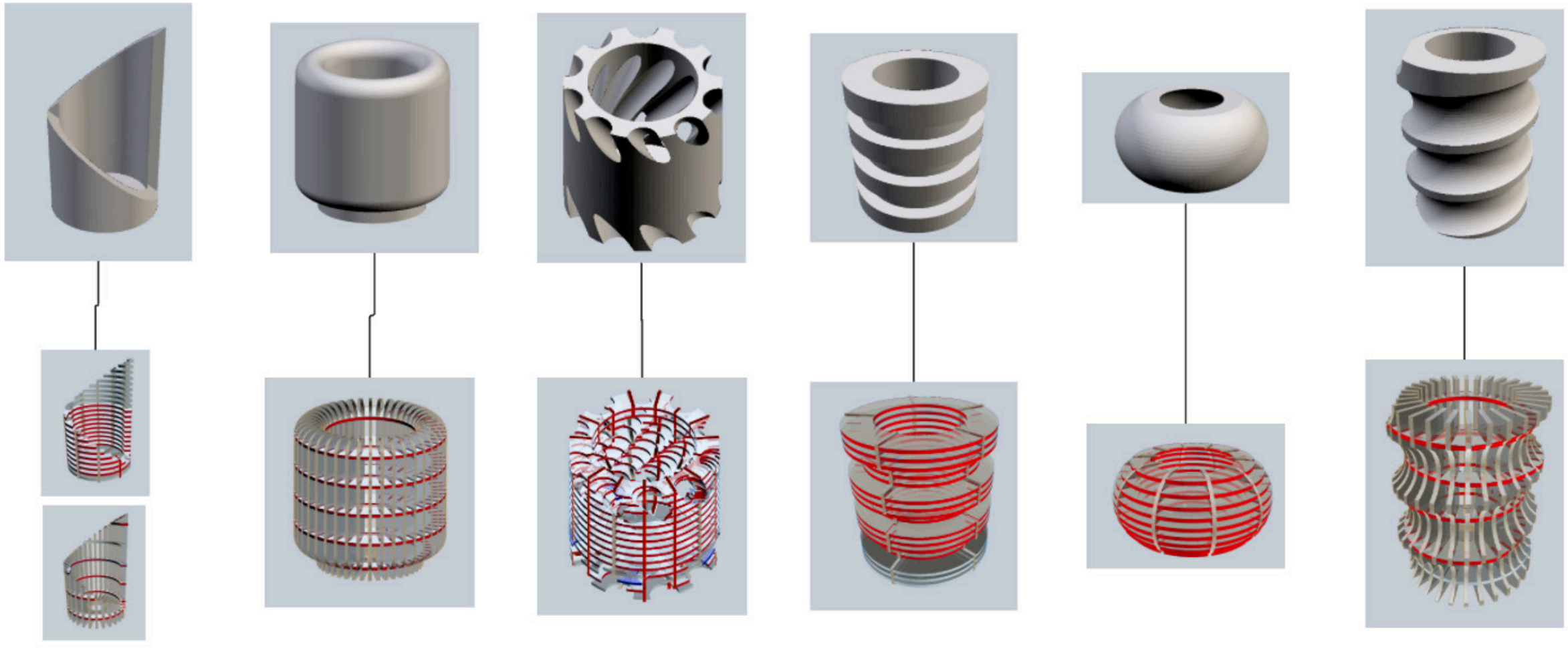
Initial Development 1



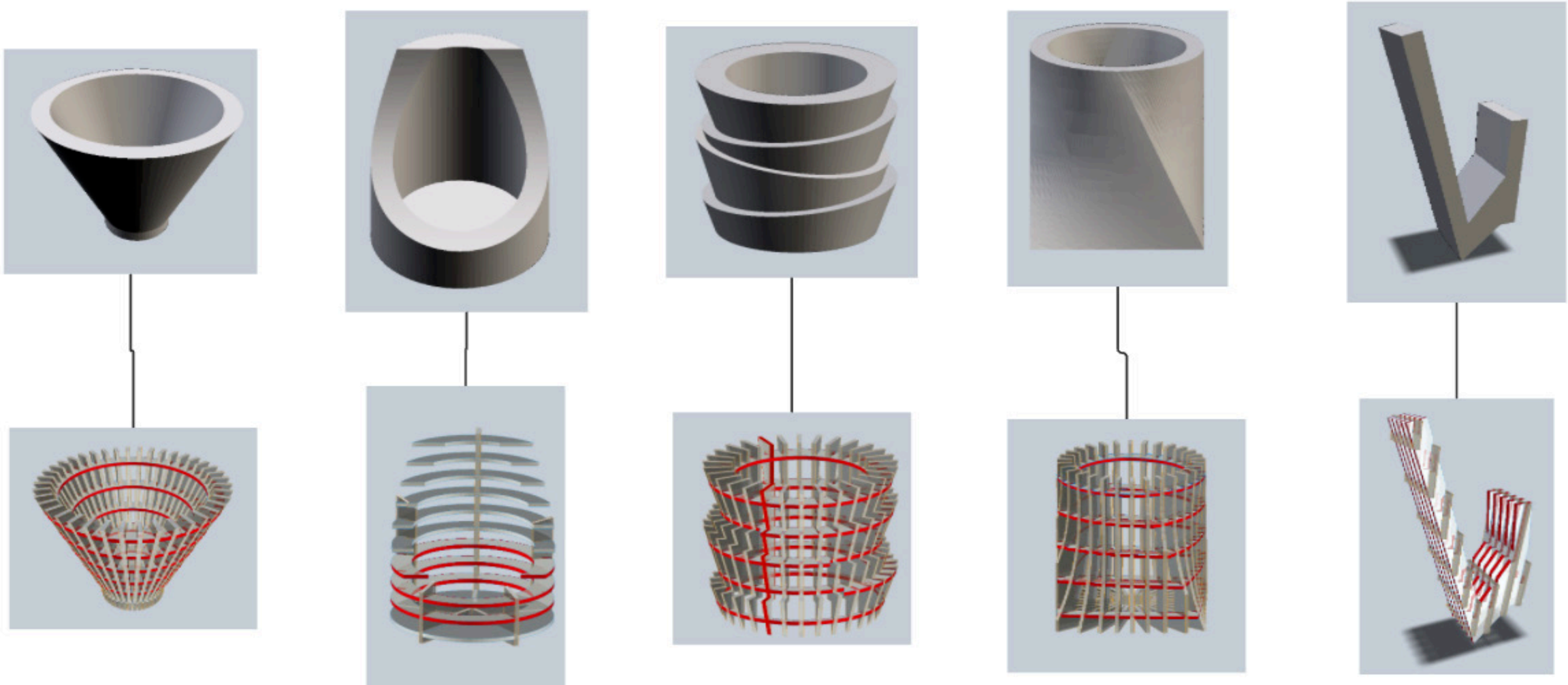
Initial Development 1

Simple Sliced Versions

I turned some of these ideas into simple CAD models to see how they would actually look when sliced.



Initial Development 1



I found that because all of the tea light designs I chose were circular, it made it quite difficult to get certain pieces to fit together during assembly. It also gave the designs a very uniform look, which made me feel that the slicing technique could be used more effectively to enhance the overall visual outcome.

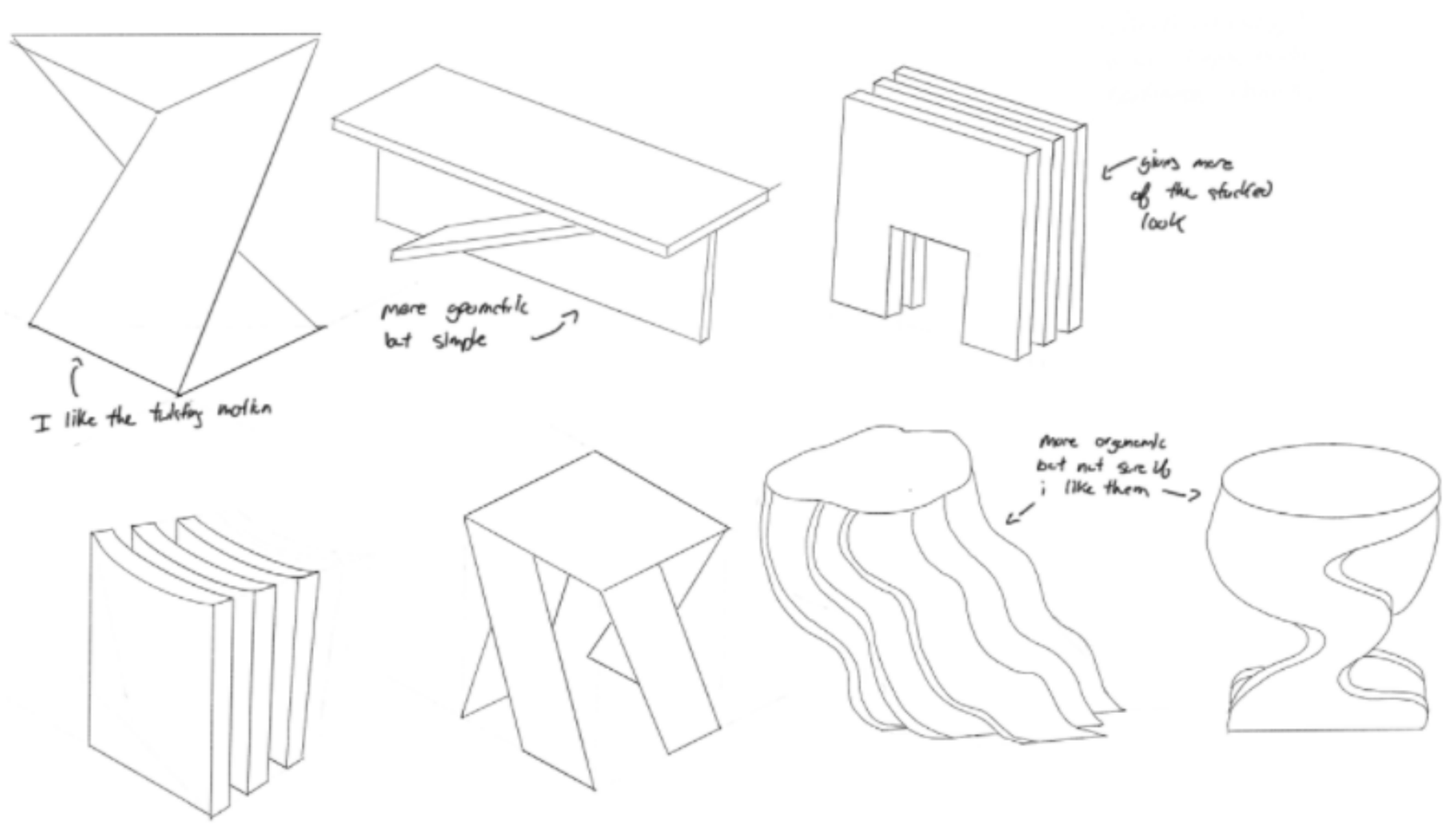
Initial Development 2

Thoughts

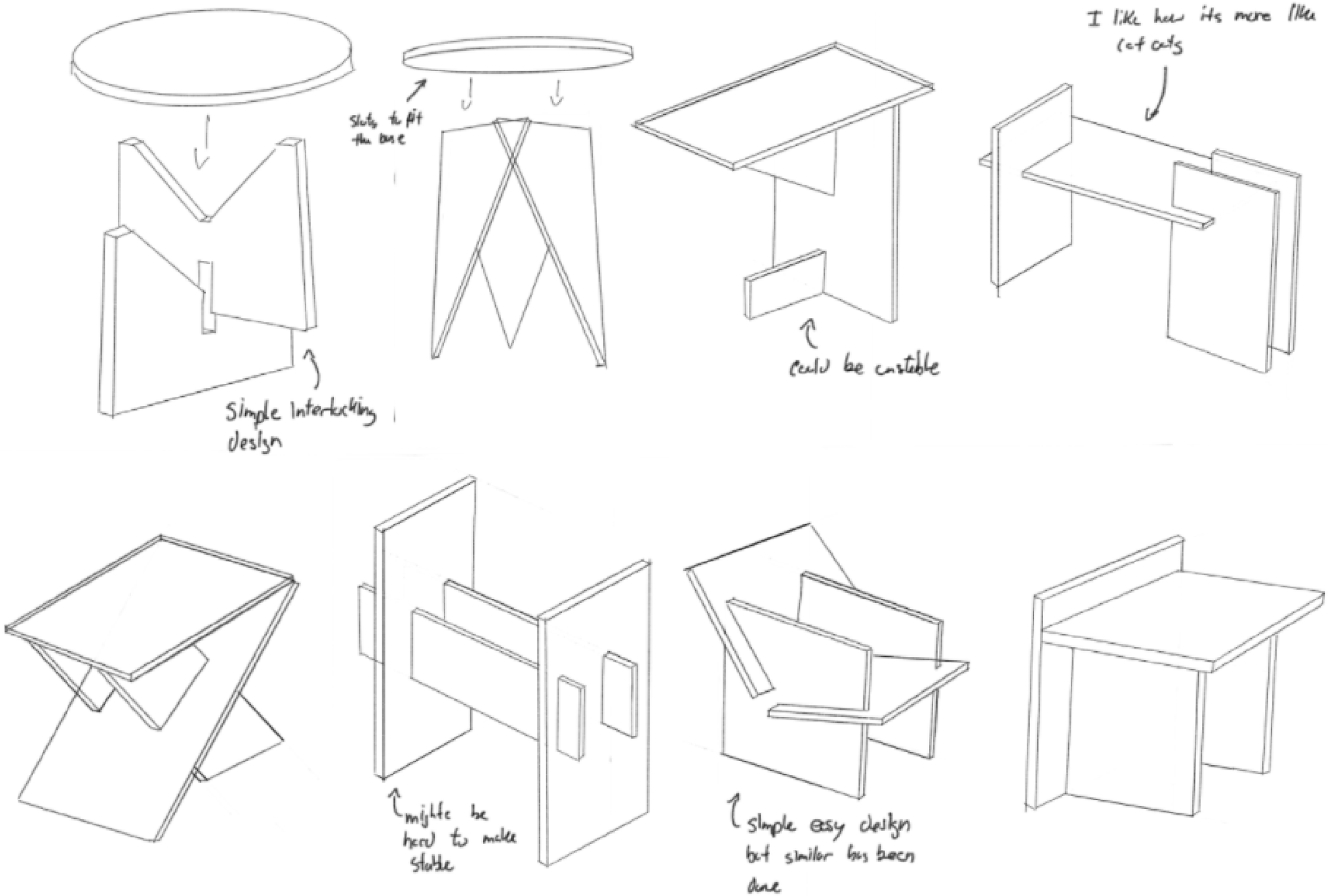
We went to see products from past years of Retail Therapy, and it made me realise how many tea light designs have already been created. This made me start thinking about changing my idea and applying the interlocking technique to a different type of product instead.

Side Table / Stool Initial Ideas

I started thinking about scaling the product up into something larger. I liked the idea of using fewer but larger pieces, so I produced some initial sketches exploring side table and stool concepts.



Initial Development 2



Initial Development 2

Side Table / Stool Cardboard Prototypes

I made some small cardboard models to get a better sense of different interlocking methods, and I found that it was already quite difficult to get them to fit together. This made me consider that if I were working at a larger scale with hand-cut pieces could create some issues.

Initial Development 2

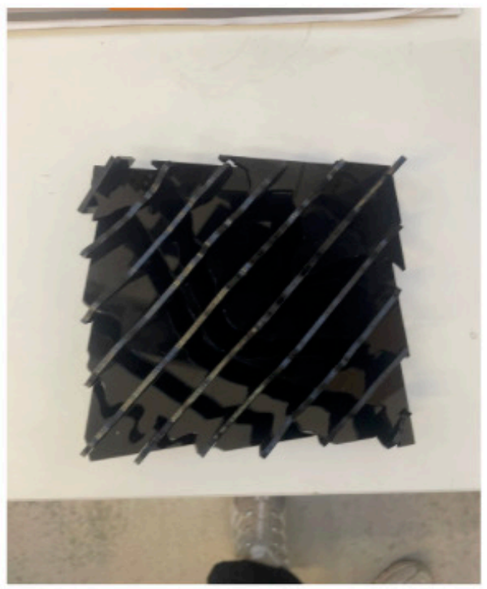
Workshop Interlocking Testing

I went down to the workshop and made some simple shapes with slots cut into them to explore different interlocking orientations. This was mainly about experimenting with how the pieces could work together. After speaking with Jen, a few issues came up around strength and scale, as a stool or side table would need to be strong enough to support someone's weight, which could complicate the making process. However, I liked the idea of combining contrasting materials within the design.

Initial Development 2

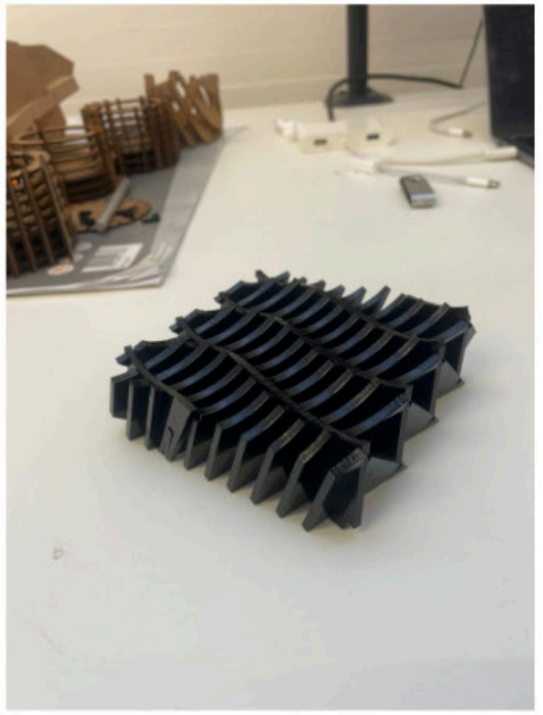
Free Form Laser Cut

I laser cut some additional pieces with more free-form shapes to see how they looked in person and what kind of effect was created when they were sliced at an angle.



Initial Development 2



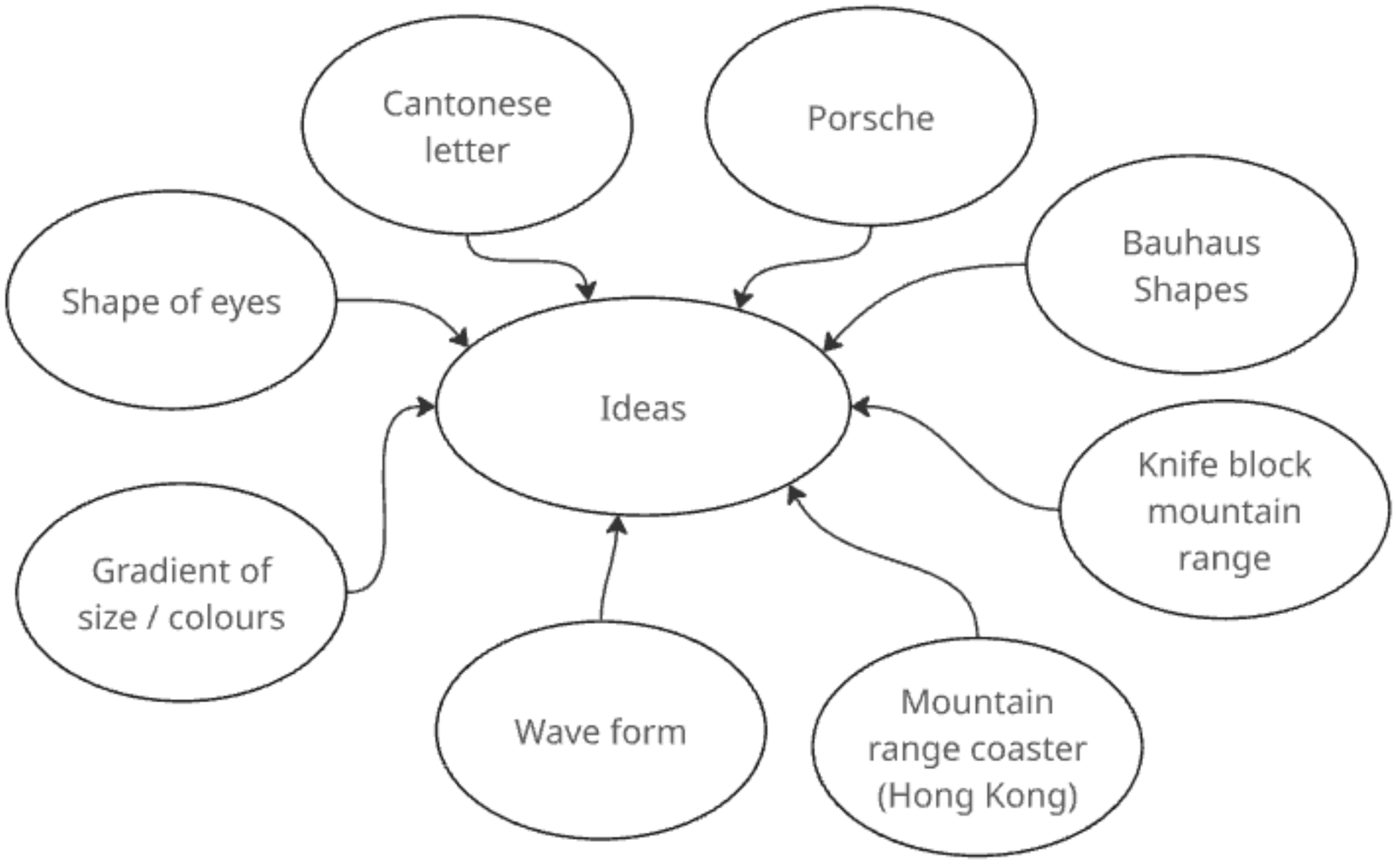



I really liked the wave form, particularly how the multiple slats move across the piece and how it looks from different angles. However, it still felt a bit too uniform. In contrast, the mountain laser-cut form had more interesting curves and angles, as the pieces vary in height.

Initial Development 3

Thoughts

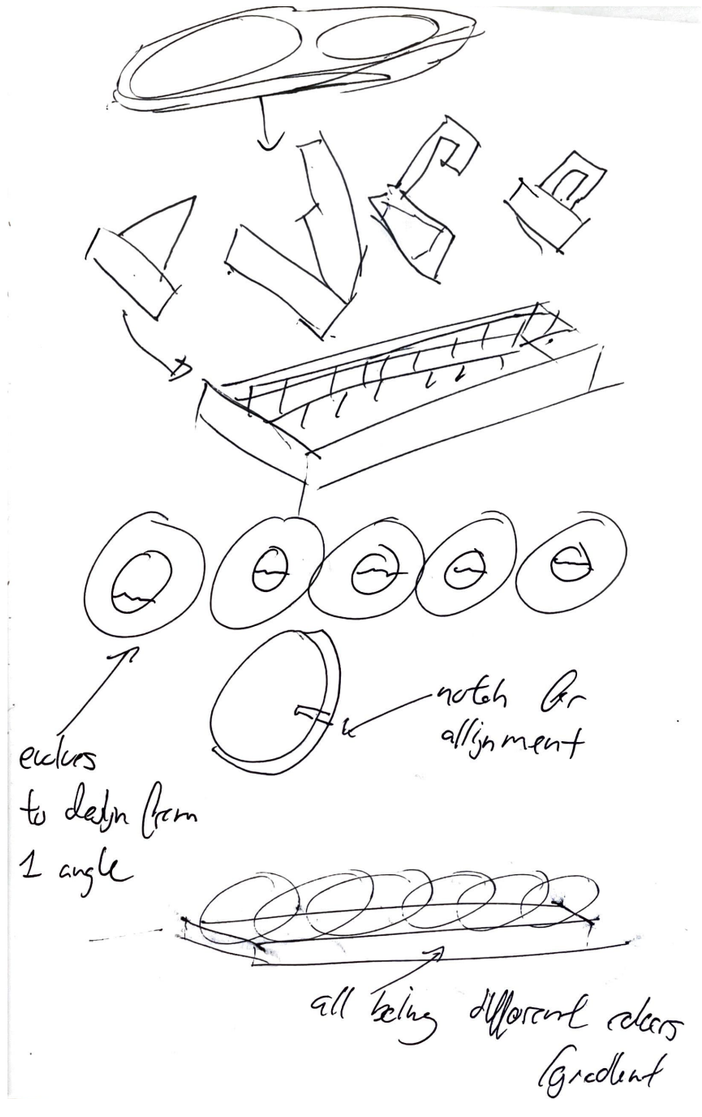
After Interim 1, I definitely felt a bit lost and unsure about what direction I wanted to take while still using the slicing technique. I decided to go back to the drawing board and make a list of my current ideas.

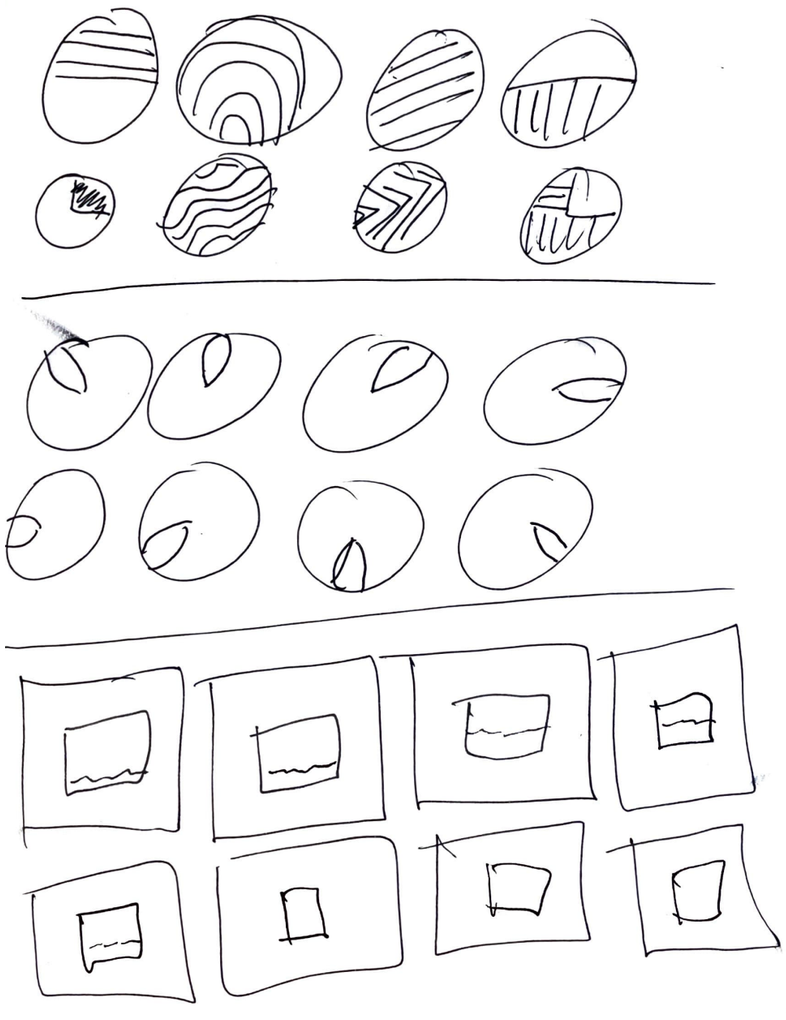


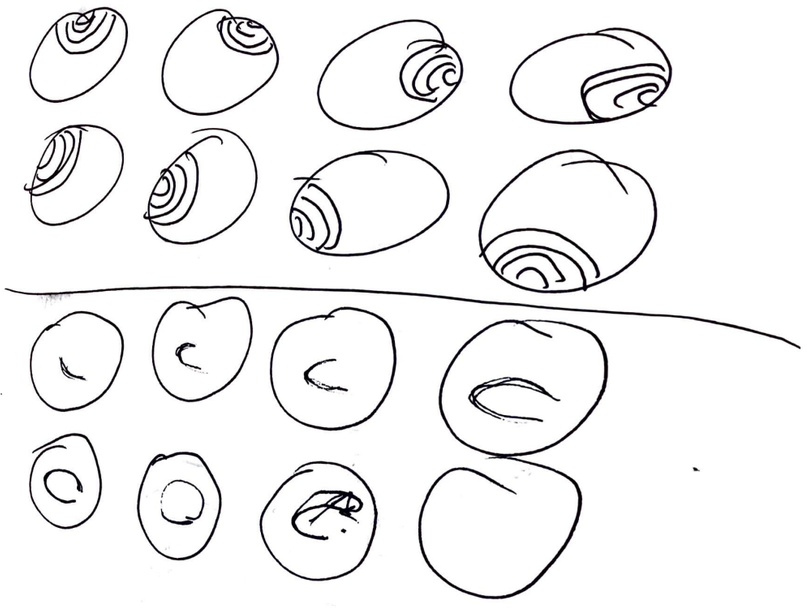
Initial Development 3

Slotting Pieces

I liked the idea of a mountain range and how it creates an interesting profile when viewed from the side. This then led me to think about designing something more playful, almost like a game, where the vertical pieces could be removed from the base and rearranged. I produced some sketches exploring a product where changing the position of the pieces would create a different image when viewed from one end.







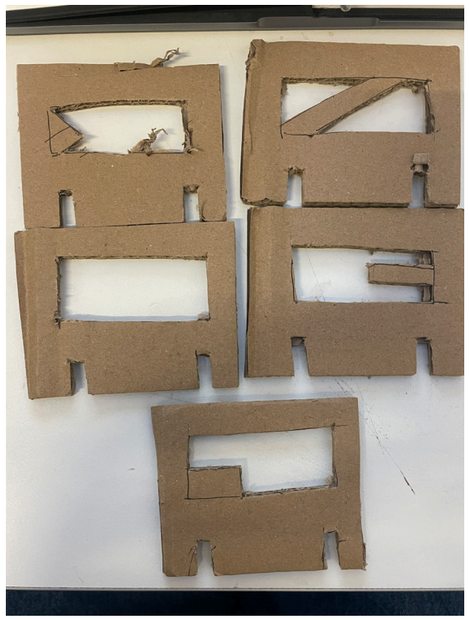
These five sets of drawings explore different ideas for how the acrylic pieces could be arranged to create a final image.

Initial Development 3

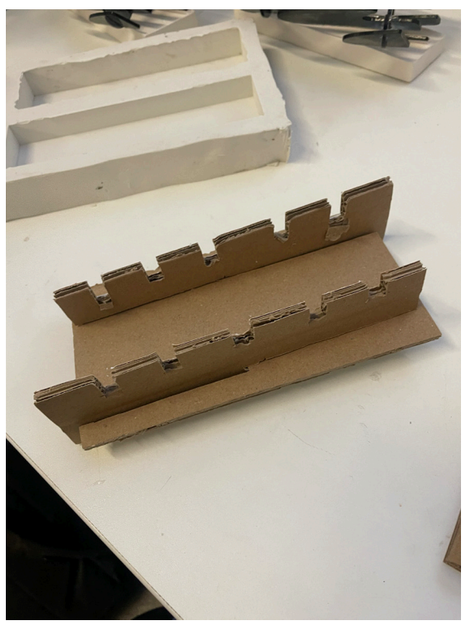
Slotting Pieces Cardboard Prototype

I created simple cardboard models to demonstrate how different pieces could come together to form an image.





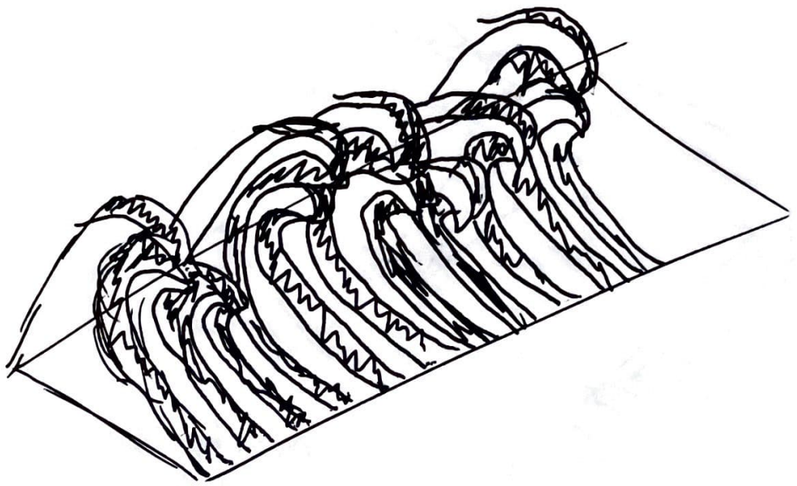




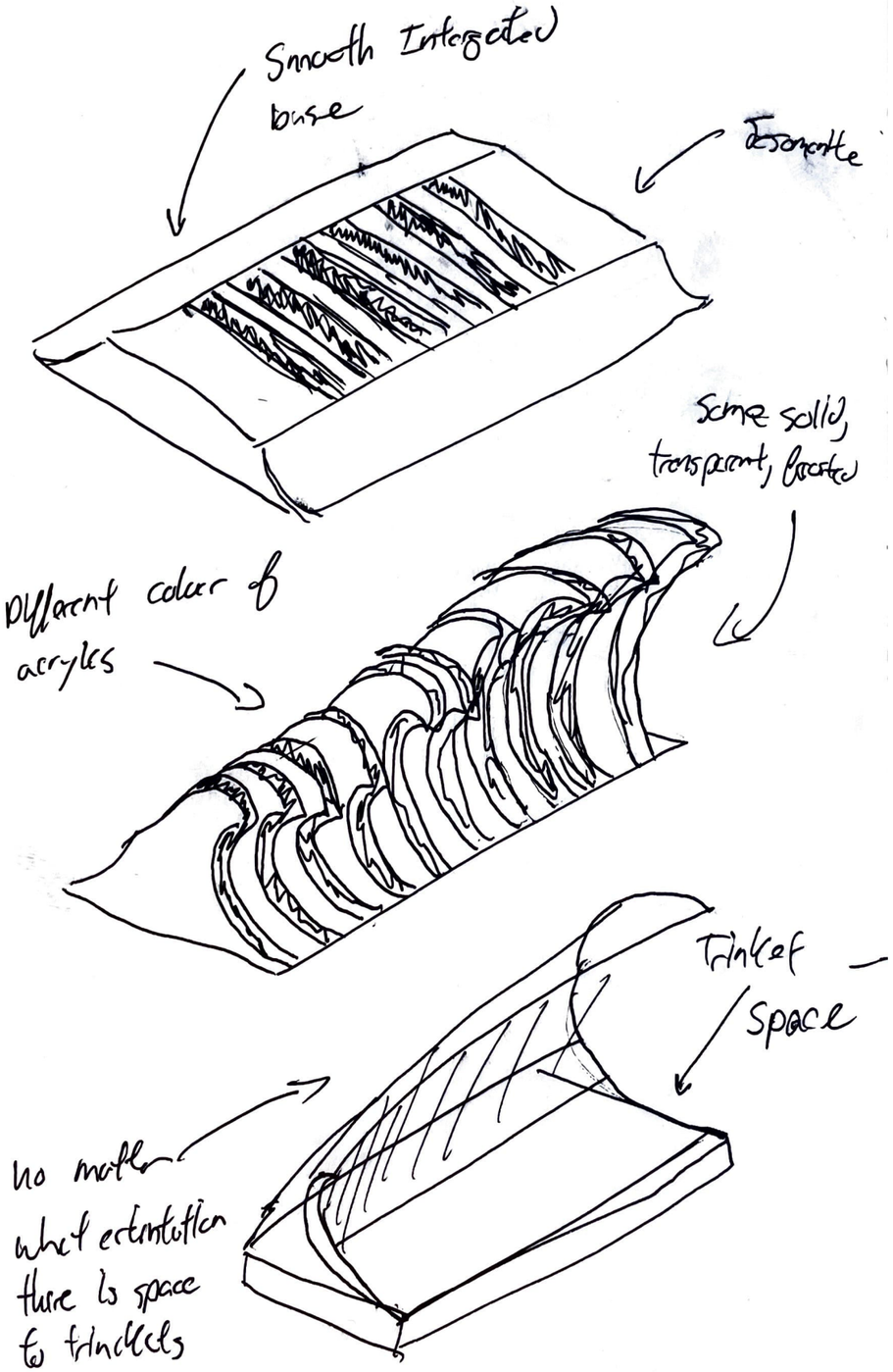

Initial Development 3

Wave Form

I also started looking into the idea of using wave-like pieces with different shapes and colours to create a final form that could still be rearranged.



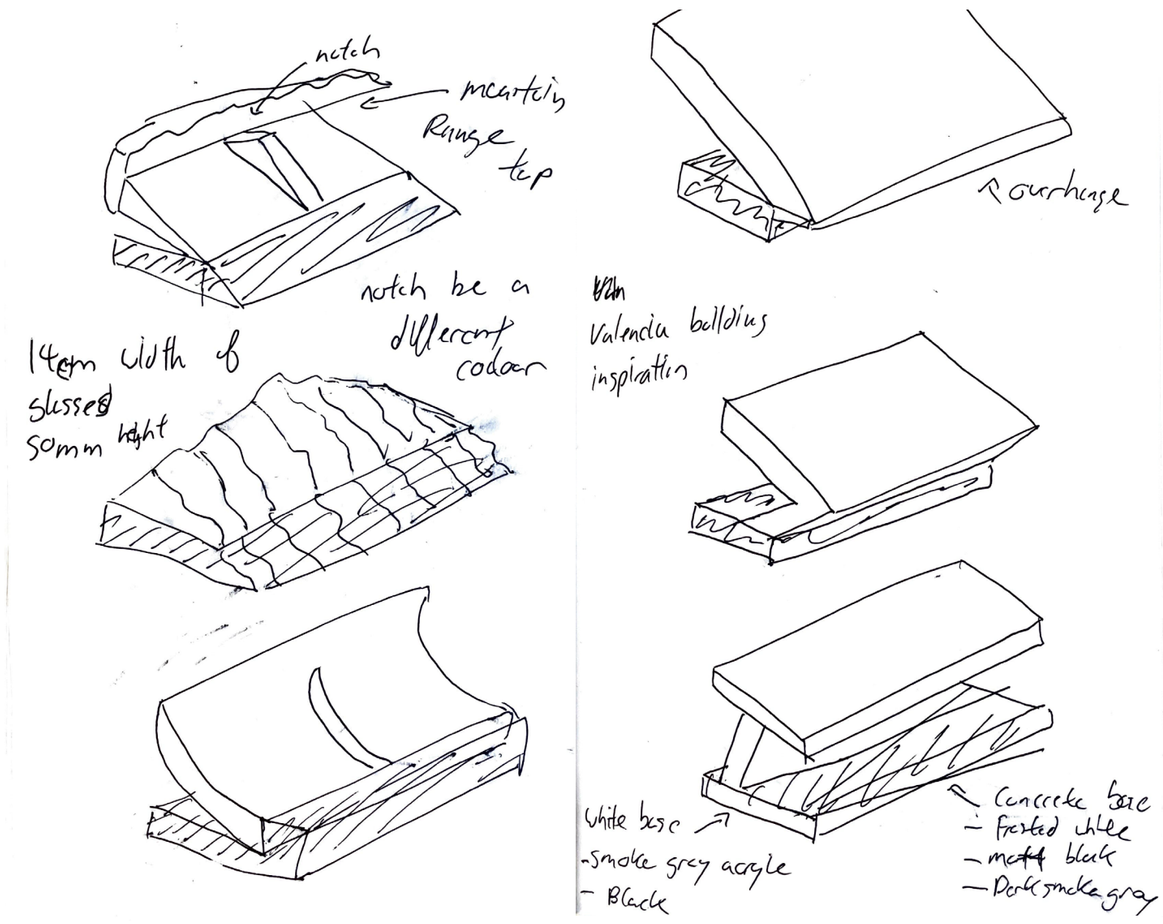
I liked the idea of keeping the wave form but giving it a clear function, such as a trinket tray, which made me rethink the overall purpose of my product. During a discussion with Jen at Interim 1, she mentioned the idea of creating a glasses holder. This sparked my interest, as it's a product I would personally use, since I wear glasses.



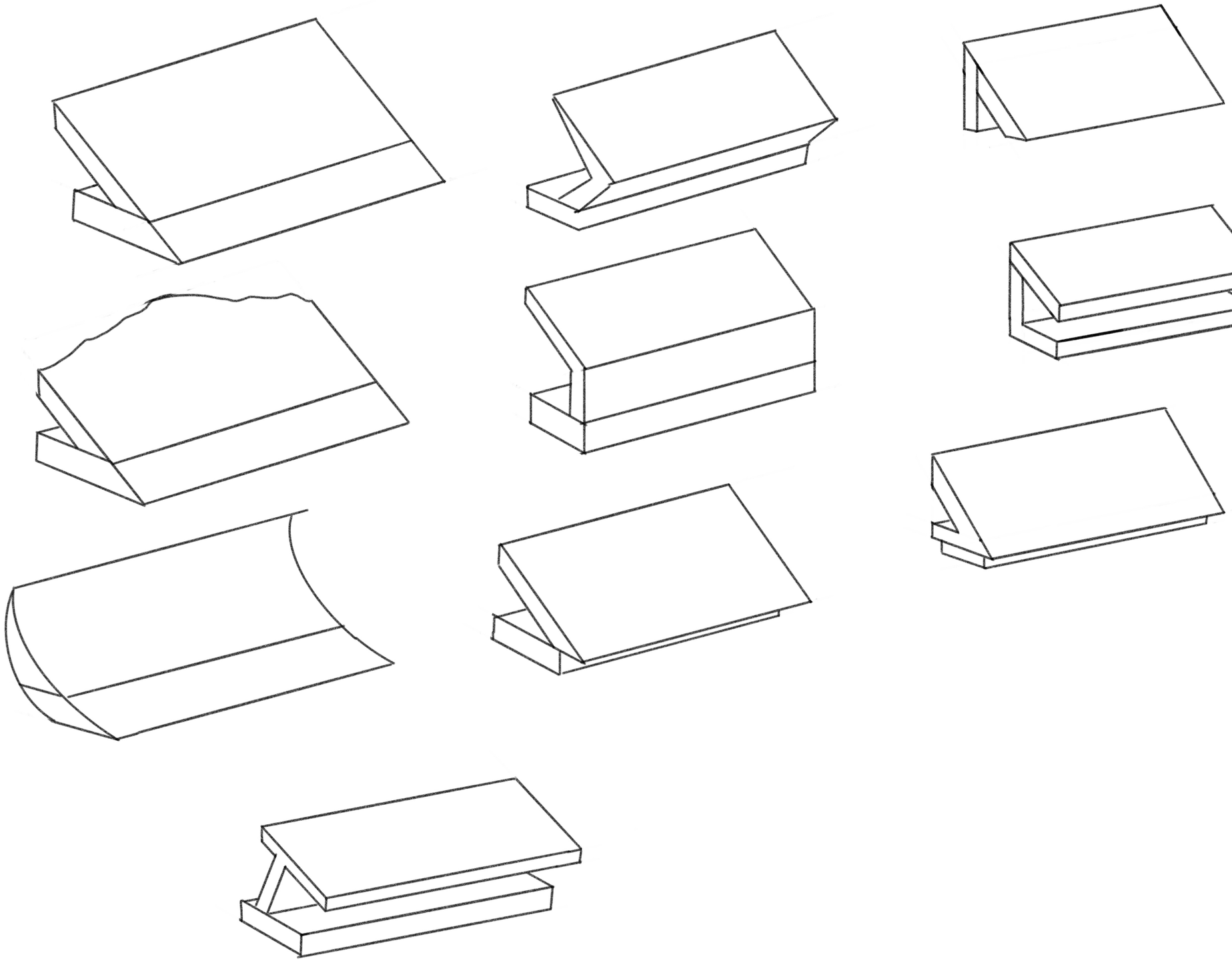
Initial Development 4

Glasses Holder

I started producing sketches exploring different glasses holder ideas.



Initial Development 4



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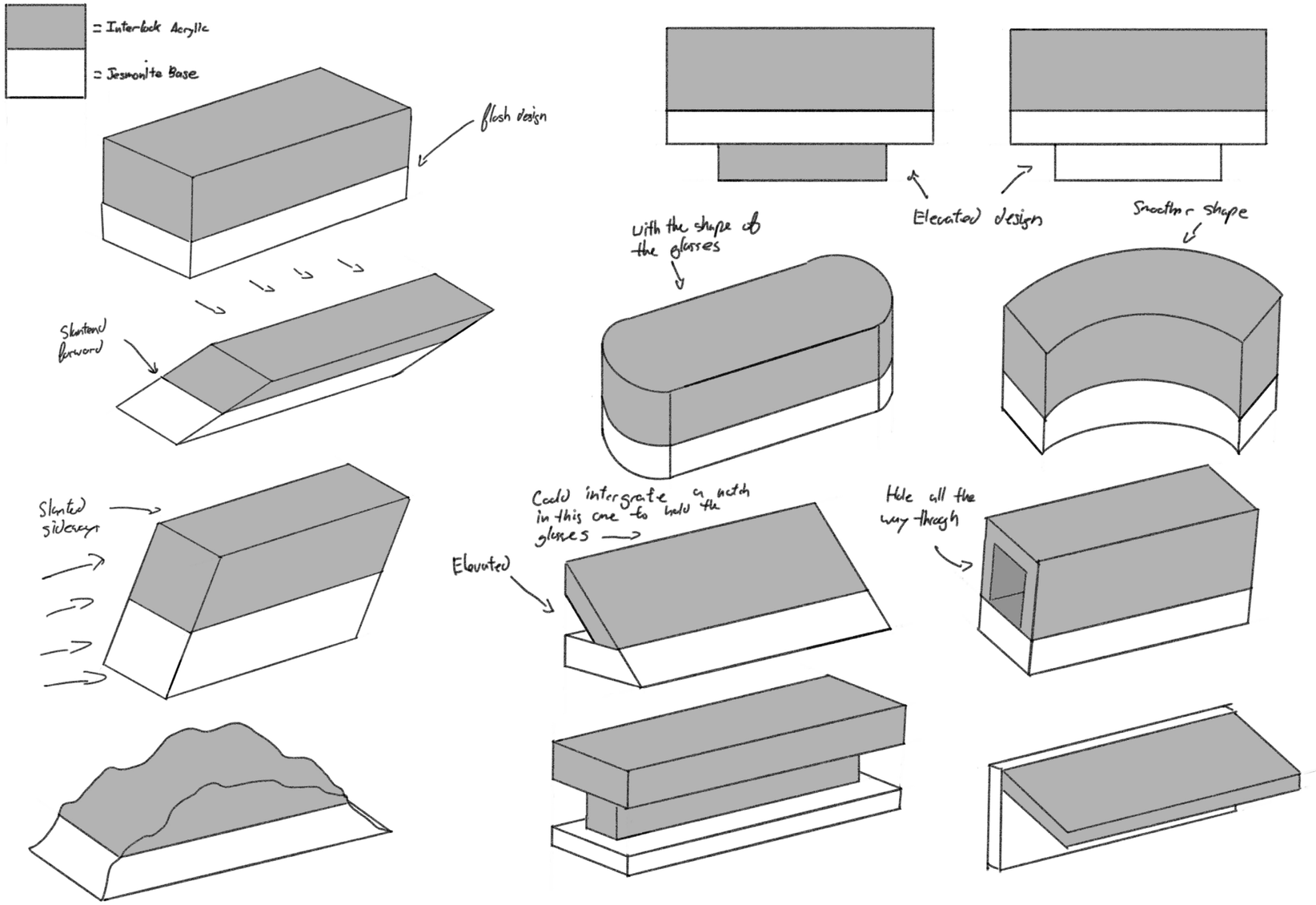


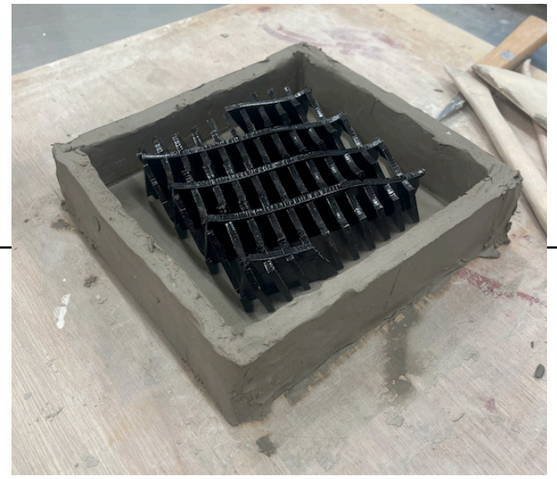
Thoughts

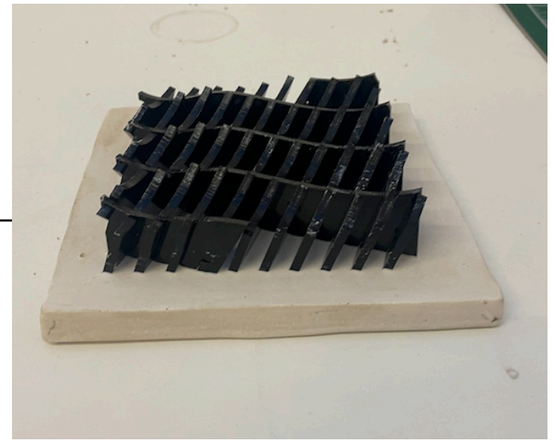
At this point, I had a realisation that I was struggling with how open-ended the project was and not knowing when to stop exploring. It felt like there were no clear limits, but this became an important learning point, as I realised I needed to make decisions and commit to them. I also recognised that I had been seeking too many opinions from others, which, while helpful to an extent, often led to conflicting feedback. This confusion likely contributed to why I found it difficult to settle on an idea early on. Moving forward, I tried to keep this in mind and trust my instincts more throughout the rest of the project.

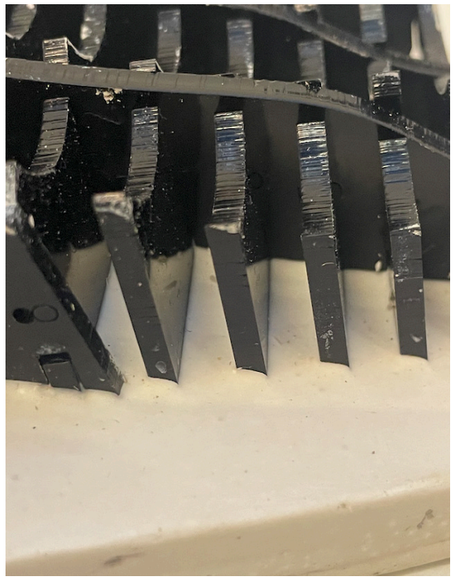
Prototyping 1

Base Research

While speaking with Hugh, he mentioned the idea of setting the acrylic pieces into a base. Using one of my earlier test pieces, I created a simple clay mould and poured Jesmonite into it. While it was setting, I placed the older test model into the Jesmonite to see how it would work.







I found that I needed to be careful when setting the acrylic into the Jesmonite, as it could easily leave marks. These could be scraped off, but not always easily.

The acrylic also came through the bottom of the Jesmonite, so I realised I needed something to cover where it breaks through.

Using clay moulds also made it harder to achieve a clean, flat edge, and I found that the clay could easily leave marks on the white Jesmonite.

Prototyping 1

Holder Research

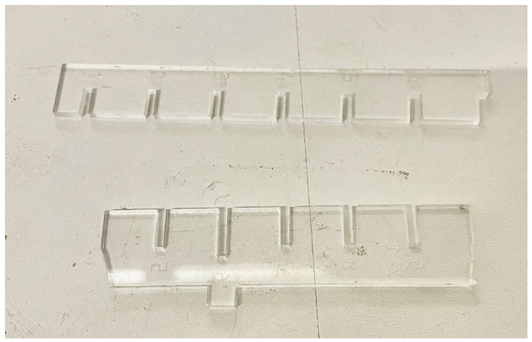
I had two ideas for how the glasses could be held on the holder: either using a notch or a full ledge. I created some simple foam models and asked people around GSA who wear glasses which option they preferred.

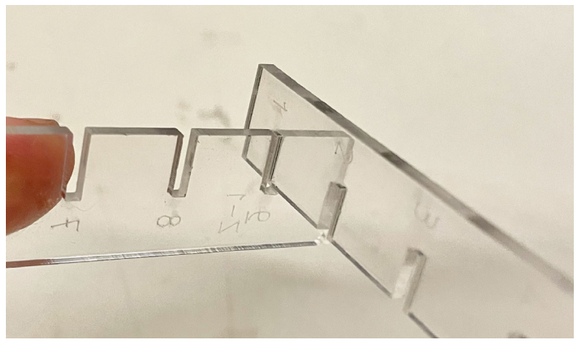
I found that people preferred the ledge, as it made placing the glasses much easier, with the frame simply resting on the surface. The notch only provided a single contact point to support the whole pair, which made it less practical. The ledge also allowed the glasses to be placed more casually, rather than needing to be positioned carefully. I also found that the notch only worked well with certain glasses, due to variations in size, shape, and design.

Prototyping 1

Holder Research

I chose one of the designs to laser cut and used 2 mm thick acrylic, which I found broke quite easily. Because of this, I decided to use 3 mm acrylic going forward. I also made the tolerance too tight, with a slot offset of 0.254 mm, which meant I wasn't able to fit the pieces together.





Glue Research

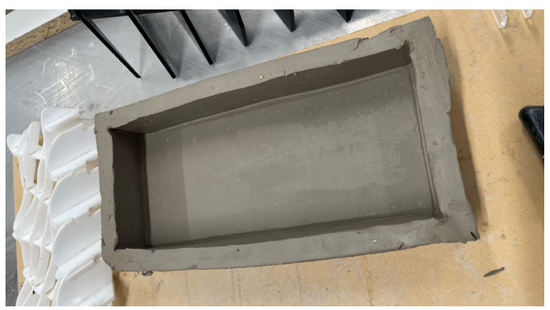
Due to the issues with figuring out the tolerance, I needed to use glue to hold the pieces securely together. I found that UHU glue was strong but took a long time to set and required a good contact area to work effectively. In comparison, super glue needed much less contact area, was strong, and dried quickly.

After the failed attempt, I decided to produce three different designs, each exploring different aspects of the product. I wanted to test variations in tolerances, materials, angles, overall form, and holder design.

Model 2
- Notch Design
- Slot Offset: 0
- Clear Acrylic
- Straight Verticel Slice

Model 3
- Ledge Design
- Slot Offset: 0.1
- Black Acrylic
- Slanted Angled Slice

Model 4
- Nose Ridge Design
- Slot Offset: 0.2
- White Acrylic
- Organic Slice



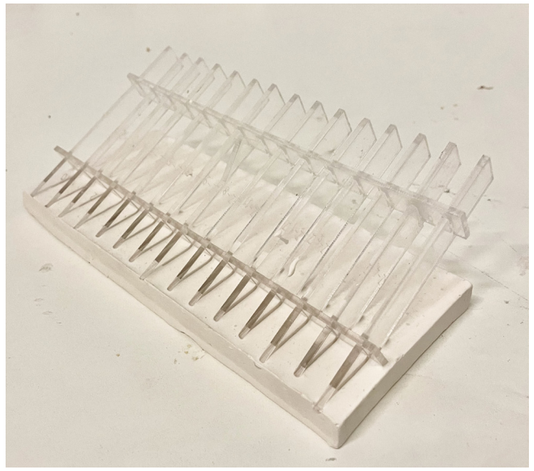
Prototyping 1

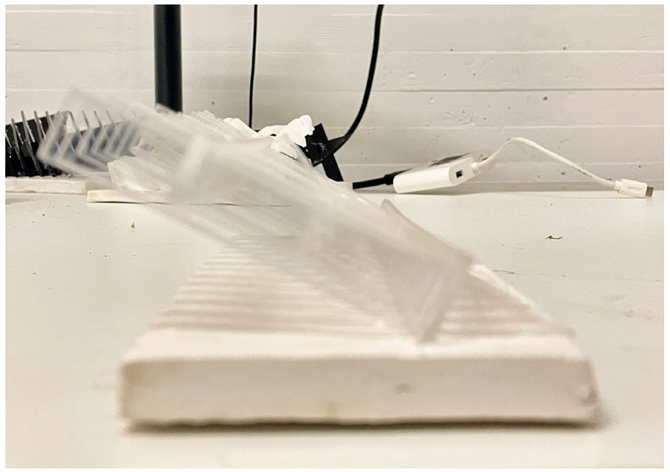
Holder Research

Model 2

Advantages
- Transparent material
- Having more pieces makes the structure more secure

Disadvantages
- Notch doesn't work well to hold the glasses
- Tolorence is too tight
- Thin areas break easily

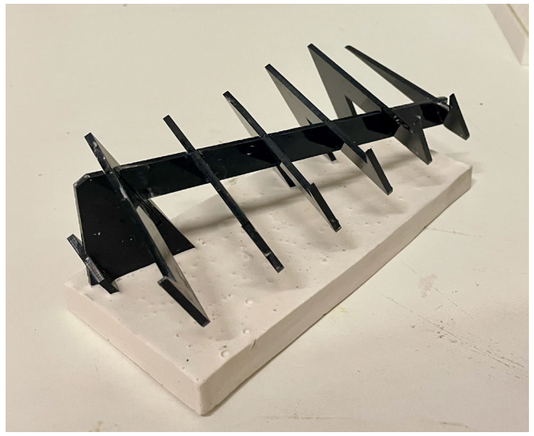


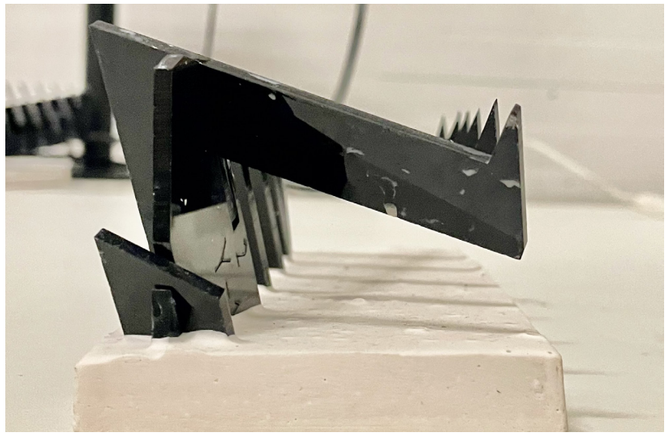


Model 3

Advantages
- Good tolerance, though it could be slightly tighter
- Overhang design
- Ledge works better for holding the glasses
- 3mm acrylic is a lot stronger so it's less likely to break
- I think the black looks effective

Disadvantages
- Ledge needs to be larger
- Needs more pieces improve strength
- The glasses area needs to be bigger
- Base is too thin which makes it less heavy and more brittle
- 2 ways of holding the glasses?

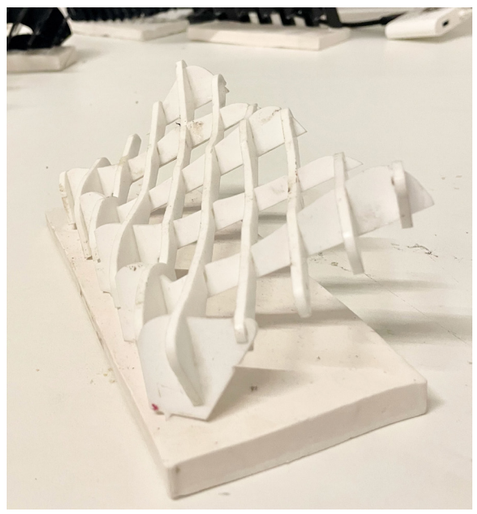


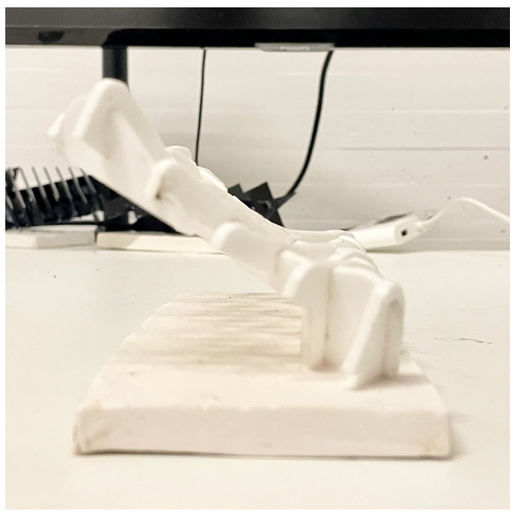


Model 4

Advantages
- The organic shape makes the design more visually interesting

Disadvantages
- Nose ridge design does not work well when the glasses are closed
- Surface is too smooth, causing the glasses to slide off
- Pieces are too thin in places and break





Prototyping 2

Thoughts

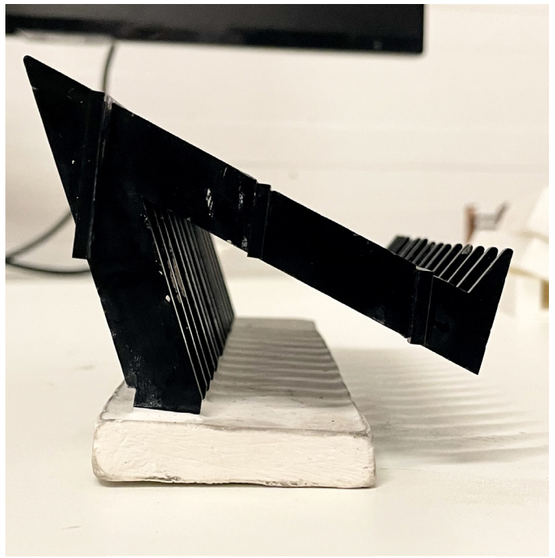
I feel like I am moving more towards a final product direction. I think the transparent acrylic works well with the idea of holding glasses, as it makes the holder more visually interesting when viewed from different angles. I also really liked how the black acrylic looked with the white Jesmonite base, as it created a strong contrast between the two materials. Because of this, I have decided to go with a dark grey transparent acrylic. After doing some research, I found that it is quite expensive, so I plan to buy it later in the project once the final design is confirmed.

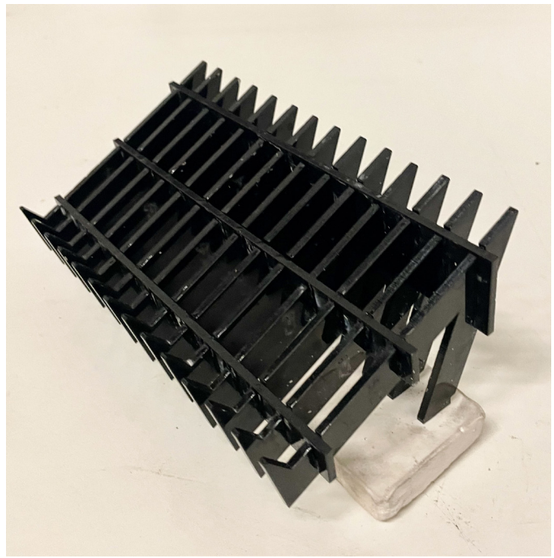
I think I need to find a good balance in the number of pieces used. Model 3 had the fewest pieces, which made it weaker and less able to support the glasses, but it also had a very interesting visual quality. I also found that using a ledge works much better than a notch. Even though I tested this with foam models, I still wanted to see how the notch would perform in a physical prototype. I am planning to stick with the overhanging form of Model 3, as I think it gives the glasses a nice elevated effect. Moving forward, I need to carry out more testing to refine the tolerances, as they are currently either too tight or too loose.

Holder Development

Model 4

I redesigned Model 3 by making some areas thicker, increasing the height of the ledge, enlarging the holder face from 55 mm to 90 mm, slightly tightening the slot offset, and thickening the base. I also wanted to see how straight slicing would look using the same overall shape. In addition, I tested a smaller base, which I prefer over a wider one, as it emphasises the overhang more.



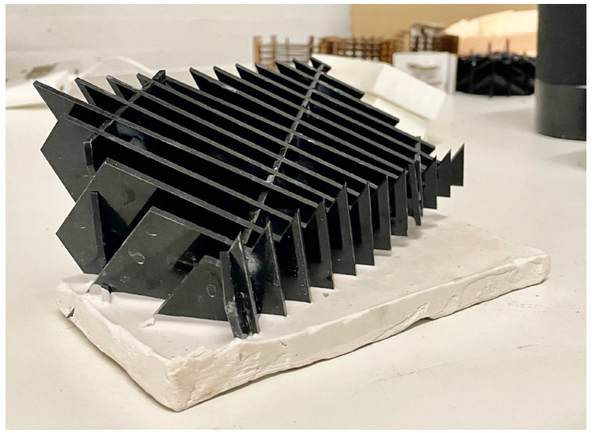


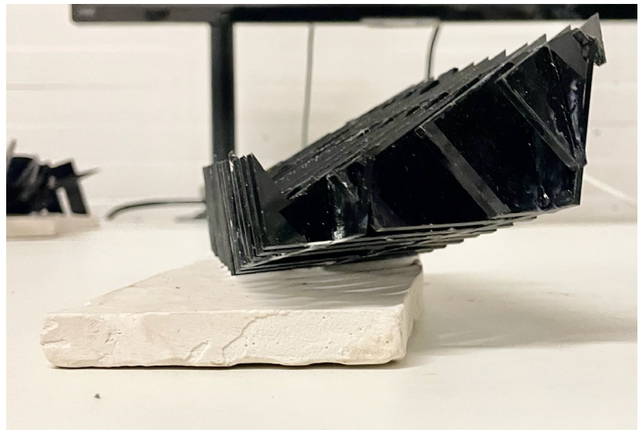
Prototyping 2

Holder Development

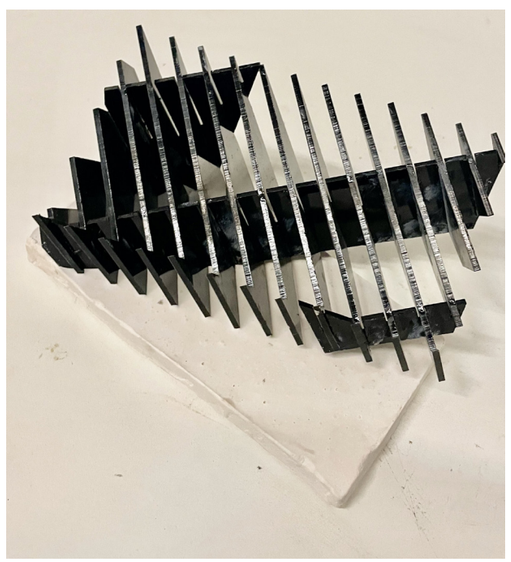
Model 5

After experimenting with Model 4 before casting it into the base, I held it at an offset angle and felt it created an interesting visual effect, which led me to develop a new design. I kept a similar overall shape but removed the overhang for this test model to ensure it was strong enough.





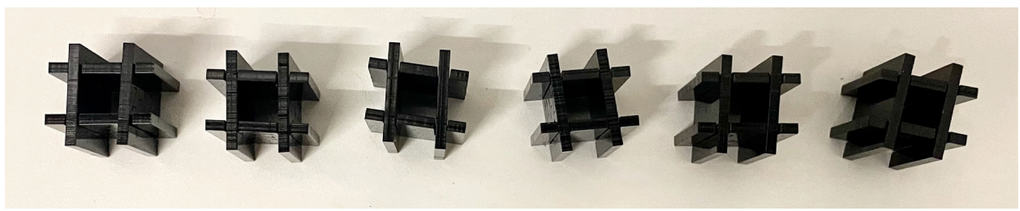
I didn’t really like how it turned out, as it felt visually off. The corners were also too sharp, so it needs more of a fillet. I added some white pigment, which made a slight difference, as Jesmonite has a natural off-white tone, but I will need to add more next time.

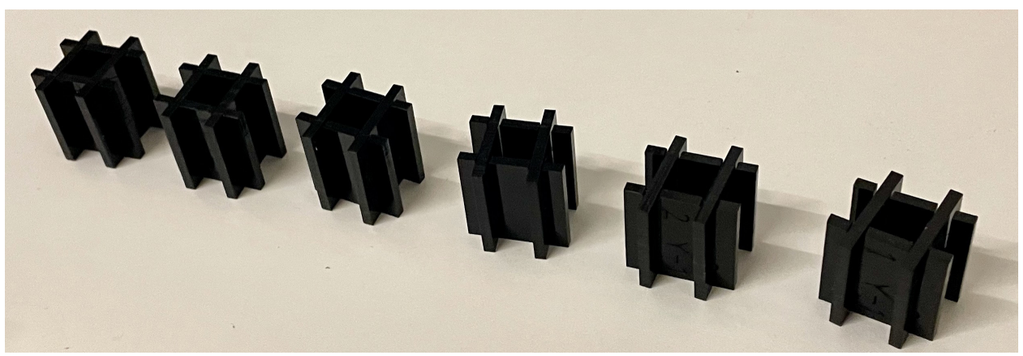


Tolerence Test

I needed to work out the best slot offset for 3 mm acrylic to achieve a good fit between the pieces. To test this, I laser cut six samples with different slot offsets: 0, 0.05, 0.1, 0.15, 0.2, and 0.25.

I found that at every tolerance, the pieces were still loose, which was unexpected, as in previous cuts some offsets lower than 0.25 had been too tight. This confused me for a while, but after speaking with Annie, she explained that sheet acrylic is rarely exactly 3 mm thick and can vary by up to 0.35 mm. After learning this, I realised that for my final cut I would need to carry out test cuts using the specific sheet of acrylic to find the correct tolerance.

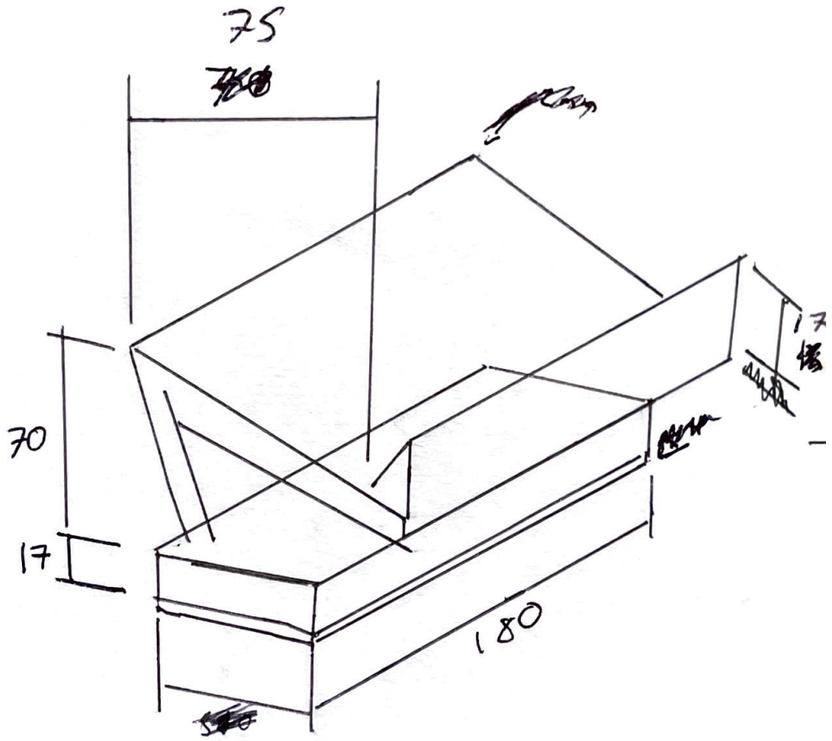




Prototyping 2

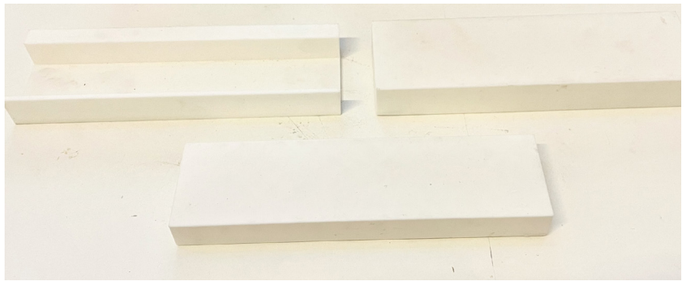
Sizing

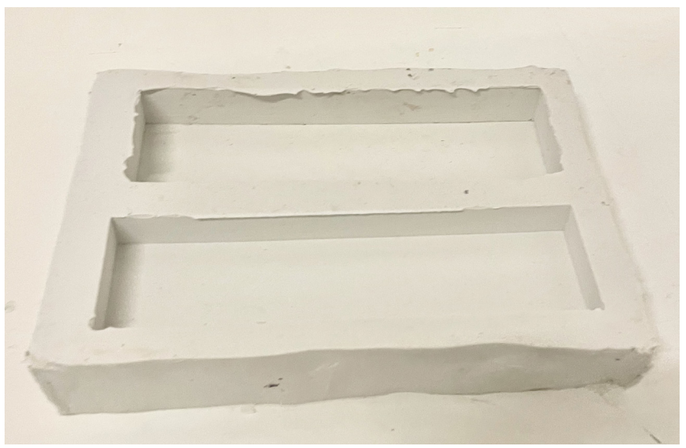
After comparing all five models, I decided on the overall dimensions for the final design. I chose a width of 180 mm after comparing around ten different pairs of glasses, with the widest measuring 155 mm, allowing some extra leeway. The total height is around 85 mm, as I didn't want the product to feel too large. The holder area has a width of 75 mm, as the largest pair of glasses measured 60 mm, again allowing for tolerance. The ledge height was set at 17 mm to ensure the glasses are securely supported, as heights of 15 mm or less were not able to hold all glasses.



Base Development

I decided to go with a base that was narrower than the holder but slightly thicker. To explore this, I 3D printed two base sizes: one at 180 × 55 × 17 mm and another at 180 × 65 × 22 mm. At this stage, I wasn't sure which size I wanted to use, but I wanted to keep the option of either. I also 3D printed a base with a cut-out showing where the holder would sit, so I could visualise how it would look before casting it.





Prototyping 3

Holder Development

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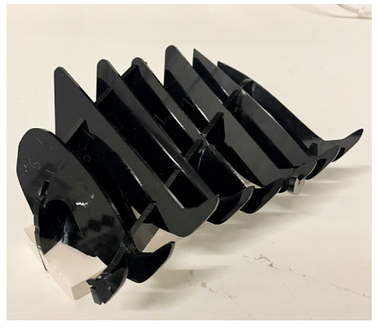
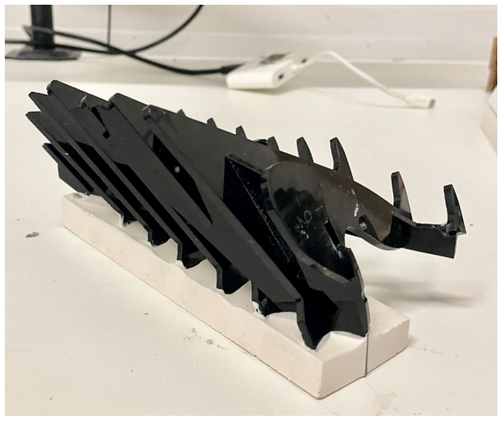
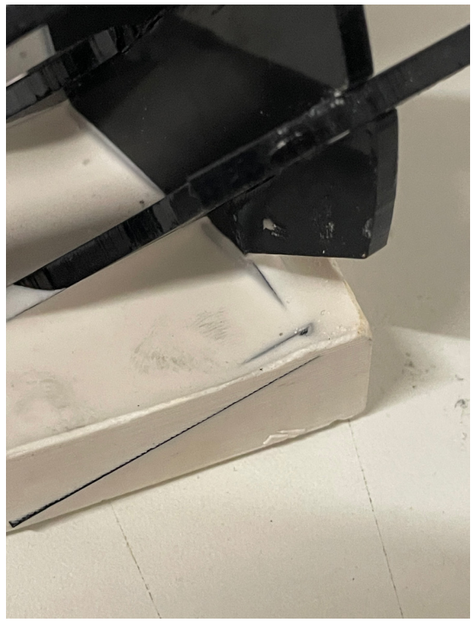
Model 6
For this version, I went back to the original overhanging design but refined it with more curves and smoother corners. However, having the holder the same width as the base meant that the acrylic was visible through the Jesmonite at the sides. Because of this, for the next model I reduced the width by 5 mm on each side. I also realised that the super glue used to hold some of the pieces together was leaving marks on the acrylic, which became an issue. After looking into this, I found that acrylic solvent is a better solution, as it is less likely to leave visible marks. I also noticed a small lip around the edge of the base. To fix this, I carefully sanded it down using sandpaper, which worked effectively.

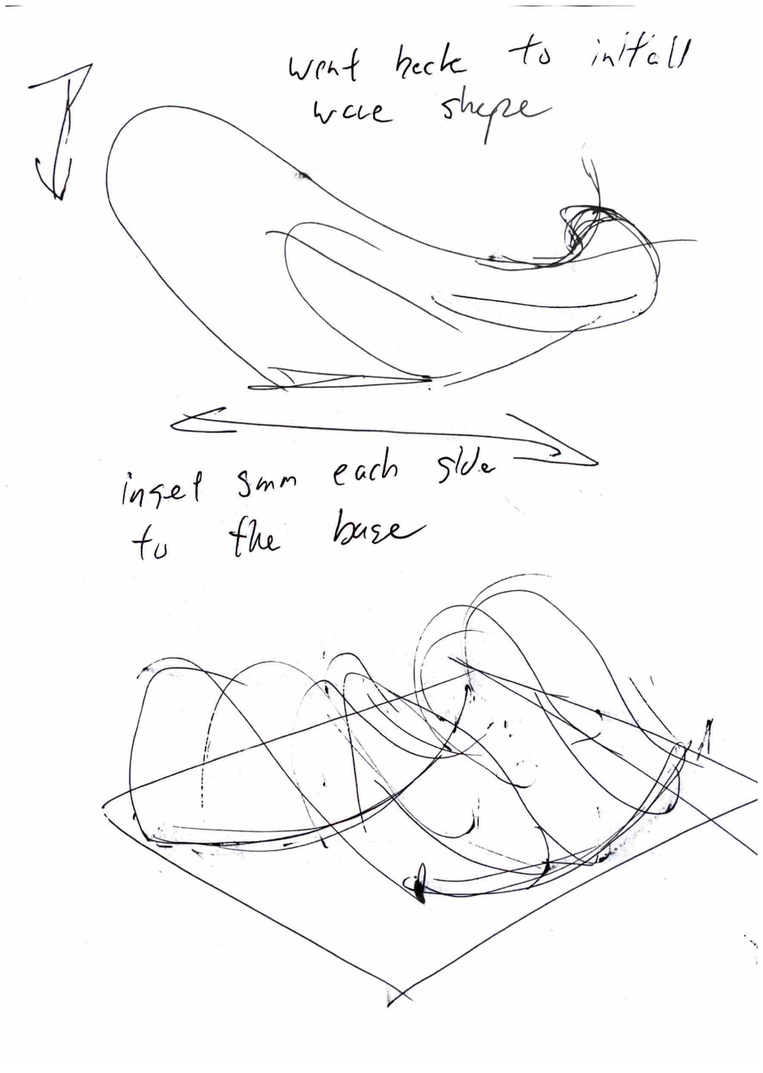





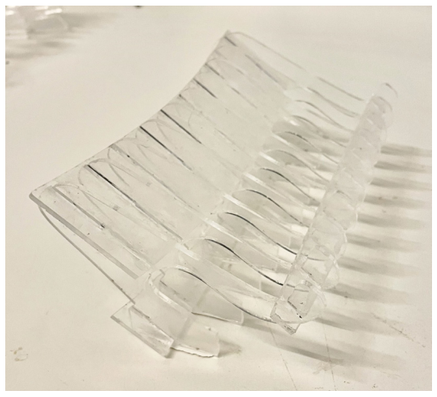
Prototyping 3

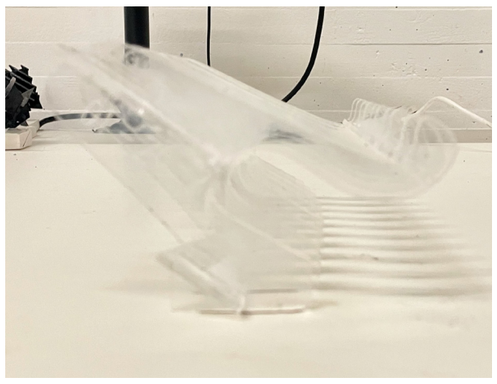
Holder Development

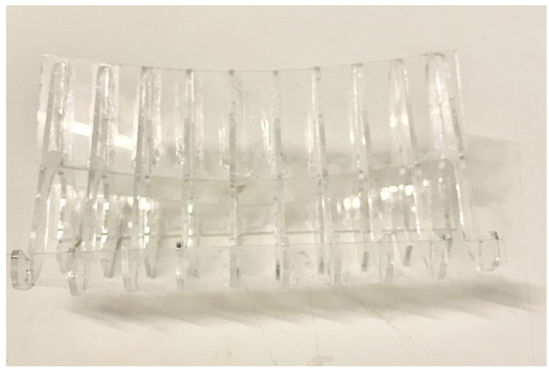
Model 7

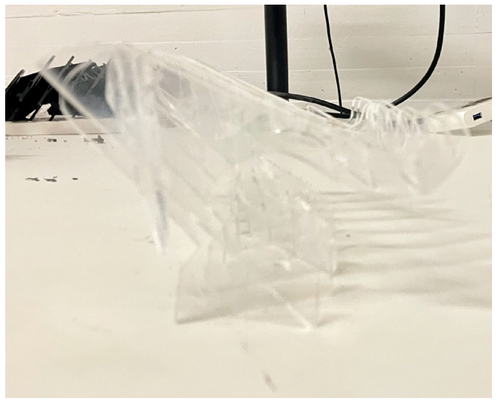
For the next version, I developed the overall form into a smoother, continuous curve, returning to the idea of a wave-like shape and increasing the fillet sizes around the edges. There were some weak areas in the previous model, particularly around the overhanging section, so I made this area thicker. I also introduced a curve along the back that matches the radius of the front, helping to create a more fluid, wave-like form. I decided to test two different slicing approaches to see which one I preferred.

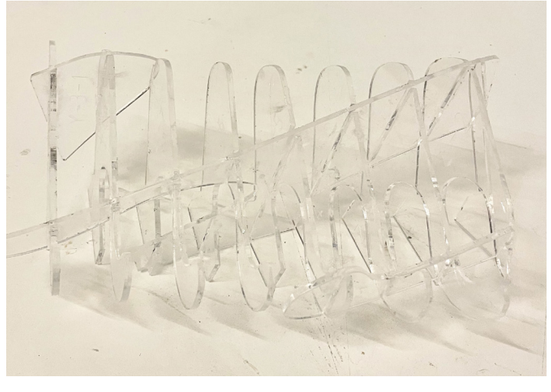












Refinment

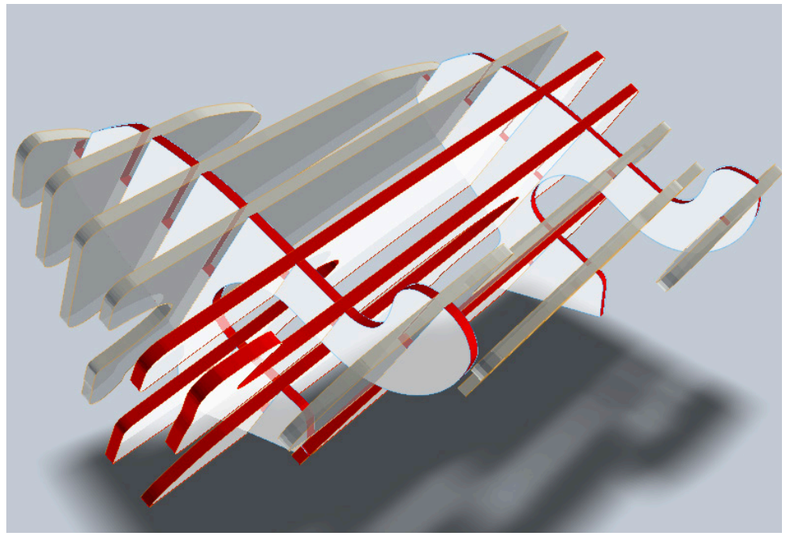
Thoughts

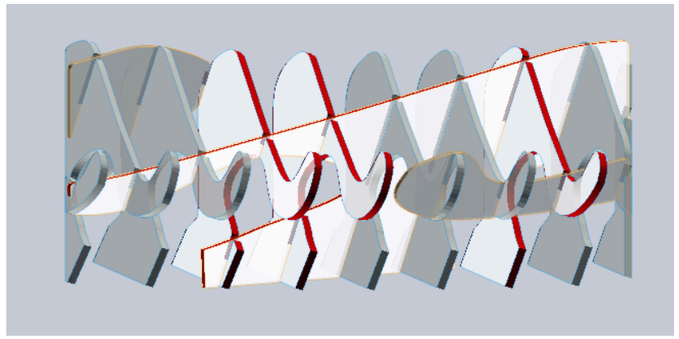
At this stage, I am focusing on resolving some of the smaller details. I really like the shape of Model 7, as it feels softer and smoother, with curves that work well together. I also think the slanted slicing looks much better than the vertical slicing used in the other model. It has been challenging recently due to limited access to laser cutting sessions, but other staff have been able to help where possible. Moving forward, I need to be more considered and make sure my laser-cutting files are set up correctly before

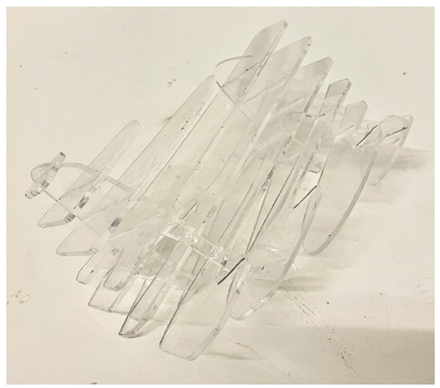
Holder Refinment

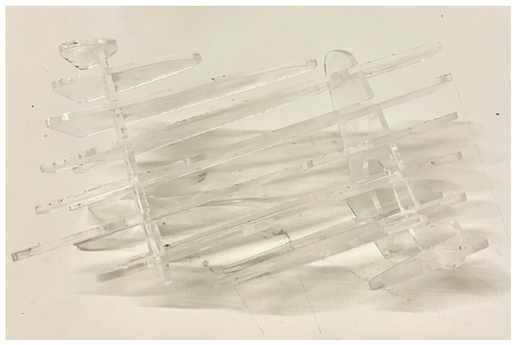
Model 8

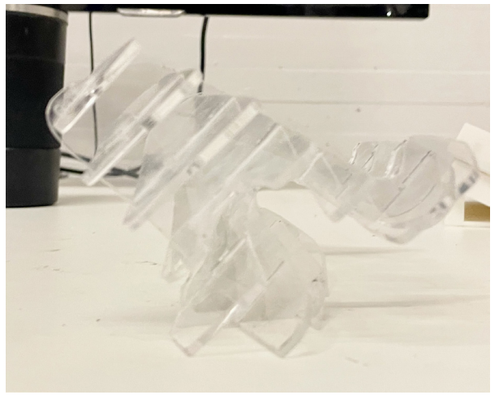
While experimenting with the slicing orientation, I swapped the number of pieces so that there were two in the y direction and nine in the x direction, instead of the other way around. I found that this created a much more interesting form visually. As I continued to view it from different angles, this version stood out to me, and I decided it would become my final shape. A friend, Findlay, also mentioned that it would be effective if the holder could be seen through from the front, as this could act as a visual indicator to help align the glasses straight when placing them on the holder. In response, I made a slight adjustment to the angle of the x-axis pieces so that when the holder is viewed straight on while sitting at a desk, it can be seen through.







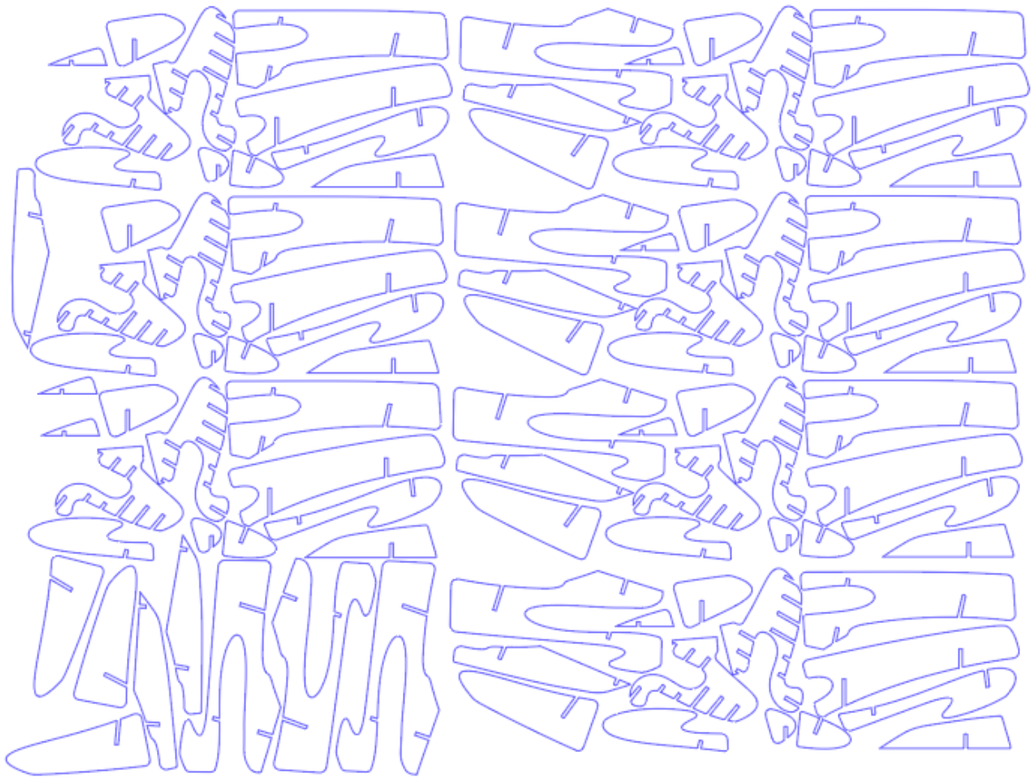




Refinment

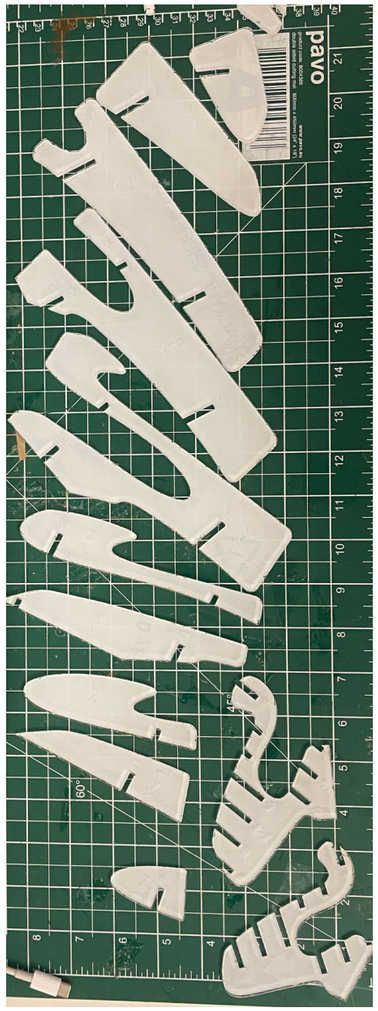
Holder Refinment

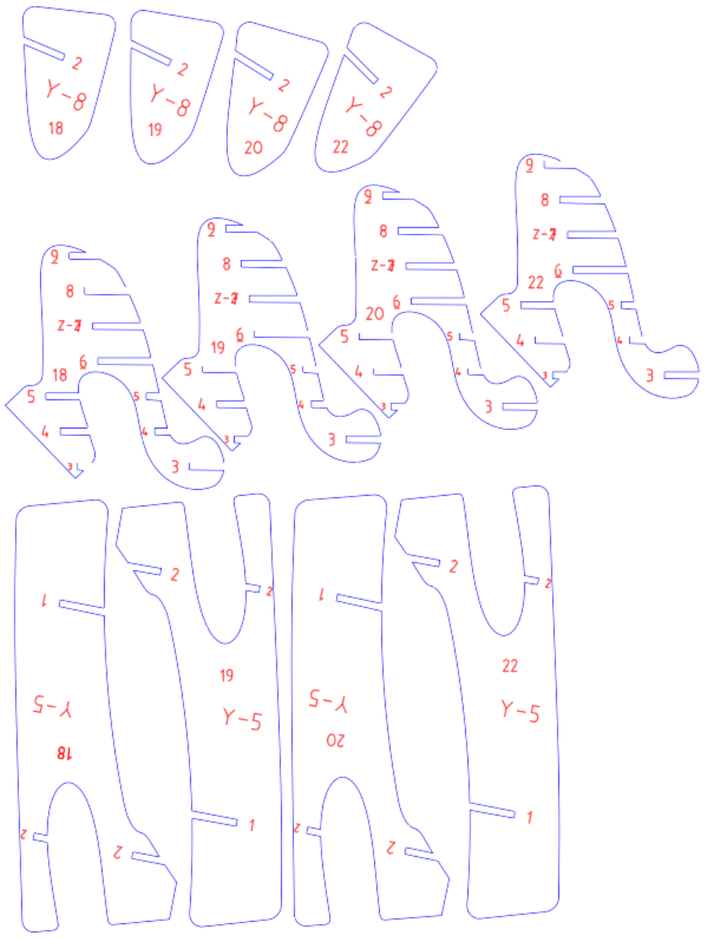
Once I had decided on my final design, I ordered my acrylic from Stockline Plastics Ltd, which is also where the workshop sources its acrylic. This meant I knew the material would be safe to use in the laser cutters, as not all acrylic is suitable for laser cutting. I first needed to work out how many sets I could fit onto the largest single sheet that would fit into the laser cutters, which measured 930 × 660 mm. After testing different layouts, I was able to fit seven holders onto one sheet. I therefore ordered two sheets of acrylic for £72, giving me 14 sets in total, allowing for any mistakes during cutting, which did happen.



Final Laser Cut

For the final laser cut, I needed to make sure the tolerance was correct. To do this, I created a test cut with four sets of pieces using different slot offsets: 0.18, 0.19, 0.20, and 0.22. Using a different sheet of acrylic with a 0.02 mm variation in thickness, I found that the 0.22 slot offset provided the best fit, which I then used for the final laser cut.

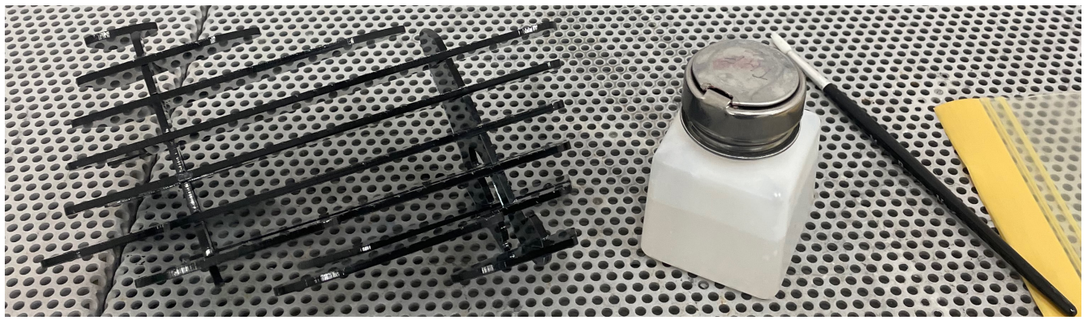


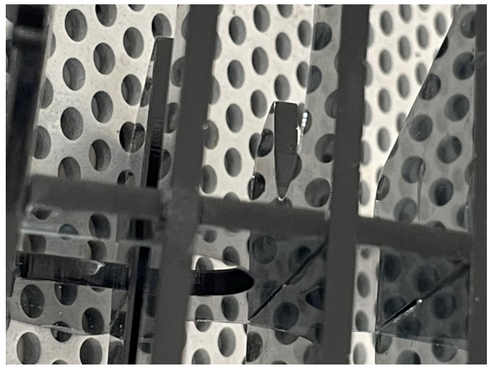


Refinment

Holder Refinment

I went down to the workshop and used some of their acrylic solvent, and it made a huge difference to the finish. I also carried out a small test on a piece of acrylic and found that applying too much solvent could leave a mark. However, to fix this, I found that adding a couple of small drops of acrylic solvent would re-melt the plastic and return it to a clean finish.





Base Refinment

After completing several Jesmonite pours during the prototyping stage, I learned that being careless could result in air bubbles and uneven surfaces. To avoid this, after mixing the Jesmonite powder and liquid, I made sure to hand-mix thoroughly at the end using a tool that could reach the bottom of the container. I then tapped the bucket on a hard surface several times while occasionally stirring. Pouring the Jesmonite slowly into the base mould also helped remove air bubbles and achieve a smoother finish.

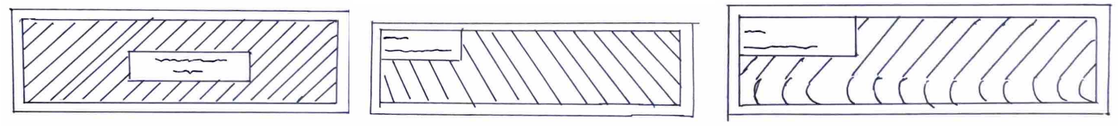
Refinment

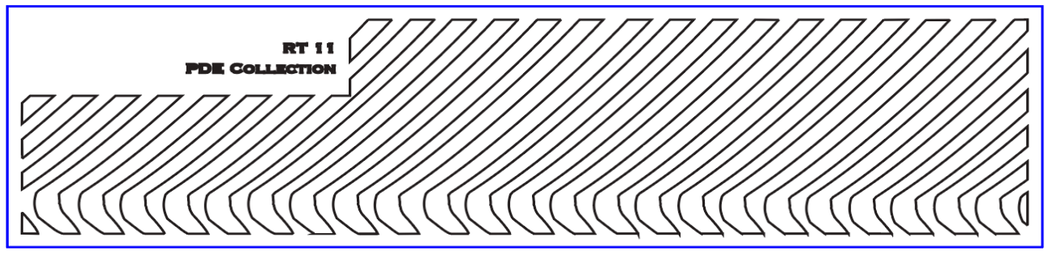
Base Refinment

I initially considered casting the holder in the larger base, but as shown in the photos, this made the overhang feel less prominent compared to the smaller base. Because of this, I chose the smaller base, as it didn't take anything away from the holder and felt like a better overall size. For the smaller base, the correct Jesmonite mix was 85 g of liquid and 212.5 g of powder, which proved to be the ideal amount.

Cork Base

I needed something to cover the acrylic coming through the bottom of the Jesmonite, so I decided to use a cork base, as it could be laser cut and was relatively inexpensive. I sketched out a few ideas and really liked the idea of incorporating an element of the glasses holder design into the cork. Using the side-view sketch from the CAD model, I took the shape of where the glasses sit and turned it into a repeating pattern through vector and raster engraving. I chose 3 mm thick cork, as it gave the holder a slightly elevated look. I also offset the cork size by 5 mm in each direction to create a subtle shadow around the base.





Packaging

Cork Leaflet

I wanted to create a leaflet to accompany the holder that included information about the product. I kept the cork theme to maintain consistency between the product and its packaging. I also realised that I needed a name for the product to appear on both the leaflet and the sleeve. After considering different options and discussing ideas with classmates, I chose a name that related to both the design and glasses. I settled on The Frame, a simple and clear name that refers to the frame of glasses while also reflecting the skeleton-like structure of the holder, suggesting the internal frame of an object.

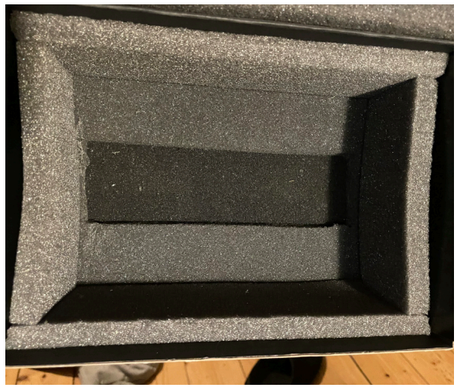
For the back design, I wanted something that related to the overall product. Whilst I was creating the laser-cut files, I realised that combining all the different sets onto one sheet formed a strong pattern, so I engraved this design into the back of the leaflet. Similarly, the phrase “designed to hold your focus” was chosen for its double meaning: the product holds your glasses to help you see, while the design itself is intended to hold the viewer’s attention.

After laser cutting the leaflet, I found that the edges had a rough finish and burnt marks. I quickly realised that these marks could transfer onto fingers and other surfaces, so I used a damp piece of tissue to rub along the edges, which resolved the issue.

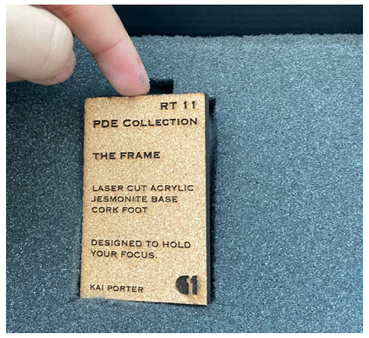
Packaging

Box / Foam

I ordered some black boxes from Amazon that were the perfect size, allowing for around 2 cm of space on each side of the holder. I also bought 1 cm thick grey foam and created cut-outs to fit the internal shape, including a slot for the base to hold it securely in place. This worked very well, even when the box was held upside down.

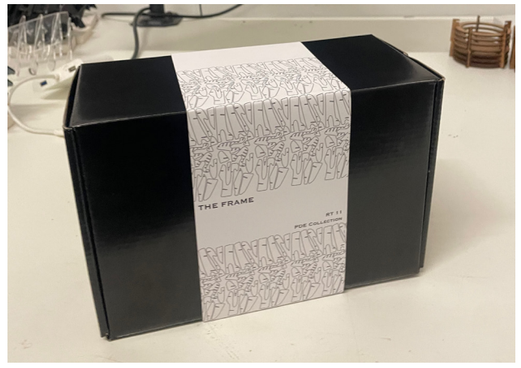


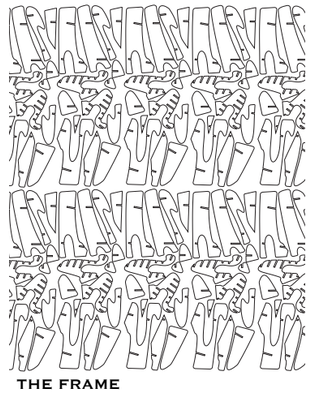
Initially, I placed the cork leaflet on top of the holder, but it often slid to the side or became hidden once the box was moved. To solve this, I created a cut-out in the lid to hold it in place. This also made the leaflet feel more like a token included with the product, adding to a more premium unboxing experience.

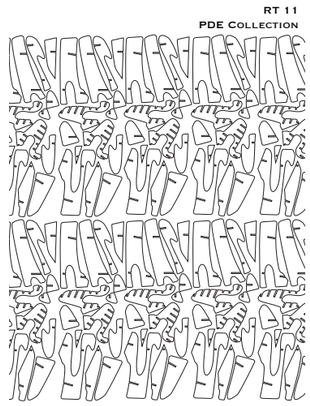


Sleeve

I decided to include a sleeve, as it made the product feel more premium. I wanted to keep the design simple and avoid using colour, matching the aesthetic of the holder. I reused the same pattern from the back of the cork leaflet to maintain visual harmony across the packaging.







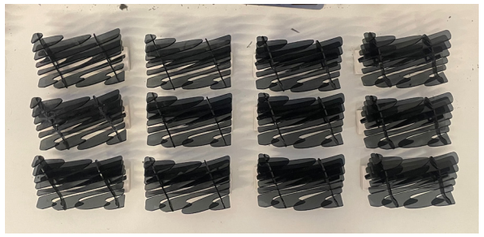
Pricing

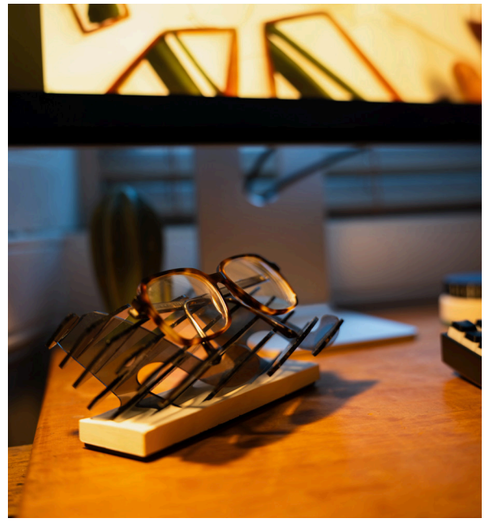
In my final cost breakdown, each glasses holder ended up costing about £19.90 to produce, including materials, cutting, and a share of the testing costs. I sold each one for £30, and I managed to produce 12 holders in total, with 11 available for sale. Out of those, I sold 5 at £30 each. After selling, I had to pay a 15% fee back to the Glasgow School of Art from those sales. Overall, this left me with a modest profit margin, but it was a great learning experience in pricing and selling my own design.

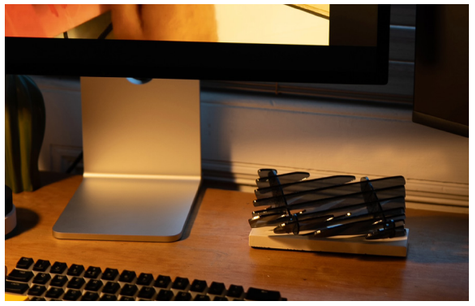
Material	Total Cost	Quantity Produced	Cost Per Holder
Acrylic	£72	14	£5.14
Cutting Acrylic	£15	14	£1.07
Jesmonite	£16.80	14	£1.20
Cork Base	£3	12	£0.25
Cutting Cork	£8	12	£0.67
Cork Leaflet	£12	20	£0.60
Cutting Leaflet	£12	20	£0.60
Sleeve	£12	12	£1.00
Box	£20	12	£1.67
Testing	£65		£5.42
Total	**£238.80**		**£19.90**

Final Design

This is my final design. I was able to produce 11 sellable final products, each with slight variations, which gives them a handmade feel. I took studio photographs on a white background for the website and Instagram, and I also captured some environmental shots on a desk at home, showing how the product would be used in its intended setting.

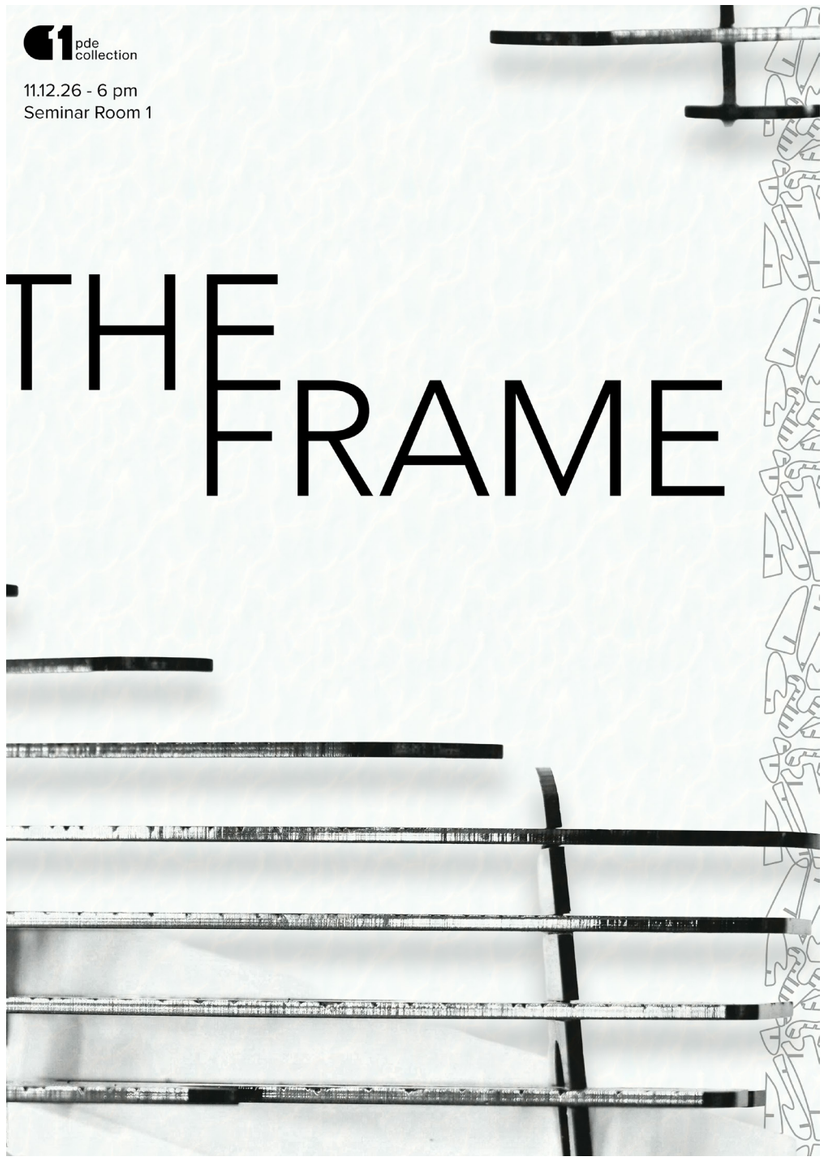






Final Poster

For my final poster, I wanted to keep a minimal and simplistic approach. I followed the same theme as the sleeve, using a black-and-white palette and incorporating the pattern along the edge. I created two different posters: one focused more on the product and the other more on the design. I really liked how both turned out. Although they are quite different in their layouts, there is still a clear visual relationship between them.



Reflection

This project has been an amazing experience, and I've learned so much about the process of designing a product from start to finish. I didn't fully appreciate how much time it actually takes to bring a product into production, especially considering this was only a small-scale, relatively simple product when compared to something like a phone. One of the main takeaways for me is that a ten-week project isn't long enough to spend too much time repeatedly concept designing early on. Instead, I learned that the most effective way to develop a product is to start making and work through the steps and processes as you go.

I'm really happy with my final product and how it turned out. At the beginning, I was worried that I was heading in a direction with a product I wasn't fully invested in, but I'm glad I settled on the idea of a glasses holder. It's something personal to me, and even though it's a fairly niche product, that didn't matter. My aim was to create a product that reflects who I am through its design, and I hope that comes across.

This project has been a journey I never could have predicted. Although there were ups and downs, I'm glad I experienced them, as they pushed me further than any project I've worked on before. What I've learned throughout this process has shown me that this is only the beginning, and that I still have so much more to learn.

Finally, I just want to say thank you to Hugh and Jen if you're still reading. It's been an amazing first semester.