IDEA292 Interdisciplinary Project Lab | Fall 2026



Oceanus

Malen Cheung '28

Project Overview

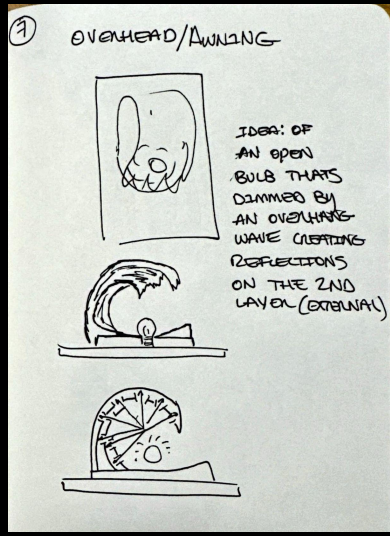


- Design a structural overhang (the wave over the bulb).
  - Directly inspired by "The Great Wave off Kanagawa" by Katsushika Hokusai (1831)
- Develop the shade from a system of folds to a structural layering of panels (balanced with tension).
  - from a design that "cascades" over the bulb → encases the bulb
- Capture the light: create gradients across panels not hard lines.
- Shape light & shadows radiating out from the base of the lamp---water flowing into and from the wave.

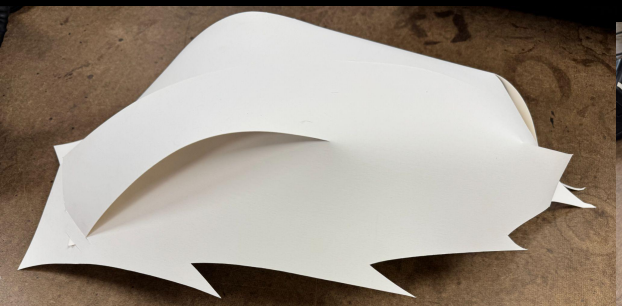
Material Note: entirely designed & made with cardstock & paper cement

Stage 0: Design Notes (preliminary designs)

This first stage of prototyping was an experimentation with a single sheet of paper to create an arc shape that was strong enough to hold its structure and thin enough to let light pass.



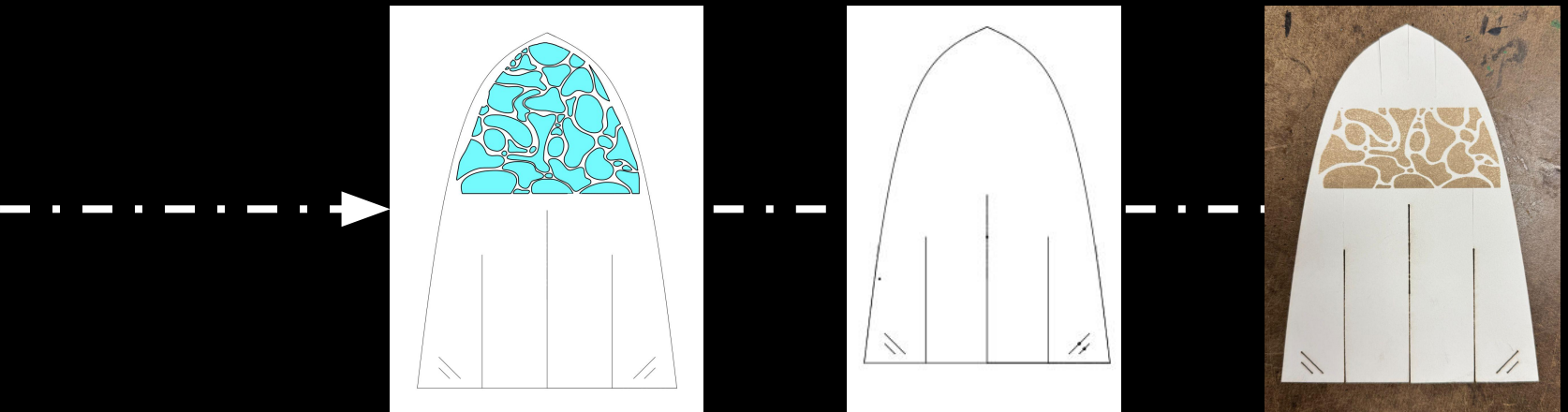
I prototyped using Onshape to create a mini version with water/foam patterns:





Stage 0: Results

This type of design lacked the side profile of the a wave, and while the structural integrity held, the folding technique caused distinct lines of shadow when light was applied.



Stage 1: Design Notes (layers)

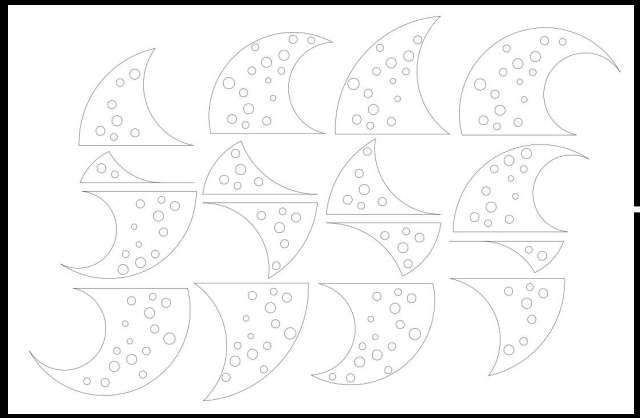
My main aesthetic priority at this stage was creating the classic side profile we associate with a wave (this was missing in stage 0)

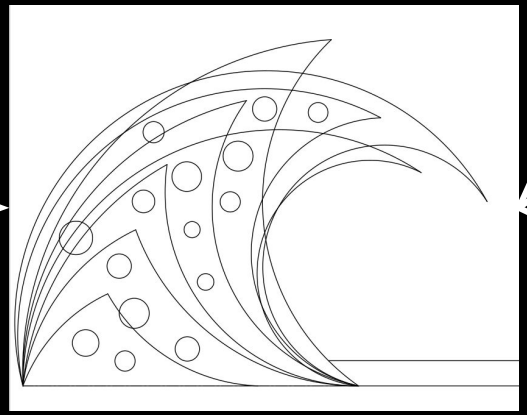
To do so, I spent a lot more time in Onshape designing pieces and modeling them before I went to the laser cutters.

I focused on the paper as both a structural and aesthetic component. I initially wanted to use as little glue as possible and develop my skills shaping the paper. This deep dive into the creative use of paper helped me avoid shortcuts in prototyping and allowed me to form a solid design before putting it all together.

Stage 1: Results

Once this design took shape I realized the need to focus on the relationship between the structure of the shade and the shadows cast onto the board.











Stage II: Design Notes (adding more layers)

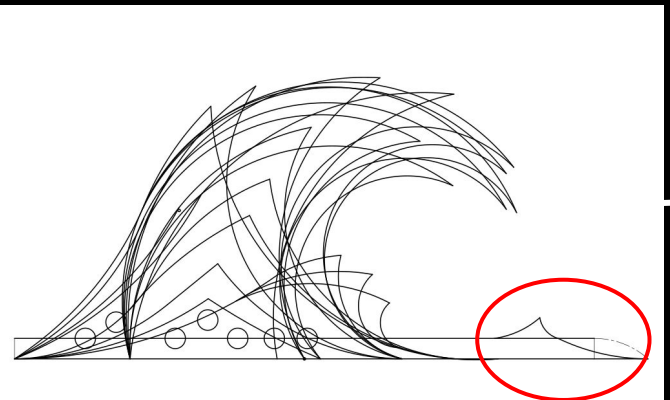
With this iteration it was clear most of my progress was taking place through my use of Onshape and Lightburn which allowed me to model how pieces fit with one another.

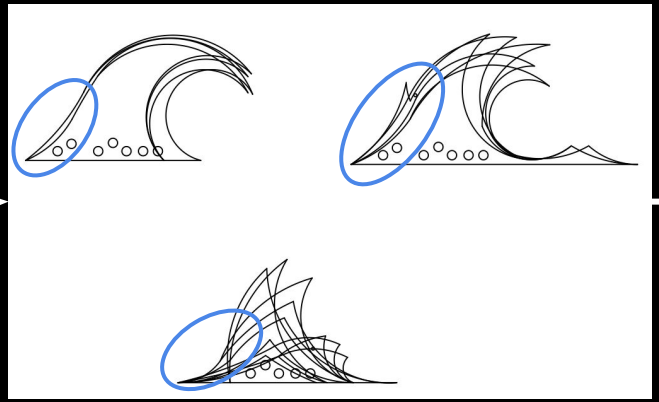
Following feedback on Stage I, my next major steps involved building the shade to enclose the bulb.

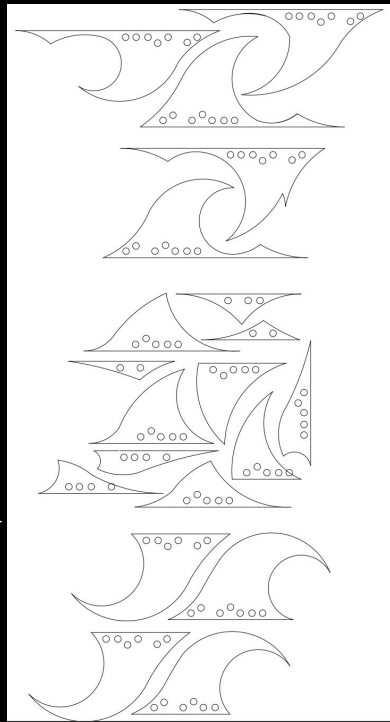
Stage II: CAD changes

Changes in the CAD in Stage II:

- Twice as many layers
- More variable shapes and sizes = natural appearance
- Long "foot" to cover more of the board and bulb
- Rear receding curve on each panel to direct light
    - More natural appearance







Stage II: Results

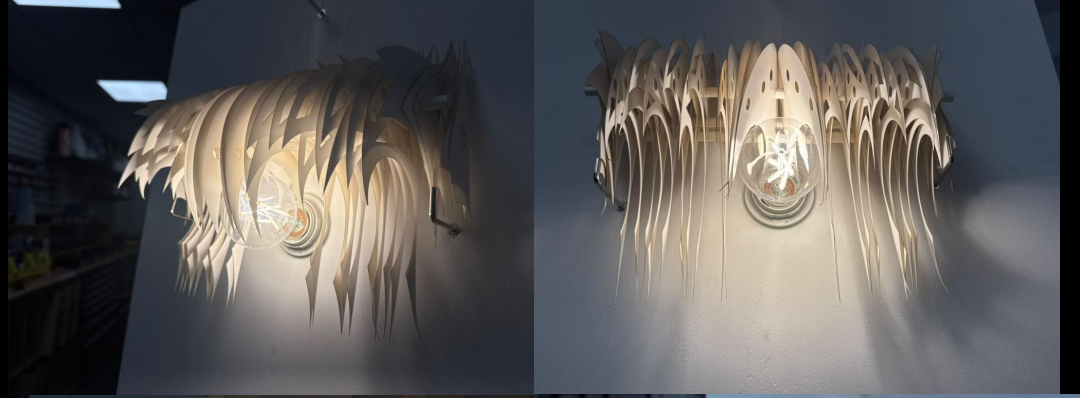
Pros:

- More radiating shadows
- Increased variable with paper shades/layers

Cons:

- Too wide and structural
- Lines = too geometric

This stage led me to address the need to cover more of the bulb and dampen excessive light.

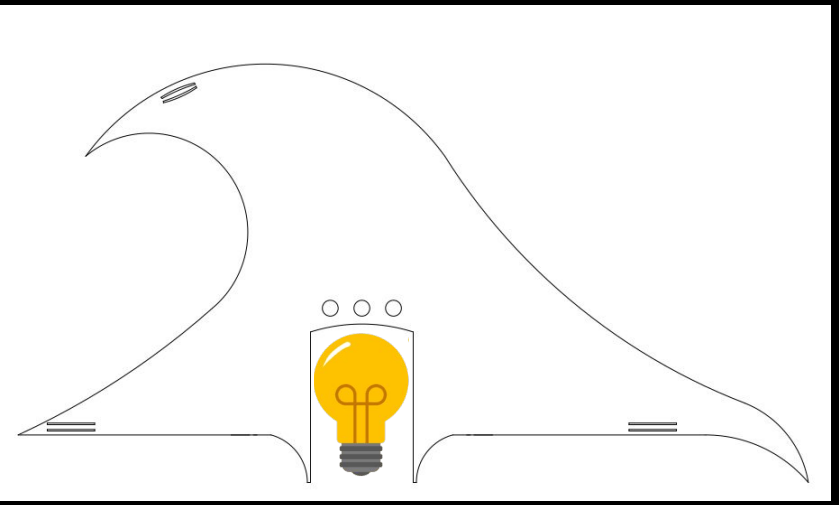


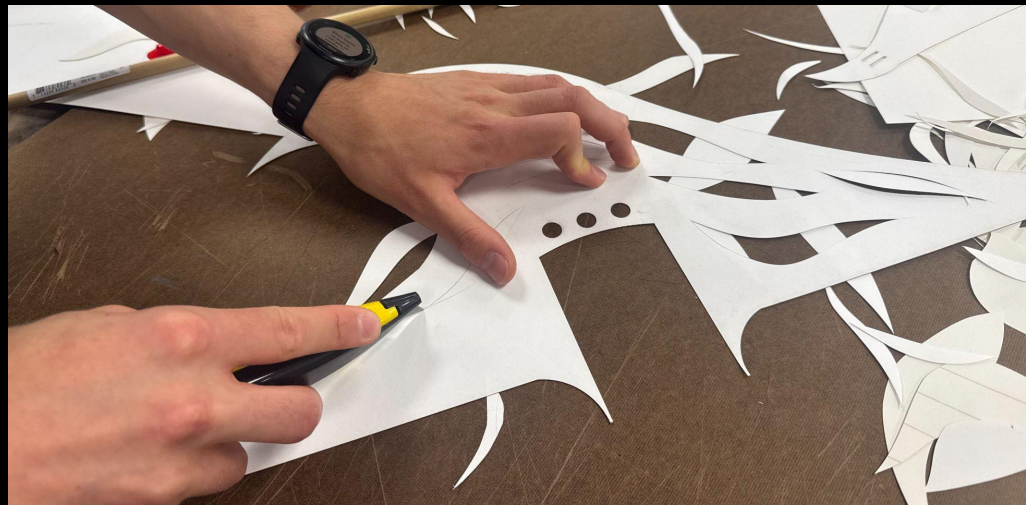


Stage III: Design Notes (the birth of Oceanus)

Stage III guided the direction of my final design.

I experimented with the number of layers, paper thickness/type, reflections, dimming, and panel shapes (around the bulb).





Stage III: Results

Pros:

- I created the **shape** of the side profile of a wave.
- I achieved more interesting **shadows** within the lamp and on the board.

Cons:

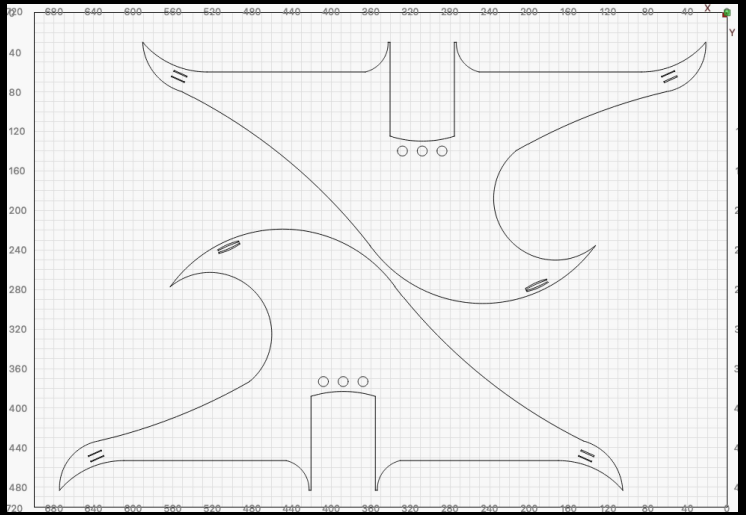
- Structural components = **distracting**
- The shade was too **bright** or too **dark**
- Not enough shadows on the board
  - Need more variable/natural shadows
- The bulb did not fit within its **cavity**

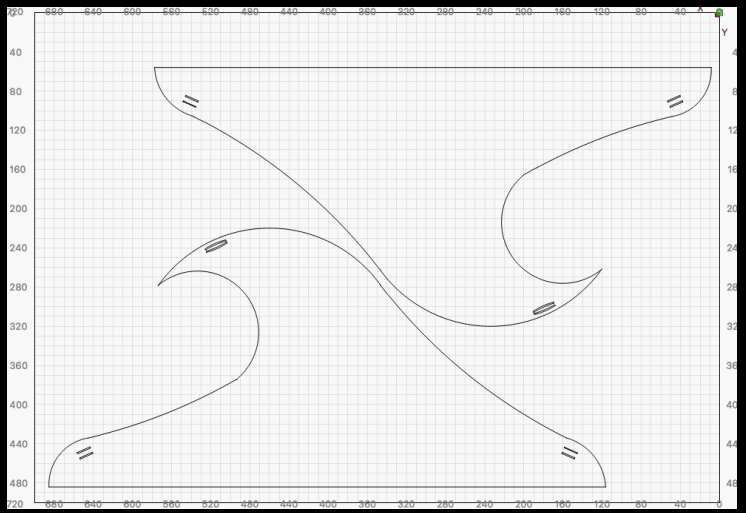




Stage IV: Design Notes (layers and glue)

I prototyped half of the lamp as I wanted to get a better understanding of the layers and how they interacted with one another. This allowed me to view the interior and exterior layers and how they interacted with the bulb.



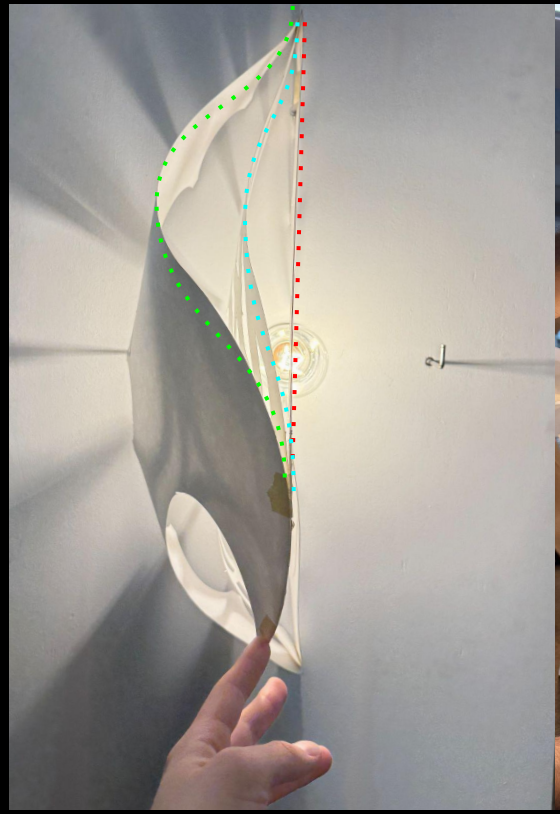


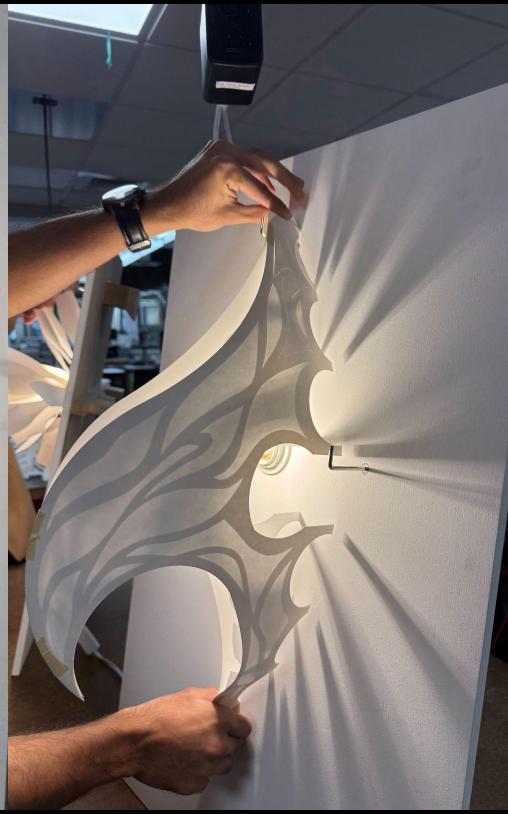
Stage IV: Results

I determined that I could use **tension**, **glue**, and **paper tabs** to hold everything together.

(This removed the need for paper pins running the width of the lamp as seen in Stage III.)

Rather than having 2 middle layers I found that double layering the **middle** and **external** panels more effectively imprinted shadows with a single **center** panel on each side.





Stage V: Oceanus





Revisions for the final version:

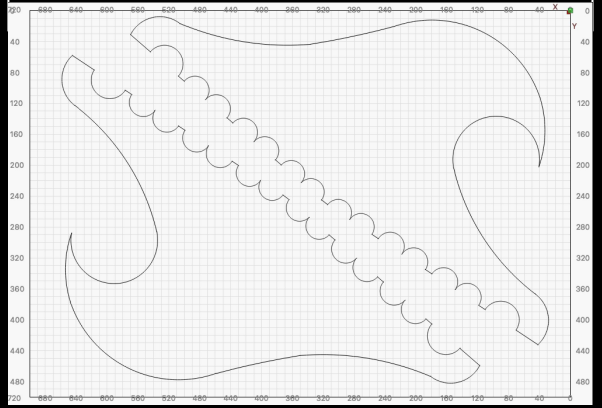
1. Increased number of arches on the external and middle panels
2. Adjusted arch shape for more variability
3. Layered external panel with cut-out panel
   a. More strength and shadows
4. Lengthened and curved external panel
   a. Closer fit to the board
   b. Increased tension = structure
5. Glued panels together
   a. Used clamps to hold in place
   b. added paper tabs at core connections

Each interior panel has "windows" to allow light through.

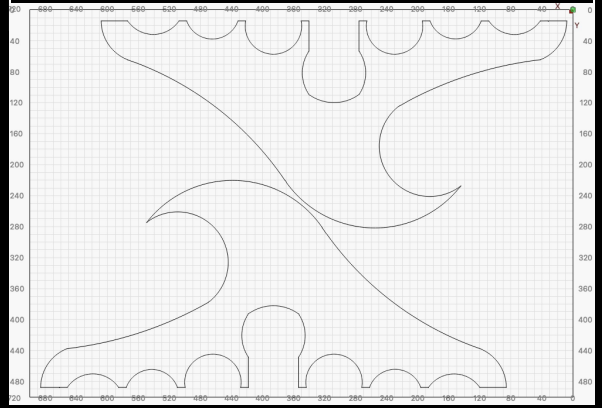
This was done by hand as the box cutter provided me with more variability and flowing patterns faster than when using Onshape (see Stage II).

Stage V: Design

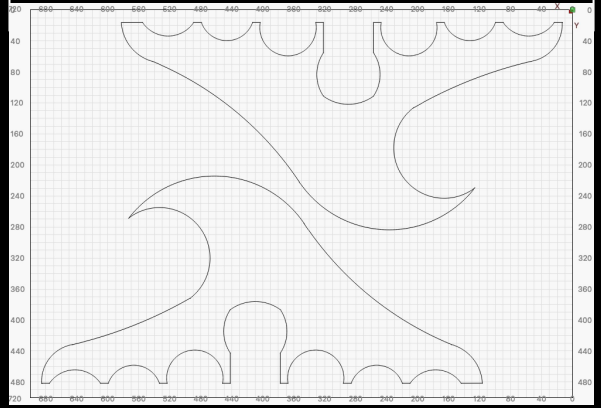
External panels:



Middle panel:



Center panel:



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