STUDIUM CURVARE

Orko Sen Capstone

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For my senior capstone project, I propose to design a premium workstation that can integrate into both residential and commercial environments. The workstation will feature a spacious work surface, sophisticated storage solutions, an ergonomic monitor/speaker riser, and contemporary aesthetic appeal.

Target Markets:

Residential Market:

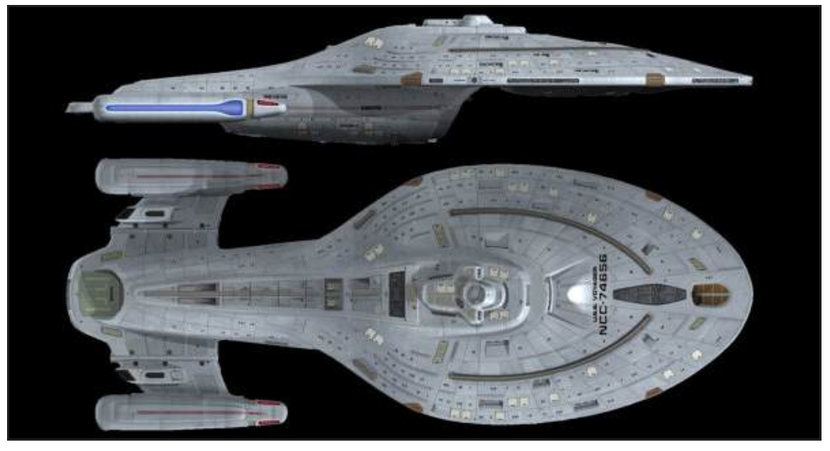
The primary residential demographic consists of high-net-worth professionals seeking a robust, design-forward workstation for their home offices that combines functionality with refined aesthetics.

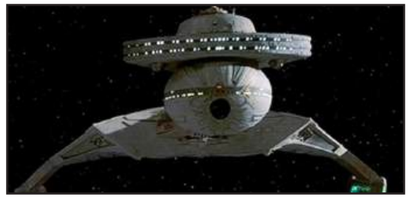
Commercial Market:

The primary commercial demographic encompasses corporations acquiring premium office furnishings for executive-level employees and their administrative staff.

The workstation must serve as both a functional tool and a statement of organizational prestige.

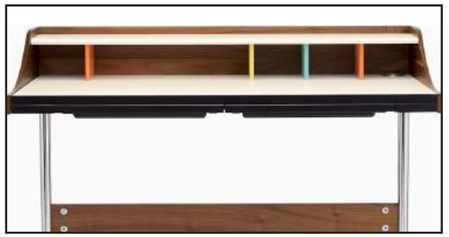
Inspiration





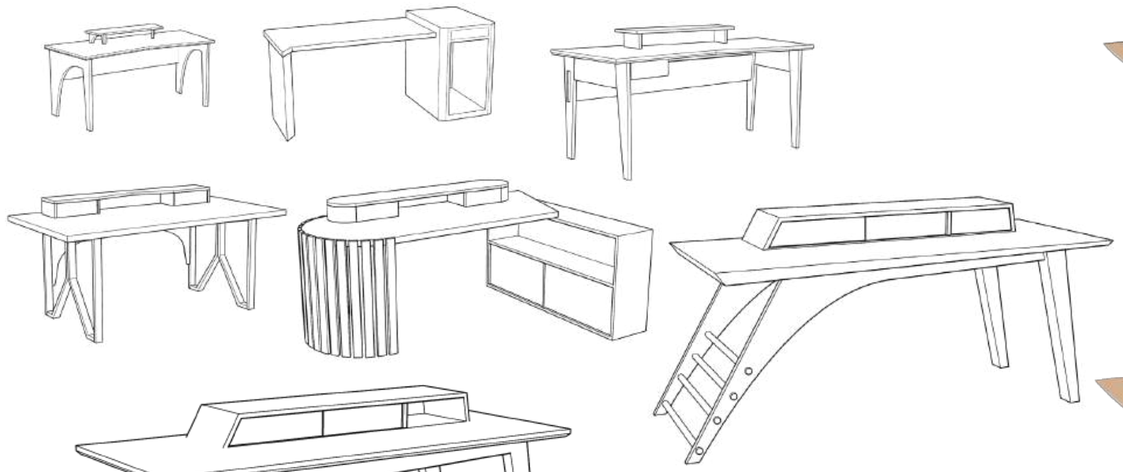
The slight curves, angles, lines, and silhouette of early sci-fi spaceship design create a fast and dynamic form. I hope to incorporate these elements into my design.

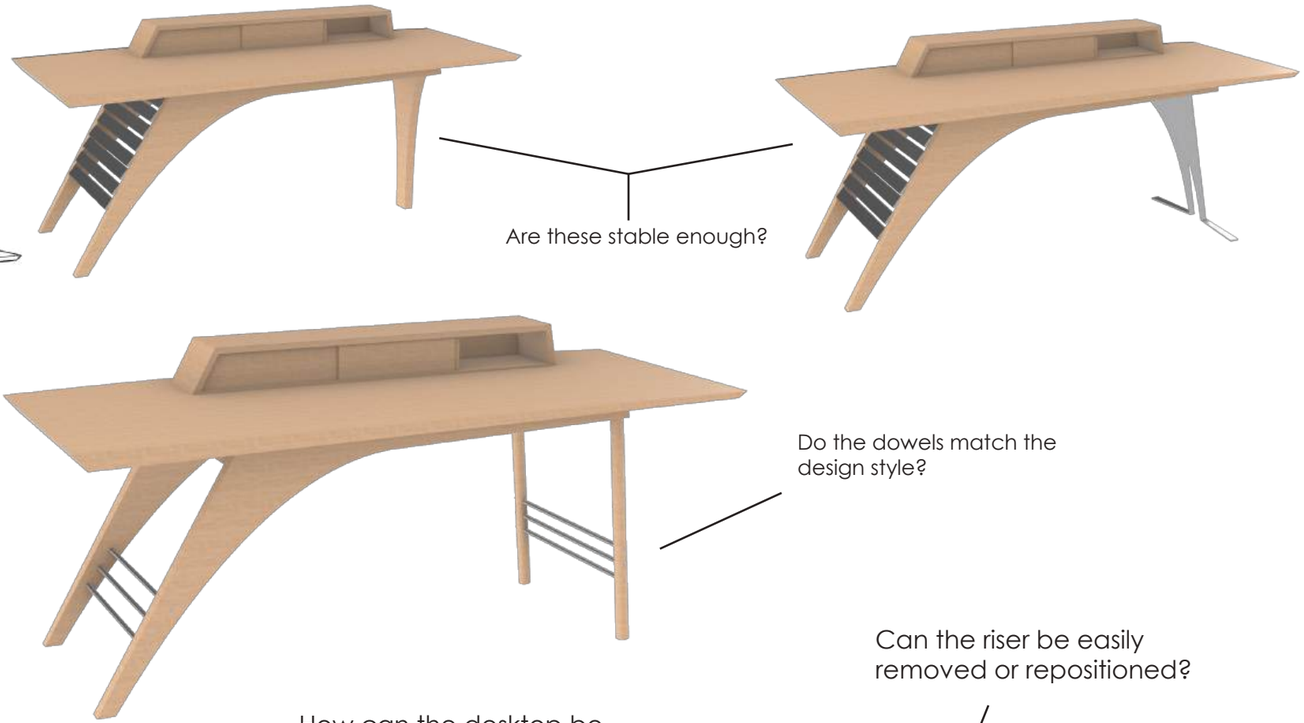
Current Market Solutions



Current market solutions offer a lot of boxy cabinet-style storage intended for papers and large office supplies. However, writing desks are the only workstations that offer smaller storage options. Most options posses a basic rectangular top, or a dual height L shaped top. While these forms work, they are big, bulky, and the standard.

Concept Refinement





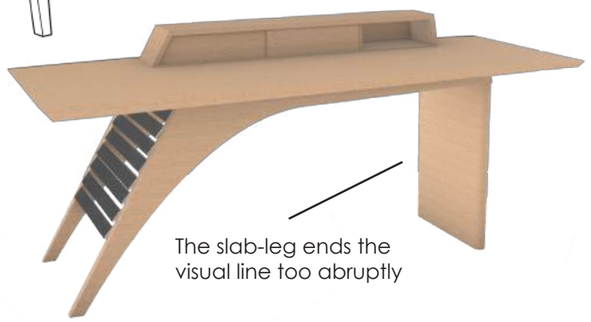
Are these stable enough?

Do the dowels match the design style?

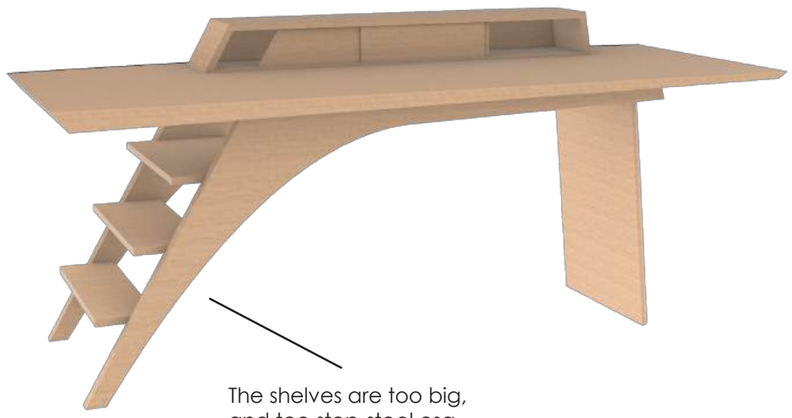
Can the riser be easily removed or repositioned?

How does the riser attach?

How can the desktop be more visually interesting?



The slab-leg ends the visual line too abruptly



The shelves are too big, and too step-stool esq

Can wood resist warping if milled like this?

How can the legs better match the design

How can I use curves to make the desk seem more inviting while keeping the angles?

Multiple different 1/8 scale models were created to dial in the dimensions of the desktop. Models 6-9 (above) featured a trapezoidal wedge design that I felt lent itself well to a large work surface. 6 & 7 were the most attractive, so I made three 1/4 models based on their dimensions.

Model 1 (right) was the best received, so I moved forward with those dimensions in mind.

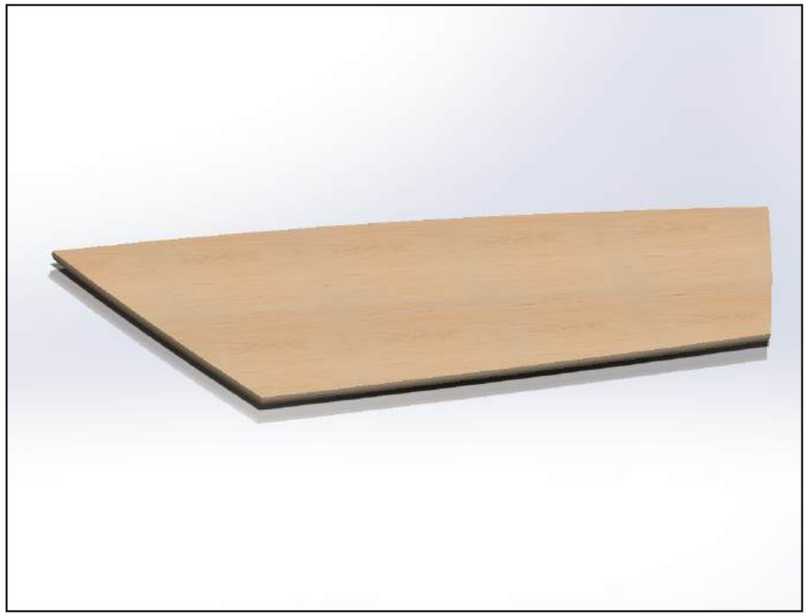
Desktop: Full Scale Model 1

I translated the dimensions of the 1/4 scale model onto paper at full scale, and mounted to cardboard. The length of the desktop and radiai of the curves were aesthetically pleasing, but the work surface was extremely shallow. With an 8" deep riser placed on top, there was only 18" of usable space on the left, and 12" on the right. To enlarge the work surface, I decided to increase the left side by 3" and the right side by 5".

Desktop: Full Scale Model 2

The above surface was far more functional than the previous one. For this model, I also added a 1.25 under-fillet to lighten the piece, and generate more interest. It worked well, and will remain much more stable than a full-length taper.

The most efficient way to produce this piece is to use the cnc. However, the cnc bed is far smaller than my desktop. This will be a problem to engineer around.



Legs: 1/4 Scale Models

Once I had the desktop dialed in, I cut 2 sets of legs as a starting point. The smaller leg worked well in the front, and the larger leg worked well in the back. It became clear that the front and back legs would need to be different.

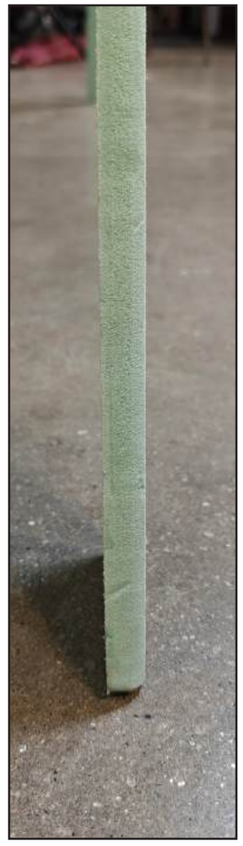
Also, the arched section comes down too far. Aesthetically it looks too big, and ergonomically, the user would have to sit too far off to the other side.

The legs also need to match the curved and filleted form of the desktop better. Cutting round-overs onto the legs should fix this problem.

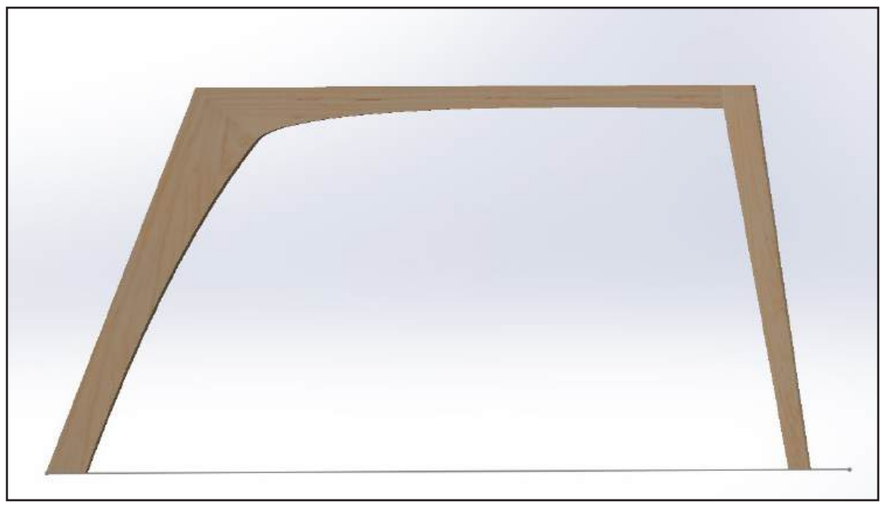
Legs: Full Scale Model 1

The dimensions for this set work, but there are still minor changes that need to be made. The legs feel too thick. Currently at 2”, thinning them to 1.5” may work better. The right legs should be re-oriented so that the flat(ish) edge is parallel to the long edge of the desk. Finally, rounding over the legs is not enough. They still feel too boxy compared to the desktop. In addition to the fillets, cutting the same curves as the edge of the desktop onto the outer faces of the legs may resolve this issue.

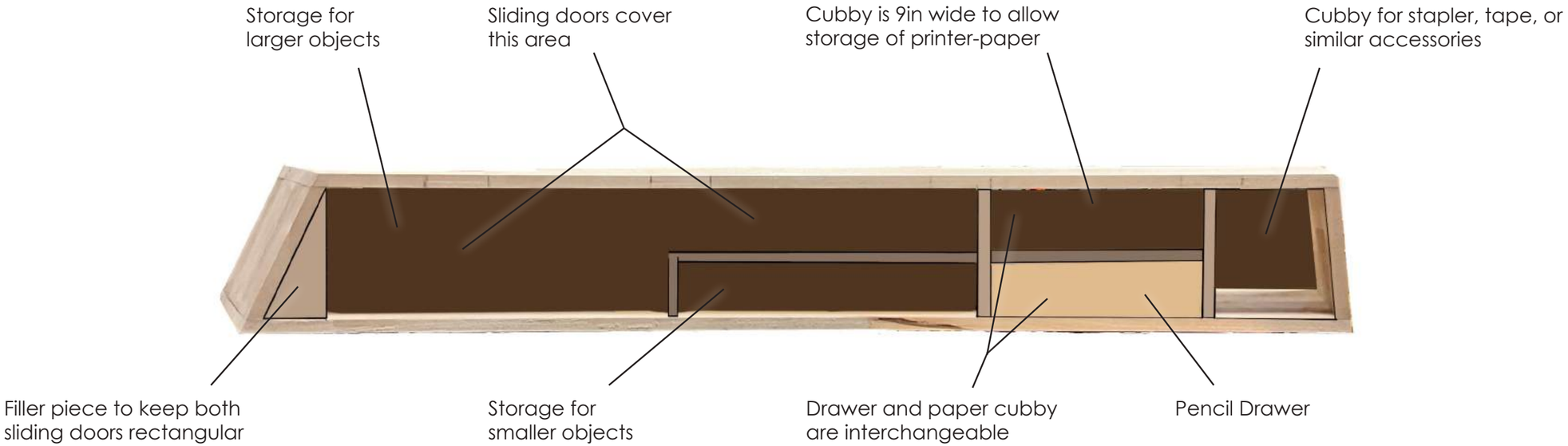
Legs: Full Scale Model 2

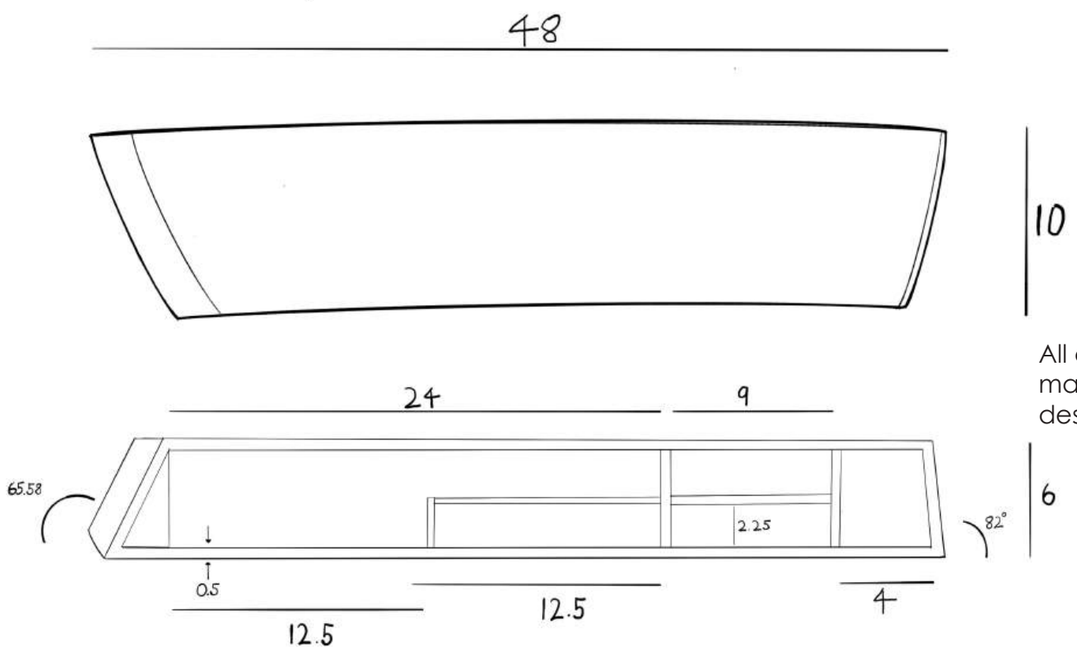


While slight, the curve cut across the face of the legs worked very well. However, the leg still seemed too thick. The thickest part of the front leg was 2”, and the thinnest part was 1.5”. Moving down to 1” looked more visually pleasing, so I resawed the left leg to check. It worked. I updated the CAD model for both legs, and was ready to fabricate them.



Riser: Design





All curves and angles match those of the desktop and legs

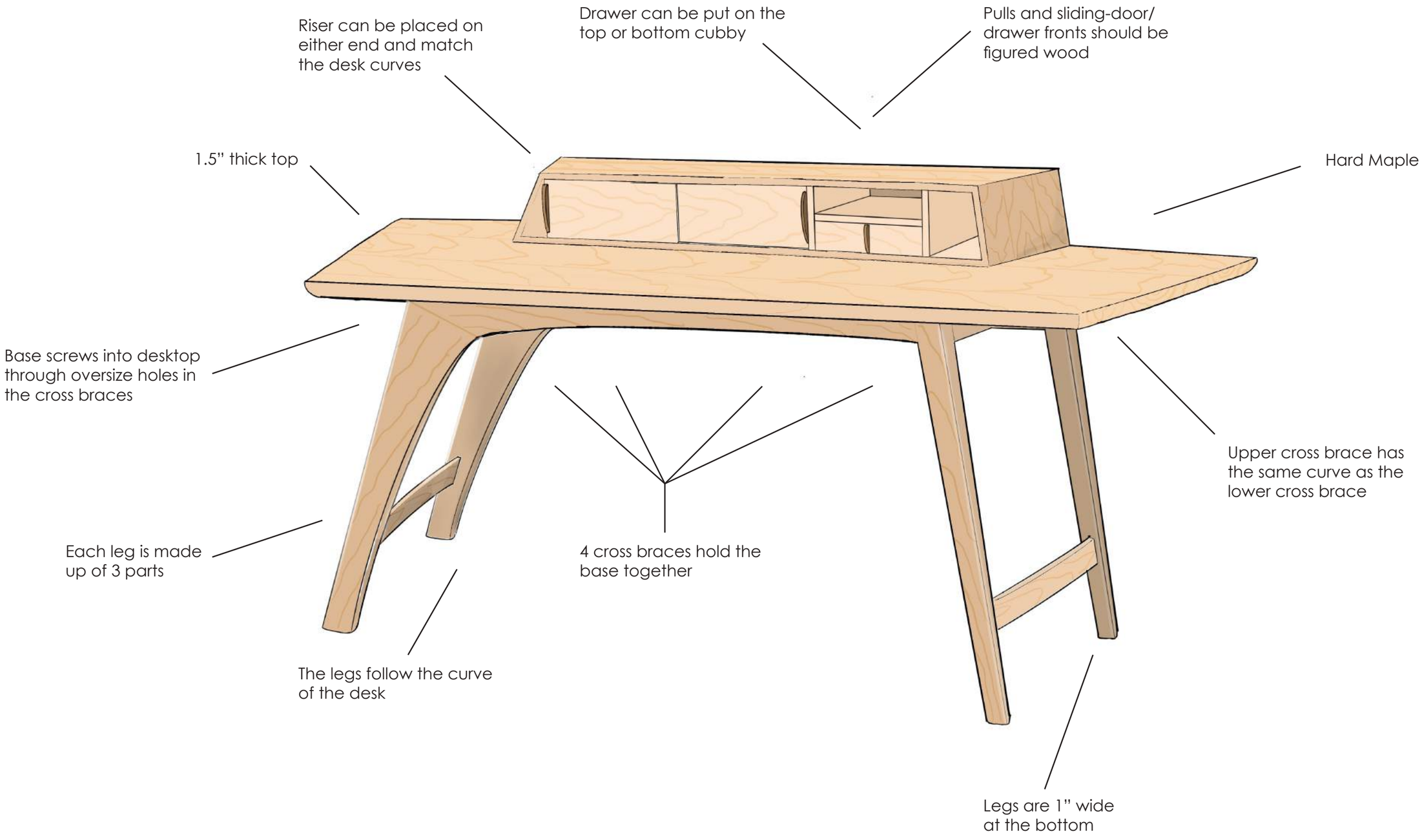
All measurements in inches

To add customizablity, the riser is not secured to the desktop. This allows the user to reposition it wherever they prefer. This means the curves of the riser must match those of the desktop, and the sliding doors of the riser must follow a curved track.

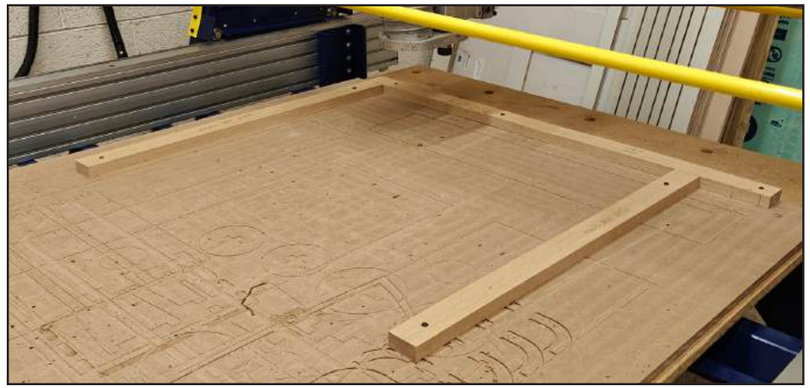
One method to do this is a reverse-tambour door. The slats are cut on the rear of the material and do not cut all the way through. Further testing is needed to see if this would work in this scenario.

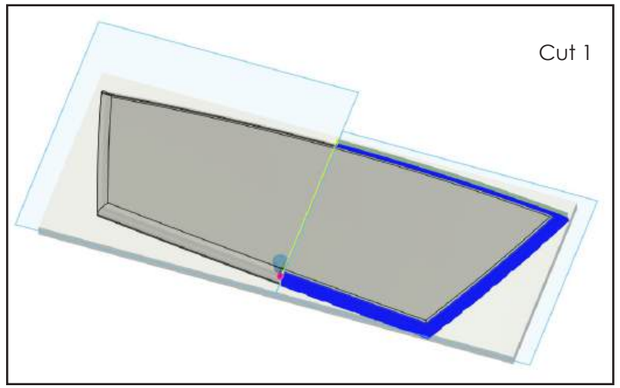
To test if my method would work, I CNC cut the curve my riser would need onto MDF. I then cut a 1/4" MDF panel to act as the door. I cut slats every 1/8" halfway into the board, and it worked very well. In fact, the number of slats could be reduced a lot and still be perfectly functional.

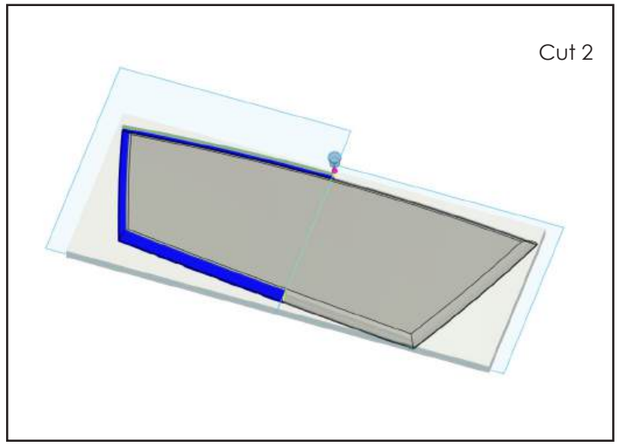
Final Concept



Process - Desk Top



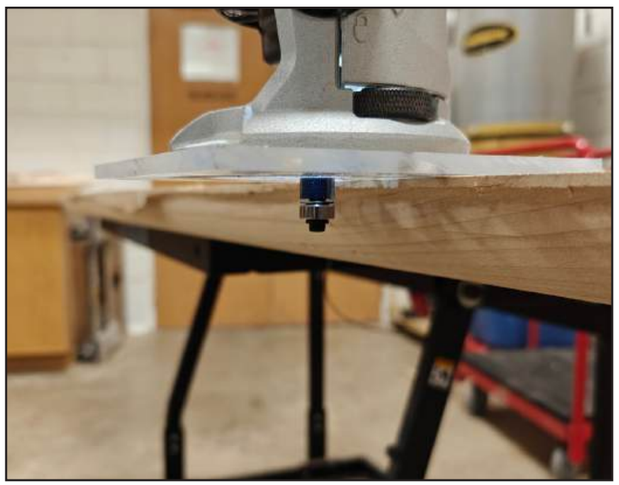




The desktop needed to be cut in two processes: the first cut for the left side, and then a second cut for the right side. To do this accurately, I set up a rail-guide on the cnc bed, and set zero to the middle of my piece. Once the first cut was done, I rotated my piece, confirmed zero was still accurate, and cut the other side.

This method worked very well, and required minimal clean up.

The tabs were removed via a flush trim bit, and then the desktop was sanded and finished with Natura Onecoat.



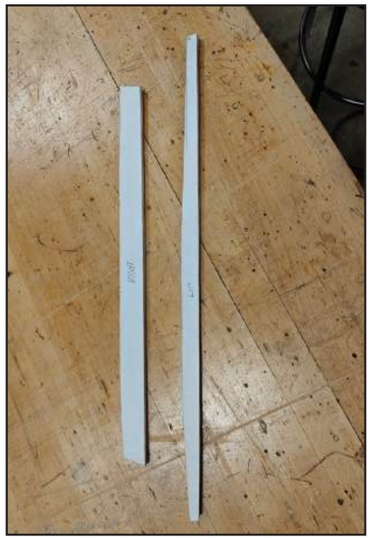
Process - Legs

The face and profile of the legs were cut by the cnc. However, the mating sides were not clean enough to accept glue. To fix this, I created a zero-clearence crosscut sled, and re-established clean and proper angles. The legs were then domino'd and glued together.

To ensure both legs were the same size, I cleaned up one side on the belt sander, and cut the other side on the table saw. Finally, joinery was cut for the cross braces, and round-overs were added.

Due to the changing shape of the legs, a single fillet size was not visually pleasing throughout the entire assembly. To address this, the left side of the leg received a 3/8" fillet while the right side received a 1/4". The were blended at the middle of the leg to create a seamless transition.

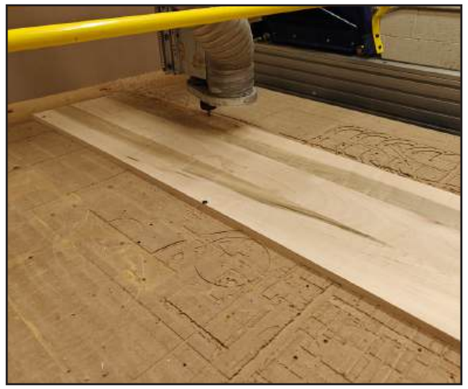
Process - Cross braces

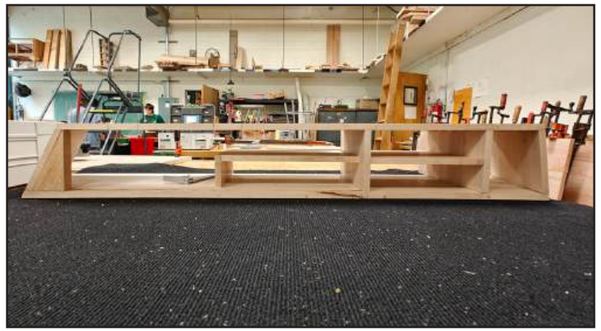


Once I had the legs fabricated, I placed them at their proper location to trace their locations. I then drew the curve I wanted, created a template, and used that to trace the curve onto my pieces.

To create the braces, I first cut the curve on a bandsaw, and then cut the angle on the miter saw. Once the angles were accurate and rough sanded, I cut the domino joinery. Risers were cut to ensure proper placement of the lower cross braces.

Process - Riser





The top and bottom panels were cut on the cnc to ensure the proper angles. The side panels were then cut and shaped by hand plane to match. All the interior shelving was domino'd in, and the groove for the sliding doors were cut via router. Unibond was used due to its long open time.

The sliding doors started off as 1/4" baltic birch, and then veneered with figured sycamore. Grooves were cut into the back of the door at 1/2" apart. Finally the pull was attached.

The drawer face was also veneered with the figured sycamore. Dowel and rabbet joinery was utilized to maximize durability and aesthetics.