FABRIC FURNITURE

IDEATED AND EXECUTED BY SAM LAROCCO

DAAPWORKS 2025, ICFF 2025, JONALD DUDD 2025

Preface

This is a furniture capstone experimenting with the findings of a material study using resin and fabric during the Summer 2024 semester with Professor John Dixon.

Puff LAMP

The Concept

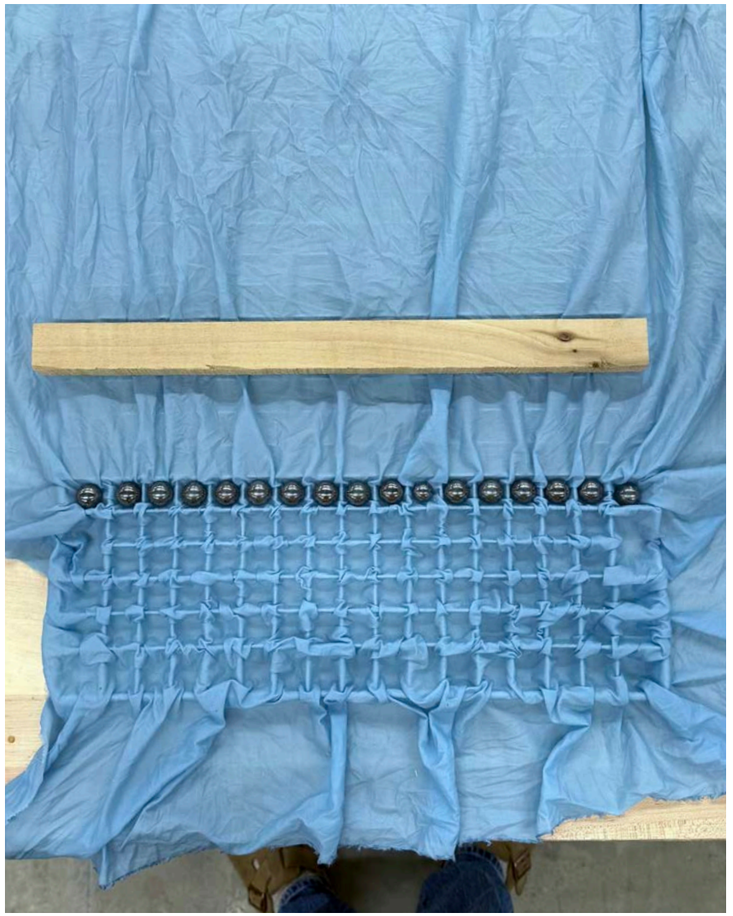
Puff-Ply

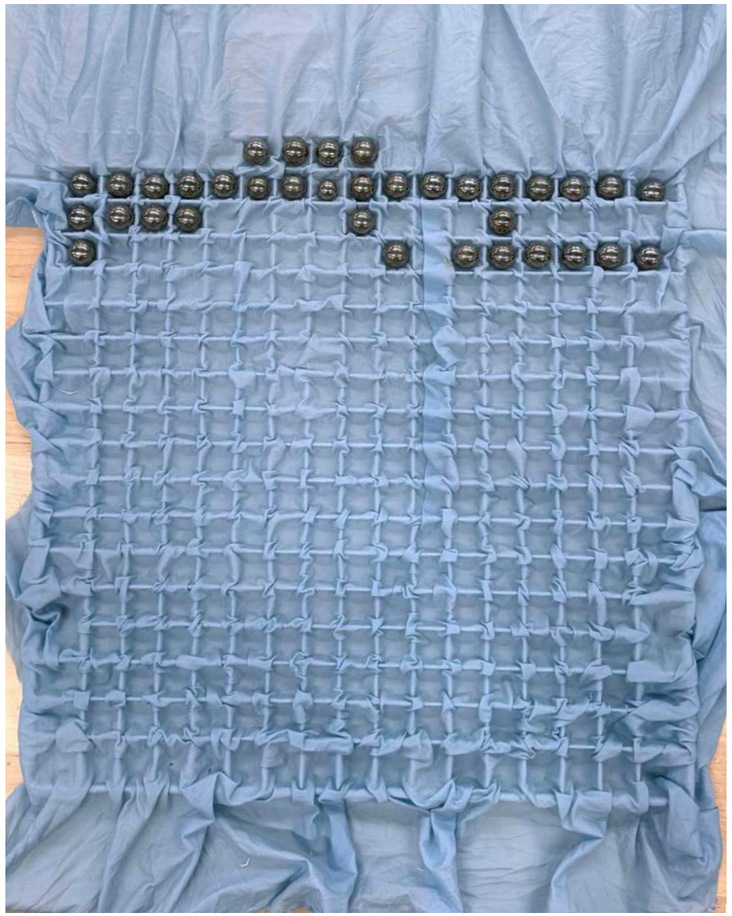
“Puff”: The supporting structure and volume in panel construction. Fabricated by pressing fabric into a 4’x4’ wire mesh sheet with custom 3D printed tooling.

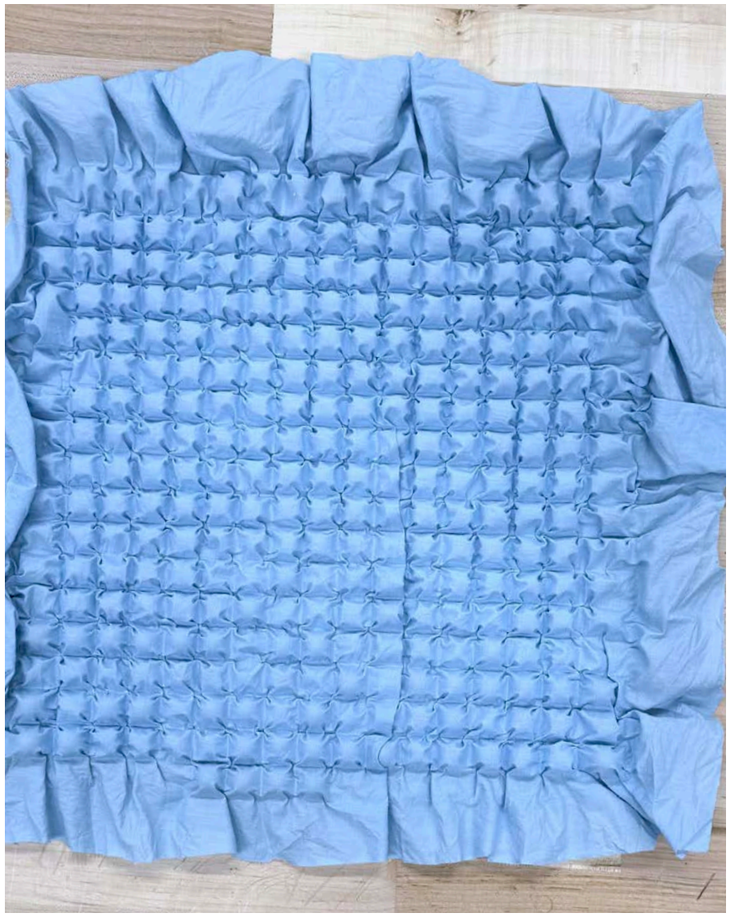
Panel Fabrication Process:

1. Initial Resin Denim Panels and Puff (3 Components)
2. Cure for 36 hours
3. Puff and Denim layered and pressed
4. Cured for 36 hours
5. Trim to size

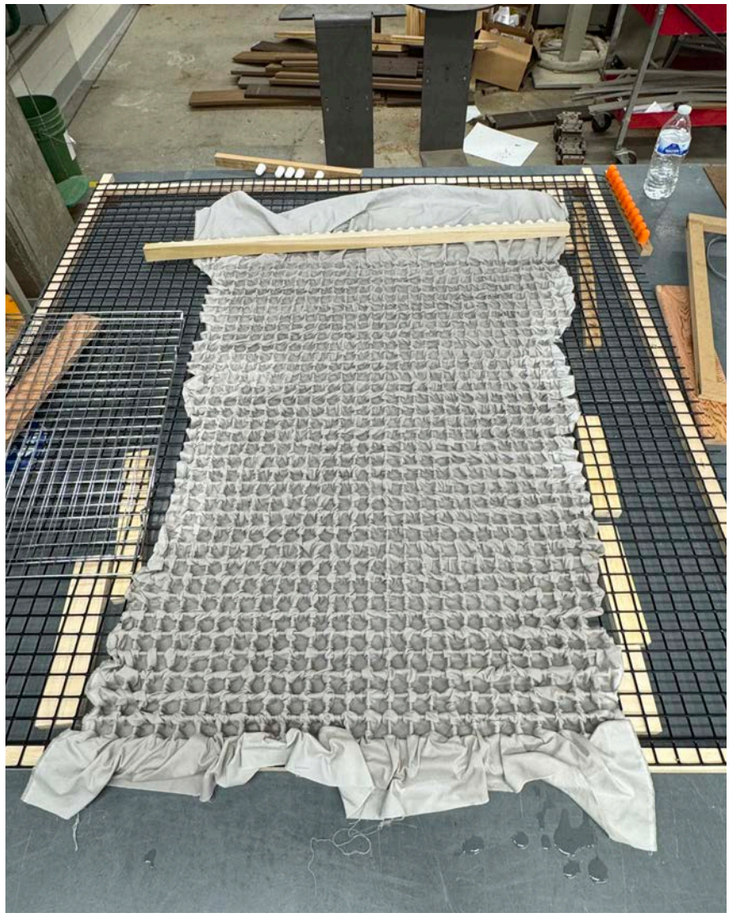
2024



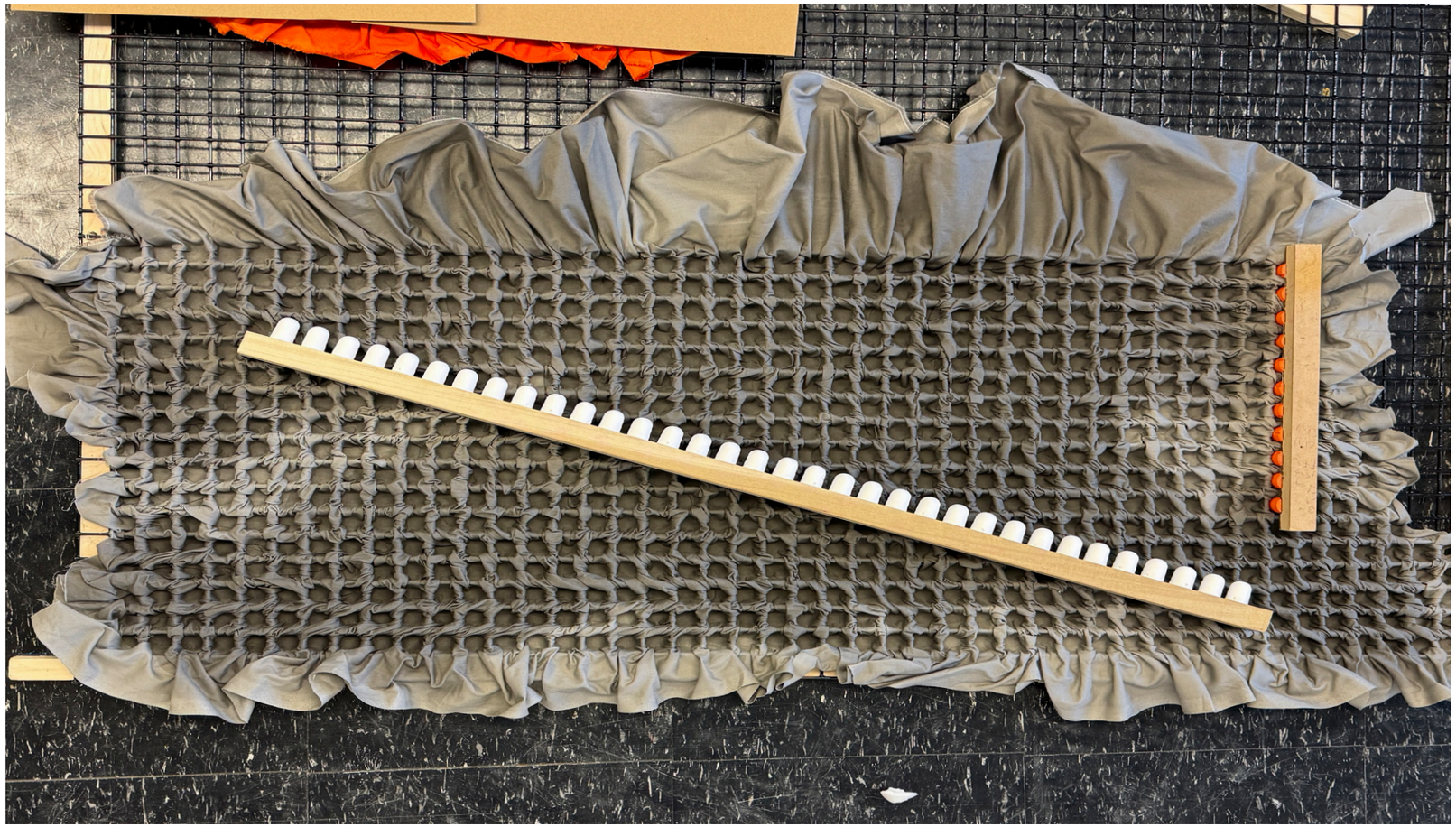


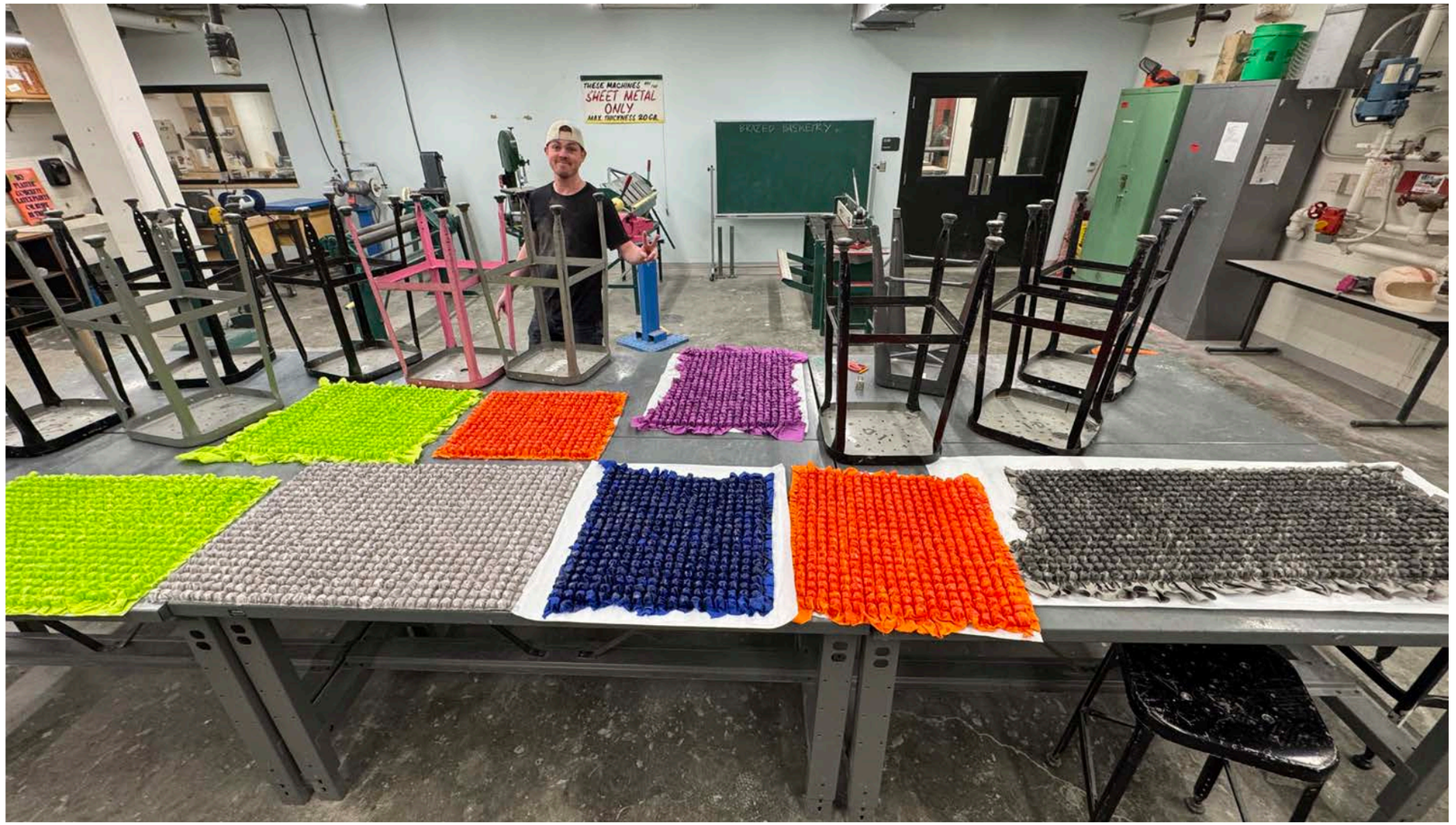


During the material study, Puff was fabricated by pressing ball bearings into a standard-sized cookie sheet (13”x18”, 0.75”x0.75” opening). Due to the scale and aspirations of this capstone, a 4’x4’ (0.98”x0.98” opening) wire mesh sheet was sourced. This allowed for larger panels but required tooling because the ball bearings would not create a consistent form throughout the sheet. The tooling features a 6-degree taper over a 1.5” length. This mimics a fingertip, the original tool used for the process.



The 4’x4’ mesh sheet and the tooling allowed for larger, more consistent, and faster fabrication of Puff, a necessity.





There was way more.

Redefine the MATERIAL through PROCESS and EXPERIMENTATION to PROVE ITS VALIDITY.

Furniture as the Experiment

The “Air Jordan Test” dubbed by Peter Chamberlain (UCID Professor)

Using the found process. Prove the Validity.

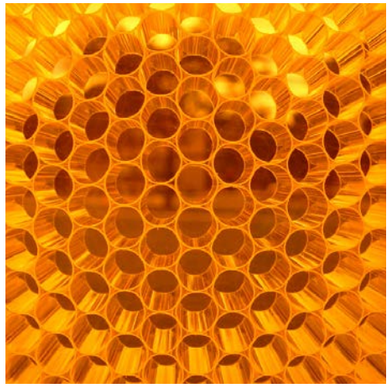
Experiment Phases:
1. TESTING
2. REFLECTION
3. VALIDITY

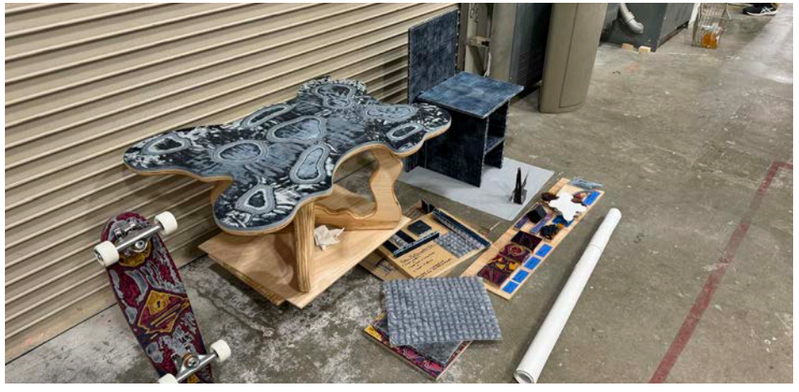
Initial Questions:
How do you design to prove validity?
How do you design for the unknown?
What is safe design?
What does fabric furniture look like?

HOW DO YOU DESIGN FOR THE UNKNOWN?

PRECEDENT.

Precedent





I am not the first person to design for the unknown. Many before me, have had the same questions I'm having now. So why not look to them for help and inspiration?

Test "LOOP": Willy Guhl Eternit Loop Chair

Fabricated in a seamless closed continuous loop, the chair was a bold and successful attempt for a material test. **Can Puff-Ply be used in a closed, continuous loop?**

Test 2 "CURVE": Eames DCW, Wegner Shell Chair

It is a timeless, classic piece of design that used a revolutionary process to mold plywood. Originally used for leg braces. **Can Puff-Ply be used in a curved form?**

Test 3 "SCALE": Sam LaRocco Bench

Any material supporting one human is valid. What about three? What if we break the plane? I initially looked into public benches; then my Instagram did its thing. **Can Puff-Ply be used at scale?**

Other processes and references were researched and discussed; however, in the end, this capstone is an experiment of

Puff-Ply: A process that produces fabric and resin structured and supported panels.

The Puff-Ply Collection is an experimental collection of furnishings focused on realizing the unknown. With a combination of non-traditional building materials (fabric and resin) and a common industrial process (corrugation), the collection pushes the limits of design and materiality.

Ideation

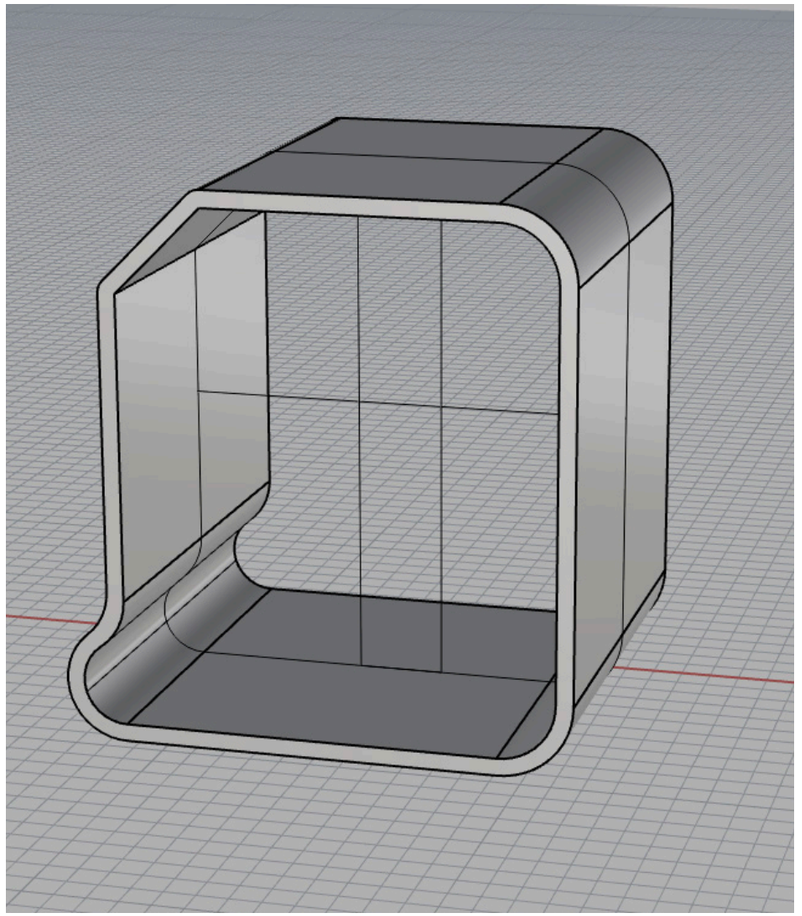
Multiple rounds of sketching, CAD, rapid prototyping, and full-scale orthographic were used before finalizing designs. When questions were raised around the material strength, I immediately referenced the precedent and continued to push for form rather than trying to make the test function.

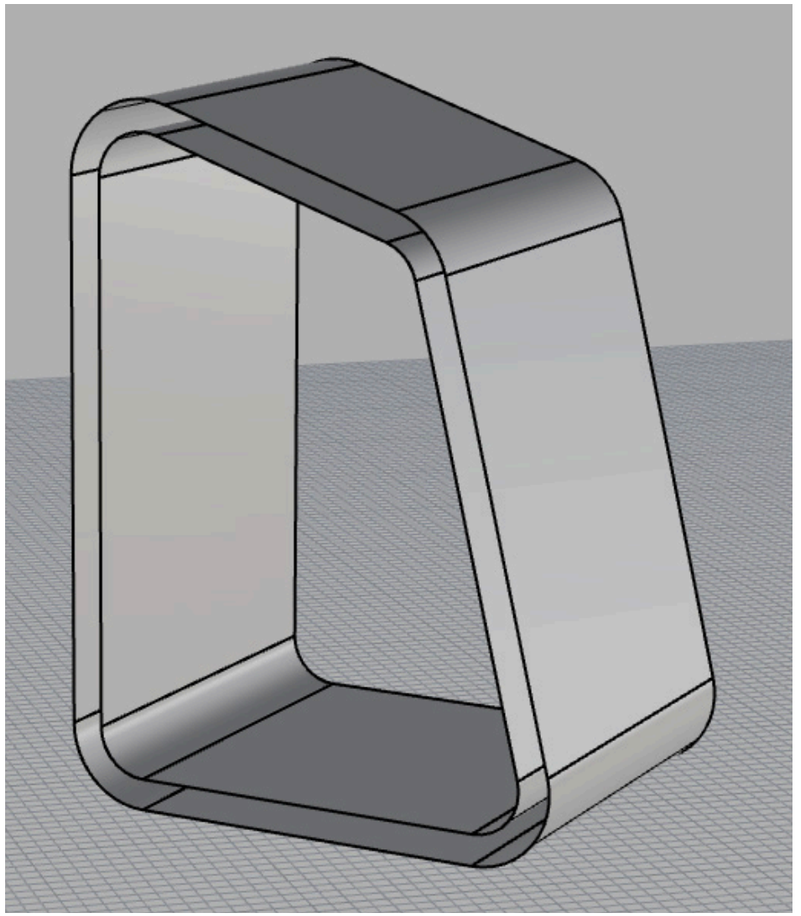
I went into fabrication with many unknowns, and **the only way to make the unknowns known was to make them physically—CAD cannot tell me if the material will work simply because I made the material.**

Minimal sketches are present in this process book: because there is a physical sketchbook.

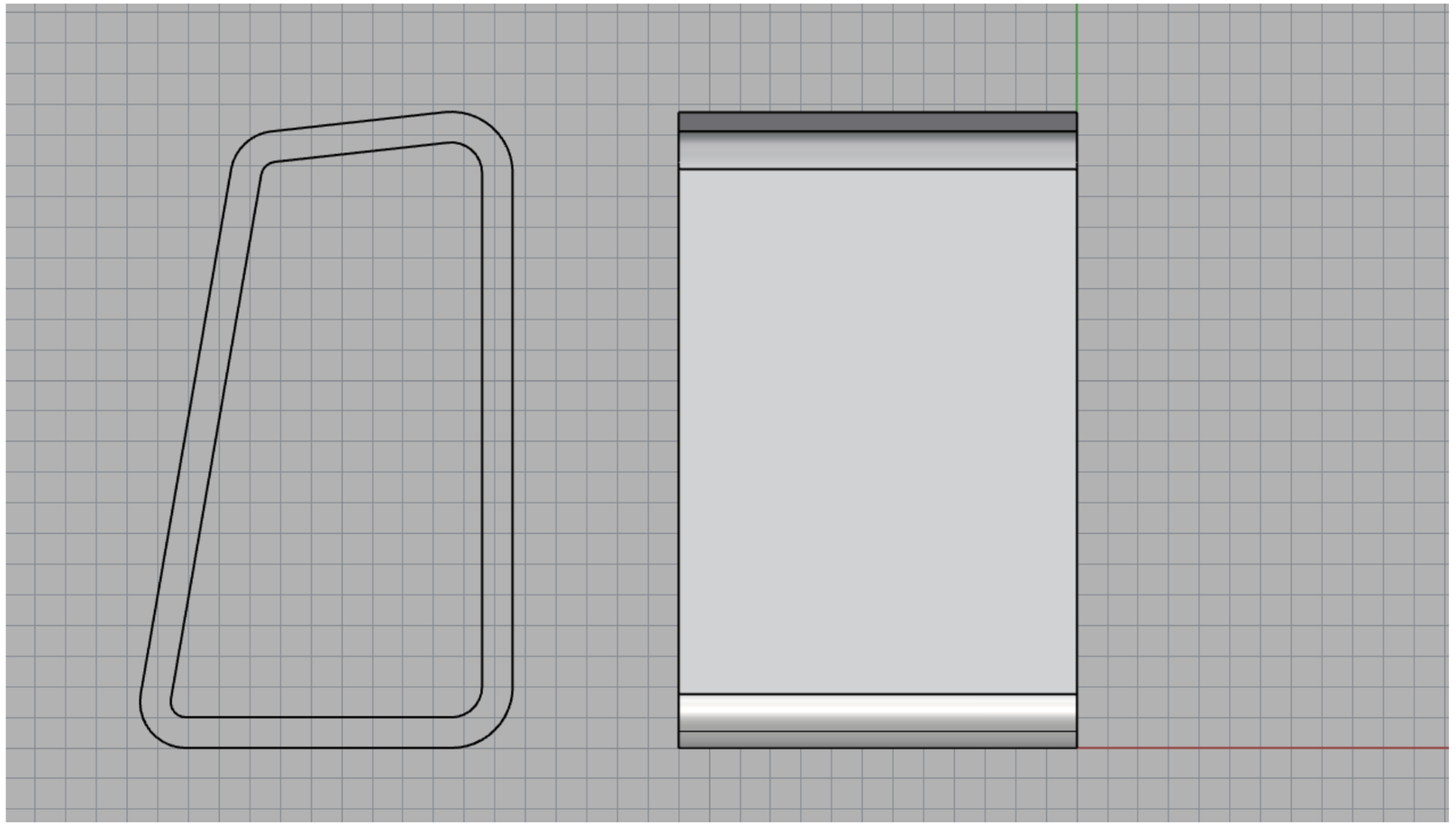
Test 1: LOOP Stool

I initially did too much with the design. I was trying for a rotating stool, but ultimately, I was unhappy and struggling for direction. Looking around, I saw John Dixon's Perch and started there for dimensions; since a perch seat angles forward, the force applied to the material is slightly different than that of a stool but, closer Guhl's initial test.





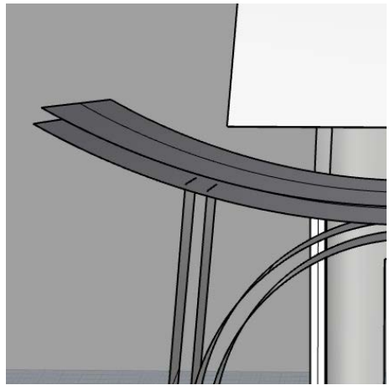
Test 1: LOOP Stool Final

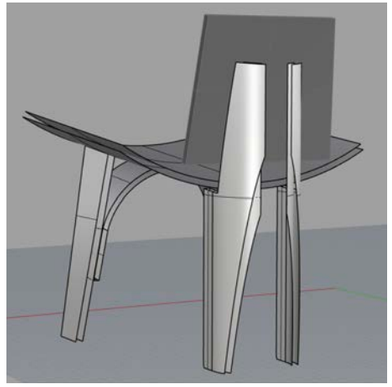


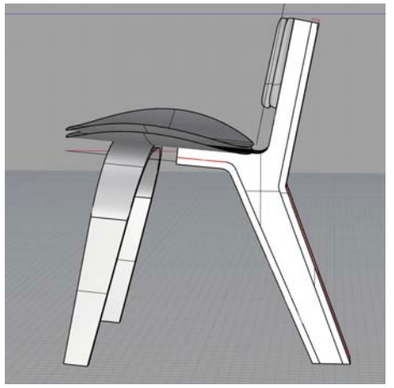
LOOP Stool
Seat Width: 13”
Seat Depth 8”
Seat Height: 21”

Questions:
Will this even hold its weight?
How am I going to get this off a mold?

Test 2: CURVE Task Chair

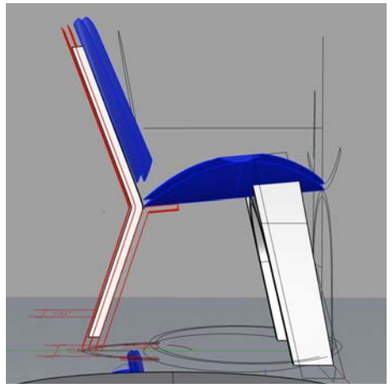


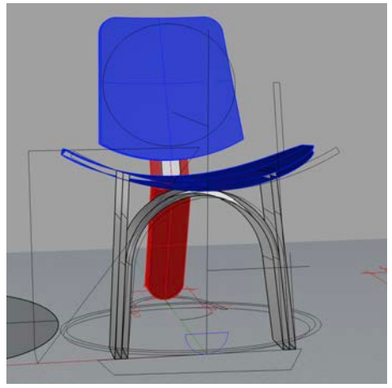


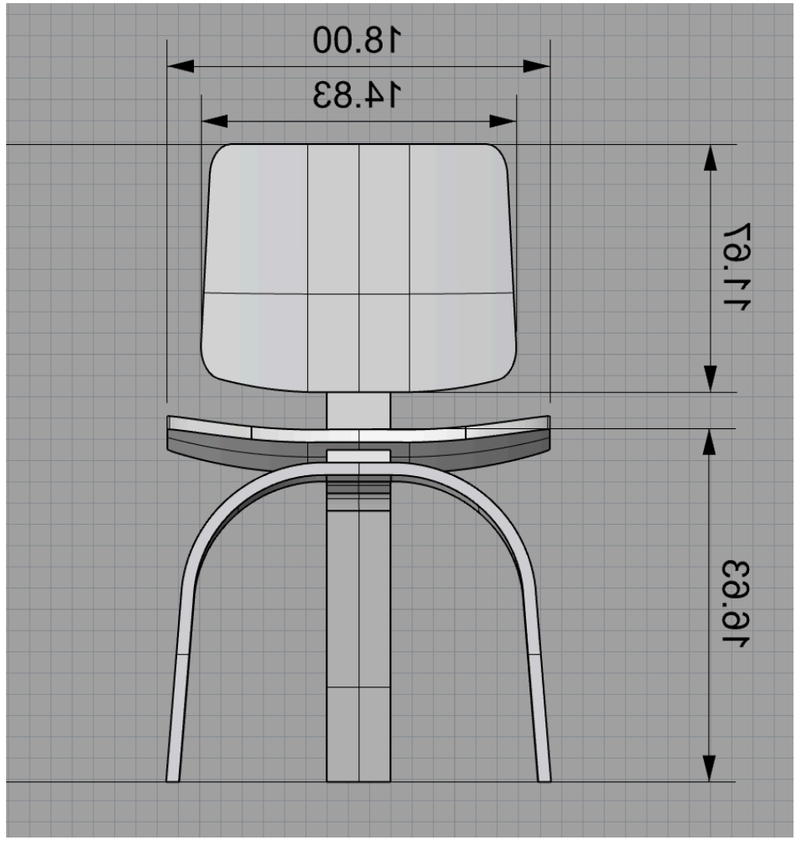


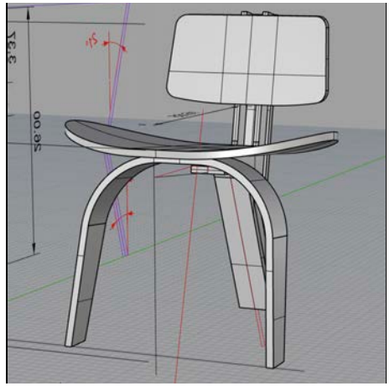
Referencing two iconic chairs, I had to tread carefully and ultimately went with a design that I initially thought was too close to the precedent, but when thinking back to the problem statement, isn't that the goal?

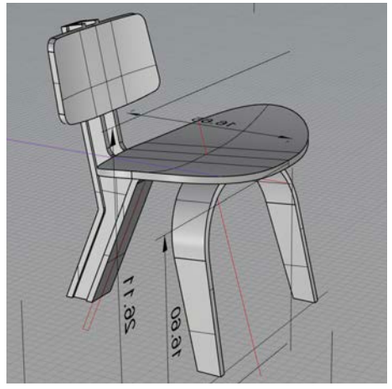
The back leg was a worry, but after a conversation with Rives (First "Air Jordan Test"), a decision was made to go all in and trust the material and the design. For the thickness of the Puff, CAD was initially defined to 0.6". After numerous tests, the new mesh sheet produced a 0.9" thick Puff.



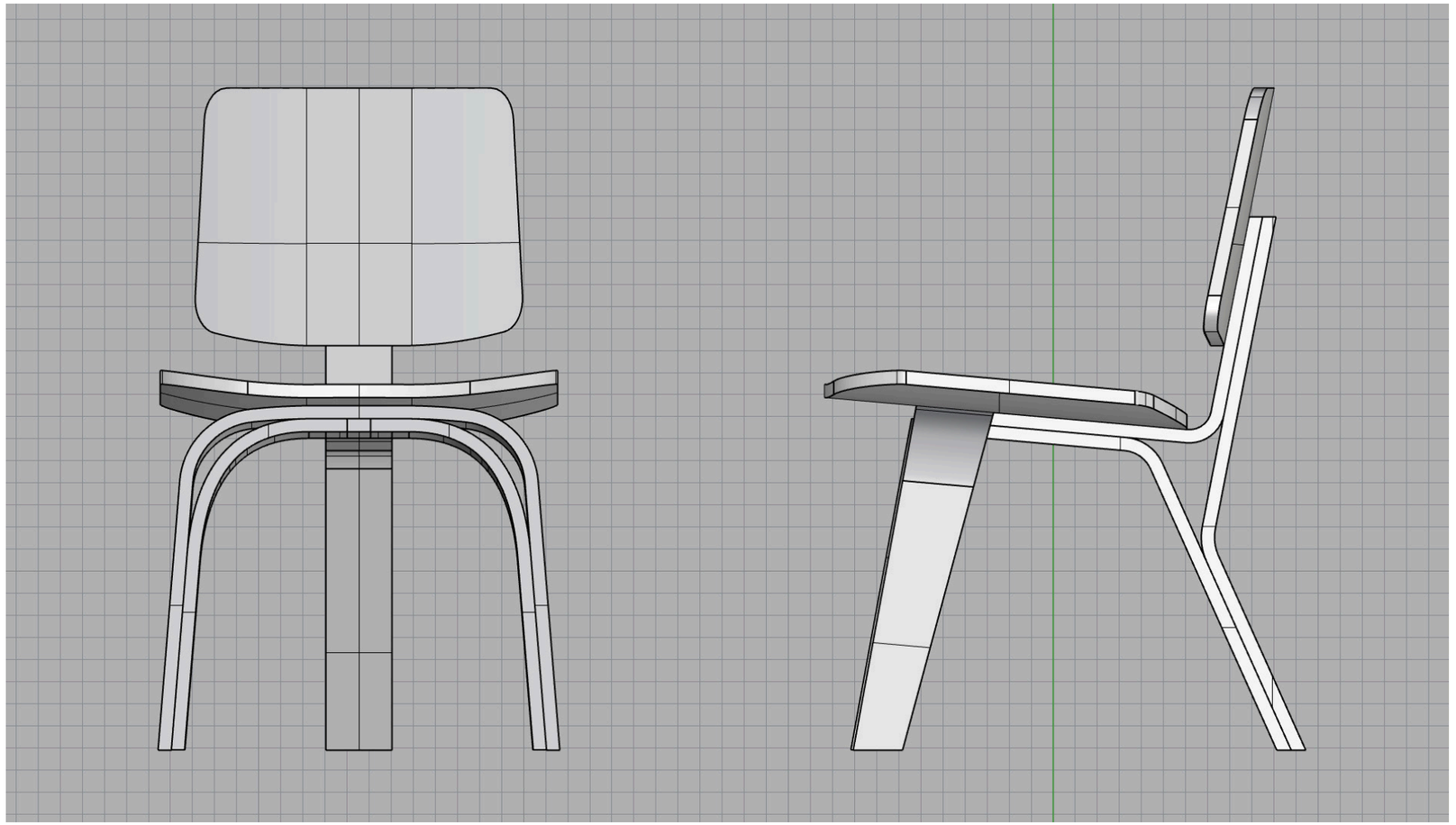








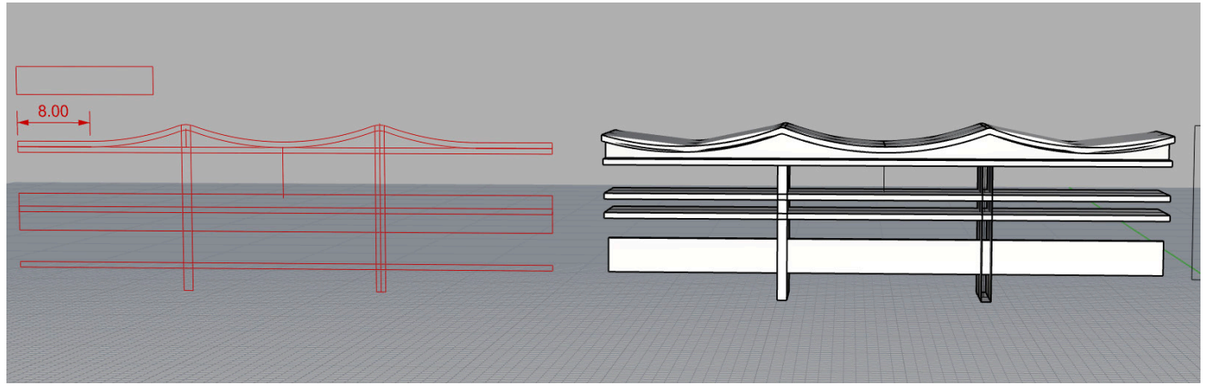
Test 2: CURVE Task Chair Final



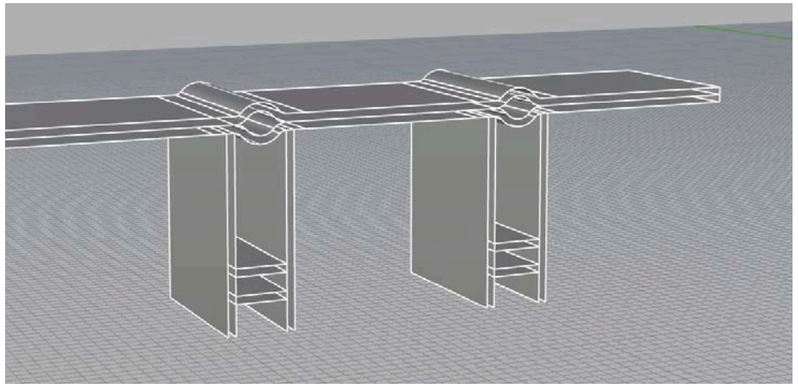
CURVE Task Chair
Seat Width: 18”
Seat Depth: 18”
Seat Height: 17”
Overall Height: 30”

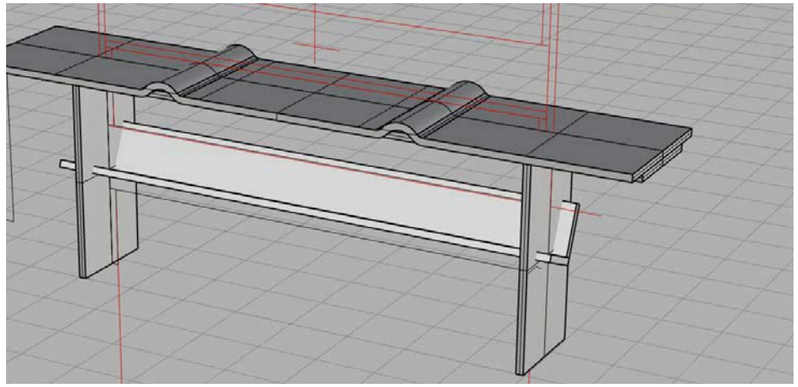
Questions:
What will fail first, the back leg, or the front?
Who is going to take the fall? Literally.

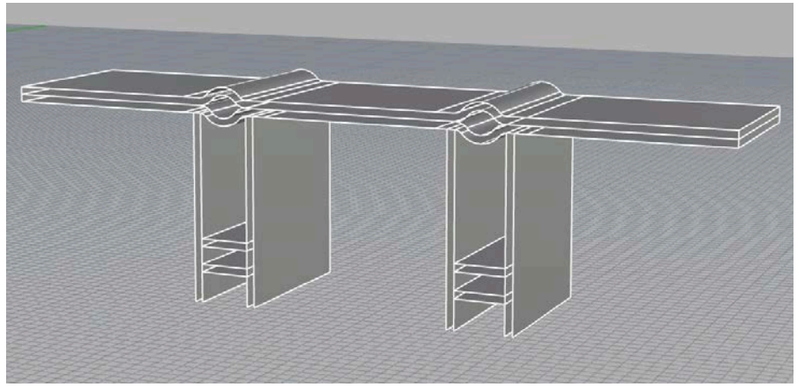
Test 3: SCALE Bench



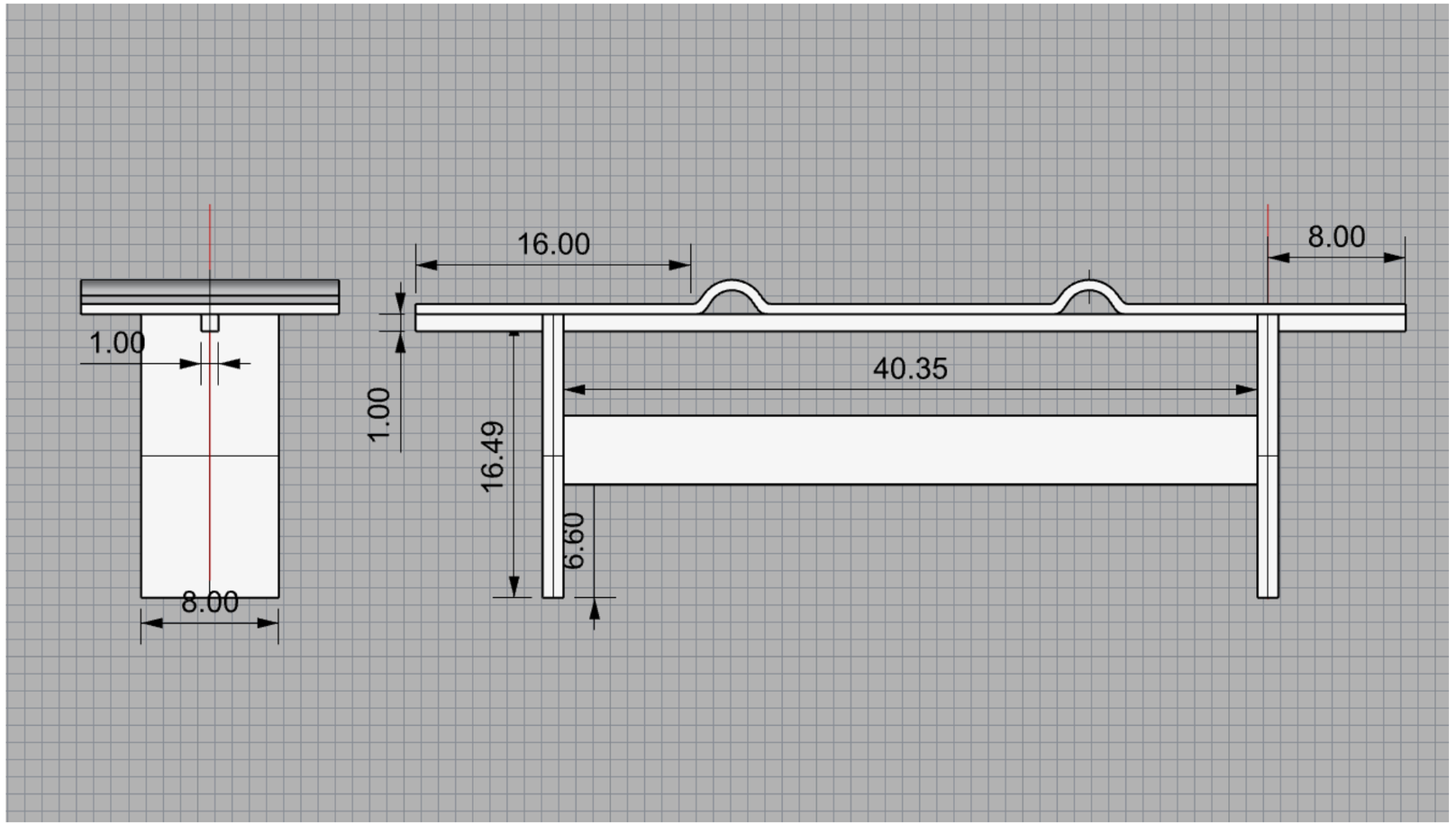
The “Scale” Bench focused on seating for three with the seating separated by a natural form or fabric “ripple.” Spanning over 40”, the outer seats are safe. But what about the center?
What if we go outside the world of design?







Test 3: SCALE Bench Final

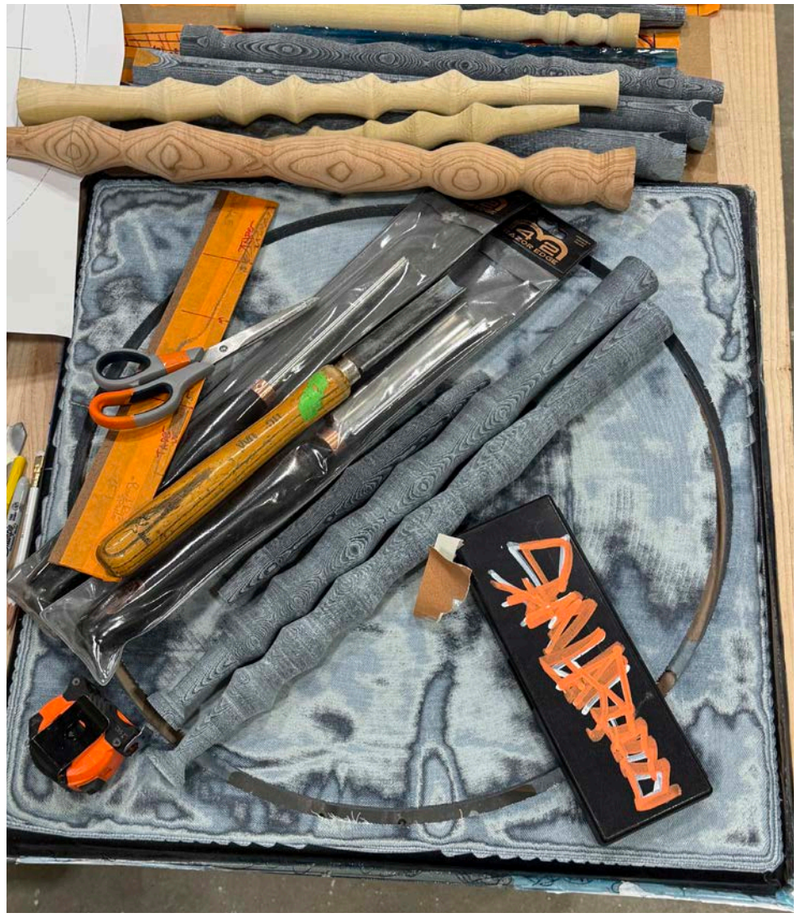


SCALE Bench
Seat Height: 17”
Seat Width: 16”
Seat Depth: 15.5”
Overall Length: 58”

Questions:
The outer seats are safe, what about the middle one?
Can I make a sheet of puff that big?
Does the mold need an offset?

WHAT DOES FABRIC STRUCTURED AND SUPPORTED FURNITURE LOOK LIKE?

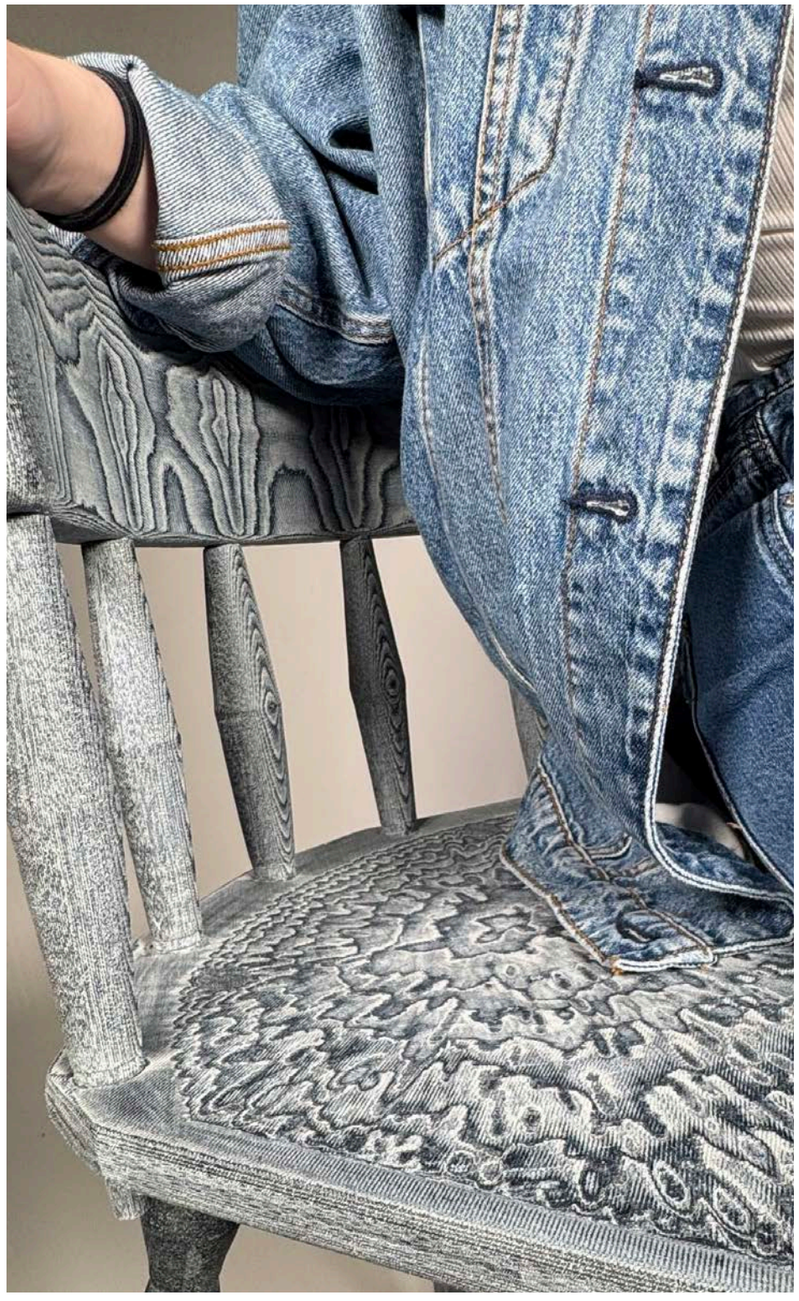
The Control



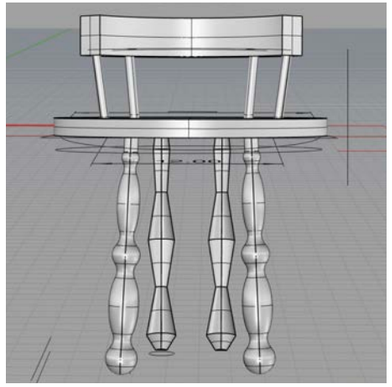
“The Denim Windsor”:
Layered, Carved, Turned, Hand Planed.

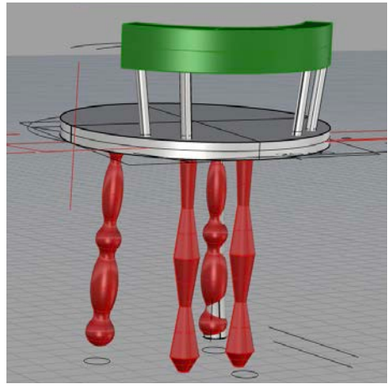
Supported by the volume of the material as well as providing the structure for form. The Denim Windsor is the control for fabric structured and fabric supported furniture.

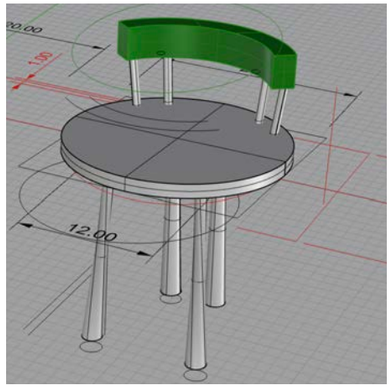
“Imagine a world where trees are made of resin and fabric. What would the chair look like?”

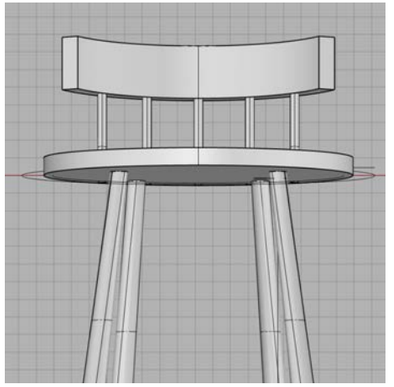


Control: Denim Windsor



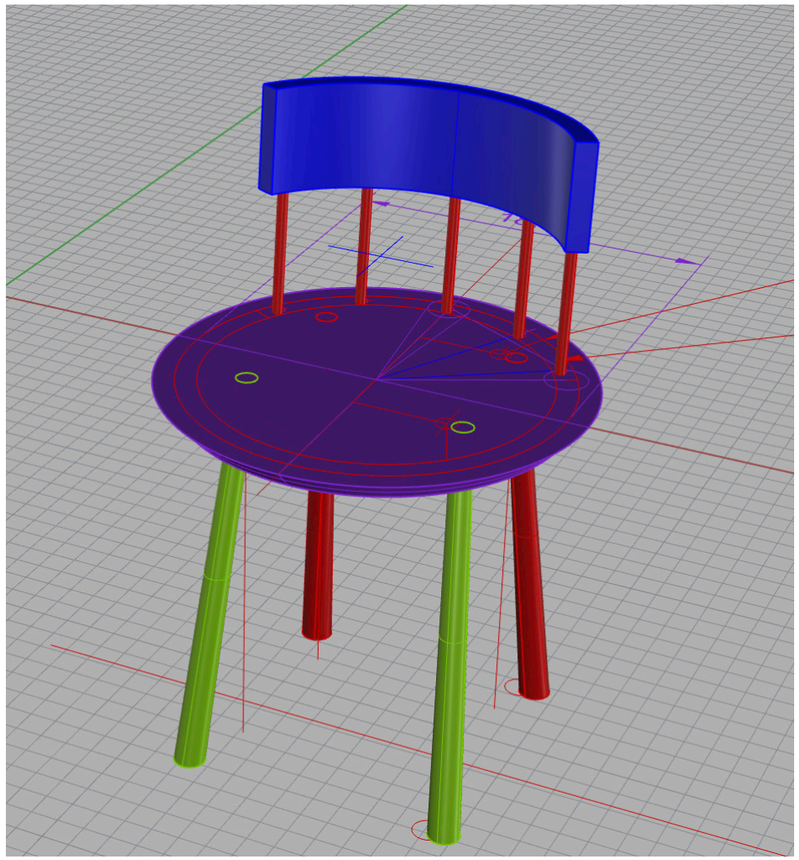




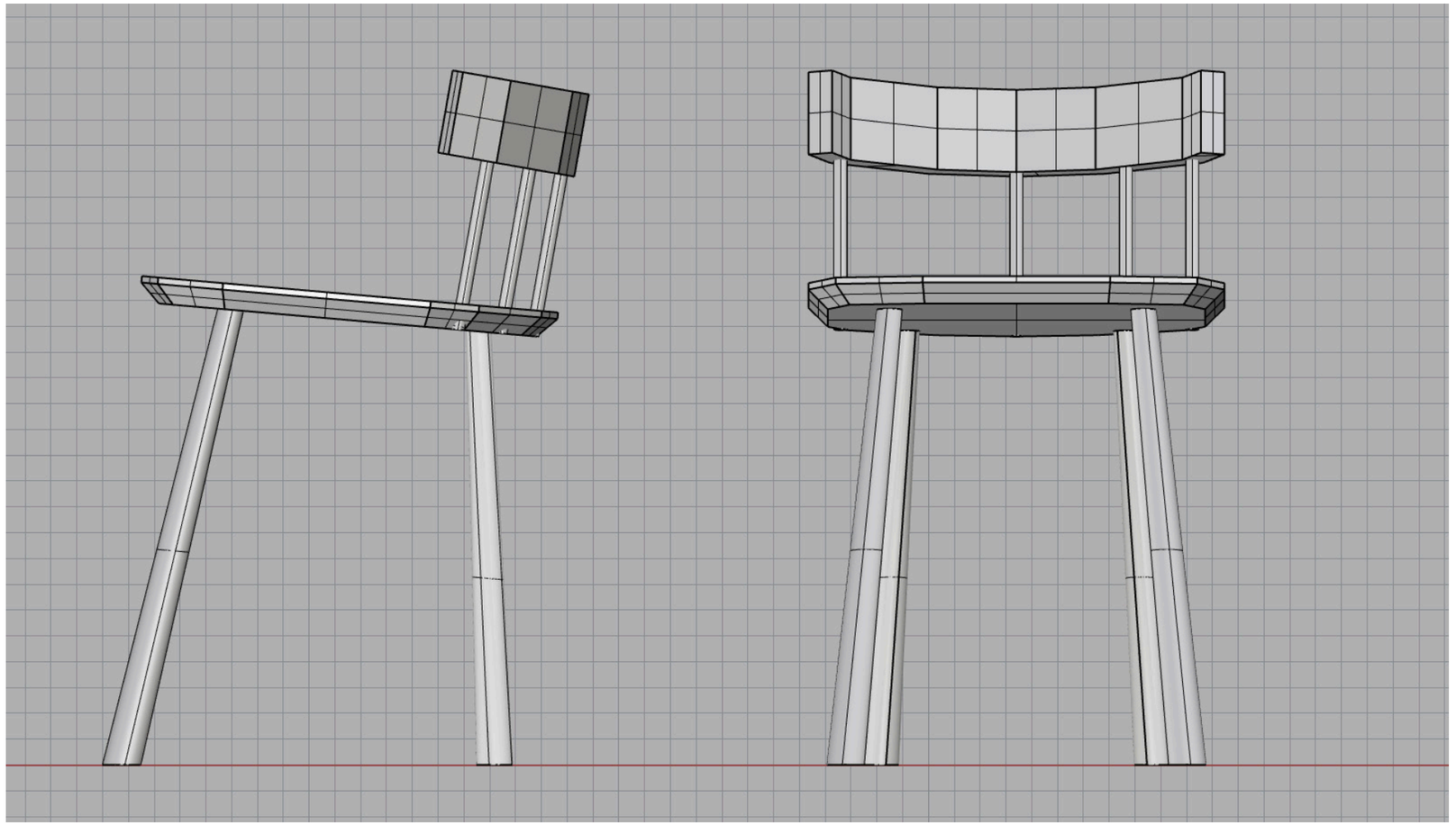


I fully recognize that a solid denim chair is not a common thing to think of or go through with, but that is a thing of the past.

The design of The Denim Windsor references and focuses on a clean, simple, and “familiar” form. Showcasing the material was the first goal. The second was don’t distract it with a bad form. Building on the known and unknown elements from my previous material study, I pushed for a funkier expression — especially in the legs, where the material had an opportunity to truly shine.



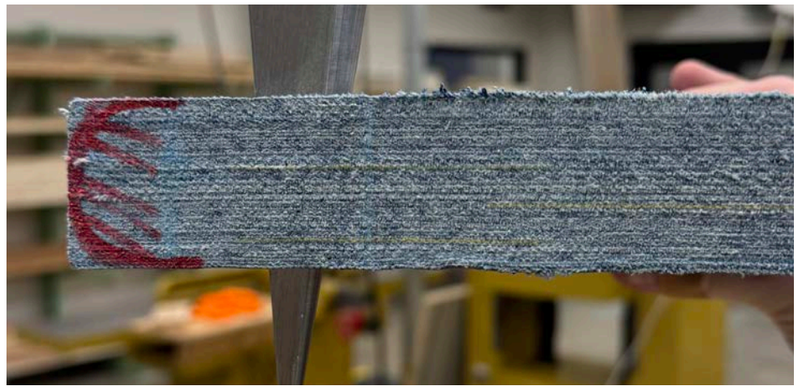
Control: Denim Windsor Final

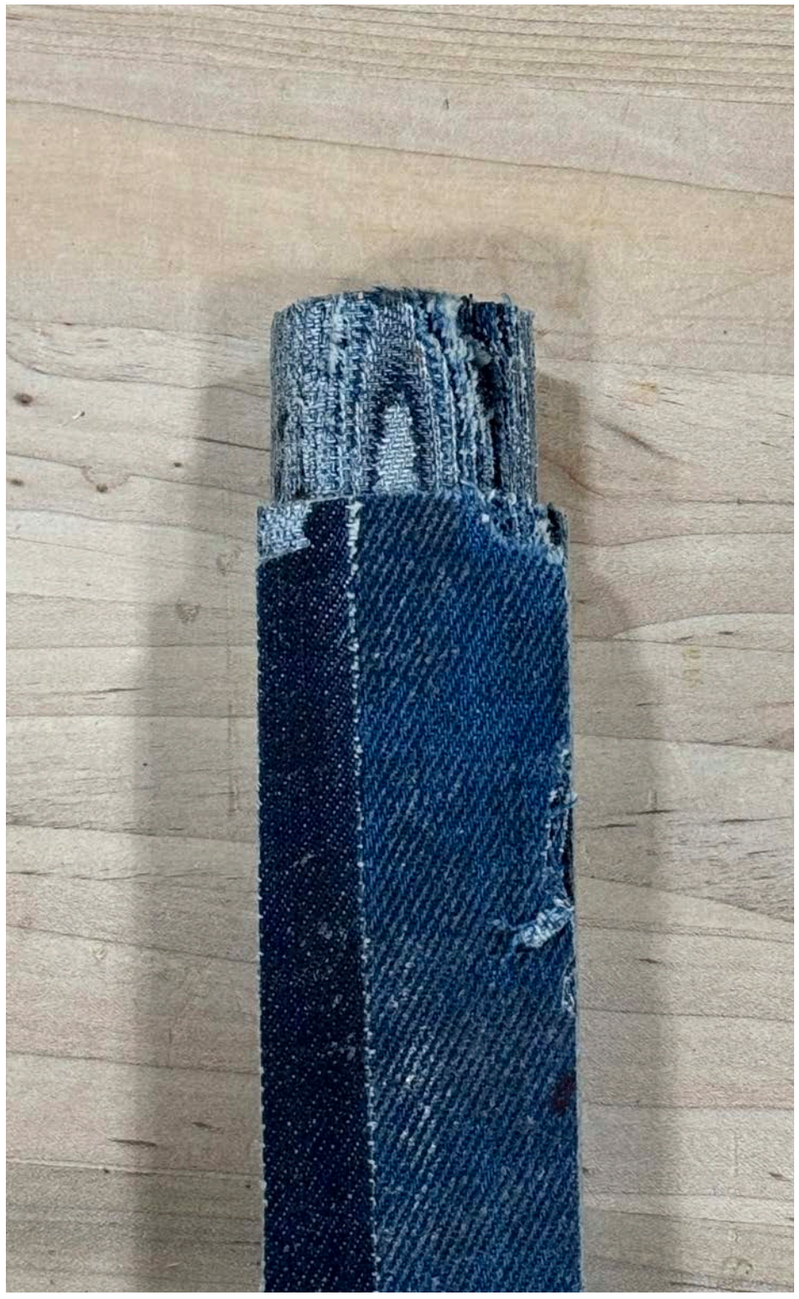


The Denim Windsor
Seat Height: 17”
Seath Depth: 14”
Back Rest Height: 22”
36 yards of fabric

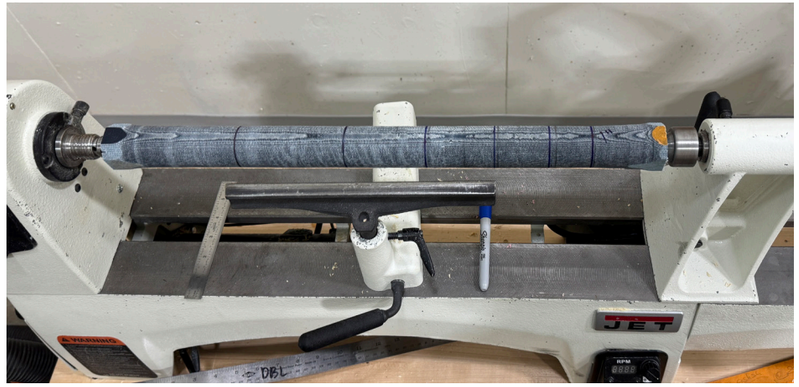
Questions:
Is this even possible?
Will this need a stretcher?

The Damascus Denim effect is achieved by layering alternating washes of denim with resin and then processing the material to reveal the unknown pattern. For the legs, 60 layers were laminated and pressed to fabricate 1.5” diameter legs. The seat blank is 50 layers and was sent to the CNC to ensure a flat surface for fabrication.

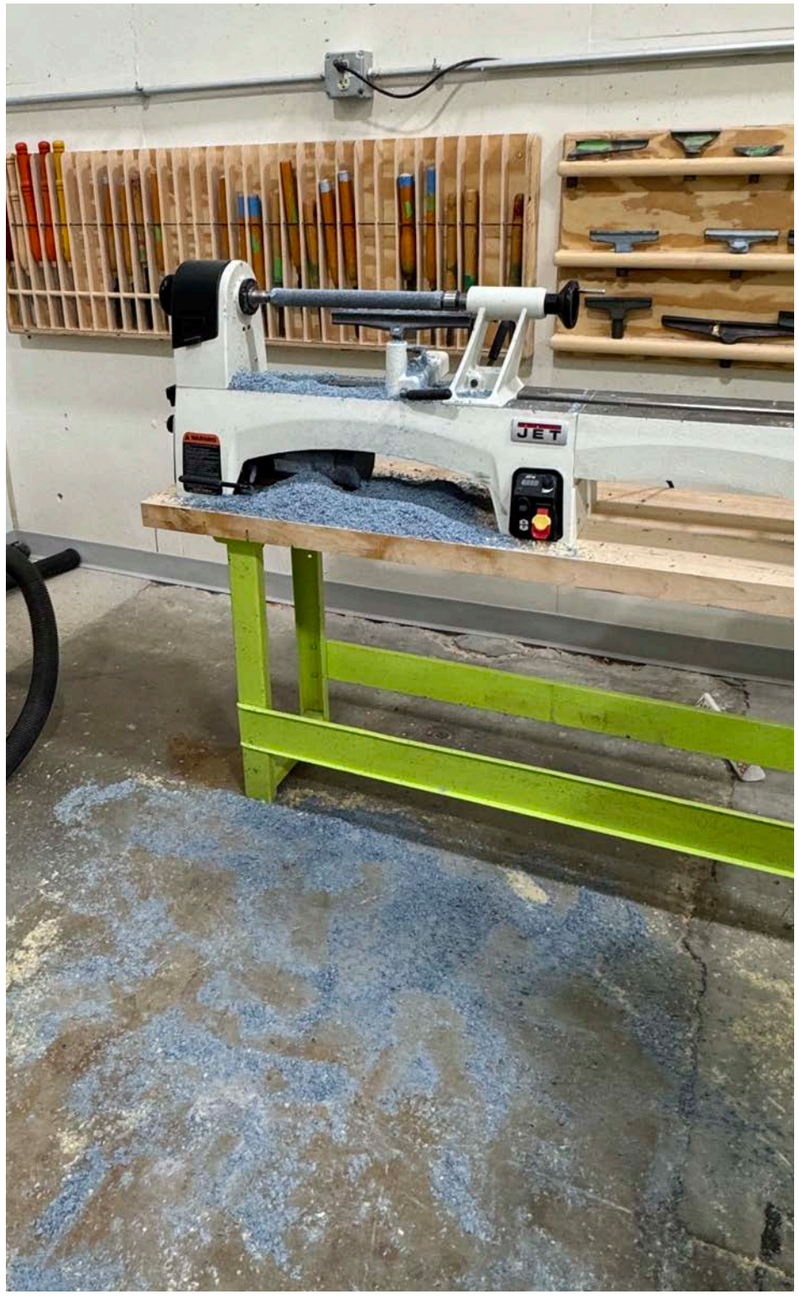




After fabricating the leg blanks, I spent some time roughing cylinder blanks. Why?
1. To get more comfortable turning. 2. Ensure there were no fatal flaws in the integrity of the material.
3. To define the largest diameter for the legs.


JET


Bell lathes
Front
to cut back
2.25"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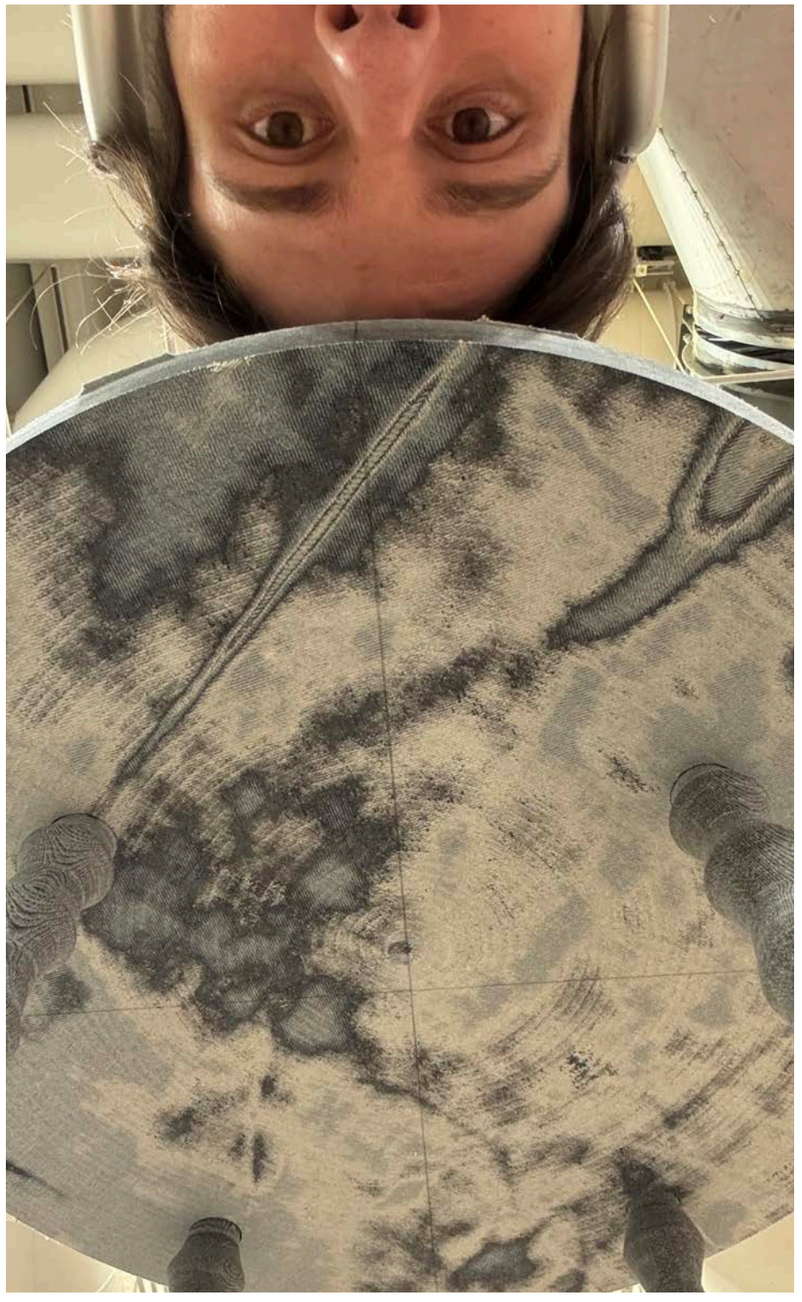
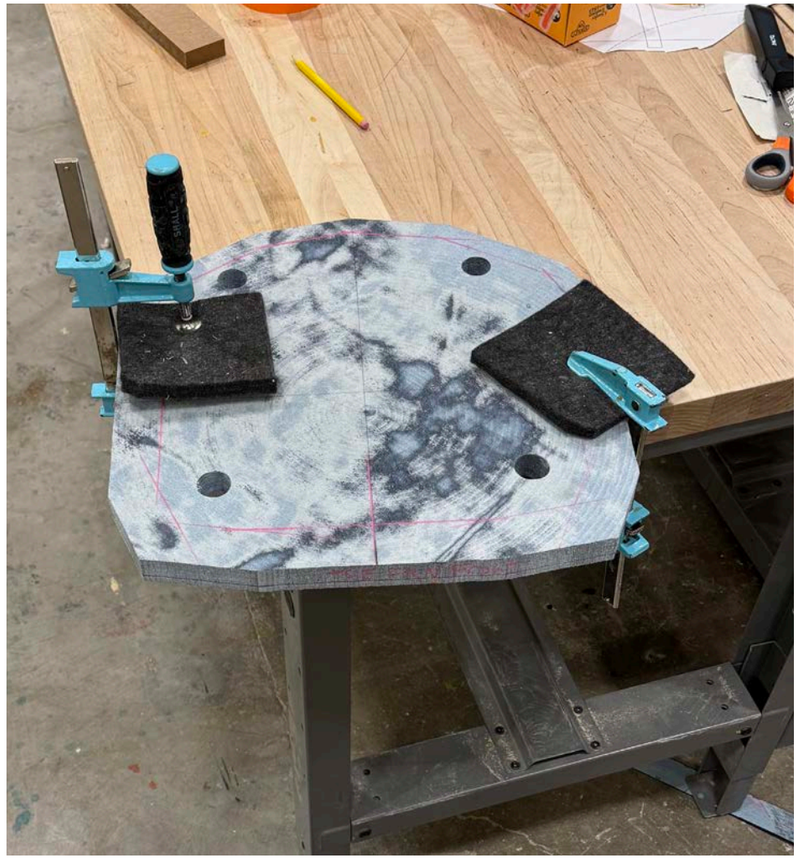
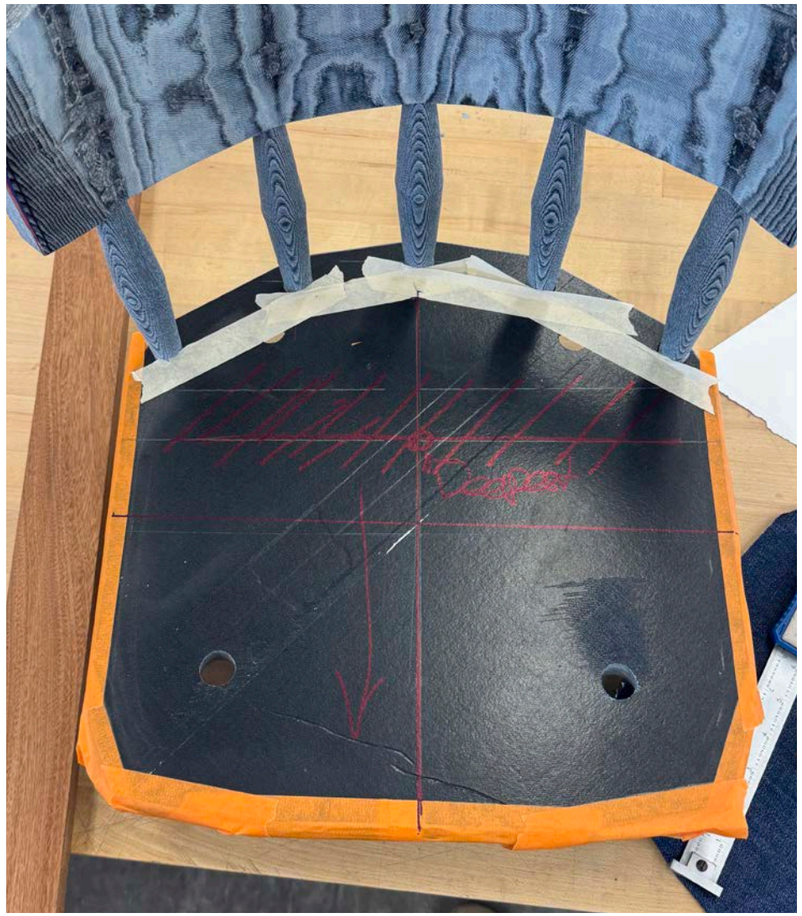
FIRE
DON'T
TOUCH
YOUR FACE


FACE MASKS

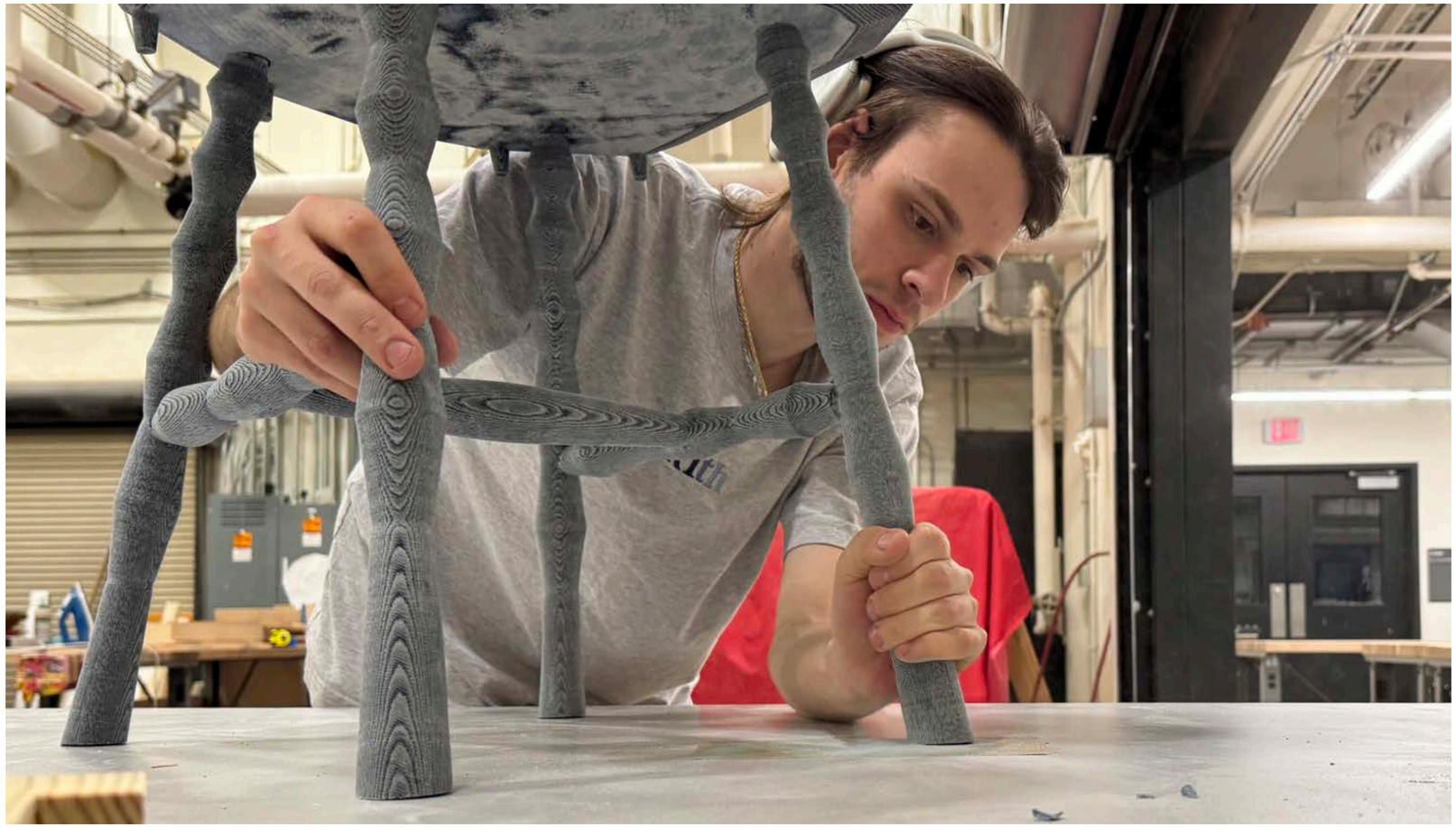





Goldblatt
0AL



Carving the seat took 12 hours. Every strike of the mallet was intentional since there was no backup plan. Carving direction and depth were a main priority and a focal point to ensure a properly functioning carved seat. The revealed pattern was a result of the carving process and a natural occurrence.



This chair exemplifies taking an “unreal” idea into a physical reality. After the summer critique, I had the idea for a solid Damascus chair. The only thing it required was planning, ideation, and execution. This was a battle with many ups and downs, from Joann’s going bankrupt to someone’s blood (hopefully not, but it was) on the legs. This chair was a challenge, and is a prototype. It will be happening again.
The Denim Windsor will be featured at the Jonald Dudd Exhibition during NYCxDESIGN 2025.

Back to the task at hand. **PUFF!**

Process: Stool

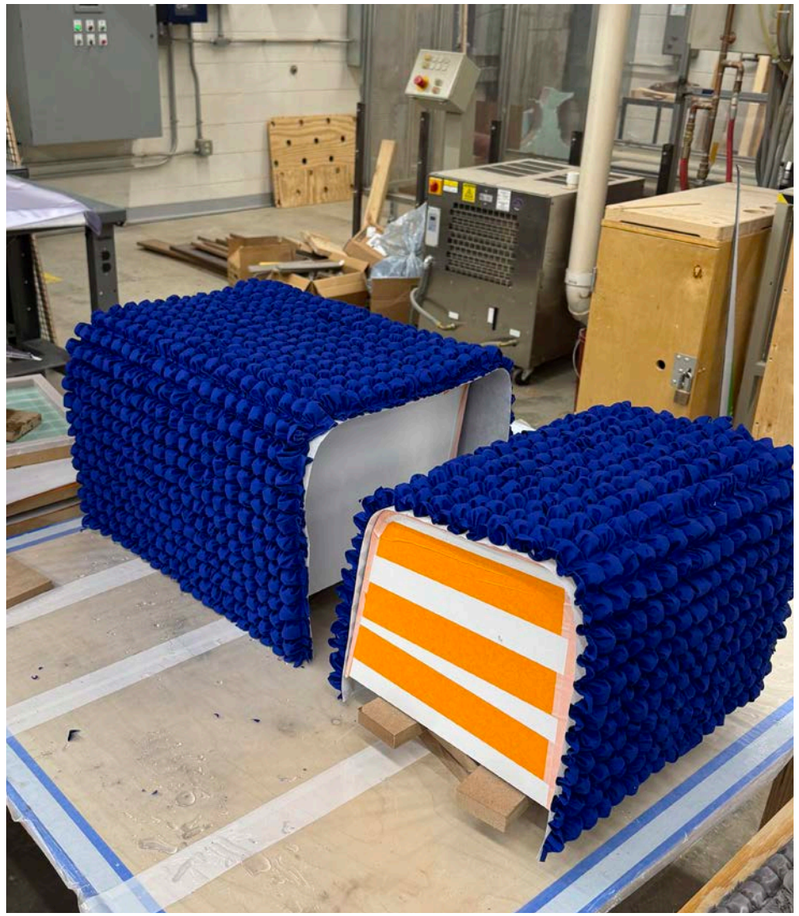
The stool fabrication process involved only a single internal mold, that the Puff and denim were formed around.

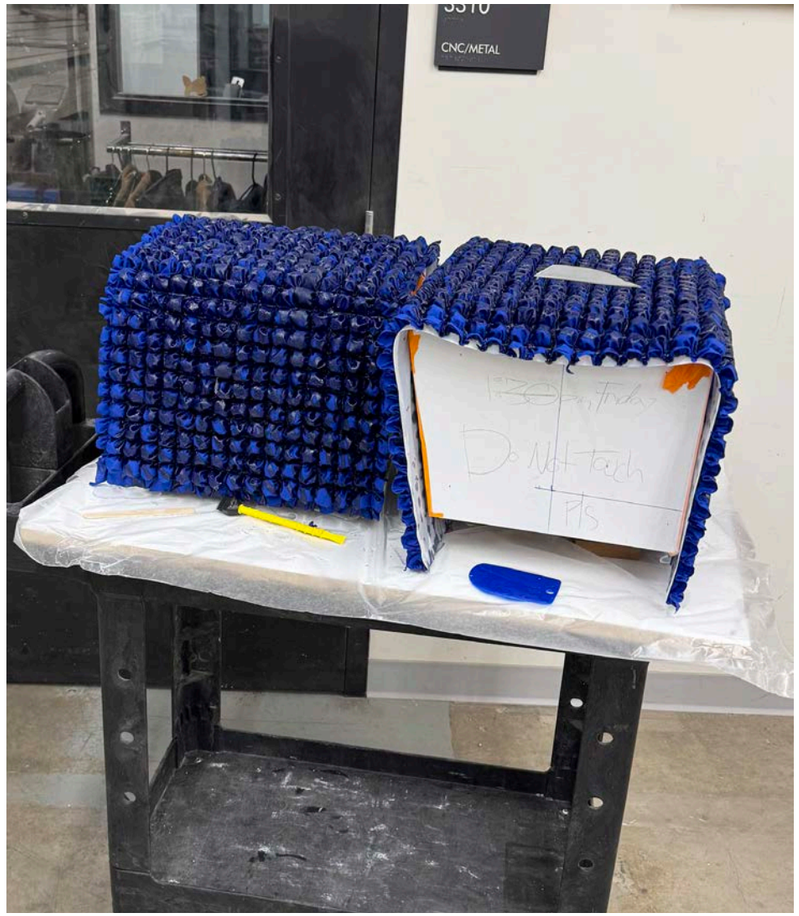
Component Fabrication:

1. Initial Denim Resin - Vac Bag
2. Puff Initial resin - Split Mold
3. Initial Resin Flat supports
(Allowed for even pressing)
4. Cure for 36 hours

Stool Assembly:

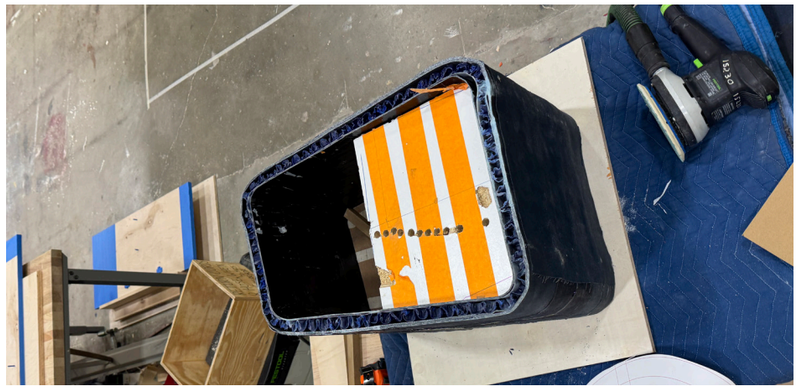
1. Clamp flat supports to flat sides
2. Wrap with denim and clamp
3. Cure for 36 hours
4. Demold and trim (simple in theory)

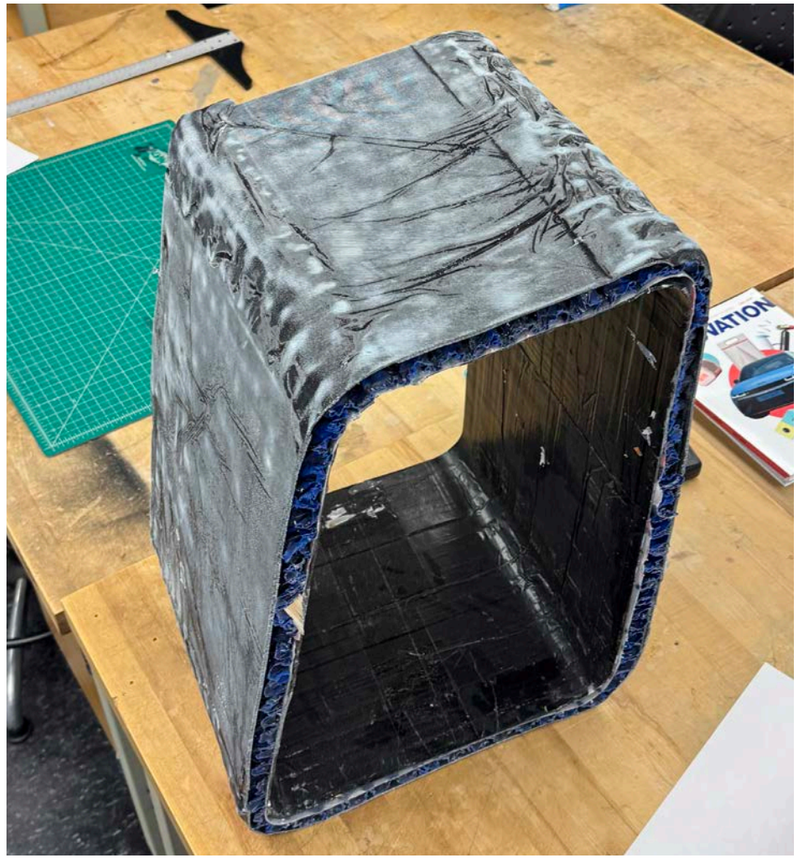


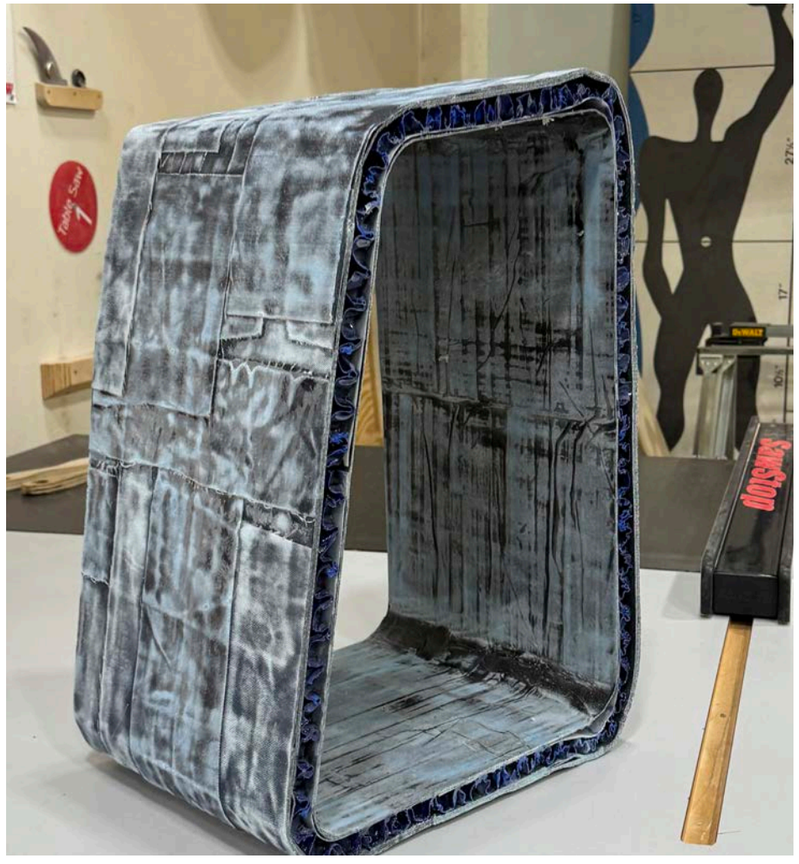


The split mold allowed for the Puff to fully cure while matchin the form, while also allowing for easy removal, when wrapped and cured with denim.

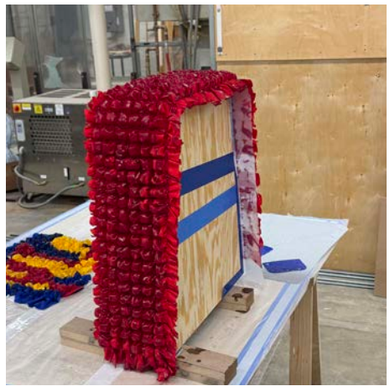
The plan was to sand whatever came out of the mold, however in the corners some Puff was too prominent in the surface and needed to be smoothed. To resolve this issue, I wrapped the stool with scraps from the project.







Process: Task Chair



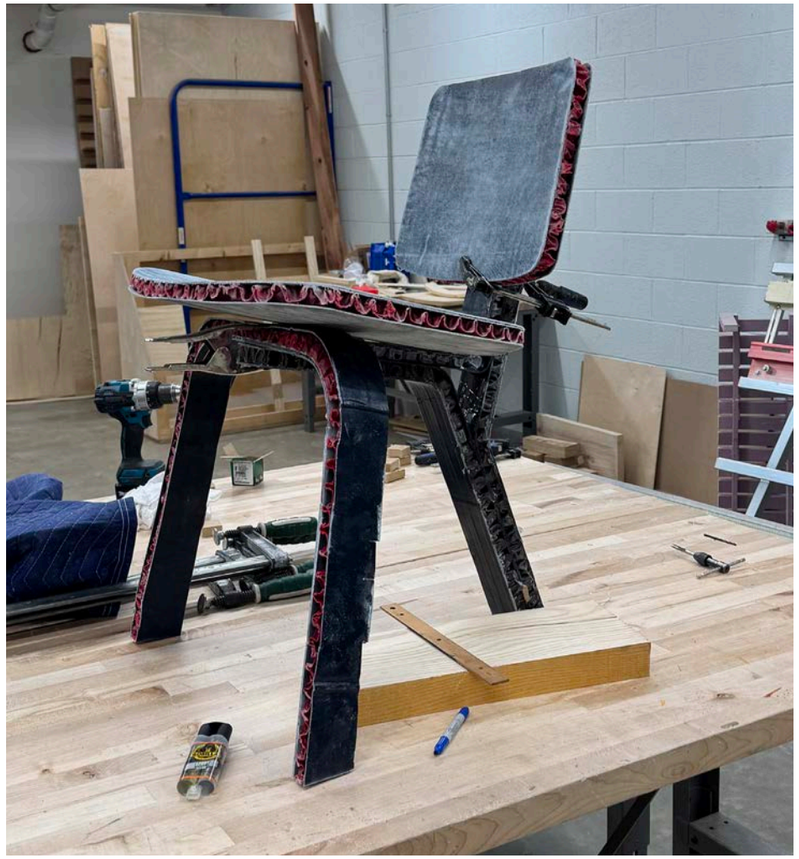
The Task Chair fabrication process included six molds.
(3) Back Leg, (2) Front Leg, (1) Seat and Back Rest

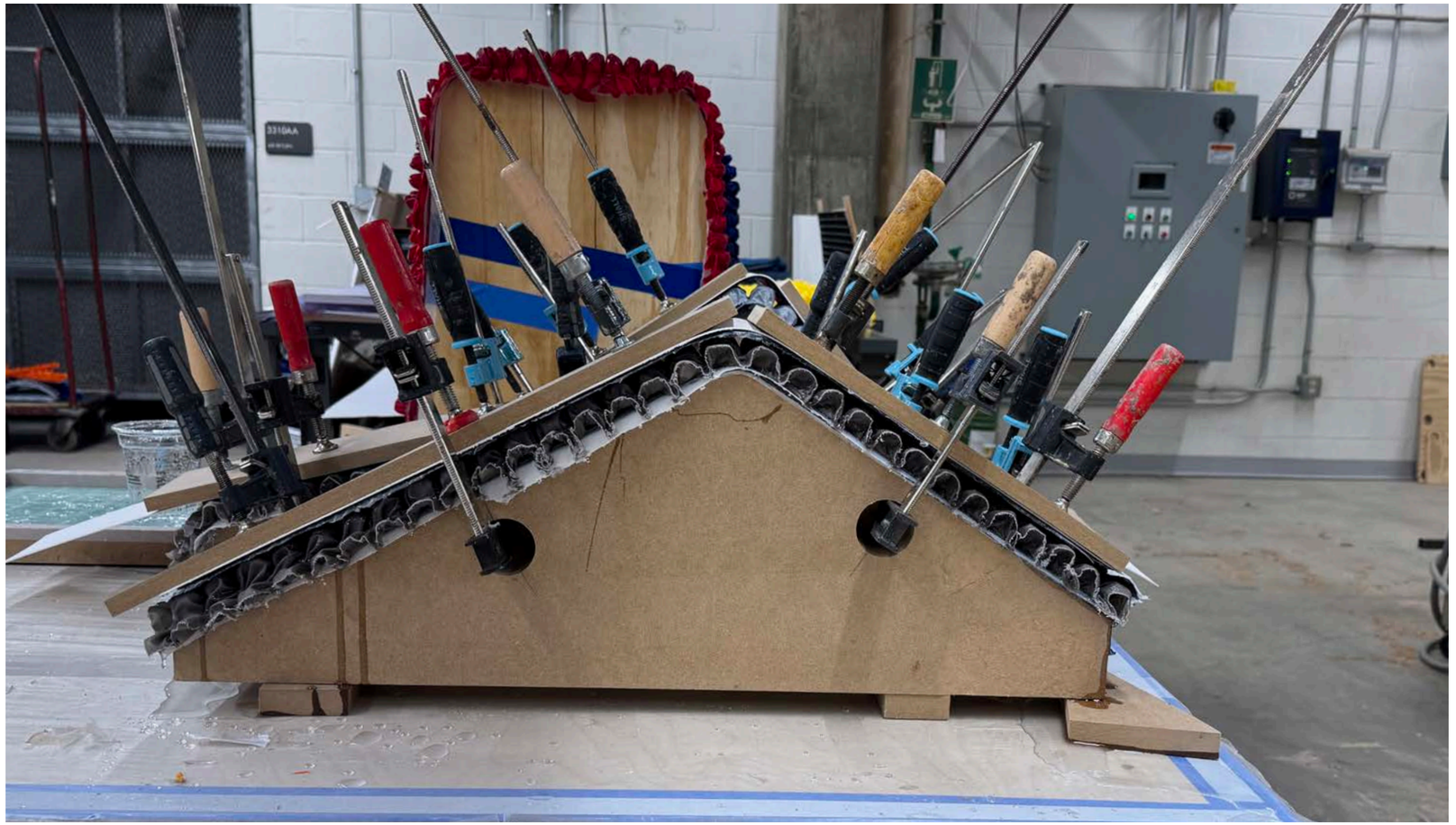
Challenges faced during fabrication:

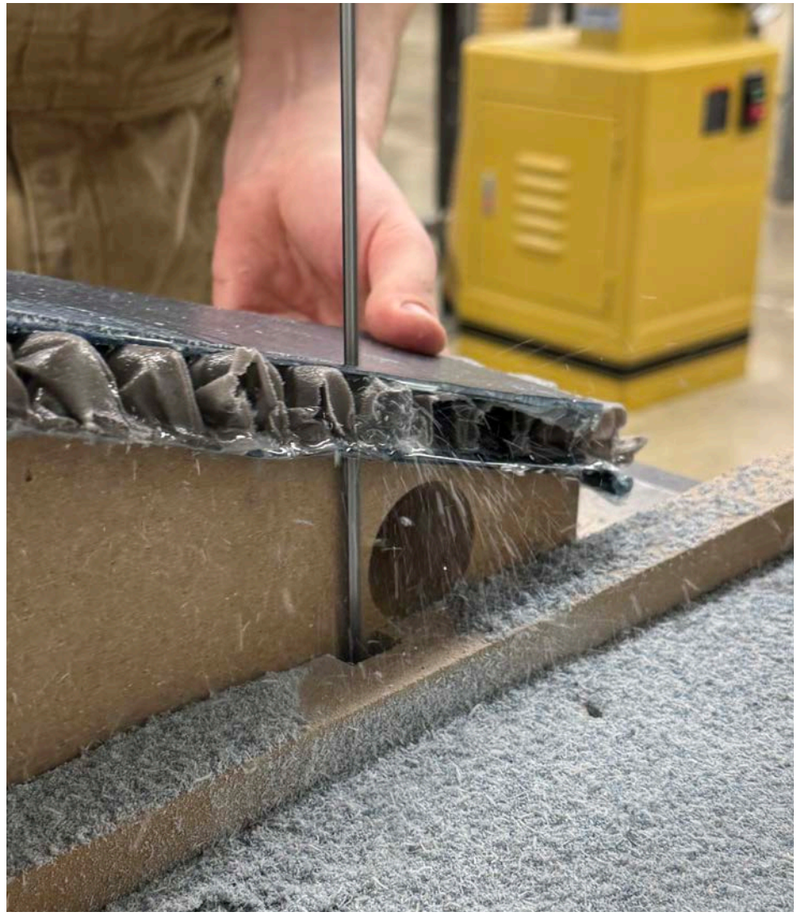
1. Front Leg poor contact between layers
2. Trimming front leg (too large)
3. Splay of front leg

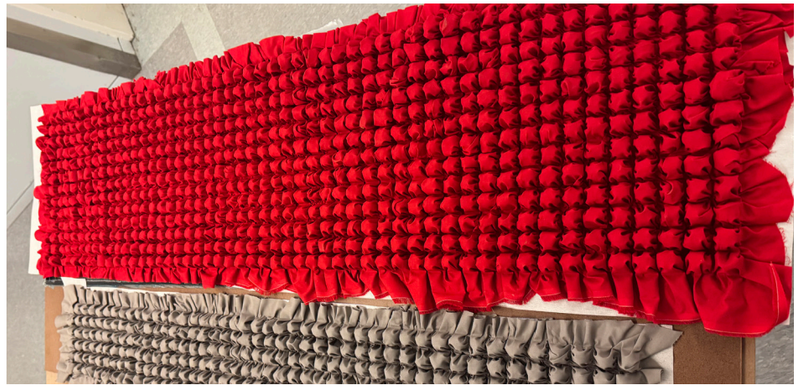
Solutions:

1. Top mold and wrap fabrication
2. Clamps, Blocks, Japanese Saw
3. Second Internal Leg Addition

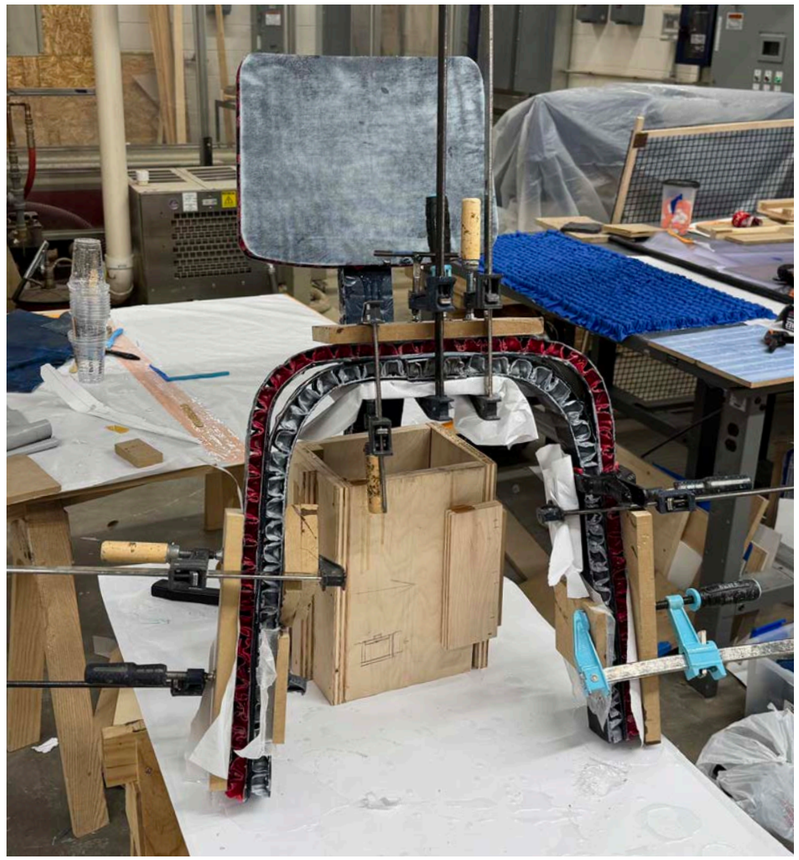


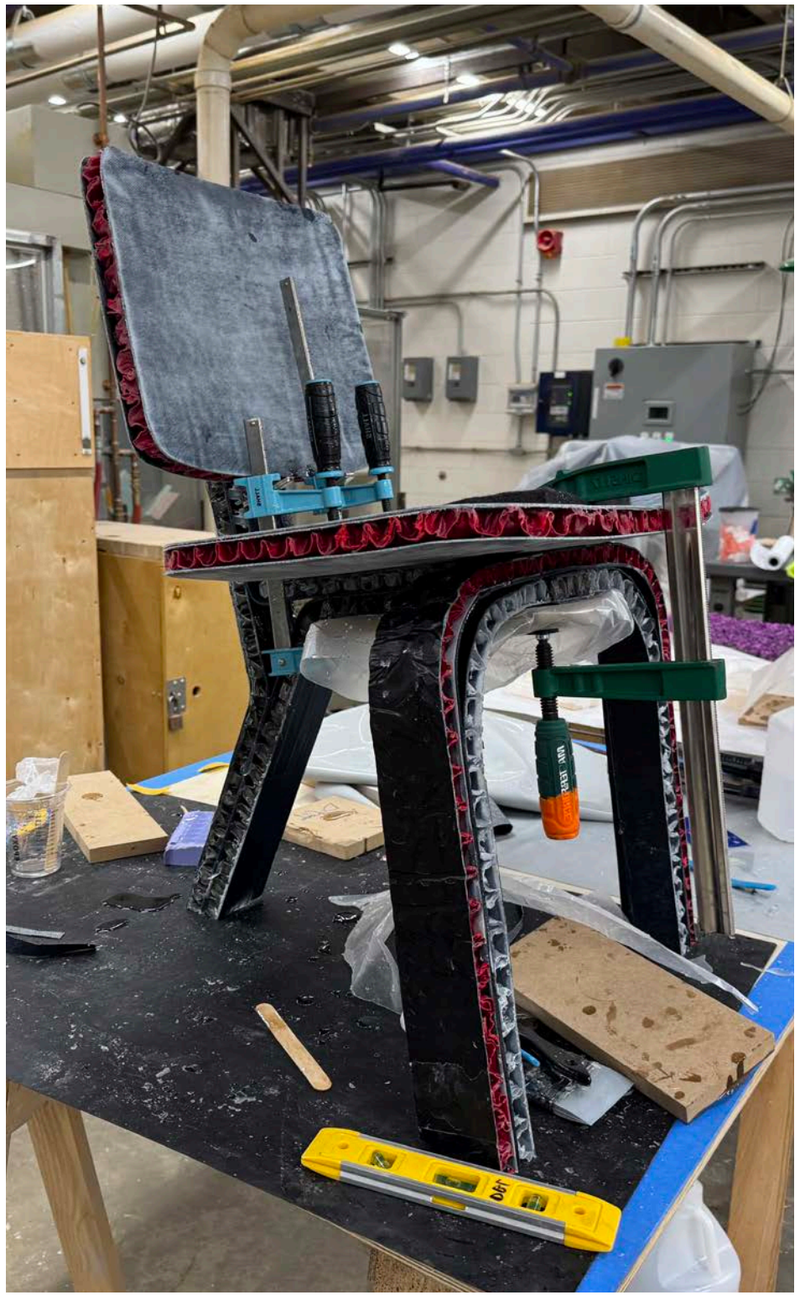


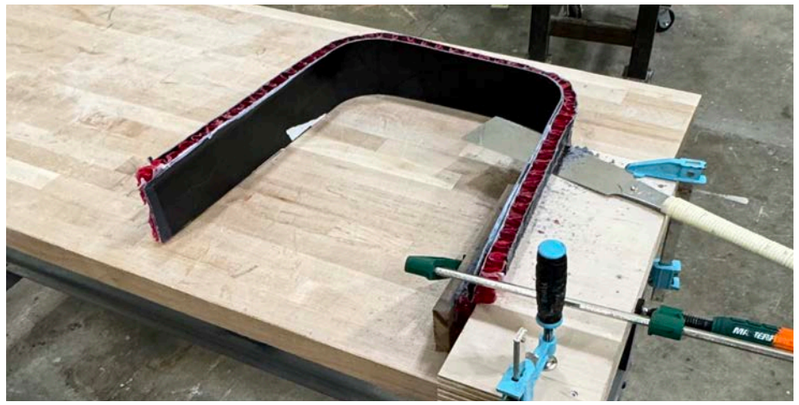


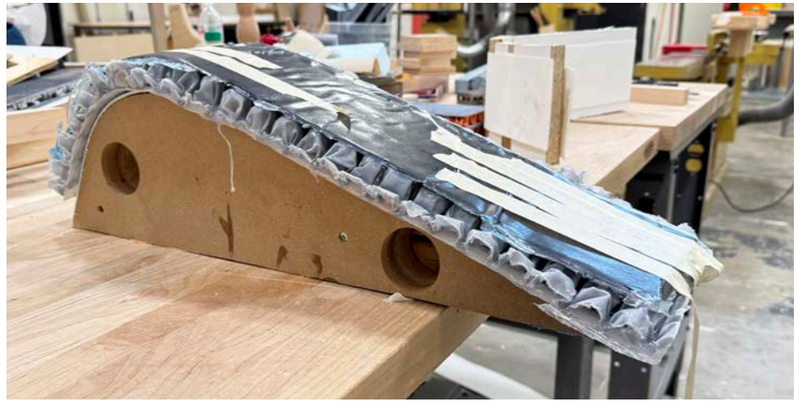


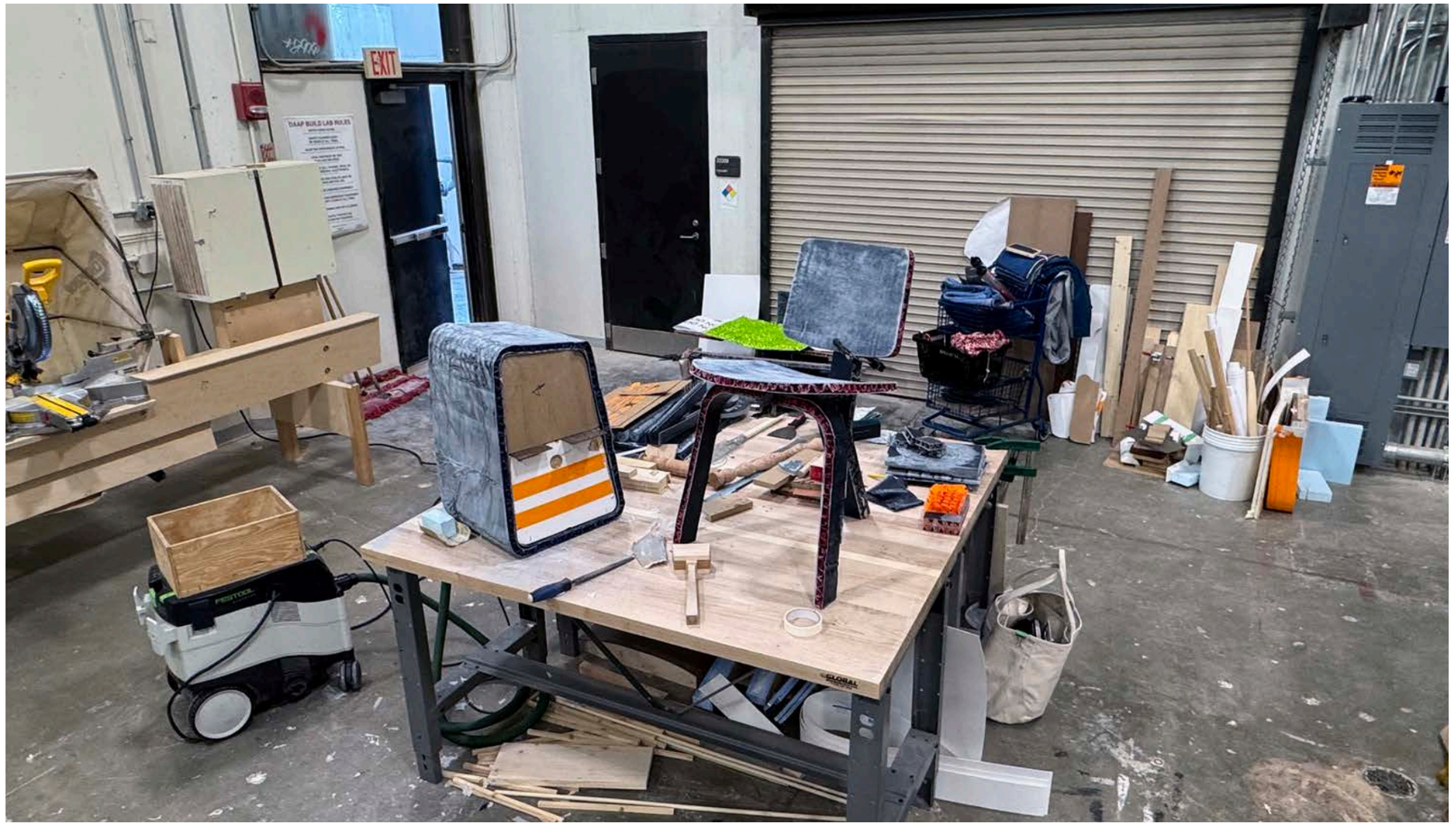

EXIT
ROCKLER®











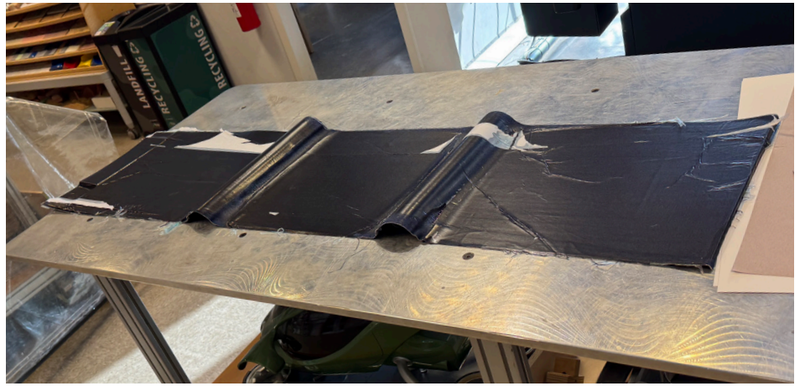
I apologize for taking up too much room. Not really. No one stopped me.

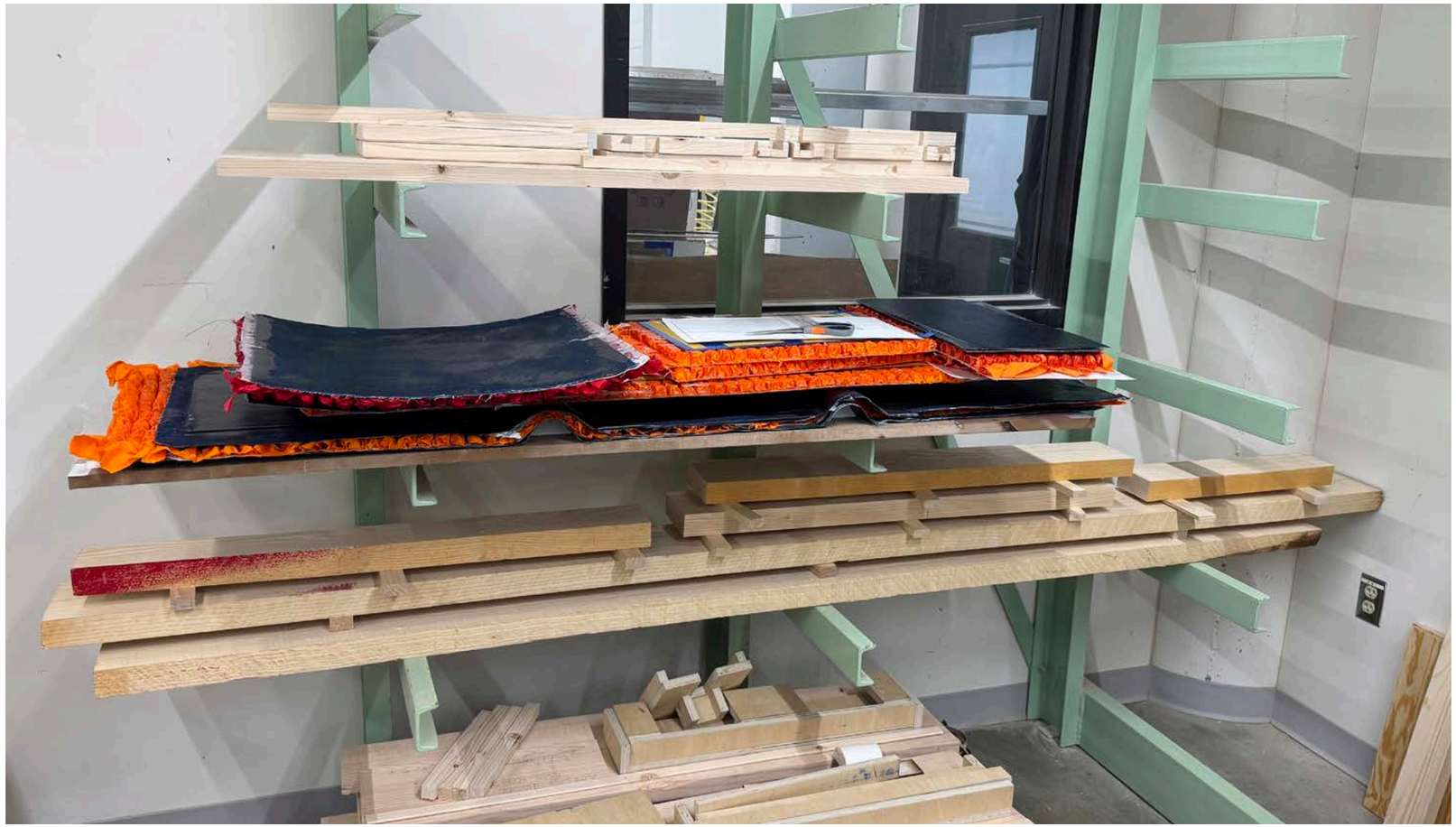
Process - Bench

The bench fabrication process centered around the seat mold. Spanning over 55”, the seat surface was vacuum molded with 3D prints to form the “fabric ripples”. With one mold, I was able to fabricate all seat components as well as assemble the panel

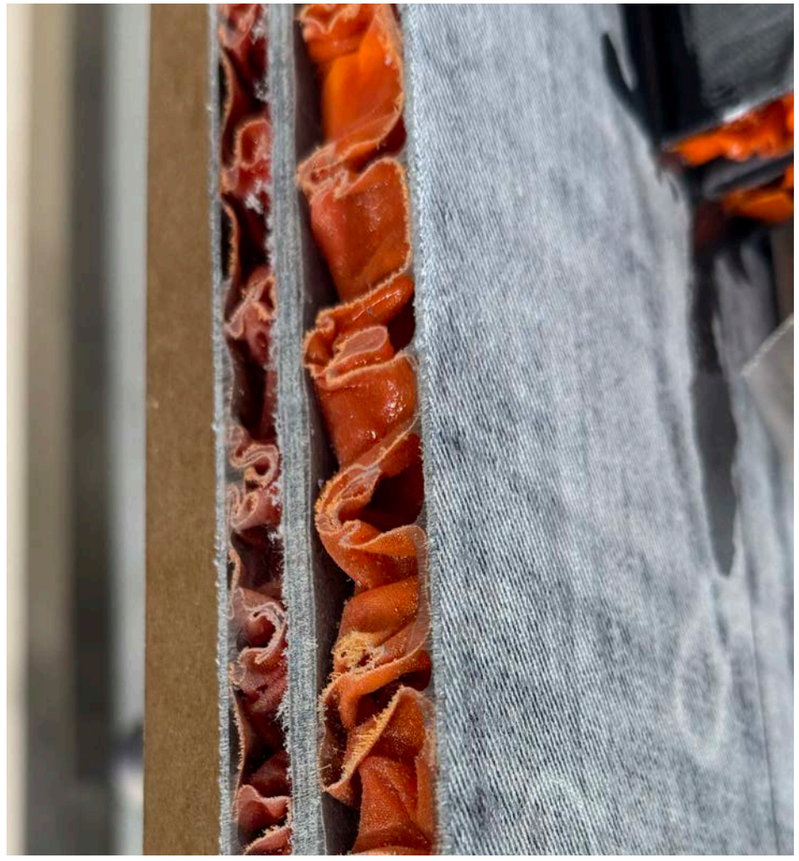
Component Fabrication:

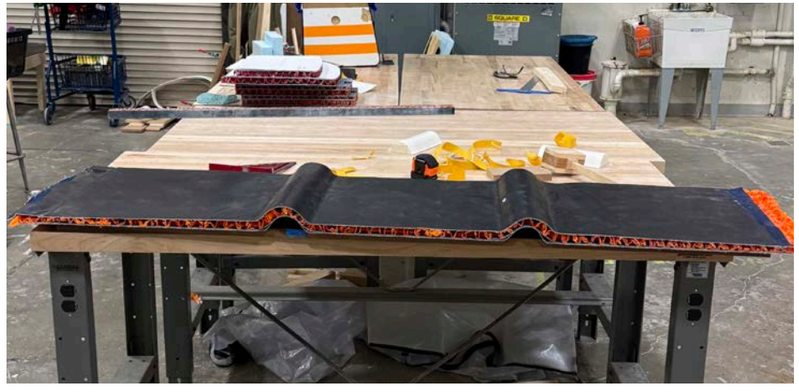
1. Initial Seat Denim Resin - Vac Bag
2. Puff Initial resin - On Seat Mold
3. Initial Resin Flat Denim and Puff for Support
4. Cure for 36 hours
5. Offset Seat Denim Resin - Vac Bag
6. Cure for 36 hours
7. Assemble Flat Panels for Legs and Support
8. Assemble the Seat on Initial Seat Mold
9. Cure for 36 hours
10. Demold Trim





Seven yards of fabric went into the puff component of the seat. To fabricate, I completed Puff the full length of the mesh sheet. I then ironed on the interfacing to a majority of the sheet and shifted it to continue the Puff.

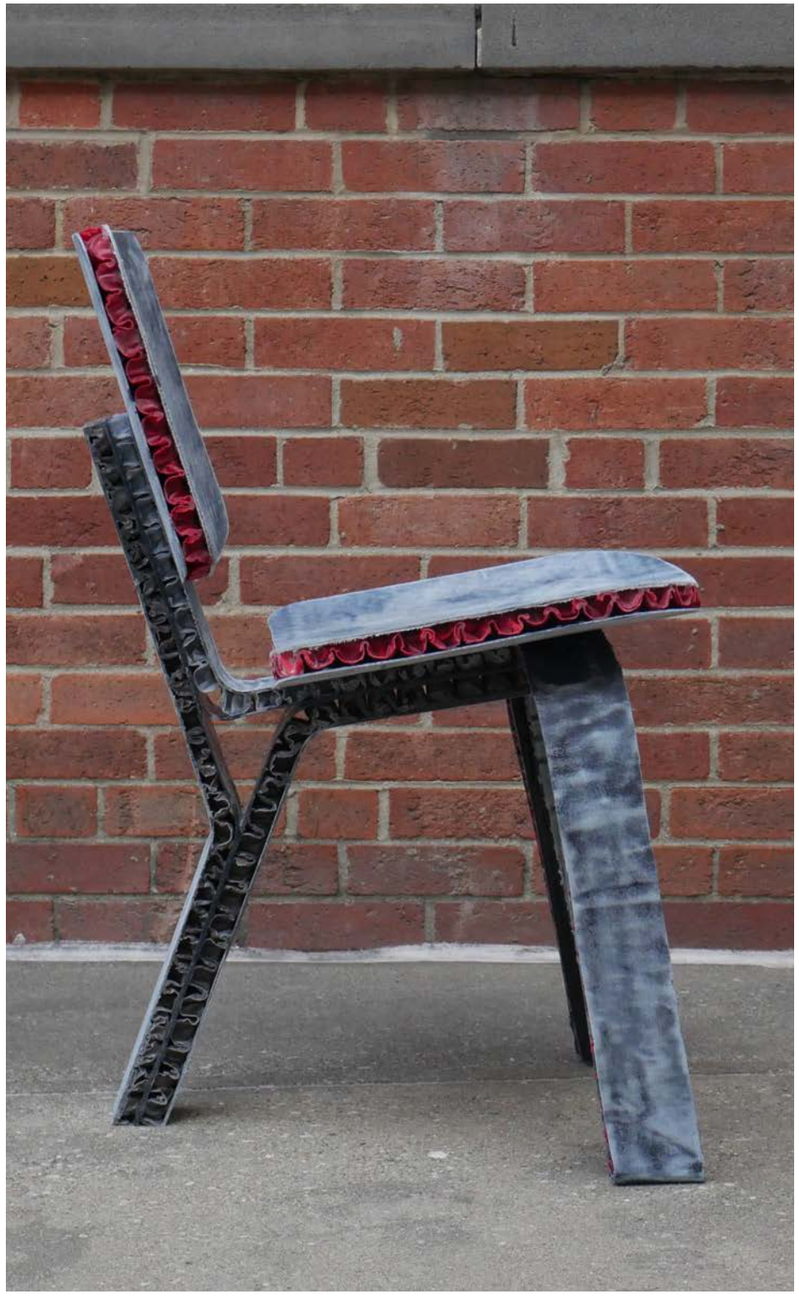





EXIT


SAFETY GLASSES MUST
BE WORN AT ALL TIMES.
WEAR THE APPROPRIATE ATTIRE.
LONG HAIR MUST BE TIED
BACK AND SECURED.
DO NOT USE CELL PHONES, MP3S, OR
OTHER PERSONAL ELECTRONICS.
ALL GUARDS AND SHIELDS MUST BE
SECURED BEFORE USE.
DO NOT USE DAMAGED EQUIPMENT.
AISLE, EXITS, AND EMERGENCY EQUIPMENT
MUST BE KEPT CLEAR AT ALL TIMES.
FOOD AND DRINKS ARE NOT ALLOWED.
IMMEDIATELY REPORT ANY
PROBLEMS OR CONCERNS.
33308

EXPERIMENT RESULTS:
TEST 1 (LOOP): PHYSICAL and SITABLE
TEST 2 (CURVE): PHYSICAL and SITABLE
TEST 3 (SCALE): PHYSICAL and SITABLE


Wait a minute.

I GOT TIME AND MATERIALS.

Reflection:
Be “Realistic”

Stoner Chair (I DID NOT NAME IT DO NOT YELL AT ME)
John Dixon was a crucial part of my time at DAAP. He was also the one who recommended that I apply for the Wanted Launch Pad. So I replicated one of my favorite chairs he made, but replaced the seat surface with Puff-Ply.
Thanks, John.

Side Jable Test
The initial process was to create flat panels. Returning to the process’s roots and using flat panels. I designed a simple side table to bring Puff-Ply closer to reality.

A full Puff-Ply piece of furniture will not be found in your local IKEA (soon at least). So looking back on the process and comparing the material to others. I decided to make some pieces to showcase use cases if used only as a surface and not as support.

Reflection Experiments

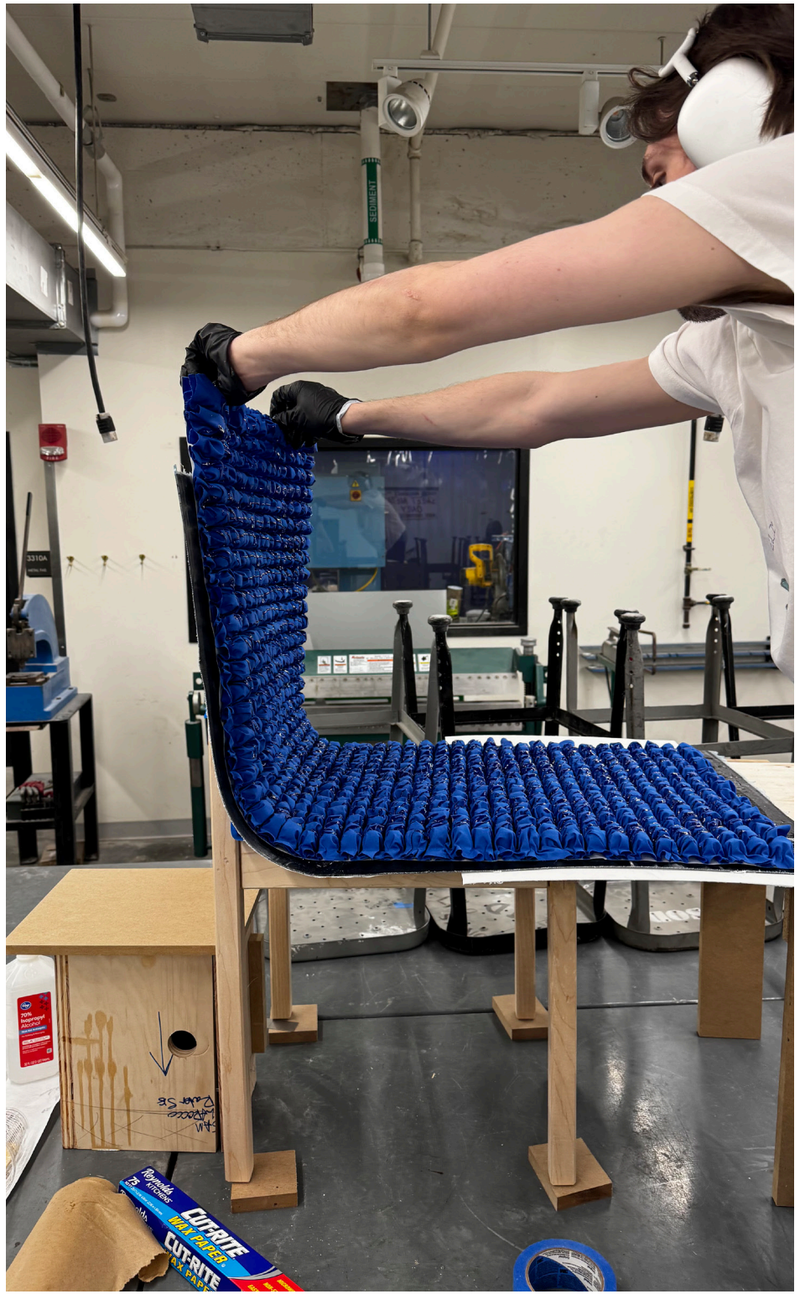
Side Jable:
Does the use case affect validity?

1. Hard Maple Legs
2. Puff-Ply Legs

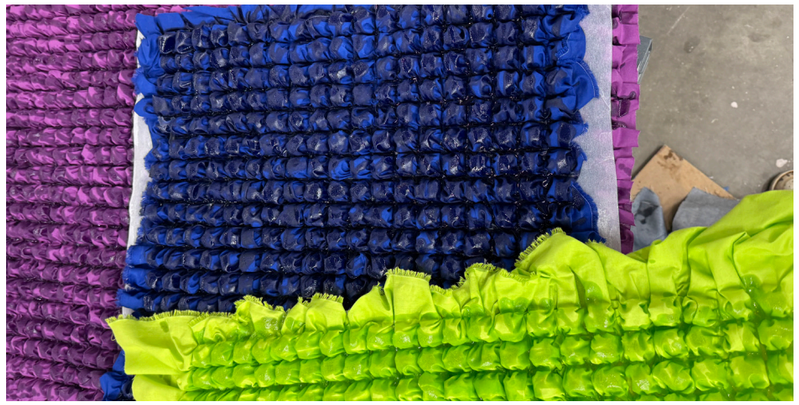
Stoner Chair Process:

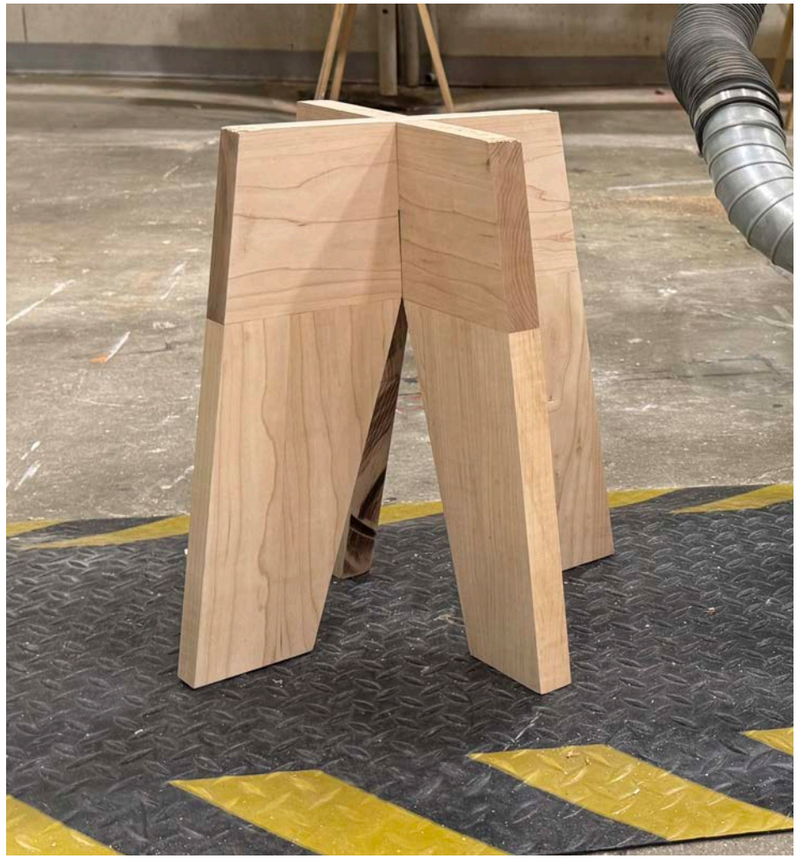
1. Remake Frame 1:1
2. Initial Resin Bottom Denim Layer
3. Initial Resin Puff
4. Initial Resin and Form Upper Layer
5. Assemble and Attach

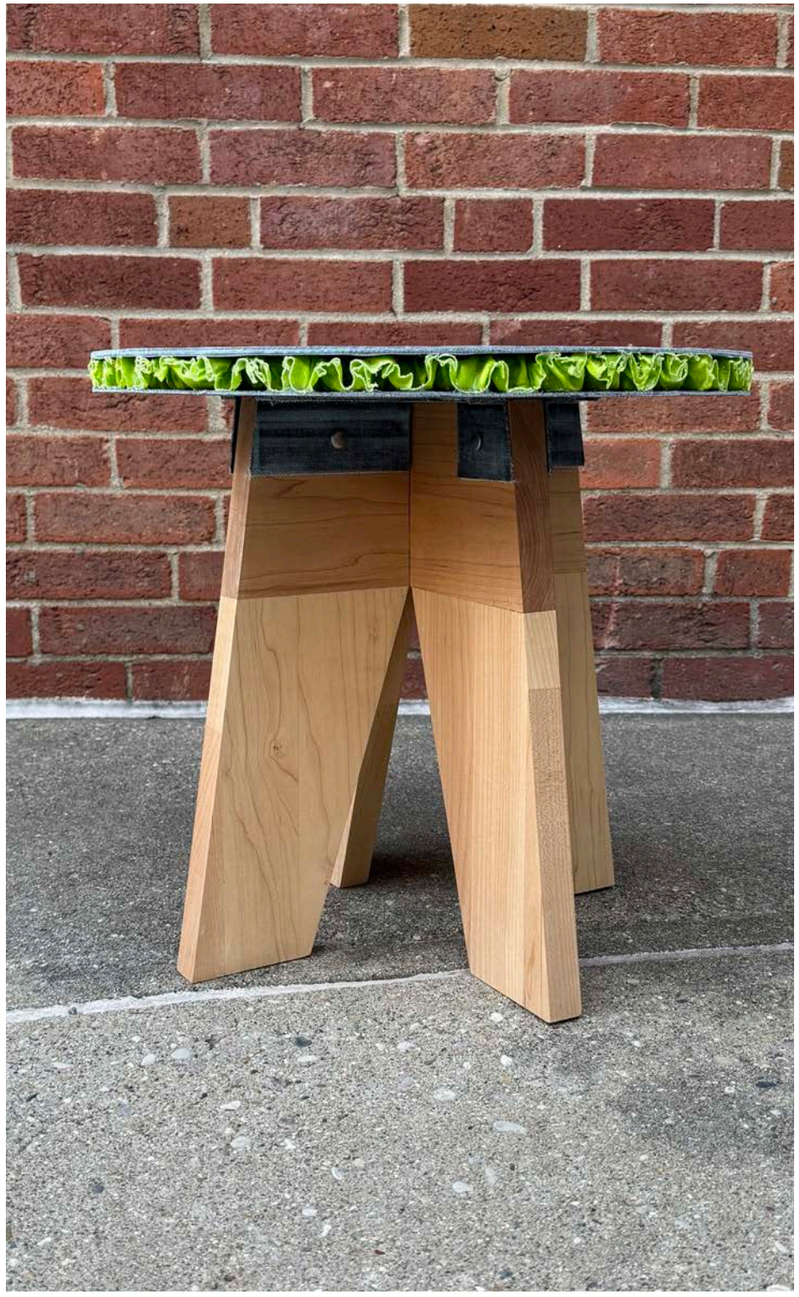
If the purpose of the material is
surface and not structure
does the validity change?

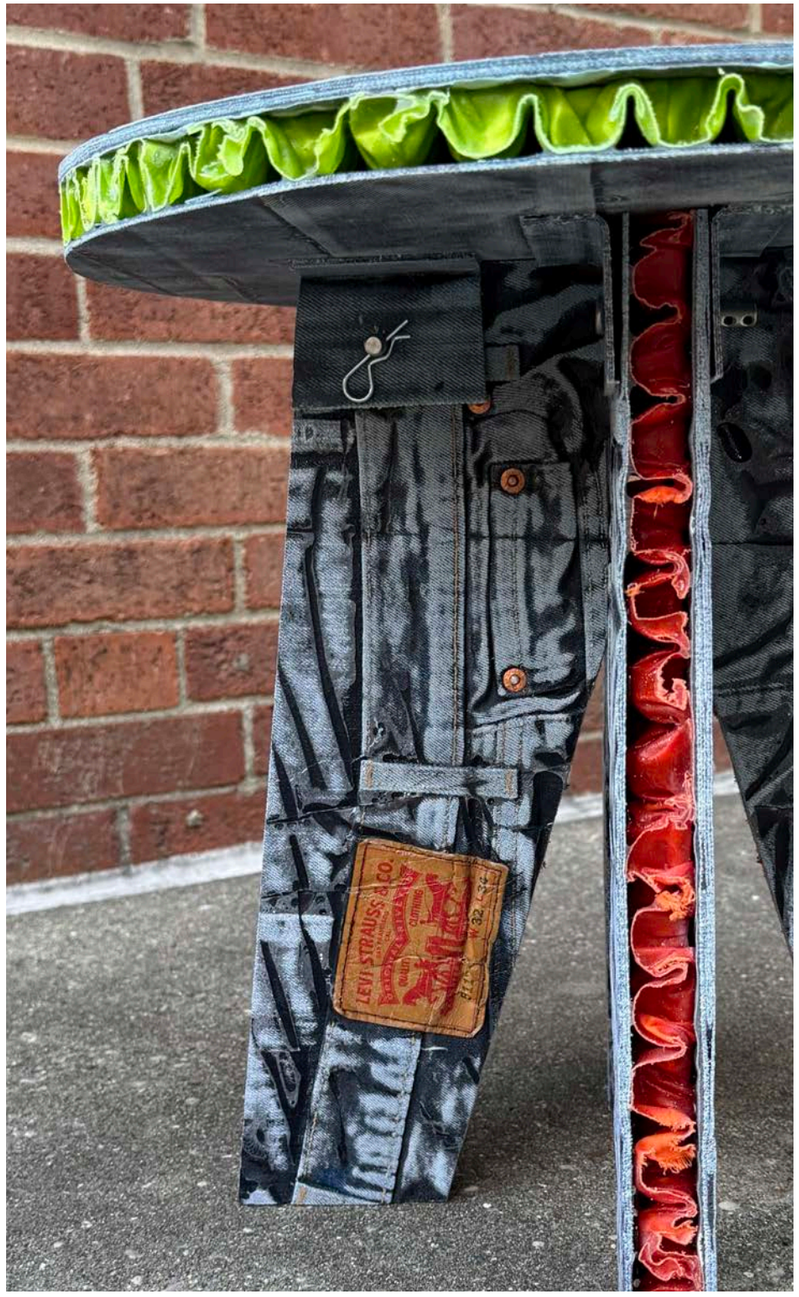

CUT-RITE
MAX PAPER


THESE MACHINES ARE FOR
SHEET METAL
ONLY
MAX. THICKNESS 20 GA.








LEVI STRAUSS & CO.

What's Validity?

IT'S COMPLEX.

Defining Validity

Industrial Designer.

When comparing to other common furniture CMF options. A valid material should

be aesthetically pleasing,
function as intended,
be welcoming and
inviting to touch/use.

Defining Validity

Furniture or scupture? Validity from user or creator?
Medium and Message.

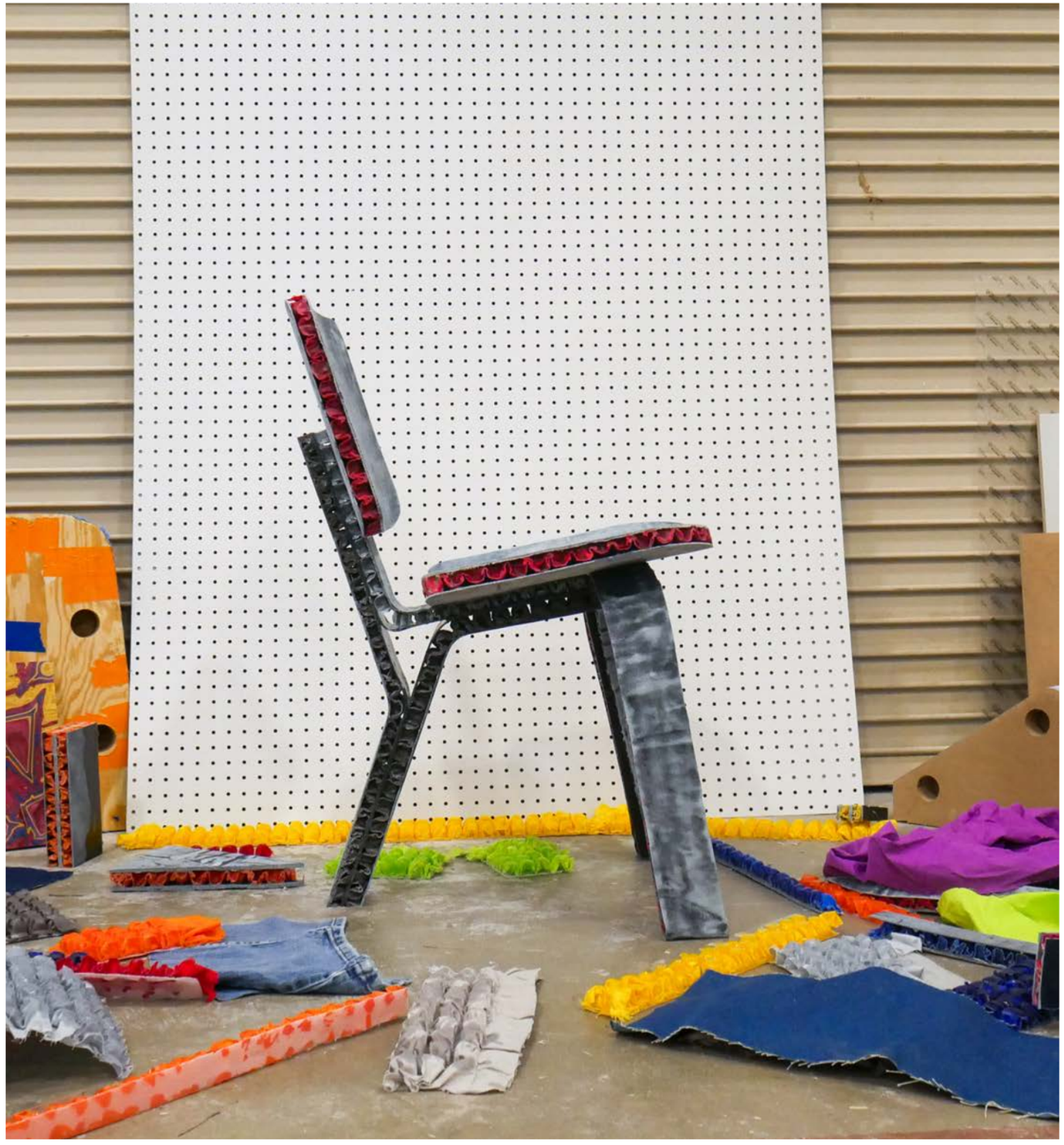
What if we go outside the world of design?

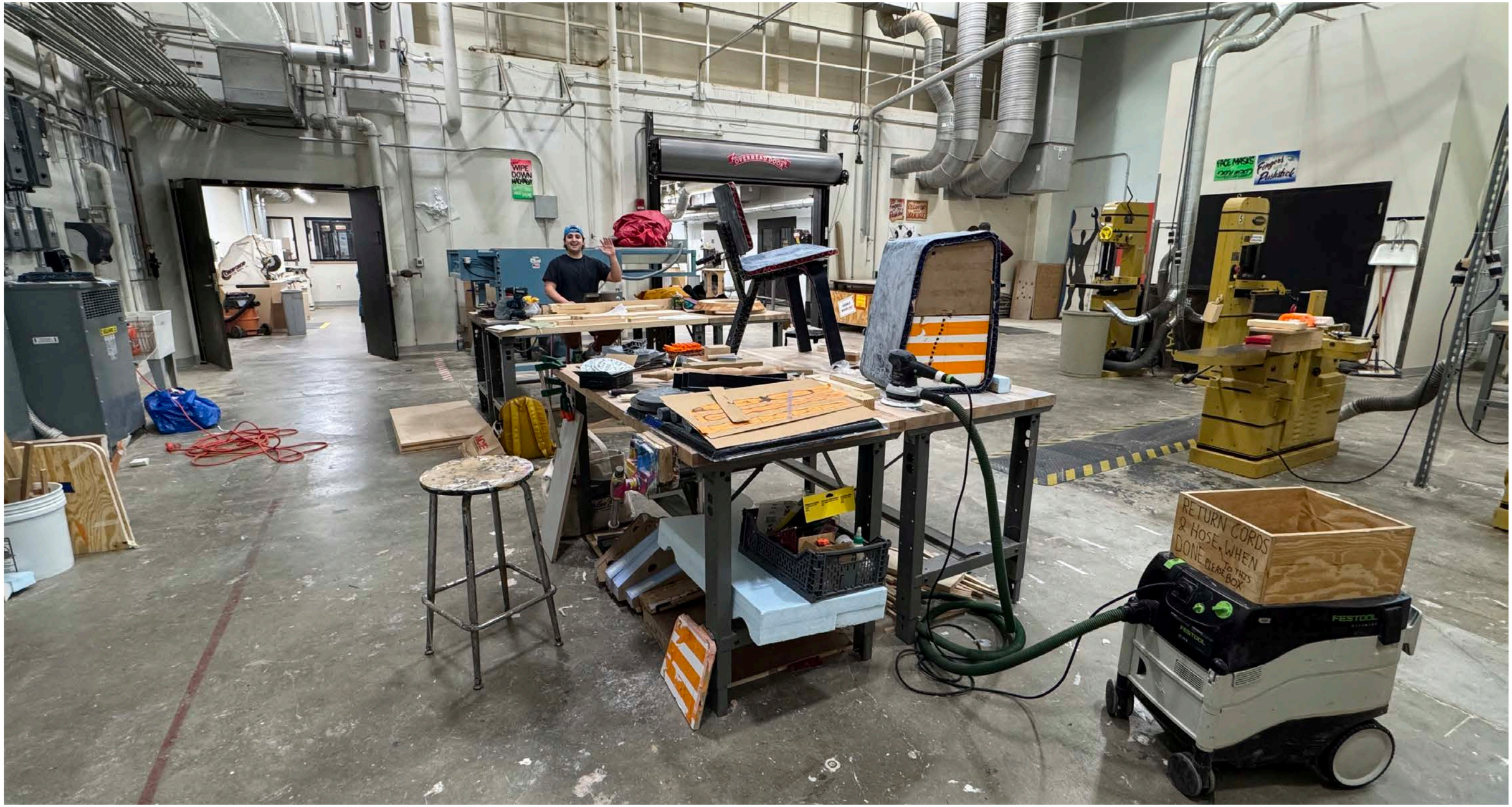
Personally, valid materials should look good and work well for whatever the project is. However, as a graduating Fifth-Year Industrial Design Student, I have seen many different use cases and many different materials being used in the most unique and interesting ways. After all, this place is Design, Architecture, **Art**, and Planning.

Is Puff-Ply a valid and proven process given the results of the experiments?

What’s Validity?

SPECIAL THANKS. Mom and Dad. Rives, John Dixon, Tim, Luke, Nick, Jeff, Braden, Michael, Mary, Katie, Kailyn, Jacob




WIPE DOWN
FACE MASKS
RETURN CORDS & HOSE WHEN DONE TO THIS BOX
FESTOOL