CHARLIE CHAIR

PROCESS DOCUMENT | ARTSTUDI 262

LEA EATON SPRING 2013

INTENTION

To learn to work with wood, metal, and leather.

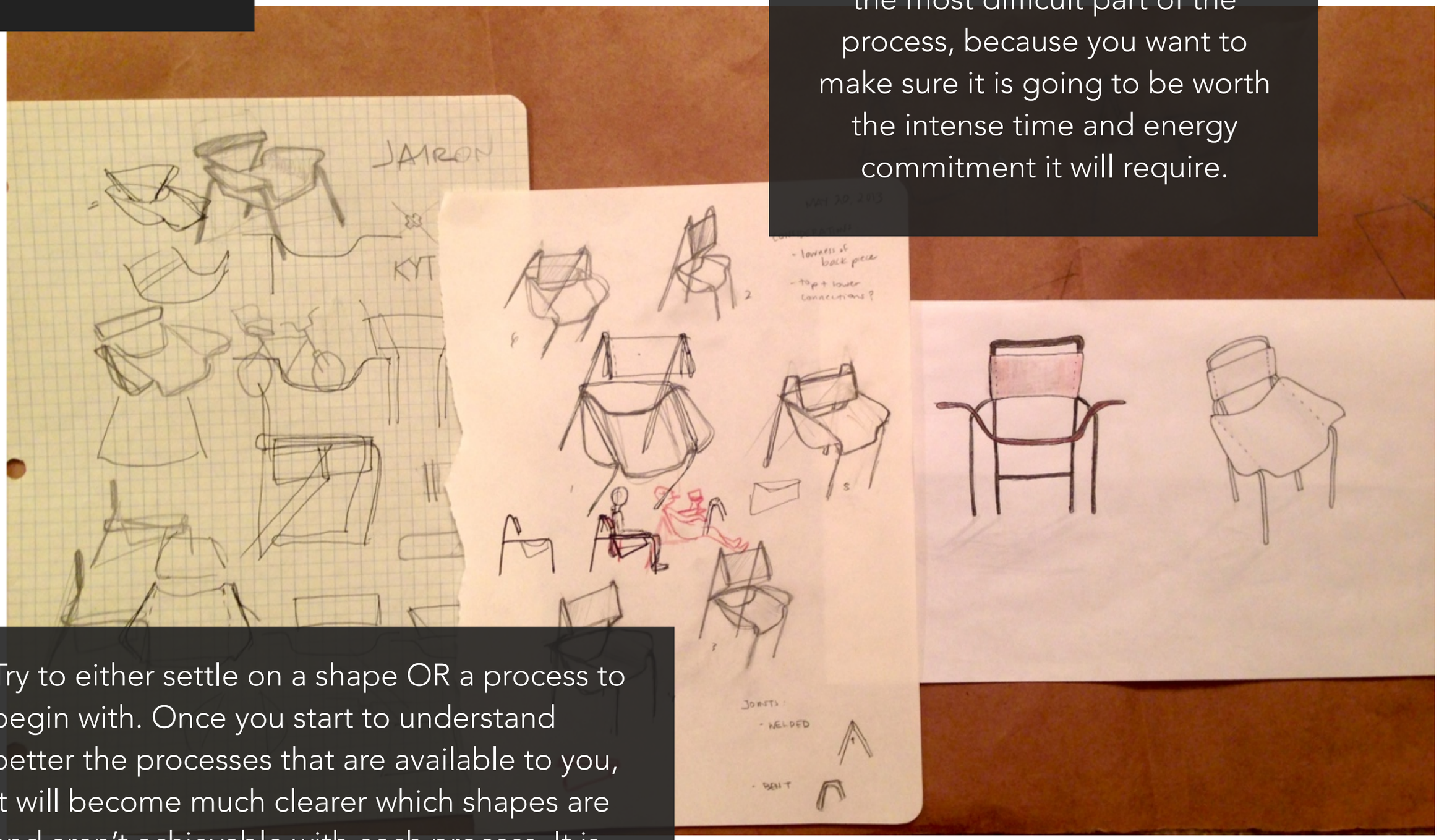
STATEMENT

A structure composed of three typically planar materials manipulated into curved and organic shapes. Each material incorporated changes with time and use, allowing the user to shape the chair themselves.

INSPIRATION

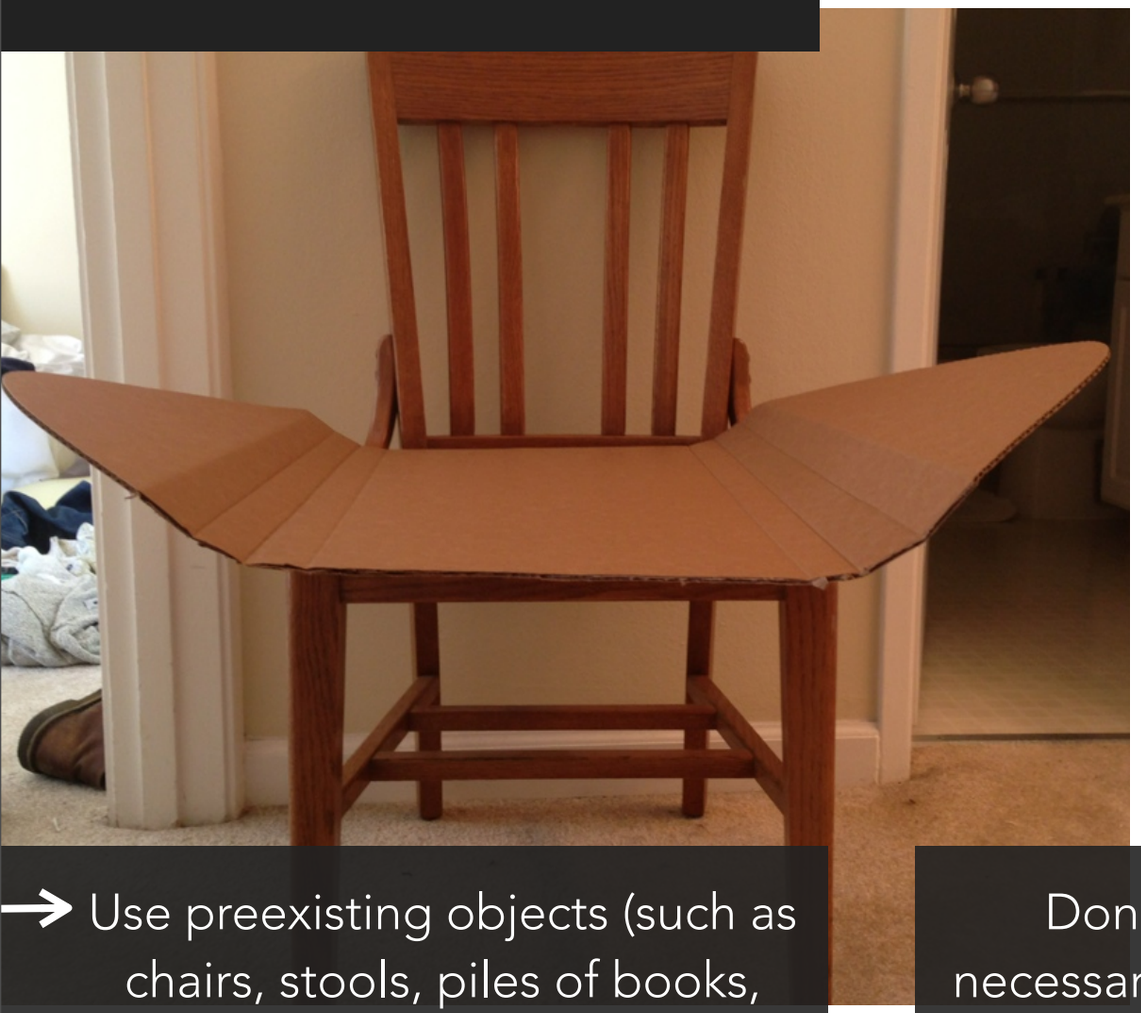
PLANNING

The initial design is potentially the most difficult part of the process, because you want to make sure it is going to be worth the intense time and energy commitment it will require.



→ Try to either settle on a shape OR a process to begin with. Once you start to understand better the processes that are available to you, it will become much clearer which shapes are and aren't achievable with each process. It is very hard to tell this from the beginning, and you don't want to get set on a shape that is incredibly difficult or impossible to construct.

PROTOTYPING



→ Use preexisting objects (such as chairs, stools, piles of books, etc.) to support different prototype parts. You don't have to build your own support structure to get a feel for how its going to sit. Build only the parts that are necessary, but do it well, so that you are sure it is exactly what you want.

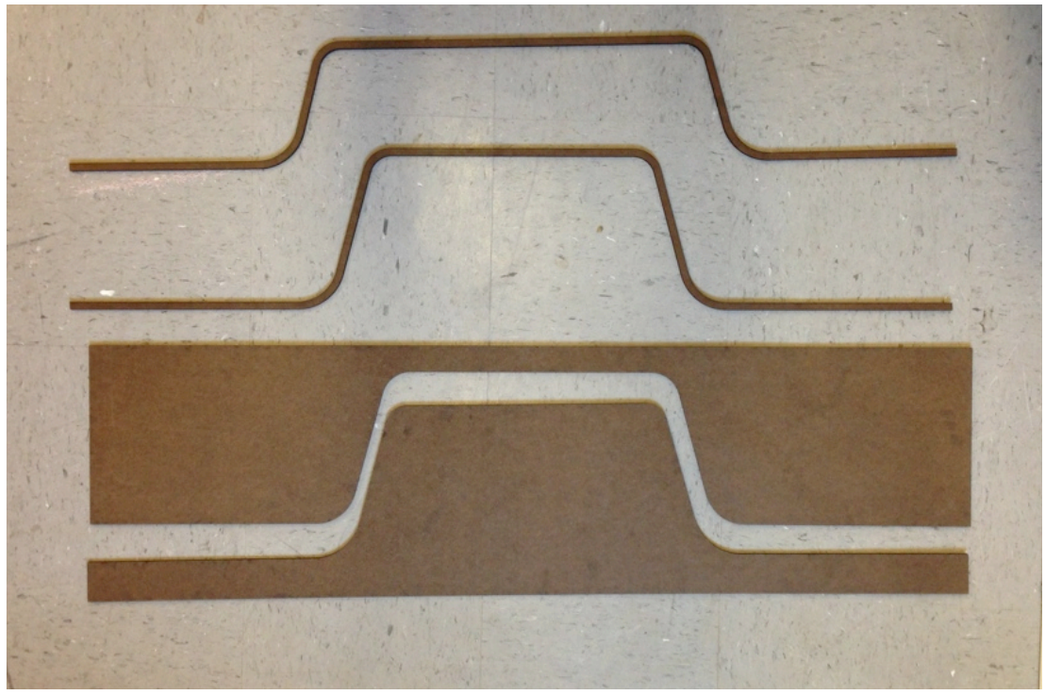
Don't assume parts are necessarily going to work, both in the building process and structurally, because similar parts have worked before. I bent the steel frame with even thicker steel than I needed before doing my final, and this was really important to be sure the machinery could handle it.

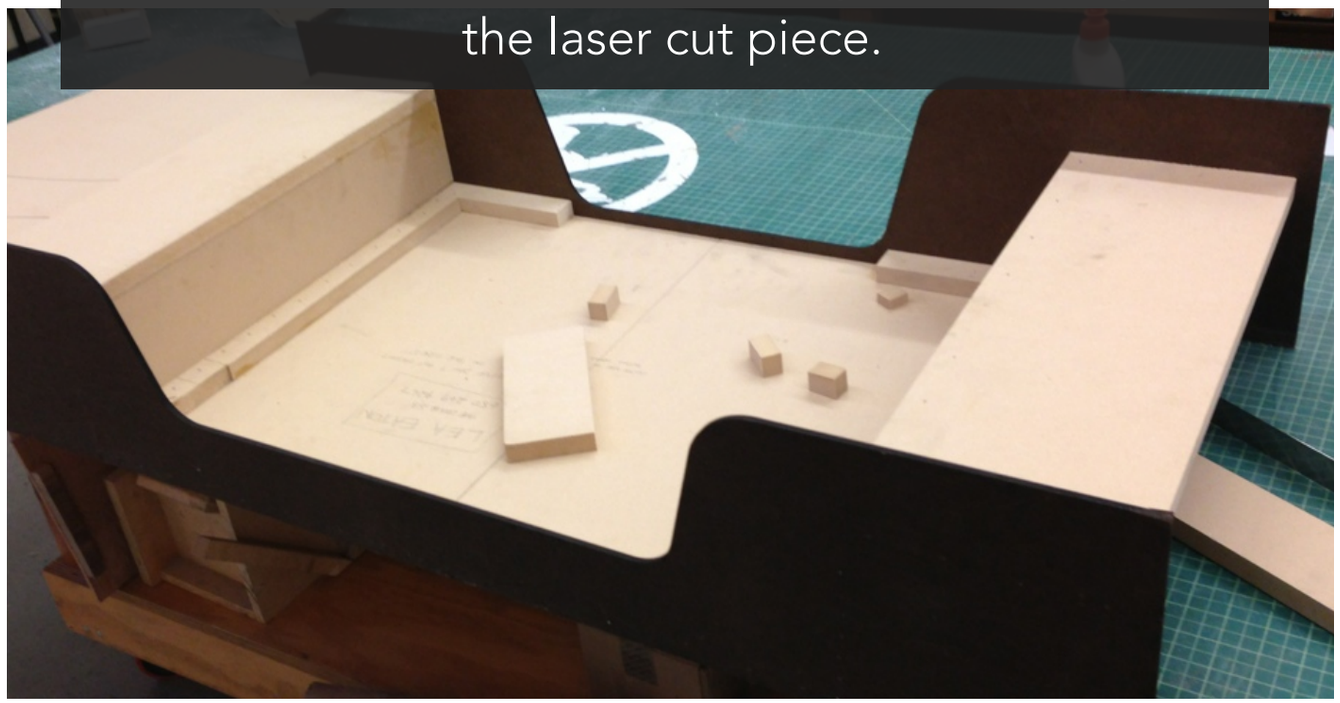
If you're using processes you aren't familiar with (which is very likely), leave yourself time to learn them. I had to learn to weld in just a few hours because it turned out it was structurally necessary. Although it turned out alright, I had to do a lot of practice ones before I touched my final piece.

MAKING THE BASE

To make the complex curves of the the base plywood piece, I could not use the router to make typical ribs of a buck because the edges would not taper with the curve.

I laser cut the front and back shape for both a top and a bottom buck, build a base support between those shapes with MDF, then filled in the top space with pink foam to be able to run a wire cutter between the two lines created by the top edge of the laser cut piece.





→ If you are using the wire cutter, **DO NOT USE PINK FOAM**. It is way stiffer than the white foam, which would seem like a good idea, but actually just breaks the wire very quickly. I went through over 20 wires to cut the buck, which made the process take over 6 hours.

FORMING THE PLY

I was really glad I had made both a male and a female buck. Although I could have potentially gotten away with only one, the process itself is already so stressful and hectic, if I had not had the safety of both I'm not sure I could have gotten it right on the first try.

→ With the buck, it's worth it to over-prepare!

BAR BENDING

Though multiple TAs and Craig told me I was not going to be able to bend thick, rectangular steel bar on the Diacro, I was able to do it with a little improvising and about three people pushing as hard as they could. Clamps were essential not only for keeping it from rotating while bending, but also for correcting the bends afterwards.

→ After you bend your steel pieces, clamp them really well to a table. Use a larger diameter, hollow tube to slip over your pieces and create a lever. This will allow you to tweak your bends by hand a little after you've done them on the Diacro to make sure they all line up.

WELDING

I had never welded before and had very little time to learn, so I chose to do MIG welding. This worked out fine, just meant a lot more finishing work on the joints.

Although it was the safer choice, I feel like I could have learned to TIG with the time it would have saved me on finishing, and it probably would have looked better.

The clamping setup actually turned out to be the most difficult part. I ended up having to weld in some of my support beams before doing the more critical joints just to be able to stabilize the parts to each other.

→ Think about how you're going to clamp each different joint before you start! The order may not be what you expect.

FINISHING

This is the finish using a PNEUMATIC SANDER- very uneven texture and shine.

To get an matte, even direction sanded grain, I used a BELT SANDER and then a lot of Scotch Brite hand sanding. Very exhausting but worth it.

Finishing was by far the most painful part of this whole process. It always takes way longer than you'd expect, and is actually really difficult to perfect.

→ Do not underestimate how long it takes! Also- steel rusts very quickly after you sand it.

LEATHER WORK

Leather was nice and pretty painless to work with with. The edges are able to be left just as they are cut, and it has amazing structure to it.

Grommets (silver rings around holes) are supplied in Room 36, as well as all accompanying punching devices. The process is very quick and it is not hard to get it to look nice and even.

→ To prevent the leather from slipping off the bars, I stuck on some adhesive sandpaper strips from the hardware store, normally used to line slippery doorways.

Very quick and easy, works better than any fastener I can imagine because its completely hidden, and the inside lining of the leather naturally has a ton of friction.

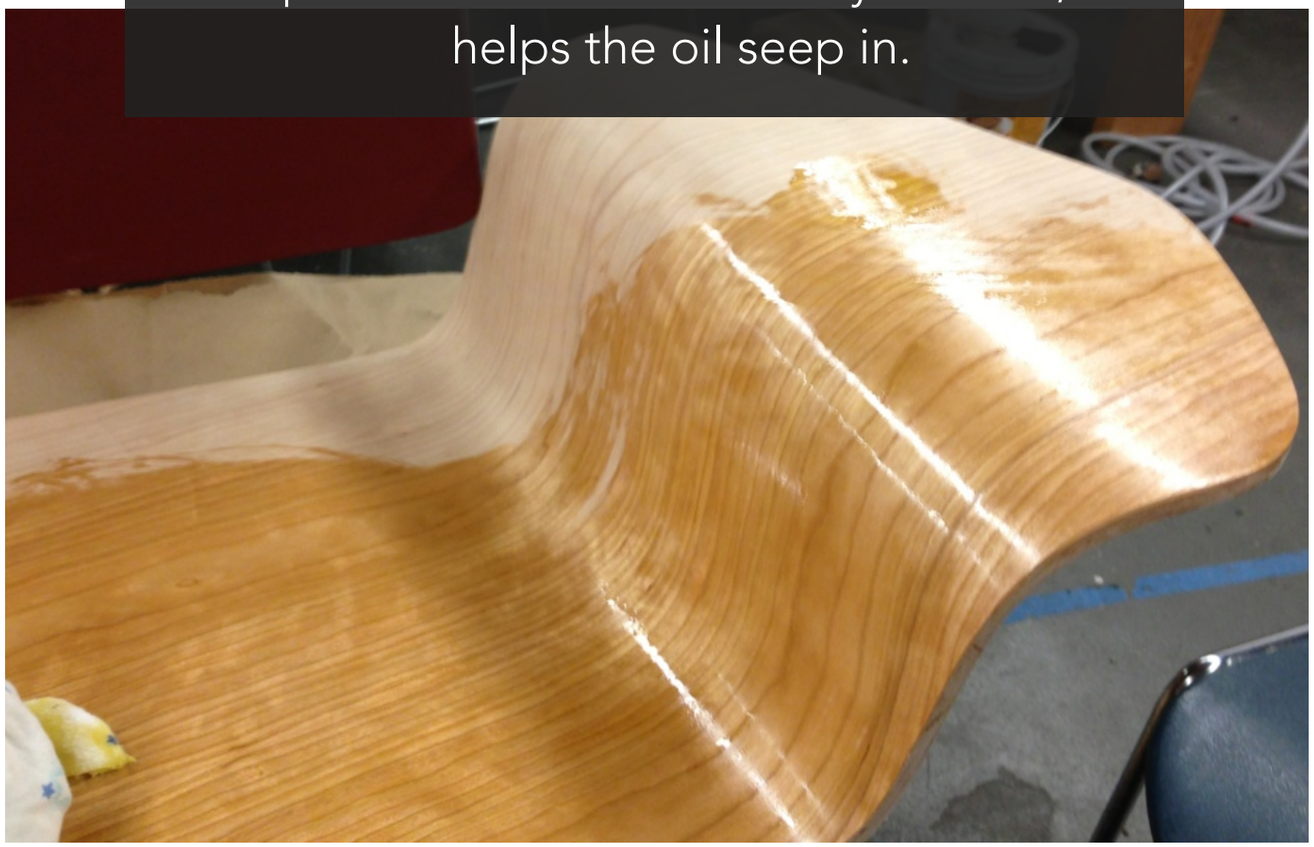
LAST DETAILS

It is incredibly difficult to attach a very thin piece of wood to a thick piece of metal, especially without any visible fasteners.

Although it sometimes felt like it was the easy way out, using the RTV silicone was aesthetically and time-consciously the best choice.

I used *Sam Maloof*, an oil and wax combination top coat, to oil my final layer of cherry veneers.

→ Sanding it first with 400 grit sandpaper on the power sander made it very smooth, and helps the oil seep in.



For aesthetics I added a top and a bottom layer of Cherry veneers. I had done 8 layers in my main middle section, but it was still pretty flexible. Adding these two layers vastly increased its strength, especially since the grain ran in a different direction.

→ 10 LAYERS IS MUCH BETTER THAN 8.

MATERIALS

Prototyping Materials	$150
Buck Materials	$80
Body Veneers[1]	$160
Top Layer Veneers[2]	$70
Resin and Hardener[3]	$70
Steel Bar[4]	$50
Leather + String[5]	$60
Sanding and Finishing	$50
TOTAL	$690

1. Purchased from MacBeath in San Jose.
2. Purchased from Woodcraft in San Carlos. Came with adhesive already applied to the back. Made the process faster but much more difficult to get aligned.
3. West System 105 Resin, 206 Hardener, purchased from West Marine in San Carlos.
4. Purchased at Borrmann's Steel in East Palo Alto.
5. Purchased from Tandy Leather in San Mateo. Had to purchase a whole hide, which ended up being about $150, but I was planning on getting extra for another personal project so it worked out. Only used about $30 worth on the chair.

THANK YOU

This class is an irreplacable design and building challenge. I am very grateful for the opportunity to grow so much so quickly. This was the most valuable and fun use of time and effort I have experienced at Stanford.

Thank you John for your incredibly generous advice and involvement.

Thank you fellow chair builders, shop TAs, Anja, and Craig for the indispensable help, advice and resources.