

Furniture Design: Thesis 2010

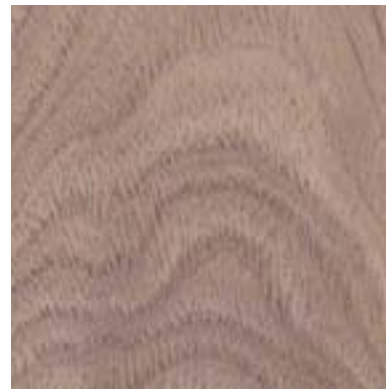
My BFA thesis was to focus on sustainability in furniture design. Specifically I focused on reconciling the difference between material life and use life. Consider the common plastic lawn chair as an example. In terms of material life, this chair was made from petroleum that took hundreds of thousands of years to develop, it took energy to find, harvest and transform this petroleum into plastic to produce this chair and once disposed of this chair will sit in a landfill taking more than 500 years to completely biodegrade. When you look at the amount of time that this chair will actually be used, 10 maybe 20 years, its only a tiny fraction of the hundreds of thousands of years this material takes to develop and biodegrade.

The attempt to reconcile these differences was approached in two ways: The first method was to engineer a composite that would have the equal material and use life of one year, in order to harmonize with the natural growing season and human consumption. The second method was to design furniture out of a more durable material, wood, and to design the chair so that it will create an endearing user-object bond that will last until the end of the material life and just enough time to regenerate for the next years product. The second method was to design a chair with a classic and durable natural material, wood, but to create a strong object-user bond which would ensure the chairs use until its natural end. A well made chair can last for four generations (about 100 years) and a black walnut tree can take up to 100 years to fully mature. This project attempted to create a balance between material and use.





Constant



Variables

The One Year Chair

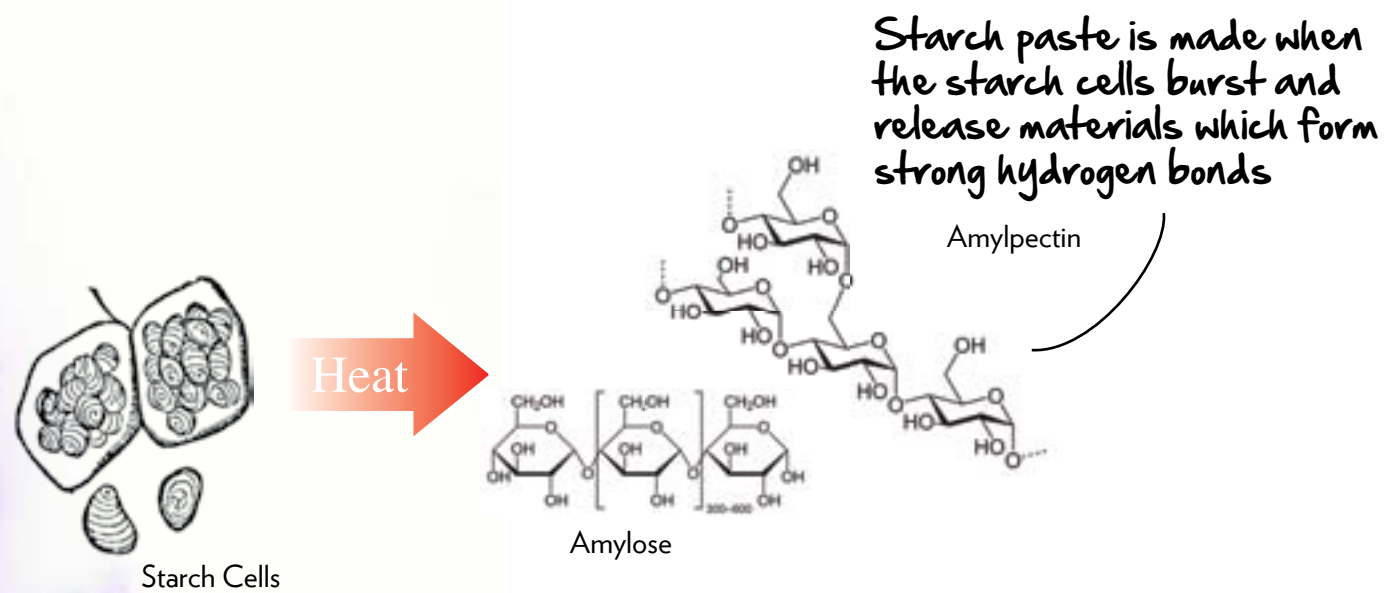
- Focus on creating a positive impact on the environment
- Research biological structures for their industrial applications
- Based on the book "Cradle to Cradle" by William McDonough and Michael Braungart

The One Hundred Year Chair

- Create meaningful bond with user
- Select materials for their ability to develop patina with age and evolve with users emotions
- Based on the book "Emotionally Durable Design" by Jon Chapman

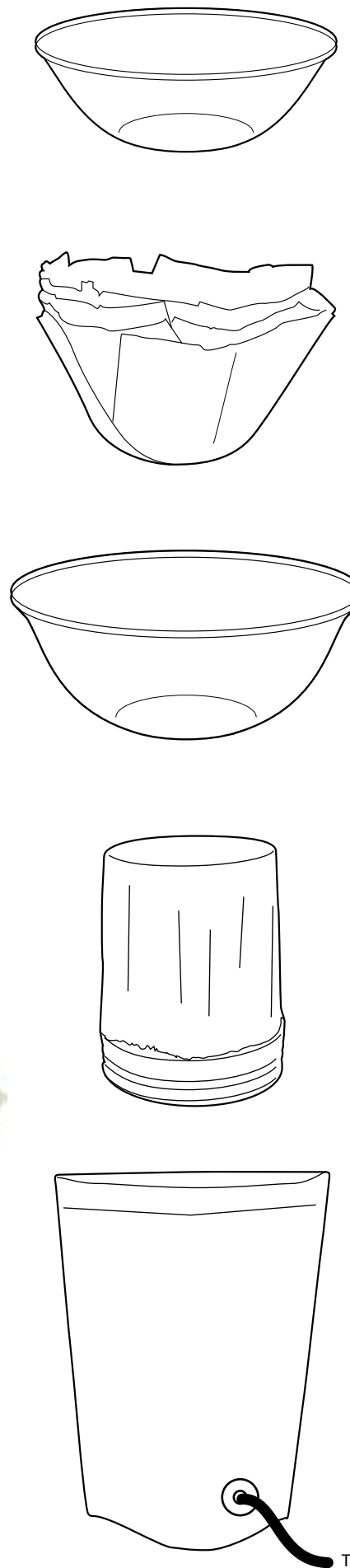
The One Year Chair: Experiments

The initial experiments for the one year chair began with exploring natural composites and adhesives. Composites usually contain two parts: The matrix and the reinforcement. In studying common composites it was apparent that many are what William McDonough calls “monstrous hybrids”. These hybrids contain natural materials for the reinforcement and polymers like epoxy for the matrix. This mix insures that the wood will not biodegrade and that the epoxy cannot be recycled. In selecting materials for my composite I looked to local resources. Living in Illinois means an abundant supply of corn. By utilizing the Corn husks (often burned as biofuel) for the reinforcement and the corn starch to create the matrix, a local, completely biodegradable composite was formed.



Insights

- Air between the layers weakens the overall structure
- Pressure creates good adhesion between layers
- A porous mold allows for even drying and minimal warping



Experiment 1



The first experiment was a compression mold. The layers of corn husks and starch paste were laid up between two glass bowls and weight was applied. This created great adhesion between the layers, but limited air flow inhibited even drying.

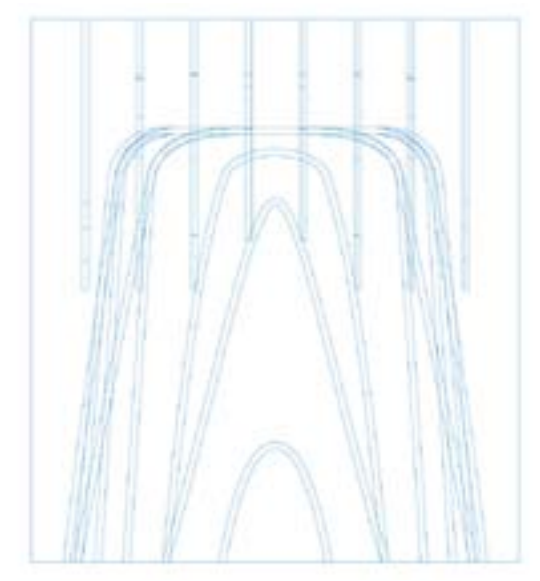
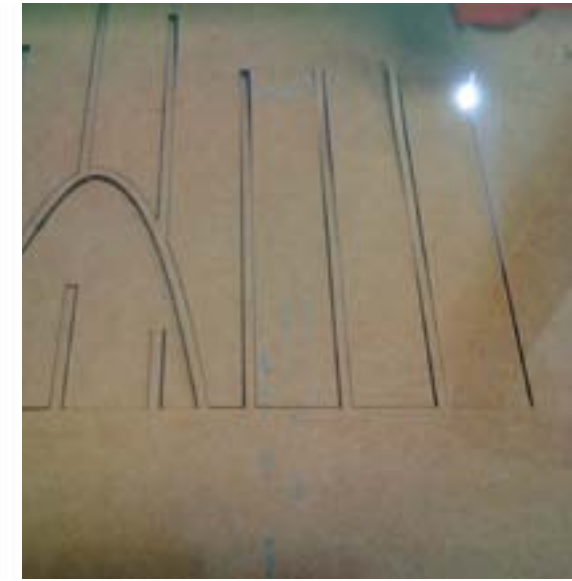
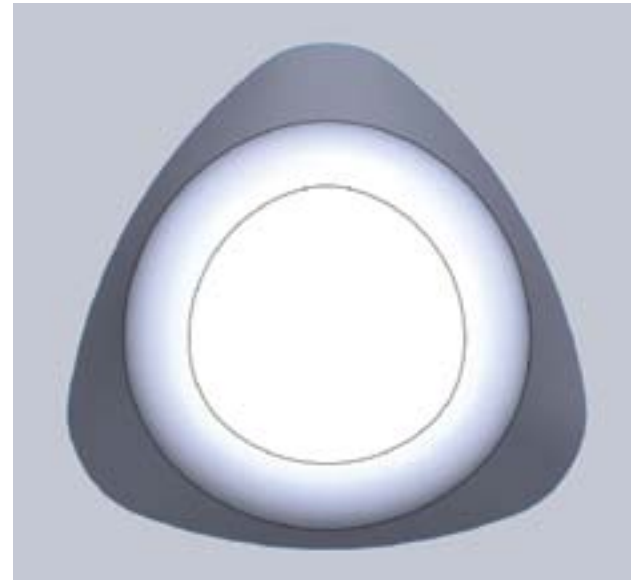
Experiment 2



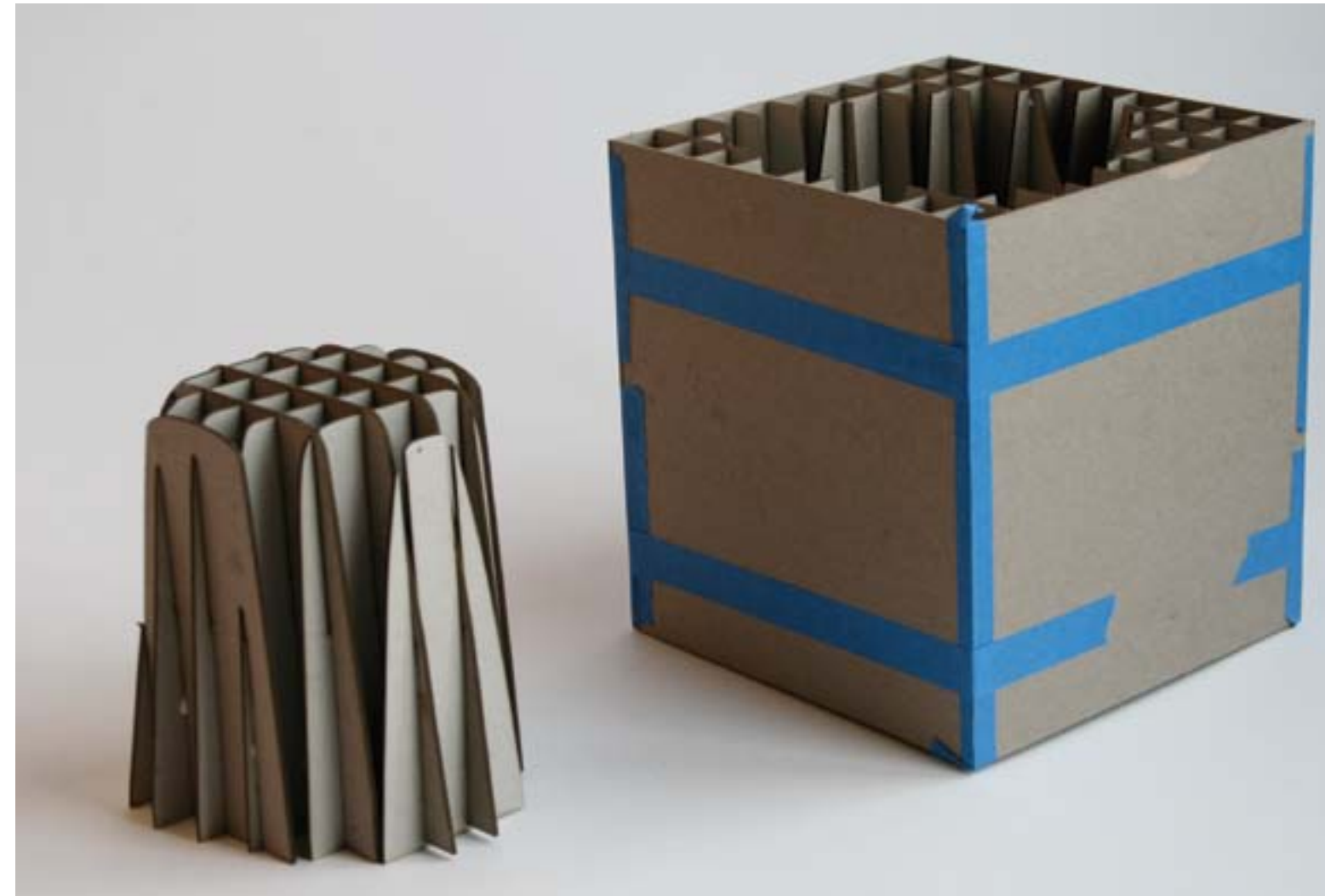
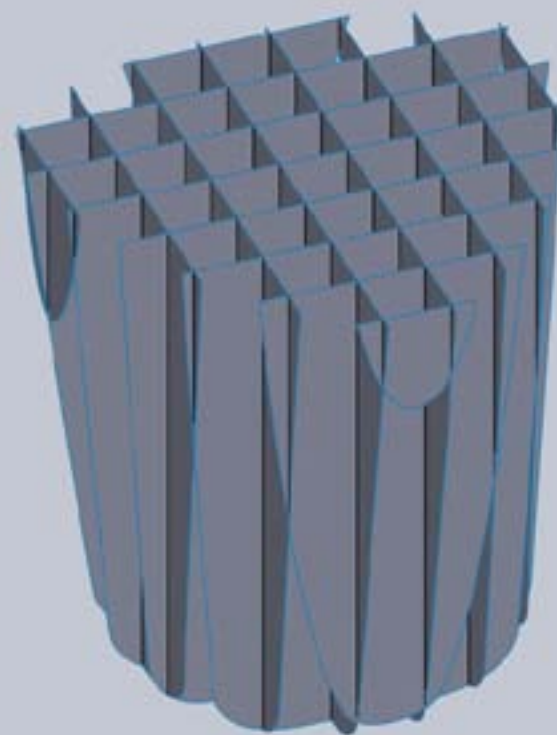
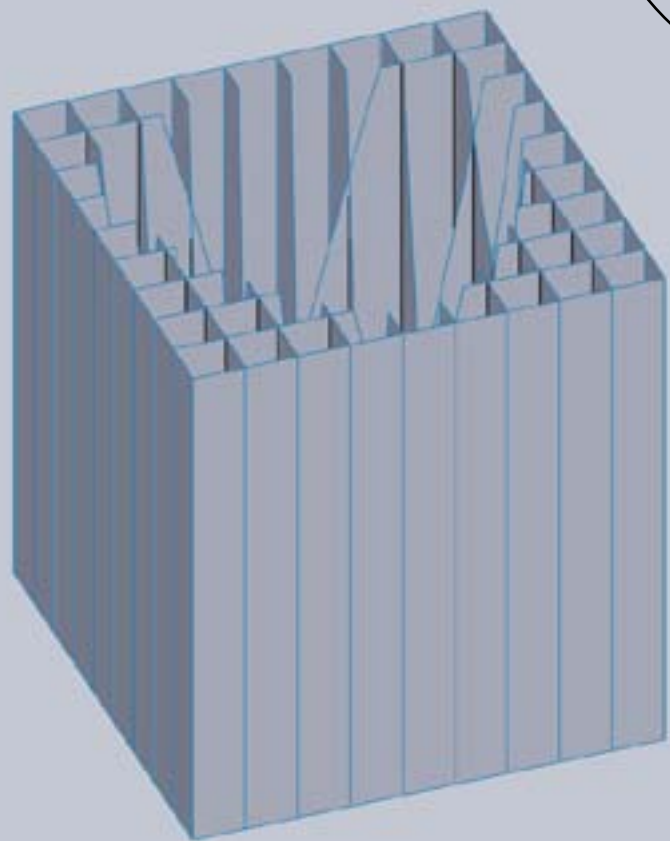
The second experiment was a vacuum mold. Layers of corn husks and starch paste were laid up on a bucket which was then placed in a vacuum bag. This created great initial adhesion but since the layers cannot dry in the bag, it was taken out to dry. Without pressure the layers peel off.

Mold Creation

From the early experiments came a few key insights: Air between the layers weakens the overall structure, pressure creates good adhesion between layers, and a porous mold allows for even drying and minimal warping. From these insights a new mold was created which was both rigid and porous. The final form was created in Solidworks. 20 intersecting planes were laser cut from cardstock and fit together to create the positive and negative forms. Once complete the mold was lined with wire mesh and ready for use.

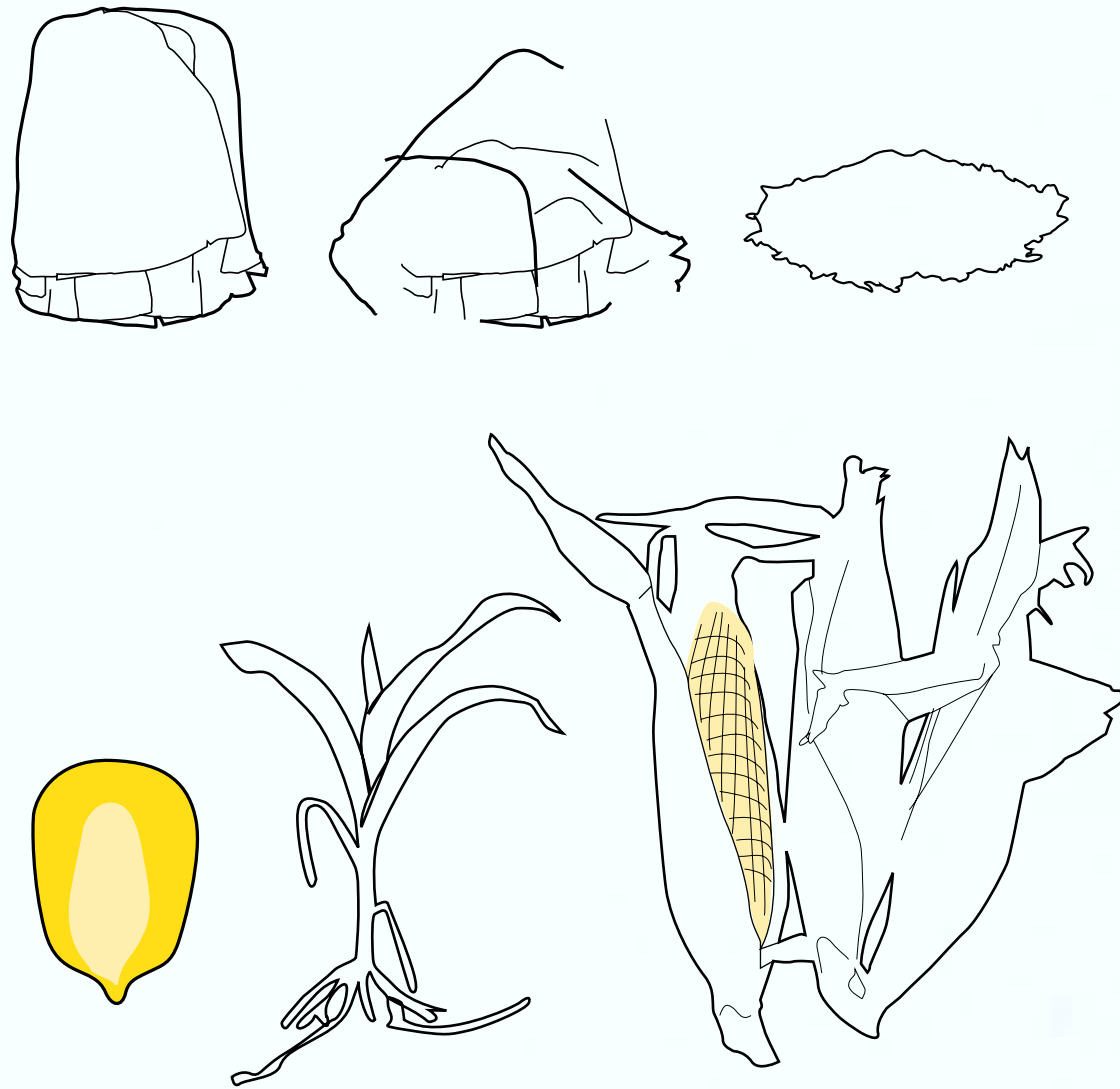


Nesting forms are offset to allow for the thickness of the stool



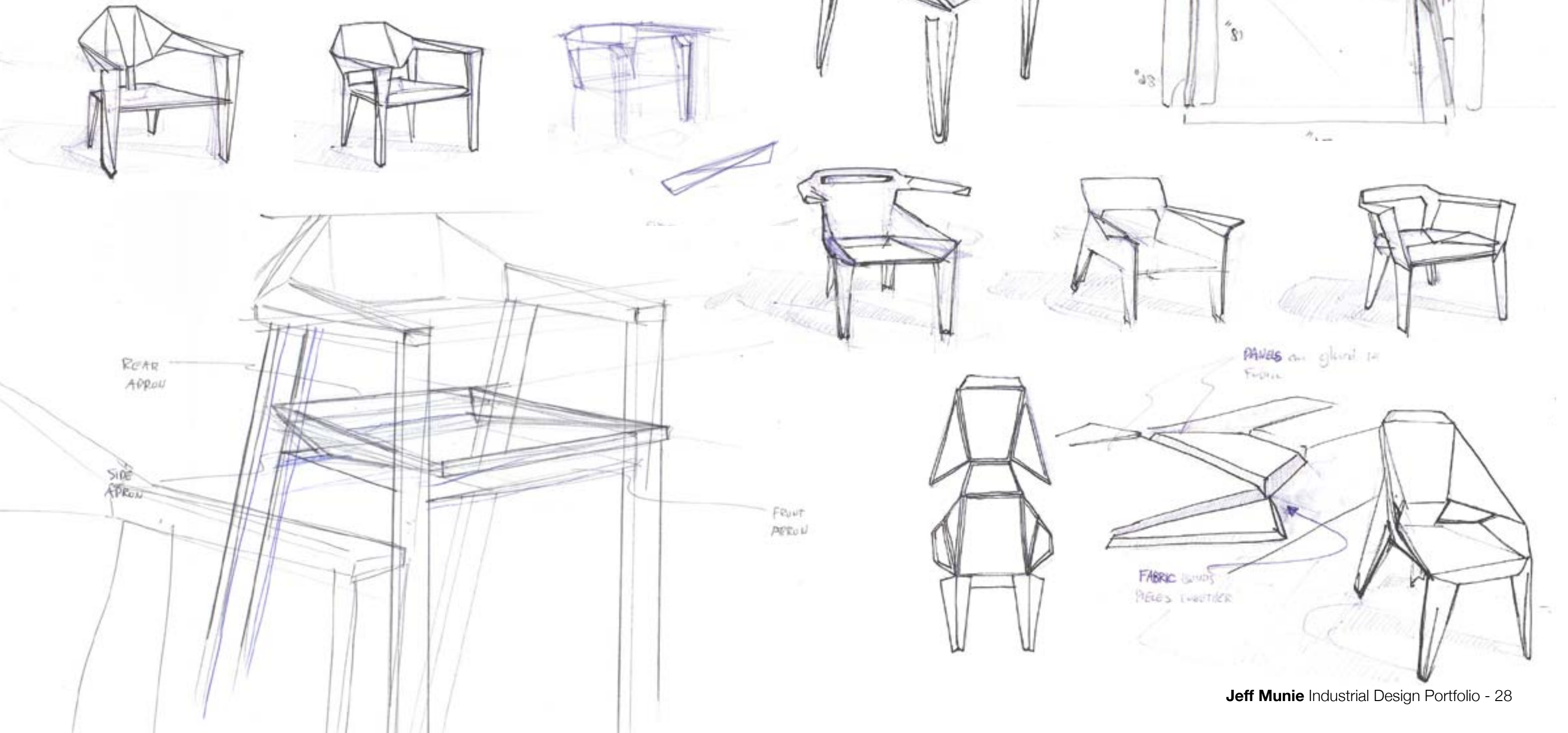
The One Year Chair

This chair is designed to last for a minimum of one year. It has reconciled the differences between material-life and use-life, by creating a chair with an annual use-life and annual material-life. By creating this chair with the annually renewable resource of corn, and using the husks, which are commonly discarded this chair has taken a local waste resource and created an responsible product. This chair will easily biodegrade into basic sugars and be reincorporated into the earth, providing nutrients for the next years crop of corn, using only a minimal amount of energy. In the time it takes this chair to biodegrade, the resources for a new season of chairs will have been regenerated.



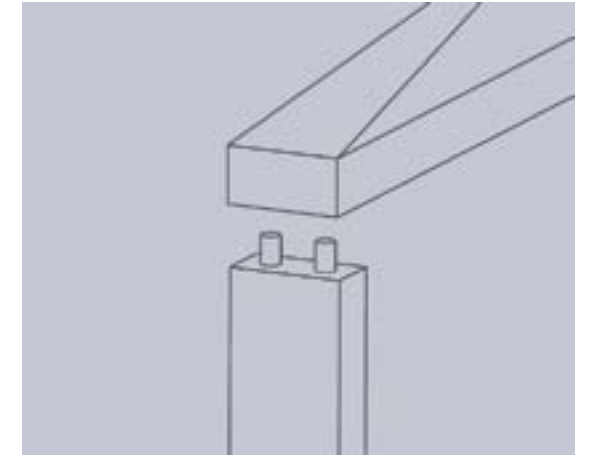
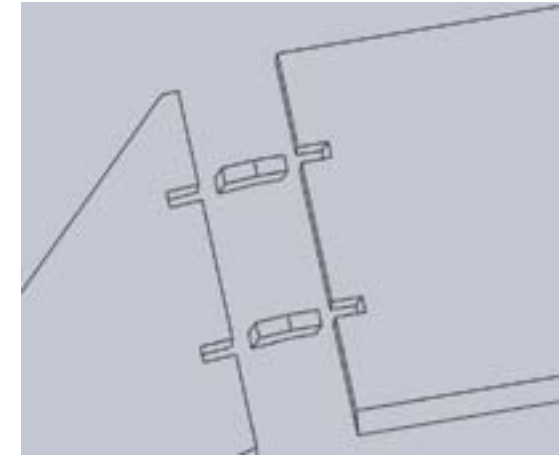
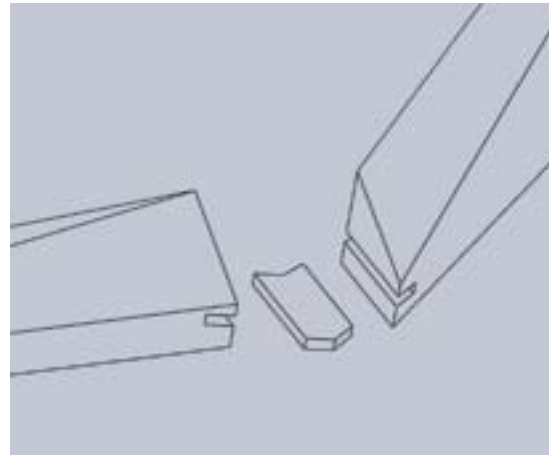
The One Hundred Year Chair: Ideation

After sight, one of the first ways that we interact with an object is through our sense of touch. Our tactile senses help us to understand volume and form. Often times you will see people running their fingers over objects, feeling the contour curves and creating a connection with this object. The mission of this chair was to emphasize and encourage these behaviors by bring out the contour lines as a feature and increasing the amount of tactile input for the user. The theory is that by strengthening the user-object bond it will thereby extend the product life. Wood was selected for this chair because of its expressive character and sustainability.

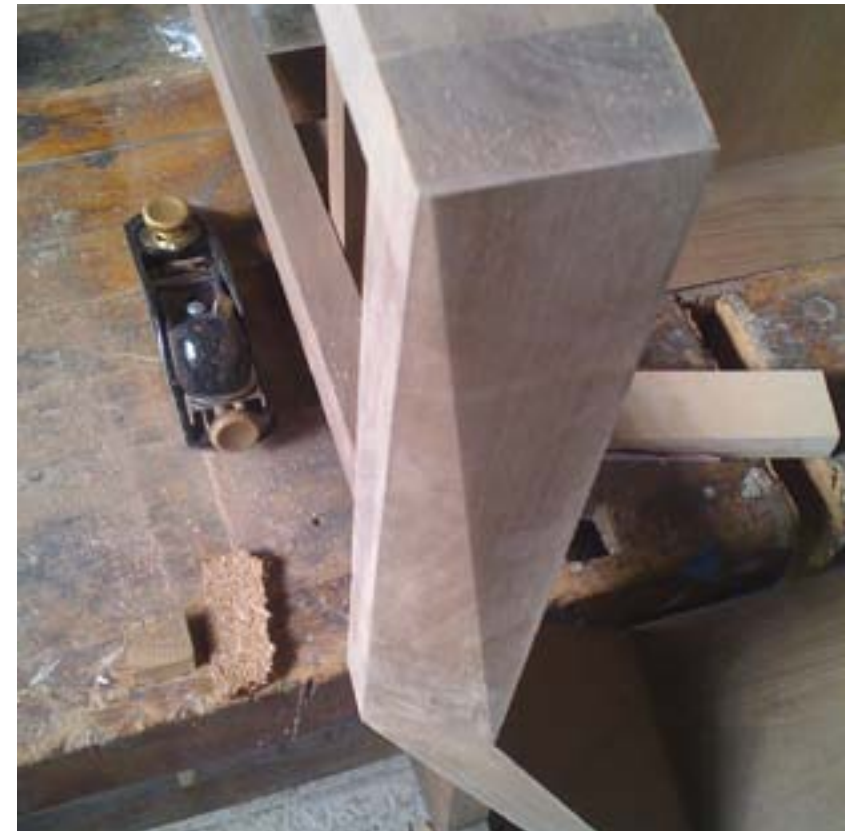


Scale Model

Based on the measurements of some of the most comfortable chairs I use, a digital model was developed. The model was printed on paper and constructed as a one third scale model. Using this scale model, the specific construction details were developed. This chair uses mitered spline joints and dowel joints. These robust joinery methods were employed to ensure this chair would last for generations. From the final revised model, a full scale prototype was constructed.



Construction



The One Hundred Year Chair

This chair was designed to last for generations. Not only was it designed to last physically, this chair was designed to last emotionally. In his book “Emotionally Durable Design”, John Chapman states that we are consumers of meaning not material. Often times perfectly good chairs are thrown out because they have not connected with us, either visually or physically. This chair seeks to connect with the user through the sense of touch. The faceted surfaces were designed so that the user would run their fingers over this chair, appreciating its construction and understanding its form. Its dark form hides certain aspects, and only by sitting in it can one truly appreciate its construction. This chair was designed to be an heirloom, becoming passed down for generations. A well made chair can last for four generations, and a black walnut tree (from which this chair was made) can take up to 100 years to fully mature. The material-life and use-life have been equalized.

