
1b. Form Finding Lab: *Compressive and Tensile Forms*

Objectives: To build and describe a purely compression structural form.

The purpose of this laboratory is to design and build a roof structure that is purely in compression. If totally in compression, a roof can be built with a relatively thin material. This design allows it be economical and sustainable, and to provide wide, open, interior spaces.

MATERIALS

1. Four pieces of wood framing
2. Extra dowel for cross-framing (optional)
3. Four C-clamps
4. Unbleached muslin
5. Plaster
6. Water
7. Staple gun
8. Scissors

LABORATORY PROCEDURE

1. Sketch a design for your roof structure (completed last week in class). Think about what features your roof should include to make it sustainable, aesthetically-interesting, economical, and wide-spanning.
2. Build yourself a frame using the pieces of wood framing. It is up to you what the aspect ratio of your frame is, and whether you use three or four pieces. The frame should be set up to support the creation of your roof structure drawing. Connect the wood pieces with C-clamps. Measure and sketch your frame.



Figure 1. *Wood frame assembly.*

3. Measure and cut a piece of fabric. Be sure that your fabric extends past the edges of the frame by at least 2 inches in each direction.



Figure 2. *Cut piece of unbleached muslin.*

4. Cut “legs” in your fabric. Before doing this you will want to decide how and where you are going to connect the fabric to the frame. (What is needed to support your roof? What do you want the roof to look like?)



Figure 3. *Muslin with holes removed to develop legs connecting to the frame.*

5. Use the staple gun to affix the fabric to the frame.

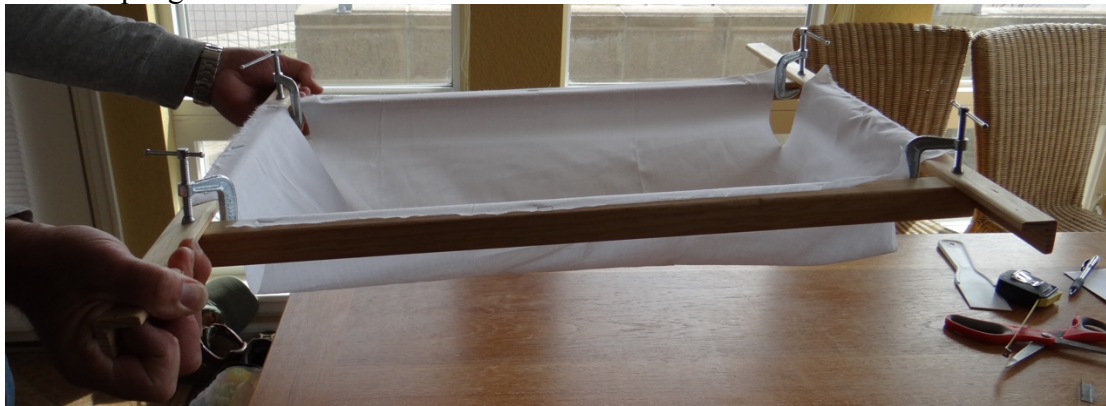


Figure 4. *Fabric stapled to frame.*

6. Arrange your frame on the tables/chairs in the classroom so that the fabric is allowed to hang freely from the frame.
7. In the bucket, mix 2 parts plaster with 1 part water. It is recommended to use the plastic container provided to get approximately the right amount. Remember, once you mix in the water, you have only about 6 minutes to apply the plaster to the structure, so make sure you are ready before you do this step.
8. Use your hands to spread the plaster on the fabric. You need only a thin layer applied over the entire surface. One side is probably enough. Add other connection points if desired using dowel, washers, needle and thread.



Figure 5. *Fabric with plaster applied, and being dried.*

9. Let hang dry for 20-30 mins.
10. Use knife to remove your structure from the frame and turn it over.
11. Admire your work and take pictures!



Figure 6. *A completed structure.*

Your Lab Report

1. Drawings

- Include the sketch you made before the lab.
- Sketch your final structure from at least three different perspectives. On at least one of these drawings include key dimensions.

2. Discussion. Please answer each question in a few sentences.

- Why did you choose the size and form that you did?
- If it were to be constructed full-scale, for what purpose would you recommend the building be used?
- Did the shape turn out as you expected? Why or why not?
- What do you like about your structure?
- If you wanted to find out, how would you determine how much load this structure could take?
- What would you do differently next time?