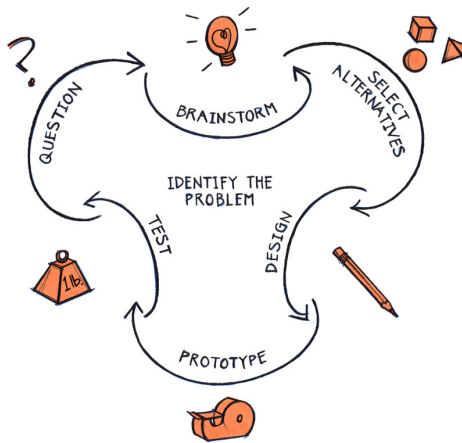



Build: Cardboard Table Guidelines



Design Goal: A table is really just a small-scale building that needs to support vertical loads as well as being stable laterally. Design a table to support a stack of books or to act as a table, maybe just a side table. Alternatively, if you prefer you can return to the design challenge from Concept 1 and re-design a cardboard chair to put into practice some of the engineering concepts you've learned.

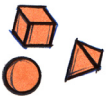
Supplies:

- Cardboard, foamcore, wood, recycled materials, whatever you can find and fits your design
- Cardstock, thin cardboard, paper for small prototypes
- Glue, duct tape, and/or string

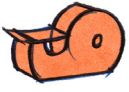
 **Question:** What size table do you want to design? A side table? A coffee table? Maybe you are tired of using cardboard? If so, go ahead and experiment with different materials: recycled or found materials? Wood? Or are you short on time and just want to use the shelf that you designed in Concept 5 and add vertical supports to it to make a table? Or maybe you want to revisit the cardboard chair you designed in Concept 1 and improve on that design now that we've discussed some basic structural principles. Go ahead and design and build whatever type of structure you are excited about!



Brainstorm: Come up with LOTS of ideas. Sketch ideas and be creative.

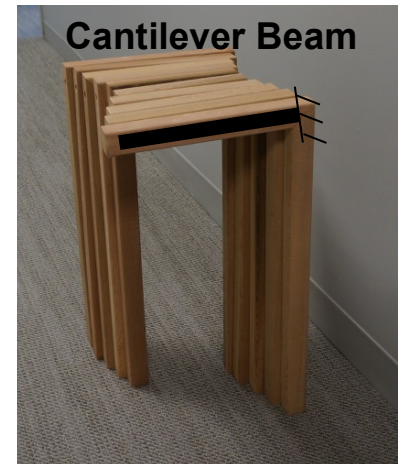
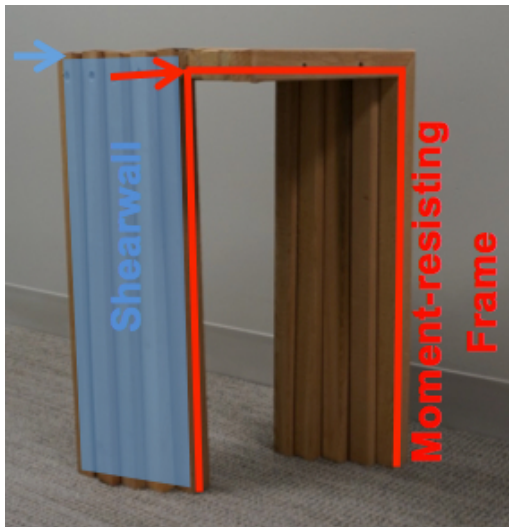


Select Alternatives: Be sure to select alternatives that meet your design goals. Can you use found and recycled materials?



Design and Prototype: I recommend sketching and building small-scale prototypes before building your final table. I often use manila folders or poster board to build small-scale prototypes of my design ideas. The more time you spend experimenting and building the more successful you'll be with your final design. The key will be to design a lateral force resisting system for your table: will you use a braced frame, a moment-resisting frame (with strong connections at the top), or a shearwall (with a panel on the sides of the table)?

The teaching assistants were tired of building with cardboard so decided to build a table out of wood since we had extra wood from a previous class project. Check out the fun design that uses a cantilever beam. Laterally, I'd say they used a moment-resisting frame in one direction and a shearwall in one direction; not a traditional shearwall but one created by closely spaced wood members.

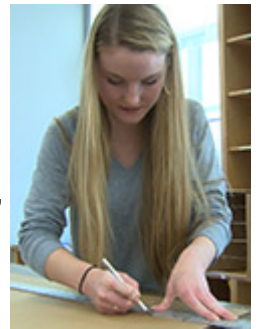


Test your design. How much load can your table (or other structure) support? Is it stable laterally as well as vertically?

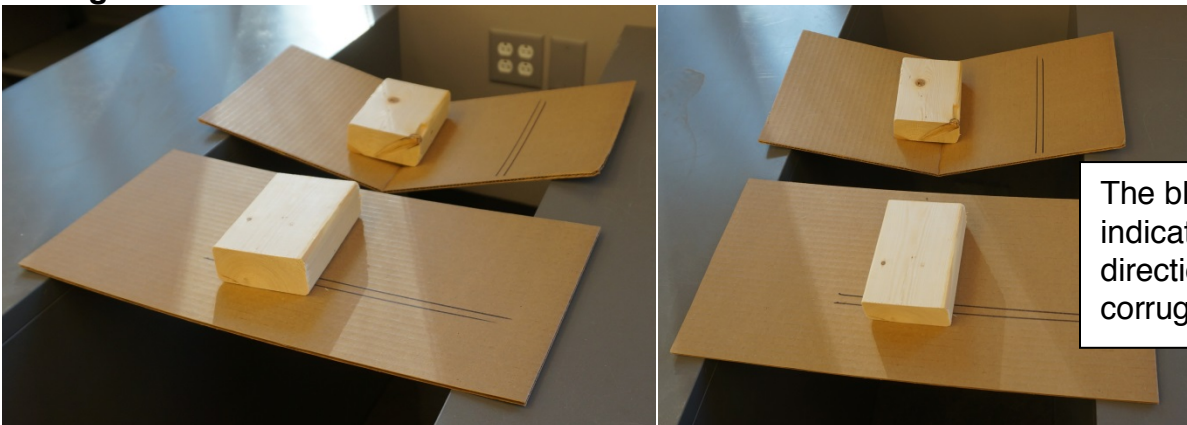
Reflect on your design: what worked? What didn't?
How might you improve your design?

Tips for Building with Cardboard:

- Use an X-Acto knife or utility knife with a sharp blade – if you start getting rough edges when cutting, it is time to change the blade.
- Use a ruler, the wider the better, to help cut straight lines and protect your hands.
- Rather than trying to cut the cardboard all the way through on the first pass, make several passes using light pressure.
- Score cardboard by cutting only through the top layer to create bends and corners in cardboard.
- Pay attention to the orientation of the corrugations in the cardboard: cardboard can be quite strong in one direction (parallel to the corrugations) but quite weak in the other direction (perpendicular to the corrugations). Experiment a bit with pieces of cardboard to determine the stronger direction.



Corrugations:



Scoring:

