



Zappos Cardboard Regatta

At Pirate Fest

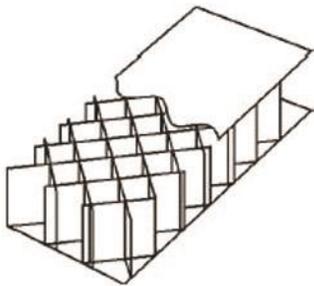
HINTS & HELP

A wise man said it is not the destination but the journey that counts! Half the fun of the Cardboard Regatta is actually building the boat. The first and most important element of proper boat design is using creativity. So it really more like, "If you can *think* it, you can float it!!"

Before you get too far, remember the PERSONAL CHALLENGE aspect. You can make a Personal Challenge against a fellow competitor. Challenge another department or another company. While you are racing for the overall trophy, the Personal Challenge is a one on one competition. Only one can win. So you may not win the big trophy, but YOU beat the shipping Department hands down!!!

I mention this because you might design things a bit differently if you have that little extra competition going on!! So let's get started!! First we need stuff....

Step 1 – Materials



Since this is a Cardboard Regatta, one would assume the most basic ingredient would be....cardboard. You should immediately start to gather materials. Refrigerator boxes are like gold! Try local sources, businesses that package or receive large items. Who uses large amounts of cardboard? How about Costco or Sam's Club? Furniture stores? We will have limited amounts donated by Mattress Firm available at the Zappos Campus. You can also use cardboard "blocks" that protect items in shipping.

Cardboard tubes such as carpet or flooring tubes are permissible, but Sona-tubes or waxed or treated tubes are not! Small boxes? Glue them together to laminate a larger piece! How many shoes DOES Zappos sell?

In this type of construction, duct tape is your friend! Duct tape, masking tape, construction adhesives, paint and varnish are your building blocks. Obviously no metal, metal fasteners, wood, plastic, fiberglass etc. See the rules (Guidelines) for more information.

Step 2 – The Plan

First you admit...there is no plan!! No step by step procedure to follow. No “kit” or design to buy and assemble. You just have to “wing” it!! There is no right way to this build. That’s good! It means there is no WRONG way!! Creative problem solving is the norm here. Combine creativity with some fun and you have a winning combination! While there is no fill-in-the-blank instruction, there are some helpful hints.

Remember sitting in those science classes telling yourself...” Why can’t I just sleep? I mean when will I ever use this stuff?” Guess what? THIS is one of those times that you could use that stuff!!! So how about a little refresher? Here’s science stuff that can make your design a little easier....

THE SCIENCE STUFF

First question people have is “how can a cardboard boat even float?” Have you ever seen a cruise ship? It is a floating city, with emphasis on floating. It weighs almost 72,000 TONS! So how can it float? It’s called **displacement**. Water weighs 62.4 pounds per cubic foot.

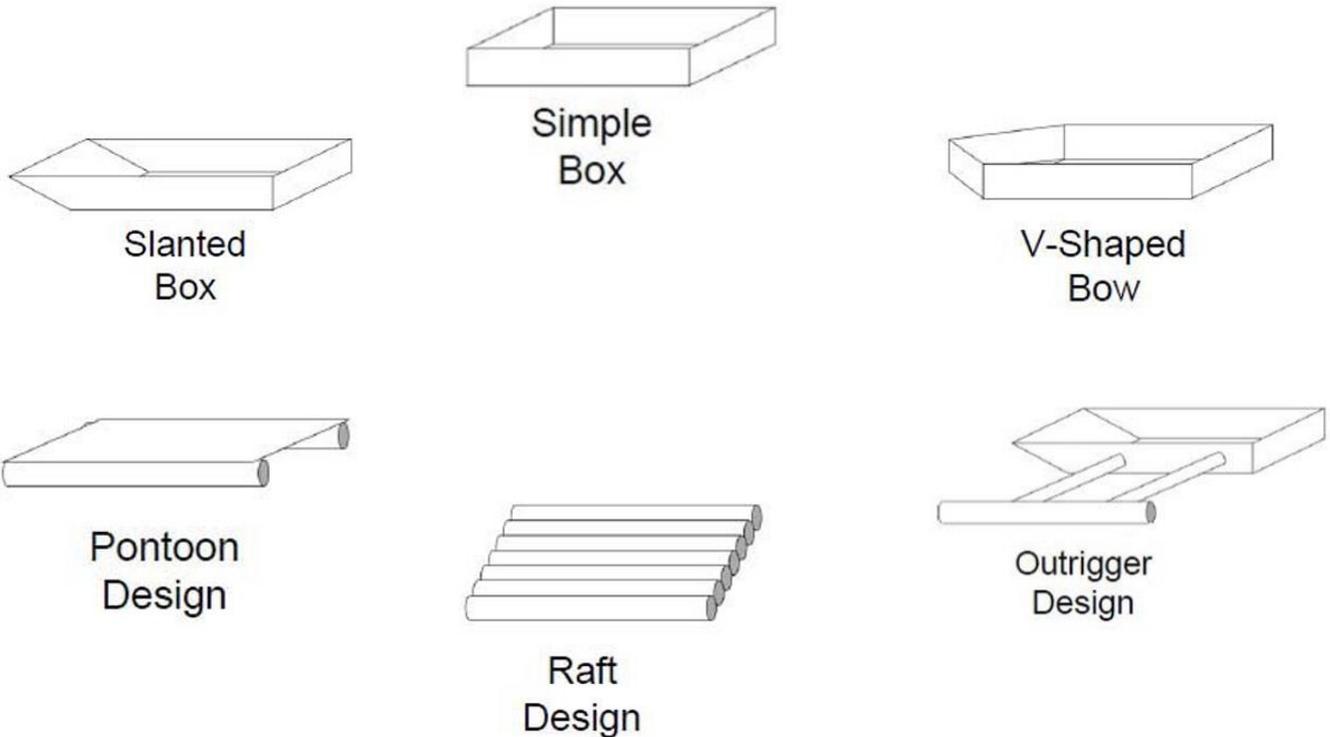
Weight of Water = 62.4 pounds/cubic-foot	Water Displaced(ft ³) = $\frac{\text{Weight-of-boat-\&-people-lbs}}{62.4 \text{ lbs/ft}^3\text{-H}_2\text{O}}$
Example:	Depth(ft) boat sinks = $\frac{\text{Water Displaced(ft}^3\text{)}}{\text{Length X Width of boat (ft}^2\text{)}}$
Box boat, 3 ft X 6 ft, 1ft tall (high)	
Boat volume = 3' X 6' X 1' = 18 ft ³	
Boat displacement = 18 ft ³ X 62.4 lbs/ft ³ = 1123.2 lbs	
Which equates to 93.6 lbs per inch of boat height	

So basically a boat that is 1 foot by 1 foot by 3 feet will float 180 pounds! This explains how they can even make a boat out of concrete!!

That size boat may be a bit uncomfortable but it shows how much boat is necessary for each person. Try not to overbuild. It will make the boat too difficult to maneuver.

Science aside, let’s decide on a basic shape for your boat. How about some helpful hints?

Flat bottomed boats are most favored due to stability. Also, the lowest point of gravity is going to be the most stable. Kneeling or standing might look cool, but you are much more likely to need swimming lessons! Here are some basic shapes:



Design hints:

Longer boats go faster, but they are harder to turn.

Boats shorter than 10 feet are difficult to steer.

Watch your center of gravity, if you are too top heavy you will topple over.

For height: allow about 18 inches so you can comfortably sit and paddle effectively.

For width: figure about 30 inches for one person. 48 inches for two people.

Save a LOT of time, create a mock up model, then scale it up to full size.

(We have included a “Design a Boat” page. It is a grid you can photo copy. I suggest on a stiffer material like a manila folder. It is a great way to practice your design. You can fold, re-fold, cut it up, glue it together and try several ideas in small scale)

Step 3 – The Build

Now armed with a basic idea and hopefully a cool model, it's time to go big! There are some simple tricks when you are working with the cardboard. Try not to damage or dent the corrugations as that will compromise the strength. Try folding the cardboard with the "grain" of the corrugations as it will fold much neater. Score your lines before folding using the handle of a butter knife or similar type edge to make a much neater crease.

Increase strength without adding weight by laminating layers of cardboard. Alternate each layer's "grain" will also increase strength. Try spreading your glues with brushes and rollers as it makes a much tighter joint. Spring clamps can be invaluable to help hold the boat together while the glue sets. You are best to use tapes for covering joints, not for keeping them together.

To keep the cardboard dry, seal the edges. Water will get drawn into the corrugations just like a drinking straw! One thing to keep in mind: Most boats sink due to cracks in the hull, not water seeping through the cardboard. Being able to make the boat as sturdy as possible is crucial.

Step 4 - Paint

When painting a boat, start off with a primer first. Cover exposed duct tape with masking tape or something similar; duct tape will shrink when exposed to paint. After priming, applying numerous coats of latex paint can really help in waterproofing your boat. Try to paint both inside and out to prevent your cardboard from getting soggy.

Step 5- Decorate

After your base coats are applied, it is pure decoration from there. Try to be creative and make something you will enjoy. The decoration does **not** have to be cardboard. However the decoration must be above the waterline and not assist in the floatation or structure of the boat. Make your boat reflect a theme (like a pirate ship!!) or represent your company or group. For example, a fast food restaurant's boat might look like a hot dog or a sandwich, a local attorney's boat might look like a law book!! You get the idea. Remember the Most Creative Award will be based on how well your boat looks! It make not be fast....but it LOOKS COOL!!!

Learn from others:

There are tips and tricks on cardboard boat building on the internet. A simple search for “cardboard boat building” will yield a ton of info. Here are a few of the sites we found useful when compiling the above information:

<http://lcnphysicscardboardboatregatta.weebly.com/construction-help.html>

<http://www.usps.org/d33/Regaton/buildAboat.pdf>

[http://www.saintdominiccatholicschool.com/uploads/3/0/1/5/3015515/directions - crazy cardboard boat race.pdf](http://www.saintdominiccatholicschool.com/uploads/3/0/1/5/3015515/directions_-_crazy_cardboard_boat_race.pdf)

<http://www.gcbr.com/tips.html>

Here are some video links:

<http://www.youtube.com/watch?v=t5w0xw44Cb0>

<http://www.youtube.com/watch?v=EyNuaEddaUA>

