

How to make a steambox for bending wood

by [nativewater](#) on December 11, 2007

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intro: How to make a steambox for bending wood

A steam box is a handy way to heat wood so that it becomes more pliable than it is at room temperature. Once pliable, you can bend the wood into shapes that you couldn't bend it into cold. Size of the steam box depends on the length and diameter of the wood that you intend to bend. In general, it's good to make the steam box just a little larger than the wood that you're trying to heat. The smaller the steam box, the faster it heats up and the sooner you're bending wood.

I use a short steam box for bending ribs for kayaks. The ribs are 1/4 inch thick and 3/4 inches wide and usually less than two foot long. I use a long steam box for steaming coamings that go around the cockpit of the kayak. The wood for the coamings is about 7 feet long and 3/4 inches by 1-1/2 inches in cross section.



Image Notes

1. The heat source, in this case a gas fired camp stove boiling water to generate steam for the steam box.
2. The steambox proper. The box can be made out of just about anything as long as it can tolerate steam at about 200 degrees F. The box walls must also have enough insulation value to maintain the interior at 200 degrees.
3. The far end of the box is open for inserting wood. A wet rag traps heat.

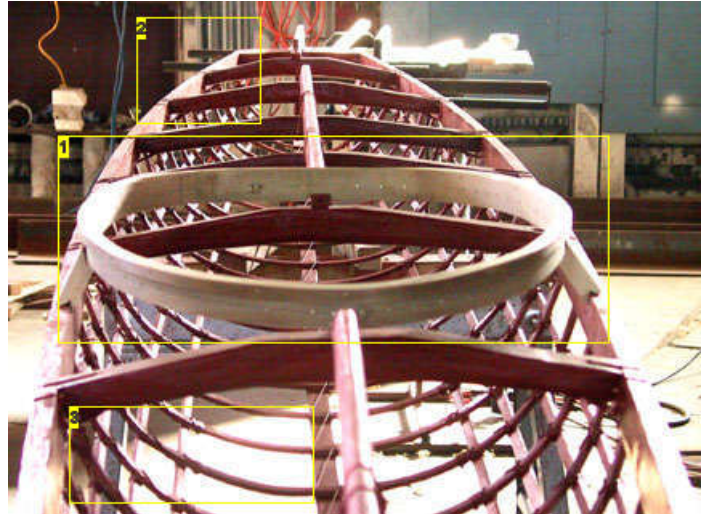


Image Notes

1. This coaming was bent out of a 7 foot long piece of red oak.
2. The wood in the gunwales is bent, but not enough to require steaming. The bending is within the elastic limits of the wood. We need steam only when the curve requires us to exceed the elastic limits of the wood.
3. Ribs are oak salvaged from pallet lumber cut to 3/8 inch square cross section. These also needed to be soaked and steamed before bending.

step 1: Materials list

You will need 5/8 inch or 3/4 inch plywood in the appropriate length. Thinner plywood would work but loses heat too quickly unless you add insulation to the outside of the steam box.

You will need a coat hanger or a few feet of heavy wire as supports inside the steam box to keep the wood off the bottom so heat can get to it from all sides.

You will need a cooking pot. A two quart size is good for starters. You can fill it two thirds full and generate steam for several hours.

You will need a heat source. If you plan on working outdoors, a camping stove works fine. If you work indoors, you can use a hotplate. The hotplate I use runs 750 watts. That is hot enough for the three foot steambox I use and just hot enough for the 8 foot steam box.



Image Notes

1. This is a 750 watt heater when the controls are cranked to max. For big wood, you might need something hotter.



Image Notes

1. You will need some kind of pot for a water reservoir. This one is a brass flower pot I picked up at a second hand store.

step 2: Construct the steam box

Cut the plywood to the dimensions that you need. The interior of the steam box should be large enough so that when you load it up with wood there will still be an inch of space around the wood so that the steam can get to the wood.

Nail or screw the 4 sides together.

Close off one end of the box. Leave the other end open.

Screw a piece of plywood that is 4 inches wider than the diameter of your cooking pot to the capped off end of the steam box.

Cut a hole in the center of the piece of plywood so steam can get from the cooking pot into the steam box.

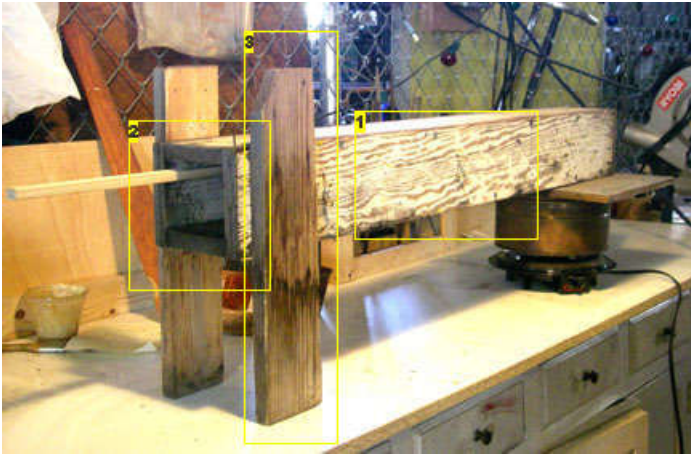


Image Notes

1. The sides of the box are 3/4 inch plywood screwed together.
2. This end of the box stays open for loading.
3. Legs support the open end of the box.



Image Notes

1. This is an 8 footer for steaming long pieces of wood.
2. Until I get around to adding feet to this end, I'm blocking it up with chunks of wood.



Image Notes

1. A piece of plywood with a hole in it serves as a lid for the boiling pot of water. Steam enters the hole and travels down the box. Burn marks are from using a gasoline powered camp stove that got a little too hot.

step 3: Add wires to support your wood

Drill some holes in the side of the box to run your wire supports through. Keep the holes the same diameter as the wire to minimize the amount of steam that escapes or the need to do a lot of caulking. The wires will elevate the wood in the box so the steam can get to all sides of it. Cut wires 4 inches longer than the diameter of the box.

Run the wire through the holes and bend over the ends so the wires don't fall out.

Finding the hole at the far side by feel is tricky. Shine a light in the open end of the box and look through the hole that you are aiming the wire for. When the light disappears, you have found the hole.

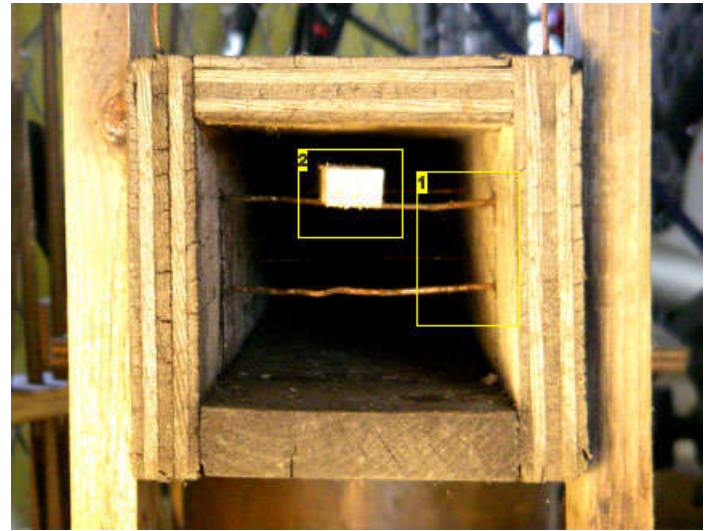
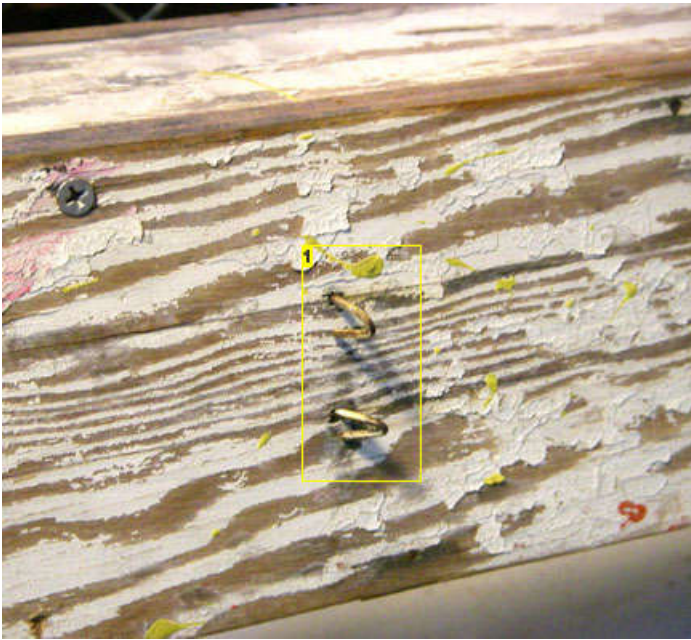


Image Notes

- 1. This is a two tier steam box that allows me to load a bunch of sticks for steaming simultaneously.
- 2. The stick is off the floor of the steambox so steam can get to all sides of it.

Image Notes

- 1. Coat hanger wire supports the wood inside the steam box so the heat can get to all sides of the wood that you are trying to heat.

step 4: Add legs to support the open end of your steambox

Set your pot up on the heater that you will be using. Screw some legs to the sides of the open end of the box so that it is level with the top of the pot. The level steam box is important so that the lid of the steam box makes a good seal with the top of the cooking pot.

If you're not that ambitious, you can just pile stuff under the open end of the steambox to raise it to the right elevation.

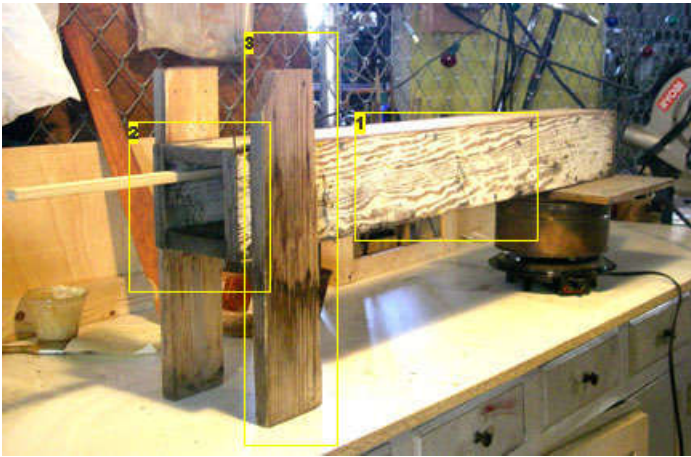


Image Notes

- 1. The sides of the box are 3/4 inch plywood screwed together.
- 2. This end of the box stays open for loading.
- 3. Legs support the open end of the box.

step 5: Steam away

When you're all set, fill your pot two thirds full of water, turn on the heater and wait for the water to boil. After the water has come to a boil, the steam box still takes a little while to heat up. Once you get a good flow of steam coming out of the end of the box, you're ready to heat and bend. One quarter inch thick ribs heat up in under 5 minutes. Thicker stock takes longer. Heat has to travel from the surface of the wood to the interior. Rule of thumb is 15 minutes of heating per 1/2 inch of thickness. Keep in mind that some woods bend better than others. White oak, red oak, ash and poplar all bend well. Straight grain is important as well. If you have grain running out of the face of the board, your wood will most likely break where the grain runs out.

Caution-Danger!

It's really easy to leave on the heat when you're done bending wood. Eventually, the water all evaporates, the pot becomes hot and the plywood starts smoking. Good way to start a fire.

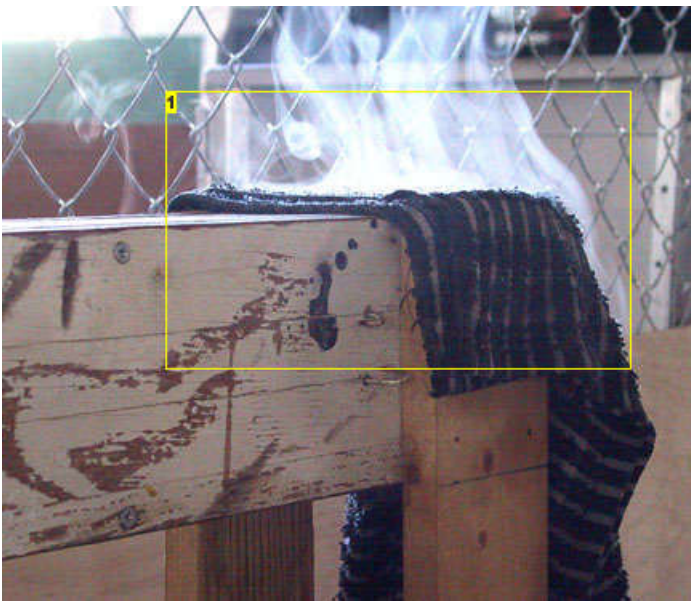


Image Notes

1. When you have a good flow of steam coming out the end of the box, then you're ready to load it with wood.

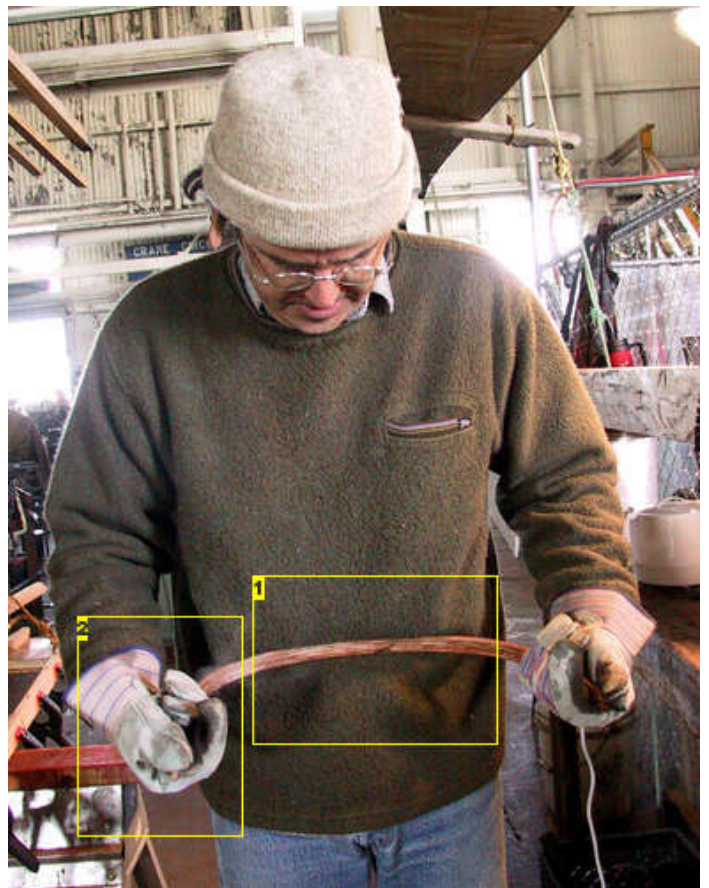


Image Notes

1. You can bend wood free-hand in some cases. Our demonstrator is pressing the middle of the stick against his belly to flatten it out and focus the bends near the ends of the stick. You have to work quickly. The wood cools down in under a minute and stiffens up again.
2. Gloves keep your hands from burning.



Image Notes

1. Or you can bend the wood around a form, this one made out of plywood. Clamps hold the bent wood in place. Clamped wood needs to stay in place until dry. Once dry, it keeps its shape.

Related Instructables



PVC Steambox to Steam Wood by sherfy



Build a Greenland kayak part 5 by nativewater



Tech Deck Keychain by SpecialEd101



How to make a tech deck spine ramp by Xander da gr8



How to make a tech deck landing ramp for your mega ramp by Xander da gr8



Evil Robot of Doom! (slideshow) by Mr. BeanyMvBeanBea



How to make a tech deck quarter pipe by Xander da gr8



Tech deck grind rail by Xander da gr8



Comments

[33 comments](#) [Add Comment](#)



otisbaldwin says:
thanks a lot! :)

Nov 9, 2008. 6:27 PM [REPLY](#)

I like your kyak it looks like its going to be nice
do you have any suggestions on how to make a ball out of wood?



altomic says:
I used to use 2 aluminium deck chairs, a mattress plastic bag, and a broken kettle.
lo-fi baby

Sep 20, 2008. 9:35 PM [REPLY](#)

though there is a certain cool-ness (I can't spell je ne ces que) with this design that leaves it home made looking but bordering on professional in quality/outcome.



ilovetea says:
I was thinking of making a chair using this technique, one similar to this but with a smaller wood sheet:
<http://www.designboom.com/history/choi/22.jpg>

Sep 20, 2008. 8:29 PM [REPLY](#)



TinKicker says:
This is a great instructable, very applicable to the pull-behind camper I am planning to build. Do you have any ideas on a good (that is, efficient) way of bending large panels (such as plywood)?

Apr 14, 2008. 6:54 PM [REPLY](#)



kd1uc says:
The real problem with steaming plywood is that it is built to be stable with the grain changing direction with every layer. Solid wood fibers stretch and compress to make the new shape and the grain is only one basic direction.

Jul 28, 2008. 4:05 PM [REPLY](#)

The best way I know of to work with plywood is to use several layers of thin plywood. Quarter inch is very flexible and one can be glued on to of the other and then trimmed to shape. You have better control of shape and thickness and when it is glued it will hold the new shape better than solid wood. Plus I believe it would be stronger than a manufactured sheet of the same size. Believe it or not the 1/4 inch is better quality than 3/4 inch.

The material cost might go up but the cost of making a one time steam box and the hours put into it is far more. Not to mention that you only have so much time after the wood is pulled from the steamer that you can work it.

I'd love to see some pics of the trailer when your done.



nativewater says:

Jul 29, 2008. 8:51 AM [REPLY](#)

I am also reminded of the trucks we had in the army - The bed was covered over with wooden bows and those were covered over with canvas.

Perfectly good for going down the road at 60mph.

See also this websites which has lots of links to traditional gypsy wagons:

<http://www.enslin.com/rae/gypsy/camps.htm>

A guy named George Buehler has also published a book called "Buehler's Backyard Boatbuilding." He uses the multiple layers of 1/4 inch plywood technique to create curved surfaces on boats and offers advice on how to make them strong and how to glue them together and make them waterproof.



nativewater says:

Apr 15, 2008. 8:45 AM [REPLY](#)

You could build a large flat steam box. You would want a high wattage steam source sufficient to heat up your steam box and plywood. I have bent 24 inch pieces of 1 door skin into cones. If the plywood has voids, it tends to kink where the voids are if the voids run the whole width of the panel.

Although it would be more expensive, you might want to look at flexible plywood. It's usually thin like 5 mm, but you could laminate it up into thicker panels which would then lock in the shape and stiffen it. No steaming involved. There are probably multiple sources, just search for flexible plywood.

Here is one source: <http://www.marineply.com/stagflex.htm>



abadfart says:

Jul 27, 2008. 5:32 PM [REPLY](#)

can you use this to build a guitar ??



nativewater says:

Jul 28, 2008. 1:27 PM [REPLY](#)

I assume you're talking about bending the sides of the guitar. If that's done with heat, then the steambox would work. You would probably also want some forms to force the wood into the proper shape.



corkey123 says:

Mar 10, 2008. 10:27 PM [REPLY](#)

How do you think steamed wood would react to epoxy resin or other glues (gorilla glue), It doesn't say anything on the packages, but do you think it would ruin the glue or something?



nativewater says:

Mar 12, 2008. 8:10 AM [REPLY](#)

If you mean glueing after steam bending, the wood will still be moist after bending. Gorilla glue would work since it wants to have some moisture to make it foam up and fill gaps. I don't know about epoxy. Depends on the type I imagine. Worst case, you would have to let the bent wood dry for a day or so before applying epoxy.



corkey123 says:

Mar 12, 2008. 10:39 PM [REPLY](#)

So, if I were to steam my wood and then put it in my press and let it dry for a bit (day), would it hold its shape completely, or does the wood want to spring back to its original form (flat) if taken out of the form



nativewater says:

Mar 13, 2008. 8:35 AM [REPLY](#)

The wood will have some tendency to spring back but it will not return to its original shape. Usually bent wood becomes part of some larger structure which helps it to hold its new shape. If your bent piece of wood is going to be free standing like say the tip of a ski, then you might have to over bend it some to compensate for the tendency to spring back.



eiwtes says:

Mar 11, 2008. 12:12 AM [REPLY](#)

you can also use a normal kettle with some type of funnel to concentrate the steam into the box, we use it in our shop, works great? i mean, it makes wood bendy!

(sorry if someone already posted this)



Wyle_E says:

Dec 12, 2007. 8:29 AM [REPLY](#)

Why not just make the top removable? It's not as if it has to hold pressure.



nativewater says:

Jan 2, 2008. 9:43 AM [REPLY](#)

Yes, you definitely don't want any pressure buildup. That would be dangerous. A removable top would be ok if you only planned on bending one piece. If you bend a number of pieces in succession, removing the top would release too much heat out of the box and would require more time to build up heat for the next piece.



carolinatinpan says:

Dec 31, 2007. 2:45 PM [REPLY](#)

duckworksmagazine.com has all you want to know about boat building.



nativelywater says:

Jan 2, 2008. 9:38 AM [REPLY](#)

Good resource for wood planked boats. And may of those designs can probably be adapted to skin on frame construction, once you get the hang of it.

Best general resource for skin on frame boats is probably qajaqusa.org which also has a very active forum where you can ask questions and get answers from other builders.



SWV1787 says:

Dec 12, 2007. 10:13 AM [REPLY](#)

This is a wonderful idea, a great way to do it. I believe that was a kayak in the start, did you make the entire thing with steamed wood or was some of it cut ply? and what do you intend to use as a skin?



nativelywater says:

Dec 12, 2007. 11:20 AM [REPLY](#)

No plywood in the kayak. Only the ribs and the cockpit coaming are steam bent. All the longitudinals are bent cold. The deck beams are cut to their curved shape, although some people laminate a bunch of 1/8 inch strips of wood together. At that thickness you can cold bend wood to some pretty extreme shapes.

I have used cotton canvas, nylon, polyester and polypropylene fabric for skins.



SWV1787 says:

Dec 12, 2007. 4:08 PM [REPLY](#)

what type of skin do you find is the best? eg. most durable easiest to work with ect. and do you have an instructable or any recommendation for a good resource to make a small boat either kayak or dingie?



nativelywater says:

Dec 16, 2007. 9:05 AM [REPLY](#)

8 oz nylon is good to work with. Has some stretch and it can be shrunk one time with water for a good tight fit. The only downside is that it expands and contracts with changes in temp. I will have an instructable on how to make a kayak shortly.



SWV1787 says:

Dec 16, 2007. 4:19 PM [REPLY](#)

I look forward to reading it. You definately seem to know what you are doing. I must admitt I am very impressed with what I have seen of your work.



Mr Mild Mannered says:

Dec 12, 2007. 5:16 PM [REPLY](#)

Cool, I'll definitely make myself one after christmas, I've been looking for a way to bend wood somewhat cheaply. Hopefully I'll get a new dremel *Crosses fingers*.
Great instructable.



Mr Tenacious says:

Dec 12, 2007. 8:16 AM [REPLY](#)

This is great, its really going to help with the recurved bow i am making, i hadn't yet made the steaming process so maybe i will make this to bend the wood in to its correct shape, originally i had thought of submerging the whole bow in to hot water, but maybe this will do it better than that, something to try.

PS i think you should try and post the kayak stuff.



nativelywater says:

Dec 12, 2007. 11:57 AM [REPLY](#)

some people favor boiling over steaming. You can keep a whole bunch of bending stock in boiling water and pull out one piece at a time as needed. There is some danger in steaming of drying out the wood if you keep it in the steamer too long. Hence you can just keep a few pieces in the steamer at a time.

The downside of boiling is that you generally have to bring a larger amount of water up to temperature to keep your entire piece submerged. When you're steaming, you only have to bring about a quart of water to a boil. Boiling typically requires a larger heat source.

re p.s. - I am planning on posting some kayak construction stuff



nativelywater says:

Dec 12, 2007. 11:15 AM [REPLY](#)

Good idea. Only downside would be how much heat you would lose every time you took the top off. Probably not too bad on a 3 foot steambox but on an 8 foot steambox it would be significant.

If you're only going to steam one piece of wood, then a removable top would probably work. But if you're going to steam 20 pieces of wood, one right after the other, then you might lose too much heat each time you took the top off and would have to wait a while for the box to come up to temp.

Whether it would work would also depend on the wattage of the heat source.



Maxx1 says:

Dec 11, 2007. 8:52 PM [REPLY](#)

Simple...Great !!!! A plus from me !!



Wolf Seril says:

Dec 11, 2007. 2:47 PM [REPLY](#)

Surprisingly, I have a lot of uses for this. Nice 'ible. You should post the kayak.

BTW- for some reason every time there is an apostrophe in your 'ible it shows a bunch of random characters. I don't know if its just my computer, though.



nativewater says:

Dec 11, 2007. 5:50 PM [REPLY](#)

yeah. I typed in ms word and cut and pasted. I thought I caught all the funny characters, but will have to go back and clean up.

& I'm working on an instructible for the kayak. coming soon

Wolfgang



FrenchCrawler says:

Dec 11, 2007. 4:14 PM [REPLY](#)

Nah, I see them too. I think he might have typed it up in something like notepad/wordpad and pasted it over to here.



GorillazMiko says:

Dec 11, 2007. 3:19 PM [REPLY](#)

i admit, this is very cool.



theRIAA says:

Dec 11, 2007. 2:25 PM [REPLY](#)

cool
