

# Instructions for Your Very Own DIY Foam Latex Oven

## *A Convection Oven, Actually...*

*(Remember: Measure Twice; Cut Once)*

*Illustrations are not to scale.*

External dimensions of finished oven: 4'H x 3'W x 2'D

- Dayton OEM High Temp Blower (from Grainger) Model 1TDV3 - \$147.10
- Adjustable Temperature Control Switch (from McMaster-Carr) Model 3626K67 - \$184.02  
or...
  - Model 35055K71 ( $\pm 4^\circ$  vs.  $\pm 12^\circ$  for 362K67) - \$248.50
- Strip Heater (from McMaster-Carr) Model 3619K871 - \$44.50
- Misc. wood screws; misc. drywall screws (1 ½", 2", 2 ½", 3") 2-3 boxes
- 1" foam insulation sheets 2' x 4' (x6)
- Foil insulation tape (several rolls)
- Door handles x2
- Lift handles x4
- Heavy-duty 3" locking castors x4
- Barrel bolt closures x3
- Utility hinges – 2.5" x6
- Romex electrical wire
- 9' Power tool replacement cord
- 3" dryer exhaust hose
- Oven thermometer
- 90° (L) framing anchors – x52
- 6" x 6" metal screen for blower intake
- Wing wire connectors
- 2 x 4:
  - 2x 32.25"
  - 2x 36"
  - 2x 17"
- 2 x 2:
  - 4x 47.25"
  - 4x 32.25"
  - 6x 20.25"
- 3/8" plywood:
  - Sides: 2x 24" x 47.25"
  - Top/Bottom: 2x 24" x 36"
  - Front/Back: 2x 35.25" x 47.25"
  - Doors:
    - Top: 32"W x 32"H



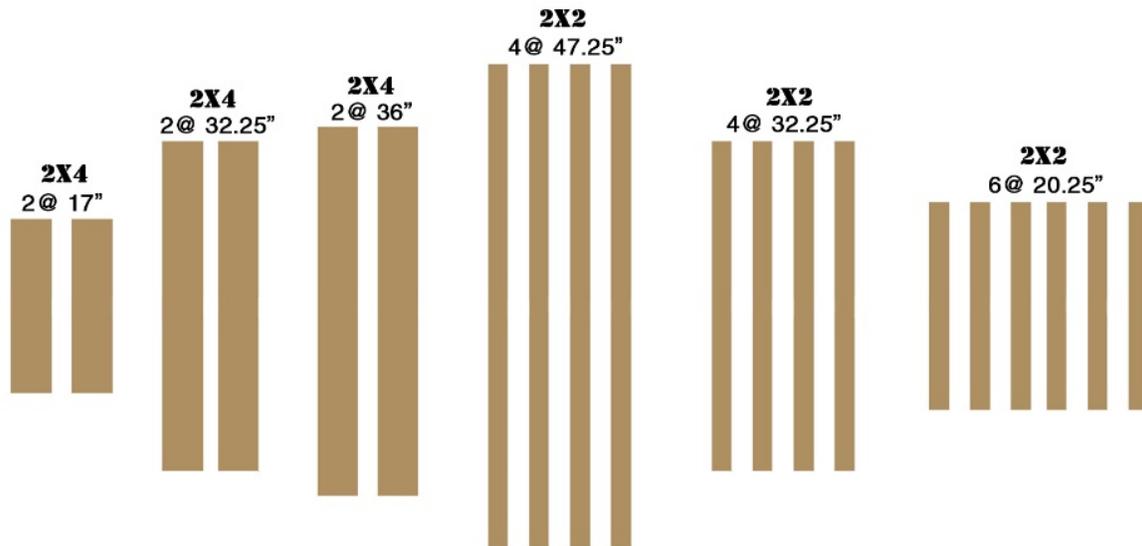
- Bottom: 32" W x 12"H
- 1" aluminum 'L' bracket: 9x 23.25"

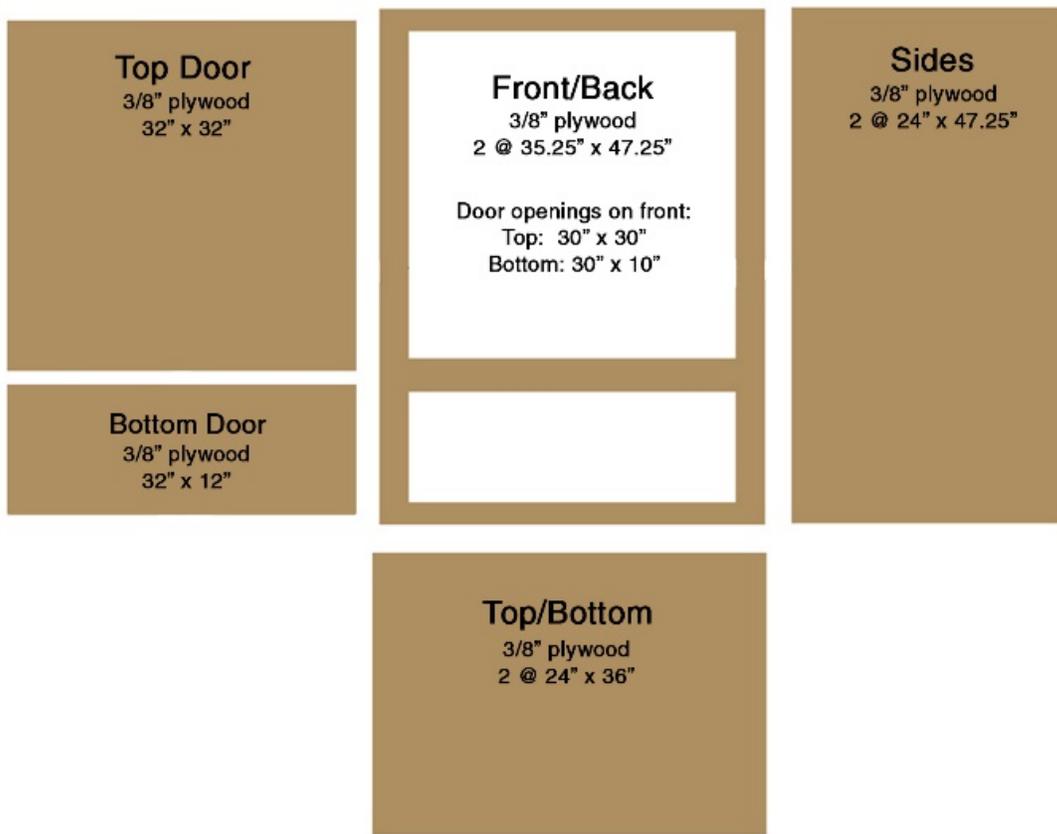
**NOTE:** Door openings in front panel: Top: 30"W x 30"H; Bottom: 30"W x 10"H

- Paint & brushes
- Misc. tools:
  - Drill and bits
  - Scrolling Sabre/Jig saw
  - Screwdrivers
  - Tape measure
  - Pencil/Sharpie
  - Misc. clamps
  - Hot glue & glue gun
  - Wood glue

**NOTE:** If you want to prepare for the possible addition of a second shelf, you will need to add:

- 2 x 4: 4x 20.25" (cut recesses for L brackets every 3.5") plus x6 3" wood screws
- 90° (L) framing anchors – x8
- 1" aluminum 'L' bracket: 6x 31"



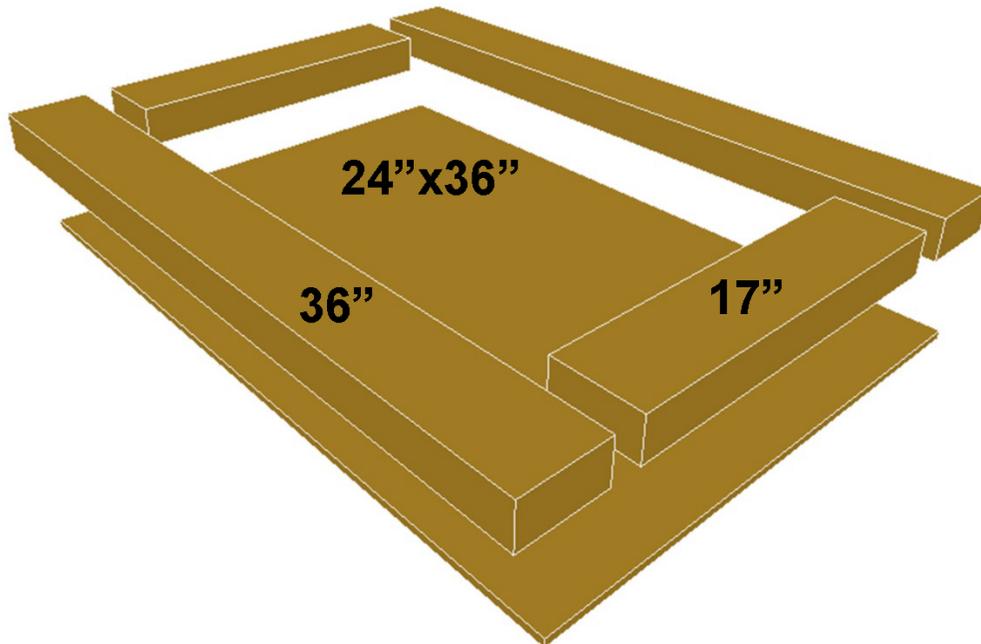


The best approach to building your own foam oven, I believe, is to have all of the pieces cut to measure and labeled in advance so the assembly can proceed relatively uninterrupted. (Illustrations are not to scale)

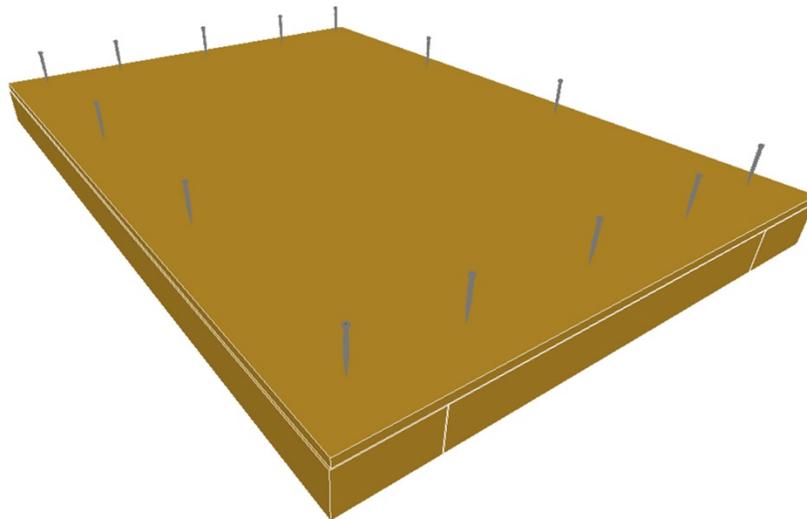
### STEP 1

Build the base.

Take the piece of 24" x 36" plywood you've chosen for the bottom, the two 17" 2x4s, and the two 36" 2x4s, and put them together like this:



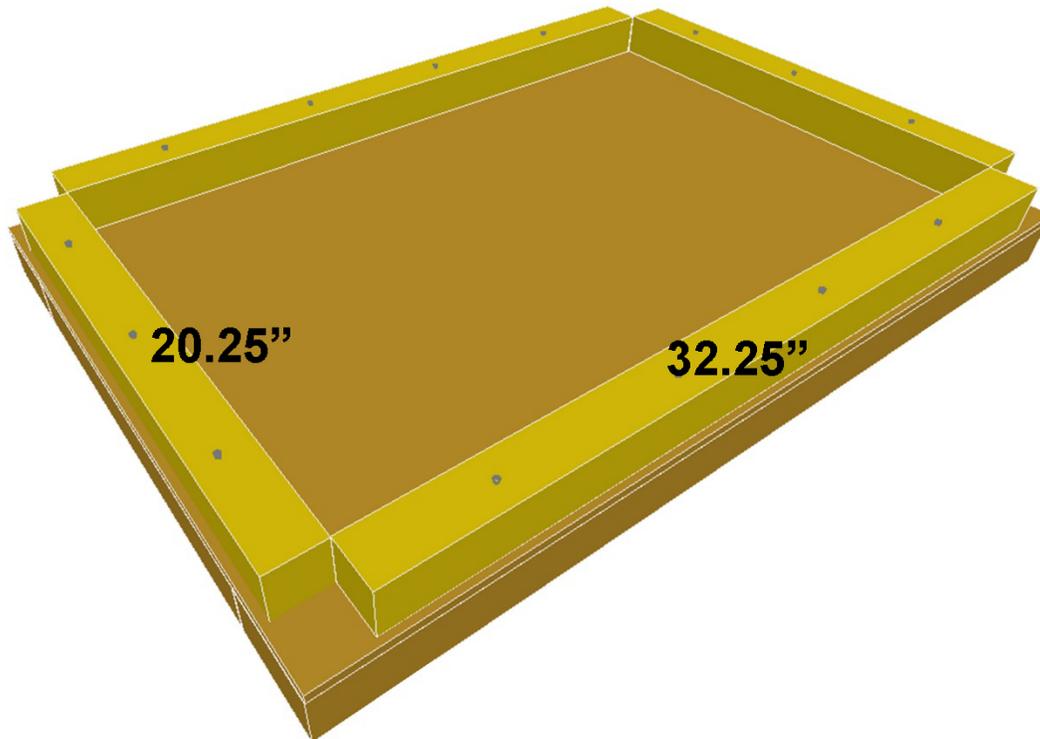
Clamp the 2x4s to the plywood and fasten them together with wood glue (apply before clamping!) and long drywall screws (2'').



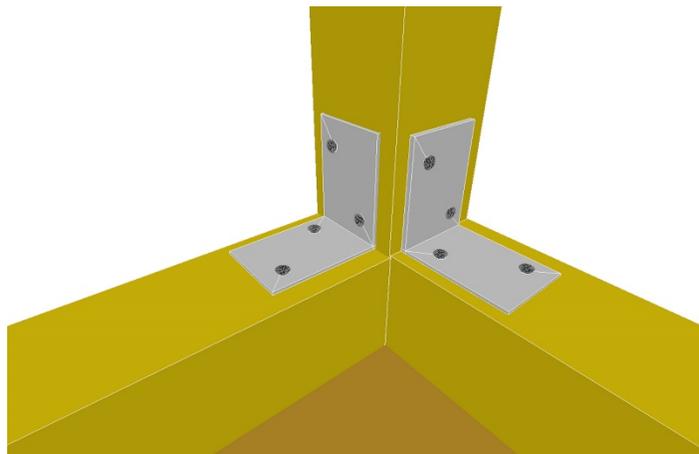
## STEP 2

Frame the oven.

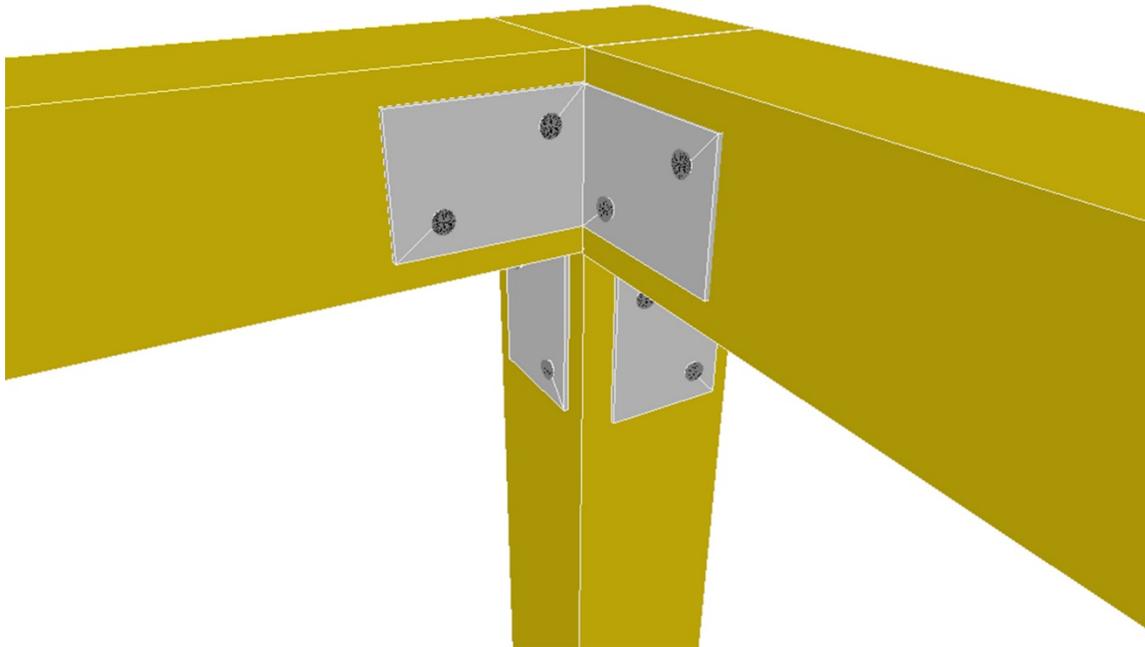
Starting on the base, place two of the 32.25'' 2x2s and two of the 20.25'' 2x2s on the base, the glue, clam and screw them in place, making sure to leave a 3/8'' perimeter space on the outside for the oven's exterior panels.



Once those are fastened in place, it's time to add the four 47.25" 2x2s that will be the vertical frame supports. Glue them, then screw two of the 90° (L) framing anchors to the vertical and horizontal 2x2s. For added stability and strength, a 3" screw can be put in from below, up into the vertical 2x2.

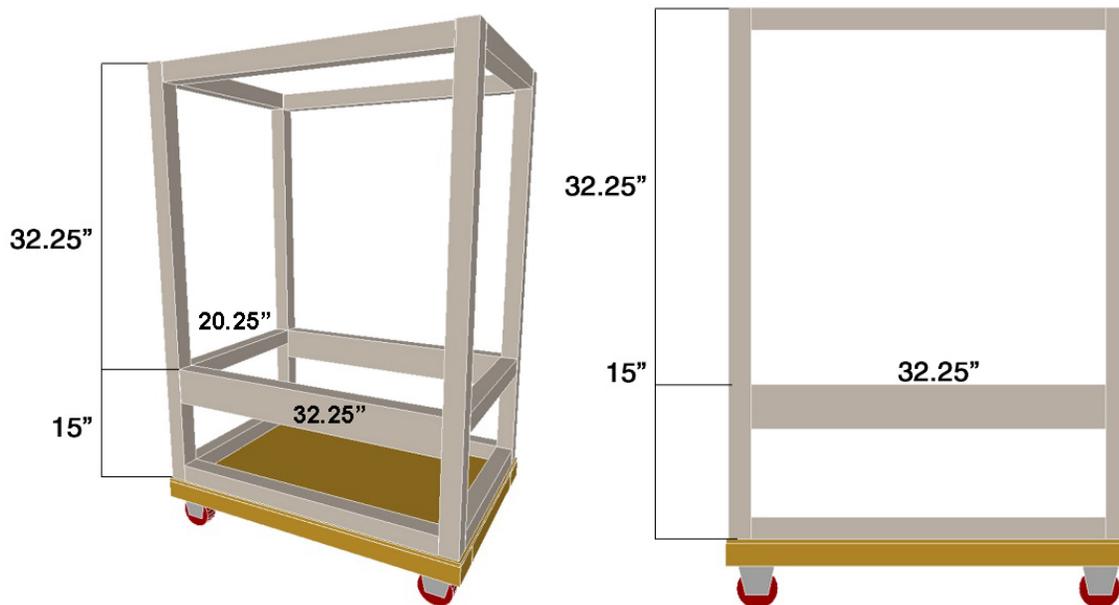


Do this for each of the four 47.25" 2x2s. Then add two more of the 20.25" 2x2s and the last two 32.25" 2x2s. Attach them to the vertical 2x2s, using two of the 90° (L) framing anchors for each corner, and one on the inside of each corner. Glue can be used as well, but be aware of the potential for a mess if you are working alone!



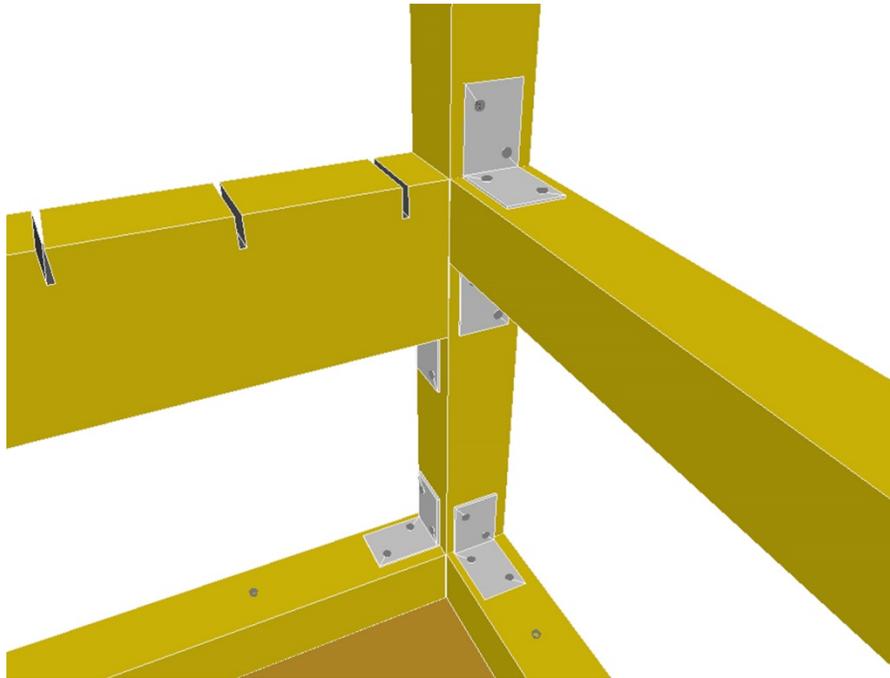
### STEP 3

Add the shelf supports and frame.



You'll use the remaining two 20.25" 2x2s and the two 32.25" 2x4s that will support the 1" aluminum 'L' brackets. Add 90° (L) framing anchors as shown, as well as one or two 3" drywall screws into the 2x4s from the outside. **IMPORTANT NOTE:** Notch the 2x4s for the 'L' brackets *before* attaching them to the oven frame.

Mark the 32.25" 2x4 pieces in the middle (about 16 1/8") and then make marks every 3.5" until you have a total of 9 marks. Using a chop saw or circular saw, carefully cut a notch an inch deep, placing the blade right on the middle of the mark. If you're going to make a top shelf, go ahead and make the notch cuts on the 2x4 pieces cut for the top shelf. Measurement instructions are at the end of Step 4.

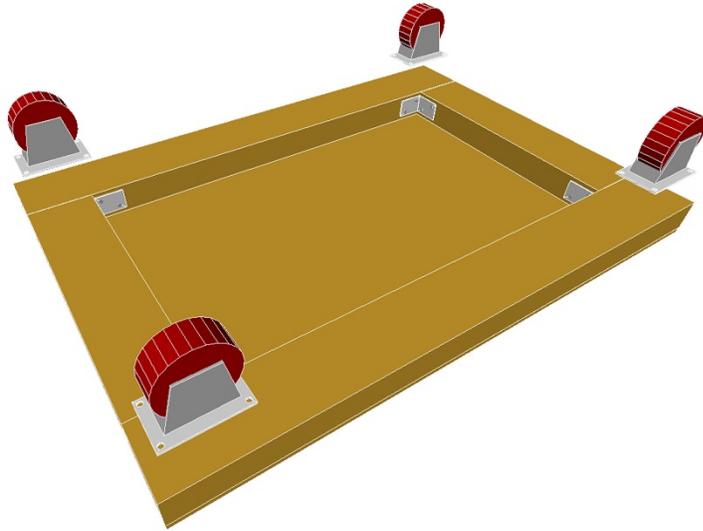


Once those parts are attached, that completes the framing.

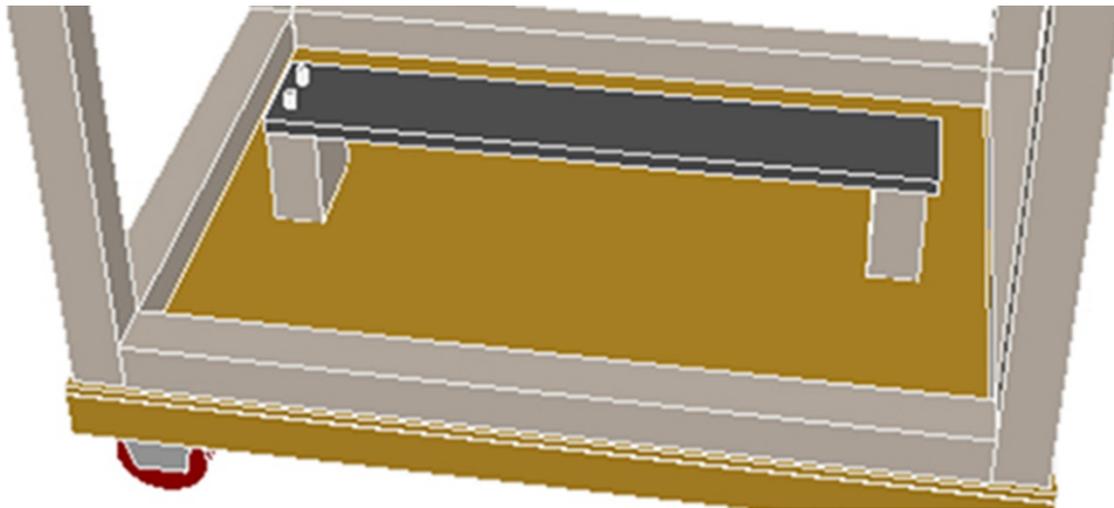
#### **STEP 4**

Putting on the casters.

Turn the frame upside down so the bottom is now facing upward. Place the caster base on the long 2x4s and mark where the screw holes are, and drill pilot holes for heavy screws to hold the casters to the base. Attach the casters with heavy duty screws.



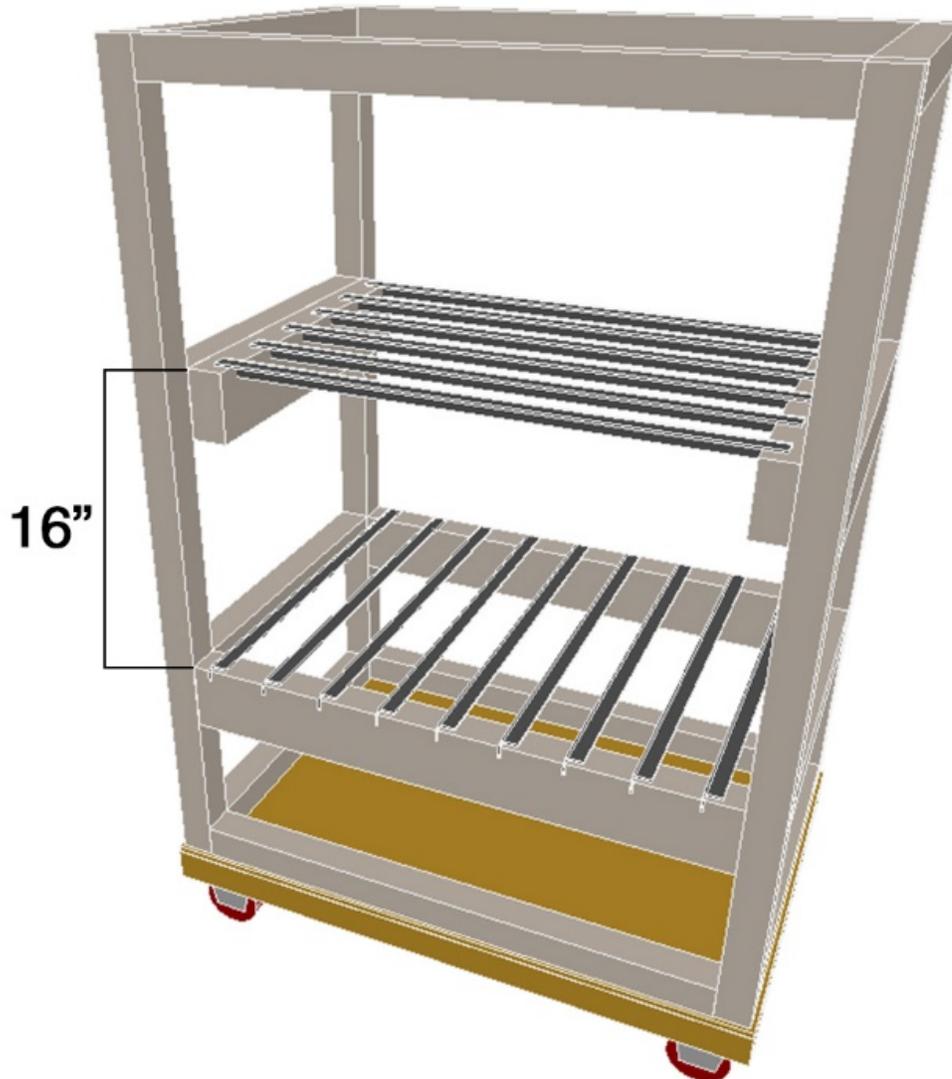
Once the casters are attached, you can turn the oven frame back to right-side-up, and attach two short equally sized (4") 2x4 pieces which will support the heating element. Then attach the heating element to the top of those two pieces. While the heating element is capable of reaching temperature hot enough to ignite the 2x4, the thermostat we'll be using does not allow the temperature to get that hot, only warm enough to bake a great batch of foam latex.



Use four 90° (L) framing anchors to attach the pieces of 2x4 to the bottom of the oven. Once that's done, you can proceed on to Step 5, skinning the oven.

**IMPORTANT NOTE:** *If you want to have the option for a second shelf inside the hot box of the oven, you will need to add those supports before going on to Step 5 as it will be very difficult to do once the oven is completed.*

*You should also add foam insulation foam and foil tape before attaching the heating element...*



This illustration (above) shows the second shelf splitting the distance between the top and bottom of the hot box area. You will need four pieces of 2x4 each 20.25", two deep on each side of the frame. The inside pieces of 2x4 will need to be notched for the 1" aluminum L bracket used for the shelf. Measure the middle and make a mark 1.5" on either side of that point. Then make marks 3.5 inches from those marks until you have marks indicating 6 notches. All of the materials needed are listed above.

#### **STEP 5**

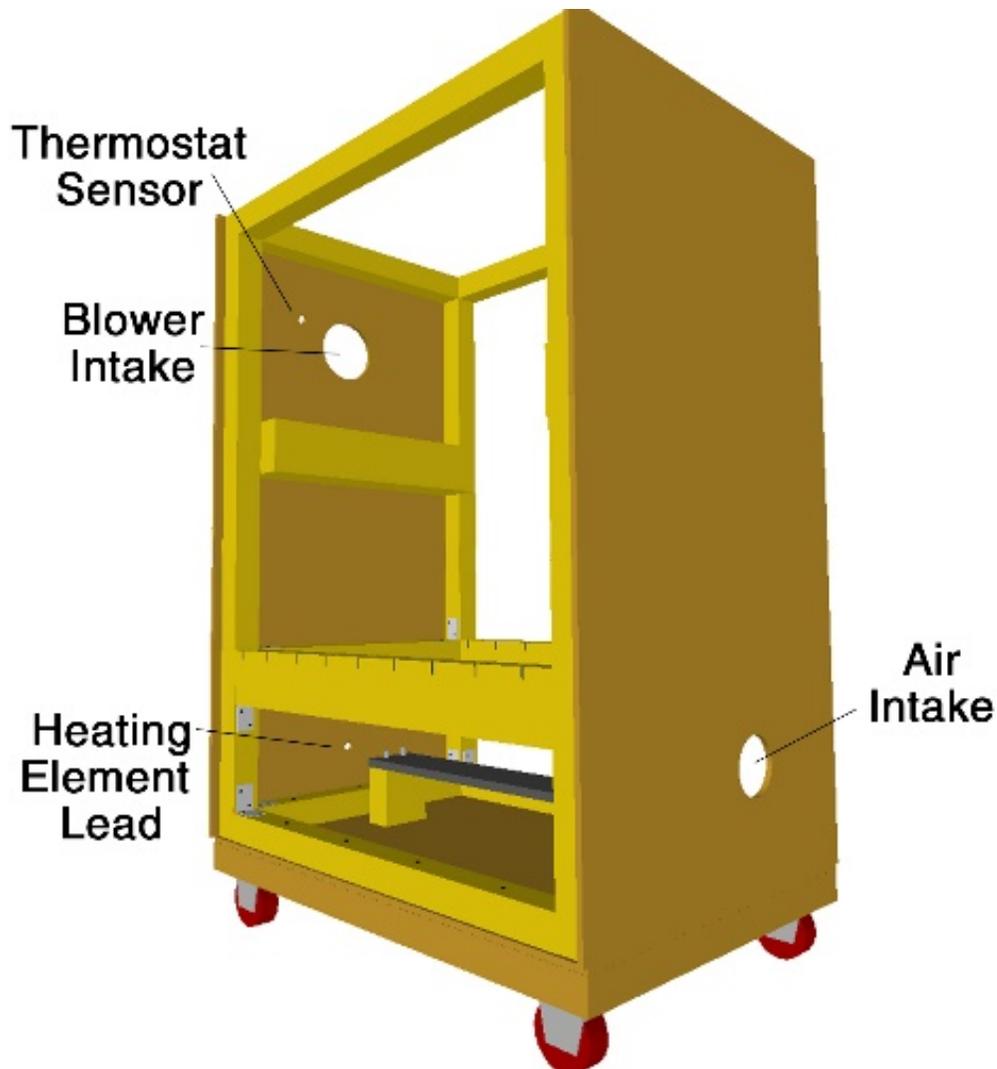
Skinning the oven.

Start with the back, then the sides, front and lastly the top.



Once the back and sides are attached with drywall screws evenly spaced around the perimeter of each panel (about every 6") you will need to drill holes in the sides for the blower intake, the thermostat sensor, the heating element power cord and the air intake. You will need a scrolling sabre or jig saw to enlarge the drilled holes for the blower hose and the blower.

The blower intake hole (top) needs to be high enough so as not to interfere with the top shelf (if you add one). The air intake hole at the bottom needs to be placed high enough so that incoming air will be forced across above the top of the heating element and lifted toward the blower intake opening.



Once the plywood panels are all attached, you can begin adding the foam insulation.

#### **STEP 6**

Foam insulation.

You can do one or two layers – one layer of 1” insulation is more than sufficient, and will cut your installation time in half. You can save even more time if you cut the pieces to fit in advance. I have a hot wire foam cutting tool that makes matching the holes easy, and trimming the larger pieces. It’s handy, but by no means critical.

The measurements for the foam insulation are:

#### **BACK**

- Top – 31” x 31”
- Bottom – 31” x 8”

#### **SIDES (x2)**

- Top – 14” x 20.5”
- Middle – 13” x 20.5”
- Bottom – 12” x 20.5”

### TOP/BOTTOM (x2)

- 31" x 20.5"

### DOORS

- Top – 30" x 30"
- Bottom – 10" x 30"



The insulation shouldn't need to be held in place with anything other than the foil tape. With the exception of the aluminum shelf bars and the heating element itself, try to cover every surface of the interior. You can use the foil tape to patch dings in the insulation, cover exposed wood, etc. It's very handy, and definitely reflects heat well.

After the insulation has been added, the doors can be attached.

- The hinges and lock latches need to be attached to pieces of 3/8" plywood, allowing them to be flush with the doors, which overlap the openings by an inch all the way around.
- Glue and screw the plywood pieces in place, and then use the screws that come with the hinges and latches. Drill holes to prevent splitting the wood.
- The lifting handles can now be attached. Find an ergonomically comfortable spot on each side of the oven to attach the handles, with enough space between them to make

lifting easy and well-balanced. Keep in mind where the cords powering the blower, thermostat and on/off switch will be so they won't try to occupy the same space when you get to that point in your construction of the oven. Mark the holes with a Sharpie or pencil, drill pilot holes and screw the handles into place.

## STEP 7

### Electronics.

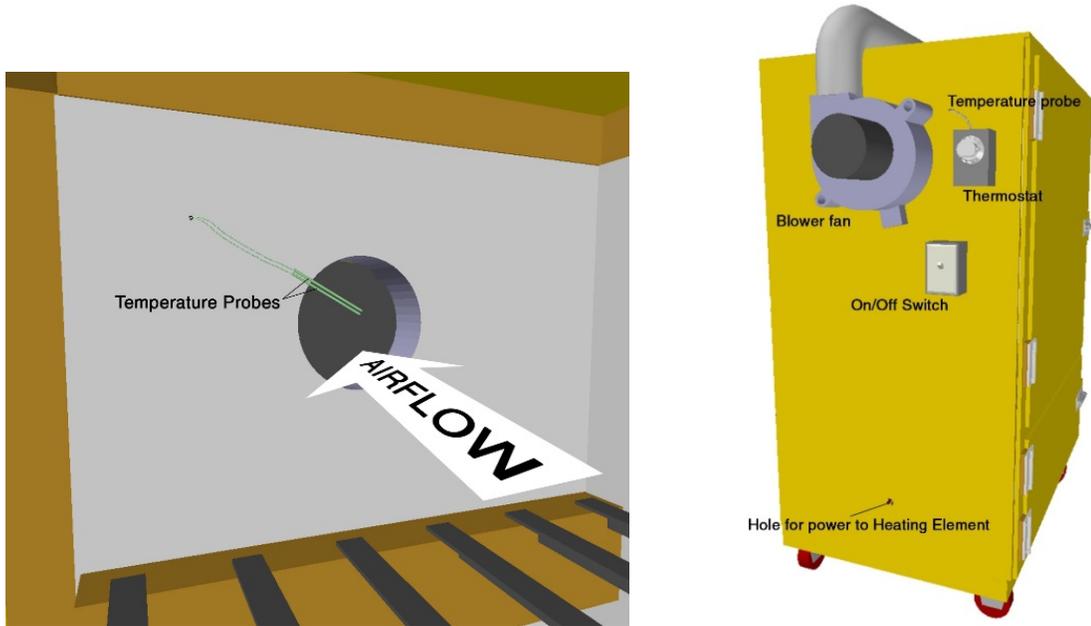
Carefully lay the oven over on its side – this will be easier with two people - with the blower hole nearest the top of the oven facing up.

- Trace the perimeter outline of the rectangular blower exit on a piece of 3/8" plywood. Mark holes for the three bolts you'll need to attach the wooden template to the blower. Then, draw a 4" circle inside the rectangular outline. Cut out the circle, then cut the rectangle. You will end up with a rectangular piece of wood with a hole in it.

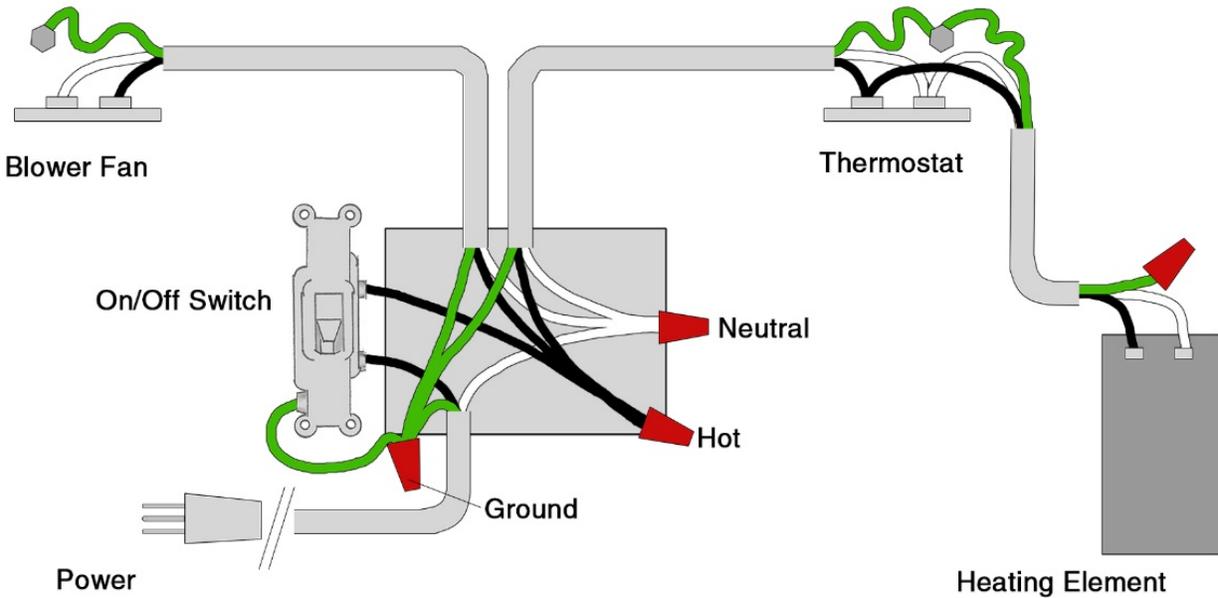


- Place the blower over the intake hole and mark the holes for the screws. Drill pilot holes and then attach the blower to the dryer. For added measure, a line of silicone caulk around the base will ensure no air leakage.
- Next, Determine the placement for both the thermostat and the on/off switch, then mount the housings to the oven.
- Now would also be a good time to attach the battery-operated external oven thermometer. You can get one of these at Bed Bath & Beyond for about \$20. You will mount its temperature probe along with the thermostat's probe. Using foil tape, secure both probes

so the tips of the probes are in the center of the opening of the Air Intake. This is where the temperature will be monitored and regulated as the air circulates through the oven.



- Next comes the fun part. Or the scary part, depending on how comfortable you are with electricity. The following diagram outlines how the wires should be connected properly to ensure your oven works properly when connected to an electrical current. ***NEVER attempt to hook up electrical wires while they are connected to live electricity!***



- The GREEN wire represents *ground*, or literally the *Earth*. For our purposes, making sure that exposed metal parts are grounded will prevent accidental electrocution when (if) electrical insulation fails.
- The WHITE wire is called the *neutral* wire. It provides the return path for the electrical current provided by the hot wire.
- The BLACK wire is called the *hot* wire because that is carrying the electrical current from the source. It is the wire that is used in a circuit as a switch leg – opening and closing the circuit (off and on) – the connection that runs from the switch to the electrical load (the blower, thermostat and heating element).
- Connect the components together using measured lengths of the 3-wire Romex. The wire running from the switch box to the power source (an electrical outlet) should be the 9' power tool replacement cord, not Romex.
- Next, take the metal dryer hose, and carefully start extending it across the top of the oven, and over the sides, conforming as tightly as you can to the surface of the oven.
- Using pieces of foil tape about 4" long, attach one end of the hose to the opening in the wood flange mounted to the blower's air exit. Make sure it's sealed well, and firmly attached. If you want to add a couple of small L anchor brackets and hold them in place with small screws, that may give a bit of added strength.
- Proceed to stretch the hose to its full length, and attach the remaining end to the air intake hole at the bottom of the other side of the oven. Use small pieces of foil tape as before. Again, you can add small L anchor brackets if you want to add a bit more security. You can even use more of them. Make sure it's well-sealed and there are no air leaks.
- Secure the hose to the oven with foil tape. You can add additional supports as well as flexible plastic foil insulation to aid in heat loss prevention.
  - Make sure the on/off switch is in the 'off' position, and the thermostat is 'off' and plug in the oven. Flip the switch to the 'on' position. The blower fan should come on; turn the thermostat on and you should hear it click on and see the pilot light come on. The heating element should be getting warm to the touch, should you decide to see.
  - Open the oven doors and feel to make sure you're feeling air flowing in at the bottom across
  - Turn the thermostat dial to 'off' and flip the on/off switch to the off position. Everything should stop. Unplug the oven and get ready to paint it! **YOU NOW HAVE YOUR VERY OWN FOAM OVEN!!**