

Please read before continuing!

1. Wear gloves when handling the solder paste. The solder paste in the fridge contains lead! If it gets on your hands it can end up all over your belongings.
2. Boards will be hot when they come out from the PCB oven! Don't get burned picking them up.
3. Wear safety goggles when using soldering irons. Use an extraction system when using anything that contains flux (solder paste, flux paste, or solder)
4. Clean up after yourself. Return all tools, solder paste tubs, syringes, etc. to where they belong before you leave. Be sure to turn off soldering irons and hot air stations as well.

Step 1) Configure the oven



If the oven is not on and preheated, turn on the oven by turning the red knob to the “ON” position. Navigate to the “PROFILE” menu. And confirm the temperature, t_a and t_b are correct. Consult the datasheet for your soldering paste for exact values. The temperature at the top of the screen should be the peak temperature of the paste.



Once you have entered the values, press “ENTER” to leave the profile menu.
For more detailed instructions, please consult the manual: [GF-B Reflow Batch Oven Manual R1-1.pdf](#)

Step 2) Managing the exhaust fan



Open the valve for the exhaust just a crack. You will hear a low hiss. The picture above shows this. If the exhaust is opened completely, the fan will pull so much air out of the oven that the heating element will not be able to heat the boards.

Step 3) Preheat (30 minutes)

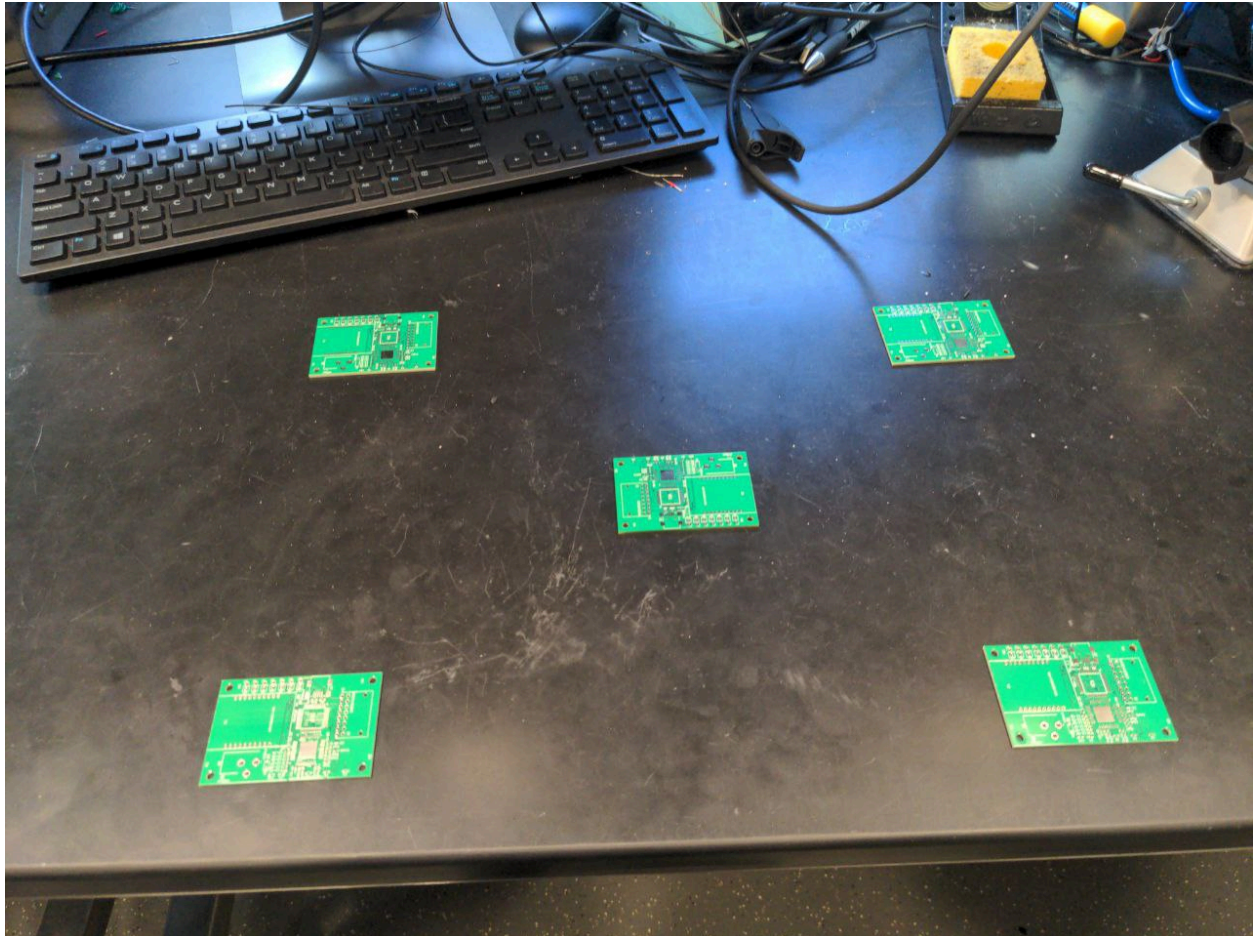
Navigate to the “WORK” function and press enter. Move the shuttle entirely to one side or the other. You may have to lift it up slightly for it to move.



The oven should start preheating. The temperature on the top right of the screen should increase. Unless this has already been done, you should wait 30 minutes.



Step 4) Place 4 extra boards around your board.

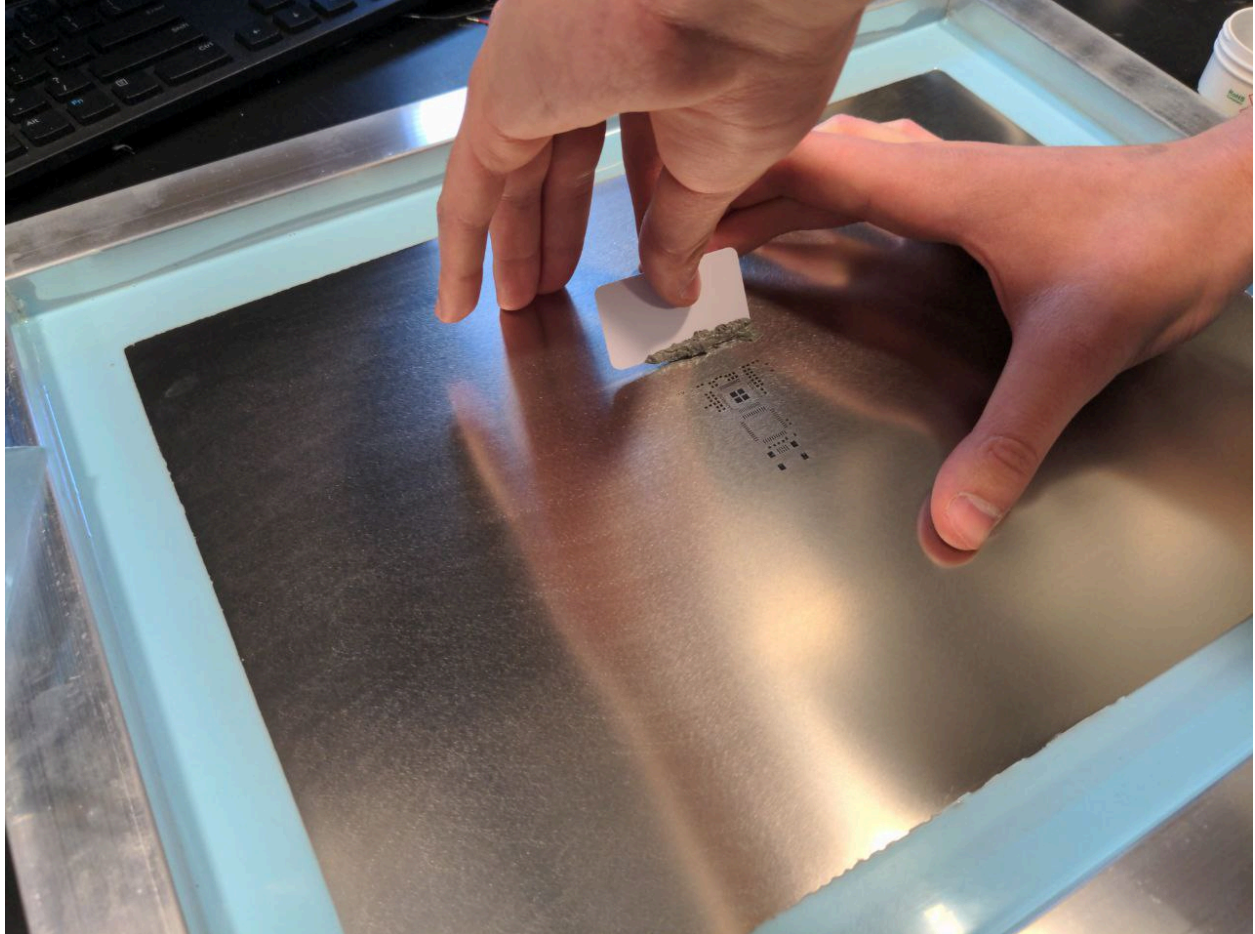


This will prevent the stencil from bowing when you apply the paste.

Note:

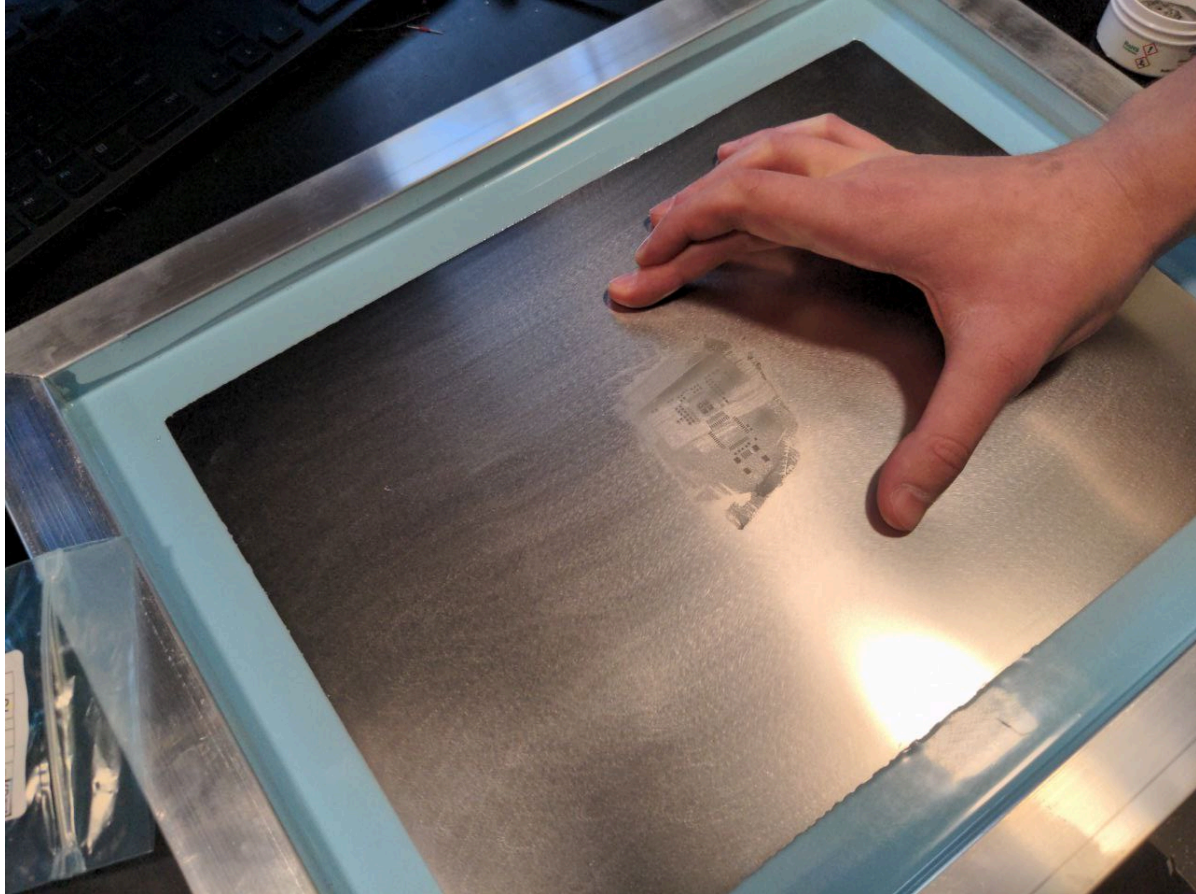
Steps 4 thru 8 use a stencil to apply the solder paste. You can use a syringe to put small amounts of solder paste on the pads if you don't have a stencil.

Step 5) Place the stencil over the boards.



Make sure the stencil aligns with the pads on your board. You may want to tape the board to the stencil to keep it from moving around.

Step 6) Spread the paste over the stencil.



You can use a squeegee or old credit card as a spreader. You can find paste in tubs in the red mini-fridge under the soldering oven.

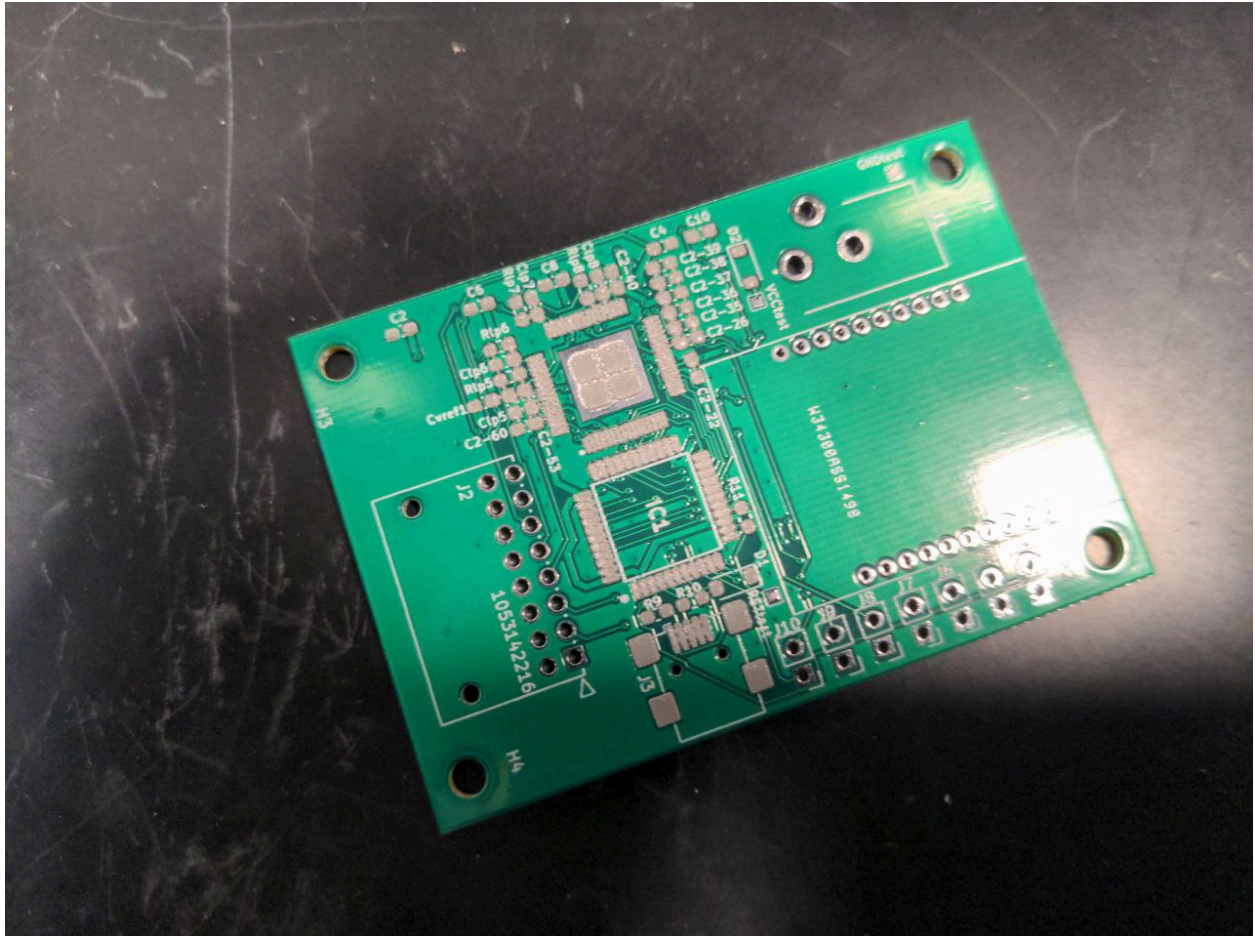
Step 7) Scrape off excess paste and return it to the tub.



Please return the excess paste to the tub you took it from. If you took it from a syringe, do not mix it in with the paste in the tub.

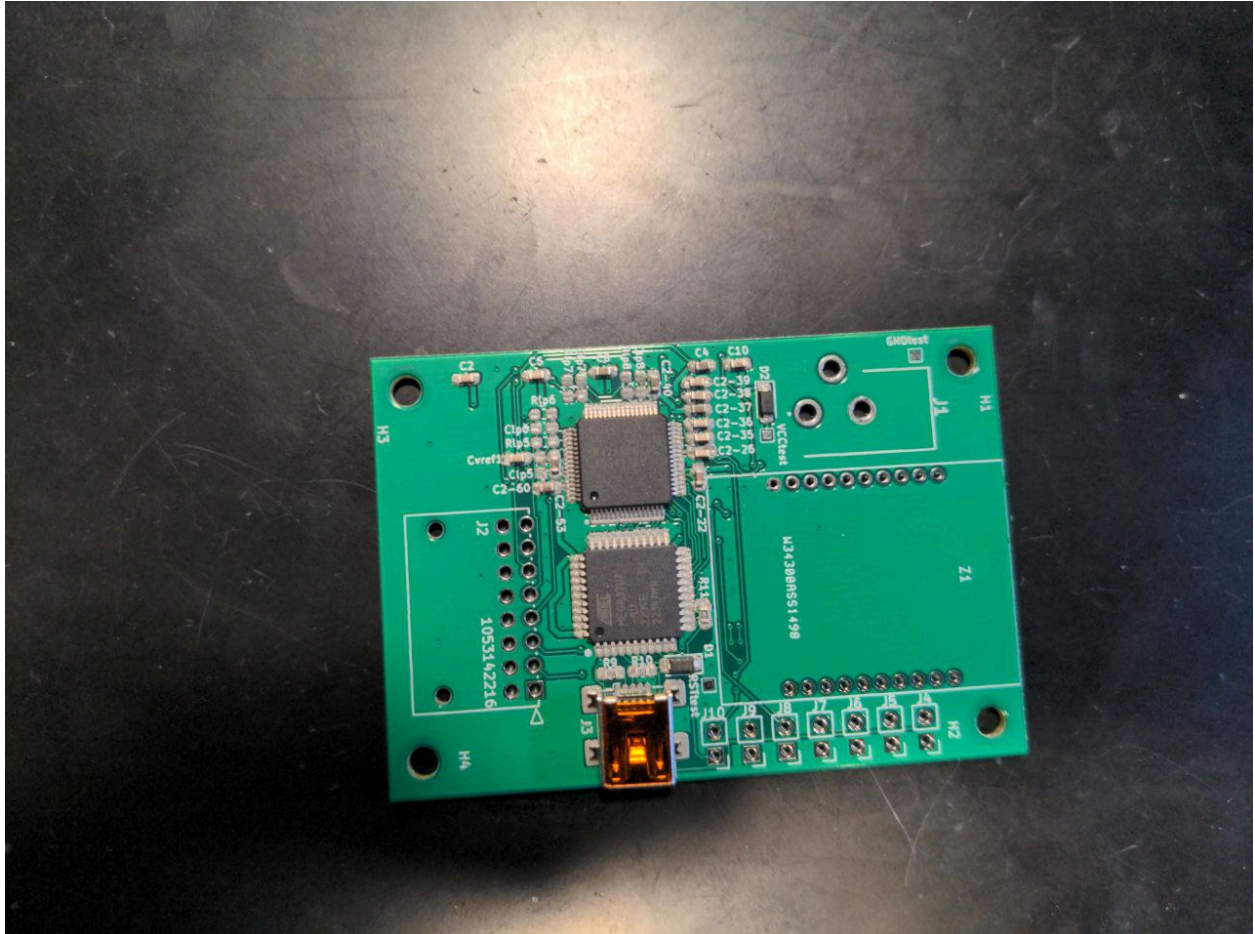
Also, scraping off extra paste will prevent application of too much paste on the pads.

Step 8) Gently remove the stencil from your circuit board.



Your board can stick to the stencil so you may need to gently peel it off. The paste should be applied only to the pads. For fine pitch components, the paste may seem to bridge separate pads. In some cases this is OK. When the solder melts, it will be soaked up by the pad and the pins of the component. In cases of very fine pitch like the upper chip in this example, bridging is likely to occur. Fixing this will be discussed later. Lastly, this is your opportunity to wipe paste off parts of the board you don't want to solder.

Step 9) Gently place your components on the pads

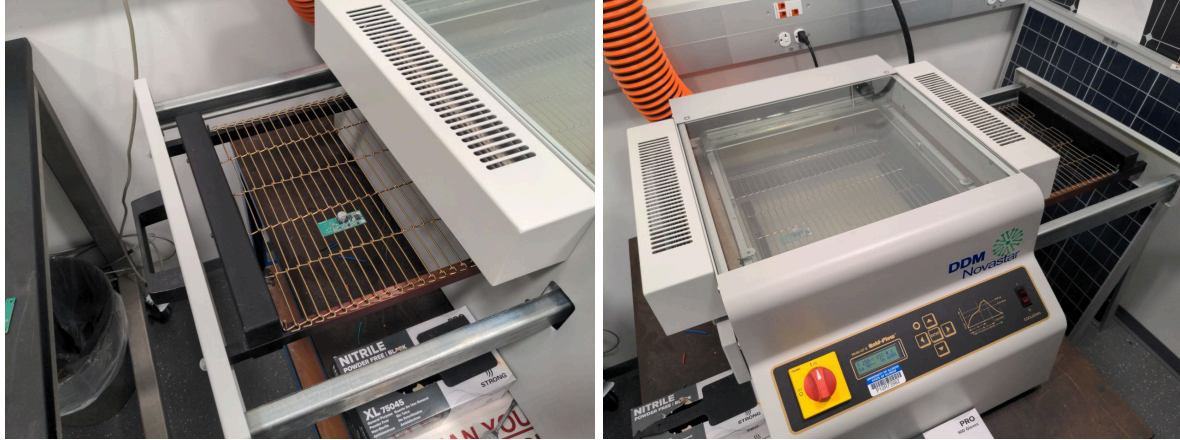


Be mindful of the orientation! You may need to refer to the component datasheet and your board layout to confirm orientation. This process usually requires tweezers.

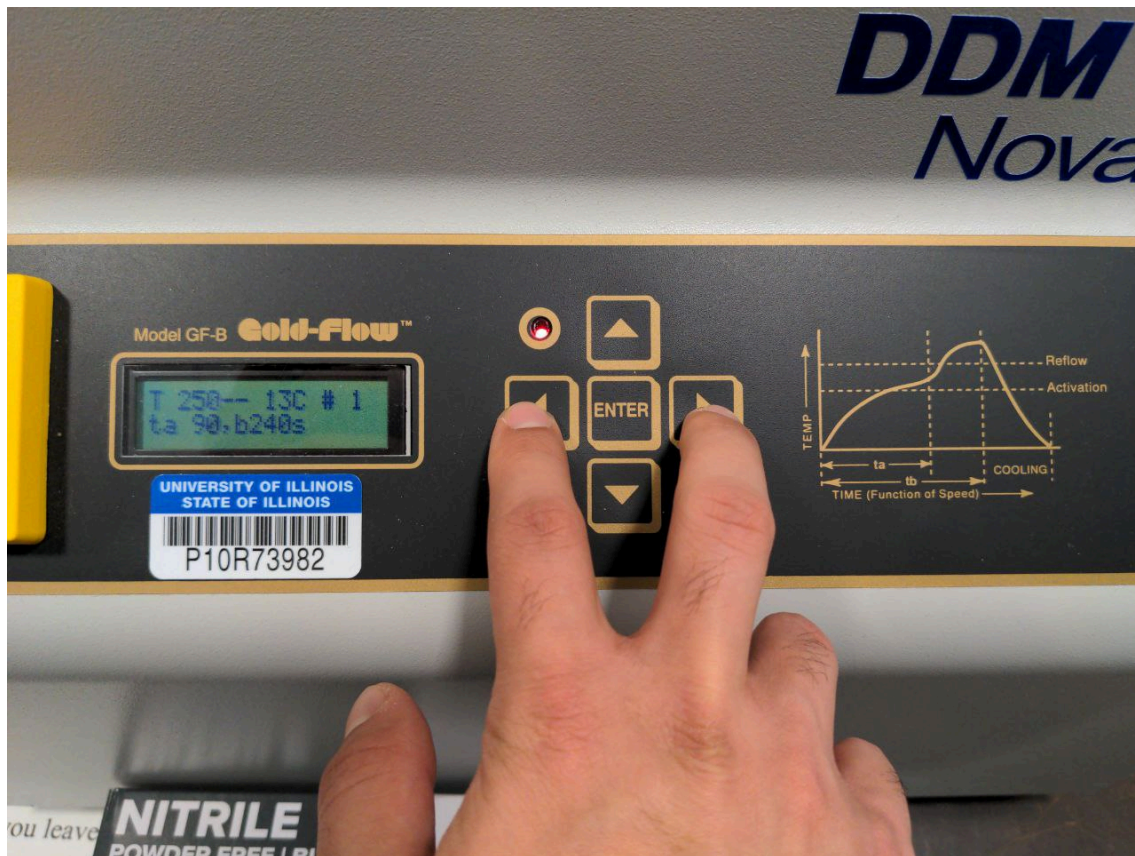
If there are many components on your board, you can use this interactive HTML BOM KiCAD plugin to help you with placement: <https://github.com/openscopeproject/InteractiveHtmlBom>

Step 10) Reflow your board

Place your board on the wire mesh and move the shuttle in. Be sure to move it all the way to the end of its travel.



To start the reflow, press both side buttons simultaneously.



When the reflow process completes, move the shuttle and retrieve your board. **Be careful** as the board will be hot! Use the “Cooldown” switch to run fans on the side of the oven to blow air over the board..

Step 11) Evaluating your results



You may notice significant bridging between pins of fine pitch components. This can be solved with flux (in the red fridge) or soldering wick (at the lab benches):

[Using Flux Paste To Fix Solder Bridging](#)

The student whose IC is shown in the picture was able to remove the bridging with flux.

Sometimes large components like the can over ESP32 microcontrollers have too much thermal mass which prevents solder paste near the device from flowing. You may have to change the temperature or duration of reflow to fix this. You can also apply hot air after using the oven.

Step 12) Cleanup

- Return solder paste and flux to the fridge
- Throw away any used gloves
- If you are the last student in the lab to use the oven, turn it off
- Turn off hot air, soldering irons, etc.
- Clean up any workstations you used