Here's a fun project that uses a CNC Vinyl Cutter to create professional-looking stick-on labels for your reusable water bottles. We made it at TechShop and you can too (learn more at http://www.techshop.ws/).

Tools Required:

- CNC Vinyl Cutter (we used the USCutter MH1351)
- Text and Graphics Layout Software (we used FlexiSTARTER v10)
- Rigid ruler or other similar straight-edge
- Utility knife
- Dental pick
- (Optional) Roller cutter and/or scissors

Materials Required:

- Sticky-back Vinyl Sheet (2-mil vinyl substrate)
- Transfer Paper
- Rapid Tac Solution
- Water Bottle

Instructions:

Before you begin the project, make sure to familiarize yourself with the basic operation of your vinyl cutter and general safety precautions recommended by the equipment manufacturer.

1. Install the vinyl sheet material in the CNC Vinyl Cutter.

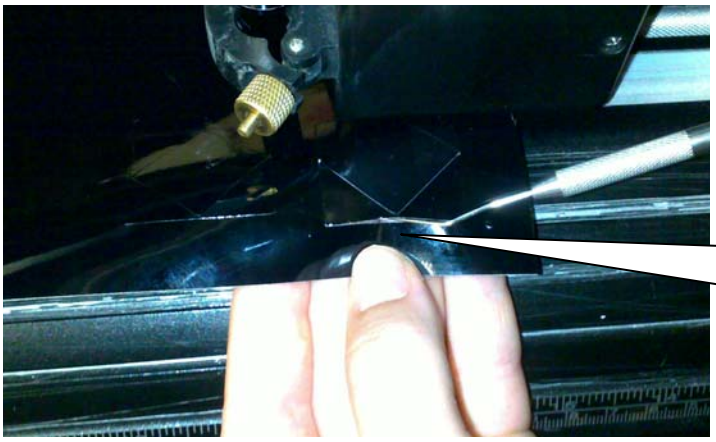
Since we will be making small labels (3-by-2 inches), alignment isn't particularly critical. Do keep in mind that the feed wheels which move the vinyl under the cutting tool are rough and will leave a "scuff" mark (roughened surface) on the vinyl. If you don't want this scuff mark on your final label, be sure to position your design so the wheels don't roll over the finished label.

MH1351 shown holding a 12-inch wide vinyl sheet with 3 feed wheels spaced evenly across the sheet.

2. Install the cutting tool in the CNC Vinyl Cutter and adjust cutter settings

Once you have installed the cutting tool and adjusted the cutter's force and speed settings, you'll want to cut a test pattern to make sure the cutting tool completely cuts the vinyl without cutting through the backing paper. We first tried a speed of 12-inches per second and force of 80 grams but found the tool cut completely through the backing paper. Reducing the force to 50 grams gave a perfect cut depth.

MH1351 shown with cutting tool properly installed in the upper portion of the tool holder clamp.

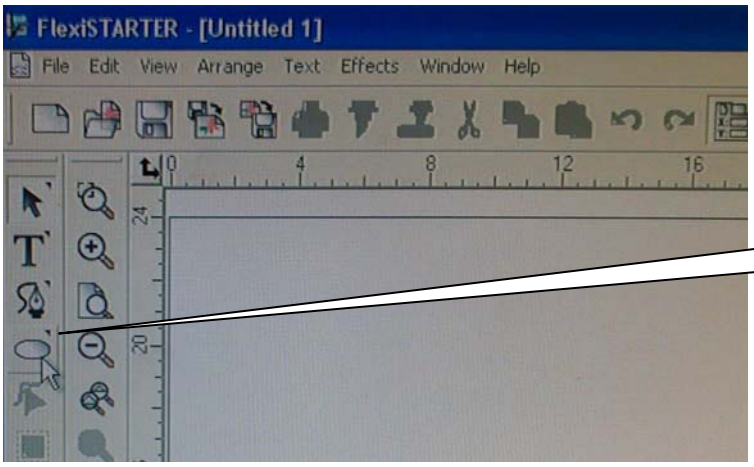


Test pattern cut completely through the backing paper using 80grams of cut force.

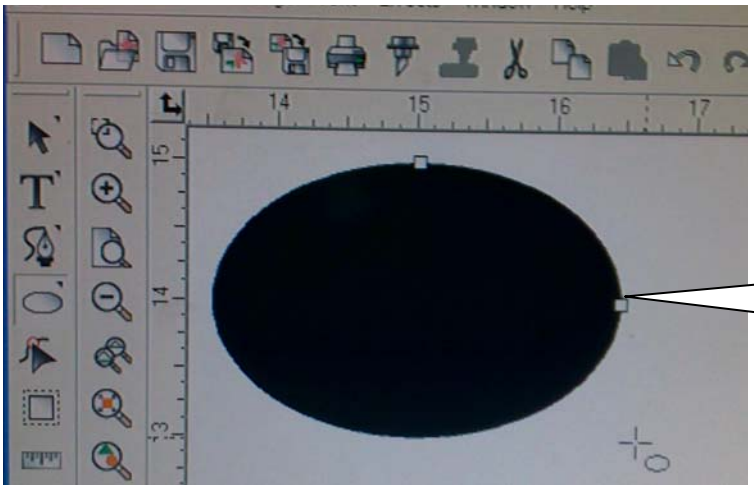
Test pattern cut depth is perfect using 50 grams of cut force.

3. Design the labels

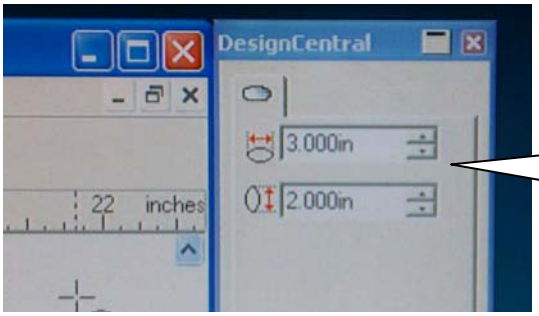
Our label design will use a solid oval surrounding the name. At TechShop, the FlexiSTARTER 10 software that controls the CNC vinyl cutter includes easy-to-use design tools for making labels.



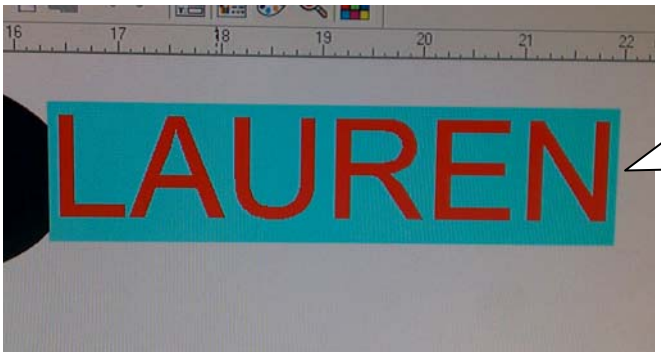
We started by selecting the “Oval” tool icon.



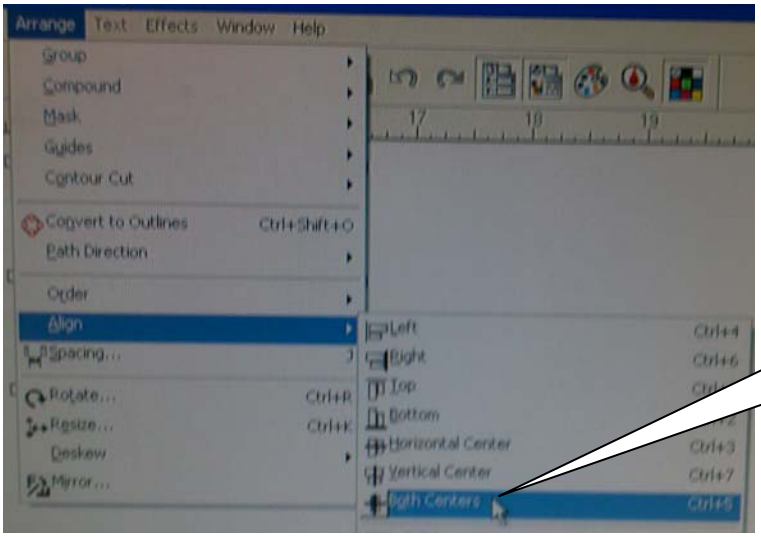
…and then used the mouse to place an oval on the design canvas.



The “DesignCentral” pane was used to set the oval width and height dimensions to exactly 3-by-2 inches.



Next we used the “T” (Text) tool to create a name on the design canvas. The name can be repositioned and resized to fit the oval using the mouse.



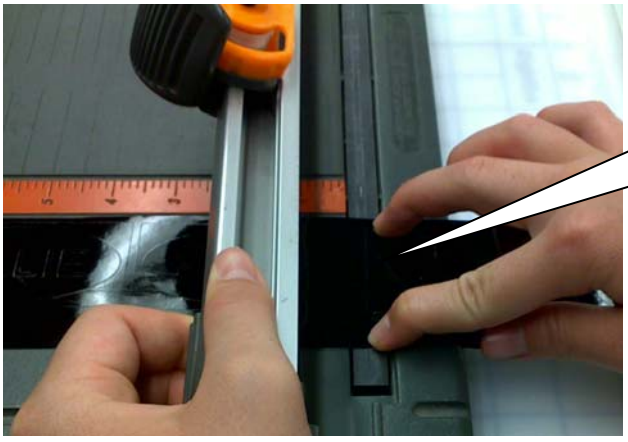
With both the oval and name selected, use the “Arrange” tools to perfectly align horizontal and vertical centers.

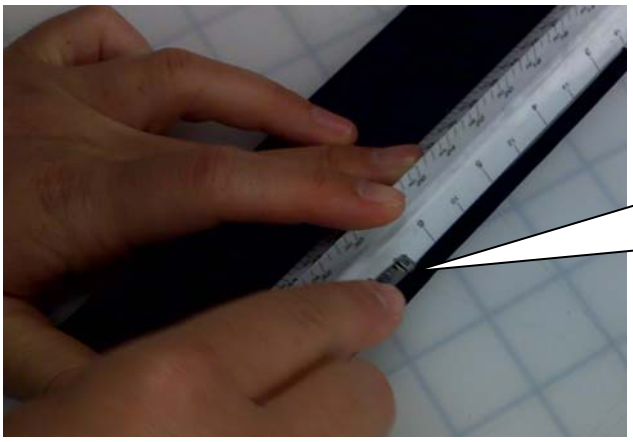
4. Cut the labels

Our water bottle labels will be oval which makes visual alignment to the bottle challenging. We chose the "weed border" cutting option to create a rectangular box around the oval for use as an alignment aide (more on this later).

5. Remove cut material from CNC Vinyl Cutter and separate individual labels

A utility knife or scissors can be used to remove a strip of cut labels from the machine. If a utility knife is used, be sure the vinyl sheet is lifted away sufficiently from the CNC Vinyl Cutter so the blade doesn't contact the machine. Using the weed borders as a cutting guide, the strip of labels can then be separated into individual labels. A roller-cutter, or straight-edge in combination with a utility knife, is a good option to insure your cuts are straight.





Here we're using a straight-edge and utility knife to separate individual labels. Weed borders serve as the alignment guide. Make sure the label is under the straight-edge in case your cut drifts away from the straight-edge.

An individual label after it has been cut squarely along each of the horizontal and vertical weed borders.

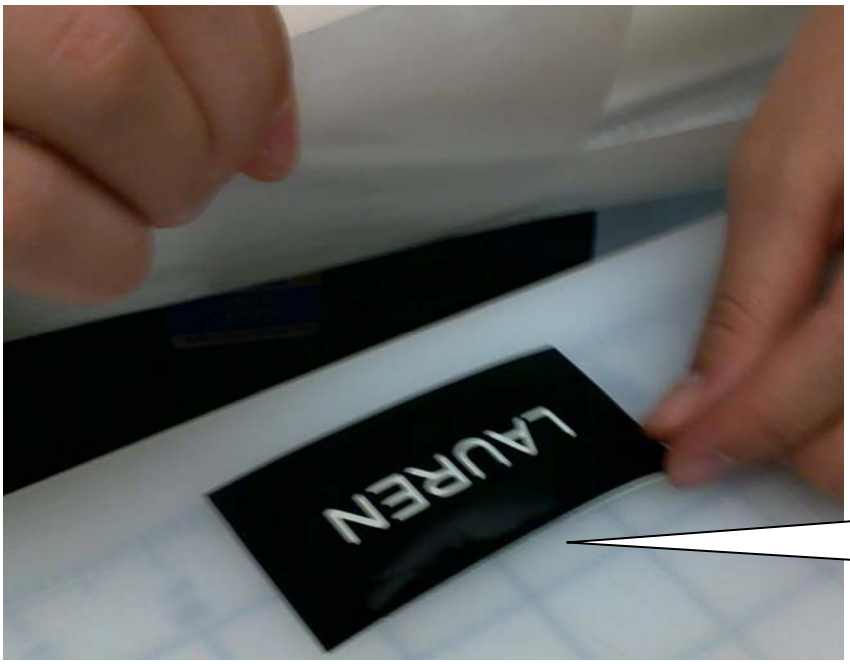
6. Peel the vinyl

At this point we need to remove any vinyl that won't be part of the finished label with the exception of the surrounding weed border box (it gets removed later). For this project, we just need to peel the individual letters. A sharp dental pick works great for getting under the cut vinyl.

Peeling away vinyl letters.

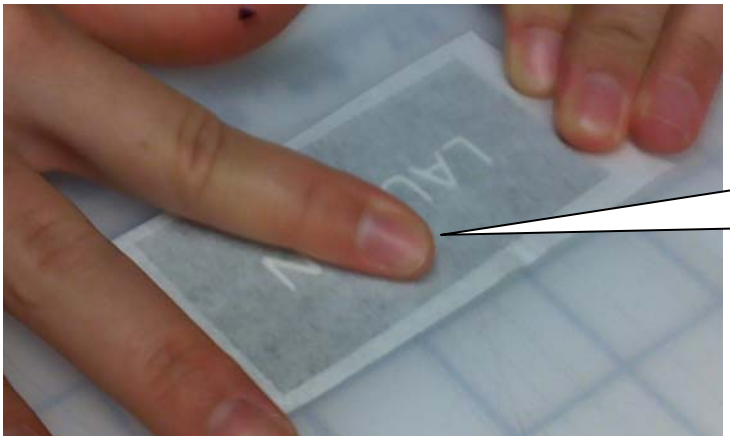
7. Apply Transfer Paper to label face

Once the vinyl has been peeled, transfer the entire label onto Transfer Paper. Transfer Paper allows us to easily handle the label after its backing paper has been removed exposing the vinyl adhesive. And now we can see why the weed border box wasn't peeled in the previous step: The flat sides of the box are used to squarely trim the Transfer Paper.

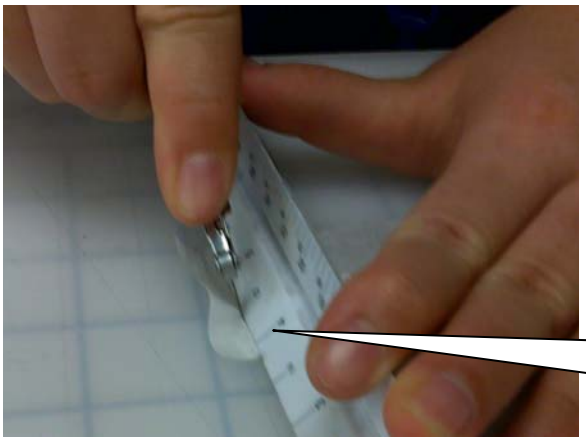


The label is placed face-up on the bench while the Transfer Paper is positioned above it.

When placing the Transfer Paper on the label, make sure it extends beyond all four sides of the label; then cut loosely around the label with a utility knife.



Press the Transfer Paper firmly against the vinyl label over its entire surface to make sure it is well-adhered.

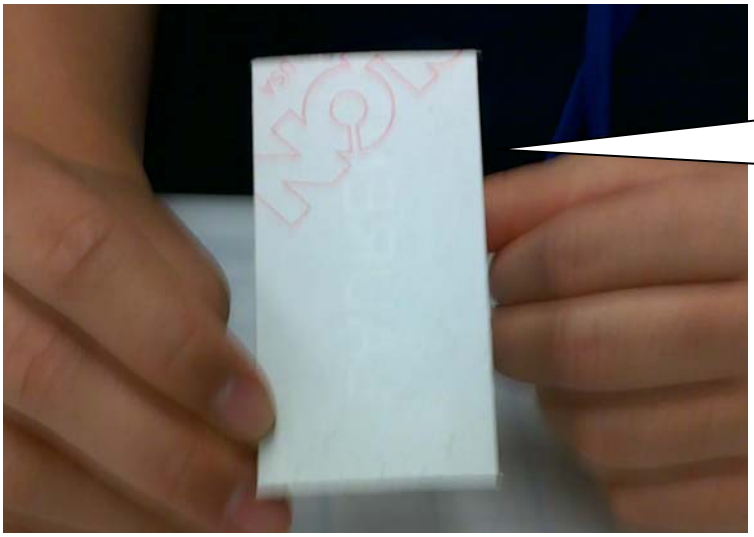


Using the vinyl label weed border box as a guide, trim the Transfer Paper to exactly match the label.

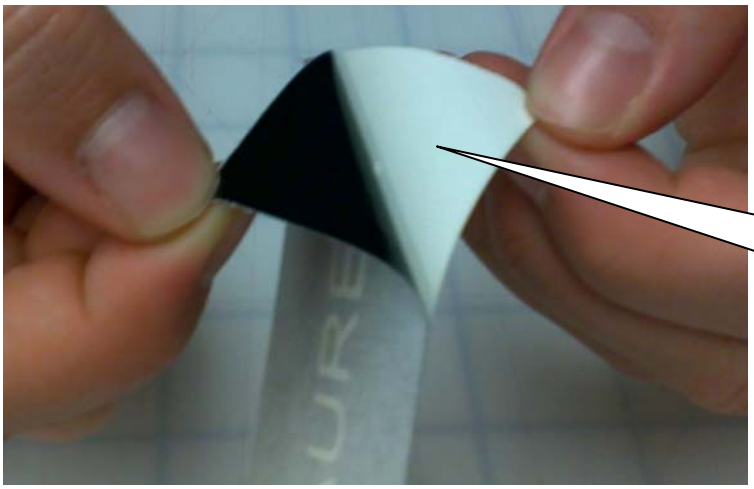
We're looking at the label through the Transfer Paper after the paper has been trimmed to match the vinyl label on all sides.

8. Remove the backing paper from the vinyl label

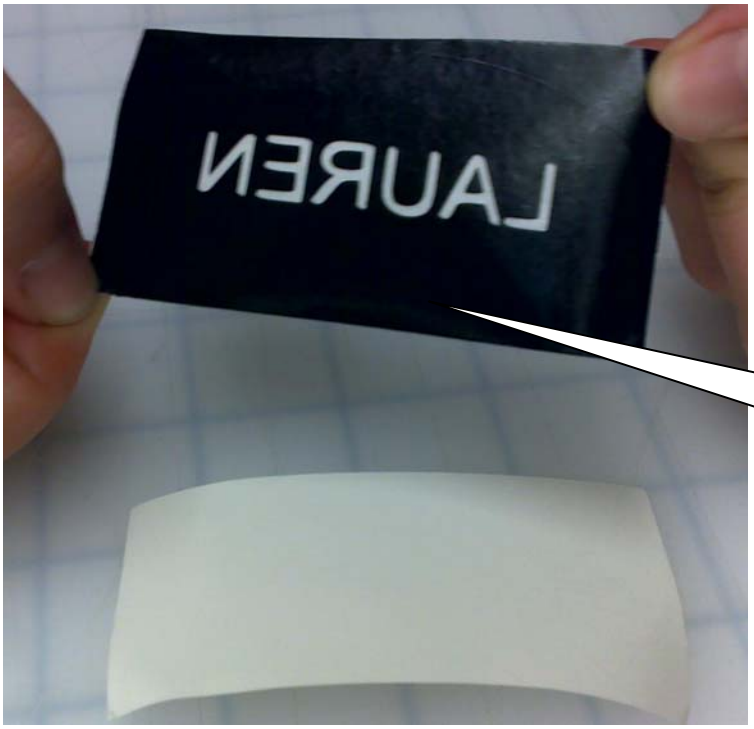
The adhesive coating on the back of the vinyl will affix our label to the water bottle, so we now need to remove the backing paper to expose the vinyl adhesive.



Backing paper seen viewing our label from the back (opposite side from the Transfer Paper).



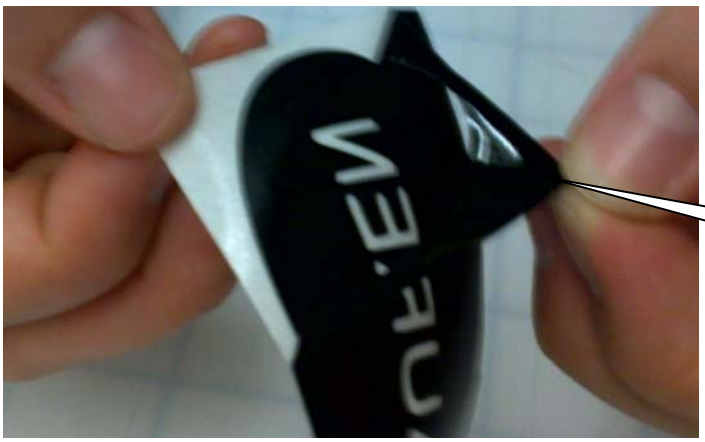
Slowly peel away the vinyl backing paper making sure none of the vinyl remains on the backing paper.



Label with backing paper fully removed and no vinyl left behind on the backing paper.

9. Remove the weed border

The final step in preparing the label is to remove the weed border since we don't want it on our water bottle. Peel carefully and avoid letting the peeled border contact the oval label.

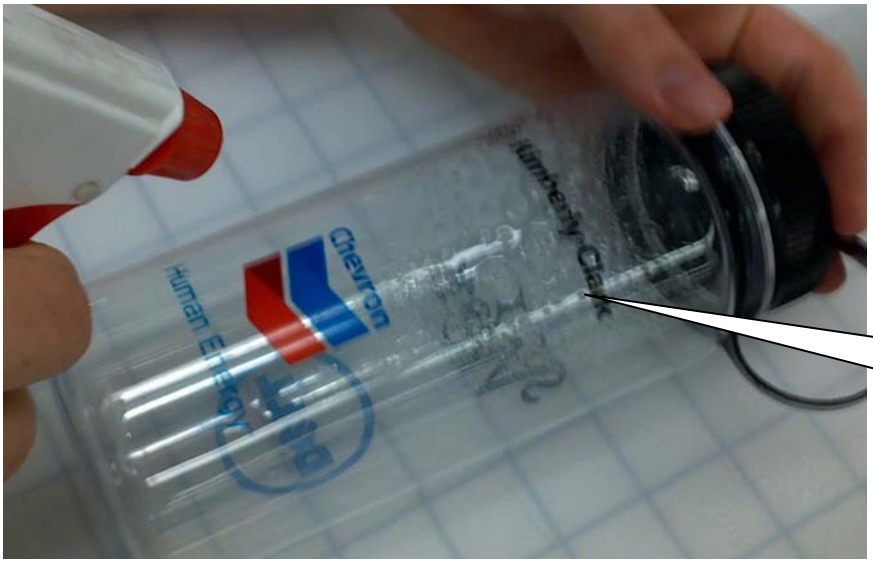


Peeling away the weed border.

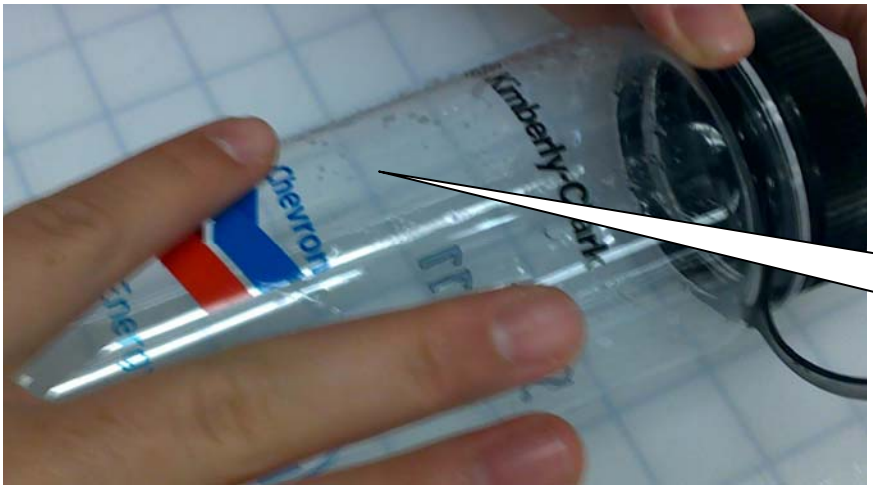
Label seen from the back-(adhesive-) side, ready to apply to the water bottle.

10. Apply the label to bottle

Now that our label is ready, we'll apply Rapid Tac solution directly on the bottle so we have an opportunity to reposition the label if necessary. We will also utilize the square edges of the Transfer Paper outline to aide our visual alignment with the bottle.



Liberally spraying Rapid Tac solution on the bottle.



Using a finger to spread the solution and pop any large bubbles caused by spraying.

Positioning the label over the bottle before it's applied. Note how the straight edge of the Transfer Paper provides for easier visual alignment.

Gently wrap the label down around each side of the bottle and inspect for proper alignment. We haven't pressed it firmly and the Rapid Tac solution is still wet so we can reposition the label if necessary.

Once we're satisfied with the alignment, we press the label firmly on the bottle as though ironing it with our fingers.

11**. Remove the Transfer Paper**

After insuring that the label has been firmly pressed to the bottle over its entire surface and the Rapid Tac solution is dry (about 2-3 minutes), slowly peel the Transfer Paper away.

We're slowly peeling the Transfer Paper. Note how the paper is pulled back keeping as steep an angle (nearly 180-degrees) to the bottle face as possible to reduce the force pulling the label away from the bottle.

Our final product!