SODA AND MENTOS SPRAY NOZZLE

TINKERCAD ASSIGNMENT

Overview

1. Start with a basic bottle cap 3D model
2. Add a chamber to hold 4 or 5 Mentos candies
3. Add holes for pins to hold candies in place
4. Add spout for soda jet
5. Print model
6. Test model
7. Refine model, if necessary

What we want to achieve!

YouTube video: EepyBird at the Maker Faire

Start with a basic bottle cap 3D model

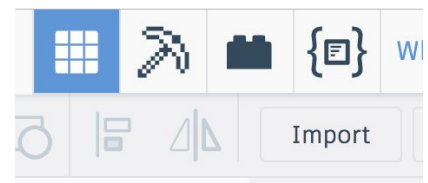Download this bottle cap 3D file. It will be the starting point for all of our models.

(I got this from Thingiverse, which is an amazing repository of 3D models that you can use "off the shelf" or that you can modify to your own ends, as we are doing here!)

Open Tinkercad, and create a new design.

Then, import the .stl file.

You may have to rotate the bottle cap so that it is upright. Make sure to rotate the bottle cap instead of reflecting it. If you reflect the cap, you will not be able to screw it onto a bottle (as I did in the first version of my prototype!).

Video: Rotate Instead of Reflect Your Bottlecap

Add a chamber to hold 4 or 5 Mentos candies

Measure a Mentos candy to get a better idea of how big to make your chamber. You can also measure the prototype nozzles I made (although keep in mind that some of my prototypes hold 4 Mentos candies and some hold 5). Add a chamber to the top of the cap that will fit 4 or 5 Mentos candies when the pins are in place (see next section). The walls of the chamber should be at least 1 mm thick.

Add holes for pins to hold candies in place

We will use straightened paper clips as pins to hold the Mentos candies in place while screwing the nozzle onto the bottle. Make the holes to hold these pins at least 2 mm in diameter.
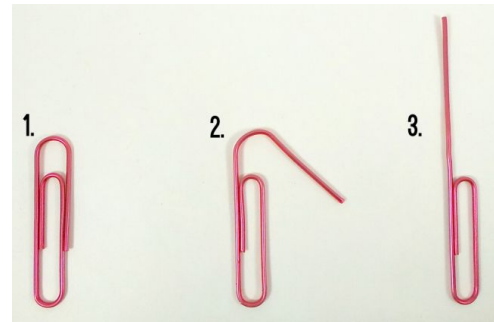
Add a spout for the soda jet

The design of the top of the nozzle is up to you. You can have one outlet or more for the soda. They can be straight up or angled. The whole nozzle should not be wider than the bottle cap itself, i.e. the chamber and any spout you add should fit entirely within the footprint of the bottle cap itself. When working in Tinkercad, make sure that liquid can flow out of the spouts by adding hole shapes in the right locations.

Print model

Video: Export a Model from Tinkercad and Load it into Cura

Your model should be a single solid piece. Export the model as a .stl file.

Log on to your Tinkercad account on the classroom 3D printer computer. Download your file and add it to the folder Mr. Magee will indicate in class.

Here is where you can check the amount of material in your model. The Cura program will indicate how many grams of material will be used in your model. It should be 16 grams or less.

We can fit up to 9 nozzles on a print plate and we can run both printers at the same time. I will run the printers every afternoon at the end of the school day.

Test model

Try screwing your nozzle onto a soda bottle.

Try adding 4 or 5 Mentos candies to your nozzle and holding them in place with paperclip pins. Do they fit with pins in place?

Do the candies stay in place when you place the nozzle right side up, even when you shake it gently?

When you pull out the pins, do the candies drop out?

BE CAREFUL AND USE A BUCKET! Without using any Mentos candies, put your nozzle on a bottle filled with water. When you turn it upside down, does water come out of the spouts?

Refine model, if necessary

After your tests, you might decide that you have to make some changes to your model. You will have the chance to do so.

Submission

Submit your preparation exercise on paper (due in class).

Submit the .stl file for your 3D model (**ongoing in class**).

Submit a short video (30 sec to 1 min) of you testing your printed nozzle. In this video, I should see you doing all of the tests mentioned above.

Name: Last name _ group _ nozzle

Add it to your Google Drive and share it with me (**Until Friday May 31**).

Submit your reflection exercise on paper (**TBD**).

Evaluation

- ▢ Did you prepare for this project before getting started?
- ▢ Does the whole nozzle fit within the footprint of the bottle cap itself?
- ▢ Have you used 16g or less of material in your design?
- ▢ Does your nozzle screw onto a standard soda bottle?
- ▢ Can it hold 4 or 5 Mentos candies when the pins are in place?
- ▢ Can you fit a paperclip into the pinholes?
- ▢ Do the Mentos candies stay in the chamber when it is right-side up with pins in place?
- ▢ Do the Mentos candies drop out of the chamber when the pins are removed?
- ▢ Can soda flow through the spouts?
- ▢ Have you reflected on what you learned during this project?