How to 3D Print in the Makerspace

a. Open Cura by clicking the icon:

b. Find a model you would like to print.

a. If you have designed your own model or have one on a flash drive, download the model on to the computer.

b. You can download a 3D model from the following websites:

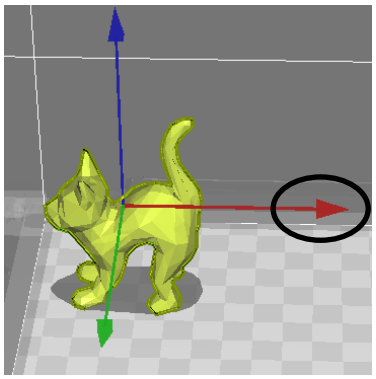
All models are free	*Some models are free*
c. Thingiverse.com **d.** Tinkercad.com/things	**e.** MyMiniFactory.com **f.** Thangs.com **g.** Free3D.com

c. Click in the top left corner to open the model file in Cura.

d. Once the model loads, click on the model to **select** it. **Move**, **scale**, **rotate**, or **mirror (flip)** as needed by using the icons on the left side panel.

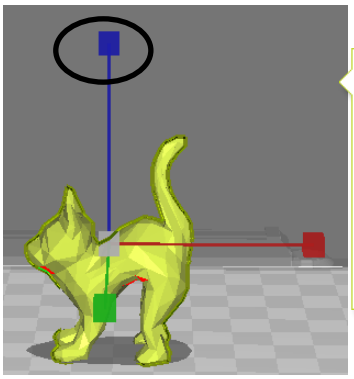
a. Move the model by clicking

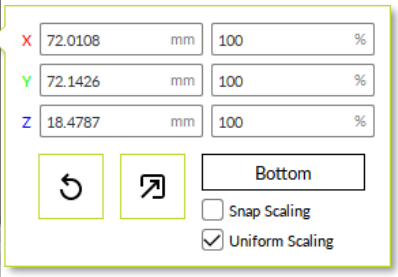
Click in the center of the model to drag it anywhere on the plate, OR click on an **X** axis (red), **Y** axis (green), or, **Z** axis (blue) arrow to move it in just one direction.



b. Scale the model by clicking

Click and drag a **length** (red), **width** (green), or **height** (blue) cube to scale, OR manually enter a size in millimeters or percentage. **Uncheck** "Uniform Scaling" to scale just one axis.

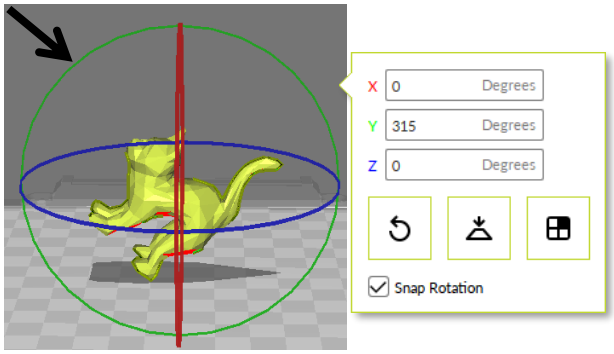




c. Rotate the model by clicking 

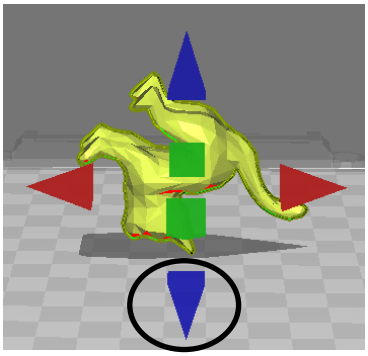
Click and drag an **X** axis (red), **Y** axis (green), or, **Z** axis (blue) compass circle to rotate, OR manually enter a degree of rotation.

Click  to **undo** or  to **lay flat**



d. Mirror the model by clicking 

Click on a direction arrow to mirror (**flip**) the model in an opposite direction. **Flip** the model left/right (red), back/forth (green), or upside down (blue).

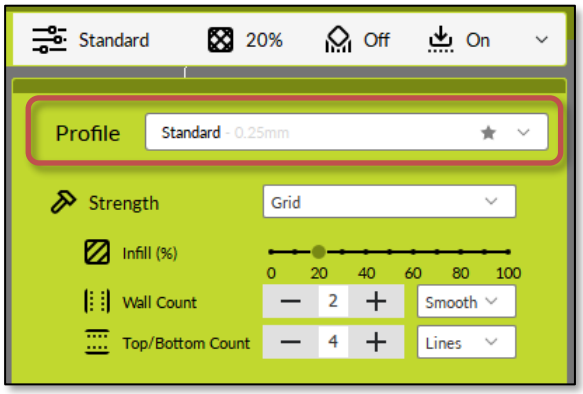


e. Check the settings in the **Print Setup** menu in the right-side panel.

a. Ensure **Material** is set to **Polymaker Polylite PLA** by selecting the filament from the drop-down menu (top of screen, center-ish)

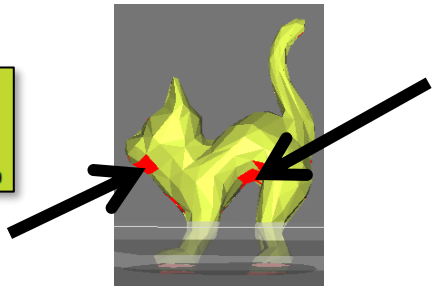
b. For best results, ensure **Profile** is set to **Standard** by selecting the profile setting from the drop-down menu.

Advanced users can change profile settings by clicking the **Custom** button at the bottom of this window. Settings can be customized within these menus. *This is not recommended unless you talk with a technology staff member.*



f. Check box on the left side panel to **generate supports** if needed.

a. Not sure if support structure is required? Look for red areas on the model that indicate an unprintable overhang.



g. Add a brim or raft from **Build Plate Adhesion** drop-down menu if additional adhesion is needed.

a. Not sure if a brim or raft is necessary? Add a brim to help small parts or parts with a lot of supports stick to the build plate. Add a raft for parts with uneven bottoms or parts that have very little area touching the build plate.

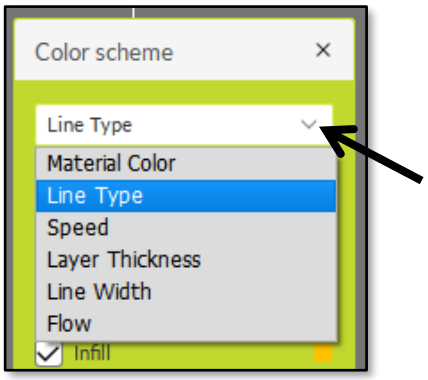
h. The first layer is the most important layer of the print. Check the layer view to ensure the model will print well.

a. Slice your model by clicking the slice button at the bottom right of the screen.

b. At the top of the screen, click on **Preview** to see what the printer intends to print.

c. Just below that, expand the **Color Scheme** drop-down.

d. To see all of the layers one by one, expand the first drop-down menu below **Color Scheme** and select **Line Type.**



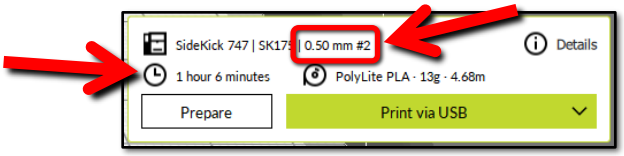
i. Use the scroll bar on the right side of the screen to view the different layers of the model.

This gives you an opportunity to view the infill of your model and determine if its density is appropriate.

j. Allow Cura to **slice** the code. Then check **print time** and **weight**.

a. If needed, **slice** the model again.

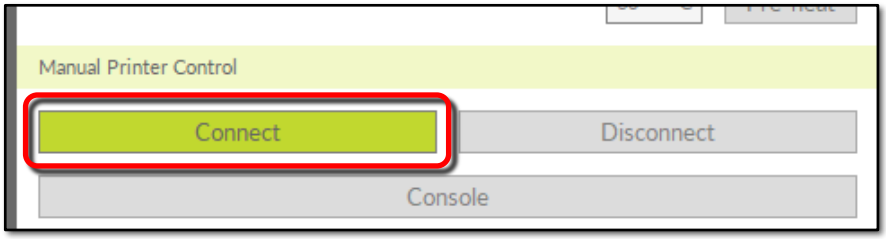
b. In the bottom right corner of the build plate visual, check the hours/minutes and approximate **grams** to ensure everything fits in time and filament available. In this example, the model will take **1 hour, 6 minutes** to print and use **0.5 grams** of filament.



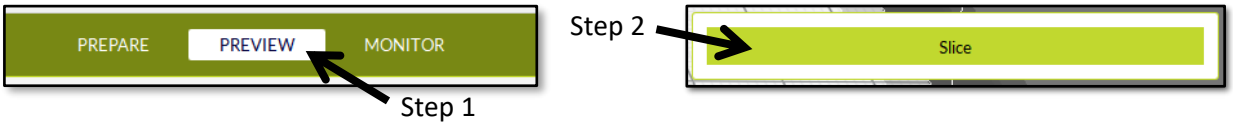
k. Ready to print? Go to the **Print** Monitor panel and **connect** the printer.

a. At the top of the screen, click on **Monitor.**

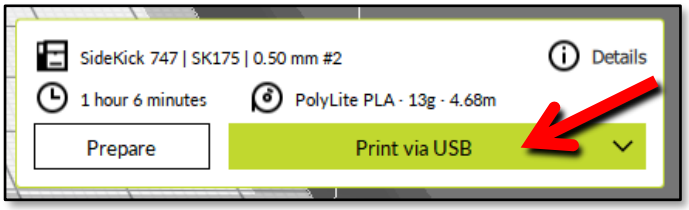
b. Ensure the **3D Printer is powered on**, and click **Connect**. The 3D printer should restart.



c. Once connected, go back to the **Preview tab** and **slice your model again**.



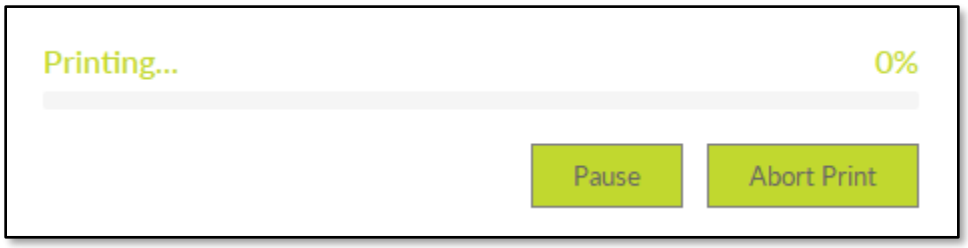
d. Finally, click **Print via USB** to start your print.



l. **Monitor** your print and how to **abort if necessary.**

a. **Return to the monitor tab** by clicking **Monitor** on at the top of the screen.

b. At the bottom right, there is a print percentage and **pause** & **abort** buttons.



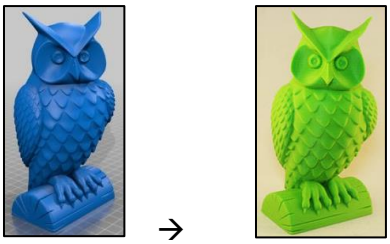
c. Click **Abort** if a problem occurs. This will completely stop the print with no possibility of recovery.

d. Wait for the print to finish, and enjoy!

e. When your print is done, let staff know. Staff will remove the print from the printer for you.

m. Making an Appointment:

a. You can print models up to **4 hours** in the makerspace lab. Make an appointment by calling **970-962-2599** or emailing **library.technology@cityofloveland.org.** Walk-ins are available on a first come, first serve basis.



b. 3D prints are **FREE** during your makerspace appointment. You **must** stay with your print until it is complete.

n. Orders

a. Technology staff can complete a 3D printing project for models of any size or length of time.

b. We print large models on a Lulzbot Taz 6 (capacity: ~250mm^3) and Lulzbot Workhorse (capacity: ~280mm^3). **There is no time limit: if it fits, it prints.**

c. 3D printing orders have a material fee of **10¢ per gram of plastic**.

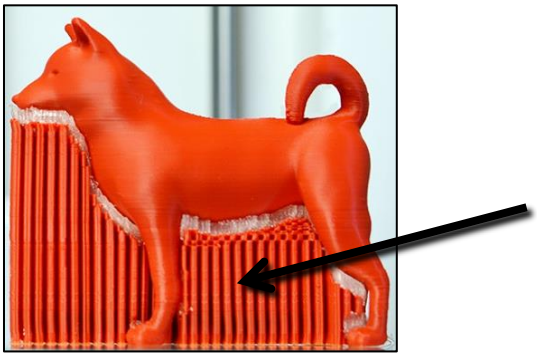
d. To place an order:

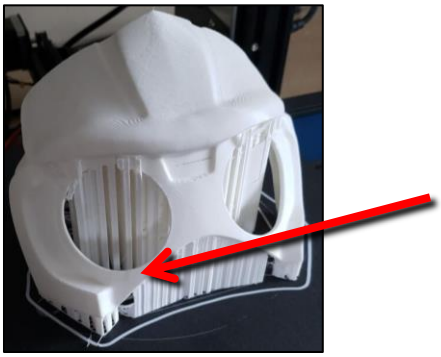
i. Visit www.lovlib.org/orders and complete the online form.

ii. **Orders can take 3-14 business days to complete dependent on current queue length and materials.**

o. Support Removal

a. Many 3D models require supports to print properly, particularly for angles <45°. Staff does not remove the support material on 3D printed objects.





b. Supports can be removed using:

i. **Needle nose pliers and wire clippers** (pinch and twist off supports)

ii. **Cuticle trimmers or nail clippers** (clip off excess material)

iii. **Files, emery boards, or sand paper** (smooth away rough spots)