

HOW TO MAKERBOT PRINT

FRESH 2 SEPTEMBER 2021

You are required to follow all current university guidelines for wearing masks while in the lab.

You are responsible for keeping our community safe!



COVER

wear a mask
when required
on campus

THE GEORGE
WASHINGTON
UNIVERSITY
WASHINGTON, DC

Visit go.gwu.edu/covid19 for the latest updates and information about how the university is responding to COVID-19.



CLEAN

wash and sanitize
hands often



CONTAIN

stay home
if you're sick



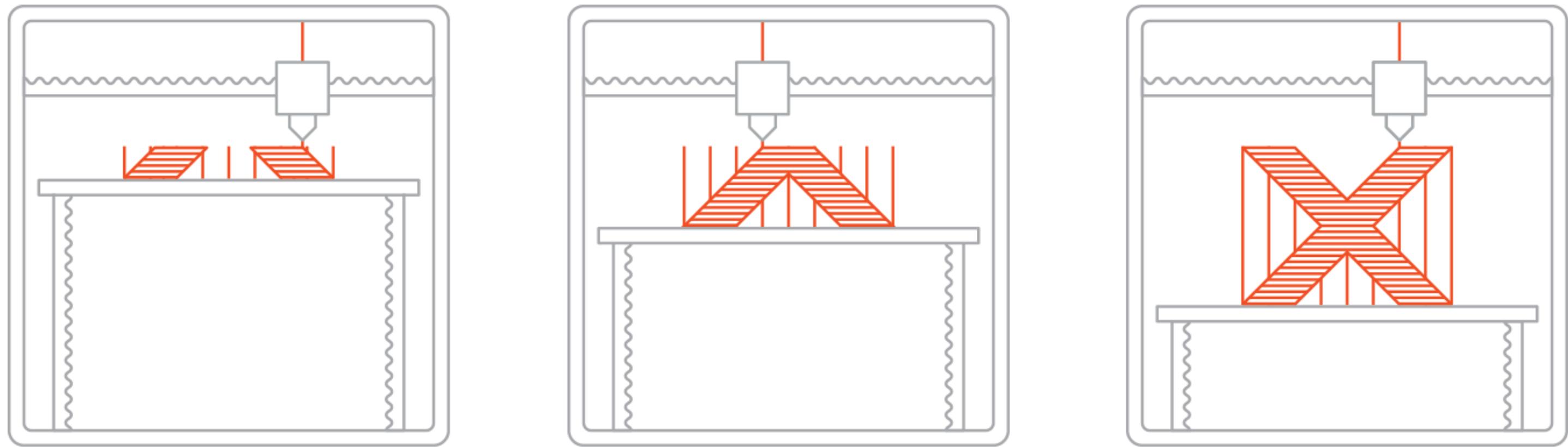
NOTE

This document is NOT
a substitute for hands-on training.
Ask your teacher
or a lab tech for a tutorial.

This tutorial assumes you already know how to use 3D software of some kind and are able to export an .STL or .OBJ file from your app of choice.

If you've never worked with 3D software before, a good place to start is [Fusion 360](#). It is free to use for students. Come back when you've modeled something.

MakerBot Print does only one thing: it prepares models made in other apps to be printed on the MakerBot. It is not a modeling app. It is a ‘slicer’ app—it takes .STL or .OBJ files created in other 3D apps, and then creates slices of the volume, adds support structures for overhangs, and saves instructions for drawing those layers on the build plate.

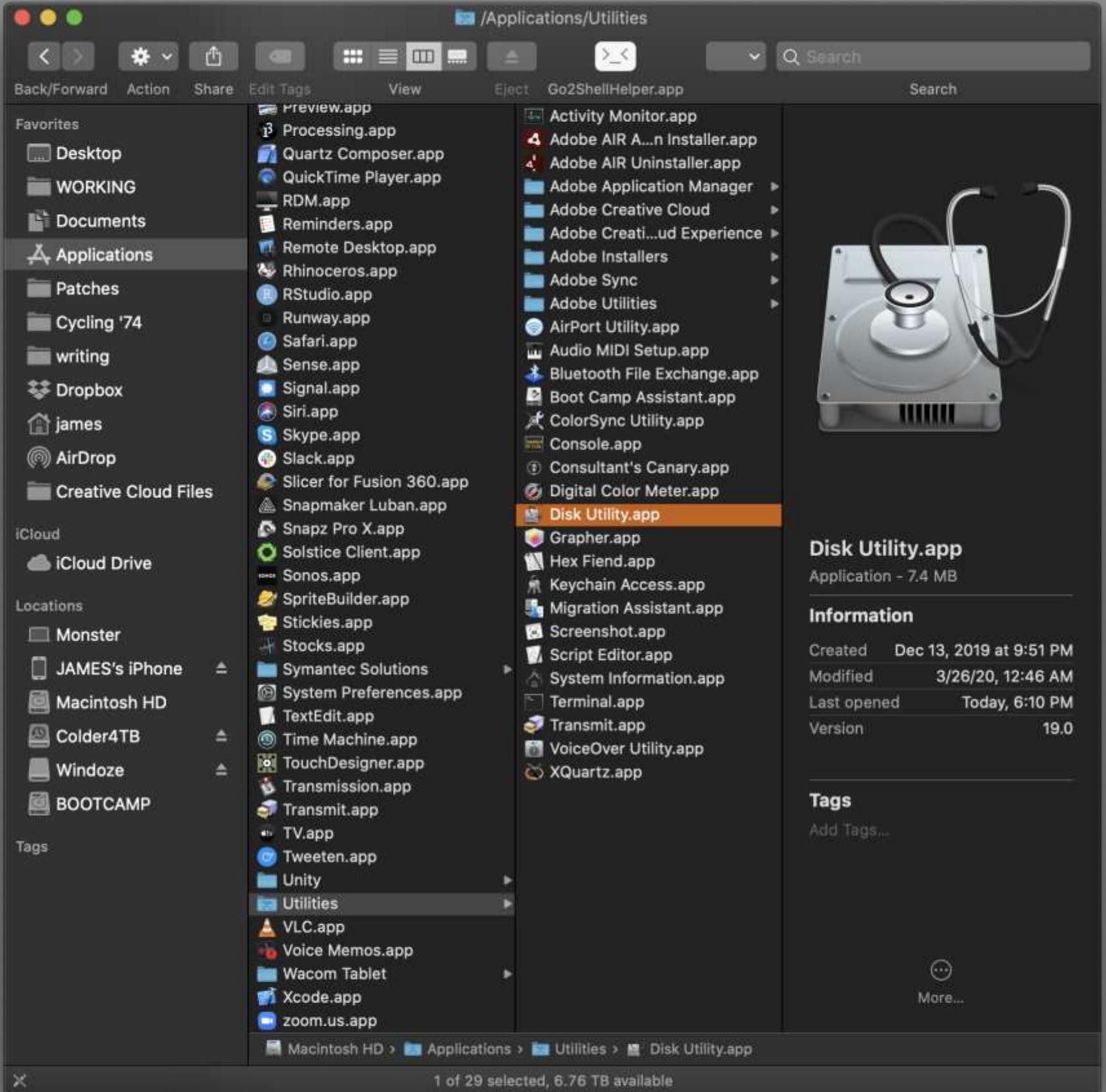


The MakerBots are Fused Deposition Model (FDM) printers. They extrude melted Polylactic Acid (PLA) filament one layer at a time, lowering the build platform incrementally between each layer.

The print includes the raft (thicker layers underneath to stabilize the model,) the shell (the outer surface of the model,) infill (less dense filling of the model,) and supports for undercuts.

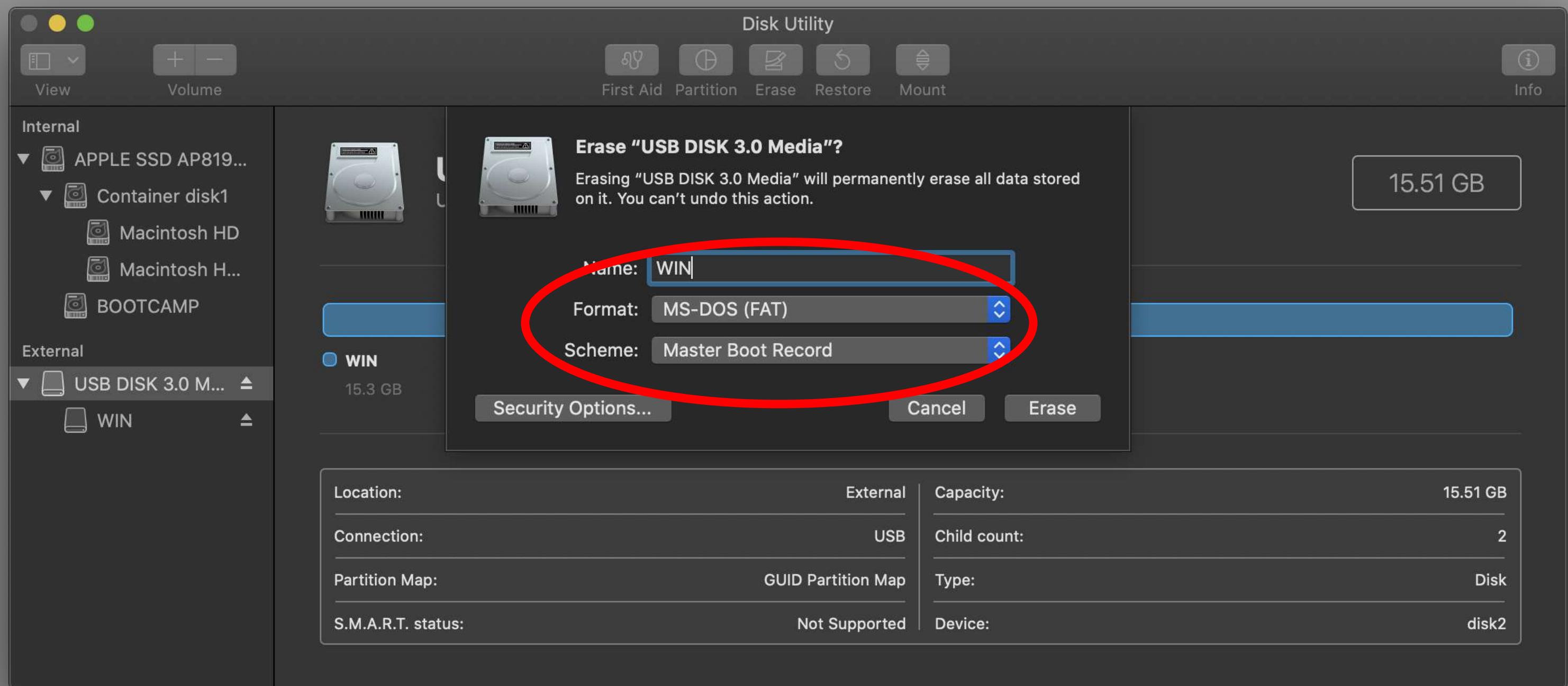
Print from a thumb drive...

Prep your jobs on a free computer in one of the other labs or on your own computer, then save the job to a thumb drive and load that directly into an unused MaKerBot.



If you are using a Mac,
you may have to
format the thumb drive
for the Makerbot to
read it.

Open the Disk Utility
app...



meet me in th X | The George V X | Studio Arts W X | Fab warrant X | Roland SG-20 X | Non-routine I X | Corcoran Lab X | GroupMe X | Download M X +

makerbot.com/3d-printers/apps/makerbot-print/download/

Apps Bookmarks Code Design Art Chuck Home Benval Unity KAZE FA 1061 FA 4195 Porter Radio Allegories OTS

PRODUCTS STORIES EDUCATION PROFESSIONAL MATERIALS SUPPORT CONTACT SEARCH CART YOU

Open a support case Software MakerCare Troubleshooting Register Your Device REQUEST A QUOTE BUY



DOWNLOAD MAKERBOT PRINT 4.3

macOS 10.12 to macOS 10.14 ▾ DOWNLOAD

Before installing MakerBot Print 3.0 and above, uninstall previous versions (Windows 7, 10). Requires firmware version 2.0 or higher. For Replicator 2/2X, USB is not supported. IT Professionals, please [click here](#) for instructions on enterprise deployment.

If you want to work on your own computer, download the MakerBot Print app. It's Free!

<https://www.makerbot.com/3d-printers/apps/makerbot-print/download/>

OVERVIEW

MakerBot Print is our new

- Prepare: Import des
- Manage: Keep your
- Monitor: Kick-off pr

SYSTEM COMPATIBILITY

- OPERATING SYSTEMS: Windows 7, 8, 10, Linux
- MAKERBOT FIRMWARE: 2.0 or higher

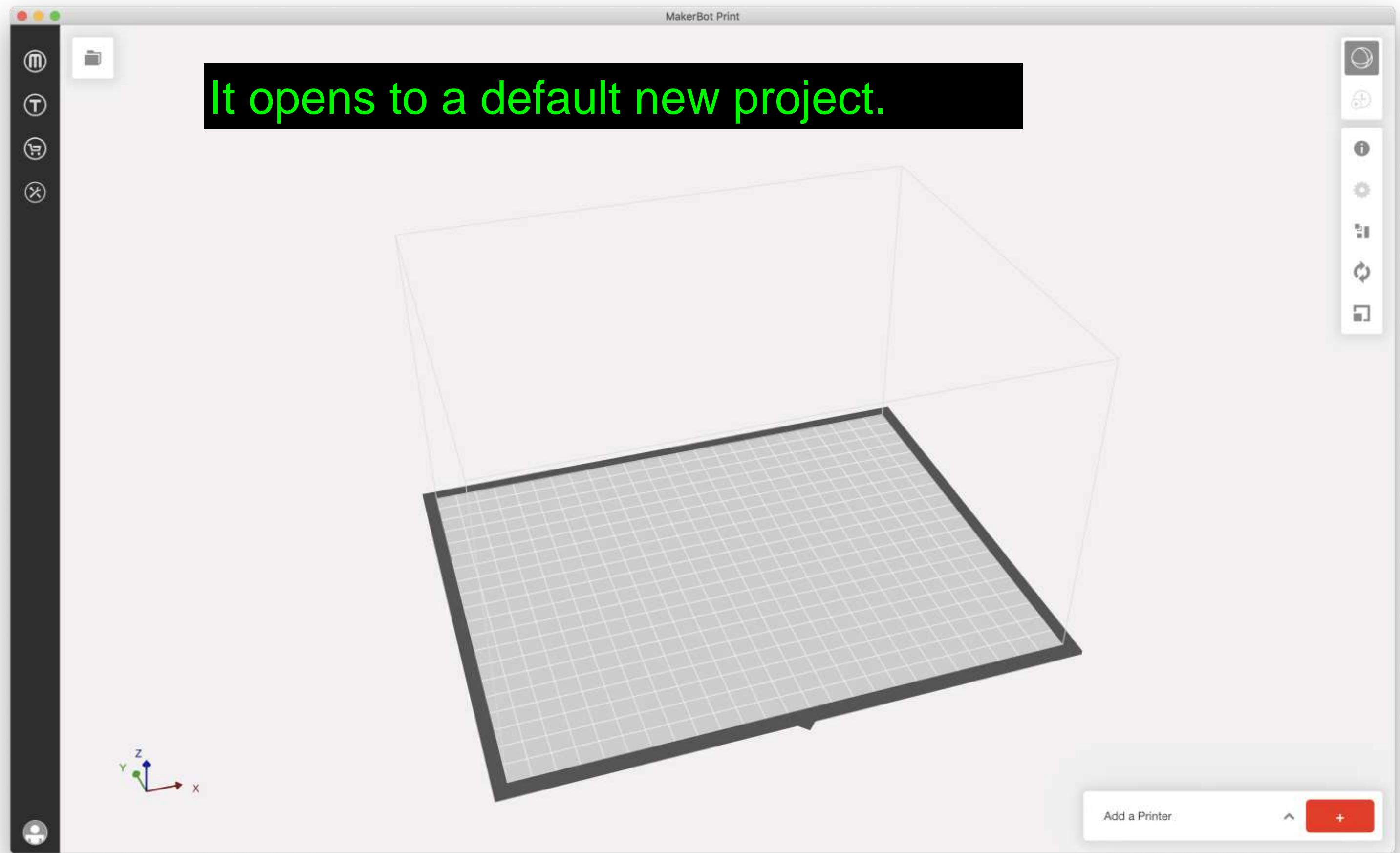
SYSTEM REQUIREMENTS:

- RAM: 2GB minimum, 8GB or more recommended
- DISK SPACE: 2.5GB, 20GB or more recommended



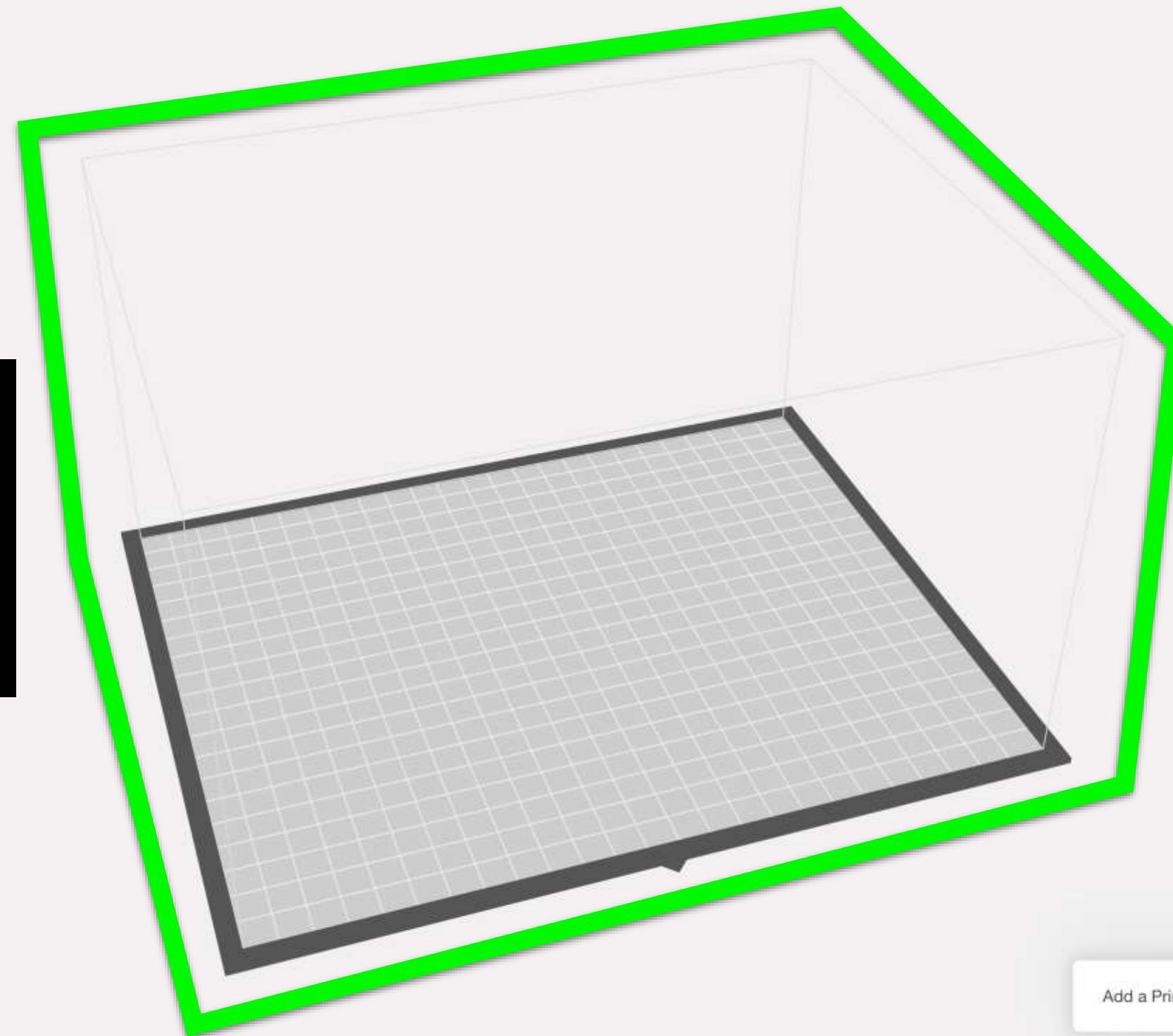
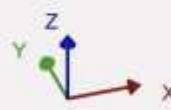
MakerBot Print

Install, and launch
MarkerBot Print.



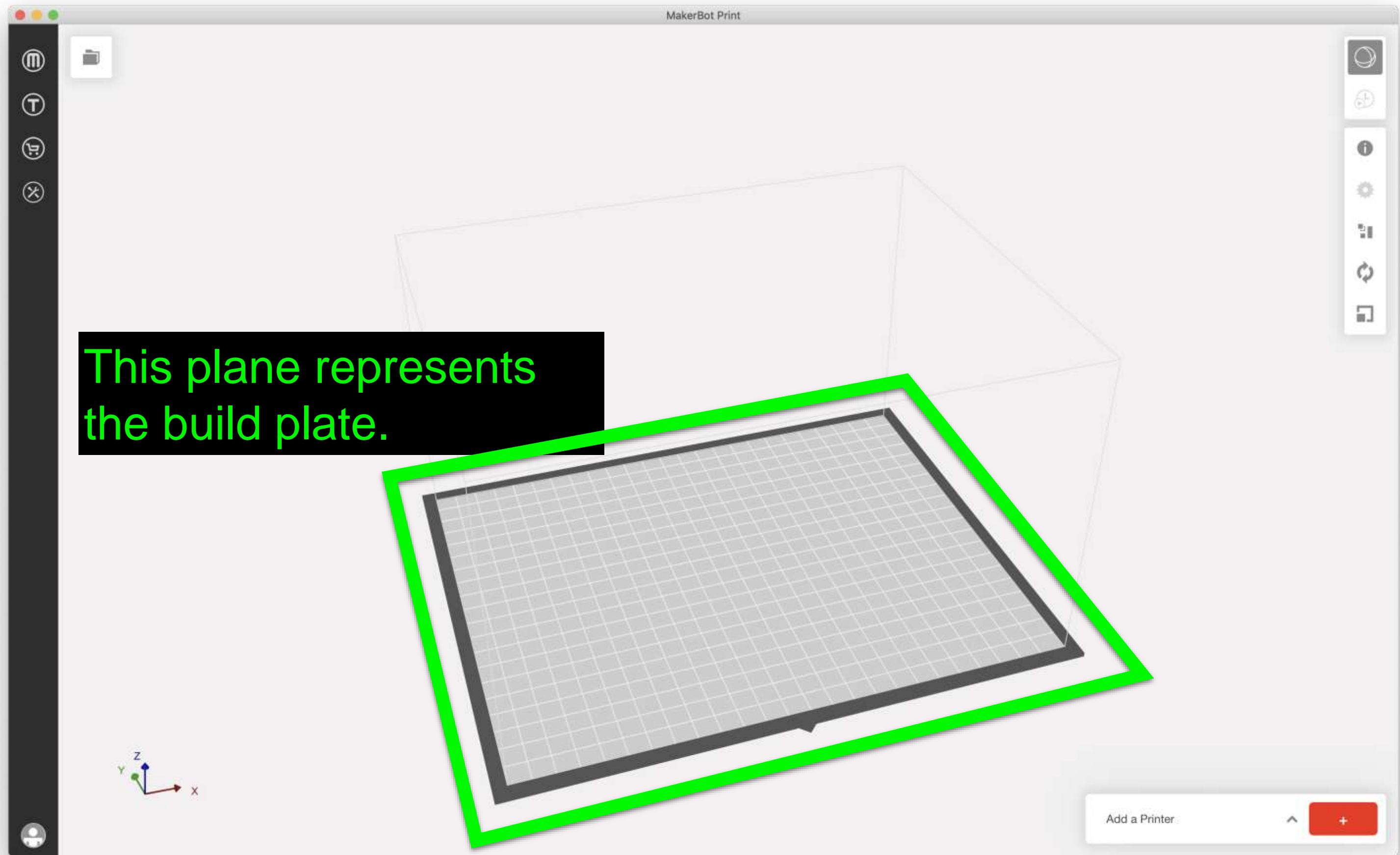


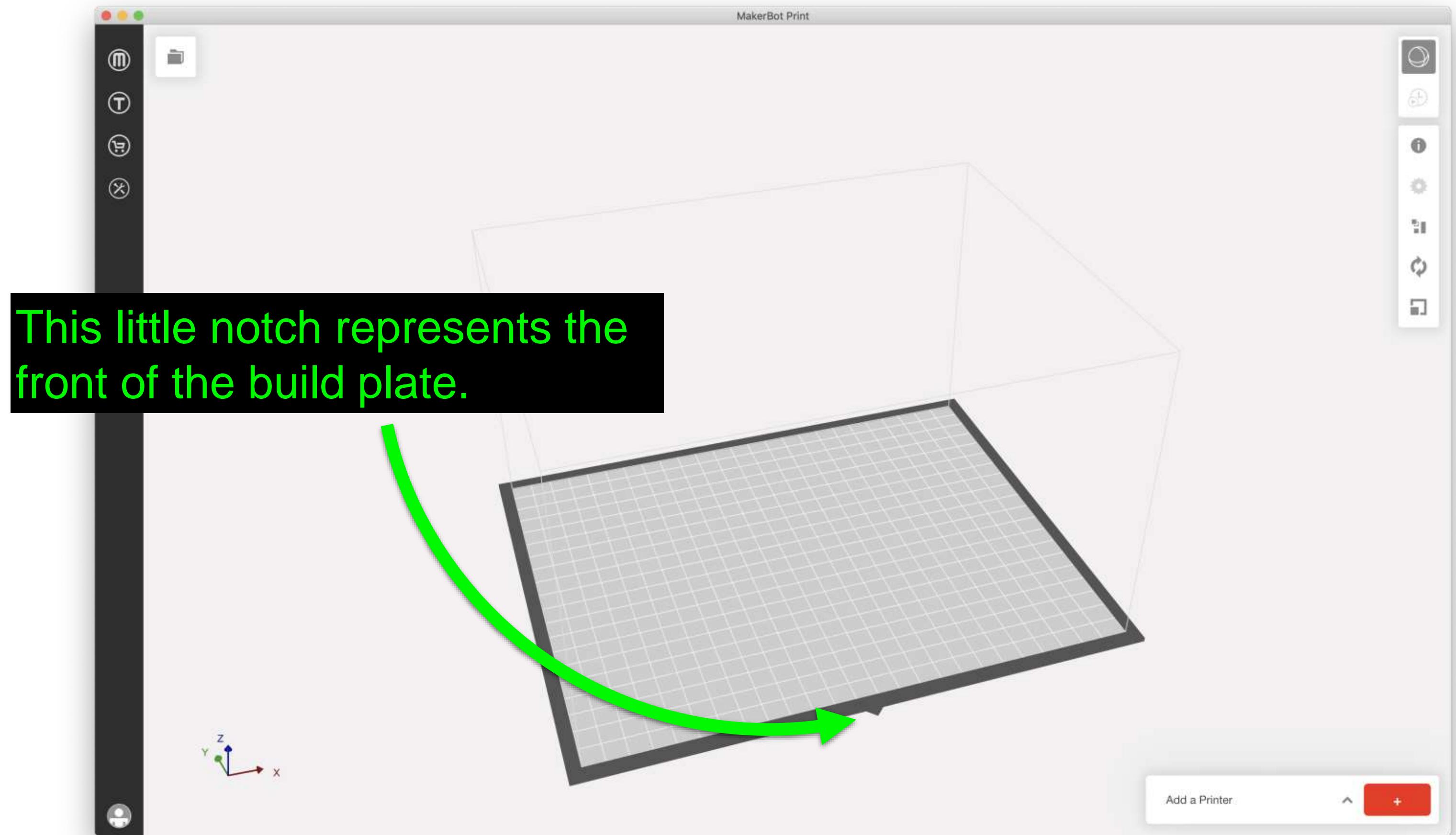
You'll see a light outline of a cube—this represents the build volume.

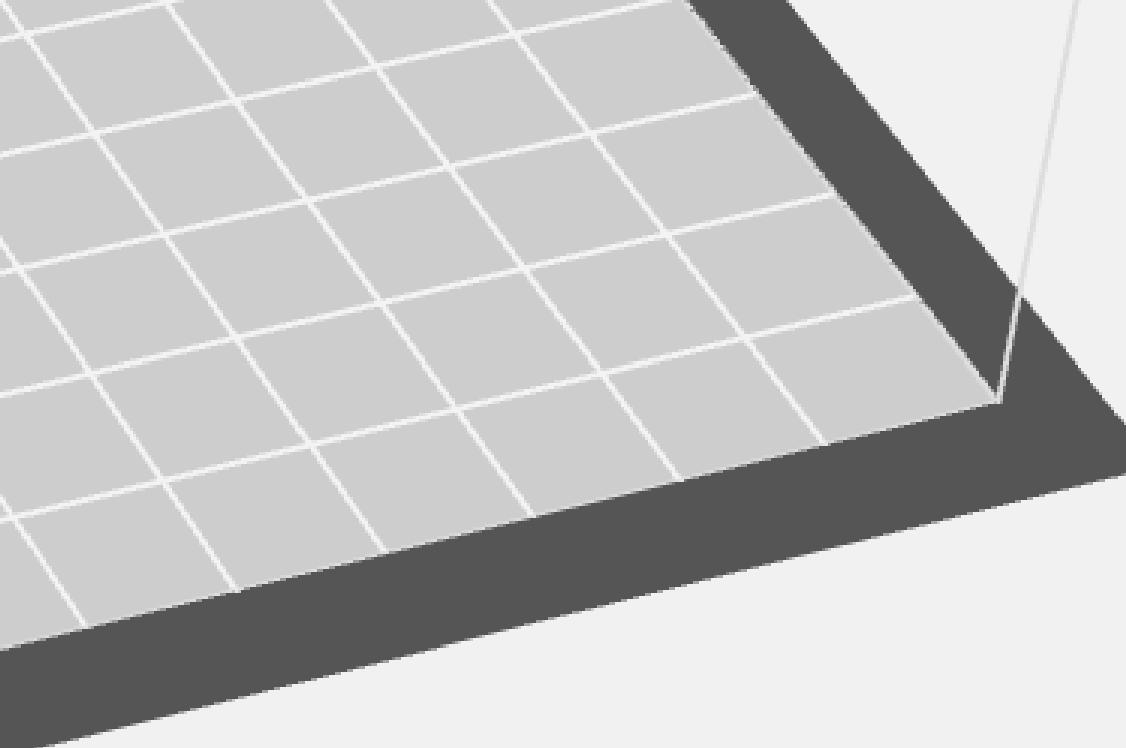


Add a Printer



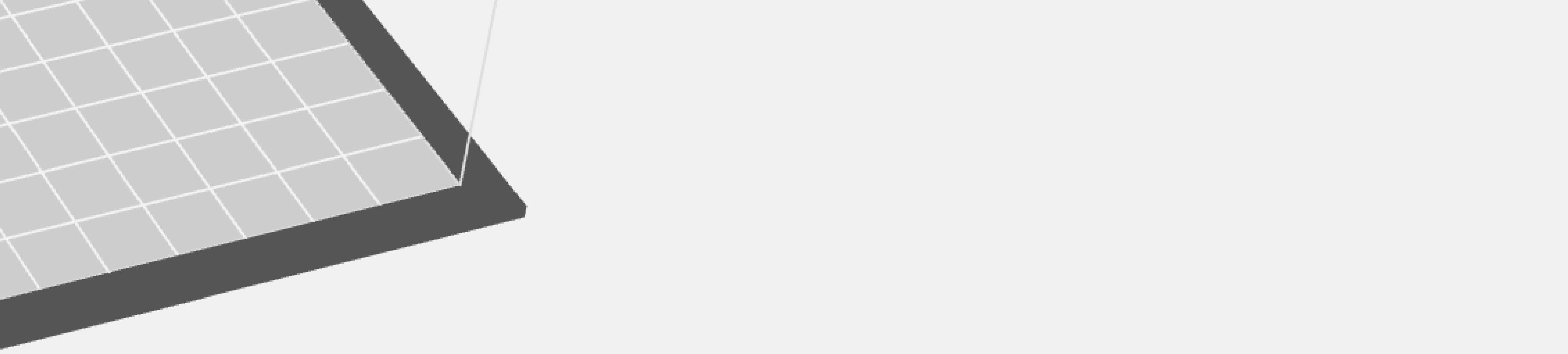






In the lower-right corner is the selected printer. You'll want to set this up the first time you open the app.

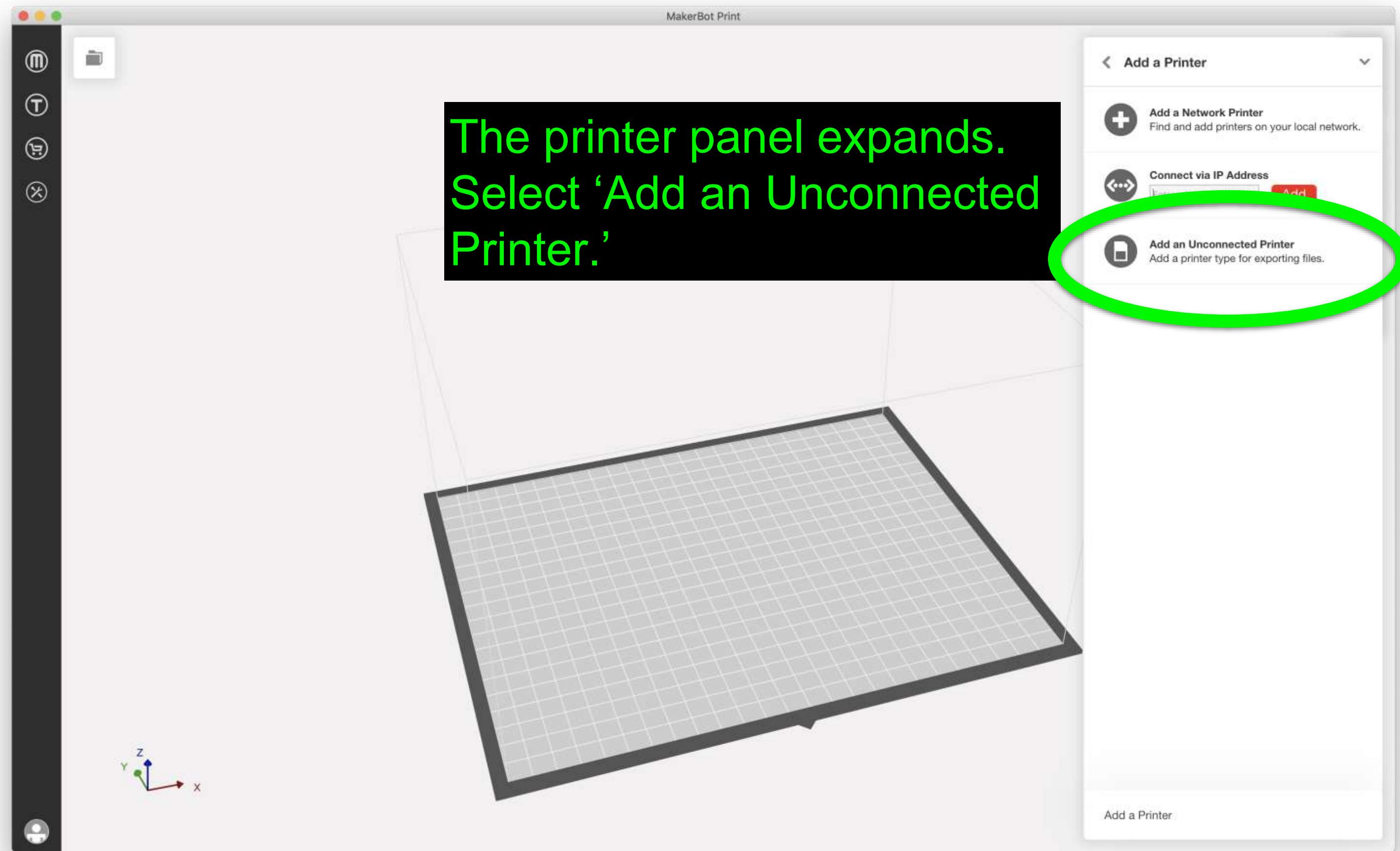


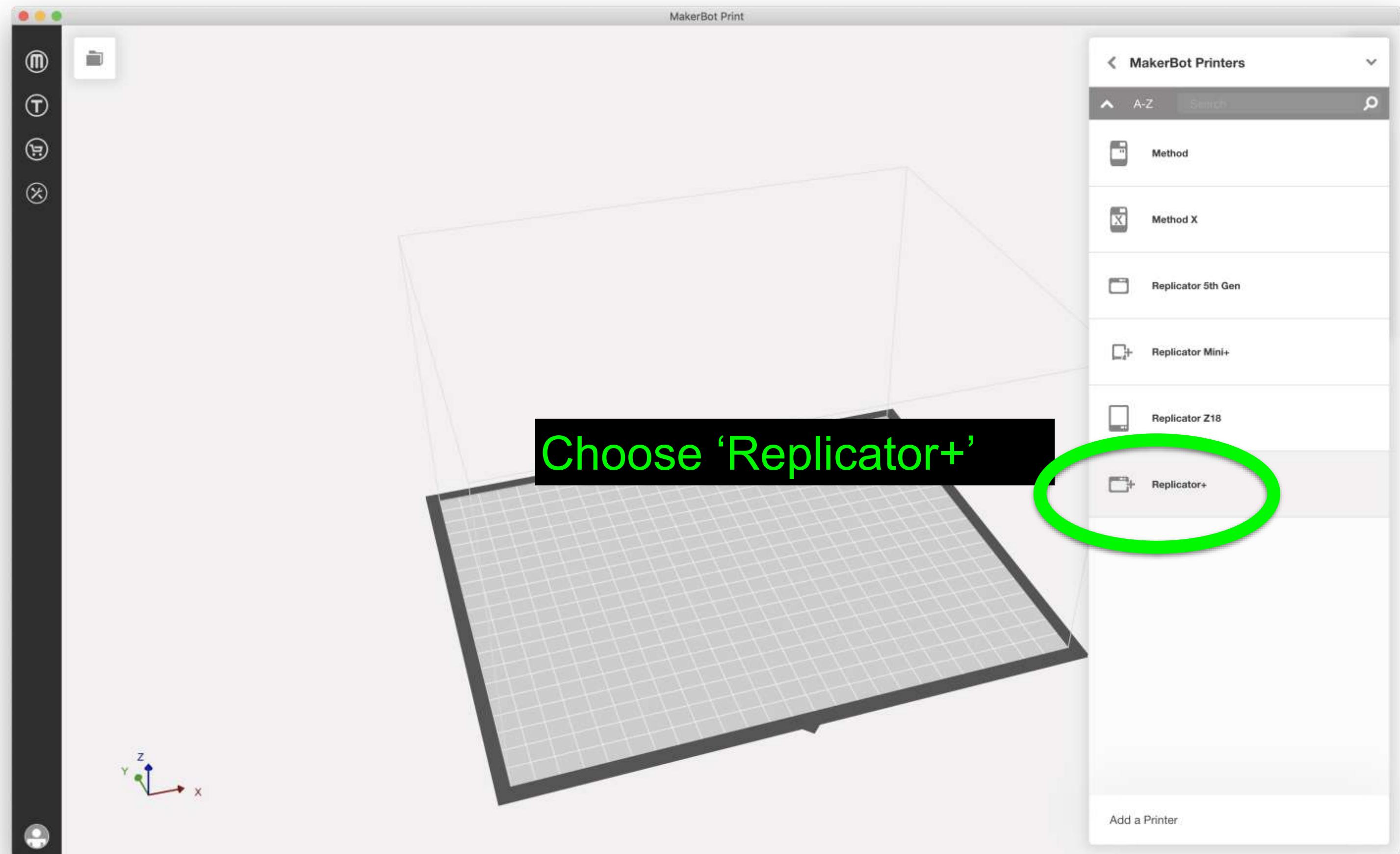


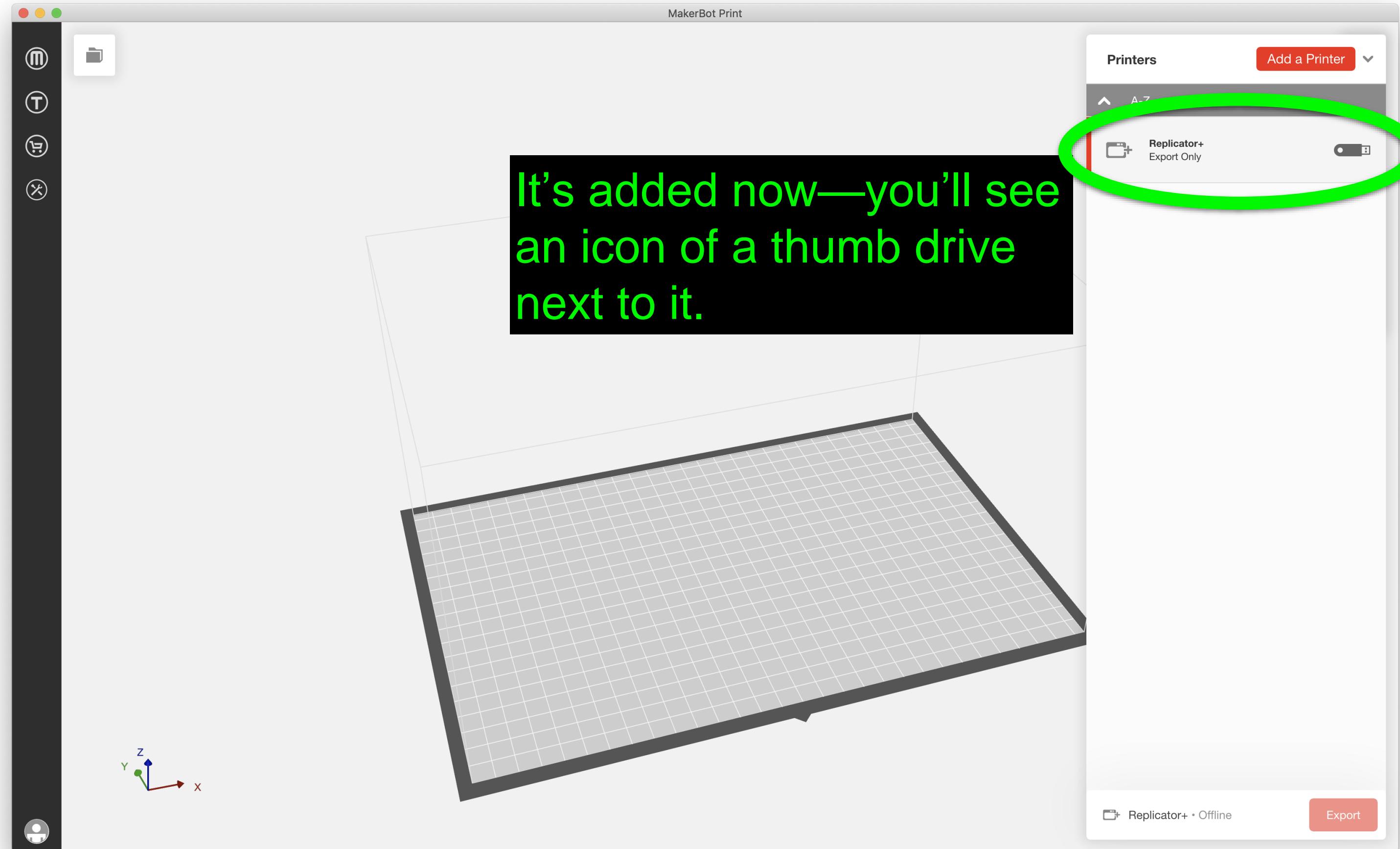
Click on the plus symbol.

Add a Printer

+







Printers

Add a Printer

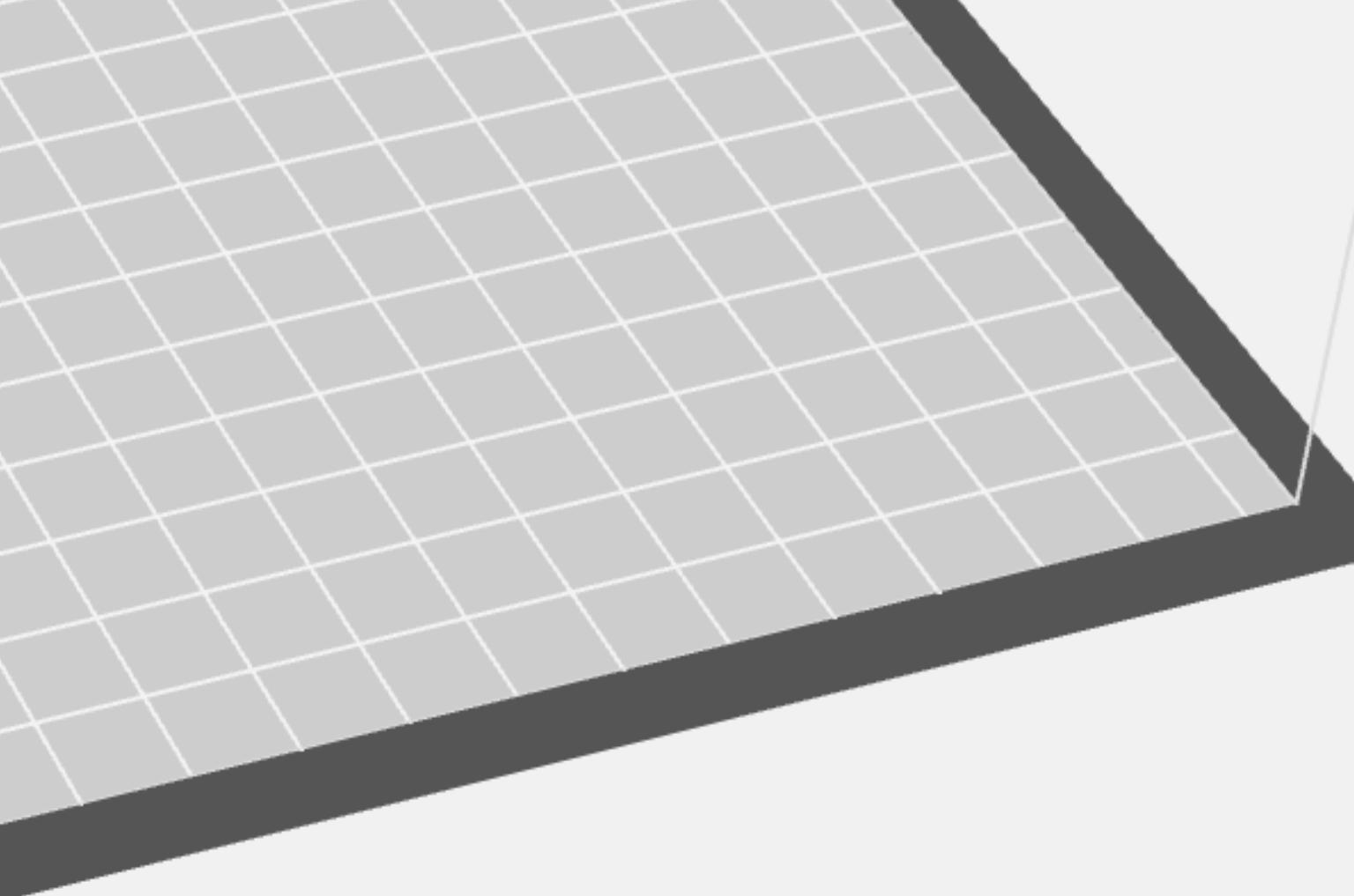
A-Z



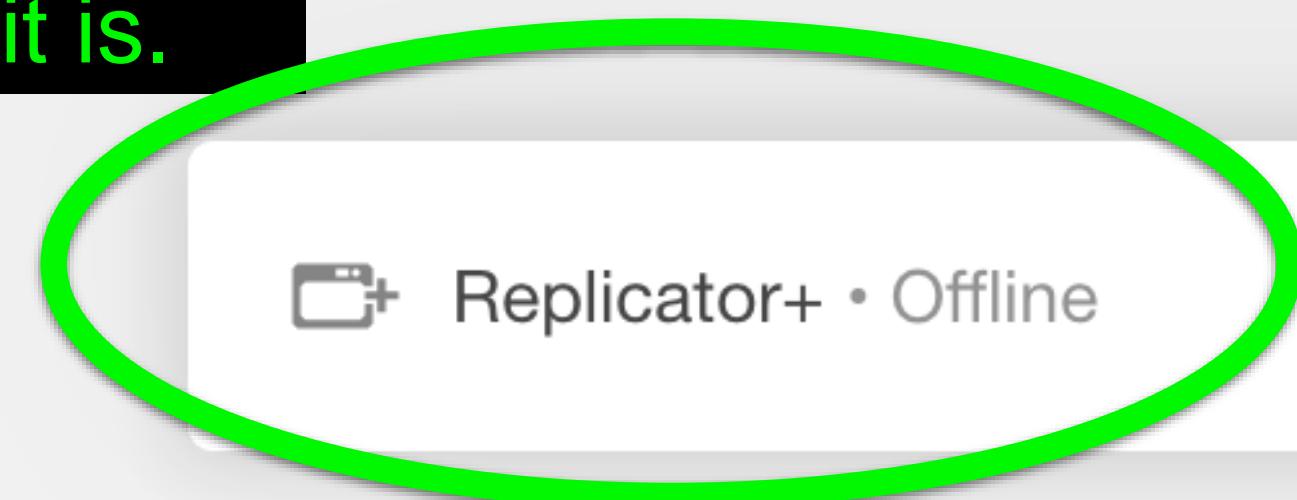
Replicator+
Export Only



Click on this little
widget to close the
Printers panel.



And there it is.



⌚+ Replicator+ • Offline



Export



MakerBot Print

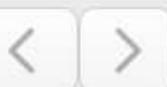
File Edit View Help



- New Project ⌘N
- Open Project... ⌘O
- Save Project... ⌘S
- Save Project As... ⌘⇧S
- Insert File...** ⌘⇧O
- Insert Example
- Insert STLs at build volume.
- Export as... ⌘E
- System Preferences
- Print from .makerbot



Add a model to the
build volume.



HOWTO-MakerBot-print



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iCloud

iCloud Drive

Locations

gyroid.print
gyroid.stl
HOWTO-makerbot-print.key
point.stl
sphere.makerbot
sphere.stl



sphere.stl

Standard Tessellated Geometry File Format - 630 KB

Tags Add Tags...

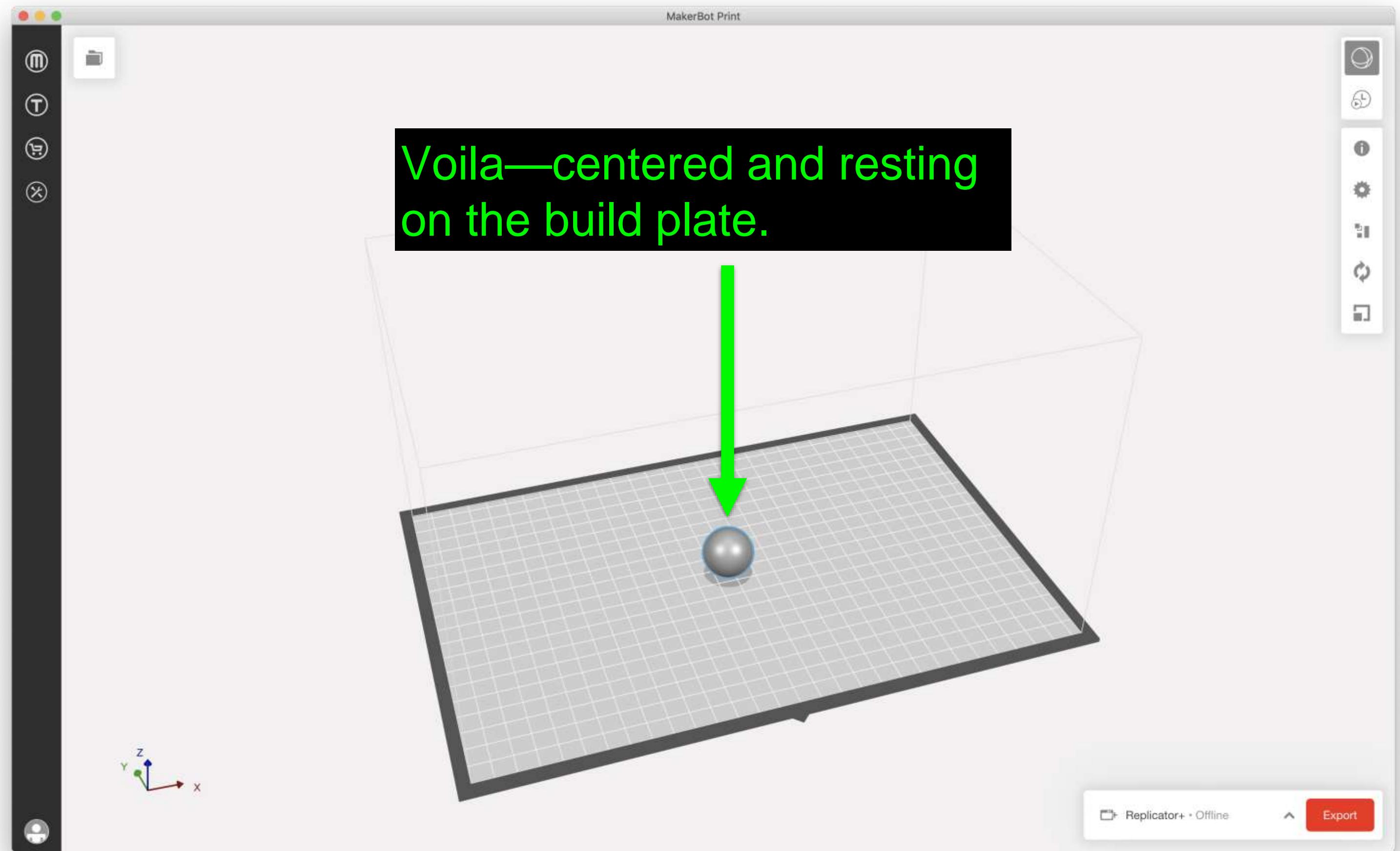
Created Today, 12:22 PM

Modified Today, 12:22 PM

Select an .STL
file and open.

Cancel

Open



If your model looks either really really small, or really really big, the units might be off. You can change the units here...

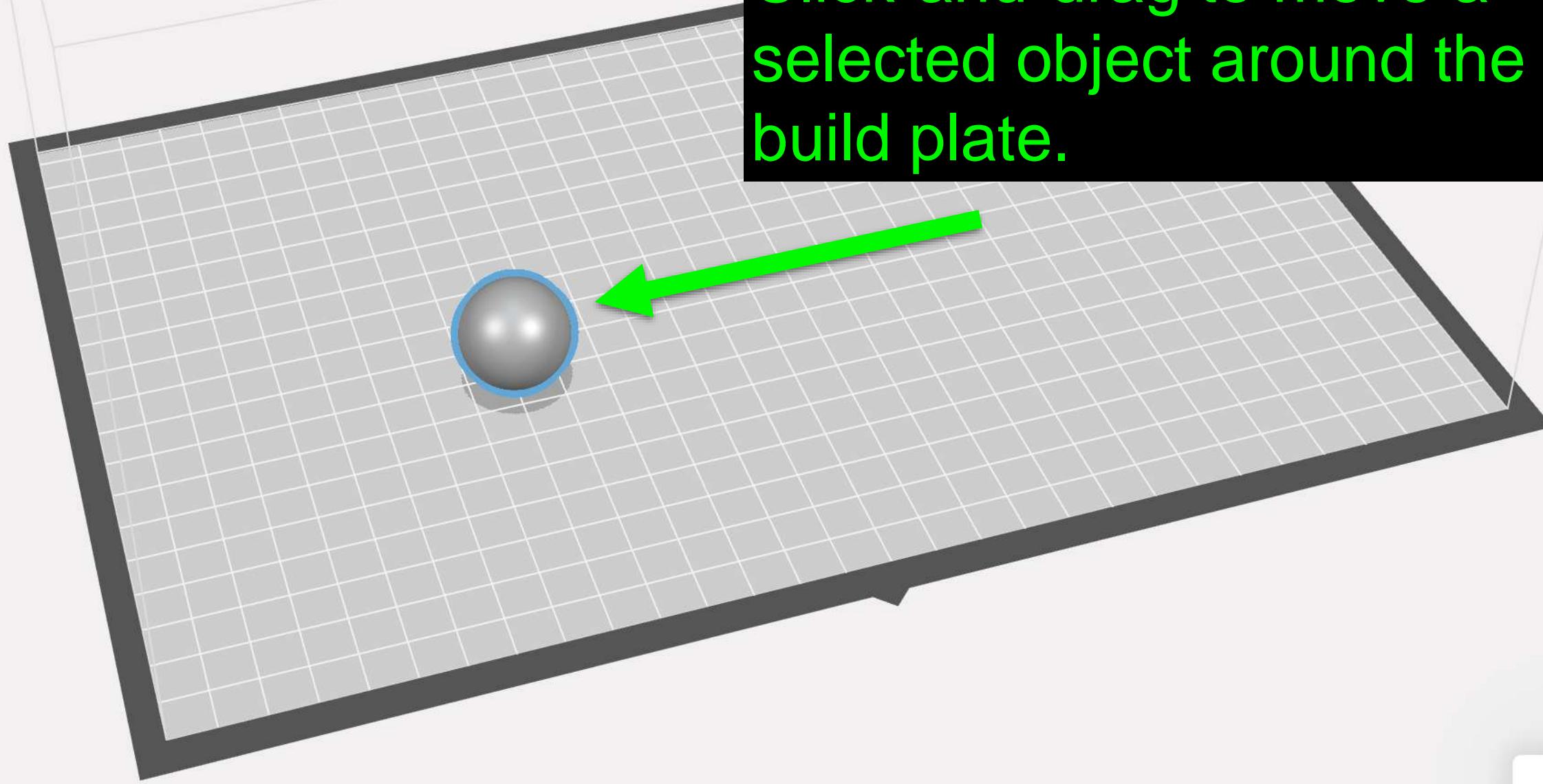
Model Info

1 of 1 Models selected

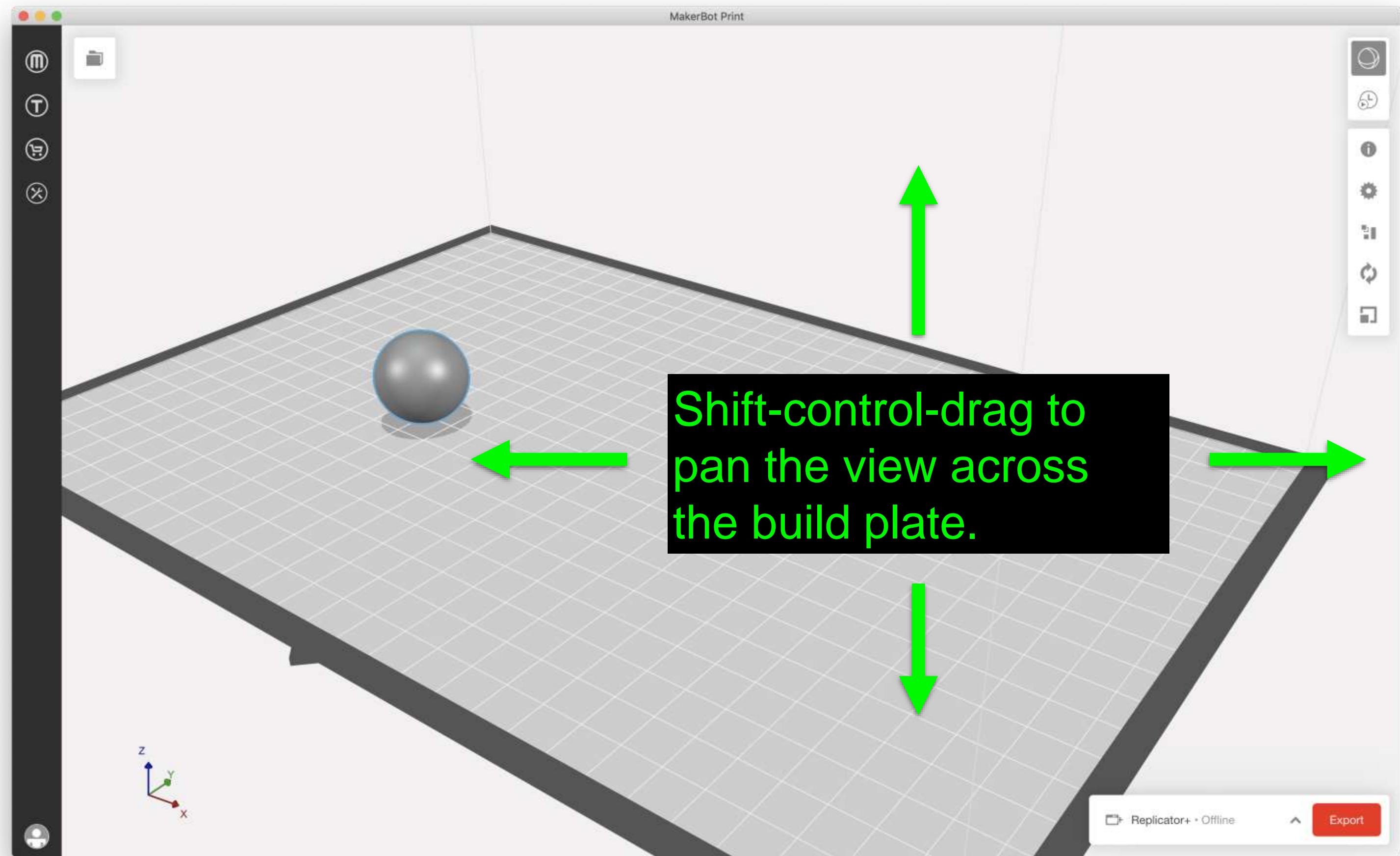
Units:

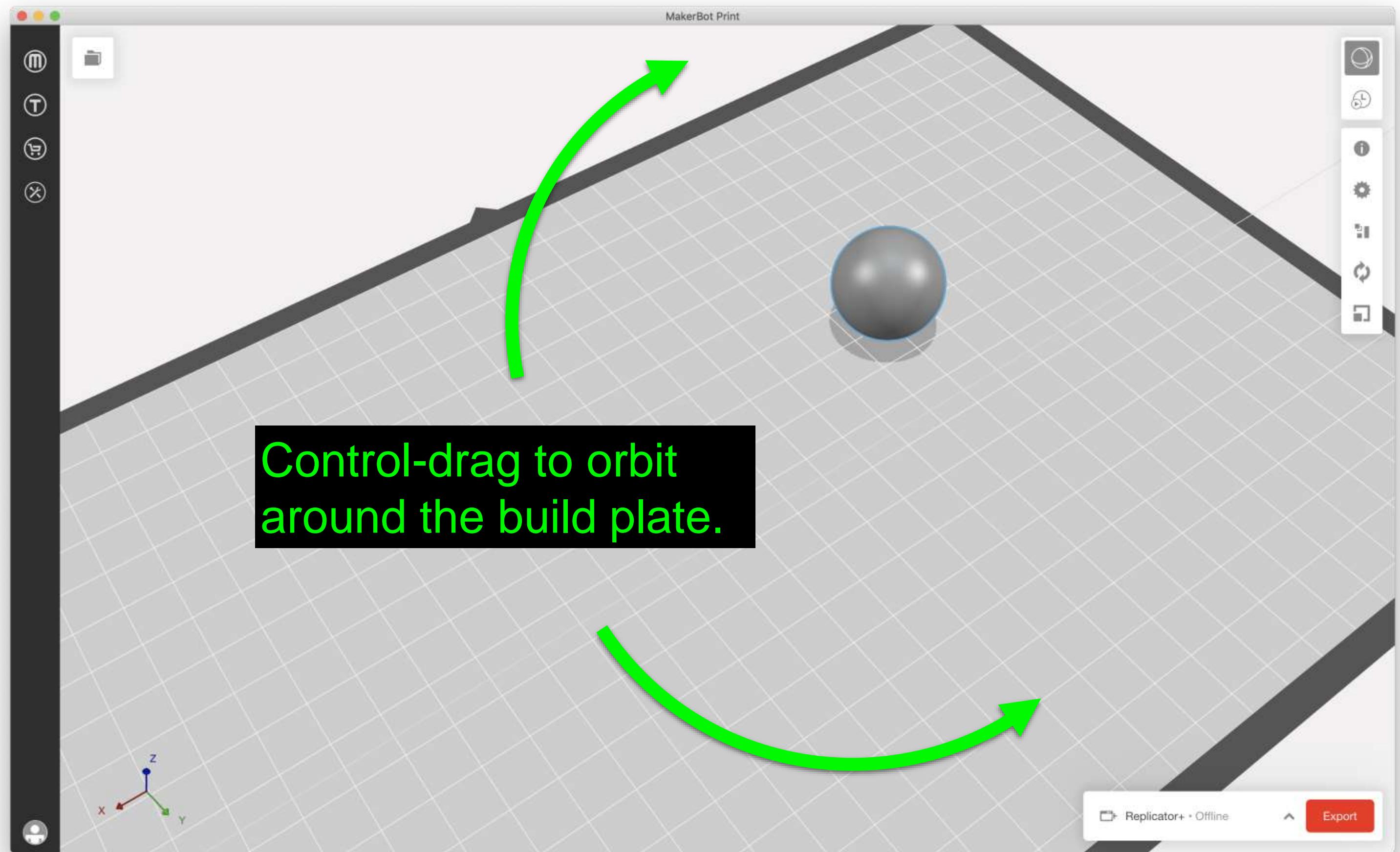
- mm
- mm
- cm
- m
- in
- ft

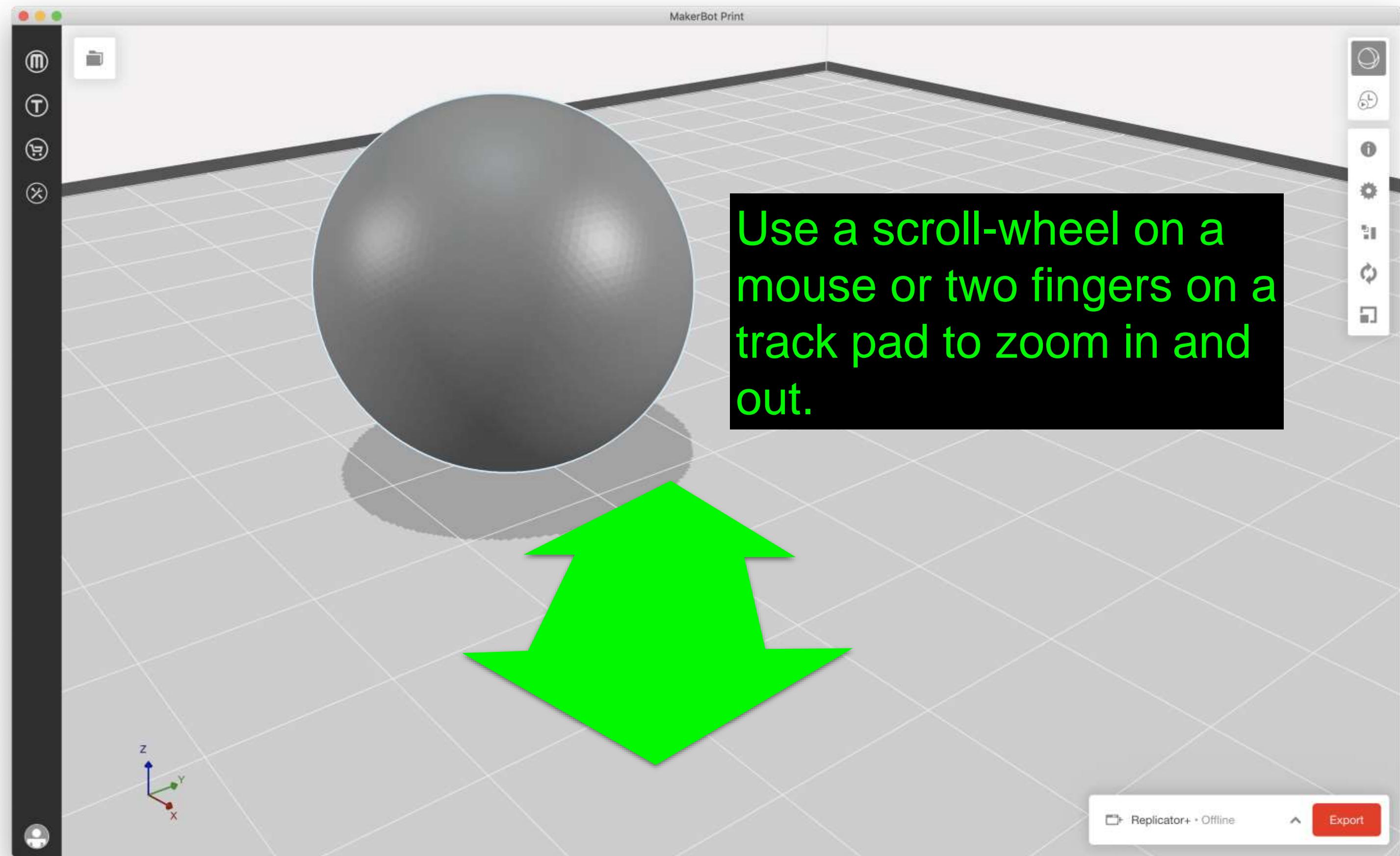
Click-and-drag to move a selected object around the build plate.



→ X







Use a scroll-wheel on a
mouse or two fingers on a
track pad to zoom in and
out.

Show Tab Bar

Show All Tabs ⌘\

2D Views ►

3D Views ►

Fit to Models ⌘F

Fit to Selection ⌘E

Fit to Build Plate ⌘T

Turn Perspective Off ⌘L

Top ⌘1

Bottom ⌘2

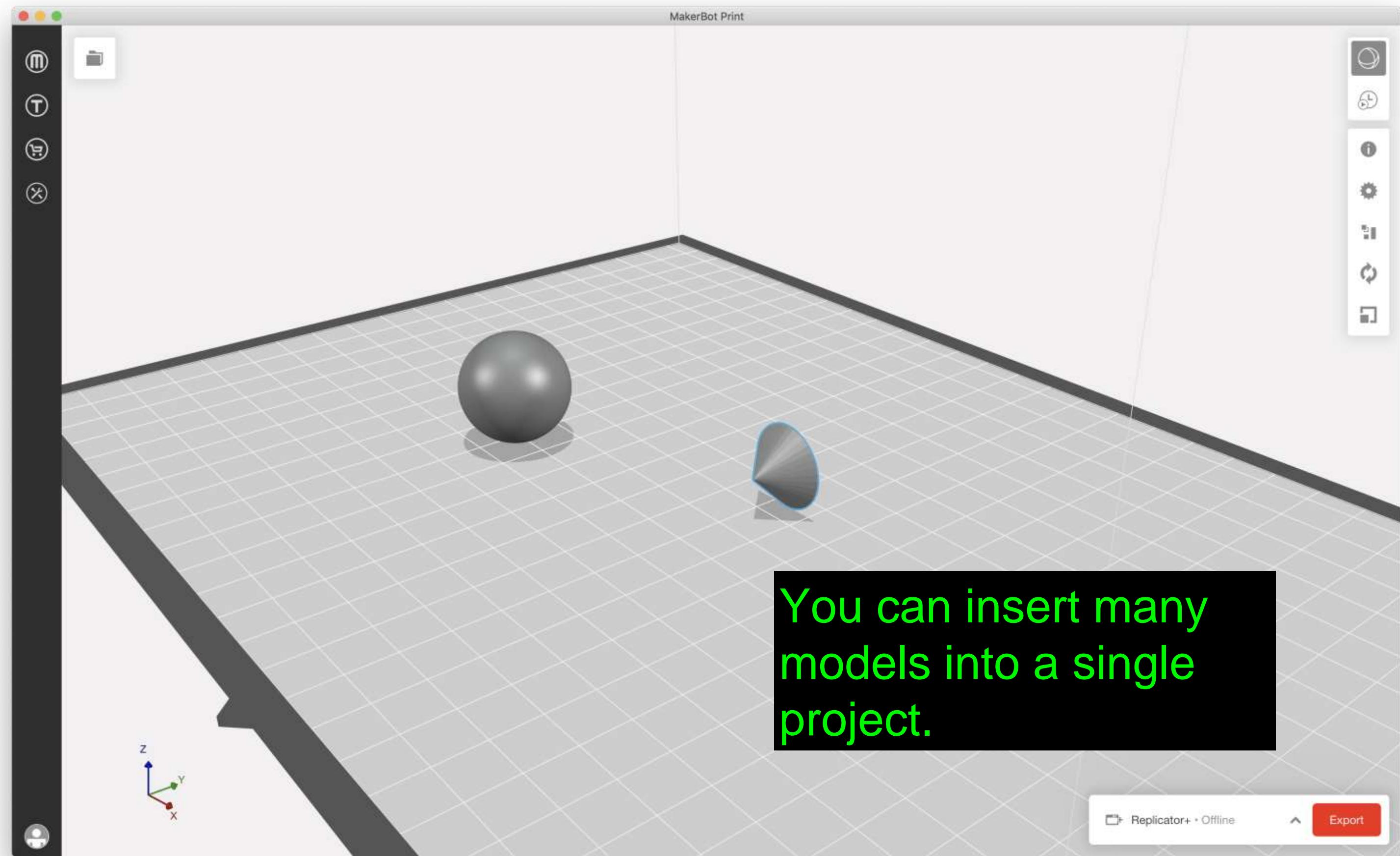
Left ⌘3

Right ⌘4

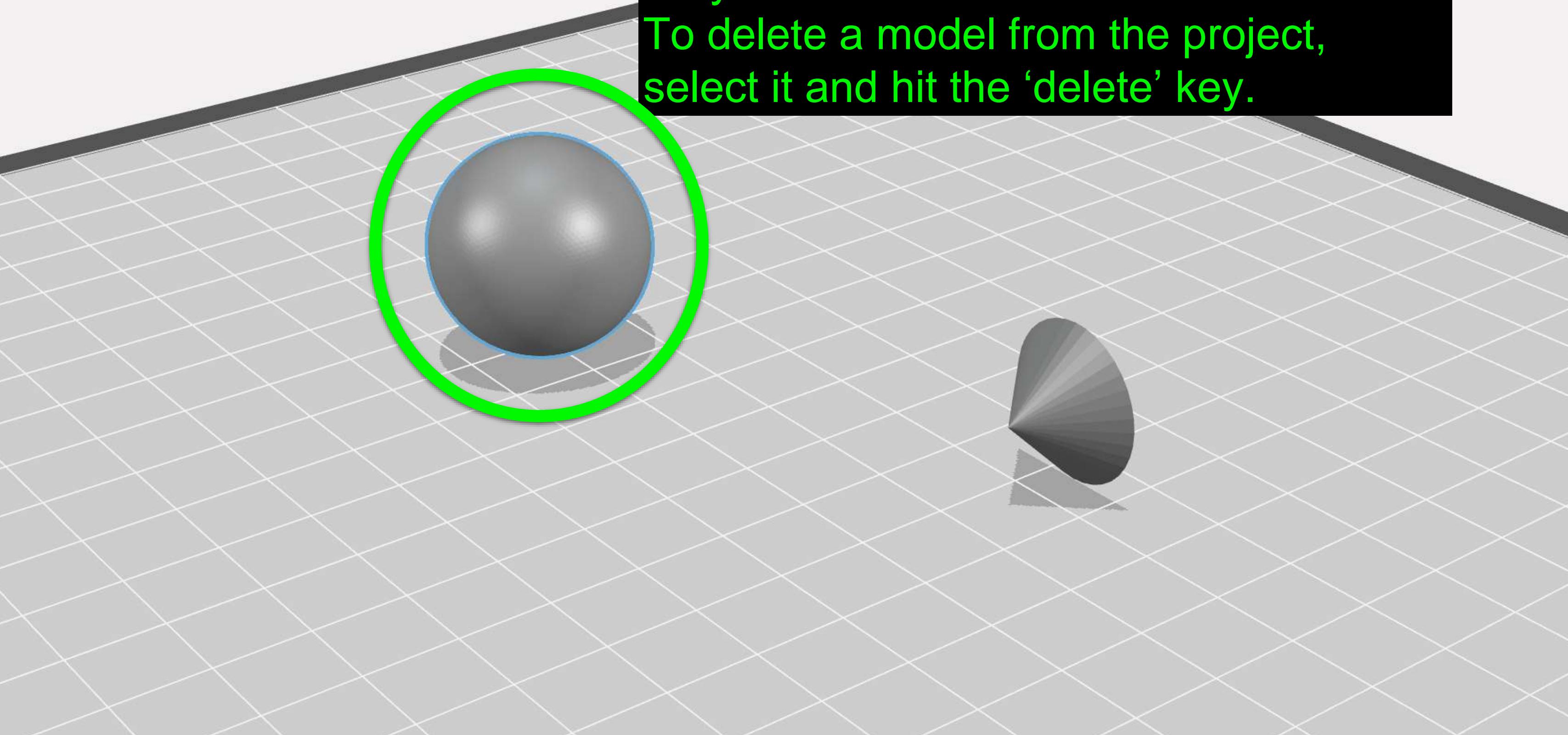
Front ⌘5

Back ⌘6

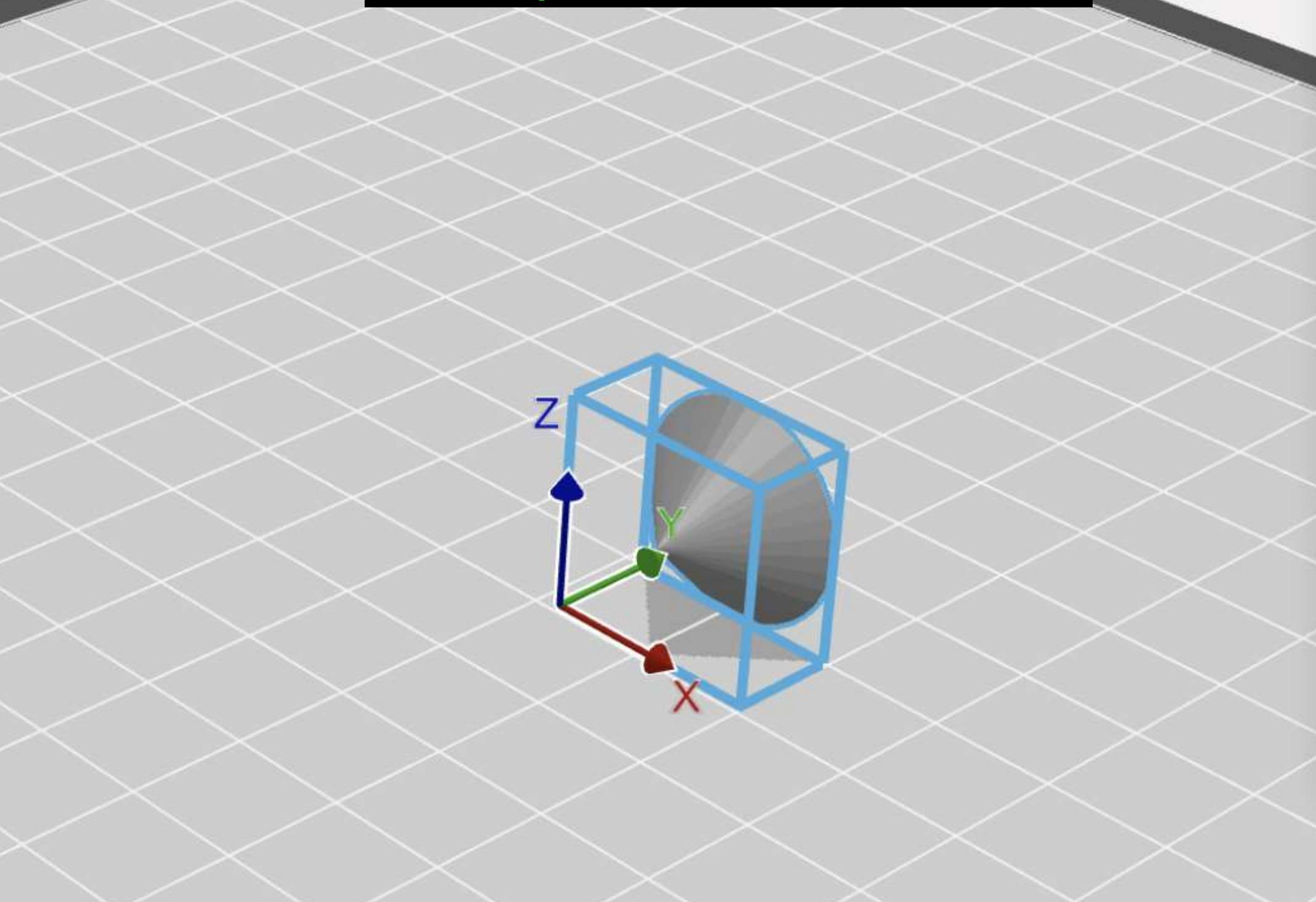
There are also several preset views under the View menu.



You select a model by clicking once on it—you'll see a blue outline. To delete a model from the project, select it and hit the 'delete' key.



To scale a model, select it,
then click once on the
Scale panel.



Scale

1 of 1 models selected on this build plate

Uniform Scaling

	%	mm
X:	300	18
Y:	300	9
Z:	300	18

Scale To Max

Reset



Scale

1 of 1 models selected on this build

plate

Uniform Scaling

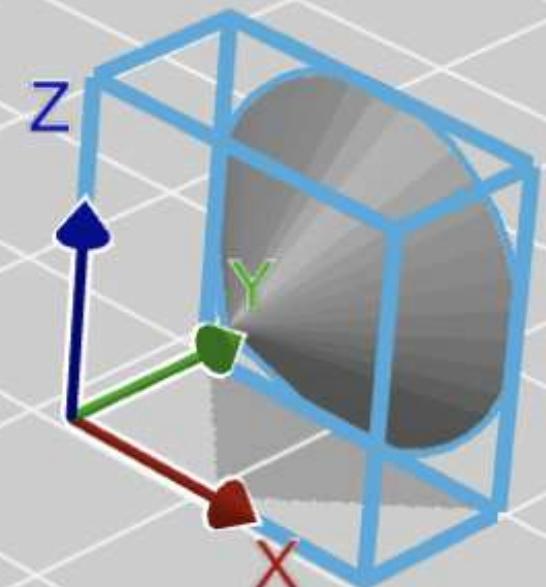
X: 300 18

Y: 300 9

Z: 300 18

Scale To Max

Reset



'Uniform Scaling' will ensure your model retains its proportions. Uncheck this only if you want to stretch/distort your model.

Scale

1 of 1 models selected on this build plate

Uniform Scaling

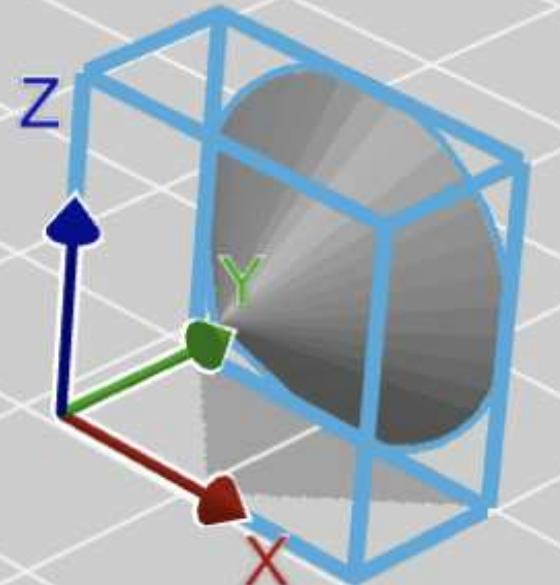
% mm
X: 300 18

Y: 300 9

Z: 300 18

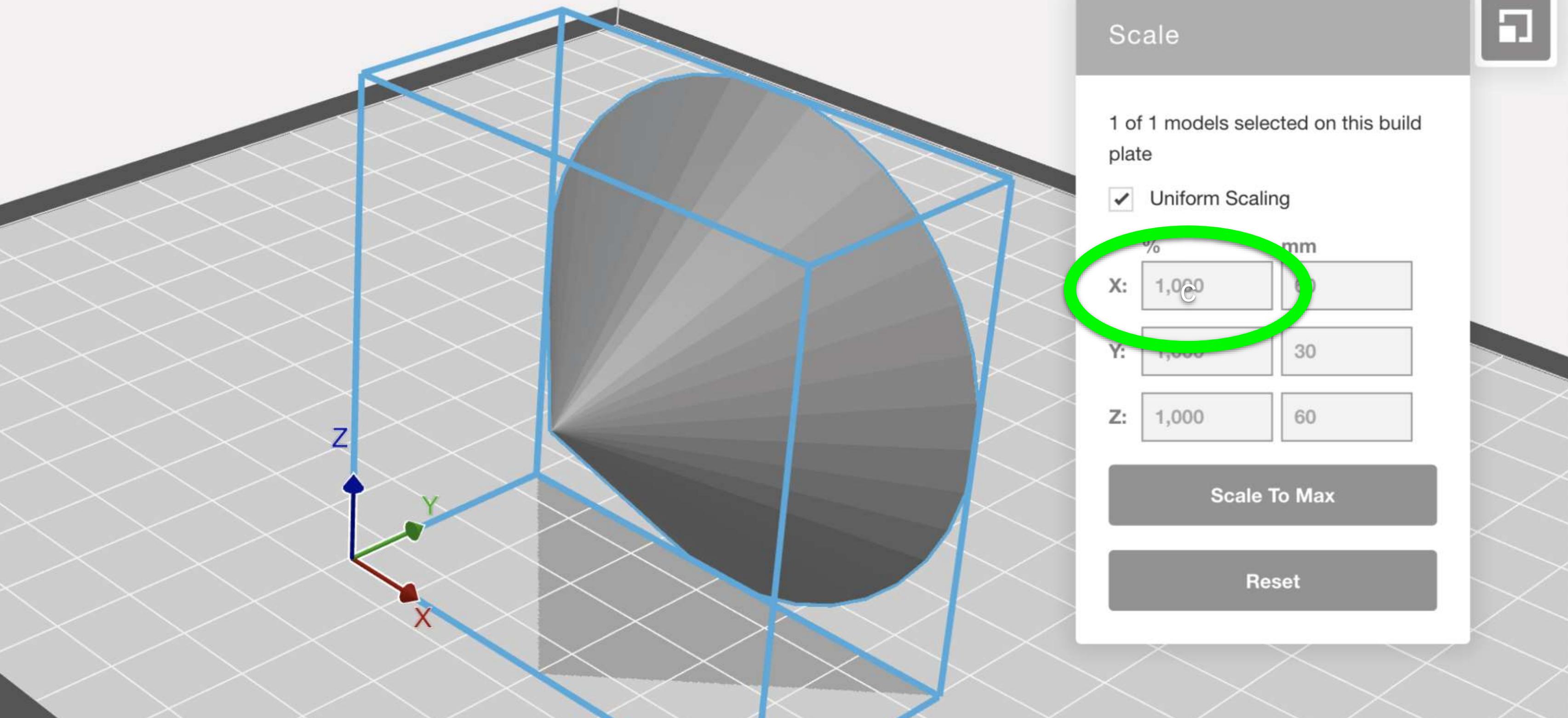
Apply to X

Reset



Key in values for a specific size or percentage.

Here I keyed in '1000' and hit
'return' (or 'enter' on PC.)



Scale



1 of 1 models selected on this build plate

Uniform Scaling

%

X: 300

mm

18

Y: 300

9

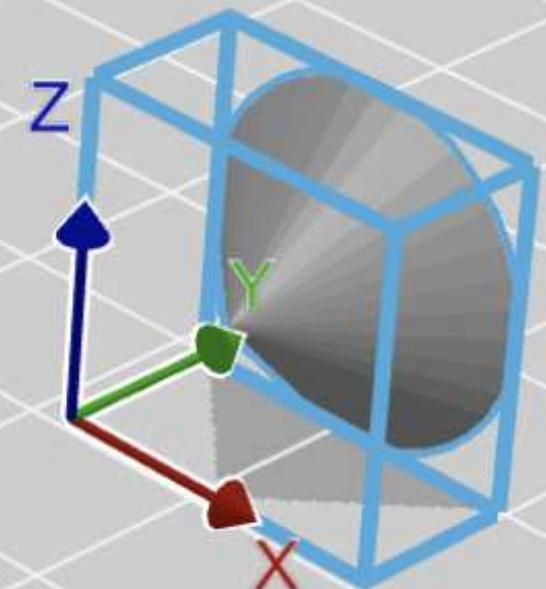
Z: 300

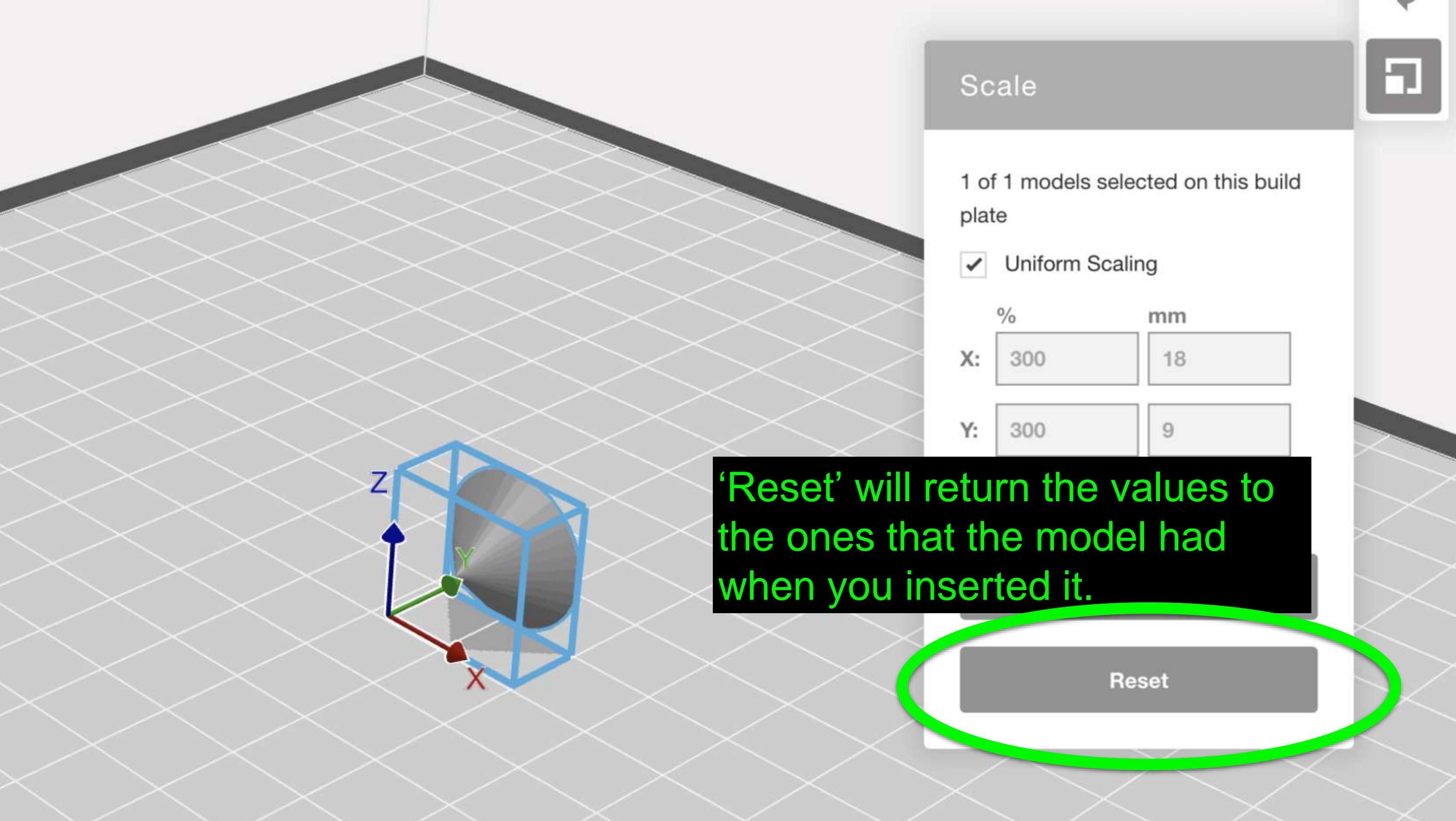
18

Scale To Max

Reset

'Scale To Max' will make the model as big as it will fit in the build volume.





Scale

1 of 1 models selected on this build plate

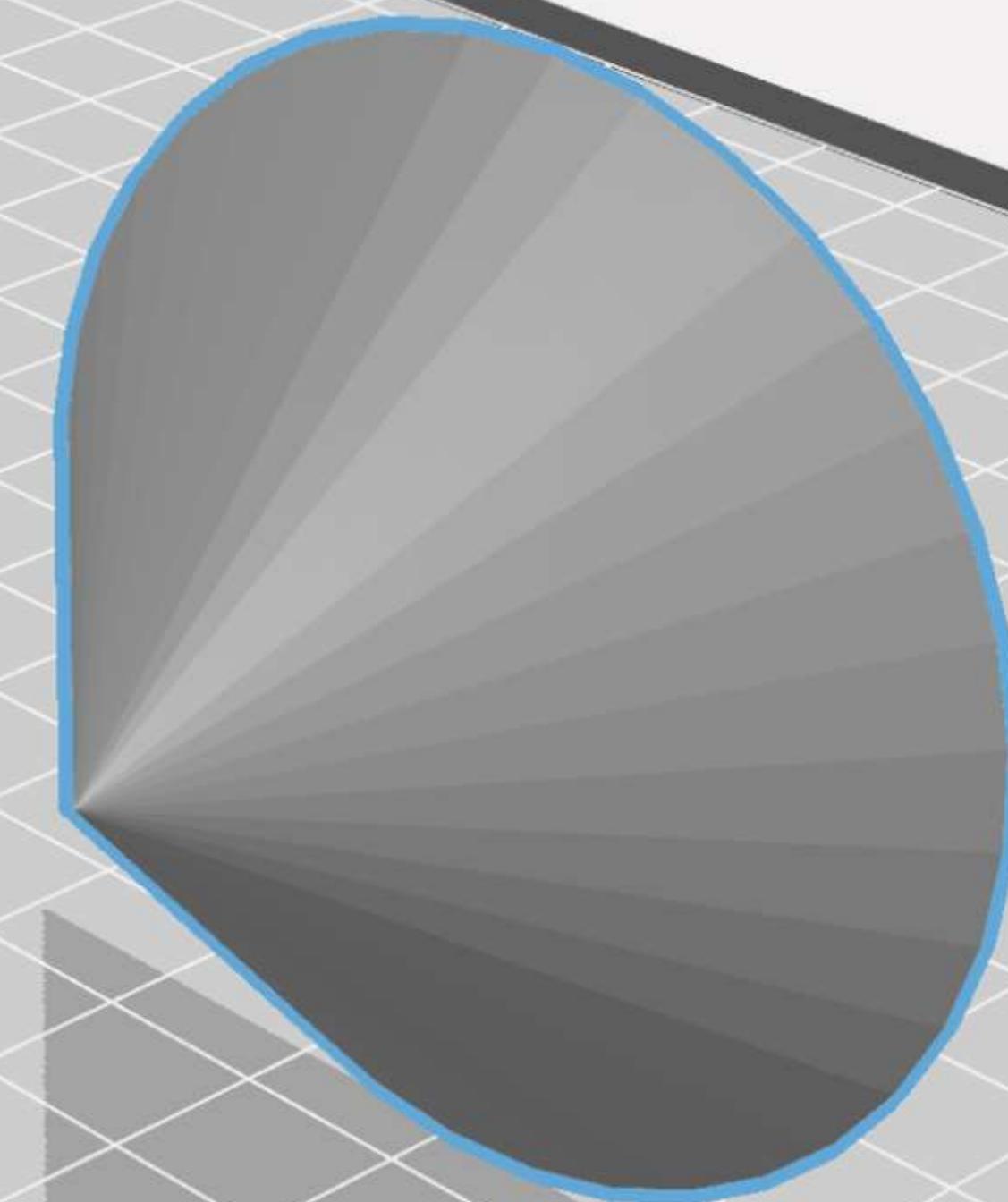
Uniform Scaling

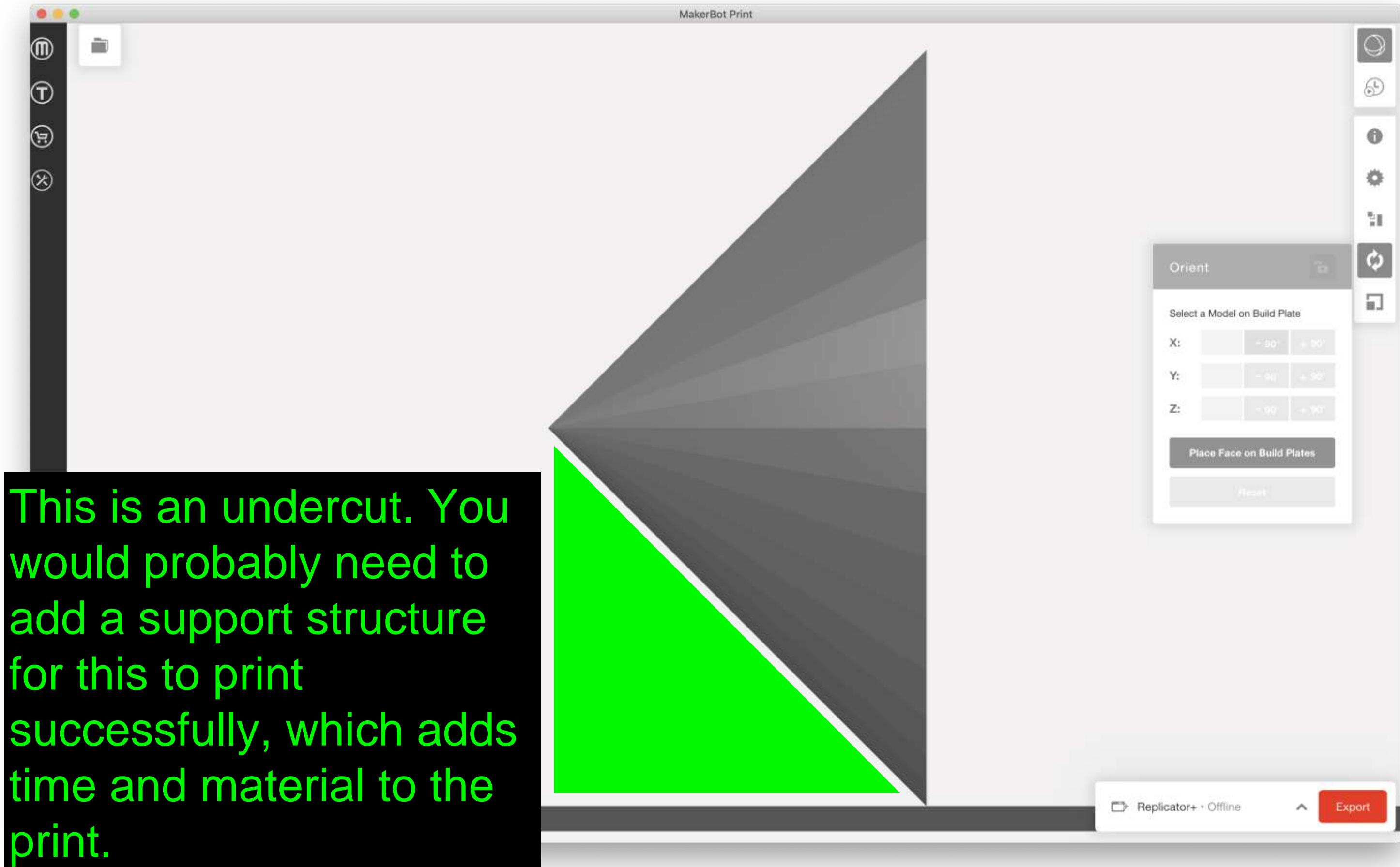
% mm
X:

Y:

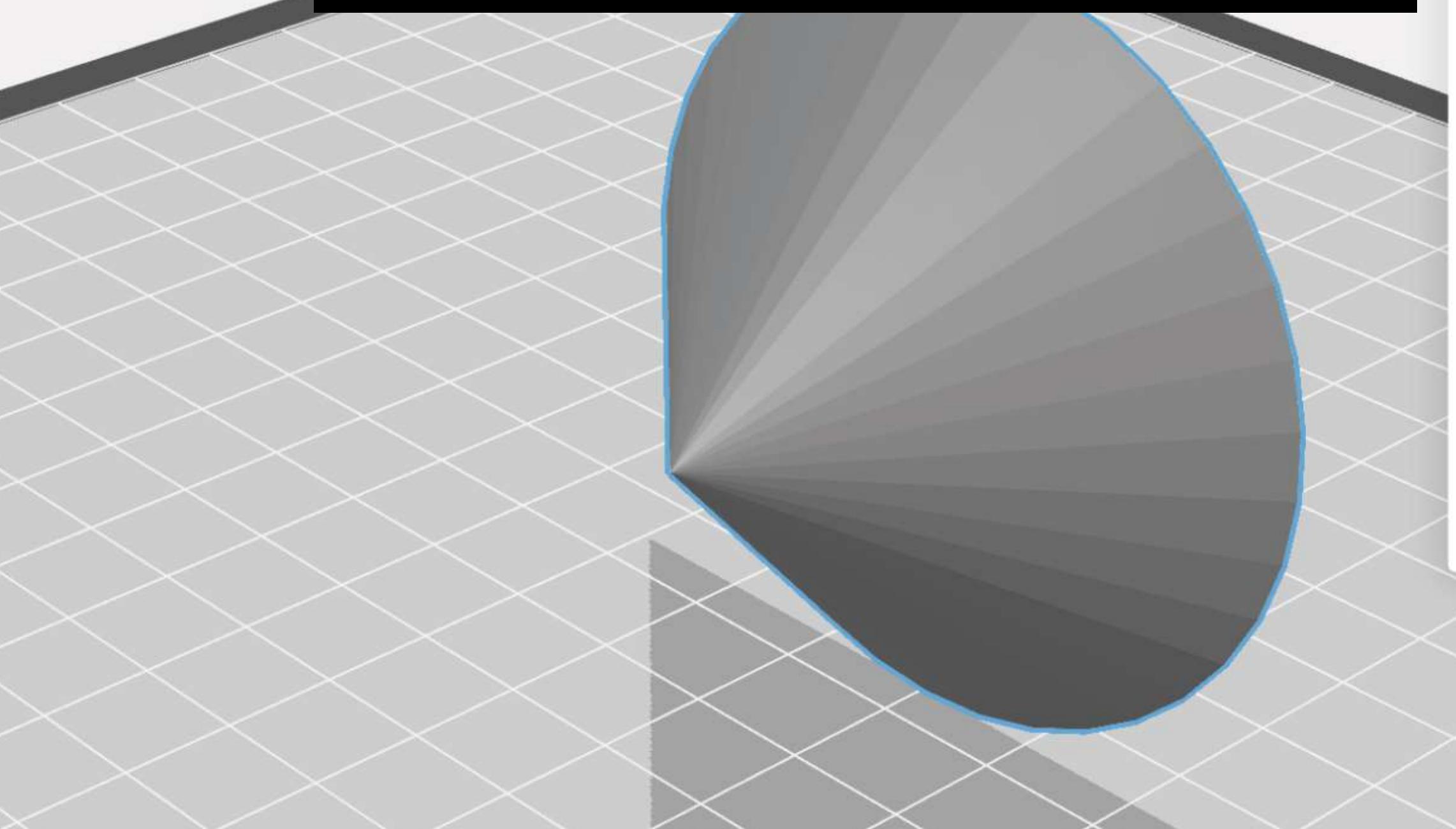
Reset

This object is oriented awkwardly on its edge. If we sent it to the printer like this, it might need to print additional support structures beneath, consuming more time and material.





Ideally a model should have as few undercuts as possible, so we will open the 'Orient' panel to rotate it. If we orient this cone flat on its base, there will be no undercuts.



Orient

1 of 1 models selected on this build plate

X: | - 90° + 90°

Y: | - 90° + 90°

Z: | - 90° + 90°

Place Face on Build Plates

Reset

A screenshot of a software interface titled 'Orient'. On the left, a small preview window shows the cone model from a top-down perspective. To the right is a control panel with three sliders labeled X, Y, and Z, each ranging from -90° to +90°. Below the sliders are two buttons: 'Place Face on Build Plates' and 'Reset'. In the top right corner of the control panel, there is a circular arrow icon with a green outline, indicating a rotation or refresh function. The entire interface is set against a light grey background.

You can key in specific rotation angles.

Orient

1 of 1 models selected on this build

X:

- 90° + 90°

Y:

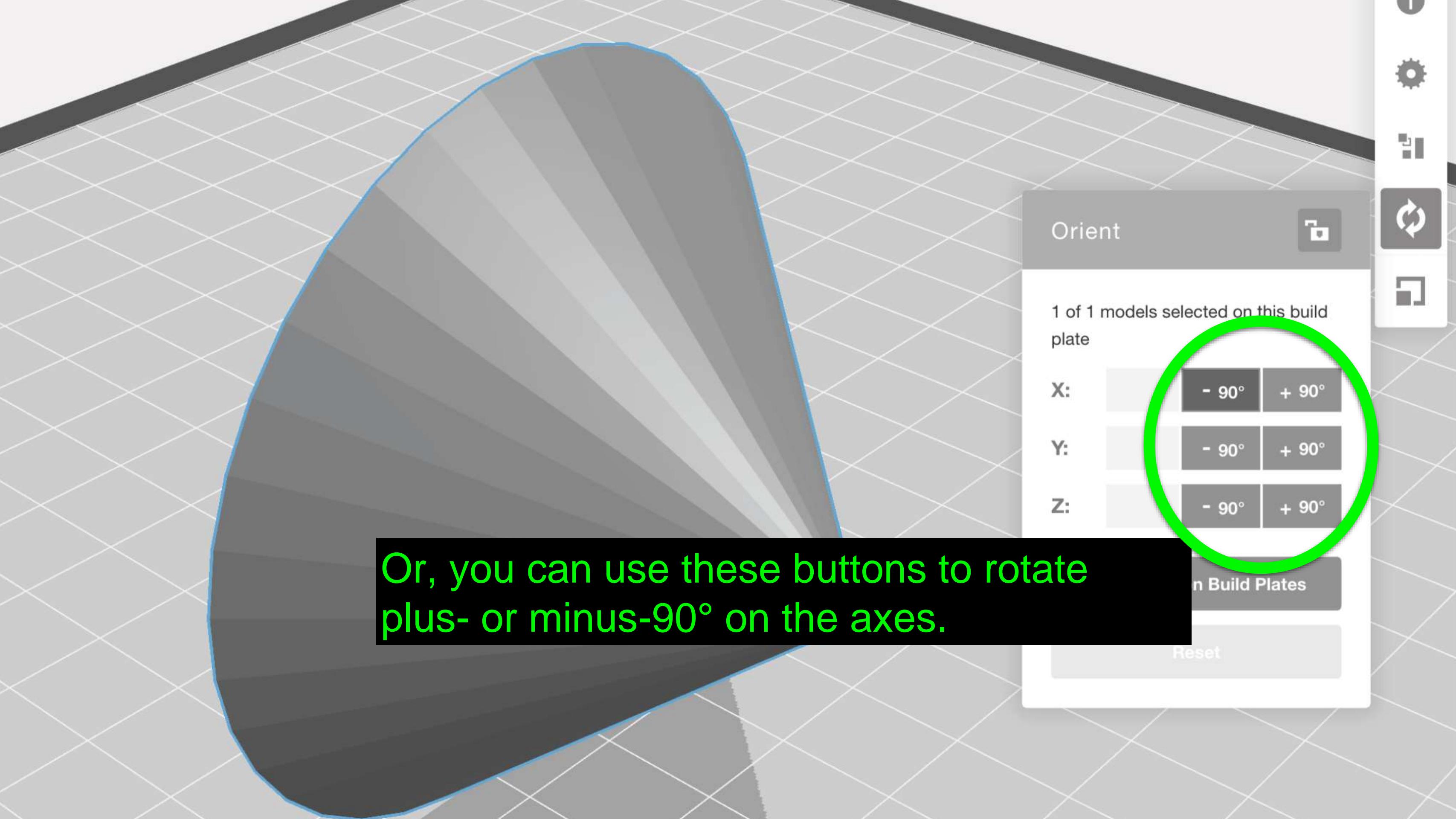
- 0° + 90°

Z:

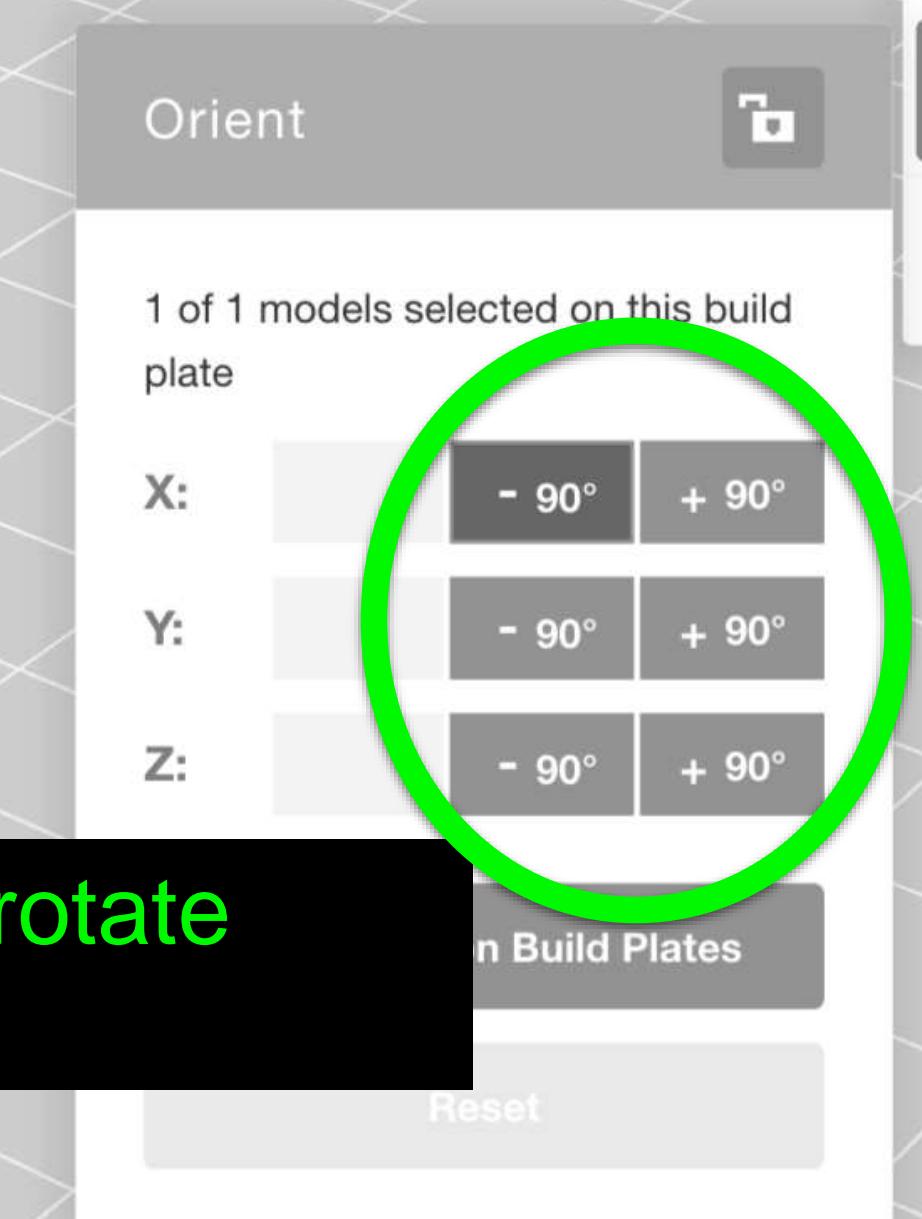
90° + 90°

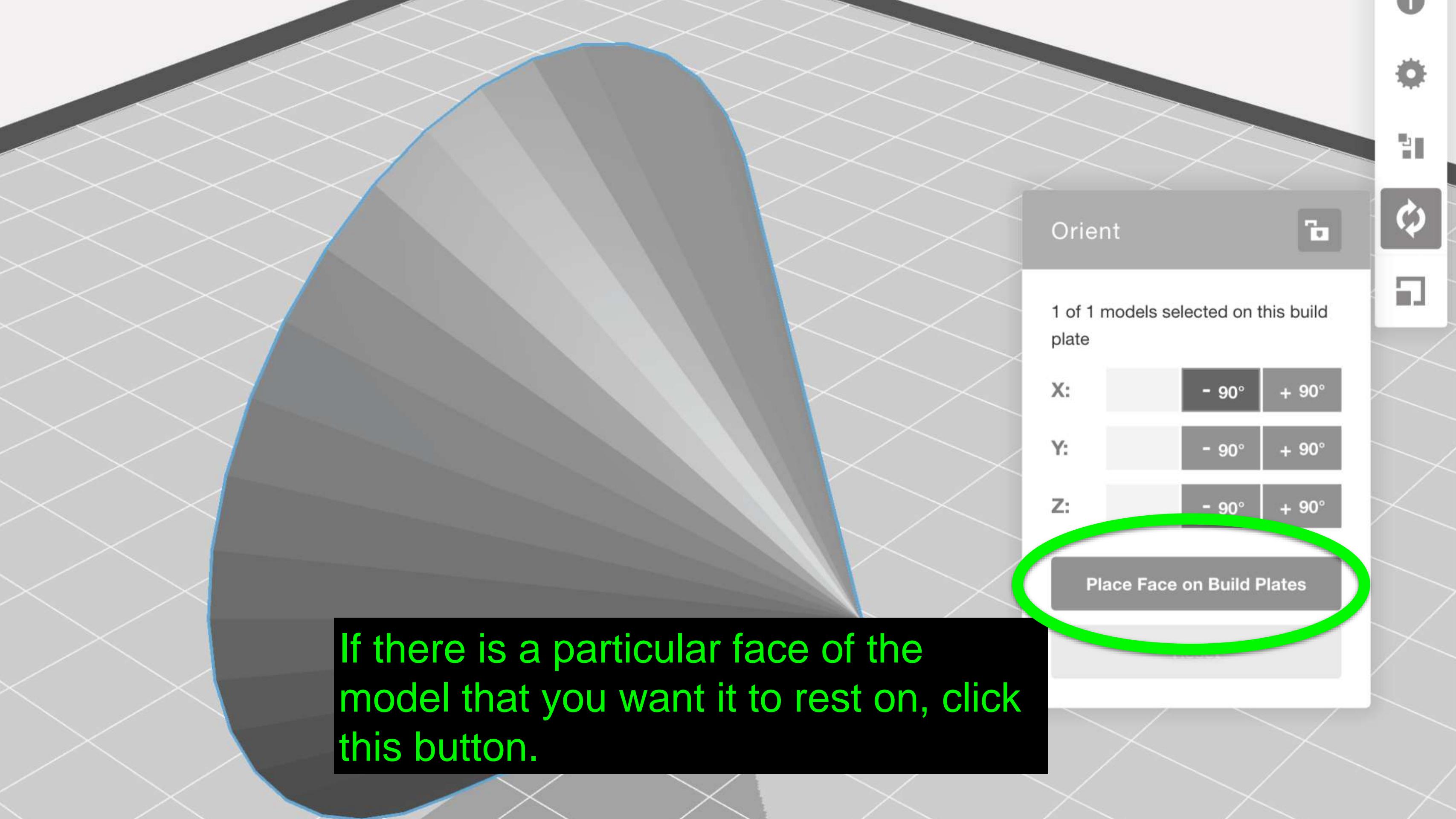
Place Face on Build Plates

Reset



Or, you can use these buttons to rotate plus- or minus-90° on the axes.





If there is a particular face of the model that you want it to rest on, click this button.

Orient

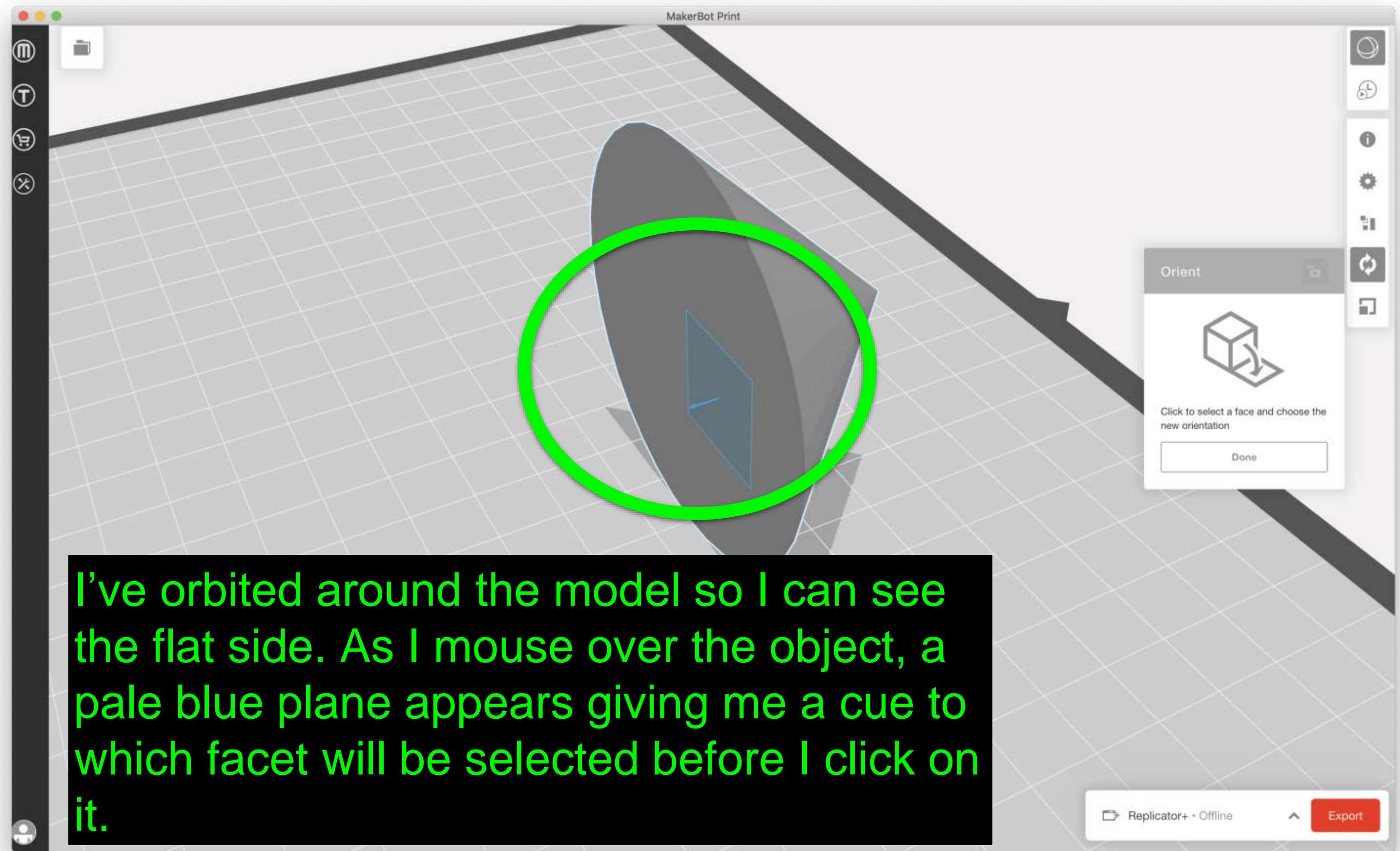
1 of 1 models selected on this build plate

X: - 90° + 90°

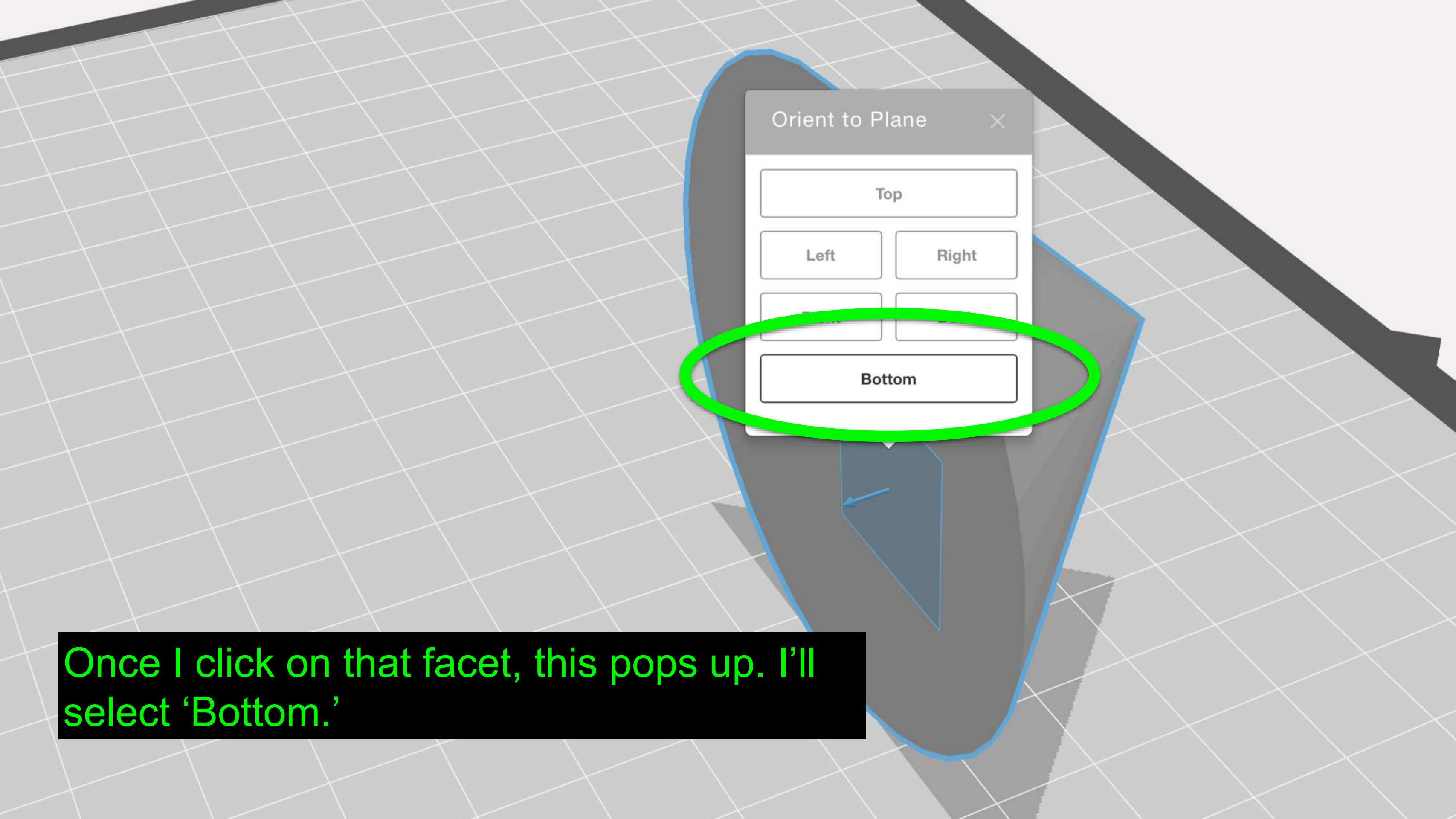
Y: - 90° + 90°

Z: - 90° + 90°

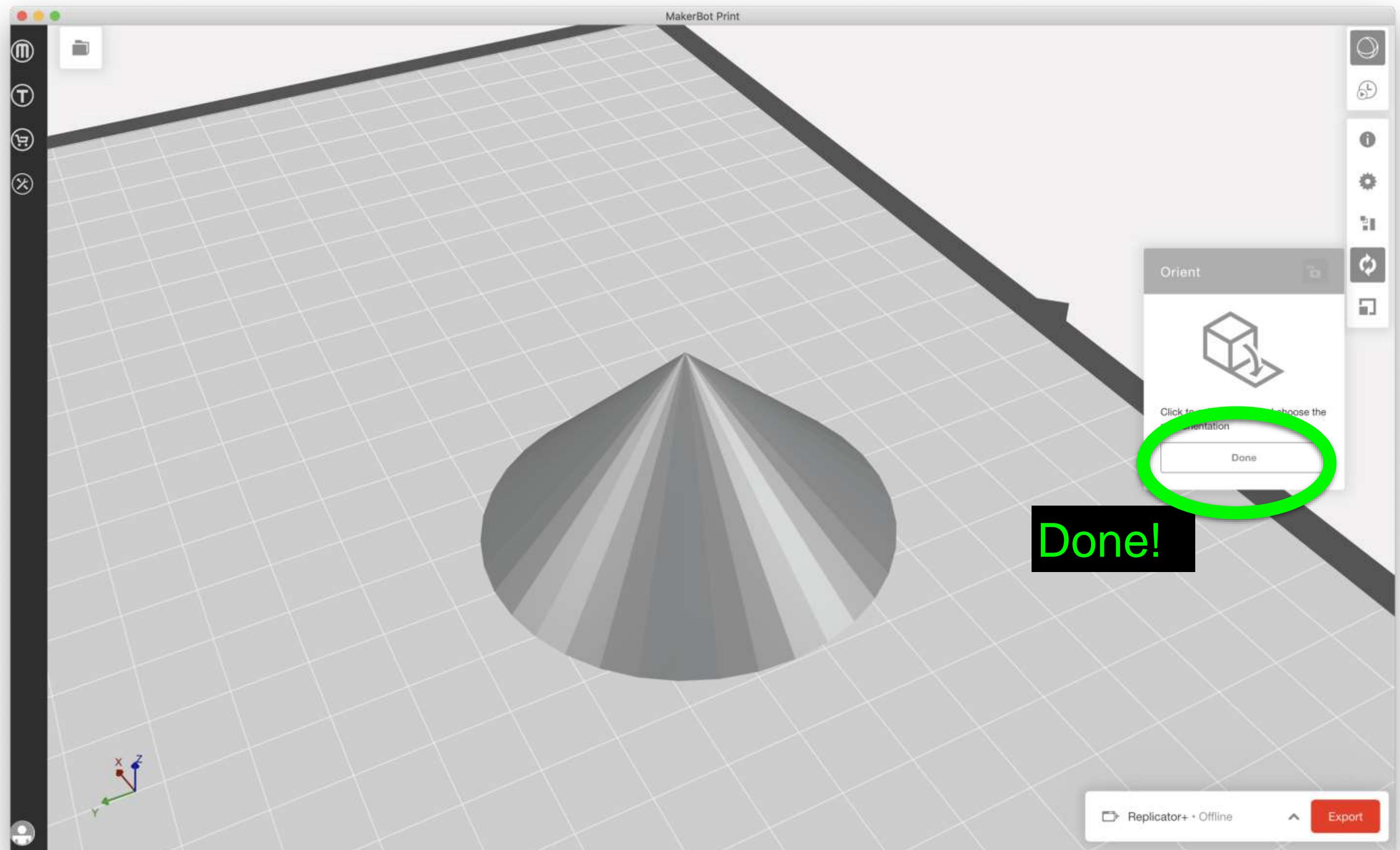
Place Face on Build Plates



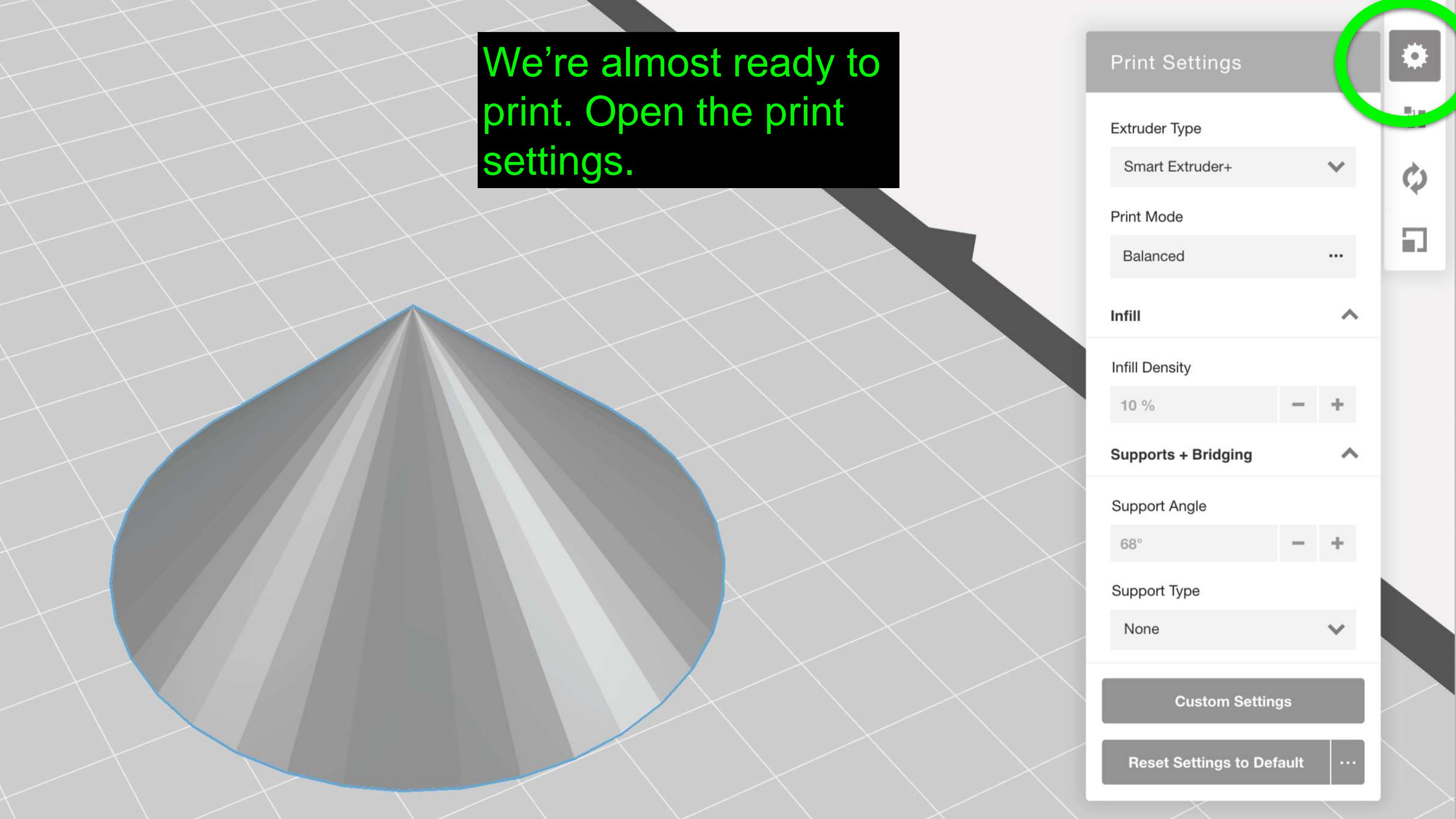
I've orbited around the model so I can see the flat side. As I mouse over the object, a pale blue plane appears giving me a cue to which facet will be selected before I click on it.



Once I click on that facet, this pops up. I'll select 'Bottom.'



Done!



We're almost ready to print. Open the print settings.

Print Settings

Extruder Type

Smart Extruder+

Print Mode

Balanced



Infill

Infill Density

10 %



Supports + Bridging

Support Angle

68°

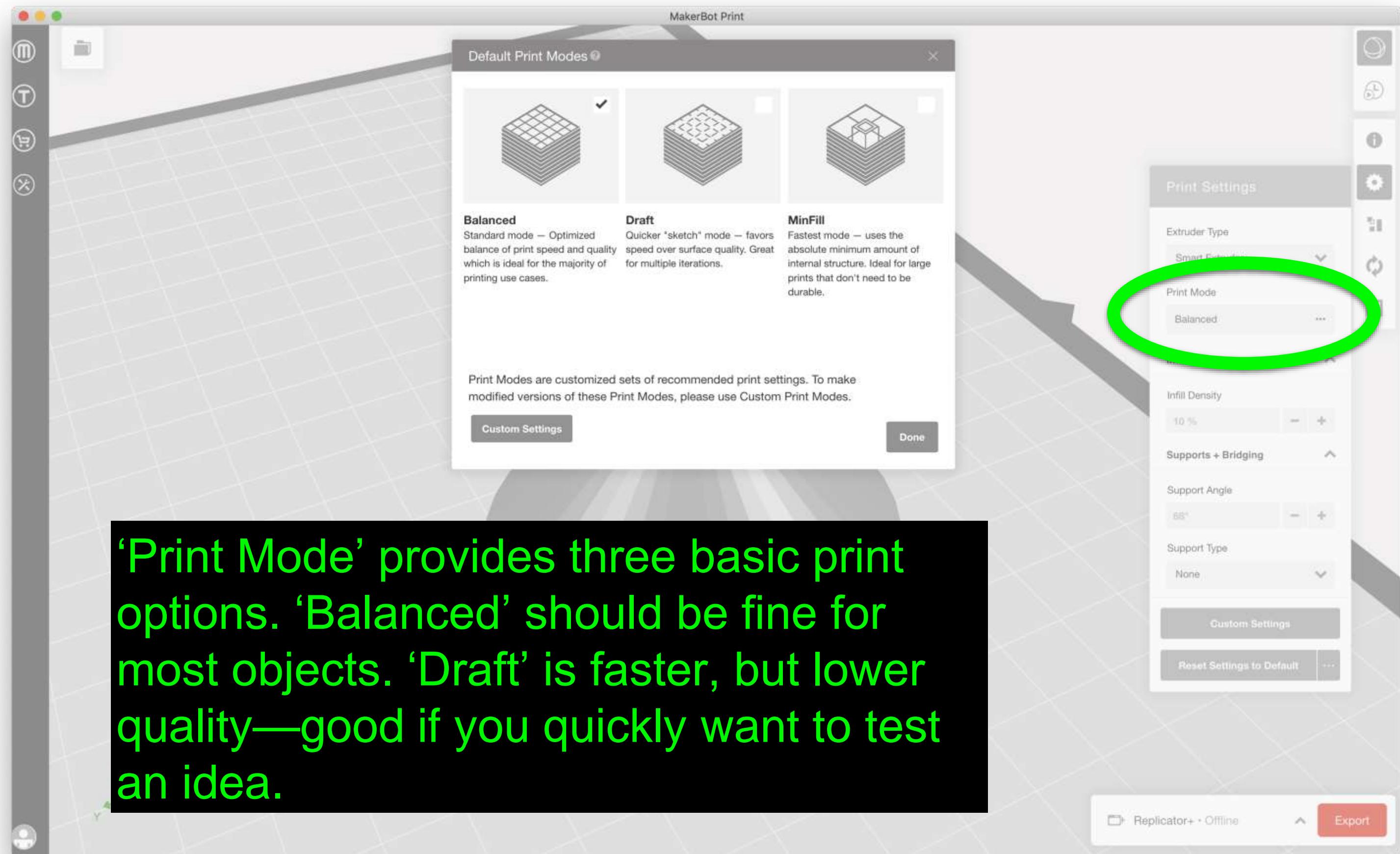


Support Type

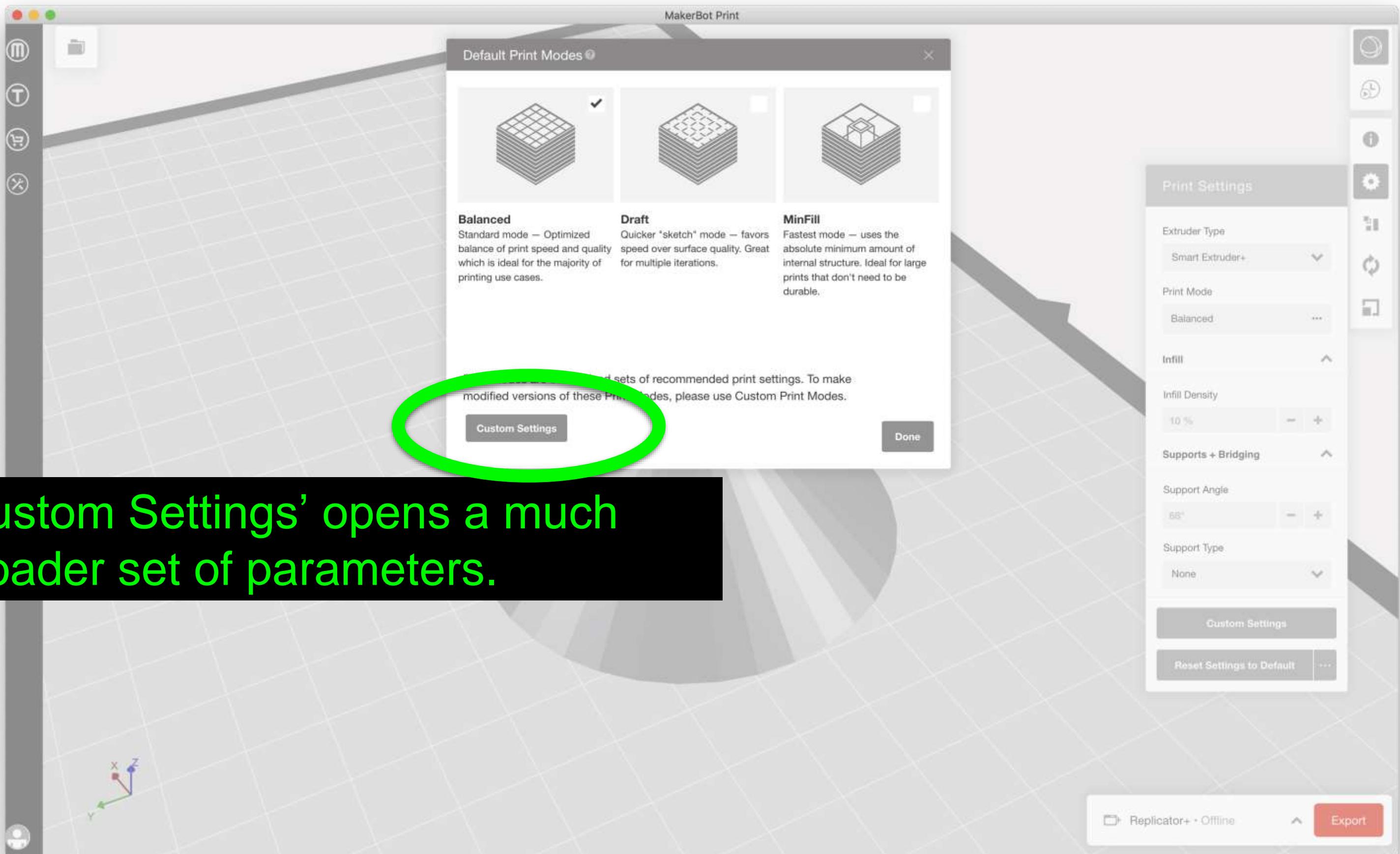
None

Custom Settings

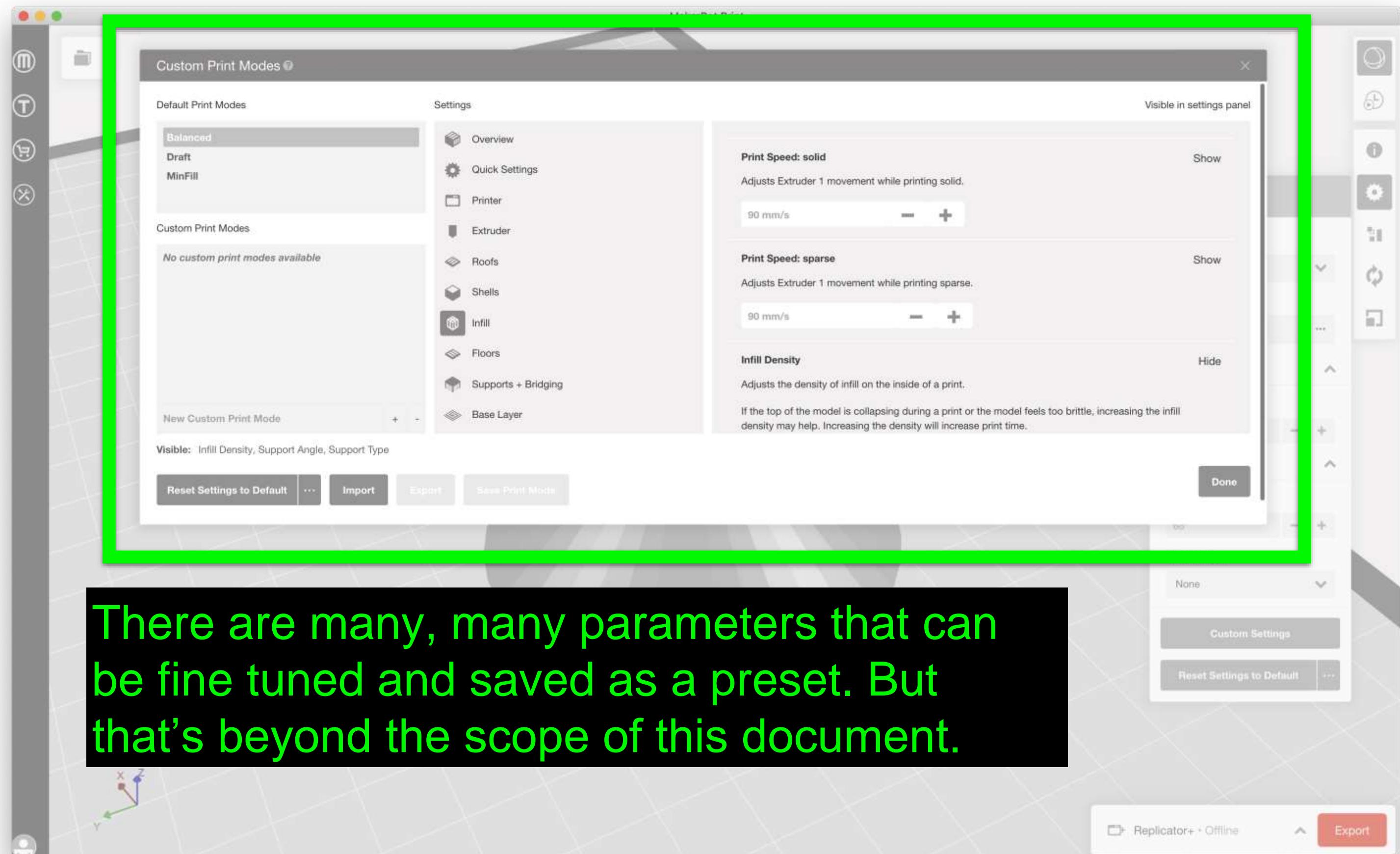
Reset Settings to Default



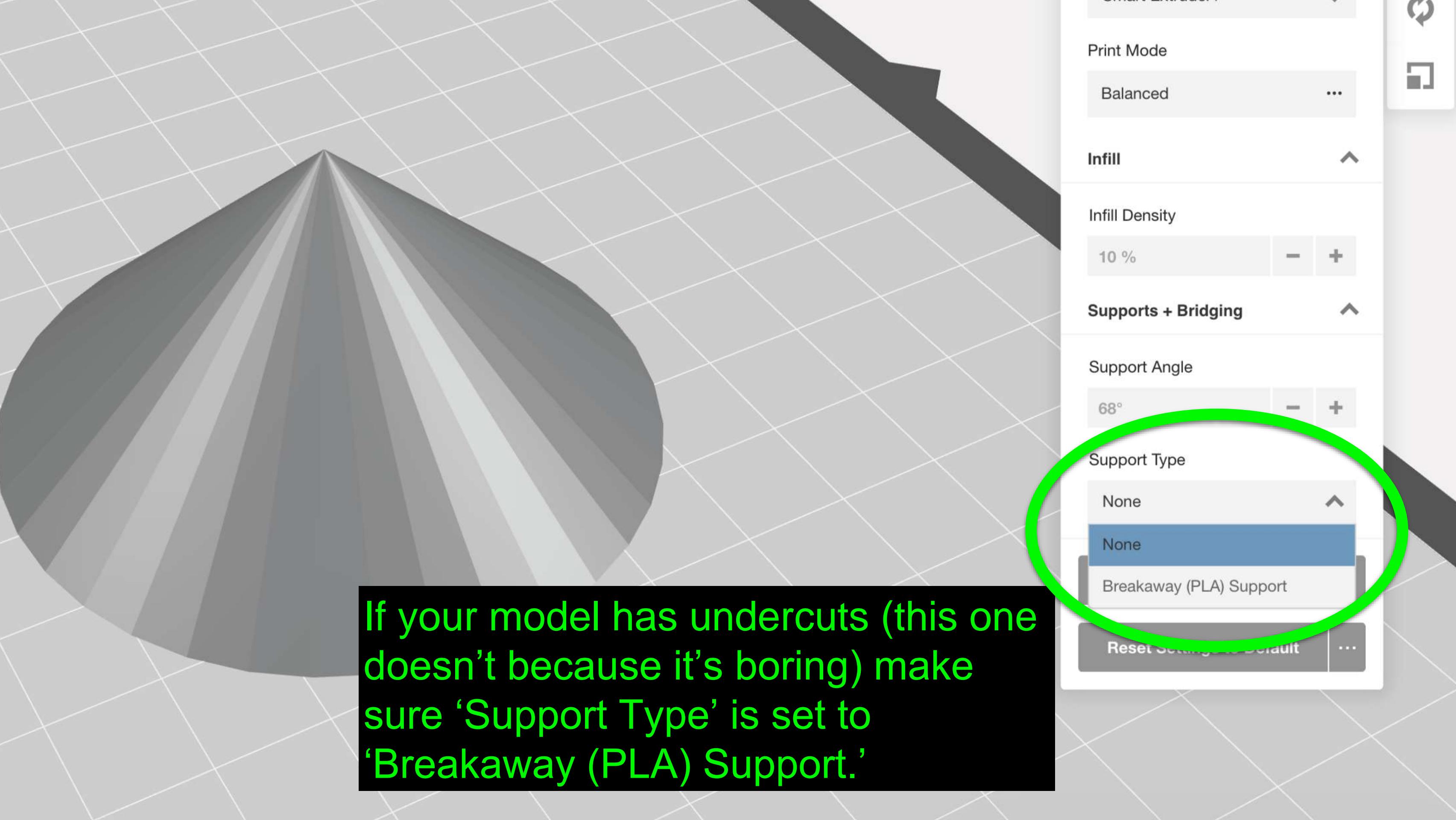
'Print Mode' provides three basic print options. **'Balanced'** should be fine for most objects. **'Draft'** is faster, but lower quality—good if you quickly want to test an idea.



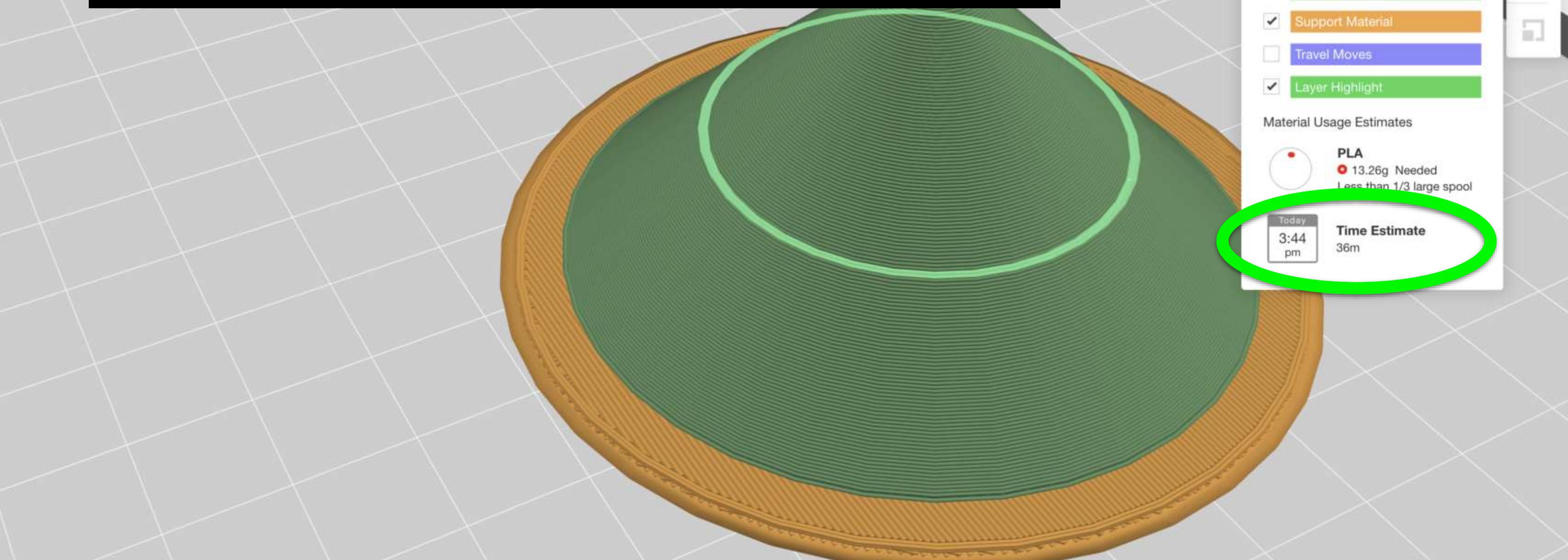
'Custom Settings' opens a much broader set of parameters.



There are many, many parameters that can be fine tuned and saved as a preset. But that's beyond the scope of this document.



Finally, before you print, it's a good idea to run a 'Print Preview.' This will show you any additional support material that will be created, as well as tell you how long it will take to print. Please try to avoid prints longer than 18 hours so other students have access to the machines.



OK! Now we will print. Click export to save your file to a thumb drive.



Replicator+ • Offline



Export

MakerBot Print

Save As: CONET.makerbot

Tags:



HOWTO-MakerBot-print



Favorites

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Applications

Patches

writing

WORKING

james

Creative Cloud Files

- coney.stl
- gyroid.print
- gyroid.stl
- HOWTO-makerbot-print.key
- poinsot.stl
- sphere.makerbot
- sphere.stl

Name it and save to a
USB thumb drive. Put
your name in the
filename.

New Folder

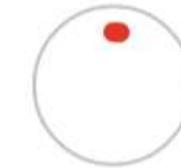
Cancel

Save

Successfully exported file /Users/james/Desktop/HOWTO-MakerBot-print/CONET.makerbot.

It will let you know when the save is complete.

Material Estimate



PLA

● 13.26g Needed

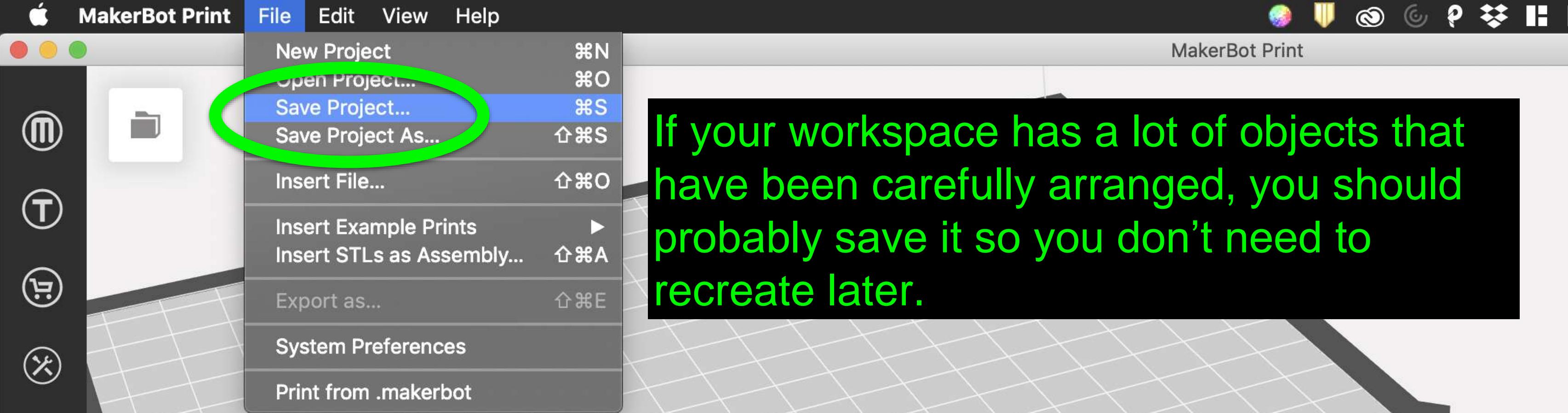
Less than 1/3 large spool

Ready by:

Today
3:50
pm

Time Estimate

36m



MakerBot Print

If your workspace has a lot of objects that have been carefully arranged, you should probably save it so you don't need to recreate later.

So it's important to remember, for any particular job, you'll likely have **3 files**:

An **.OBJ or .STL file**—this is the model output from your 3D software that gets imported into MakerBot Print.

A **.makerbot file**—this is what you put on a thumb drive to go to the printer. It is not readable or editable by anything else.

A **.print file**—this saves all of the setup info in you've done and can be in MakerBot Print. So If you want to return to a project a week later and make changes to the print settings without starting from scratch, save this.



We have 12 MakerBot Replicator+ printers. They are all named after famous artists and architects.



Be careful of this switch on the corner. If you accidentally hit this, all printers will shut off and all work will be lost!



Walk over to a free printer and
plug in your USB



Check that the build platform of the printer is clean and free of debris. It is recommended you add glue to the build platform, especially if your print has a large flat section.

MakerBot

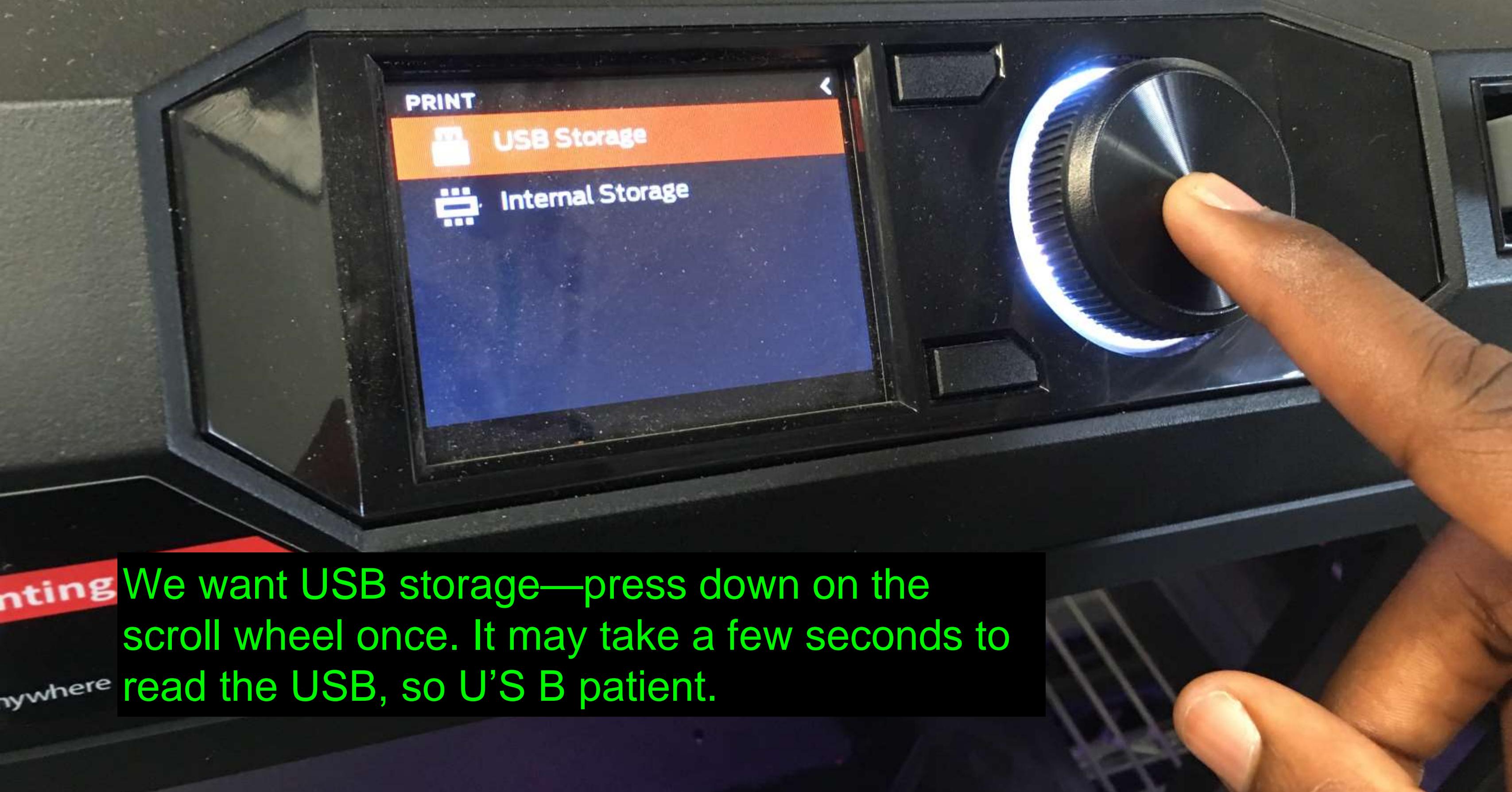


Get a glue stick from the Lab Tech. This is the only thing that should be applied to the build platform.

Do not use hair spray, other glue sticks, or any other 3D printing gels on these printers!!!



Use the scroll wheel to navigate to
'Print' then press down.



We want USB storage—press down on the scroll wheel once. It may take a few seconds to read the USB, so U'S B patient.

USB STORAGE (6)



Nevada



posters



seki.zeen Folder

CONET

sphere



Scroll to navigate to your file,
then press the button.

Yes, ‘Print.’ (Press the button.)

CONET

CONET



PRINT TIME 00:36:27

Print

Info

Copy



GETTING READY TO PRINT

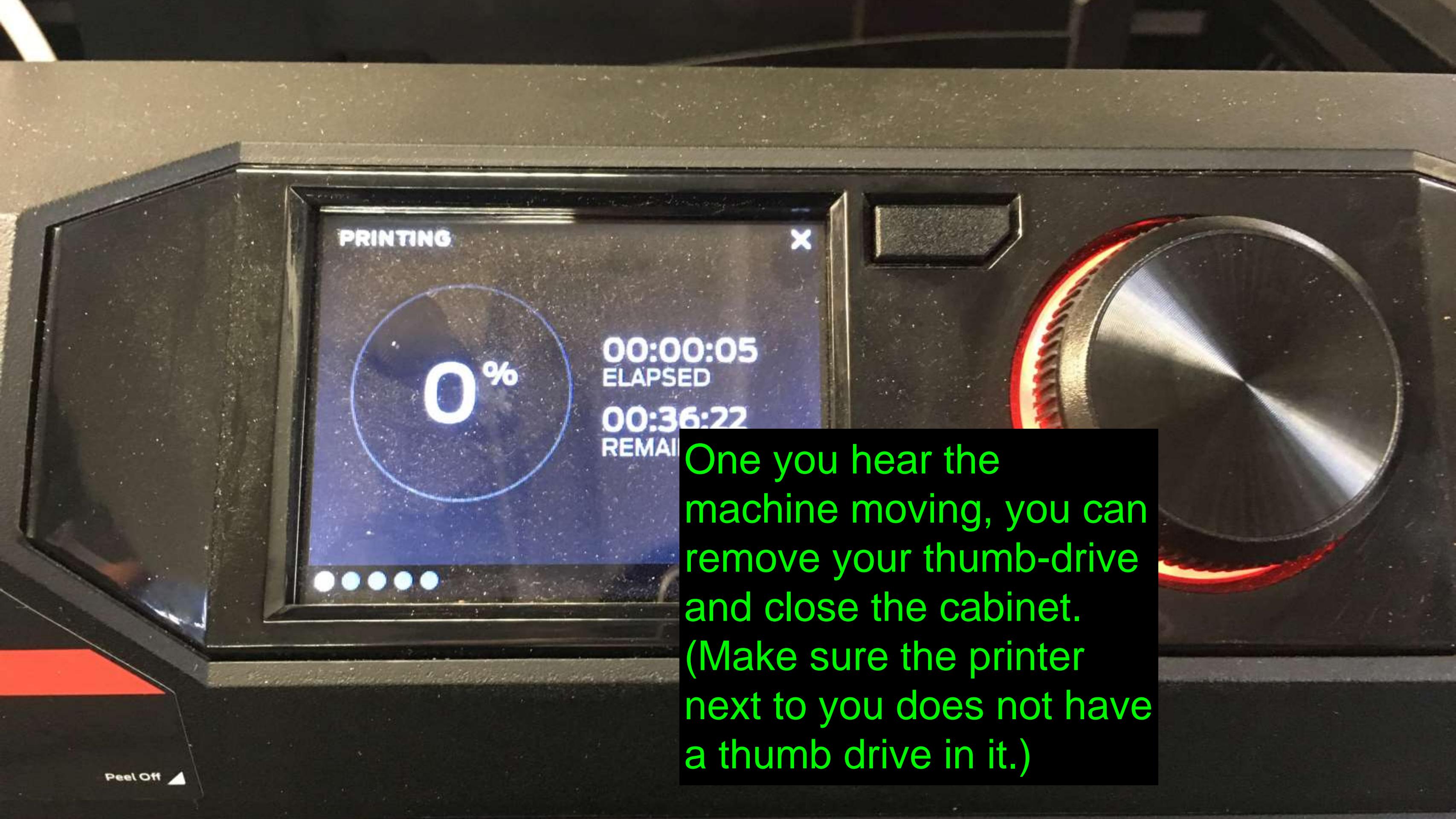


STEP [3/3]
FINAL HEATING



Extruder: 117C / 215C

The printer will go through several steps to get warmed up, it will take a few minutes.
(Good time to return the glue stick to the Lab Tech!)



Once you hear the machine moving, you can remove your thumb-drive and close the cabinet.
(Make sure the printer next to you does not have a thumb drive in it.)

FINISHED



Finished

Push Knob to
Continue

00:40:10
Print Time



ng

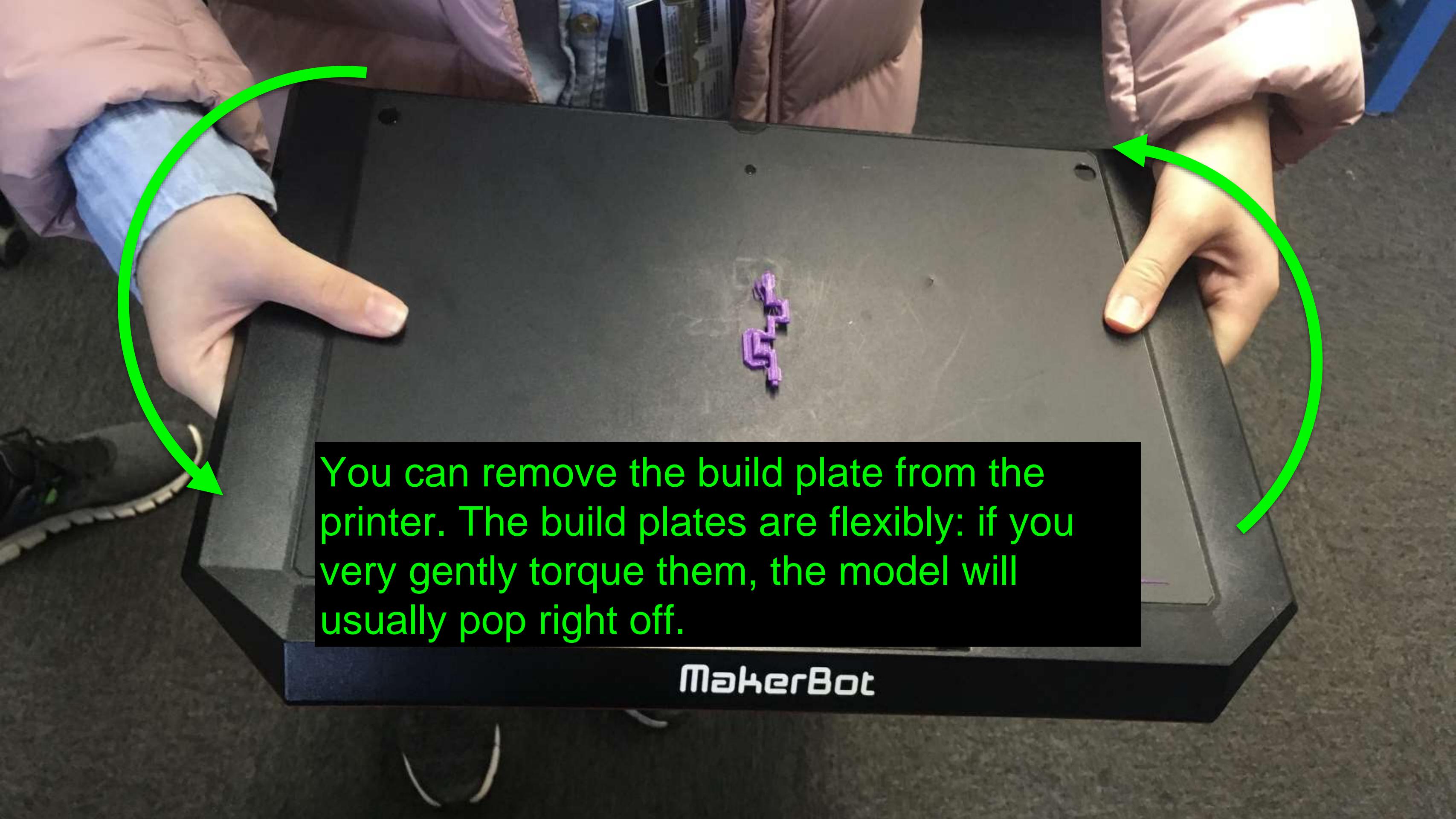
where

Peel Off ▲

40 minutes later!
(Estimated times
are rarely accurate.)



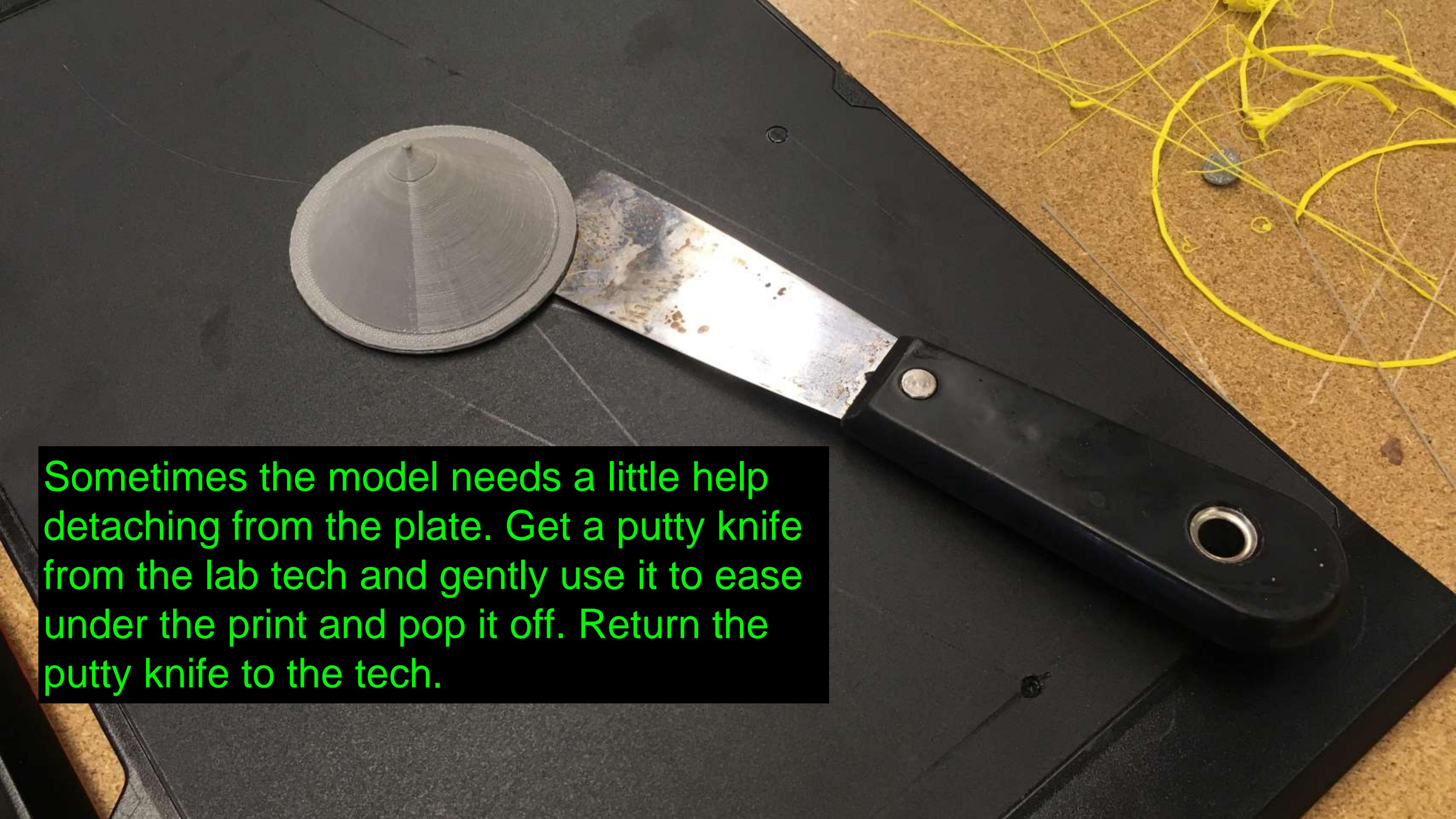
DONE.



You can remove the build plate from the printer. The build plates are flexibly: if you very gently torque them, the model will usually pop right off.

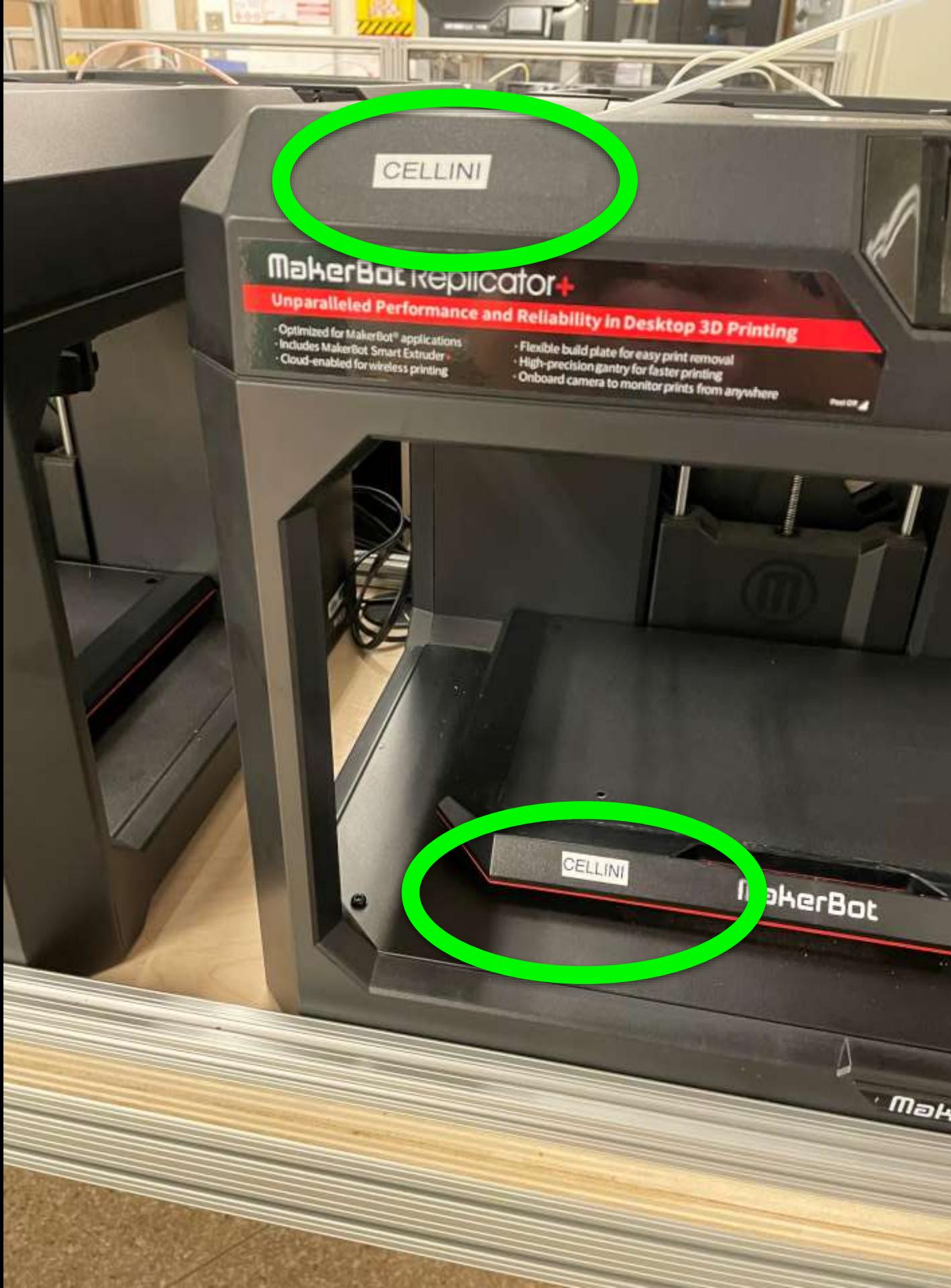
MakerBot

Sometimes the model needs a little help detaching from the plate. Get a putty knife from the lab tech and gently use it to ease under the print and pop it off. Return the putty knife to the tech.





Rinse the build plate off with warm water. You'll notice the glue turns purple. Once all the purple is gone, the platform is clean. (You won't need to rub it if the water is warm.) Dry it off with paper towels and put the platform back on the correct machine.



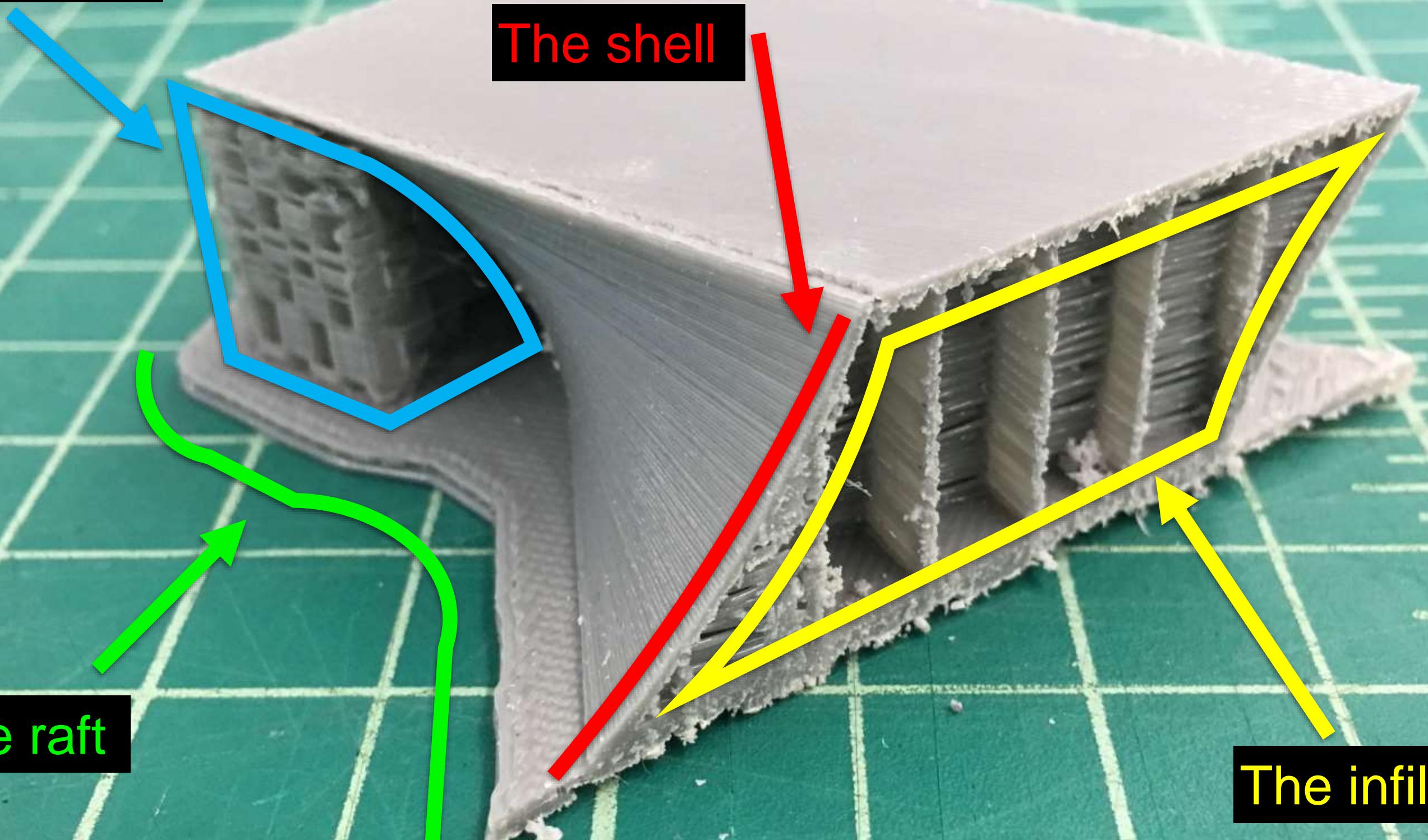
All of the printers and build platforms have their names on them. Make sure to put the build platform back on the right machine. The platforms get calibrated to each machine.

The supports

The shell

The raft

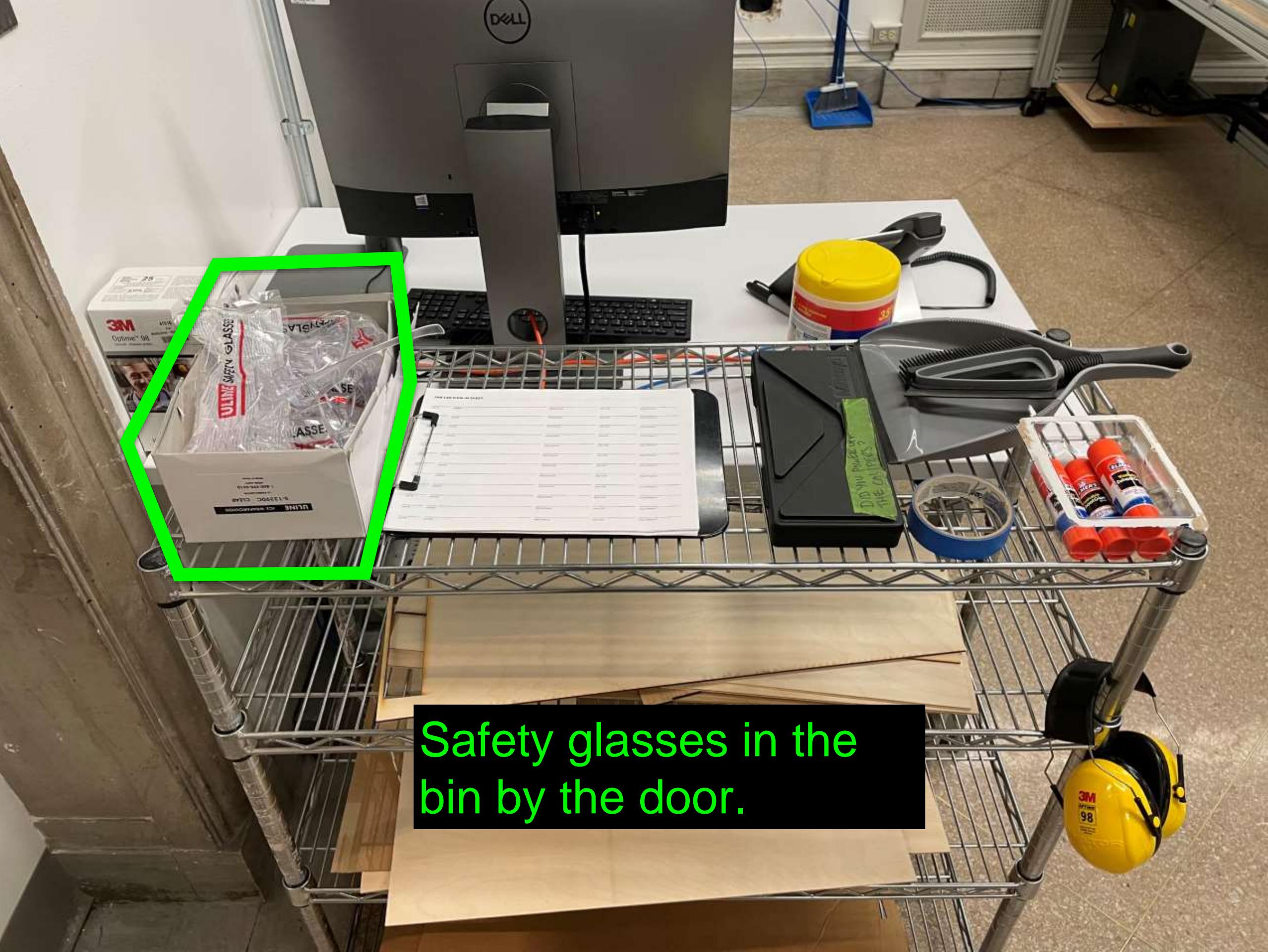
The infill





Needle nose pliers are great for removing the supports. But BEWARE pieces can come flying off.

YOU MUST WEAR EYE PROTECTION.



Safety glasses in
the
bin by the door.

EXIT

Do not remove the support material in the lab!! There are desks outside in the hallway you can work on. Return all tools you use to the lab tech.



Be considerate of the other people in the lab. Always clean up after yourself. Throw away any waste and leave the room as good or better than you found it.

Also, avoid using the lab computers for doing things that you can do on other computers... **you're tying up machines that might be needed for laser printing, while you could be prepping in MakerBot Print on your own laptop, or just about any other computer in the building.**

More information can be found on our GitHub:

<https://github.com/GWUCorcoranFabLab/FabLab>

There is also a wiki page that has info to set up your 3D printer file:

<https://github.com/GWUCorcoranFabLab/FabLab/wiki/3D-Printer-Job-Submission>