

SOP

3D Printers

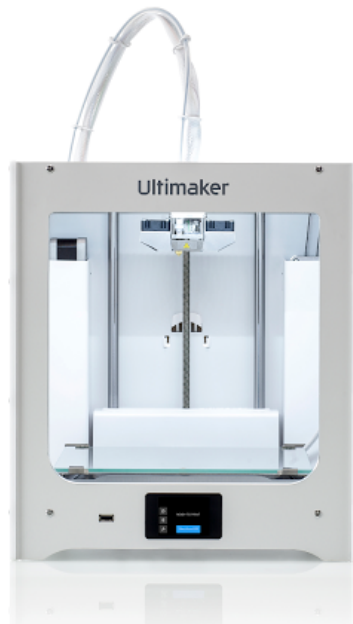
Ultimaker 2+

Ultimaker 2+ Connect

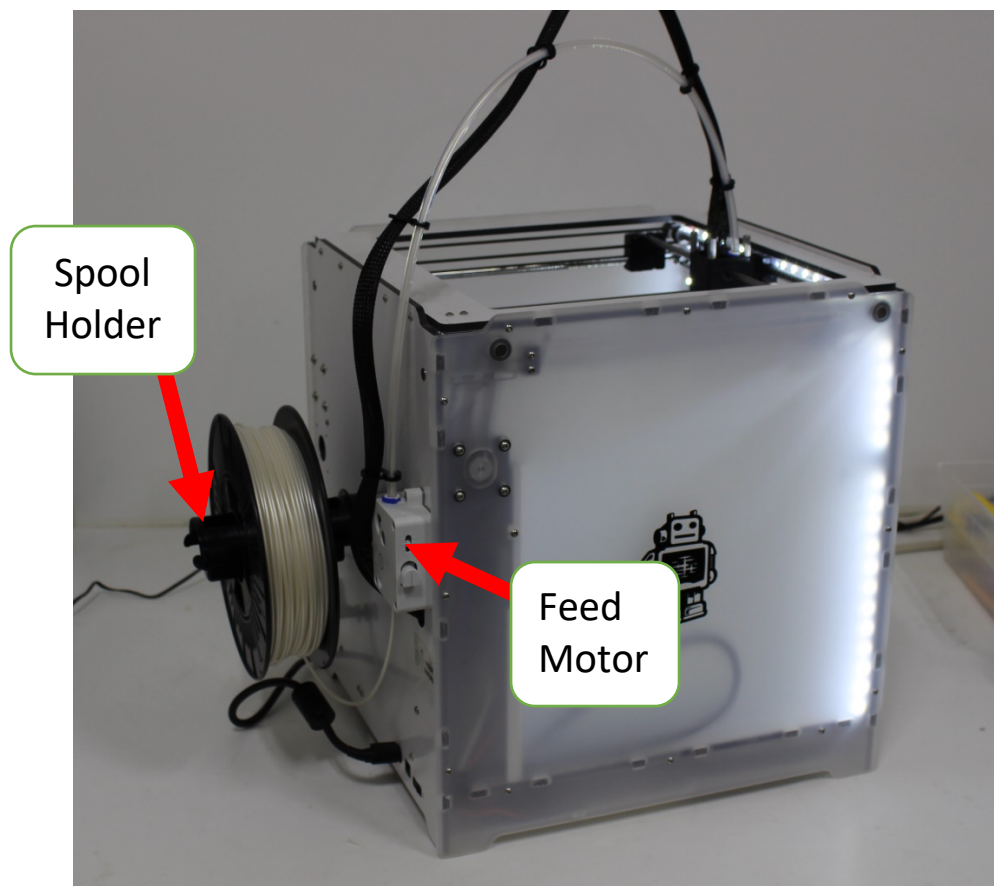
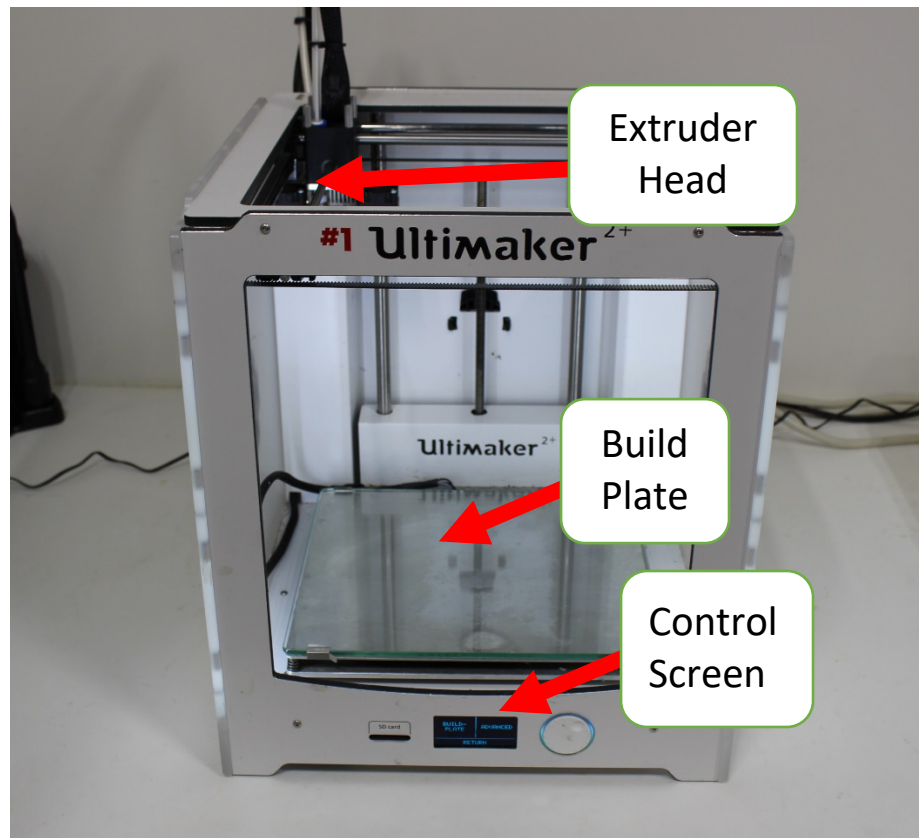
Ultimaker 2+ Extended

Ultimaker 3 Extended

*Training is required before using this equipment
Reservations are required when using this equipment*



Layout



Setting up the 3D Print File

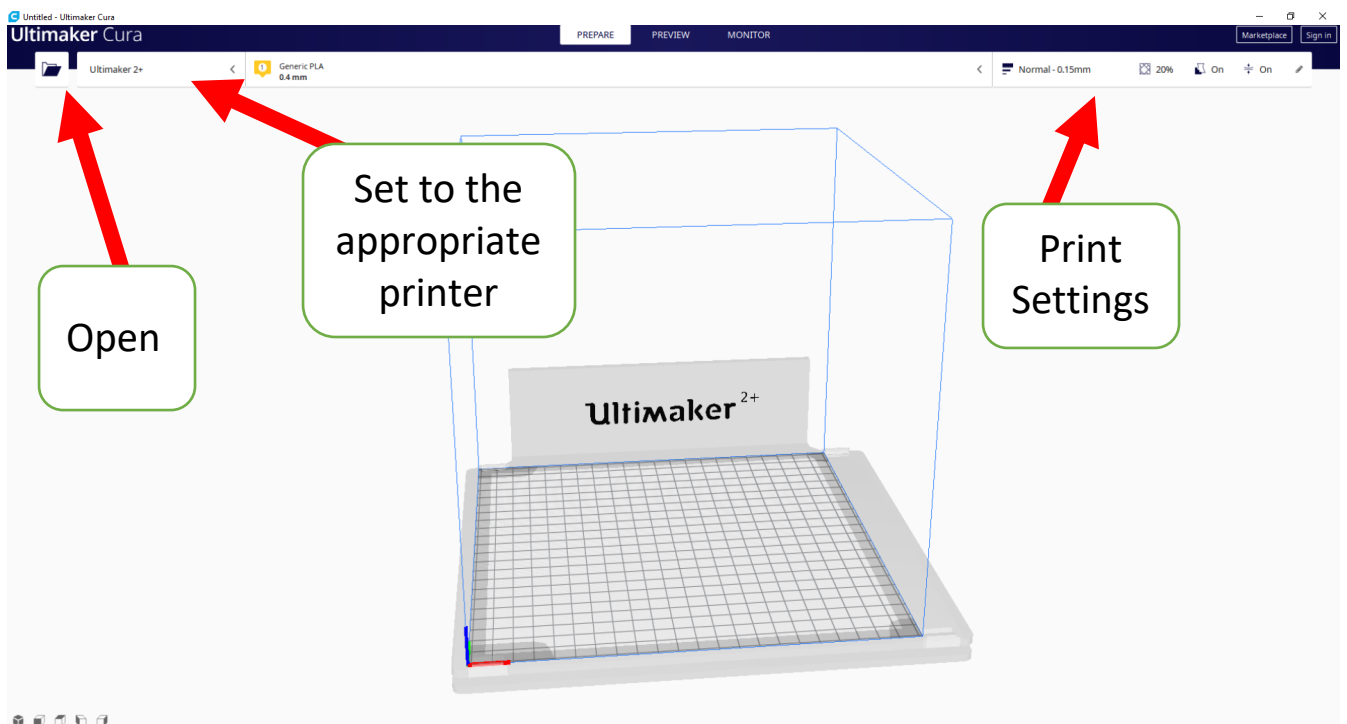
Cura is the program used to communicate with the Ultimaker 3D Printer.

Cura requires .STL files.

If creating a 3D file export it as an .STL.

If looking for files online, download .STL files.

1. In the upper left hand corner set your machine to the appropriate Ultimaker, consult with NIS Staff if you are not sure what printer to use.
2. Add your file to the build plate by selecting “Open” and navigating to the .STL file



3. Adjusting the View Area

The build plate view can be adjusted in multiple ways:

- Middle Click and Hold – Pan the view
- Right Click and Hold – Rotate the view
- Scroll up – Zoom in
- Scroll down – Zoom out

4. Manipulating your object

Left click an object to select it. A toolbar in the left hand side of the build plate will appear which will allow you to manipulate the object.

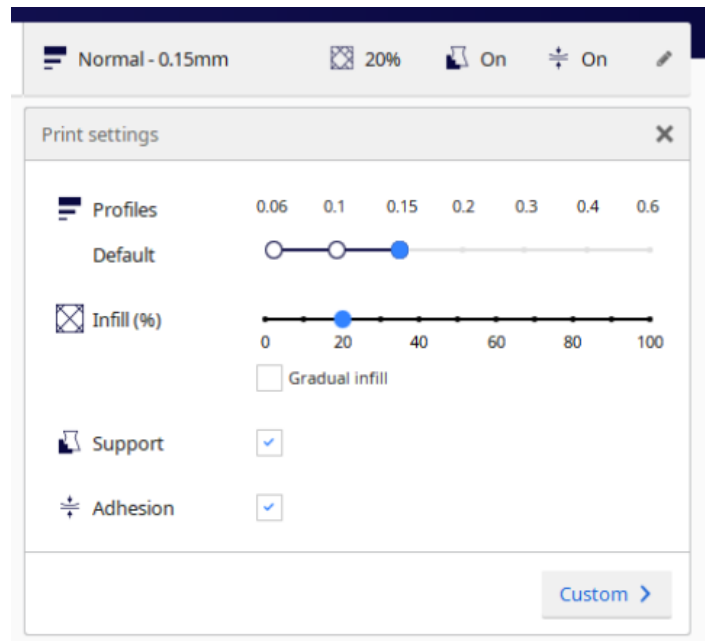
- Move – Objects may be moved around the build plate
- Scale – Objects may be printed smaller or larger than the original model
- Rotate – Objects may print better or worse in different orientations
- Mirror – Objects may be mirrored before printing
- Mesh Type – This is an advanced tool outside the scope of this SOP
- Support Blocker – This is an advanced tool outside the scope of this SOP



5. The upper right-hand corner of the window will allow you to adjust the print settings. By default a basic number of settings are available, more options are available by selecting “Custom”.

Material – By default Cura assumes you are using PLA material and a nozzle size of 0.4mm. If a material other than PLA is being used you must make adjustments to the material settings-see an NIS staff member.

Layer Height – The height of individual layers, a thicker layer height reduces time but also reduces quality.



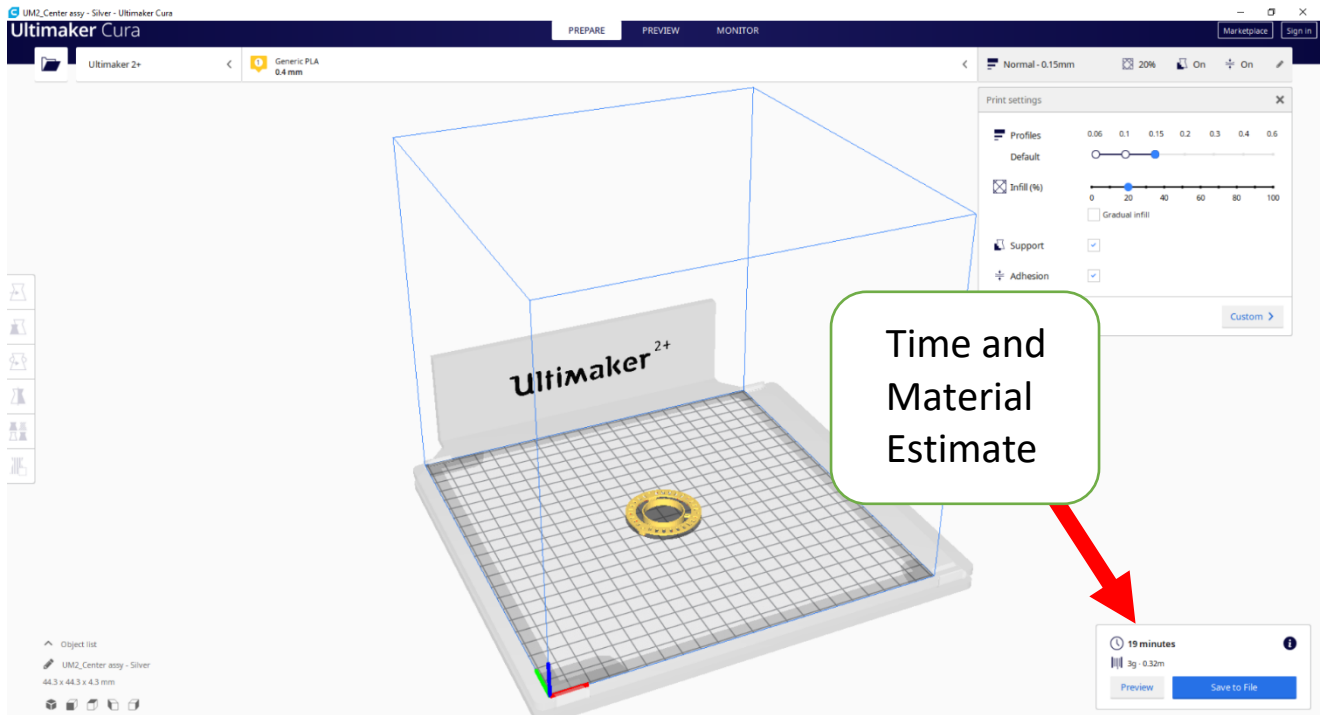
Infill % – This determines how hollow or solid an object is. A solid object is sturdier but takes longer to print and uses more material.

Support – Cura will automatically generate support that can be removed after the print is finished. Prints are more likely to be successful if support is enabled. Any print with overhanging features should have support enabled. Cura generates support material that can either be physically broken off of the finished print or dissolved away.

Build Plate Adhesion – Cura will automatically generate structures that assist in the model adhering to the build plate. It is always recommended to use build plate adhesion.

Printing Your File

1. Cura gives a time estimate in the lower right hand corner of the screen. This estimate needs to be **increased** a factor of about 1.25 when making your online reservation.
2. Cura also estimates the amount of print material to be used, in grams. This is just an estimate. Your finished print must be weighed *with support material* to determine final cost.



3. The different printers use different ways to export your job (2+ uses SD Cards, 3 Extended and 2+ Connect use USB Drives). There is a collection of SD cards and flashdrives by the 3D Printers, grab the one you need for your printer.
4. Insert the SD card or flashdrive into the computer and click "Save to Removable Drive". This will export the file into a format that the 3D printer can read.
5. Remove the SD card or flashdrive and take it to the 3D Printer.

Setting up the 3D Print File – Ultimaker 3 Extended

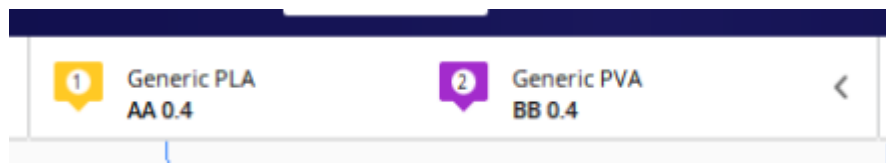
The Ultimaker 3 Extended has the ability to print in two different materials that may be two different colors of materials or one color and a water soluble support material. Because of this there are some different setup instructions.

The Ultimaker 3+ has two different extruder heads so the material must be properly defined for both extruder heads.

If you are printing with support material:

Extruder 1 must be set to PLA and AA 0.4

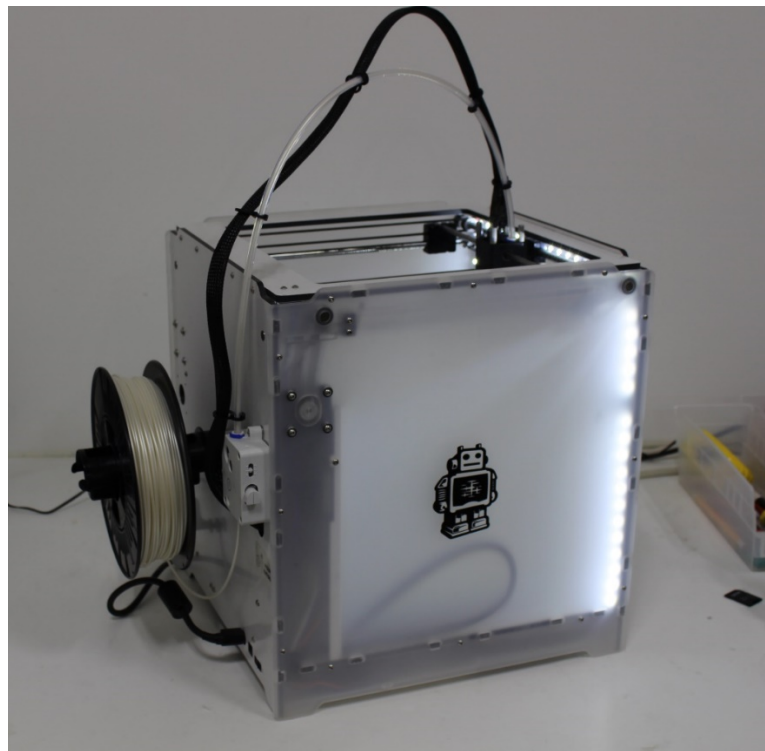
Extruder 2 must be set to PVA and BB 0.4



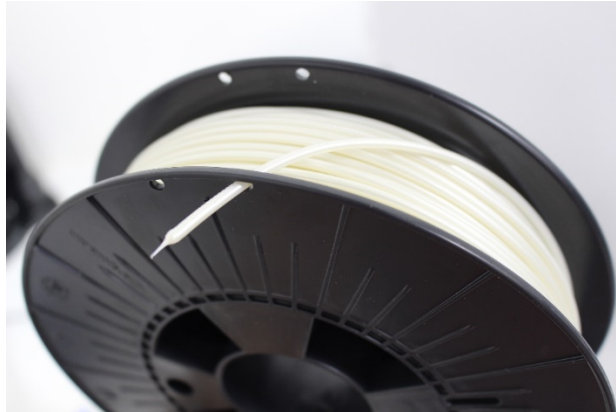
Unloading and Loading Filament- Ultimaker 2+ and Ultimaker 2+ Extended

NOTE: Because of machine differences these directions only apply to the Ultimaker 2+ and Ultimaker 2+ Extended machines.

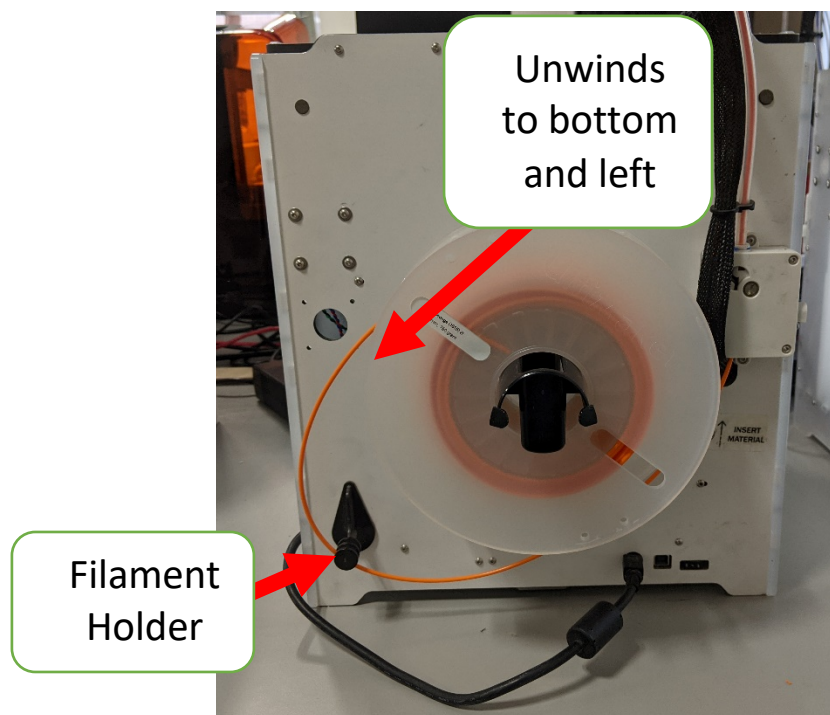
1. The Ultimaker has a screen on the front of the unit that's controlled with a scroll wheel that also clicks. To unload filament navigate to "Material" and then select "Change." The machine will begin heating the print head. Rotate the machine so you have access to the spool on the back of the printer.



2. When the extruder head is properly heated it will automatically retract the filament. When the filament is extracted remove it from the spool holder, spool it up tightly, and insert the filament through the filament holders.



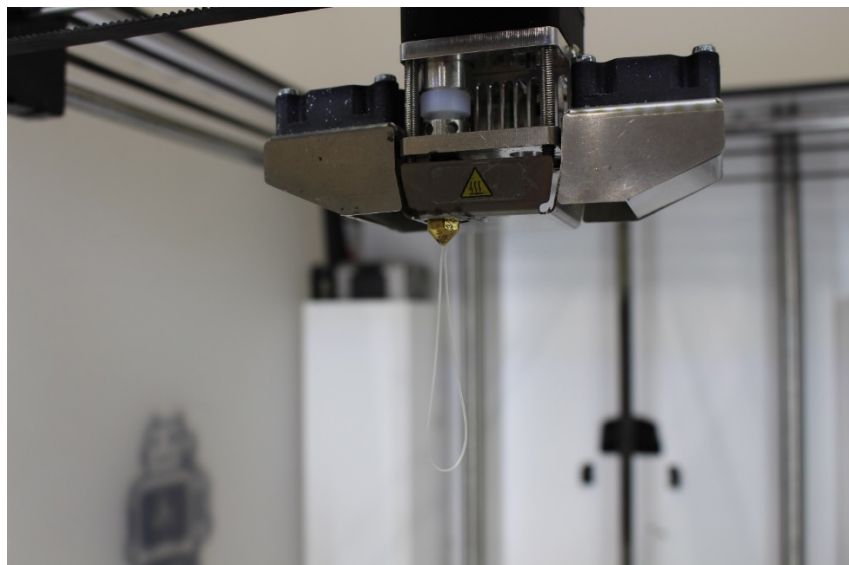
3. Store the roll of filament in a plastic bag. Filament is very sensitive to changes in humidity and storing it in plastic bags preserves the life of the filament.
4. Remove the new spool from the plastic bag and load it onto the spool holder so that the filament unrolls as seen below and around the filament holder (located to the left and below the filament holder).



5. On the front of the printer use the control wheel to select **READY** which will automatically begin the material feed process. If you are prompted for the material type select "PLA". Press the filament into the feed motor on the back of the machine.
6. When the material is visible from the clear plastic tube above the feeder select "Confirm" on the front of the 3D Printer to quickly advance the filament through the tube. Rotate the Ultimaker back into place.



7. The extruder head will begin extruding filament. Wait until the new color of filament is extruding from the nozzle and select "Done".

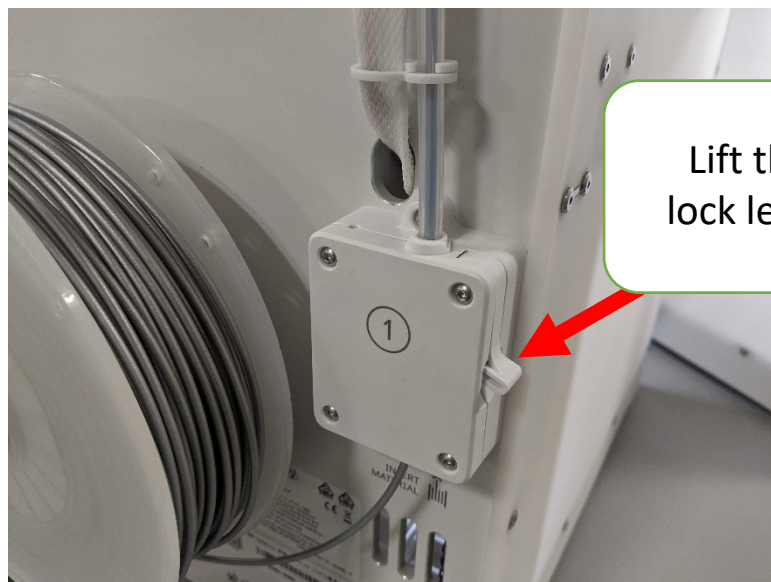


Unloading and Loading Filament - Ultimaker 2+ Connect

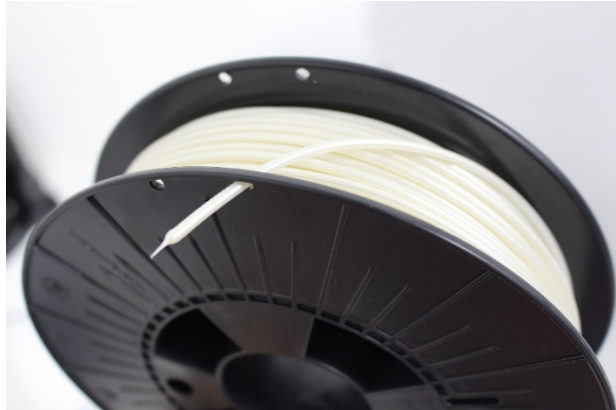
1. The Ultimaker 2+ connect is controlled with a touch screen on the front of the machine. Select Material and then “Change material”.



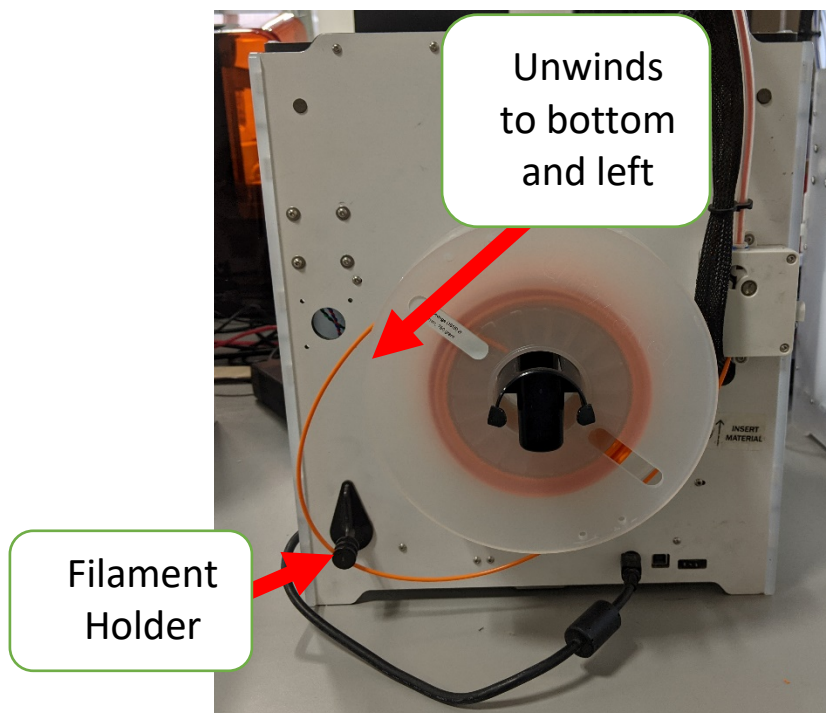
2. The touch screen will provide instructions on how to change the material.
3. Rotate the 3D Printer so you can access the back and lift the lock lever on the feed motor.



4. Pull the filament out of the feed motor, spool it up tightly, and insert the filament through the filament holders.



5. Store the roll of filament in a plastic bag. Filament is very sensitive to changes in humidity and storing it in plastic bags preserves the life of the filament.
6. Remove the new spool from the plastic bag and load it onto the spool holder so that the filament unrolls as seen below and around the filament holder (located to the left and below the filament holder).



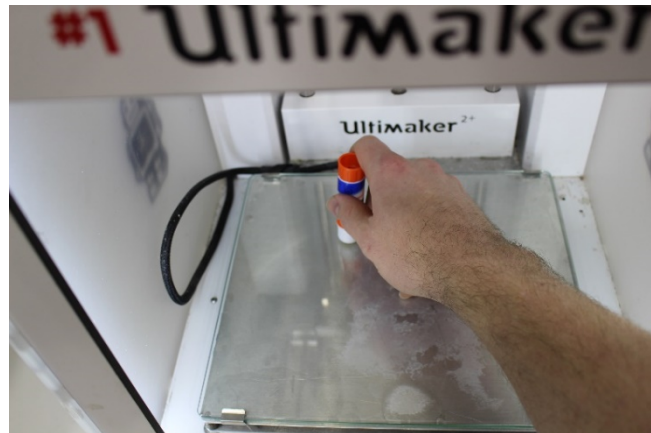
7. Advance the filament into the feed motor until it reaches the extruder head.
8. Press down on the lock lever.
9. Follow the touch screen prompts to finish loading the material.

Unloading and Loading Filament - Ultimaker 3 Extended

Because of the complexity of loading and unloading material for the Ultimaker 3 Extended only NIS Staff will change material on this machine.

Beginning the Print

1. Clean the glass build plate by removing the plate and taking it to a sink. Brush the build plate using warm water and a brush. Dry the plate and return it to the printer.
2. Apply glue to the glass plate, too little glue and the print will not adhere to the build plate, too much glue and it will be difficult to remove the finished print.



3. Load the SD card or flashdrive into the machine.



4. On the Ultimaker's main screen navigate to "Print" and select the file to print. The extruder and the bed will begin heating up.
5. The machine will begin extruding filament onto the build plate, remain by the machine until at least two layers have successfully printed.

If it seems that your print is failing pause the print by selecting "Pause" and contact an NIS staff member.

Removing the Finished Print

1. When the Ultimaker is finished printing it will lower the build plate and begin cooling the extruder head.
2. Larger prints can be removed by hand, but prints that are stuck to the build plate may require removal with a spatula.
3. Remove the build plate from the 3D Printer and place it on the shooting board. Slide the spatula under your print to remove it from the build plate. Keep your hands and fingers clear during the removal process.



4. Take the completed print to an NIS staff member for weight and payment.