

3D Printing Reference for EASC1107 PA's

Below is a recap of the file sending and design requirements for EASC1107 puzzle project.

If a student does not follow these requirements, ask that they revise and resubmit by the appropriate deadline. **Late puzzle submissions will not be 3D printed.**

Design:

- 1 puzzle per person with at least 4 interlocking pieces
- Must fit within 4" x 4" x 4" (100mm x 100mm x 100mm) volume
- Create 3D model of each piece and of assembled puzzle in Autodesk Inventor

Check:

- Fit: is there enough space between mating parts? **(At least 0.5mm or 0.02in)**
- Scale: are any features too small to be manufactured? **(Nothing thinner than 1mm or 0.04in)**

Export:

- Save each part as *.STL
- Save each drawing as a *.PDF

Send:

- Send all files to your PA(s) and to prototype@newhaven.edu
 - Subject Line:
 - "Course #" - "Section #" "Last Name" "Project Title"
 - *Example:* "EASC1107-02 Jones Puzzle Project"
 - Attachments:
 - *.PDF files of each individual part drawing with appropriate dimensions
 - *.PDF file of assembly drawing with dimensions and exploded view
 - Assembly drawing should indicate quantities of each type of part
 - Puzzle Cost Excel sheet
 - *.STL files of each part

Inspecting Drawings:

When looking at students' part and assembly drawings, check for:

- Overall dimensions
- Dimensions of mating areas (is there enough clearance?)
- Parts list (how many of each part do I print?)
- Small features (is there anything too intricate or fragile?)
- Non-orientable features (is there a way to lay this part flat on the printer?)

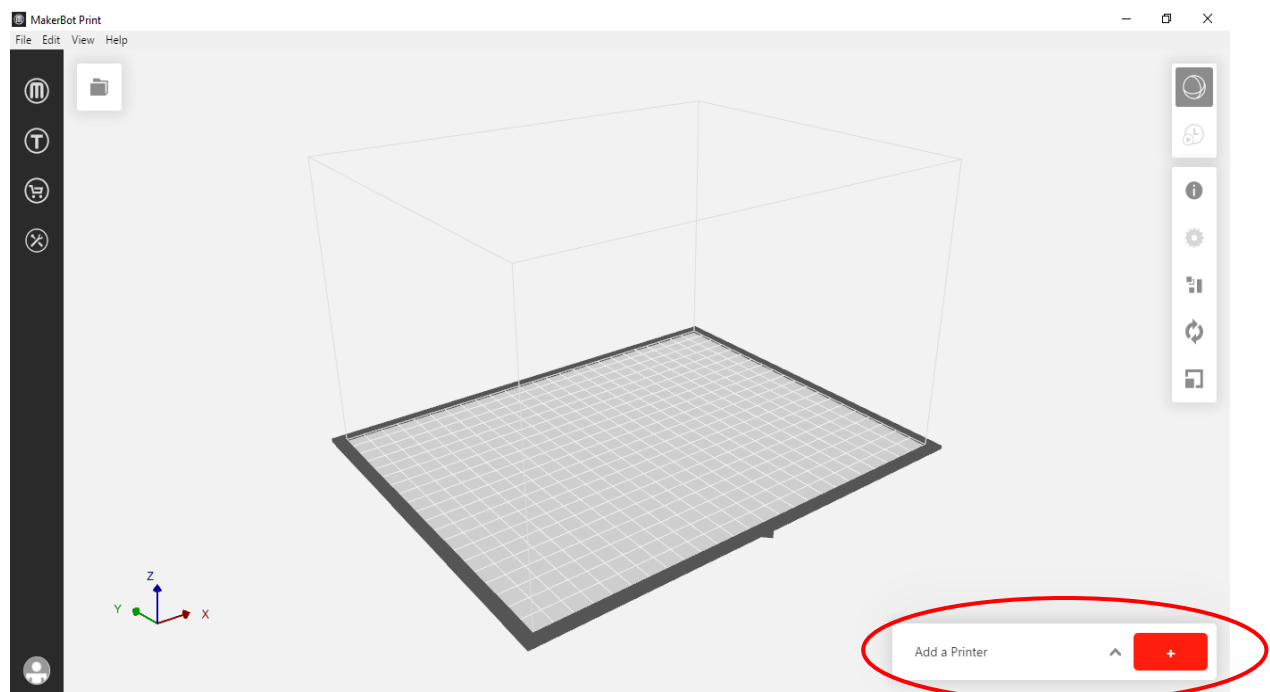
If there are any issues or areas of uncertainty, communicate with the student and do not print the parts.

Using Makerbot Print

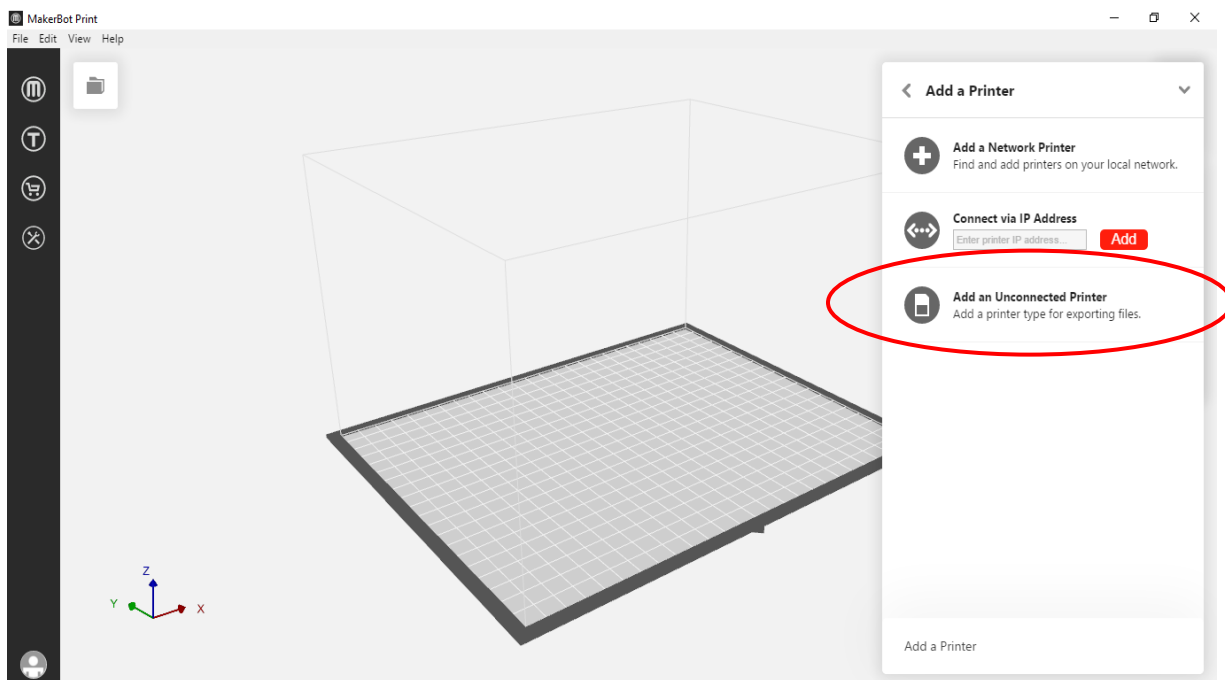
Students will send you files in *.STL format. These files must be processed in Makerbot Print before sending to the 3D printers.

Setting up to print via flash drive:

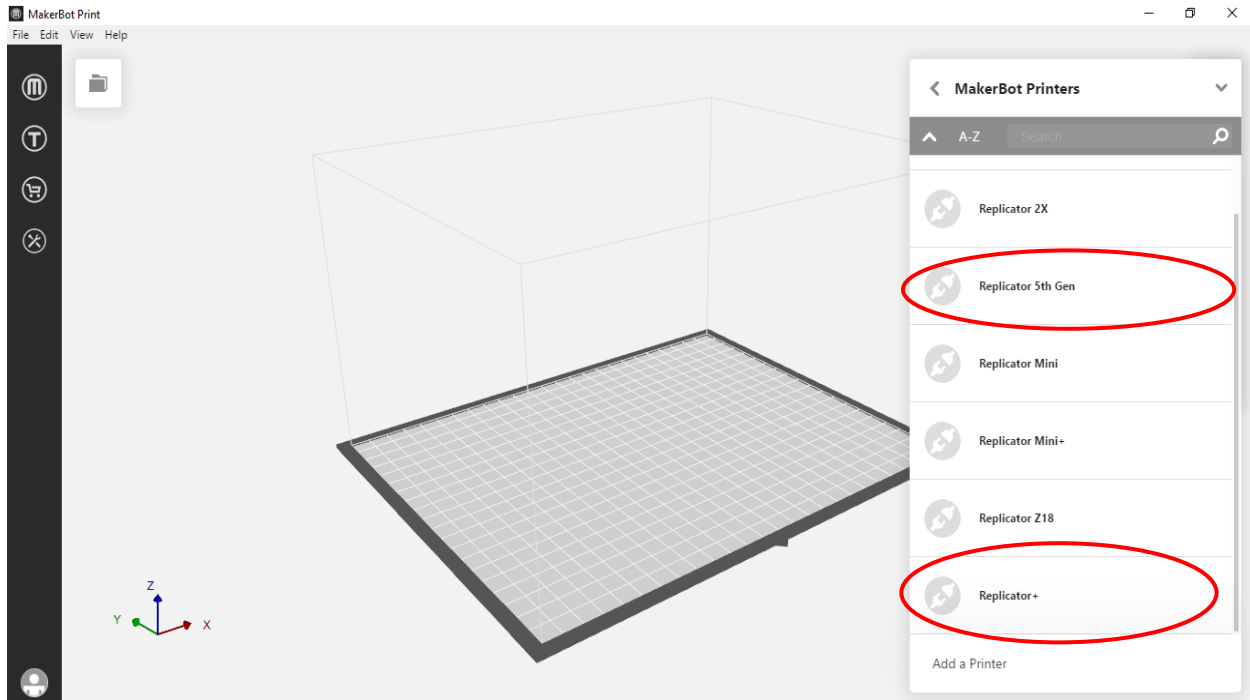
1) Select "Add a Printer"



2) Select "Add an Unconnected Printer"



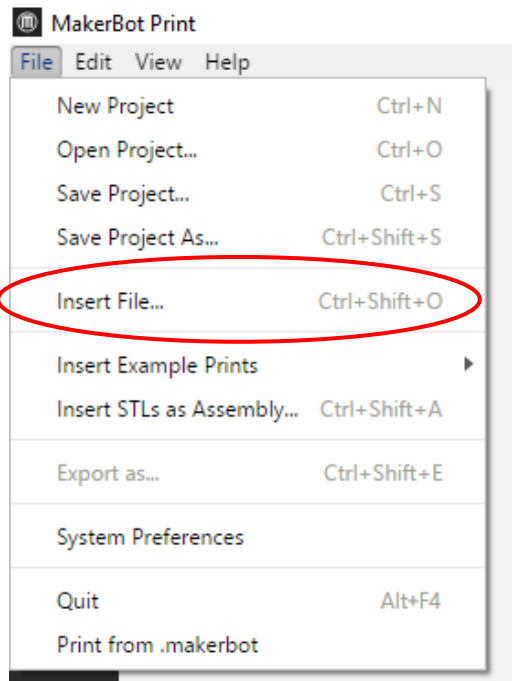
3) Select printer model (Makerbots 1-3 are Replicator 5th Gen, Makerbot 4 is Replicator +)



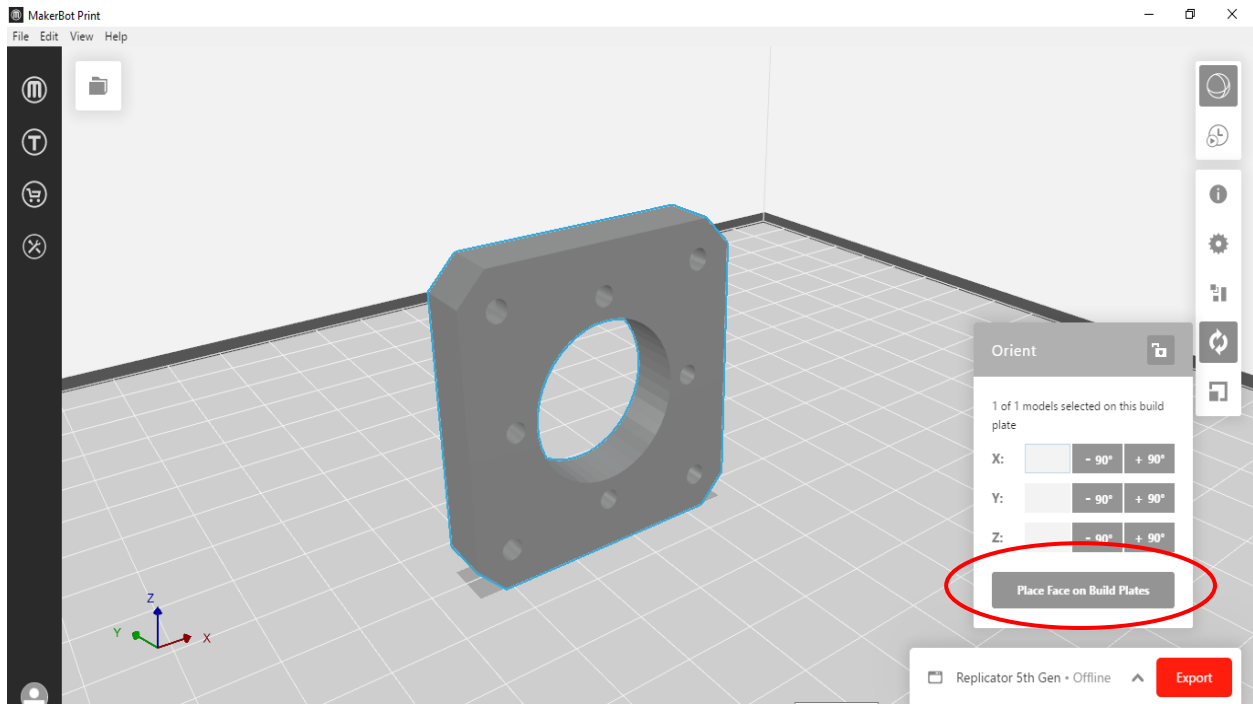
4) Sf

Preparing a model for printing:

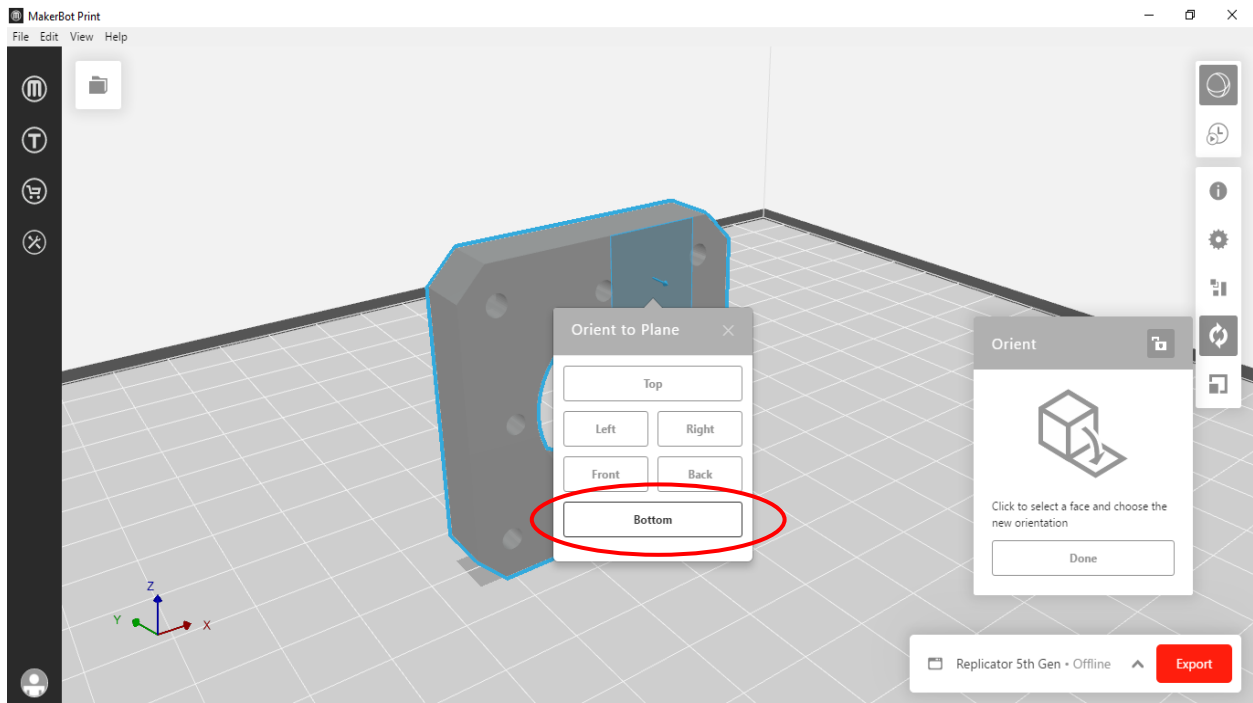
1) Select File > Insert STL File:



2) If orientation is not ideal, select “Orient.” If there is a more desirable bottom face, select “Place Face on Build Plates”



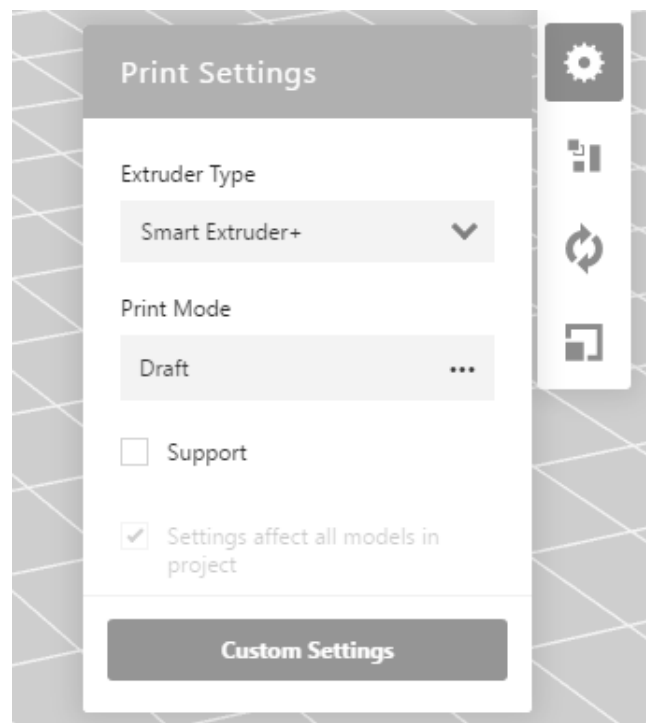
3) Select the face you wish to be the bottom and select “Bottom.” The model should sit flat.



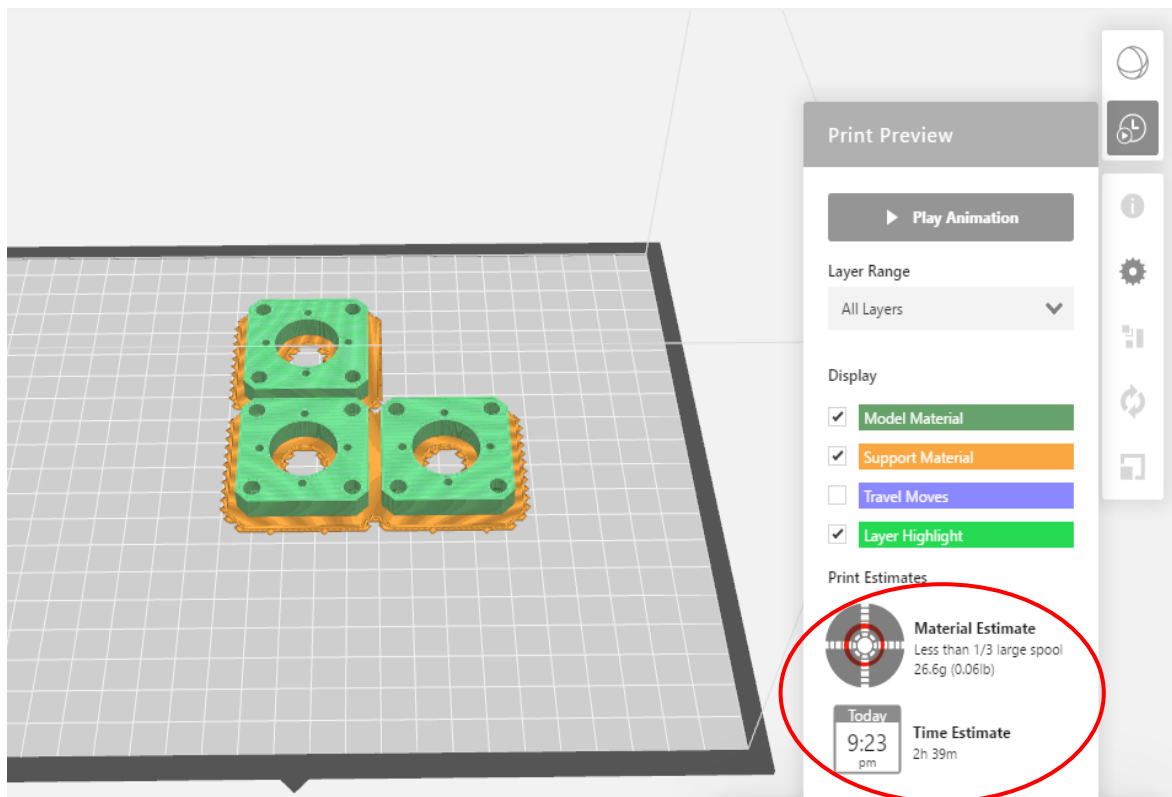
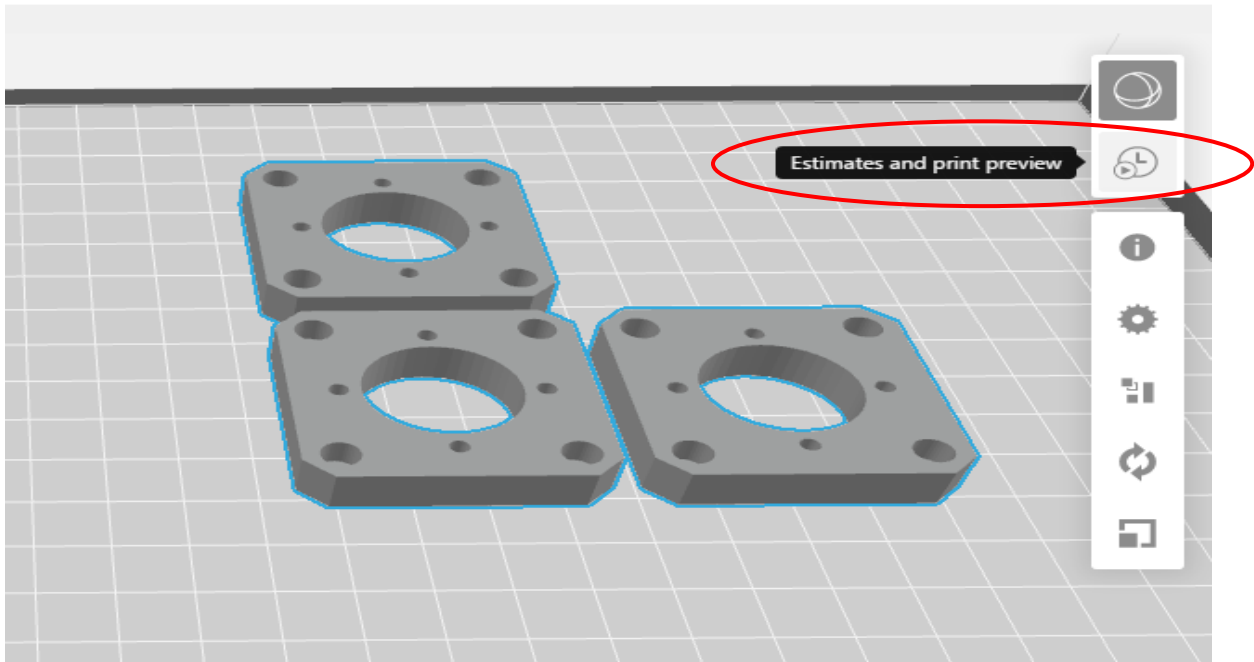
4) You may now choose to insert more models or make duplicates of the same model. Arrange them logically by selecting Arrange > Arrange Build Plate:



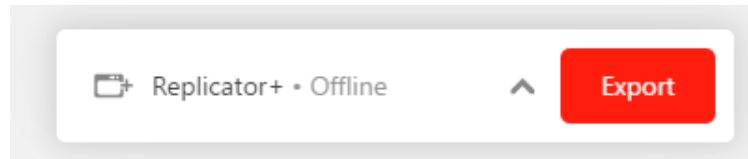
5) Under “Print Settings > Extruder Type” ensure that “Smart Extruder +” is selected. Under “Print Mode” select “Draft” which is the most efficient mode. If there are overhanging features in the model, check “Support.” Try to avoid using supports as they can be difficult to remove later.



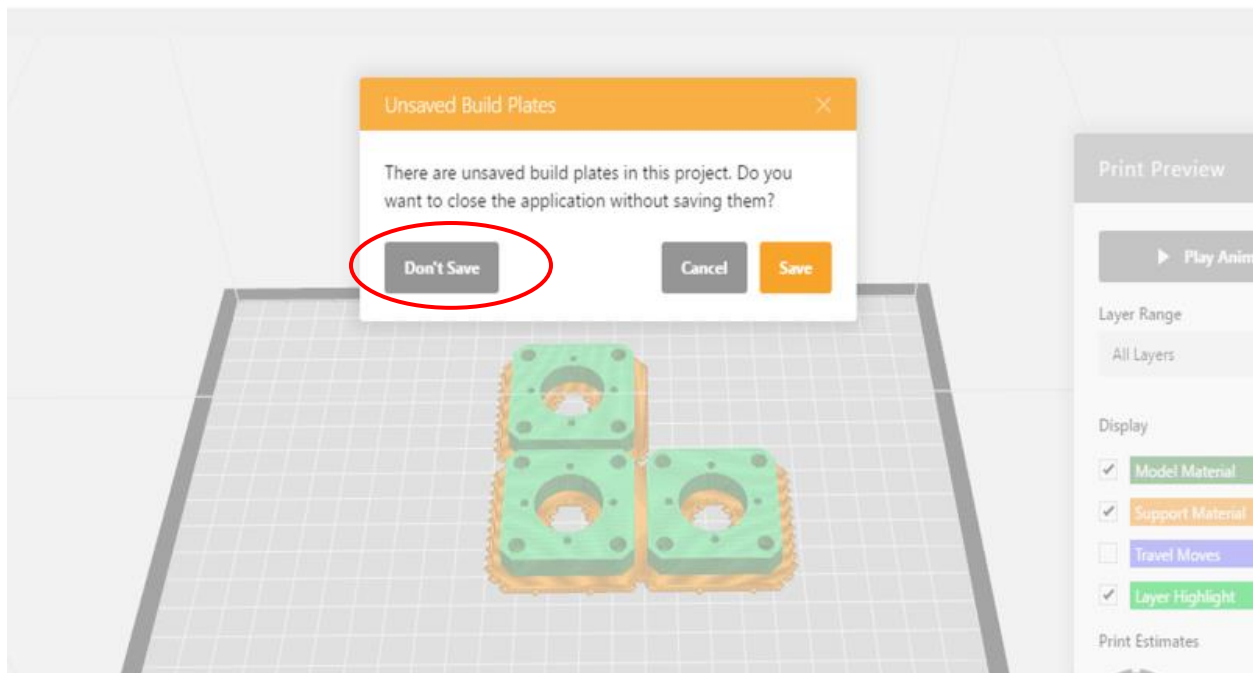
6) Select “Estimates and Print Preview” to see how long the print will take and how much material it will use.



7) When ready to print, select “Export” and save the file to a flash drive as a *.makerbot. Use a good file naming convention to avoid confusion (e.g. don’t use “part1, part2, part3”).



8) Close out of Makerbot Print when done. You don’t need to save the build plate unless you wish to come back to it. The important file is the *.makerbot which can only be understood by the Makerbot 3D printers.



Using the Makerbot 3D Printers

With a *.makerbot file on a flash drive, you are now ready to print.

These are the 2 types of Makerbots we have available:

Replicator 5th Gen (Makerbots 1-3)

- Build base: 10in x 8in
- Build height: 6 in
- Glass build plate
 - Must have layer of tape for plastic to stick
 - Requires periodic leveling



Replicator + (Makerbot 4)

- Build base: 11in x 8in
- Build height: 6 in
- Flexible plastic build plate
 - NO ADDED TAPE NEEDED
 - "Auto" leveling



Follow the steps below to print a file:

- 1) Ensure that enough material is loaded (see Makerspace staff for help changing filament)
- 2) Check that build plate tape (on Replicator 5th Gen only) is intact. Notify Makerspace staff about putting down new tape.
- 3) Insert flash drive into printer. Use center dial to select Print > USB Storage and select the correct file. Click "Print"
- 4) Fill out the log sheet for the printer **for each print**. This is necessary for tracking material usage and giving others a way to contact you if a print goes wrong. Indicate somewhere that the print is for EASC1107.
- 5) Set a timer and come back to retrieve the print in a timely manner. **Remove the build plate** and use a scraper to remove the print. The support raft (pictured) may be peeled off and discarded.



- 6) Place each student's puzzle pieces in a plastic bag with a piece of sandpaper and a note with their name on it. Put these bags in the nearby box for students to pick them up.

If you run into an issue, ask someone before attempting to troubleshoot

For prototyping assistance: email prototype@newhaven.edu