UNITED STATES
AIR FORCE
ACADEMY

3D Printing

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DFEC
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Purpose

- To familiarize yourself with the 3D printers in the Makerspace.
- Learn how to successfully print models with little to no errors.
- Know what resources are available.

Taz Workhorse+



Cleaning the base plate

- **Before using the printer, be sure to use an alcohol wipe to clean the surface of the build plate. If it calls for it (ex. Ninjaflex) use a glue stick to coat the baseplate. It is important to clean the baseplate beforehand in case someone used glue before you and didn't clean it.**

Printing, Part Removal, and Bed Preparation

Filament	Purging Temperature (°C)	Part Removal Temperature (°C)	Print Bed Preparation (See maintenance section for more information)
ABS, HIPS	220	50	Isopropyl alcohol wipe
PLA	180	45	Isopropyl alcohol wipe
PETg	220	50	PVA glue stick
Bridge, PCTPE, Nylon 910	220	50	PVA glue stick
Ninjaflex, PolyFlex	200	Fully Cooled	Plain Glass or PVA glue stick
PA-CF	220	50	Isopropyl alcohol wipe
PolyCast	180	45	Isopropyl alcohol wipe

Cleaning the bed plate continued

- Every 5-6 prints, the bed must be cleaned thoroughly and scratched with a scratch pad.
  - Wipe the bed with the alcohol Wipes provided.
  - Take a scratch pad and lightly scuff the bed.
  - Wipe the bed one more time to ensure the bed is free of debris.
  - Ensure the bed is completely dry before using it.
- A tally will be on the printer. Once you have cleaned the bed thoroughly, erase the tallies and tally your print.

Clean the Tool Head

- **The tool head should be cleaned before each use of the printer.**
  - **Take a scrub pad and clean the nozzle.**
  - **If there is build up, TURN OFF THE PRINTER and scrub the nozzle lightly with a wire brush. DO NOT USE THE WIRE BRUSH WHEN THE PRINTER IS ON!**
    Doing so will short the printer, and a fuse will need to be replaced on it.

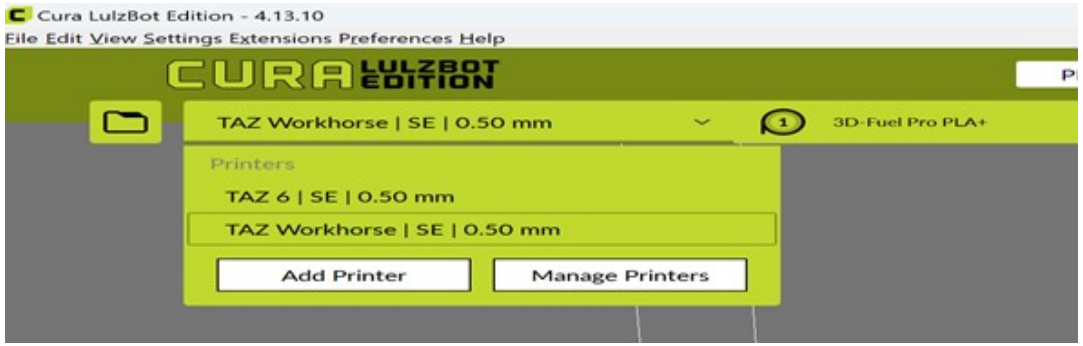
Setting up Cura

Setting up Cura: Be sure you are using the most up to date version of Cura

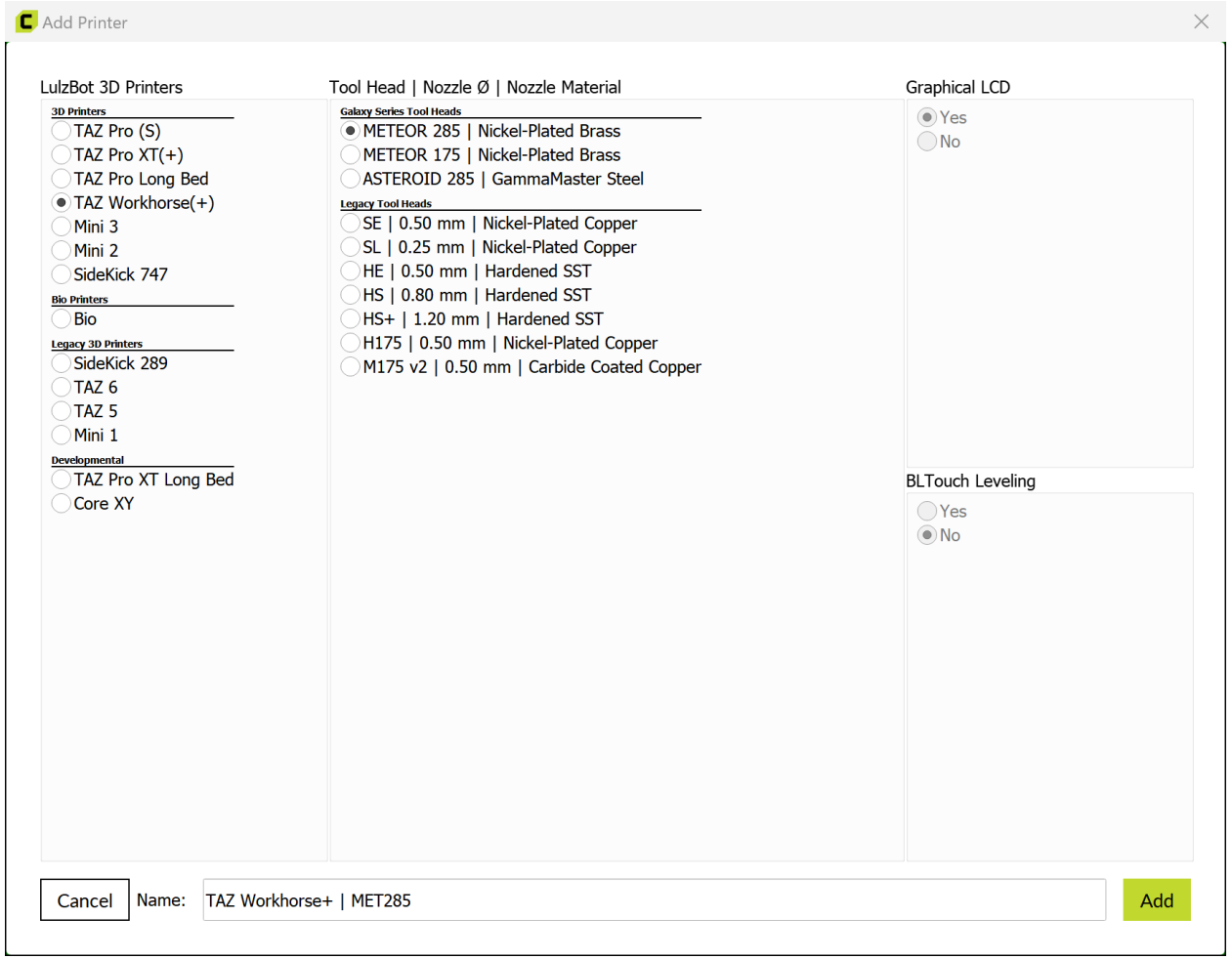
https://www.lulzbot.com/cura#download

Add Printer:

Left Drop Down Menu -> “Add Printer”

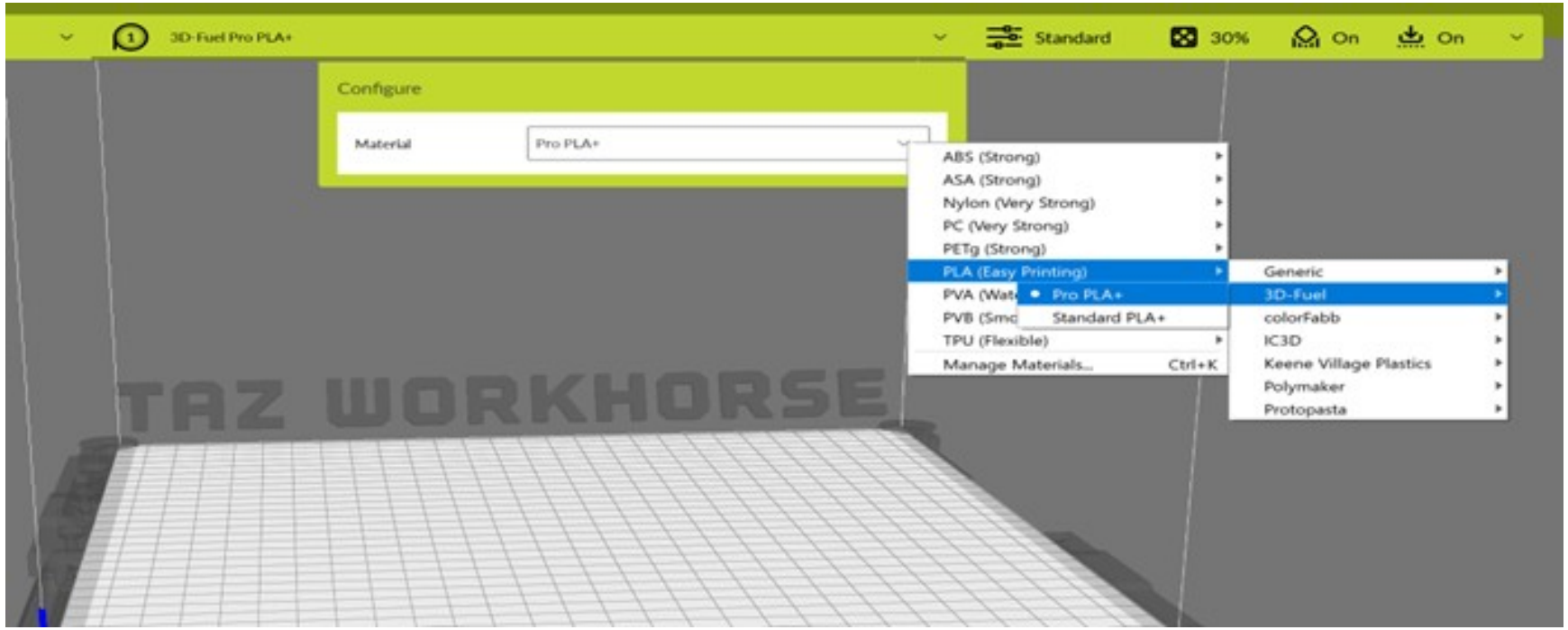


“TAZ Workhorse” -> “Meteor 285” -> “Add”



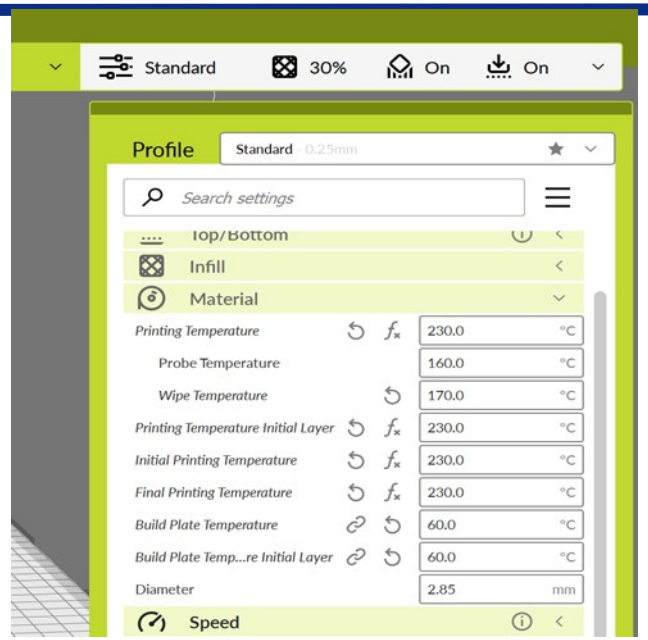
Setting up Cura (cont.)

Printer Settings:
Material Selection: Select the correct material you are using according to the package.
Ex: Pro PLA+ (3D-Fuel)
Middle Drop Down Menu -> “PLA…” -> “3D-Fuel” -> “Pro PLA+”



Setting up Cura (cont.)

Material Settings:
Right Drop Down Menu -> “Material”
Ensure settings are correct:
Print Temp = Check your material and find a temp that fits within the range provided. It is located on the box.
Probe Temp = Check your material and find a temp that fits within the range provided. It is located on the box.
Wipe Temp = 170
Initial Layer Temp = Same as Print Temp
Final Print Temp = Same as Print Temp
Build Plate Temp = 60
Build Plate Temp Initial Layer = 60
Diameter = 2.85

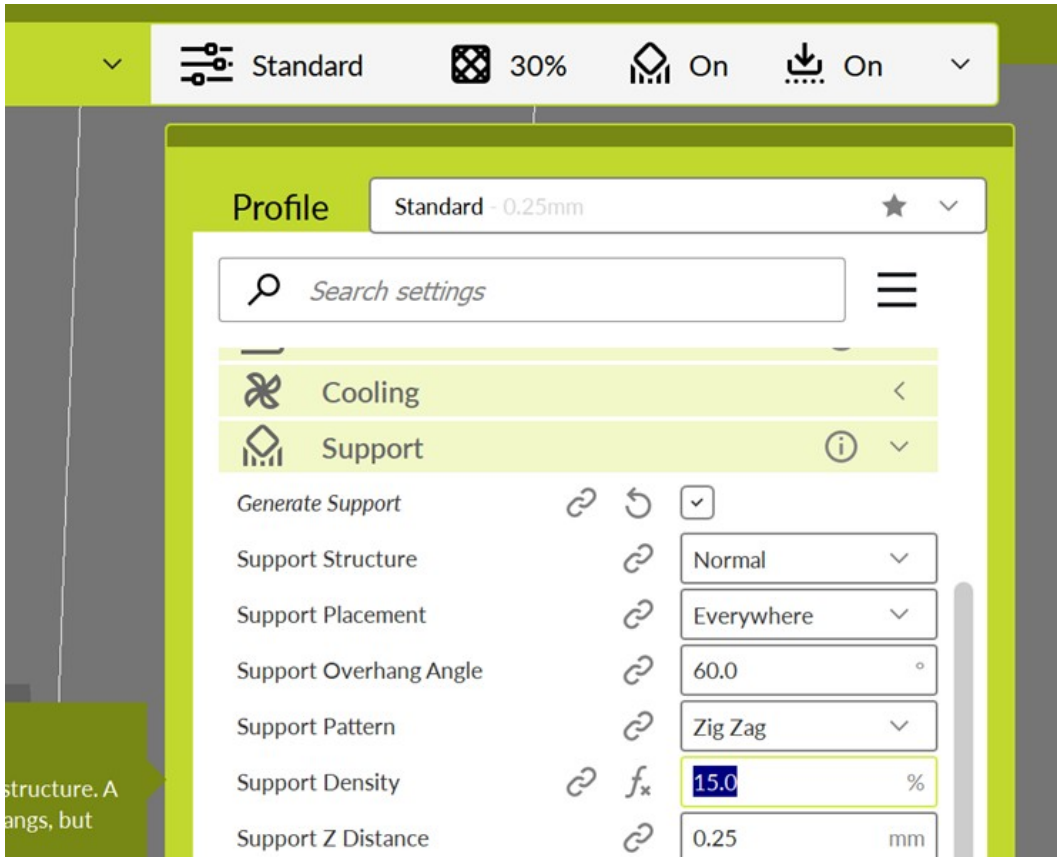


Filament Type	Bed Preparation	Nozzle Temp	Bed Temp	Removal Temp
ABS	Clean PEI	245-270	110	50
Nylons	Gluestick	240-270	65	45
TPU’s	Gluestick+PEI/Clean Glass	225-240	60	25
Polycarbonate	Gluestick	250-295	60-110	45
PETG	Gluestick	235-265	80	45
PLA	Clean PEI	215-235	60	45
Soluble Support	Clean PEI	200-230	60	45
PolyCast	Clean PEI	215-235	60	45

Table 2.1: Recommended Temperatures (C)

Setting up Cura (cont.)

Supports (if needed):
Right Drop Down Menu -> “Support”
Set the “Support Density” to 15%



Creating a .gcode file for printing

1. Create/download an .stl file using Fusion360, TinkerCAD, etc., or download from website.

2. Open .stl file in Cura LulzBot Edition.

3. Ensure correct printer and settings are selected.
   (See last slide)

4. Ensure 3D model is oriented correctly in Cura.

5. Select “Slice”.

6. “Save to Disk” using correct naming convention.

Setting up your file

- File name must be in the correct format:
  - LastName_Filament_Object.gcode
  - Example: Rosario_PLA+_Robot.gcode

- Write your name on the tally sheet as well so we know who to contact if a print is failing.

Choose the Toolhead

- On the printer, press the scroll button to go to the menu.
- Scroll to Tool Heads (TH) and press the scroll button again.
- Select MET285 NKL-PL-BRASS.
- The correct toolhead should now be displayed on the screen.



Changing PLA

1. Select “Change Filament” -> “Unload Filament” -> “Preheat PLA” on the printer.
2. Follow prompts on screen
    1. Wait for nozzle to heat
    2. Wait for filament to unload
3. Get new PLA+ roll and load on filament holder
4. Select “Change Filament” -> “Load Filament”
5. Follow prompts on screen
    1. Wait for Load filament (load filament)
    2. Wait for filament purge (select “Purge more” if additional purging is needed or “Continue” if initial purge was adequate)

Sending .gcode to the printer

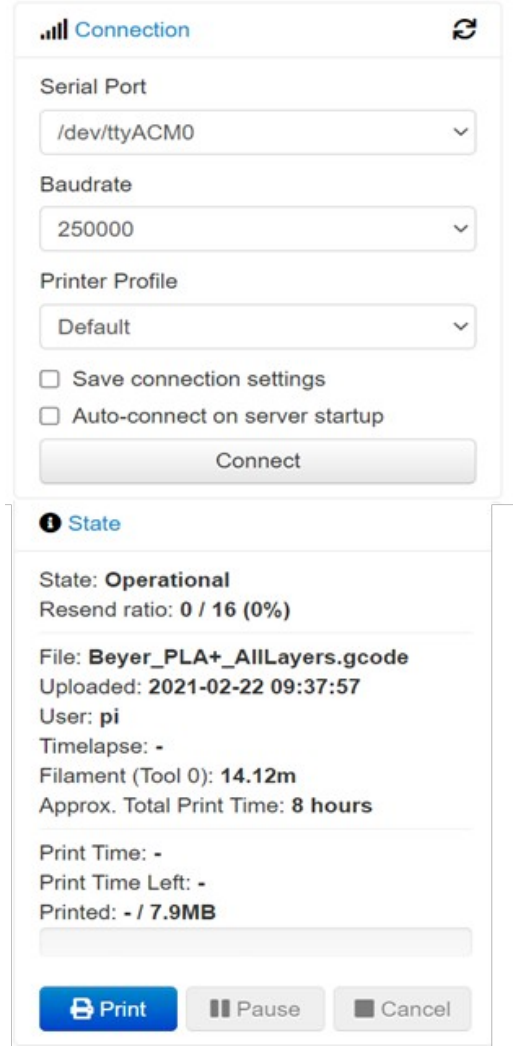
1. Ensure you are connected to the “Maker_Space” WiFi.

2. Using Google Chrome, browse to the IP address of the printer you want to print on (e.g., 10.0.40.111). (Password will be given to you at the completion of this training. DO NOT SHARE THIS PASSWORD WITH ANYONE OR YOU WILL BE BANNED FROM 3D PRINTING.)

3. Ensure the printer is connected.

4. Drag .gcode to the left side of the page to upload the file locally.

5. Select your .gcode in the list of files and ensure it shows up in the “State” menu and select “Print”.



Websites with free 3D models

Websites with free 3D models:

https://www.thingiverse.com/
https://all3dp.com/
https://www.cgtrader.com/
https://www.prusaprinters.org/

Questions? Concerns?

Contact Ms. Vanessa Rosario
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You may also let any ECE instructor know if there are issues, and they will contact Ms. Rosario.



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