DREMEL 3D45 PRINTER

STUDENT INNOVATION CENTER
ROOM 2222

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VERSION 2.1

10/21/2020

CONTENTS

OVERVIEW.....1

HEALTH & SAFETY INFO.....2

HAZARD CONTROL MEASURES/REQUIRED PPE.....3

FIRST AID PROCEDURES.....4

WASTE DISPOSAL.....5

SPILL/CLEAN UP PROCEDURES.....6

OPERATIONS GUIDE.....7
- SOFTWARE INTERFACE 8
- SOFTWARE OPERATION 10
- MACHINE OPERATION 24
- AFTER PRINTING.....36

OVERVIEW

The purpose of this document is to provide standard operating procedures for the use of the Dremel 3D45 printers in room 2222 of the Student Innovation Center.

Prior to engaging in hands-on training and operation, these required training modules MUST be completed:

- Shop Safety Fundamentals
- Fire Safety and Fire Extinguisher Training
- Hazard Communication Training (aka Worker Right to Know)
- Portable Power Tool Safety

HEALTH & SAFETY INFO

Nanoparticle Emissions: Nanoparticles (ultrafine particles less than 1/10,000 of a millimeter) are one of the byproducts emitted during the 3D printing process. Nanoparticles are of concern because they are very small, have large surface areas and can interact with the body's systems, including the skin, lungs, nerves and brain.

Chemical Vapors: Heating of certain thermoplastic filament can generate toxic vapors and vapors with high volatile organic compounds (VOCs).

Hot Surfaces: The print head block and UV lamp generate heat. Such surfaces must be guarded and labeling must warn users of the hazards.

Mechanical Hazards: Moving parts must be guarded to prevent accidental contact. Guards must never be bypassed.

Ultraviolet Light (UV): UV light poses a radiation hazard that can cause damage to vision and skin. Do not look at the lamp and ensure the UV screen is intact before use.

Electrical: Contact with energized parts can lead to injury or even death. Before each use, inspect the 3D printer for any damaged wiring and safeguards. Do not use the printer if problems are found. Ensure the printer is properly grounded and plugged directly into an outlet.

HAZARD CONTROL MEASURES AND REQUIRED PPE

REQUIRED PPE:

- ***Safety glasses***
- ***Closed toed shoes***

Hazard Control Measures:

- Wait until the printer is completely finished printing before removing parts/material
- Tie long hair back
- The build platform and extruders are HOT!!! They can burn you. Do not touch them until they have had a chance to cool to room temperature
- Only print with PLA filament. If you are unsure or want to experiment with non-PLA materials, please ask a Shop Supervisor, we would be happy to help figure it out!
- The scraper used to remove prints is sharp! Be very careful and ONLY scrape *away* from your body!
- Wash your hands after using the printers, especially SLA (resin) printers

FIRST AID PROCEDURES

People performing first aid where blood or any other potentially infectious bodily fluid is present, should wear the appropriate PPE (i.e. Gloves) to prevent any exposure.

BURNS: Minor burns are typically small, red, have swelling, and can blister. Treat burns with cold water and continue until the pain lessens. After cooling, cover with a dry, sterile bandage or clean dressing. Seek medical attention as needed.

CUTS/SCRAPES: Minor cuts and scrapes usually stop bleeding on their own. If needed, apply gentle pressure with a clean bandage or cloth and elevate the wound until bleeding stops. Clean the wound and apply bandages. Seek medical attention as needed.

PINCH/CRUSH: Seek medical attention as needed.

INHALATION: Ensure there is proper ventilation prior to use. If needed, stop the procedure and move to a well ventilated area. Seek medical attention as needed.

EYES: Immediately irrigate the eyes at an eyewash station (located near the sink in the East side of 2222) for at least 15 minutes. Hold the eyelids away from the eyeball, moving eye in all directions to wash thoroughly behind the eyelids. Seek medical attention as needed.

All accidents and injuries occurring at work or in the course of employment must be reported to the employee's supervisor as soon as possible (even if no medical attention is required).
https://www.ehs.iastate.edu/services/occupational/accidents-injuries

WASTE DISPOSAL

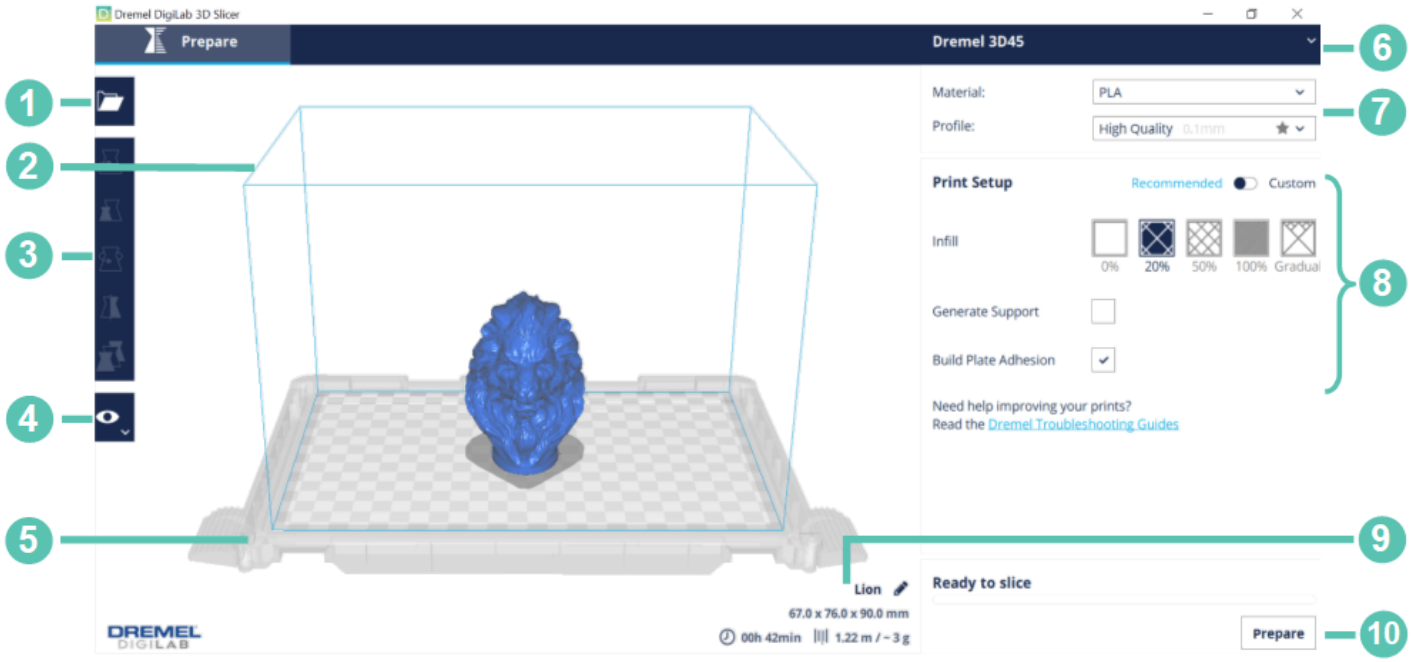
For all failed prints, support structures, or excess filament, allow both the machine and material to cool to room temperature first then dispose of in the bin labeled “PLA RECYCLING”. We donate our PLA waste to the CCL in College of Design.

SPILL/CLEAN UP PROCEDURES

Allow both the machine and PLA material to cool to room temperature first then dispose of in the bin labeled “PLA RECY-CLING”.

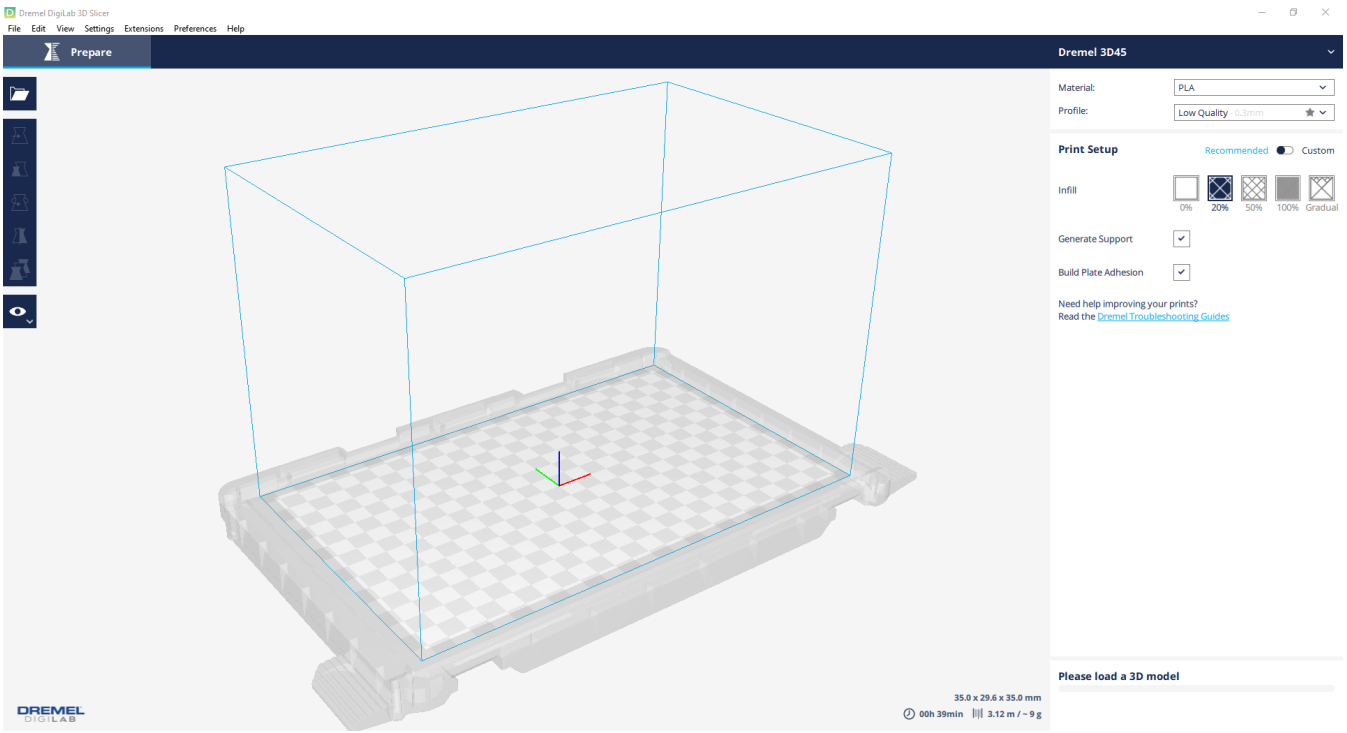
OPERATIONS GUIDE

SOFTWARE INTERFACE

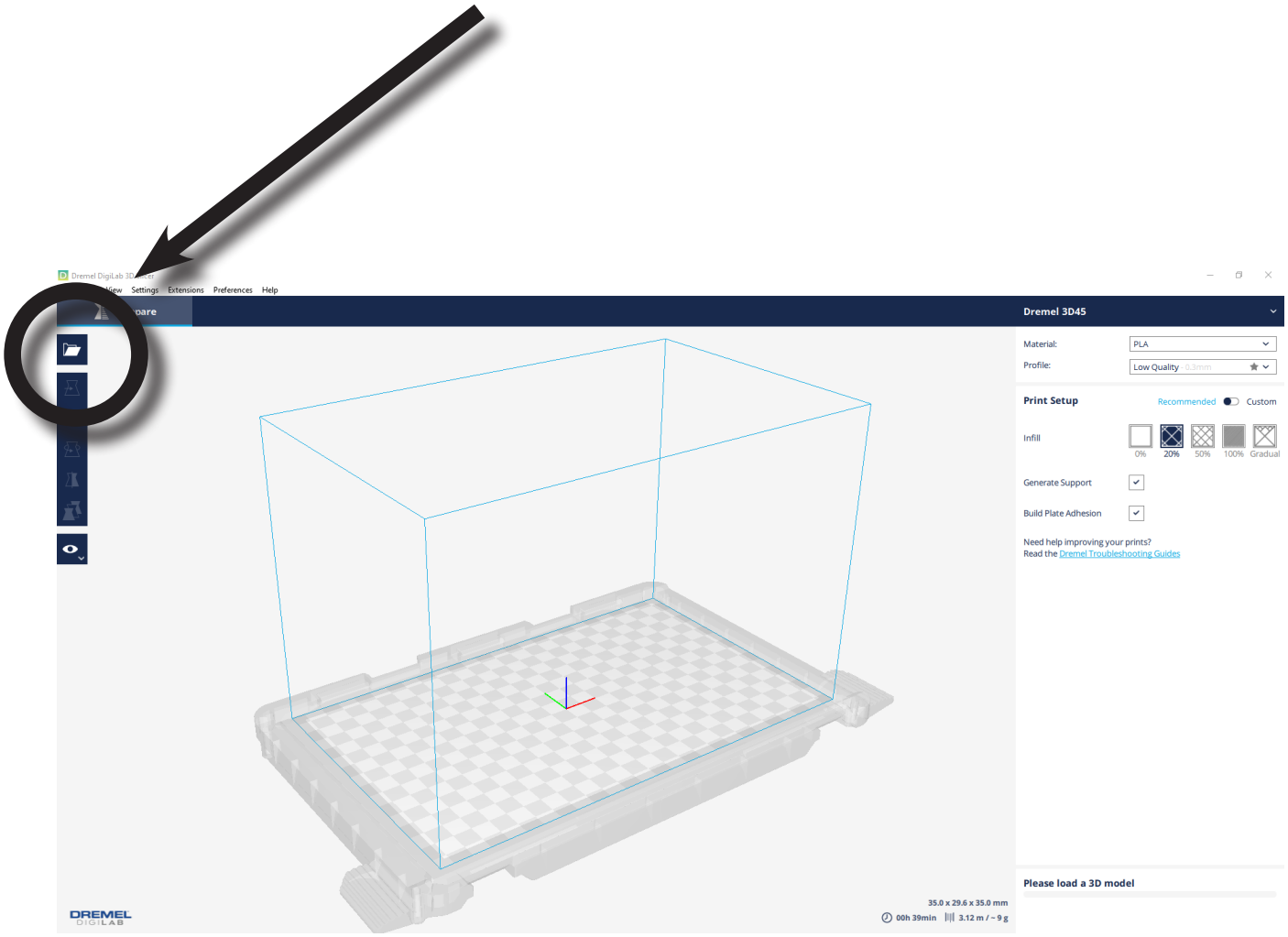


1. **Open File:** Import the file to be printed.
2. **Build Volume:** The thin blue line represents the edge of the build volume, which is 10" x 6" x 6.7" (255 mm x 155 mm x 170 mm).
3. **File Preparation:** Move, scale, rotate, and mirror the file in the file preparation tab.
4. **View Mode:** Visualize the file as a solid, x-ray, or by layers based on the setup being used.
5. **Build Platform:** Represents the location to where the models adhere when printing.
6. **Printer Selection:** The software is compatible with the Dremel 3D45, 3D40, and 3D20. Ensure the correct printer is selected.
7. **Material and Quality:** Select the material supported by your printer and the profile (quality) of the print.
8. **Print Setup:** Adjust infill, support, and build plate adhesion settings.
9. **Print Estimates:** Estimate print time. Material required and cost after preparing the file.
10. **Prepare:** Prepare the file to be printed based on the print setup being used.

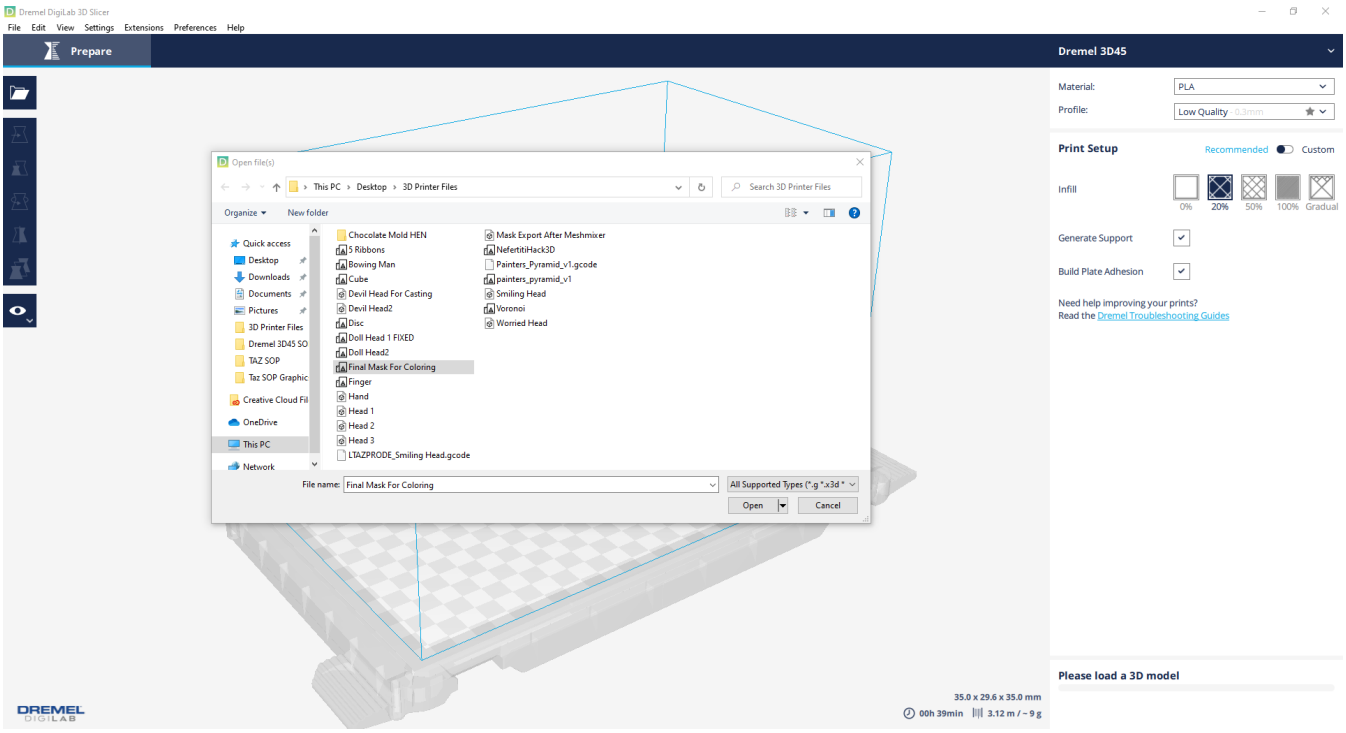
1. Open the “Dremel DigiLab 3D Slicer” program



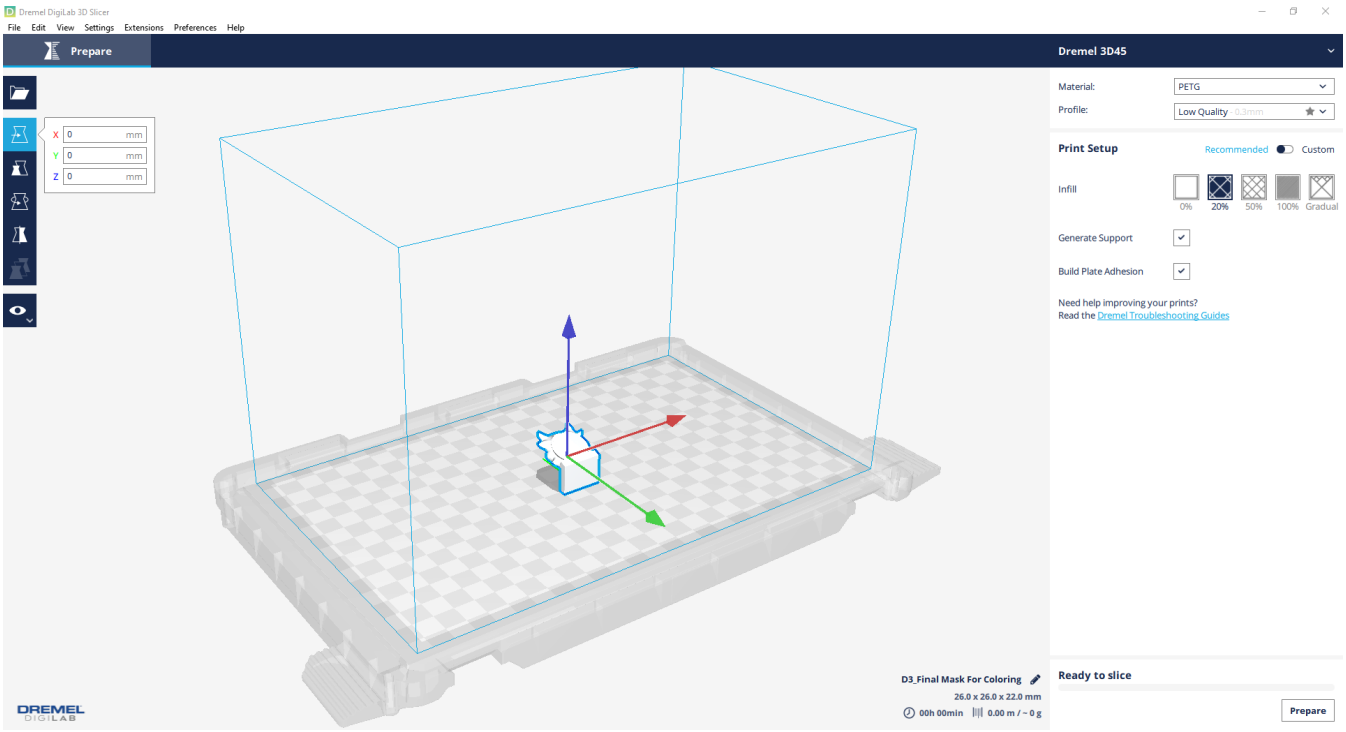
2. In the upper left corner of the screen, click the “Open” icon (Looks like a folder)



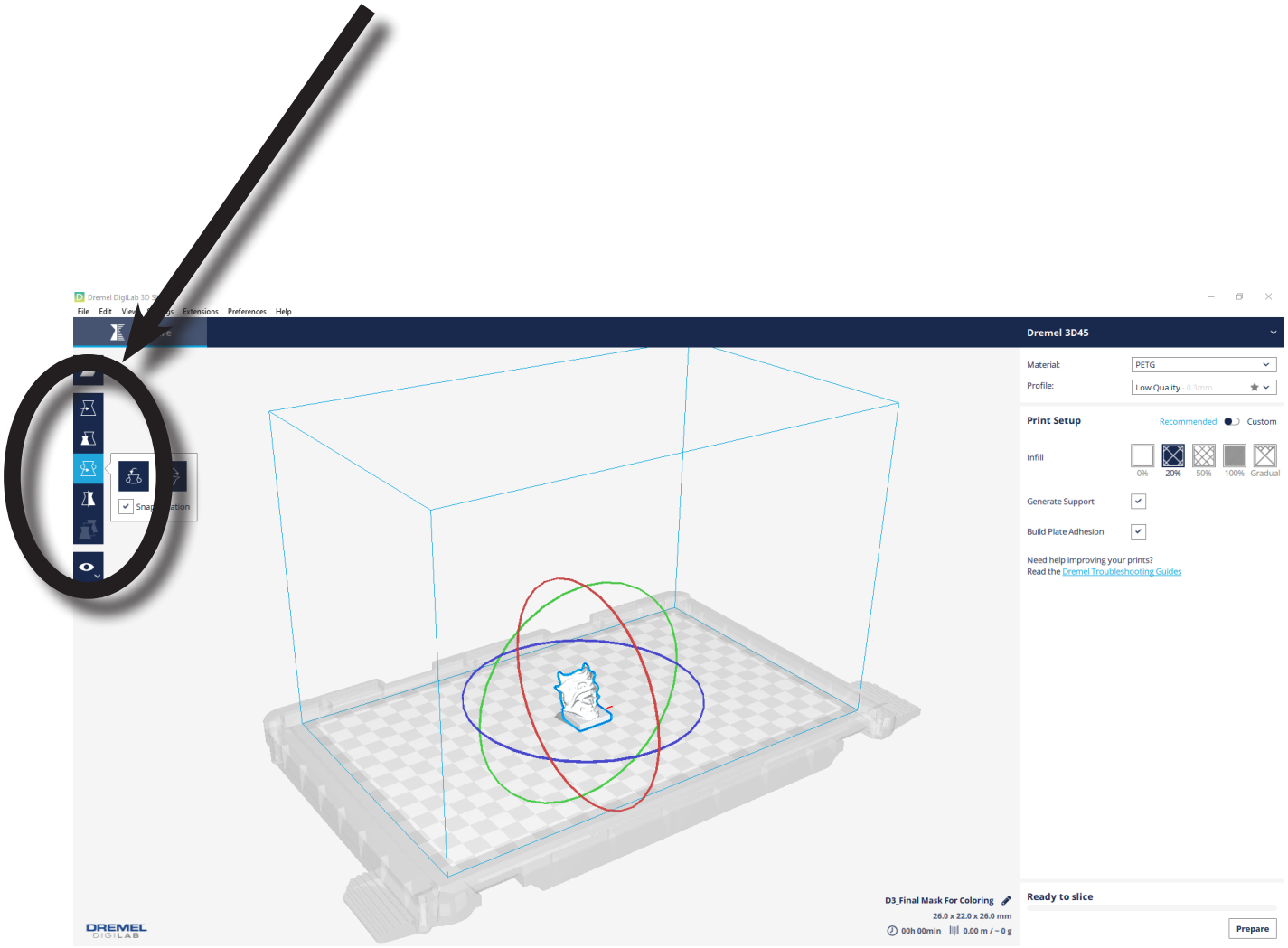
3. Locate the file you want to prepare and click “Open” in the dialog window



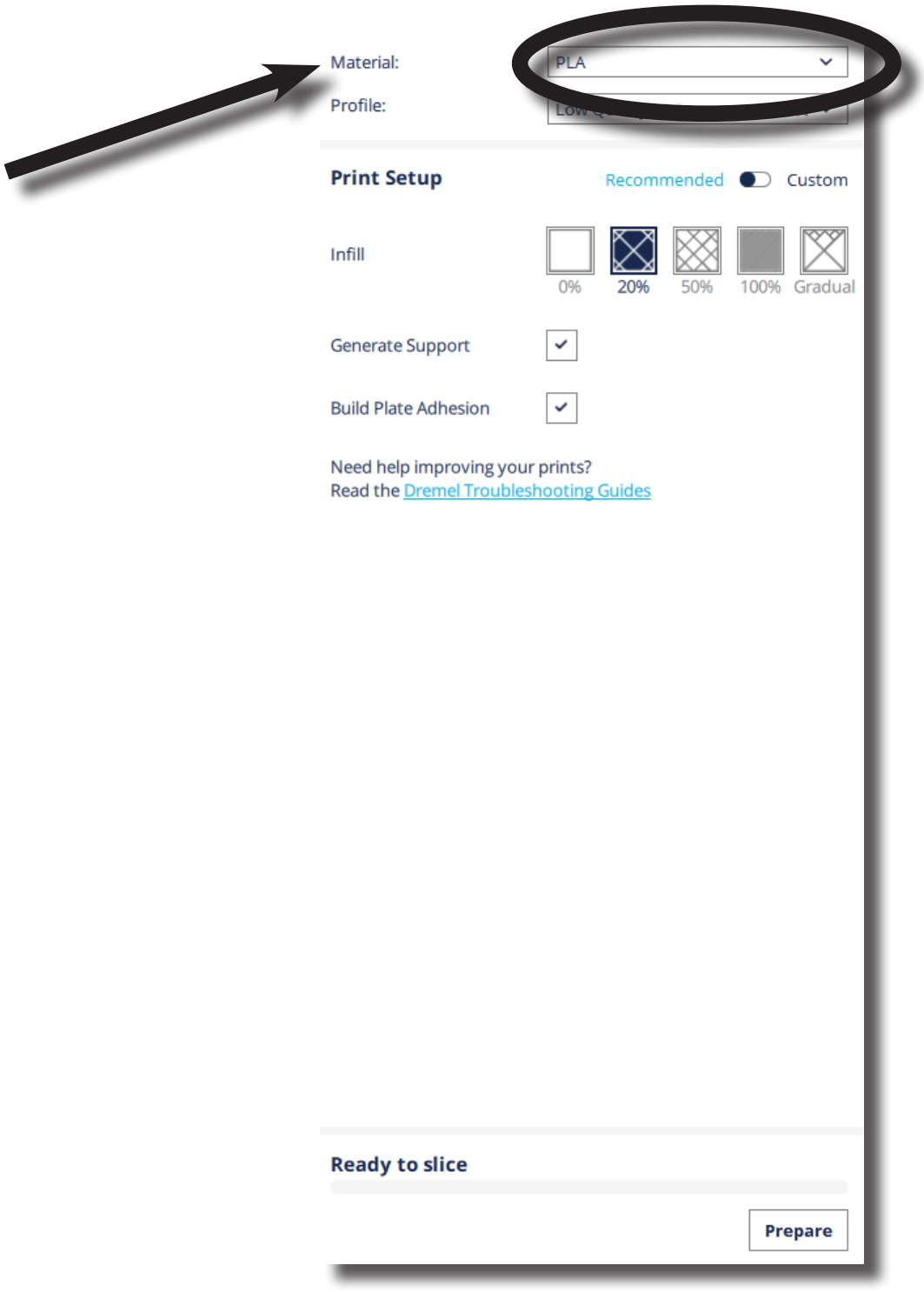
4. After your model has uploaded, click the model to select it.



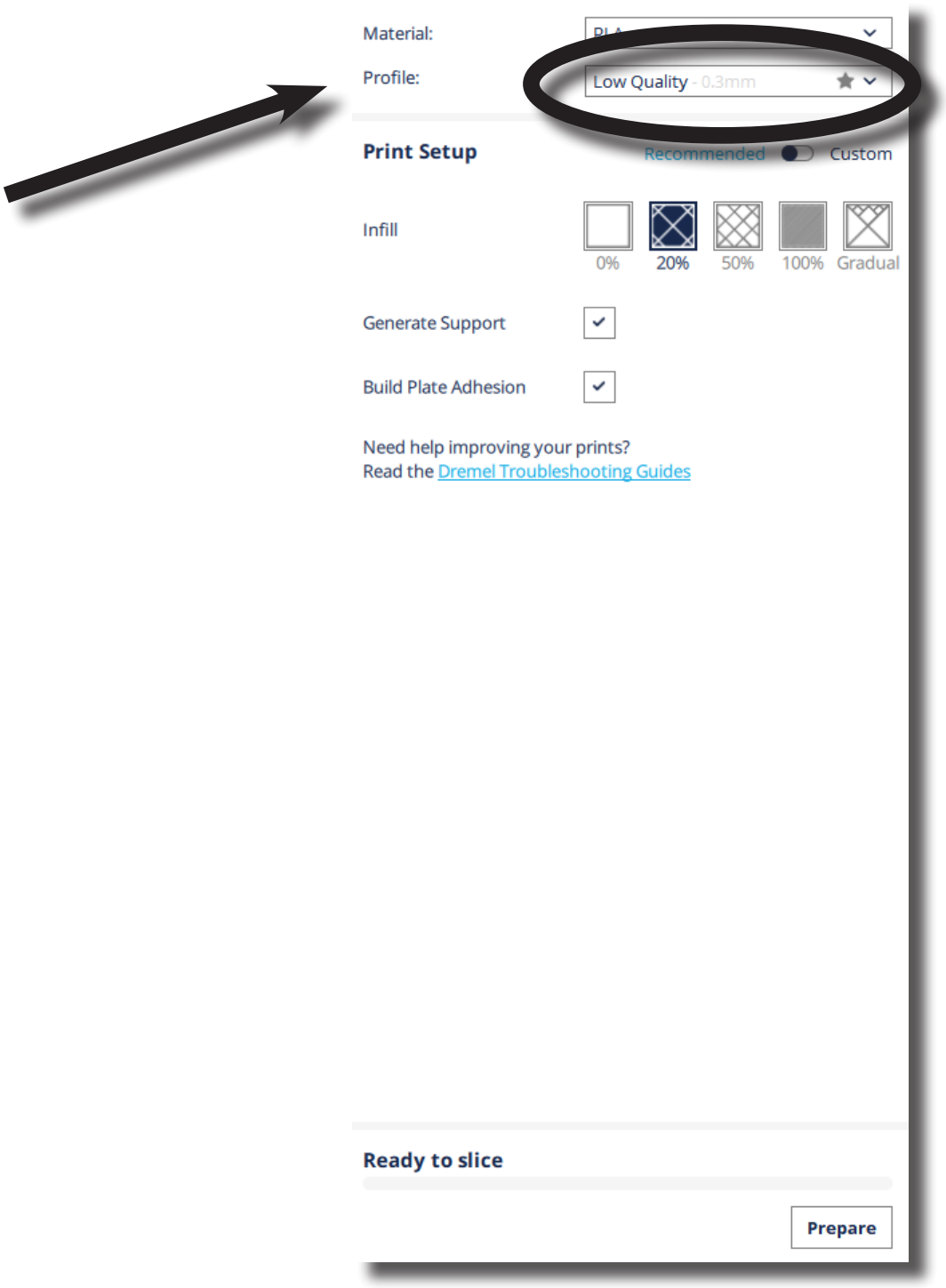
5. Adjust the object's properties as needed via the left toolbar (i.e. scale, rotate, etc.)



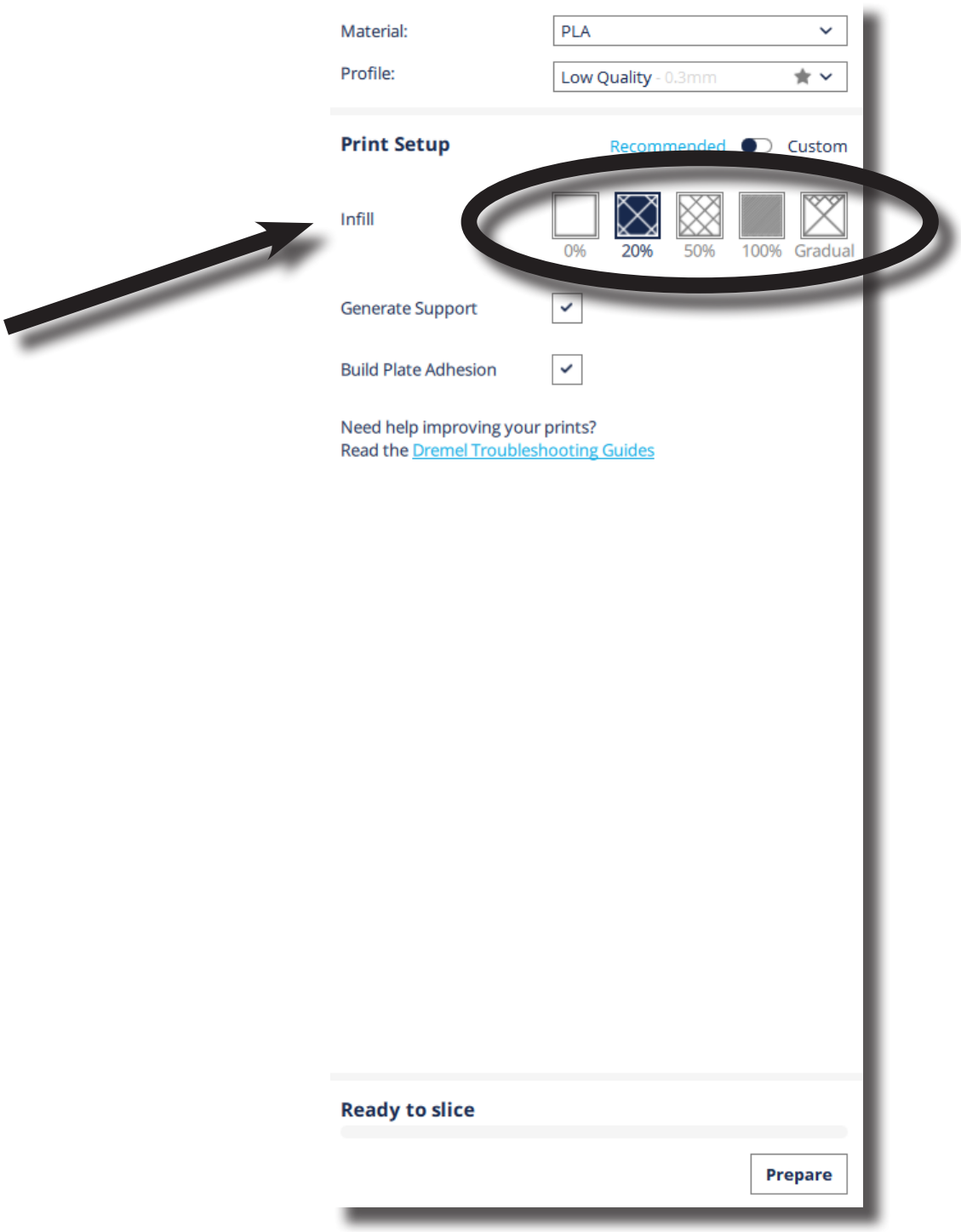
6. In the right toolbar, under the drop-down labeled "Material", make sure it says PLA. (NOTE: If you want to use a material other than PLA, please speak to one of the Shop Supervisors)



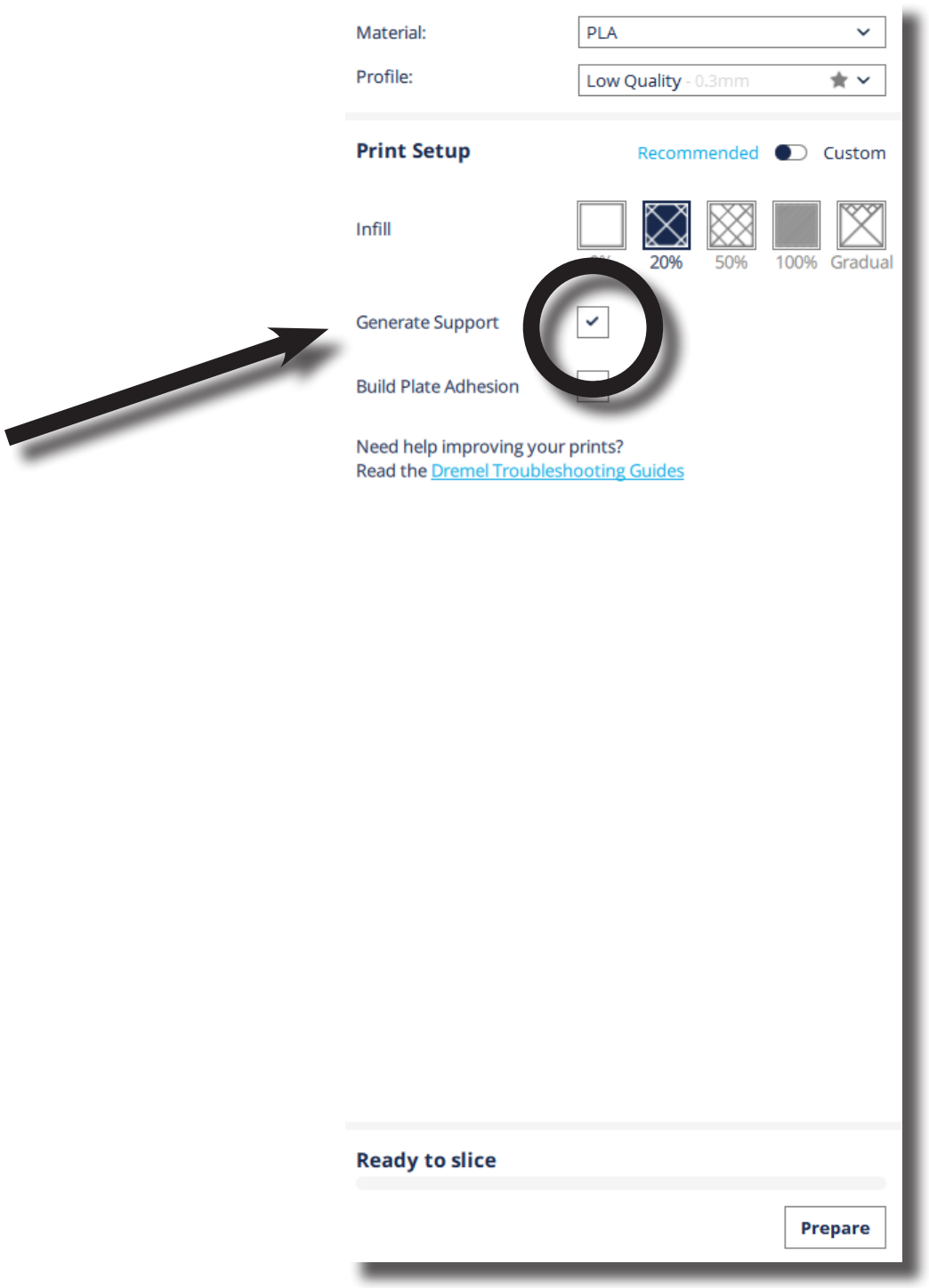
7. In the drop-down menu labeled “Profile” you can adjust the resolution of your print. Keep in mind the trade-offs: Ultra Quality = longer print time, but better surface finish; Low Quality = Less resolution but a faster print time



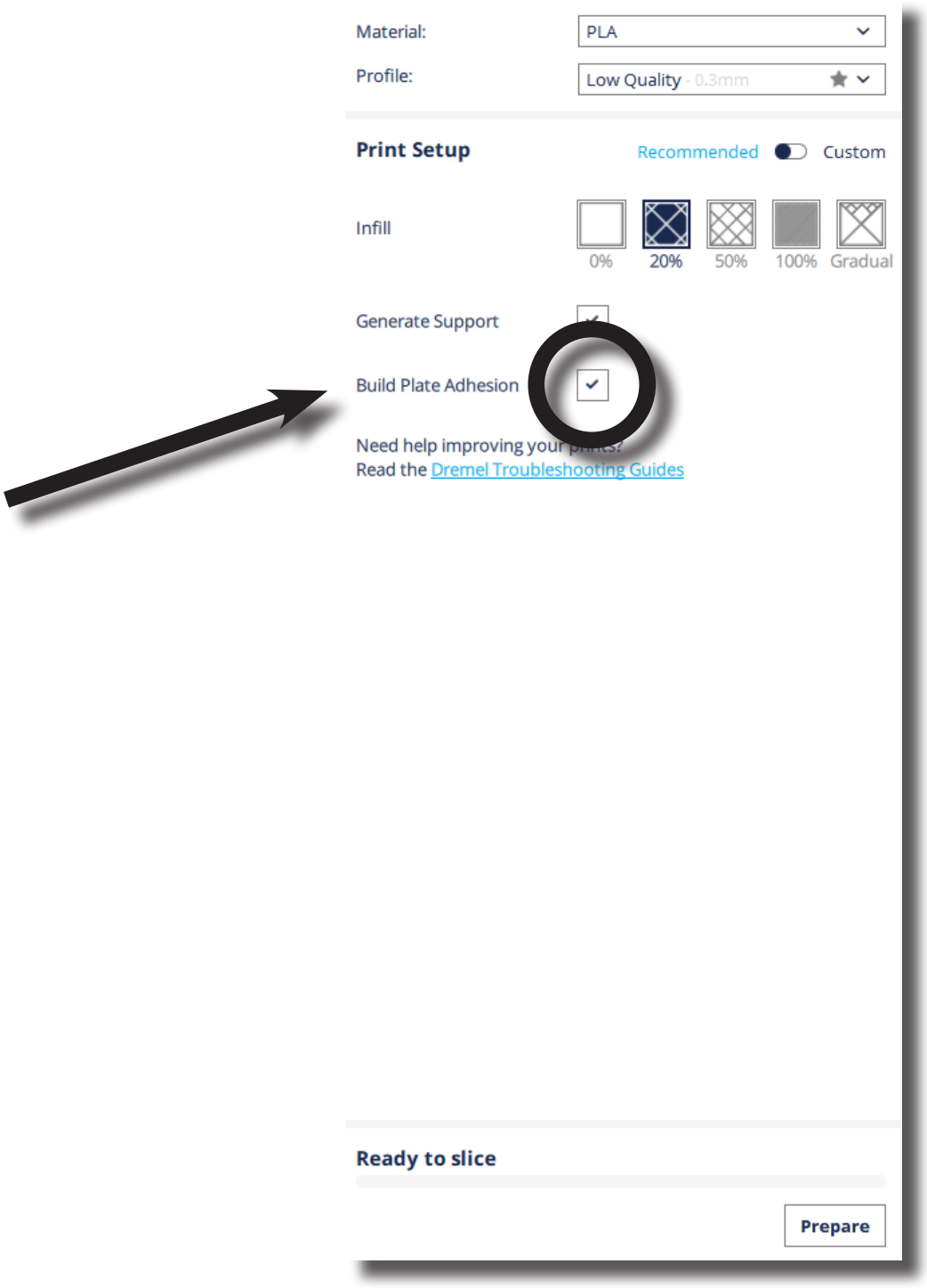
8. If needed, adjust your infill. The default setting is 20%, which is fine for most prints. However, again there is a trade-off: Higher Infill Density = stronger print, but slower print time; Lower Infill Density = Weaker print (easier to damage) but faster print time



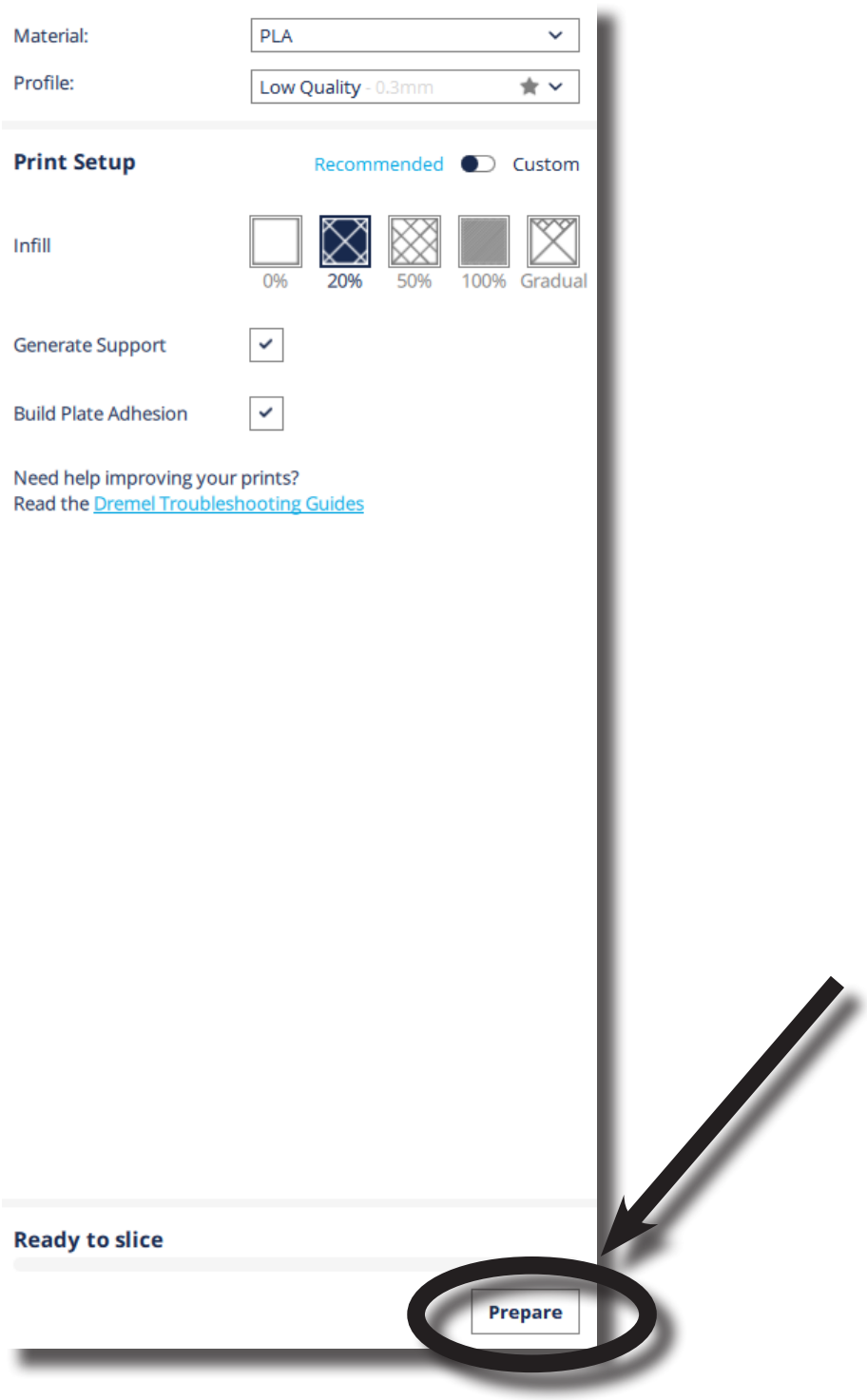
9. If your model has over-hangs, make sure to click the "Generate Support" check-box. (NOTE: It is recommended to check this box)



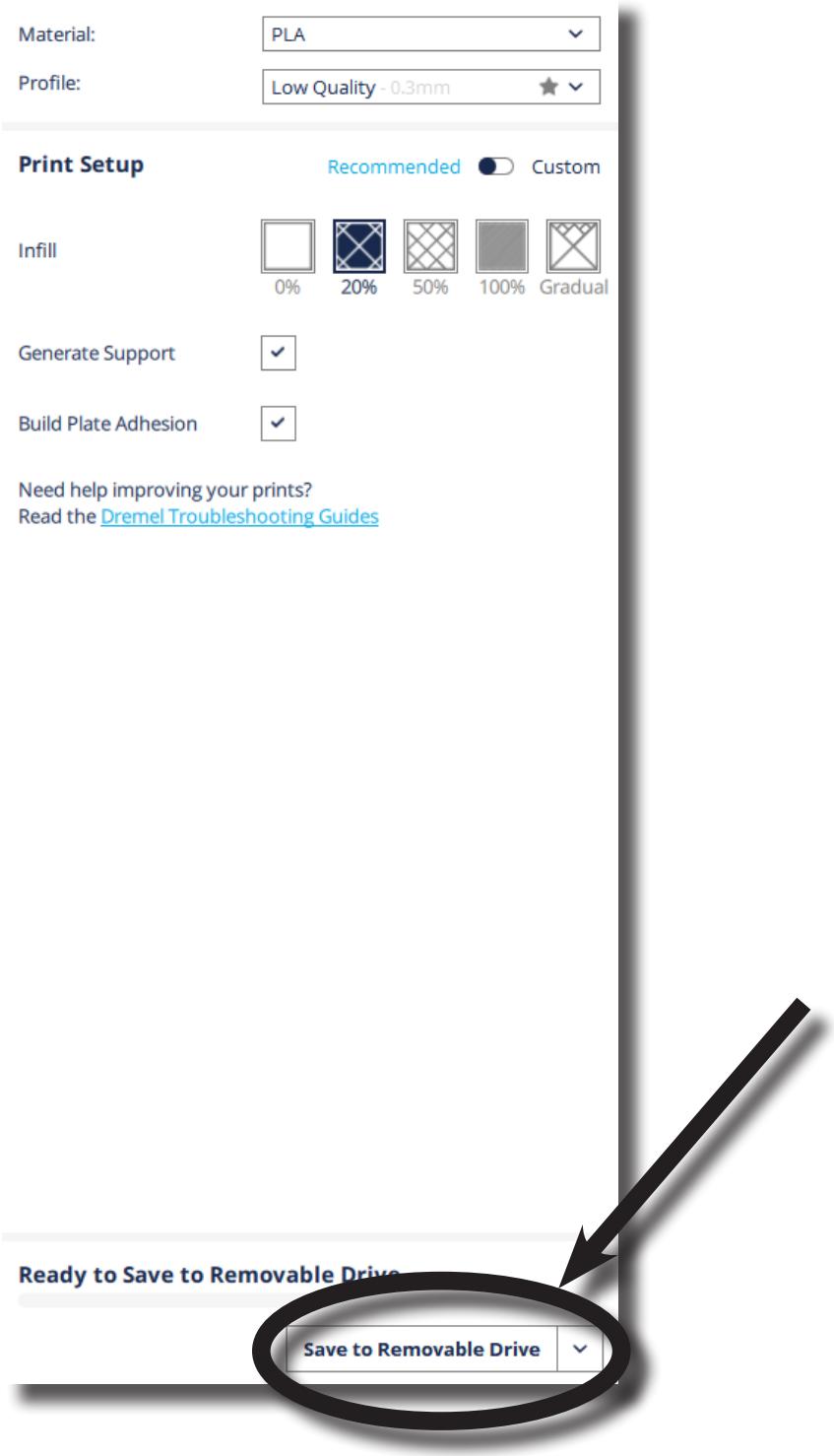
10. If you wish, you can check the box labeled "Build Plate Adhesion". The default is a skirt, a line of material printed around the model to ensure that the filament is properly flowing. (NOTE: It is recommended to check this box)



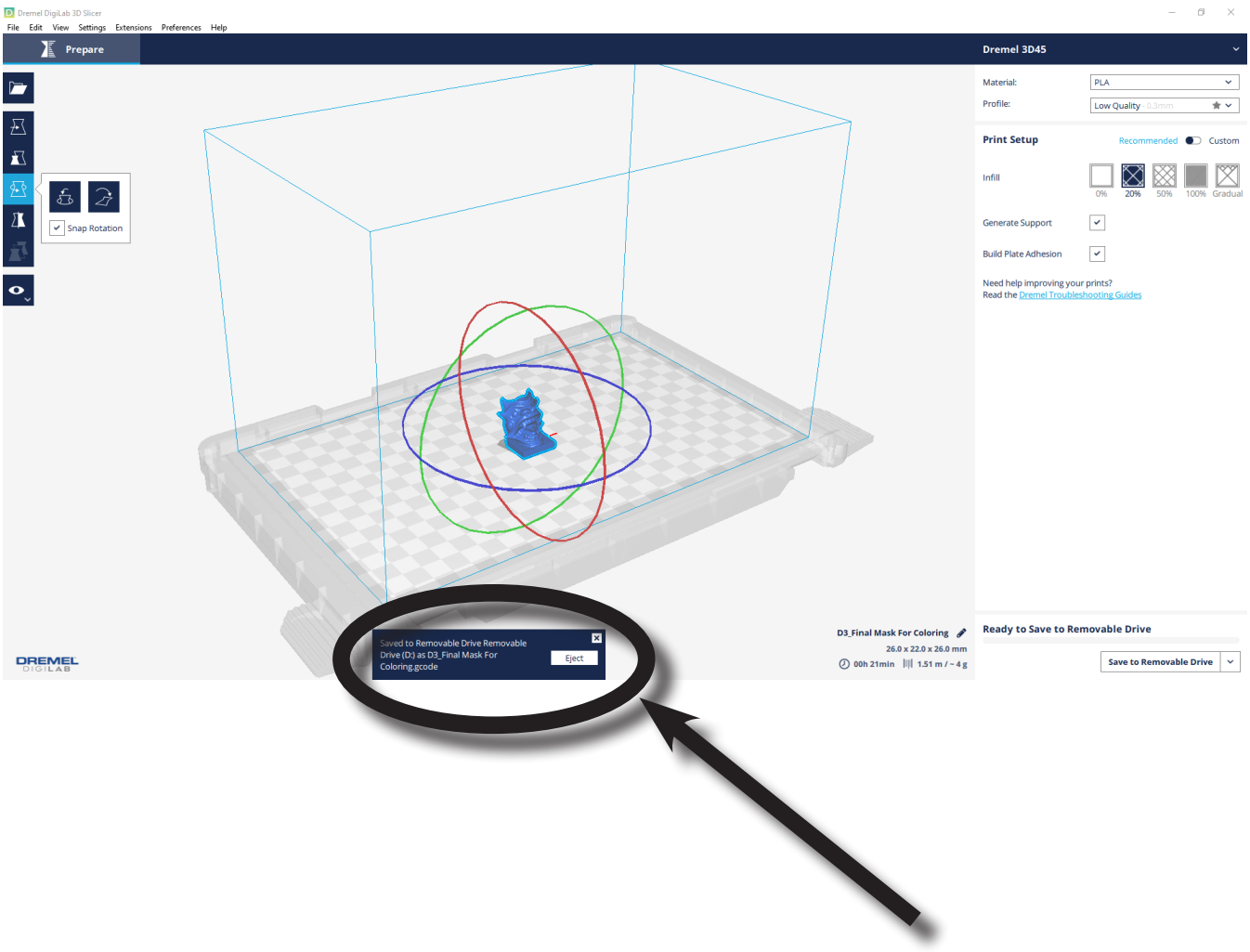
11. When you have finished adjusting the object's properties and the print settings, insert your USB drive into the computer, then click the "Prepare" button located in the lower right portion of the screen



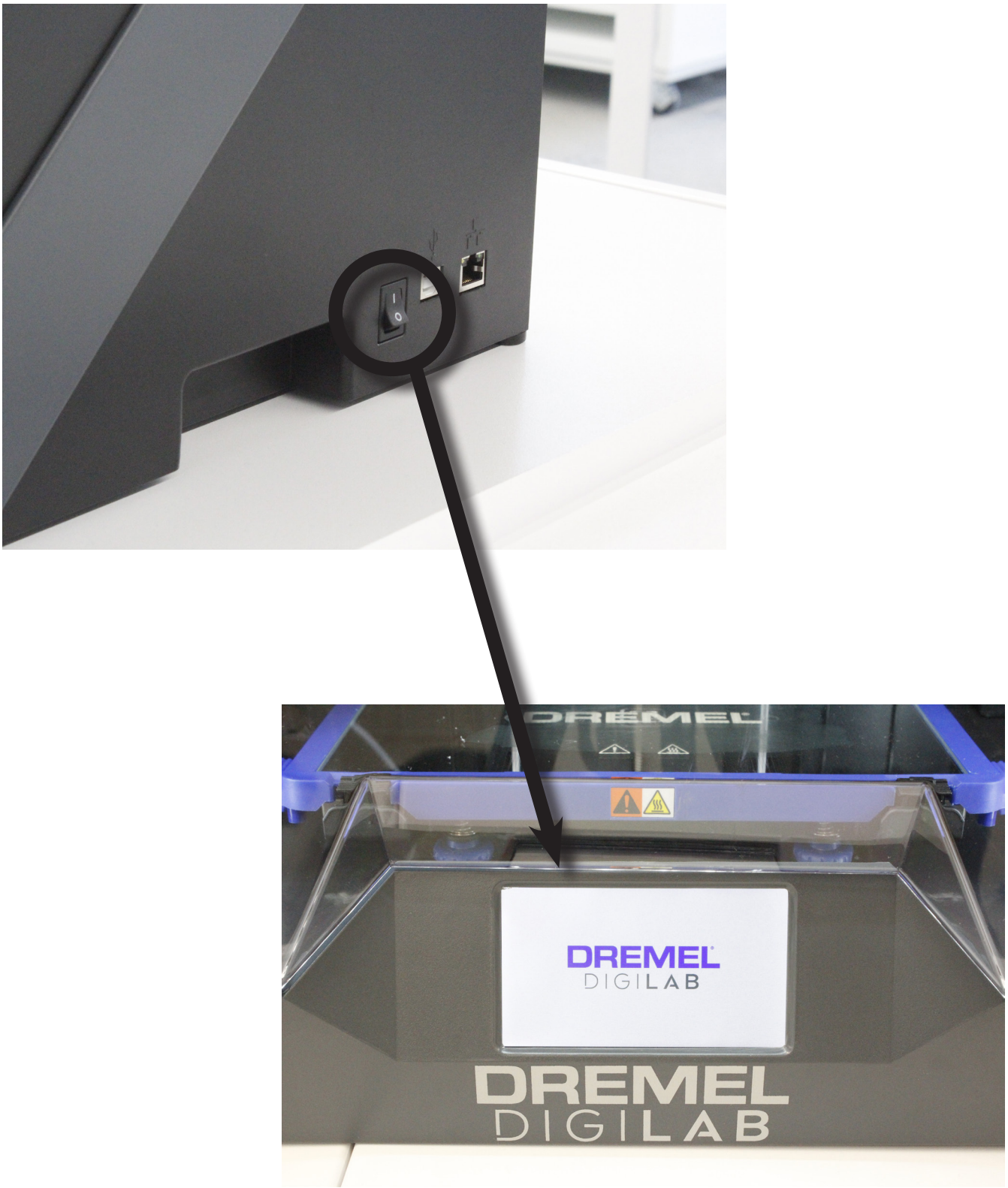
12. Next, click the "Save To Removable Disk" button located in the same location as the "Prepare" button. This will save the prepared file to your USB



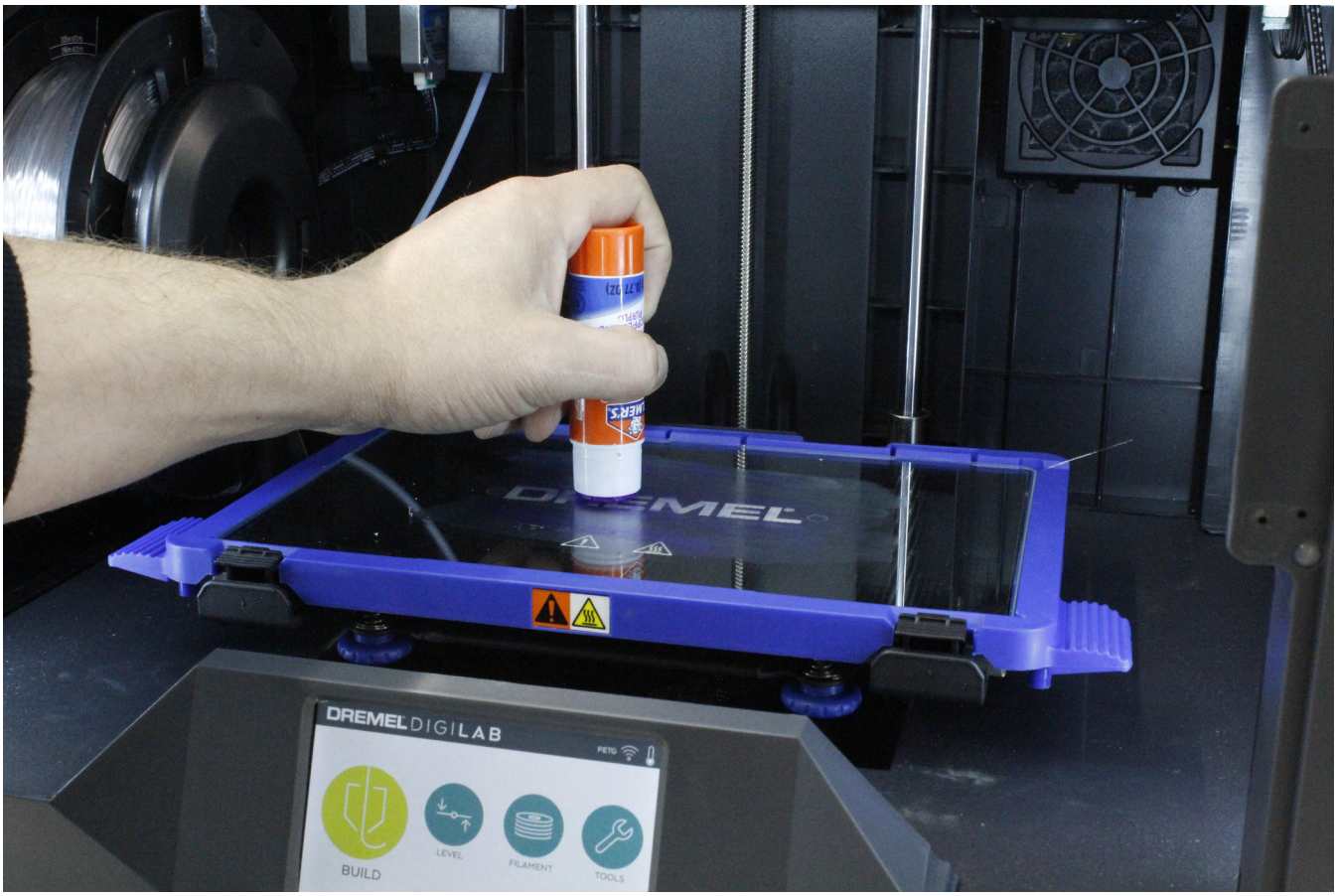
13. In the lower center part of the screen, click the “Eject” button and remove your USB



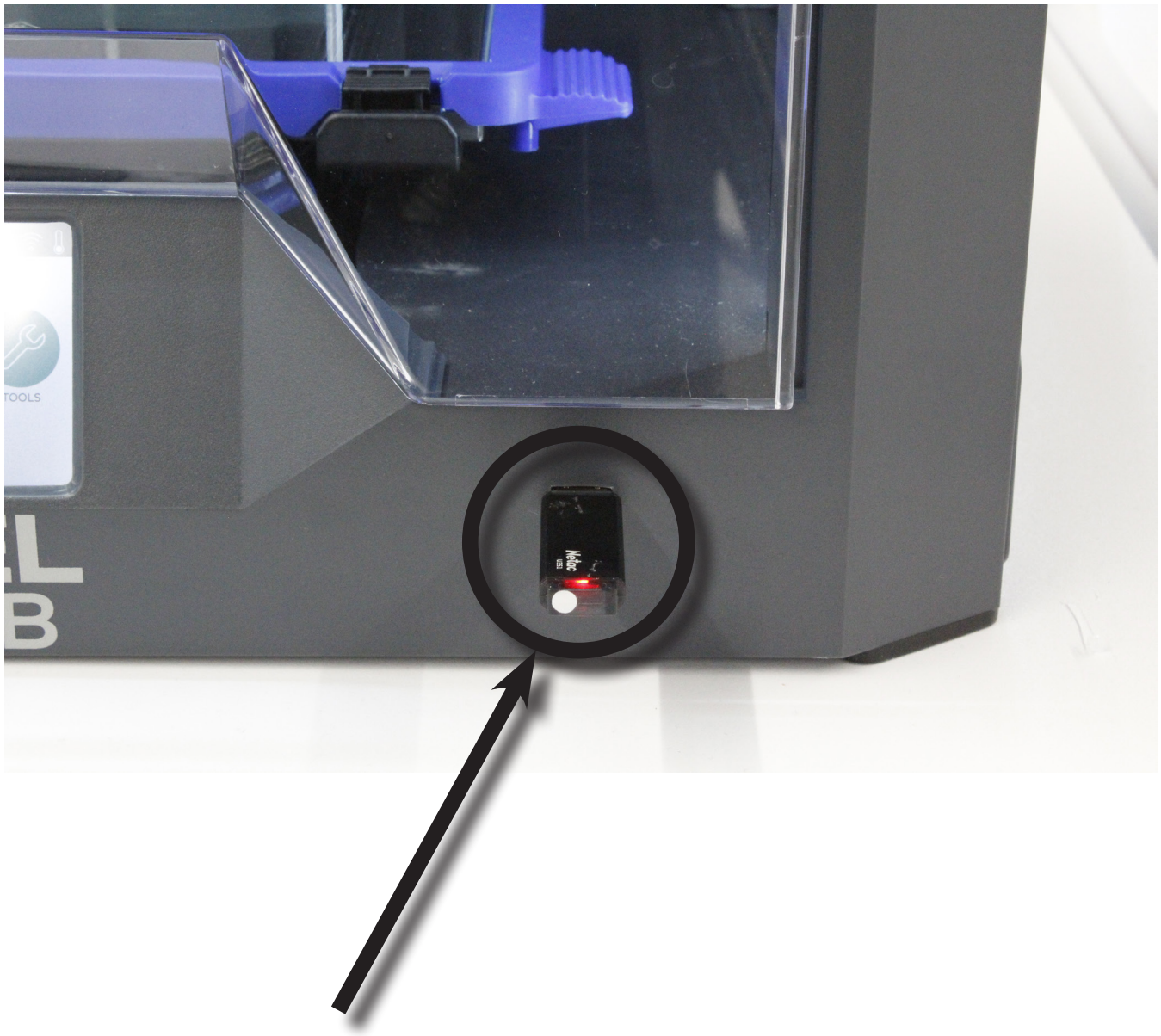
1. Make sure the machine is turned on



2. Apply a layer of glue using the glue stick. Make sure you cover enough surface area to account for the size of your print



3. Insert your USB into the port on the front of the machine

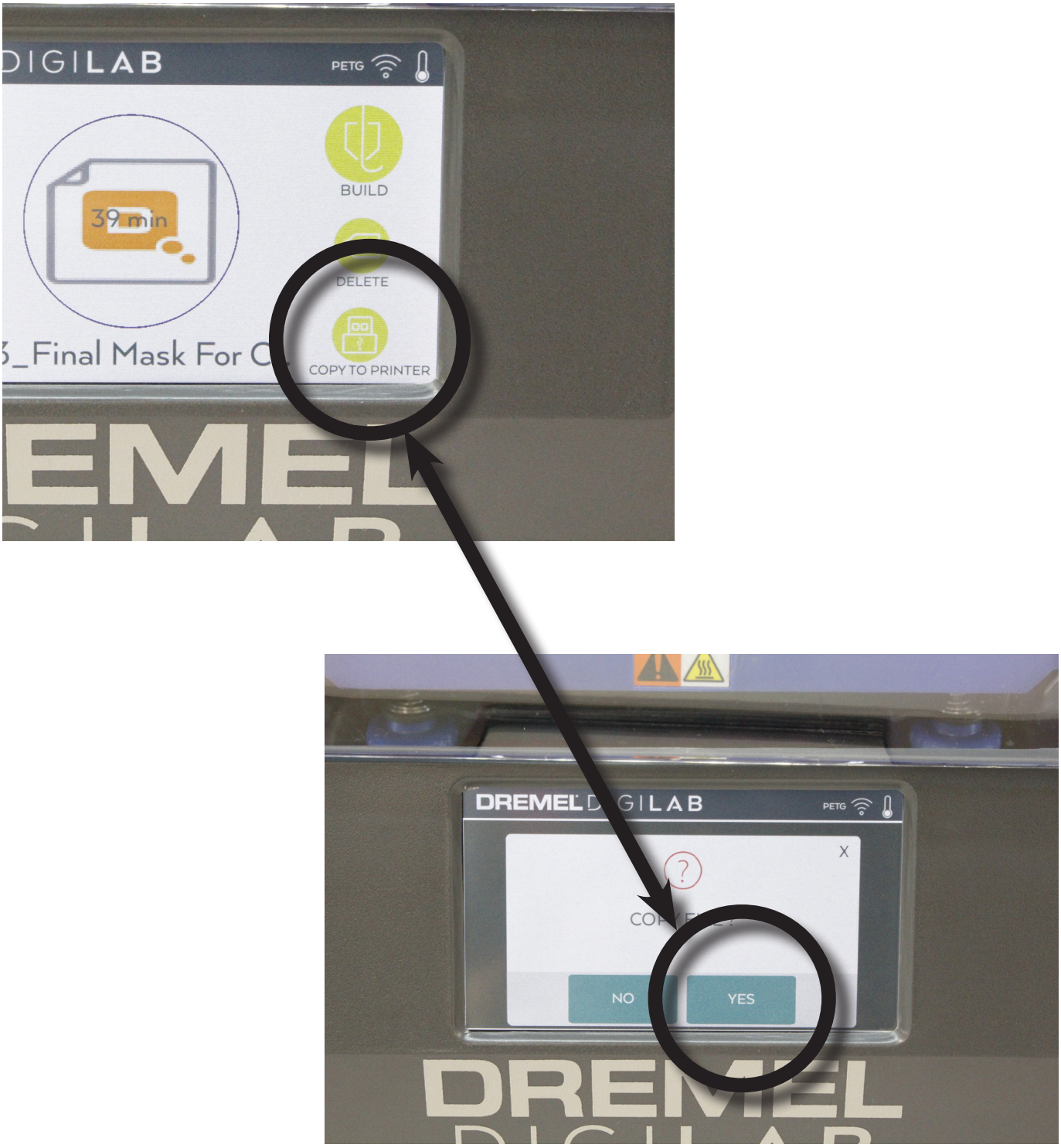


4. On the touchscreen, tap the “Build” button

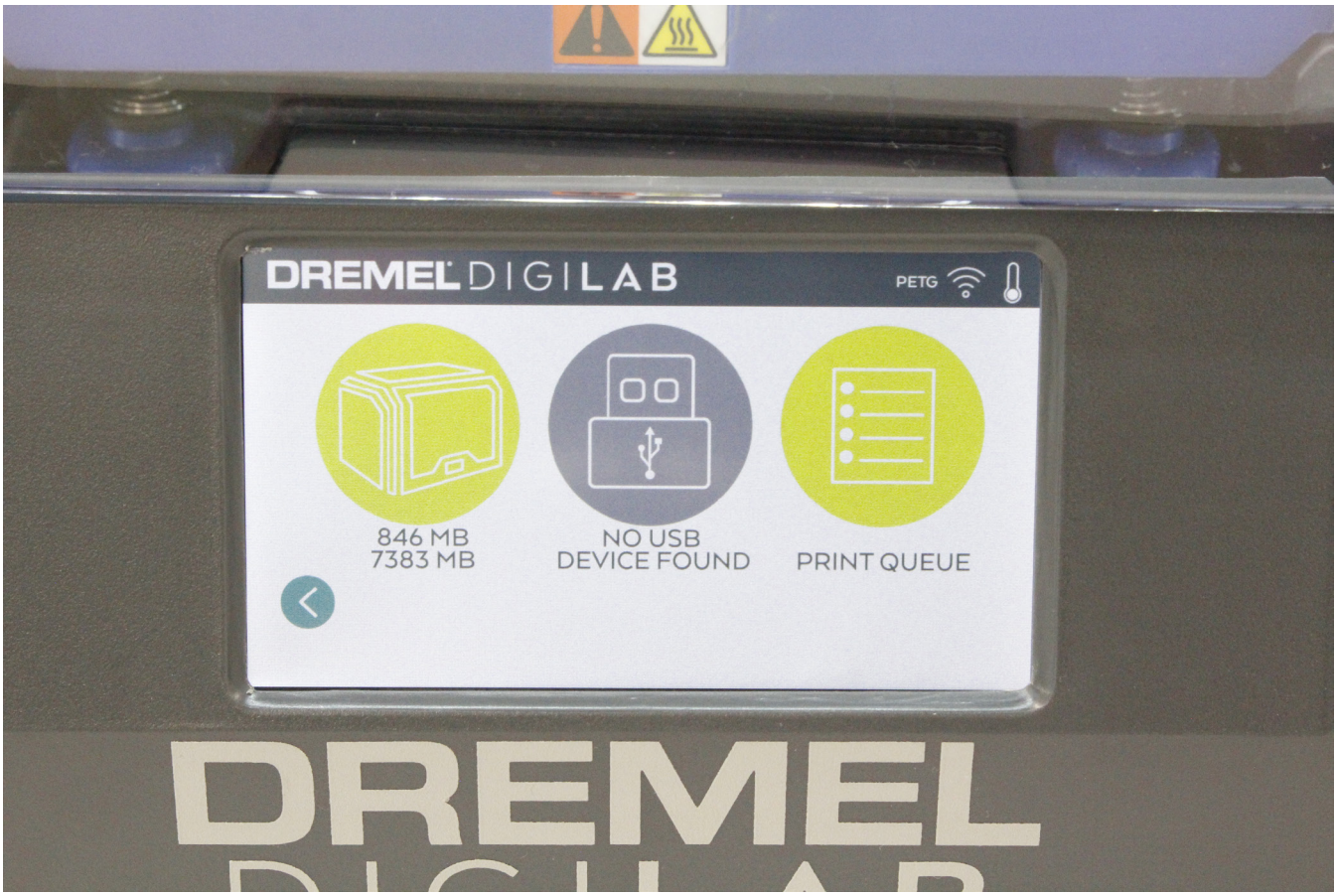
5. Tap the “USB” icon on the touch screen (Looks like a USB drive)

6. Using the up and down arrow buttons, locate your file, then tap it to select it.

7. In the new screen, tap the “Copy to Printer” selection. It will ask you if you want to copy they file. Tap “Yes”



8. Remove your USB. (This will return you to the screen on step 6 except now the USB icon will be grayed-out)



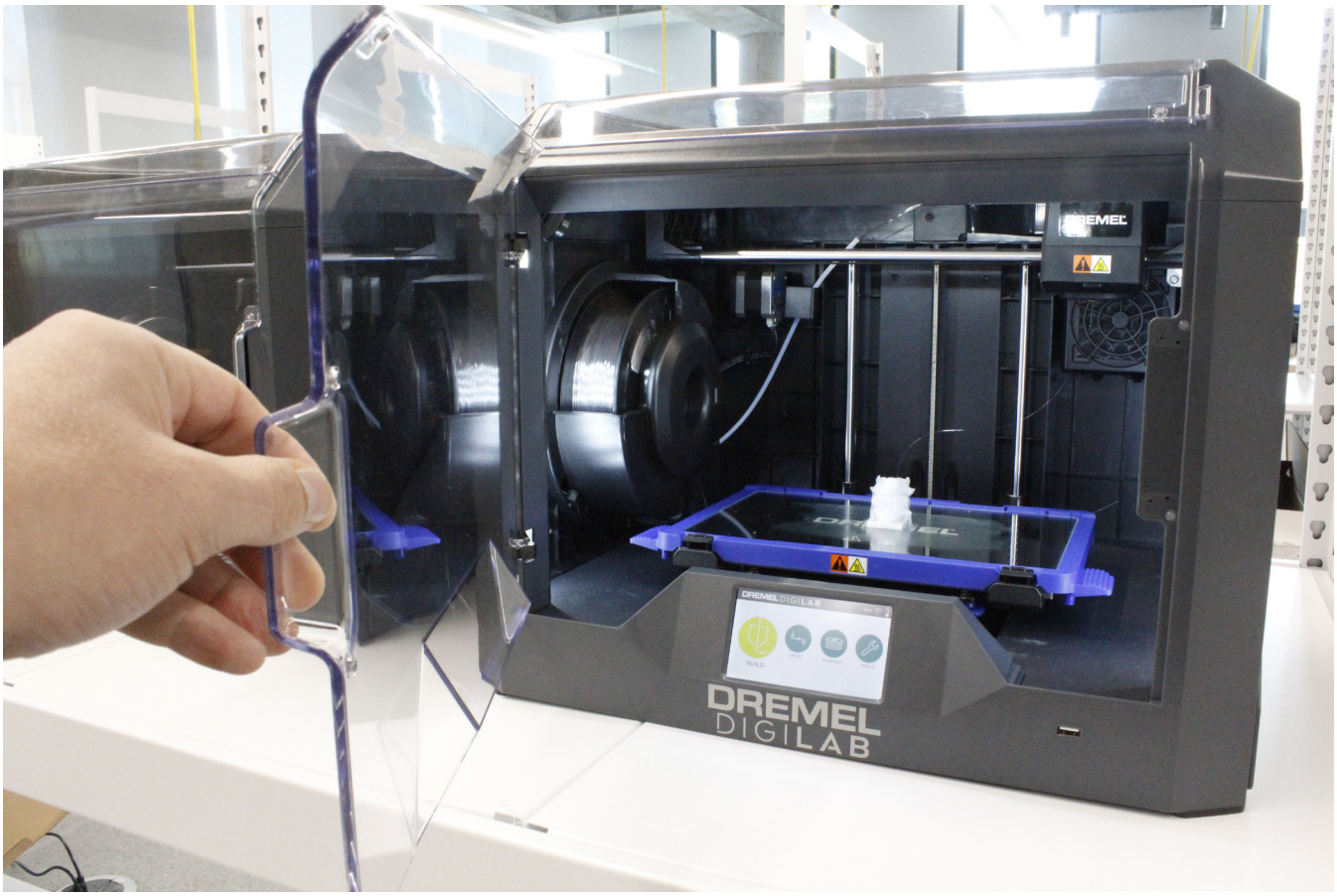
9. Tap the Left-most icon (looks like the Dremel Printer).

10. Locate and Tap your file once again on the touch screen

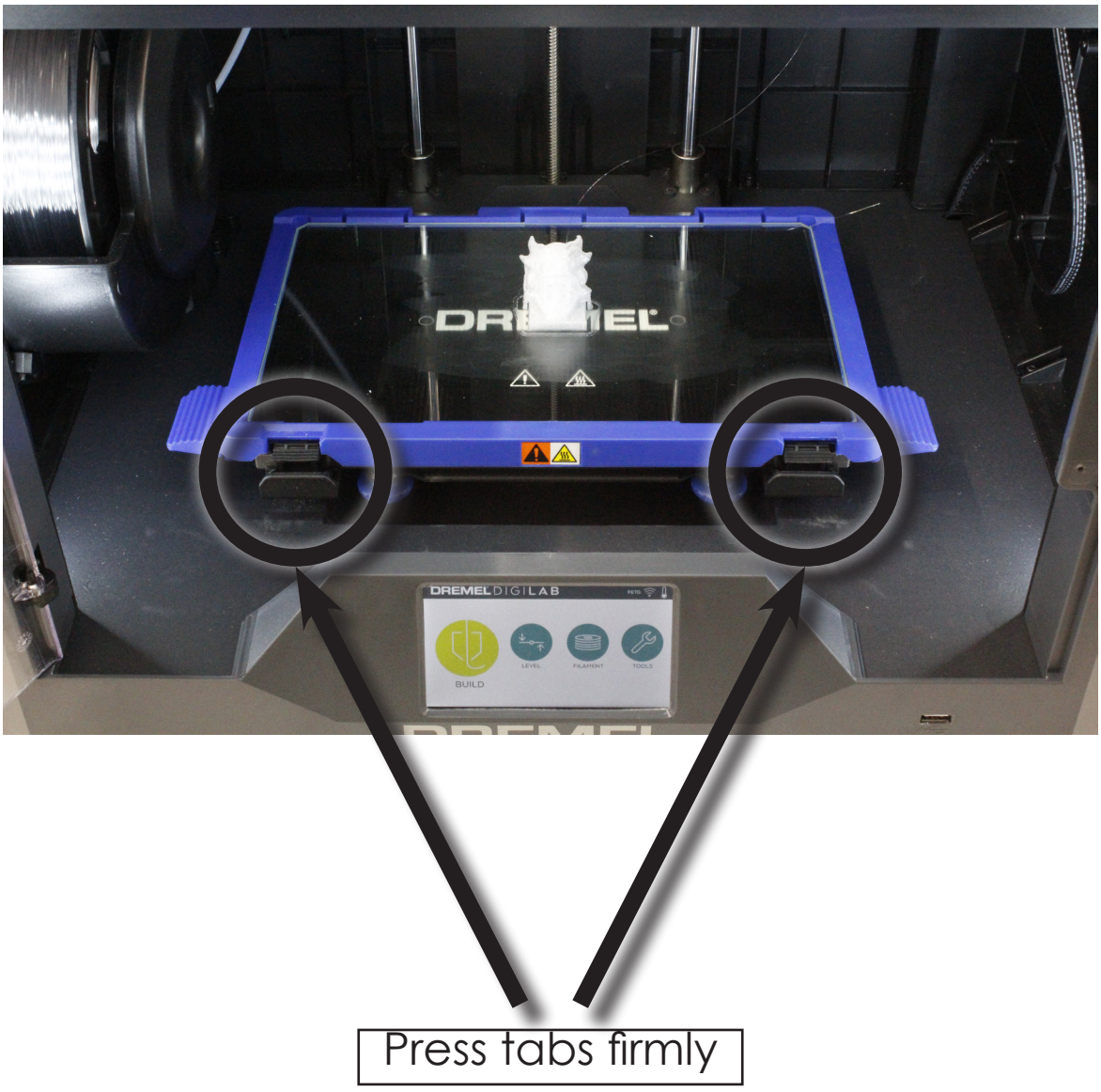
11. In the new screen, tap the “Build” button located in the top-right of the touchscreen. This will start the print

1. After the print finishes, the screen will display the message “Build complete. Clear the build platform”. Tap the “Accept” button

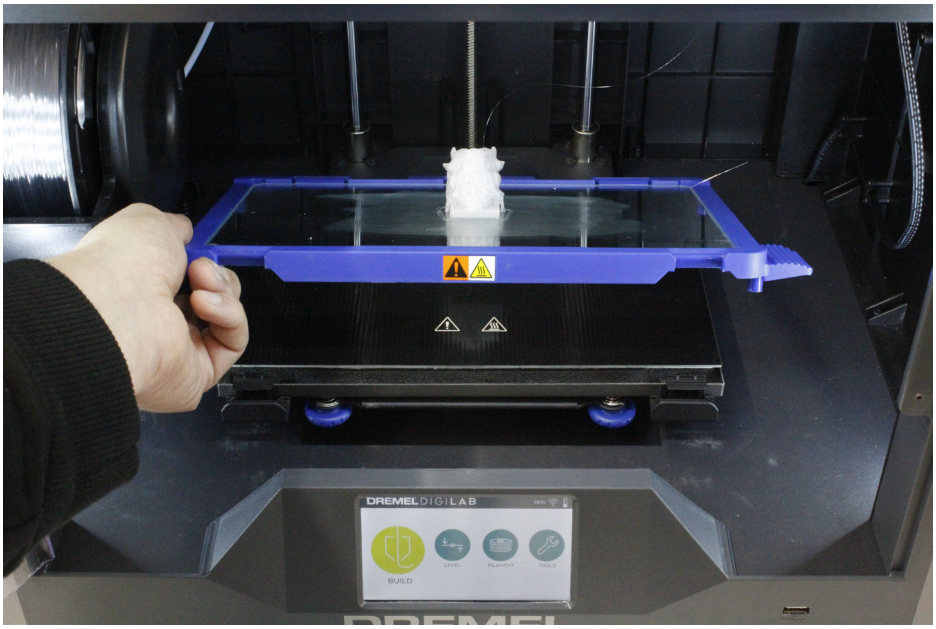
2. Open the front door

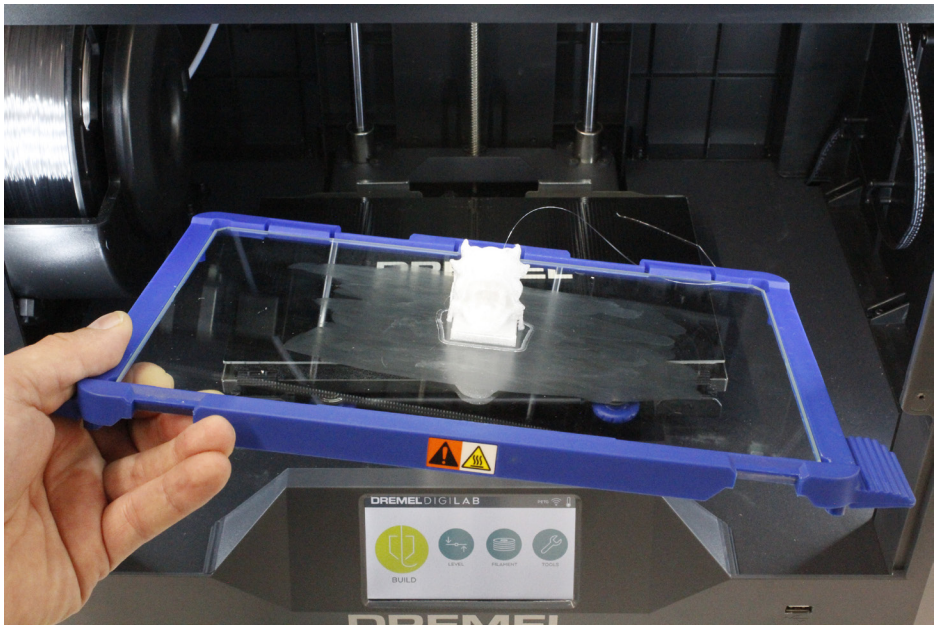


3. Release the build platform by pressing down firmly on the two black tabs in the front of the build platform

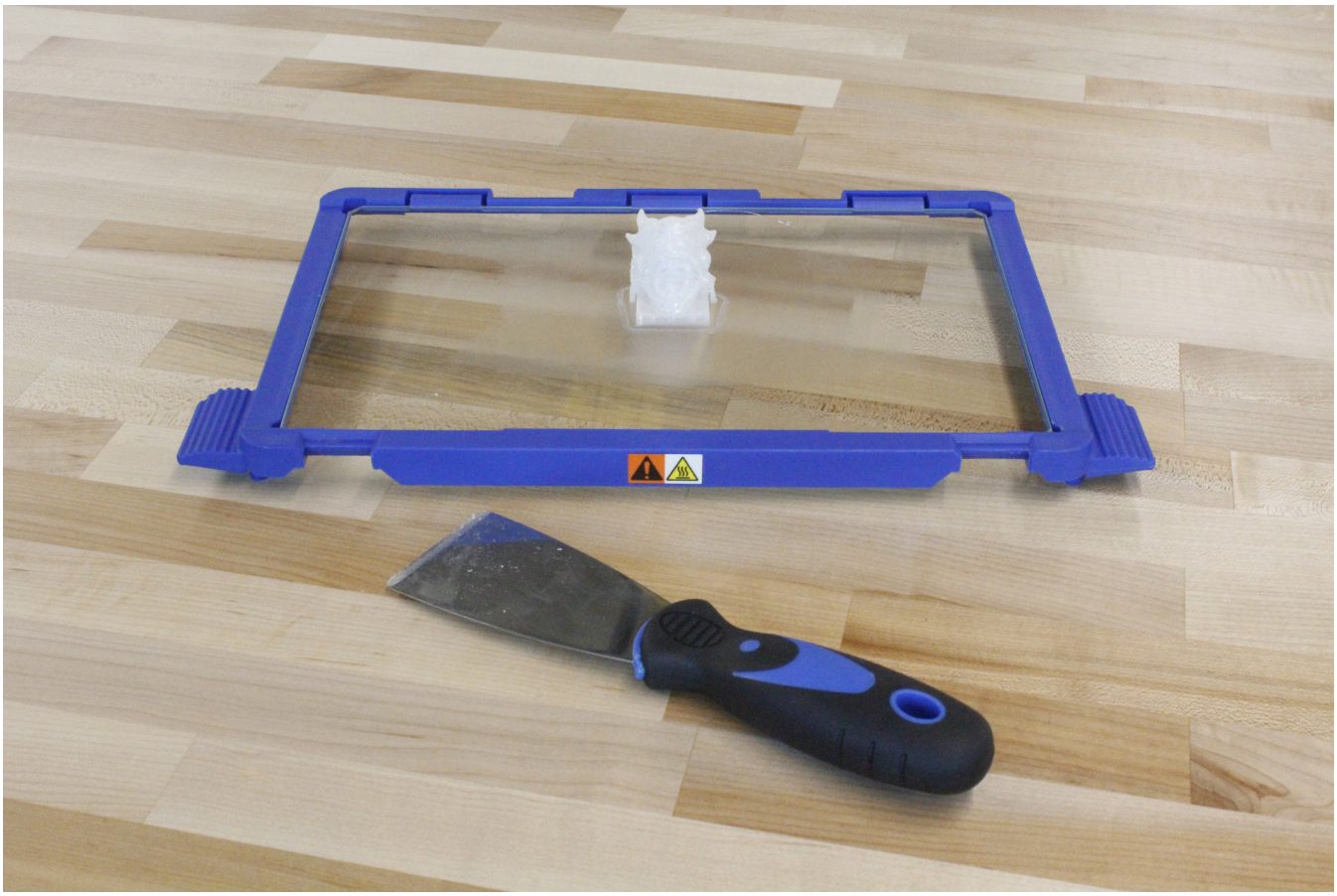


4. Using the handles on the side of the build platform, remove the build platform from the printer by first pulling it up about 45°, then pulling toward you

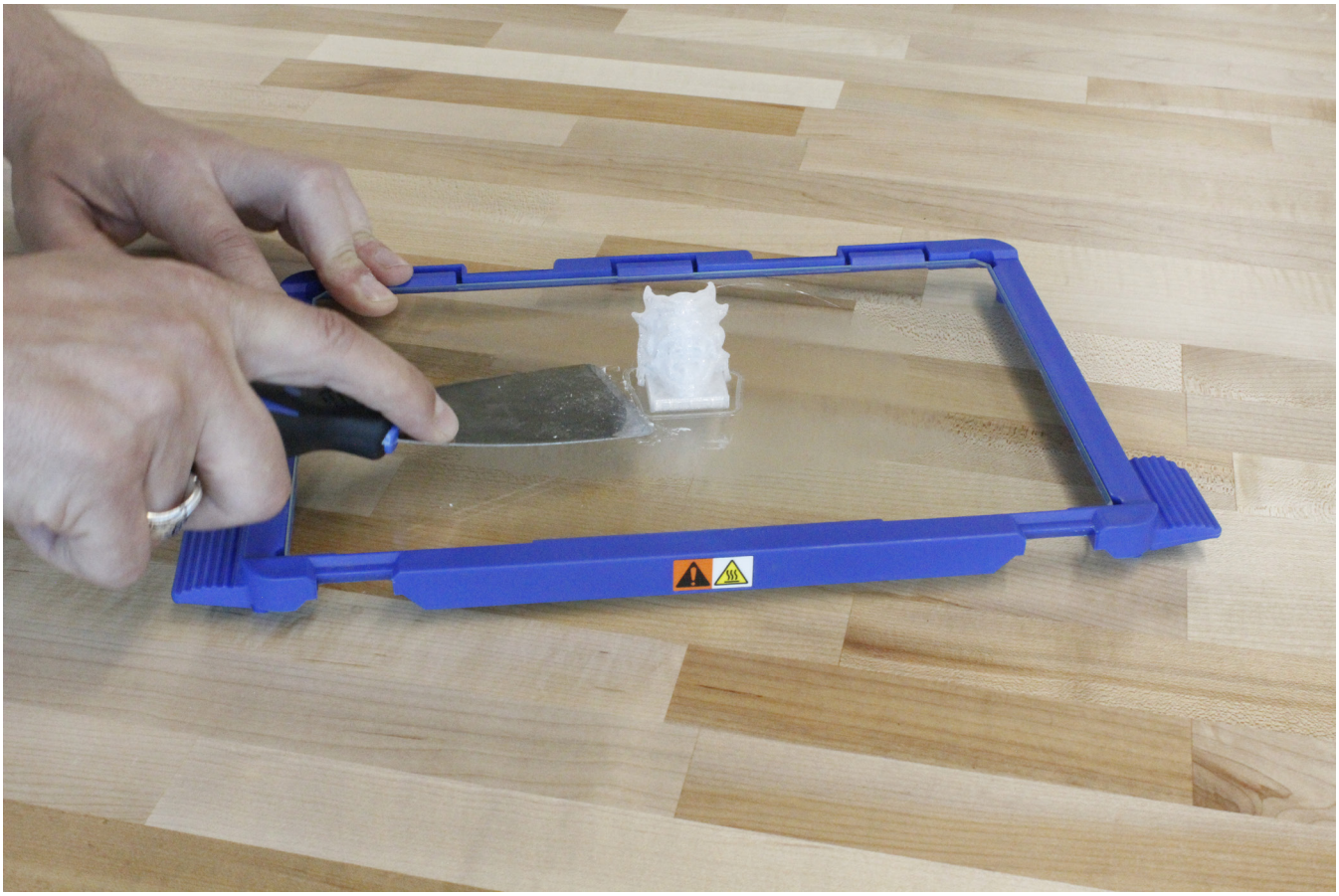


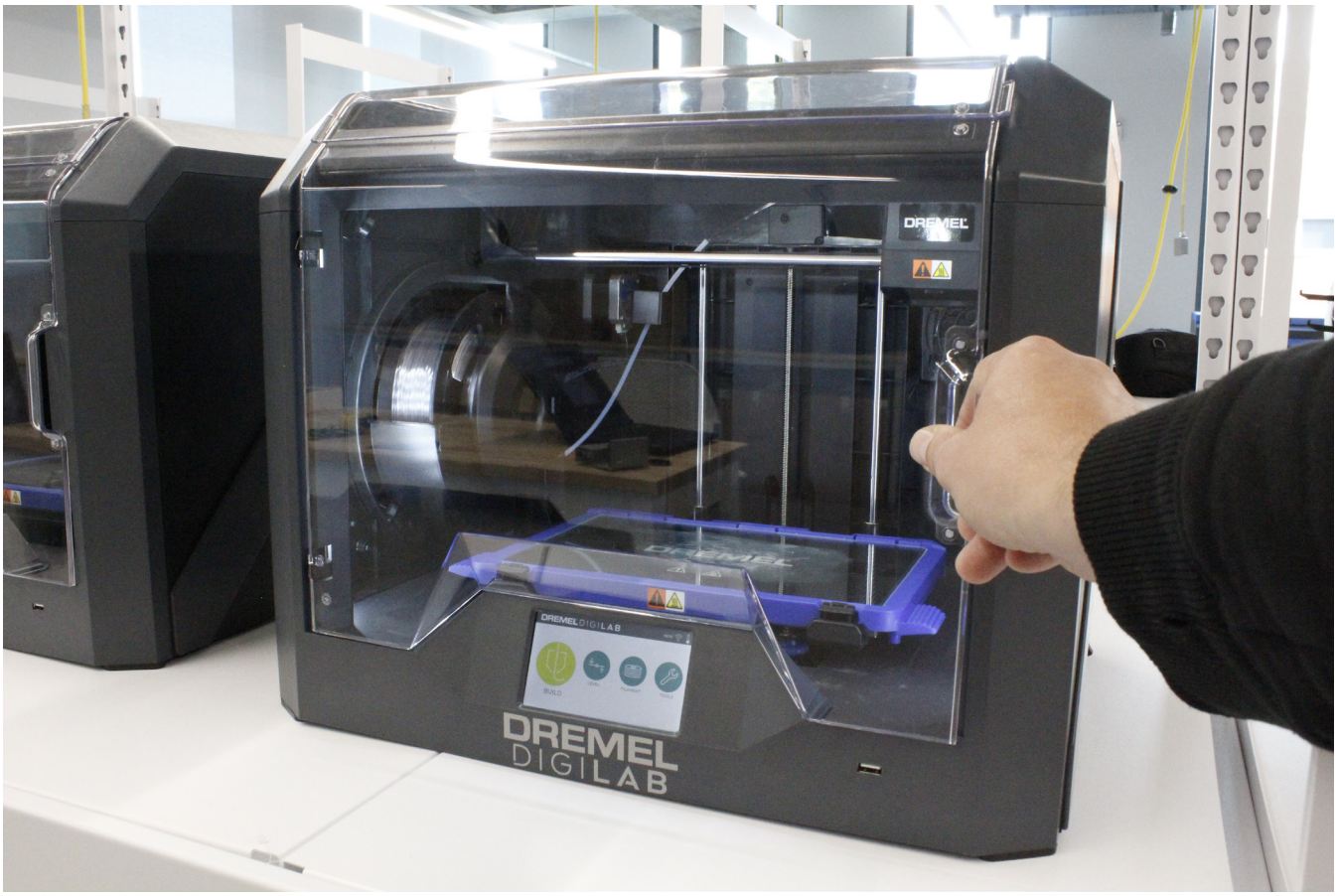


5. Place the build platform on a flat surface where it will not fall and break



6. Firmly hold the build platform, and, using the scraper, remove the print from the platform. CAUTION: always scrape AWAY from you! The scraper is sharp and can easily cut you!



7. After you have removed the print, re-attach the Build Platform. Make sure the Platform securely snaps into place

8. Close the front door