dFab 3d Printing Manual

Much of this is abbreviated from the 3D PRINTING HANDBOOK by Joseph Prusa. Refer to this manual for more detailed instructions if needed. Do not perform any maintenance that is not outlined below.

1 3d Printing Guidelines

1.1 Use Guidelines

1.1.1 Access

First priority goes to students performing homework for dFab coursework. Please check with a tech before sending prints that are longer than 16 hours.

1.1.2 dFab Filament

We provide filament for homework assignments in dFab coursework and the occasional small print for students outside of coursework. We want to make the machines accessible by providing this filament. In general, if you are making a series of prints, or a single larger print (more than 12 hours of printing time) best etiquette is to provide your own 1.75mm PLA filament. If you're in a pinch for time, it's ok to use dFab filament, keep track of what you used and replace it.

1.2 Filament Handling

1.2.1 Loading/Unloading

The end of the filament must always be held in your hand, or passed through the little hole on the rim of the spool. If you let go, it will almost certainly knot up, which will print failure. If the filament is knotted, or you let go, carefully unspool about 15-20 winds and re-wind it before passing the end through the hole for storage, or load the filament.

1.2.2 Storage

Dust and moisture are an issue with storage of filament, both are causes of nozzle (hot end) clog. Store filament in original plastic bag or zip lock bag with desiccant (that little pouch containing silica gel beads that says "do not eat – throw away") after opening.

1.3 Common Ways to Clog a Hot End

1.3.1 Don't Preheat the Hotend

We encourage you not to use the preheat function on the machine, simply load and start printing your file, the machine will automatically warm up to the correct temp, then prime and wipe the hot end clean with an "Intro Line"(that first thick extrusion from X0 Y-3 to X100) before each print starts. If you do for some reason need to pre-heat, stay near the printer and reset the printer before walking away. The filament sitting in the hot end without being extruded will burn and cause the nozzle to clog.

1.3.2 Reset the Printer – never power off while hot

Please do not turn the printer off at the power supply unless the hot end has reached room temperature (between 20 and 30C). This will certainly clog the extruder. Instead, press the "X" button below the knob on the front panel. This is because with the power on, the printer will keep the side fan running which in turn keeps the heatsink cool and keeps the filament from expanding and clogging the cold end of the extruder.

1.3.3 Printing with filled filaments such as wood fill or metal filled PLA

Please only print with PLA that has no other elements such as wood filler or metal filler. Use of these requires different nozzles and can cause intermittent clogging issues with our machines.

1.4 Don't remove prints from a hot bed

You can damage the bed by removing the prints when it is still hot. Allow to cool to room temperature before breaking your prints off the tray.

2 As Needed Maintenance

Do not perform any maintenance or calibrations that are not outlined below.

2.1.1 Calibrate Z – After you move the machine

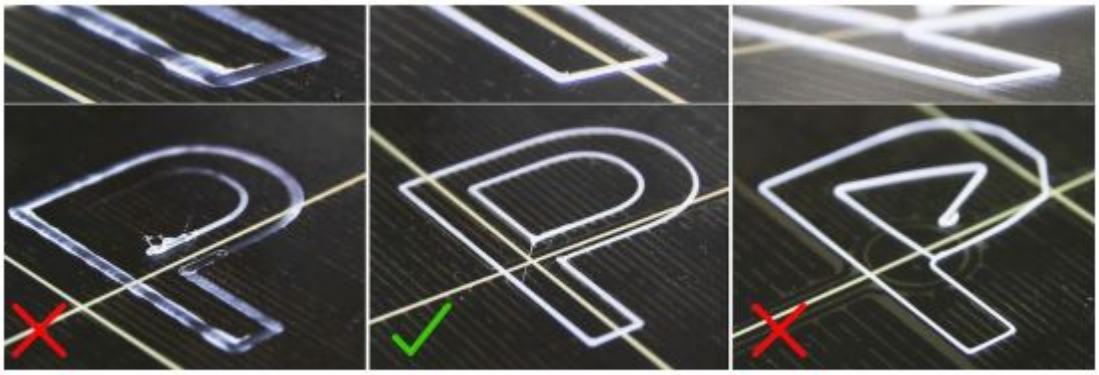
Calibrate Z is located in the **LCD Menu - Calibration - Calibrate Z**. It is always done with the steel sheet on. It should be performed whenever you move the printer to a different location. This procedure ensures, that 1) the X axis is perfectly horizontal, 2) the print nozzle is in a known distance from the print bed. In case the Z carriage did not touch the end stoppers, the printer could not possibly know the height of the print nozzle above the print bed and it could therefore crash into the print bed during the Z calibration procedure. The Z calibration procedure also prompts you to "Please clean the nozzle for calibration. Click when done." If this advice is not followed and there is a plastic debris on the print nozzle, then the debris may touch the print bed or even push the print bed away from the PINDA probe, so the PINDA probe will not trigger properly and the calibration will fail.

Self Test and **Calibrate XYZ should never be used, they are only for initial setup and will not help with extrusion problems or Z calibration.**

2.1.2 Live Z Adjust– Print not sticking OR nozzle is clogging early in the print

Ensure that the bed is clean. Remove the steel sheet and allow it to cool, clean with Windex and a paper towel. Ensure that the heating bed is clean before replacing the spring steel tray.

Carefully watch your first layer. The perimeters should stick to the bed, but should not be transparent. See the below photograph from the 3D PRINTING HANDBOOK.

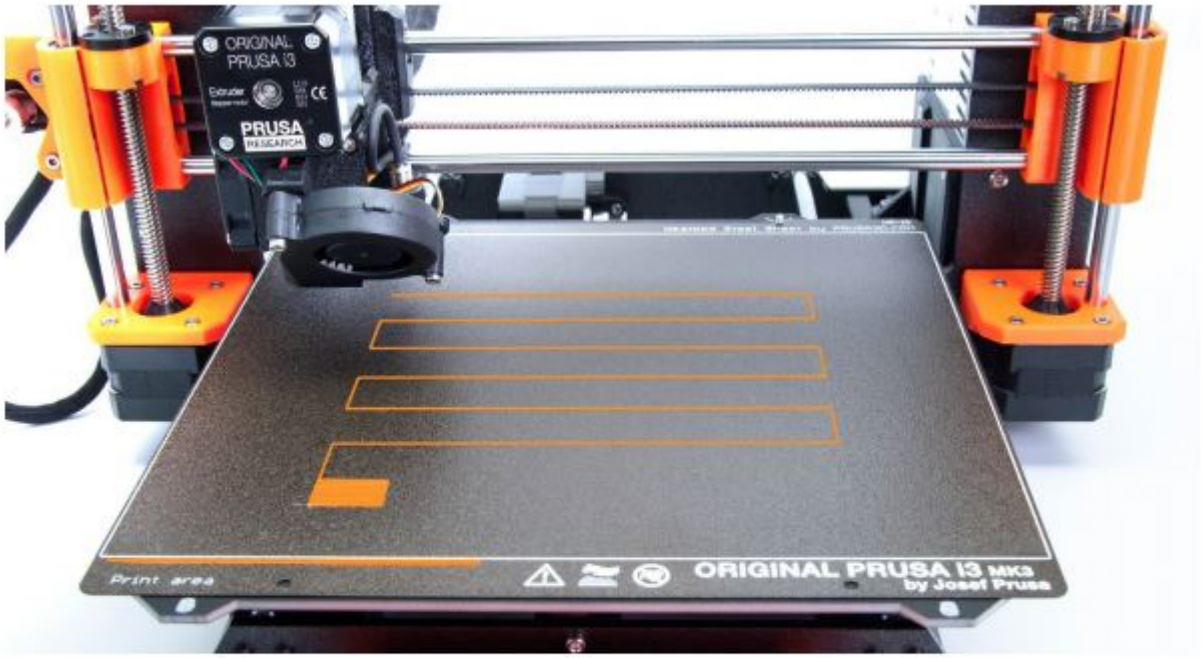


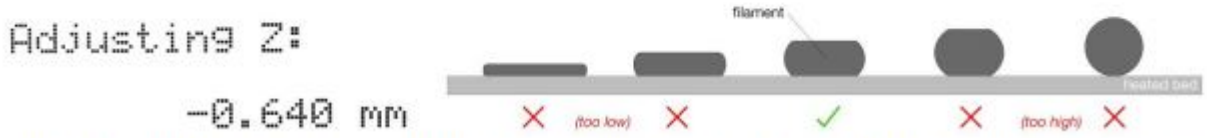
Pict. 11 - The properly-tuned first layer

2.1.3 First Layer Calibration

Sometimes it's frustrating to use Live Z Adjust to try and get the printer calibrated on your print. If you would prefer use first layer calibration.

You can launch the calibration from **LCD Menu - Calibration - First layer cal**. The printer will probe the bed and start printing a zig-zag pattern on the print surface. The nozzle will be at the height based on the PINDA probe setting, it must not by any means touch the printing surface.





Pict. 10 - How to tune the nozzle height live during the test print. Note: -0.640 mm is only for illustration. Your setting will be different!

Observe the line which is being extruded on the print surface. A new menu will automatically show up where you can tune the nozzle height in real time by turning the knob. The aim is to adjust the nozzle height until

the extruded plastic sticks nicely to the bed and you can see that it is being slightly squished. The value should not exceed -2.000 mm. On the solid infill portion at the end of the print, inspect it to see that each line is fused to the next one AND there are no ridges between the layers.

2.1.4 Clogged/Jammed Extruder

Reach out to a student tech for help with unclogging the extruder.

3 Maintenance Schedule

3.1 Weekly Maintenance – Performed by Student Techs

3.1.1 Bearings

Clean smooth rods with a paper towel, then apply 3 drops of way oil to each smooth rod and move axis back and forth slowly by hand with printer off. Jog Z axis from bottom to top by holding wheel down for 2 seconds. If you notice any axis not running smoothly through its range of travel, notify studio manager.

3.1.2 Fans

Dust and plastic can build up in fans causing a decrease in efficiency or even damage. Inspect both fans. Use tweezers to remove any large piece, use cleaning duster to blow away dust.

3.1.3 Extruder Drive Gear

Inspect drive gears through windows on either side of extruder housing. If you notice buildup in the gears or are noticing missing lines of extrusion in prints, inspect the gears. They can be cleaned with a toothpick

3.2 Monthly Maintenance (only with studio manager)

3.2.1 Extruder Drive Gear

Lubricate gears with lithium grease after disassembly

3.2.2 Bearings

Inspect and grease if needed

3.2.3 Filament Sensor

Inspect and clean if needed