

INF Printing Best Practices



CubePro®

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Introduction

Printing with Infinity Rinse-Away™ (INF) is an exciting endeavor for the 3D printing enthusiast. Now, you can utilize supports that can be dissolved in water for easier post processing.

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Compliance

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

 **NOTE:** Changes or modifications to this equipment not specifically approved by 3D Systems may void the user's authority to operate this equipment.

KCC

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

This equipment is home use (Class B) electromagnetic wave suitability equipment and to be used mainly at home and it can be used in all areas.

This equipment conforms with International Electric Committee (IEC) 60950-1 and meets the requirements of the applicable EC directives.

CAN ICES-3 (B)/NMB-3(B)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



Important Safety Information

Safety Symbols and Definitions



HOT SURFACE HAZARD: A HOT SURFACE IS ACCESSIBLE IN THE VICINITY OF THIS SIGN OR AT THE PRINT JET. AVOID CONTACT WITH THESE AREAS. HOT SURFACES CAN CAUSE SEVERE BURNS.



Caution: Indicates something may happen that could cause loss of data, damage to equipment, or could cause personal injury.



Caution: Indicates a pinch point hazard that could cause personal injury.



SHOCK WARNING: INDICATES A POTENTIAL SHOCK HAZARD.

SAFETY GUIDELINES

- Follow all safety rules in this section and observe all cautions and warnings in this guide.
- Do not modify any safety features or make modifications to the CubePro. Doing so is prohibited and voids the warranty.
- Use of print materials other than genuine 3D Systems components may void the warranty.



WARNING: HAZARDOUS MOVING PARTS. KEEP FINGERS AND OTHER BODY PARTS AWAY.



HOT SURFACE HAZARD: DO NOT TOUCH THE PRINT JETS DURING SETUP AND OPERATION. THE PRINT JETS BECOME VERY HOT.



Caution: Read and follow all instruction prior to setting up the printer.



SHOCK WARNING: DUE TO RISK OF SHOCK, AVOID CONTACT WITH ALL INTERNAL ELECTRONIC COMPONENTS.



WARNING: THE CUBEPRO SHOULD ONLY BE SERVICED BY AUTHORIZED SERVICE TECHNICIANS. PRIOR TO ANY PART REPLACEMENT PROCEDURE, THE PRINTER MUST BE POWERED OFF AND DISCONNECTED FROM UTILITY POWER.



HOT SURFACE HAZARD: WHEN PRINTING WITH ABS MATERIAL, THE INTERIOR (PRINT CHAMBER) OF THE PRINTER WILL HEAT TO A PREDETERMINED TEMPERATURE. THE SURFACE OF THE PRINT CHAMBER HEATER WILL BE HOT. AVOID CONTACT WITH THE PRINT CHAMBER HEATER AND NOTE THAT OTHER COMPONENTS INSIDE THE PRINT CHAMBER MAY BE HOT.

To ensure safety, please exercise caution when operating your CubePro. Read and follow all safety precautions as outlined in this user guide. Be careful when operating your CubePro to ensure proper printing and be mindful of and avoid hot surfaces.

INF Printing

Verify the Print Jet Nozzle Level

Leveling the print jet nozzles is very important to ensure quality prints especially after replacing a print jet, an extruder assembly or the print pad.

The Print Jet Level Gap calibration file requires all cartridge bays to be loaded with the same material type cartridges.

NOTE: Ensure the file used matches the printer model and the installed print material type. All installed cartridges must be of the same material type. (Ex. If the cartridge bays have ABS material cartridges installed, print the ABS Level Gap calibration file.)

These files are available at www.3dsystems.com/shop/cubepro/downloads. The Level Gap Calibration files are available from the Calibration Files download link in the Firmware and Files section of the web page.

The file names are listed below:

PLA:

- noz12_PLA_LEVELGap.cubepro (This file is for printing PLA on a CubePro Duo)
- noz123_PLA_LEVELGap.cubepro (This file is for printing PLA on a CubePro Trio)

ABS:

- noz12_ABS_LEVELGap.cubepro (This file is for printing ABS on a CubePro Duo)
- noz123_ABS_LEVELGap.cubepro (This file is for printing ABS on a CubePro Trio)

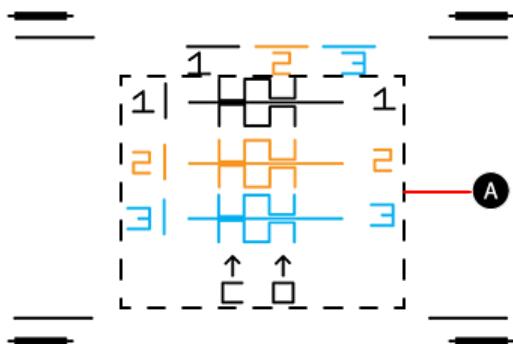
Nylon:

- noz12_NYL_LEVELGap.cubepro (This file is for printing nylon on a CubePro Duo)
- noz123_NYL_LEVELGap.cubepro (This file is for printing nylon on a CubePro Trio)

Other files may be made available in the future.

Level Nozzle Calibration Print Overview

The following illustration demonstrates what you would see when the print jet nozzles are properly leveled.



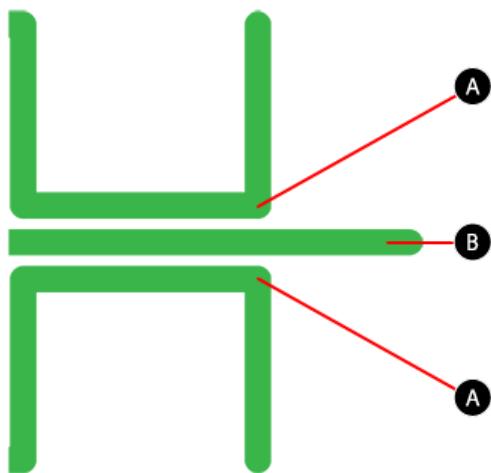
A **Z-Gap** - The Z-Gap is the distance between the print pad and the print jet nozzles. The Z-Gap should always be checked and adjusted first before the Level Gap.

Important

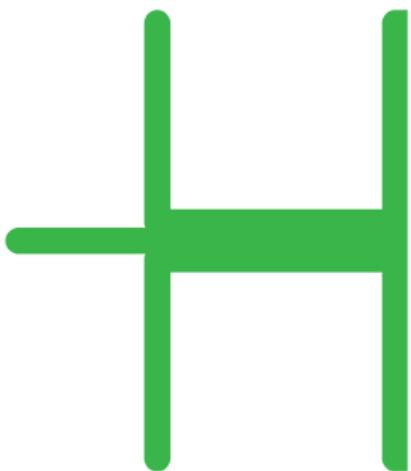
If either ABS or PLA materials are used to check nozzle level, the gap must be checked with the nylon single nozzle Level_Gap file.

- When using NYL_LEVEL_GAP it is best to have the corner-plate level patterns contain a gap above and below the baseline.
- The gap for nylon is different than the gap for ABS and PLA materials. For best print results, the Z-gap for nylon should be slightly more than the Z-gap for other materials when reading the open Z-gap print. This gap is found between the measurements lines (A)

and the baseline (B).



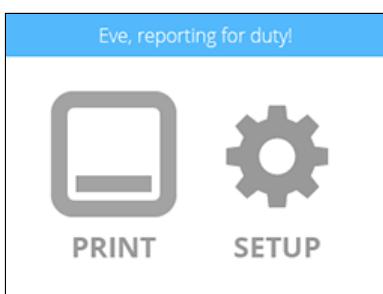
- The closed pattern should remain be closed.



Printing the Level Gap Calibration File

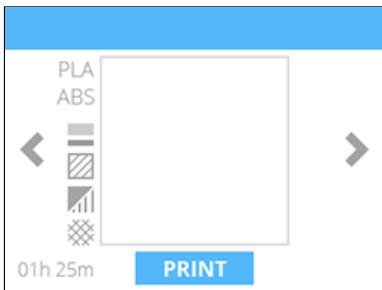
 NOTE: Ensure the print pad is completely clean from glue and printed parts before beginning this procedure.

1. Download the [CALIBRATION FILES](#) and extract them to your computer's hard drive.
2. Navigate to the file location and copy the appropriate file to your USB mass storage device.
3. Insert the USB mass storage device into the USB host port on the printer.
4. Select [PRINT](#).



5. Using the arrows, navigate to the Level Gap Calibration file and select [PRINT](#).

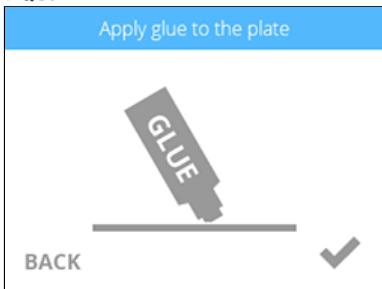
 NOTE: There are several Level Gap Calibration files as well as Nozzle Offset Calibration files. Select the Level Gap Calibration file for print material type installed in the printer.



6. Apply two thin layers of Cube Glue to the print pad in an area of 50 mm x 50 mm. Select the **checkmark** to continue.

NOTE: For more information, refer to the section titled [Applying Cube Glue](#).

NOTE: It may take several minutes to print the file.



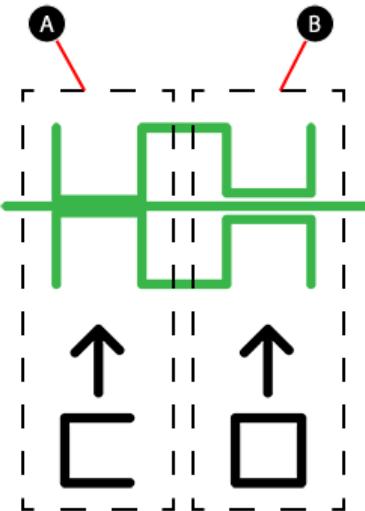
7. When finished, remove the print pad and verify the Level Gap.

NOTE: If any adjustments are needed, perform this procedure again after making the adjustments. Make sure all glue and plastic residues have been removed prior to performing this procedure again.

Compare Print Jet Z-Gaps

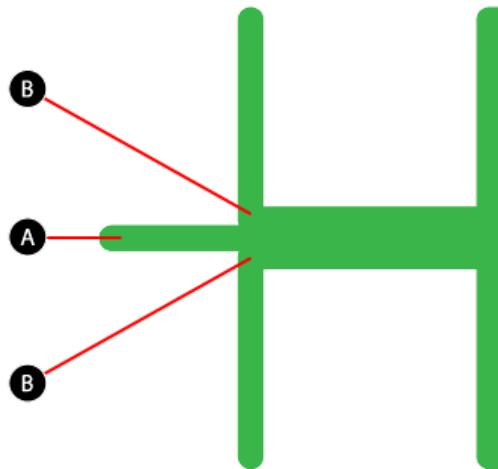
Inspect the Z-Gap readings for each print jet. If any of the print jets have an incorrect Z-gap, they will need to be leveled again.

NOTE: The Closed Z-Gap (A) and the Open Z-Gap (B) are two different measurements but should be read together.



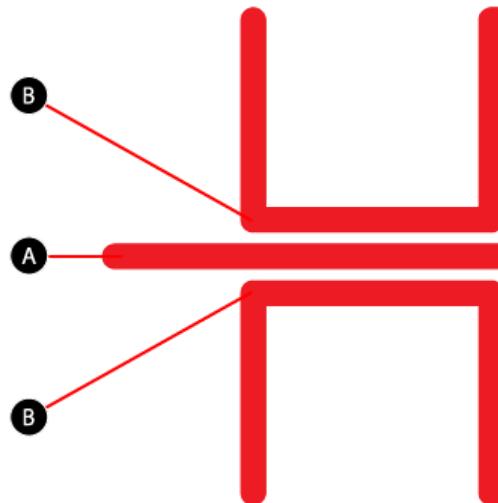
Correct Closed Z-Gap

The Closed Z-Gap bars (B) should touch the baseline (A). This should be consistent with the calibration print for each print jet.



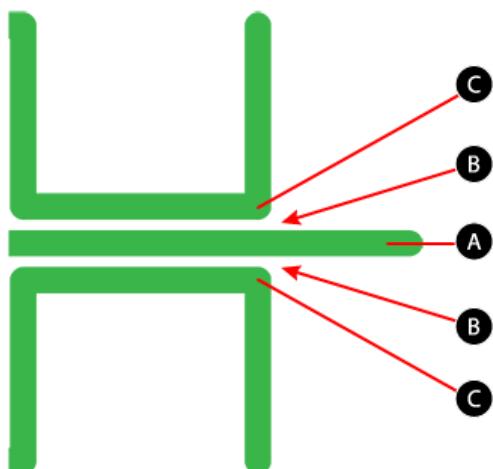
Incorrect Closed Z-Gap

If there is a gap between the Closed Z-Gap bars (B) and the baseline (A), that print jet is too high and should be adjusted. Once it has been adjusted, print the calibration file again to verify that the print jets are level.



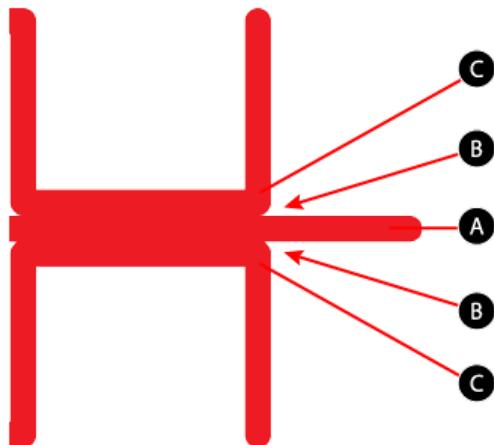
Correct Open Z-Gap

If there is a gap (B) between the Open Z-Gap bars (C) and the baseline (A) and there is no gap between the Closed Z-Gap bars and the baseline, that print jet is level.



Incorrect Open Z-Gap

If there is no gap (B) between the Open Z-Gap bars (C) and the baseline (A), that print jet is too low and should be adjusted. Once it has been adjusted, print the calibration file again to verify that the print jets are level.



Leveling The Print Jet Nozzles

Tools Needed

- T10 Torx Driver

Level The Print Jets



SHOCK WARNING: EXERCISE CAUTION WHENEVER YOU ARE NEAR ELECTRICAL COMPONENTS.



WARNING: BEFORE SERVICING THESE COMPONENTS, ENSURE YOU ARE WEARING A WELL-GROUNDED ELECTRO-STATIC DISCHARGE (ESD) STRAP. ESD PROTECTION IS REQUIRED.



WARNING: NEVER PULL ON WIRES TO DISCONNECT THE CONNECTORS. THIS COULD DAMAGE THE WIRES AND THE CONNECTORS AND VOID THE MANUFACTURER'S WARRANTY.

The following procedure is intended to provide instructions about how to level print jets for printers with more than 1 print jet.

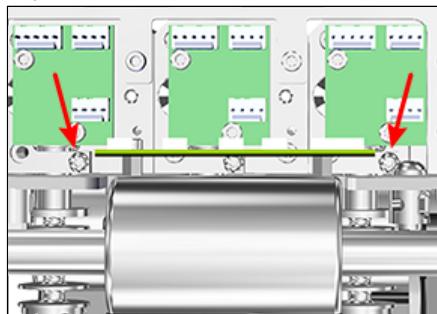
1. For printers with two (2) or three (3) print jets, loosen the T10 torx screws on extruders 1 and 3.



CAUTION: There should be enough access to reach the torx screws using an insulated torx driver. Exercise caution when working around the PCBs.

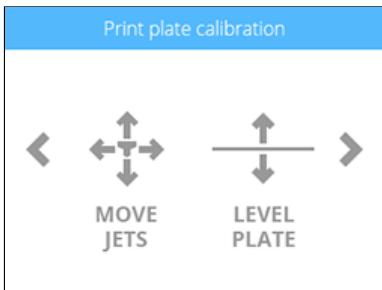


NOTE: Print jet 2 should not need adjustments.



2. Connect the printer to utility power, turn on the main power switch and then turn on the display.

3. Navigate to the Print Plate Calibration screen and select **MOVE JETS**.



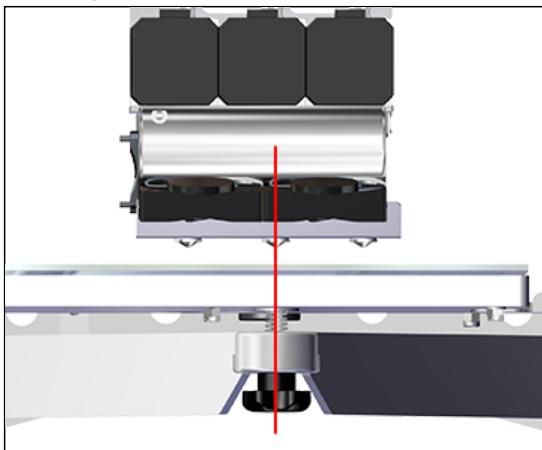
4. Select the Z: down arrow until the display reads -0.50.

NOTE: For printers with 2 or three print jets, visually inspect the gap between the nozzle tip of print jet 2 and the print pad. If necessary, press the Z: down arrow until there is a gap.



5. Press the X and Y adjustment arrows until print jet 2 is closely aligned above the front print pad adjustment knob.

NOTE: The red line in the illustration demonstrates an approximate alignment of print jet 2 and the front print pad adjustment knob.



6. Press the Z: up arrow until the nozzle of print jet 2 lightly touches the print pad.

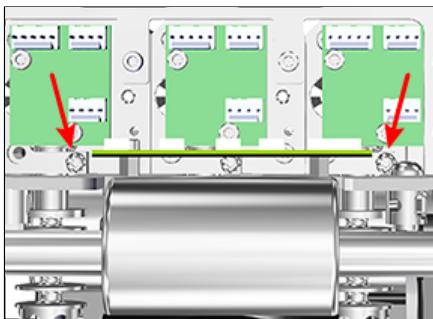
NOTE: If there is still a gap between the nozzle of print jet 2 and the print pad, and the Z: up arrow will not raise the print pad further, rotate the front print pad adjustment knob counter-clockwise (from the bottom side) until the nozzle lightly touches the print pad. If the adjustment knob was turned, turn it back the same amount and then be sure to perform the print pad leveling procedure.



7. Verify that the nozzles of print jet 1 and print jet 3 are also touching the print pad.

8. When all of the print jet nozzles lightly touch the print pad, power off the printer and disconnect it from utility power.

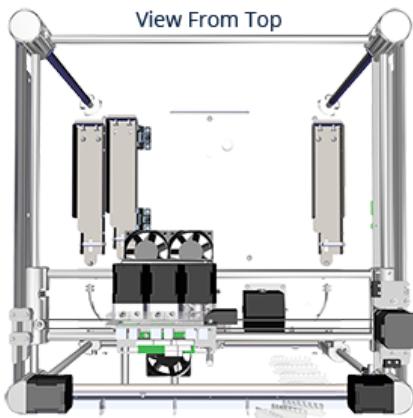
9. Tighten the left and right print jet screws using a T10 torx driver.



10. Connect the printer to utility power and power on the printer.

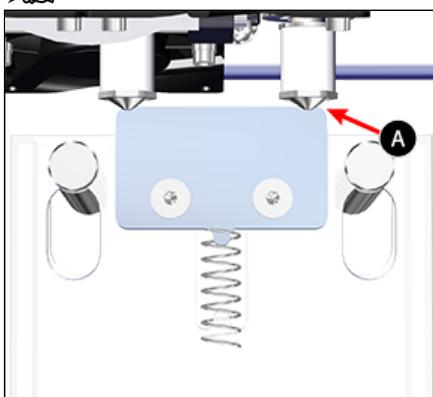
11. Ensure the print pad is at its lowest position.

12. Holding on to the extruder carriage assembly, gently position it over the jet wiper assembly.

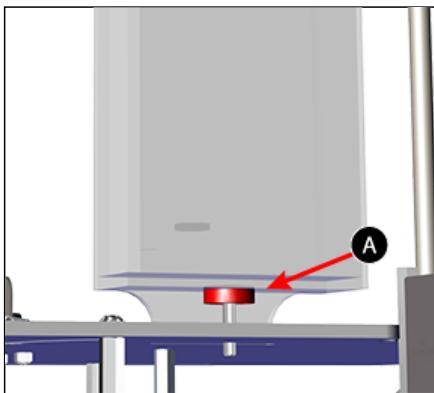


13. Verify the wiper blade meets the tapered portion (A) of the print jet nozzle. If it does, the jet wiper is properly adjusted. Proceed to step 16.

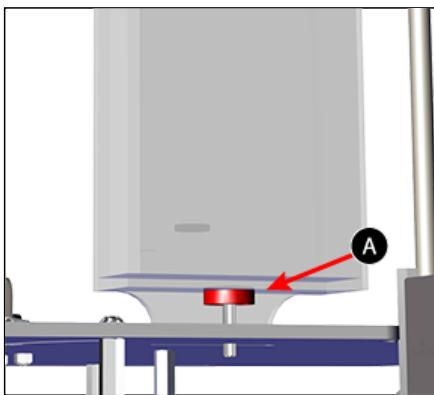
 NOTE: If the wiper tip is too high, proceed to the next step. If the wiper tip is too low, proceed to step 15.



14. If the wiper blade is too high, remove the jet wiper assembly and turn the adjustment thumbscrew (A) clockwise. Reinstall the jet wiper and return to step 13.



15. If the wiper tip is too low, remove the jet wiper assembly and turn the adjustment thumbscrew (A) counter-clockwise. Reinstall the jet wiper and return to step 13.



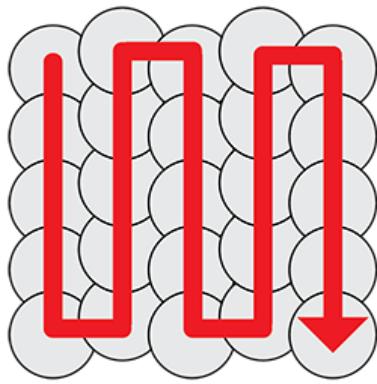
16. Once satisfied with the adjustment, connect your printer to utility power and power on the printer.

17. If necessary, calibrate the print pad.

18. Proceed to the Z-Gap and Level Gap procedure. Once the Z-Gap and Level Gap are correct, calibrate the offset jets.

Glue

Using Cube Glue is always recommended for printing, especially for areas of the print pad where INF prints. Ensure that glue is applied to the print pad in an area that is larger than the base of your part.

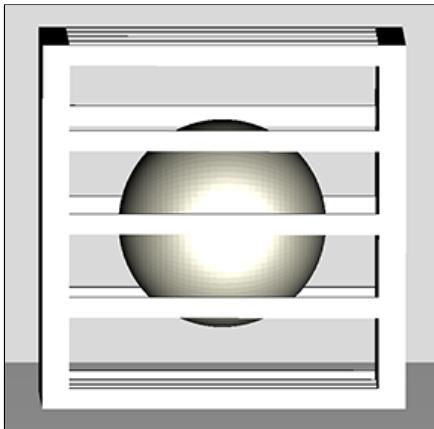


Position The Part To Optimize The Print

For best results, position PLA parts in a way where there are fewer horizontal spans between vertical features.

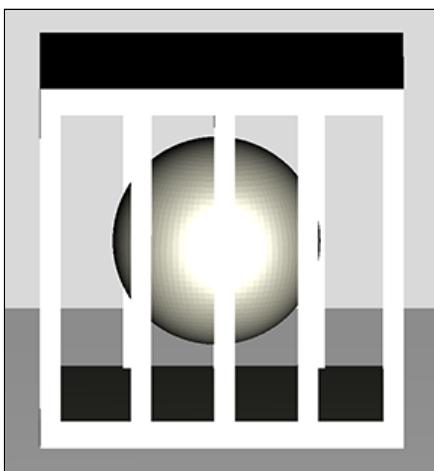
Preferred

Note the horizontal features of this part. Even though the bars in this part span a significant distance, these features will be properly supported by INF material.



Not Preferred

Note the vertical features of the part in this illustration. Spanning PLA material between multiple vertical features may not print as intended.

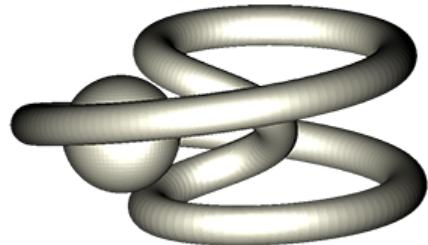


Maintain A Large Footprint

- Arrange the part where you will have the largest footprint touching the print pad. You may also add a sidewalk to your print to increase the footprint.
- Use PLA material to anchor your part to the print pad.

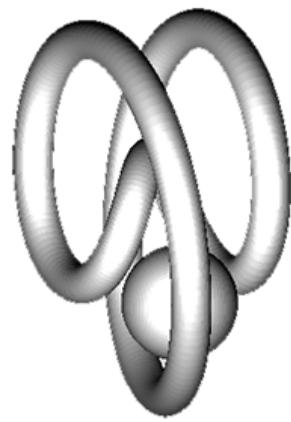
Preferred

Note the contact point of this part. Adding a sidewalk will stabilize it even more.



Not Preferred

Note the limited contact point of this part. This part may not be stable enough to print properly.



Maintain Gaps

For moving parts, ensure there is enough space for INF support. Maintain at least .6 mm between components that need to print with separation.

