



## UP 3D Printer Printing Guide

Up 3D printers are designed to be extremely user friendly but, like all 3D printers they do require tweaks in your printing process in order to maximise the quality of your print.

We have put together a small guide to give you some tips and tricks to maintain the quality of your print. It should help you to improve your print quality. The guide covers:

1. Model Adhesion
2. Warping
3. Improving the print & trouble shooting
4. Layer delamination



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## 1. Model Adhesion

Probably the most important part of successful 3D printing is the first layer, if your model doesn't stick you will get a complete mess, at best model warping. The things to bear in mind to improve your first layer adhesion are:

- **Clean the print bed.** Use acetone to clean the print bed of dirt and grease and try to avoid getting fingerprints onto the board.
- **Don't clean out the perf board holes.** The perf board is designed to reduce warping as the model will stick to the ABS in the holes. It just needs to be scrapped flat.
- **Pre heat the bed for at least 15mins.**
- **Adjust nozzle height to ~0.2mm.** The nozzle height wants to be approximately a 2 x a papers thickness from the bed. For the UP Plus and UP Mini. For the UP Plus use the auto platform levelling and Nozzle setting routines.
- **Ensure the platform is level.**
- **Use an alternative print surface.** Try different coverings to improve adhesion, for example: Kapton tape, Glass sheets, Acrylic sheets, Masking tape, PVA, Hairspray
- **Use an adjustable "Wind Barrier" (if not fitted).** Normally keep the wind deflector closed (i.e. not blowing over the platform) while printing the first layers, then open the deflector to allow wind to cool the model as it is being printed. To get the latest spare parts, install the latest version of the UP! Software and you will find 3D spare part models in this directory: C:\Program Files\UP\Example.

## 2. Reducing Warping

Warping can be an issue with 3D printing. It is the result of uneven cooling of the plastic. Essentially as it cools it shrinks, some parts are shrinking faster than others and this results in warping. ABS is much more prone to warping than PLA.

- **Level the platform.** Although there is an auto calibration function you may get better results with manual calibration. This should not need doing every time you print.
- **Set nozzle height.** Try touching the nozzle to the highest point on the bed and then set this as the nozzle height in platform calibration.
- **Clean the print bed.** This improves first layer adhesion (see section 1 on model adhesion).
- **Use UP ABS or PLA.** UP filament is specifically designed to work with UP printers. Check whether ABS is dull or glossy, glossy is the new ABS . If using new ABS use it



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is best to use v2.13 UP software. If it is old ABS it is better to use v2.11 software.

- **Use PLA.** PLA is less prone to warping so unless you need the material properties of ABS it is a good idea to use PLA.
- **Print Fast for large Models.** If the part is over 50% of the bed size print it on fast. It is likely that this will cure any warping problems as most warping is caused by temperature difference between layers . Temperature differences between layers are reduced if the time between each layer being printed is reduced.
- **Increase layer thickness.** If part is composed mainly of vertical sides increase layer thickness.
- **Pre-heat the bed to at least 75C before printing.** This will mean that the heat distribution across the bed is even when printing commences. Cold spots increase the tendency for warping in those areas.
- **Place printer away from draughts in warm environment.** Variations in the temperature during the print process due to drafts effects extrusion consistency and can increase warping. Also printing in a warmer room, i.e. not on a factory floor also helps the printer to maintain the printing bed temperature.
- **Print hollow parts.** Large solid parts tend to warp, especially if the part is not of a uniformed height as thinner areas cool faster than thicker parts.
- **Calibrate the printer steps/mm.** See section 3 on “improving the print”.
- **Direct the air flow from the feeder unit fan.** Direct the airflow on to the model, this will cool at ABS faster.

### 3. Improving the print and troubleshooting

Here are a few tips to help you improve print quality and prevent problems with your print.

- **Use genuine UP filament.** Non-UP filament has different properties and usually melts or goes soft at a lower temperature. If the filament gets soft around the extruder gear then it can grind the away at the material and stop it feeding through causing holes in your print / under extrusion.
- **Ensure Nozzle is not blocked.** Either replace regularly with new ones or for ABS soak in acetone for 24hrs or for both ABS and PLA you can try to burn it off (wearing gloves and safety glasses). Don't use abrasives as this can widen the nozzles hole.
- **Clean the Extruder and feed gear.** If your printer is under extruding it may be down to problems feeding the filament through to the hotend.
- **Make sure the extruder motor fan is working effectively.**



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- **Calibrate the printer steps (See manual).** If the steps/mm are off for the stepper motors this can result in dimensional inaccuracies. It also means that the extrusion beads are closer together than they should be so material may not have stretched as it should and the interface layer between raft and part may stick more than it should. Open the Calibrate96.stl found in C:/program files/UP/samples, print this on default settings, go to >3D Print>Calibrate on the UP software toolbar and type in the measured dimensions.
- **Print Cylinders vertical.** For a better, more rounded shape to cylinder try printing them vertically. If this is not possible try increasing the angle of support to 45° and also selecting "Unsolid model" before printing.
- **Disconnect the USB cable.** Earthing and electrical interference issues at certain locations (e.g. the PC is connected to a different mains than the printer) have been known to cause strange behaviour of the printers. Try disconnecting the USB cable once it has started printing. The printer stores its instructions on an internal SD card so will continue printing when disconnected from the PC software.
- **Check the SD card.** Make sure that the SD card is clean and inserted correctly (this is probably best left until last if all other checks haven't improved things).

#### 4. Layer delamination

3D printing involves the building objects out of layers. One issue that can arise is layer delamination, or gaps between layers. Delamination can be reduced by following the same procedure in section 2 on "Warping". You can try looking at some of the below suggestions to reduce this anomaly:

- **Pre Heat the bed.**
- **Use the latest software.**
- **Run the platform calibration routine.**
- **Increase layer height.**
- **Reduce the number of perimeters (reduces print time).**
- **Change quality to "Fast".**