

# **Ultimaker 3**

## **Installation and user manual**

# Disclaimer



Please read and understand the contents of this installation and user manual carefully. Failure to read the manual may lead to personal injury, inferior results or damage to the Ultimaker 3. Always make sure that anyone who uses the 3D printer knows and understand the contents of the manual and makes the most out of the Ultimaker 3 or Ultimaker 3 Extended.

The conditions or methods used for assembling, handling, storage, use or disposal\* of the device are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, injuries, damage, or expense arising out of or in any way connected with the assembly, handling, storage, use or disposal of the product.\*

The information in this document was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness.

## Intended use Ultimaker 3

Ultimaker 3D printers are designed and built for fused deposition modeling with Ultimaker engineering thermoplastics within a commercial/business environment. The mixture of precision and speed makes the Ultimaker 3D printers the perfect machine for concept models, functional prototypes and the production of small series. Although we achieved a very high standard in the reproduction of 3D models with the usage of Cura, the user remains responsible to qualify and validate the application of the printed object for its intended use, especially critical for applications in strictly regulated areas like medical devices and aeronautics. While being an open material platform the best results will be achieved with Ultimaker certified material, while effort has been made in order to match material properties with machine settings.

\* We comply to the WEEE-directive.

# Table of Contents

|   |    |
|---|----|
| <b>1. Safety and compliance .....</b>               | 6  |
| Safety messages                                     | 7  |
| Hazards   | 8  |
| <b>2. Introduction.....</b>                         | 9  |
| Main components Ultimaker 3 or Ultimaker 3 Extended | 10 |
| Specifications                                      | 11 |
| <b>3. Unpack and install the hardware .....</b>     | 12 |
| Unboxing  | 13 |
| Install the hardware accessories                    | 15 |
| <b>4. Set up for first use .....</b>                | 17 |
| Print core installation                             | 18 |
| Loading materials                                   | 19 |
| Installing WiFi and firmware                        | 21 |
| Cura software                                       | 22 |
| <b>5. Operation.....</b>                            | 23 |
| Display and control button                          | 24 |
| Using Cura  | 25 |
| Starting a print                                    | 26 |
| Materials   | 28 |
| Print cores   | 31 |
| Build plate calibration                             | 32 |
| <b>6. Maintenance.....</b>                          | 34 |
| Updating firmware                                   | 35 |
| Lubricating the axles                               | 36 |
| Keeping the printer clean                           | 37 |
| Maintaining the BB print core                       | 38 |
| <b>7. Help &amp; support .....</b>                  | 40 |
| Troubleshooting                                     | 41 |

# Preface

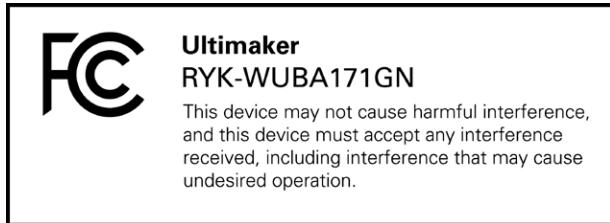
This is the installation and user manual for your Ultimaker 3 or Ultimaker 3 Extended. This manual contains chapters about the installation and use of the 3D printer.

The manual contains important information and instructions on safety, installation and use. Please read all information and follow the instructions and guidelines in this manual carefully. This ensures that you will obtain great quality prints and that possible accidents and injuries will be prevented.

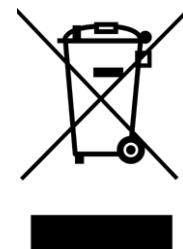
Make sure that everyone who uses the Ultimaker 3 or Ultimaker 3 Extended has access to this manual.

Every effort has been made to make this manual as accurate and complete as possible. The information is believed to be correct but does not aim to be all inclusive and shall be used only as a guide. Should you discover any errors or omissions, please bring this to our attention, so that we can make amendments. This will enable us to improve our documentation and service to you.

# Certifications



UL 60950-1  
CSA C22.2 No. 60950-1  
E114168



# 1 Safety and compliance

It is very important to work safely with your Ultimaker 3 or Ultimaker 3 Extended.  
This chapter is about safety and hazards.  
Please read all information carefully to prevent possible accidents and injuries.

# Safety messages

This manual contains warnings and safety notices.



Provides additional information that is helpful to do a task or to avoid problems.



Warns of a situation that may cause material damage or injuries if one does not follow the safety instructions.

## General Safety Information

The Ultimaker 3 or Ultimaker 3 Extended generates high temperatures and has hot moving parts that can cause injury. Never reach inside of the Ultimaker 3 or Ultimaker 3 Extended while it is in operation. Always control the printer with the button at the front or the power switch at the back. Allow the Ultimaker 3 or Ultimaker 3 Extended to cool down for 5 minutes before reaching inside.

Do not change or adjust anything on the Ultimaker 3 unless the change is authorized by the manufacturer.

Do not store items in the Ultimaker 3.

The Ultimaker 3 or Ultimaker 3 Extended is not intended for use by persons with reduced physical and/or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

Children should be under constant supervision when using the printer.

## Intentional radio

This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

# Hazards

## Electromagnetic Compatibility (EMC)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The EMC test report of the Ultimaker 3 or Ultimaker 3 Extended is available on request at [info@ultimaker.com](mailto:info@ultimaker.com).

## Electrical Safety

 The Ultimaker 3 has been tested according to the IEC 60950-1, which falls under the low voltage directive. The Ultimaker 3 must be used in conjunction with the Meanwell power supply GST220AX and delivered power cord. In combination they guarantee safe use in relation to short-circuit, overload, over-voltage and over temperature. For more information, please look at our website for the CB-report.

 Always unplug the printer before doing maintenance or modifications.

## Mechanical Safety

 The Ultimaker 3 contains moving parts. No damage to the user will be expected from the drive belts. The force of the build plate is big enough to give some damage, so keep hands out of the reach of the build plate during operation.

 Always unplug the printer before doing maintenance or modifications.

## Risk of Burns

 There is a potential risk of burns: the print head can reach temperatures up to 280 °C, while the heated bed can reach temperatures of 100 °C. Don't touch both with your bare hands.

 Always allow the printer to cool down for 30 minutes before performing maintenance or modification.

## Health and Safety

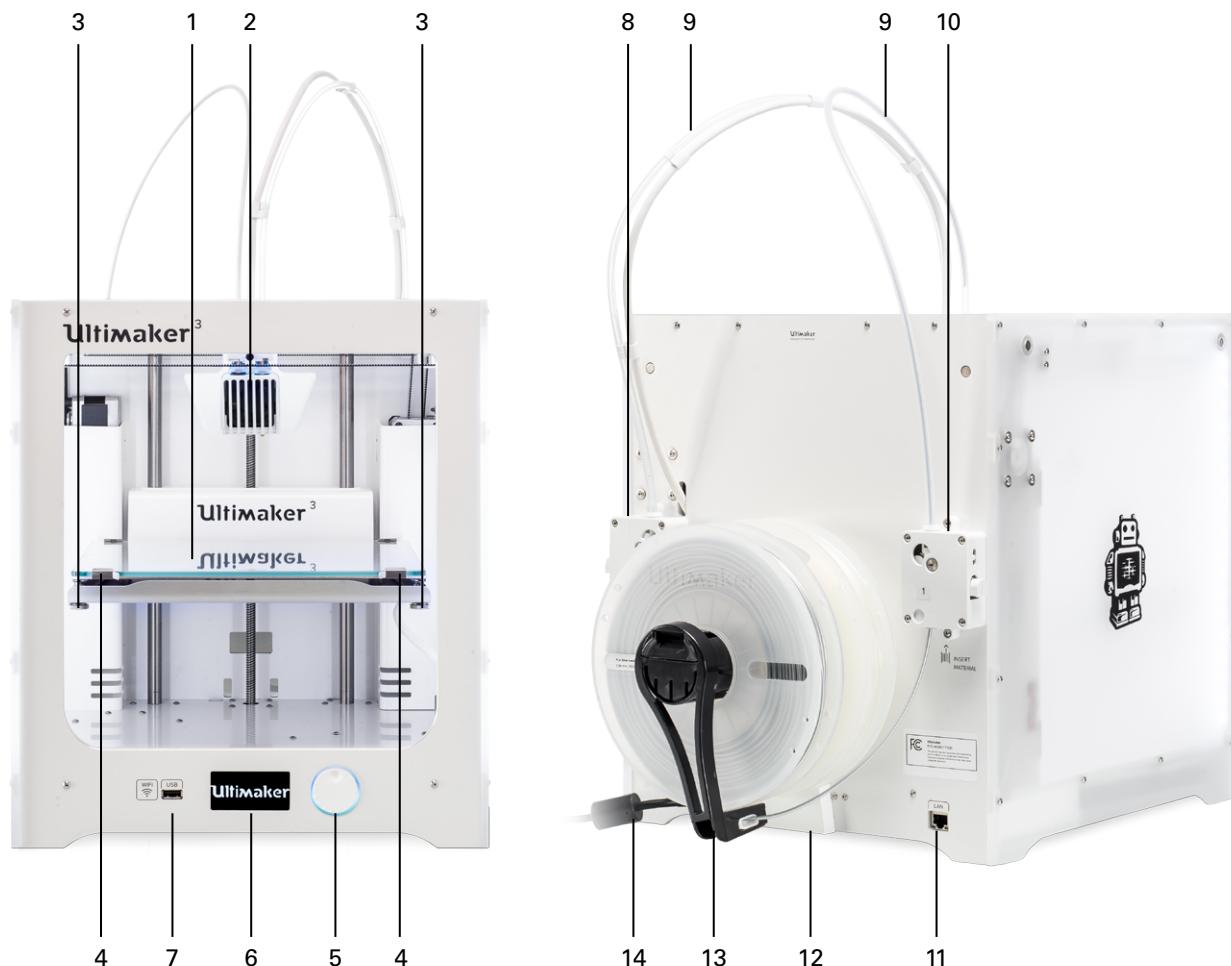
 The Ultimaker 3 is designed for Ultimaker PLA, Ultimaker ABS, Ultimaker CPE, Ultimaker Nylon and Ultimaker PVA. Our materials can be printed safely if the recommended temperatures and settings are used. We recommend to print all Ultimaker materials in a well-ventilated area. Please check the SDS of each specific material for more information.

Non-Ultimaker materials could release VOC's (volatile organic compounds) while processed in Ultimaker 3D printers (not covered by warranty). These can cause headaches, fatigue, dizziness, confusion, drowsiness, malaise, difficulty in concentration and feeling of intoxication. Usage of a fume hood is recommended. Take a look the SDS of these materials for more information.

# 2 Introduction

Meet your Ultimaker 3 and learn what the possibilities of this 3D printer are.

# Main components Ultimaker 3 or Ultimaker 3 Extended



- 1. Build plate
- 2. Dual print head
- 3. Build plate screws
- 4. Build plate clamps
- 5. Push/rotate button
- 6. Display
- 7. USB socket

- 8. Feeder 2
- 9. Bowden tubes
- 10. Feeder 1
- 11. Ethernet port
- 12. Cable cover
- 13. Double spool holder with NFC cable
- 14. Power cable



The model exposed is the Ultimaker 3. The main components of the Ultimaker 3 Extended are the same and on the exact same position. The only difference between the two printers is the height of the housing. See Specifications for the different dimensions.

# Specifications

| Printer and printing properties                     |   | Ultimaker 3   | Ultimaker 3 Extended |
|---|---|---|----------------------|
| When no value is listed, it is equal to Ultimaker 3 |   |   |                      |
| Technology  | Fused Deposition Modeling (FDM)   |   |                      |
| Print head  | Dual extrusion print head with a unique auto-nozzle lifting system and swappable print cores  |   |                      |
| Build volume  | Left nozzle: 215 x 215 x 200 mm<br>Right nozzle: 215 x 215 x 200 mm<br>Dual material: 197 x 215 x 200 mm  | Left nozzle: 215 x 215 x 300 mm<br>Right nozzle: 215 x 215 x 300 mm<br>Dual material: 197 x 215 x 300 mm  |                      |
| Filament diameter                                   | 2.85 mm   |   |                      |
| Layer resolution                                    | 0.4mm nozzle: 20 - 200 micron   |   |                      |
| XYZ accuracy  | 12.5, 12.5, 2.5 micron  |   |                      |
| Print head travel speed                             | 30 - 300 mm/s   |   |                      |
| Build speed   | 0.40 mm nozzle: up to 16 mm <sup>3</sup> /s   |   |                      |
| Build plate   | Heated glass build plate  |   |                      |
| Build plate temperature                             | 20 - 100 °C   |   |                      |
| Build plate leveling                                | Active leveling   |   |                      |
| Supported materials                                 | Nylon, PLA, ABS, CPE, PVA   |   |                      |
| Nozzle diameter                                     | 0.4 mm  |   |                      |
| Nozzle temperature                                  | 180 - 280 °C  |   |                      |
| Nozzle heat up time                                 | < 2 min   |   |                      |
| Build plate heat up time                            | < 4 min (20->60 °C)   |   |                      |
| Operating sound                                     | 50 dBA  |   |                      |
| Material recognition                                | Material recognition with NFC scanner   |   |                      |
| Connectivity  | Wi-Fi, LAN, USB port  |   |                      |
| Monitoring  | Live camera   |   |                      |
| <b>Physical dimensions</b>                          |   |   |                      |
| Dimensions  | 342 x 380 x 389 mm (DxWxH)  | 342 x 380 x 489 mm (DxWxH)  |                      |
| Dimensions (with bowden tube and spool holder)      | 342 x 505 x 588 mm (DxWxH)  | 342 x 505 x 688 mm (DxWxH)  |                      |
| Nett weight   | 10,6 kg   | 11,3 kg   |                      |
| Shipping weight                                     | 15,5 kg   | 16,8 kg   |                      |
| Shipping box dimensions                             | 390 x 400 x 565 mm (DxWxH)  | 390 x 400 x 680 mm (DxWxH)  |                      |
| <b>Power requirements</b>                           |   |   |                      |
| Input   | 100 - 240V<br>4A, 50-60Hz<br>221 W max.   |   |                      |
| Output  | 24V DC, 9.2 A   |   |                      |
| <b>Ambient conditions</b>                           |   |   |                      |
| Operating ambient temperature                       | 15 - 32 °C<br>10 - 90 % RH non-condensing. From ±50% RH and up you will get problems with PVA. See material specifications for optimal operating conditions | 15 - 32 °C<br>10 - 90 % RH non-condensing. From ±50% RH and up you will get problems with PVA. See material specifications for optimal operating conditions |                      |
| Storage conditions printer                          | 0 - 32 °C   |   |                      |
| <b>Software</b>                                     |   |   |                      |
| Supplied software                                   | Cura, our free print preparation software   |   |                      |
| Supported OS  | macOS, Windows, Linux   |   |                      |
| File types  | STL, OBJ and 3MF  |   |                      |

# 3

# Unpack and install the hardware

Carefully unpack your Ultimaker 3 or Ultimaker 3 Extended and set up the hardware according to the instructions in this chapter.

# Unboxing

The Ultimaker comes in reusable, durable packaging, specially designed to protect your Ultimaker 3.

## Unpacking

Follow the steps below properly to unpack your Ultimaker 3.

1. Take the Ultimaker 3 out of the cardboard box.
2. Loosen the strap by opening the buckle.
3. Remove the top part of the styrofoam packaging with the two spools of filament and factory test print in it.
4. Take out the accessory box.
5. Remove the styrofoam part that is placed at the front bottom side of the Ultimaker 3.
6. Take the Ultimaker 3, remove the bottom styrofoam part and place the Ultimaker 3 on a flat surface.
7. Manually lift the build plate and remove the packaging material under the build plate.
8. Cut the zip tie that secures the print head.



## This in the box

The Ultimaker 3 is supplied with several hardware accessories. Check if all these accessories are included before continuing.

1. Print core AA 0.4 (in print head slot 1 of the Ultimaker)
2. Print core AA 0.4
3. Print core BB 0.4
4. Glass plate
5. Cable cover
6. Spool holder with NFC cable
7. Material guide
8. Material spool PLA (350 g)
9. Material spool PVA (350 g)
10. Ethernet cable
11. USB stick
12. Glue stick
13. Machine oil (for X/Y axles)
14. Magnalube grease (for Z axle)
15. Hex screwdriver
16. XY calibration sheet
17. Calibration card
18. Quick start guide
19. Power adapter
20. Power cable
21. Test print



# Install the hardware accessories

## Placing and connecting the NFC spool holder

1. Gently place the printer on its right side.
2. Insert the spool holder into the back panel. First place the top part in the hole and push down until it snaps into place.
3. Connect the NFC cable to the NFC socket. The flat side of the connector faces away from the bottom panel.
4. Guide the NFC cable through the slot in the back panel.
5. Insert the cable cover into the back panel to keep the cable in place.
6. Gently place the Ultimaker upright.



## Placing the glass plate

1. Open the two build plate clamps at the front of the build plate.
2. Gently slide the glass plate onto the build plate and ensure that it snaps into the build plate clamps at the back.
3. Close the two build plate clamps at the front to secure the glass plate.



### **Connecting the power supply**

1. Connect the power cable to the power brick.
2. Plug the power cable into the wall socket.
3. Connect the other side of the power supply to the Ultimaker 3. The flat side of the connector needs to point downwards. Before you push the cable firmly into the port, you have to pull the sliding mechanism back. When the cord is in the printer you can let go to lock it into place.



# 4

# Set up for first use

After installing the accessories, you have to set up the printer for the first use. In this chapter you find the steps to be taken for print core installation, loading the materials, setting up WiFi, updating the firmware and installing Cura software.

# Print core installation

To perform the setup steps, turn on the printer with the power switch at the back. The welcome wizard appears in the display. Rotate the button to navigate through the menus and press the button to confirm your selection.

## Installing print cores

The Ultimaker 3 has two print cores in the print head, which are interchangeable.

There are two types of print cores:

- Type AA: for printing build material (PLA, ABS, CPE and Nylon)
- Type BB: for printing support material (PVA)

Each Ultimaker 3 comes with two AA print cores - of which one is already installed in print head slot 1 - and one BB print core. This means that it is possible to make prints with two build materials or with a build and support material.

The print cores contain information so that the printer always knows which print cores are installed and which materials can be used with this print core.

To install the second print core, follow the steps on the display of the Ultimaker 3:

1. Open the print head fan bracket.
2. The Ultimaker 3 will now automatically detect the print core (AA) that is placed in print head slot 1. Confirm to continue.
3. Install the BB print core in print head slot 2 by squeezing the levers of the print core and sliding it into the print head.
4. The Ultimaker 3 should now automatically detect the print core (BB) that is placed in print head slot 2. Confirm to continue.
5. Close the print head fan bracket and confirm to proceed with the setup procedure.



Do not touch the chip on the back side of the print core with your hands.



Make sure you keep the print core completely vertical while installing it so it will smoothly slide into the print head.



# Loading materials

Before you can start printing on the Ultimaker 3, you need to load materials into the printer. Material 2 will be loaded first, because this is the material that must be placed closest to the back side of the printer.

## Loading material 2

1. Place the spool with the material on the spool holder. Make sure to put it with the material in clockwise direction, so that the material can enter feeder 2 from the bottom. Straighten the material a bit so it can easily enter the feeder.
2. Wait until the Ultimaker 3 has detected the material (when using Ultimaker material).
3. Insert the end of the material into feeder 2 and gently push it until the material is grabbed by the feeder and is visible in the bowden tube.
4. Wait for the Ultimaker 3 to heat up print core 2 and to load the material into the print head.
5. Confirm when the new material extrudes from the print head.
6. Wait a moment for print core 2 to cool down.



### **Loading material 1**

1. Take the material guide and hold it with the outer part towards you.
2. Place the material spool on the material guide with the material in counter-clockwise direction.
3. Guide the end of the material through the hole in the material guide. When you have done this, select continue.
4. Place the material guide - with material 1 on it - on the spool holder, behind material 2 and wait until it is detected by the printer.
5. Insert the end of the material into feeder 1 and gently push it until the material is grabbed by the feeder and is visible in the bowden tube.
6. Wait for the Ultimaker 3 to heat up print core 1 and to load the material into the print head.
7. Confirm when the new material extrudes from the print head.
8. Wait a moment for print core 1 to cool down.



# Installing WiFi and firmware

The Ultimaker 3 allows for printing wireless over a network. Therefore the next step is to connect your Ultimaker 3 to a network.

## Setting up WiFi

1. Wait until your Ultimaker 3 has created a WiFi hotspot. This can take a minute.
2. Move to your computer and connect it to the wireless network of the printer. The name of the network is shown on the display of the Ultimaker 3.
3. A pop-up will appear on the display of your computer. Follow the steps to connect the Ultimaker 3 to your local WiFi network. The pop-up will disappear when you have completed these steps.



When the pop-up does not appear, open a browser and type "Ultimaker.com".

4. Go back to the Ultimaker 3 to continue with the setup for first use.



Within some network environments the Ultimaker 3 may experience difficulties connecting wireless. When this happens, re-run the WiFi setup from another computer.



If you skip this process you can always re-do the WiFi setup by going to System → Network → Run WiFi setup.

## Updating the firmware

As a last step the Ultimaker 3 will check if the latest firmware is installed. If not, it will get the latest firmware from the network and install it. This will take several minutes.

# Cura software

For the Ultimaker 3, we recommend our free Cura software to prepare your 3D print files. Cura quickly and accurately converts 3D models into 3D print files within seconds, showing you a preview of the print so you can be sure everything is as you would like it to be.

For the Ultimaker 3 you must use Cura 2.3 or higher.

## System requirements

### Accepted platforms

- Windows Vista or newer
- Mac OSX 10.7 or newer
- Linux Ubuntu 15.04, Fedora 23, OpenSuse 13.2, ArchLinux or newer

### System requirements

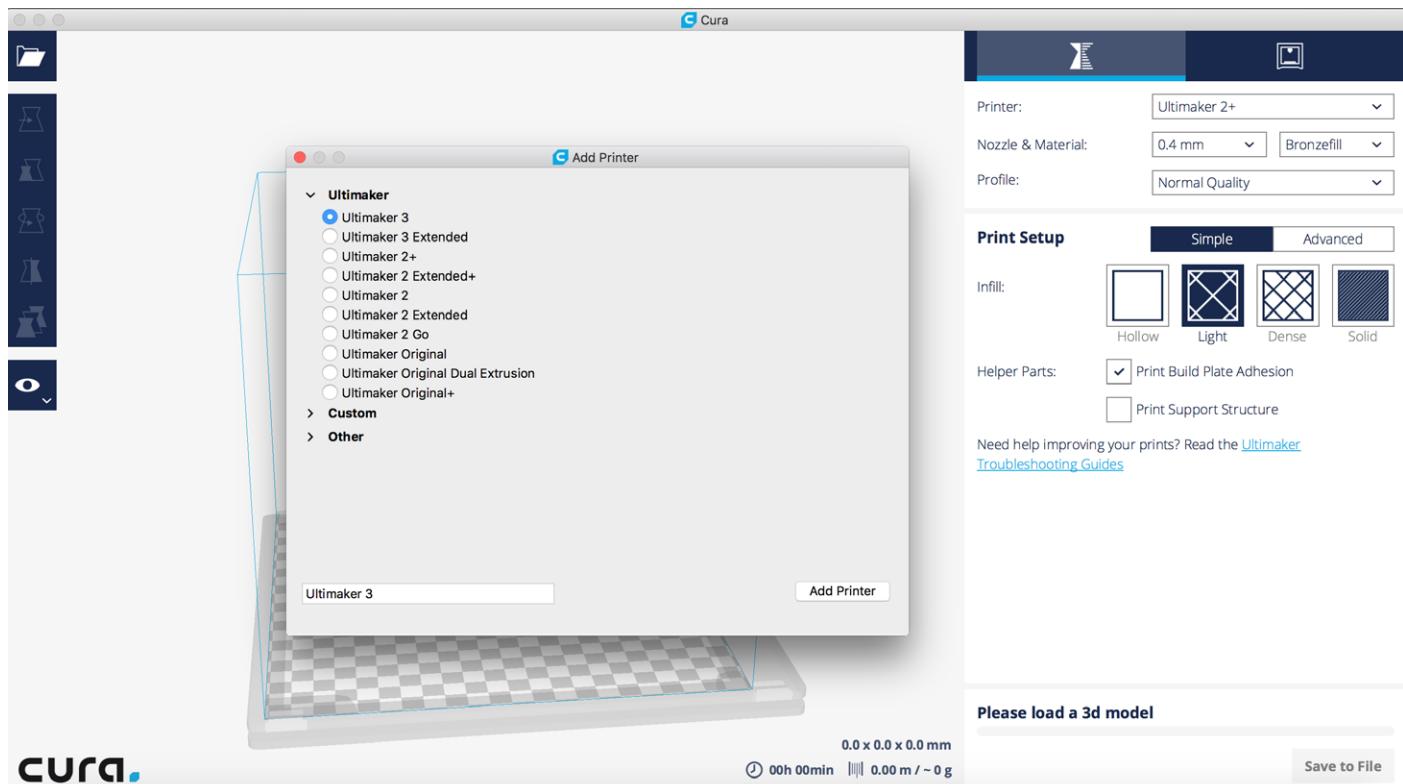
- OpenGL 2 compatible graphics chip
- Intel Core 2 or AMD Athlon 64 or newer
- At least 4Gb of RAM (8Gb or more is recommended)

### Compatible file types

- STL (most common file format for 3D printing)
- OBJ
- 3MF

## Installation

The Cura software can be found at [www.ultimaker.com/software](http://www.ultimaker.com/software). After downloading, open the installer and run the installation wizard to complete the installation. When opening Cura for the first time, you will be asked to select your 3D printer, the Ultimaker 3. No other configuration is required and you can directly start using Cura.



# 5 Operation

After installation, it is time to start printing with your Ultimaker 3. This chapter provides information about the display, using Cura, starting a print, materials that can be used, changing and calibrating the print cores and calibrating the build plate.

# Display and control button

The display at the front side of the Ultimaker 3 shows all the necessary information for setting up and using your Ultimaker 3. You can navigate through menus by rotating and/or pushing the button at the right side of the display. Rotate to select or control an action; push to confirm an action. When pushing the button you will hear a “beeping” sound to confirm the action. A blinking button means the Ultimaker 3 is waiting for user input.

When turning on your Ultimaker 3 after the first use, you will always see the Ultimaker logo first after which the main menu appears. The main menu offers three options: Print, Material/PrintCore and System.

## **Print**

The Print menu allows you to select a print, when using a USB stick. While printing, the menu also allows you to tune the print, and change the settings for instance.

## **Material/PrintCore**

With the Material/PrintCore menu you can change, load and unload materials and print cores.

## **System**

The System menu offers various options to control the network, build plate, print head and to perform maintenance and several tests .

# Using Cura

Cura allows you to prepare dual material prints using support material or printing with two colors and single extrusion prints for the Ultimaker 3. When preparing a model, you always need to make sure that the print core and material configuration match with the configuration on your Ultimaker 3. If you are using the network you can allow Cura to automatically transfer the configuration from your Ultimaker 3 to Cura.

## Slicing a dual extrusion print with a support material

1. Load a 3D model into Cura.
  2. Select the desired print profile and adjust print settings to your liking.
  3. Select the right print core/material for printing the support material (PVA). This can either be done in the Simple settings, by selecting 'Print support using PVA (Extruder [x])'. Or in the Advanced settings by going to the Dual Extrusion settings and selecting 'PVA (Extruder [x])' as the Support Extruder.
-  If you want to use another material for the support you have to change the print core and material configuration in Cura.
4. Wait until Cura has sliced the model, check the Layers view for a preview of your print and start printing.

## Slicing a dual material print with two colors

1. Load both model files into Cura.
2. Select one of the models and click on the 'Per Model Settings' button on the left side.
3. Choose which print core/material you want to use for this part of the print from the 'Print model with' drop down menu.
4. Do the same for the other model.
5. Select both models by selecting one of them first and holding the Shift button to select the other model.
6. Right-mouse click and select 'Merge models' (or Alt+Ctrl+G).
7. Select the desired print profile and adjust print settings for both print cores to your liking.
8. Wait until Cura has sliced the model, check the Layers view for a preview of your print and start printing.

## Slicing a single extrusion print

1. Load a model into Cura.
2. Select the model and click on the 'Per Model Settings' button on the left side.
3. Choose which print core/material you want to use for this print from the 'Print model with' drop down menu.
4. Select the desired print profile and adjust print settings to your liking.
5. Wait until Cura has sliced the model, check the Layers view for a preview of your print and start printing.

For more instructions on how to use Cura take a look at the [Cura manual](#) on our website.

# Starting a print

## Network printing

The Ultimaker 3 offers the possibility to print over a network, either via WiFi or Ethernet.

To start printing via WiFi:

1. Install WiFi (if not done yet) by going to System → Network → Run WiFi setup and follow the steps on the display.
2. Enable WiFi in the network menu.
3. In Cura go to Settings → Printers → Manage printers.
4. Click on the “Connect via network” button.
5. Select your Ultimaker from the list of printers that are shown and click “Connect”.



Select “Add” in this screen to configure an Ultimaker 3 by IP address manually.



Cura will ask if you want to transfer configuration from your Ultimaker 3 to Cura. Select “yes” to automatically transfer them. When selecting “no”, make sure you select the correct settings manually.

6. Slice your 3D model in Cura.

7. Press “Print over network” to start the print.

To start a print via Ethernet:

1. Connect the LAN cable to socket on the back side of the Ultimaker 3.
2. Enable Ethernet in the network menu.
3. In Cura go to Settings → Printers → Manage printers.
4. Click on the “Connect via network” button.
5. Select your Ultimaker from the list of printers that are shown and click “Connect”.



Cura will ask if you want to transfer configuration from your Ultimaker 3 to Cura. Select “yes” to automatically transfer them. When selecting “no”, make sure you select the correct settings manually.

6. Slice your 3D model in Cura.

7. Press “Print over network” to start the print.



## Printing with USB

When it is not possible to print via a network, 3D print files can still be transferred to your Ultimaker 3 with a USB stick.

1. Place the USB stick in your computer.
2. Slice your 3D model in Cura. Ensure that the print core and material configuration in Cura match the configuration on your Ultimaker 3 or change the configuration on your printer to match the settings in Cura.
3. Save the print file (.gcode) via the "Save to removable drive" button to the USB stick.
4. Eject the USB stick in Cura and remove it from your computer.
5. Place the USB stick in the Ultimaker 3 (front side, next to the display).
6. Go to Print and select the file you want to print.



## Monitoring your print

Once the print is running via network or if you connect to your Ultimaker 3 from Cura, you can monitor the print. This allows you to view the progress of your prints and spot failures and to control your printer from a distance.

You will find:

- A (live) camera connection to your Ultimaker 3.
- Print information (temperatures, job name, printing time, etc).
- Buttons to pause or abort the print from a distance.

**Printer Monitor**

Connected over the network to Ultimaker 3.

**Temperatures**

|             |       |
|-------------|-------|
| Extruder 1  | 250°C |
| Extruder 2  | 202°C |
| Build plate | 60°C  |

**Active print**

|                     |                      |
|---------------------|----------------------|
| Job Name            | UM3_Model Tech.gcode |
| Printing Time       | 27:16:57             |
| Estimated time left | 05:27:56             |

**Printing...** 80%

Pause Abort Print

# Materials

## Printing with two materials

As explained in chapter Set up, the Ultimaker 3 comes with two print cores for build material (AA) and one print core for support material (BB). The AA print cores can be used for printing PLA, ABS, CPE and Nylon. The BB print core can be used for PVA.

If you want to print with two materials, the following combinations of Ultimaker materials are officially supported:

- PLA - PVA
- Nylon - PVA
- PLA - PLA
- ABS - ABS
- CPE - CPE

Although the Ultimaker 3 has an open material system, we recommend the use of Ultimaker material on the printer. The Ultimaker 3 has an NFC reader that will read the Ultimaker material spools and transfers this information to Cura when connected via the network. This way Cura will automatically select the right material for each print core.

In Cura you will also find material profiles that have specifically been developed for Ultimaker materials and thus guarantee the best printing result.

## Changing materials

Materials can be changed easily on the Ultimaker 3 by using the procedure from the menu. Besides changing a material you also have the option to only load or unload a material.



Make sure compatible print cores are installed before you insert materials.

1. Go to the menu Material/Print core → Material 1 or 2 → Change.
2. Wait for the print core to heat up and reverse the material.
3. Remove the material from the feeder and spool holder.
4. Place the new material on the spool holder and wait until the Ultimaker 3 detects it.



When using non-Ultimaker material, you can select a material manually.

5. Insert the material into the feeder and push it until the feeder grabs it.
6. Confirm that you have inserted the material into the feeder by pushing the button at the front side of the Ultimaker 3.
7. After the material has been forwarded, wait until it extrudes from the print head and then push on the button.

## Material settings

The below table gives overview of the recommended settings per material. These settings are automatically set correctly in Cura when selecting one of the material profiles.

| Material | Nozzle temperature (°C) | Build plate temperature (°C) | Fan speed (%) | Adhesion type (Cura) |
|----------|-------------------------|------------------------------|---------------|----------------------|
| PLA      | 195 - 205               | 60                           | 100           | Brim*                |
| ABS      | 225 - 240               | 80                           | 50            | Brim                 |
| CPE      | 235 - 250               | 70                           | 70            | Brim                 |
| Nylon    | 250 - 255               | 60                           | 40            | Raft*                |
| PVA      | 215 - 225               | 60                           | 50            | Brim or raft*        |

\* When printing PLA or Nylon in combination with PVA, it is recommended to print the adhesion type in PVA.

## **Build plate adhesion**

Although the heat of the heated build plate already helps with a good adhesion of the material to the glass plate, you will need an adhesive in some cases. In the accessory box of your Ultimaker 3 is one glue stick, of which a thin, even layer can be applied to the glass plate to let the first layer of the print stick better. Below you can find an overview on the use of glue per material.



### **PLA**

Ultimaker PLA usually adheres well to the glass plate. Make sure that the glass plate is completely clean and free of any oil/grease and fingerprints. For best results, you can apply a thin layer of glue to the glass plate.

Once the print is finished, do not remove it while the build plate is still warm. This can result in deformation of the base of your print.

### **ABS**

When printing with Ultimaker ABS you must apply a thin layer of glue to the glass plate. Not using the glue results in a high risk of chipping the glass plate when removing the print and may void the warranty.

Please note that for this material it may be easier to remove the 3D prints from the build plate if it is still slightly warm at approximately 40°C.

### **CPE**

Although Ultimaker CPE adheres well to the glass plate, it does tend to warp heavily. To minimize warping when printing with Ultimaker CPE, apply a thin layer of glue to the glass plate using the glue provided with your Ultimaker 3.

### **Nylon**

Ultimaker Nylon sticks well to the build plate. In most instances, extra adhesives are not necessary for a successful print. For even better build plate adhesion, apply a thin layer of glue to the glass plate.

### **PVA**

Ultimaker PVA strongly adheres to the build plate, so we suggest to apply a thin layer of glue to the glass plate.

## **Removing support material (PVA)**

Prints for which PVA has been used as support material require some post-processing to remove the PVA support material. This can be done by dissolving the PVA in water.

### **1. Submerge the print in water**

By putting a print with PVA in water the PVA will slowly dissolve. You can however speed up this process in a few ways:

- By using warmer water a slight decrease in dissolving time can be reached. When you do this, make sure you use a maximum temperature of 35 °C if your build material is PLA to avoid deformation of the PLA. Do not go above 50 °C for Nylon to prevent burns.
- Use stirring/running water to decrease the dissolving time significantly. When the water moves PVA will dissolve much faster, which means that it can be dissolved in under three hours.
- Additionally you make it even easier for the PVA to dissolve, by putting the print in water for approximately 10 minutes first, after which you can remove most of the support by using pliers. When you now put the print back in the water, it only has to dissolve the remaining parts of PVA.

### **2. Rinse with water**

After PVA supports are totally dissolved, rinse the print with water to remove any excess PVA.

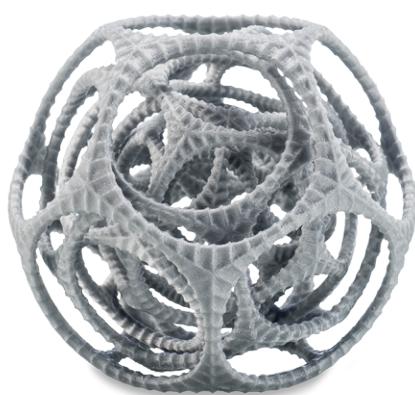
### **3. Let the print dry**

Let the print dry completely and apply additional post-processing to the build material if necessary.

### **4. Disposal of waste water**

Since PVA is biodegradable it is quite easy to dispose the water afterwards. The water can be disposed through the drain when the waste water distribution network is connected to a wastewater treatment plant. After disposing the water, run hot water from the tap for approximately 30 seconds to remove any excess of the saturated PVA water from the drain and to avoid clogging on a long term.

It is possible to use the water for more than one print, but this might extend the dissolving time. The water will get saturated by previously dissolved PVA, so for the quickest result it is always recommended to use new water.



## **Storage and handling of materials**

When you have multiple spools of material in use or do not print with a material, it is very important that you store them properly. When stored incorrectly this may affect the quality and process-ability of the material.

To keep your materials in optimal condition it is important that you keep them:

- Dry and cool
- Out of direct sunlight
- In a resealable bag

The optimal storage temperature for PLA, CPE and Nylon is between -20 to +30° C. For ABS and PVA the advised temperature is between 15 and 25° C. Furthermore a relative humidity of below 50% is recommended for PVA. If PVA is exposed to a higher humidity the quality of the material can be affected.

You can store the material in a resealable bag, including the supplied desiccant (silica gel). For PVA it is advised to store the spool in a resealable bag with the supplied desiccant directly after printing to minimize moisture uptake.

# Print cores

## Changing print cores

Print cores can be changed easily on the Ultimaker 3 by using the procedure from the menu. Besides changing a print core you also have the option to only load or unload a print core.

1. Go to the menu Material/PrintCore → PrintCore 1 or 2 → Change.
2. Wait for the print core to heat up, reverse material and cool down again.
3. Open the print head fan bracket.
4. Remove the print core carefully by squeezing the levers and sliding the print core out of the print head.
5. Insert the new print core in the print head.
6. Close the print head fan bracket.
7. Wait for the Ultimaker 3 to load the material into the print core and cool down again.



Do not touch the chip on the back side of the print core with your hands.



Make sure you keep the print core completely vertical while removing or installing it so it will smoothly slide out of/into the print head.

## Calibrating the print cores

When a new combination of print cores is installed some calibration is required to align both nozzles. The Ultimaker 3 will automatically detect new combinations and gives a message to do the calibration. This calibration must only be done once; after this, the information is stored on the printer. The AA print core that was installed on receipt of the Ultimaker 3 has already been calibrated with the other two print cores and does not require calibration.

To do the calibration you will need the XY calibration sheet, which you can find in the accessory box or download [here](#). If you need to print it, make sure you print it on an A4 paper at 100% scale.



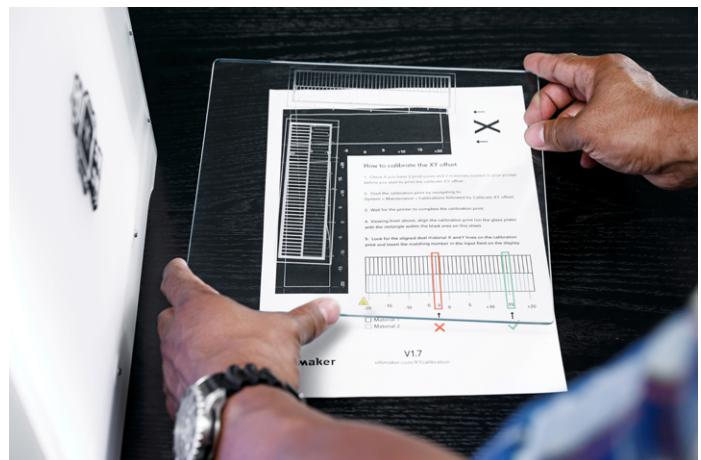
Ensure 2 print cores and materials are installed before starting the calibration.

To start the calibration:

1. Go to System → Maintenance → Calibration → Calibrate XY offset.
2. The Ultimaker 3 will now print a grid structure on the build plate. Wait until it is finished.
3. Once the Ultimaker 3 has cooled down, remove the glass plate from the printer and place it on the XY calibration sheet. Ensure the printed grid is exactly placed on the two rectangles on the sheet.
4. Find the aligned lines on the printed X grid and look which number belongs to these lines. Enter this number as the X offset value on your Ultimaker 3.
5. Find the aligned lines on the printed Y grid and look which number belongs to these lines. Enter this number as the Y offset value on your Ultimaker 3.



It is important that the printed XY offset print adheres well to the build plate and shows no signs of under extrusion. If it does, it is recommended to re-do the calibration print.



# Build plate calibration

While using your Ultimaker it is necessary to periodically calibrate the build plate for good adhesion of the print to the build plate. If the distance between the nozzles and build plate is too big, your print won't stick properly to the glass plate. On the other hand, if the nozzles are too close to the build plate, it can prevent the material extruding from the nozzles.

The Ultimaker 3 offers two ways of calibration the build plate: active leveling and manual leveling. Active leveling is the preferred choice, as there's no chance for human inaccuracies.

**i** Make sure there is no plastic on the nozzles and the glass plate is clean when you want to calibrate the build plate, as this can lead to inaccurate leveling.

## Active leveling

If you choose active leveling, the Ultimaker 3 will measure the level of the build plate, so it can compensate for inaccuracies of the build plate level during the first layers of the print. It will do this by slightly moving the build plate up or down while printing.

To start active leveling:

1. Go to System → Build plate → Active leveling.
2. Wait for the printer to finish the leveling procedure. This will take a couple of minutes.

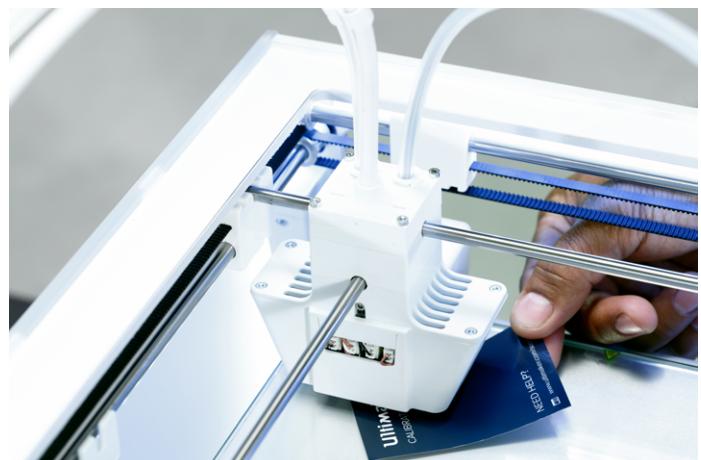
**!** Do not touch the printer while doing the active leveling. This could affect the measurements.

## Manual leveling

If the level of the build plate is off too much (and active leveling cannot compensate for this), manual leveling can be done.

1. Go to System → Build plate → Manual leveling.
2. Wait for the Ultimaker 3 to do its homing procedure and continue when the print head is in the center at the back of the build plate.
3. Rotate the button at the front until there is approximately 1 mm distance between the first nozzle and the build plate. Make sure that the nozzle is close to the build plate without touching it.
4. Adjust the front right and front left build plate screw to roughly level the build plate at the front side. Again there should be a distance of approximately 1 mm between the nozzle and build plate.
5. Place the calibration card in between the nozzle and build plate when the print head is in the center back of the build plate.
6. Adjust the build plate screw in the middle back until you feel slight friction when moving the card.
7. Press "Continue." The print head moves to the second point.
8. Repeat step 5 "place the calibration card" and step 6 "adjust the build plate."
9. Press "Continue" again. The print head moves to the third point.
10. Repeat step 5 "place the calibration card" and step 6 "adjust the build plate."

**!** Do not push on the build plate while fine-tuning with the calibration card. This will lead to inaccuracies.



After calibrating the build plate with the first nozzle, the second nozzle needs to be aligned as well, to ensure the heights of both nozzles are set correctly. For this it is only necessary to set the correct height by using the calibration card.

1. Place the calibration card between the second nozzle and build plate.
2. Rotate the button at the front of the Ultimaker 3 until it touches the calibration card and fine-tune it until you feel slight friction/resistance when moving the card.



The alignment of the second nozzle can also be done separately, by navigating to System → Maintenance → Calibration → Calibrate Z offset.

### **Leveling frequency**

The Ultimaker 3 will ask how often you want to level your build plate, once you have leveled it.

These are the options:

- Every day
- Every week
- After startup
- Never
- Automatic (the leveling frequency is determined by the printer, based on the amount of printing hours since the last time the build plate was leveled)

You can always change the leveling frequency by going to System → Build plate → Frequency in the menu.

# 6 Maintenance

In order to have a smoothly working Ultimaker 3 it is important to maintain it correctly. In this chapter the most important maintenance tips are described. Read them carefully in order to achieve the best results with your Ultimaker 3.

# Updating firmware

Periodically, a new version of the Ultimaker 3 firmware is released. To keep your Ultimaker 3 up to date it is therefore recommended to update the firmware regularly. This can be done on the Ultimaker 3 (when connected to the network) or via USB.

## Updating on the printer

1. Connect the printer to the network via WiFi or Ethernet.
2. Go to System → Maintenance → Update firmware.

The Ultimaker 3 will now get the latest firmware from the network and install it. This will take several minutes.

## Updating via USB

1. Download the new firmware file from [www.ultrimaker.com/firmware](http://www.ultrimaker.com/firmware).
2. Put the firmware files on the USB stick.
3. Place the USB stick in the Ultimaker 3.
4. Go to System → Maintenance → Update firmware.
5. The Ultimaker 3 will detect it if there is a firmware file on the USB stick. Select the file to start the firmware update.

# Lubricating the axles

To maintain your Ultimaker 3 correctly and keep it running smoothly, it is advised to lubricate the axles periodically. In the accessory box of your Ultimaker 3 you can find Unilube for the X and Y axes and Magnalube for the Z axle.



Especially in countries with a high humidity or in very dry countries the axles must be lubricated regularly.

## X and Y axles

When you notice small ridges on the surfaces of your 3D printed objects or feel that the X and Y axles are dry, it is advised to apply some Unilube to the X and Y axles. Put a single drop on each of the X and Y axles and manually move the print head to distribute the oil over the axles.



Only use Unilube on the X and Y axles. Using other oils or Magnalube may affect the coating of the axles.



## Z axle

Magnalube (grease supplied with the Ultimaker 3) can be used for lubricating the Z axle. This must be done approximately once every six months. Spread about ten drops of grease over the entire threaded rod and move the build plate up and down to distribute the grease over it.



Do not put Magnalube on any of the other axles as this will affect the working of your Ultimaker 3.



# Keeping the printer clean

For the best print results it is important to keep the Ultimaker 3 clean while using it. Therefore it is advised to not use the Ultimaker 3 in a room where it can easily be covered with dust and to remove small pieces of material that might be in the printer.

Besides this, there are a few parts in the Ultimaker 3 that might require more regular cleaning. Instructions on this are described below.

## Cleaning the glass plate

After a lot of printing, there might be too much excess glue stuck to the glass plate. This can cause an uneven print surface and it is therefore recommended to clean the glass plate once in a while. When doing this, always make sure that the Ultimaker 3 is turned off and build plate has cooled down.

To clean the glass plate, take the following steps:

1. Move the build plate manually to the bottom of the Ultimaker 3.
2. Open the build plate clamps at the front side.
3. Remove the glass plate from the build plate by sliding it to the front and taking it out.
4. Clean the glass plate with lukewarm water and dry it with a cloth. If necessary, you can also use some soap to clean it.
5. Place the glass plate back onto the build plate and close the build plate clamps at the front side to secure it.

## Cleaning the nozzles

While using the Ultimaker 3 it can happen that the nozzle of a print core gets dirty by material that sticks to nozzle.

Although this will not damage your printer, it is recommended to try keeping the nozzle clean, in order to achieve the best print results.

To remove plastic from the outside of a nozzle, it is advised to take the following steps:

1. Heat up the nozzle to 150 °C so that the plastic on the outside gets soft. You can do this by navigating to Material/Print core → Print core [x] → Set temperature and using the scroll wheel to change the temperature.
2. When the nozzle is hot, carefully remove the material with tweezers.



Do not touch the nozzle and be careful while cleaning it as it will become hot.

## Cleaning the feeders

After many hours of printing, or when material has been ground down, there is a chance that there is some debris of the material left in the feeders. To prevent any of these particles to end up in the bowden tubes and print cores, it is important to clean the feeders in this case. This can be done by blowing the particles out of the feeders or by using a vacuum cleaner.



# Maintaining the BB print core

To keep the BB print core in optimal condition it is necessary to clean it once every 250 hours of printing. This will prevent the BB print core to get clogged because of degrading PVA material. Cleaning the BB print core will be done by doing a hot pull and cold pull with PLA material.



Make sure there is no material in the print core when you start this procedure.

## Preparing

1. Go to Material/PrintCore → PrintCore 2 (BB print core) → Set temperature and set the temperature to 230 °C.
2. Remove the clamp clip from the top of the print head.
3. Loosen the bowden tube by pressing on the tube coupling collet and pulling the bowden tube out while doing this.
4. Place the print head in the front right corner to avoid bending of the XY axles when applying pressure to the material during a hot pull or cold pull.



## Hot pull

1. Cut off approximately 30 cm of PLA with a straight cut and try to straighten the material as much as possible.
2. When the nozzle reaches the target temperature of 230 °C gently insert the piece of PLA into the print head until you feel some resistance.
3. Hold the piece of PLA with pliers and gently apply pressure to the material for ±2 seconds so that it extrudes from the nozzle.



The use of pliers is required to prevent injuries on your hands in case the material breaks.



Applying too much pressure to the material is almost impossible, the Ultimaker 3 will not get damaged. If there is no extrusion, apply more pressure.

4. Pull the material out with a quick, firm pull once the 2 seconds have passed.



5. Check the color and the shape of the tip of the material that you have pulled out. Compare it with the pictures below to see if it looks correct. If not, repeat this process.



#### Cold pull

1. Take a new piece of PLA and insert it into the print head by hand until you feel some resistance.
2. Hold the piece of PLA with pliers and gently apply pressure to extrude some material.
3. Lower the temperature of the print core to 75 °C. Keep pressure on the material with the pliers until the print core reaches a temperature of 120 °C.



The slight pressure on the material while cooling down is required to prevent air from entering the nozzle.

4. Wait until the target temperature of 75 °C is reached.
5. Grab the material with pliers and pull it out with a quick, firm pull. The material should now look like this.



#### Re-assembly

1. Insert bowden tube into the print head.
2. Re-attach the clamp clip and keep pressure on the bowden tube while doing this.

# 7

# Help & support

There are a few printer specific issues that could occur while using your Ultimaker 3. In you run into one of these issues, you can troubleshoot the issue yourself with the help of the information on the next pages.

# Troubleshooting

In this chapter the most common issues that can occur on an Ultimaker 3 are described. For a complete description of each issue and information on how to troubleshoot them, please take a look at the [Ultimaker website](#).

## Material is not extruding from the print head

In case of a long unattended print job where material runs out or material gets jammed, the print core may run for a long time without any material flow. As a consequence the material in the hot end may degrade and cause clogs in the print core. Especially for PVA there is a higher chance of degrading material when the print core is not cleaned regularly.

When material gets clogged, the print core must be cleaned. Therefore the cleaning method as described on page 38 can be used. Please note that the following things are important and may be different from the regular procedure when print core is clogged:

- Remove the bowden tube from the print head after the print core has heated completely.
- Repeat the hot pull process until no burned material is pulled out and the tip of the material has a smooth shape.
- Flush some material through the nozzle and apply a cold pull to confirm that the nozzle is clean.
- Clean an AA print core always with the same material as was used for printing.
- Clean a BB print core (PVA) always with PLA material.

## Print not sticking to the build plate

When you experience problems with the adhesion of a print to the build plate, the following things can be done:

- Ensure that the correct material settings and adhesion method were used (see chapter 5 Operation).
- Re-calibrate the build plate manually and then do the active leveling (see chapter 5 Operation).
- Check the Cura settings that were used and try printing with one of the default Cura profiles.

## Material is not forwarded by the feeder

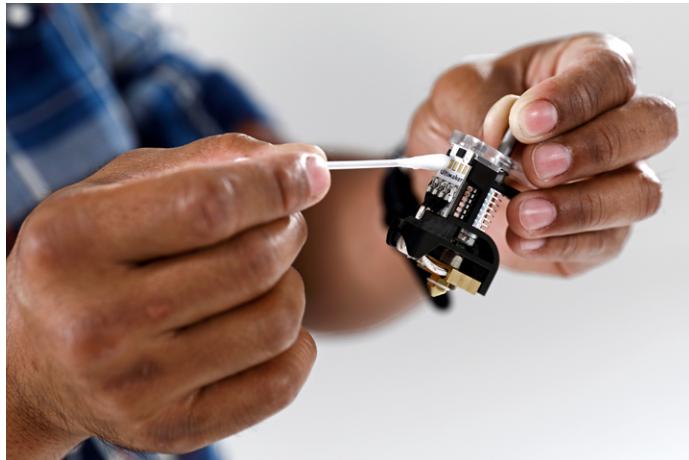
There are a few things that can cause material to not be forwarded by the feeder when it is being loaded or while printing.

The following things can cause this behavior:

- Material is not inserted far enough into the feeder while loading.
- Material is ground down by the feeder. Take a look at [this page](#) for more information.
- The feeder tension is too low.

## Print core not recognized

If a print core is not recognized by the Ultimaker 3, the printer will inform you about this. The main reason for this are dirty contact points on the chip at the back side of the print core. When this happens, clean the contact points with a cotton swab and some alcohol.



## Error messages

This is the complete list of error messages that can show up on the Ultimaker 3. For more information on troubleshooting these error messages please go to the error specific page on the Ultimaker website.

- An unspecified error has occurred. Restart the printer or go to [ultimaker.com/ER11](https://ultimaker.com/ER11).
- Max temp. error on PrintCore {display\_hotend\_nr}. Go to [ultimaker.com/ER12](https://ultimaker.com/ER12).
- Min temp. error on PrintCore {display\_hotend\_nr}. Go to [ultimaker.com/ER13](https://ultimaker.com/ER13).
- Max temp. error on the build plate sensor. Go to [ultimaker.com/ER14](https://ultimaker.com/ER14).
- Heater error on PrintCore {display\_hotend\_nr}. Go to [ultimaker.com/ER15](https://ultimaker.com/ER15).
- The Z axis is stuck or the limit switch is broken. Go to [ultimaker.com/ER16](https://ultimaker.com/ER16).
- The X or Y axis is stuck or the limit switch is broken. Go to [ultimaker.com/ER17](https://ultimaker.com/ER17).
- There is a communication error with the print head. Go to [ultimaker.com/ER18](https://ultimaker.com/ER18).
- There is an I2C communication error. Go to [ultimaker.com/ER19](https://ultimaker.com/ER19).
- There was an error with the safety circuit. Go to [ultimaker.com/ER20](https://ultimaker.com/ER20).
- There was a sensor error within the print head. Go to [ultimaker.com/ER21](https://ultimaker.com/ER21).
- Active leveling correction failed. Manual level the build plate or go to [ultimaker.com/ER22](https://ultimaker.com/ER22).
- An incorrect print temperature is specified. Go to [ultimaker.com/ER23](https://ultimaker.com/ER23).
- An incorrect build plate temperature is specified. Go to [ultimaker.com/ER24](https://ultimaker.com/ER24).
- The motion controller failed to be updated. Go to [ultimaker.com/ER25](https://ultimaker.com/ER25).
- This print job is not suitable for this printer. Go to [ultimaker.com/ER26](https://ultimaker.com/ER26).