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3D Printing with an Ultimaker
Troubleshooting Guide
www.createeducation.com

Overview

Like all machines, your 3D printer will develop problems from time to time, perhaps producing poor print results or not working at all. When you are new to 3D printing, one of the main concerns is what to do if something goes wrong, how do you identify the problem and fix it so that your printer can be up and running again as quickly as possible?

The good news it that many problems, although alarming at first, can be fixed relatively easily with minimal expertise and there is a plethora of very good online technical support available to help you. The difficulty lies in knowing what to look for and where to look as scouring online help sources can be time-consuming and confusing.

This guide has been developed by The CREATE Education Project to provide an overview of some of the common 3D printing issues you may experience with the Ultimaker range of printers. For each issue it will provide an explanation of why you might be experiencing the problem, the steps you can take to fix it and include links to recommended online videos and help sources to get further support.

To keep it simple and avoid confusion this guide only covers some of the most common 3D printing issues that most people will experience from time to time.

The 6 Common problems covered in this guide are:

1. Blocked nozzle or under extrusion
2. Print not sticking to the bed
3. Warping
4. Caked nozzle
5. Leaning prints or shifted layers
6. X,Y,Z switch broken error message

If you are experiencing a different issue not addressed in this guide, we recommend as a next step that you take a look the following:

Ultimaker Troubleshooting resources: **https://ultimaker.com/en/resources/troubleshooting**

The very comprehensive "A Visual Ultimaker Troubleshooting Guide" by 3DVerkstan: **http://support.3dverkstan.se/article/23-a-visual-ultimaker-troubleshooting-guide**

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Printer Setup

It is important that the printer is set-up correctly in order to have successful prints. This includes ensuring the machine is calibrated by levelling the bed, correctly inserting and replacing filament and updating the firmware.

You can access video tutorials that guide you through these process at:
www.createeducation.com/help-support/videos-tutorials/

Ultimaker also provide an online manual for each of their 3D printer models.
The manuals include complete step-by-step guides with videos for each set-up process and can be accessed at:
https://ultimaker.com/en/resources/manuals/ultimaker-3d-printers

Simply select your printer model and go to the appropriate section of the manual by selecting the links on the right of the screen.

Top Tips

Inserting filament

1. Cut off and discard the first 5cm from the roll
2. Cut the end of the filament at an angle of approx 45°
3. Straighten the first 20cm of the filament before guiding it into the feeder


Glass Plate

1. Ensure glass plate is clean
2. Apply glue only when required
3. Ensure the safety sticker is facing up
   (there are different sides to the glass plate)
4. Always remove the glass plate when transporting your Ultimaker.

Checking & Aborting Prints

Often if there is going to be a problem with the print, you will notice an issue in the first layer. For example the material may not be sticking to the bed, it may be under extruding or not extruding at all, you may hear the feeder clicking etc.

It is advisable therefore to watch (or periodically check) the first layer of your design being printed wherever possible. Then if there is a problem with your print that becomes apparent in the first layer, you can detect it immediately and abort the print. This limits both the time and material wasted on a poor print.
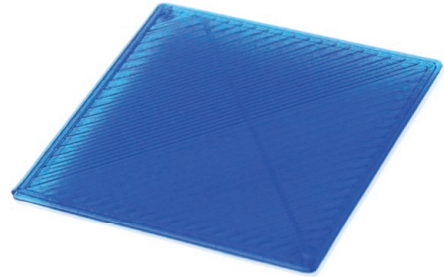
You can see what a successful first layer should look like with this visual reference from Ultimaker:
**https://ultimaker.com/en/resources/21330-what-does-a-successful-first-layer-look-like**

Aborting a Print

A print can be aborted at any time. If the printer is still warming up and the print has not started, simply turn the controller to highlight **ABORT** and click to abort the print.
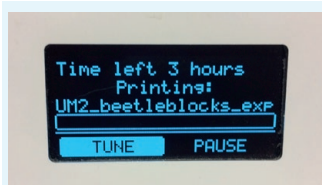
When the print has been started, you need to abort through the TUNE menu. To do this simply turn the controller on the front of the printer until **TUNE** is highlighted and click to enter the TUNE menu.
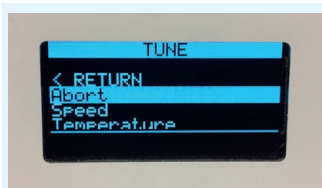
Then turn the controller to highlight **Abort** and click.
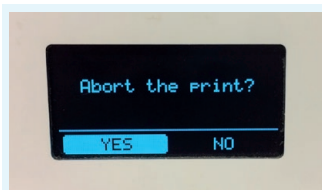
Finally, turn the controller to highlight **YES** and click to abort the print.

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Basic Maintenance

In order to prevent printing problems, make sure that you follow these basic maintenance tips for keeping your printer in top condition.

Atomic Method

The Atomic Method can be used to unclog the nozzle of your Ultimaker. It will clear the blockage by pulling dirt or carbonised material out of the nozzle from the top side. To apply the Atomic Method you don't need need to disassemble the print head or hot end, which makes it very easy to use this method.

Tip: Besides using this method to unclog the nozzle, you can use the Atomic Method when switching to a material that requires a lower printing temperature. This way all residue from the previous material will be removed, helping to prevent blockages.

Step-By-Step Guide: **https://ultimaker.com/en/resources/19510-how-to-apply-atomic-method**

Video Guide: **http://www.createeducation.com/help-support/videos-tutorials/**

Lubricating the Axis

X/Y AXES

When you notice small ridges on the surfaces of your 3D printed objects or feel that the X and Y axes are dry it is advised to put a single drop of sewing machine oil onto the X and Y axes. This will help to keep your Ultimaker running smoothly. Sewing machine oil is not included in the Ultimaker 2+ package, but we highly recommend to only use this for lubricating the X and Y axes.
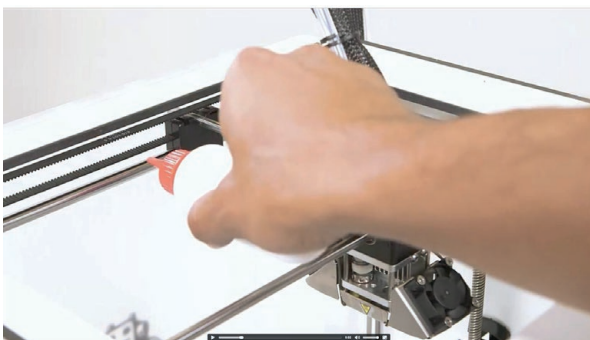
Important: Do not use WD40 as this will affect the coating that is on the axes. We advise to only use a drop of sewing machine oil for oiling the axes.

X/Y AXES

Once every half year the Z trapezoidal leadscrew has to be lubricated with Magnalube. This is the green grease that was delivered with your Ultimaker. Make sure to spread 10 drops of grease over the entire threaded rod. With your next print the Ultimaker will lubricate the axis itself by moving up and down.

Note: Magnalube should be applied to the Z trapezoidal leadscrew only; make sure to not put it on any of the other axes.

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Cleaning the Feeder

Using the feeder in the right way and keeping it clean is important for a good extrusion. The feeder can be cleaned by blowing air on the knurled wheel or using a simple brush.
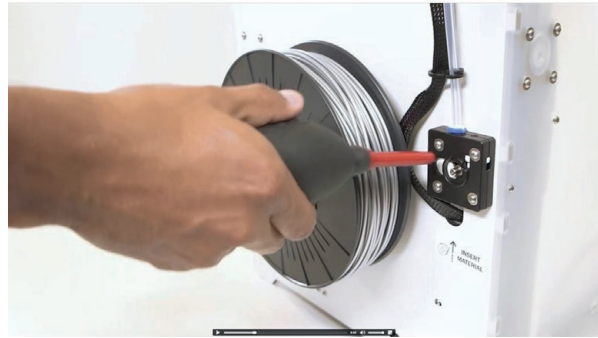
Learn more about maintaining the feeder here:
https://ultimaker.com/en/resources/173-the-feeder

Cleaning the Glass Plate

After a lot of printing, if using glue 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 awhile. When doing this, always make sure that the Ultimaker 2+ is turned off and build plate has cooled down.

To clean the glass plate, take the following steps.

Removing the glass plate

1. Move the build plate manually to the bottom of the Ultimaker.
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.

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Top Tips

In order to be sure about a successful next print it is recommended to re-level the build plate after having repositioned the glass plate.

Try using hairspray instead of glue for build plate adhesion. **If using hairspray always remove the glass plate before spraying to prevent future issues.**

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Common 3D Printing Problems

1. Blocked nozzle or under extrusion
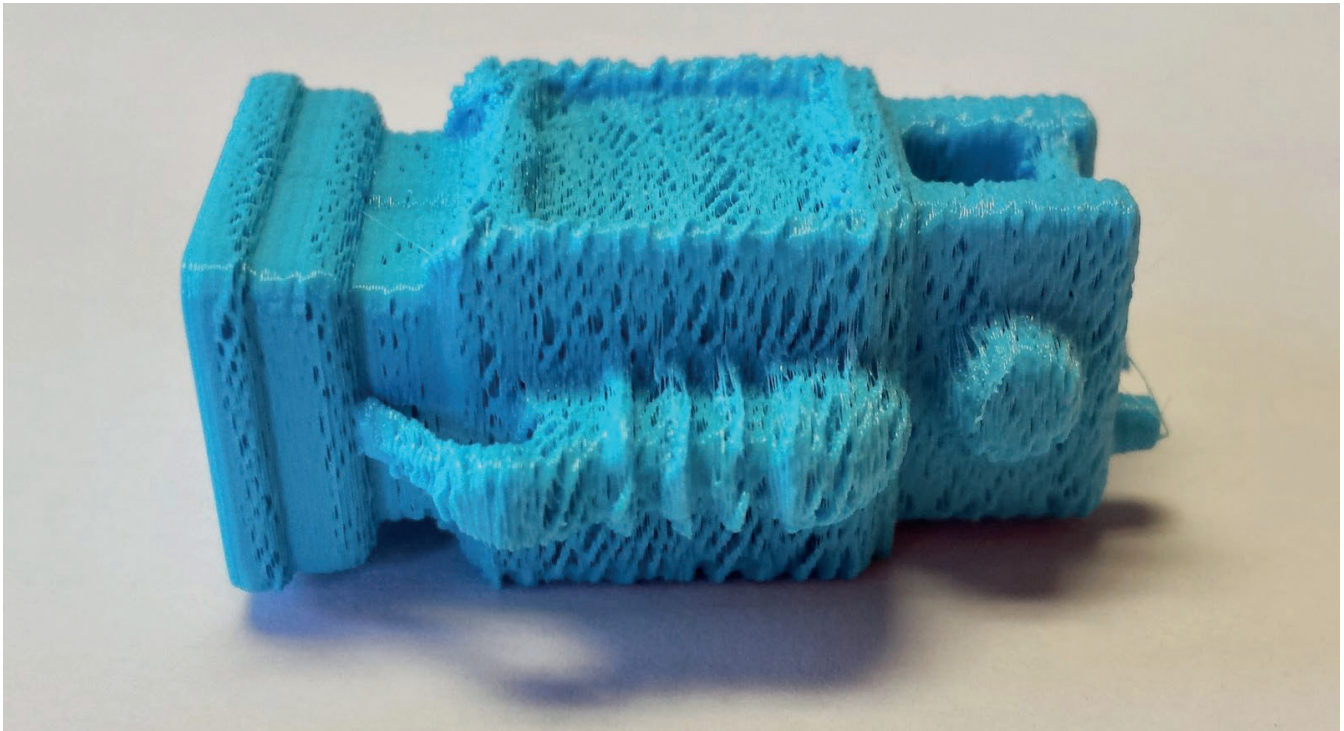
After a long time of using your Ultimaker you might notice some signs of "under extrusion". This means that your Ultimaker can't extrude enough plastic and is usually shown by very thin or missing layers in a print. There are several issues that can cause under extrusion however in most cases, it is caused by some dirt or carbonized material in the nozzle or another hot end part through which a (partial) blockage is created. When under extrusion appears it is recommended to use the Atomic Method in order to clean the nozzle and other hot end parts.

Step-By-Step Guide: **https://ultimaker.com/en/resources/19510-how-to-apply-atomic-method**

Video Guide: **http://www.createeducation.com/help-support/videos-tutorials/**

Another issue that could cause under extrusion is that the filament is not being fed through the feeder freely. This could be because the filament is tangled on the reel, or it is a little too tightly coiled towards the end of a reel. Check the reel and if required untangle, unwind or try to straighten any tightly coiled filament.

For more tips on identifying and solving under extrusion problems, take a look at the ultimaker under extrusion guide: **https://ultimaker.com/en/resources/21477-how-to-fix-under-extrusion**

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Common 3D Printing Problems

2. Print not sticking to the bed

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 nozzle and build plate is too big, the print will not stick properly to the glass plate.

To resolve this issue re level the build plate:

Step-by-step Guide: **https://ultimaker.com/en/resources/18769-build-plate-leveling**

Video Guide: **http://www.createeducation.com/help-support/videos-tutorials/**

It is also very important that your print bed is clean (glue is an exception of course) and free from oils from your fingers. If you've touched your print bed a lot the oils from your fingers can prevent or make it harder for the plastic to stick properly, so try cleaning the glass plate.

To promote stickiness your machine was delivered with a stick of glue. Using glue is optional but tends to help quite a bit. Don't go crazy with the glue though, more is not better. Clean your glass plate and then spread a bit of the glue onto it. With a damp piece of paper or cloth spread the glue out over the bed and let it dry (starting a print that uses the heated bed will make it dry quickly). After the water evaporates you will be left with a very thin layer of glue.

If you're printing on a cold bed with blue painters tape, like on the Ultimaker Original, it is very helpful to wipe the tape down with some alcohol. The tape is covered with a waxy substance that can make it harder for the parts to stick. This isn't always needed but it's something to keep in mind.

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Common 3D Printing Problems

3. Warping
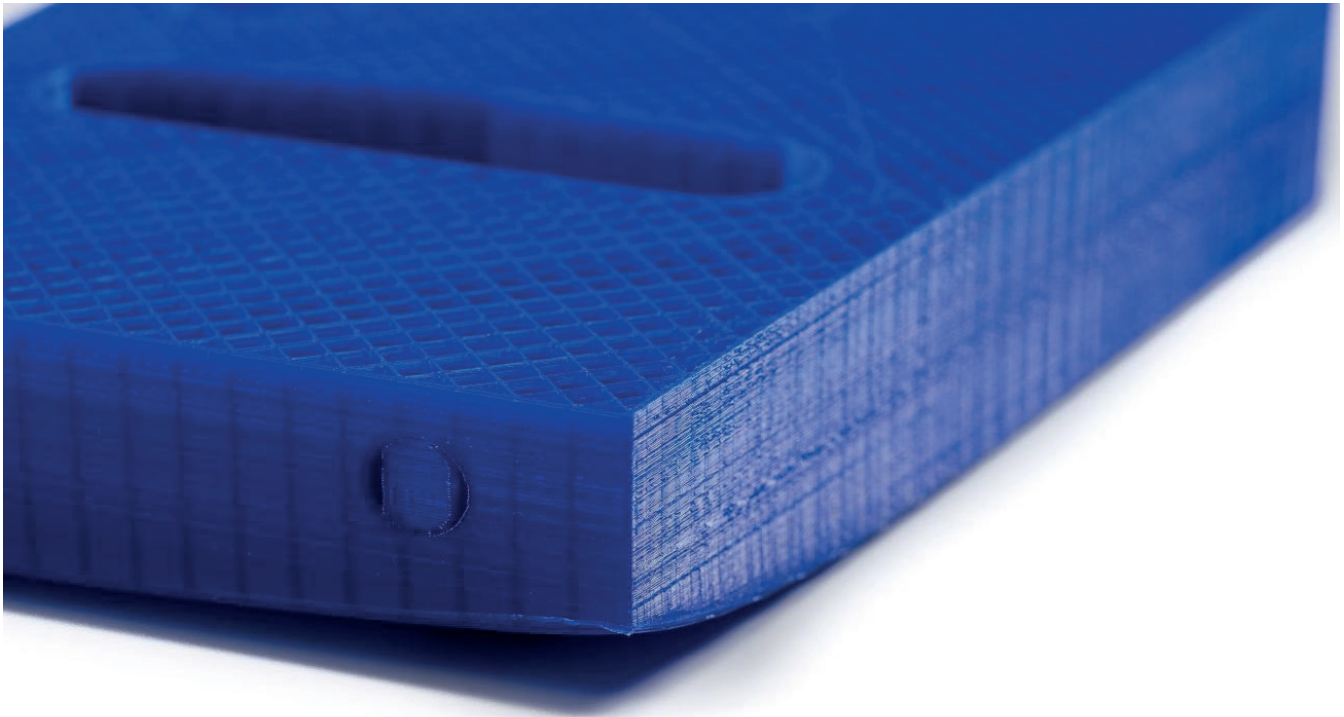
Warping occurs due to material shrinkage whilst 3D printing, which causes the corners of the print to lift and detach from the build plate. When plastics are printed, they firstly expand slightly but contract as they cool down. If material contracts too much, this causes the print to bend up from the build plate.

When your print is warping, make sure you have done the following:

- Level the build plate correctly
- Apply a thin layer of glue to the glass plate
- Use the correct temperature settings
- Use one of the default Cura profiles
- Try adding a Brim in Cura

To troubleshoot this issue in more detail, take a look Here:
https://ultimaker.com/en/resources/19537-how-to-fix-warping

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Common 3D Printing Problems

4. Caked Nozzle

The cause of a caked nozzle is usually that the print comes loose from the platform or that it never stuck in the first place. If the print detaches from the platform it can stick to the nozzle and prevent plastic from flowing correctly. This causes it to curl up and flow upwards along the side of the nozzle and block.

Preventing this is a matter of correct bed levelling and making sure that the part has good adhesion to the platform during the print. This can include using brim, cleaning the bed and/or adding glue and making sure that the platform has the correct temperature for the material you're using.

Resolution:

Removing the block of plastic isn't difficult but can require some patience and time. Let's say that the plastic in question is PLA, start by heating up the print head to ~100C and let the heat transfer into the plastic for a couple of minutes to soften it. If you're lucky you will now be able to remove the block of plastic in one go. At the very least you should be able to get rid of the worst of it. If the plastic won't budge, start increasing the temperature in increments until it starts to give in.

If the plastic has spread around the two wires coming out of the heater block you should be careful not to pull on the wires too hard as you

might break them. It's primarily the smaller of the two (the sensor) that can be a bit sensitive.

If the plastic doesn't become soft enough to remove by just heating up the block you can add additional heat by using a heat gun on a low setting. Just be careful that you don't melt the fans.

After you have removed most of the plastic you can heat the block up to printing temperature and simply wipe off most of the remaining plastic. It's not critical to remove every last trace of plastic but you don't want to have big blobs still stuck that can melt and then drip down on your following prints.

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Common 3D Printing Problems

5. Leaning Prints or shifted layers
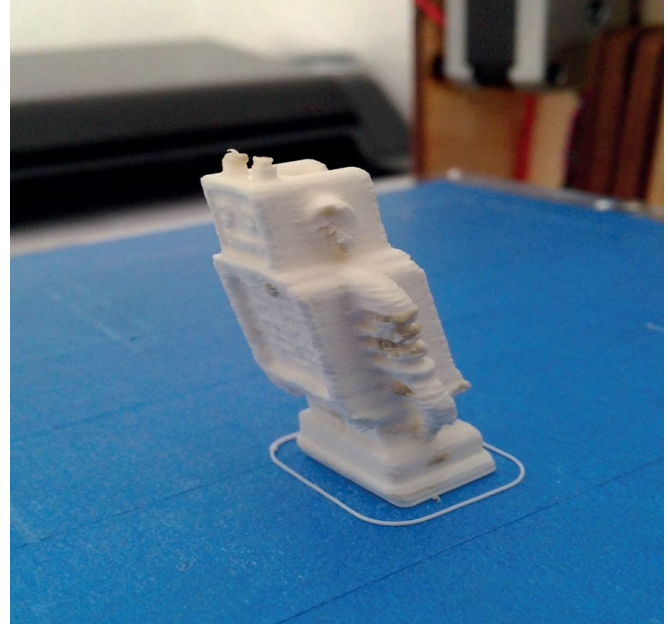
Prints start to lean or shift layers when a pulley becomes loose. The pulleys are connected to the axel's by a small grub screw, as these move constantly when printing they occasionally work loose over time.

Resolution:

To resolve this issue take a 2mm hex screwdriver and tighten all 12 grub screws that hold the pulleys in place very tightly, probably a bit tighter than you expect. The small allen key that came with your printer will flex as you tighten the screws.
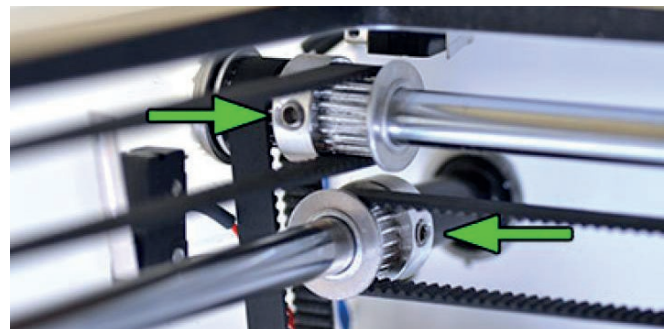
Top Tips

It's a good idea to check how smooth the head runs manually on the gantry at this point. If there is any stiffness apply the unilube or some low viscosity oil and check the squareness of the axes.

For more detailed guidance for addressing shifted layers visit:
http://support.3dverkstan.se/article/23-a-visual-ultimaker-troubleshooting-guide#shifted

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Common 3D Printing Problems

6. X, Y, Z switch broken error message

X or Y switch broken
This error occurs when either the X or Y limit switch is not activated while the print head is homing. There are a few possible reasons for this, therefore it is advised to check the points described below:

- Check if the levers of both limit switches are physically pressed by moving the print head manually to the left back corner. If one of them is not activated, you could slightly bend the lever to ensure it is being pressed.
- If the print head is not reaching the left back corner at all it probably means that there is a loose pulley. In this case, make sure that all pulleys (on the axes and X and Y motor) are tight.

Z-Switch broken or Z-switch stuck
If you get one of these errors it means that there is a problem with the Z limit switch. It either tells you that the Z limit switch can't be pressed or that something is preventing the lever of the switch from switching back. Both errors require the same checks and solution:

- Check if nothing is blocking or pressing the Z limit switch for example filament under the switch. There might be something lying underneath the platform (preventing the platform from moving down completely) or there could be something stuck inside the hole in which the Z limit switch is located.
- You can slightly bend the lever of the Z limit switch to ensure it is properly pressed and switches back without any problem.

For more detailed guidance for addressing this error visit:
http://support.3dverkstan.se/article/23-a-visual-ultimaker-troubleshooting-guide#limit-switch-broken

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More Help & Support

There are a number of avenues for accessing further help and support.

If the information in this guide has not helped you to deal with your printing problems, or you need to fix the printer urgently as a 3D printing lesson is imminent, the first port of call is our dedicated technical support team.

3DGBIRE

When purchasing a printer directly through the CREATE Education Project, Ultimaker GB or 3DGBIRE, in addition to your standard printer warranty, you will have access to FREE lifetime support. 3DGBIRE are the official Ultimaker product support team for the UK and Ireland. Their technical support team is always happy to help in isolating the cause of a problem, finding parts and providing solutions.

Support is available Monday-Friday 9am-5pm

Email: support@3dgbire.com
Telephone: 01257 276116
Create a ticket: **https://3dgbire.com/pages/help-support**
Live Chat: **https://3dgbire.com/**
or visit us at Unit 2, Chorley Business Park PR6 0BL

CREATE Education Project

Visit the help and support section of the CREATE Education Website for Help Videos and Tutorials, FAQs, Glossary and Documentation: **www.createeducation.com**

Ultimaker

Visit the Ultimaker website to access all product manuals, tips and tricks and troubleshooting: **https://ultimaker.com/en/resources**

Visit the Ultimaker Community and forums to engage with over 10,000 Ultimaker users, post a question or search the hundreds of community posts and responses to find a solution to your 3D printing problem: https://ultimaker.com/en/community/dashboard

The FREE Ultimaker App provides a valuable reference point for your machine, including:

Step-by-step 3D printer setup
Useful tips and tricks
Troubleshooting articles
Product manuals

Learn more and download the Ultimaker App: **https://ultimaker.com/en/products/ultimaker-app**

3D Verkstan

3D Verkstan has published a very detailed and comprehensive "Visual Troubleshooting Guide" which covers in detail most of the problems you could encounter with your 3D printer:
http://support.3dverkstan.se/article/23-a-visual-ultimaker-troubleshooting-guide

Professional Development

3D Printing in the Classroom

This half day, professional development course for up to 10 teachers equips you with everything you need to be able to develop, deliver and manage 3D printing projects with your students.

The course includes:

- Overview of the 3D printing process.
- 3D design tools, techniques and selecting appropriate 3D modelling software.
- How to utilise and embed 3D printing within your subject area(s).
- How to develop and progress pupils skills in 3D design and printing.
- Age/stage specific 3D printing skills and projects.
- How to develop a successful 3D printing project.
- How to manage the 3D printing workflow in an educational environment.
- How to deal with technical issues and access support.
- Budgeting for and managing ongoing running costs.
- Where to access classroom resources and 3D files.

Learn more at **http://www.createeducation.com/cpd/**

Online Professional Development Resources:

http://www.createeducation.com/professional-development/online/

Further Support

Introducing any new technology is always a challenge, but the CREATE Education project is here to support you in every step of your journey. Our website provides information and links to access further support.

Technical Support:

http://www.createeducation.com/help-support/technical-support/

Documentation:

http://www.createeducation.com/help-support/documentation/

Community Access:

http://www.createeducation.com/professional-development/community-access/

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Share and showcase your work with the CREATE Education Community

The CREATE Education Project is an open-source project dedicated to helping and supporting educators and schools in their 3D printing journey. This is only made possible with the continued support of our 3D printing community. Once you have got started we would love for you to share what you are doing with the CREATE Education Project. We can showcase your school and share your resources so that others can benefit. This also helps to promote your school to the community. There are many ways in which you can do this:

1. Write a blog post about your experiences or a post to share ideas and inspiration.

2. Help us to produce a case study of your work, outlining what you are doing with your 3D printer and how your students and school community are benefiting.

3. Share your classroom resources - these can be schemes of work, lesson plans, presentations, student worksheets, project booklets etc. Don't worry if your resources are incomplete or are not professionally presented. We have experts in-house that with your ideas and guidance can refine them and turn them into a professional publishable resource in which your school will be credited.

4. Share examples of your student projects so that others can be inspired by their creativity and technical prowess.

If you have any ideas, stories or resources to share please contact:

Sonya Horton
s.horton@createeducation.com

And finally
Enjoy your experience with 3D printing and never forget the CREATE Education Project and the 3DGBIRE technical support team are always available to support you.

Keep in touch and up to date with our latest news, stories and resources through our website and social media channels

Website: **createeducation.com**
Linked In: **linkedin.com/in/create-education-645814114**
Twitter: **@UltimakerCREATE**
Facebook: **facebook.com/createeducationproject**
Instagram: **@createeducation**

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Acknowledgements

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