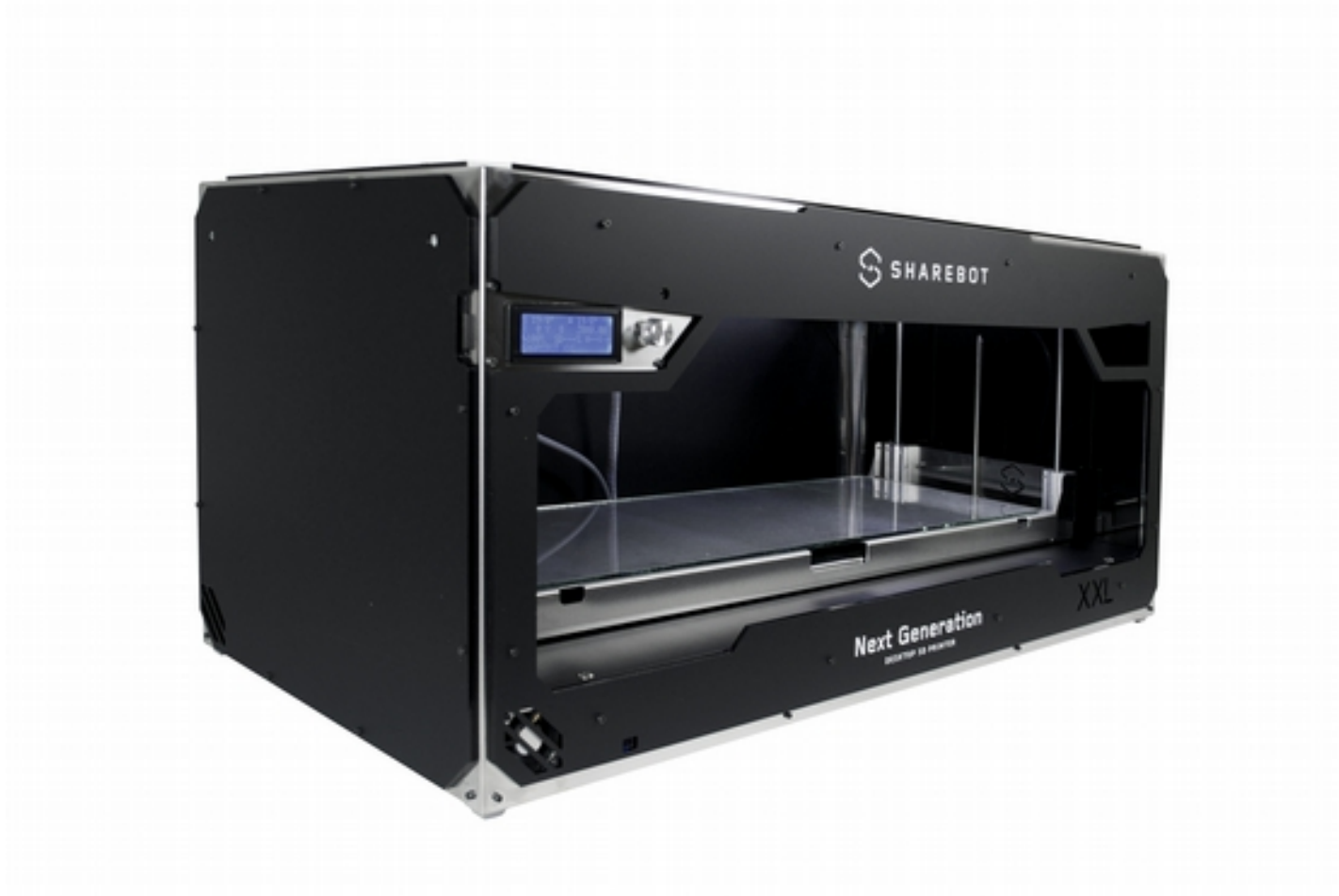


# Sharebot Next Generation XXL

## user's manual



Version 0.3 16/09/2015

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### **ATTENTION – EXTRUDER**

The fusion and extrusion system of the thermoplastic filament requires a heated end up to temperatures of 250 degrees and more. The contact, even for a very limited time, with the heated part causes burns. You must avoid to put your hands or other body parts in the printing area when printing and for minutes after the printing process is over. The current temperature of the extruder is indicated on the LCD screen.

### **ATTENTION – HEATED PRINTING BED**

All the printing plate is made of metal with the addition of a glass plate. This device is electrically heated and serves to bring to desired temperature the entire printing bed, including the glass plate. The temperature is measured directly on the heating plate: so the temperature of the glass plate will be less than the one shown for several minutes after the beginning of the heating process, but likewise it may be warmer than what is indicated on the display for several minutes after the end of the printing due to the the phenomenon of thermal inertia. Remember that it can be set in special cases for temperatures of 90 degrees, while the recommended temperature for prints is usually 80 degrees. At these temperatures the unintentional contact does not produce damage and burns if you retract immediately the body part that is in contact, while at higher temperatures it greatly reduces the time necessary to create burns. You have always to check the temperature indicated on the display before you start maneuvering like the removing of the glass plate on the printing bed.

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### Support Policies

If you have any problems in using our printers, the procedure to be followed is as follows:

- Check the manual and guides available on the web site;
- Contact the dealer from which you purchased the machine;
- Contact our technical support by filling out the form beside remember to fill in all fields. Our technicians will reply within 3 working days.

<http://www.sharebot.it/index.php/support-en/?lang=en>

In case your printer should return in the factory to be repaired, our technical support will assign it a file number to return and we will provide all the additional information required.

**Attention: the package should be the original one, penalty forfeiture of the guarantee.**

Check out this [video](#) to see how to pack the printer for assistance.

Upon receiving your printer, our technicians will assess whether the problem results from a failure, in this case the repair under warranty will be carried out for free, or by improper use of the printer or by an improper use of material not approved by Sharebot: in the latter case we will provide you a quotation to request your consent to repair. For out-of-warranty printers may be required a quote for the inspection. Troubleshooting is a very important task for us and we think is necessary to share experiences, problems and solutions. Because of that please give priority to the use of the form that will also allow others to take advantage of our and your efforts. Visit our website for more information.

If you are interested in customized assistance programs please contact [info@sharebot.it](mailto:info@sharebot.it)

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### ***Technical characteristics***

Printing technology : **Fused Filament Fabrication**  
Printing volume : **680 x 250 x 200 mm +/- 10mm**

Theoretical positioning resolution axes X and Y : **0,06mm**  
Risoluzione di posizionamento Z: **0,0025mm**

Extruder diameter: **0,4mm**  
Positioning resolution axis Z : **1,75mm**

PLA best extruding temperatures: **PLA: 200-230°**  
Maximum temperature heated printing bed: **90°**

Supported and tested printing filaments : **PLA**

External Dimensions: **955 x 470 x 445 mm**  
Weight: **40 kg**  
Power consumption: **500 watt**

**Electronic board compatible with Arduino Mega 2560 with Firmware Open Source <https://github.com/Sharebot3D/Marlin>**

**LCD screen 20 x 4 with menù navigation (encoder)**  
**Presence filament sensor**  
**Extruder block with regulation pressure upon filament**

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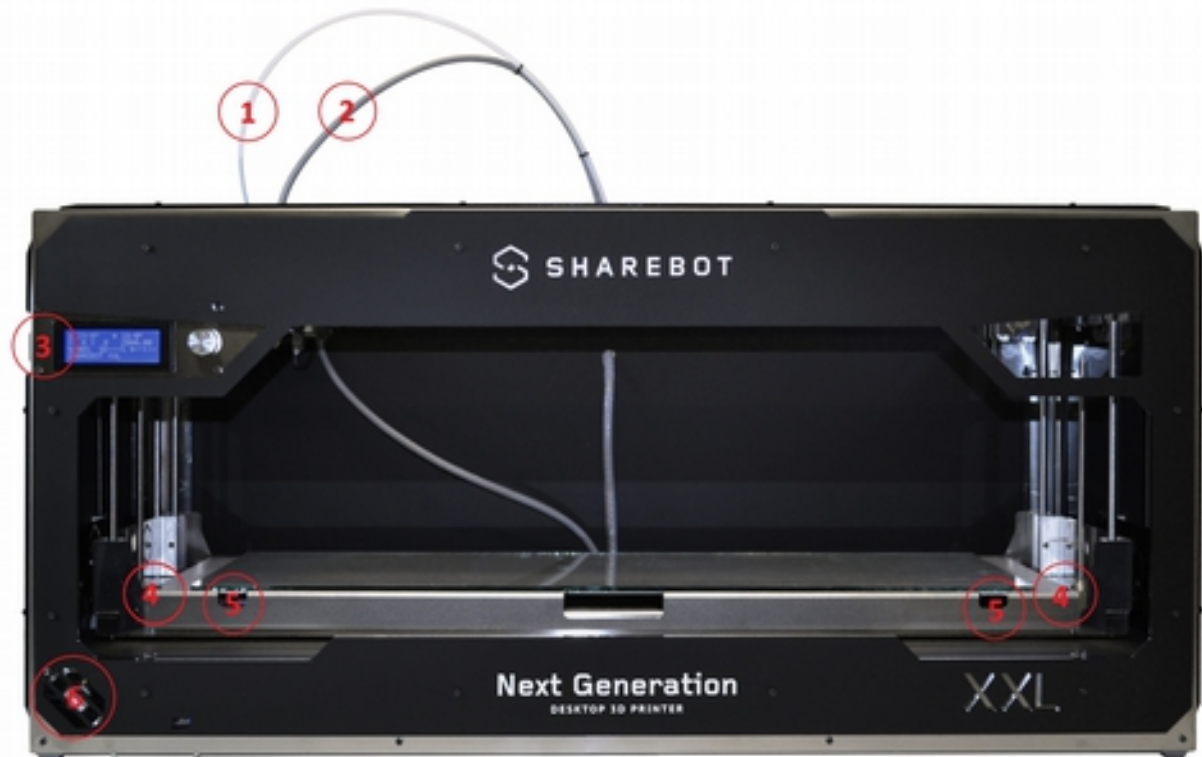
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### 1 - Preliminar Operations

#### *Experience Sharebot XXL*

Your professional 3D printer Sharebot Next Generation XXL is a tool of precision, designed, developed and assembled in Italy by qualified staff. Before leaving the factory it was submitted to a quality control and to a quality test that guarantees its operation. It's very important, before you can use the printer, knowing all the technical terms used in this handbook and identify all the specific components that form a Sharebot XXL.

- 1 Filament teflon sheath
- 2 Extrusion head cable
- 3 LCD screen
- 4 Calibration screws
- 5 Clips position
- 6 Electronic frontal ventilation



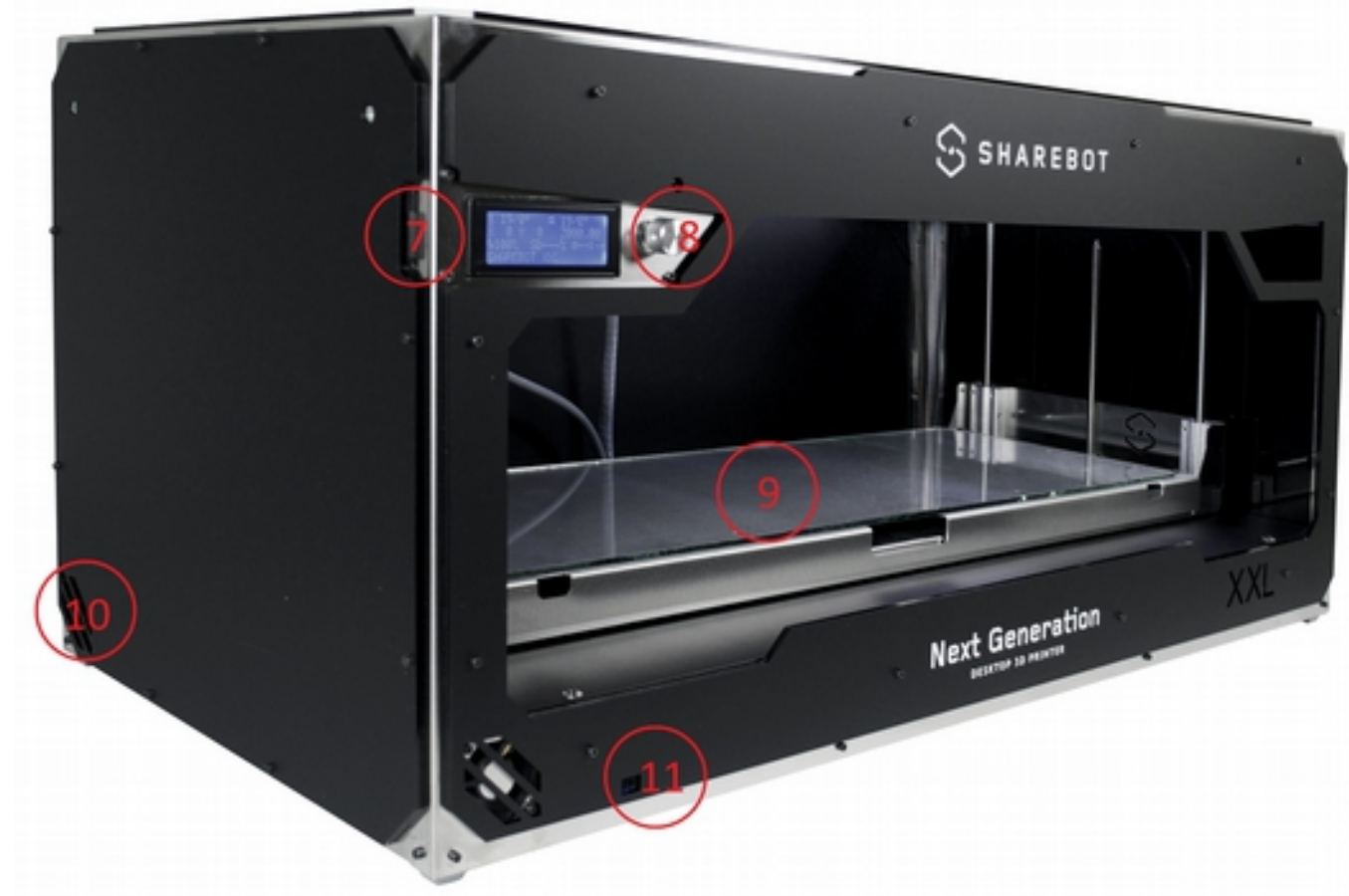
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- 7 SD card slot
- 8 LCD control knob
- 9 Glass printing bed
- 10 Electronic lateral ventilation
- 11 USB connection

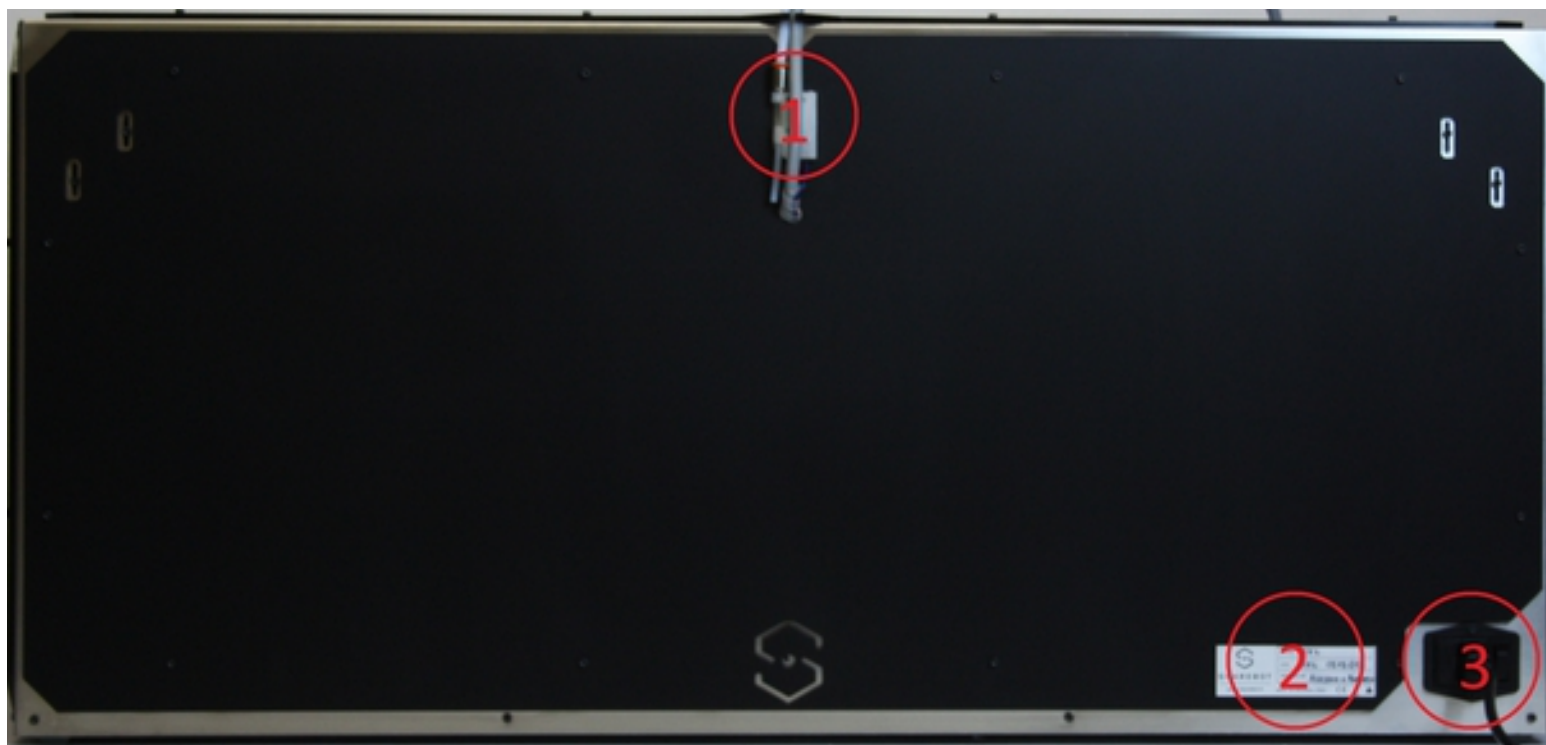
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- 1 Presence filament sensor
- 2 Label with Identification Code
- 3 Switch and power cable socket



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### ***Opening the package***

Your Sharebot XXL is equipped with a series of accessories that allow you to make it immediately operative; there is no software because it is open source and constantly updated. Software must be downloaded from the Sharebot website to always have the latest version . Alternatively, we recommend the purchase of Simplify3D from our website to take advantage of the potential of Sharebot XXL.

With care and without damaging the packaging remove the various parts and elements that fix the printer inside the package and then - helped by another person - pull it out by the two short side of the frame. Do NOT pull the cable that comes to the extruder: it is a power cord and NOT an handle. Proceed with the recovery from the packaging of all the parts and check that the material listed below are all in the package:

Warning: Do not throw away the original package. You could use it if you have to send it or move it. A shipment without original packaging prejudices the warranty.

1. Our letter of presentation and welcome plus “Warranty and support”
2. Spool-holder + threaded bar + two nutse + eight M3 bolts
3. PLA spool
4. Power cable
5. SD Card (already in its slot)
6. USB cable
7. Hair spray
8. Cutter
9. Nippers
10. Spatula
11. 2,5 Allen screwdriver
12. Glass printing bed (in the printer)
13. Clips to stop the glass
14. Spare part kit (two hot-ends and two fans)

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### ***Positioning the printer***

For proper operation, the printer must work in a clean and dust-free space, with an ambient temperature between 10° C and 30° c. It is also preferable a position away from drafts or air conditioning.

In the left back you'll find power switch so we recommend to leave it easily accessible; the power cable is the only way of separation of the plug from the mains. At the front -bottom left – and on the left side of the printer, you will find the ventilation of the electronic parts from wich depends the correct circuit cooling: these must be left unobstructed.

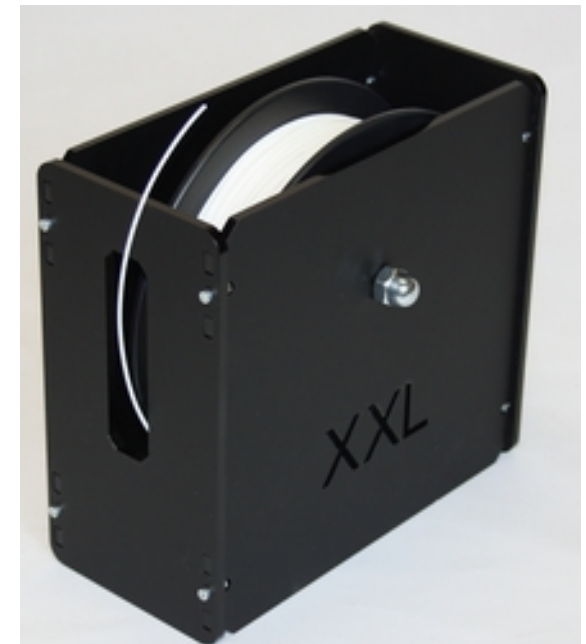
Remember that the filament is usually in a spool and that this should be positioned on the reel-carrier included in the packaging Remember that the wire is usually in a spool and that this should be positioned on the reel-carrier included in the packaging . The recommended position is behind the printer, on the same floor, unrolling the filament bottom up. There are alternative positions that possibles, but in that case you have to disable the filament presence from the “prepare” menu. The important thing is that the filament flow and is dragged smoothly without whatsoever impediment throughout all the print area useful. For this reasons, the printer may not be placed in places that haven't at least 35 cm free space around the rear or side.

### ***Assembling the spool-holder***

Using the M3x12 screws and the nuts, assemble the spool-holder. Do not overtighten the screws to avoid breaking the plexiglass. Orientate the sides with the hole for the threaded bar facing up and logos readable from the outside. the front cover with the hole should be at the top as in figure.

Insert the spool inside, insert now the M10 threaded bar and fix it with the two M10 nuts.

Place the spool-holder behind the printer remembering that the filament must flow smoothly without obstacles.



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### 2 – The workflow of 3D printing

Before you start printing with your Sharebot XXL it is important to understand how you arrive at a finished object. This allows you not only to know what you need to do to give form and substance to your ideas, but it helps you to identify any constraints and limitations of the technology used by this printer. In the table we summarized the steps required to obtain a 3D printing:

Working enviroment	Operation	Output
Common used software CAD	Design the object	Common used format for your file
Common used software CAD	Import/save file in .stl format (or .obj)	File .stl
Slicing software: Slic3r or Simplify3D	Generate command file for 3D printer	File .gcode
3D printer: Sharebot XXL	Select the file from SD card	Printed object

#### ***3D model file***

It all starts with creating or downloading a three-dimensional model of the object that you want to print in 3D. The creation is done through one of the many modeling software available. There are many and each of them has specific characteristics. In this respect it is worth noting that you can have different modelling requirements and this is reflected in the variety of applications . In this respect it is worth noting that you can have different modeling requirements and this is reflected in the variety of applications. Some are more suited to mechanical design, other artistic modeling, other than architecture . Remember that 3D modeling was primarily used to create projects or for rendering. In the first case the model was thought to be accomplished physically and therefore is subject to a series of specifications and constraints that allow the project to be turned into something real. In the latter, the aim is to create an image for certain requirements: the model might then be flawless as display but physically impossible and so, unprintable.

When you choose the program that you want to use for your models you must then ensure that it is able to create a file suitable for the production (especially 3D printing).

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### ***Downloading from internet***

Internet offers many ready-made 3D models, but also in this case there are differences between the models that you “see fine” and those who “print well”. A good indicator of the ability to print the file extension: the most popular 3D printing is STL (websites that intend to offer printable objects use this format). If there is no STL it is likely that the intended use is different and the result on a 3D printer is not guaranteed.

### ***From a 3D model to a printing file***

The real “secret” of three-dimensional printing is the transformation of three-dimensional object into a sequence of two-dimensional slices that overlapped, reconstruct the object. Imagine a series of slices of bread: If the stack rebuilt the loaf from which they were cut.

In the case of 3D printing every slice may consist of two-dimensional shapes not connected together as it is their sum to create the finished object. Thanks to this breakdown, the object can be complex as desired because the printer will draw with the plastic one layer after another overlapping it; a square or a doodle for the printer have the same difficult.

The most important work the software makes is starting from the 3D model – usually a mesh of triangles in space called mesh – and transforms it into a sequence of slices according to a number of parameters (slicing). In order that the process is completed correctly the mesh should be closed and not have triangles that are oriented incorrectly confusing the “inside” and “outside”. It happens that some model is made to art: at this point or the software that does the slicing manages to repair the mesh or the result of errors that will prevent the correct reproduction of the object.

### ***A good STL, a good slicing, a good print***

The STL file is the starting point for the entire procedure, so from the file should be removed anything you don't want to print (hidden objects, etc.). The 3D drawing must be a solid and not a sum of single solids interpenetrate or adjacent. Similarly, the design must be as definite and precise as possible: the 3D objects must have an inside and an outside well defined so that the surfaces perfectly match each other without leaving holes. Most 3D design software gives you the possibility to carry out an analysis of borders to check for holes. The 3D drawing must be oriented in such a way as to have a face adjacent to the XY plane of your drawing software: in other words, the design should not “float in a vacuum”, otherwise the machine will not print. If you're working on a STL downloaded from internet or given to you by a client, there are free software for checking and correction of STL as Netfabb.

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The “slices” are saved in a specific format (called G-Code); This format is nothing more than a set of instructions for moving the instrument (extruder head) along a path X, Y, and Z axes.

Each slice contains the movements on two axes, the moving the of the plane and the commands of the motor that extrudes the plastic to create one by one the layers that make up the object. Every 3D object can be transformed with the process of slicing in a variety of G-Code files, each different from each others because generated with different slicing parameters: for example you can slice an object with an 100% internal infill, or completely empty or partially empty, or the walls are made with one, two, three or more perimeters. Even the thickness of each layer is one of the parameters. The same object can be printed with 100 or 200 slices and so on.

### ***The printing file: G-code***

The G-Code files - containing instructions for the movements of the various mechanical parts of the printer according to specific parameters and settings - has no compatibility between different printers. While the STL file can be used by anyone with a 3D printer to create a printing G-Code, a G-Code file is definitely running for the printer for which it was created but could be unusable with other printers. Do not print G-codes downloaded from internet if they are not clearly compatible with Sharebot XXL.

The file also contains the heated printing bed temperatures and those of the extruder, linking the file not only to the printer but also to the material to be used. As we shall see in the following pages, with the LCD Panel it is possible to modify some parameters while printing: Sharebot XXL offers you the possibility to modify a lot of parameters of the G-Code during the printing.

### ***Storing the files***

As we have seen, the process consists of the stages of modeling, exportation of the STL file, slicing it into a G-Code file and print. We recommend that you save the 3D model file in the native format of the 3D modeling software, so as to keep any primitives that compose the object. Similarly the STL files should be stored in order to make slicing with different parameters, and finally we suggest you save the G-Code, even in different versions for the same model, so you can repeat a print with specific features using the G-Code files that you already know the final result.

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### 3 - LCD screen

Sharebot XXL is a printer that supports both printing stand-alone both control from one computer (OS X, Windows or Linux). In both cases the LCD screen provides functions both for consultation both editing.

Our suggestion is to **print always in stand-alone mode, saving gcodes on the SD card.**

#### *Informative screen*

When the printer is on - printing or waiting for comands – dispays the following information on the four rows:

The first row contains the actual extruder temperature followed by the one setted; on the right of the same row is displayed in the same way the temperature of the heated bed. The temperature is in degrees Celsius.

The second row displays the current position of the extruder and the z-axis. The values are in millimetres, with two decimals indicate hundredths of millimetres.

The third row has on the left the percentage control of speeds: turning the control knob we modify in percentage all the different speeds that are present in the gcode.

On the same row but in the middle is displayed the progress percentage of the printing and on the right of the same row is displayed the time elapsed in hours and minutes.

The fourth line contains messages that can be generated by the G-Code file with a special command, or messages from the firmware about specific situations . Once the printing is concluded we will find the real printing time on this row.



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### ***The Control knob***

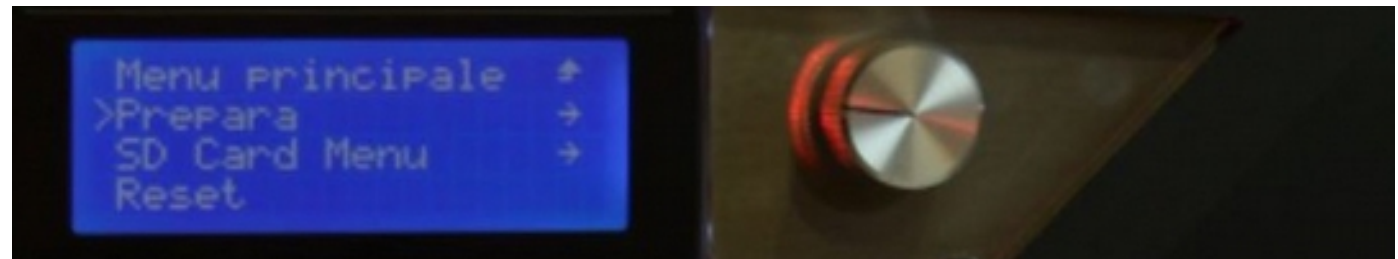
To the right of the LCD there is a knob which rotates with small clicks and can be pressed as a button. With this knob you can interact with Sharebot XXL: turning it clockwise you decrease the selected value, turning it anticlockwise it increases. During menu scrolling, rotation anticlockwise flows downward and vice versa. When the LCD is on the information screen, the rotation of the knob acts on FR percentage, increasing or decreasing the speed of all the movements and so the printing speed.

### ***Access to principal menu***

Pressing the control knob, you access the main menu. Remember that the menu displayed depends on the state of the printer: if it is waiting to run offers the menu "prepare", while if you are printing offers the menu "adapt". The voices and the features available in these two modes are different.

#### **Printer waiting for work**

- Info Screen
- Prepare
- SD Card Menu
- Reset



#### **Printer during printing**

- Info Screen
- Tune
- Pause print
- Stop print
- Reset



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### ***“Prepare” menu***

This menu is used to set up and manage the printer, such load and unload the filament, pre-heating the extruder and the printing bed, launching 'autohome or moving all the different axis. In practice, you have complete control of the printer and you can perform all management and maintenance operations.

Info screen

Disable steppers

Autohome

Preheat:

- Preheat all
- Preheat bed

Cool down

Move axis

Move down plate

Test Plate (level plate)

Change filament

Check filament: ON/OFF

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### ***“Tune” menu***

The item is displayed only while the machine is printing; the commands we find in are:

Info Screen

Speed

Nozzle

Bed

Fan speed

Flow

Change filament

Check filament: ON/OFF

The first item is about the printing speed: we can change the percentage of all the speeds of the gcode. It is identical to the one that we can change directly in the info screen. Note that generally, increasing the speed, decreases the quality. The second item is to set the temperature of the nozzle: the value is in degrees Celsius and any change must be confirmed by pressing the menu knob. Same thing for following item, the heated bed.

The next item is the fan speed, adjustable from 0 to 255; with very low values the fan may not even start.

The fifth item is relative to the percentage increment or decrement in material flow in the extrusion phase: the slicing software calculates exactly how the material is extruded to create individual layers, but with this item we can "get fat" or "lean" the print as we prefer.

The penultimate item concerning the change of the filament while printing: since the printer has the "check filament sensor" this item permits you to change filament when you want, for instance if you want change color.

The procedure starts with the shift of the extruder in parking area, then the extruder motor expels the current filament and the internal buzzer is activated as soon as the

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filament is unloaded. Press now the control knob to insert the new filament: the extruder motor will help you dragging the filament, while you insert it in contact with the cogwheel of the stepper motor. When the flow of the new filament is ok, press the control knob again to resume printing.

Your Sharebot XXL has got a sensor that monitors the presence of the filament. When the sensor no longer detects the filament, the printer goes automatically into change filament procedure (identical to that described a little while ago); the buzzer sounds and the printer waits to receive the new filament just for 24 hours. By pressing the control knob the buzzer will stop and the machine will be ready for the loading of the new filament. Clicking control knob another time will resume the printing.

You can disable the sensor of the filament: select the "prepare" menu and from "check filament" you can chose "ON" or "OFF"; at the end of each print the value is reset to "ON". The same procedure is possible from "tune" menu.

## 4 - Setting the printer

Your Sharebot XXL is a mechanical device built with care both in design and in the assembly from qualified staff in Italy. To keep it in a state of optimal functioning is necessary to compensate some normal processes of adjustment, for example, due to repeated thermal cycles of extruder motors and print heated bed.

During each printing process, the entire machine is subject to vibrations and movements that in the long run can loosen the four screws that hold the printing bed. This leads to not have more precise and uniform spacing of the glass plate from the extruder which inevitably fails to apply the first layer with the accuracy and uniformity necessary for quality printing. Just exit out of the box, Sharebot XXL should be even with the exact factory calibration, but a long journey or vibrations during transport may have done move some calibration screw.

### ***Loading the filament***

The first thing to do before printing is load the printing filament. Sharebot XXL has a specific procedure to load the filament from "Prepare" menu: select "change filament" and the procedure starts heating the extruder; when the temperature of 230° c is reached, you can load or unload the filament (the procedure is identical to that which is accessible from the menu "Tune" described in the previous chapter).

When the extruder is cold it retains the material: don't force it by pulling or pushing it into the extruder. To load the filament, obliquely cut the filament tip and insert it in the teflon guide through the check filament sensor (it will lights) till the extruder head, making sure that the filament is dragged, surpassing the cogwheel and into the

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hole below. You can help yourself by releasing the teflon guide pressing the orange quick-release on the extruder block.



Now that the filament is inserted, dock again the teflon guide.

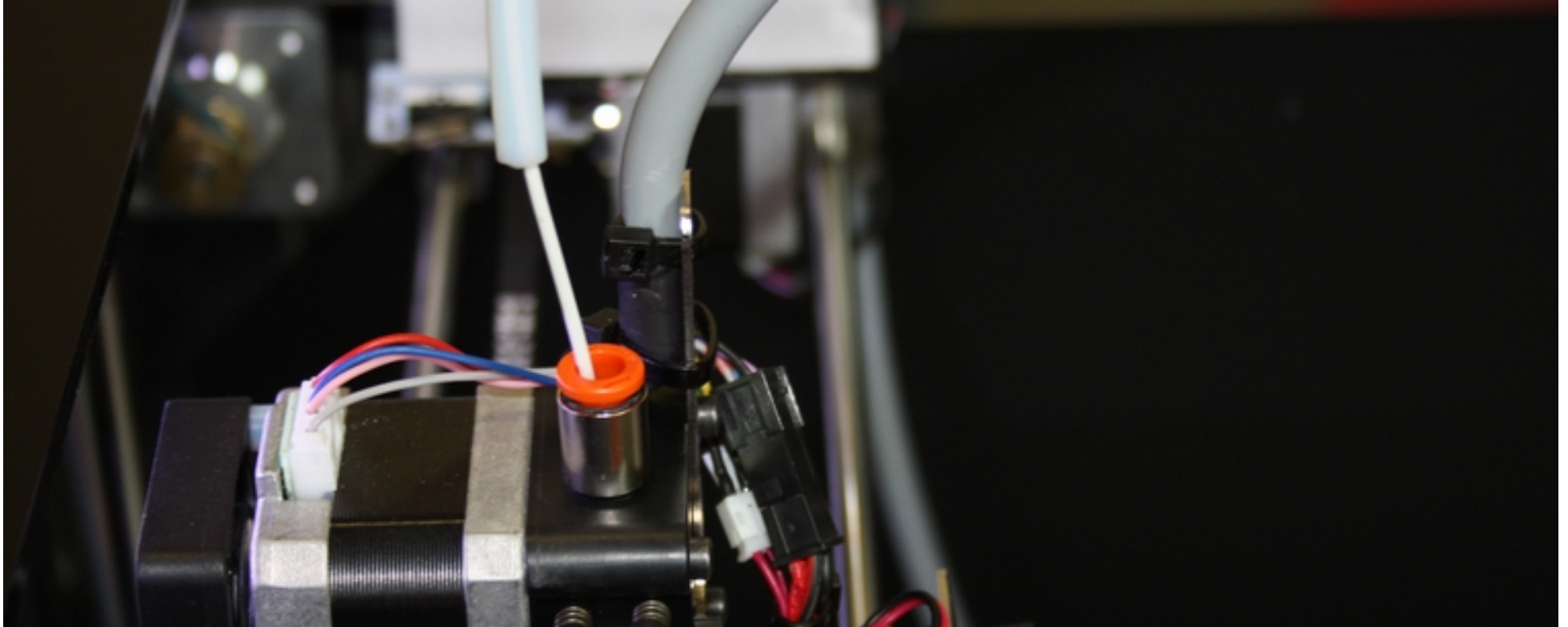
In case you want to print with the check filament sensor disabled, you can load the filament bypassing the sensor itself, positioning the spool-holder in a upper position, in such manner that the filament reaches all the print area smoothly.

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### ***How to calibrate the printing bed***

This operation, although at first a bit hard-working, it will become an habit for you that you will want to do before every prestigious print, taking only a few tens of seconds. With experience you might even make regulations "on the fly" while printing the first layer, if there is evidence of some

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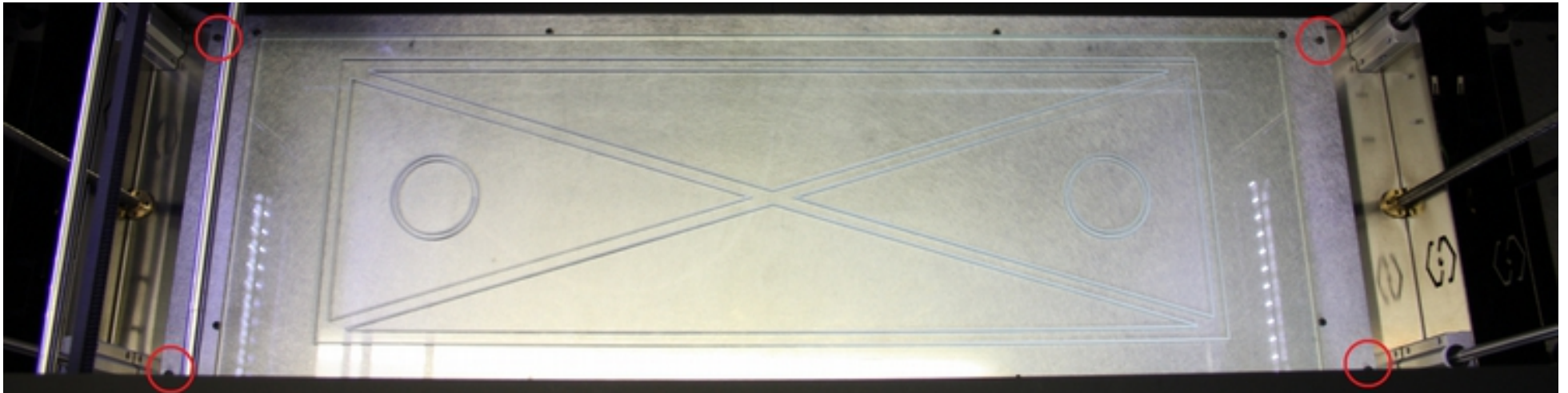
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irregularity in thickness. Acquiring the right sensitivity for the calibration of the printing plate, even just looking frontally, it will be an advantage for you and potential warranty for prints always optimal.

### Plate levelling (calibration)

From the "prepare" menu select "Test plate": the procedure prints concentric rectangles made with a single layer, allowing you to evaluate the adhesion of the material to the printing bed and to figure out if the plan is leveled properly observing the width extrusion. A narrowest print indicates a greater distance between the plate and extruder (plate too low), while a print very wide and discolored indicates a plate too high. You will notice that the narrowest parts detach themselves from the plate too much easily: this is because the plate is too far from the extruder and so there is not adhesion between the material and the glass.



Once launched the calibration, the procedure starts heating and the zeroing the various axis; when the extruder is 230° c the printer draws the first rectangle. Evaluating the result, you can adjust the four screws at the corners of the plate. Pay attention: the four calibration screws are only the ones at the end of the aluminium plate (red circled in the picture). Do not bother to interfere with the internal movements in this case, the rectangles are drawn in such a way to be able to access the four screws

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calibration without hindering the movement of the bridge. The procedure continues by drawing the diagonals of the rectangle and then two circles, taking about 8 minutes.

### ***Advanced calibrations (X and Y)***

The operations described below are intended for only qualified technician. The possible X and Y calibrations on your Sharebot XXL are of two types, software or hardware:

#### **Backlash recovery and M99 use (calibration via software)**

If you have a backlash on one of the two axes you will recognize it verifying any hole or circle printed, as in the figure.

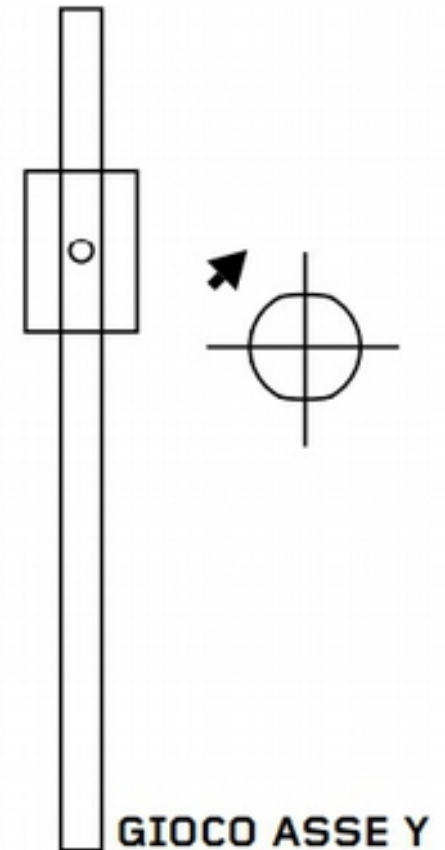
Recognize the direction of the backlash, for example, if the flat appears along the X-axis (toward the front of the printer and the bottom of the printer) as shown in the figure, it means that you have a backlash on the Y axis.

The first operation is verify the correct tension of the belts on the identified axis, then you can act via software for the eventual correction.

Insert in the “start gcode” of your slicing software the command M99 Y0,2 , where Y0,2 stands for the backlash distance to gap.

You can obtain the value using the file test\_cerchi.gcode downloadable from [www.sharebot.it/downloads/test\\_cerchi\\_gcode.zipper](http://www.sharebot.it/downloads/test_cerchi_gcode.zipper) and verify the correct value that will be written in the start gcode of your slicing software to make the backlash on the axis vanishes finally. The same procedure is described also in the section “tricks and tips” of our website:

<http://www.sharebot.it/index.php/faqs-en/?lang=en>





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### **X and Y squareness check (hardware calibration)**

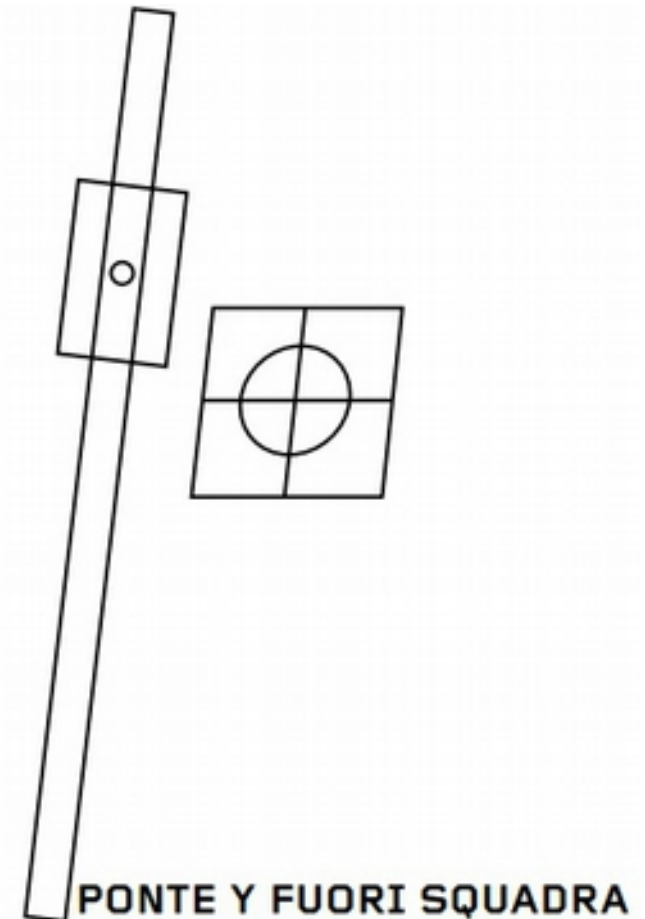
If your circles are ovoidal or the square of the printed parts (figure) are not "squared" maybe you need to re-align the bridge print.

To verify that the X and Y axes are orthogonal to each other, we can run the calibration from the "Prepare" menu. Now we measure the two diagonals of the printed rectangle: if they are different from each other we should intervene to square the axes X and Y. This procedure requires some dexterity and experience on the machine: if you are not sure about it we advise you to avoid it. From the "prepare" menu select "auto home"; Now we remove the two lateral body shells of the printer to access the pulleys and unscrew the pulleys grub screws just enough to make them movable relative to the bar. To correct the misalignment found just square the Y guides: measure the distance between one of them and the Z guides of the left side of the printer; move just enough the front carriage shoulder to match the two distances and tighten again the pulleys grub screws and repeat the test print. If necessary, repeat the process until you get the desired accuracy. At the end remount the two body shells.

### ***Adjusting pression force on filament***

Your Sharebot XXL is equipped with an amortized bearing opposed to the extruder cogwheel. This solution allows to compensate irregularities in thickness that some filaments may present, helping the dragging of it. The correct pression already regulated when you receive the printer.

If you need to adjust it, select "Change filament" from the "prepare" menu. Wait the expulsion of the filament and then insert it again. During the dragging of the filament, try to stop it with your fingers; if the cogwheel skids upon the filament, you have to tighten more the screws of the springs until the stepper motor loses steps while you try to stop the filament (you should hear a ping like a tak tak ). The springs have not to be tightened too much to avoid motor losses of step .



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### **5 – Our first 3D printing**

If you followed the instructions in this manual, you have already positioned your Sharebot XXL and spool-holder, plugged the printer to the power point, tuned it on, loaded the filament and checked the plate calibration. You can now proceed with your first print.

If you missed any of the steps just listed, please go back and read them before continuing.

#### ***SD card***

You will find your SD card already inside its slot in the printer. You can store in it your gcode files (Cap.2) that you want print. On chapter 6 we will understand how generate our gcodes from our STL. You should find some sample files on SD card, ready to be printed, allowing you to launch your first print. If you want to use other SD cards you need to format it "FAT 32".

#### ***Let's print!***

Press the control knob and select "SD card menu". Now you can choose a pre-setted printing profile: by choosing "Use Gcode params" you will print with all the parameters setted in the slicing software; by choosing "PLA" we will print with standard PLA parameters (extruder temperature: 220°, printing bed: 50°, fans: 255). Our suggestion is to choose "Use Gcode params" in order to use all the advanced parameters setted in the XXL profile developed by Sharebot.

Selected the printing profile ("Use Gcode params" or "PLA") you read the content of the SD card, files and folders. Choose the file you want to print by pressing the control knob on it, and the printing process starts.

Your Sharebot XXL starts heating the extruder and the printing bed while executing an auto-home, then reached the setted extruder temperature, it will start printing the first layer. It is crucial to check the first perimeters of the first layer: the filament has to stick to the printing bed, not too close, not too far and so circular. It is possible to make changes to the calibration while printing, if needed, paying attention not interfere with the screwdriver the XY movements.

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### ***Stop the printing process***

During printing you can pause or quit printing. The two options are available directly from the main menu displayed as "Pause print" and "Stop print".

Remember that in the first case is only paused the printing process (this operation may take a few seconds) waiting for you to give the command "Resume print". Pay attention: if you pause the printing process, you may damage the printed part where the extruder stops due to his temperature and to the spillage of melted material. Therefore, the pause is to be used only in case of necessity and just for short periods. We recommend to activate it while the extruder is tracing a filling so that the spillage remains hidden within the object.

In the second case, the printing process stops immediately and can no longer continue; then the extruder executes an auto-home.

### ***Modify the parameters during printing***

One of the characteristics of Sharebot XXL is the ability to act on a number of parameters while printing is in progress.

During printing, the "Tune" menu becomes available instead of the "Prepare" (see chapter 3): this allows you take action by changing the temperatures of the nozzle and plate, modify the fan speed or change the filament.

### ***Detach the printed part***

When printing is complete, your Sharebot XXL positions the platen down and park the extruder. In this position you can easily extract the printing glass after removing the clips to detach the printed object it from.

This operation is delicate and inevitable: to complete correctly the printing, it's necessary that the first layer adheres well and remains attached to the printing glass for the entire duration of the process. If there was not a good grip, the mechanical stress and the pressure of the tip of the extruder on the model it would detach the model itself, ruining irretrievably printing.

Detach the model asks a certain skill, a thin spatula or a knife with a wide blade. You need to wait a few minutes, as is necessary to cool the glass and the model itself, which would otherwise deform due to the temperature of the printing surface (setted to 80°). Cool down the printed part helps you to detach it.

Remember to pay maximum attention during the proceedings: please wear protective gloves to avoid injury due to the warm glass plate or knife.

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Whether you use a spatula or knife, you have to try to put the tool below one side of the molded part, then with horizontal movements, without trying to lift the printed part, you have to sink the blade to the opposite side. If you look at the printed part through the glass, you can also find the any discolored areas of the model, sign that in that area there's already been a detachment from the glass and then thread at that point the tool. Usually the piece jumps off without too much force and without having to get completely on the other side. If the model has legs or thin part, try to gently detach these before, to detach the the wider part. In this way we avoid breaking the thin parts. In the case of models with a single wide base, start from one side, trying to put the knife deeper and deeper, with an oscillatory movement to advance the blade.

As advice, avoid using price as an element to make strength (pulling) or lever (folding) it could break. If now you still can't detach the part, you can put the glass plate under water (warm is better), thus enabling the dissolution of the hairspray and a facilitated detachment of the printed piece.



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Remember that when printing is just completed, you may have the printing plate and certainly the extruder at high temperatures. The nozzle remains for several minutes at a temperature such as to cause a burn; check its temperature on lcd screen and absolutely avoid any contact with it if the indicated value is above 50 degrees. If in doubt, do not take out the glass until the temperature decreased to safe levels before you put your hands inside the print.

## 6 – Generate our Gcode

As well as for modeling software, also for slicing software we have available a wide range of programs: from free and open source, up to professional.

Among the free ones, we selected Slic3r as reference slicing software, because of its versatility that makes it usable by anyone, from principiant to professionist. Among the professional one, we selected Simplify3D that allow you to accelerate the work flow, thanks to its STL and GCODE preview, both in slicing and printing phase.

### *Slic3r*

Written by Alessandro Ranellucci, is a slicing open source software; it's free downloadable here: [www.sharebot.it/index.php/download/](http://www.sharebot.it/index.php/download/) We suggest to download the latest stable version. It is a open source software and is in continuous development.

When the download is ended, decompress the folder and double click the "Slic3r" icon: the software starts without installation: we suggest to create a shortcut on your desktop. During the first run, the software should ask you to set the parameters of your printer: click "cancel" and load the "config bundle Sharebot" as shown in the next paragraph.

### **Load the Sharebot profiles in Slic3r**

As a first step we recommend you to switch to expert mode: from the "File" menu, choose "preferences" and, select "expert". You need to restart Slic3r to make the changes effective.

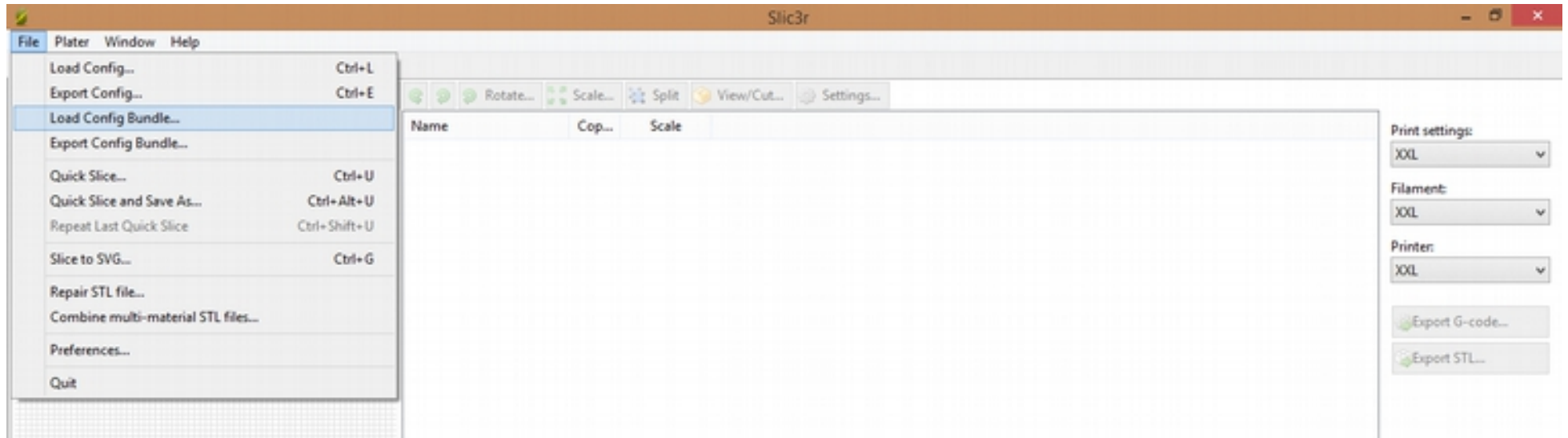
At this point it is necessary to define the parameters relating to the printer. In order to simplify the procedure we have made available on our website, in the same download section, all Sharebot printers profiles into one file "Slic3r\_config\_bundle" that we invite you to download. Unzip the downloaded file. Chose now "Load Config Bundle..." from "File" menu; select "Slic3r\_config\_bundle" from the homonym folder you have already unzipped. The software will load all the profiles: select "XXL" in all three dropdown menu ("Print Settings", "Filament settings" e "Printer settings"). The XXL profile will be loaded any time you launch the software.

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In the configuration file we have setted all the parameters to allow you a well experimented point of start that allows you print almost everything. If you want to create different profiles you can change individual parameters and save configurations with a new name. We suggest you do not overwrite the profiles developed by Sharebot and to check for new profiles releases on our social network – website.

### Import the STL to print

In the "Plater" tab click "Add" to import your 3D model with STL extension, or you can just drag and drop it inside the software window. Slic3r puts the model in the center of the printing area, laying it on the printing plate: but is strongly recommended to export the STL laid on the XY plane already oriented as we want to print it.

You can upload multiple STL or upload several times the same STL. For the first prints we recommend you try one file at a time. Generally print one object at time increases the print quality of the printed part.

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### Fundamental parameters of Slic3r

- *Layer height*: in the "print settings" tab you find "layers and perimeters" menu and the "layer height" voice; this is the height of the single layer and determines the printing resolution (for those curves developed in Z) and, consequently, the printing time. The default value is 0.3 mm and is recommended for all prints with Sharebot XXL because of its large print area.
- *Fill density*: in the next menu, "infill", the item "fill density" concerns the internal material infill of Obviously with a low filling you will have a lighter piece and fragile with a tendency to leave holes in the top closures of the modelthe printed model. You can set values from a minimum of 0% to a maximum of 100%. Also this parameter affects the speed of the printing process, the lower the filling faster the print. (named "top" in Slic3r). For this reason the parameter of filling could be varied depending on the result that you will obtain. The item "fill pattern" allows you to choose from a dropdown menu the texture you want to give to the internal infill areas of the object (rectilinear, hexagonal, etc ...).

The default value of 10% is a good compromise between speed and print quality.

- *Support material*: in the "support material" menu you can flag the voice "generate support material" and the software will draw automatically in the overhang areas (suspended areas or over 45° sloped areas) some removable tower of support. Before using this option you should read the considerations of Chapter 8 of this manual and evaluate all the alternative solutions (change orientation of the part, etc ...).

For further details, please consult the Slic3r manual ([manual.slic3r.org](http://manual.slic3r.org)) and our base and advanced courses at: [www.sharebot.it/index.php/sharebot-academy/sharebot-training/](http://www.sharebot.it/index.php/sharebot-academy/sharebot-training/).

### The Slicing process

Modified the parameters of your interest you can launch the slicing. Let's go back to the "Plater" tab and click "export g-code". Selected the destination and the file name, the process will start, taking several minutes in some cases, depending on the complexity of the model and the parameters set.

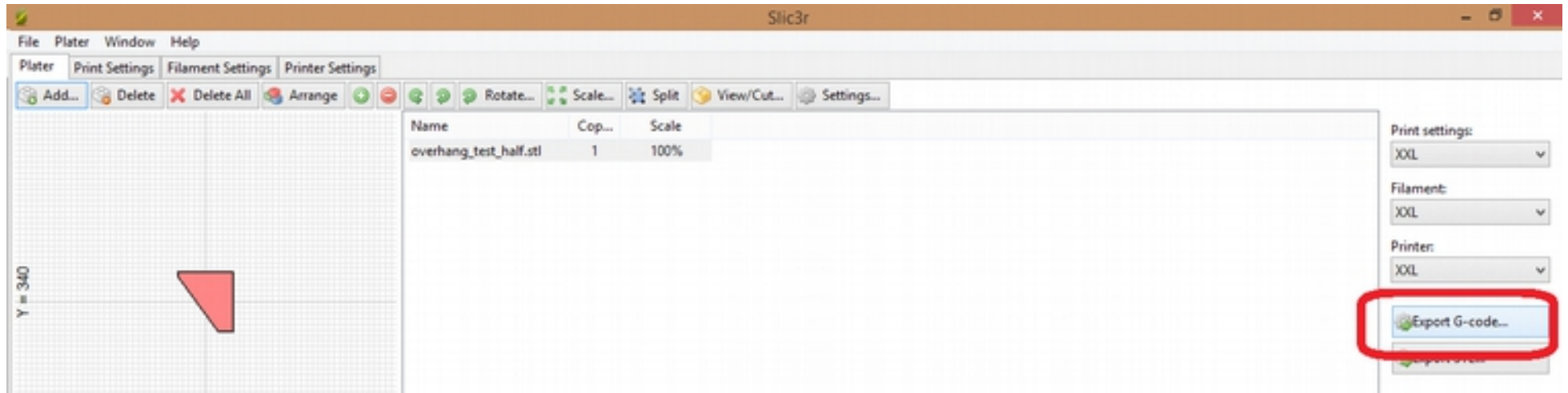
When the slicing is concluded, copy the g-code on the SD Card and you are ready for printing.

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### ***Simplify3D***

It is a slicing software, very intuitive and powerful. It can be purchased on our website at: [www.sharebot.it/index.php/software/simplify3d/](http://www.sharebot.it/index.php/software/simplify3d/)

The first strength of this software is a three-dimensional interface that allows you to accelerate your slicing workflow, both in the import of models either in the export gcode. The algorithm allows to generate gcode very quickly.

The second, but not less important, is the management of the support material: Simplify3D allows you to put it only where you really need it, or alternatively to remove it there where you don't want it (after having create it automatically by the software).

Even for this software Sharebot provides profiles dedicated to XXL in the download section: [www.sharebot.it](http://www.sharebot.it)

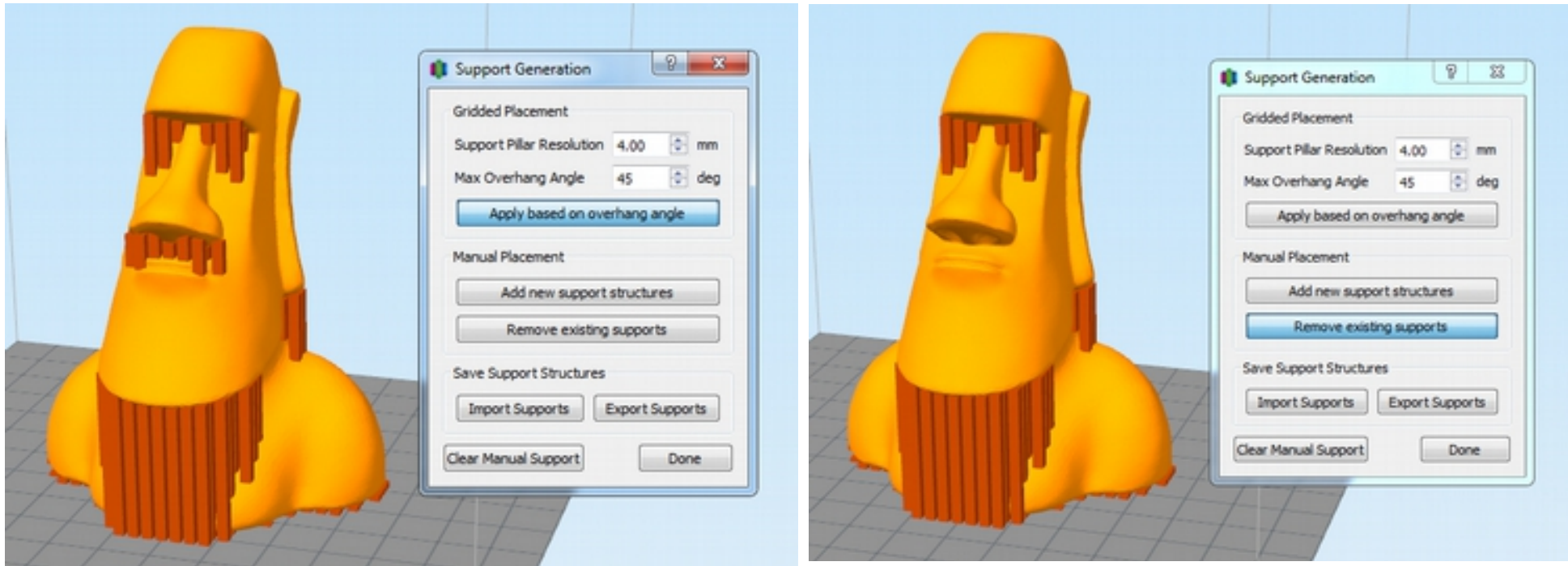
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For further details, please consult the Simplify3D user's manual or our dedicated course: [www.sharebot.it/index.php/events/event/corso-simplify3d](http://www.sharebot.it/index.php/events/event/corso-simplify3d)

## 7 - Printing behaviour of thermoplastic materials

One of the most critical factors in the current 3D printers is the surface treatment of the printing plate. When the filament is extruded, the first layer must be daub by the nozzle on the printing surface.; if by cooling down, the plastic loses grip, the printing process can fail, or decrease in quality, because of the detachment of the printed part from the printing bed. There is not a unique solution for all types of filament to be printed. Let's analyze the behaviour of the PLA during printing.

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### ***Printing behaviour of PLA***

This material, created by processing pulp plant waste rich in cellulose, is preferred by many compared to ABS, although more subject to high temperatures (over 70 ° tends to become malleable). It's printed between 195 and 230 celsius degrees, depending on the additives that are added to color and change its physical and mechanical properties. Compared to ABS is more environmentally friendly and does not emit smell during printing. The surface of the printed parts with PLA is more shiny and bright while in terms of shrinkage we have a variation much less pronounced also due to a lower extrusion temperature. Unfortunately, the range of temperatures in which the PLA remains elastic is vast: Therefore, if the piece in print is not properly cooled, is likely to deform under its own weight or to be dragged from the extruder in the finer points.

It could have a shrinkage about 1% during printing, that has to be checked and limited on such a wide printing area. Using two strategies: heating the printing bed (80 °) and an applying adhesive spray to the printing surface (hairspray).

So extract the printing glass, apply the hairspray supplied, put back in the printer the printing glass blocking in with the clips and launch the print. It is essential to spray the lacquer only outside of the printer: apply the lacquer on the glass without removing it from the printer is bad for all mechanical movements and thus void the warranty.

### ***The heated bed***

This is an option which improves the adhesion of the pieces on the printing plate and limit the shrinkage of the material, thanks to the heating of the plate at temperatures in which PLA still has a certain plasticity and has not yet undergone a deformation due to the cooling to ambient temperature. If you plan to print parts of some importance dimension this option is not only advisable but necessary: within the provided profiles (Slic3r and Simplify3D) is set to 80°.

## **8 - Consideration about models orientations**

The possibilities offered by your Sharebot XXL are many, but like all the technological tools, this must be understood and used by applying various parameters over time increasingly sophisticated. If from one point of view, as 3D printer technology, promises to create any shape, from another one are frequent cases where a print could finish with a big disappointment.

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### ***The orientation***

Let's begin with a consideration about the orientation of 3D files in relation to the printing surface: the object is built layer by layer and so each new layer is supported by the one previously built. When a wall or a surface is tilted over 45°, or some parts are built without layers supporting them (floating in the void) you are in front of a model that requires some specific expedients. The first question concerns the possibility to rotate the model in relation to the printing direction to improve or resolve the issue of the overhangs.

Maybe necessary rotations of 90 or 180 degrees, thereby changing the part resting on the printing bed. In general, if you can find an orientation that allows a flat surface to be in contact with the printing plate, it would be better for the attachment of the object to the plate during the printing process.

Let's take the model of a door for example: printed in its natural position (vertical) would have a thin support, on the contrary, lying would potentially have a contact surface much wider and stable. Maybe however be details (such as the handle, for example) that do not allow the laid orientation: in this case we suggest that you remove the handle to print it separately, attaching it after with a glue to its original position.

### ***Cutting the object***

There are cases in which you need to print in a single piece, but there are many cases where it is possible to cut into pieces the object to print it in an easier and better way.

An example often seen on the internet is the Eiffel Tower: for its height you would force it to print as a whole and with small details too tiny to be created by most FFF printers. Cutting the model into two or three parts you can instead place it in the print volume of almost all printers and metal structures would be large enough to be printed accurately. The parts can be easily combined with glue after, thus having the tower perfectly printed and defined.

### ***The support material***

When you can not avoid suspended parts, overhangs or beginning in void you have to give the printer a support on which to begin creating these parts. The material support is the solution that technology has developed to overcome the force of gravity and allow the creation of complex models, with white parts suspended and inside of other parts (the bearing balls), or with elements that necessarily begin (moving from bottom to top) from nothing, as the arms do not rest against the flanks in a bust.

In some cases, the problem can only be linked to a detail and then you can create already in the model solution. Take the case of this famous model, thanks to an

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enterprising individual, has been modified with the addition of the only support you need to get a print flawless: the bottom of the chin begins with some ring in anything, so it was added a support calculated tenth of a millimeter.



In this way, from a printing to do with some attention and with a critical point, it has become a print from the guaranteed result.

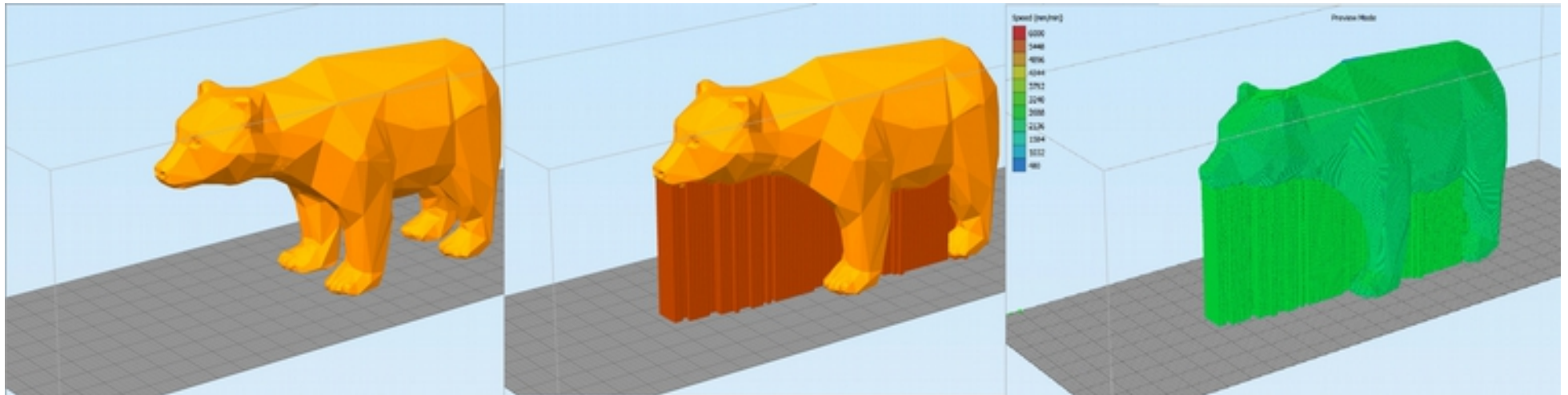
The material support is still generated by the software if it is activated within the printing parameters. Depending on the parameters and the shape of the model, are then created supporting structures (thin walls), to allow the filament to have a support. At the end of printing, with some patience, you remove these structures and the piece remains with the desired shapes. Here's an example of an object that requires the support material, the preview of the supports applied, and the preview of .gcode generated with the support material (software: Simplify3D).

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The support material are vertical structures generated -in this case – under the surfaces tilted over 45°.

Need to consider that in the model surfaces in contact with the support material e will have a coarser surface finish, for the real possibility that the two areas are fused together: this would need a post-lavoration of the printed part to remove the support material from it and some finishes (if necessary). In any case, the same tilted surface, will always have a lower finish if is negatively tilted (overhang) in comparison with the same positively oriented.

### ***Details in prints***

When printing a piece, is defined between the various parameters even layer thickness. This value has a significant impact in the object definition especially for all surfaces that grow upward (Z) with a very bland inclination. Imagine an inclined plane and mentally sliced: the size of the slices can vary widely and, if they are drawn with a fixed width line, you can see open spaces between layers. If the number of slices increases because they are thinner, the space between an edge of the layer and the next is reduced, therefore, the shape is better defined both under the horizontal profile, both vertical. For this reason also the resolution of the Z axis is advertised as a distinctive element of 3D printers.

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A collateral effect of the prints with very low thicknesses of the layers (0.1 or 0.2 mm) is the increase in printing time: the part will be built with the same amount of material, but the extruder will have to travel a lot more "journey" because of the greater number of layers to be created, even if each is made with less material and therefore the total does not change.

Each type of object has its own range of optimal thicknesses for printing and only with a little experience you can operate on this parameter knowing what you are going to realize actually. **Our advice is to think more about orientation of the model: the same object printed with different orientations, will have different surface finishes**, precisely depending on how it is "sliced" and rebuilt. From this point, the height layer is a secondary parameter.

The definition on the two axes X and Y is not controllable by the user, resulting from the geometry of the model, composed of triangles (mesh), could show the facets instead of soft surfaces, rounded or well detailed. This depends on the number of mesh that compose the object. More triangles can bring more detail, or are simply the result of a process of creating the mesh not optimized.

The number of mesh determines more work for the slicing software and if the triangles are tens of thousands, then they can even arise processing problems. As you can guess, below a certain threshold the details are no longer "solved" by the printer, and then they are essentially useless. Or rather, are significant in view of a magnification of the model for the printing of its detail. To reduce the number of triangles that describe the 3D model there are several programs and even the same Slic3r offers an option that allows you to ignore details under a defined size, simplifying and speeding up the slicing of the model.

Finally it should be considered that the minimum thickness recommended of the vertical walls is 1.44 mm which consists of three perimeters made by the extruder. Walls of a lower thickness are printable, but are fragile and composed only by the perimeter, without internal filling.

### ***Clips position***

XXL profiles are designed in a conservative manner, with a maximum depth in Y set to 240 mm to ensure that the position of the clips that locks the printing glass do not interfere with the prints; the clips blocking glass invade the useful printing area, but knowing the location of them, you can print objects that have a maximum size in Y up to 250 mm.

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### 10 - Ordinary maintenance

#### *Taking care of the printer*

Sharebot XXL does not require special maintenance operations, but like all machines, increases efficiency if kept clean.

#### *Printing plate*

The first layer of the object that we print is crucial for the success of printing: for this reason the printing surface must be perfectly smooth, with a uniform layer of hairspray applied. After many prints, layers of hairspray overlap each other and together with the residues of the molded parts compromising the flatness of the surface of the printing glass by creating irregularities: paying attention you can wash the printing glass with warm water and remove any remaining impurities.

#### *Regulation of pressure upon filament*

The cogwheel of the motor of the extruder and the relative amortized pulley tend to "eat" the filaments. For a perfect dragging of the filament you should check that no out dust or other residues of filament remains between the pulley and the cogwheel. If you want an accurate cleaning, unscrew the 4 lateral screws (the ones with the springs) and remove the plaque with the corresponding bearing; then proceed by removing any residue. After that you can mount the whole things and launch a "change filament" procedure.

During the dragging of the wire try to block it with your fingers: if this cause a "skidding" of the cogwheel on the filament", the springs must be tightened up to cause a loss of steps to the engine (you should hear a ping-like tak tak). The springs should not be too tight to avoid that the engine is under too much stress and consequently loses steps.

#### *Nozzle*

If you want to remove the material left on the tip of the nozzle, select "preheat" - right or left depending on the nozzle you want to clean - from the "prepare" menu; then select "move axes" and extrude some inches of material from the nozzle, until it sweeps away the material retained previously. Now select "cooldown" and when the nozzle temperature will be between 100 ° and 115 ° go with tweezers to take the melted plastic that hangs from the extruder and detach it. Alternatively you can select from the

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"Prepare" menu the "Change Filament" command to the extruder concerned.

### ***Lubrication***

Is only necessary following heavy use of the machine (or prematurely if used in a dusty environment - strongly not recommended! -). In any case is the machine itself that ask it, starting to whistle during movement

Therefore apply a drop of oil for sewing machines (or vaseline based) on the summit of Z screw and on the X - Y guides; move the axes to spread the oil for the entire length.

### ***Belts tension***

For perfect functioning of the machine, the belts that move the axes must always be in tension properly; to tighten the short belts by of the X-axis we have to act on the two Allen screws on the rear of the machine that hold the X stepper motors:in the first place must be loosened in order to move down the engine by increasing the tension of the belt; obtained the ideal tension, tighten again two screws securely; to tension the Y belt the procedure is similar: loosen the screws of the Y stepper (on the rear shoulder of the machine), move the engine to get the proper belt tension and then tighten again the two Allen screws.

### ***Checking of proper ventilation***

Your XXL is equipped with two cooling fans dedicated to electronics, located in the lower left on the front side and on the left side: you will notice that they turn always when the printer is turned on. You should ensure that dust and other residues do not block the forced ventilation of the electronics, stopping also the very functioning of the fans.

Behind the stepper motor of the extruder there is a cooling fan dedicated to it: also this fan is vital for the proper success of prints; if not adequately cooled, the engine transmits the heat to the cogwheel of the, which in turn heating the filament itself losing efficiency in dragging it.

The cooling fan of the extruder motor must always turned on when the printer is moving.

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### ***Firmware Update***

Sharebot XXL uses a "Open source" firmware and then benefits from frequent updates. We advise you to periodically check our website for updates firmware, so keep your Sharebot XXL in good working condition and potentially improved over previous versions. Instructions on how to upgrade are provided with firmware.

### **Warnings on the safety**





You find on the machine the followings safety labels

#### *Description of the safety signs*

	SIGN	DESCRIPTION
A	 The image shows a CE label for a Sharebot 3D printer. It includes the Sharebot logo, company name (Sharebot S.r.l.), address (via Montello 18, 23095, Nibionno, (LC), ITALY), phone number (+39) 031 697457, and website www.sharebot.it. Below this, there are four fields: Denominazione (DESKTOP 3D PRINTER), Modello (SHAREBOT NG), Anno (2014), and Matricola (empty). <p>Sharebot S.r.l. via Montello 18 23095, Nibionno, (LC) ITALY Tel. (+39) 031 697457 www.sharebot.it</p> <p>SHAREBOT</p> <p>CE</p> <p>Denominazione: <input type="text" value="DESKTOP 3D PRINTER"/></p> <p>Modello: <input type="text" value="SHAREBOT NG"/></p> <p>Anno: <input type="text" value="2014"/></p> <p>Matricola: <input type="text"/></p>	CE Label

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B		Indicates the danger of electrocution at electrical casings of the machine .
C		Report the danger of mechanical moving parts.
D		Report the danger of crushing at the point where the machine is located.
E		Report the danger to the presence of hot surfaces at the point of the machine where it is placed.