



Sinterit Lisa

USER MANUAL



Read the instruction manual before starting the device

Version 1.5





Industrial quality SLS 3D printing right from your desktop!

How the Lisa printer works:

The Sinterit Lisa desktop 3D printer uses selective laser sintering technology to produce your prints. Within its chambers, a powdered material is heated up and turned into a solid mass with a concentrated laser beam. Layers of polymer powder are placed onto the printer's work platform, where they are selectively sintered, giving perfect industrial-quality prints:

- small elements with details,
- complicated structures,
- complex solid shapes with moving parts in one go,
- simultaneous multi-objects prints,
- extremely durable models against unfavourable conditions (such as temperature),
- solid, lightweight parts,
- and much, much more..

Lisa's main features:

- Precision: high accuracy of prints thanks to layer thickness from 0.075 [mm],
- Plug-and-play: no installation or calibration needed,
- 4-inch touch screen: for a friendlier user experience,
- Wi-Fi connectivity: to track the printing process,
- Easy to operate,
- Dedicated software suite - Sinterit Studio 2018 supporting formats: STL, OBJ, 3DS, FBX, DAE and 3MF,
- Economic: powder recovery system allows printing with up to 100% recycled powder,
- Startup time: 45-60 min.

Printer ideal for:

- Functional testing,
- Rapid prototyping,
- Low volume manufacturing,
- High-heat and chemical resistant applications.



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1.Dictionary









The following terms and forms have been adopted and used in the manual.

1. **SINTERIT Lisa 3D PRINTER** (3D printer, printer, device, product) – a selective laser sintering (SLS) device used in additive manufacturing (AM) processes. Device dedicated for professional and quick manufacturing of three dimensional (3D) models of spatial objects.
2. **SINTERIT STUDIO** – dedicated software for the Sinterit Lisa Printer. Sinterit Studio as a desktop application allows to prepare 3D models (set them in the printable area - called Print Bed) and track the print status of the printer during the printing process.
3. **PA12 SMOOTH** (PA12, polyamide powder, nylon powder, PA powder, PA12 powder, powder) – a polyamide powder with the granulation at 20-100 micrometers. Black and smooth powder is suitable for printing detailed objects, rigid and extremely durable against unfavourable conditions (such as temperature). Due to its mechanical strength and heat resistance, dedicated for functional prototypes or end-use parts.
4. **FLEXA BLACK, FLEXA GREY (Flexa)** – a powder from the Thermoplastic Polyurethane Elastomers (TPU) group. Elastic, similar in its properties to rubber. Possesses good formability properties (returns to its initial shape). Suppresses hits and shocks well.
5. **RECOATER** – a Recoater in the form of a roller, moving on a guide bar by means of a wire. Used to transfer the powder from the Source Bed to the Print Bed during the printing process.
6. **FEED BED** (Source, Source Bed) – a chamber storing new, unsintered powder.
7. **PRINT BED** – a chamber where the sintering of powder takes place, creating the print.
8. **OVERFLOW BIN** – a chamber used to collect the excess unsintered powder, transferred from the Source Bed to the Print Bed by the Recoater.
9. **FRESH POWDER** (PA12 Smooth Fresh Powder - container no. 1) – virgin powder, used for refreshing, needs to be mixed with the used powder in correct proportions. Fresh Powder is not suitable for printing (the print may not be successful).
10. **PRINT READY POWDER** (PA12 Smooth Print Ready Powder - container no. 2) – powder ready to be used by the printer.
11. **USED POWDER** all the unsintered powder that remains after the printing and cleaning process. Suitable for printing if we are using Flexa Black or Grey. If using PA12 - suitable for printing after refreshing by 30 % of Fresh Powder.











2. Marking text conventions used in the document

Listed below are descriptions of the symbols used on the device. They constitute a warning or convey the information to protect the user, other individuals and surrounding objects, and ensure correct and safe use of the device.

| | |
|---|--|
|  | WARNING! An inevitably dangerous situation which can result in serious injury or even death, if not mitigated. Initiation, omission of a specific procedure or inattention can cause severe physical injury to the user. |
|  | ATTENTION! Initiation or omission of a specific procedure can cause physical damage to the equipment or the user. |
|  | WARNING! Risk of electric shock which can be fatal or cause severe burns. An inevitably dangerous situation which can result in serious injury or even death, if not mitigated. Before working with any equipment, you should be aware of the dangers associated with the flow of electric current, and become familiar with the standard procedures to prevent accidents. |
|  | ATTENTION! Risk of electric shock. |
|  | CAUTION! High temperature – do not touch. Excess heat dissipation can cause burns. |
|  | CAUTION! IR laser radiations. Looking directly into the laser beam can cause blindness and skin burns. The laser emits infrared radiation (Infrared, IR), which is invisible to humans. Avoid eye or skin exposure to direct or scattered radiation. Do not stare into the beam or view with optical instruments. |
|  | CAUTION! Beware of intense light. |
|  | CAUTION! Beware of moving parts which can crush hands. |



| | |
|---|--|
|  | CAUTION! Beware of sharp edges which can cause body cuts and injury. |
|  | CAUTION! Beware of moving parts which can snag and pull. |
|  | WARNING! Avoid fire! PA12 powder dust is flammable. |
|  | STOP! Action prohibited. |
|  | IMPORTANT! Information essential to correctly perform a specific task. |
|  | ATTENTION! It is necessary to wear protective gloves. Mandatory action when working with powder. |
|  | ATTENTION! It is necessary to wear protective face mask. Mandatory when working with powder. |
|  | IMPORTANT! You must read the instructions before taking action. |



3. Sinterit Lisa 3D printer

A. Description



1.Printer lid / 2.Opening lid handle / 3.Overflow bin / 4.Front panel / 5.USB port / 6.Safety key switch / 7.Safety button (E-STOP)

Image. View of the printer's right side.



1.Front panel / 2.LCD panel - Camera view / 3.Ventilator

Image. Front view and rear view of the printer.



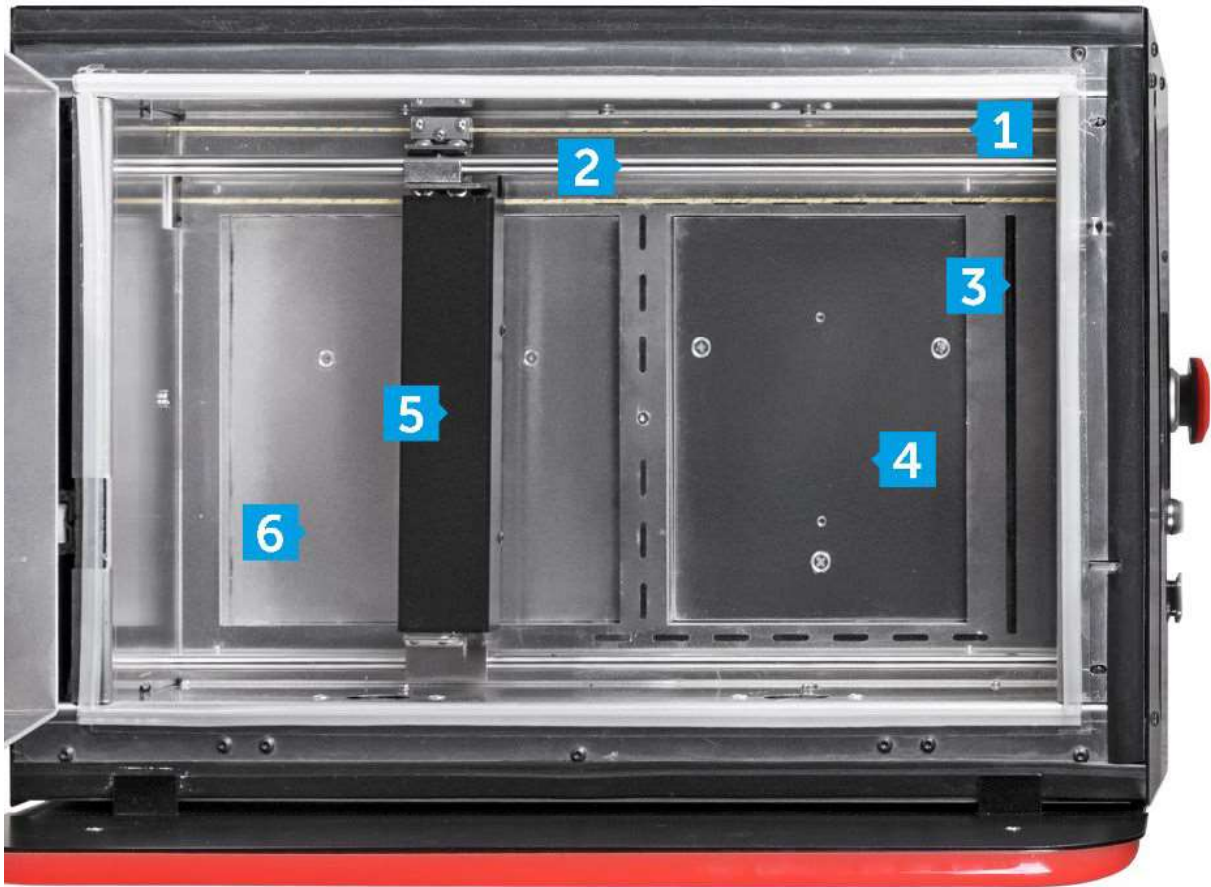
Image. View of the printer's left and top side.

1.Lid hinges / 2.Power socket / 3.Power button / 4.Viewing window in the lid



1.Infrared heaters (long, red) / 2.Laser protective glass / 3.Laser system / 4. split pin / 5.Infrared heaters (short, white) / 4 pieces on each side of the laser protective glass

Image. View of the printer's lid inner side.



1.Recoater's cable / 2.Recoater slide guide / 3.Overflow Bin's gap / 4.Print Bed / 5.Recoater / 6.Source Bed

Image. View of the printer's internal chamber.



1.Camera recording a working printer with closed lid / 2.Pyrometer / 3.Pyrometer

Image. Inside view of the printer (the location of pyrometers and camera).



B. Specification

GENERAL

| | |
|---------------------|---------------------------------|
| Category | Desktop 3D printer |
| Printing technology | Selective Laser Sintering (SLS) |

HARDWARE

| | |
|--------------|--|
| Dimensions | 620 x 400 x 660 [mm] (24.4 x 15.8 x 26.0 [in]) |
| Total weight | 41.0 [kg] (90.4 [lbs]) |

PACKAGING

| | |
|------------------|--|
| Size of package | 780 x 480 x 960 [mm] (30.7 x 18.9 x 37.8 [in]) |
| Package weight | 65.0 [kg] (143.3 [lbs]) |
| Package contains | Sinterit Lisa Printer + set of accessories + Manuals |

POWER

| | |
|---------------------------|---|
| Power supply | 220-240 [V] AC, 50/60 [Hz], 7 [A] (100-130 [V] AC, 50/60 [Hz], 15 [A]) |
| Average power consumption | 0.9 [kW] |
| Maximum power consumption | 1.6 [kW] |
| Type of laser | Class 4, IR 5 [W]; $\lambda = 808$ [nm] |
| Beam divergence | $\theta = 10$ [°] |
| Beam output | CW (continuous wave) |

INDEPENDENT HEATING SYSTEM

| | |
|---------------------------------|--|
| Multi zone | Heated piston, cylinder, Feed Bed, Print Bed |
| Max. temperature in the chamber | 190 [°C] / 374 [°F] |

POWDER

| | |
|--------------------------------------|---|
| Powder PA12 Smooth - polyamide 12 | 20-100 [μm], average size 38 [μm] |
| Powder Flexa Black - TPU | 20-105 [μm] |
| Powder Flexa Grey - TPU | 20-105 [μm] |
| Storage powder temperature (min-max) | 10-40 [°C] (50-104 [°F]) |



PRINTER PARAMETERS

| | |
|---------------------------------|---|
| Size of Print Bed | 150 x 200 x 160 [mm] (5.9 x 7.9 x 6.3 [in]) |
| High accuracy max. print volume | Pa12 - 90 x 130 x 130 [mm] (3.5 x 5.1 x 5.1 [in]) |
| | Flexa - 110 x 150 x 150 [mm] (4.3 x 5.9 x 5.9 [in]) |
| XY accuracy | from 0.05 [mm] (0.002 [in]) |
| Min. layer thickness | 0.075 [mm] (0.003 [in]) |
| Min. wall thickness XZ | 0.4 [mm] (0.015 [in]) |
| The layer height Z (min-max) | 0.075-0.175 [mm] (0.003-0.007 [in]) |

SOFTWARE

| | |
|---------------------------|------------------------------|
| Control software/firmware | Sinterit Studio 2016 |
| Operated file formats | STL, OBJ, 3DS, FBX, DAE, 3MF |
| OS compatibility | Microsoft Windows |
| External communication | USB, WiFi |

COMMUNICATION

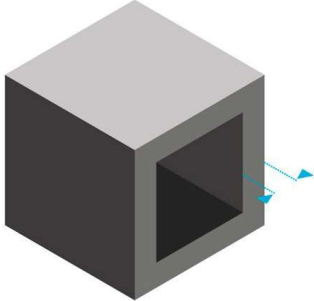
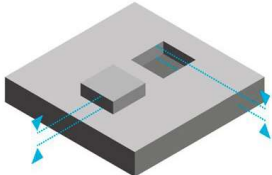
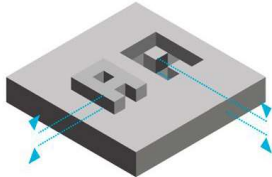
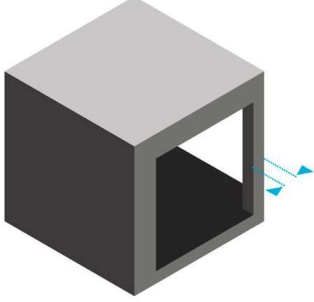
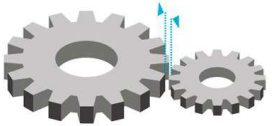
| | |
|-----------------|-----------------------------|
| LCD touchscreen | Capacitive, colour - 4 [in] |
| On-board camera | Built-in |

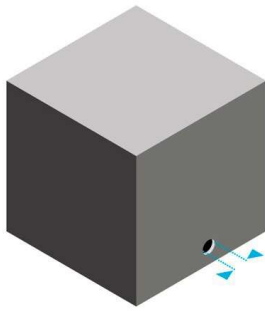
SAFETY

| | |
|----------------------|---|
| Certificates | CE (class A) according to IEC 60825-1 Ed. 3 (2014) FCC (class A) |
| IEC protection class | Class I |
| Laser product class | Class 1, invisible laser radiation |



D. Parameters - print design guide

| | |
|---|---|
|  | <p>Wall thickness</p> <p>The 3D model's wall must be thick enough to support the model. We recommend working with 0.8 [mm] for larger objects, in smaller objects you can have a lower wall thickness of 0.4 [mm].</p> |
|  | <p>Embossed and engraved details - minimum detail size</p> <p>Selective Laser Sintering is one of the 3D Printing processes with the highest accuracy; up to 0.1 [mm] is enough to create clearly visible details. If you plan to put some embossed and engraved DETAILS, we recommend adding the minimum thickness of 0.15 [mm] and depth of 0.15 [mm].</p> |
|  | <p>Embossed and engraved text</p> <p>If you plan to put some TEXT embossed we recommend adding a minimum line thickness of 0.5-0.6 [mm] and a depth of 0.5 [mm]. Use a bold sans-serif font for readability, such as Arial Bold f.ex.</p> |
|  | <p>Minimum feature size</p> <p>The minimum feature size for printing with SLS is 1 [mm]. If your feature is a thin wire connected on both sides, you can go slightly thinner to 0.5 [mm], otherwise, we recommend at least 0.8 [mm] thickness.</p> |
|  | <p>Functional gap - moving or interlocking parts</p> <p>A powerful feature of SLS is that you can print moving parts in one go. You should keep at least 0.2 [mm] clearance between elements. We recommend keeping at least 0.5 [mm] if you are a beginning user.</p> |



Escape holes

Sometimes you have to increase your clearance or create extra escape holes for the powder to get out f.ex when you have moving parts like hinges over a long distance. We recommend making in the model at least 4 [mm] diameter for one escape hole, 2 [mm] for two or more.

4. Installation of the printer

To ensure safe use of the Sinterit Lisa Printer, please read and follow the instructions below. Keep this manual for future use. Also, be sure to follow all warnings and instructions marked on the product.



WARNING!

Only trained and qualified personnel should install, replace or service the equipment.

The device should be installed in accordance with these instructions and by trained personnel.

A. Environment and place of installation

- The Sinterit Lisa Printer should be placed at room temperature.
- The room must be well ventilated, adequately to its size.
- The product should be placed on a flat, stable surface that extends beyond all edges of the product. If you place the product by the wall, the distance between the product and the wall should be greater than 500 [mm] (20 [in]).
- The product will not work properly if it is set at an angle.



ATTENTION! Do not place or store the product:

- outdoors;
- in areas with large amounts of dust;
- in places subject to shocks, vibrations, high temperature and/or humidity, and extreme changes in temperature and humidity;
- near water, or heat sources;
- near inflammable and volatile substances, concentrated acids or corrosive vapours;
- in places easily accessible to children and animals.



**ATTENTION!**

- Never use wood, equipment with wooden elements and flammable substances while working with the printer.
- The minimum distance between the printer and wooden parts is 200 [mm].
- The printer emits large amounts of heat (60°C), and therefore it is prohibited to place it on wood or wooden furniture.

B. Power supply:

- Use only the power cord supplied with the product.
- The printer must be connected to a grounded outlet to prevent electric shock in the event of a fault.
- When connecting/disconnecting the plug to/from the power source always hold the cover, not the cord.

**WARNING!**

Do not use cables from other devices. Using the power cables from other devices or connecting the power cord supplied with the product to other devices may cause fire or electric shock.

**ATTENTION!**

Never disassemble, modify or repair the power cord, plug, devices inside the printer, except as described in the product manual.

- The product should be placed near a wall outlet, which can be easily unplugged.
- It is recommended to use UPS units that, in the case of a momentary power failure, will allow the printing process to finalise.
- When an extension cord is used for the power supply of the product, make sure that the total power consumption of all devices connected to it does not exceed the extension cord's limit. Also make sure that the total current drawn by connected equipment does not exceed the ampere rating for AC wall outlet.
- Power cables should be placed in such a place that they are not rubbed, cut, pulled or twisted.

**ATTENTION!**

- Do not place objects on the power wires.
- Do not place power cords in path where people will have to walk or run.



- Pay special attention to the fact that the power cables are not bent at the points of connection of the printer.
- Disconnect the plug whenever it is planned to shift/transfer the device.

In the following situations, unplug the product from the power supply and contact a qualified service personnel:

1. the power cord or plug is damaged,
2. some liquid got into the product,
3. the product has been dropped or the case has been damaged;
4. the product does not operate properly or clear changes in efficiency have been observed.

Do not adjust controls that are not described in the manual.



ATTENTION! Do not:

- spill liquid on the product;
- put any containers on the equipment, in particular containing water;
- handle it with wet hands;
- block or cover the vents and openings in the product;
- touch movable parts.



ATTENTION! If the device is not used for a long time (e.g. vacation), unplug the power cord from the socket.

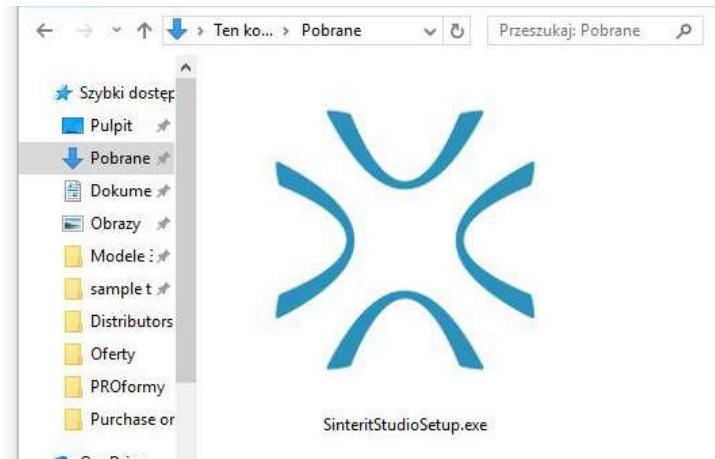
5. Sinterit Studio software - installation



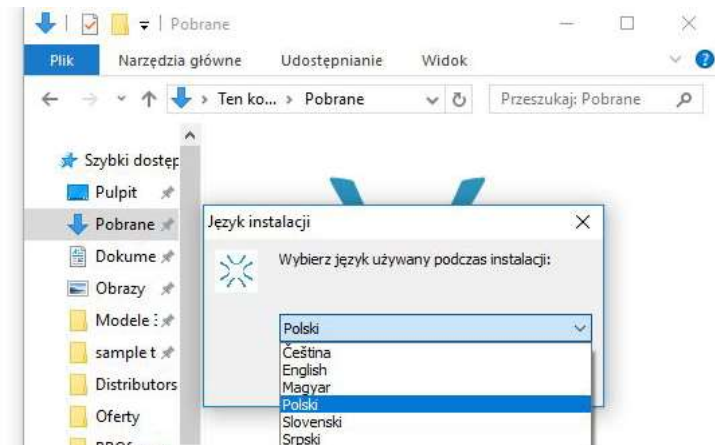
Technical requirements to install Software:

- Windows 7 or higher,
- Minimum 500 MB of disk space,
- Minimum 2 GB of RAM,
- Graphics adapter compatible with OpenGL 3.0 or higher.

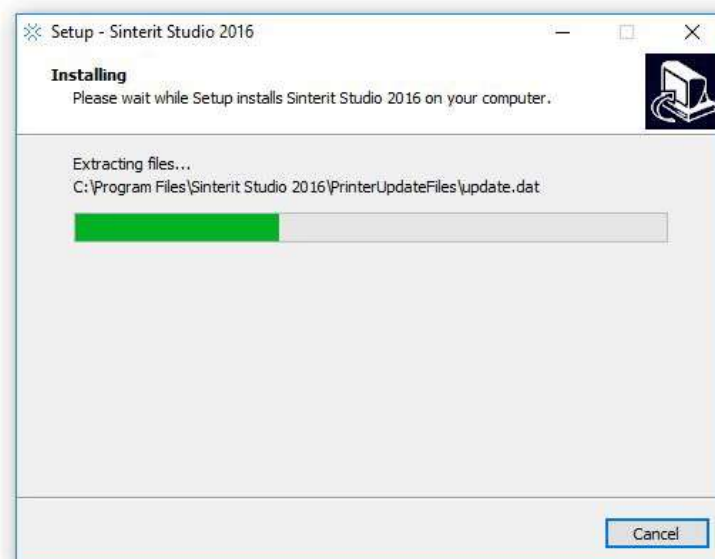
1. Connect the USB flash drive included in the set to the computer USB port.
2. Locate the Sinterit Studio folder.
3. Open SinteritStudioSetup.exe.



4. Select the language for the installation.



5. Act accordingly to the messages on the installation screen.



6. After the installation, the software is ready to use.



Image. Installing Sinterit Studio.



IMPORTANT!

Be sure to carefully read the license agreements and accept them. Chapter 17.

6. Initial startup of the device after delivery

1. Take the printer out of the package. Carefully discard protective foil and paper.
2. Place it on a stable and hard surface (ideally the target location of the printer).
3. Connect the power cord.
4. Switch the power button (from “0” to “1”) located on the back.
5. Check whether the red safety button is out. If not, rotate it clockwise at a quarter of a turn (the black flange of the button).
6. Place the key in the ignition and turn clockwise at a quarter of a turn. After a moment, the device will start.



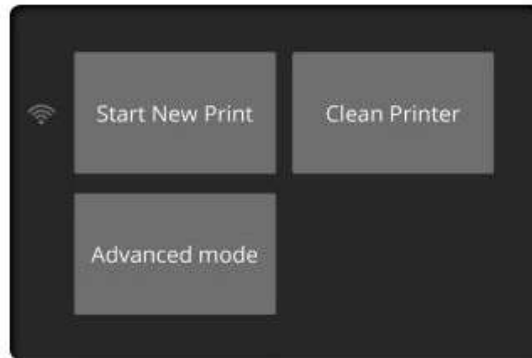
Image. Off/On key positions.



WARNING!

Check whether the safety button is out. If not, release it by turning it clockwise at a quarter of a turn.

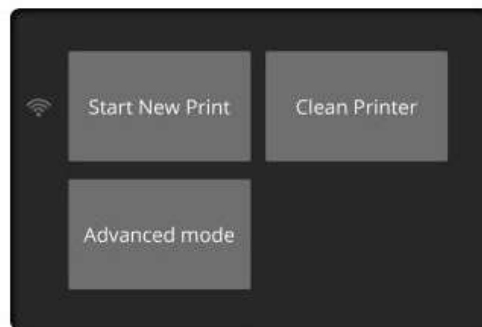
After switching on the Sinterit Lisa, the startup screen will be displayed.



Three functions will be displayed. "Start New Print", "Clean Printer" and "Advanced Mode". "Advanced Mode" is a previous software version.

7. Printer's connection to the wi-fi network

To connect the printer to a WiFi network choose ADVANCED MODE option.



IMPORTANT!

Advanced Mode should be chosen when Sinterit Lisa Printer is used for the first time, to set the printer to WiFi network. "Advanced Mode" is a previous software version.

1. On the Printer's touch screen, select ADVANCED MODE.
2. On the Printer's touch screen, select ADVANCED//SELECT WI-FI.
3. Find the network you want to connect to and click on its name.



4. Enter your password if necessary and press OK.
5. Next to the SELECT WI-FI you see the combined network

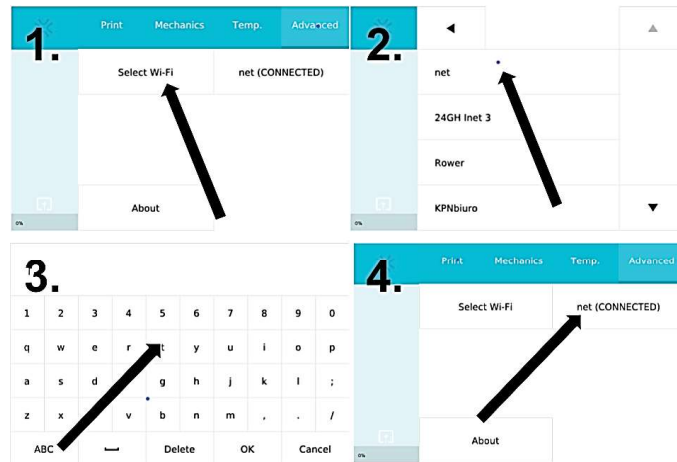
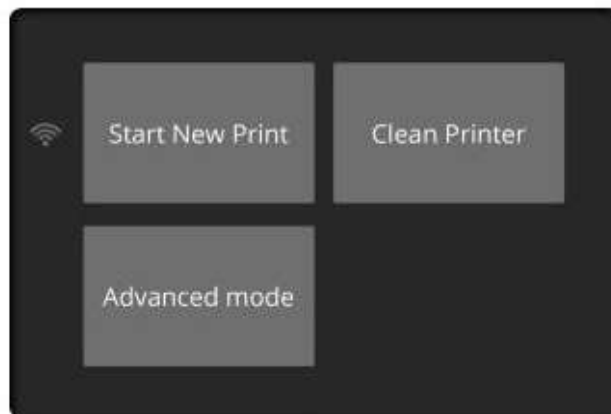


Image. Connect to Wi-Fi.

6. Switch off, then turn the printer on again. After switching on the Sinterit Lisa, the startup screen will be displayed again.



IMPORTANT!

You can also press button BACK to back to STANDARD MODE if you want to stay with the OLDER VERSION of software. To proceed in this mode read instruction "PRINTING - ADVANCED MODE" - chapter 10. We strongly recommend to stay with the new version of software.



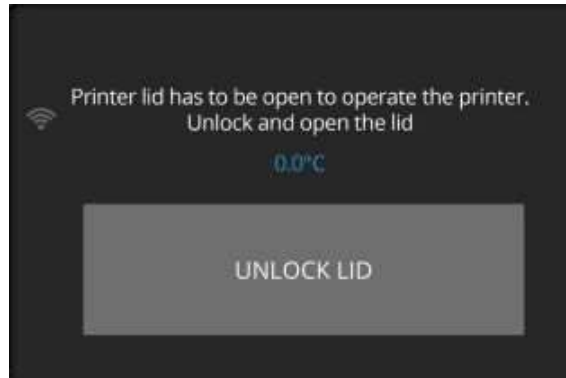
CAUTION!

When the lid is open, beware of strong light.



8. Preparing the device to print

1. Choose “START NEW PRINT” option to open the lid - main screen will be displayed.



In order to open the printer release the magnetic lock of the lid - click on “UNLOCK LID”. The lock releases the blockade for 10 seconds. System will count down 10 seconds and magnetic lock will be closed again.

2. **Softly press** and then lightly lift the printer lid.
3. Turn the power off, and disconnect the power cord from the socket.
4. Carefully discard the transport protections located on the inside, also those surrounding the laser.
5. Install the laser protection glass:



CAUTION!

Beware of sharp edges. Put on safety gloves in order to protect yourself from injuring hands against the edge of the heating module.

- a. holding the heating module, take of the split pin positioned on the top of the inner part of the lid.



Image. heater module - split pin system



- b. lower the heating module to get access to the place dedicated for laser protective glass



Image. heater module - opening

- c. take out the laser protection glass out of the box (from the additional equipment package).



Image. Repackaging of laser protection glass

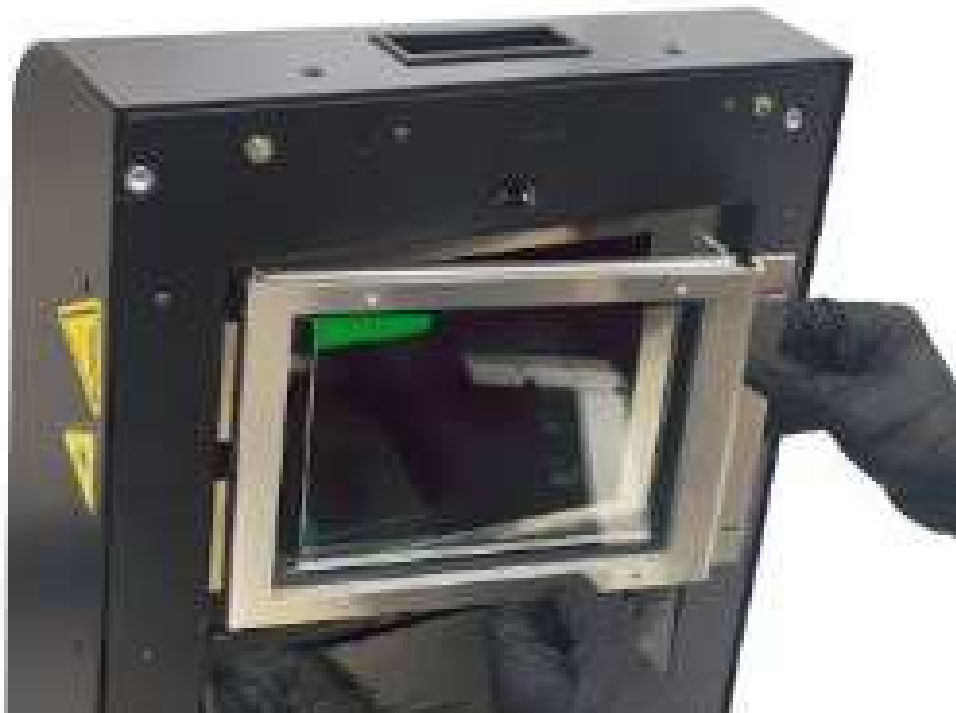


- d. rub the surface of glass carefully with a cotton cloth soaked with alcohol (pay attention to any fibers left on the surface), clean both sides.



Image. Cleaning of laser protection glass

- e. mount the glass: holding the glass behind the metal frame, slide the tabs into the holes on the left side, press gasket gently, after obtaining the perfect fit, screw the butterfly screw on the right side.



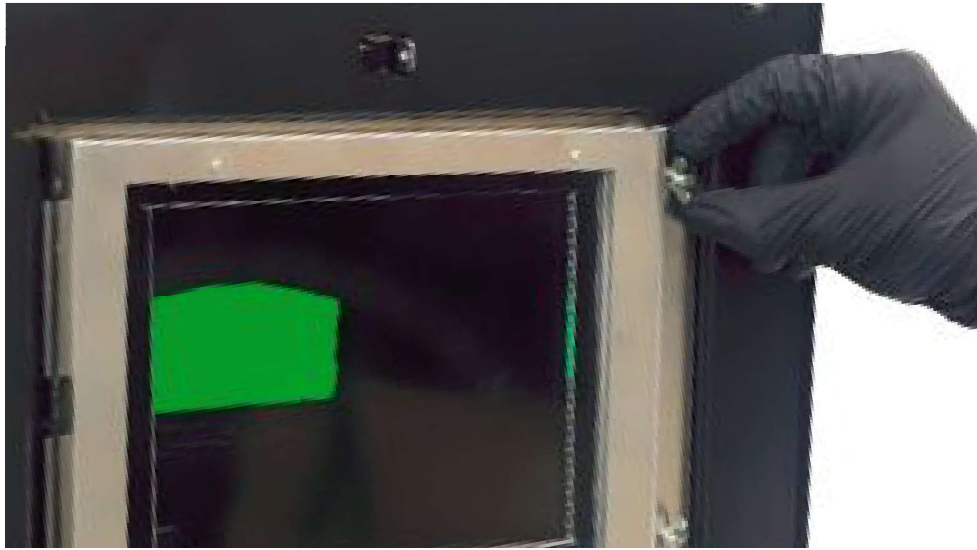


Image. Correct placement of the laser protection glass on the heater module.

- f. join the heating module with the lid - using metal split pin.
- g. clean the glass one more time from any finger marks or stains.

6. Check (wearing gloves or through paper – see image below) whether the heaters are stable in their sockets. If there is any dust/powder on them, blow it gently off with air.



Image. Methods of verifying the setting of the heaters.



ATTENTION!

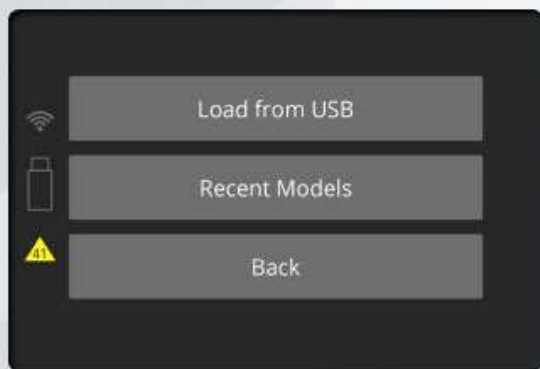
Remember, do not touch the heating bulbs with your fingers or greasy objects (eg. a dirty cloth).

Dirt and grease may cause local overheating and burn the heaters or even cause an explosion during printing.

7. Verify whether the Source Bed and Print Bed are ready to work (during the initial startup, after unpacking, the Beds should be on par with the printer's case), check the wire tension and whether the guide bar for the Recoater is clean (should be located in the middle, between the Beds).

8. Disassemble the Recoater cover and wipe the rotating shaft with a cotton cloth soaked with alcohol.

9. After carrying out all of these steps, the printer may once again be connected to the power source and prepared for work.



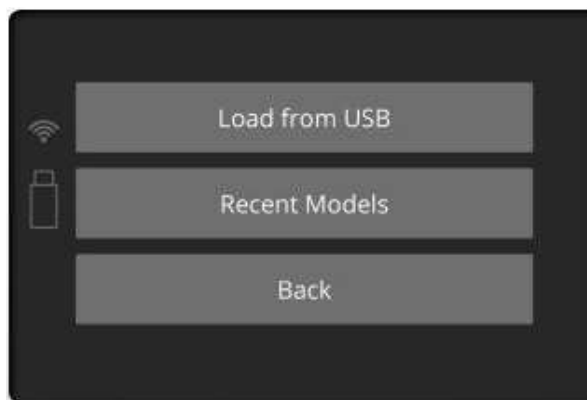
IMPORTANT! Yellow triangle displayed on the side of the screen informs about a malfunction. Printer should be checked immediately by opening the lid. When the lid is opened and all visible elements are not damaged (CHECK THEM ALL CAREFULLY), please contact Support Section¹ referring to the code displayed inside the warning triangle and providing the serial number of the device.



9. Printing - STANDARD MODE

1. Load the file for printing:
 - a. save the file prepared using the Sinterit Studio to a USB carrier (USB flash drive recommended),
 - b. connect the carrier to printer's USB port, with its power turned on,

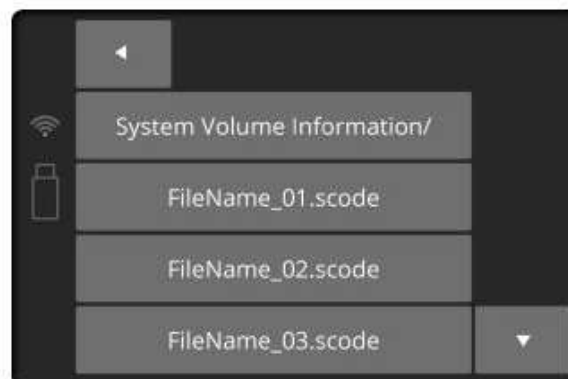
After installing a flash drive into Lisa's USB port, "Load from USB" section will be displayed and a flash drive icon will appear on the left side.



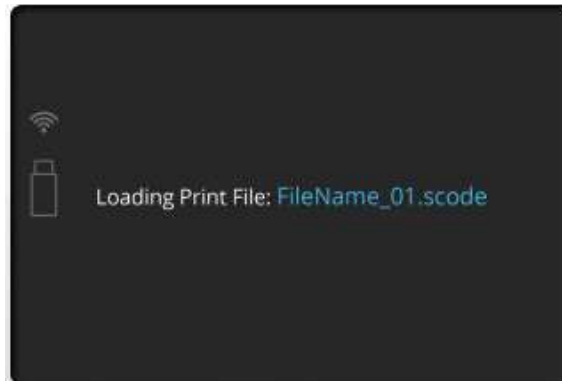
IMPORTANT!

Later, printed projects can be chosen from "Recent Models" section (previously "Used Projects").

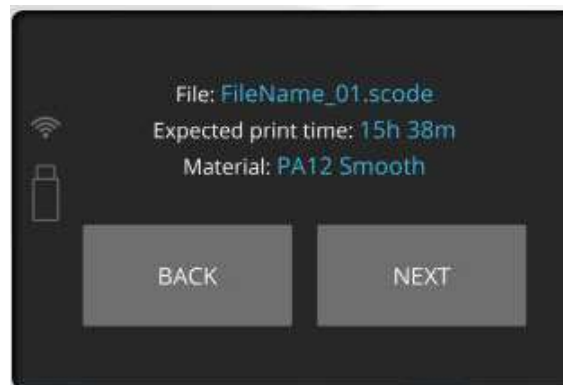
2. Choose source. Projects' file names will be displayed. Displayed arrows will help you navigate through folders and files.



3. After choosing a file, it will be loaded into the device's memory.



4. After loading the files, the display will show basic information such as the filename, powder and expected printing time. The flash drive can be then safely removed.



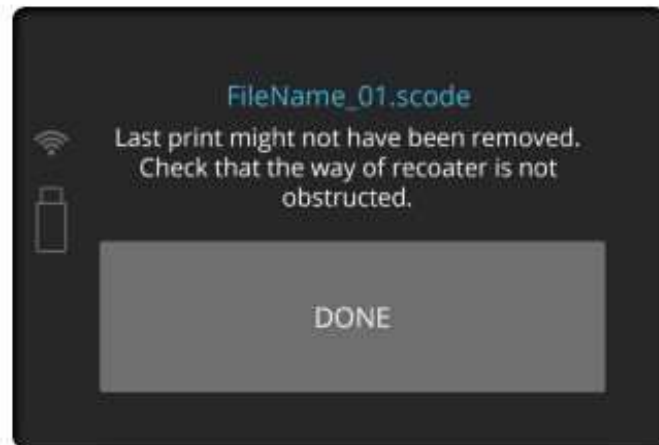
Software will allow you to return to previous section or proceed to the next. After choosing the next section, Sinterit Lisa will check whether it is ready to print.



WARNING!

Carefully read all messages displayed on the screen while preparing the printing process. Skipping the described operations may result in incorrect printing or device failure.

5. After confirming that the previous print has been removed and that the moving path of the Recoater is not obstructed, the printer will be ready for printing - it will start preparing the printing process by the repositioning the Beds and the Recoater.



6. By clicking “DONE” the Recoater and the Beds will be repositioned. During this operation, the height of both Beds is set in accordance with the currently selected printing process.

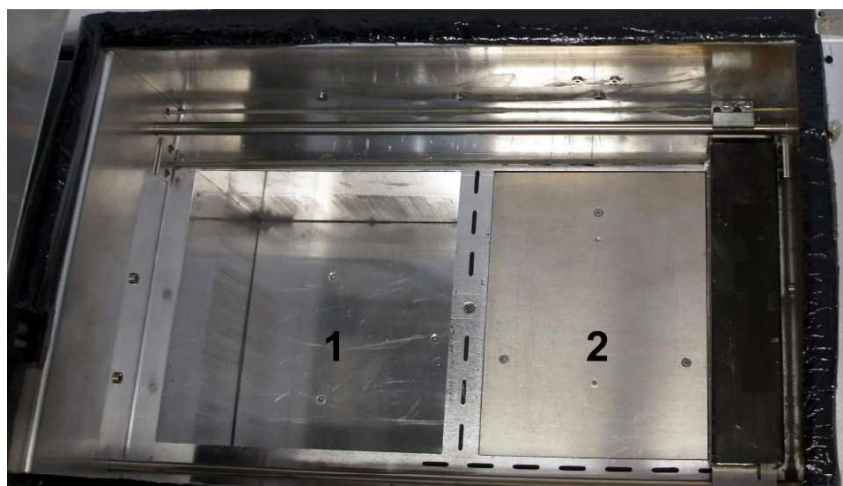
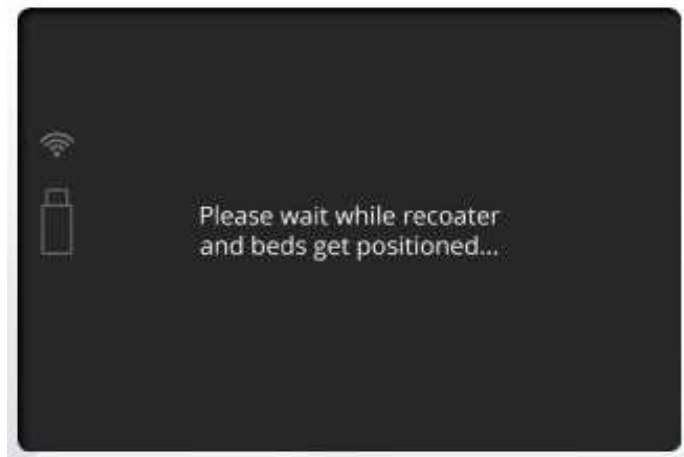
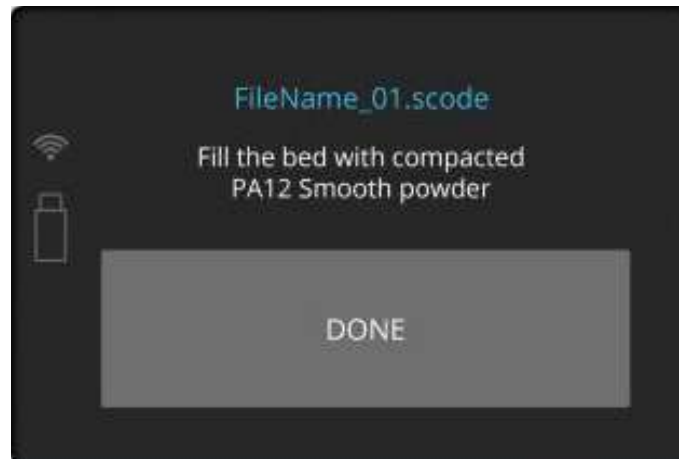


Image. Positioned Beds, ready to be filled with powder and the base position for the Recoater.

7. After the Beds positioning process is finished, you will be asked to fill the print chamber with powder and compress it with a dedicated tool provided in the Accessory Box. To do this:



IMPORTANT!

While working with the powder always wear protective clothing (glasses, mask, gloves) when working with PA12 Smooth and other powders used with the Sinterit Lisa Printer.

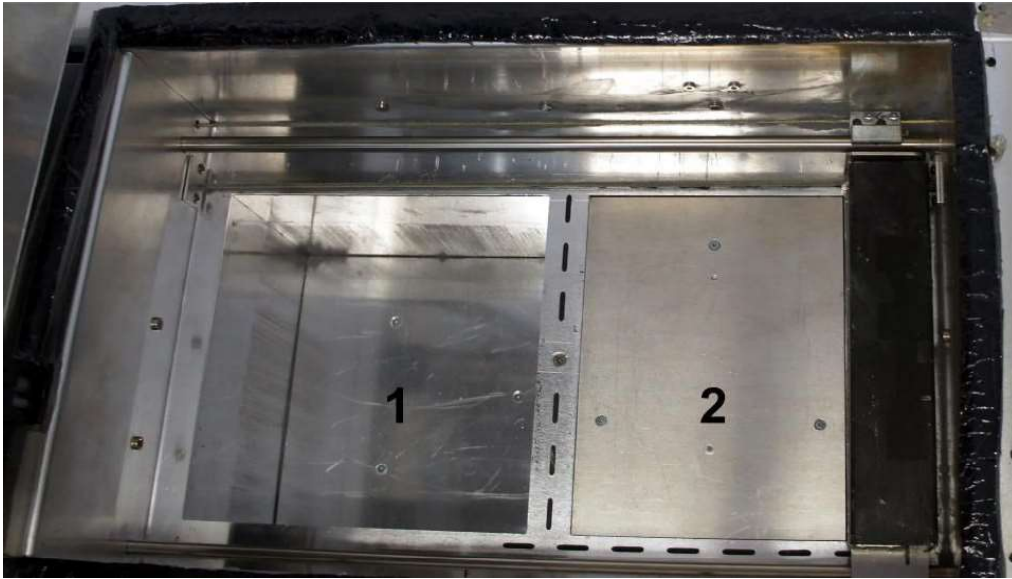


- If you're printing with PA12 for the first time, you can only use powder from container number 2 (Print Ready Powder).



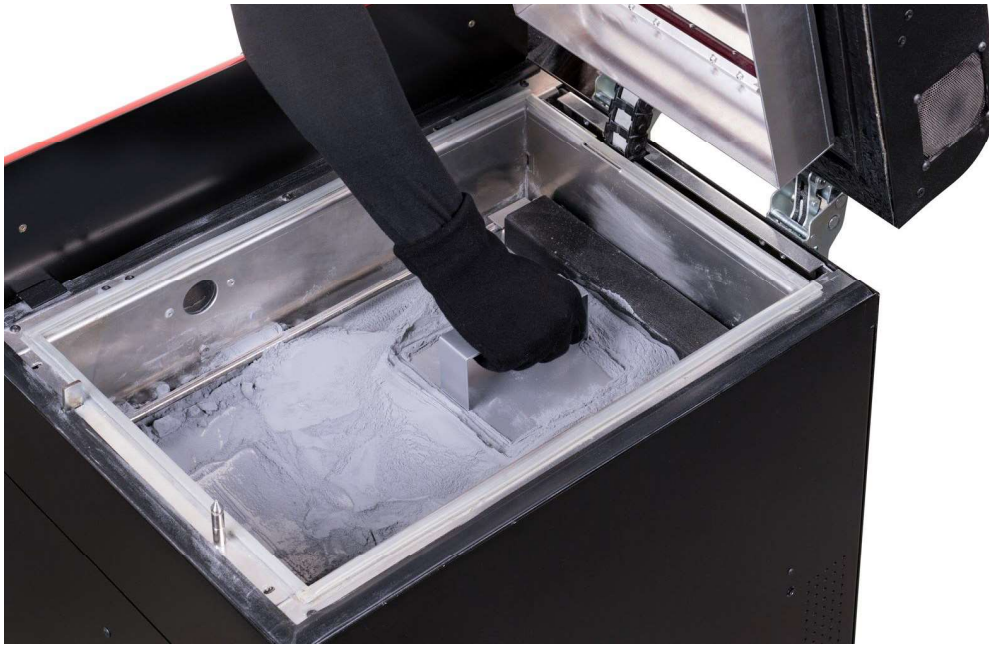
- Always pay attention to the messages displayed on the main display of the Sinterit Lisa Printer.





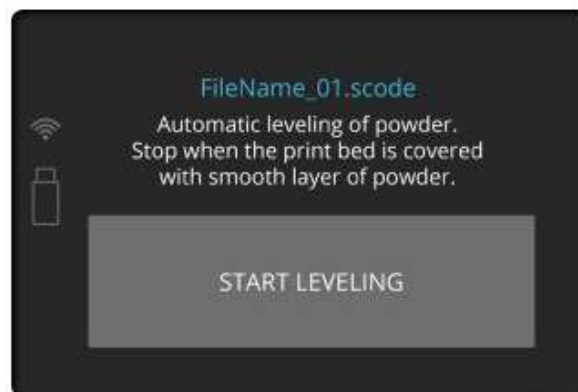
- Add the PA12 Smooth Print Ready Powder to the Source Bed (number 1 in the image above), 6[L] of powder maximum. Make a little pile of the powder and press it gently, but firmly(using powder trowel f.ex). Be careful in order for the powder not to go airborne (it is recommended to use a spatula for adding the powder).





- It is also recommended to add a little bit of the Print Ready Powder on the surface of the Print Bed (number 2 in the picture above). This will make creating the first layer during positioning, faster.

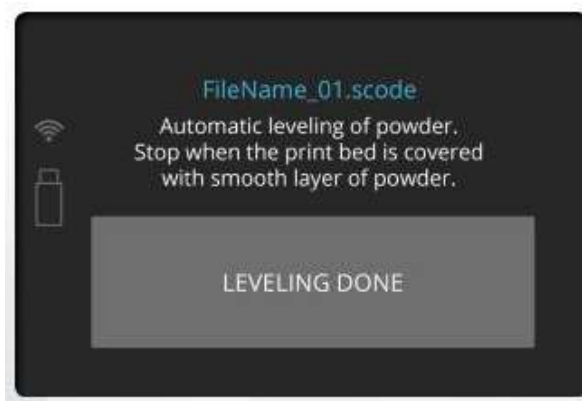
8. To perform the levelling of the powder inside the printer click the “START LEVELING” button.



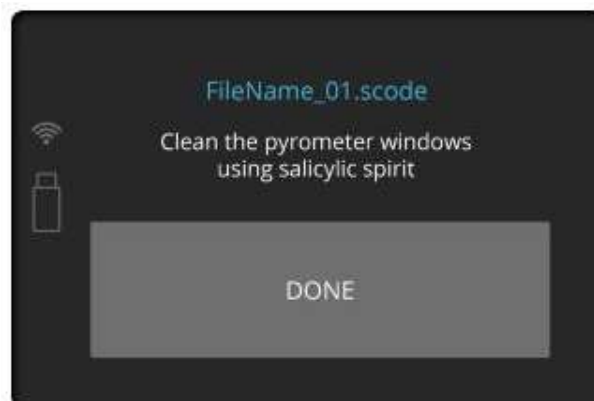
Once the Print Bed is covered with a smooth layer of powder, press “LEVELING DONE”.
9. After “LEVELING DONE” is pressed, the Recoater will return to its default position.



The operation may complete quicker: whenever the powder uniformly covers the Print Bed surface you can press STOPPING .

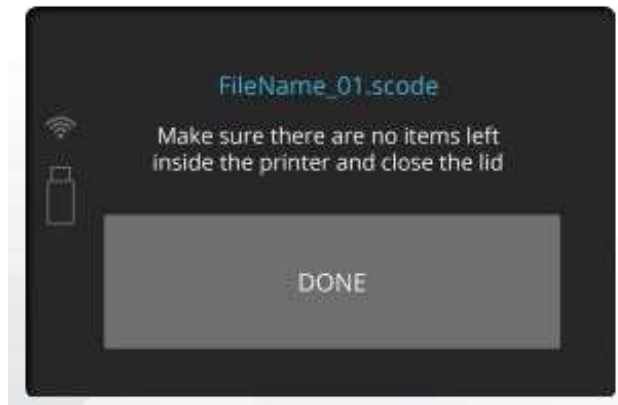


10. When the levelling is done and the Recoater has returned to its default position, the cleaning process must be initiated.



- Use an alcohol wipe to carefully clean the vision windows of the camera and pyrometers, as well as the laser protection glass.
- Clean the infrared heaters (white and red ones) by gently blowing on them with clean compressed air.

11. Ensure that no tools or previous printouts are left in the printing chamber.



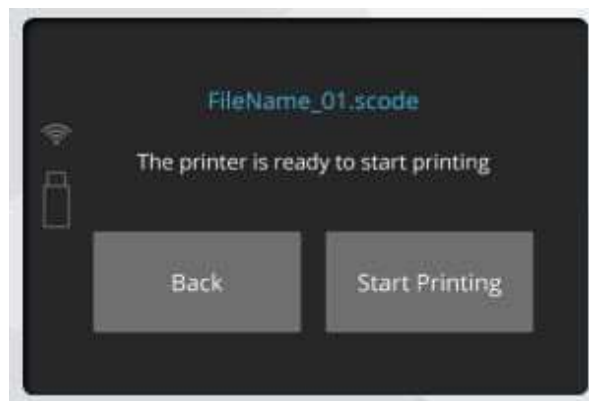
12. Clean any excess powder from the area around the BEDs, the guide bar and the wire of the Recoater, using a paintbrush.
13. Lubricate the plain bearing of the Recoater with the included silicone grease.
14. Press DONE and gently close the Lid.



IMPORTANT!

If the quality of distributed powder is unsatisfying, close upper lid and press “Back” button. Unlock the Lid and start the Leveling procedure/process again.

15. Press “Start Printing” button and the printing process will start.



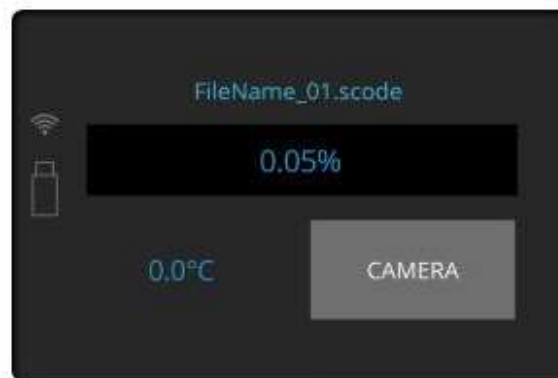
16. Upon confirmation, the progress of printing process will appear on the screen.

A. Information and tasks while printing

1. The main screen of the graphical user interface displays the status of the print in real time, current temperature of the BEDs, warming and cooling states, and the remaining time of laser sintering.



2. Clicking on the “CAMERA” button activates the internal camera view, which will be displayed for 10 seconds. After that the display will return to the main screen.



3. If there appear any problems during a printing process (f. ex. observed by the means of the internal camera or the top vision window), the user can fine tune the temperature (TEMP +/- 5 [°C]).



Temperature management suggestions:

- The possibility to adjust the temperature is provided directly in Sinterit Lisa Printer in ‘Temp.’ tab or in the Sinterit Studio software suite.
- On the device, this option is depicted by means of + and – buttons which increase or decrease the temperature by 0.5 [°C] (maximum extent +/- 5 [°C]). In Sinterit Studio, this option is depicted by means of Print Surface Temperature Offset drop-down menu [°C].
- These options are used to increase the level of cake welding (printouts more straight but less detailed) or to decrease the level of cake welding (cake becomes more powdery, it is easier to clean it up but printouts can be distorted; printout details have better quality).
- Another calibration option is to change the laser power. This change is only possible on the level of Sinterit Studio. In the program menu, it can be found as Laser Power Ratio (1.0 by default).
- The laser intensity is raised by increasing the value by 0.05, and lowered by decreasing (also by 0.05). The acceptable calibration scope of laser multiplier is 0.5-3.0.
- As the laser gets weaker, the printout durability get lower as well, however the quality of details gets better. Similarly: an increase of



laser power strengthens the printout but lowers the quality of details.

These remarks apply to the PA12 Smooth powder. In case of Flexa powder, an increase in laser power results in a printout stiffening (up to a certain, maximum level).

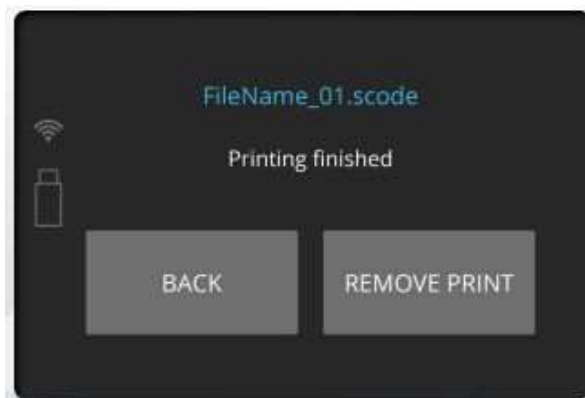
4. While the printer is working do not touch any other elements besides: the LCD, the safety button, the USB port and the power switch.

| | |
|--|--|
| | ATTENTION! Do not lower the temperature inside too quickly. The permissible standard is 0.5 [°C] on one layer. |
| | WARNING! During printing, if smoke, irritating smell or any other alarming circumstances take place, press the safety button. It will immediately cut off the power from the printer. However, remember that it is impossible to open the printer (e.g.: by lifting the lid), until the temperature inside will not drop below 49 [°C] and the "UNLOCK LID" option becomes available. |

B. Finishing the print

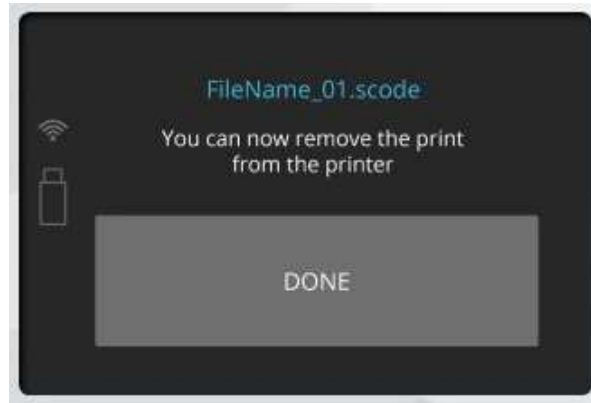
When the process will be finished, the information of possibility to remove printout will be displayed.

- By clicking "REMOVE PRINT" the Print Bed will raise, enabling the printout to be taken out from the chamber.
- By clicking "BACK" the system will return to the first screen.





1. When the printing is complete and the print has cooled down, “You can now remove the print from printer” message will appear on the screen. Click “DONE” to complete the printing process and open the printer.



IMPORTANT!

The blockade of the device is engaged up until the internal temperature drops below 49 [°C].

There is no possibility to open the lid before the temperature drops.

Remember that the print inside the printer may still be hot, despite the fact that the printer has cooled down!

2. In order to open the printer, unlock the magnetic lock on the lid. The lock releases the blockade for 10 seconds. After 10 seconds the lock will become active again. Softly press the lid and then lift it by pulling up.



IMPORTANT! Put on the safety clothing included in the set (mask, glasses, gloves).

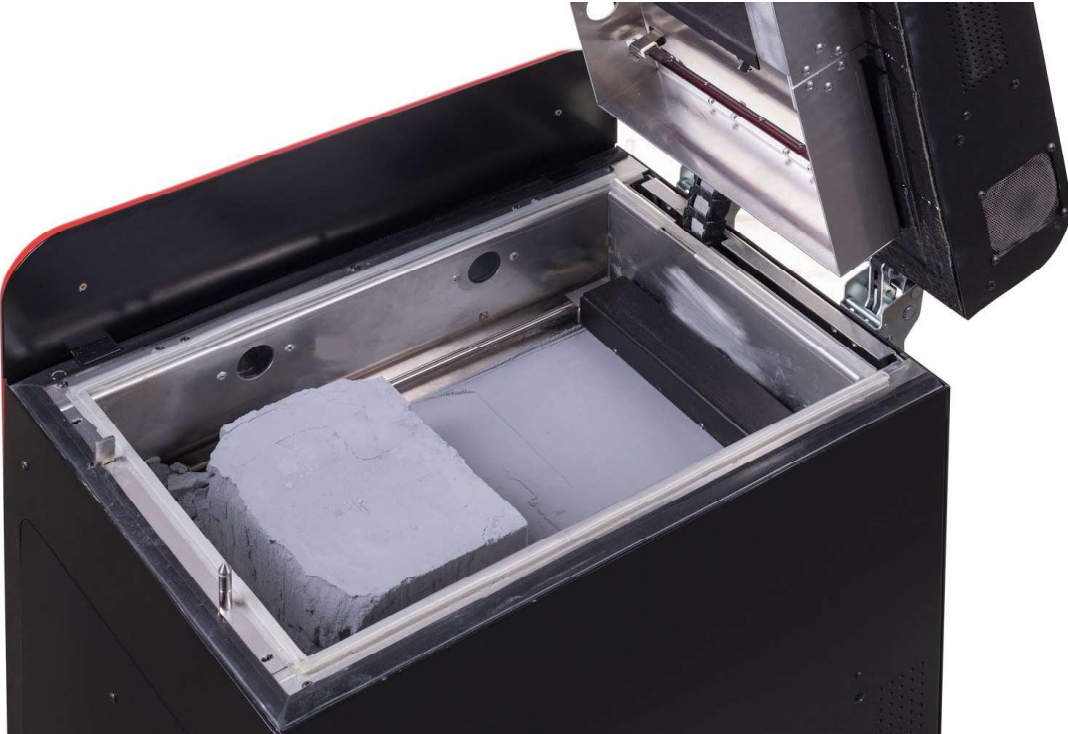
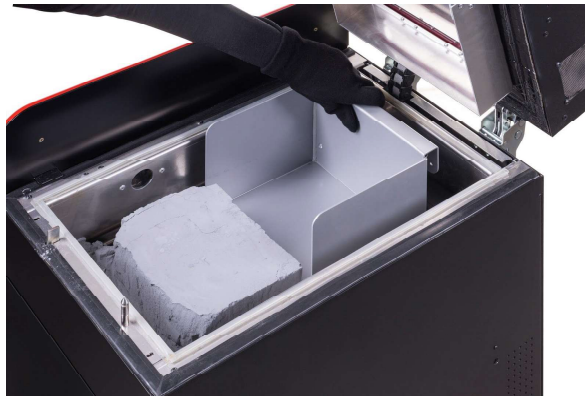


Image. A correct condition of the powder after printing (visible cracks on the surfaces of both Beds).

3. Using the provided two-piece kit of plates, carefully transfer the entire content of the Print Bed to the plate for carrying the prints, and transfer it to the mold included in the set. Leave the cuboid with the print to cool down, for at least one hour (see image).



C

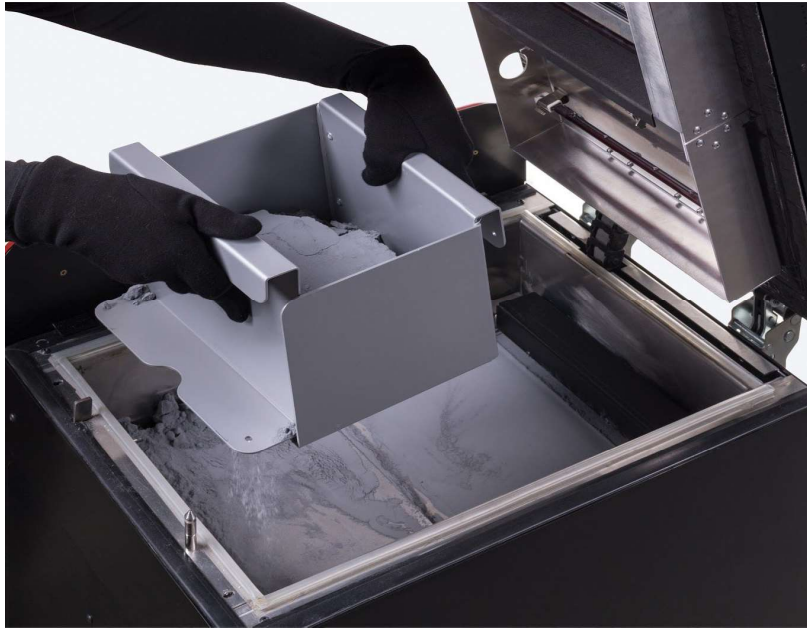
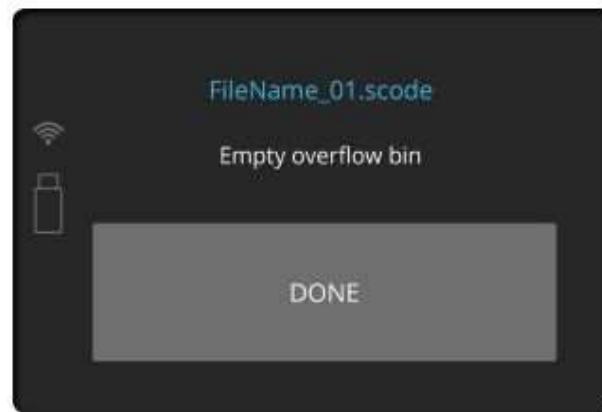


Image. A correct way of taking out the prints from the Print Bed



4. Remove the powder from the Overflow Bin.

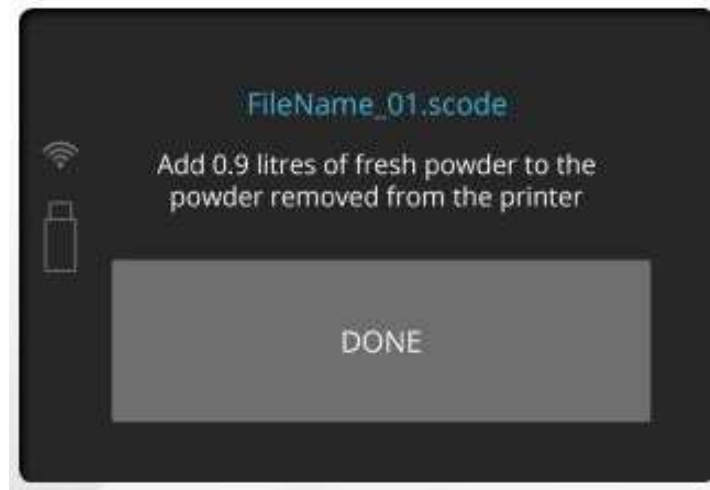


Transfer it to the container which will be used to mix the powder from the printer, with the Fresh Powder later (to refresh the used powder and prepare it for the next print).



5. Place the Overflow Bin back in its place.

6. After the Print Bed is ready to remove the printout, the information about refreshing of the remaining powder will appear. The quantity of PA12 Fresh Powder needed to be add for the next print will be displayed on the screen.



7. The system will guide you through printer cleaning process. It will allow you to recover, all remaining powder.



IMPORTANT!

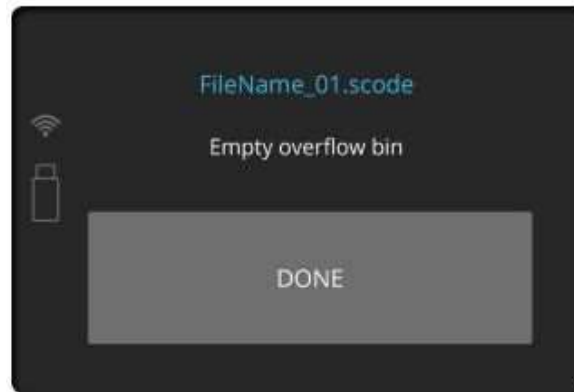
- Always pay attention to the messages displayed on the main display of the Sinterit Lisa printer. The Sinterit Studio software calculates the amount of Fresh Powder, which needs to be added to that already inside of the printer. Not following instructions in the messages may result in the following print being incorrect.
- Even if you do not intend to make the following print right after the first one, mix both powders in the proportions given by the Sinterit Studio software. Store the mix in the container number 2 for the Print Ready Powder.

C. Cleaning the printer

The system will guide you through printer cleaning process when you will proceed straight after printing. You can also do it later using CLEAN PRINTER option displayed in main menu.

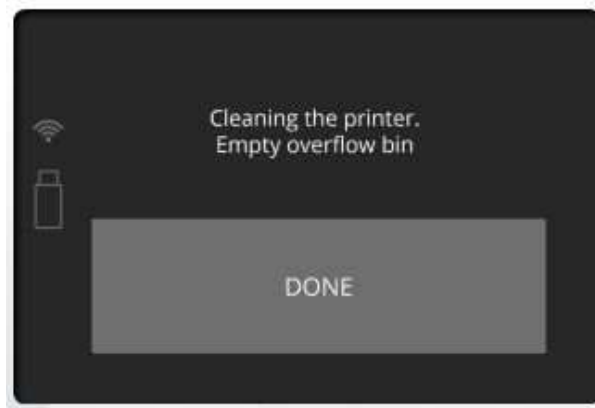
All actions should be confirmed by pressing the “Done” button.

1. Remove the powder from the Overflow Bin. See picture at page 37.



Transfer it to the container which will be used to mix the powder from the printer, with the Fresh Powder later (to refresh the used powder and prepare it for the next print).

2. Remove and clean the laser protective glass. It is recommended to clean the glass before and after each print:



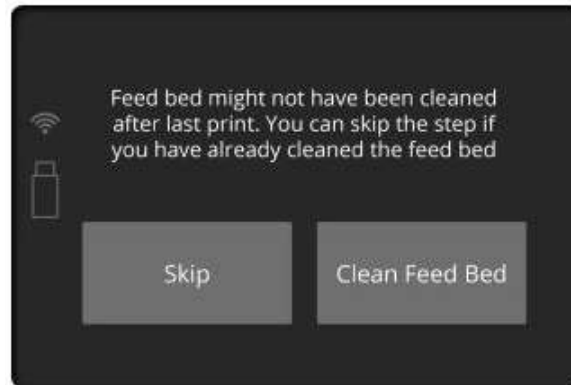
- a. in order to clean the glass, follow the instructions in the chapter “Maintenance and service of the Sinterit Lisa Printer” paragraf at page 58
- b. Place the glass back, then confirm all actions by pressing the “DONE” button.



STOP!

- Watch out for the elements of the heating system of the device.
- Do not clean the glass under running water.
- The cleaning process should be carried out outside of the device.

3. A message “Feed bed might not have been cleaned after last print” will appear.



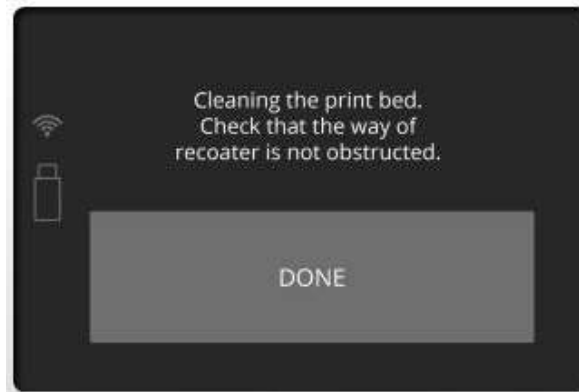
Cleaning the Feed Bed should be confirmed by pressing “Clean Feed Bed” button. The Feed Bed will be raised and the Print Bed will be lowered.

All remaining powder from Feed Bed should be placed into the Print Bed. Precisely clean the Feed Bed from the remaining unsintered powder including the Beds’ surroundings. This can be done with the use of a spatula.



“Skip” button can be pressed if cleaning process had been previously done.

4. Ensure that the movement path of the Recoater is not obstructed and remove all objects from the printer chamber.



Check if all elements are at their default positions (Recoater, Laser). Check the tension and condition of the Recoater's wire. Confirm by clicking "DONE" button.

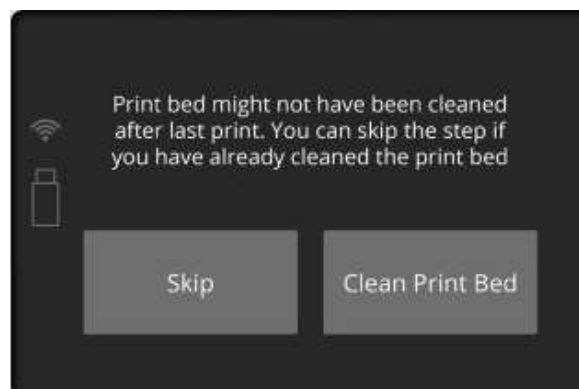


STOP!

Do not use any greases or oils for the guide bar of the Recoater. This may cause damages to the device.

For cleaning, it is recommended to use a paintbrush with a soft bristle (included in the set), or compressed air (when there is no powder inside the printer).

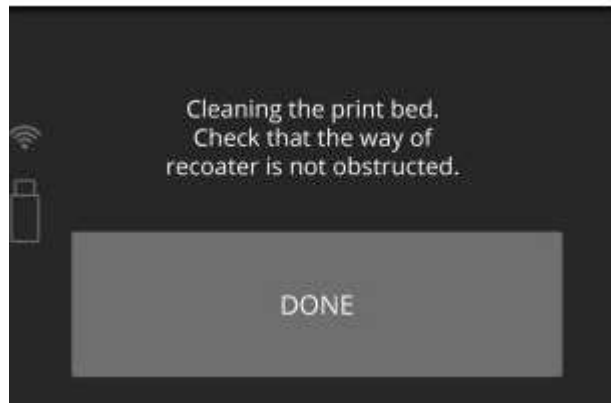
5. A message "Print Bed might not have been cleaned after last print" will appear. All remaining powder from print chamber should be removed.



All remaining powder from Print Bed should be placed into the Overflow Bin gap. Precisely clean the Print Bed from the remaining unsintered powder including the Beds' surroundings. This can be done with the use of a spatula.

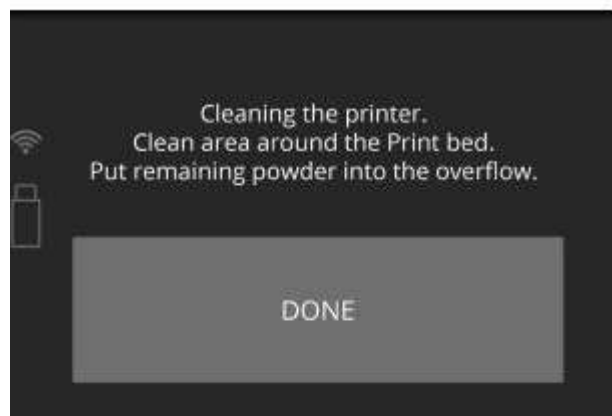


6. Ensure that the movement path of the Recoater is not obstructed one more time and remove all objects from the print chamber. Confirm by clicking on “DONE” button.

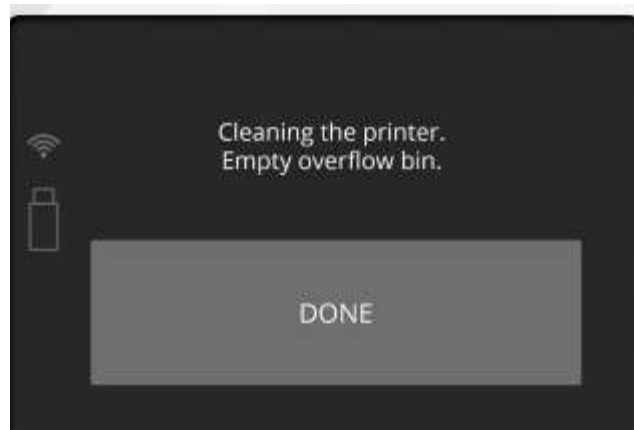


After cleaning operations are finished, confirm by clicking “DONE”.

7. Dutifully clean all the remaining unsintered powder from the surroundings. All remaining powder should be placed into Overflow Bin gap. Confirm the operation by clicking “DONE”.



8. Remove the powder from the Overflow Bin.



Transfer it to the container in which you will mix the powder from the printer with the Fresh Powder later (to refresh the used powder and prepare it for the next print).

9. Place the Overflow Bin back in its place.

10. Confirm operation by clicking “DONE” and close the lid.



CAUTION!

Beware of sharp edges.

10. Printing - ADVANCED MODE

1. Switch the power button (from “0” to “1”) located on the back. Place the key in the ignition and turn it right, clockwise, at a quarter of a turn.



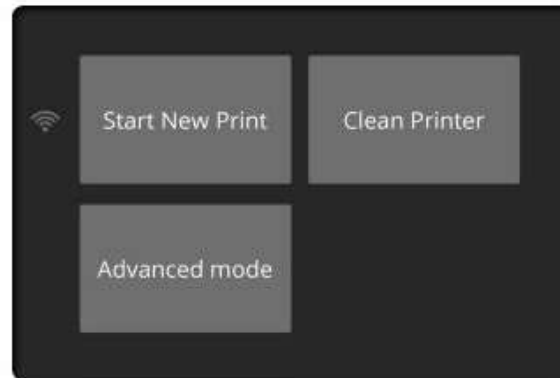
Image. Off/On key position.



WARNING!

Check whether the safety button is out. If not, release it by turning it clockwise at a quarter of a turn.

After switching on the Sinterit Lisa, the startup screen will be displayed. Choose the “ADVANCED MODE” option.



2. In order to open the printer, release the blockade from the magnetic lock on the lid (press PRINT//UNLOCK LID on the screen).

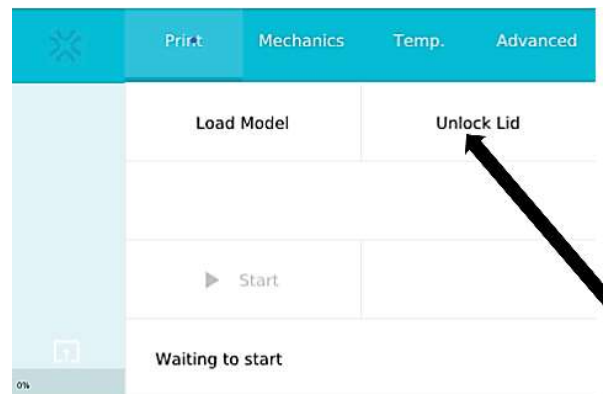


Image. Releasing the blockade from the lock.

3. Softly press and then lift the lid. Remember that the lock is unlocked for 10 seconds.
4. Verify whether the Source Bed and Print Bed are ready to work (during the initial startup, after unpacking, the Beds should be on par with the printer's case), check the wire tension and whether the guide bar for the Recoater is clean (should be located in the middle, in between the Beds).
5. Disassemble the Recoater cover and wipe the rotating shaft with a cotton cloth soaked with alcohol.
6. The following stages may be carried out in two ways: manually and automatically (recommended). Both processes have been described below in two subchapters.

A. Printing in **ADVANCED MODE**: automated version

1. Load the file for printing:
 - a. save the file prepared using the Sinterit Studio, to a USB carrier (USB flash drive recommended),
 - b. connect the carrier to the USB port of the printer, with its power on,
 - c. in order to load a new file, select: PRINT//LOAD MODEL//LOAD FROM USB//file name. The loading process may take a few minutes (depending on the file size),



- d. in order to load a file already stored in the printer's internal memory, select: PRINT//RECENT MODELS//file name.

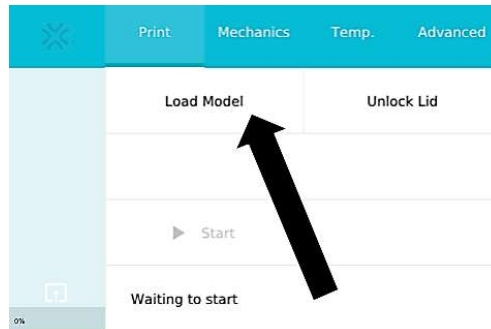


Image.Loading file for printing.



WARNING!

Carefully read all messages displayed on the screen when preparing the printing process. Skipping the described operations may result in incorrect printing or device failure.

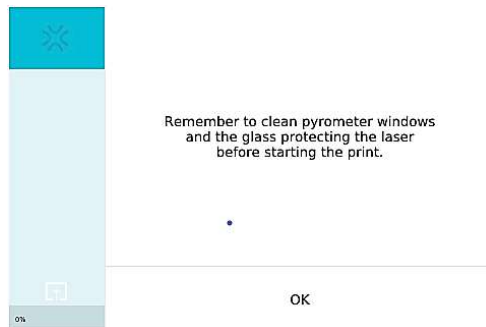


Image. Example message – reminding to clean the pyrometer and camera windows.

2. After the model has been loaded to the internal memory, a message concerning the positioning of the Beds will be displayed. In order to initiate it, press YES. The process approximates the usage of powder required for printing. During this operation, the height of both Beds is set in accordance with the currently selected printing process.



Image.Message/question concerning positioning the BEDs.



Image. Positioned Beds, ready to be filled with powder and the base position for the Recoater.

3. Put on the protective clothing included in the set (gloves, mask, glasses).



4. Add the PA12 Smooth Print Ready Powder (container no. 2) to the Source Bed (number 1 in the image above), 6[L] of powder maximum. Make a little pile of the powder and press it gently, but firmly (using powder trowel f.ex). Act carefully in order for the powder not to go airborne (it is recommended to use a spatula for adding the powder).
5. It is also recommended to add a little bit of the Print Ready Powder on the surface of the Print Bed (number 2 in the picture above). This will make creating the first layer during positioning faster.
6. Clean the infrared heaters (white and red ones) by gently blowing on them with clean compressed air. Use an alcohol wipe to carefully clean the vision windows of the camera and pyrometers, as well as the laser's protection glass.
7. In order to precisely cover the Print Bed with powder and even out the layers, go to the MECHANICS tab and press START LEVELING. The process will last until the Recoater processes approximately 25 layers of powder.
8. The operation may be finished quicker: when the powder covers the surface of the Print Bed uniformly we can press STOP LEVELING.



IMPORTANT!

Remember: The right side of the printer (above the Overflow Bin) is the base position for the Recoater. That is why it is possible for it to move above the Beds to its base position despite pressing the STOP LEVELING button.

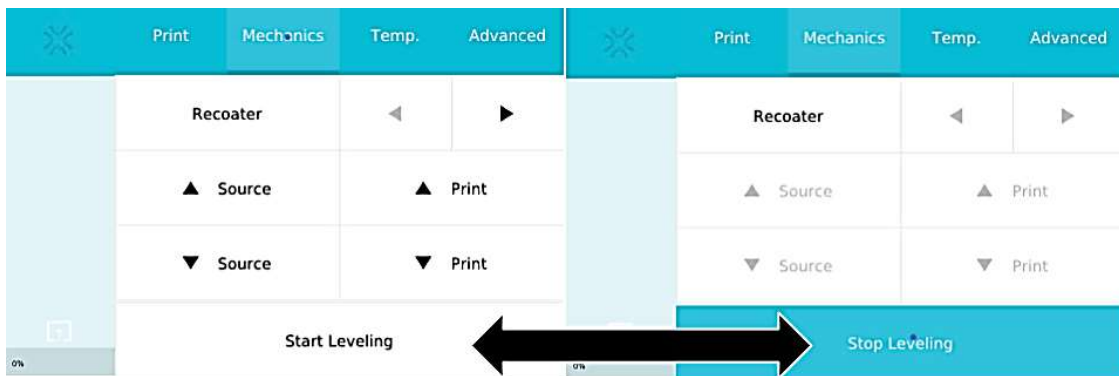


Image. The Start/Stop Leveling button for creating the first layers.

9. Clean any excess powder from the area around the BEDs, the guide bar and the wire of the Recoater, using a paintbrush.
10. Gently blow the infrared heaters (white and red) with air.
11. Lubricate the Recoater bearing with included silicone grease
12. Use an alcohol wipe to carefully clean the vision windows of the camera and pyrometers, as well as the laser protection glass.

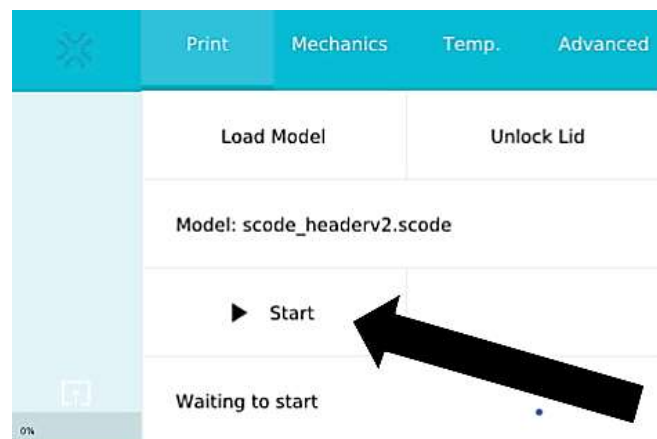


Image. The Start button, initiating the printing with the Sinterit Lisa Printer.

B. Printing in ADVANCED MODE: manual version

1. Load the file for printing:
 - a. Save the file prepared using the Sinterit Studio to a USB flash drive.
 - b. Connect the drive to the printer's USB port, with its power on.
 - c. In order to load a new file, select: PRINT//LOAD MODEL//LOAD FROM USB//file name. The loading process may take a few minutes (depending on the file size).
 - d. In order to load a file already stored in the printer's internal memory select: PRINT//RECENT MODELS//file name.



WARNING!

Carefully read all messages displayed on the screen when preparing the model for printing. Skipping the described operations may result in an incorrect printing or device failure.

2. After loading the model, a message concerning leveling the Beds will be displayed. After pressing NO the operation has to be carried out manually, keeping in mind the information entered in Sinterit Studio after “cutting” the model (like the height of the powder in the Source Bed, volume of the model, etc.).
3. After lowering the Source Bed to the selected height (MECHANICS//SOURCE/▼) move the Recoater to the right (MECHANICS//RECOATER//►).

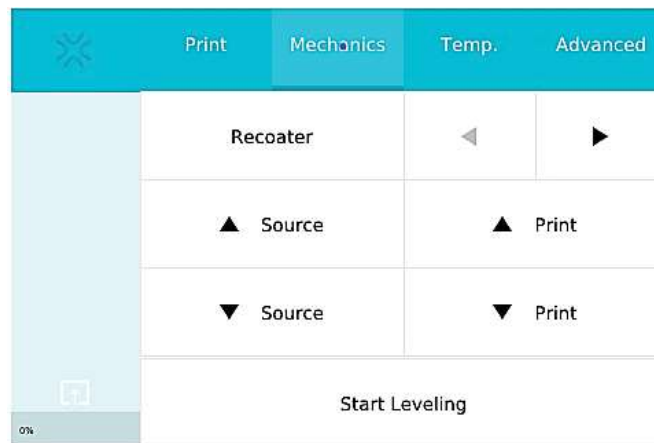


Image.The Mechanics tab with direction arrows for the Beds and the Recoater translation movement.



WARNING!

Do not move the Recoater manually. It is allowed only using commands on the screen.

4. Put on the protective clothing included in the set (mask, glasses, gloves).




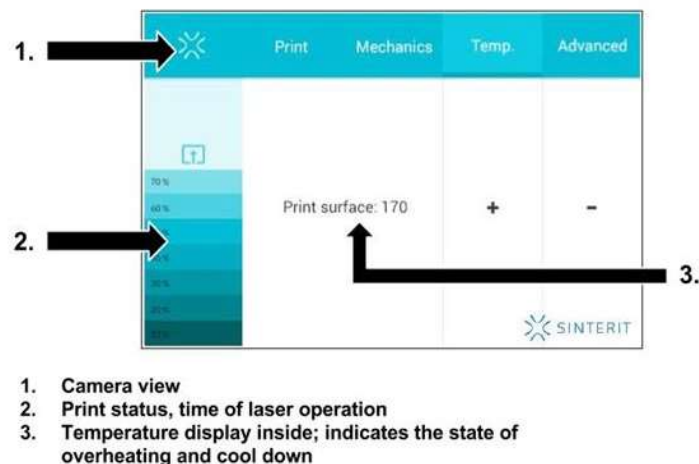
5. Add the PA12 Smooth powder from the container number 2 (Print Ready Powder) to the Source Bed (6[L] of powder maximum). Make a little pile of the powder and press it gently, but firmly. Act carefully in order for the powder not to go airborne (it is recommended to use a spatula/scoop for adding the powder).
6. It is also recommended to add a little bit of the Print Ready Powder on the surface of the Print Bed (number 2 in the picture above). This will make creating the first layer during positioning faster.
7. Move the Recoater to the left (MECHANICS//RECOATER//◀).



8. Check whether the Print Bed is levelled in reference to the case (preparing initial layers). If necessary, press MECHANICS//PRINT//▲ to level out.
9. Lift the Source to about 1 layer (MECHANICS//SOURCE ▲).
10. Move the Recoater to the right (MECHANICS//RECOATER//►). It will transfer the powder to the Print Bed, slowly covering the surface.
11. Move the Recoater to the left (MECHANICS//RECOATER//◄).
12. Repeat steps 8-10 until the powder covers the entire surface of the Print Bed.
13. After the Beds are leveled and the powder covering processes is complete, close the lid and press ►START in the PRINT tab.

C. Information and tasks while printing

1. The main screen of the graphical user interface displays (in real time) the status of the print (left side of the screen), current temperature of the Beds, warming and cooling states (tab TEMP, see image) and the remaining time of laser sintering.
2. Clicking on the SINTERIT logo on the screen  (upper left corner, see image) activates the internal camera view, which will be displayed for 10 seconds. After that the display will return to the main screen.



1. Camera view
2. Print status, time of laser operation
3. Temperature display inside; indicates the state of overheating and cool down

Image. The main screen during printing.

3. During printing, if visible problems appear (surface changes), observed by the internal camera or the top visor window, the user can fine tune the temperature (TEMP +/- 5 [°C]).
4. While the printer is working do not touch other elements besides: LCD, safety button, USB port and power switch.



ATTENTION!

Do not lower the temperature inside too quickly. The permissible standard is 0.5 [°C] on one layer.



WARNING!

During printing, if smoke, irritating smell or other alarming circumstances take place, press the safety button. It will immediately cut off the power from the printer. However, remember that it is impossible to open the printer (f. ex.: by lifting the lid), until the temperature inside will not drop below 49 [°C].

D. Finishing the print in **ADVANCED MODE**

1. Put on the safety clothing included in the set (mask, glasses, gloves).



2. When the printing is complete and the print cooled down the **PRINT FINISHED** command will appear on the main screen. Click it to complete the printing process and open the printer.



IMPORTANT!

The blockade of the device is engaged until the internal temperature drops below 49 [°C].

There is no possibility to open the lid before the temperature drops. Remember that the print inside the printer may still be hot, despite the fact that the printer has cooled down!

3. In order to open the printer, unlock the magnetic lock on the lid (**PRINT//UNLOCK LID**). The lock releases the blockade for 10 seconds. After 10 seconds the lock will become active again.
4. Softly press the lid and then lift it by pulling up.



WARNING!

Do not move the Recoater manually. It is allowed only using commands on the screen.



Image. A correct condition of the powder after printing (visible cracks on the surfaces of both Beds).

5. Remove the powder from the Overflow Bin. Transfer it to the container in which you will mix the powder from the printer, with the powder from container number (Fresh Powder).
6. Place the Overflow Bin back in its place.



Image. A correct way of taking out the Overflow Bin and placing it back.

7. In order to take the print out of the Print Bed keep pressing **MECHANICS//PRINT//▲** until the entire content of the Print Bed will be out in the form of solid cuboid (see image).



- Using the provided two-part kit of plates, carefully transfer the entire content of the Print Bed to the plate for carrying the prints, and transfer it to the mold included in the set. Leave the cuboid with the print to cool down for at least one hour (see image).



Image. A correct way of taking out the prints from the Print Bed

- Precisely clean the Print Bed from the remaining unsintered powder including the Beds' surroundings (it's highly recommended to move it to the Overflow Bin and then transfer it to the form with the print).



10. Remove any remaining powder from the Source. This can be done with the use of a spatula or by moving the Source Bed to the top (MECHANICS//SOURCE//▲) and moving the powder to the Overflow Bin using a spatula. Transfer the powder to the container with the powder from the Overflow Bin.



STOP!

Do not use any greases or oils for the guide bar of the Recoater. This may cause damages to the device.

For cleaning, it is recommended to use a paintbrush with a soft bristle (included in the set), or compressed air (when there is no powder inside the printer).



Image. Removing the remaining powder from the inside of the printer.

11. Check if all elements are at their default positions (Recoater, laser).

12. Check the tension and condition of the Recoater wire.



13. Check the condition of the laser protection glass
14. Close the lid.

11. Cleaning the prints

1. By using a brush with a nylon bristle, initially clean the print of any unsintered powder, until an outline of the print is visible. If the mass is still warm, leave it to cool down.
2. Separate the prints from the mass and continue to clean them with the nylon brush included in the set. Mash up the clumps of powder remaining in the form (this will help to sift the remaining powder through the sieve).



Image. Cleaning the prints.

3. After an initial cleaning, a Sandblaster* (available at Sinterit online store) or a brush with a gold/bronze bristle (included in the set) may be used to clean the print details.



Image. Sinterit Sandblaster

4. Combine the unsintered powder from the Print Bed with the powder remaining in the Source and Overflow Bin. Sift the entire unsintered powder through a sieve (included in the set). We recommend to use Sinterit Powder Sieve* available at Sinterit online store.





Image. Two ways of sive the powder.

5. Add the amount of Fresh Powder indicated by the Sinterit Studio software, from container number 1 to the sifted unsintered powder from the printer. Mix them together. If you do not intend to start printing, transfer the powder into the container number 2 for the Print Ready Powder.

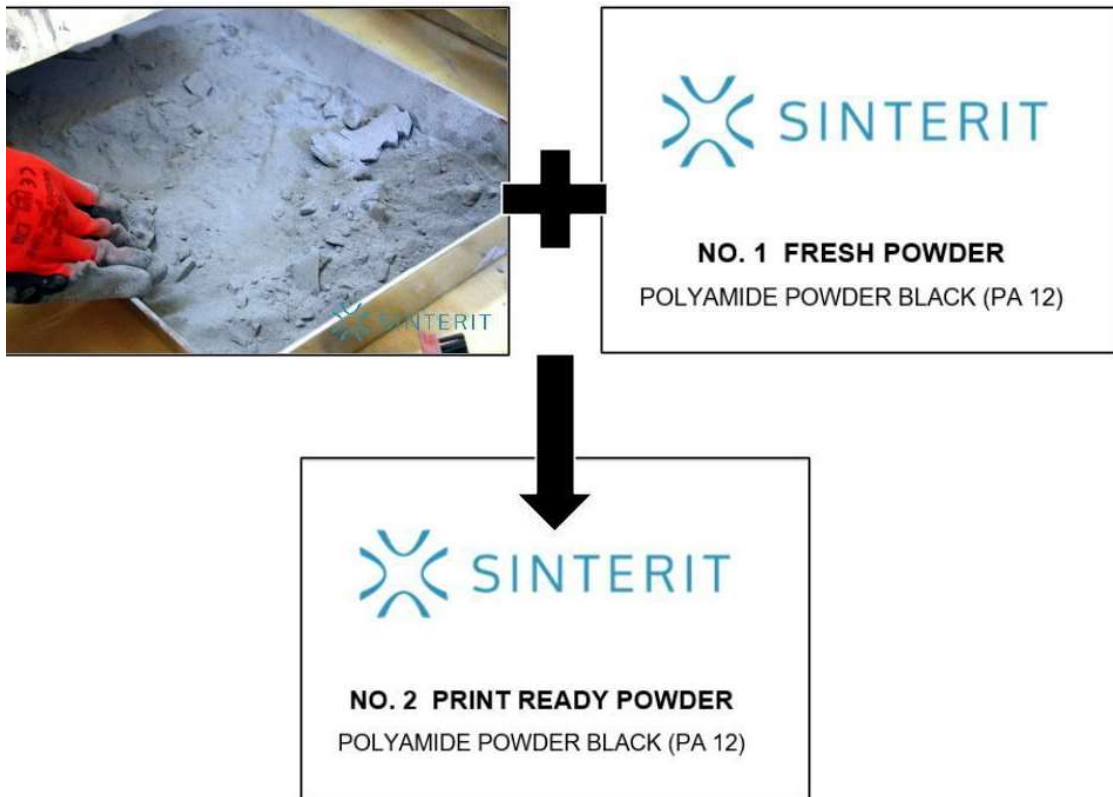


Image. The method of combining powders after the printing.



6. After cleaning, the product possesses its full durability and is ready to be used.

*** A Sandblaster and Powder Sieve may be optionally included in the set. Contact Sinterit or a Sandblaster seller in order to select an abrasive which may be used to clean PA12 Smooth.**

A. Painting and lacquering

SLS parts are able to be spray painted and/or coated with a lacquer (varnish or clear coat). Via lacquering it is possible to obtain various finishes, such as high gloss or metallic sheen. Lacquer coatings can also improve wear resistance, surface hardness, water-tightness and limit marks and smudges on the surface of the part. Due to the porous nature of SLS it is recommended that 4- 5 very thin coats are applied to achieve a final finish rather than one thick coat. This results in faster drying time and reduces the likelihood of the point or lacquer running.

12. Maintenance and service of the Sinterit Lisa Printer

To maintain the most efficient and long-lasting Printer, ensure regular conservation. The basic maintenance contains:

- cleaning the pyrometers and the camera protective glasses before and after each print,



- checking the status of the Recoater transmission cable,
- cleaning the laser protective glass before and after every print,
- cleaning the surface under the Beds after every third print,
- lubricating the Recoater's ball bearings.

A. Laser protective glass - replacement

To replace the laser protective glass, ensure that you are holding the heating module by one hand. Then pull out the clasp placed on the top of the inner part of the lid. By lowering the heating module, you will get access to the laser protective glass socket.



Image. heater module - clasp system



CAUTION!

Beware of sharp edges. Put on the safety gloves to protect yourself from injuring the hand against the side of the heating module.

To open the laser protective glass socket, you need to unscrew the wings on the right side of it. While doing so, remember to hold the metal frame and then gently draw out the socket. Now you can take the glass out of the frame and replace it with the new one.

To assemble the laser glass protective socket, slide the tabs into the holes on the left side of the heating module. Press the module gently to the lid and then screw the wings on the right side.



Image. Correct placement of the laser protection glass on the heater module.



Close the lid and protect it by the metal clasp. Clean glass once more to get rid of any finger marks or stains.

B. Cleaning the laser protection glass



ATTENTION!

Before cleaning, turn the printer off.

- a. To clean the laser protective glass, ensure that you are holding the heating module by one hand. Then pull out the clasp placed on the top of the inner part of the lid. By lowering the heating module, you will get access to the laser protective glass socket.



- b. To open the laser protective glass socket, you need to unscrew the wings on the right side of it. While doing this, remember to hold the metal frame and then gently draw out the socket. Now you can take the glass out of the frame, put it on a stable and clean surface and start cleaning
- c. To clean the laser protective glass, rub its surface carefully with a cotton cloth soaked with alcohol (pay attention to any fibers left on the surface) and clean both sides of the glass.



Image. Cleaning the laser protection glass

- d. After the cleaning, put the glass back into the metal frame. To assemble the laser glass protective socket, slide the tabs into the holes on the left side of the heating module. Press the module gently to the lid and then screw the wings on the right side.



STOP!

- Watch out for the elements of the heating system of the machine.
- Do not clean the glass under running water.
- The cleaning process should be carried out outside of the device.

C. Cleaning the surface under the Beds



ATTENTION!

Before cleaning, turn the printer off.



CAUTION!

Beware of moving parts which can crush hands.
Pay attention to the indications inside!

To facilitate cleaning of the space under the Beds Sinterit reinvented the front panel assembly. Now under the panel, you will find plastic hooks which allow you to remove it fast and simple.



Image. Click - click hooks

1. You will find a hollow to easily put your fingers - which will make it quicker for you to remove it
2. Lift up the panel gently, unfastening each clip one after another.
3. After removing, put the panel on a flat, safe surface.



Image. The way of taking off the front panel

4. Gently remove the powder using a brush, or special vacuum cleaner, minding the Beds engines.



5. To **install** the panel, perform the above actions in reverse order.

D. Replacement of infrared heating units placed around the protecting glass.

1. Wear protective gloves or use a clean cloth/paper towel while replacing the heating unit. Do not touch the heaters with your hands.
2. **Make sure the heaters are not hot.** Carry the operation out when the device is cold and switched off.
3. Gently grab the heater with your fingers and remove it by moving it parallelly to its slots. Do not twist it in any direction, it may cause damage to the heater's slots.
4. Insert the new heater to the slot.



IMPORTANT!

If you will touch heater by your hand, remove it, clean it and install one more time, using gloves or a clean cloth.



Image. Correct removal of the old and installing the new infrared heaters.

E. Changing the Recoater wire

1. Clean the printer's chambers (Source Bed and Print Bed).
2. Go to ADVANCED MODE - see chapter 10.
3. Move the Recoater left to the position of the Source Bed (MECHANICS//RECOATER//◀) in order to have access to the screws holding the Recoater's cover (on the right side of the Recoater).
4. Dismantle the casing (the black element on the Recoater):
 - a. clean any possible remains of the powder from the insides of the screws (for example using the chisel included in the set or some other sharp tool),



- b. using a size 2 hex key (ISO 2936:2014) unscrew two screws (M3x8),
 - c. carefully take out the cover and lay aside together with the screws.
5. Unscrew the screws holding the wire on the right side of the internal printer's housing.
6. Carefully take out the holding plate from the printer housing.
7. Holding the bearing of the Recoater, manually reposition the device to the middle position - between Print Bed and Source Bed. This position allows access to the left side of the Recoater's transmission cable and space below the Recoater to replace the parts.
8. Unscrew the two holding screws on the left side of the printer's internal housing.
9. Take out the plate from the housing and take out the Recoater's transmission cable.

**IMPORTANT!**

Be careful! The left side of the wire is ended with a spring which is located inside the printer's housing.

10. After taking the wire out from the housing, remove it from the Recoater mechanism:
 - a. unscrew the right end of the Recoater's transmission cable from the plate (use a size 2 hex key, those are the same M3x8 as in the case of the Recoater's casing),
 - b. carefully lift the Recoater and pull the wire through from the right to the center.

**ATTENTION!**

In case of difficulties in taking the Recoater's transmission cable out due to the knot or the cable lug, reposition the cable lug to the middle of the cable. Carefully reeve first the cable lug and then the knot from the end of the cable.

11. Take out a new Recoater's transmission cable from the package.
12. Put the new Recoater's transmission cable through the Recoater, starting from the left towards the center.

**ATTENTION!**

If the Recoater's transmission cable does not fit between the bearing and the roller, move the cable lug to the middle of the wire, put the cable through the mechanism and hold the end using nippers or pliers. Carefully pull so that the knot gets through the mechanism, and then the move the cable lug. Repeat one more time (from the center towards the right).





13. Attach the right end of the Recoater's transmission cable to the plate, using the cable lug and a screw.
14. Insert the left side of the Recoater's transmission cable, with the spring and two spacers, in order to chock the mechanism.
15. Softly tensing, screw back the right side of the Recoater's transmission cable with the plate to the printer's housing (remember that the knot has to be hidden between the housing and the plate). The plate should touch the housing.
16. Screw the left side of the wire with the plate to the printer case (remember that the two spacers and the spring should be inside the opening).
17. Attach and screw back the Recoater casing.

F. Technical support




The latest information, technical support, and versions of the manual are available in the Support tab of the Sinterit Sp.z.o.o. company website or by contacting us through email: contact@sinterit.com or phone: +48 570 967 860.

The list of distributors and technical support in specific countries can be found at www.sinterit.com.

13. Working processes with the powders

A. Supplies information

When working with the polyamide powder or other designated printer powder for the Sinterit Lisa Printer, always wear protective kit attached to the above-mentioned device (glasses, gloves, dust mask).

| | |
|---|--|
| WARNING! When working with a polyamide powder, avoid inhalation, swallowing or contact with skin and eyes. | |
|  | - If the PA12 Smooth powder is inhaled, move to a place with fresh air and gargle thoroughly with plenty of water. If coughing develops, contact a physician. |
|  | - If you eat any PA12 Smooth powder, rinse your mouth with water and drink 1-3 glasses of water to dilute stomach contents. If necessary, contact your doctor. |
|  | - If the PA12 Smooth powder gets in your eyes, rinse them thoroughly with water. In case of persisting eye irritation, contact a physician. |



- When the PA12 Smooth powder gets in contact to your skin, wash it with soap and water.

- Polyamide powder should be stored in tightly closed containers, in a room at room temperature and low humidity.
- Powder should be stored out of reach of children and pets.
- If the device is not used for a long time, the powder should be stored in a sealed package.
- When printing, the smell of burning powder may be emitted in intensities which do not affect the health of users. However, in the case of long-term operation of the printer in a poorly ventilated room, the smell may become unpleasant and irritating. Adequate ventilation is recommended in order to create the best printing conditions.



WARNING!

Do not attempt to burn/melt polyamide powder. The resulting sparks and hot mass can cause severe burns.
Keep the polyamide powder away from fire.



STOP!

Do not dispose in municipal waste!
The used polyamide powder should be stored in sealed containers and disposed in accordance with local policy of waste plastic material.

B. General information

PA12 SMOOTH

- PA12 Smooth is a black, polyamide based, nylon 12 powder, consisting of 20-100 micrometers size spherical particles. It is suitable for printing detailed objects, rigid and extremely durable against unfavourable conditions (such as temperature). Due to its mechanical strength and heat resistance, it is a powder dedicated for functional prototypes or end-use parts.
- The sintering temperature with Sinterit Lisa is about 178[°C] inside the printing chamber.





- It is forbidden to set or raise the temperature within the printer at $\geq 180[^\circ\text{C}]$ when there is PA12 Smooth inside.
- In higher temperatures, the powder loses its stability and becomes liquid which may cause damage to the device.
- The PA12 Smooth powder must be stored in tight, preferably original, containers; at room temperature and at a low humidity.

FLEXA GREY

- Flexa Grey is a grey powder, based on TPU (Thermoplastic Polyurethane Elastomer), with its properties similar to rubber. It's extremely elastic.
- Example uses: well known for automotive and textile coating applications, a popular material found in outer cases of mobile electronic devices, perfect impact modifier.
- The sintering temperature with Sinterit Lisa Printer is about $100[^\circ\text{C}]$ inside the chamber. For the provided temperatures, fuming is normal when sintering the above mentioned powder, although it should not come out of the printer.
- It is forbidden to set or rise the temperature within the printing chamber above $100[^\circ\text{C}]$ when Flexa Grey is inside. In higher temperatures, the powder loses its stability and becomes liquid which may cause damage to the device.
- The Flexa Grey powder must be stored in tight, preferably original, containers; at room temperature and at a low humidity.
- All of the safety and maintenance conditions for the Flexa Grey powder, are the same as for PA12 Smooth (except the refreshing process). **Used/unsintered Flexa Black powder doesn't need to be refreshed after printing.**



FLEXA BLACK

- Flexa Black is a black powder, based on TPU (Thermoplastic Polyurethane Elastomer), with its properties similar to rubber. It's elastic and at the same time resistant to most physical and chemical agents. It stands out with high abrasion resistance.
- Example uses: prototyping, the shoe industry, the medical industry (for example prosthetics), pipes, gaskets, design, modeling-making.
- Due to the larger size of the powder particles, it cannot be used to print as detailed elements as those done with the use of PA12 Smooth.





- The sintering temperature with Sinterit Lisa Printer is about 100[°C] inside the chamber. For the provided temperatures, fuming is normal when sintering the above mentioned powder, although the fumes should not come out of the printer.
- It is forbidden to set or rise the temperature within the printing chamber above 100[°C] when Flexa Black is inside. In higher temperatures, the powder loses its stability and becomes liquid which may cause damage to the device.
- The Flexa Black powder must be stored in tight, preferably original, containers; at room temperature and at a low humidity.
- All of the safety and maintenance conditions for the Flexa Black powder are the same as for PA12 Smooth (except the refreshing process). **Used/unsintered Flexa Black powder doesn't need to be refreshed after printing.**

C. Powders in Sinterit Studio

PA12 Smooth

| | |
|---|--|
| Types of settings | All of the basic parameters for working with PA12 Smooth are already included in Sinterit Studio. |
| The temperature and power of the laser | The temperature and power of the laser are automatically set after selecting PA12 Smooth. |
| Layer height | The recommended layer height is 0.125 [mm]. |
| Working area | Due to high sintering temperature and a requirement to provide a uniform temperature, the working area for this powder is significantly smaller than the Print Bed's area. Dimensions: 90 x 130 x 130 [mm] // 3.5 x 5.1 x 5.1 [in] |
| Positioning the prints | If the model is dense and the cross-section has large area, please rotate the model so that the cross-section decreases. If the model has some details, please orient the detailed surface upward. The detailed surface will be sharp, while the bottom surface will be smooth. If the model has round holes and features, the shape will be most accurate if the surface is positioned flat. If the model contains movable parts, please position it perpendicular/parallel to the printing chamber. More information in Manual Sinterit Studio - chapter "Positioning" |



FLEXA BLACK and GREY

| | |
|---|---|
| Types of settings | All of the basic parameters for working with Flexa are already included in Sinterit Studio. There are two types of settings to choose from: <ul style="list-style-type: none">- more flexible – with those settings the prints are more flexible, more delicate, small details are more visible, however the prints are less resistant to stretching or crushing.- more rigid – with those settings the prints are more rigid, more abrasion and stretching resistant, small details may however not be visible. |
| The temperature and power of the laser | The temperature and power of the laser are automatically set after selecting Flexa. |
| Layer height | The recommended layer height is 0.125 [mm]. |
| Working area | Due to the low sintering temperature, the working area for this type of powder is larger than with PA12 Smooth. Dimensions: 110 x 150 x 150 [mm] // 4.3 x 5.9 x 5.9 [in] |
| Positioning the prints | The Flexa does not have such rigorous rules in terms of positioning models in the Print Bed as in the case of PA12 Smooth (and other PA12). EXAMPLE: Long prints may be positioned flat because the lower melting temperature does not cause the prints to bend. |



WARNING! Important messages will be displayed in Sinterit Studio, not obeying the may result in damaging the print and/or the printer. Similar messages appear on the display of Sinterit Lisa Printer. Please read them carefully in case of changing the powder from Flexa to PA12 Smooth.

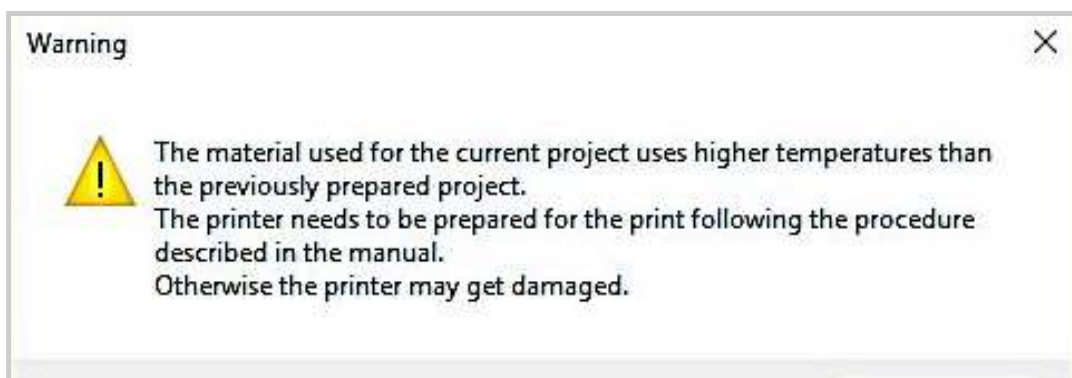


Image. A warning message appearing after changing Flexa to PA12 Smooth.



D. Powders in the Sinterit Lisa Printer

PA12 SMOOTH

- When printing using PA12 Smooth, the printer may become hot. Be careful and do not harm yourself.
- During the printing process, you may watch the objects building through the top glass.
- After printing, the block in the Print Bed is very firm, but also very powdery (all of the unsintered powder falls down even when lightly shaken).
- Prints made from PA12 Smooth may take some time and effort to get cleaned from the unsintered powder. Please clean them with the tools included in the set. As you do so, next we recommend using a sandblaster or compressed air to clean areas difficult to reach.
- Due to high temperatures, the material ageing process (degradation) occurs – there is a need to add Fresh Powder to the used one (from the printer, Overflow Bin and the one remaining from model cleansing). The used one must be sifted through a sieve, then the fresh batch of powder must be added and the compound must be blended together.

FLEXA BLACK or GREY

- When printing using Flexa, smoke from the melted powder may appear inside the printer.
- Due to a lower melting temperature, the visibility through the window and the camera, is limited (the infrared heaters working with lower power do not produce enough light).
- After printing, the block in the Print Bed is very firm, but also very powdery (all of the unsintered powder falls down even when lightly shaken).
- Prints made from Flexa (unlike those from PA12 Smooth) may be easily cleaned, using for example a paint brush (the brushes included in the set do not have to be used). We recommend using a sandblaster or compressed air to clean areas difficult to reach.
- Flexa does not require refreshing – there is no need of adding new powder to the one from the printer (unlike with the PA12 Smooth case). After sifting through a sieve, the entire powder is ready to be reused.

E. Cleaning the device and changing the powder

1) PA12 SMOOTH → FLEXA

When changing PA12 to Flexa, no dutiful cleaning of the inside of the printer is required. The same actions as cleaning the device after printing should be carried out.



2) FLEXA → PA12 SMOOTH

- When changing Flexa to PA12 it is required to clean the device very precisely. Special attention should be paid on the bottom and side walls of the Print Bed and the Source Bed as well as the Recoater's guide bar. It is also recommended to clean the area around the Beds using compressed air. Disassemble the Recoater's casing and remove the remaining powder. It is important to clean the printer as thoroughly as possible before adding PA12; otherwise, the remaining Flexa (with its properties similar to rubber, becoming liquid in temperatures above 100[°C]) may get into the mechanism responsible for moving the Beds or the Recoater's mechanism, and damage the device.
- Clean the laser protection glass as some fumes may release during printing with Flexa and make the glass foggy. If it is hard to clean the surface, you can use ethyl acetate.

14. General legal information

Where this manual refers to Sinterit or the Company, this means Sinterit sp. z o.o. with its legal seat in Krakow, registered by the District Court for Kraków-Śródmieście in Cracow, XI Commercial Division of the National Court Register under number: 535095, NIP (tax number): 6793106416, with the share capital for a date of publication of this manual of PLN 78,350 (say: seventy eight thousand three hundred and fifty).

This document contains material protected under copyright and industrial property laws. This means that the document may not be, including but not limited to, reproduced or modified without the consent of Sinterit.

This manual serves to assist in the correct use of the device, perform basic maintenance and, if necessary, to solve simple problems, allowing to maintain the device in a good condition.

This manual contains content exclusively for the provision of information and the use by individuals professionally trained and engaged in the operation and maintenance of the equipment described below.

The information contained in this document is intended for use only with the product made by Sinterit and called Sinterit Lisa.

Due to the constant development of Sinterit's products the information contained in this manual, specifications and markings are subject to change without notice.



15. Disclaimer

Sinterit is not responsible for any use of this information in relation to other products. Sinterit is not liable for any damages, including but not limited to losses or lost profits, resulting from the use of any materials (consumables) other than those provided to the purchaser by Sinterit.

Sinterit is not liable to the purchaser of the product or any third party for any damages, including but not limited to losses or lost profits resulting from improper use of the product, particularly not in accordance with this manual, or modifications or repairs unauthorised by Sinterit or improper maintenance.

Although every effort has been taken to provide accurate information about the product, Sinterit assumes no responsibility for any incorrect information or omission. Sinterit reserves the right to correct any errors and disclaims any liability in situations resulting from these errors.

Sinterit shall not be liable for defects in the Printer's firmware.

Further limitations or exclusions of Sinterit's liability may result from the applicable laws or agreements entered into with the purchaser of the products.

16. Trademarks

SINTERIT name and logo, as well as Sinterit Lisa name are registered trademarks of the Company (or necessary motions have been filled to register the trademarks).

17. Software license agreement

Sinterit grants the buyer a non-transferable license without a right to sublicensing to use the control software Sinterit Studio under the terms and conditions set forth in agreement between the buyer of Sinterit Lisa Printer and the Company.

18. Terms of warranty

The terms of warranty granted by Sinterit to its direct clients are set forth in the agreement between the client and the Company. Sinterit's warranty is nominative.

In case of purchase made in the Sinterit online shop, the terms of the warranty are specified in the Terms and Conditions, that have to be accepted by a client before placing an order.

In case of purchase made outside the Sinterit online store, the warranty terms may be specified in the offer or in another form chosen by the Company to provide a customer with relevant information before making a purchase decision.



Sinterit's warranty does not cover including but not limited to:

- damages, abnormalities or malfunction caused by a client or any third party,
- damages, abnormalities or malfunction caused by inappropriate use, effects of force, insufficient or inappropriate maintenance, abnormal operating conditions, incorrect installation or inadequate servicing,
- normal wear and tear, including but not limited to replaceable infrared heaters, laser`s protection glass, recoater`s transmission cable – short, recoater`s plain rotary bearings, recoater`s plain linear bearing,
- damages, abnormalities or malfunction caused by dismantling, alterations, tuning or other changes of product by a client or any third party made without a written consent of Sinterit,
- damages, abnormalities or malfunction caused by or related to use of consumables other than those being supplied by Sinterit,
- damages, abnormalities or malfunction caused by or related to use of product against instructions/manuals or safety regulations,
- damages, abnormalities or malfunction caused by incompatibility of client software and Sinterit software or for any malware,
- damages or abnormalities Sinterit is not liable for, according to the applicable law,
- damages exceeding the price paid by the client,
- costs incurred by the client in connection with conclusion of the product sale agreement as well as storage and/or insurance of products,
- damages of property caused by the defect of the product,
- loss of profits,
- incidental, indirect, consequential damages.

The abovementioned exclusions of warranty apply as well to any other liability of Sinterit, to the widest extent permitted by the applicable law.

Terms of liability of sellers others than Sinterit as distributor or resellers shall be regulated by them in separate documents.

19. Packaging / repackaging guide



Attention!

Sinterit Lisa Printer is a fragile device and must be protected against damage during transport.

Recommended packaging technique in case the product has to be returned or repaired.



A. Preparing the device:

1. Remove the key and press the safety button. Remove the power cord.
2. Remove the laser protection glass and wrap it in a bubble wrap. Put the glass in a box outside the device.
3. Place the bubble wrap in the upper flap to secure the laser module and close the printer's lid.
4. Manually move the Recoater to the center of the print chamber and secure it with a bubble wrap (the foil should be on the Print Bed and Source Bed).
5. Be careful not to apply too much foil, and not to damage the infrared heaters in the flap when closing.
6. Close the device.



Attention!

Repack the product in the original manufacturer's packaging, complete with the inner cushioning material.

B. Packaging:

1. Place 6[cm] of filler material (wrinkled wrapping paper) at the base of the outer box or flight case before placing the Lisa Printer.
2. Place the printer in its original packaging - centered - then fill in the remaining space with the original filling - wrinkled wrapping paper.
3. **Make sure the printer sits straight and the flap is facing up!**
4. Close and seal the box.
5. Secure the package with straps so that it does not move on the pallet,
6. Seal the whole package by stretch.
7. Mark where the top of the device is located.
8. Mark the package as "fragile".



Attention!

If the product has been shipped on a pallet or in a flight case package, it should be returned in the same way.



C. Packaging if the original packaging is no longer available or damaged:

1. Wrap the Lisa Printer in multiple layers of bubble wrap so that a cushioning layer with at least 6[cm] of thickness protects the item,
2. Source a strong outer box which is at least 14[cm] larger than Sinterit Lisa Printer in all dimensions. This box should be strong enough to protect the printer. We suggest a dual-wall box,
3. Place 6[cm] of filler material (wrinkled wrapping paper or polystyrene foam) on the base of the outer box before placing the Sinterit Lisa Printer (wrapped in bubble wrap) inside,
4. **Make sure the printer sits straight and the flap facing up! ,**
5. Place the Lisa Printer inside the outer box or flight case - centered,
6. Fill (wrinkled wrapping paper or polystyrene foam) all available space for best results,
7. Close and seal the box by H-taping with pressure sensitive tape,
8. Secure the package with straps so that it does not move on the pallet,
9. Seal the whole package with stretch wrap,
10. Mark where the top of the device is,
11. Mark the package as "fragile".



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