



SINTERIT LISA

USER MANUAL

Version 1.2

TABLE OF CONTENTS

1) CONTENTS OF THE SINTERIT LISA PACK.....	4
2) INFORMATION ABOUT LEGAL REGULATIONS	5
3) DISCLAIMER	5
4) TRADEMARKS	6
5) SOFTWARE LICENSE AGREEMENT	6
6) TERMS OF WARRANTY	6
7) EXCLUSION OF WARRANTIES	7
8) MARKING TEXT CONVENTIONS USED IN DOCUMENT	8
9) DICTIONARY	9
10) DESCRIPTION OF THE CONSTRUCTION OF A PRINTER SINTERIT LISA	10
11) SPECIFICATIONS	13
12) TECHNICAL SUPPORT	15
13) IMPORTANT SAFEGUARDS AND WARNINGS	15
A) ENVIRONMENT AND THE PLACE OF INSTALLATION	15
B) POWER SUPPLY:	16
14) INFORMATION ON SUPPLIES	18
15) WORKING WITH THE POWDER.....	19
16) INSTALLING SINTERIT STUDIO	19
17) INITIAL STARTUP OF THE MACHINE AFTER DELIVERY	20
18) PRINTER'S CONNECTION WITH THE WI-FI NETWORK	23
19) (INITIAL) PRINTING USING SINTERIT LISA PRINTER:	24
5.A) PRINTING: AUTOMATED VERSION (RECOMMENDED)	25
5.B) PRINTING: MANUAL VERSION	28
20) INFORMATION AND ACTIVITIES WHILE PRINTING	30
21) FINISHING THE PRINT	31
22) CLEANING THE PRINTS	35
23) MAINTENANCE AND SERVICE OF THE SINTERIT PRINTER LISA	36
A) CLEANING THE SURFACE UNDER THE BEDS	37
B) REPLACEMENT OF THE GLASS PROTECTING LASER	37
C) REPLACEMENT OF INFRARED HEATING (...).	37
D) CHANGING THE RECOATER WIRE	38
24) FLEXA BLACK–GENERAL INFORMATION AND A DESCRIPTION OF THE WORK PROCESSES FOR THE TPU POWDER	39
A) GENERAL INFORMATION.....	39
B) FLEXA BLACK IN SINTERIT STUDIO	40
C) FLEXA BLACK IN THE SINTERIT LISA PRINTER	41
CLEANING THE MACHINE AND CHANGING THE POWDER (IMPORTANT!!!):.....	41
YOUR NOTES:	42

1) CONTENTS OF THE SINTERIT LISA PACK

- The SINTERIT LISA 3D printer;
- The SINTERIT STUDIO Dedicated software on an external carrier (Pendrive);
- Manual: for the Sinterit Lisa printer, for the Sinterit Studio software, as well as positioning PA12 Smooth prints;
- A safety package for the additional equipment;
- 4 kg of black polyamide powder (PA12 BLACK) in two 2kg containers:
 - container 1 FRESH POWDER;
 - container 2 PRINT READY POWDER;
- 1x safety glasses;
- 2x safety dust mask;
- 1x safety gloves;
- 1x plate for carrying the prints (two parts included in the set);
- 1x form for cooling the prints;
- 1x spatula for taking out the powder;
- 1x set of large brushes, 2 pieces (with nylon bristle, with bronze bristle);
- 1x set of small brushes, 3 pieces (with nylon bristle, with metal bristle, with bronze bristle);
- 1x paintbrush;
- 2x metal cleaner for the details (a small chisel and a sound);
- 1x set of plastic spatulas;
- 1x metal sieve;
- 1x plastic scoop for measuring the powder in ml;
- 1x 100ml of salicylic alcohol (only within the EU);
- 1x protective glass for the laser, to be installed;
- 1x safety key;
- 1x stylus for the display;
- 1x power cord.

2) INFORMATION ABOUT LEGAL REGULATIONS



No part of this publication may be reproduced, stored in any information retrieval system, or transmitted in any form or by any means (electronically, mechanically, photocopied, recorded, or otherwise) without the written consent of Sinterit Sp. z o.o.

There will be no liability for patent infringement in connection with the use of information contained in this manual. There will be no liability for damage resulting from the use of the information contained in this manual.

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.

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 good condition.

The information contained in this document is intended for the use only with the product made by Sinterit Sp. z o.o. and called Sinterit Lisa. The company Sinterit Sp. z o.o. is not responsible for any use of this information in relation to other products.

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

3) DISCLAIMER



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

Sinterit Sp. z o.o., nor any of the parties involved in the creation, production or delivery shall not be liable to the purchaser of this product or third parties for damages, losses, costs or expenses resulting from accident, misuse or use of a product not according to specifications or unauthorized modifications, repairs or alterations to this product, or failure to observe the manual Sinterit Sp. z o.o. on operating and maintenance.

The Sinterit Sp. z o.o. company shall not be liable for defects in the printer's firmware SINTERIT LISA.

The Sinterit Sp. z o.o. company is not responsible for any damage or problems arising from the use of other supplies than those designated by Sinterit Sp. z o.o. as dedicated.

4) TRADEMARKS



SINTERIT product name and LISA SINTERIT logo are registered trademarks of Sinterit Sp. z o.o.

All other brand names, products and trademarks are the property of their respective companies.

5) SOFTWARE LICENSE AGREEMENT



The company Sinterit Sp. z o.o grants the Buyer a license to use the control software SINTERIT STUDIO simultaneously on up to three PCs, which are on the use of the Buyer, designed for use with the supplied SINTERIT LISA printer. Sinterit Sp. z o.o. includes a 24 month period update SINTERIT STUDIO with the selling price of the printer.

6) TERMS OF WARRANTY



1. Sinterit Sp. z o.o. company hereinafter referred to as the Seller, guarantees to the Buyer the correct functioning of SINTERIT LISA printer for 2000 hours or 12 months (whichever comes first) on the basis described below.
2. The remaining liability of the Seller, including the warranty for defects in the product is
3. The device should be used in accordance with the manual provided.
4. The holder of the original, properly completed Warranty Card or the proof of purchase (invoice, receipt) of the Printer is entitled to guarantee.
5. Requirements for warranty coverage are as follows:
 - a. statement of claim in the written form within the period of 14 days of failure occurrence and not using the printer from the discovery of the defect;
 - b. sending your application together with the data downloaded by the application supporting the printer with a copy of proof of purchase/Warranty Card;
 - c. Sinterit Sp. z o.o. determines the method of repair as follows:
 - commissioning a simple repair to the Buyer (sending the necessary parts and instructions);
 - sending the device at the expense of Sinterit Sp. z o.o. to the service indicated by Sinterit Sp. z o.o., the Buyer is responsible for the Printer's safe packing;
 - Printers exchange for a new one.
 - d. In the event of an error for reasons of misuse of the Printer, Sinterit Sp. z.o.o. surcharges the Buyer with the costs of repairs, parts, and transport of equipment.
 - e. Within 14 days of filing the complaint Seller shall notify the Buyer about the way it has been handled.
 - f. The warranty period shall be extended by the time repair.

6. The risk of accidental loss or damage to the printer from the time its release or dispatch to the Seller charges the Buyer.
7. In case the equipment sent for repair under warranty is unjustified, the Buyer shall be charged the costs of transport in both directions and inspection costs of the device according to the price list.
8. The buyer is obligated to make a copy of data stored in the Printer's memory. Seller is not responsible for any loss of Buyer's data during carrying out the service procedures.
9. Sinterit Sp. z o.o. reserves the right to change the terms of the warranty. The new warranty will not be applied retroactively to previously purchased products.

7) EXCLUSION OF WARRANTIES



1. The warranty does not cover the maintenance parts: replaceable infrared heaters, replaceable recoater's drive roller, exchangeable glass protecting laser.
2. The warranty does not cover printing powder.
3. The warranty applies only to the media on which the Software is recorded. It does not include the software provided by Sinterit Sp. z o.o.
4. The warranty does not include the right holder of the warranty to claim reimbursement of lost benefits due to defects of the device. Sinterit Sp. z o.o. is not responsible for damage to property caused by a defective product
5. The warranty also does not cover:
 - a. damages arising from chance events/unforeseeable circumstances (electrical fault, fire, inundation, flood, etc.);
 - b. mechanical, chemical fault and defects caused by them;
 - c. damage resulting from installation and operation the device under conditions or in a manner incompatible with the manufacturer's specifications, and used against safety regulations;
 - d. damage caused by the fault or by the user's lack of knowledge;
 - e. activities described in the manual, the holder of a guarantee is required to do on their own and at their own expense;
 - f. transport damage caused during moving the device to the service indicated by Sinterit Sp. z o.o., in particular, when for transporting non-original packaging without transport security was used;
 - g. damage arising from the use of other supplies than those recommended by Sinterit Sp. z o.o.;
 - h. damage and malfunctions resulting from repairs, alterations, fine-tuning or structural changes made without the written consent of Sinterit Sp. z o.o. or outside the service station indicated by the mentioned above company;
 - i. where it is found by the Sinterit Sp. z o.o. that the violation of the seals placed in the printer and components included has taken place or the incompleteness of the device.
 - j. malfunction caused by conflict or incompatibility between the installed applications and the impact of computer viruses.

8) MARKING TEXT CONVENTIONS USED IN 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.

	<p>WARNING!</p> <p>Warns that the initiation, omission of a specific procedure or inattention can cause physical injury or death to the user.</p>
	<p>ATTENTION!</p> <p>Announces that initiation or omission of a specific procedure can cause physical damage to the equipment.</p>
	<p>WARNING!</p> <p>The warning symbol indicates an inevitably dangerous situation which can result in death or serious injury, if not avoided. 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.</p>
	<p>ATTENTION!</p> <p>Warns of the possibility of electrical shock.</p>
	<p>CAUTION!</p> <p>Note, high temperature – do not touch. Excess heat dissipation can cause burns.</p>
	<p>CAUTION!</p> <p>Note the laser light. Looking into the laser beam can cause blindness and burn the skin.</p>
	<p>CAUTION!</p> <p>Beware of moving parts which can crush hands.</p>
	<p>STOP!</p> <p>Action prohibited.</p>

	<p>IMPORTANT!</p> <p>Getting to know with the information that is needed to perform a specific task.</p>
	<p>ATTENTION!</p> <p>It is necessary to wear protective gloves. Mandatory action when working with powder.</p>
	<p>ATTENTION!</p> <p>It is necessary to wear protective face mask. Mandatory action when working with powder.</p>
	<p>IMPORTANT!</p> <p>You must read the instructions before taking action.</p>

9) DICTIONARY



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

1. **SINTERIT LISA PRINTER (3D printer, printer, machine, device, product)** – a printer in the additive manufacturing technology (3D) of an LS (laser sintering) type. A device dedicated for professional and quick manufacturing of spatial prototypes or creating three dimensional models of objects.
2. **SINTERIT STUDIO** – a control and support software for the SINTERIT LISA printer.
3. **PA12 SMOOTH (PA12, polyamide powder, nylon powder, PA powder, PA12 powder, powder)** – a polyamide powder with the granulation at 20 – 100 micrometers, black, with its properties in accordance with the capabilities of the SINTERIT LISA printer.
4. **FLEXA BLACK** – a material from the group of Thermoplastic Polyurethane Elastomer (TPU). Elastic and flexible, and at the same time hard and resistant to inter alia chemical agents. Similar in its properties to gum. Possesses good formability properties (returns to its initial position). Suppresses hits and shocks well. Not as resistant to temperature as PA 12.
5. **RECOATER** – a recoater in the form of a roller, moving on a guide bar and a wire. Used to transfer the powder from the SOURCE BED to the PRINT BED during the printing.
6. **SOURCE BED (Source, Feed Bed)** – a chamber for the new, unsintered powder.
7. **PRINT BED** – a chamber in which the sintering of the powder takes place in layers, creating the print.
8. **OVERFLOW BIN** – the overflow bin chamber is used to collect the excess unsintered powder, transferred from the SOURCE BED to the PRINT BED using the RECOATER.
9. **FRESH POWDER PA12 SMOOTH (container number 1, Fresh Powder)** – fresh powder, which needs to be mixed with the PRINT READY POWDER PA12 SMOOTH

in correct proportions. The sole FRESH POWDER is not suitable for printing (the print may not be correct).

- 10. **PRINT READY POWDER** (*container number 2, Fresh Powder*) – powder ready to be used with the printer.

10) DESCRIPTION OF THE CONSTRUCTION OF A PRINTER SINTERIT LISA 

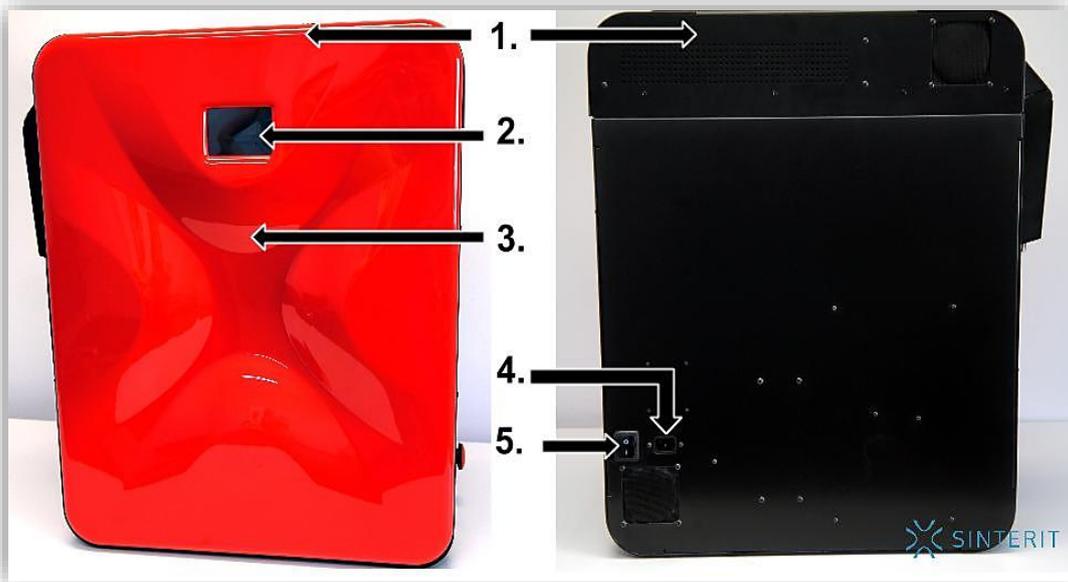


Image 1. View of the printer from the front and the rear.

1.	Printer lid
2.	LCD panel/Camera view
3.	Front panel
4.	Power
5.	Power button

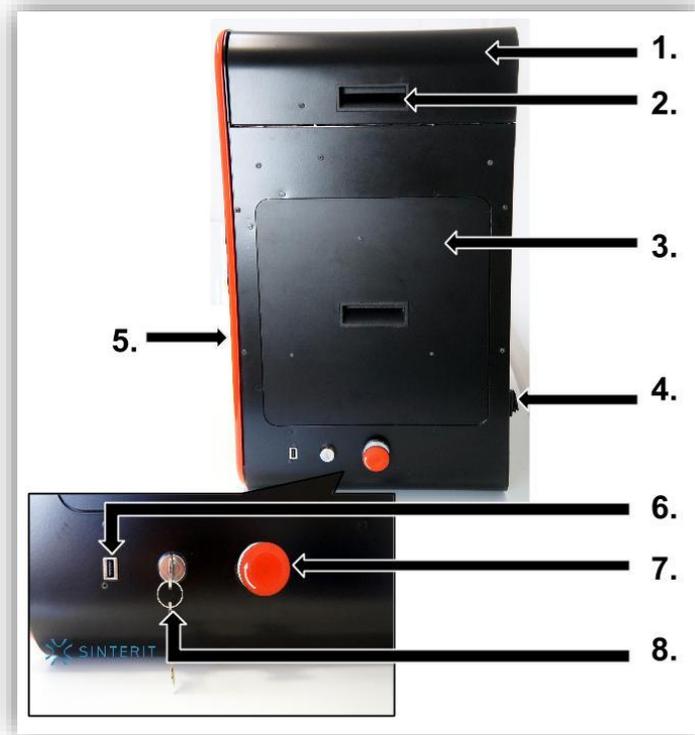


Image 2. The view on the right side of the printer.

1.	Printer lid
2.	The handle for opening lid
3.	Overflow Bin
4.	Power button

5.	Front panel
6.	USB port
7.	Safety button
8.	Safety key switch and keys

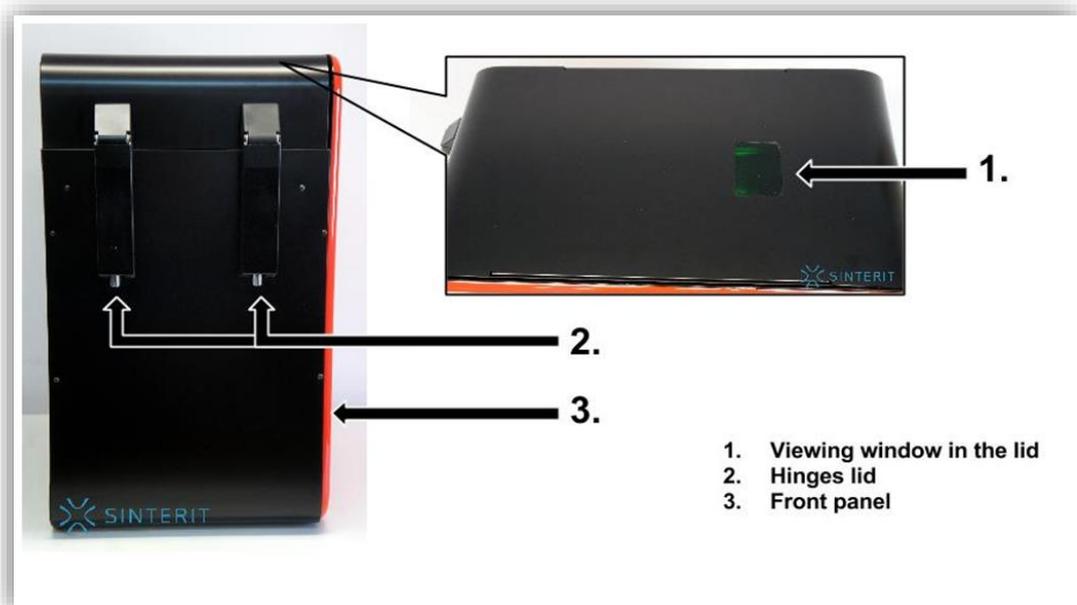


Image 3. View of the printer on the left side and from the top.

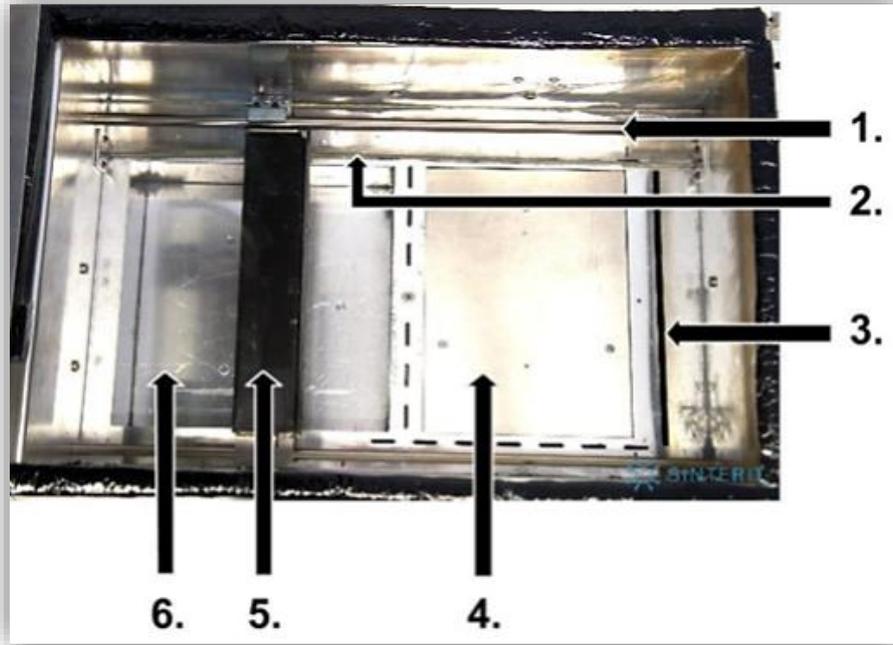


Image 4. Inside view the beds in the printer.

1.	The guide of the Recoater
2.	The cable of the Recoater
3.	The gap of the Overflow Bin

4.	Print Bed
5.	Recoater
6.	Source Bed

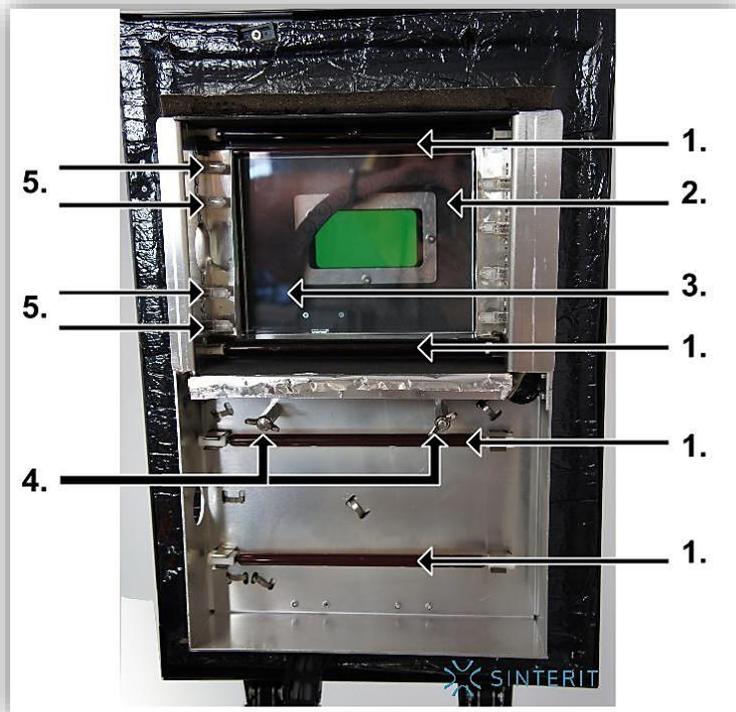


Image 5. The inner side of the printer lid.

1.	Infrared heaters I (long, red)
2.	Glass protecting the laser
3.	Laser

4.	The two wing bolts bonding the heaters unit
5.	Infrared heaters II (short, white) 4 pieces on each side of the protective glass



Image 6. View of the inside of the printer (the location of pyrometers and camera).

11) SPECIFICATIONS



1. General technical data	
Size of device (mm/in)	650x550x400 // 25,60x21,65x15,75
Size of the package (mm/im)	800x600x900 // 31,50x23,62x35,43
Unit weight (kg/lb)	35 kg // 77,16 lb
Package weight	Up to 60kg // up to 132,3 lb
2. Parameters	
Printing technology	Laser sintering (LS)
The size of the working chamber (mm/in)	150x200x150 mm // 5,91x7,87x5,91 in
max. Print working area	FLEXA BLACK: 110x130x150 mm //

(X/Y/Z)(mm/in) ²	4,33x5,90x5,12 in PA12 SMOOTH: 90x110x130 // 3,5x4,3x5,1 in
min. print wall thickness	0,5 mm // 0,02 in
Recommended print wall thickness XY	0,8 mm // 0,3 in
The layer height Z (min - max)	0,075-0,175mm // 0,003-0,007 in // 3,0-6,9 mils
Type of material	poliamid 12 (PA12 black), TPU.
Powder diameter ²	20-100 µm
Max. working temperaturę (inside the machine)	Up to 190° C // 374° F
Storage temperaturę powder (min - max)	10-40° C // 50-104° F
Humidity	10-90% without condensation
3. Power	
Power	Single phase, 220-240V AC, 50Hz, 7A // 100-130V AC, 60Hz, 15A
Maximum power consumption	2 kW / 1,5 kW
Laser safety class	class 1
Type of laser	class 4, infrared LED 5W; λ=808 nm;
LCD panel	resistive, color, 4"
4. Safety	
Certificates	CE (class A), FCC (class A)
Fire protection class	Class II
5. Software	
Control software/firmware	Sinterit Studio 2016 compatibile with Windows
Operated file formats	STL, OBJ, 3DS,FBX
External communication	USB, WiFi ¹
Additional equipment	Build-in camera
¹ – Available in the future ² – It depends on the type of powder	

12) 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 or by contacting: contact@sinterit.com

The list of distributors and technical support in specific countries can be found at www.sinterit.com/where-to-buy.

13) IMPORTANT SAFEGUARDS AND WARNINGS

To ensure safe use of the SINTERIT LISA product, 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.

	<p>WARNING!</p> <ul style="list-style-type: none"> • 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 THE PLACE OF INSTALLATION

- The printer SINTERIT LISA should be placed at room temperature.
- The room must be well ventilated adequate 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 50 cm (20 in).
- The product will not work properly if it is set at an angle.

	<p>ATTENTION!</p> <p><u>Do not place</u> or store the product:</p> <ul style="list-style-type: none"> ➤ outdoors; ➤ in areas with high dust; ➤ in places subject to shocks, vibrations, high temperature and/or humidity, and extreme changes in temperature and humidity; ➤ near water, or heat sources;
---	--

	<ul style="list-style-type: none"> ➤ near inflammable and volatile substances, concentrated acids or corrosive vapors; ➤ in places easily accessible to children and animals.
--	---

	<p>ATTENTION!</p> <ul style="list-style-type: none"> ➤ Never use wood, equipment with wooden elements and flammable substances at work with the printer. ➤ The minimum distance between the printer and wooden parts is 20 cm. ➤ The printer emits large amounts of heat, and therefore it is prohibited to put it on the wood and wood 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.

	<p>WARNING!</p> <p>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 a fire or electric shock.</p>
---	---

	<p>ATTENTION!</p> <p>Never disassemble, modify or repair the power cord, plug, devices inside the printer, except as described in the product's manual.</p>
---	--

- The product should be placed near a wall outlet, which can be easily unplugged.
- It is recommended to use the UPS units that in the case of a momentary power failure printing process is not interrupted.
- 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.

	<p>ATTENTION!</p> <ul style="list-style-type: none"> ➤ <u>Do not</u> place objects on the power wires. ➤ <u>Do not</u> place power cords in path where people will have to walk or run. ➤ <u>Pay special attention</u> 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 machine.
---	--

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

- The power cord or plug is damaged,
- some liquid got into the product,
- the product has been dropped or the case damaged;
- 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.

	<p>ATTENTION!</p> <p><u>Do not:</u></p> <ul style="list-style-type: none"> ➤ 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 live parts.
---	--

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

14) INFORMATION ON SUPPLIES



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).

	<p>WARNING!</p> <p>When working with a polyamide powder, avoid inhalation or swallowing and contact with skin and eyes.</p> <ul style="list-style-type: none"> ➤ If the PA 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 a PA powder, rinse your mouth with water and drink 1-3 glasses of water to dilute stomach contents. If necessary, contact your doctor. ➤ If the PA powder gets in your eyes, rinse them thoroughly with water. In case of persisting eye irritation, contact a physician. ➤ When the PA 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 material may be emitted in quantities 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.

	<p>WARNING!</p> <ul style="list-style-type: none"> ➤ Do not attempt to burn/melt polyamide powder. The resulting sparks and hot mass, the powder is converted into can cause severe burns. ➤ Keep the polyamide powder away from fire.
---	---

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

15) WORKING WITH THE POWDER

1. Always wear protective clothing (glasses, mask, gloves) when working with PA12 and other used with the Sinterit Lisa printer.



2. For the first use of the Sinterit Lisa printer use only the container number 2 (PRINT READY POWDER) if you wish to print using precisely this material.
3. 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 inside of the printer. Not acting according to the message may result in the following print being incorrect.
4. 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 in the container number 2 for the PRINT READY POWDER.

16) INSTALLING SINTERIT STUDIO

1. Connect the Pendrive included in the set, to the computer USB port.
2. Locate the SINTERIT STUDIO 2016 folder.
3. Click 2 times on the SinteritStudioSetup.exe icon.
4. Select the language for the installation.
5. Act according to the messages on the installation screen***.
6. After the installation, the software is ready to be used.

*** Software compatible with Windows 7 and higher.

	<p>IMPORTANT!</p> <p>Be sure to carefully read the license agreements and accept them.</p>
---	---

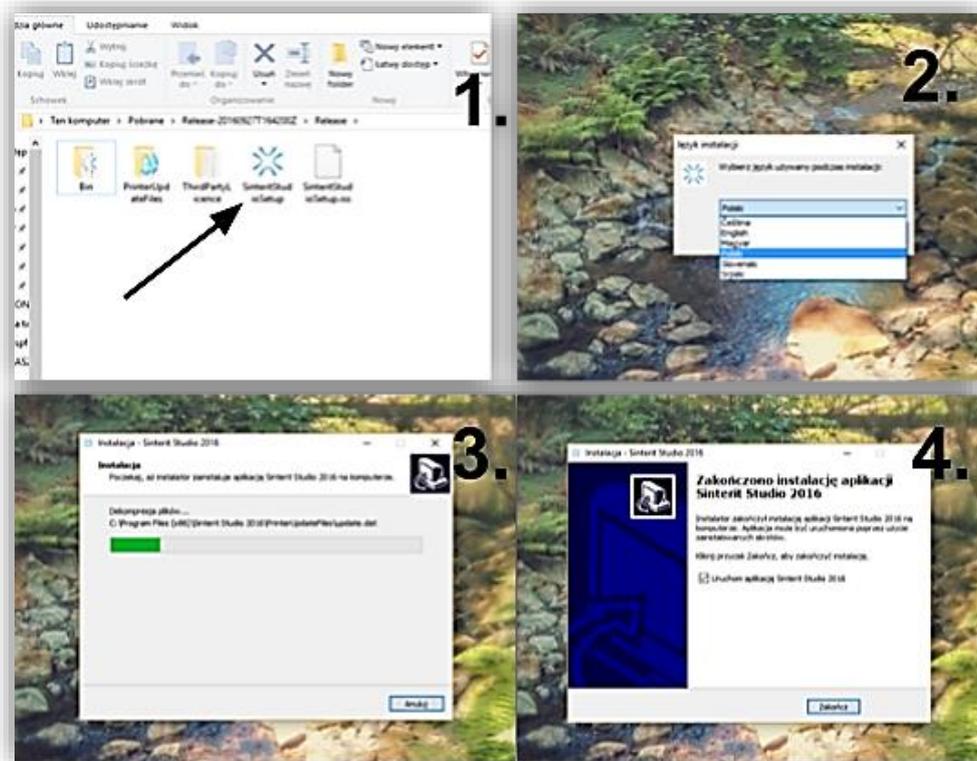


Image 7. Installing Sinterit Studio.

17) INITIAL STARTUP OF THE MACHINE AFTER DELIVERY

1. Take the printer out of the package, remembering to carefully discard the protections from the foil and paper.
2. Place on a stable and hard surface (it is recommended for it to be the target location of the printer).
3. Connect the power cord to the printer.
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 machine will start.



Image 8. On/Off key positions.

7. In order to open the printer release the magnetic lock of the lid (**PRINT//UNLOCK LID**). The lock releases the blockade for 10 seconds.

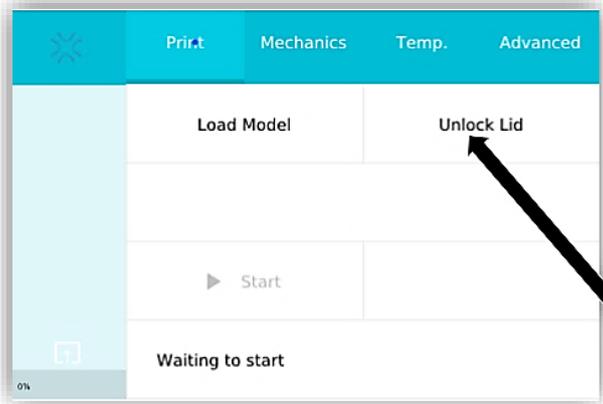


Image 9. Releasing the blockade.

8. Softly press and then lightly lift the printer lid.
9. Turn the power off, and disconnect the power cord from the socket.
10. Carefully discard the transport protections located on the inside, also those surrounding the laser.
11. Install the glass protecting the laser.
 - a. Put on the safety gloves in order to protect yourself from injuring the hand against the edge of the heating module.
 - b. Holding the heating module (see image 10), unscrew the two wing bolts holding the module with the lid.
 - c. Carefully lower the heating module to the lower part of the printer.



Image 10. The correct manner of holding the heating module during the unscrewing.

- d. Take out the laser protection glass out of the box (from the additional equipment package). Rub the surface carefully with a paper/microfiber towel (pay attention if any fibers are left on the surface).
- e. Carefully lay it on the recess, with the longer side (see image 11).

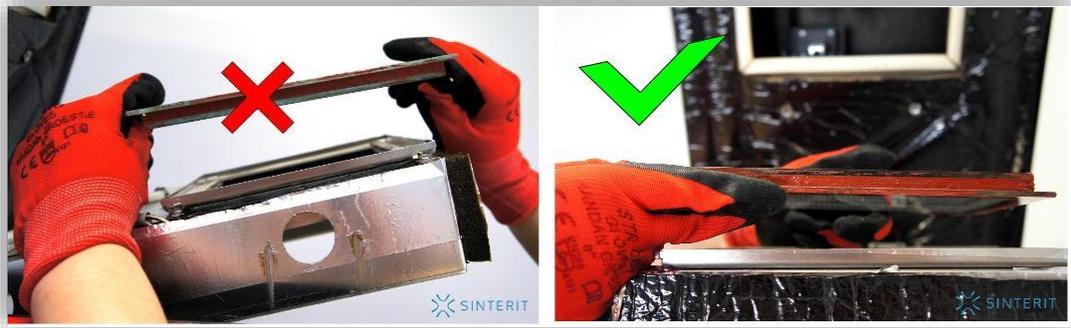


Image 11. Incorrect and correct placement of the glass protecting the laser, on the heater module.

- f. Lift the heater module to the lid. Holding both pieces, connect using the wing bolts.
 - g. Clean any finger marks or stains, using a towel soaked in salicylic alcohol.
12. Check (wearing gloves or through paper – see image 12) whether the heaters are stable in their sockets. If there is any dust/powder on them, blow it off with air.
 13. After carrying out all of these steps, the printer may once again be connected to the power source and prepared for work.

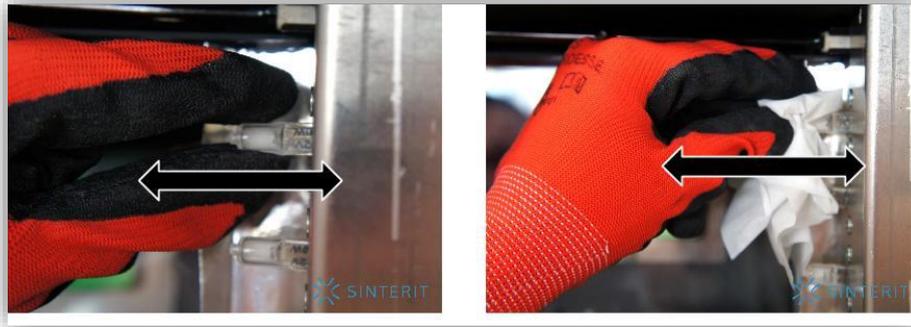


Image 12. Methods of verifying the setting of the heaters.

	<p>ATTENTION!</p>
<p>Remember, do not touch the heating bulbs with your fingers or greasy objects (eg. a dirty cloth).</p>	
<p>Dirt and grease may cause local overheating and burn the heaters or explosion during printing.</p>	

18) PRINTER'S CONNECTION WITH THE WI-FI NETWORK

1. On the Printer's touch screen, select **ADVANCED//SELECT WI-FI**.
2. Find the network you want to connect to and click on the name.
3. Enter your password if necessary and press **OK**.
4. Next to the SELECT WI-FI you see the combined network.

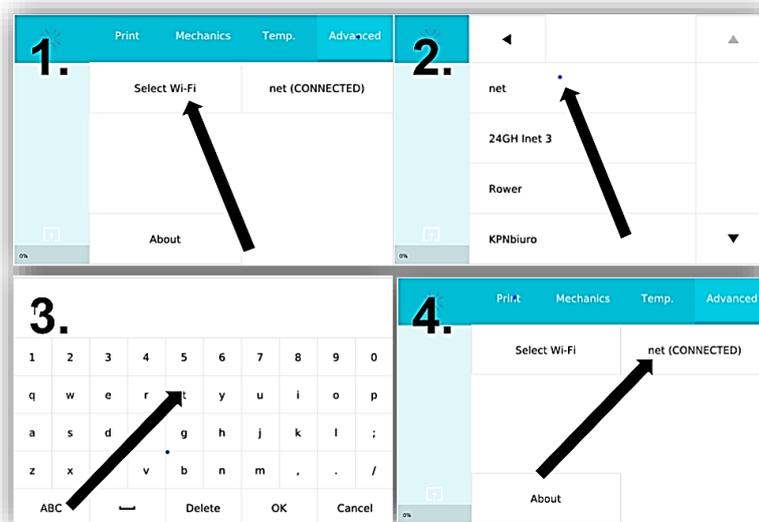


Image 13. Connect to Wi-Fi.

19) (INITIAL) PRINTING USING SINTERIT LISA

PRINTER: 

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

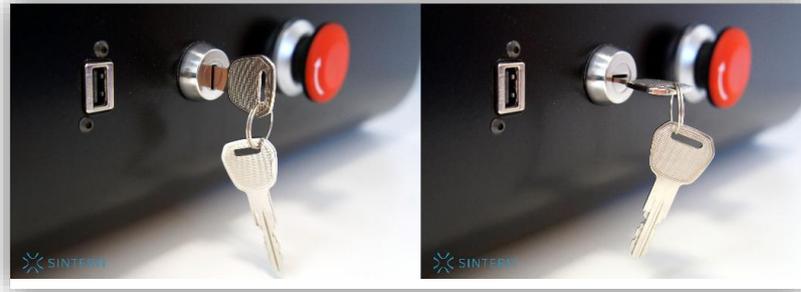


Image 14. On/Off key position.



WARNING!

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

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

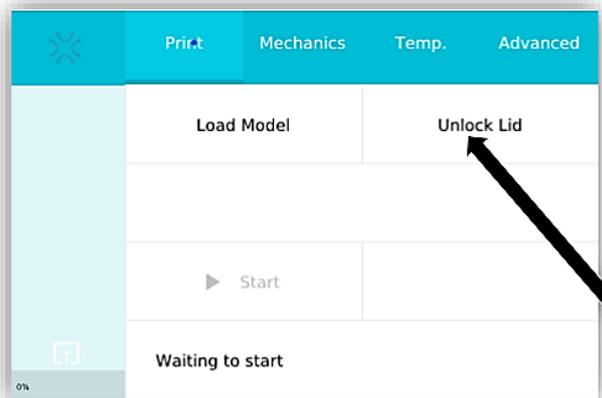


Image 15. Releasing the blockade from the lock.

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, between the BEDs).

5. The following stages may be carried out in two ways: manually and automatically (recommended). Both processes have been described below in two subchapters.

5.A) PRINTING: AUTOMATED VERSION (RECOMMENDED)

1. Load the file for printing:
 - a. Save the file prepared using the SINTERIT STUDIO, to a USB carrier (Pendrive commended).
 - 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 may take a few minutes (depending on the file size)
 - d. In order to load a file which already is in the memory of the printer, select: **PRINT// RECENT MODELS// file name**.

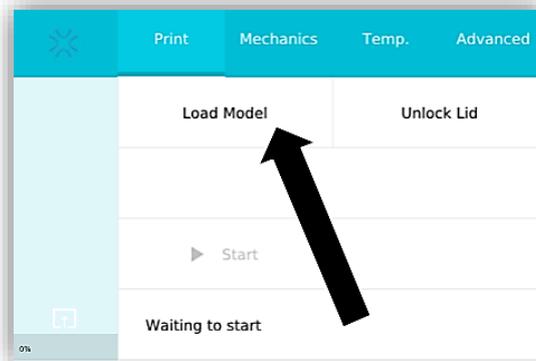


Image. 1. Loading file for printing.

	<p>WARNING!</p> <p>Carefully read all of the messages displayed on the screen when preparing the model for printing. Skipping the described operations may result in an incorrect printing or damaging the machine.</p>
---	--

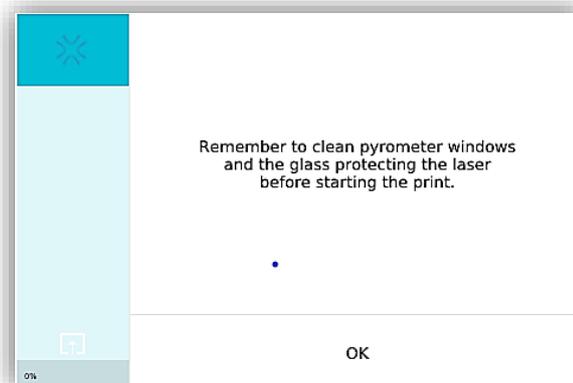


Image. 2. Example message – reminding to clean the pyrometer and camera windows.

2. After the model is loaded, a message concerning positioning the BEDs will be displayed. In order to initiate it, press **YES**. The process optimizes the usage of the powder required for the printing. During this operation, both BEDs are lowered to the bottom in order to then set the height in accordance with the currently selected model.

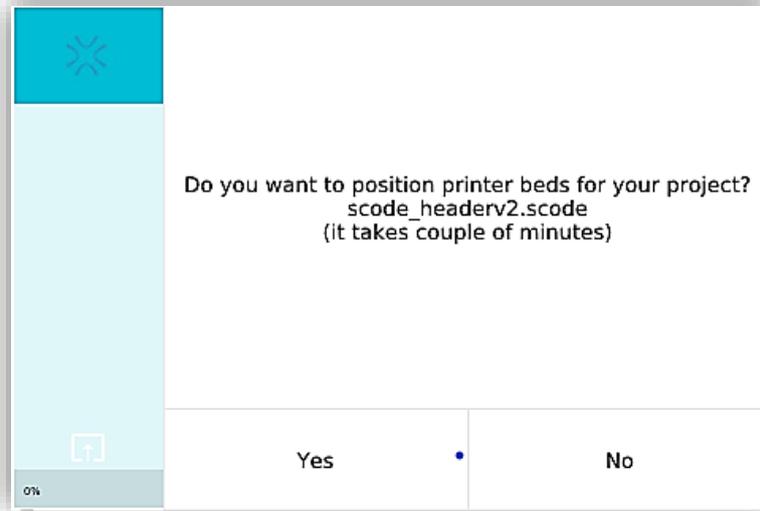


Image. 3. Message/question concerning positioning the beds.

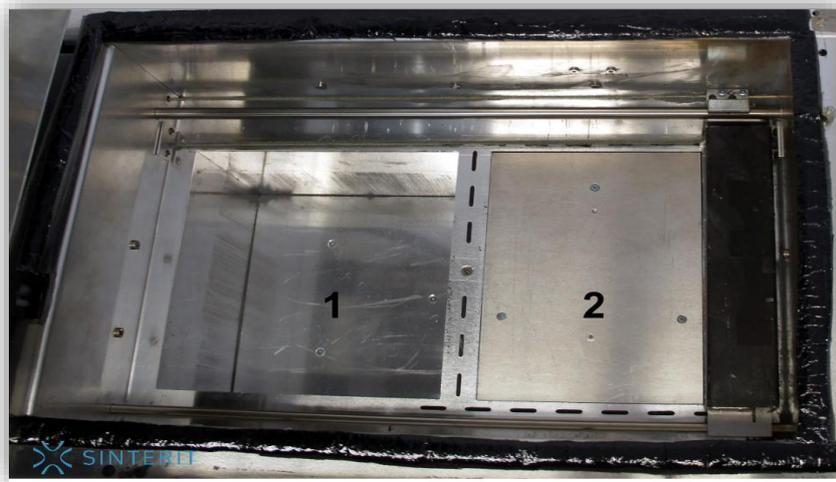


Image. 4. The positioned beds, ready to be filled with powder and the "0" position for the recoater.

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



4. Add the PA12 powder from the container number 2 (PRINT READY POWDER) to the SOURCE BED (number 1 in the image above). 6l of powder maximum. Even out the surface and press gently. Act carefully in order for the powder not to go into the air (it is recommended to use a spatula/scoop 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 any excess powder from the area around the BEDs, the guide bar and wire of the recoater, using a paintbrush.
7. Gently blow the infrared heaters (white and green) with air.
8. Use an alcohol wipe to carefully clean the vision windows of the camera and pyrometers, as well as the glass protecting the laser.

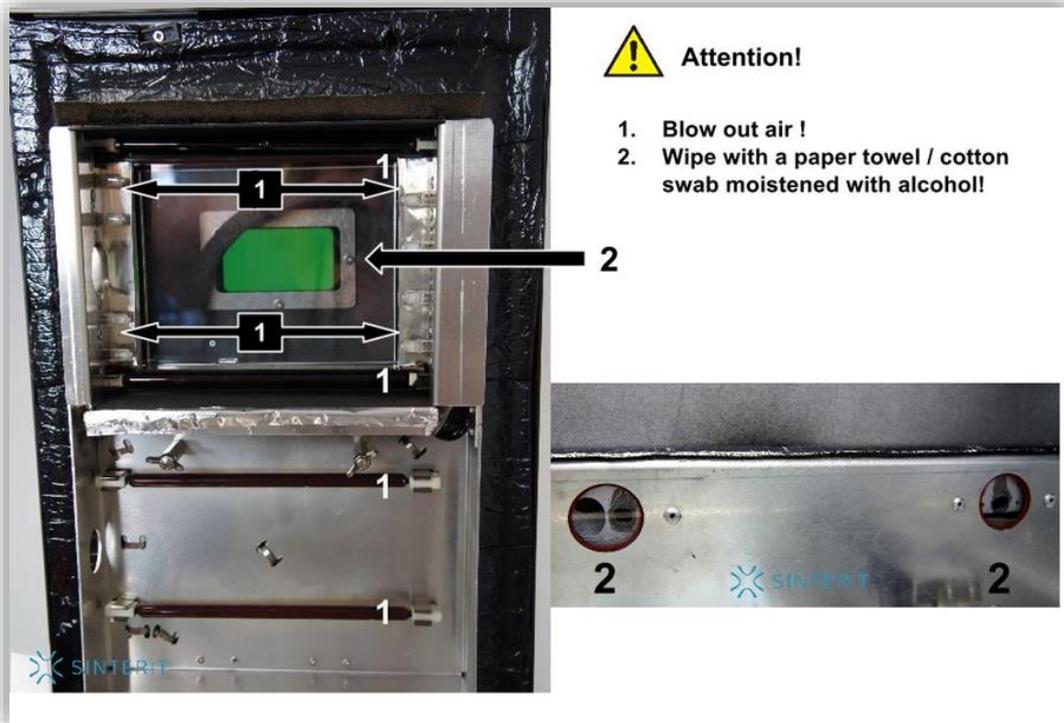


Image. 5. Cleaning particular elements of the printer before printing.

9. 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 lasts until the recoater processes 25 layers of powder.
10. The operation may be ended quicker: when the powder covers the surface of the PRINT BED we can press **STOP LEVELING**.



IMPORTANT!

Remember: The right side of the printed (above the OVERFLOW BIN) is the “0” position for the RECOATER, that is why it possible for it to move above the BEDs despite pressing the STOP LEVELING button.

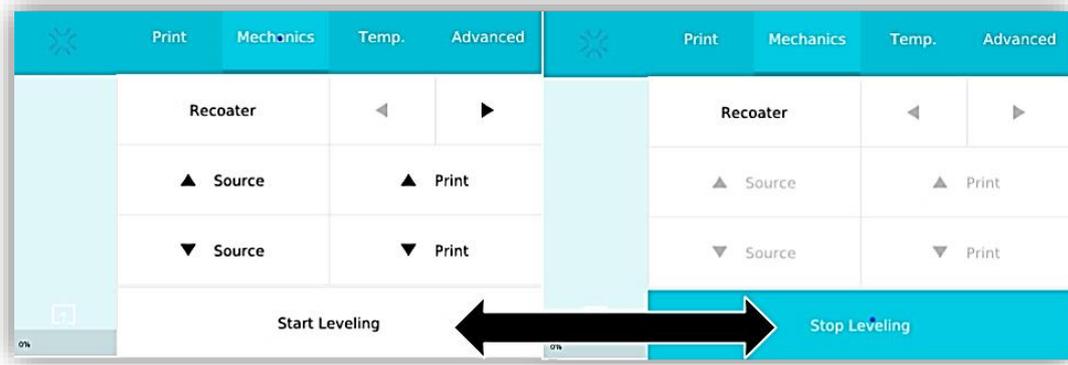


Image. 6. The Start/Stop Leveling button for creating the first layers.

11. After covering and leveling the layers of the powder in the BEDs, close the lid and press ► **START** in the **PRINT** tab.

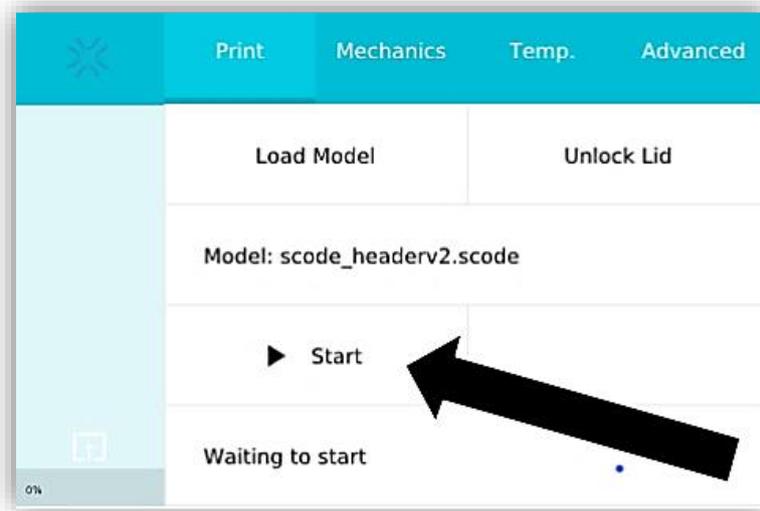


Image. 7. The Start button, initiating printing with the Sinterit Lisa.

5.B) PRINRING: MANUAL VERSION

1. Load the file for printing:
 - a. Save the file prepared using the SINTERIT STUDIO, to a USB carrier (Pendrive commended).
 - b. Connect the carrier into 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 may take a few of minutes (depending on the file size).
 - d. In order to load a file which already is in the memory of the printer, select: **PRINT// RECENT MODELS// file name**.

	<p>WARNING!</p> <p>Carefully read all of the messages displayed on the screen when preparing the model for printing. Skipping the described operations may result in an incorrect printing or damaging the machine.</p>
---	--

- 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 (inter alia the height of the powder in the Feed Bed, volume of the model, etc.).
- After lowering the SOURCE BED to the selected height (**MECHANICS//SOURCE/▼**) move the RECOATER as far to the right as possible (**MECHANICS//RECOATER//▶**).

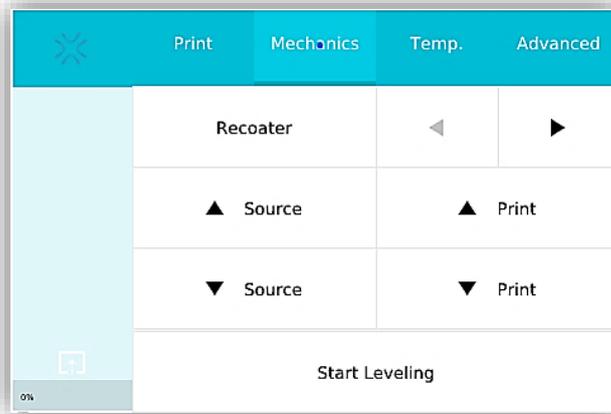


Image. 8. The image of the Mechanics tab and direction arrows for the BEDs and the recoater.

	<p>WARNING!</p> <p>Do not move the RECOATER manually. It is allowed only using the electronic control on the monitor.</p>
---	--

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



- Add the PA12 powder from the container number 2 (PRINT READY POWDER) to the SOURCE BED (6l of powder maximum). Even out the surface and press gently. Act carefully in order for the powder not to go into the air (it is recommended to use a spatula/scoop 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.
- Clean any excess powder from the area around the BEDs, the guide bar and wire of the recoater, using a paintbrush.

8. Gently blow the infrared heaters (white and green) with air.
9. Use an alcohol wipe to carefully clean the vision windows of the camera and pyrometers, as well as the glass protecting the laser.
10. Move the RECOATER as far to the left as possible (**MECHANICS//RECOATER//◀**).
11. Check whether the PRINT BED is leveled in reference to the case (preparing initial layers). If necessary press **MECHANICS//PRINT//▲** to level out.
12. Lift the SOURCE to about 2mm (**MECHANICS//SOURCE ▲**).
13. Move the RECOATER as far right as possible (**MECHANICS//RECOATER//▶**). It will transfer the powder to the PRINT BED, slowly covering the surface.
14. Move the RECOATER as far left as possible (**MECHANICS//RECOATER//◀**).
15. Repeat points 12-14 until the powder covers the entire surface of the PRINT BED.
16. After covering and leveling the layers of powder in the BEDs, close the lid and press **▶START** in the **PRINT** tab.

20) INFORMATION AND ACTIVITIES WHILE PRINTING

1. There is the status of the print on the main screen (left side of the screen), warming and cooling (tab TEMP, see image 24), the remaining time of laser work.
2. By clicking on the SINTERIT logo on the screen  (upper left corner, see image 24) we go to review mode of the camera. Review time is 10 seconds.

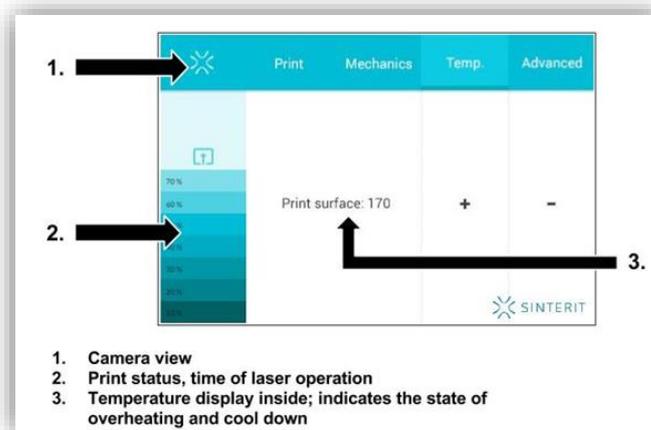


Image. 9. The main screen during printing.

3. If during the printing, in the camera or the top vision window, visible problems appear with the print, you can reduce / increase the temperature (TEMP // +/-).
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.

	<p>WARNING!</p> <p>If during the printing, smoke, irritating smell, or other alarming circumstances take place, press the safety button. It will immediately cut the power to the printer. However, remember that it is impossible to open the printer, until the temperature on the inside is above 49°C.</p>
---	---

21) FINISHING THE PRINT

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



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

	<p>IMPORTANT!</p> <p>The blockade of the device, works until the internal temperature is above 49°C.</p> <p>There is no possibility to open the lid before the temperature drops.</p> <p>Remember that the print inside the printer may still be hot, despite the fact that the printer has cooled down!</p>
---	---

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.
4. Softly press the lid and then lift it by pulling up.
5. Move the RECOATER as far to the left as possible (**MECHANICS//RECOATER//◀**). Pay attention whether anything is disrupting the RECOATER to smoothly move through the BEDs.

	<p>WARNING!</p> <p>Do not move the RECOATER manually. It is allowed only using the electronic control on the monitor.</p>
---	--

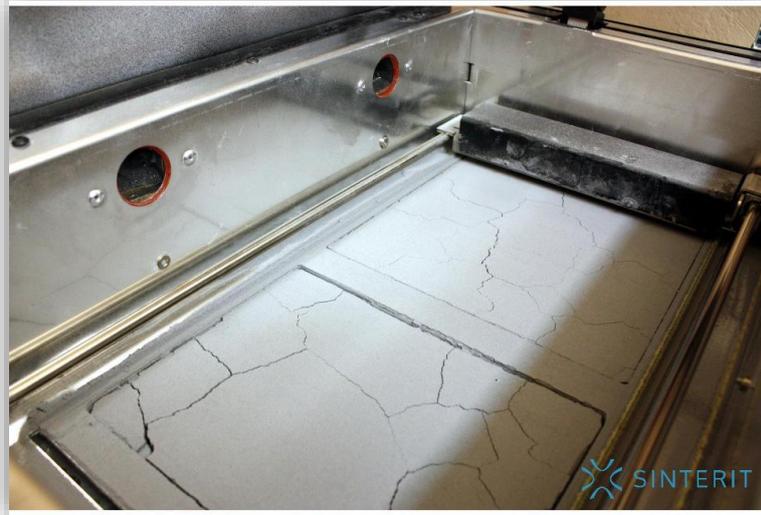


Image. 10. A correct condition of the powder after printing (visible cracks on the surfaces of both BEDs).

6. 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 1 (Fresh Powder).
7. Place the OVERFLOW BIN back in its place.



Image. 11. A correct way of taking out the OVERFLOW BIN and placing it back.

8. In order to take the print out of the PRINT BED keep pressing **MECHANICS//PRINT//▲** until the entire contents of the PRINT BED will be out in the form of solid cuboid (see image 27).

9. Using the provided spatula, carefully transfer the entire contents of the PRINT BED to the plate for carrying the pints, and transfer to the form included in the set. Leave the cuboid with the print to cool down, for at least one hour (see image 27).

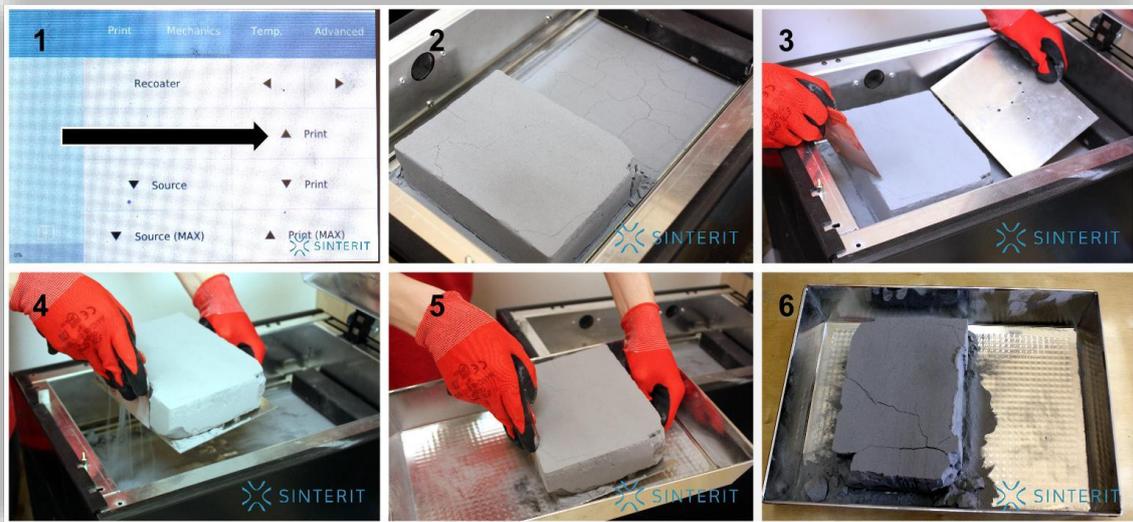


Image. 12. A correct way of taking out the prints from the PRINT BED (points 8-9)).

10. Precisely clean the PRINT BED from the remaining unsintered powder, including that surrounding the BEDs (it's best to move it to the OVERFLOW BIN and then transfer it to the form with the print, see image 28).
11. 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.

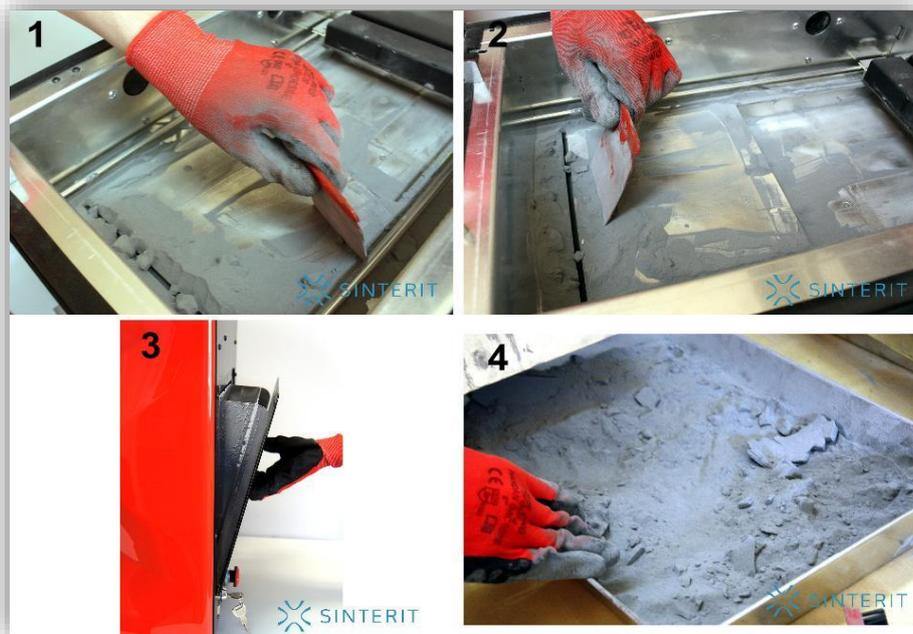


Image. 13. Removing the remaining powder from the inside.

	<p>STOP!</p> <p>Do not use any greases or oils for the guide bar of the RECOATER . This may cause damages to the machine.</p> <p>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).</p>
---	--

12. Check if all elements are where they should be (RECOATER, LASER).
13. Check the RECOATER wire (tension, condition).
14. Check the condition of the glass protecting the laser (it is recommended to clean the glass every three printings).
 - a. In order to clean the glass, unscrew the two wing bolts located on the right side of the glass, which also hold the heating module.
 - b. Lower the module and take the glass out of the frame of the case.

	<p>STOP!</p> <ul style="list-style-type: none"> ● Watch out for the elements of the heating system of the machine. ● Do not clean the glass under running water, also carry out the cleaning process outside the machine.
---	--

- c. Clean the glass using a wipe heavily soaked in salicylic alcohol; then (in order to clean the created smudges) spray the glass with a glass cleaning agent and clean using a soft cloth or a paper towel until dry.
 - d. Place the glass back inside the frame of the case and connect the heating module using the wing bolts.
15. Close the lid.

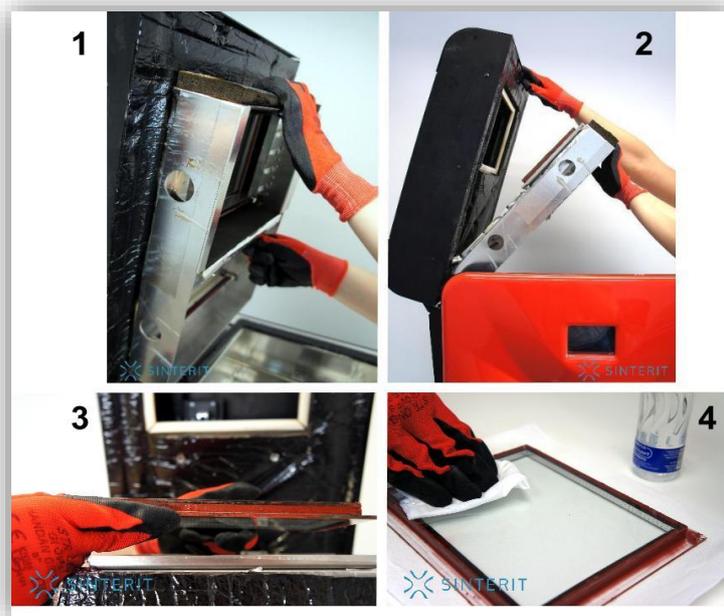


Image. 14. Cleaning the glass protecting the laser.

22) CLEANING THE PRINTS

1. 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 clean 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).

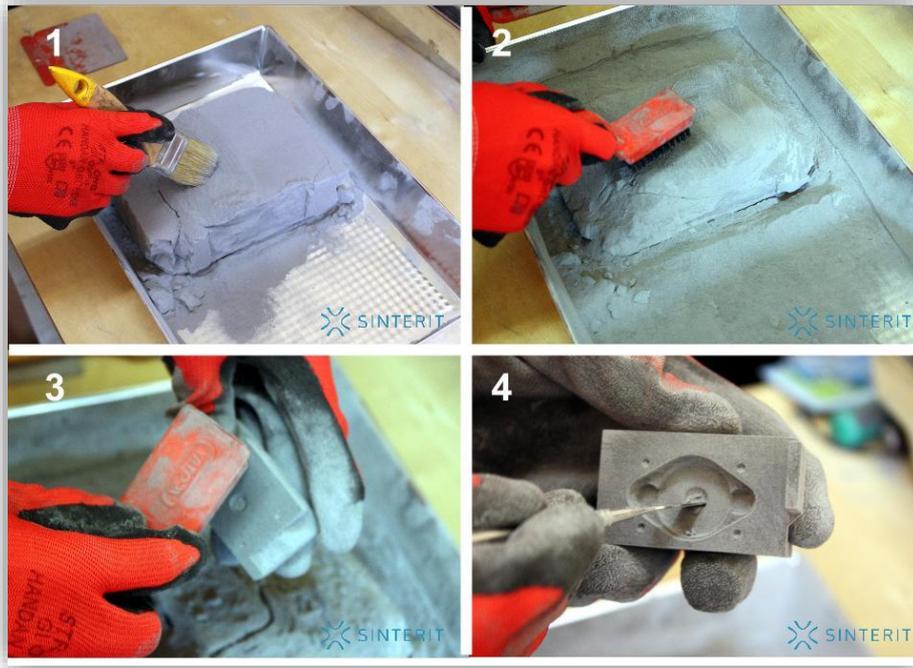


Image. 15. Cleaning the prints.



Image. 16. The method of mashing up the printing remains and preparing for the sifting.

3. After an initial cleaning, a sandblaster* or a brush with a gold/bronze bristle may be used to clean the details (included in the set).
4. Combine the unsintered powder from the PRINT BED with the powder remaining in the SOURCE and OVERFLOW BIN. Sift through a sieve (included in the set).

5. Add the amount of FRESH POWDER from container number 1, indicated by the SINTERIT STUDIO software, to the powder from the printer. Combine. If you don't intend to start printing, transfer the powder into the container number 2 for the PRINT READY POWDER.

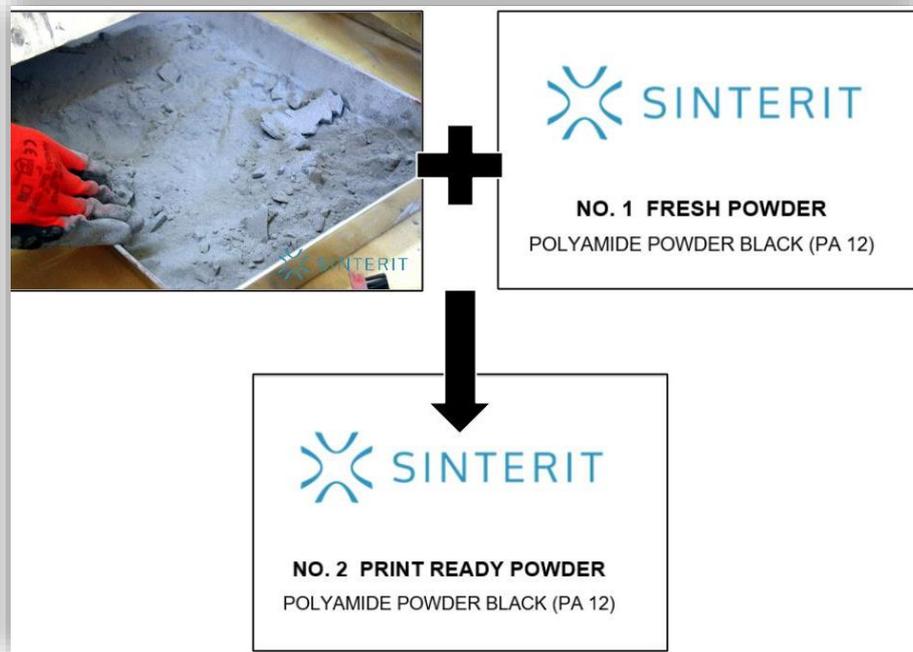


Image. 17. The method of combining powders after the printing.

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

* A sandblaster 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.

23) MAINTENANCE AND SERVICE OF THE SINTERIT PRINTER LISA

In order for the Printer to work efficiently and last a long time, ensure regular maintenance. The basic maintenance work:

- cleaning the protective glass of the pyrometers and the camera before each printing;
- check the status of the cord of the recoater;
- clean the glass protecting the laser – the cleaning is recommended after every third printing;
- clean the surface under the BEDS – the cleaning is recommended after every third printing.

A) CLEANING THE SURFACE UNDER THE BEDS

 CAUTION!	<p>Before cleaning, turn the printer off!</p> <p>Pay attention to the indications inside!</p> <ul style="list-style-type: none"> ➤ In order to clean the surface under the BEDS hold the front panel of the printer with both hands and lift it up (the fixing springs should raise and set the front panel in the correct position). ➤ Gently sweep the set powder off using a brush, minding the BEDS' engines. ➤ Close the printer in the same way to the opening.
 ATTENTION!	

B) REPLACEMENT OF THE GLASS PROTECTING LASER

1. Holding the heaters' unit, unscrew the two wing bolts that secure the module with the lid of the printer (see image 33. pt. 1).
2. Gently lower the heaters' unit on the lower part of the printer (see image 33. pt. 2).
3. Remove the glass protective laser out of the box. Wipe its surface gently with a paper towel / microfiber (see if there are no fibers left, see image 33. pt. 3).
4. Gently Lay the longer side in the niche (see image 33. pt. 4).
5. Raise the heaters unit to the lid. Holding the two parts, attach them together using the wing screws (see image 33. pkt. 5-6).
6. Wipe the glass from possible fingerprints and stains with a towel dampened in alcohol.



Image 18. Replacement of the glass protecting laser.

C) 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 machine is cold and switched off.
3. Gently grab the heater with your fingers and remove it parallel to its seat. Do not twist in any direction, it may cause damage to the heater's slot (see image 34)
4. In the same way, insert the new heater to the nest.

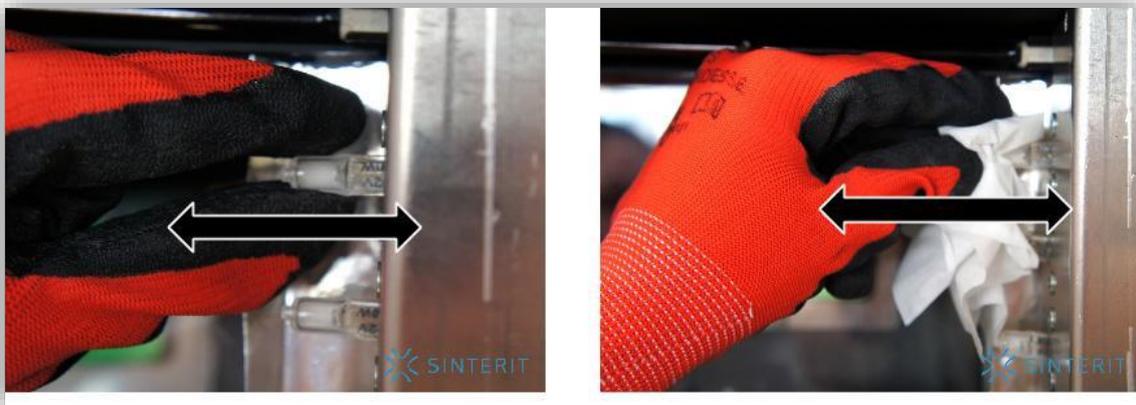


Image. 19. Correct removal of the old and installing the new infrared heaters.

D) CHANGING THE RECOATER WIRE

1. Clean the chambers of the printer.
 2. Move the Recoater left to the position of the SOURCE BED (**MECHANICS//RECOATER//◀**) in order to have access to the screws holding the RECOATER cover (on the right side of the recoater).
 3. Dismantle the cover (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 number 2 hex key unscrew the two screws (M3x8);
 - c. Carefully take out the cover and lay aside together with the screws.
 4. Unscrew the screws holding the wire on the right side of the internal printer case.
 5. Carefully but in a precise motion take out the holding plate from the printer cover. The right side is free.
 6. Holding the bearing of the RECOATER, manually reposition the device to the middle of the BED. Thanks to this there is access to the left side of the wire and space below the recoater to exchange the parts.
 7. Unscrew the two holding screws on left side of the internal case of the printer.
 8. Take out the plate from the case and take out the wire.
- Be careful!** The left side of the wire is ended with a spring, which is located inside the printer.
9. After taking the wire out from the case, remove it from the RECOATER mechanism:
 - a. Unscrew the right end of the wire from the plate (use a number 2 hex key, those are the same M3x8 as in the case of the RECOATER cover).

- b. Carefully lift the RECOATER and pull the wire through from the right to the center.

ATTENTION: In case of difficulties in taking the wire out due to the knot or crimp on ring, reposition the crimp on ring to the middle of the wire. Carefully reeve first the crimp on a ring and then the knot on the end of the wire.

10. Take out a new wire from the package.
11. Put the new wire through the RECOATER starting from the left towards the center.

ATTENTION: if the wire does not fit between the bearing and the roller, move the crimp on ring to the middle of the wire, put the wire through the mechanism and hold the end using nippers or pliers. Carefully pull so that the knot gets through the mechanism, and then the crimp on a ring. Repeat one more time (from the center towards the right).

12. Attach the right end of the wire to the plate, using the crimp on ring and a screw.
13. Insert the left side of the wire, with the spring and two spacers, in order to chock the mechanism.
14. Softly tensing, screw back the right side of the wire with the plate to the case (remember that the knot has to be hidden between the case and the plate). The plate should touch the case.
15. 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).
16. Attach and screw back the RECOATER cover.

24) FLEXA BLACK – GENERAL INFORMATION AND A DESCRIPTION OF THE WORK PROCESSES FOR THE TPU POWDER

A) GENERAL INFORMATION

- Flexa Black is a black powder from the TPU (Thermoplastic Polyurethane Elastomer) group, with its properties similar to gum. 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 can not be used to print as detailed elements as those done with the use of PA12 Smooth.
- The sintering temperature with Sinterit Lisa is about 80°C inside the chamber. For the provided temperatures, smoke 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 printer at $\geq 100^{\circ}\text{C}$ when there is Flexa Black inside. In higher temperatures, the powder loses its stability and becomes liquid which may cause damages to the machine.
- The Flexa Black powder must be stored in tight, preferably original, containers; in 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. Please learn them (chapter 14. Information concerning consumables, and chapter 15. Working with the powder).

B) FLEXA BLACK IN SINTERIT STUDIO

Types of settings	<p>All of the basic parameters for working with Flexa Black are already included in Sinterit Studio. We have two types of settings to choose from:</p> <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 Black.
Layer height	The recommended layer height is 0,125 mm.
Working area	<p>Due to the low sintering temperature, the working area for this type of powder is larger than with PA12 Smooth.</p> <p>Dimensions: 110 x 130 x 150 mm // 4,3 x 5,1 x 5,8 in</p> <p>There is no yellow printing space (after selecting Flexa Black in Sinterit Studio it is visible in the Models tab).</p>
Positioning the prints	<p>The Flexa Black 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).</p> <p><u>EXAMPLE</u>: Long prints may be positioned flat because the lower melting temperature does not cause the prints to bend.</p>

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

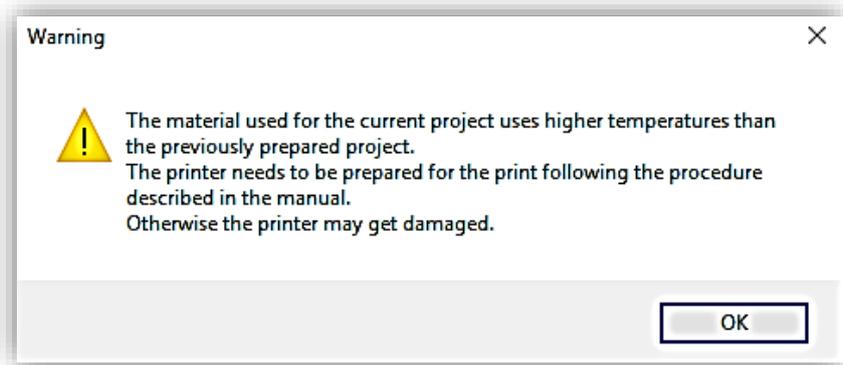


Image. 20. A warning message appearing after changing Flexa Black to PA 12 Smooth.

C) FLEXA BLACK IN THE SINTERIT LISA PRINTER

- When printing using Flexa Black, smoke from the melted material 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 in a 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 Black (unlike those from PA12) may be easily cleaned, using for example a paintbrush (the brushes included in the set do not have to be used). We recommend using a sandblaster or compressed air to clean difficult to reach places.
- Flexa Black does not require refreshing – there is no need of adding new powder to the one from the printer (as is the case with PA12). After sifting through a sieve, basically the entire powder is ready to be reused.

CLEANING THE MACHINE AND CHANGING THE POWDER (IMPORTANT!!!):

1) Pa12 Smooth → Flexa Black

When changing PA12 for Flexa Black, no precise cleaning of the inside of the printer is required. The same actions as cleaning the machine after printing should be carried out.

2) Flexa Black → PA12 Smooth

When changing Flexa Black for PA12 it is required to clean the machine very precisely. Special attention should be put on the case and side walls of the PRINT BED and SOURCE BED as well as the guide bar of the RECOATER. It is also recommend to clean around the BEDs using compressed air. It is important to clean the printer as precisely as possible before adding PA12; otherwise, the remaining Flexa Black (with its properties similar to gum, becoming liquid in temperatures above 100°C) may get into the mechanisms responsible for moving the BEDs (or the RECOATER mechanism), and damage the machine.

YOUR NOTES: