Blueprinter
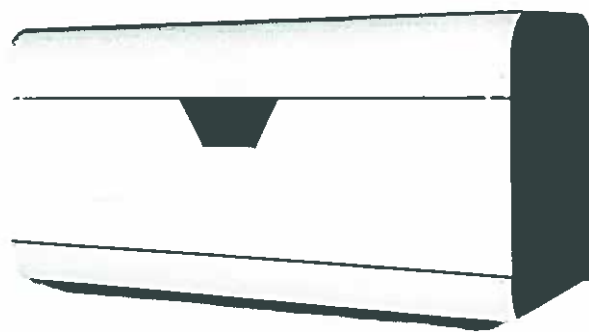## 3D printer

User guide

For technical support, contact: **support@blueprinter.dk**

Blueprinter
Year of manufacture: 2014

Blueprinter is manufactured by:
Blueprinter ApS
Ravnsborggade 2
DK-2200 Copenhagen N
Denmark

info@blueprinter.dk

RoHS $C\,\epsilon$
Compliant

The Blueprinter conforms to the following directives:
- Machinery directive, MD, **2006/42/EC**
- Electromagnetic compatibility directive, EMC, **2004/108/EC**
- Waste of Electrical and Electronic Equipment (WEEE) Directive, **2012/19/EU** .
- Restriction of Hazardous Substances (RoHS) Directive, **2011/65/EU**

A signed copy of the Declaration of Conformity can be obtained from Blueprinter.

The English language version of this manual is the original instruction.
Any other language versions are translations of the original instruction.

This is user guide version 05.

1 Introduction

Blueprinter is a 3D printer that uses Selective Heat Sintering™ technology to print 3D prototypes and parts. SHS™ technology uses a thermal print head that applies heat on layers of thermoplastic powder in the build chamber.

Printer features

- Free forming of any complex geometry (minimum wall thickness is 1 mm)
- Load and print several 3D models at once
- Web-based interface works with Windows, Mac and Linux

Materials

- Thermoplastic powder optimized to work with SHS™ technology
- Monochrome white
- Unused powder can be reused in the printer
- No need for additional support materials - models being built are supported by the powder in the build chamber

About this user guide

This user guide will tell you how to setup and use the printer correctly and safely. The user guide also contains instructions on how to use the Blueprinter cleaning station, which is a recommended additional equipment.

Safety guidelines

Follow the safety guidelines in this user guide to avoid personal injury and damage to the equipment.

Printer safety guidelines

- If there is smoke or an unusual smell or noise coming from the printer, turn off the printer and disconnect the power cable. Contact technical support.
- If the fuse is set off, contact technical support.
- If the printer detects an error that may damage the equipment, the printer shuts down automatically. If this happens, contact technical support.
- If there is a power failure during a print job it may be possible to open the top lid before the printer has cooled down, and surfaces in the printer can be hot.
- This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Powder safety guidelines

- Only use Blueprinter powder as building material in the printer.
- The powder material can irritate the eyes and respiratory tract. Place the printer in a ventilated room. After handling powder containers, let the powder settle for two minutes before opening the lid. For more detailed safety guidelines and specifications regarding the powder, see the Material safety data sheet for the powder.
- Powder residue can make the floor around the printer and the cleaning station slippery. Keep the floor clean from powder.

Safety symbols

Follow the safety symbols and the safety messages in this user guide and on the printer to avoid personal injury and damage to the equipment.

The following safety symbol is used in this user guide:

⚠	WARNING! A warning message indicates a possible loss of data, damage to equipment, or personal injury.

The following safety symbol is used on the printer:

⚠	The symbol indicates a hot surface. Do not touch the surface. Use extra care when working near hot surfaces.

The safety **symbols (1)** are placed on the printer according to the image below. Replace missing or damaged safety symbols immediately.

Printer overview
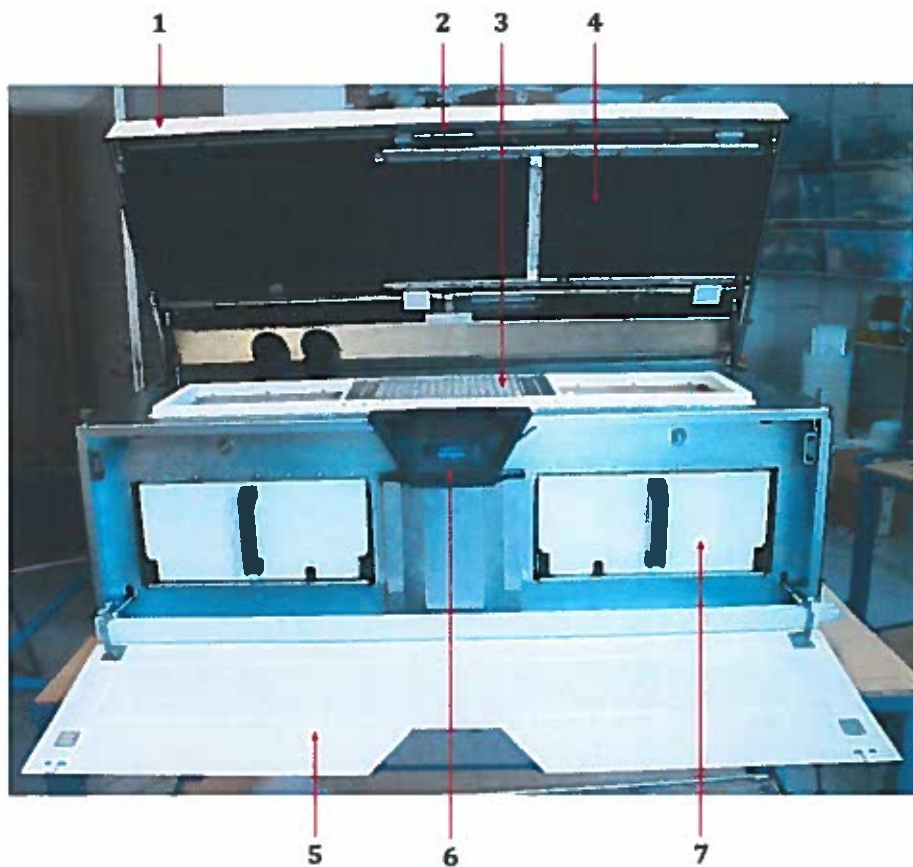
1. Top lid
2. Handle
3. Build chamber
4. Protective sheet
5. Front lid
6. Printer display
7. Powder container
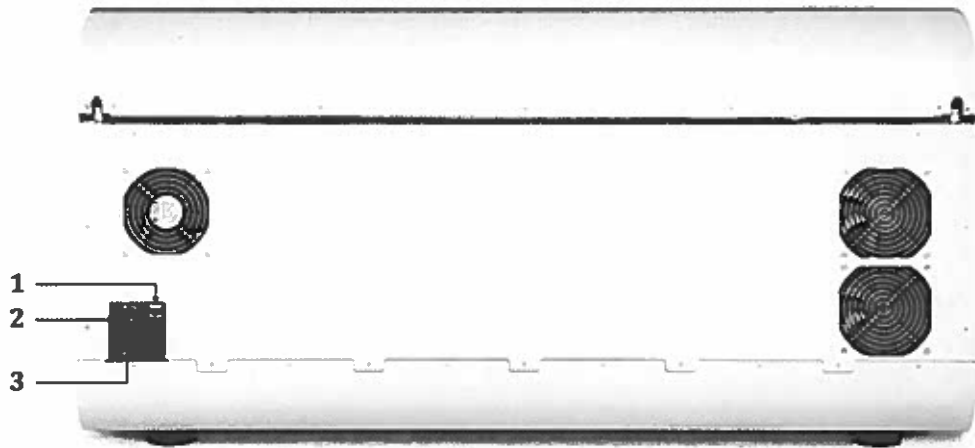
1. Ethernet connector
2. Power switch
3. Power cord connector

Cleaning station overview
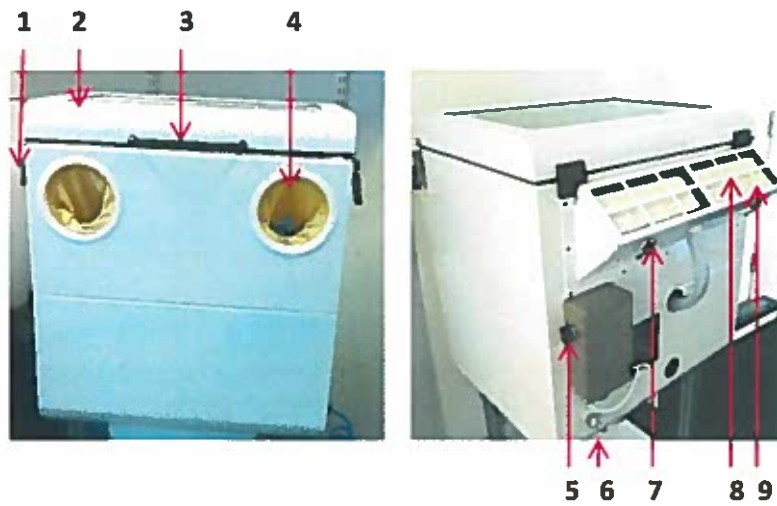
1. Snap lock
2. Lid
3. Crossbar
4. Gloves
5. Power switch
6. Compressor connector
7. Snap lock
8. Filter
9. Filter holder

10. Sieve
11. Powder blaster gun

Kit content

The following is included in the printer delivery:

- printer
- power cable
- Ethernet cable
- remover box
- user guide
- Cleaning Kit

2 Setup

Specifications and workspace requirements

Specifications	• Printer dimensions: width: 1150 mm, height: 600 mm, depth 500 mm • Printer weight: 125 kg • Build chamber dimensions: width: 160 mm, height: 140 mm, depth 200 mm • Printing speed: 2-3 mm/hour • Layer thickness: 0.1 mm • File formats: STL • Technical specifications: Rated voltage: 100 – 240 VAC Rated frequency: 50/60 Hz Rated current: 16 A max Fuse: 16 A
Workspace requirements	• Network connectivity: Ethernet TCP/IP 10/100 base T • Grounded electrical outlet • Power supply: 220-240 VAC 50/60 Hz, minimum 7A dedicated circuit Rated current: 16A Minimum cross sectional area of conductors: 1,5 mm^2 (up to and including 16 A) • Operating temperature 15-35 °C • Humidity: 37-75% RH • Ventilation capacity: 2 m^3/hour for printer
Placement	• Place the printer on a stable, horizontal table that can support the weight of the printer (125 kg) • Place the printer in such a way that the power switch on the rear side of the printer is easily accessible • There should be a distance of 15 cm between the rear side of the printer and a wall • We recommend to not place the printer in an office environment due to noise and powder dust

Additional equipment

Computer

The printer is operated via a web-based interface on a personal computer. Use a computer with 1.5 GHz processor or faster, at least 2 GB RAM and an accelerated graphics device. Use a web browser that supports HTML5. We recommend Google Chrome 13 or higher, or Mozilla Firefox 9 or higher. For the best user experience, use a browser that supports WebGL and always keep your browser up to date.

Vacuum cleaner

When cleaning the printer, use an industrial vacuum cleaner with a:

- HEPA filter
- antistatic tube
- self-cleaning filter
- brush

Cleaning station

We recommend using a Blueprinter cleaning station to clean the printed parts, to facilitate powder reuse and avoid powder dust. When you clean the printed parts inside the cleaning station, using the powder blaster gun, excess powder is collected so that it can be reused.

Specifications	• Length: 600 mm, height: 1350 mm, depth 500 mm weight: 30 kg
Workspace requirements	• Power requirements: 220-240 VAC 50/60 Hz, 100W
Placement	• Place the cleaning station near a local exhaust with a capacity of 400 m³/hour

Compressor

The largest electric motor available on single phase supply is normally 3 h.p. This will drive the pump of a 14 c.f.m. compressor, which will give 10 c.f.m. FAD (free Air Delivery). 10 c.f.m. FAD will sustain a constant 72 psi. through a nozzle 3mm. diameter. Of course, smaller compressors (10 c.f.m. upwards) will also work, but will not sustain the higher pressure indefinitely. with a smaller compressor, you will either have to pause from time to time to allow the compressor to build up the pressure again. The following chart gives an indication of the pressure you can expect your compressor to sustain when blasting continuously through the 3mm.

Air Displacment	Free Air Delivery	Presure using 3mm Nozze
14 cfm (400L/min)	10cfm (300L/Min)	72psi (5 Bar)
10 cfm (300L/min)	7 cfm (200L/Min)	50psi (3.5Bar)

Transport and handle the printer

The printer weighs approximately 125 kg. The printer is delivered on a pallet. Do not lift the printer manually. Use a fork lift or other lifting aids. Keep the printer horizontal during lifting. Use the **handles (1)** on each side of the printer to adjust the placement of the printer.
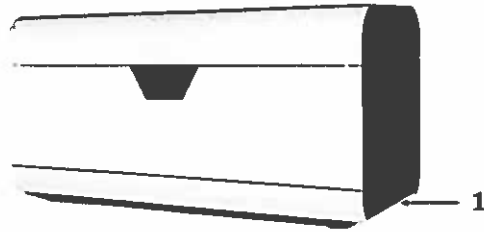
If you move the printer after the first installation, empty the powder containers before transporting the printer.

Setup the printer

Connect the printer to a grounded electrical outlet with the supplied power cable.

Setup a network connection

Before you can use the printer, you need to establish communication between the computer and the printer.

a) Use an Ethernet cable to connect the printer to the network hub or router.
b) Make sure that the computer is connected to the same network.
c) Turn on the printer.
d) Open the web browser on the computer and type the printer's name or IP address in the address bar. The name and the IP address of the printer can be found on the printer display. The default name is "blueprinter.local".
e) When the network connection is established, the printer software opens in the web browser.

Note! The printer uses zeroconf technology to publish its name to the network. If there are no zeroconf features on your computer, the web browser cannot find the printer. To install zeroconf features, we recommend that you install DNSSD, Apple Bonjour, or a similar tool.

Setup a network connection on a static network

If you have a static network you need to manually assign an IP address to the printer, to make the printer accessible on the network.

a) Contact your network administrator for the correct IP settings.
b) In the printer software, click **Settings** > the **Network Settings** tab.
c) Uncheck the **Use DHCP** checkbox and enter the correct IP settings, then click **Save**.

Note! You can also connect the printer directly to the network port on the computer with an Ethernet cable.

Setup the cleaning station

The cleaning station weighs approximately 30 kg, and must be lifted by two persons.

a) Connect the compressor to the **compressor connector (1)** at the rear side of the cleaning station.

b) Connect the supplied power cable to the power cord connector) at the rear side of the cleaning station, and to an electrical outlet. **Turn on contact (2)**
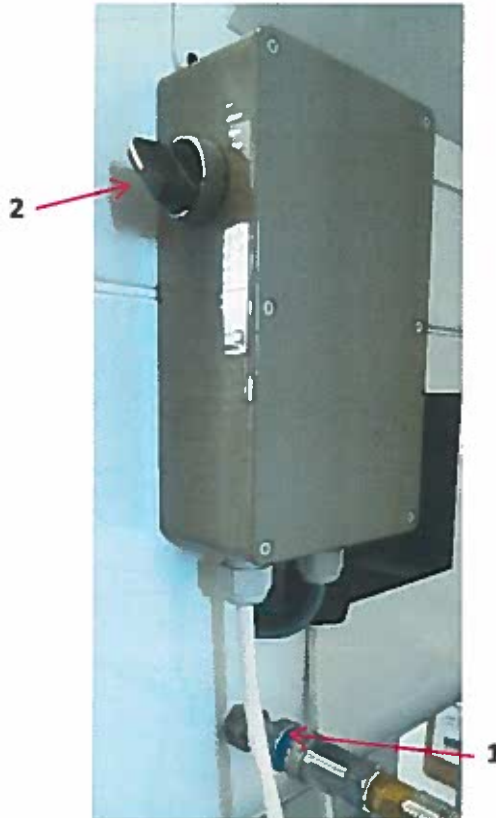
Fill the printer with powder

To avoid powder dust, we recommend that you fill the printer's powder containers inside the cleaning station. When you clean the finished parts in the cleaning station, excess powder is collected and can be reused. When you fill the printer with new powder, first put the powder in the cleaning station, and then fill the printer's powder containers.

Fill the cleaning station with new powder

a)   Place the unopened powder can in the cleaning station and close the lid with the snap locks.

b)   Place your hands in the gloves and open the powder can inside the cleaning station.

c)   Empty the powder can into the cleaning station.

d)   Follow the instructions in <u>Fill the printer with reused powder</u> on page 16 to fill the powder containers in the printer.

Fill the printer with reused powder

a)   Open the front lid of the printer and remove the left powder container.

b)   Place the powder container in the slot in the cleaning station.

c)   Fasten the powder container with the handle.

d)   Drag the slider towards you to dispense powder.
     Note! A full powder container weighs approximately 6 kg. When lifting the container, use one hand on the handle and one hand under the container as support.

e)   Place the powder towards the rounded side of the powder container.

f)   Put the powder container back in the printer.

g)   Repeat step a) to e) with the right powder container.

h)   Close the front lid.

Note! Fill both powder containers with the same amount of powder. Make sure to put back the left powder container in the left container slot with the notch **(1)** to the right. Put the right container in the right slot with the notch **(2)** to the left.

3 Printing

Prepare the printer

a) Make sure that the printer is clean, see Clean the printer on page 25.

b) Make sure that there is enough powder in the printer. See Fill the printer with powder on page 16.

c) Close the front lid and the top lid carefully.

d) Turn on the printer. When the printer display shows **ready**, the printer is ready to start a new print job.

Start the software

Open the web browser and type the printer's name or IP address in the address bar.

Note! The name and IP address of the printer can be found on the printer display. The default name is "blueprinter.local".

Software overview
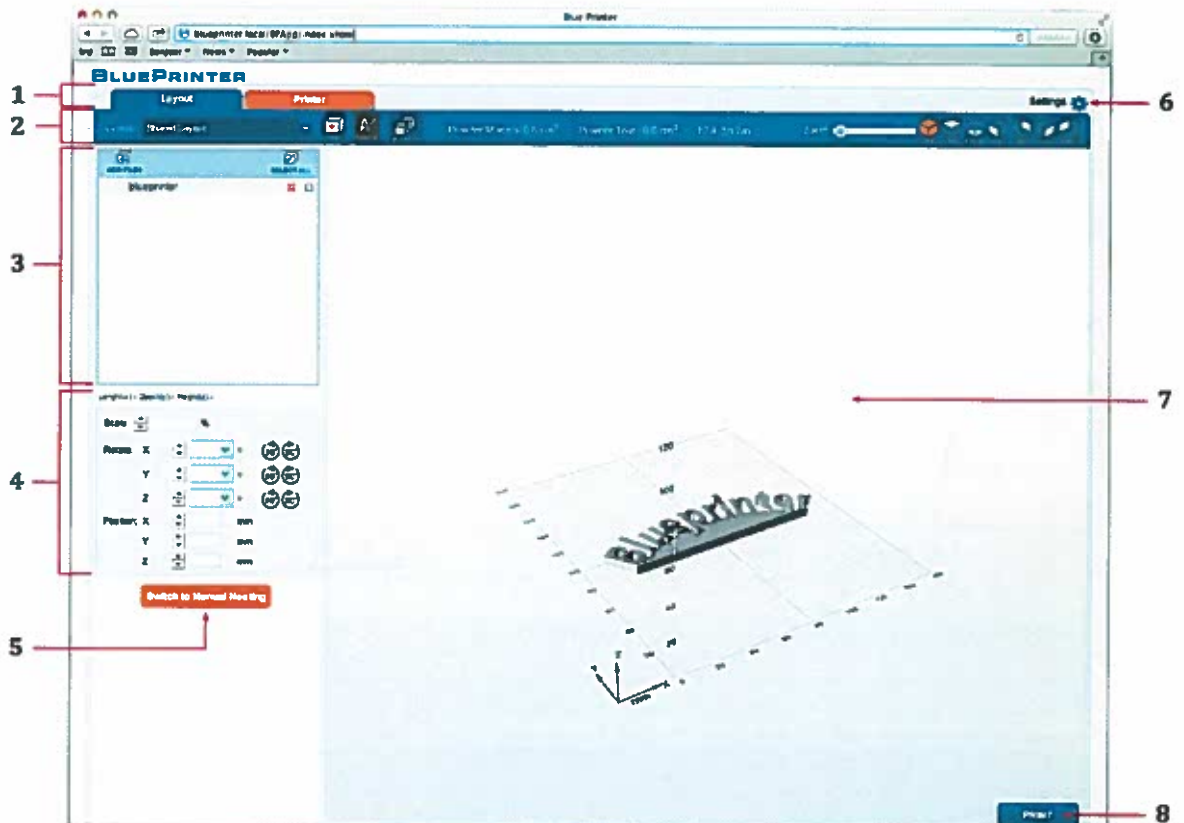
1.	Tabs	Switch between the Layout tab and the Printer tab
2.	Top menu	Contains layout and viewing options
3.	Model list box	Add, delete and duplicate 3D models
4.	Control box	Change the size, rotation or position of a 3D model
5.	Switch to Manual Nesting	Switch between manual and automatic nesting mode
6.	Settings	Change printer settings
7.	Build chamber view	Shows how the models are placed in the build chamber
8.	Print button	Start a print job

Top menu

9.	Current layout	Shows the name of the current layout
10.	New layout	Open a new layout
11.	Rename layout	Rename the current layout
12.	Save a copy	Save a copy of the current layout
13.	Zoom	Zoom in the build chamber view
14.	Build chamber orientation	Change the orientation of the build chamber view

Model list box
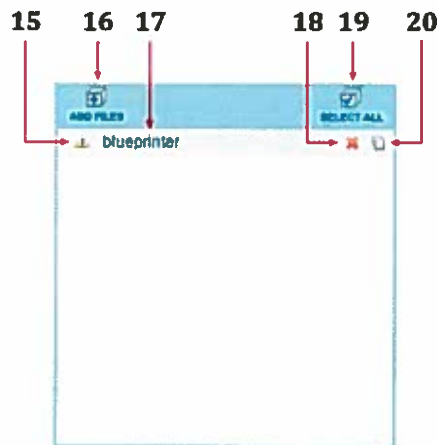
15.	Size warning	Indicates that the 3D model does not fit in the build chamber
16.	Add files	Add one or more 3D models
17.	File name	The file name of the 3D model
18.	Delete	Delete a 3D model
19.	Select all	Select all 3D models in the list
20.	Duplicate	Duplicate a 3D model

Handle layouts

A layout is the arrangement of 3D models in the build chamber. When you open the software, the Layout tab shows the Shared Layout. All users that are accessing the printer software at the same time can add and modify 3D models in the Shared Layout.

- To save a copy of the current layout, click **Save a copy**.
- To open a new layout, click **New Layout**. The new layout is not shared.
- To open a previously saved layout, click the **Layout list (1)** in the Top menu and select a layout.

1

All layouts are automatically saved on the printer.

Manage layouts

a) Click the layout list in the Top menu and select **Manage Layouts**.
b) A window with information about all saved layouts on the printer opens.
c) To delete a layout, select it and click **Delete**.

Add a 3D model to the build chamber

The printer supports the STL file format. Use good quality STL-files. When you open a file, the software repairs minor errors and holes. If there are major errors in the file, it will not be repaired and the printed part will be of bad quality.

a) Click **Add files** and select one or more files to open.
b) The **Upload file** window opens, and the proportions of the model are shown. Select a unit of measurement for the model and click **OK**.
c) The 3D model is shown in the build chamber view.

Prepare the 3D model(s) for printing

Automatic vs. manual nesting

When you add a 3D model to the layout, it is placed in the build chamber in the position that will enable the fastest print. When you add several 3D models they are automatically placed at some distance from each other. If you want more control over the placement of the 3D models, click **Switch to Manual Nesting**. In the manual nesting mode, you can change the position of the 3D models in the build chamber

Note! In the manual nesting mode, the 3D models can be placed inside of each other, causing the printed parts to merge.

Duplicate a 3D model

To print several copies of a single 3D model, click **Duplicate** next to the file name in the Model list box.

Delete a 3D model

Click **Delete** next to the file name in the Model list box.

Change the size of a 3D model

a) Select one or several of the 3D models in the Model list box.
b) Enter a percentage in the **Scale** control in the Control box.

Rotate a 3D model

a) Select one or several of the 3D models in the Model list box.
b) In the **Position** controls in the Control box, enter how many degrees you want to rotate the model on the X, Y, or Z axis. To rotate the 3D model 90 degrees, click the **90°** icon.

Note! How the 3D model is oriented affects the surface finish of the printed part. Vertical and horizontal surfaces have a smoother finish than surfaces that are printed at an angle.

Move a 3D model in the build chamber

a) Select one or several of the 3D models in the Model list box.
b) In the **Position** controls in the Control box, enter how many millimeters you want to move the 3D model on the X, Y, or Z axis.

Start a print job

a) Click the **Print** button.
b) To view the printer status, click the **Printer** tab.

View printer status

The **Printer** tab in the software shows the status of the printer and the printer queue.
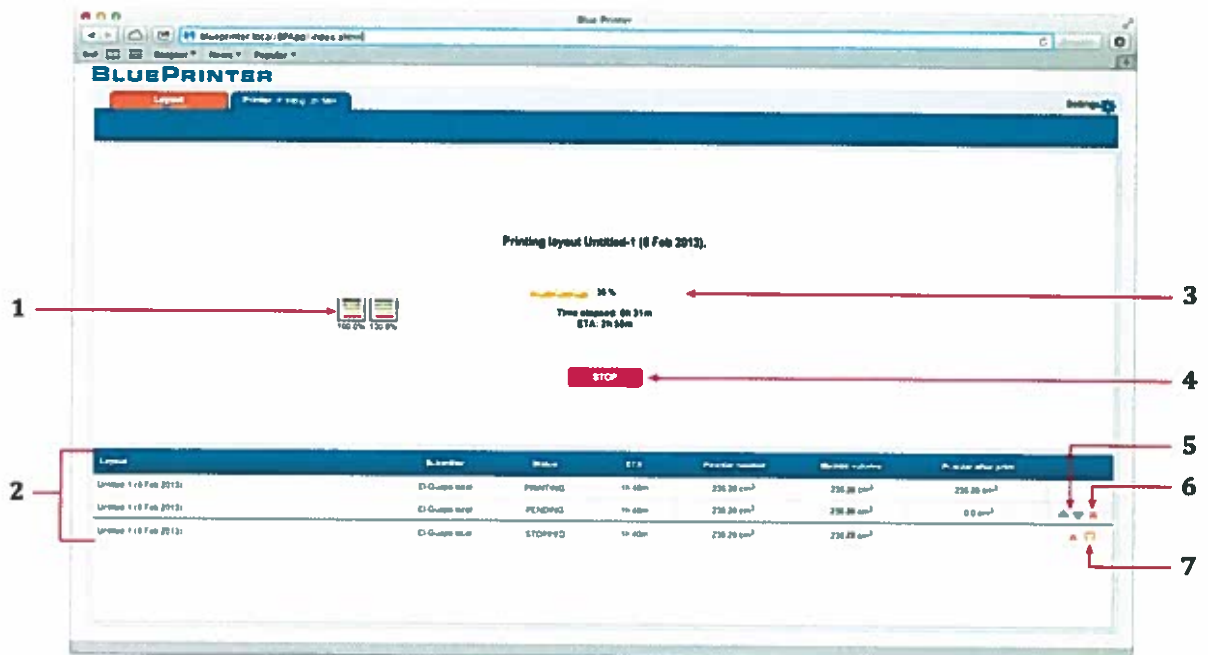
1.	Powder level	Shows how much powder is left in each powder container in the printer.
2.	Queued prints	Shows information about the prints in the queue
3.	Progress bar	Shows the time elapsed and the time left until the print is finished
4.	Stop button	Stop the print
5.	Change print order	Move the print up or down in the queue
6.	Delete	Delete the print job from the queue
7.	Reprint	Reprint a print job that has failed or been stopped

If the print job cannot start, the job is placed in the print queue. The reason for the delay is stated.

A print job can be queued if

- the printer is busy with another job
- there is not enough powder in the printer
- the printer lids are open
- there is a printed part in the build chamber

The printer display

During a print job, the printer display shows **printing** and the estimated time left. When the printer display shows **printing done** or **please empty chamber**, the print is finished. When the printer display shows **ready**, the printer is ready to start a new print job.

Remove the finished part from the printer

During the print process, the build chamber is filled with powder. The part is supported by the excess powder during the build. After the build is completed, you need to remove the part and the excess powder from the build chamber. The excess powder can be reused.

a) Pull the printer handle towards you and open the top lid.
b) Place the remover box on top of the build chamber.
c) When the remover box is placed correctly, the build chamber platform is raised.
d) When the build chamber is fully raised, push the sliding tray into place at the bottom of the remover box.
e) Remove the remover box from the printer.

Remove excess powder from the finished part

Use the cleaning station to remove excess powder from the finished part.

Note! Keep your body in contact with the **cross bar (1)** when working with the cleaning station to avoid static electricity.

a) Make sure that there is powder in the cleaning station powder reservoir. The powder is used to blaster the parts.
b) Place the remover box with the printed part in the cleaning station.
c) Remove the sliding tray and the top part of the remover box.
d) Close the lid and lock the snap lock on each side of the cleaning station.
e) Turn on the compressor and the cleaning station.
f) Place your hands in the gloves and use the powder blaster gun to remove excess powder from the part. Keep the powder blaster gun at a distance of 10-15 cm from the part.

Powder blaster gun

Note! If there is excess powder that cannot be removed using the powder blaster gun, use a manual tool, for example a spatula or a small brush to remove the powder.

4 Cleaning

Clean the printer

Clean the printer carefully after each print job. Use a vacuum cleaner that fills the requirements in <u>Additional equipment</u> on page 12.

> ⚠️ **WARNING!**
> The protective sheet is fragile. Use a brush on the vacuum cleaner when vacuuming the protective sheet; otherwise the sheet may be damaged.

a) Pull the printer handle towards you and open the top lid.
b) Vacuum the protective sheet, the build chamber, and all other surfaces on the inside of the printer.
c) Open the front lid and remove the two powder containers.
d) Vacuum the powder container slots.
e) Put the two powder containers back in their slots and close the front lid.
f) Close the top lid.

Note! Make sure to put back the left powder container in the left container slot and the right container in the right slot.

> ⚠️ **WARNING!**
> Do not reuse powder from the vacuum cleaner in the printer or the cleaning station.
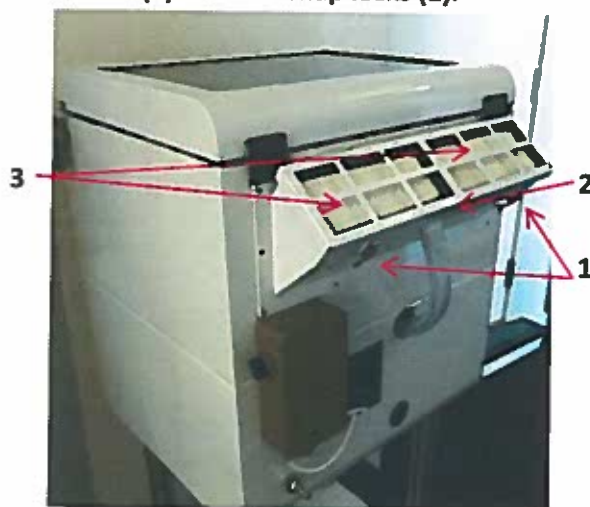
Clean the cleaning station

- Use the air vacuum gun to clean the lid, by squeezing the side

- Vacuum the inside of the cleaning station regularly, to make sure that the sieves do not get clogged.
- Clean the filter after use. To clean the filter:
  a) Open the two **snap locks (1)**.
  b) Remove the **filter holder (2)** and the **filter (3)**.
  c) Vacuum the inside of the **filter holder**.
  d) Clean the **filter (3)** in a dishwasher and let the **filter (3)** dry.
  e) Put the **filter (3)** back in the **filter holder (2)**, and attach the **filter holder (2)** with the **snap locks (1)**.

5 Disposal

Dispose of the powder

Dispose of the powder from the printer as thermoplastic waste according to your local regulations.

Dispose of the printer and the cleaning station

The printer and the cleaning station are classed as electric or electronic equipment in accordance with the WEEE directive. The equipment must not be disposed of as household or commercial waste. Follow your local regulations regarding the recycling of electronic equipment.