

## Planmeca Creo™

### *user's manual*



# Table of contents

---

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>2</b>	<b>ASSOCIATED DOCUMENTATION</b>	<b>1</b>
<b>3</b>	<b>TRAINING</b>	<b>1</b>
<b>4</b>	<b>REGISTERING YOUR 3D PRINTER</b>	<b>2</b>
<b>5</b>	<b>PREVENTIVE MAINTENANCE</b>	<b>2</b>
<b>6</b>	<b>SYMBOLS ON PRODUCT LABELS</b>	<b>3</b>
<b>7</b>	<b>FOR YOUR SAFETY</b>	<b>4</b>
7.1	Connecting and disconnecting printer	4
7.2	Caution for accessibility	4
7.3	Caution for servicing	6
7.4	Additional safety information	7
<b>8</b>	<b>RESIN HANDLING</b>	<b>8</b>
8.1	Precautions	9
8.2	Approved resins	9
<b>9</b>	<b>MAIN PARTS</b>	<b>10</b>
9.1	Printer accessories	12
9.2	Printer controls	14
9.3	Printer menus	14
<b>10</b>	<b>PREPARATIONS BEFORE PRINTING</b>	<b>16</b>
10.1	Attaching splash guard	16
10.2	Attaching basin	16
10.3	Levelling and installing build platform	17
10.4	Calibrating printer (cubes calibration)	19
10.5	Filling basin	20
10.6	Replacing Teflon film	21
<b>11</b>	<b>PRINTING</b>	<b>24</b>
11.1	Calibration print	24
11.2	Printing	26
<b>12</b>	<b>AFTER PRINTING</b>	<b>27</b>
12.1	Removing build platform	27
12.2	Removing prints from build platform and post-processing	27
12.3	Cleaning build platform	28
12.4	Removing, emptying and cleaning basin	28
12.5	Cleaning outside surfaces of printer	30
<b>13</b>	<b>PLANMECA CREO STUDIO SOFTWARE</b>	<b>31</b>
13.1	Overview	31
13.2	Control panel	34
13.3	Default views	34
13.4	Bottom menu	34
13.5	Print area controls	35
13.6	Creating new project	36
13.7	Printing dental models	36
13.8	Printing surgical guides	37
13.9	Printing impression trays	37

13.10	Editing support structures .....	38
13.11	Generating print job .....	38
13.12	Saving print job to USB .....	38
13.13	Importing printer settings .....	39
<b>14</b>	<b>TECHNICAL SPECIFICATIONS .....</b>	<b>40</b>
<b>15</b>	<b>DISPOSAL .....</b>	<b>40</b>

---

## Appendix A: TROUBLESHOOTING

<b>A.1</b>	<b>TROUBLESHOOTING TABLES .....</b>	<b>42</b>
A.1.1	Print fails to attach to build platform .....	42
A.1.2	Print cannot be removed from build platform .....	42
A.1.3	Print is misshapen or incorrect .....	43
<b>A.2</b>	<b>TROUBLESHOOTING TASKS .....</b>	<b>44</b>
A.2.1	Cured resin present in printer .....	44
A.2.2	Print layer stuck to basin floor .....	44
A.2.3	Removing cured resin from basin glass .....	45
A.2.4	Slice-by-slice view in Creo Studio .....	47
A.2.5	Radio & television interference .....	48
<b>A.3</b>	<b>SERIAL NUMBER CAPTURE .....</b>	<b>49</b>

The manufacturer, assembler and importer are responsible for the safety, reliability and performance of the unit only if:

- installation, calibration, modification and repairs are carried out by qualified authorised personnel
- electrical installations are carried out according to the appropriate requirements such as IEC 60364
- equipment is used according to the operating instructions.

Planmeca pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice.

COPYRIGHT PLANMECA  
 Publication number 30003127 Revision 2  
 Released 08 December 2017

# 1 INTRODUCTION

This manual describes how to use the Planmeca Creo 3D printer.

The printer has been designed specifically to print parts for the dental industry. It is designed to be used within a dental lab by technicians that have completed the appropriate training course.

The printer works by building the dental parts in successive thin layers. Each layer is created by exposing a photo-polymer (resin) to UV light. This causes the resin to polymerize (cure) into a solid where it is exposed to the light. After one layer has been cured the build platform moves up the thickness of the next layer and the process is repeated until the part is complete.

## NOTE

Depending on your current configuration the parts illustrated may appear different from yours. The instructions apply, however, for all configurations.

# 2 ASSOCIATED DOCUMENTATION

- Planmeca Creo Technical manual (publication number 30003128)  
For service personnel. Gives instructions for service situations and parts replacements. Includes technical descriptions and component diagrams.
- Planmeca Creo Installation Quick guide (publication number 30002966)  
For service personnel. Describes how to install the Planmeca Creo 3D printer.

# 3 TRAINING

Only fully-trained operators should operate the Planmeca Creo 3D printer. The printer is designed to be used within a dental lab by technicians that have completed the appropriate training course.

## 4 REGISTERING YOUR 3D PRINTER



Before you start using your Planmeca Creo 3D printer, you must register it to activate the additional one-year warranty.

To register:

- Read the QR code on the package box with a QR code reader to enter the registration website.

OR

- Navigate to the registration website *www.planmeca.com/register/* in your Internet browser. Follow the instructions on the website.

## 5 PREVENTIVE MAINTENANCE

Keep all parts that contact resin clean and free from uncured resin.

Check the projector lens is clean on a monthly basis. Clean with air or a lint free cloth if required.

Check the fans are clean on a monthly basis. Clean with air if required.

## 6 SYMBOLS ON PRODUCT LABELS



Serial number



Date of manufacture



Manufacturer



Separate collection for electrical and electronic equipment according to Directive 2002/96/EC (WEEE).



European conformity



Non-ionizing electromagnetic radiation

## 7 FOR YOUR SAFETY

Read these instructions carefully. Keep this document for future reference. Follow all warnings and instructions marked on the Planmeca Creo 3D printer.

### CAUTION

**DO NOT use under the following conditions:**

- In extremely hot, cold or humid environments.
- In areas susceptible to excessive dust and dirt.
- Near any appliance that generates a strong magnetic field.
- Locations with an ambient temperature above 30 °C.

### 7.1 Connecting and disconnecting printer

Observe the following guidelines when connecting and disconnecting power to the printer:

- Install the printer before connecting the power cord to the AC power outlet.
- Unplug the power cord before moving the printer.

### 7.2 Caution for accessibility

Ensure that the power outlet you plug the power cord into is easily accessible and located as close to the printer as possible. If you need to disconnect power to the printer, unplug the power cord from the electrical outlet.

### CAUTION

**Do not use the printer near water.**

### CAUTION

**Do not place the printer on an unstable cart, stand or table. If the printer falls, it could cause injury and or damage.**

### CAUTION

**Do not place the printer on any surface that is not rated to withstand the printer's weight.**

### CAUTION

**Slots and openings are provided for ventilation to ensure reliable operation of the printer and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the printer on a soft surface or too close to a wall.**

### CAUTION

**Do not place the printer near or over a radiator or heat register, or in a built-in installation unless proper ventilation is provided.**



**CAUTION**

Never push objects of any kind into this printer through cabinet slots as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind onto or into the printer.

**CAUTION**

To avoid damage of internal components, do not place the printer on a vibrating surface.

**CAUTION****Using electrical power**

- Operate the printer only from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate the printer where people will walk on the cord.
- If an extension cord is used with the printer, make sure that the total ampere rating of the equipment plugged into the extension cord does not exceed the extension cord ampere rating. Also, make sure that the total rating of all products plugged into the wall outlet does not exceed the fuse rating.
- Do not overload a power outlet, strip or receptacle by plugging in too many devices. The overall system load must not exceed 80% of the branch circuit rating. If power strips are used, the load should not exceed 80% of the power strip's input rating.
- The printer's AC adapter is equipped with a three-wire grounded plug. The plug only fits in a grounded power outlet. Make sure the power outlet is properly grounded before inserting the AC adapter plug. Do not insert the plug into a non-grounded power outlet. Contact your electrician for details.

**CAUTION**

The grounding pin is a safety feature. Using a power outlet that is not properly grounded may result in electric shock and/or injury.

**NOTE**

The grounding pin also provides good protection from unexpected noise produced by other nearby electrical devices that may interfere with the performance of the printer.

- Use the printer only with the supplied power supply cord set. If you need to replace the power cord set, make sure that the new power cord meets the following requirements: detachable type, UL listed/ CSA certified, VDE approved or its equivalent.

## 7.3 Caution for servicing

### CAUTION

Do not attempt to service the printer yourself, as opening or removing covers may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel. Unplug this printer from the wall outlet and refer servicing to qualified service personnel when:

- the power cord or plug is damaged, cut or frayed
- liquid was spilled into the printer
- the printer is exposed to rain or water
- the printer is dropped or the case is damaged
- the printer exhibits a distinct change in performance, indicating a need for service
- the printer exhibits strange noises or odours
- the printer does not operate normally after following the operating instructions

### NOTE

Adjust only those controls that are covered by the operating instructions, since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the printer to normal condition.

### CAUTION

For safety reasons, do not use non-compliant parts when adding or changing components. Consult your reseller for purchase options.

### CAUTION

Your device and its enhancements may contain small parts. Keep them out of the reach of small children.

## 7.4 Additional safety information

- Always wear suitable nitrile gloves and eye protection when handling printer resins and parts that have not been post-cured.
- Have a flat stable surface ready to place the basin before removal from the printer.
- Have a suitable resin proof container ready to place the platform before removal from the printer.
- Do not look into the printer's lens when printing. The bright UV light may hurt your eyes.
- Do not place the printer in the following environments:
  - Space that is poorly ventilated or confined. At least 50cm side clearance from walls and free flow of air around the printer are necessary.
  - Locations where temperatures may become excessively high.
  - Locations where excessive humidity, dust, or cigarette smoke may contaminate optical components and shorten the life span.
  - Locations near fire alarms.
  - Locations with an ambient temperature above 30 °C.
  - Locations where the altitudes are higher than 2000 meters.
- Unplug immediately if there is something wrong with your printer. Do not operate if smoke, strange noise or odour comes out of the printer. It might cause fire or electric shock. In this case, unplug immediately and contact your dealer.
- Do not keep using the printer if you break or drop it. In this case contact your dealer for inspection.
- When switching the printer off, please ensure the printer has five minutes cooling before disconnecting power.
- Do not frequently turn off the main power abruptly or unplug the printer during operation. The best way is to wait for before turning main power off.
- Ensure that the ventilation slots are clean and unobstructed. The printer's internal temperature can rise and cause damage if ventilation slots are dirty or obstructed.
- Do not attempt to disassemble the printer. There are dangerous high voltages inside which may hurt you. The only user serviceable parts are the build platform and basin. Refer servicing only to suitable qualified professional service personnel.
- Do not stand the printer on any side except its feet. It may cause the printer to fall over, causing injury and or damage.
- Ensure the surface the printer is set up on supports the printer's weight.

## 8 RESIN HANDLING

As sunlight has a high UV content handling of uncured resin should be done away from strong sunlight. Artificial light also contains a UV component and as such resin should be kept in its original container with the cap on. The basin should be kept in the printer with the door closed. When not being used for printing all parts should be cleaned from uncured resin.

### CAUTION

**Do not place the printer or any resin-touching components, for example the basin or build platform, in areas of high sunlight.**

### NOTE

**Ensure adequate ventilation when working with resins.**

Before using any resin ensure that:

- The operator is familiar with the specific safety requirements for that resin.
- The working area is clean and free from any hazards that could lead to a spill.
- The working area has a tray large enough to hold the build platform and any printed parts.
- There is an adequate supply of absorbent towels to deal with any spills should they occur.

### CAUTION

**Always wear suitable nitrile gloves and eye protection when handling printer resins and parts that have not been post-cured.**

Have a suitable resin proof container ready to place the build platform before removal from the printer.

### CAUTION

**Use of the printer involves the use of sharp tools. Using these tools on the resin covered build platform can lead to sudden movement. Always use the removal scraper away from yourself and your hands.**

## 8.1 Precautions

- Only use approved resins with the Planmeca Creo Printer as listed in section 8.2 "Approved resins" on page 9.
- Always wear nitrile gloves, covered arms & legs and eye protection.
- Ensure all use of resin is undertaken in a well ventilated area.
- Ensure a spill kit is available.
- Ensure a suitable container is available to place the build platform and printed parts in.
- Ensure that a supply of IPA (96%) or ethanol (96%) is available for cleaning the build platform and printed parts.

## 8.2 Approved resins

### NOTE

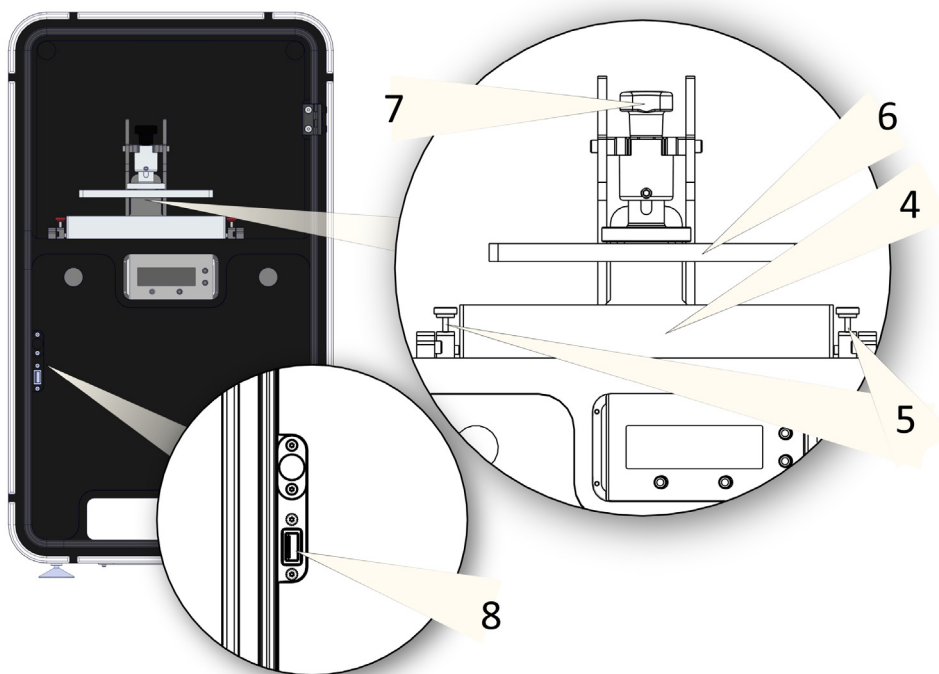
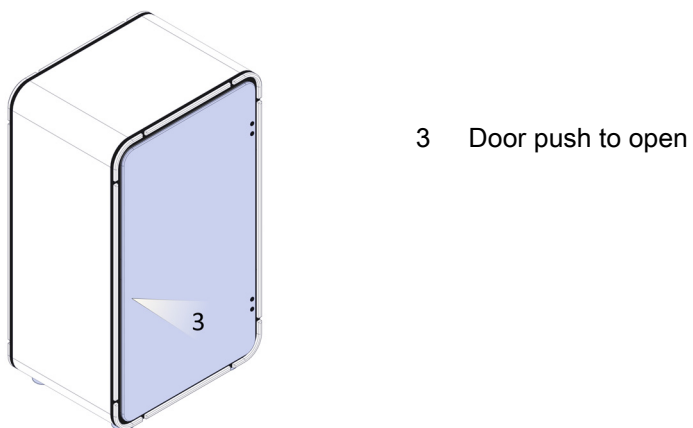
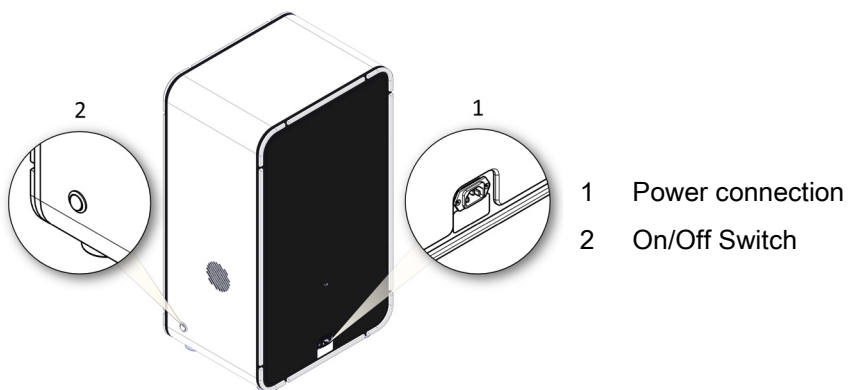
Please read the Planmeca "Instructions For Use" before using any of the listed resins.

Only the following resins are approved for use with the Planmeca Creo 3D printer.

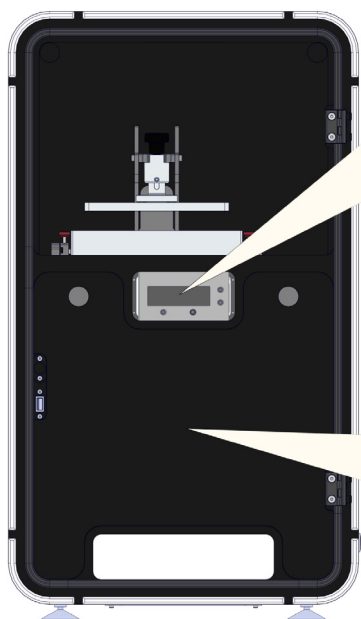
- Planmeca Surgical Guide
- Planmeca Dental Model
- Planmeca Dental Splint
- Planmeca Cast
- Planmeca Tray

The list of approved resins is subject to change. Please check the latest manual for an updated list.

## 9 MAIN PARTS



4 Basin 5 Basin release knob 6 Build platform 7 Build platform release knob 8 USB socket

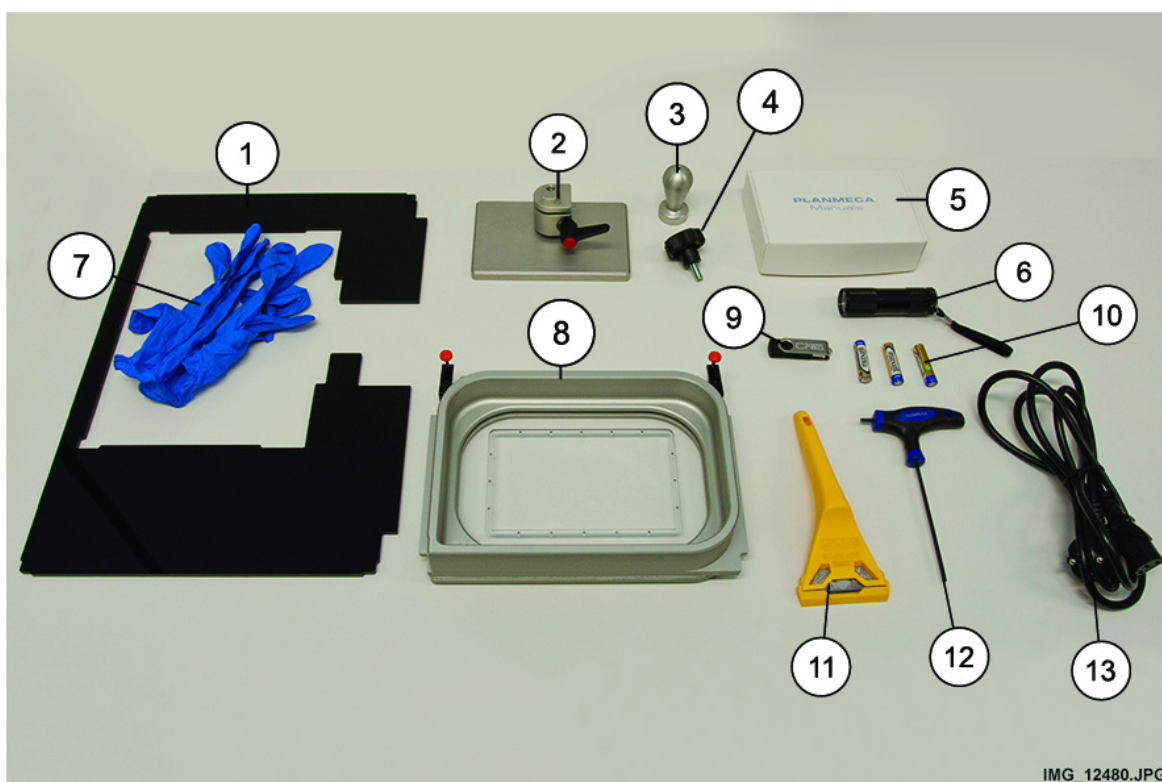


10

9

- 9 Inner cover
- 10 Display & buttons

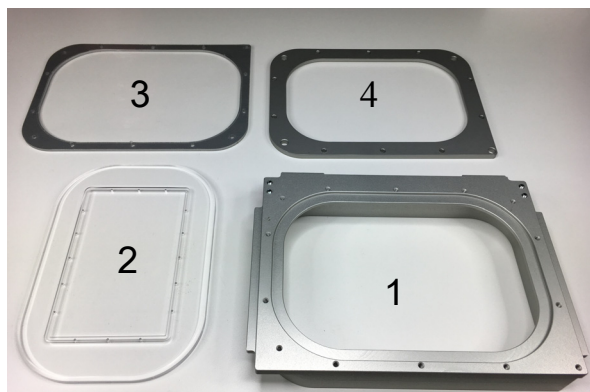
## 9.1 Printer accessories



- |    |  |    |                                 |
|----|--|----|---------------------------------|
| 1  | Inner splash guard   | 2  | Build platform                  |
| 3  | Resin puller   | 4  | Build platform adjustment screw |
| 5  | Planmeca Creo manuals in USB flash drive   | 6  | UV flash light                  |
| 7  | Pair of nitrile gloves   | 8  | Basin                           |
| 9  | Creo branded USB flash drive including PM Creo Studio installation package. The Creo USB flash drive may be used for saving and transferring print jobs from Planmeca Creo Studio on PC to the Planmeca Creo 3D printer. | 10 | AA batteries x 3                |
| 11 | Scraper  | 12 | Allen key                       |
| 13 | Power lead   |    |                                 |

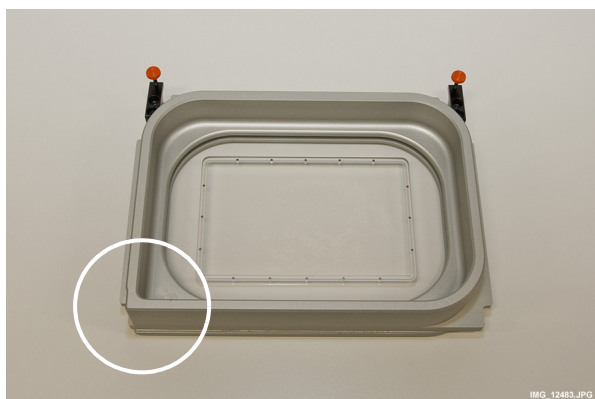


### 9.1.1 Basin



The FlexBasin consists of the following parts:

- robust re-usable frame (1),
- acrylic glass (2)
- flexible Teflon film (3),
- outer frame (4).



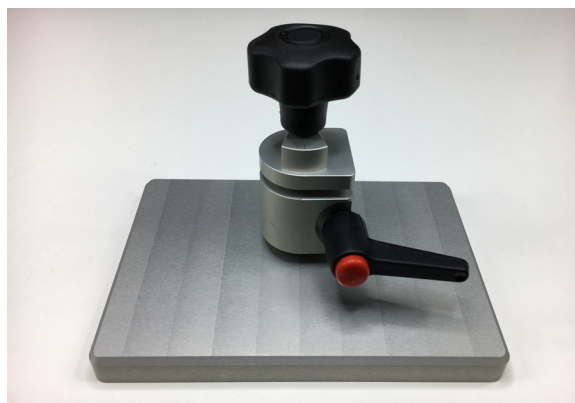
A draining corner is intended for pouring out the excess liquid.

#### CAUTION

Be careful when handling the film for not to scratch or otherwise harm it.

On how to replace the film see section 10.2 "Attaching basin" on page 16.

### 9.1.2 Build platform



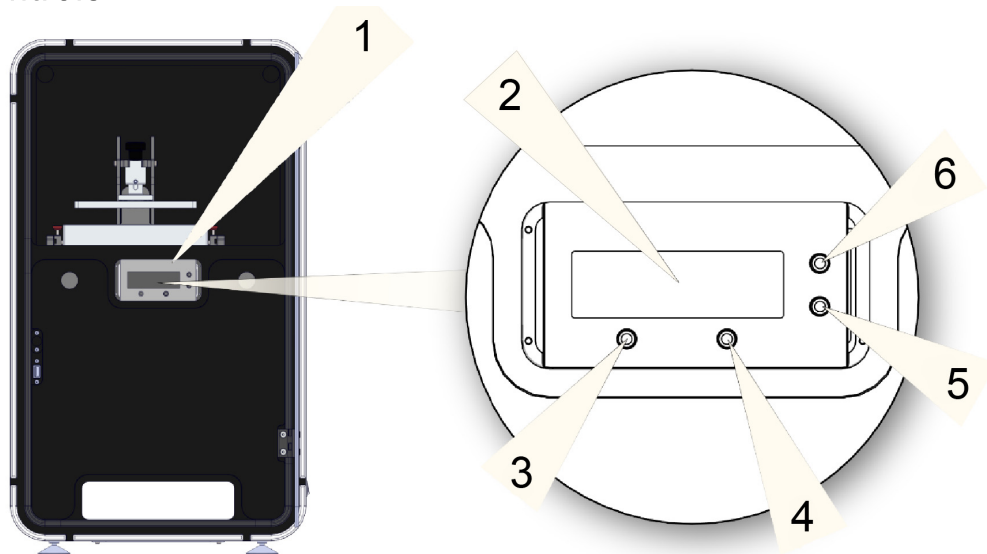
The build platform consist of tightening handle, tightening screw and the plate itself.

#### CAUTION

Do not disassemble the ball joint configuration attached to the build platform.

On how to use the build platform see section 10.3 "Levelling and installing build platform" on page 17.

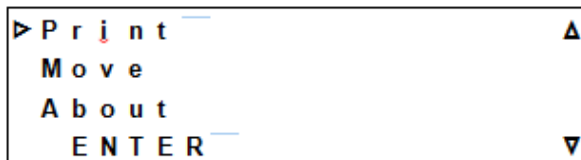
## 9.2 Printer controls



- |   |                   |   |         |   |              |   |            |   |             |   |           |
|---|-------------------|---|---------|---|--------------|---|------------|---|-------------|---|-----------|
| 1 | Control interface | 2 | Display | 3 | Enter button | 4 | Esc button | 5 | Down button | 6 | Up button |
|---|-------------------|---|---------|---|--------------|---|------------|---|-------------|---|-----------|

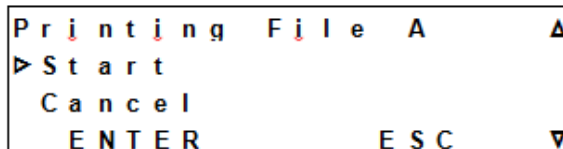
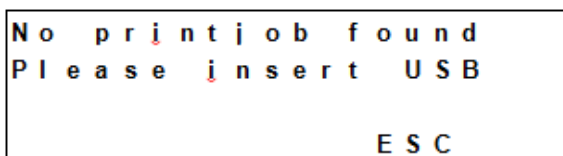
## 9.3 Printer menus

### Main menu



- Use the up and down arrow buttons to select the required menu option.
- Press **ENTER** to select the chosen option.
- *Print* enters the print menu to allow selection of the file to be printed.
- *Move* enters the move menu to allow moving of the build platform up and down.
- *About* enters the about menu, this allows control of the projector and checking system values.

### Print menu



- If no USB stick is present, the following message is displayed.
- Insert a USB stick and wait 10 seconds. The file list displays.
- Use the up and down arrow buttons to select the required print file. Keep pressing the arrow buttons to scroll the list of files.
- Press **ENTER** to select the file to print.
- Press **ESC** to return to the *Main* menu.

```

H r s   0 1 : 1 8
                                     E S C

```

```

L a y e r : 2 3   o f   4 3 5   ▲
▶ P a u s e
  C a n c e l   P r i n t
    E N T E R           R E S U M E ▼

```

- Use the up and down arrow buttons to select *Start* or *Cancel*.
- To start the printing select *Start* and press **ENTER**.
- To return to the file selection menu select *Cancel* and press **ENTER**.
- **ESC** will return to the file selection menu.

- Selecting *Start* displays the print time remaining.
- **ESC** will open the pause/cancel menu.

- Selecting *Pause* and pressing **ENTER** pauses the printing and displays the pause screen.
- Selecting *Cancel Print* and pressing **ENTER** opens the confirm cancel screen.
- To cancel printing, select *Yes* and press **ENTER**.
- To return to the pause/cancel menu, select *No* and press **ENTER**.

### Move menu

```

                                     M o v e   U p   ▲
                                     M o v e   D n
                                     E S C           ▼

```

```

                                     M o v e   U p   ▲
                                     H o m i n g
                                               ▼

```

- From the *Main* menu select the *Move* option and press **ENTER**.
- Use the **Move Up** and **Move Dn** to move the build platform.
- To return to the Main menu, press **ESC**.
- If the build platform reaches the upper limit switch it stops moving and can only be moved in the down direction.
- If the build platform reaches the lower limit switch it starts the homing calibration sequence. After homing, the build platform only moves in the up direction.
- When homing starts, the printer automatically completes the homing cycle.

### About menu

```

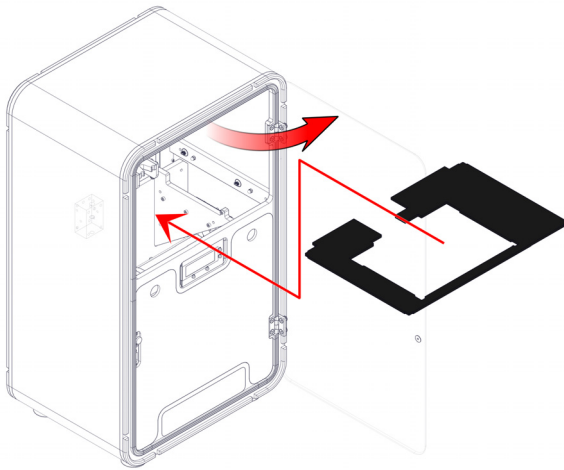
▶ P r o j e c t o r   O n   ▲
  P r i n t   H o u r s
  V e r s i o n
    E N T E R           E S C           ▼

```

- Selecting *Projector On* and pressing **ENTER** turns on the projector and projects a grid pattern. There is a 100 second delay to allow the projector to stabilise.
- Selecting *Print Hours* and pressing **ENTER** displays the total hours printed.
- Selecting *Version* and pressing **ENTER** displays the firmware version number.

## 10 PREPARATIONS BEFORE PRINTING

### 10.1 Attaching splash guard

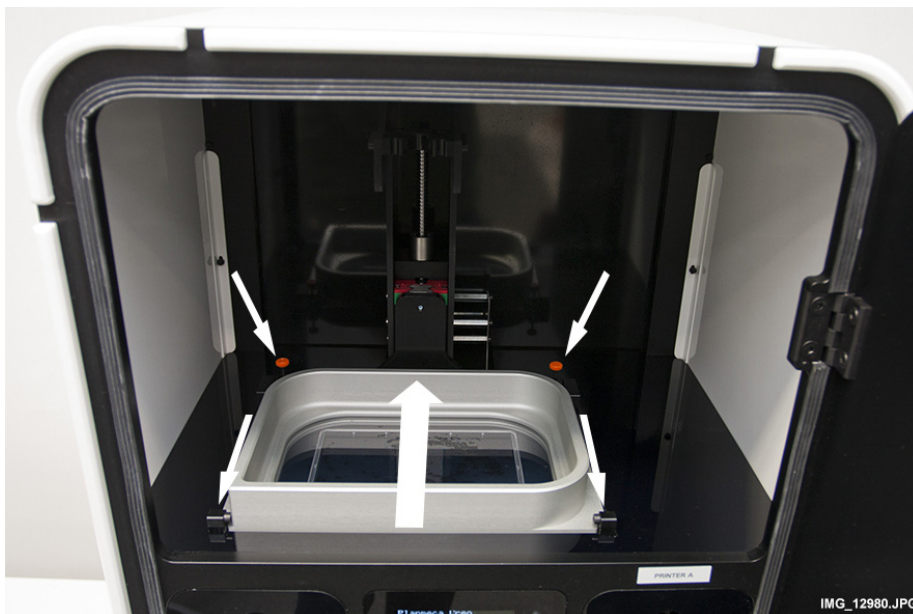


1. Remove any packaging material before attaching the splash guard.
2. Open the printer door and attach the inner splash guard as illustrated.

### 10.2 Attaching basin

1. With the attachment screws loose, place the basin in the back of the printer.
2. Attach the basin by gently tightening the screws on both sides of the basin.

A properly secured basin sits tightly in place while moving freely on hinges.



#### NOTE

Ensure the basin is securely fastened in place. Poorly secured basin may cause failed prints.

### 10.3 Levelling and installing build platform

The levelling is done to perfectly pair the flat surfaces of the build platform and respective basin.

Level the build platform every time a new build platform and basin pair is adopted.

Use one basin and one build platform per resin type. Level each basin and build platform pair together as a unit.

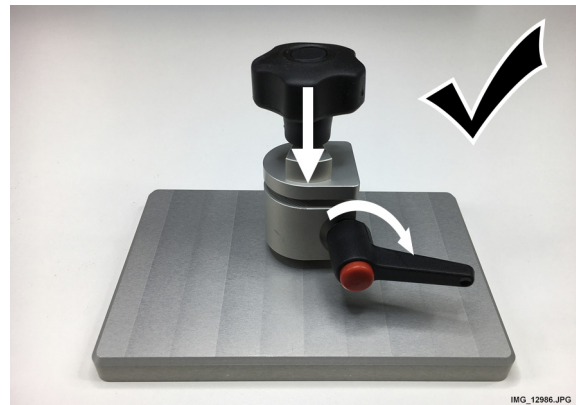
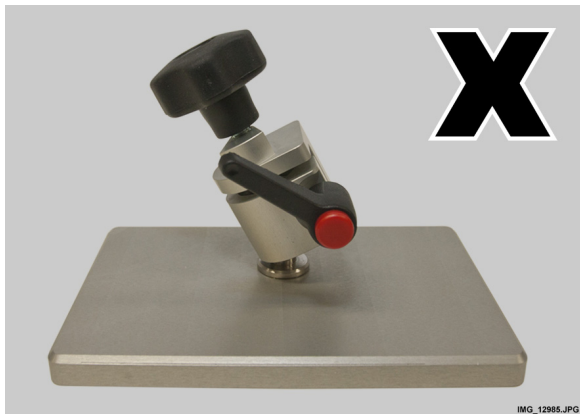
#### NOTE

If you use different resins with a platform or basin, the print can adhere to the printing components and be very difficult to remove.

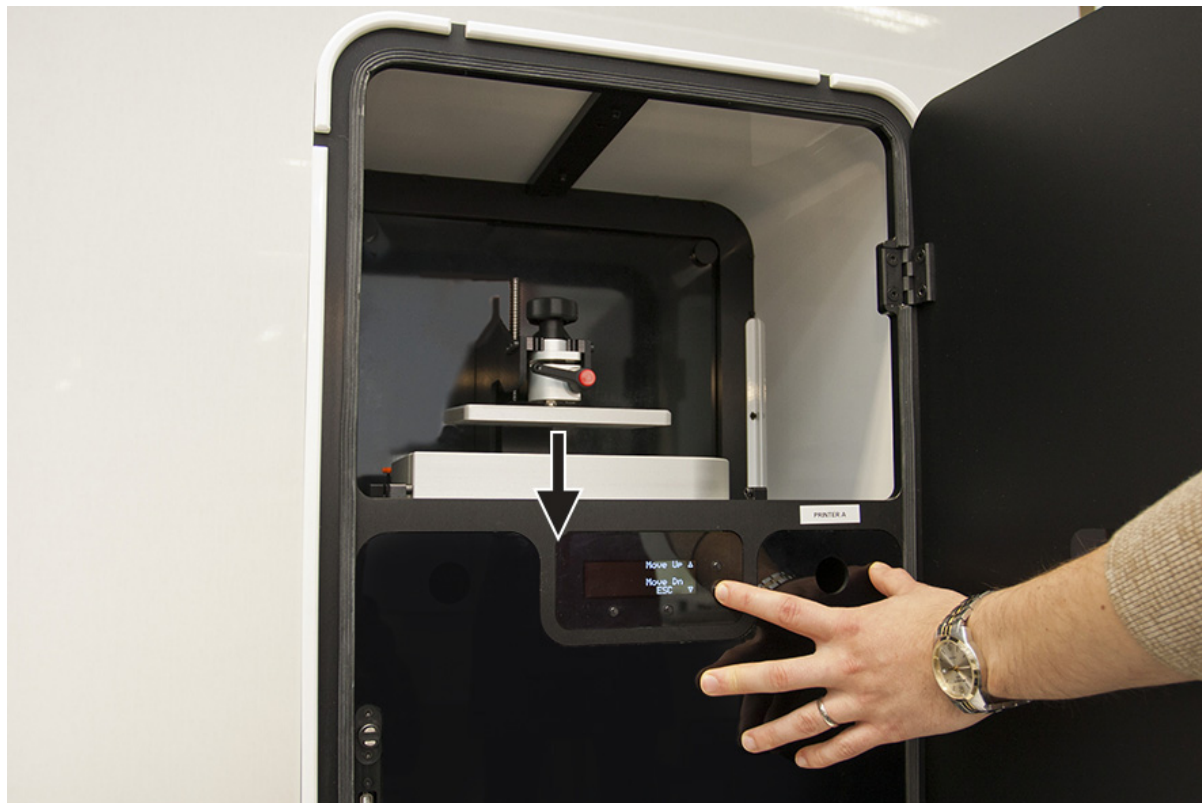
#### CAUTION

If the platform is not correctly set (too high) before initial homing it can cause failed prints or lead to a broken basin.

1. Place the platform (printing surface down) onto a clean surface.
2. Open the Ball joint by turning the lever counter-clockwise.
3. Adjust the build platform so that the adjustment screw is in its lowest position and perpendicular to the build platform, then slightly tighten the adjustment screw. Tighten the lever to lock the initial position of the build platform.



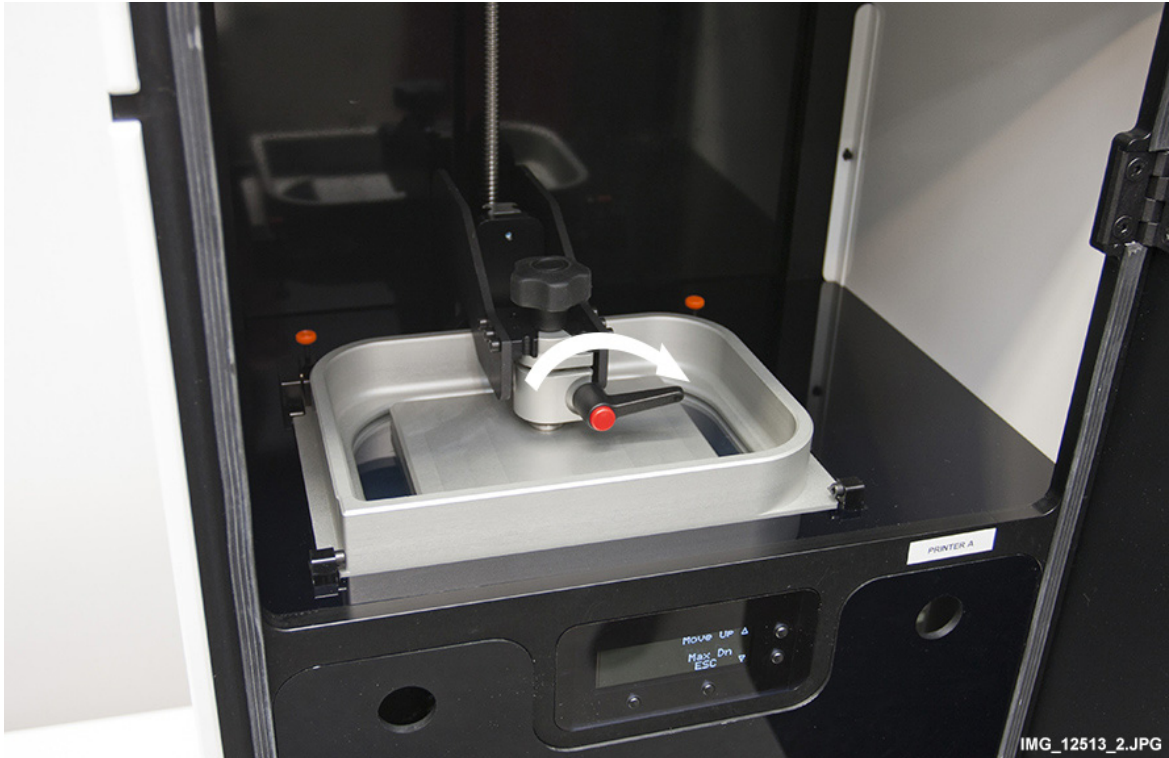
4. Mount the build platform to the printer.
5. Drive the motor down until the printer initiates and completes a homing cycle.



6. Release the clamp by opening the handle.

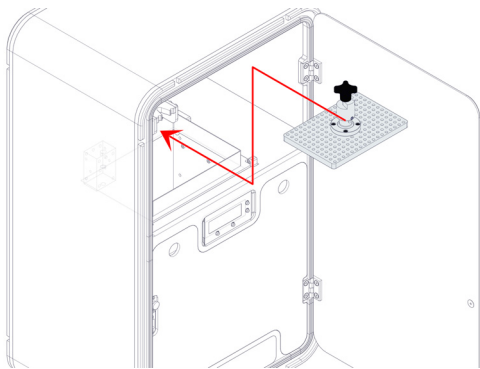


7. Tighten the handle to lock the position. If necessary, amend position for ideal alignment.



To prevent the handle from touching the resin you can adjust its position by pushing the red button and turning the handle

#### 10.4 Calibrating printer (cubes calibration)



Before beginning normal printing, perform a printer calibration test-print to ensure that Planmeca Creo Studio and the printer are aligned.

Additionally the calibration print ensures that the build platform and basin have been successfully leveled. The calibration job prints five cubes onto the build platform. The four corner cubes are measured for calibration values and the fifth center cube is printed to ensure that the whole printing surface is leveled.

For full description of the calibration process, see section 11.1 "Calibration print" on page 24.

## 10.5 Filling basin

### NOTE

Only fill the basin when it is installed in the printer. DO NOT fill the basin on the bench.

### NOTE

Always fill the basin with the 3D printing material chosen for the print job. The material is chosen in the print job configuration in Planmeca Creo Studio software.

### NOTE

To protect your hands and eyes (the resin can cause reactions over time), and to avoid getting oil from skin onto sensitive surfaces, wear gloves at all times.

1. Install the basin and the build platform into the printer before starting to fill the basin.
2. Shake the resin in the bottle for 5 minutes before use. This mixes the pigment properly and ensures even spread of colour.

### NOTE

Extra particles in the basin may break the basin. If necessary filter the material before printing.

### CAUTION

The basin-bottom surface is very easy to damage using scraper, tools or fingernails. The ceramic bottom can be cracked by improper motion of the build platform.

3. Pour the resin into the basin slowly giving it time to spread across the whole of the basin. Pouring too quickly can lead to a spill over the side of the basin. There is enough resin when it is approximately to the upper surface of the build platform. This ensures that the basin contains sufficient resin for the print job.

### CAUTION

Before starting to print make sure you have enough material in the basin.

### NOTE

In Planmeca Creo Studio, when you generate a print job disregard the “resin required” amount. This refers only to the total resin cured into the print itself, not to the amount required inside the basin for a successful print. Excess resin can be returned to the bottle.

### NOTE

Use one build platform and basin per material.

4. Replace the cap on the resin bottle as soon as filling is finished. Any light entering the resin container will start the curing process.

### NOTE

Any spills should be cleaned immediately with Isopropyl Alcohol (IPA) (96%) or Ethanol (96%), if left they will cure making cleaning more difficult.

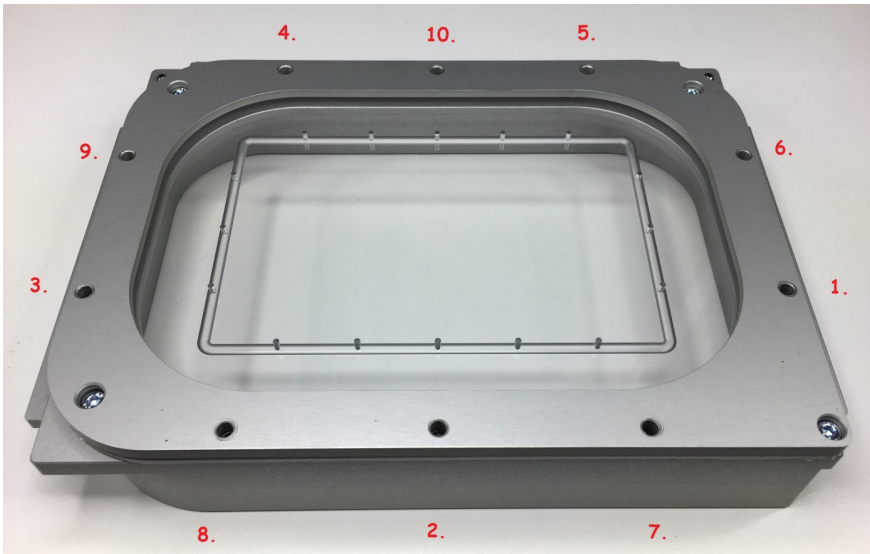


### 10.6 Replacing Teflon film

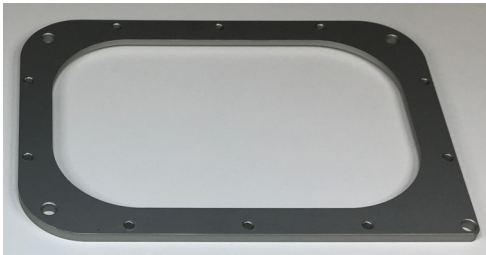


The Teflon film needs to be replaced if leakage is detected or visible scratches develop on the surface.

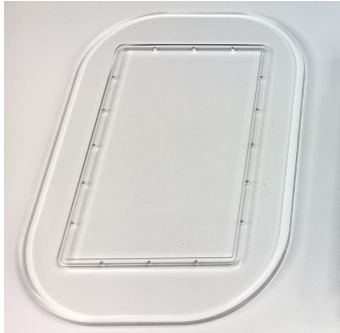
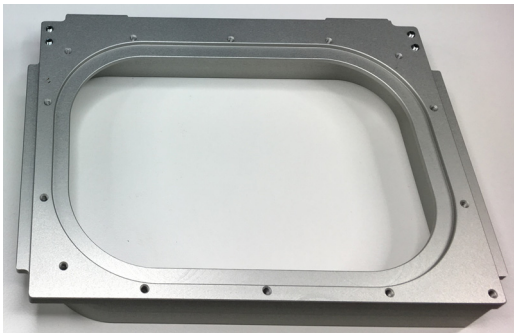
1. Start by loosening the 10 screws in the order illustrated.



2. Remove the outer frame.



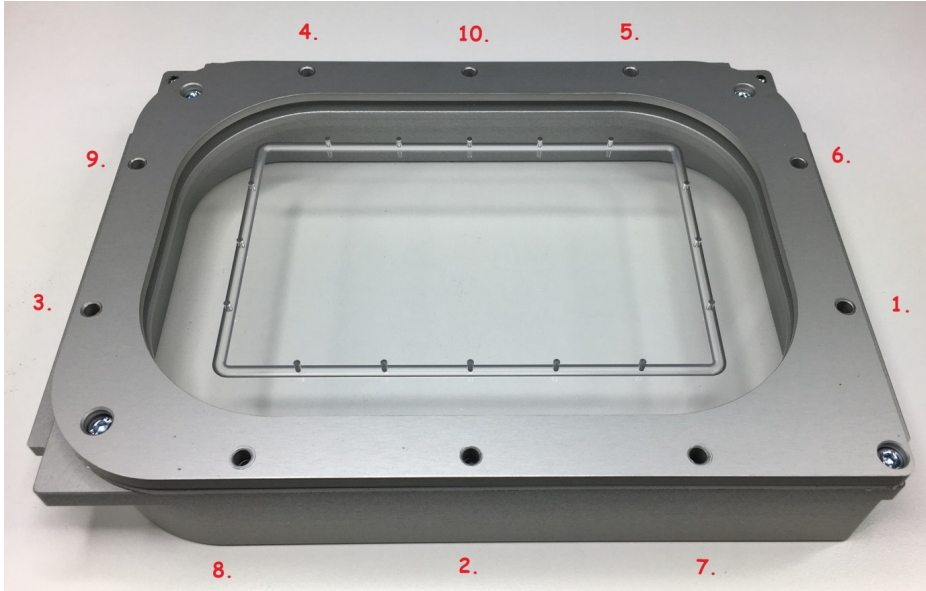
3. First remove the acrylic glass and then the 4 remaining bolts..





4. Remove the frame with the Teflon film attached to it and replace the old film frame with a new one.
5. Secure the frame with the 4 bolts without fully tightening them.
6. Embed the acrylic glass back. Ensure cleanliness, wipe surface if necessary.

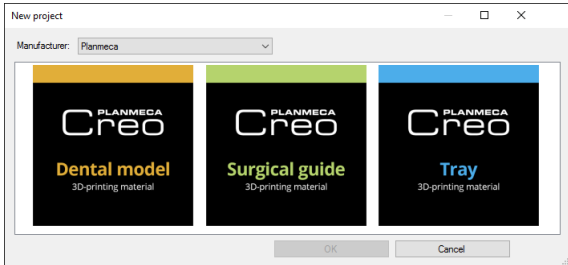
7. Reattach the outer frame by inserting the screws to appropriate holes.
8. Gently tighten the 10 screws in the order illustrated. Once all the screws are loosely attached tighten them as tight as you can



# 11 PRINTING

## 11.1 Calibration print

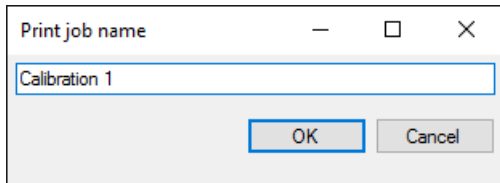
1. Open Planmeca Creo Studio software.
2. Start a new project.
3. Choose material to 3D print on. The default material for calibration is Dental model.



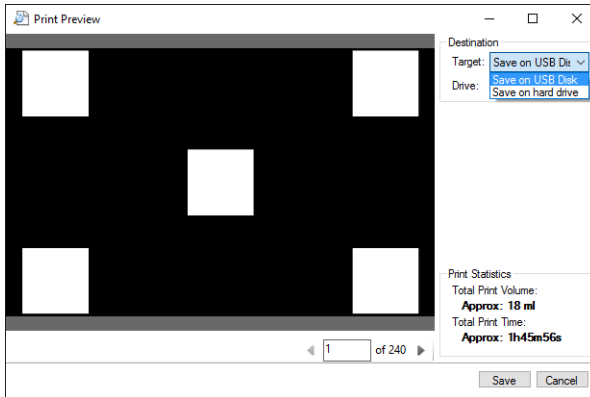
4. Click **Tools - Calibration file**.  
Studio loads the default calibration file.

### CAUTION

Do not move the model using the Planmeca Creo Studio tools.



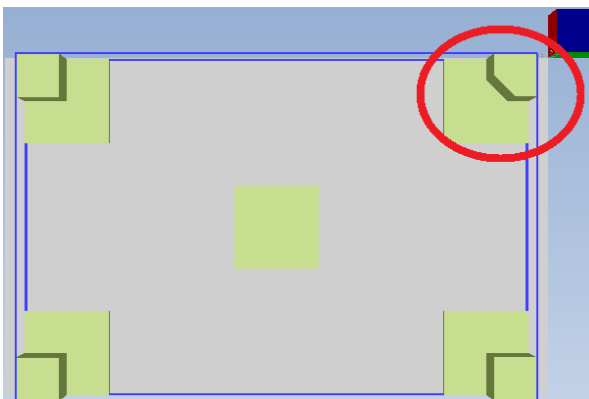
5. Click **Generate Print Job**.  
The calibration process may require multiple calibration prints. It is therefore recommended to name the print job in a manner that allows you to keep track of the calibration process. Give the print job a name that includes a date and version number.
6. Start calibration print.

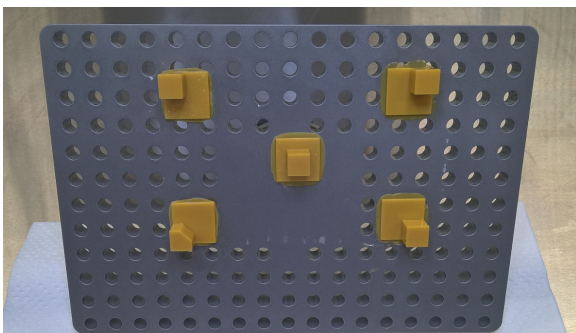


- a. Check the print preview and save to USB.
- b. Insert USB stick into the printer.

For more information, see 11.2 "Printing" on page 26.

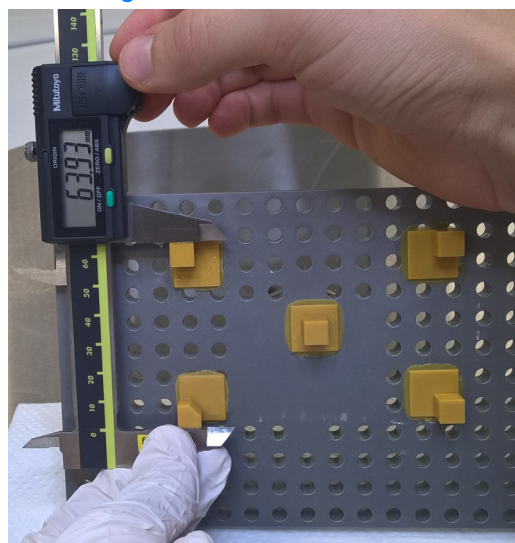
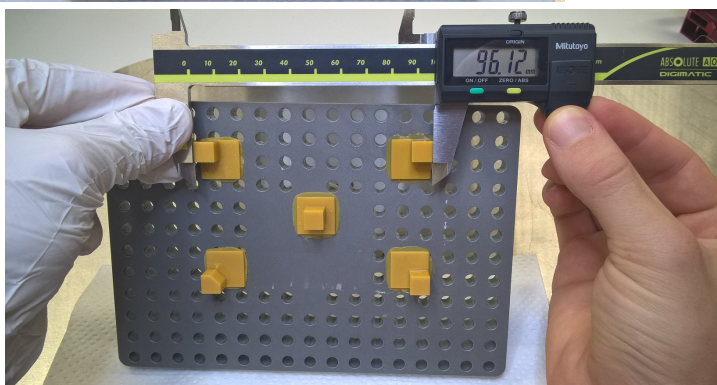
7. After successful completion of the printing process, clean and dry the platform and cubes and measure the distance between edges of cubes in all four sides.



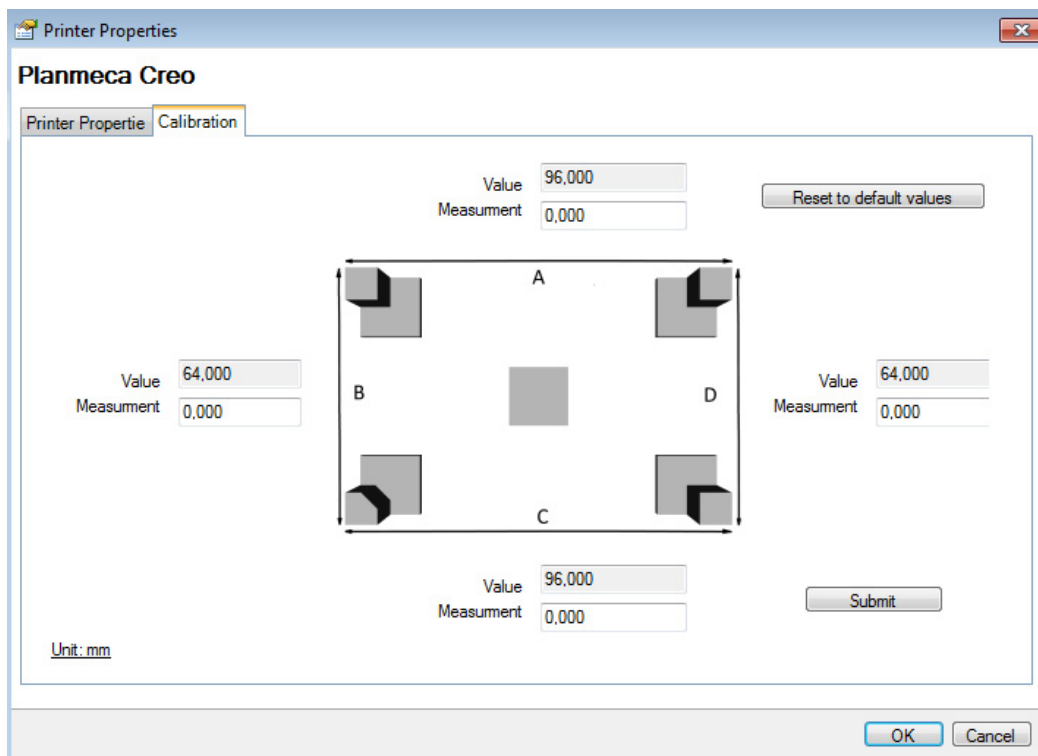


**NOTE**

Pay attention to the position of the cube with the truncated corner when measuring, as this corresponds to the calibration screen and allows accurate recording of measurements.



8. Click **Tools - Printer manager**.  
If you have multiple printers in your network, select the appropriate printer.
9. Click **Printer Properties** and the **Calibration** tab.
10. Enter the measured values into the corresponding boxes.



11. Click **Submit**.  
Repeat the calibration process from step 4 until the measured distances between the printed cubes are within the tolerance of  $\pm 0.2$  millimetres.
12. If calibration is not within stated accuracy of  $\pm 0.2$  millimetres after 3 calibration attempts, select "Reset to default values" to start the process again.

### CAUTION

Back up your printer settings file as soon as you finish calibration of the printer. Keep the back up file on a separate device to the PC on which you have Planmeca Creo Studio installed. For more information on saving your printer settings, see 14 "TECHNICAL SPECIFICATIONS" on page 40.

## 11.2 Printing

### CAUTION

Do not block the slots and openings on the printer provided for ventilation.

1. Process a part to print using Planmeca Creo Studio (for detailed description see section 13.6 "Creating new project" on page 36).
2. Download file to USB stick.
3. Insert USB with the required print file into the printer USB port.

### NOTE

It can take up to 10 seconds to list the print files.

4. Select **Print**.
5. Select the file to print.
6. Press **Start**.
7. Wait for the timer to appear.

### NOTE

The larger a print is, vertically, the longer the print time.

### NOTE

The printer can pause and resume, but if there is a power failure or the printer switches off for any other reason, printing suspends and cannot resume. Clean out resin and printed material and start again.

8. Remove the USB stick.
9. Close the door.
10. Wait for the print to finish (the logo will flash when the print has finished)
11. Continue to section 12 "AFTER PRINTING" on page 27.

---

## 12 AFTER PRINTING

### 12.1 Removing build platform

To avoid getting resin inside the printer, raise the build platform and remove it before removing the basin.

### 12.2 Removing prints from build platform and post-processing

Before removing the print from the platform it should be washed in IPA or Ethanol to remove all excess resin. This can be done by washing in a tank.

The prints should be removed using the scraper provided.

1. Place the platform long edge down on a flat surface covered with an absorbent cloth to catch any resin.
2. Using the scraper work it gently under one corner of the print.
3. Repeat working the scraper under all the corners, rotate the platform if required.
4. Go lightly around the edges using the scraper, and gradually separate print from platform.

#### NOTE

Trying to remove the print working only from one corner can cause the print to break.

#### CAUTION

Be careful with not to damage yourself or the platform surface with the scraper when removing the print from the platform.

5. To make part removal easier and reduce the chance of platform damage use the scraper at the shallowest angle possible.
6. Once the print is free of the build platform it needs to be post-processed. The prints need to be cleaned from uncured resin and cured in an UV curing unit before use.

#### NOTE

For more post-processing instructions, see the resin's own instructions.

## 12.3 Cleaning build platform

After the printed part has been removed from the build platform it should be cleaned from uncured resin with IPA or ethanol. Use only solvents that leave no residue. If available, use of an ultrasonic tank will help. When handling the build platform always wear gloves. Any contamination of the printing surface can lead to failed prints.

1. Using IPA / ethanol (96%) clean the build platform every time you finish printing, ideally.
2. Clean the platform with a steam cleaner. Otherwise rinse thoroughly in IPA / ethanol (96%) bath.

### NOTE

Dry the build platform thoroughly to ensure that no IPA / ethanol (96%) remains on the surfaces, as this can interfere with the print.

### NOTE

The build platform should be cleaned at least once a day at the end of the workday.

## 12.4 Removing, emptying and cleaning basin

### CAUTION

Always use a microfibre cloth to wipe and dry the Teflon film. Do not use paper towels.

### CAUTION

The basin should only be removed from the printer after the build platform has been removed, otherwise drips from the build platform can damage the projector causing permanent damage.

### CAUTION

The basin-bottom surface is very easy to damage using scraper, tools or fingernails. The ceramic bottom can be cracked by improper motion of the build platform.

### CAUTION

Do NOT remove cured resin from basin using scraper. Use the UV flashlight and resin puller. Cure the resin close to the cured section for 15-60 seconds depending on the material and size of the part to be removed, then peel it away. This works better if the basin is emptied of most leftover uncured resin first. For detailed instructions see section A.2.3 "Removing cured resin from basin glass" on page 45.

1. Have a flat stable surface ready to place the basin before removal from the printer.
2. Undo the orange basin retaining screws by 2 turns, you do not need to remove them completely.
3. Pull the basin forward until the front of the basin sides touch the front frame lugs.



4. Lift the back of the basin clear of the rear bearings.
5. Slide the basin backwards clear of the front limit bolts and remove from the printer. The basin has 2 plastic feet to prevent the glass touching a surface.

### NOTE

Uncured resin can be reused and should be returned to the original bottle.

6. Pour the resin back into the resin bottle using a filtered funnel with a pore size of < 100 microns.  
When you filter resin back into bottle for reuse, remember to shake the bottle thoroughly the next time you pour resin into the basin. This mixes the pigment properly

### CAUTION

Do not leave resin in the printer after printing.

7. After emptying, using IPA or ethanol clean the basin every time you finish printing, ideally.
8. Wipe basin clean with ordinary paper, dry with compressed air to ensure no paper fibres remain. Otherwise rinse thoroughly in IPA / ethanol (96%) bath.

### NOTE

Dry the basin thoroughly to ensure that no IPA / ethanol (96%) remains on the surfaces, as this can interfere with the print.

### NOTE

The basin should be cleaned at least once a day at the end of the workday.

9. Use only solvents that leave no residue. If available, use of an ultrasonic tank will help. When handling the basin ensure no sharp objects touch the inner glass surface, this has a delicate surface coating.

### CAUTION

If the surface becomes damaged the basin will not work.

## 12.5 Cleaning outside surfaces of printer

1. Before cleaning, turn off the printer and unplug it from the wall outlet.
2. Use a soft cloth moistened with mild detergent to clean the outside surfaces of the printer.

### **CAUTION**

Do not use liquid cleaners or aerosol cleaners.

### **CAUTION**

Do not use abrasive cleaners, waxes or solvents to clean the printer.

### **CAUTION**

Clean any spills immediately with Isopropyl Alcohol (IPA) (96%) or Ethanol (96%). If left they will cure making cleaning more difficult.

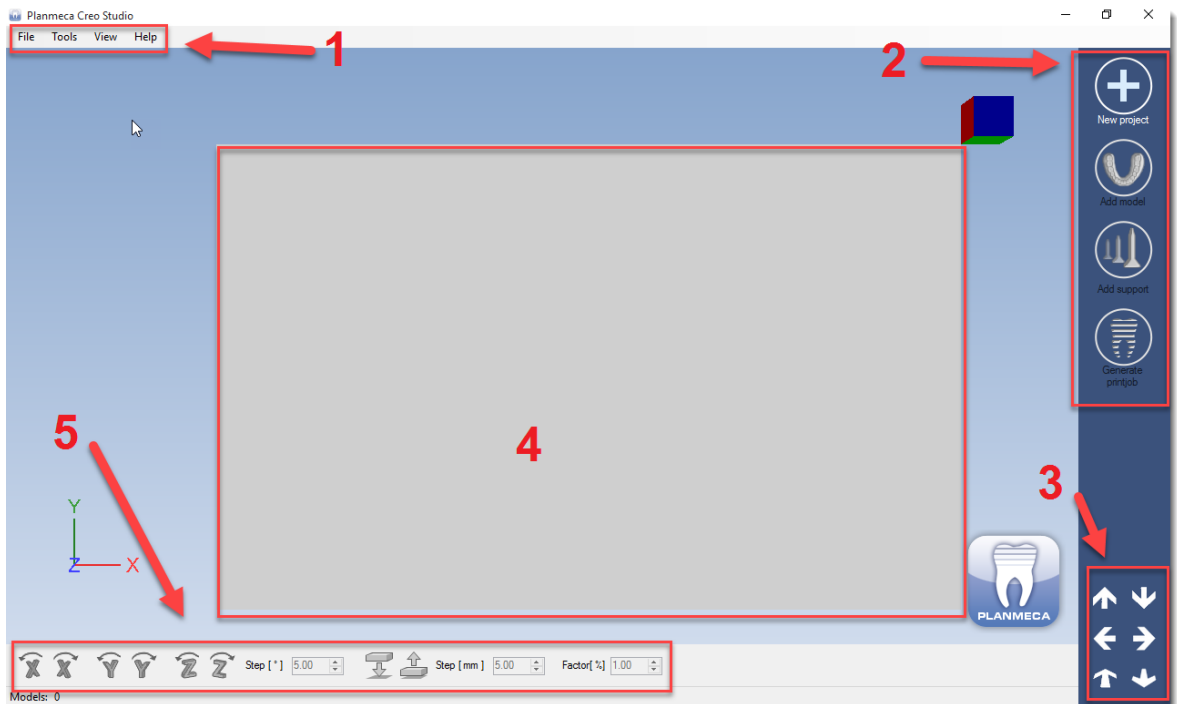
- If the printer is not being used for a long period of time disconnect the power plug from AC outlet.

# 13 PLANMECA CREO STUDIO SOFTWARE

Planmecca Creo Studio supports the Windows operating systems XP, Vista, 7, 8 and 10.

Planmecca Creo Studio is a software created specifically to be used with the Planmecca Creo 3D printer.

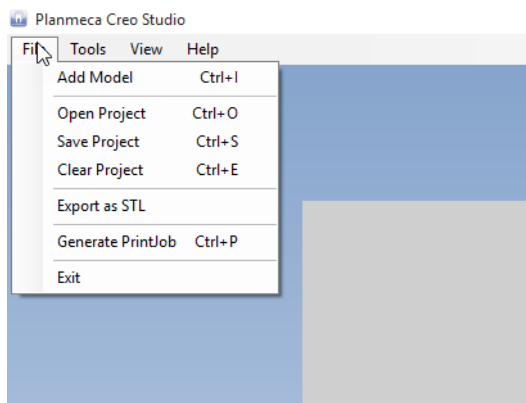
## 13.1 Overview



1 Top menu 2 Control panel 3 Default views 4 Print area 5 Bottom menu

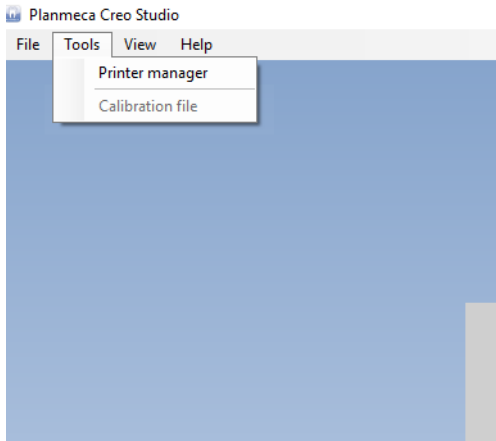
### 13.1.1 Top menu

#### File



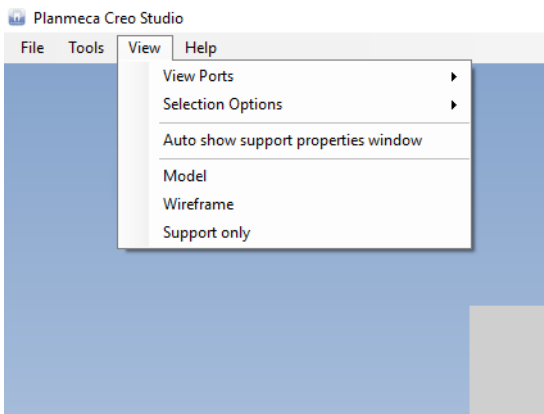
- **Add model (Ctrl + L)**  
Adds new model (.stl) file to existing project;
- **Open project (Ctrl + O)**  
Opens previously saved projects
- **Save project (Ctrl + S):**  
Saves existing project
- **Clear project (Ctrl + e):**  
Deletes all model files and material information from existing project
- **Export as .stl:**  
Exports existing models as .stl file from Studio
- **Generate print job:(Ctrl+p):**  
Creates print job for printer
- **Exit:**  
Closes Planmecca Creo Studio

## Tools



Printer manager: Opens the Printer Manager menu, where user can perform printer calibration, name the printer and add another Planmeca Creo 3D printer to Planmeca Creo Studio on specific computer.

## View



View ports (top, left, right, bottom, front, back views): default preset view of working area;

Selection options. annotations: displays/hides models dimensions;

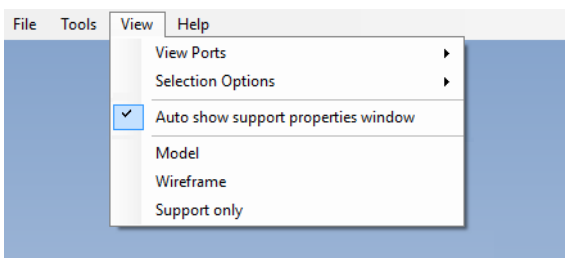
Selection options. XYZ Axis: shows/hides XYZ Axis on working area;

Models: shows/hides models displayed on working area;

Wireframe: activates wireframe only mode for displayed models;

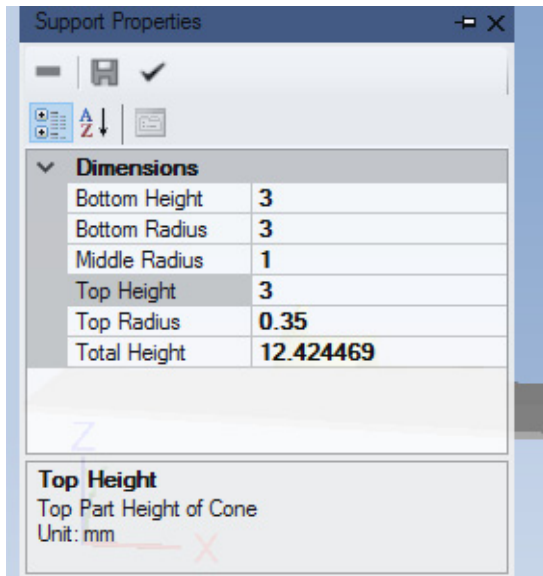
Support only: hides any models displayed on working area, leaving supports only view.

It is possible to edit the properties of the support structures.



To use this function, select the **Autoshow support properties window** option.

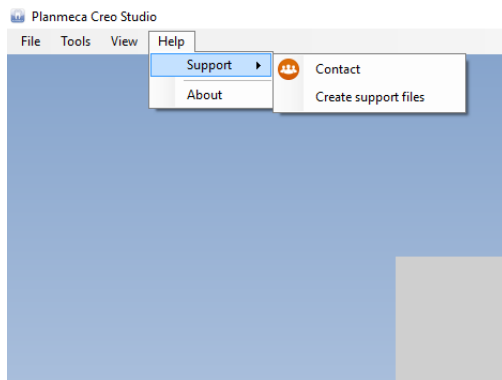
Select / highlight one of the supports on the model.



The supports editor appears automatically, and disappears when you deselect the support.

For more information on editing supports, see 13.10 "Editing support structures" on page 38.

## Help



Support: Allows you to contact technical support or generate support files

Planmeca After Sales can retrieve all settings information from a specific Planmeca Creo Studio installation after receiving support files by e-mail. To create these files:

Click Help - Support - Create support files

Planmeca Creo Studio creates a ZIP file for e-mailing

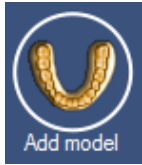
Support files contain the following information:

- Logging folder: The information logged during the printing process
- Materials folder: The material used in the print job
- Models folder: The calibration model STL file
- Settings folder: Performance settings and printers settings
- About: Displays version and technical information about Planmeca Creo Studio

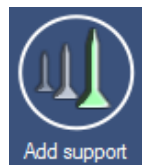
### 13.2 Control panel



- **New project:**  
Creates a new project for Planmeca Creo 3D Printer;



- **Add model:**  
Adds model to the project;



- **Add support:**  
Adds supports to the model;



- **Generate print job:**  
Creates a print file for Planmeca Creo 3D Printer.

### 13.3 Default views

Default preset views of working area:



- Front view
- Back view



- Left view
- Right view



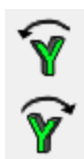
- Bottom view
- Top view

### 13.4 Bottom menu

Bottom menu functions help control the models on the working area:



- Rotate X counter-clockwise:  
moves parts on X direction
- Rotate X clockwise:  
moves parts on X direction



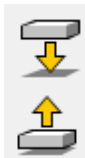
- Rotate Y counter-clockwise:  
moves parts on Y direction
- Rotate Y clockwise:  
moves parts on Y direction



- Rotate Z counter-clockwise:  
moves parts on Z direction
- Rotate Z clockwise:  
moves parts on Z direction



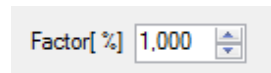
- Step [°]:  
Sets a minimum step for above mentioned operations in mm



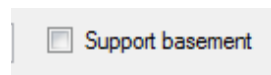
- Lower model down:  
Moves the models down
- Lift model up:  
Moves the models up



- Step [mm]:  
Sets a minimum step for lifting and lowering the models.



- Factor [%]:  
Allows you to change the overall scale of the model without beginning a new project



- Support basement:  
Adds a printed base to the model to assist in securing the print to the build platform

## 13.5 Print area controls

### NOTE

The print area indicated in the software is the actual size of the print area, not the one of the platform.

Print area can be controlled using windows mouse:

- For moving the models on the platform use the left mouse button
- To zoom in and out scroll the mouse wheel
- To pan the print area press and hold the mouse wheel
- To rotate the print area use the right mouse button

### NOTE

For quick change of views use the preset views buttons on bottom right corner.

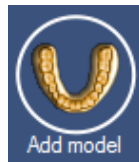
## 13.6 Creating new project

The type of project depends on the nature of parts you are going to print. Each type of part in 3D printing in dentistry has each own specifically developed material. Properties of which meet application requirements that you are trying to 3D printed parts in. For example: Surgical guide material is used for printing dental surgical guides only because application requires for material to be safe for handling in patients mouth and safe with contact with patients blood.

### CAUTION

**Do not use materials if they are not designed for your application.**

## 13.7 Printing dental models



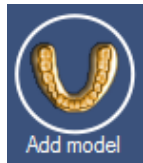
1. Prepare .stl file of a dental model.
2. Click **New project**.
3. Select **Dental model** in material selection.
4. Click **OK**.
5. Select **Add model**.
6. Position parts on the platform.
7. Click **Generate print job**.
8. Save on USB flash drive (for detailed information see section 13.12 "Saving print job to USB" on page 38).

### NOTE

**The actual model will have the exact same colour as the colour of the parts loaded to the platform. For dental models the colour is gold yellow.**



## 13.8 Printing surgical guides

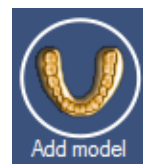


1. Prepare .stl file of a dental model.
2. Click **New project**.
3. Select **Surgical guide** in material selection.
4. Click **OK**.
5. Select **Add model**.
6. Position the parts on platform.
7. Click **Generate print job**.
8. Save on USB flash drive (for detailed information see section 13.12 "Saving print job to USB" on page 38).

### NOTE

The actual guide will have the exact same colour as the colour of the parts loaded to the platform. For surgical guides the colour is light green.

## 13.9 Printing impression trays



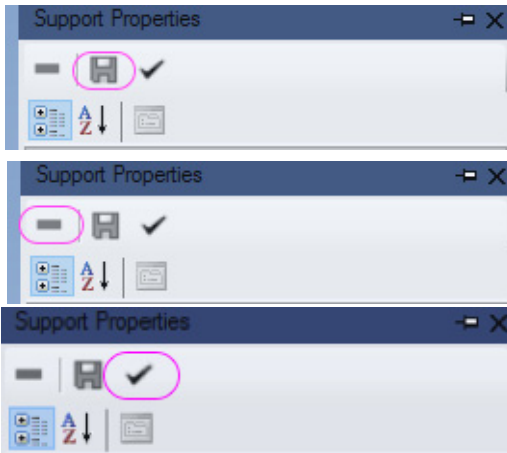
Prepare .stl file of a dental model.

1. Click **New project**.
2. Select **Tray** in material selection.
3. Click **OK**.
4. Select **Add model**.
5. Position parts on the platform.
6. Click **Generate print job**.
7. Save on USB flash drive (for detailed information see section 13.12 "Saving print job to USB" on page 38).

### NOTE

The actual model will have the exact same colour as the colour of the parts loaded to the platform. For tray models the colour is light blue.

## 13.10 Editing support structures



1. Highlight one of supports placed on the model.
2. Edit the dimensions according to the options listed in the **Dimensions** section of the **Support Properties** menu.
3. Click the save symbol to save the settings for the selected support.
4. Click the delete symbol to delete the selected support.
5. Click the update all symbol to apply the new settings to all supports on the model.

### CAUTION

Default settings apply when new supports are placed. Place all support structures first, then change their settings.

## 13.11 Generating print job

This is a process where Planmeca Creo Studio prepares a project for 3D printing on Planmeca Creo 3D Printer. The software cuts parts into slices for the printer to build a part from liquid material.

To generate a job:

1. Click on **Generate print job**.
2. In the opening *Print Preview* menu click **Next Slice** to view each individual slice for your planned project.

The print statistics shows:

- Approximate total print volume in ml.
- Approximate total print time.

### NOTE

It is important to not to have completely black slices on a print preview screen as they lead to print failure.

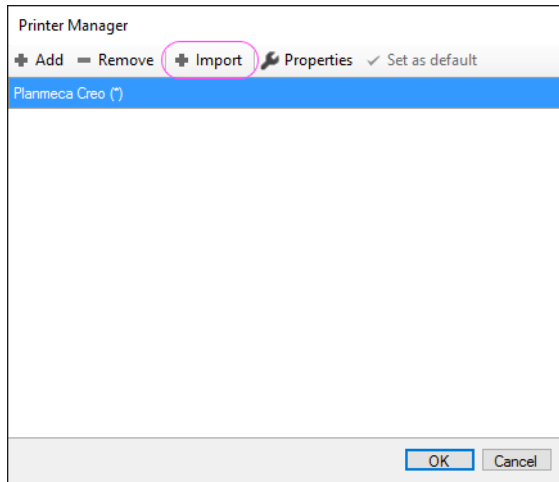
## 13.12 Saving print job to USB

Planmeca Creo 3D printer reads files for printing only created in Planmeca Creo Studio and only when saved onto USB flash drive.

To save your project:

1. Select **Save on USB** in target section of destination information.
2. Select relevant drive in drop-down menu of section **Drive**.
  - If your USB is not showing in the drop-down menu click **Refresh**.
3. Click **Save**.

## 13.13 Importing printer settings



Printer Manager provides the option to import printer settings.

Importing the printer settings allows you to, for example, transfer Planmeca Creo Studio to another PC, reinstall the PC operating system or reinstall Planmeca Creo Studio without needing to recalibrate the printer.

The option is available from the Printer Manager menu.

1. Click **Import**.
2. Choose the Printer Settings.XML file.
3. Click **Open**.

Planmeca Creo Studio adds the printer (or printers) saved in this XML file.

## 14 TECHNICAL SPECIFICATIONS

Print technology	Digital Light Processing (DLP)
Resolution (XY)	68 µm
Layer thickness	50 µm
Light source	LED
Guaranteed LED life	5,000 hours
Build volume / print area	130mm x 81mm x 130mm (5.1 x 3.5 x 5.1 in.)
Power	100v-240v AC 3A
Weight	31 kg (68.3 lbs)
Dimensions (W x H x D)	425 mm x 740 mm X 320 mm (16.5 in. x 28 in. x 12.5 in.)
Minimum required clearances	Front: 50 cm (19.7 in.) Sides: 50 cm (19.7 in.) Rear: 50 cm (19.7 in.) Top: 50 cm (19.7 in.)
Operating temperature	15-32 °C (59-89.6°F)

## 15 DISPOSAL

Do not throw this electronic device into the trash when discarding. To minimize pollution and ensure utmost protection of the global environment, please recycle. For more information, please see the Waste from Electrical and Electronics Equipment (WEEE) regulations.

The approved printing resins in their fully cured form are not environmentally harmful and may be disposed with regular plastic waste. Residual waste material in its liquid state should be delivered to a collection point for waste material.

# Appendix A: TROUBLESHOOTING

---

The Planmeca Creo 3D printer does not display error messages, but a print can fail as a result of technical issues.

A failed print refers to a printed part that is geometrically incorrect, or to the fact that the printing process has failed to produce the part.

An interrupted printing process can result in parts of the prints getting stuck to the basin glass and build platform.

## NOTE

The printer can pause and resume print jobs, but if a power failure or other issue occurs to interrupt the print job, the printer cannot resume. Clean the parts and begin the print job again.

## A.1 TROUBLESHOOTING TABLES

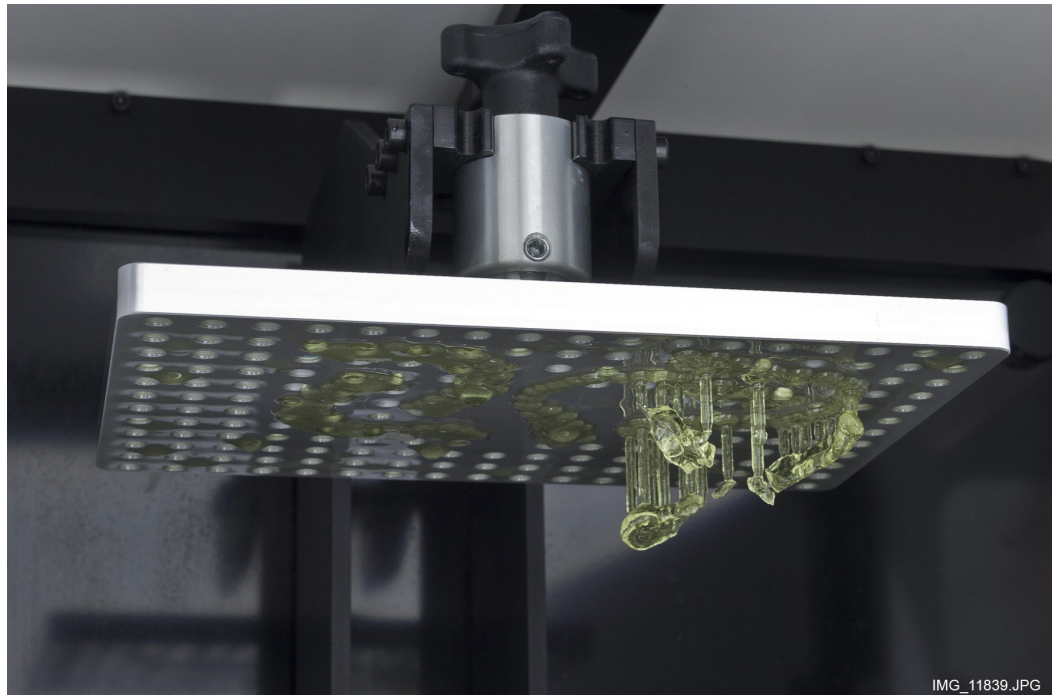
### A.1.1 Print fails to attach to build platform

Possible cause	Solution
Build platform set too high	Check that the build platform homes correctly and the calibration gap is OK.
Build platform is not clean	Check that the build platform is completely clean and free of contamination, especially oils. Handling the build platform without gloves can leave traces of oil.
Not enough resin in the basin	Check that the resin is filled to the top of the build platform at minimum, plus the volume needed for the printed part.
Small parts positioned over a build platform hole	If you are printing small parts and they are positioned over a build platform hole, the parts may not attach to the build platform with sufficient strength. Make one of the following changes: <ul style="list-style-type: none"> <li>• Move the part on the build platform</li> <li>• Add a support basement to the part</li> </ul>
Part base smaller than largest cross section	If you print a cone with the point to the build platform, for example, the print can detach when the force between the basin and the printed part becomes greater than the force holding the part to the build platform. <ul style="list-style-type: none"> <li>• Change the orientation of the part</li> <li>• If you cannot change the orientation of the part, add supports to the part where the cross section starts to increase</li> </ul>
Resin-contaminated build platform or basin	If you use the build platform or basin with multiple different resin-types, the print can fail to attach to the build platform. Use only the appropriate resin for the build platform and basin pair.
Support is too long and thin	If the supports are long and thin enough to move during the print process, new support layers can fail to attach to the rest of the support and instead attach to the basin. Thicken the support in Creo Studio, and try the print again.

### A.1.2 Print cannot be removed from build platform

Possible cause	Solution
Resin contaminated platform or basin	If the build platform or basin has been used with multiple different resin-types, the print can adhere very strongly to the build platform. Use only the appropriate resin for the build platform and basin pair.

### A.1.3 Print is misshapen or incorrect



Possible cause	Solution
Supports too long and thin	If the supports are long and thin enough to move during the print process, the printing of the support part can fail. Thicken the support in Creo Studio, and try the print again.
Basin not secured	A loose basin can cause a variety of artefacts in the print. Alternatively, a loose basin can allow one print to complete successfully, but cause failure in the next print job. Tighten the basin fixing screws. Check that the basin still pivots.
Resin-contaminated build platform or basin	If the build platform or basin has been used with multiple different resin-types, the print can deform due to resin coagulating, over-curing or under-curing. Over-curing and under-curing can both happen within the same print. Use only the appropriate resin for the build platform and basin pair.
Parts with angled walls	Non-solid parts with angled walls can cause the print to be "levered" off the build platform. Add supports to the angled face.

## A.2 TROUBLESHOOTING TASKS

### A.2.1 Cured resin present in printer

The 3D print job can fail as a result of small fragments of cured resin being present in the printer, particularly suspended in the uncured resin in the basin and on the build platform. This issue is the result of a print layer separating from the basin improperly after curing, causing small fragments to come loose and interfere with the subsequent layers.

To clear the printer of cured resin:

1. Move the build platform up and allow the uncured resin to drip into the basin.
2. Remove the build platform.
3. Remove the basin and drain the uncured resin through a funnel and filter back into the resin container. Uncured resin can be reused as long as it is filtered thoroughly.
4. Clean the basin and build platform, removing the failed print from the build platform at the same time.

For more information, see sections 12.3 "Cleaning build platform" and 12.4 "Removing, emptying and cleaning basin" on page 28.

5. Replace the basin and build platform.
6. Restart the print job.

### A.2.2 Print layer stuck to basin floor

The 3D print job can fail as a result of a resin layer remaining behind on the basin floor after curing. The UV light can cure the resin layer and cause it to adhere to the basin floor instead of the previous print layers, which puts the subsequent build platform motions out of configuration.

To clear the printer of a misplaced resin layer:

1. Move the build platform up and allow the uncured resin to drip into the basin.
2. Remove the build platform.
3. Remove the basin and drain the uncured resin through a funnel and filter back into the resin container. Uncured resin can be reused as long as it is filtered thoroughly.
4. Remove the failed resin layer from the basin.

Take particular care not to damage the basin floor.

For more information, see A.2.3 "Removing cured resin from basin glass" on page 45.

5. Clean the basin and build platform.
6. Replace the basin and build platform.
7. Restart the print job.



### A.2.3 Removing cured resin from basin glass

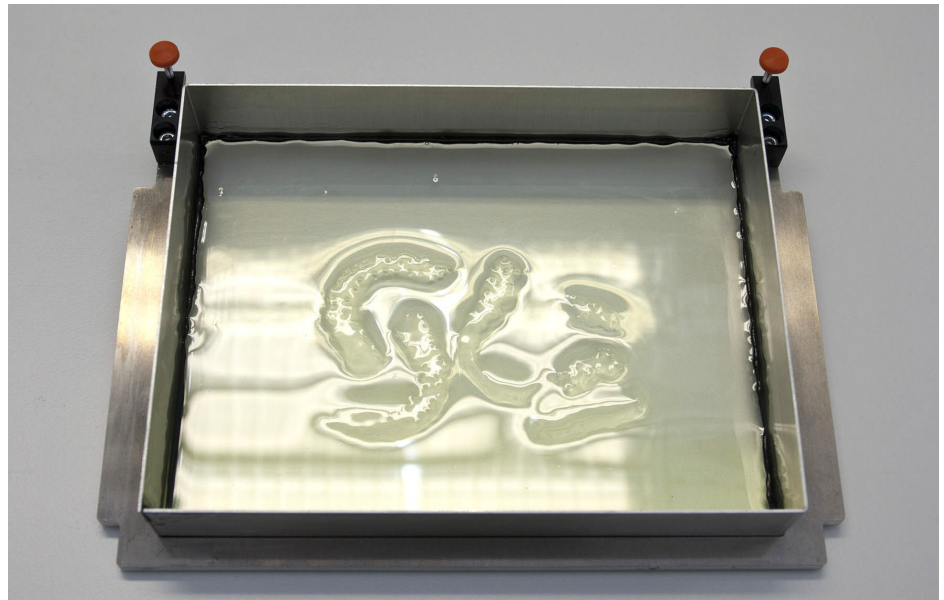
For this procedure, use the detachment knob and a UV flashlight to cure the resin onto the knob for 15-60 seconds depending on the material and size of the part to be removed, then peel it away from the basin floor.

#### CAUTION

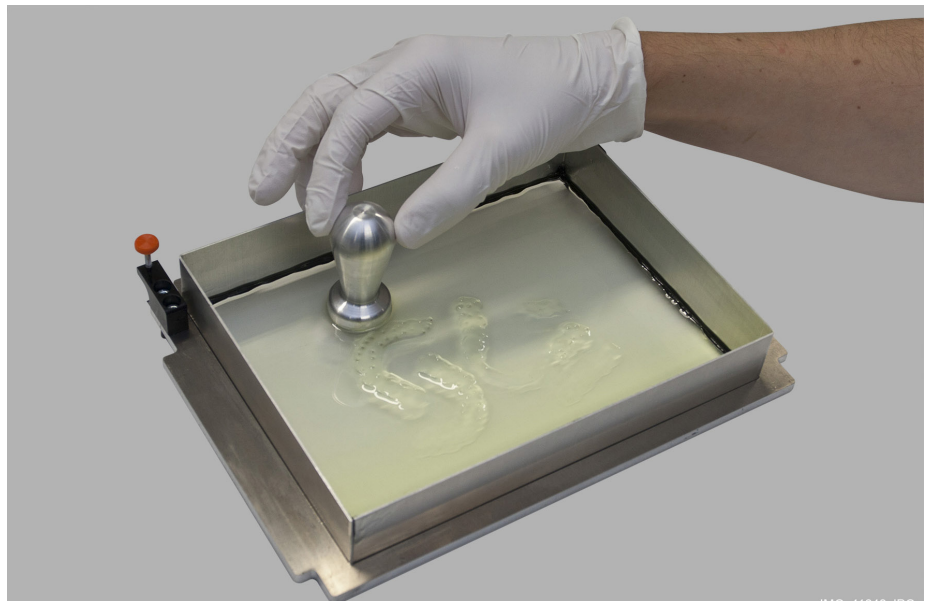
**Do not use tools or fingernails to scrape off the cured resin.**

1. Pour the excess uncured resin out of the basin and back into its storage bottle. Remember to filter the resin, as small cured pieces can be loose in the material.

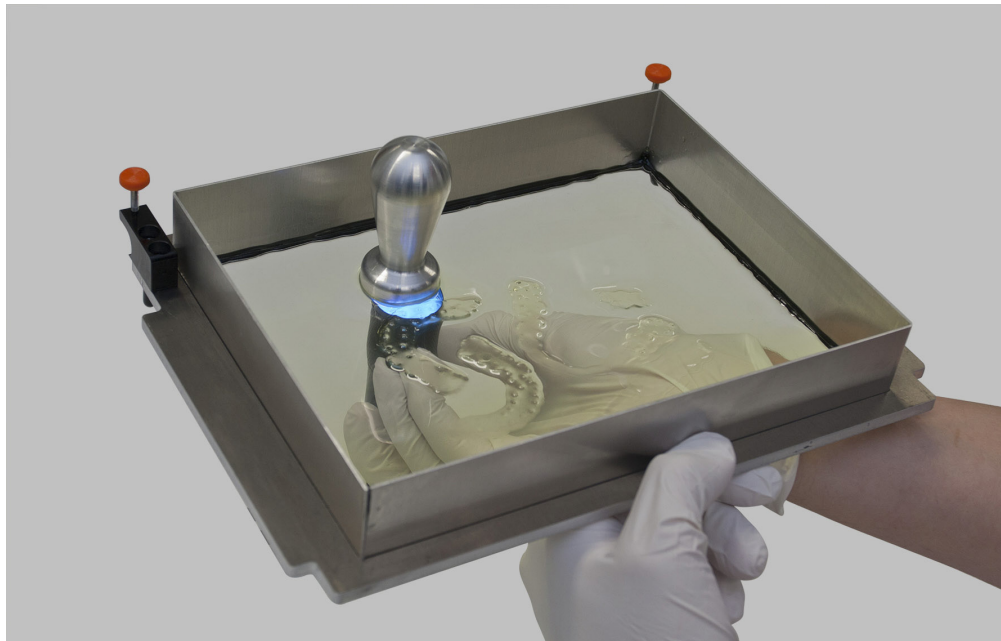
Leave a thin layer of uncured resin in the bottom of the basin, to assist in the adherence of the detachment knob to the failed print layers.



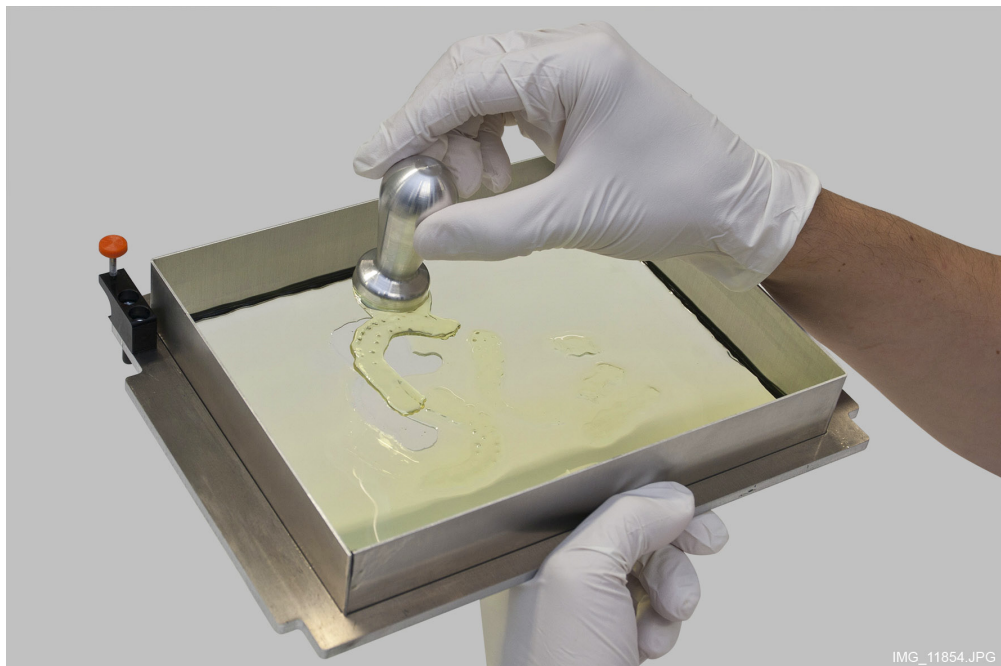
2. Place the detachment knob on the basin floor alongside the failed print layer.



3. Lift the basin and shine the UV flashlight against the detachment knob base and the underside of the failed print.



4. Carefully lift and angle the detachment knob to peel away the cured resin.





5. Repeat the process for each failed print piece.

#### A.2.4 Slice-by-slice view in Creo Studio

To minimise the chance of print failures, check the print job carefully in Creo Studio before you run it in the printer.

Creo Studio includes a slice-by-slice preview of the print job, showing each layer as a black-and-white image.

If the first image in this preview is black, it means the print model is not correctly flush with the build platform, and will not connect correctly during the initial printing process. Move the print model down in Creo Studio so it contacts the build platform / printing area.

It is also very important to place sufficient connectors between the print model and the build platform, to ensure there is sufficient connecting surface area between the build platform and the model.

## A.2.5 Radio & television interference



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, can cause harmful interference to radio communications. There is no guarantee, however, that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, try to correct the interference in the following ways:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio or television technician for help

The following booklet, prepared by the FCC, also includes useful information:

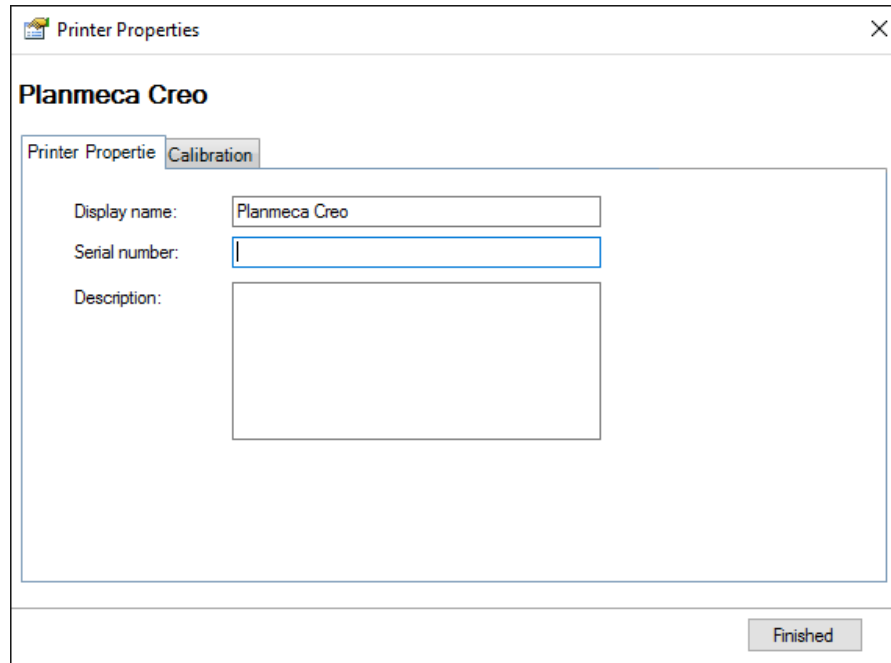
- "How to Identify and Resolve Radio-TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under FCC rules.

## A.3 SERIAL NUMBER CAPTURE

Printer Manager tool allows the capture of Planmeca Creo 3D printer serial numbers to assist in troubleshooting and tracking.



The screenshot shows a window titled "Printer Properties" with a close button (X) in the top right corner. The window is titled "Planmeca Creo" and has two tabs: "Printer Properties" and "Calibration". The "Calibration" tab is selected. Inside the window, there are three input fields: "Display name:" with the text "Planmeca Creo", "Serial number:" with a single character "1", and "Description:" with an empty text area. A "Finished" button is located at the bottom right of the window.

This feature allows you to keep track of your printer.

Saving your printer's serial number in the configuration also helps Planmeca After Sales to provide you with assistance.





# PLANMECA

Planmeca Oy | Asentajankatu 6 | 00880 Helsinki | Finland  
tel. +358 20 7795 500 | fax +358 20 7795 555 | sales@planmeca.com | www.planmeca.com

