



**3D Printer  
(RAM600-M)**

# **User Manual**

RUG-9011-EN  
Rev. 2.0



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This user manual contains information for appropriate use of RAYDENT Studio.

The operator must read this manual carefully before using the product.

The operator must follow instructions and safety regulations described in the user manual to prevent any injury to the operator and damage to the product.

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Required Software for Manual : RAYDENT Studio Ver. 1.0.6.8902 and above

This Manual is subject to quality upgrade and specification change without prior notice.

For further inquiries, contact customer service of manufacturer.

You can get more 3D Printer information at [3dp.raymedical.com](http://3dp.raymedical.com).

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# User Manual Introduction

# 1

# 1 User Manual Introduction

The following user manual contains not only a specific step-by-step guide on how to use RAYDENT Studio (referred to as “the product”), but also the basic information regarding the product.

- 1) Please keep this manual for future reference.
- 2) Please read the safety regulations before using the product.
- 3) Please refer to “Appendix B. Troubleshooting” if there is any problem.
- 4) The pictures on the user manual might differ from actual ones depending on the option and model of the product.
- 5) The screenshot on the user manual might differ from actual ones depending on the firmware/driver version of the product.

## 1.1 Related Terms

Some terms used in this manual may be used interchangeably as follows.

- 1) RAYDENT Studio is the same as 3D printing system, product, or program.
- 2) 3D printer is the same as RAYDENT printer, printer, or main body.
- 3) IPA is the same as Isopropyl alcohol or alcohol.

## 1.2 Symbols



Warning

Indicates a hazardous situation that, if the instructions are not followed, could result in death or serious injury.



Caution

Indicates a hazardous situation that, if the instructions are not followed, could result in minor or moderate injury.



Indicates information considered important but not hazardous.

## 1.3 Safety Information

The following safety information must be read and understood before using the product. Please check the safety precautions to use it safely and correctly. Improper use of the product may cause bodily injury or death.

Product damage caused due to incorrect use environment or careless use is not eligible for free maintenance service.



Warning

Use by qualified users.

The owner of the product should follow all precautions, safety precautions, and maintenance procedures.



Warning

Use with authorized components approved by the company.

Equipment failure that is caused by using other components is not eligible for the free maintenance service.



Warning

Do not change the product unless authorized by the manufacturer.

## 1.4 System Symbols

The symbols used in the device.



Serial Number





CE Mark




Direct Current

## 1.5 Precautions for Installation / Remarques lors d'une installation du produit


 <b>Warning</b> <b>Risk of electric shock or fire</b>	<p>Il y a un danger de commotion ou incendie.</p>
<p>Do not install the product in humid or dusty place or where rainwater splashes.</p>	<p>Ne pas installer au lieu plein d'humidité ou poussière, ni autour de l'eau.</p>
<p>Do not put candles, lighters, etc. on the product or install the product near heating appliance.</p>	<p>Ne mettez pas la bougie, le briquette etc sur le produit ni installer autour des appareils en courant.</p>
<p>Do not use the product near flammable sprayer or substances.</p>	<p>Ne pas utiliser près de l'atomiseur combustible ou le matériel inflammable.</p>
<p>Do not install the power cord where it is difficult to remove.</p>	<p>Ne pas installer au lieu difficile d'enlever le cordon d'alimentation.</p>
 <b>Caution</b> <b>Risk of malfunction, equipment failure, or bodily injury</b>	<p>Il peut être une cause de l'anomalie, la panne et le dommage du produit.</p>
<p>Install the product on a safe and flat surface with no risk of falling.</p>	<p>Installez le produit au lieu sûr et plat sans danger de tomber.</p>
<p>Do not install the product in a place exposed to direct sunlight or ultraviolet (UV) light.</p>	<p>Ne pas installer le produit au lieu à rayon direct ou exposé aux ultraviolets.</p>
<p>Do not install the product where vibration or strong shock might occur.</p>	<p>Ne pas installer le produit au lieu où une grande vibration ou un choc fort peut se produire.</p>
<p>Install the product in a place that meets the operating temperature conditions.</p>	<p>Insalez le produit au lieu ayant une condition de température conforme à l'usage</p>
<p>Use the product at room temperature between 23°C to 28°C (73.4°F to 82.4°F). Follow the guideline for the temperature of the materials to be used.</p>	<p>Utilisez le produit dans la température de 23°C (73.4°F) ~ 28°C(82.4°F) en thermomètre intérieur. Suivez le guide des matériaux pour la température par rapport à ceux-ci utilisés.</p>
<p>Install the product in a well-ventilated area to allow heat release from the product for cooling.</p>	<p>Installez au lieu bien aéré afin de dégager convenablement la chaleur produite du produit.</p>
<p>Do not place the product on the places subject to direct wind from an air conditioner or an air cleaner.</p>	<p>Ne pas utiliser le produit au lieu directement atteignable du vent produit par le climatiseur ou le purificateur d'air etc.</p>
<p>Do not install near an object that generates a magnetic field such as motor.</p>	<p>Ne pas installer au lieu permettant de produire un champ magnétique du moteur etc.</p>
<p>Do not turn the product upside down or lay it down when moving.</p>	<p>Ne pas renverser ni coucher dès son déplacement.</p>
<p>Remove the power cord after pressing the power button to turn it off when moving.</p>	<p>Déplacez le produit après avoir certainement débranché et arraché le cordon d'alimentation dès son déplacement.</p>
<p>When resin gets on the skin during installation, and wash it with soap.</p>	<p>Essayez proprement avec du savon dans le cas où la résine s'attache à la peau dès l'installation.</p>

Seek medical advice if the resin accidentally get into the eye.	Consultez le médecin à l'hôpital voisin dans le cas où la résine est entrée dans les yeux par faute.
Keep the temperature at 23°C (73.4°F) or higher for about 3 hours before use if the product was stored at low temperature for a long time.	En cas de conservation du produit à long terme en température basse, utilisez après avoir conservé environ 3 heures en température ambiante (plus de 23°C).
Do not move the product with printout in it.	Ne pas déplacer le produit en état contenant d'un objet en sortie.

## 1.6 Precautions for Use / Remarques lors d'une utilisation du produit


 <b>Caution</b> Risk of malfunction, equipment failure, or bodily injury	Il peut être une cause de l'anomalie, la panne et le dommage du produit.
Mount the build plate and vat carefully. Carelessness may cause injury to the hand or breaking of LCD.	Installez avec attention la plaque de construction et le carter puisqu'on peut se blesser à la main ou LCD peut se casser.
Only use the resin provided by Ray Co., Ltd.	Ne pas utiliser la résine que (S.A.)Ray n'a pas offert.
Do not get the resin on your skin or in your eyes.	Faites attention pour que la résine ne soit pas mise à la peau ou dans les yeux.
Do not place heavy objects on top of the product.	Ne mettez pas l'objet lourd sur le produit.
Do not open the door or put your hand inside of the product during operation.	Ne pas ouvrir la porte ni mettre la main dans le produit pendant l'actionnement du produit.
Do not disconnect the power cord during operation.	Ne pas débrancher le cordon d'alimentation pendant l'actionnement du produit.
Careful not get the hand caught. The build plate may move when operating inside chamber.	Lors d'une utilisation du produit, faites attention pour ne pas mettre la main dans la chambre pendant le travail puisque la plaque de construction se déplace et peut causer un danger.
Be sure to close the door during printing.	Il faut utiliser en fermant la porte sans faute pendant l'output.
Be careful when touching the build plate. The build plate could be extremely hot during operation.	Faite attention de toucher puisque la plaque de construction peut être chaud pendant l'actionnement du produit.
Do not look directly at the irradiated or reflected UV light. It may damage your eyes.	Ne pas regarder puisque les ultraviolets directement ensoleillés ou réverbérés sont dangereux aux yeux.
If used in a manner not specified by the manufacturer, the protection function may be impaired.	La fonction de protection peut s'endommager en utilisant un moyen que le fabricant n'a pas désigné.

## 1.7 Precautions for Power Connection / Remarques lors d'une connexion électrique

 Warning	Risk of electric shock or fire  Il y a un danger de commotion ou incendie.
Do not use loose power outlets or damaged power cord.	Ne pas utiliser la prise relâchée ou le cordon d'alimentation endommagé.
Do not touch the power cord with wet hands.	Ne pas toucher le cordon d'alimentation avec la main mouillée.
Grasp the power cord and pull to disconnect, and avoid pulling out of the cable line.	Il faut arracher le cordon d'alimentation avec la prise dans tendre le câble.
Remove the power cord during a thunderstorm.	On arrache la prise des le tonnerre et l'éclair, et ne l'utilisez pas jusqu'à ce qu'ils s'arrêtent.
Do not place objects (chemicals, water containers, and little metallic objects such as tweezers) near the product.	Ne mettez pas le médicament, le récipient contenant d'une eau ou le petit métal tel que la princette autour du produit.
Remove the power cord if the product emits strange sound, smell, or smoke and contact the seller.	Dans le cas où le bruit ou l'odœur bizarre, ou bien la fumée se produit au produit, on arrache le cordon d'alimentation et adressez au lieu d'achat.
Use with a rated voltage. Use an outlet (or multi-outlet) with a ground terminal that meets the rated voltage/current.	Utilisez au voltage en régime. Utilisez la prise(ou celle multiple) s'accordant à la capacité en régime(voltage/courant) et ayant le terminant en raccord à la terre.
Do not bend or damage the power cord excessively.	Ne pas courber exagérément la fiche d'alimentation en puissance ni l'endommager.
Do not disassemble or modify the product by yourself.	L'utilisateur ne doit pas démonter, ni transformer arbitrairement le produit.
Do not modify the main body, build plate, or vat.	L'utilisateur ne doit pas transformer arbitrairement le corps, la plaque de construction et le carter.
Remove the power cord when the product is not in use for a long period of time.	Conservez après avoir arraché la fiche d'alimentation en cas de non-usage à long terme.











## 1.8 Precautions for Cleaning the Product / Remarques lors d'un nettoyage du produit

 <b>Warning</b> Risk of electric shock or fire	Il y a un danger de commotion ou incendie.
Remove the power cord when cleaning the product.	Débranchez le cordon d'alimentation lors d'un nettoyage du produit.
Use soft, lint-free cloth when cleaning. Soak it with a little bit of water to clean the product, and be careful not to get water on the inside.	Essuyez avec un tissu doux pour ne pas se produire le duvet lors d'un nettoyage du produit. On l'essuie avec un tissu un peu mouillé et faites attention de ne pas mettre l'eau dans le produit.
Use after cleaning any dust or water off of the power cord pin.	Utilisez après avoir essuyé proprement en cas de présence de la poussière, l'eau etc sur les parties de contact avec la fiche d'un cordon d'alimentation.
Do not use thinner, alcohol, benzene, or other chemical products to clean the product. Color or outer appearance of the product can be altered due to chemicals.	Ne pas essuyer le produit avec le diluant, l'alcool, le benzène etc puisque la couleur du produit peut se décolorer ou l'apparence de celui-ci peut se transformer par les substances chimiques.

## 1.9 Label

Label or mark is located on the rear side of the product.

<b>RAM600-M</b>		Model / 모델명	MADE IN KOREA 대한민국 제조
<div style="border: 1px solid black; padding: 2px; display: inline-block;">SN</div>			
<b>Rated Input / 입력:</b> 24 V  , 2.5 A <b>AC/DC Adapter:</b> KPL-060M-VI 100-240V~, 50/60Hz, 1.7A <b>CAUTION / 주의사항 / PRÉCAUTIONS IMPORTANTES:</b> Refer User Manual / 사용자 매뉴얼 참고 / Veuillez vous référer au manuel d'utilisation			
 E496903	    	 A급기기 MSIP-REM-rAY-RAM500	
LABORATORY EQUIPMENT FOR USE IN HEALTH CARE APPLICATIONS			
<b>Ray Co., Ltd.</b> 332-7, Samsung1-ro, Hwaseong-si, Gyeonggi-do, Korea +82.31.605.1000 / <a href="http://www.raymedical.com">www.raymedical.com</a> 주식회사 레이 경기도 화성시 삼성1로 332-7 (우)18380			

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# Product Introduction

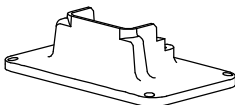
# 2

## 2 Product Introduction

### 2.1 Components



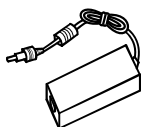
3D Printer



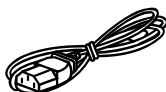
Build Plate



LAN Cable



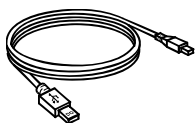
AC Adapter



Power Cord



LCD protective sheet



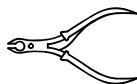
USB Cable



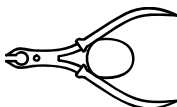
USB Memory



Quick Guide



Trimmers



Nippers



Tweezers

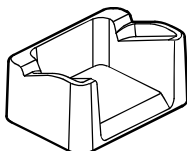
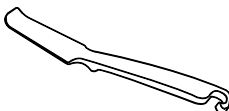
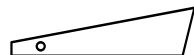


Plate Cradle



Spatula

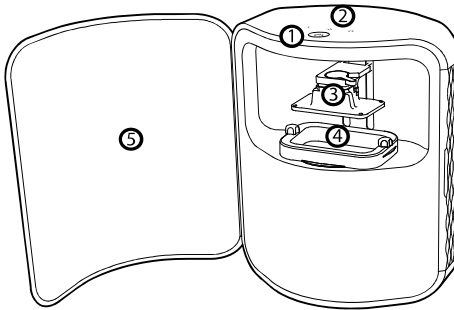


Scraper

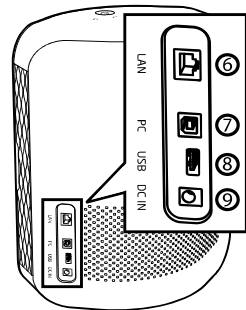


Actual components may look different from pictures above. Depending on the sales option or country, the type, quantity, and packaging of the components provided may look different from the contents of this manual. For inquiries regarding components, contact Ray Customer Service or sellers.

## 2.2 Sections and Functions

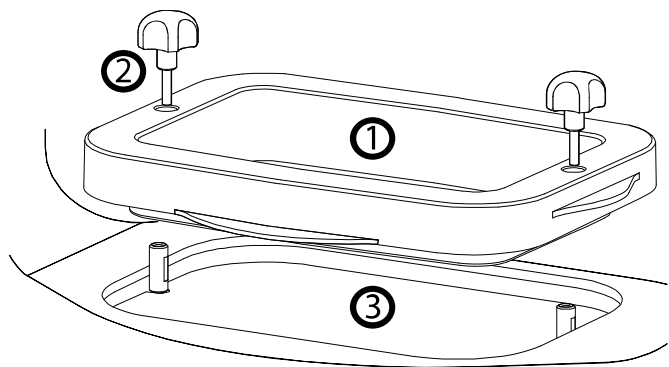


Front



Back

Items	Description
① <b>Power Button</b>	<p>Press the power button to switch the power on and off. The power status is indicated through LED light.</p> <p>LED off: 3D printer is turned off.</p> <p>White LED: 3D printer is in standby mode.</p> <p>White LED blinking: Vat is not properly tightened.</p> <p>Blue LED blinking: 3D printer's UV is being exposed.</p> <p>Red LED: Stopped while 3D printing or error has occurred.</p>
② <b>LED Indicator</b>	Indicate the action status of 3D printer. (standby, printing, and finished)
③ <b>Build Plate</b>	Plate to which the laminated printout is attached and supported.
④ <b>Vat</b>	A container containing 3D printing resin.
⑤ <b>Door</b>	A door to block outside light from entering during 3D printing.
⑥ <b>Ethernet Port (RJ45)</b>	Port to connect an ethernet cable.
⑦ <b>PC Port</b>	Port for the 3D printer setup during installation.
⑧ <b>USB Port</b>	Reserved port.
⑨ <b>DC IN Port</b>	<p>Terminal to connect the AC adapter plug. Connect one side of the power cord to the AC adapter before connecting to the outlet.</p> <p><b>Attention: The power cord may differ depending on the area of the use.</b></p> <p><b>Warning: Do not use other AC adapters.</b></p>



Items		Description
①	Vat	A container containing 3D printing resin.
②	Vat fixing knob	Vat fixing knobs for tightening the vat.
③	LCD protective sheet	Sheet to protect the LCD.

# Installation

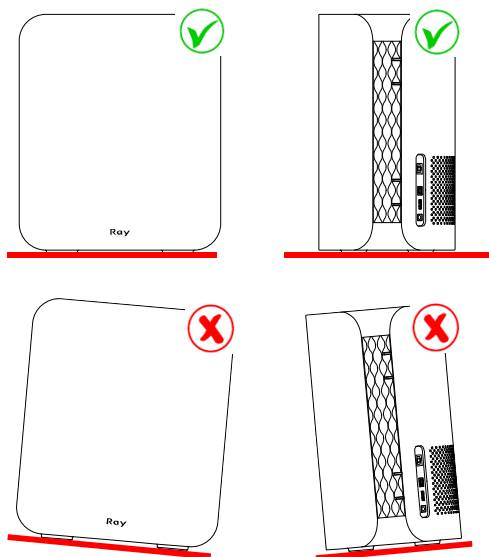
# 3

## 3 Installation

### 3.1 Installation Environment

#### 3.1.1 Installation Setting

The product should be installed on a flat floor within 1° and on a table capable of stably supporting a weight of 10 kg or more in an area of 50 cm x 50 cm or larger.



Caution

Remove the power cord after pressing the power button to turn the product off when moving. Keep the temperature at 23°C (73.4°F) or higher for about 3 hours before use to avoid malfunction.



### 3.1.2 Working Environment

- 1) Do not install the product in a place exposed to direct sunlight or ultraviolet (UV) light.
- 2) Use the product at room temperature between 23°C to 28°C (73.4°F to 82.4°F).
- 3) Do not install near a wireless apparatus or mobile device that generates electromagnetic wave.
- 4) Do not place the product on places where vibration might occur to avoid error when printing.
- 5) Install on a stable floor to avoid accumulating the resin on one side.
- 6) Do not move the product during operation.
- 7) Do not put the product under severe shock.



Caution

Be sure to follow installation setting and working environment. If not, printing error and equipment damage may occur.

3.2 System Requirements

Items	Recommended Specifications	Minimum Specifications
CPU	2GHz (or higher) Quad Core processor	2GHz (or higher) Dual Core processor
RAM	4GB (or more)	2GB (or more)
HDD space	20GB (or more)	10GB (or more)
Monitor Resolution	1280 X 800 (or higher)	1024 X 768 (or higher)
Video	OpenGL 3.2 (or higher) graphic device - Intel 4th Geneneration Core i Series(Haswell) (or higher) - AMD E-Series or A-Series APU - NVIDIA GeForce 600 Series Graphic Memory 2GB (or more) - AMD Radeon HD 7000 Series Graphic Memory 2GB (or more) - Up-to-date graphic driver on above graphics devices	OpenGL 3.2 (or higher) graphic device - Intel 3rd Geneneration Core i Series(Ivy Bridge) (or higher) - AMD E-Series or A-Series APU - NVIDIA GeForce 400 Series Graphic Memory 1GB (or more) - AMD Radeon HD 5000 Series Graphic Memory 1GB (or more) - Up-to-date graphic driver on above graphics devices
USB port	USB port 2.0 (or higher)	
LAN port	10/100/1000Mbps Ethernet	
Operating System	Microsoft Windows® 7 x86 or x64 Microsoft Windows® 8 x86 or x64 Microsoft Windows® 10 x86 or x64	



Depending on the specification of the computer it might slow down if other programs are running at the same time when operating.

### 3.3 Maintenance

As described on the description, the user must conduct maintenance check periodically. The user has an obligation to manage the product in order to prevent potential problems.

Check Cycle	Description
<b>Everyday</b>	Check for damage in the product or parts. Check for dust or residue on LCD when inserting vat. Check for resin near vat fixed knob.
<b>Before Printing</b>	Check for other types of resin or residues on the bottom of build plate and vat and LCD protective sheets.
<b>Every Week</b>	Clean the printing area using IPA.
<b>Every Six Months</b>	For quality control, go to Setup->Print Option->Diagnosis using RAYDENT Studio.



Caution

A periodic quality control will prevent degradation of quality and occurrence of problem by the product. Degradation of quality could be the cause of problems such as damage in product itself.



Caution

If the resin is on the vat fixed knob, vat can not be fixed and it may cause fail printout.



If there are dust or residues on the LCD, clean it with alcohol and let it dry before using it.

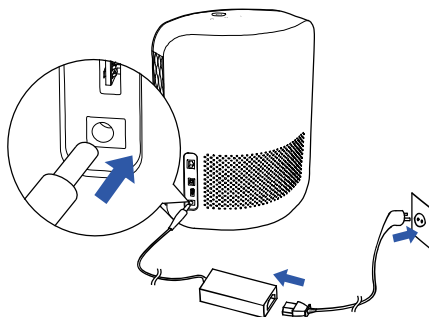


Do not throw away the package box after the installation. For warranty service, the product must be brought into the service center in the original package.

## 3.4 Product Installation

### 3.4.1 Connect Power

For initial installation, make sure that the mains power of the installation location matches the AC adapter specifications. Connect the power cord and AC adapter, as shown in the following figure.



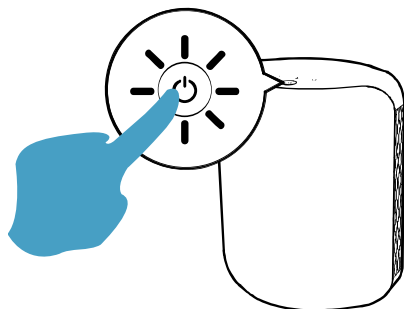
Please contact the seller if the product and the enclosed power cord are different from those in local area.

Use the AC adapter and the power cord provided with the product. If not, it may result in product damage.

### 3.4.2 Power On and Off

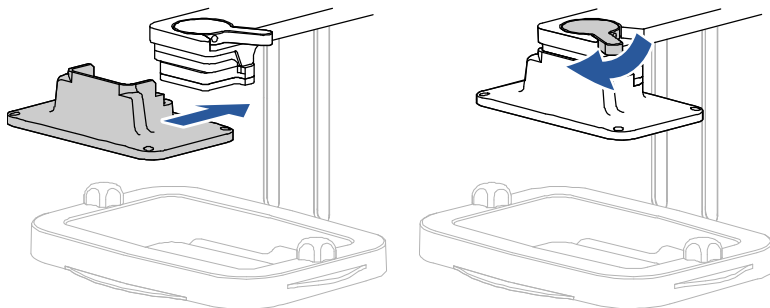
Turn on the 3D printer by pressing and holding the Power button for 2 seconds.

Turn off the 3D printer by pressing and holding the Power button for 5 seconds when the power is on.

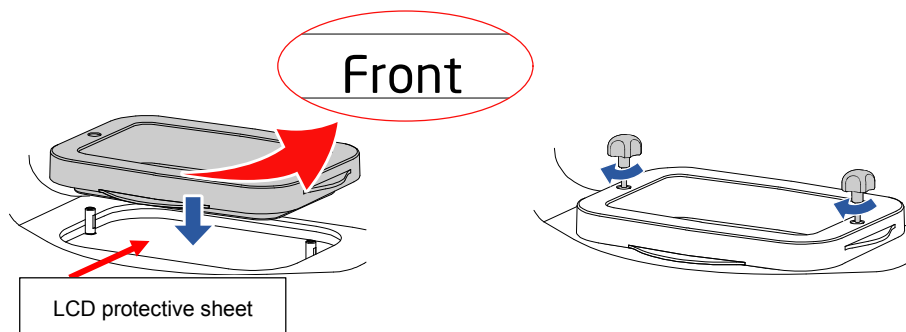


### 3.4.3 Mount build plate and vat

Push the build plate to the holder all the way in and then pull the tightening lever to fix it, as shown in the following figures.



Mount vat



Caution

Place the vat containing resin in the correct direction and securely tighten with the fixing knob.

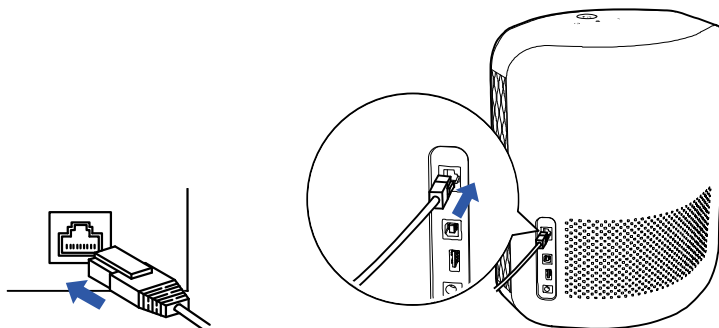


Caution

Read "5 Printing" before mounting the build plate and vat, and follow the procedure and sequence shown. If not, malfunction and product damage may occur.

### 3.4.4 Connect to Network

Connect the 3D printer to a computer (or network) using a network cable, as shown in the following figure.



Refer to "3.7 RAYDENT Studio Setting" about network setting.

### 3.4.5 Network Setting Configuration

RAYDENT Studio provides various network environments, as shown in the following figures.

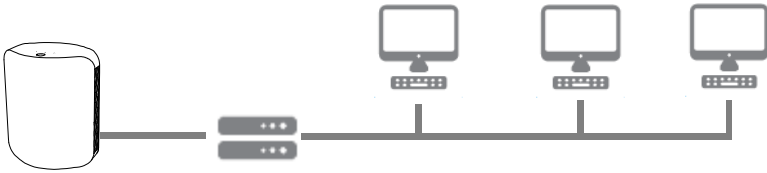
- 1) A computer ► A 3D printer (direct connection)



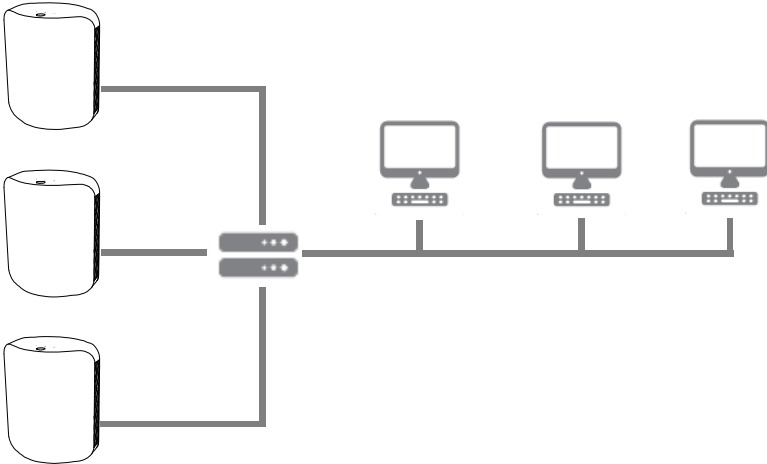
Set a static IP address on your computer.

Check the IP address applied to the computer, which should be set different from the IP applied to the 3D printer.

- 2) Computers ► A 3D printer (multiple computer to one printer)



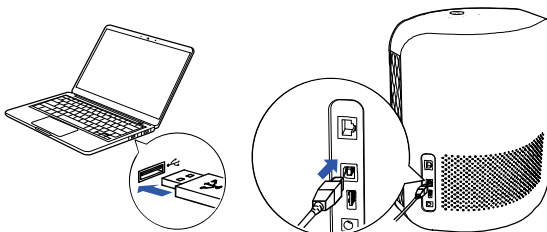
- 3) Computers ► 3D printers (multiple computers to multiple printers)



Check the connection of 3D printer network in RAYDENT Studio. Refer to "3.7 RAYDENT Studio Setting".

### 3.4.6 Connect to PC

After the printer is connected to a computer using a USB cable, name, IP and other information can be set. Refer to "3.7 RAYDENT Studio Setting".

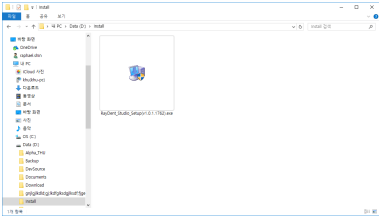
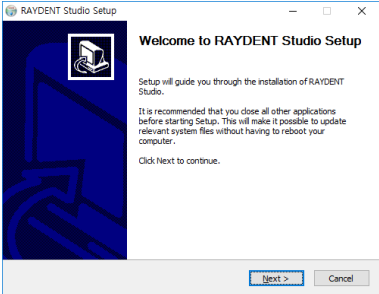
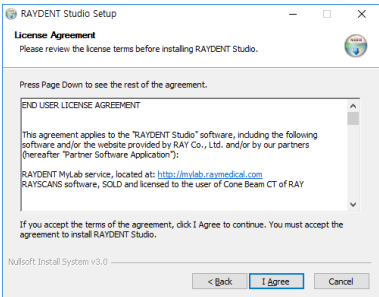


3.5 Software Installation

The RAYDENT Studio and RAYDENT Designer software can be installed through the installation USB Memory provided in the box.

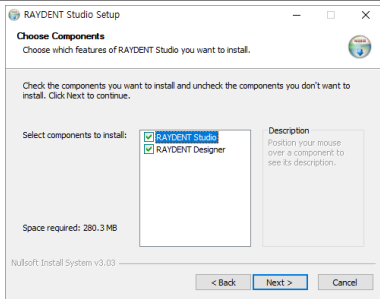
3.5.1 RAYDENT Studio Installation

RAYDENT Studio installation steps are as follow.

NO.	Figure	Description
1		Install the RAYDENT Studio software by opening the installation file. At this time, a warning window will pop up asking if the user will continue the installation on the user administration account. Press [Yes] button and continue.
2		Press [Next] button to continue the installation process.
3		Press [I Agree] button when asked about license agreement. Installation cannot continue if the user does not agree.

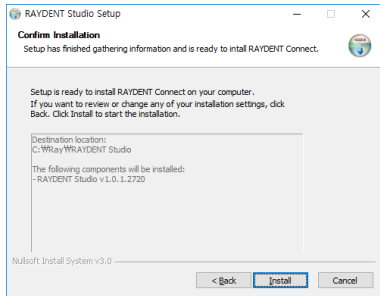


4



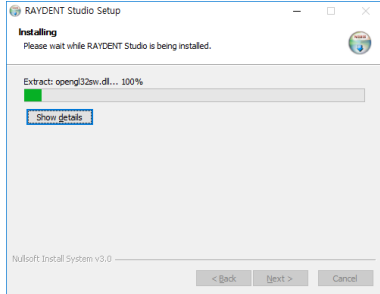
Select the program to be installed and click [Next] button.

5



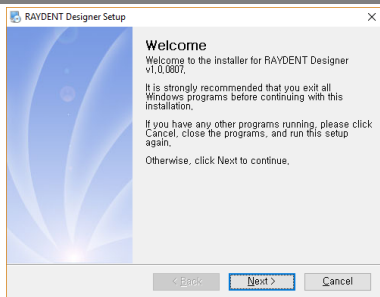
Setting for installation has been completed. Press [Install] button to continue the installation process.

6



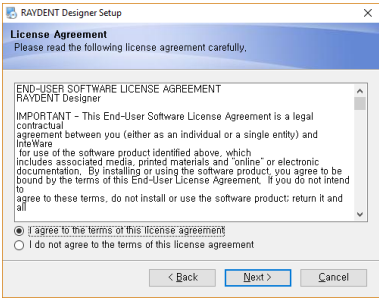
Wait until the RAYDENT Studio installation has been completed.

7



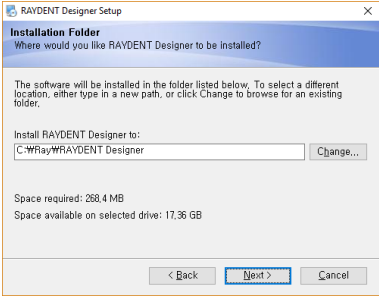
If you checked RAYDENT Desinger, as soon as the RAYDENT Studio installation completed, you can proceed to install RAYDENT Desinger. Click [Next] button.

8



After accept the license policy, click [Next] button.

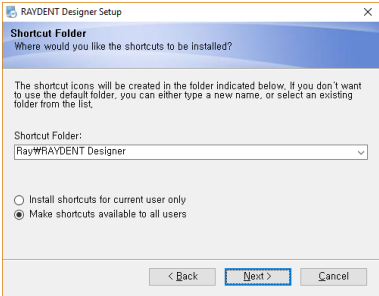
9



Select the path where RAYDENT Desinger will be installed and click [Next] button.

**Note:** The system default is recommended as the default path.

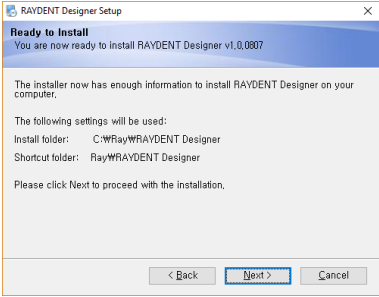
10



Select the path to create the shortcut icon and click [Next] button.

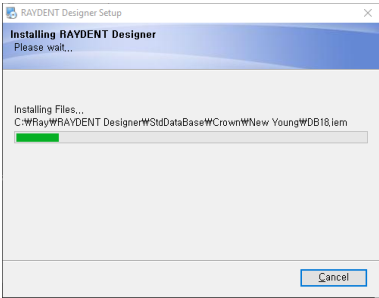
**Note:** This is the path created in the Start menu.

11



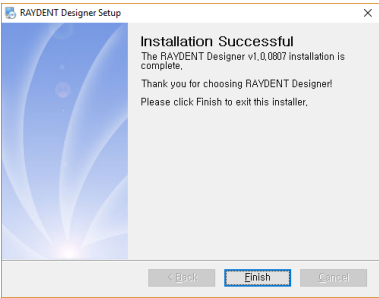
Check the installation and shortcut path, and click [Next] button to proceed the installation.

12



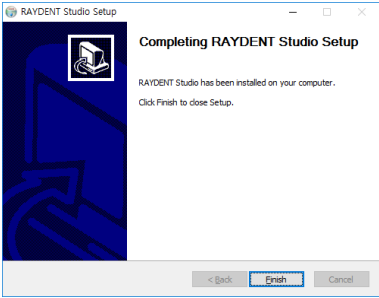
Please wait while RAYDENT Desinger is installed.

13



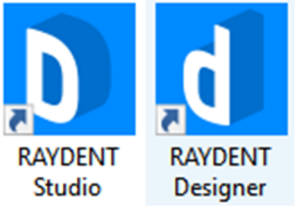
Click [Finish] button to exit the installer.

14



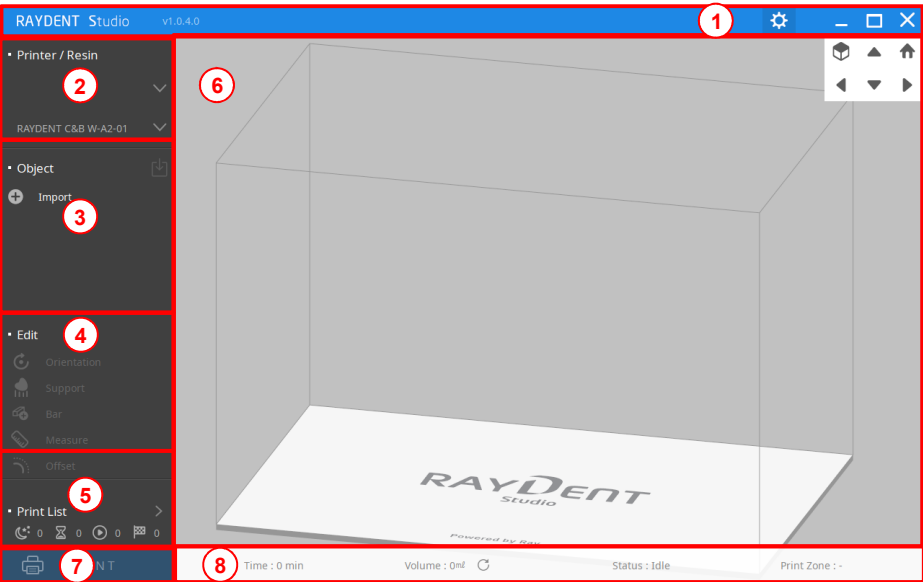
Click [Finish] button to close the setup page.

15



RAYDENT Studio and RAYDENT Desinger icons are created on the desktop.

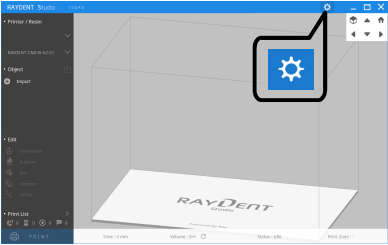

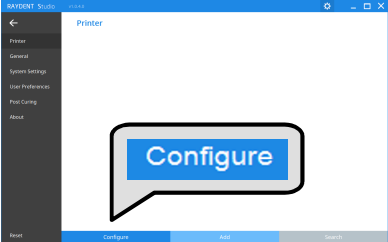

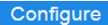
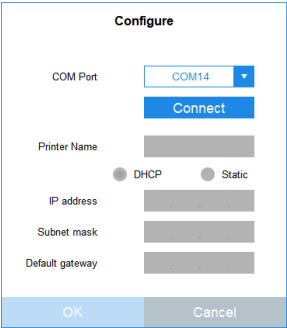
3.6 RAYDENT Studio Screen Composition



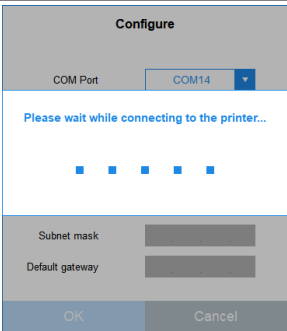
NO.	Category	Description
1	Setting	Initial setting option for RAYDENT Studio can be changed.
2	Printer/Resin	Printer unit and resin can be selected.
3	Object	Object list will show. User can add or remove objects.
4	Edit	User can adjust the output direction of the selected object, and creat the supports. User can measure the thickness of the printouts or set offsets for specific areas. <b>Note:</b> The offset function may not be supported depending on the 3D printer model.
5	Print List	The user can verify print list, start printing, stop, restart, and cancel print.
6	Chamber	Chamber is a object working space. The user can move or rotate the object.
7	Print	Print the prepared object.
8	Object information	Information regarding printout is shown.

### 3.7 RAYDENT Studio Setting

#### 3.7.1 Add Printer by Connecting with Serial Port

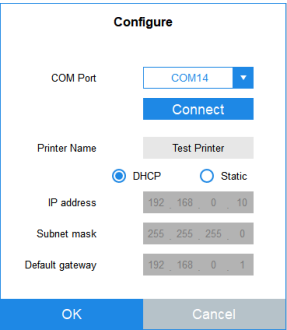
NO.	Figure	Description
1		Press [  ] button after running the program.
2		A printer (connected to the computer serial port) setting page will appear after pressing [  ] button from the setup page. Check the connection status between the printer and the serial port before pressing [  ] button.
3		The configure window shows the current computer's available COM port.

4



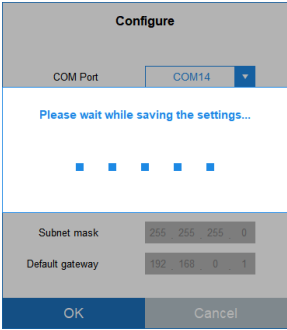
After selecting the COM port that has been connected with the printer, press [ **Connect** ] button to see the information of current printer.

5



After the printer is connected, name, IP, and other information can be edited. After pressing [ **OK** ] button, the change will be applied.

6



After the setting is completed, the connected printer will be shown in the printer list on the offline status.


7



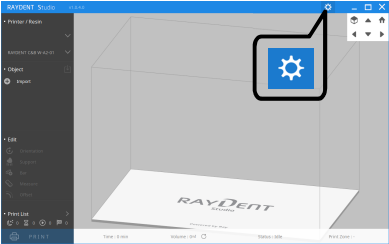

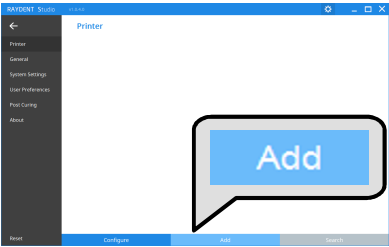

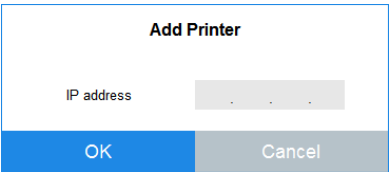

After a while, the printer status can be verified, and the printer can be changed to online status and be available for use. The model name of the added printer is displayed in the bottom right corner.




8



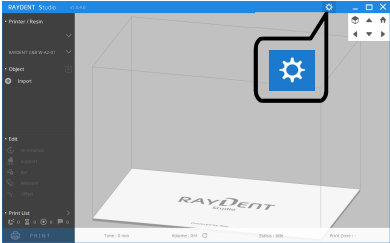

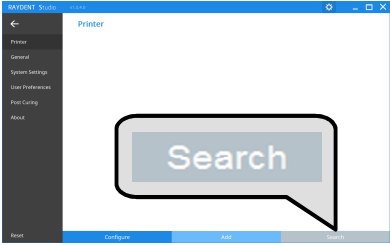
If [  ] is displayed on the added printer, the application update of the printer is required. Refer to [3.7.9.5 Updating the printer] for how to update.

3.7.2 Add Printer by Adding Specific IP Address

NO.	Figure	Description
1		Press [  ] button after running the program.
2		A window to add IP address will pop up after pressing [  ] button in the setup page.
3		Input the IP which the user would like to add and press [  ] button to access the IP. If there are no errors, the selected printer will be added to the list.

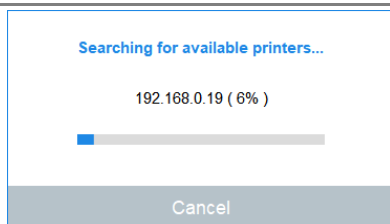
4	<div><div>RAM600-M AM62110001</div><div></div><div>192.168.2.28 Online / Enable</div></div>	Information about the printer can be verified in the printer list.
5	<div><div>RAM600-M AM62110001</div><div></div><div>192.168.2.28 Online / Enable</div></div>	<p>If [  ] is displayed on the added printer, the application update of the printer is required.</p> <p>Refer to [3.7.9.5 Updating the printer] for how to update.</p>

3.7.3 Add Printer through Automatic IP Search

NO.	Figure	Description
1		Press [  ] button after running the program.
2		Press [ Search ] button in the setup page to start the automatic search feature.



3



The software will sequentially access the networks connected to the computer in search for printers.

4



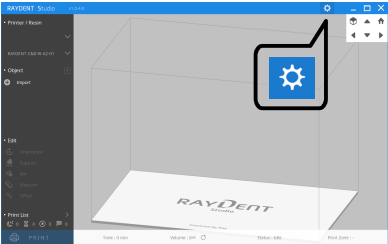

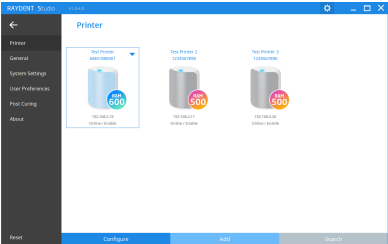
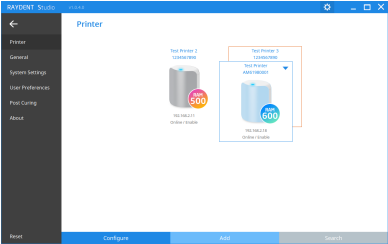
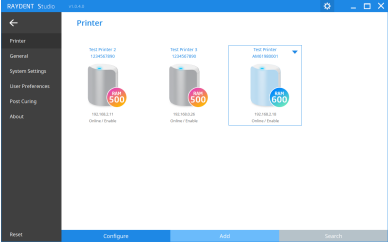
Once the search is complete, the search window will disappear and the found printer will show in the list.

5

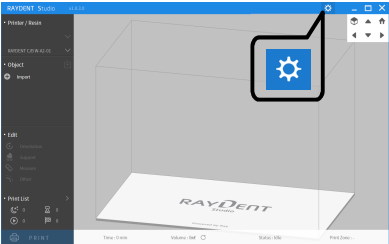

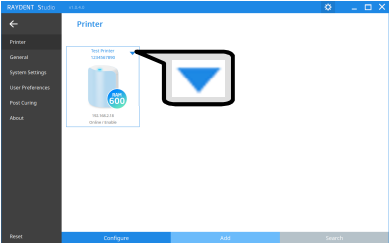

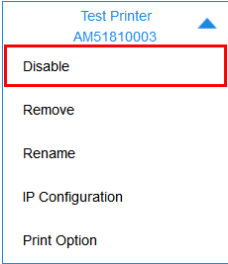

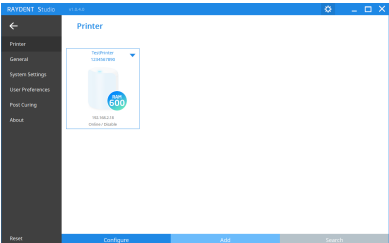


If [🔧] is displayed on the added printer, the application update of the printer is required. Refer to [3.7.9.5 Updating the printer] for how to update.

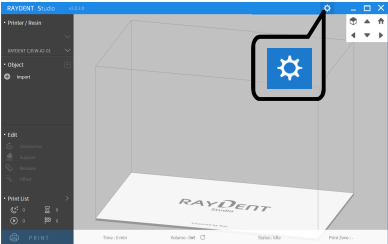

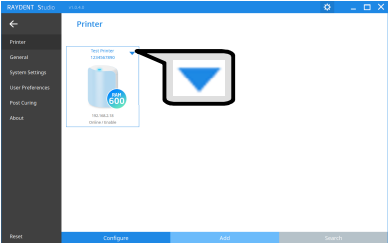

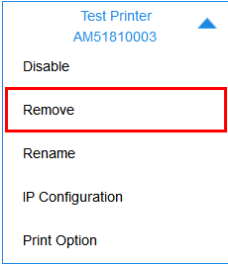
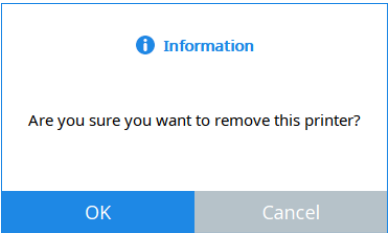

3.7.4 Move the location of the added printer

NO.	Figure	Description
1		<p>Can change the order of the printers added to the program.</p> <p>Press [  ] button after running the program.</p>
2		<p>Select the printer you want to change the location of from the printer list.</p>
3		<p>Drag the printer to the desired location.</p> <p>If you can move to the dragged position, the position becomes orange.</p>
4		<p>Release the mouse button to complete the move.</p> <p>Can also move the printer with the arrow keys on your keyboard.</p>

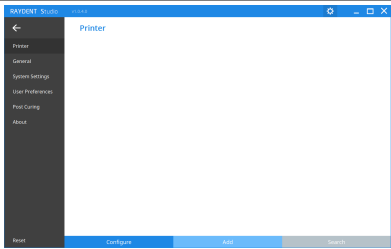
3.7.5 Disable Printer

NO.	Figure	Description
1		Press [  ] button after running the program.
2		Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.
3		Press [Disable] button from the setting. Press the [  ] button to complete the setting.
4		The user can verify the printer has been disabled.

3.7.6 Remove Printer



NO.	Figure	Description
1		Press [  ] button after running the program.
2		Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.
3		Press [Remove] button from the setting.
4		A verification message will show to confirm the removal. Press [  ] button to remove the printer.

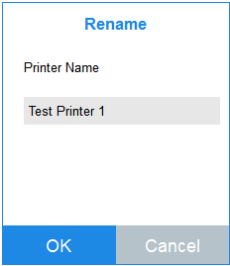
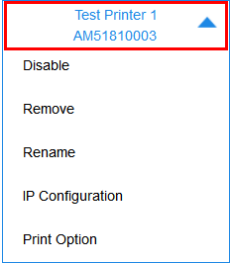
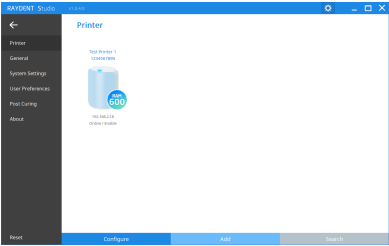
5



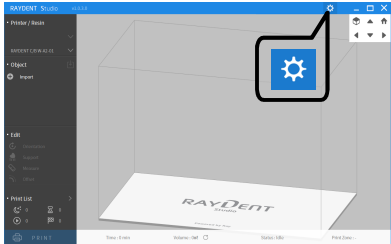

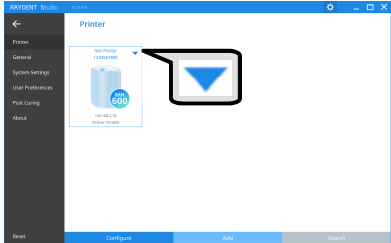

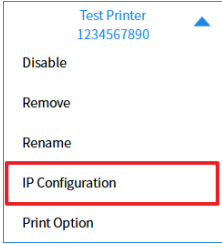
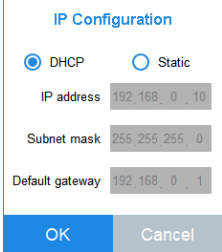
The user can verify the printer has been removed.

3.7.7 Rename Printer

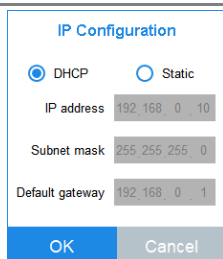
NO.	Figure	Description
1		Press [  ] button after running the program.
2		Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.
3		Press [Rename] button from the setting.

4	 A dialog box titled "Rename" with a "Printer Name" label and a text input field containing "Test Printer 1". At the bottom are "OK" and "Cancel" buttons.	After renaming the printer, press [ OK ] button.
5	 A context menu for "Test Printer 1" with ID "AM51810003". The menu items are: Disable, Remove, Rename, IP Configuration, and Print Option. The "Rename" option is highlighted with a red box.	The user can verify the printer has been renamed on the setting.
6	 The RAYDENT Studio application window showing a list of printers. The "Printer" tab is selected, and "Test Printer 1" is listed with its ID "AM51810003". The printer icon shows a blue "800" badge.	The user can verify the printer has been renamed on the printer list.

## 3.7.8 Change Printer IP

NO.	Figure	Description
1		Press [  ] button after running the program.
2		Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.
3		Press [IP Configuration] button from the setting.
4		The current IP address can be seen on initial setting page.

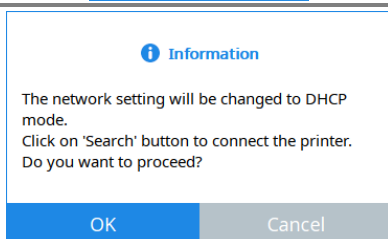
5



The IP Configuration dialog box has a title bar 'IP Configuration'. It contains two radio buttons: 'DHCP' (selected) and 'Static'. Below the radio buttons are three text input fields: 'IP address' with the value '192.168.0.10', 'Subnet mask' with the value '255.255.255.0', and 'Default gateway' with the value '192.168.0.1'. At the bottom are two buttons: 'OK' and 'Cancel'.

Input the desired IP address in the IP Change window and press [OK] button.

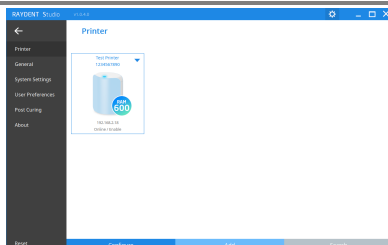
6



The Information dialog box has a title bar 'Information' with an information icon. The text inside reads: 'The network setting will be changed to DHCP mode. Click on 'Search' button to connect the printer. Do you want to proceed?'. At the bottom are two buttons: 'OK' and 'Cancel'.

A verification message will show to confirm the change. Press [OK] button to change the IP address.

7



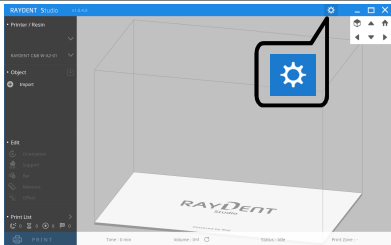

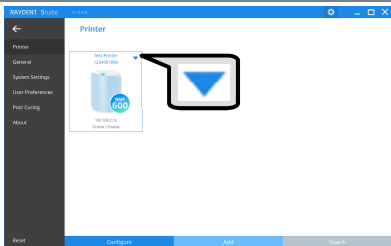

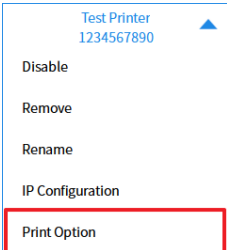
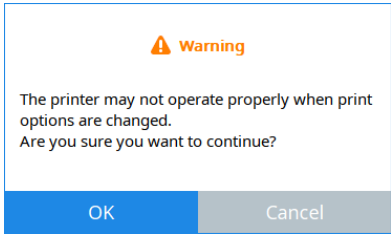

The Printer configuration window has a title bar 'Printer'. On the left is a sidebar with a list of settings: 'Printer', 'General', 'System Settings', 'User Preferences', 'Print Config', and 'About'. The main area shows a printer icon with a blue 'Add' button and the text 'No printer found. Click here to add a printer.' At the bottom are three buttons: 'Configure', 'Add', and 'Search'.

The user can verify the printer has been reconnected to the changed IP address on the printer list.

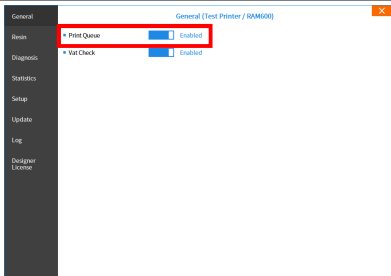


### 3.7.9 Change Printer Setting

#### 3.7.9.1 General setting

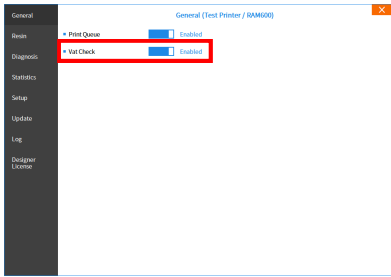
NO.	Figure	Description
1		Press [  ] button after running the program.
2		Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.
3		Press [Print Option] button from the setting.
4		Warning message will show regarding changing printer setting. Press [  ] button to continue.

5



The user can enable/disable the Print Queue. It is disabled by default.

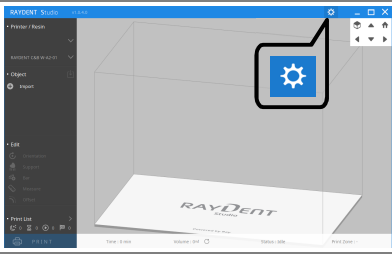

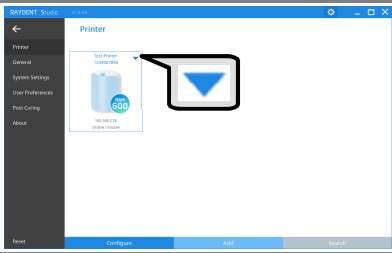

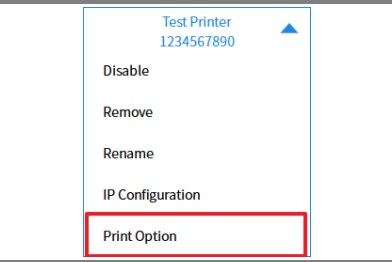
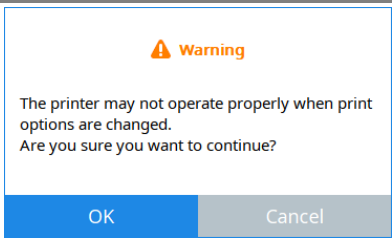

6



The user is able to check whether FLEX Vat is securely locked.

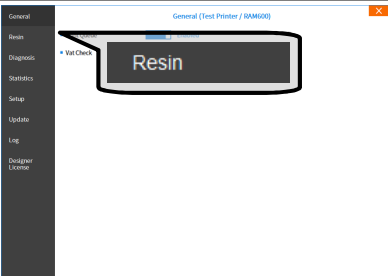
**Note:** Activate on FLEX Vat only.

## 3.7.9.2 Change resin settings

NO.	Figure	Description
1		<p>Press [  ] button after running the program.</p>
2		<p>Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.</p>
3		<p>Press [Print Option] button from the setting.</p>
4		<p>Warning message will show regarding changing printer setting. Press [  ] button to continue.</p>

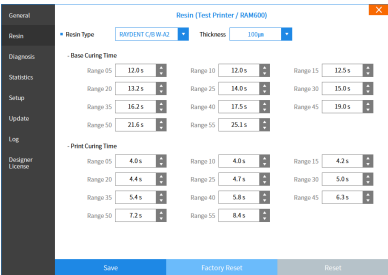
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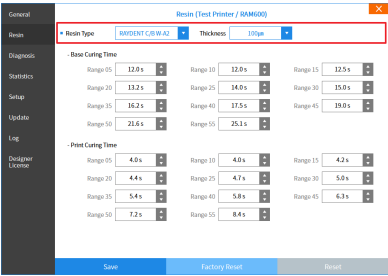
Press [ **Resin** ] button on the left menu.

6



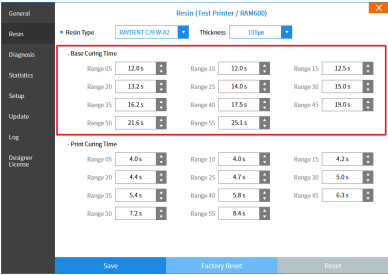
You can change the curing time for each resin.

7



Select the resin and output slice thickness you want to change.

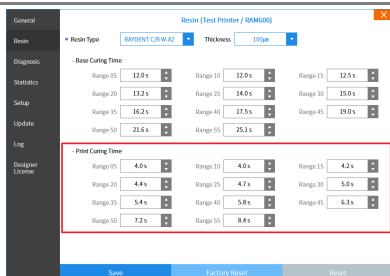
8



The curing time up to the slice thickness of the support base can be set according to the Print Zone.

**Note:** Changing the curing time can have a large effect on the printout. Only change it if you understand it correctly.

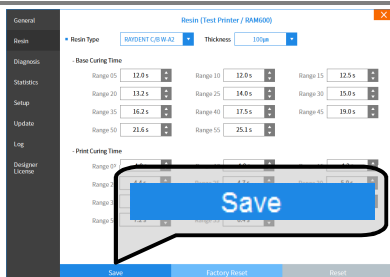
9



After the support base, the curing time for the output plane can be set according to the Print Zone.

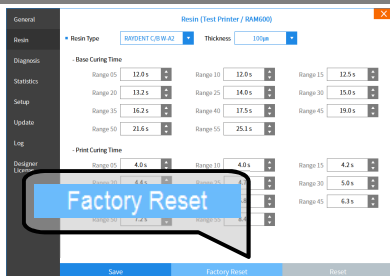
**Note:** Changing the curing time can have a large effect on the printout. Only change it if you understand it correctly.

10



When you have manually changed the curing time or have imported a value from another printer, you must press the **Save** button to save the value to the printer.

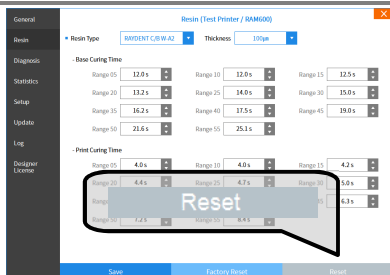
11



Press the **Factory Reset** button to reset the resin setting to the factory default.

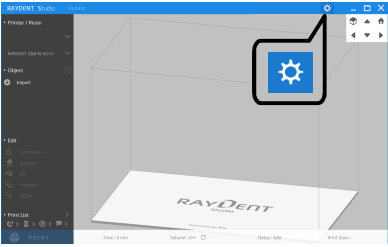

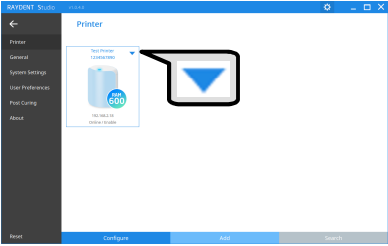

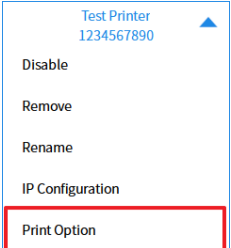
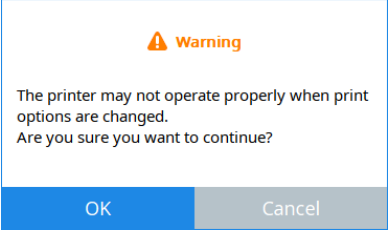

Press the **Save** button to save the settings.

12



When you want to restore the value before the change, press the **Reset** button.

3.7.9.3 Running diagnosis

NO.	Figure	Description
1		Press [  ] button after running the program.
2		Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.
3		Press [Print Option] button from the setting.
4		A warning message will show regarding changing the setting. Press [  ] button to continue.

5



General (Test Printer / RAM600)

- Print Queue ☐ Finished
- Test Check ☐ Finished

Diagnostics

Press [Diagnostics] button on the left menu.

General

Status

Diagnosis

Log

Designer Interface

Item

Action

Test Result

Standard

Diagnosis (RAM000 / RAM000)			
LCD Panel	ON OFF	Not Tested	
LCD Condition	Check	Not Tested	
UV LED	ON OFF	Not Tested	
UV Duty	ON 0	Not Tested	
UV Intensity	Check 0	Not Tested	
Cooling Fans	ON OFF	Not Tested	
Power LED	ON OFF	Not Tested	
Standby LED	ON OFF	Not Tested	
Priaming LED	ON OFF	Not Tested	
Flash LED	ON OFF	Not Tested	
Error LED	ON OFF	Not Tested	
Warning LED	ON OFF	Not Tested	
Speaker	Check	Not Tested	
Zero Point	Check 0 mm	Not Tested	
Z-axis Sensor	Check	Not Tested	
Vel lock status		Unlocked	

[999,1000]

The user can test for each function. Press **[ON]** button to start the test, and **[OFF]** button to complete the test, and click the Test Result item to see the result.

**[Result Indication]**

- Not Run: The test item is not tested yet.
- Pass: The test item operates properly.
- Fail: The test item operates improperly.

7	LCD Panel	Verify the image file is displayed on the LCD panel.
---	-----------	--

8	LCD Condition	<p>Use “UV Calibration Kit” to measure UV intensity and check if the LCD is normal. Click [OK] button to check the LCD status.</p>
---	---------------	--

**8-1**

Diagnostic (BAM000 / BAM000)

COM  Check

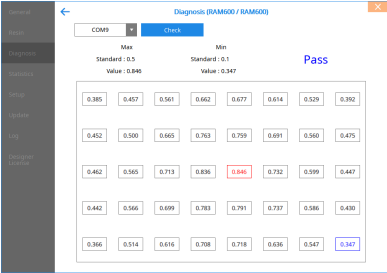
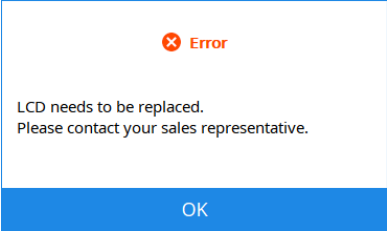
Max  
Standard: 0.5  
Value: 0

Min  
Standard: 0.1  
Value: 0

Not Tested

Grid of 20 empty rectangular boxes (4 rows by 5 columns).

Select the COM port to which the “UV Calibration Kit” is connected and click OK to start the measurement. It takes about 2 minutes. Please wait while the measurement is in progress.

8-2		When the measurement is completed, the position of the measured sensor and the final result are displayed.
8-3		If the message shown on the left is displayed after the measurement is completed, proceed with the calibration using the “UV Calibration Kit. If the same message is displayed after calibration, contact your seller or customer service of manufacturer.
9	UV LED	Verify the UV LED is turned on.
10	UV Duty	UV Duty increases from 50% to 99%. Verify that the UV intensity increases to the indicated UV Duty value.  <b>Note:</b> The vat and Build plate must be removed to get the accurate measurement.
11	UV Intensity	Verify the UV intensity meets the manufacturer’s standard. It takes a few minutes to test, and the result will be displayed when complete. If the test result is ‘Fail’, go to Setup menu and perform UV Calibration.  <b>Note:</b> The vat and Build plate must be removed to get the accurate measurement.
12	Cooling Fans	Listen to the operation sound generated while the cooling fans operate.
13	Power LED	Verify to see if the Power LED turns white properly.



<b>14</b>	Standby LED	Verify to see if the Standby LED turns whites properly to indicate the print job in the print queue.
<b>15</b>	Printing LED	Verify to see if the Printing LED turns white properly to indicate printing operation.
<b>16</b>	Complete LED	Verify to see if the Complete LED turns white properly to indicate print completion.
<b>17</b>	Error LED	<p>Verify to see if the Power LED turns red properly.</p> <p>The LED is tuned on when system error occurred. The corresponding code will be displayed on the monitor.</p>
<b>18</b>	Warning LED	<p>Verify to see if the Power LED turns cyan properly.</p> <p>The LED is turned on when UV is exposed. Be sure not to open the door while printing. It might cause improper printing.</p>
<b>19</b>	Speaker	Listen to the alarms from the speaker.
<b>20</b>	ZeroPoint	<p>Verify the distance of the Build plate corresponds to the value set from the factory.</p> <p>If the test result is 'Fail', go to Setup menu and perform Zero-Point Setting. Please contact your seller or customer service of manufacturer when performing Zero-Point Setting.</p>
<b>21</b>	Z-axis Sensor	<p>Verify the Z-axis sensor is operating. When the build plate reaches the top of the printer, the Z-axis sensor is activated and stops automatically.</p> <p>If the test result is 'Fail', the motor might generate abnormal noise.</p>

22 **Vat lock status**

Display the state of FLEX Vat fastened.

[Locked]: Both sides are fastened.

[Half Locked]: Only one side is fastened.

[Unlocked]: Not fastened at least one side.

[Unknown]: Not supported or sensor disabled.

---

23 **Temperature**

Display the internal temperature of the product.

---

24 **Diagnosis (RAM600 / RAM600)**

After all the tests have been completed, [ **Report** ] button on the bottom will be activated to enable the result report to output as a PDF file.

---

25 **Diagnosis (Test Printer / RAM600)**

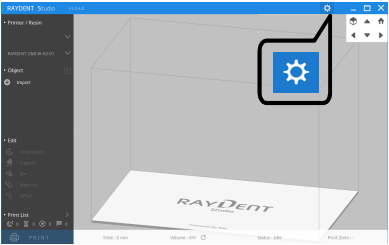

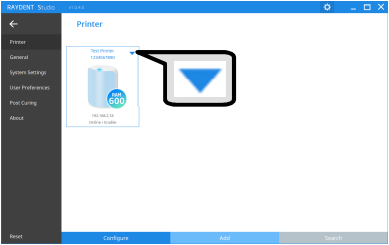

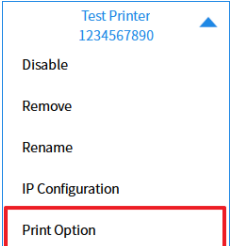
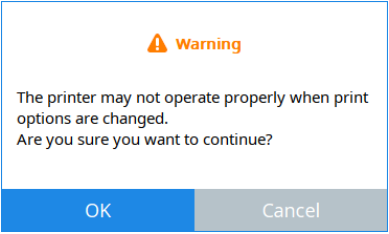

Press [ **Report** ] button then a window for entering basic information is newly displayed. After inputting the information according to each item, press [ **OK** ] button then a dialog box will appear in which the user can input the path and name of the report.

---

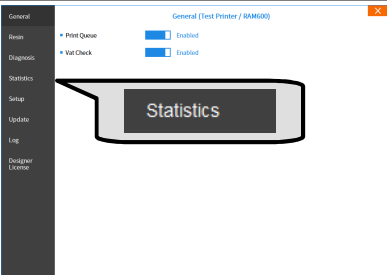
26 **Select Open Folder**

After entering the name of the report, press [ **OK** ] button on the path the user wish to save then the saving of the report is completed.

## 3.7.9.4 Checking the statistics

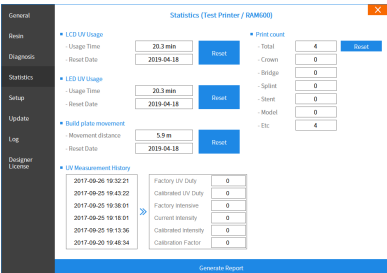
NO.	Figure	Description
1		<p>Press [  ] button after running the program.</p>
2		<p>Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.</p>
3		<p>Press [Print Option] button from the setting.</p>
4		<p>A warning message will show regarding changing the setting. Press [  ] button to continue.</p>

5



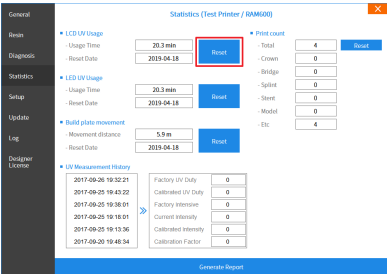
Press **Statistics** button on the left menu.

6



The user can check the statistical values such as reset date, usage time, build plate movement distance and print count.

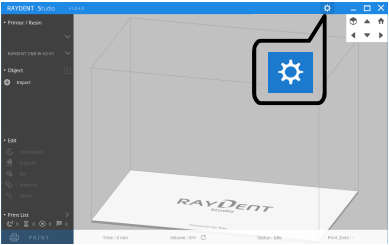

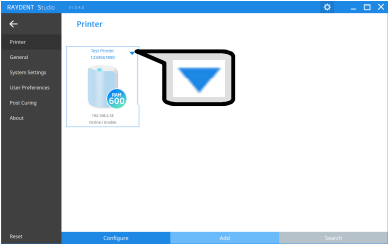

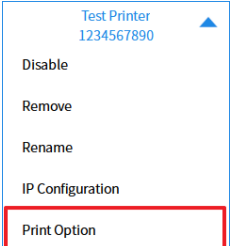
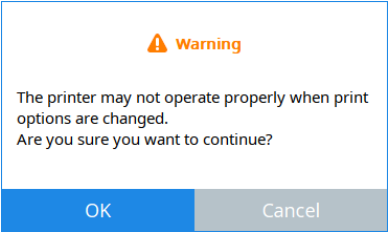

7



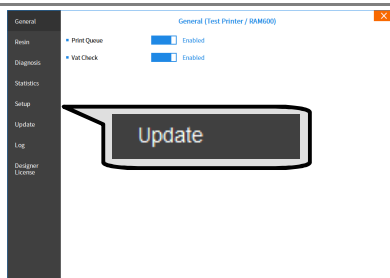
If you want to reset the items, you can reset them by press the **Reset** button.

**Note:** When replacing the LCD and UV LED, reset each item.

## 3.7.9.5 Updating the Printer

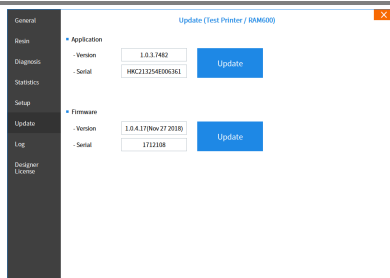
NO.	Figure	Description
1		<p>Press [  ] button after running the program.</p>
2		<p>Select the printer the user would like to change the setting from the printer list and press [  ] button to bring up the setting list.</p>
3		<p>Press [Print Option] button from the setting.</p>
4		<p>A warning message will show regarding changing the setting. Press [  ] button to continue.</p>

5



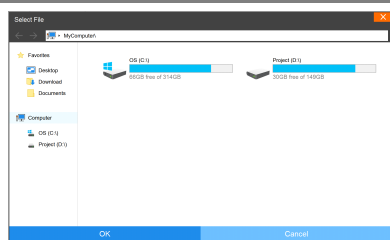
Press [ Update ] button on the left menu.

6



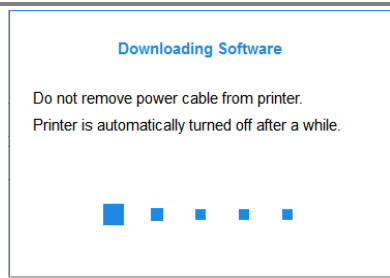
Press [ Update ] button on the software or the firmware the user wants to update.

7



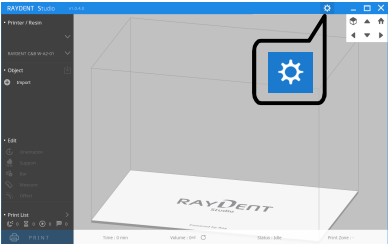

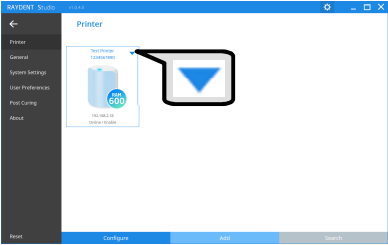

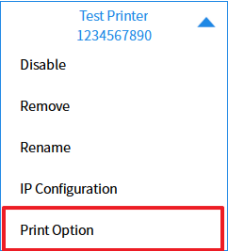
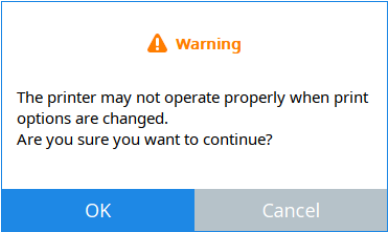

If the user selects firmware from file dialog, the update will proceed.

8



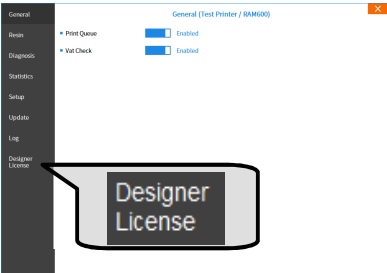
Do not disconnect the power cord while the update file is being transferred. After the update, the printer automatically turn off and press the power button to turn on the printer.

3.7.9.6 Managing Desinger licenses

NO.	Figure	Description
1		Press [  ] button to access the printer configuration.
2		Select the printer to change the setting from the printer list and press [  ] button to drop down the setting list.
3		Press [Print Option] button from the setting.
4		A warning message will show regarding changing the setting.  Press [  ] button to continue.

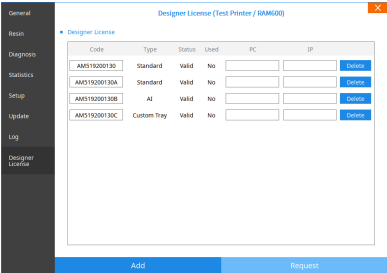
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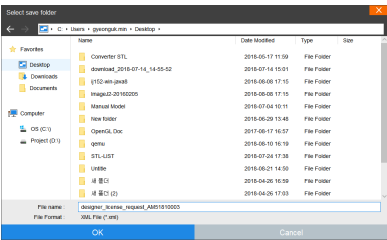
Press [ **Designer License** ] button on the left menu.

6



The valid Designer license is listed on the selected printer.

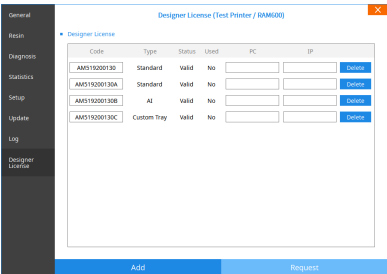
7



If an additional Desinger license is needed, click the [ **Request** ] button on the bottom right to generate a Desinger license request file.

**Note:** 1 valid Designer license is pre-applied as preset. Please contact your sales representative for more details.

8

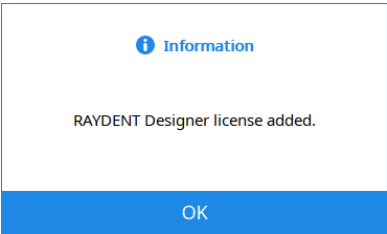


Click [ **Add** ] button on the bottom left to browse the provided license file.

Click [ **OK** ] button to apply the additional license.

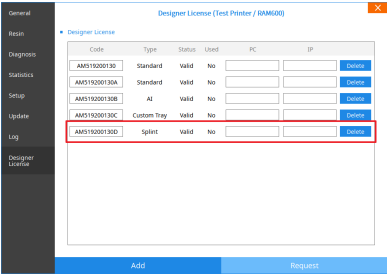


9



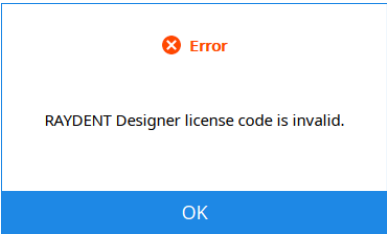
Click [ OK ] button to confirm the process.

10



Verify the additional license has been added properly in the license list.

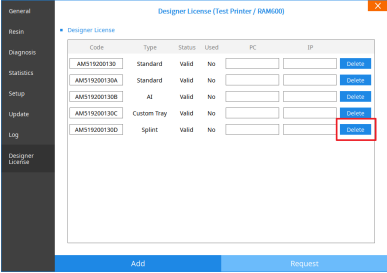
11



The generated license file is dedicated to the requested printer only.

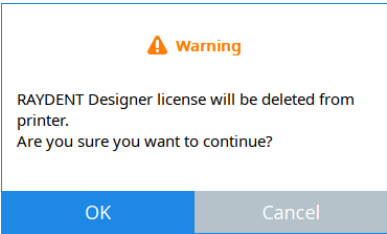
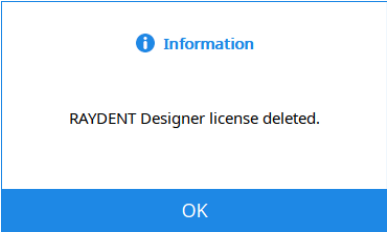
It might display an error pop-up if applied on a different printer.

12



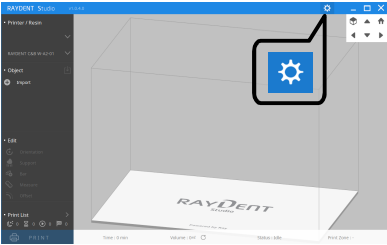
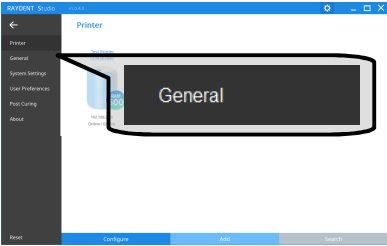
User can delete the licenses in case of expire or managing purposes.

Click [ Delete ] button at the end of each license in the list.

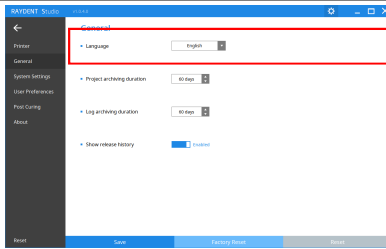
13	 A warning dialog box with a yellow triangle icon and the text: "Warning", "RAYDENT Designer license will be deleted from printer.", "Are you sure you want to continue?". At the bottom are "OK" and "Cancel" buttons.	An Warning window for deleting licenses will appear and click [ OK ] button.
14	 An information dialog box with a blue circle icon and the text: "Information", "RAYDENT Designer license deleted.". At the bottom is an "OK" button.	Click [ OK ] button to close the pop up.

3.7.10 Change Studio Setting

3.7.10.1 General setting

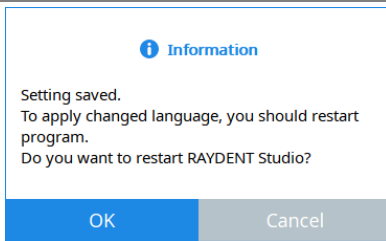
NO.	Figure	Description
1	 The main window of RAYDENT Studio. A callout box points to a gear icon (Settings) in the top right corner of the window.	Press [ ⚙ ] button after running the program.
2	 The "Settings" window with the "General" tab selected. A callout box points to the "General" button in the left-hand menu.	Press [ General ] button on the left menu.

3



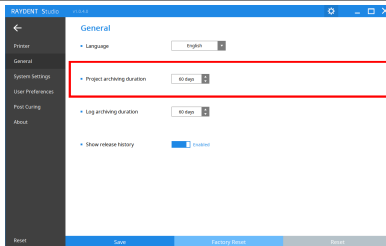
User can select the language displayed in RAYDENT Studio.

4



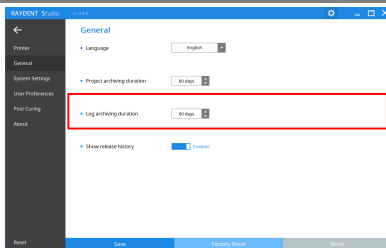
When you select the language you want and press [ **Save** ] button, a window asking whether you want to restart the program is displayed. If you press the [ **OK** ] button, the program will restart automatically and apply the language you set.

5



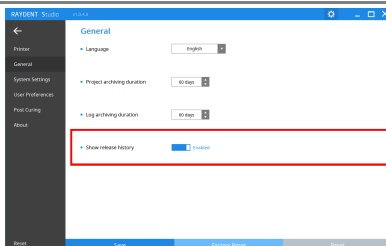
When you output object, the project file is automatically saved in the C:\Ray\ RAYDENT Studio\print\_history folder. You can set the archiving duration of these files in the Project archiving duration item.

6



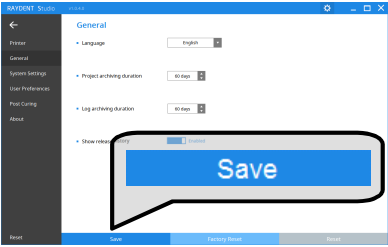
The log files of RAYDENT Studio are saved in C:\Ray\log\RAYDENT Studio folder. You can set the archiving duration of the log files in the Log archiving duration item.

7




Sets whether to display the Release Notes window that appears when the RAYDENT Studio is first run.

8



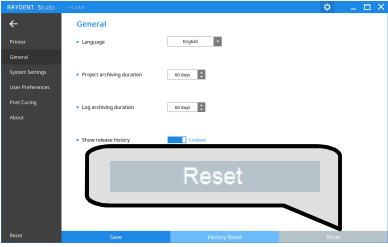
Press [ **Save** ] button to save the modified settings.

9



Press [ **Factory Reset** ] button to reset to the factory settings.  
Press [ **Save** ] button to save the factory settings.

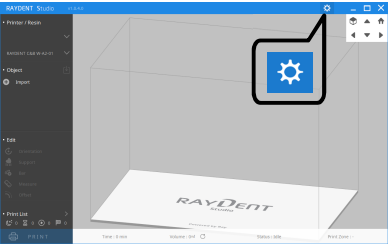

10



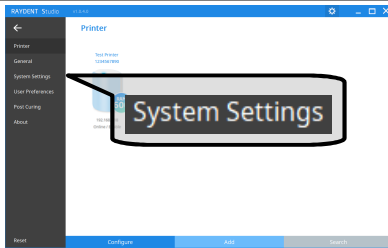
If want to restore the previous value, press [ **Reset** ] button.

3.7.10.2 System Settings

Proceed with “System settings” when detailed settings are required. Changing the “System settings” effects print quality. Only change it if you understand it correctly.

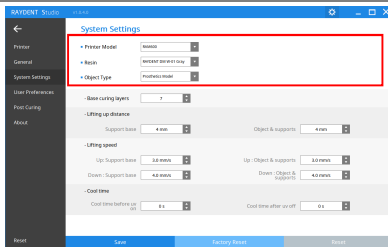
NO.	Figure	Description
1		Press [  ] button after running the program.

2



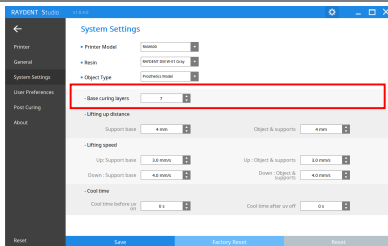
Press **System Settings** button on the left menu.

3



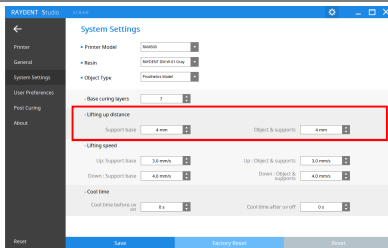
User can select the Printer model, Resin and Object type to change the settings. Select Object type displays supported resins only.

4



Adjust the initial number of intentionally over-cured slices to build a print to the Build plate.

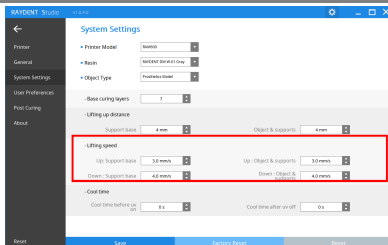
5



Adjust the distance that the Build plate goes up after curing on each slice.

If the environment temperature is low, the resin fluidity will deteriorate. This setting might help to print more accurately.

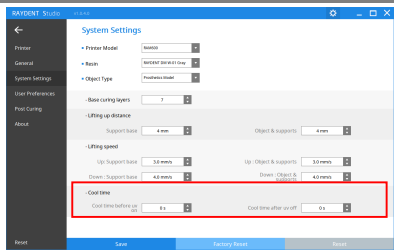
6



Adjust the moving speed when the Build plate moves up and down.

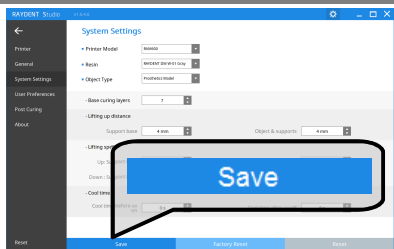
If the environment temperature is low, the resin fluidity will deteriorate. This setting might help to print more accurately.

7



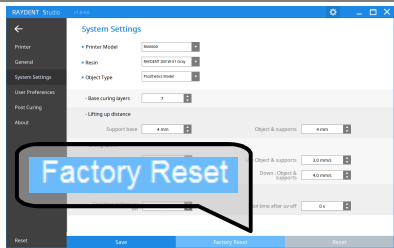
The user is able to set the Cool time before turning UV on and after turning UV off.

8



Press [ **Save** ] button to save the current settings.

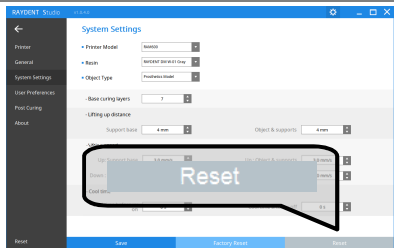
9



Press [ **Factory Reset** ] button to restore to the factory default.

Press [ **Save** ] button to save the current setting.

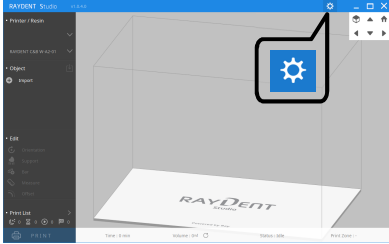

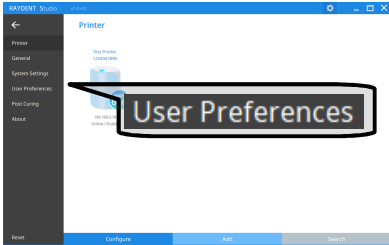
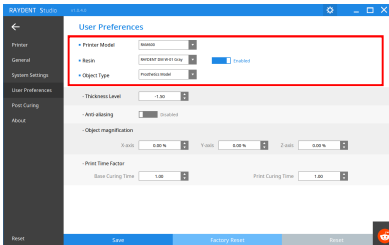
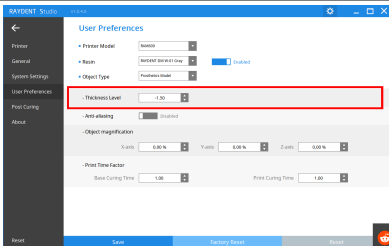
10



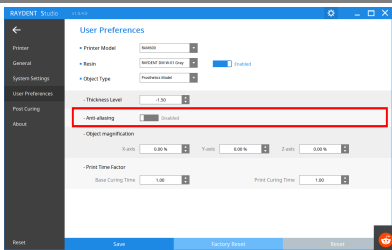
Press [ **Reset** ] button to restore to the previous setting.

### 3.7.10.3 User Preferences

Proceed with “User Preferences” when detailed settings are required. Changing the “User Preferences” effects print quality, Only change it when you understand it clearly.

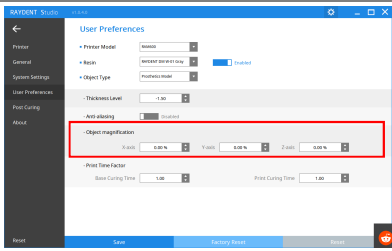
NO.	Figure	Description
1		Press [  ] button after running the program.
2		Press [ <b>User Preferences</b> ] button on the left menu.
3		User can select the Printer model, Resin and Object type to change the settings, and set whether or not to use the selected Resin. Select Object type displays supported resins only.
4		The thickness of the printout can be corrected. Set a high value for thick printouts and a low value for thin printouts.

5



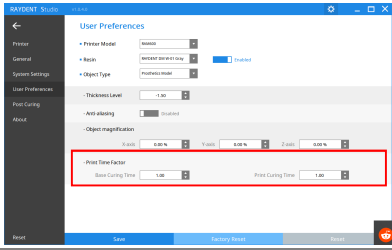
User can turn on the anti-aliasing option to improve the surface quality of the printout. Depending on the option, the thickness of the printout may vary.

6



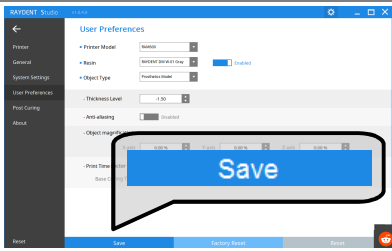
Under Object Magnification, to compensate for shrinkage during post-curing, you can set how much the object is to be magnified and printed for each resin.

7



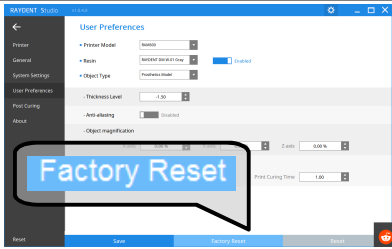
If you want to over-curing/under-curing than the time set for each printer, you can adjust the "Print Time Factor". "Print Time Factor" is multiplied to "Print Curing Time" in resin option for each printer.

8



Press [ Save ] button to save the current settings.

9

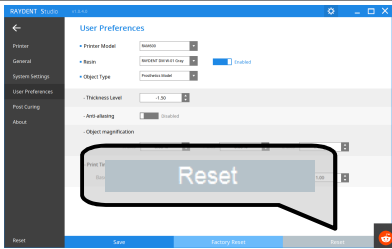


Press [ Factory Reset ] button to restore to the factory default.

Press [ Save ] button to save the current setting.




10

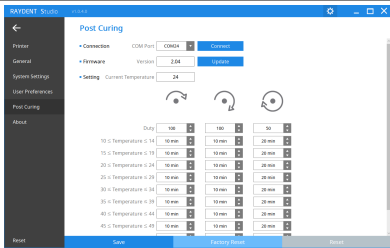


Press [ **Reset** ] button to restore to the previous setting.

3.7.10.4 Curing Unit(RPC500) Setting

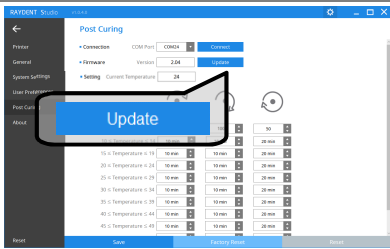
NO.	Figure	Description
1		Press [  ] button after running the program.
2		Turn the Curing Unit(RPC500) on and connect the device using the included USB cable.  Press [ <b>Post Curing</b> ] button on the left menu.
3		Available COM port is displayed under the Post Curing tab. (COM Port number might be vary.)  Press [ <b>Connect</b> ] button to connect to the device.

4



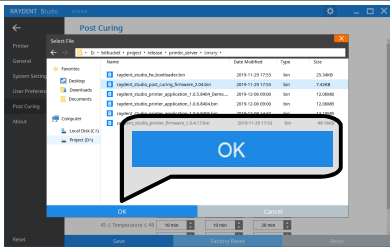
When the device is connected successfully, you can update the firmware, check the current temperature of the curing unit and set the curing time according to the temperature range of each mode. If the connection fails, check the COM port number and reconnect the USB cable.

5



Press [ **Update** ] button then a file dialog box will be displayed.

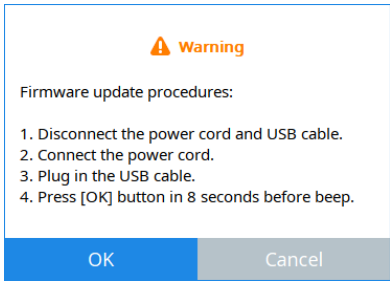
6



Navigate the file location and select the correct file.

Press [ **OK** ] button to proceed the update.

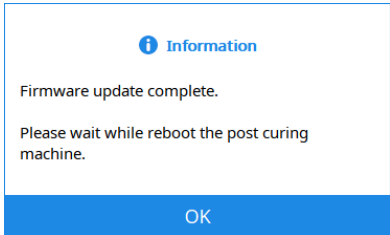
7



Read the update procedures carefully and press [ **OK** ] button.

If the procedures are not correctly followed, updates might not occur properly.

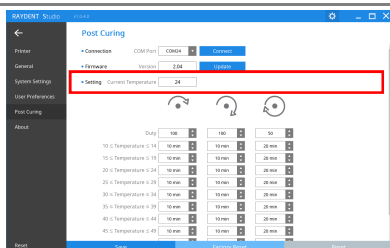
8



After the update is complete, the completion message will be displayed.

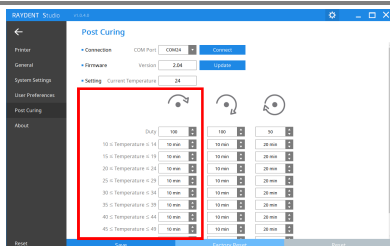
Refer to the guides on the second line if the update fails.

9



You can check the current temperature of the curing unit.

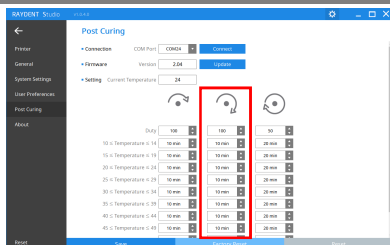
10



Adjust the curing time and intensity according to the temperature range for the first mode of the curing unit.

The mode is optimized for the RAYDENT C/B (Crown and Bridge) resin.

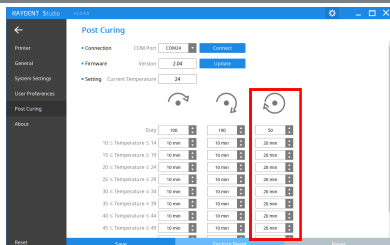
11



Adjust the curing time and intensity according to the temperature range for the second mode of the curing unit.

The mode is optimized for the RAYDENT SG (Surgical Guide) resin.

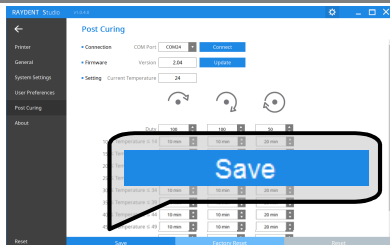
12



Adjust the curing time and intensity according to the temperature range for the third mode of the curing unit.

The mode is optimized for the RAYDENT DM (Digital Model) resin.


13



Press [ **Save** ] button to save the current setting.

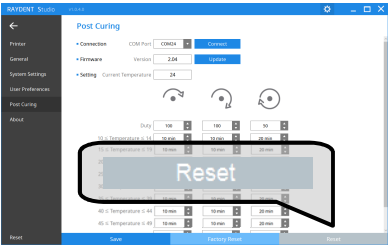
After changing the settings, remove the power cord and USB cable from the curing unit and reconnect to apply the modifications.

14



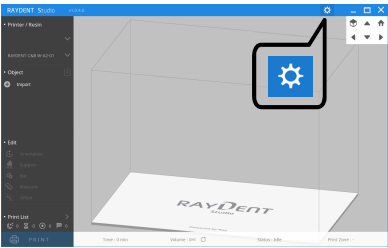

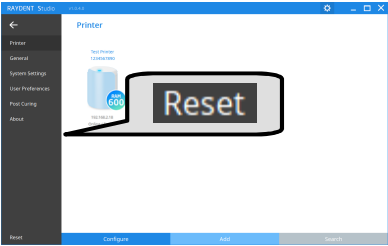
Press [ **Factory Reset** ] button to restore to the facotry default.

15

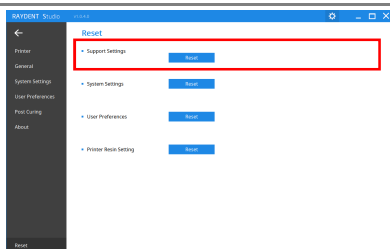


Press [ **Reset** ] button to restore to the previous setting.

3.7.10.5 Reset

NO.	Figure	Description
1		Press [  ] button after running the program.
2		Press [ <b>Reset</b> ] button on the left menu.

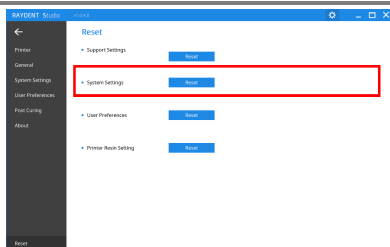
3



Initialize all setting values related to the support.

**Note:** The support setting values for all kinds of resins are changed to the factory default.

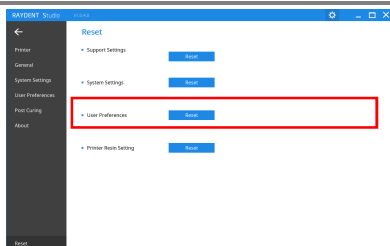
4



Initialize all system output settings.

**Note:** The setting values for all kinds of resins are changed to the factory default.

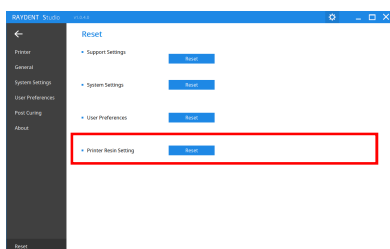
5



Initialize all user output settings.

**Note:** The setting values for all kinds of resins are changed to the factory default.

6



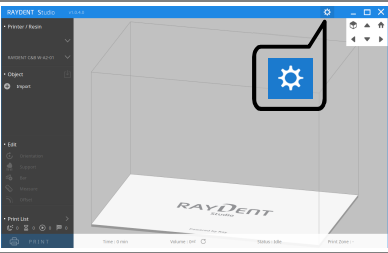

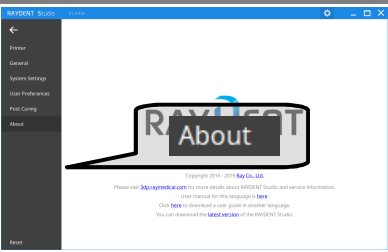
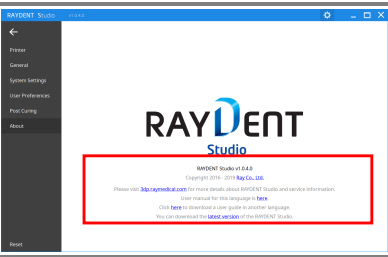
Initialize the resin curing time setting value of the printer to the factory default. This function is online and only applies to enabled printers.

The function may be disabled when:

- There is a printer in progress.
- No printer is online.
- No printer is active.
- The program and printer application version are different.

RAYDENT Studio 3 Installation

3.7.10.6 About

NO.	Figure	Description
1		Press [  ] button after running the program.
2		Press [ <b>About</b> ] button on the left menu.
3		You can check the product information and links to sites with product and service information.

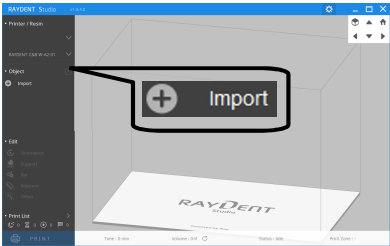
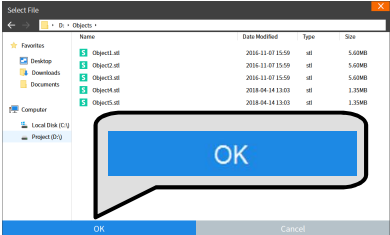
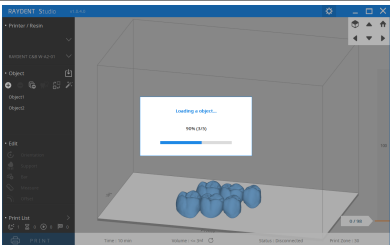
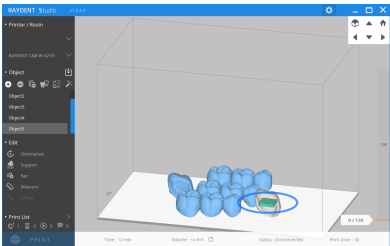
# Operating the Software

# 4

# 4 Operating the Software

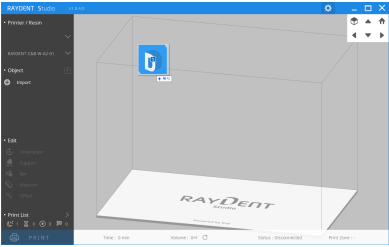
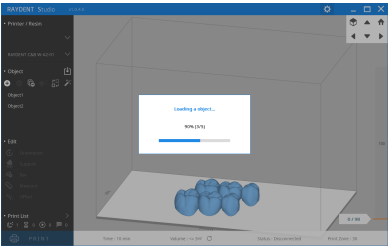
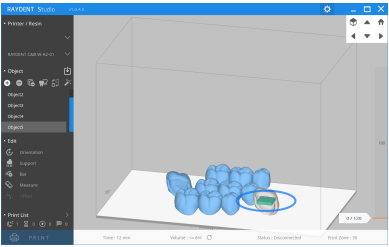
## 4.1 Import Object

### 4.1.1 Open

NO.	Figure	Description
1		On the screen menu, press <b>[+ Import]</b> button or press <b>[Insert]</b> key on the keyboard to open <b>[Open File]</b> window.
2		Up to 20 objects can be selected. Press <b>[OK]</b> button to open the object.
3		The opened object is added to the object list and can be seen from the screen (chamber).
4		If multiple objects are added, the objects will be added one at a time in alphabetical order. The final object added will be automatically selected.

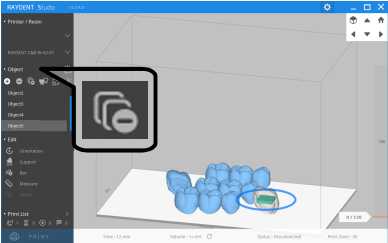

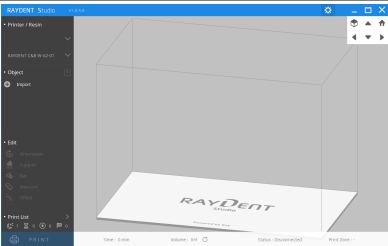


4.1.2 Drag and Open

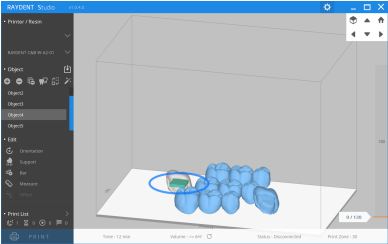
NO.	Figure	Description
1		The user can drag up to 20 objects from a specific folder to the program.
2		The selected object is added to the object list and can be seen from the screen (chamber).
3		If multiple objects are added, the objects will be added one at a time in alphabetical order. The final object added will be automatically selected.

4.2 Remove Object

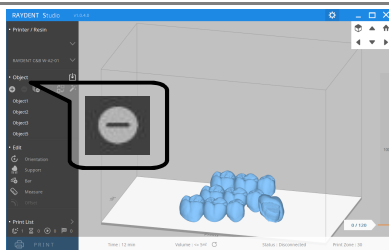
4.2.1 Remove All Objects


NO.	Figure	Description
1		To remove all objects, press [  ] button.
2		All objects will be removed from the chamber.

4.2.2 Remove Individual Objects

NO.	Figure	Description
1		Select the object the user wants to removed.

2



When [  ] button or [Delete] key is pressed, the selected objects will be removed.

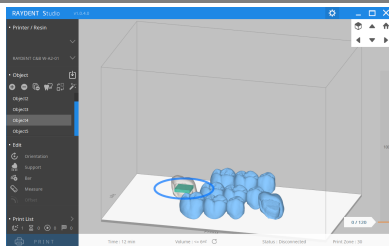
### 4.3 Duplicate Object

NO.

Figure

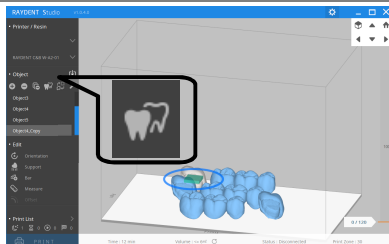
Description


1



Select the object the user wants to duplicate.

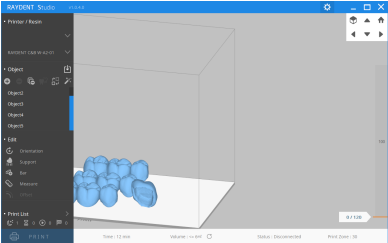
2



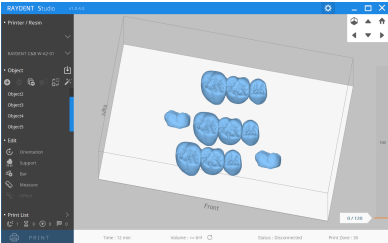
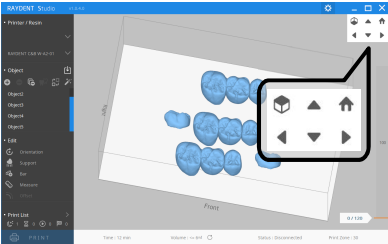
When [  ] button is pressed, the selected objects will be duplicated.

4.4 Switch to Object View

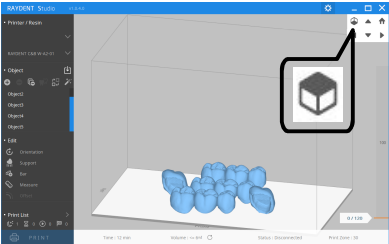

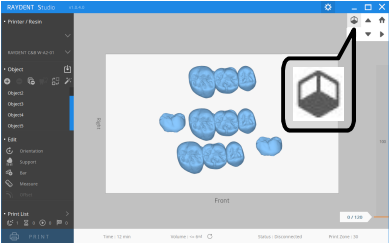


4.4.1 Move the Screen

NO.	Figure	Description
1		The user can move the screen up, down, and side-to-side when the left mouse button is pressed and held on the chamber.

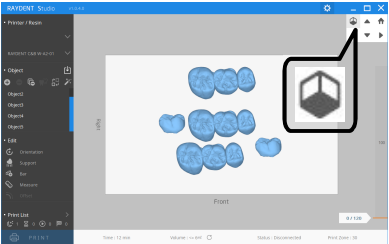

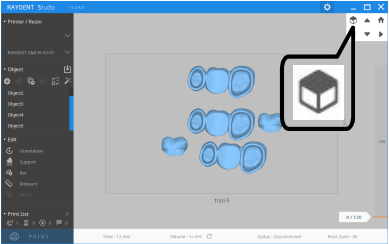


4.4.2 Rotate Screen

NO.	Figure	Description
1		The user can rotate the screen up, down, and side-to-side when the right mouse button is pressed and held on the chamber.
2		The user can also use [ ▼ ] [ ▲ ] [ ◀ ] [ ▶ ] buttons on the menu to get the same result.

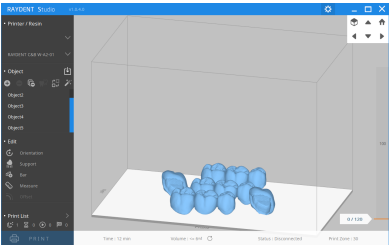

4.4.3 Top View

NO.	Figure	Description
1		Press [  ] button from the menu to have a top view of the chamber.
2		After, [  ] button will be changed to [  ] button.

4.4.4 Bottom view

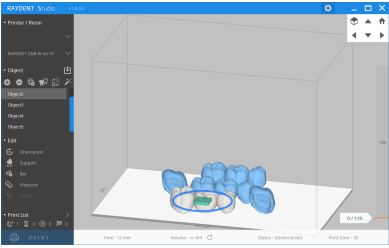
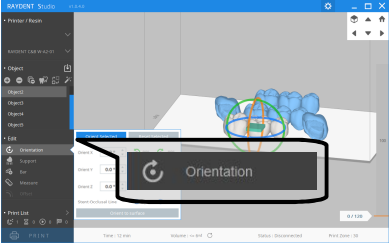
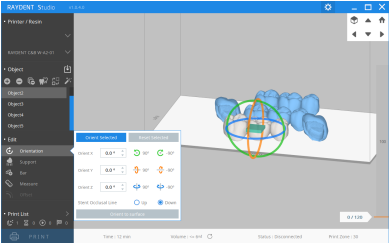
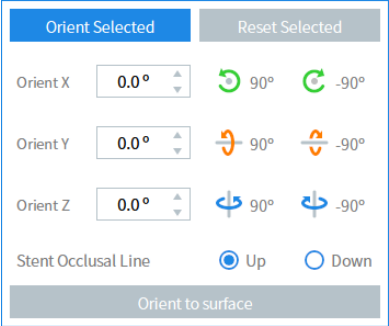
NO.	Figure	Description
1		Press [  ] button from the menu to have a bottom view of the chamber.
2		After, [  ] button will be changed to [  ] button.

4.4.5 Quarter view

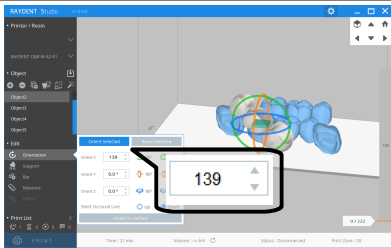
NO.	Figure	Description
1		Press [  ] button from the menu to have a top-right side view of the chamber.

## 4.5 Preparing Object Printing

### 4.5.1 Change in Print Direction (Manually)

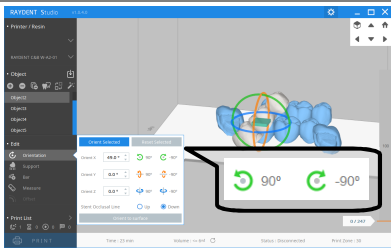
NO.	Figure	Description
1		Select the object the user wants to change in the Object list.
2		When the user presses <b>Orientation</b> button on the menu, sub-menu are shown. Axis of rotation is also shown on the object.
3		The rotation axis are displayed in three different planes. If the user moves the mouse while holding left mouse button, the object will rotate accordingly in highlighted axis.
4		Manual changing of the orientation can be done by putting the angle value or by clicking 90° buttons.

5



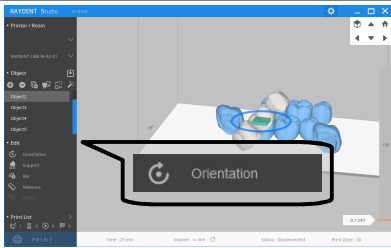
Putting a numeric value next to Orient X, Orient Y or Orient Z allows object rotation in corresponding axis and angle.

6



Pressing the buttons on the right side rotates the object 90° at a time.  
The [ +90° ] button rotates the object +90° and [ -90° ] button rotates the object -90°.

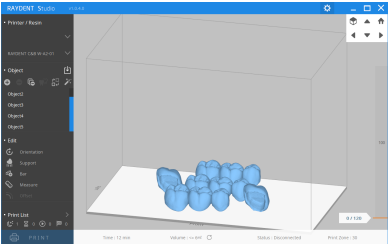
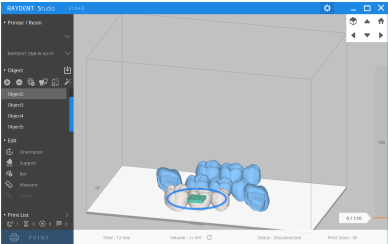
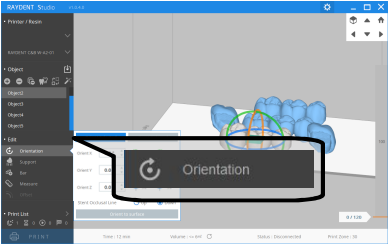

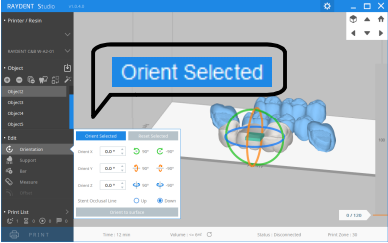

7



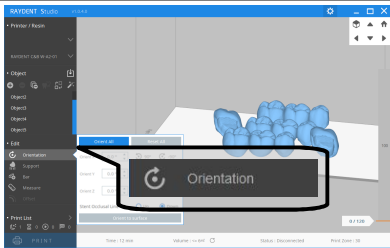
To exit the orientation, press [ Orientation ] button to finish.




4.5.2 Change in Print Direction (Automatically)

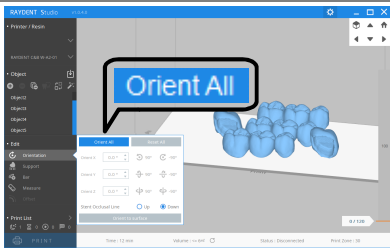
NO.	Figure	Description
1		User can be adjust the print direction of individual objects or all objects. Select the object the user wants to change in the Object list.
2		To adjust the print direction of individual objects, select the object the user wants to change.
3		If the user presses [  Orientation ] button on the menu, sub-menu will be shown. Axis of rotation will also be shown on the object.
4		The user can press [  ] button in the sub-menu to automatically adjust the object's print direction.

5



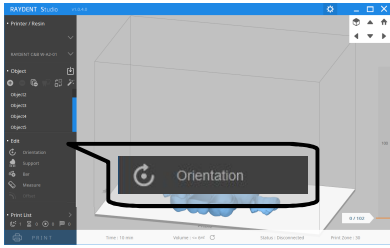
To adjust the print direction of all objects, press the [  Orientation ] button without selecting objects.


6



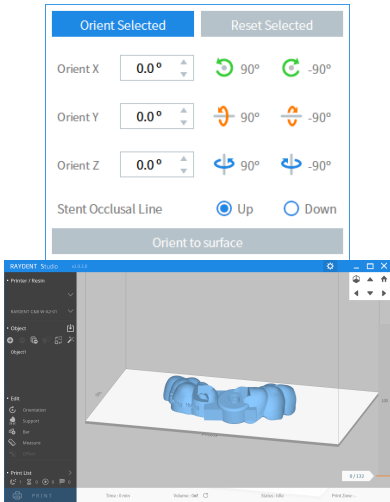
The user can press [ **Orient All** ] button in the sub-menu to automatically adjust the object's print direction.

7



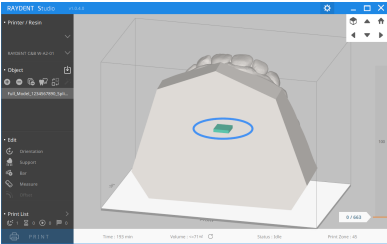
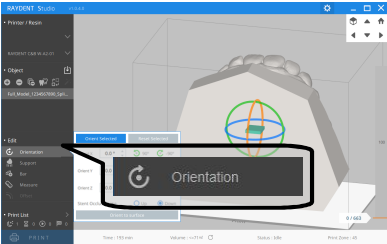

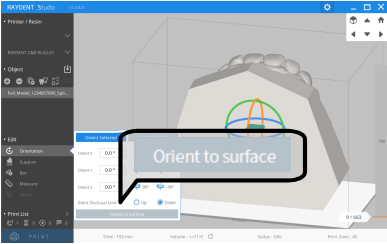

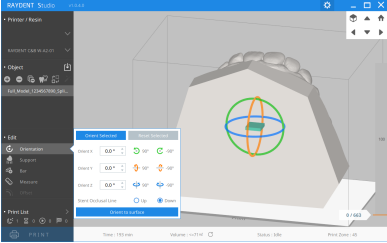
If the user does not need to adjust the print direction, press [  Orientation ] button on the menu to complete.

8

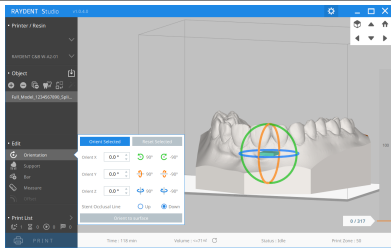


If you select Stent Occlusal Line as Up, orientation will be made so that the occlusal surface of the stent is facing up when the stent is auto oriented. When Down is selected, the it is oriented downward.  
The figure on the left is the orient result when it is UP.

4.5.3 Align the selected faces to the bottom

NO.	Figure	Description
1		User can align the output direction of the object so that the selected face is at the bottom.
2		Click the [  Orientation ] to display the submenu.
3		Click [  Orient to surface ] in the submenu to activate the appropriate mode.
4		With the mode active, click the left mouse button on the face you want to align on the bottom.

5

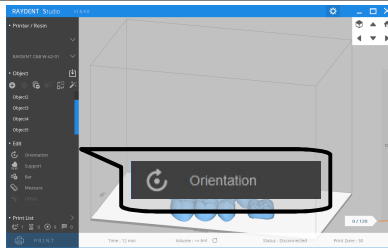



Make sure the selected face is aligned to the bottom.

4.5.4 Print Direction Reset

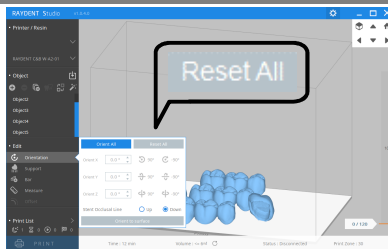
NO.	Figure	Description
1		Select the object the user wants to reset in the Object list.
2		When the user presses [ Orientation ] button on the menu, sub-menus are shown. Axis of rotation is also shown on the object.
3		The user can press [ Reset Selected ] button in the sub-menu to reset the object's print orientation.


4



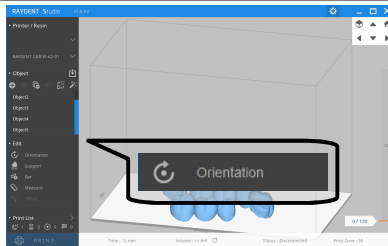
To reset the print direction of all objects, press the [  Orientation ] button without selecting objects.


5



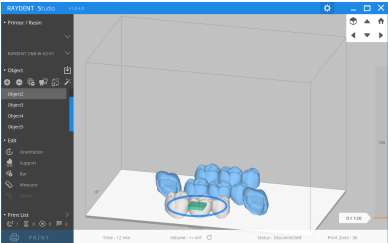
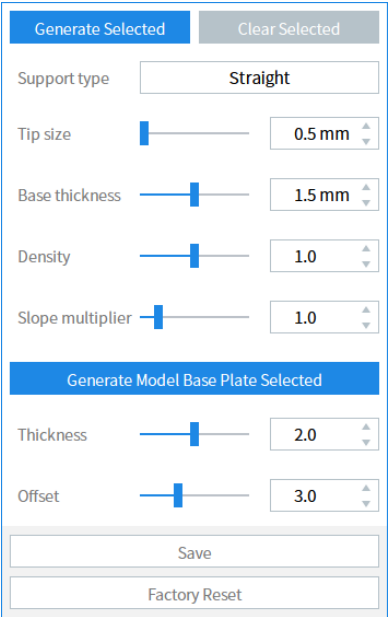

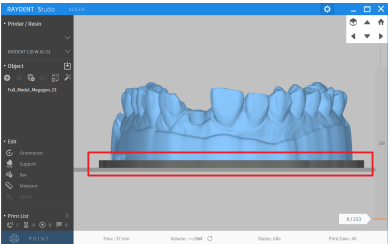
The user can press [  Reset All ] button in the sub-menu to reset the object's print orientation.

6

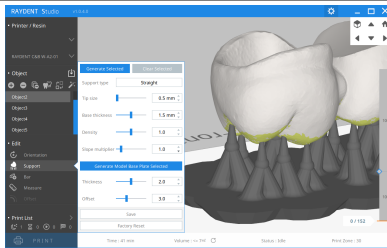


If the user does not need to adjust the print direction, press [  Orientation ] button on the menu to complete.

4.5.5 Generate Support Stand (Manually)

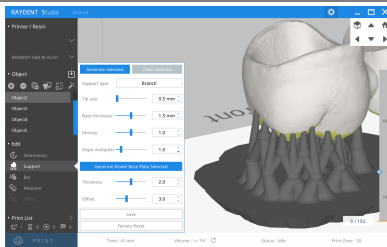
NO.	Figure	Description
1		Select the object the user wants to generate support in the Object list.
2		When the user presses [  Support ] button on the menu, sub-menu will show. The area where the supports can be placed is displayed as a light green on the object. Select the type of support from straight or branch.
3		If a user needs to print a hollow model or unevenly adhered model without supports , press [ <b>Generate Model Base Plate Selected</b> ] button in order to create a base plate and increase the adhesion to the build plate.

4



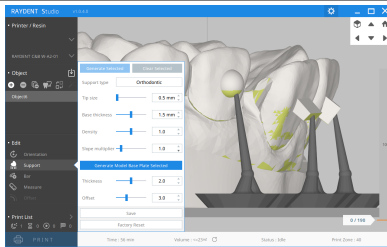
It is the appearance of Straight type generate support by created.

5



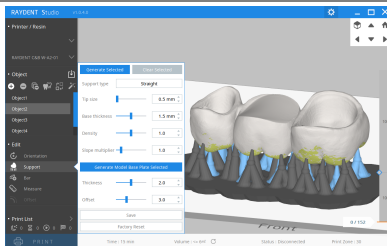
It is the appearance of Brush type generate support by created.

6



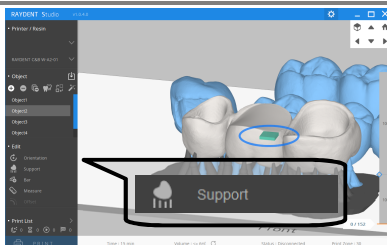
Can add a support to your printout without floating the build plate. The figure on the left shows an orthodontic support.


7

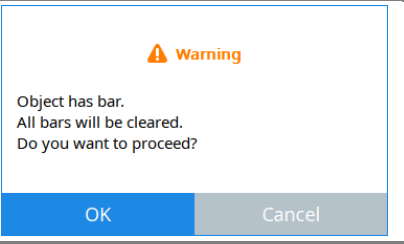


Move the mouse over the applicable area of the object to display the supports to be inserted. Press the left mouse button to insert the supports.

8



When inserting/removing the supports is completed, press  **Support** button on the menu.

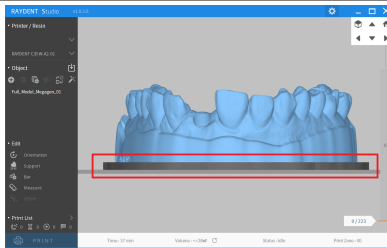
9		If the object has bars, a message will pop-up as the figure on the left. Press <b>[ OK ]</b> button to delete the bar and create a support.
---	---	---

4.5.6 Automatic Supports Generation

NO.	Figure	Description
1		Select the object the user wants to generate support in the Object list.
2		The user can select the object the user wants to generate support and press <b>[ Generate Selected ]</b> button in the sub-menu to automatically make the supports. If a user needs to print a hollow model or unevenly adhered model without supports , press <b>[ Generate Model Base Plate Selected ]</b> button in order to create a base plate and increase the adhesion to the build plate.

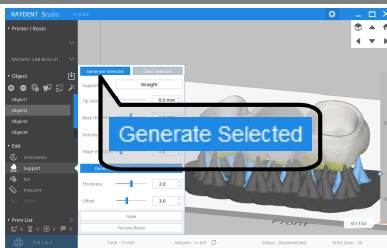


3



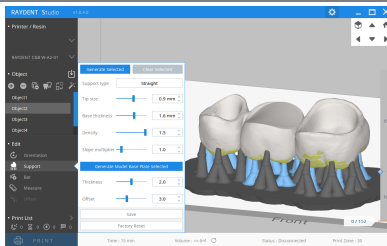
If a user needs to print a hollow model or unevenly adhered model without supports, press [ **Generate Model Base Plate Selected** ] button in order to create a base plate and increase the adhesion to the build plate.

4



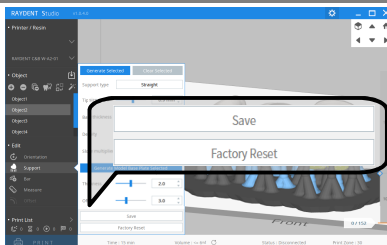
If the user needs to adjust the size of the supports, press [ **Generate Selected** ] button to complete, after regulating the size of the area on the menu.

5



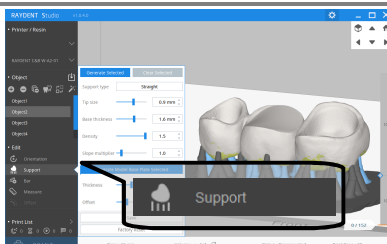
After a while, the size-regulated supports will be created.

6



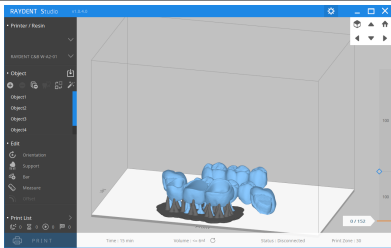
Press [ **Save** ] button if the user wants to continue using the adjustment. Press [ **Factory set** ] button if the user wants to change to default value.

7



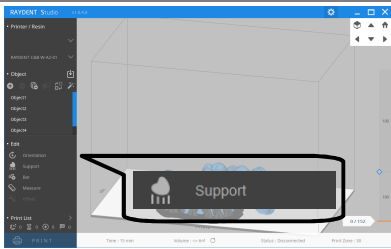
When inserting/removing the supports is completed, press [ **Support** ] button on the menu.


8



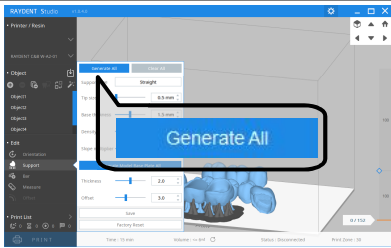
User can automatically generate supports for all objects.

9



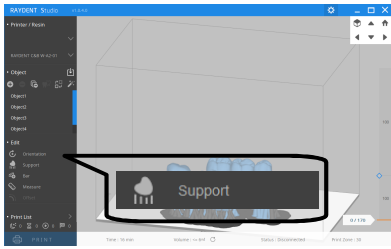
Press the [  Support ] button without selecting objects.


10



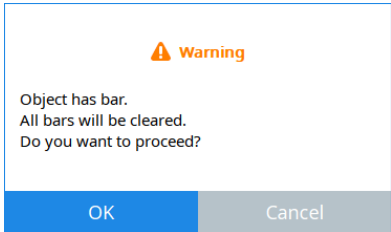
The user can press [ **Generate All** ] button in the sub-menu to automatically make the supports.

11



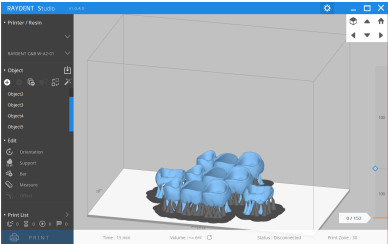
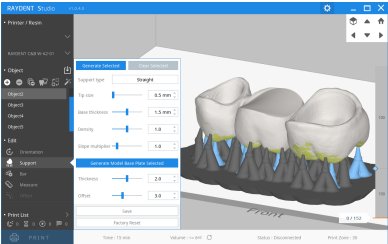

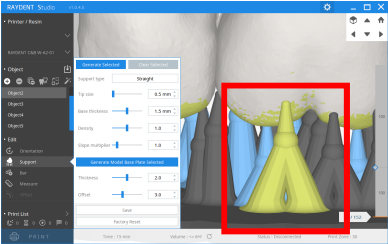
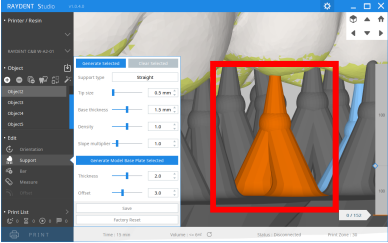
When inserting/removing the supports is completed, press [  Support ] button on the menu.

12

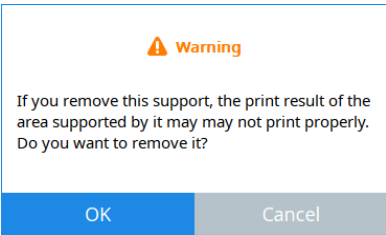


If the object has bars, a message will pop-up as the figure on the left. Press [ **OK** ] button to delete the bar and create a support.

4.5.7 Remove Support

NO.	Figure	Description
1		The user is selectively able to delete only the desired support from the currently created support.
2		Select the object to be modified and press the  button.
3		Move the mouse cursor over the part where the support is connected to the object to change the color of the support and click to delete the support.
4		Blue colored-support means the particular area is supported and move the mouse cursor over the support to change the color to red.

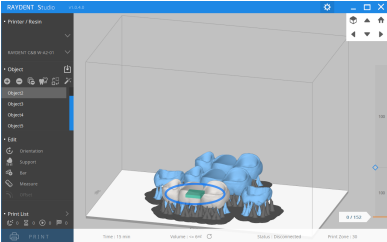
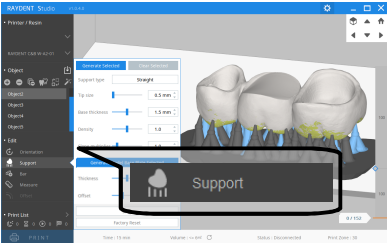
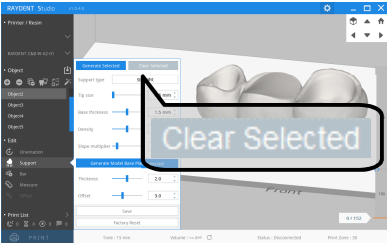
5



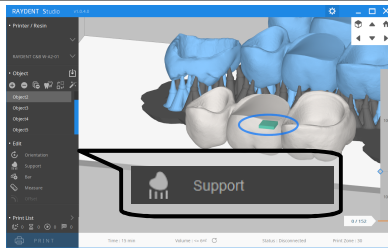
When the user tries to erase the blue-support, a message will pop-up as the figure on the left.


Press [ **OK** ] button to delete the suport. However, note that the supported area may not be printed correctly upon this modification.

4.5.8 Supports Clearing

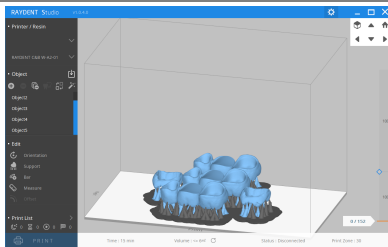
NO.	Figure	Description
1		Select the object the user wants to reset in the Object list.
2		If the user presses [ <b>Support</b> ] button on the menu, sub-menu will be shown. The area where the supports is applicable will be displayed as a light green on the object.
3		The user can press [ <b>Clear Selected</b> ] button in the sub-menu to clear the support of the selected object.

4



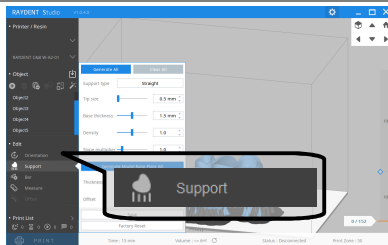
When inserting/removing the supports is completed, press [  Support ] button on the menu.

5



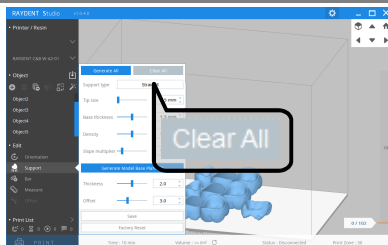
User can clear the supports for all objects.


6



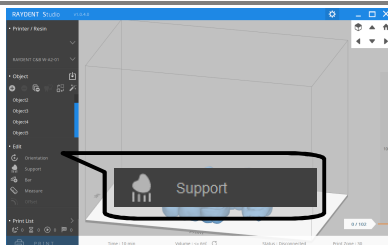
If the user presses [  Support ] button on the menu, sub-menu will be shown.


7



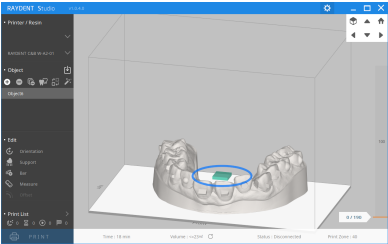
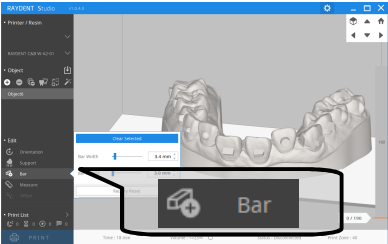

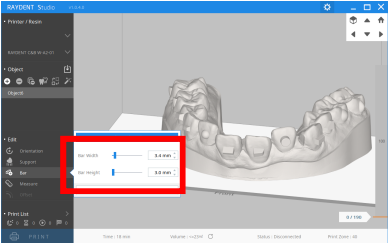
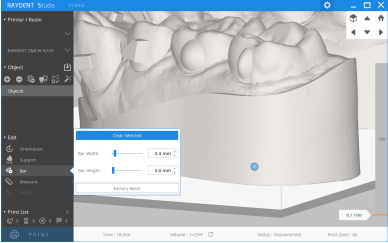
The user can press [  Clear All ] button in the sub-menu to clear the all supports.

8

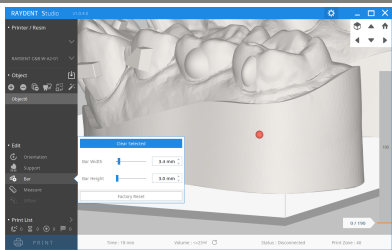


When inserting/removing the supports is completed, press [  Support ] button on the menu.

4.5.9 Attaching Bars

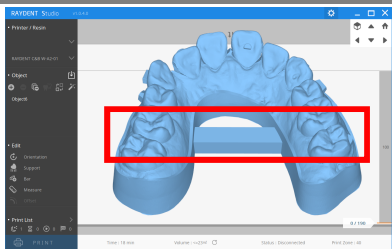
NO.	Figure	Description
1		Can create bars in your model. Select the model to create a bar.
2		Press [  Bar ] button in the menu to display the detailed menu.
3		Can set the Bar width or Bar height.
4		When the mouse pointer is over the model, a blue dot is displayed where you can attach it. Click to select the start and end points of the bar.

5



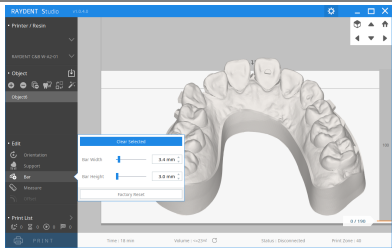
You cannot create a bar in a position higher than [Bar Height], and a red dot is displayed. If you want to create a bar up to the height of the model, adjust the Bar height value in the detail menu.

6



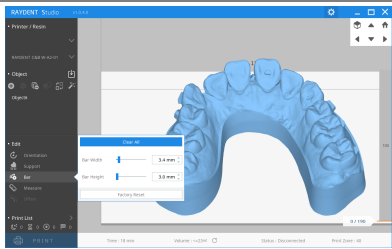
The bar has been created.

7



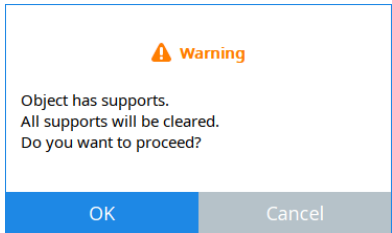
Press [Clear Selected] button on the detailed menu to delete the bar created in the current model.

8



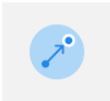








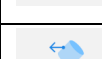




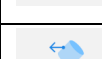




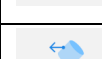
If you press [Clear All] button when no model is selected, the bar of all objects is deleted.

9



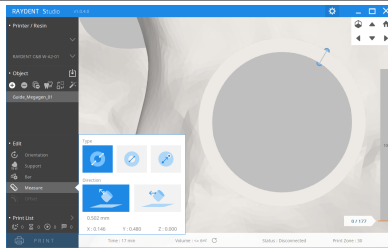
If the object has supports, a message will pop-up as the figure on the left. Press [OK] button to delete the support.

4.5.10 Printout measurement

NO.	Figure	Description										
1		A user is able to measure the thickness of the in/outside of the printout or the distance between two points.										
2		Select an object to print and click <b>Measure</b> button to see more details.										
3	<div><p>Type</p><div></div><p>Direction</p><div></div><p>0 mm</p><p>X : 0      Y : 0      Z : 0</p></div>	<div><p>[Measurement type]</p><table><tr><td></td><td>Measure the outer thickness of the printout.</td></tr><tr><td></td><td>Measure the inner distance of the printout.</td></tr><tr><td></td><td>Measure the two specific points.</td></tr></table><p>[Measurement direction]</p><table><tr><td></td><td>Measure in the vertical direction of the selected surface.</td></tr><tr><td></td><td>Measure in the direction parallel to the printout.</td></tr></table></div>		Measure the outer thickness of the printout.		Measure the inner distance of the printout.		Measure the two specific points.		Measure in the vertical direction of the selected surface.		Measure in the direction parallel to the printout.
	Measure the outer thickness of the printout.											
	Measure the inner distance of the printout.											
	Measure the two specific points.											
	Measure in the vertical direction of the selected surface.											
	Measure in the direction parallel to the printout.											

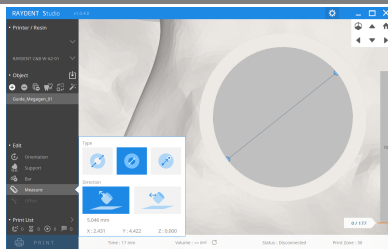


4



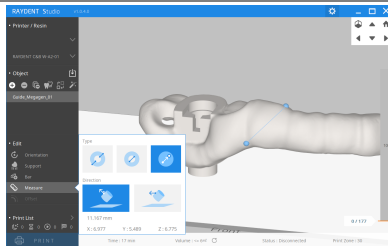
The thickness of the printout can be measured.

5



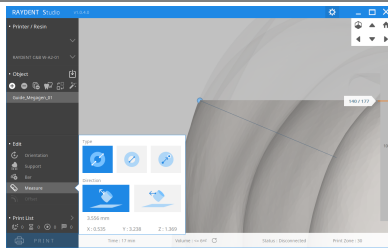
The inside distance of the printout can be measured.

6



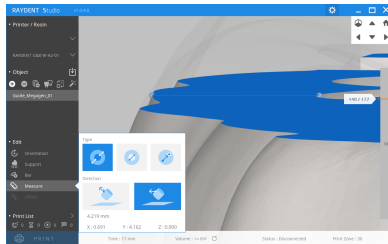
The distance of the two specific points can be measured.

7



The distance in the vertical direction of the selected surface can be measured.

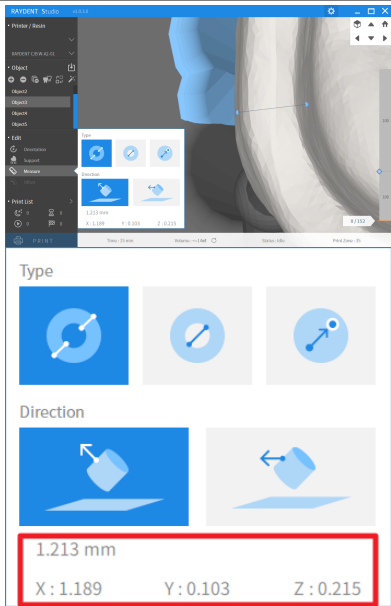
8



The distance in the parallel to the selected surface of the printout.

**Note:** The printout result may vary due to printout options.

9



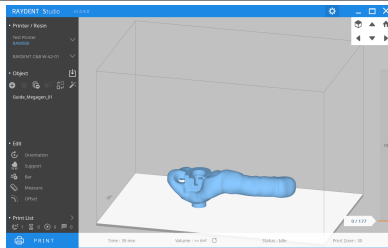
After select the measurement type and direction, click the desired point. Then, the distance of the straight line, each axis will be calculated and displayed at the bottom of the submenu.

Distince: Between measuring two points.  
X: Horizontal distance of printout plane.  
Y: Vertical distance of printout plane.  
Z: Perpendicular distance of printout plane.

4.5.11 Specifying Offset

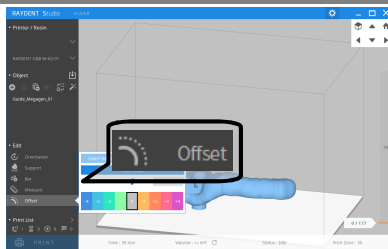
NO.	Figure	Description
1		<p>The function enables to assign an offset to the hole area to improve the printout quality of the guide holes.</p> <p><b>Note:</b> Available only if a product is selected that supports the offset feature.</p>
2		<p>Select Offset function supporting printer.</p>


3



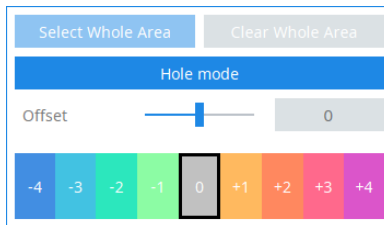
Load a model / surgical guide to apply Offset.

4



Click [  Offset ] button to view more detail operation options.

5



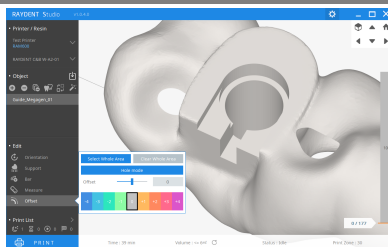
(-) makes the printout thinner and the inner surface of the hole is wider in result.

(+) makes the printout thicker and the inner surface of the hole is narrower in result.

The difference between 0 and +4/-4 is 1 pixel (Printer resolution) in the thickness of the printout. Since the thickness of printout becomes thicker or thinner by 1 pixel in one direction, the hole inside becomes narrower or wider by 2 pixels.

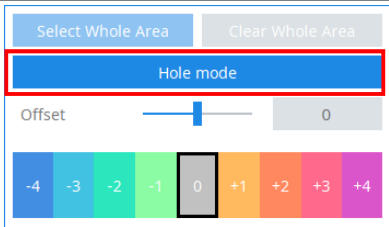
The result of range (1~3) may be vary due to the correlative effects of [Thickness Level] and [Anti-aliasing].

6



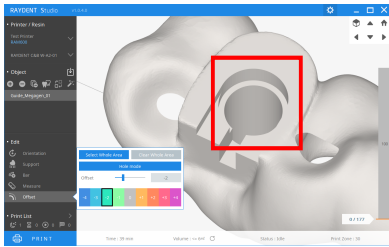
Select the object to apply Offset in the specific area such as guide holes.

7



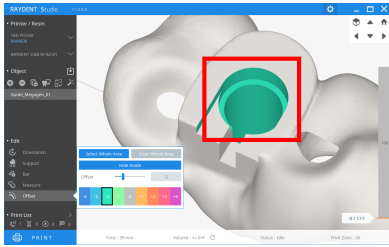
Select the offset mode with [Hole mode] or [Plain mode] depending on the shape of the part to be applied.

8



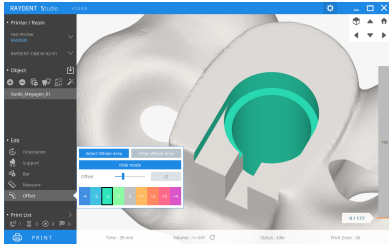
After select the Offset value in the indicator click the surface to apply the adjustment.

9



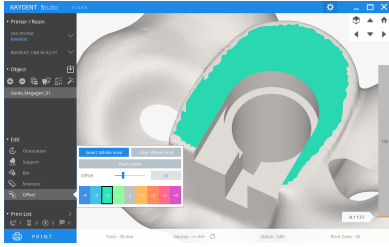
Verify the selected area is applied with desired option.  
Hold down the Ctrl key on keyboard and select hole to disable the function.

10



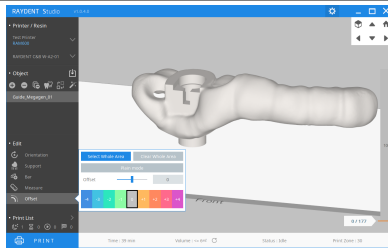
The result of offset applied in [Hole mode].

11



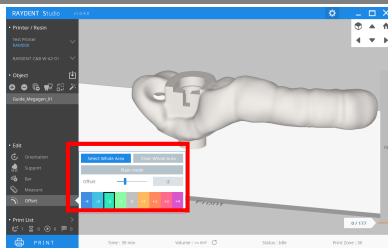
The result of offset applied in [Plain mode].

12



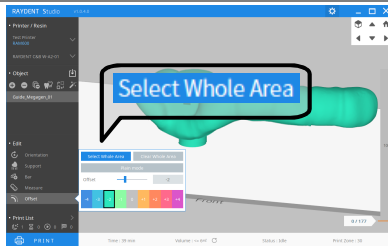
Offset can be applied not only specific surface but also on entire object if desired.

13



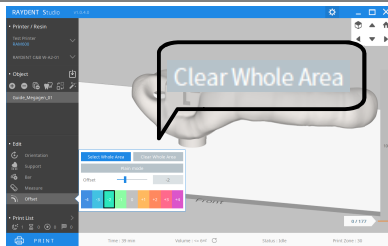
Select the object to apply and select the Offset to apply.

14



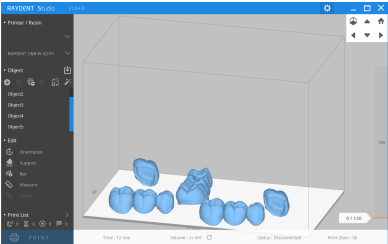
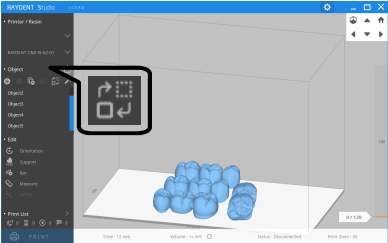

Click [ Select Whole Area ] button to apply on entire object.

15

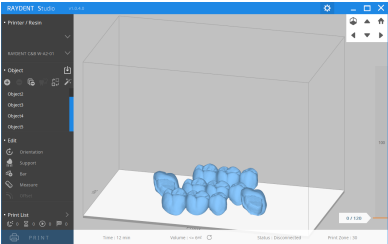
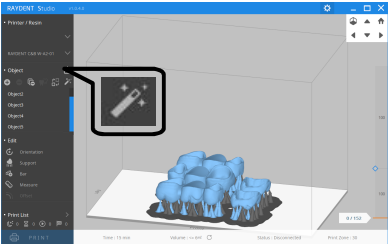

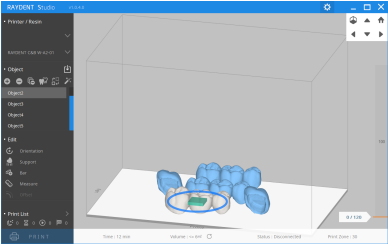

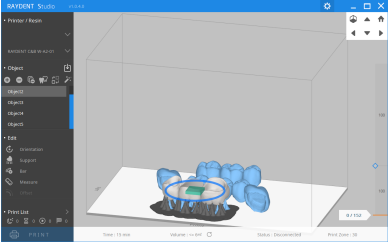


[ Clear Whole Area ] button disable the Offset function on the object.


4.5.12 Auto Positioning

NO.	Figure	Description
1		It provides a fully automatic preparation function to simplify the procedure for preparing printing.
2		Press [  ] button on the menu to sequentially create the print direction and the supports for each object.

4.5.13 Prepare Auto printing

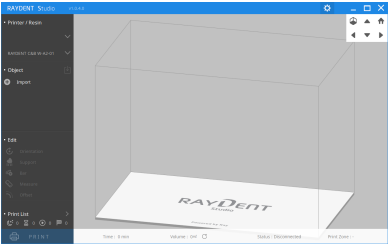
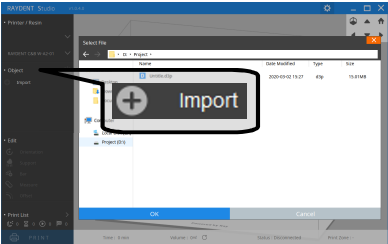
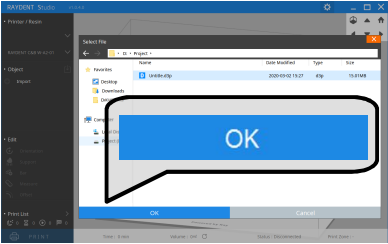
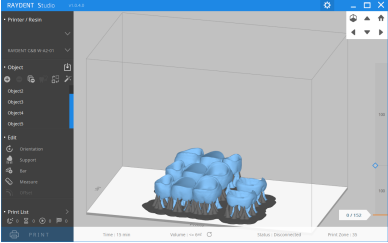
NO.	Figure	Description
1		It provides a fully automatic preparation function to simplify the procedure for preparing printing.
2		With no objects selected, press [  ] button on the menu to sequentially create the print direction and the supports for each object.
3		After selecting one object, press [  ] button on the menu to create the print direction and the support for the selected object.
4		Only the selected object can be confirmed that the print direction and the support are created.

4.5.14 Save Project

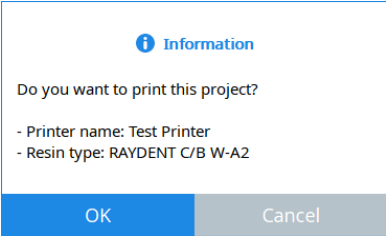
NO.	Figure	Description
1		The object in process can be saved as project file.
2		When the user presses [  ] button from the menu, the latest saved folder will show.
3		After naming the file, press [Enter] key or [ <b>OK</b> ] button to have the Scene saved in d3p extension file. The project file stores the selected printer and output section with all options of RAYDENT Studio.
4		A message will pop up to show that the file has been successfully saved.



4.5.15 Import Project

NO.	Figure	Description
1		Import the saved project file.
2		On the screen menu, press <b>Import</b> button to display the final working folder.
3		The RAYDENT Studio Project filename extension is d3p. After selecting the file, press <b>OK</b> button to open the project file.
4		Project files are loaded and the objects are displayed.

5

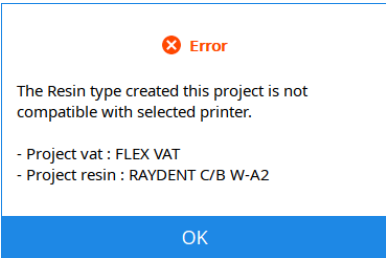


When the project file is loaded, if the printer to be output is selected, a message prompts you to print the project file directly. To output the project file, click the **OK** button.

When you click the **OK** button, you can print using the printer and RAYDENT Studio settings when the project file is created.

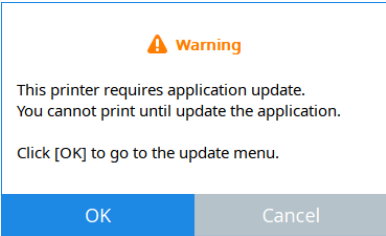
If you click the **Cancel** button, only the object will be loaded without printing. After that, If you use the **PRINT** button to print, it will be output using the settings of the currently selected printer and RAYDENT Studio, instead of using the printer and RAYDENT Studio settings when the project file is created.

6



If the selected vat type for the selected printer is different from the vat for saving the project, the pop-up will appear as the left figure.

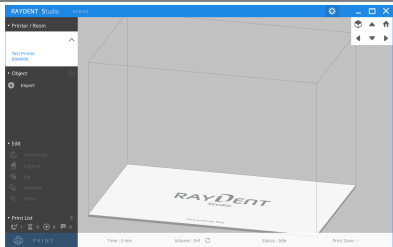
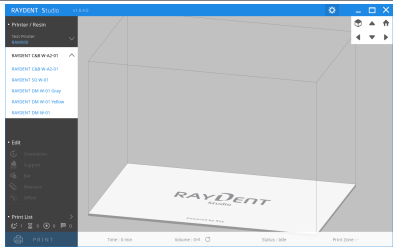
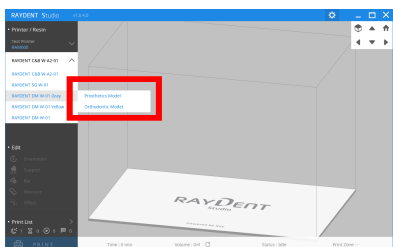
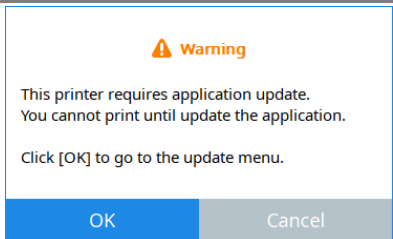
7



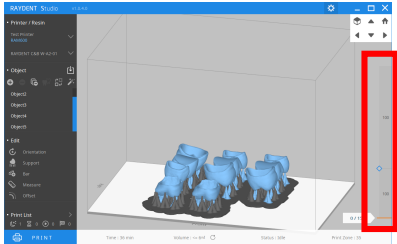
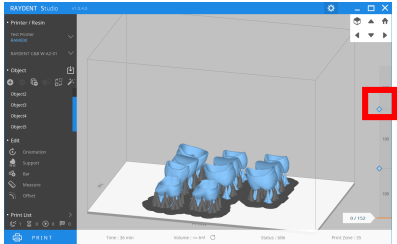
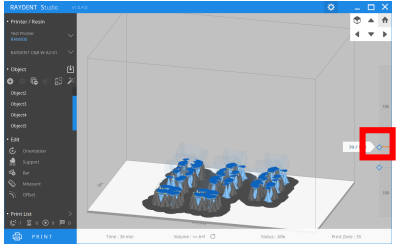
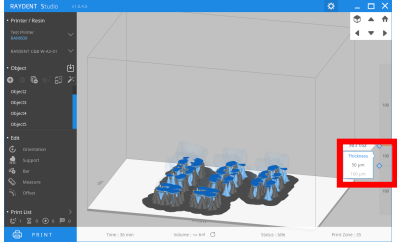
If you get a message like the left , you need to update the application of the printer. Refer to [3.7.9.5 Updating the printer] for how to update.

## 4.6 Object Printing

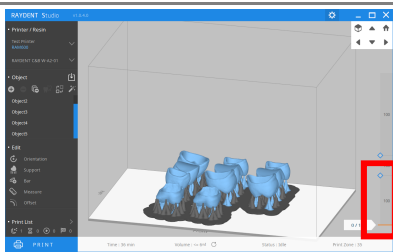
### 4.6.1 Printer and Resin Selection

NO.	Figure	Description								
1		When you are ready to print, select the Printer type the user wants to print from the Printer/Resin list to start printing. Select by referring to the printer name and model that are displayed in the list.								
2		Select the resin type the user wants to print from the Printer/Resin list.								
3		<p>If the selected resin supports multiple object types, you can select the object type when selecting the resin. The list of supported object types by resin is as follows.</p> <table><tr><th>Resin</th><th>Object type</th></tr><tr><td rowspan="2">RAYDENT DM W-01 Yellow</td><td>Prosthetics</td></tr><tr><td>Orthodontic</td></tr><tr><td rowspan="2">RAYDENT DM W-01 Gray</td><td>Prosthetics</td></tr><tr><td>Orthodontic</td></tr></table>	Resin	Object type	RAYDENT DM W-01 Yellow	Prosthetics	Orthodontic	RAYDENT DM W-01 Gray	Prosthetics	Orthodontic
Resin	Object type									
RAYDENT DM W-01 Yellow	Prosthetics									
	Orthodontic									
RAYDENT DM W-01 Gray	Prosthetics									
	Orthodontic									
4		<p>If you get a message like the left , you need to update the application of the printer. Refer to [3.7.9.5 Updating the printer] for how to update.</p>								

4.6.2 Slice thickness setting




NO.	Figure	Description
1		After selecting the printer and resin type, you can set the thickness of the slice for each section in the slice bar on the right.
2		Double-click left mouse button on any spot along the slice bar to add a marker for dividing sections.
3		Move the marker to the position of the desired slice.
4		Press the number in the middle to see up a list of slice thickness and you can change it to the desired thickness.

5

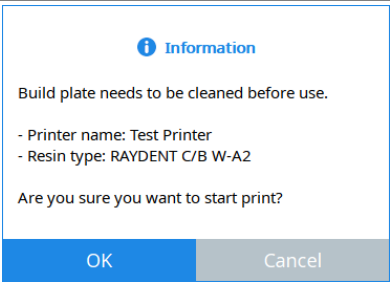


If there are supports in the printout, the first section is for the support, slice thickness can be changed but position can not be moved.

### 4.6.3 Start Printing

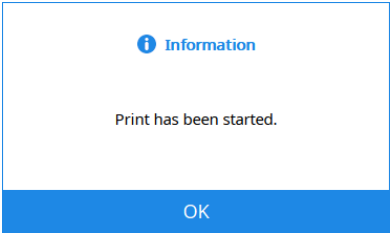
NO.	Figure	Description
1		After finishing the slice thickness setting of slice section, press [  PRINT ] button to start printing.
2		An error message will pop up if either vat holding knob is not securely tightned when click print. Verify both knobs are fully engaged to the system.
3		A warning message will pop up there is an unsolved problem related to the supports in advance, if you want to continue, press [  OK ] button. If you want to proceed with the work related to the supports, press [  Cancel ] button to stop printing.

4



The information window is displayed on the screen before the printing. Confirm the information about printer name and resin type for the print job.

5



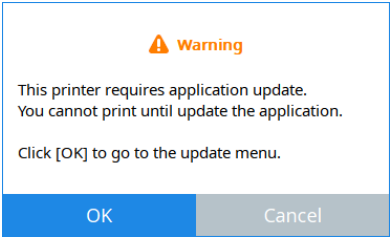
After checking the information, a message indicating that the print has been started will pop up. Press [OK] button.

6



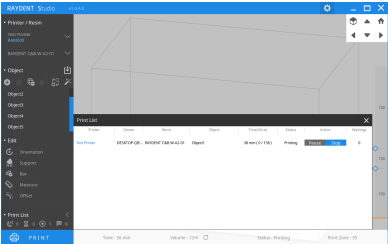
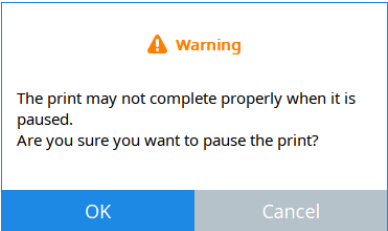
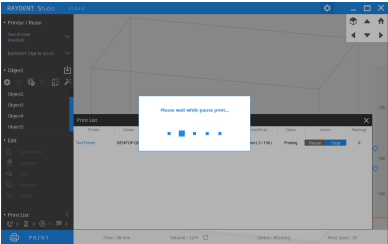
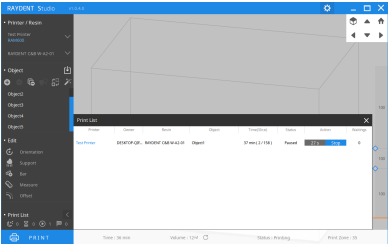
If the inside of the printer is below a certain temperature, it will warm up for about 5 minutes before printing starts. Please wait for the warming up to be finished.

7

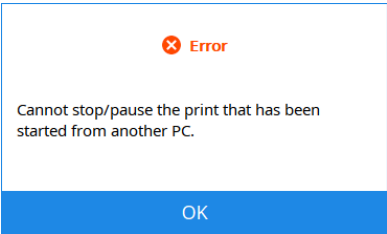


If you get a message like the left , you need to update the application of the printer. Refer to [3.7.9.5 Updating the printer] for how to update.

4.6.4 Pause and Resume

No.	Figure	Description
1		Select the item the user wants to pause in the print list.
2		Pressing the [ <b>Pause</b> ] button will display a warning message, and pressing the [ <b>OK</b> ] button to pause the printing.
3		The printing is pausing.
4		When the printing is paused, it will wait for 30 seconds and then restart automatically. Pressing the button with the time will immediately restart the printing.

5

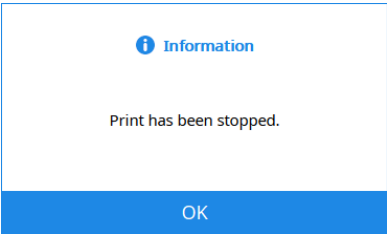
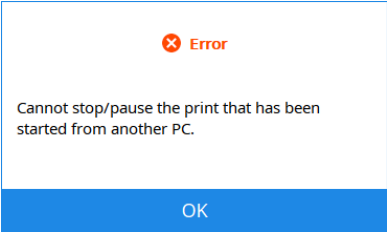


If you pause output on a PC other than the PC from which you started the job, an error message appears.  
You can pause only on the PC from which you started the output.

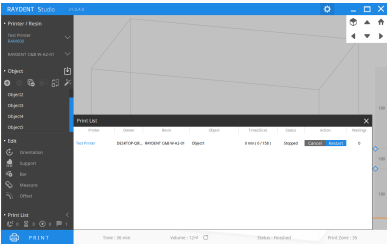
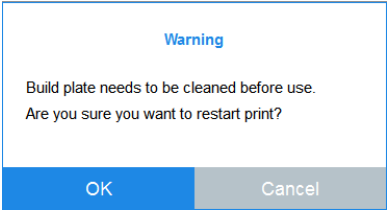
4.6.5 Stop Printing

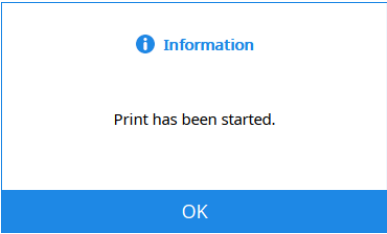
NO.	Figure	Description
1	A screenshot of the RAYDENT Studio software interface. The "Print List" dialog box is open, showing a table with columns: Name, Status, Object, Priority, and Action. The table contains one entry: "PrintJob1", "RAYDENT-000-000-000-000", "Object", "Priority", and "Print". The "Print" button is highlighted in blue at the bottom left of the dialog.	Select the item the user wants to stop in the print list.
2	A warning dialog box with an orange triangle icon and the text "Warning". The message reads: "Are you sure you want to stop the print?". There are "OK" and "Cancel" buttons at the bottom.	Press [ Stop ] button to stop printing. After, a warning message will show to confirm the stop. Press [ OK ] button to stop the printing.
3	A screenshot of the RAYDENT Studio software interface. A small dialog box titled "Stopping the print..." is displayed in the center, showing a progress bar with four dots, indicating the process is in progress.	Printing is shutting down.



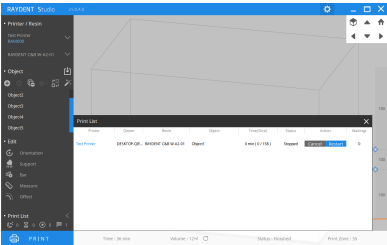
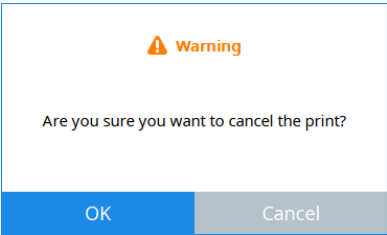
4		Press [ <b>OK</b> ] button when the message indicating that the print has been stopped appears.
5		If you stop output on a PC other than the PC from which you started the job, an error message appears. You can stop only on the PC from which you started the output.

4.6.6 Restart Printing

NO.	Figure	Description
1		Select the item the user wants to restart in the print list.
2		A warning message will pop up if the user presses [ <b>Restart</b> ] button. Press [ <b>OK</b> ] button to start reprinting.

3	 An information dialog box with a blue header bar containing an 'i' icon and the word 'Information'. The main area is white and contains the text 'Print has been started.' Below this is a solid blue bar with the text 'OK' in white.	Press [ OK ] button when a message indicating the start of print pops up.
---	--	---

4.6.7 Cancel Printing

NO.	Figure	Description
1	 A screenshot of the RAYDENT Studio software interface. A 'Print List' dialog box is open, showing a table with columns: 'Print Name', 'Print Date', 'Print Size', 'Print Type', 'Print Status', and 'Print Action'. The 'Print Action' column contains buttons for 'Cancel' and 'Print'. The 'Cancel' button is highlighted in blue.	Select the item the user wants to cancel in the print list.
2	 A warning dialog box with an orange header bar containing a warning triangle icon and the word 'Warning'. The main area is white and contains the text 'Are you sure you want to cancel the print?'. Below this are two buttons: 'OK' (blue) and 'Cancel' (gray).	A warning message will pop up if the user presses [ Cancel ] button. Press [ OK ] button to cancel printing.

**Note** At the edge of the build plate, the printout may be slightly smaller. Place printouts avoiding edges.

# Printing

# 5

## 5 Printing



Caution

Follow instructions in the followings to properly use the 3D printer.

- Wear protective gloves.
- Make sure the vat or LCD protective sheets is free of dust and moisture.
- Use an air gun to remove foreign substances if the vat or LCD protective sheets is dirty.
- Do not use sharp or pointed tools to remove foreign substances from the vat and LCD protective sheets.
- Can cause printing failure when the vat film or LCD protective sheet wrinkles or scratches occur.
- Understand the vat is a consumable product and should be used with a packaged resin.
- Keep used resin in a place where the light is blocked.
- Understand natural curing will occur and vat and resin will not be available if it is exposed to light.
- Remove resin as soon as it gets on the product and floor.
- Do not mix different types of resin together. The resin will be unable to be used after being mixed.
- Use vat and resin included in genuine resin cartridges.
- Do not arbitrarily change the materials for printing and printout conditions.
- 3D printer uses a UV light source. Normal operating conditions require the printer door to be closed.
- Do not stare directly into the UV light source of this equipment.
- The printer does not have an emergency button. Also, the power button does not completely shut off the product. Unplug the power cord in case of emergency.

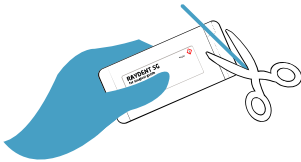
## 5.1 Preparing Resin

Resin cartridges are classified for each application. Please select the proper resin cartridge for effective printing. It is necessary to check the type and capacity of the resin described in the resin pouch.

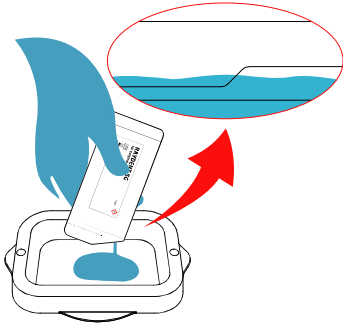
- 1) Shake the resin pouch well.



- 2) Open the resin pouch using a pair of scissors.



- 3) Pour the appropriate amount of resin within the indicated range of vat. (30ml ~ 80ml)



- 4) Tilt both sides of the vat slightly so that the resin in the vat is evenly spread on the bottom.



- 5) Store it in a place where light is blocked after putting the remaining vat and resin into packing of cartridge.

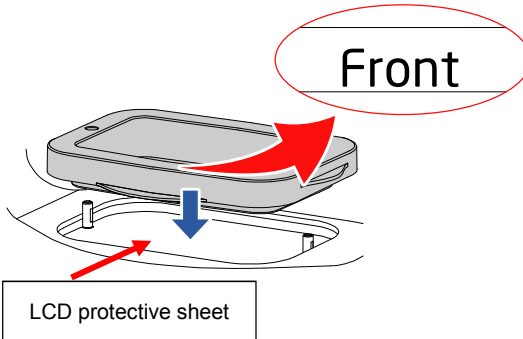


Caution

Store it according to resin storage conditions after removing the residue or foreign substances from used resin by using a strainer, ect. Use it as soon as possible. The resin may cause printing failure when stored for a long time.

## 5.2 Mounting vat

- 1) Place the Vat containing resin in the correct direction and securely tighten with the fixing knob.



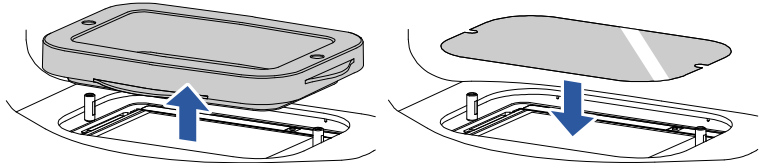
Caution

Check for resin or residues on the bottom of Build Plate and vat and LCD protective sheet.

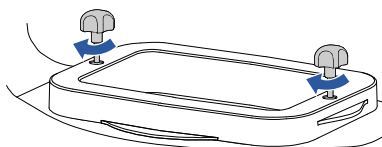
If the LCD protective sheet is dirty or damaged, remove it to clean or replace it. Remove the vat and take out the LCD protective sheet. If you use tape, it is easy to take out. Mount the LCD protective sheet as shown below.



Caution



- 2) Tighten the vat with the fixing knob.



Caution

If the vat locking knob is not securely tightened on both sides, an error will occur and the print might not be acceptable. Be sure to tighten the vat fixing knobs.



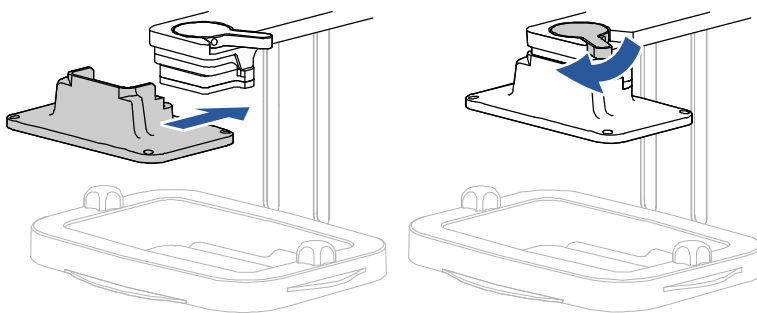
Caution

The bottom of vat is made of thin film. Handle with care. Pulling or pressing the film with a pen or nail might damage the surface of the film. It may cause to fail or un-acceptable quality of prints.

### 5.3 Connecting Build Plate

- 1) Open the printer door.
- 2) Fasten the build plate to the Holder.

Push the build plate all the way into the holder, as shown in the following figures. Then pull the fixed lever to fasten it.



- 3) Close the printer door and complete printing preparation.



Caution

Check for foreign substances from the build plate. If found, remove all of them.



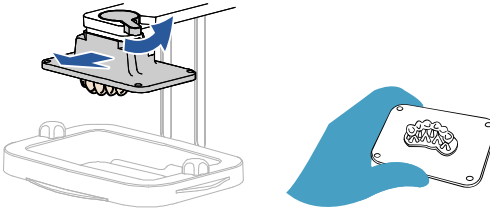
## 5.4 Taking Off the Printout



Caution

Be sure to wear gloves before the operation. Make sure that the resin remains on the build plate and do not let it fall on the floor. Pay attention to the hand injuries because tweezers, nippers and scraper are sharp. Be careful not to get the resin on your eyes or skin.

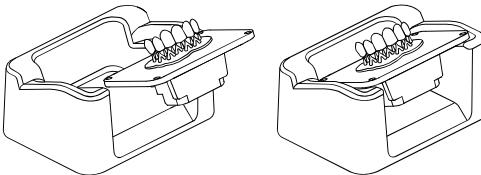
- 1) Open the door of the printer after sounding alarm notifying about printing completion.
- 2) Push the fixed lever of the build plate inward to release it, and pull it out.



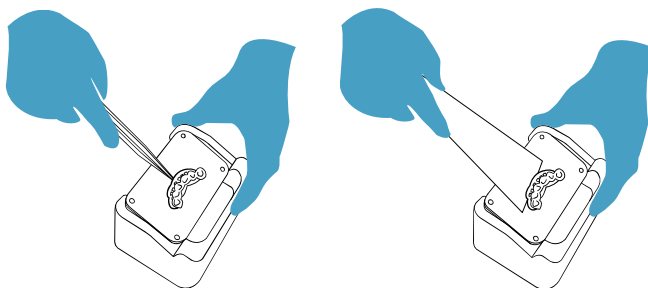
Caution

Removing the vat before removing the build plate may cause damage to the LCD and equipment.

- 3) Remove the remaining resin from the build plate with a tissue paper.
- 4) Place the build plate on the holder to remove the printout.



- 5) Use a tweezers to create a gap on the bottom of the printout by moving the tweezers up and down. Use a scraper to dislodge the printout.



Caution

Pay attention to the hand injuries because tweezers, nippers and scraper are sharp.

- 6) Wipe the surface of build plate with IPA(90%) to remove foreign substances after removing printout. If foreign substances remains on the printout, it may cause fail printout. Make sure to completely dry up the IPA or water used for cleaning.

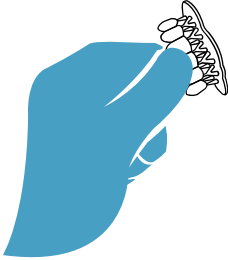
## 5.5 Removing Supports



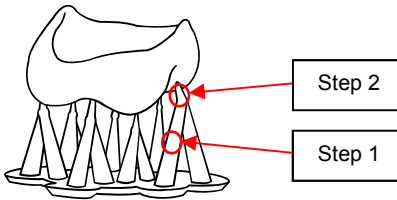
Caution

Do not hold the supports too tight. It could damage the printout. To keep the printout in a perfect form, remove the supports as close to the printout as possible.

- 1) Hold the printout.



- 2) Remove the supports in two steps.



Caution

Do not use fingers to remove the supports. Use the provided trimmers or nippers tools to remove the supports.

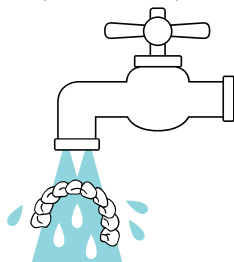
## 5.6 Cleaning the Printout



Caution

Wear gloves and work.

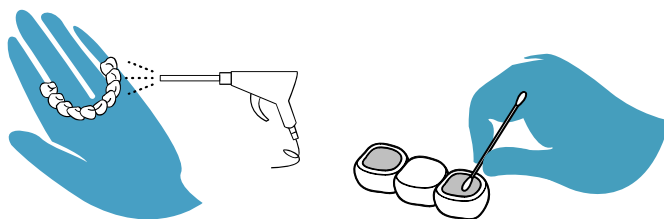
- 1) After removing the supports, use a neutral detergent to clean it under running water. (30 seconds ~)



Caution

Do not use an ultrasonic cleaner for cleaning purpose.

- 2) Use unit chair air gun to remove water and residue. If any water remains on the inside surface, wipe with a cotton swab.



Caution

Remove the water inside of the printouts.

If water is not completely removed, staining may occur after post curing.

## **5.7 Post Curing of Printout**

After the cleaning, the printout must go through post curing process to become a final product. The cleaning residue must be completely removed in order to proceed to post curing process. For the best post curing result, please use the Curing Unit (Model number: RPC500) sold by RAY Co. For information regarding post curing, please contact the seller or Ray Co. customer service center.

## **5.8 Environmental Safety**

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Appendix A. Product Specification

Items	Specifications
Z-axis Layer Thickness	50 μm, 100 μm
XY Resolution	31.5 μm
Molding Size (X x Y x Z)	100 x 60 x 70 mm / 3.9 x 2.4 x 2.8 in.
Product Size(W x H x D)	31 x 21 x 37 cm / 12.2 x 8.3 x 14.6 in.
Product Weight	6.5 kg / 14.3 lbs
Network Connection	Ethernet
UV Specification	405 nm
AC Adapter	100 – 240VAC, 50/60Hz (24VDC, 2.5A, AC/DC adapter)
Operation Condition	Temperature Range: 23 ~ 28 °C (73.4°F ~ 82.4°F) Relative Humidity Range: 30 ~ 70 % Atmospheric Pressure Range: 800hPa ~ 1060hPa
Storage Condition	Temperature Range: -20 ~ 70 °C (-4°F ~ 158°F) Relative Humidity Range: 10 ~ 90 % Atmospheric Pressure Range: 800hPa ~ 1060hPa
Use type	For indoor use only
Rated pollution	Pollution degree 2

## Appendix B. Troubleshooting

Symptom	Cause	Solution
Unable to Turn on power.	Power cord is not correctly connected.	Check if the power cord and AC adapter has been connected correctly.
	Did not press the power button for 3 seconds.	Press the power button for 3 seconds.
A new printer cannot be added through serial port.	COM port named [] from the computer is not found.	Check if the USB cable on the computer has been connected correctly.
		Check if the driver for serial port has been installed.
Printer IP cannot be changed.	The computer cannot connect to the printer.	Check if the network cable has been connected correctly.
		Check if the printer is operating. If the power is turned off, turn on the power first.
		Check if the printer is operating. If the printer setting is in progress, or if the printer is printing, changes cannot be made.
Printer IP auto search does not work.	The computer cannot connect to the printer.	Check if the network cable has been connected correctly.
		Check if the printer is operating. If the power is turned off, turn on the power first.
Printer does not start.	The computer cannot connect to the printer.	Check if the network cable has been connected correctly.
		Check if the printer is operating. If the power is turned off, turn on the power first.
	Vat fixing knobs are not securely tightened.	The power button flashes when the vat locking knobs are not securely tightened. Tighten the both knobs and check that the power button stops blinking.
STL, OBJ, D3P files are not found when opening the file.	The file extension is incorrect, or the file does not exist.	This is the case where the correct file extension was not input or the file is under a different name. Change the file extension to STL or OBJ.
Setting option on the printer cannot be used.	The printer is currently operating, or the setting is being changed on a separate computer.	The printer is currently operating. Please try again after the work is finished. If the printer is not operating or if there is no setting change being made, after a certain amount of time has elapsed, the operation mode will automatically cancel and setting change will be possible.

## Appendix C. Message

Message	Cause	Solution
Failed to initialize OpenGL. Update the latest graphic card driver.	Initialization of OpenGL driver failed.	Update the device driver of the graphic card to the version.
The minimal requirement is that the graphic card should support OpenGL 3.2	Graphic card does not support the minimum specification of OpenGL by RAYDENT Studio.	Please update the device driver of the graphic card to the version. If that does not work, replace it with the latest graphic card.
There is a problem on COM port	There is an unknown error when the printer is connected through the COM port.	Check if the printer connector is properly connected to the USB port, reboot the computer and try again. If the same symptom is repeated, please contact the seller.
Connection failed to the printer through COM port.	Printer cannot connect through the COM port.	Check if the printer connector is properly connected to the USB port, reboot the computer and try again. If the same symptom is repeated, please contact the seller.
There is a problem on printer COM port	There is a problem with the printer's COM port.	Check if the printer connector is properly connected to the USB port, reboot the computer and try again. If the same symptom is repeated, please contact the seller.
Some value is invalid.	The printer and COM port are connected but the information received from the printer is incorrect.	Check the setting value after reconnection. If the same symptom is repeated, please contact the seller.
The printer is operating.	The printer is currently operating.	The printer is currently operating. If the user wants to continue the operation, stop printing or try again after waiting until it is completed.
Setting in progress.	Another PC is connecting to the printer and editing the setting.	Wait until another PC completes the setup and try again.
IP address [1] is conflicted	The printer's IP [1] collided with the another device's IP.	In case of the current setting IP, input another IP or use with DHCP automatically because it is being used elsewhere.



Unable to check IP conflict on %1 Check the network cable connection. Are you sure you want to save settings?	It cannot check for conflicts because the printer is not connected to the network.	Check the network cable connection to the printer, and check the network system such as a router. If the same symptom is repeated, please contact the seller.
Unable to set static IP address [1]	The printer's IP [1] cannot be set to static.	Use the DHCP setting function.
Unable to obtain IP address. Check the network cable connection.	The printer is not connected to the network and cannot receive IP normally.	Check the network cable connection to the printer, and check the network system such as a router. If the same symptom is repeated, please contact the seller.
Unable to complete IP setting with DHCP. Try the static IP setting.	The printer setting has been saved, but the IP address cannot be received from the DHCP server.	Check the network cable connection to the printer, and check the network system such as a router. If the same symptom is repeated, please contact the seller.
The settings are saved on this printer but the printer cannot be connected. Please wait while the connection is being established. If the problem persists, please verify your network settings.	Printer has been connected to the network and the setting has been saved, but the printer cannot be connected.	After the printer IP is set, it takes some time for the connection with the IP. Please try again later.
Network cable is unplugged	The printer's network cable is not connected.	Check the network cable connection to the printer, and check the network system such as a router. If the same symptom is repeated, please contact the seller.
Invalid subnet mask. The subnet mask should be contiguous. Please, input correct subnet mask	The subnet mask value entered is invalid.	Contact your network manager for information on the correct subnet mask.
The default gateway is not in the network segment defined by the IP address and subnet mask. Do you want to save this configuration?	The gateway entered is not in the segment defined by IP and subnet mask.	Contact your network manager for information on the correct gateway mask.
There is no network interface	No network devices are connected to the network.	Check the network cable connection to the PC, and check the network system such as a router. If the same symptom is repeated, please contact the seller.

## RAYDENT Studio Appendix C. Message

Unable to make printer disabled while operating	The user wants to disable the printer with the requested printing work on the PC.	Wait for the completion of the requested printing, or change the printer to disabled state after removing the work.
Unable to remove this printer while operating.	The user has print work that is currently operating on the PC but the user wants to delete the printer.	Wait until the work starting on the PC finishes, or stop the work and try again.
Application has been updated	Printer software or firmware updated is completed.	Turn on the printer after checking update.
Failed to connect to the printer	The program cannot connect to the printer.	Restart the program, reboot the printer and try again. If the same symptom is repeated, please contact the seller.
The printer is not responding	There is no response from the printer.	Reboot the printer and try again. If the same symptom is repeated, please contact the seller.
XML message is invalid	The XML file that communicates with the printer is invalid.	Please contact the seller.
Value is invalid	The value used to communicate with the printer is incorrect.	Please contact the seller.
The printer ID does not match	The printer's ID that used to communicate is different from the relevant device's ID.	Please contact the seller.
The printer is operating	The printer is currently operating.	Try again after the printer finishes work.
Cannot start print since printer queue is disabled	The printer Queue is inactive while attempting to add a print job to a printer.	Delete a pending work in the printer and try again.
The printer is in setup mode	Another PC is changing the printer setting.	The operation will not proceed while the setting is being changed on another PC. Please try again after the printer finishes work.
Your access is denied. – PC name:[1]	The printer is locked by another PC [1].	The operation will not proceed while the setting is being changed on another PC. Please try again after the printer finishes work.
Restart the setting	The printer cannot operate because the printer is not properly locked.	Reboot the printer and try again. If the same symptom is repeated, please contact the seller.
Resin is incompatible	This is unsupported resin.	Unsupported resin cannot be used. Choose another resin to mount. If the same symptom is repeated, contact the seller.

There is completed or stopped print waiting click finish button.	Completed work is in the process of being finished or the process has stopped at the moment.	From the print list, finish the printing. Restart after the printer finishes work. If the same symptom is repeated, contact the seller.
Communication error occurred between application and firmware	Problem with the communication between the software and firmware.	Restart the program and reboot the printer and try again. If the same symptom is repeated, contact the seller.
Failed to make XML response message	PC cannot form the XML message sent by the printer.	Restart the program and reboot the printer and try again. If the same symptom is repeated, contact the seller.
Failed to save file in the printer. Restart the printer	Cannot save the file on the printer.	Reboot the printer and try again. If the same symptom is repeated, please contact the seller.
Failed to execute process on the printer. Restart the printer	Unable to execute processes on printer.	Reboot the printer and try again. If the same symptom is repeated, please contact the seller.
Update file is invalid	Invalid file for update.	Try with the appropriate update file. If the same symptom is repeated, please contact the seller.
Failed to decode image data. Restart the printer	Unable to decode image from the printer.	Please contact the seller.
Failed to send image data to image viewer. Restart the printer	Printer is unable to send image data to image viewer.	Please contact the seller.
Failed to write update file. Restart the printer	Unable to use update file.	Please contact the seller.
Update data is invalid	Update data is invalid.	Try with the appropriate update file. If the same symptom is repeated, please contact the seller.
The printer setting file is not for this printer	The printer setting files used to recover is not from the same printer.	Try with the setting file from the same printer. If the same symptom is repeated, please contact the seller.
XML parsing error	XML message parsing error occurs.	Please contact the seller.
Connection failed to the post curing machine through COM port	Unable to connect to the curing unit through COM Port.	Try after changing the COM Port to another one. If the problems is not fixed, restart the RAYDENT Studio and the curing unit and try. If the same symptom is repeated, please contact the seller."
Update file is invalid.	The update file for the curing unit is invalid.	Please contact the seller.

Firmware update failed.	Unable to update the curing unit.	Try after restarting the curing unit. If the same symptom is repeated, please contact the seller.
Cannot start print since vat is not locked completely.	Print button is pressed but the vat is not tightened with knobs.	If the LED of the printer power button is blinking, the vat is not properly fastened. If the vat has been firmly fastened and the LED of the power button is not blinking but the symptoms are repeated, contact your sales representative.
Cannot resume print since vat is not locked completely.	Print button is pressed but the vat fixing knobs are not tightened.	If the LED of the printer power button is blinking, the vat is not properly fastened. If the vat fixing knobs have been firmly fastened and the LED of the power button is not blinking but the symptoms are repeated, contact your sales representative.
Resin vat is not locked completely.	Vat fixing knobs are not properly fastened.	If the LED of the printer power button is blinking, the vat is not properly fastened. If the vat fixing knobs have been firmly fastened and the LED of the power button is not blinking but the symptoms are repeated, contact your sales representative.
This printer requires application update. You cannot print until update the application.	If the printer is not the correct version and needs an application update.	If you get a message like the left , you need to update the application of the printer. Refer to [3.7.9.5 Updating the printer] for how to update.

## Appendix D. Regulations

### Product Disposal (Refer to wastes collection systems by countries)



This symbol on the product, component to document, indicates that it should not be disposed of with other household wastes when disposing of the product. Please cooperate to promote the continuous recycling of resources by separating and recycling the product from others to avoid environmental and check the terms of the purchase agreement. This product and electronic component should not be mixed with other commercial waste.

### Electromagnetic compatibility



When using the product, consider the electromagnetic compatibility (EMC) requirements and electrostatic discharge (ESD) safety measure.

#### FCC NOTICE

This equipment has been tested and found to comply with the limits for a class "A" digital device, pursuant to Part 15 of the FCC rules.



These limits are designed to provide reasonable protection against harmful interference. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense.



It is prohibited to use cell phone, other mobile devices, or other wireless devices near the product. Even products that do not correspond with EMC regulations will may have an indirect effect on the machine, which could result in unintentional action by the product.



Through static electricity, from user or the patient, the product could be damaged, or result in unintentional action by the product. Please follow the procedure to remove static from the body. Static can be removed by touching the ground or metal objects.



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