

D I G I T A L I N N O V A T I O N

bright CT

User's Manual



Model	ICT-R02-1T, ICT-R02-1TC, ICT-R02-2T, ICT-R02-2TC, ICT-R02-2TS, ICT-R02-2TSC
Version	I033-01MU-02 Rev. 03

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In this manual,

we explained the functions and shooting methods etc. in detail for the appropriate use of Dental Digital Image Shooting Equipment, Bright CT.

In order to use Bright CT correctly, please read and fully understand the contents of this manual. Please follow all of the provided precautions, guidelines and warnings in this manual.

This manual may not include the most updated information about the upgrades of the quality of the product. Related information is subject to change without prior notice.

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01

Introduction

1.1. Description and purpose of use of the product

1.1.1. bright CT Introduction

– As a computed tomography X-Ray imaging device and dental medical diagnostic equipment, and in order to get the images of the teeth, rhinal cavities and temporomandibular joint, this product is designed to be able to display the tomography images of the concerned part of the patient on the screen through the computed calculation by acquiring the images while arranging the X-Ray and image detecting sensors to be faced each other and put the patient on the center of the axis and rotating the device around him/her, and also, as a part of the functions of this equipment, images can be reconfigured, displayed, modified and saved using the operational functions.

– Standard system is consisted of X-Ray generator, X-Ray detector, X-Ray irradiation limiting device (Collimator), main frame and rotating component together with PC and monitor.

1.1.2. Purpose of use of the product

– As a tomography images of teeth, chin etc. acquiring device by converting the X-Ray projected signals to digital using semiconductors etc., this product is designed to shoot the Panoramic, CT, Ceph (Option) and Model images of the teeth, chin and oral structure for the diagnostic purpose

1.2. Characteristics of bright CT

- This is a dental synthetic diagnosing & analyzing digital imaging system which Panoramic, CT, Ceph (Option) and MODEL functions are integrated in one single equipment and is able to provide 4 in 1 function to the operator.
- CT or Panoramic shooting can be done with one sensor without replacing or rotating it.
- Various FOV can be selected during CT shooting process.
- Exposure dose can be minimized for the children.
- Intuitive interface is applied for the user's convenience.
- Exposure dose can be significantly reduced comparing to the general medical CT equipment.
- Voice assistance function is provided for the convenience of both of users and patients.
- DICOM 3.0 (Digital Imaging Communication in Medicine), international standard of digital medical imaging system is complied.

02 Safety Guideline

2.1. Symbols used in this manual

- In order to use the product effectively, following symbols are used in this manual, and therefore, please fully understand the meaning of the symbols and follow the requirements correctly.
- Please comply with the safety precautions specified in this document to prevent the injury or damages of property. Precautions will be marked as the following symbols.

Symbol	Name of the symbol	Meaning of the symbol
	Information (NOTE)	This symbol provides the information and precautions to be useful for the use of the product.
	X-ray	This symbol provides the precautions and warnings in regards to the danger of radiation.
	Warning (WARNING)	This symbol provides important instructions to be required for the use of the product. This can be the cause of fatal injuries or critical damages to the equipment.
	Warning / dangerous voltage	Do not touch. This can be caused of electric shock.
	Laser	Do not look the laser in the eye. It can be the cause of the fatal damages to the eyes.
	Information (NOTE)	This symbol provides the information and precautions to be useful for the use of the product.



X-Ray can be dangerous or harmful to the human body if not used correctly. Users must comply with the instructions & warnings included in this manual. This equipment must be installed inside of the radiation shielded room. Equipment installed place must comply with all of the safety protection regulations from the radiation.

2.2. Precautions before use the product

- This product must be operated by the qualified person who is authorized for the operation of medical radiation equipment.
- Never open the cover of the equipment arbitrarily. Please contact with adjacent sales office or manufacturer for the malfunctions or problems of the product.
- From the start to the end of the shooting process, equipment operator must stay in the place where he/she can communicate with the patient verbally or visually.
- Power switch must be turned OFF if the equipment is not to be used.
- Check the power, PC, cable etc. before start the equipment.
- Turn the power off immediately and contact with adjacent sales office or manufacturer if and error caused by water or foreign substances.
- Be careful not to move or install the computer in the enclosed space as it can be the cause of malfunction (computer installed place need to be properly ventilated)
- Equipment must be installed in the place free from dangerous object or flooding or leakage of water.
- Do not put or hang heavy objects on the equipment as it can be the cause of malfunction of the product.
- Use the equipment in 10~35° C of room temperature for the stable operation.
- Sterilize the components as required before start operation.
- Extreme change of room temperature can be the cause of condensation. Do not turn on the equipment until it reaches to the room temperature.



WARNING

Equipment must be connected to the grounding terminal to prevent the danger of electric shock.

Software installed on the PC of the equipment is optimized for the X-Ray diagnosis. Therefore, installation of software such as vaccine or virus-related programs other than the one basically provided can be the cause of the shooting error and we strongly recommend not to install them arbitrarily.

2.3. Precautions during the use of the product

- Patient must wear protective cloth and thyroid guard before taking an X-Ray. Especially children and infants, pregnant women etc. need to discuss with the doctor before start treatment.
- Please provide new sanitary cover to the new patient to prevent the transmittable diseases.
- Please use alcohol-based sterilizer for the used sanitary components etc. after the shooting.
- Make sure patient is placed apart from the equipment during the adjustment of the height of the equipment.
- Let the patient stand still at the place where he/she is until the equipment is fully stopped.
- Turn off the equipment and contact with adjacent sales office or manufacturer if you have any suspect of oil leak from the X-Ray generator.
- Be careful not to disassemble or modify the product arbitrarily as it can be the cause of void of free warranty.
- X-Ray equipment can be dangerous to both of patient and operator if the exposure safety regulation and operation related guideline is not followed. Please obey the safety regulations properly.
- Operator needs to control the X-Ray shooting process in safely protected facility and watch out for the safety of the patient and operation of the machine until the shooting is completed.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.
- Explain how to use the emergency stop button to the patient so that he/she can get out of the dangerous situation fast if incident occurred during taking an X-Ray.
- Operate the equipment in 10~35° C of room temperature for the safety. It can be the cause of poor quality of images if used outside of this range.
- Take an X-Ray only when there is no problem with the equipment.

2.4. Electrical precautions

- 220V of input power supply must be used for the equipment.
- Do not install the power plug in the place not easy to disconnect.
- Do not connect the power plug with the portable multi-socket.
- Use the power supply separately from the other medical equipment.
- Please contact with adjacent sales office or manufacturer if input power supply needs to be changed.
- Do not place any of the objects within the installation zone defined in this manual.
- Educate what the patients need to do before and after taking an X-Ray prior to start the process.
- Take a special attention for the safety when the height adjustment is required during the alignment of the patient.
- Do not pull out the power plug forcedly.
- Take an X-Ray only when there is no problem with the equipment.



WARNING

Equipment must be connected to the grounding terminal to prevent the danger of electric shock.

- Class 1 laser product is used for the laser beam of the equipment. Purpose of use of this laser is to align and position the patient correctly which must not be used in other ways.
- At least 10 cm (4") of laser beam distance must be maintained during the alignment of the patient, and be careful not to look at it in the eye.
- Be careful not to direct the laser beam to the eyes of the patient during the alignment process.
- Be careful not to pour or spray water or liquid on the product as it can be the cause of electric shock or damages to the machine or fire etc.
- X-Ray equipment can be dangerous to both of patient and operator if the exposure safety regulation and operation related guideline is not followed. Please obey the safety regulations properly.
- Do not put any of the object within the range of motion as it can be the cause of danger to both of the equipment and patient.
- Do not store the flammables around the equipment as it can be the cause of fire.
- Never operate the switches or PC of the equipment during the shooting process. It can be the cause of mal-operation of the equipment.
- Release the irradiation switch or push emergency switch under the handle frame of the equipment and stop the operation immediately if problem found during the process.
- Use corresponding marked extinguisher when electrical fire take place as water or liquid can be the cause of even severer harm or danger to the people and equipment. Disconnect the power supply plug before extinguishing the fire to prevent danger of electric shock.
- Do not use spray for the sterilization and disinfection as sprayed sterilizing or disinfecting agent can be the cause of fire.

2.5. Radiation protective policy



WARNING

This is the important instruction for the correct use of product. It can be the cause of fatal injuries or critical damages to the equipment if not followed.

- Children or pregnant women need to discuss with the doctor before start treatment.
- Push the emergency stop button and stop the operation of equipment immediately if it does not work correctly during the shooting process.
- Operator needs to stay outside of the shielded space to protect himself/herself from the radiation during image shooting process.
- Operator must keep more than 2 meters of distance from the equipment during image shooting process.
- Operator needs to provide protective measures such as lead skirt etc. mandatorily during image shooting process.
- Patient must wear lead skirt that has neck and thyroid protective function when taking an X-Ray.
- In order to be prepared for the emergency situation, operator needs to check the conditions of the patient and equipment continuously during image shooting process.
- X-Ray equipment must be located inside of the shielded facility and shooting process must be carried out while watching carefully through the window from the outside of shielded facility.
- This equipment must be stored inside of the X-Ray shielded room.

2.6. Warning and precautions

- Please follow all of the local firefighting regulations and furnish extinguisher around the equipment.
- Turn off all of the power supplies of the equipment and contact with Dentium customer service center if the equipment is exposed to water, moisture or foreign substances.
- Turn off all of the power supplies of the equipment and contact with Dentium customer service center if you have any suspect of oil leak.



WARNING

Like the other medical devices, this equipment uses high frequency electric signals that can interfere the implantable devices. Let the patients with pacemaker and implantable heart defibrillator acknowledge above fact and dental X-Ray power needs to be turned off.

Though this equipment is designed to be able to put up with the operation of defibrillation, please disconnect the dental X-Ray system during the operation of defibrillation as it can be dangerous for the patient if the safety controlling function does not work correctly.

▪ Manufacturer's obligation policy



Manufacturer has the right to revise this manual without prior notice to the customers.

Note

Manufacturer is responsible for the safety and proper operation of the X-Ray equipment for the following cases only.

- Other cases than the damages and accidents caused by the mistake of the customers
- When the product is operated in a proper condition following the requirements of user' s manual.
- When manufacturer approved genuine parts are used.
- When the agent authorized by the manufacturer conducted the maintenance work.
- When the agent authorized by the manufacturer installed the product.
- When the product is installed in compliance with the requirements and precautions provided in the manufacturer.

2.7. Safety functions

2.7.1. System safety

- All of the operation of the system will be stopped when power failure or emergency switch is activated.
- Allowed outage time (cooling time) due to the overheat of X-Ray generator varies depending on the preset kV/mAs ratings and actual radiation discharge time. It will be set between 8 seconds to 90 minutes automatically depending the tube load.

2.7.2. Marking/Warning system

- Red lamp will be turned on in case of equipment error.
- Orange lamp will be turned on and music will be played during an X-Ray irradiation process.

2.7.3. Patient protecting system

- All of the operation will be stopped and patient can be protected if you push emergency switch in case of mal-operation of the equipment.
- For the children, tube voltage and current can be set automatically through the registration information, and exposure dose can be minimized.

2.8. Description of the labeling and symbol of the product

■ Markings and Symbols

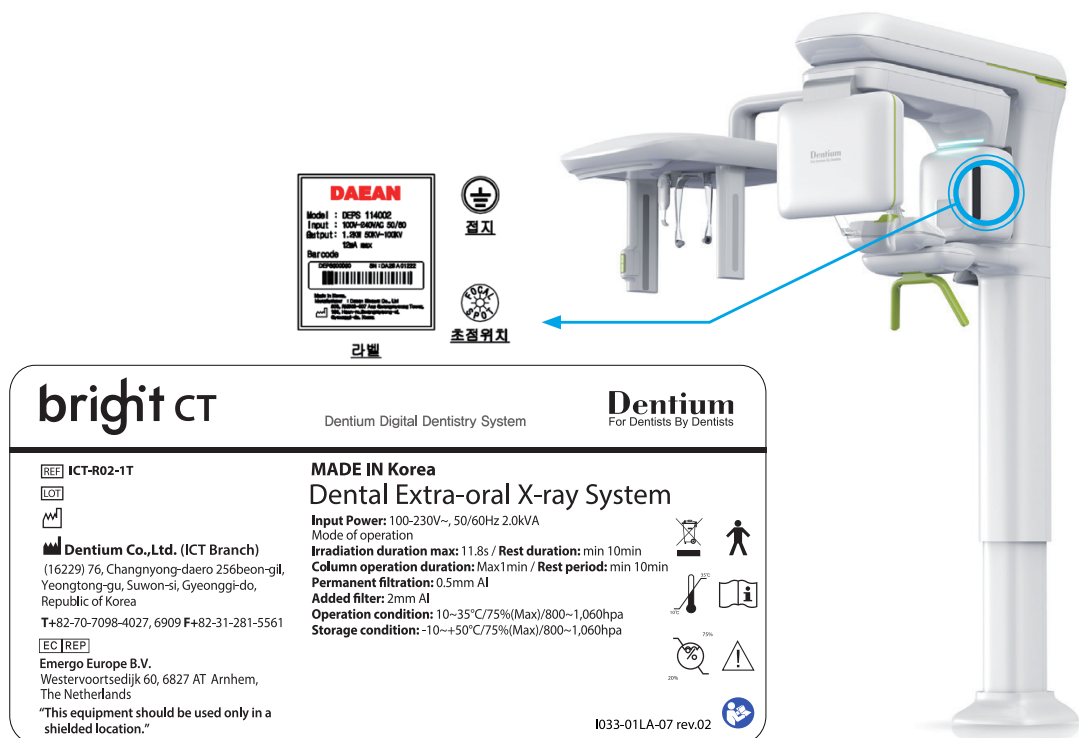
- Accident can be prevented by attaching the labels on the precautionary areas that may cause dangerous situation

Symbol	Name of the symbol	Meaning of the symbol	Location
	Caution	Important instruction required for the use of product	Label
	Danger of high voltage	Precautions for the electric shock of the equipment	Label
	Radiation	Danger of radiation exposure	Shooting software
	Laser beam	Precautions for the laser beam	Label
	Emergency switch	Emergency switch instruction	Chin rest marking
	Protective grounding	Whole equipment protective grounding mark	Grounding label
	B type machine	Patient non-contact type machine	Product label
	AC power	AC power applied machine	Product label
	ON	Turning on the power	Main switch
	OFF	Turning off the power	Main switch
	WEEE Separate discharge	Marking of separate discharge	Product label
	Recycle	Recycle mark	Package box

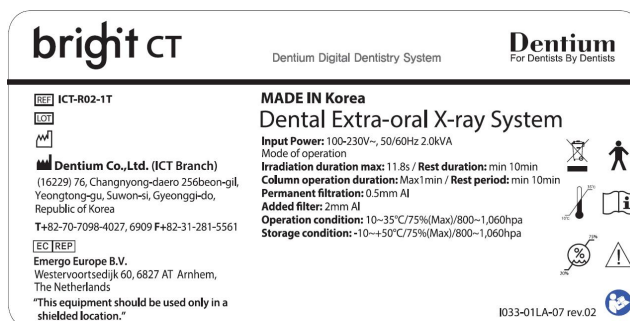
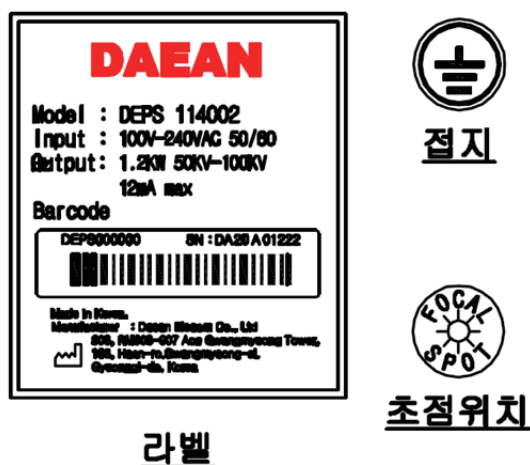
	Reference	Refer to the manual	Product label
	Manufacture date	Manufacture date of the equipment	Product label
	Manufacturer	Manufacturer of the equipment	Product label
	European agent	European agent	Product label

2.8.1. Labeling on the product

- Product label is attached on the left side of the equipment and consisted of the following 6 items.



2.8.2. Product and X-ray generator label



System components

No	Item
1	System components
2	PC system
3	Imaging Software
4	rainbow™ Image Viewer (patient management S/W)
5	rainbow™ 3DViewer (3D Viewer S/W)
6	rainbow™ Ceph(Cephalometric analysis S/W)

Option configuration

Model	Shooting mode	Sensor	
ICT-R02-1T	Panoramic+CT+Model	DTX1512	
ICT-R02-1TC	Panoramic+CT+Model +Ceph	DTX1512	DTX2906
ICT-R02-2T	Panoramic+CT+Model	DTX1524	
ICT-R02-2TC	Panoramic+CT+Model+Ceph	DTX1524	DTX2906
ICT-R02-2TS	Panoramic+CT(Stitching)+Model	DTX1524	
ICT-R02-2TSC	Panoramic+CT(Stitching)+Model+Ceph	DTX1524	DTX2906

Standards and regulations

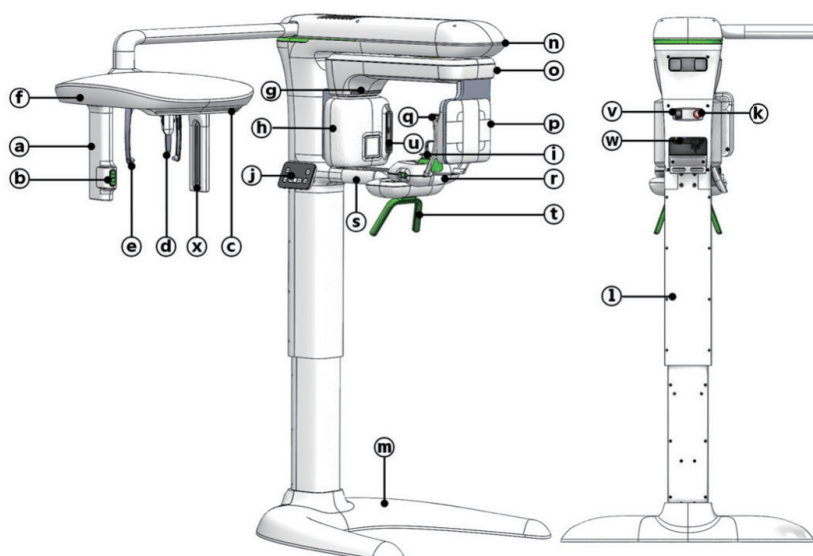
bright CT is designed complying with the following international standards and regulations.

- IEC/EN 60601–1 (3rd), IEC/EN 60601–1–3 (1st), IEC/EN 60601–2–63
- 21 CFR 1020.30, 31, 33
- CE 0068 : This is a class 1 B type equipment and acquired CE certificate (equipment instruction 93/42 EEC)
- Ingress Protection degree : General equipment IPX0
- Electric shock Protection degree : Class1, Type B

03

Structure and function of the equipment

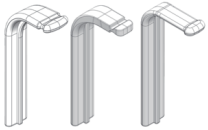
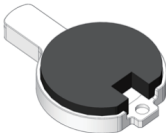
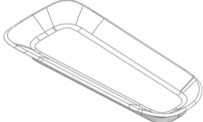
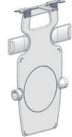
3.1. Structure (name)



■ Detailed information of the name of each part

(a)	Cephalo sensor	A device that detects, digitizes and transmits the subject shooting signals.
(b)	Column Up/Down switch	A switch to adjust up & down position of the lift column.
(c)	Cephalo status indication lamp	A lamp that indicates X-Ray irradiation status which will be changed to orange from green when the shooting process is started and also, it will be changed to red in case of error state.
(d)	Forehead scale	This will be used for the posture alignment of patient during Cephalo shooting process.
(e)	Cephalo ear load	This will be used for the posture alignment of the patient by applying to the ear part during Cephalo shooting process.
(f)	Cephalo unit	Driving module device to be required for the Cephalo shooting process
(g)	CT + Pano status indication lamp	A lamp that indicates X-Ray irradiation status which will be changed to orange from green when the shooting process is started and also, it will be changed to red in case error occurred.
(h)	X-Ray generator	X-Ray generating device
(i)	Chin rest	This is the support for the alignment of patient when taking an X-Ray. Thanks for this support, patient can place the chin stably.
(j)	Switch module	This is the switch module for the alignment of patient which provides various functions (column UP/DOWN, laser ON/OFF, Origin, laser ON/OFF, temple support Open/Close)
(k)	Emergency switch	This is the button to protect the patient in emergency situation during shooting process, which will be used to stop the equipment immediately (power of the equipment will be turned off if this switch is activated).
(l)	Lift column	This is the module to be used for the adjustment of the height of the equipment. It moves Up & Down the equipment by operating the switch and the max. travel range is 700mm.
(m)	Base support	This is the support for the fixing and balancing the equipment (option: wall mount)
(n)	Top frame	A device that supports the rotary unit.
(o)	Rotary unit	This unit moves to the shooting position automatically in case shooting mode is selected, and also, it rotates around the head of the patient and performing the shooting process.
(p)	CT+PANO+MODEL sensor	A device that detects, digitizes and transmits the subject shooting signals.
(q)	Temple support	This will be used to align and fix the head of patient during shooting
(r)	Chin rest module	A module that includes the basic devices for the operation of temple
(s)	Handle arm	A support to fix the patient's position alignment module.
(t)	Handle	This is the handle that patient can hold stably during the alignment process.
(u)	Laser module	This module is consisted of vertical and horizontal laser for the alignment of patient.
(v)	Power switch	This switch is used when turning on the equipment.
(w)	Communication connector	This is Optic & RS232 communication port to communicate with PC.
(x)	Secondary collimator	This is the module to minimize the exposure dose during X-Ray taking procedure.

3.2. Accessory

Description	Image	
Standard chin rest / 3 kinds of standard tooth bite		
Edentulous jaw chin rest / Edentulous jaw tooth bite		
1 tile type SINUS chin rest / 1 tile type SINUS bite		
TMJ chin rest / Temple support L/R		
Impression jig / Accessory tray		
Capus jig (3 in 1 Option)		
Manual bright CT User' s Manual ainbow™ Ceph manual rainbow™ 3D viewer manual rainbow™ Image Viewer manual		

3.3. Irradiation switch

– Image shooting will be started if the shooting is ready and operator pushes the irradiation switch from outside of the shielded room. Operator needs to push the irradiation switch until the shooting process is completed. Shooting process will be terminated if the irradiation switch is released in the middle of the process.



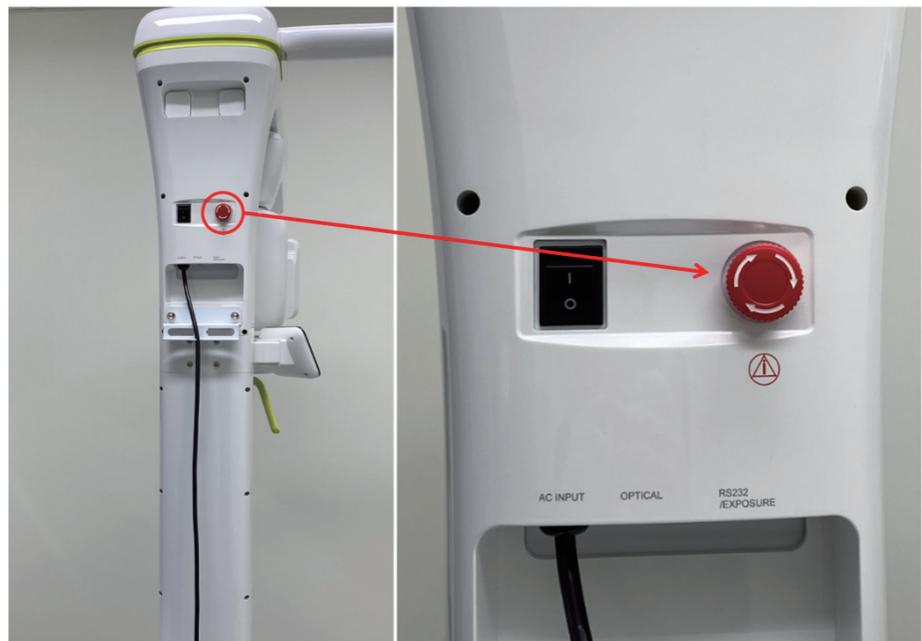
(Irradiation switch)

- Irradiation switch will be turned off in shooting preparation state.
- Irradiation switch will be turned on in green when the shooting is ready.
- This lamp will be turned to red if the operator pushes the shooting switch while it is in green and the lamp will be turned off when the shooting is completed.



Irradiation switch must be operated from outside of the defended area.

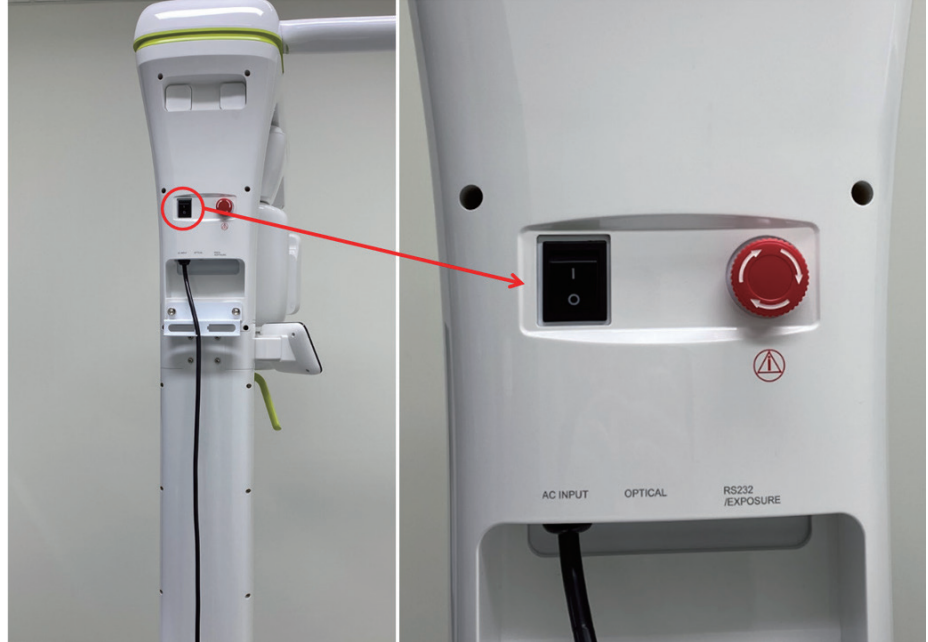
3.4. Emergency switch



- Emergency switch is located on the backside of the equipment.
- Push the Emergency switch and stop the equipment immediately in case following emergency situation occurred during the operation of the equipment.
- When the patient hits the equipment during shooting process.
- In case X-Ray is taken mistakenly or other errors occurred due to the mal-operation of the equipment.
- If shooting process continues in spite of the cancellation of irradiation switch during shooting process.
- Emergency mode will be released if the emergency switch is pressed and turned to the arrow direction.
- Power will be blocked and the operation of whole equipment will be stopped when the Emergency switch is pressed.
- Emergency switch will be returned to the unpressed position and emergency mode will be released if it is turned to the clockwise direction.

3.5. Power switch

- Power can be turned On or Off using the power switch on the backside of the equipment.



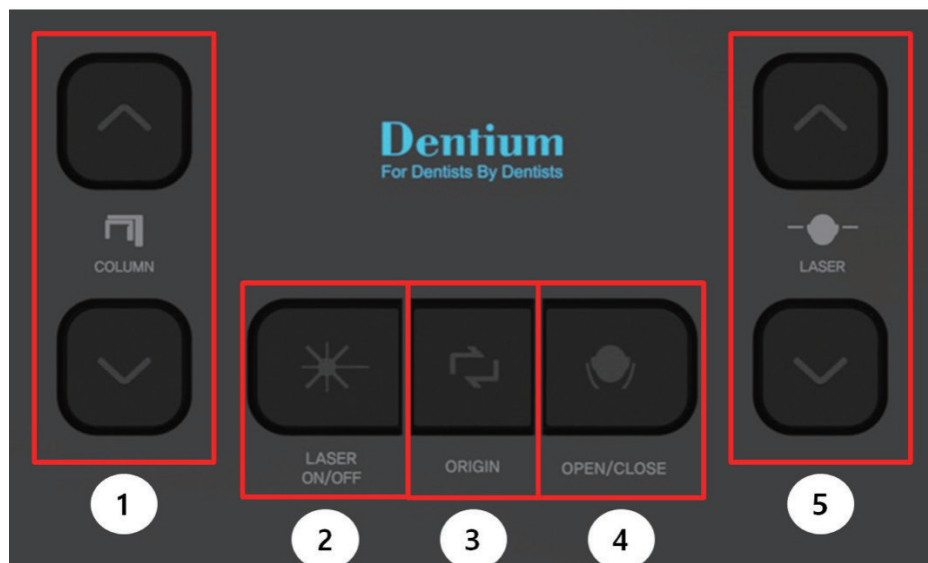
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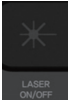
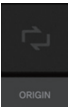
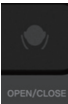
[" O " Power Off]

- Power switch is located on the backside of the equipment.
- Power will be turned On if the power switch is pushed to “I” direction.
- Power will be turned Off if the power switch is pushed to “O” direction.

3.6. Control switch

This is the Control switch to align the patient, Please refer to the followings for the detailed information of the functions.



No	switch	Image	Description
1	COLUMN $\wedge$ $\vee$		Lift column will move up or down if you push the direction key (max. travel range is 700mm).
2	LASER ON/OFF		If you push the switch once, laser will be turned on and it will be turned off if you push again.
3	ORIGIN		Equipment will move to the shooting origin point if you push this switch. Push this switch again once the shooting is completed and the patient came outside, then the equipment will move to the shooting initial position.
4	OPEN /CLOSE		This is the switch to fix the patient stably. Temple support will fix both sides of forehead of patient stably if you push this switch after the patient alignment process is completed.
5	LASER $\wedge$ $\vee$		Laser beam position will move up or down depending on the switch to be pushed.

3.7. Indicator lamp



Default model



Ceph option

No	Classification by each product	Description
1	ICT-R02-1T	③ Panoramic, CT status indication lamp
2	ICT-R02-1TC (option)	③ Panoramic, CT status indication lamp ④ Scan Cephalo status indication lamp
3	ICT-R02-2T	③ Panoramic, CT status indication lamp
4	ICT-R02-2TC (option)	③ Panoramic, CT status indication lamp ④ Scan Cephalo status indication lamp
5	ICT-R02-2TS	③ Panoramic, CT status indication lamp
6	ICT-R02-2TSC (option)	③ Panoramic, CT status indication lamp ④ Scan Cephalo status indication lamp

3.7.1. Operation of status indication lamp (common to all modes)

- Indication lamp will be turned to Green when the equipment is in normal state.
- Indication lamp will be turned to Orange during X-Ray shooting process.
- Indication lamp will be turned to Red when the equipment is in error state.

3.8. Provided Software

3.8.1. Provided software list

No	Name of the software	Use
1	rainbow™ Image Viewer	2D Viewer, Patient information managing program
2	rainbow™ 3D Viewer	3D Viewer & Analysis
3	rainbow™ Ceph	Correction and Analysis
4	Shooting software	Panoramic + CT + +MODEL + Ceph (option)

3.8.2. Recommended PC specification

– PC has an important role not only for the system shooting function but also for the image processing time and safe use. Please configure the PC environment in the manner to be able to satisfy the following specification. Specifications failed to satisfy the following requirements may limit the image quality and usage time.

Item	Specification	Others
CPU	Intel core i5 3.5Ghz 이상	
RAM	16GB DDR3-1600 RAM 이상	
HDD	1TB (7200RPM) 이상	
Graphic card	NVIDIA GeForce GTX 1060 6GB	
OS	WINDOW 10 64BIT	
Serial Port	RS232 port	Communication between the equipment and PC

3.8.3. rainbow™ Image Viewer

- rainbow™ Image Viewer is the dental image managing software. Doctors can make even faster diagnostic decision through 2D images of patient with this software and also it interlocks with rainbow™ 3D Viewer and rainbow™ Ceph software and makes the equipment to be used more conveniently.
- Please refer to the rainbow™ Image Viewer user's manual for more detailed information in regards to the new patient and search function.



WARNING

Software must be updated through the manufacturer only. Unauthorized software update through the other company other than the manufacturer is strictly prohibited.

04

Shooting software

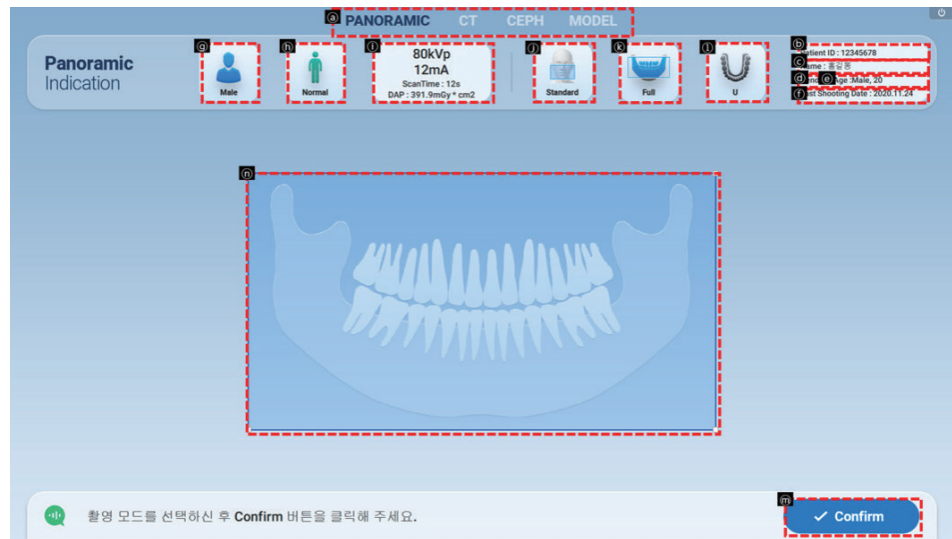
You can configure the shooting images by each of the shooting mode with shooting software.



Note

Shooting software screen image is subject to be change without prior notice to improve its function.

Shooting software is configured as shown below. Please refer to the followings for the detailed information of each mode.



Detailed information

No	Image	Description
Ⓐ	Shooting mode	Shooting mode indicating and changing icon (panoramic + CT + CEPH + MODEL) – Selected shooting mode will be displayed in darker color – You can change the shooting mode by pushing corresponding text during mode change.
Ⓑ	Patient ID	System displays the chart number of the patient – Patient ID selected from rainbow™ Image Viewer will be displayed.
Ⓒ	Name	System displays the name of the patient. – Patient' s name selected from rainbow™ Image Viewer will be displayed.
Ⓓ	Gender	System displays the gender of the patient – Patient' s gender selected from rainbow™ Image Viewer will be displayed.
Ⓔ	Age	System displays the age of the patient – Patient' s age selected from rainbow™ Image Viewer will be displayed
Ⓕ	Shooting date	System displays the last shooting date – Last shooting date will be displayed
Ⓖ	Gender	System displays the gender of the patient – Gender can be changed manually from the shooting software.
Ⓗ	Body type	System displays the body type of the patient – Body type can be changed manually from the shooting software.
Ⓘ	Tube voltage, tube current, irradiation time and DAP	Tube voltage & Tube current changing mode – Once the patient is selected from rainbow™ Image Viewer, basic kVp/Ma information of the patient will be displayed. If manual adjustment of kVp/Ma is required for the improvement of image, you can change the value using + and – key manually. – Shooting time that fits to the selected mode and area dose will be displayed.
Ⓙ	Scan mode	Scan range changing mode – You can change the scan mode manually.
Ⓚ	Sub mode	Sub area changing mode – You can change the detailed scan mode manually.
Ⓛ	Dental arch selection	Dental arch changing mode – You can change the dental arch shape of the patient manually.
Ⓜ	Setup complete	You can go to the patient alignment step if you push this button after all of the setup is completed.
Ⓝ	Scan range	Designating the user' s scan range – You can change the scan range manually depending on the treatment area.

Gender classification

Gender of the patient	Classification by age / Gender		Age
	Children		2~12 years
	Adults	Male	> 12 years
		Female	

05

Start shooting

Detailed information

Classification by age	Head size	Range	Age
Children	54±3Cm	> 54±3Cm	Fat (Hard)
		54±3Cm	Normal
		54±3Cm <	Thin (Soft)
Adults (male / female)	56±3Cm	> 56±3Cm	Fat (Hard)
		56±3Cm	Normal
		56±3Cm <	Thin (Soft)

* Korean size - 6th as of 2010

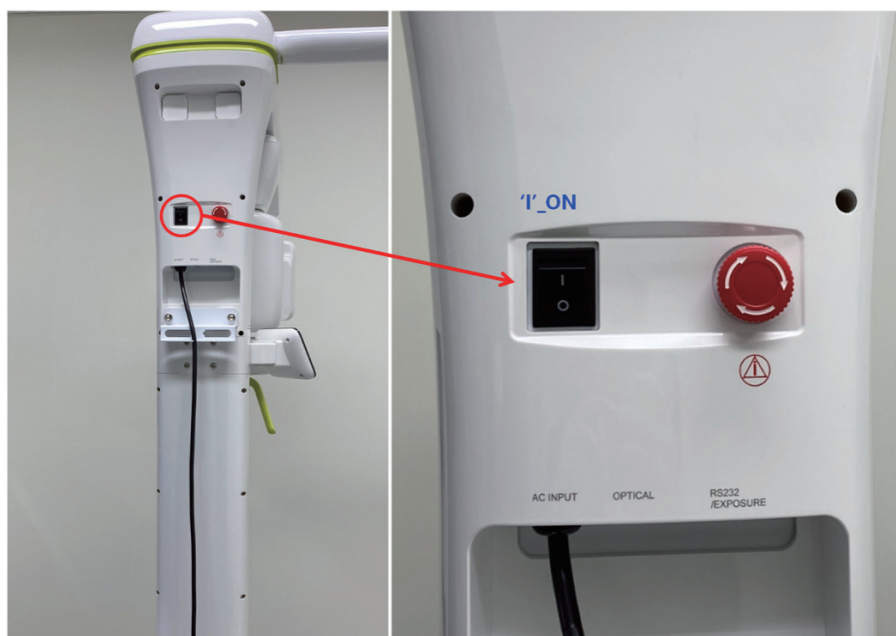
5. Start shooting

5.1. Turning on the equipment



Caution

- Do not allow the patient to be close to the equipment before turning on the equipment. It can be the cause of accident.
- Excessive change of shielding room temperature may cause condensation. Do not turn on the equipment until it reaches to the room temperature.
- Wait at least 5 minutes of warming up time after the equipment power is turned on.
- Do not turn on the PC while the equipment is working as it can be the cause of the malfunction of the equipment.
- Do not operate the PC and control switches arbitrarily while the equipment is working as it can be the cause of mal-operation of the equipment.



5.2. Running image management program (rainbow™ Image Viewer)



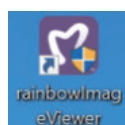
Note

Please refer to the rainbow™ Image Viewer user's manual for the detailed information.

■ Introduction

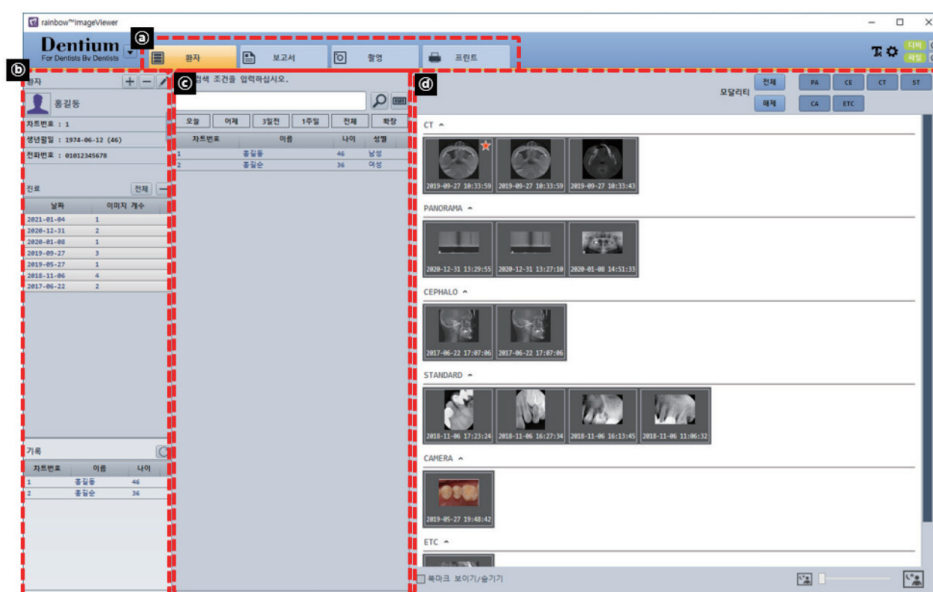
– As a dental image managing program, rainbow™ Image Viewer provides easy image managing and analyzing functions for the fast and precise diagnosis.

■ Execution of the program



– rainbow™ Image Viewer is the basic software for the dental X-Ray equipment. You can double click and activate the main window.

Functions

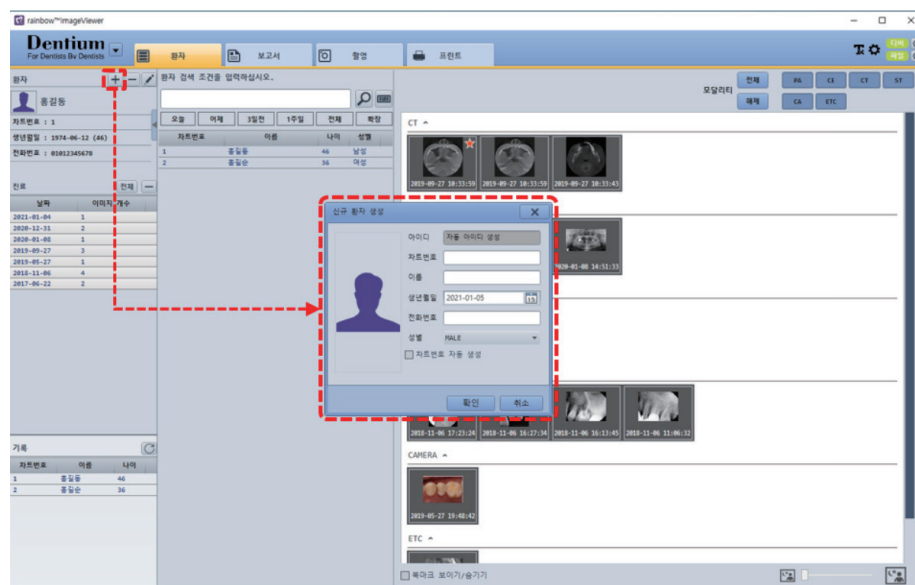


No	Item	Functions	Functions
①	Main tab	Patient	Displays the information of whole patients.
		Report	This is the function to be required when preparing for the report.
		Shooting	This is the function to select the modes of X-Ray shooting for the diagnosis.
		Printing	This is the function to print out the DICOM images.
②	Patient information	Information change	This is the function to register, delete or modify the patient information.
		Detailed information	You can acquire the patient information and shooting image status.
③	Patient search	Patient search	This is the function to search and select the patient. You can search using chart number, name, date etc.
④	Thumbnail list	Image preview	This is the preview function by each of the diagnosis image in regards to the medical treatment received date of the selected patient.

– You can retrieve the existing patient or register the new treatment recipient using rainbow™ Image Viewer program.

■ Introduction

–You can push  button from the left patient information window on below image and open the new patient registration window.
 –Below setup window will be displayed.



– New patient will be registered if you enter the ID, chart number, name, date of birth, phone number etc. of the new patient and push OK button.
 – Out of the patient information, chart number, name, date of birth and family name is the required field that must be filled up with.

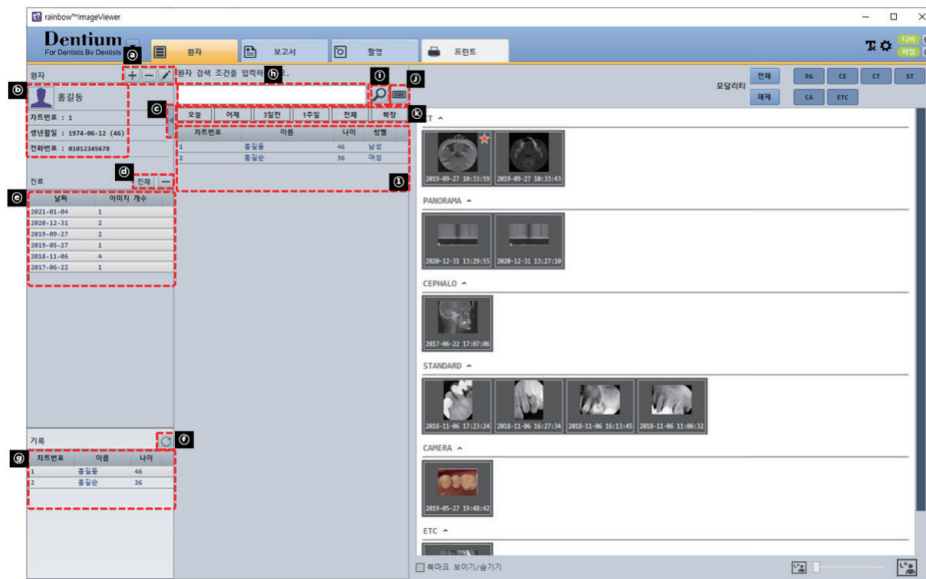


Note

Refer to the rainbow™ Image Viewer user's manual for more detailed information.

■ Retrieving patient information

- rainbow™ Image Viewer provides search by chart number, patient name and date function.
- Patient search and list module need to be configured as follows.



No	Item	Functions
a	Patient registration	You can register new patient
	Thumbnail list	You can delete existing patient
	Thumbnail list	You can register new patient
b	Patient information display	You can display currently selected patient information
c	Show/hide the patient search field	You can show or hide the patient search field
d	SSelect all medical treatment date / delete	You can delete all of the medical treatment information or delete selected information only
e	Medical treatment date of the patient	System will display the medical treatment received date information of the selected patient
f	Recent patient list update button	You can update the recent patient list
g	Recent patient list	System displays the list of recently selected patients
h	Patient information search	This is the field to enter the search word for the patient to be searched.
i	Search event mouse button	Search event mouse button
j	Virtual keyboard activation	System will activate the virtual keyboard
k	Date and expanded search	You can search by period or through detailed information
l	Searched patient list	This is the patient list corresponding to the search result



Note

You need to enter the whole chart number to find out the patient precisely. System will find out all of the patients whose name starts with corresponding letter if you search for the patient by name and enter even one letter only.

– Chart number and patient name searching method

- System will display the cursor to be used to enter if you click the input window.
- System will start the search of the patient if you enter the chart number or name of the patient and hit Enter key or click the magnifier icon on the right side of input window. If you want to search with virtual keyboard, click the keyboard button on the right side of the search window then virtual keyboard will be activated. System will search all of the corresponding character included candidates' data even though you do not enter whole name or chart number.

환자 검색 조건을 입력하십시오.

홍길

오늘 어제 3일전 1주일 전체 확장

차트번호	이름	나이	성별
1	홍길동	46	남성
2	홍길순	36	여성

– Expanded search

- Below window will be activated if you click **확장** button on the bottom of the search window. Corresponding date included **확장** treatment received patients will be added on the search condition if you select the start and end date to search.

환자 검색 조건을 확장하십시오.

오늘 3일전 1주일 1달 전체 사용자지정

2020년 12월 6일 일요일 15 ~ 2021년 1월 6일 수요일 15

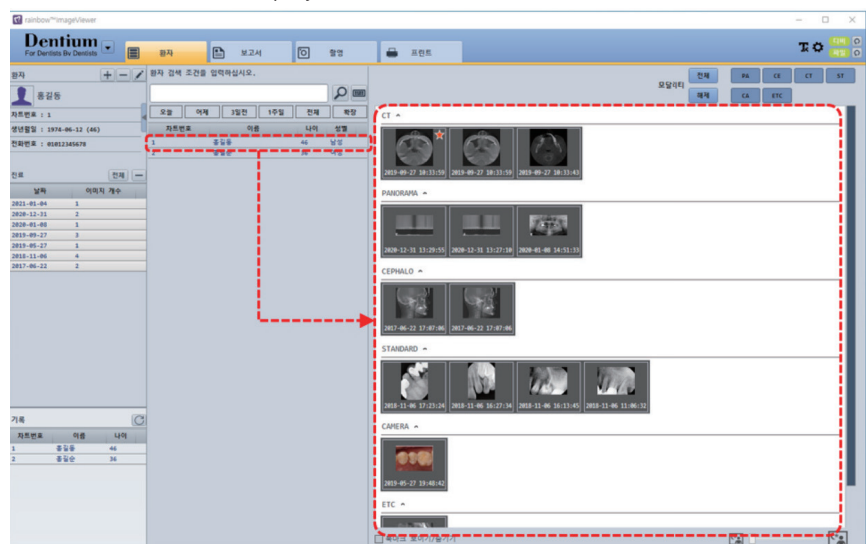
PANORAMA CEPHALO CT STANDARD CAMERA

ETC 전체

검색 취소

- System will search for the patient based on corresponding search criteria only if you enter nothing on the chart number and patient name.

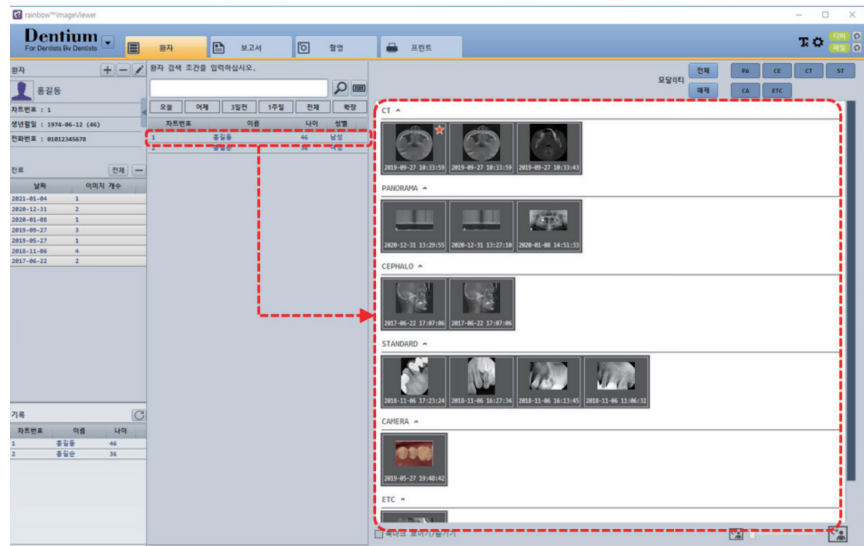
- Search result will be displayed as below.



5.3. Starting the shooting software

5.3.1. rainbow™ Image Viewer

- Register the patient information by retrieving the patient who took an X-Ray already or newly registered patient.
- In order to proceed further, push “촬영 (shooting)” button from the tab on top of rainbow™ Image Viewer.
- System will display below window.
- Select the shooting mode in the middle of the screen.



- Corresponding time will be selected automatically as the shooting date of the patient.
- Refer to the following detailed information for the shooting method by each mode.

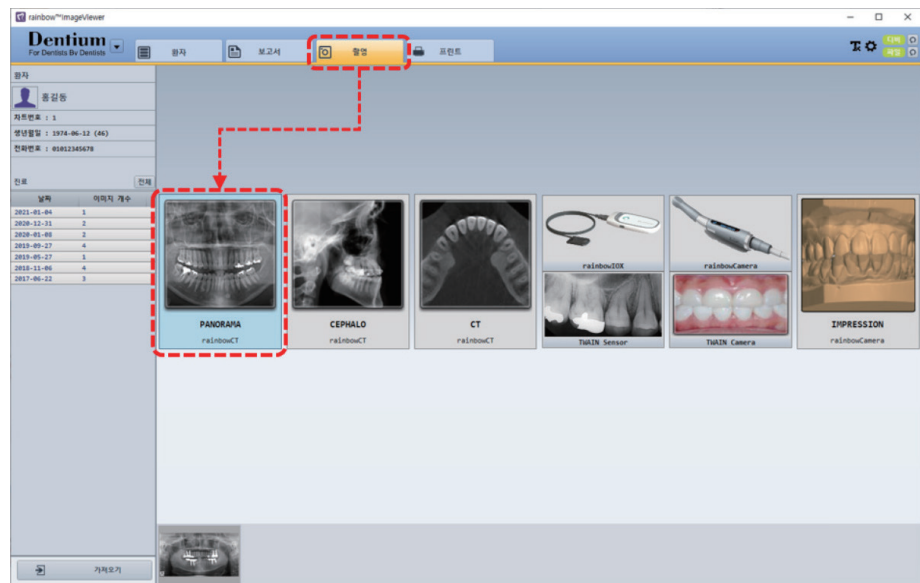
5.4. Start shooting

5.4.1. Panoramic shooting

- Please refer to the Panoramic shooting mode

Mode	Scan mode	Diagnosis area
panoramic (Adults + Children)	Standard	Full
		Incisor
		Bitewing
	Sinus	Sinus
	TMJ	TMJ

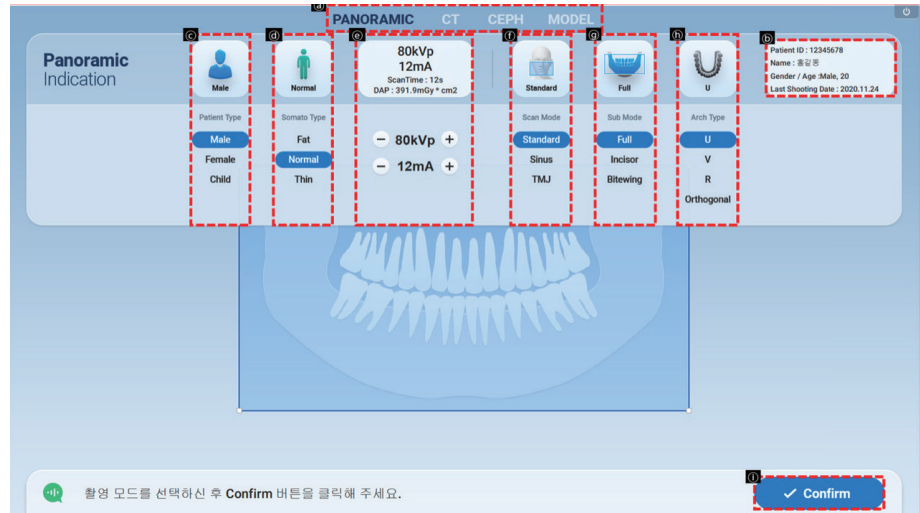
- Click the shooting tab from the tab menu on top of the screen.
- Select PANORAMA mode to run the panoramic shooting software.



– Below shooting software screen will be displayed on the monitor.



- System will display the options to be selected if you put the mouse cursor on the red box area.
- Please refer to the followings and setup the detailed shooting options.



Shooting mode	No	Set up	Description
Panoramic	(a)	Shooting mode selection	Shooting screen will select PANORAMIC shooting mode automatically if Panoramic is selected from rainbow™ Image Viewer. You can change to CT, CEPH, MODEL shooting mode manually as required.
	(b)	Patient information display	Patient information selected from the rainbow™ Image Viewer will be displayed. You cannot change corresponding information. You need to change from rainbow™ Image Viewer and rerun the program if you need to change this information.
	(c)	Patient's gender selection	You can change the gender of the patient.
	(d)	Patient's body type selection	You can change the body type of the patient.
	(e)	Shooting condition selection	X-Ray generator tube voltage & current value will be set automatically depending on the gender, age etc. of the patient. You can change this value with + and – key manually as required to improve the quality of the image.
	(f)	Diagnosis area selection	You can change the diagnosis area.
	(g)	Diagnosis detailed area selection	You can change the detailed diagnosis area.
	(h)	Dental arch trace selection	You can change the dental arch trace depending
	(i)	Shooting detailed option setup completed	Choose detailed shooting option and select "CONFIRM" button consecutively.



Note

Before start shooting, verify that the information of the patient displayed on the patient information window on top right side of the shooting program corresponds to the actual patient's name who is taking an X-Ray.



Caution

Replace the cover with the new one for the shooting of the next patient as it can be the cause of infection.

- Equipment will move to the patient alignment mode if you click CONFIRM button.
- Once the equipment stopped, guide the patient to the shielded room and align him/her on the shooting position.
- Let the patient wear the protective cloth. We strongly recommend to have the patient wear the protective cloth so that he/she can be protected from the radiation.



Caution

- Once the shooting mode is decided, equipment will move to the position to align the patient. Do not locate the patient in place during the movement of the equipment to avoid the injury of the patient.
- Do not operate the equipment or select the menu during the movement as it can be the cause of mal-operation.



Note

Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and follow the instruction for the good quality images.



Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.

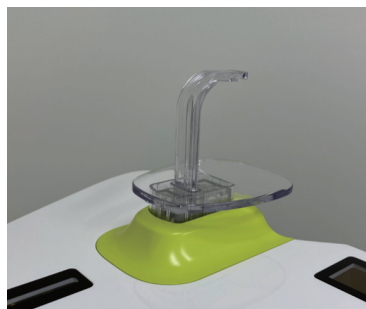


Caution

Let the patient wear protective cloth and thyroid guard before taking an X-Ray and especially children and pregnant women need to discuss with the doctor before start process.

■ Patient alignment

- Let the patient relax and keep the upright posture while straightening up the shoulder.
- Patient needs to straighten up the cervical vertebrae (neck) as well.
- Let the patient remove all of the metallic objects such as glasses, ear rings, hair pin, oral instruments etc. Metallic objects make artifacts on the images and degrade the quality of the image.
- Connect the standard Chin Rest and Tooth Bite block on the Chin Rest hole and cover the Tooth Bite block with sanitary cover (common to edentulous jaw patient).



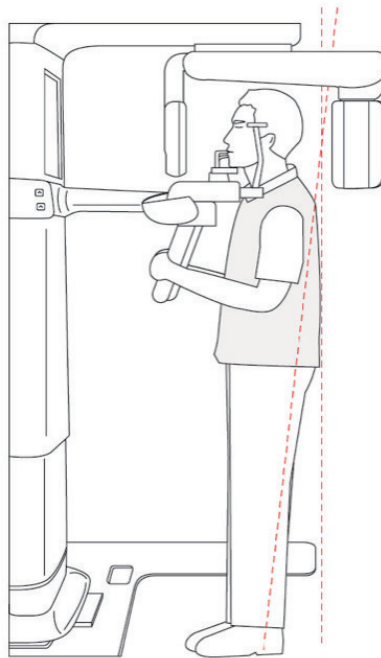
(Tooth Bite block)



Caution

Replace the cover with the new one for the shooting of the next patient as it can be the cause of infection.

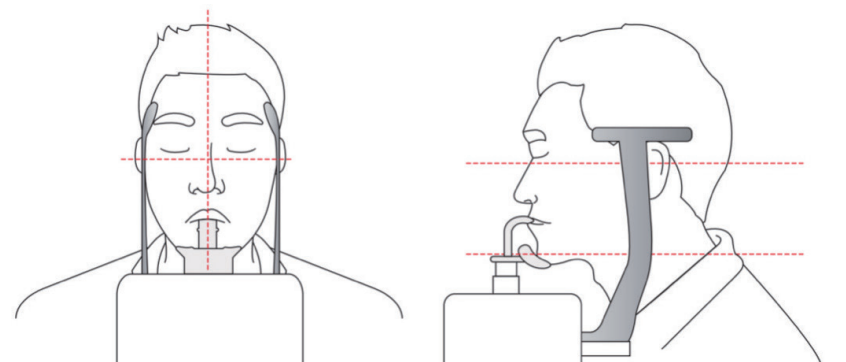
- Let the patient stand upright in the manner the chin of the patient matches to the chin rest and have him/her hold the handle that is on the lower part of the equipment (have the patient place the feet a little bit inside of straight line)



- Adjust the height of the equipment using up/down switch on the column so that the chin of the patient can be seated on the chin rest.
- Let the patient bite the front groove on the Tooth Bite with upper and lower front teeth.



- If you push ON/OFF button, laser beam will be turned on, then proceed further following below instruction.
- Vertical beam is fixed and place the patient in the manner that the vertical beam comes to the center of the face.



- Match the horizontal beam so that it can be straight to the Frankfort Line of the patient's face.
- Frankfort Line means the imaginary line that connects between the point under the eye and the upper edge of external auditory meatus as shown in the picture.
- Lower horizontal beam is fixed and the upper beam can be adjusted by controlling the UP/DOWN switch.



Canine beam adjusting SW

- Place the canine beam on the center of the canine tooth of the patient.
(for edentulous jaw patient, use mouth corner parts when patient shuts his/her mouth).
- Canine beam adjusting method is attached on the right side of the temple support module (refer to the picture).



Caution

Be careful not to allow the patient look the laser beam in the eye as it can be the cause of fatal damages to the eyes.

- Once the patient alignment process is completed, push Control switch OPEN/CLOSE button and fix both sides of the head of the patient.
- Guide the patient shut the mouth and attach the tongue on the palate.
- Guide the patient close the eyes and have him/her keep this state until the shooting is completed without movement.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.



- Equipment will move to the shooting position if you push the 'Ready (red box)' button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready.
- Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process.
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.

5.4.3. Left & Right selecting function of TMJ shooting

- Screen to be displayed when TMJ mode is selected (default: shoot left and right simultaneously)



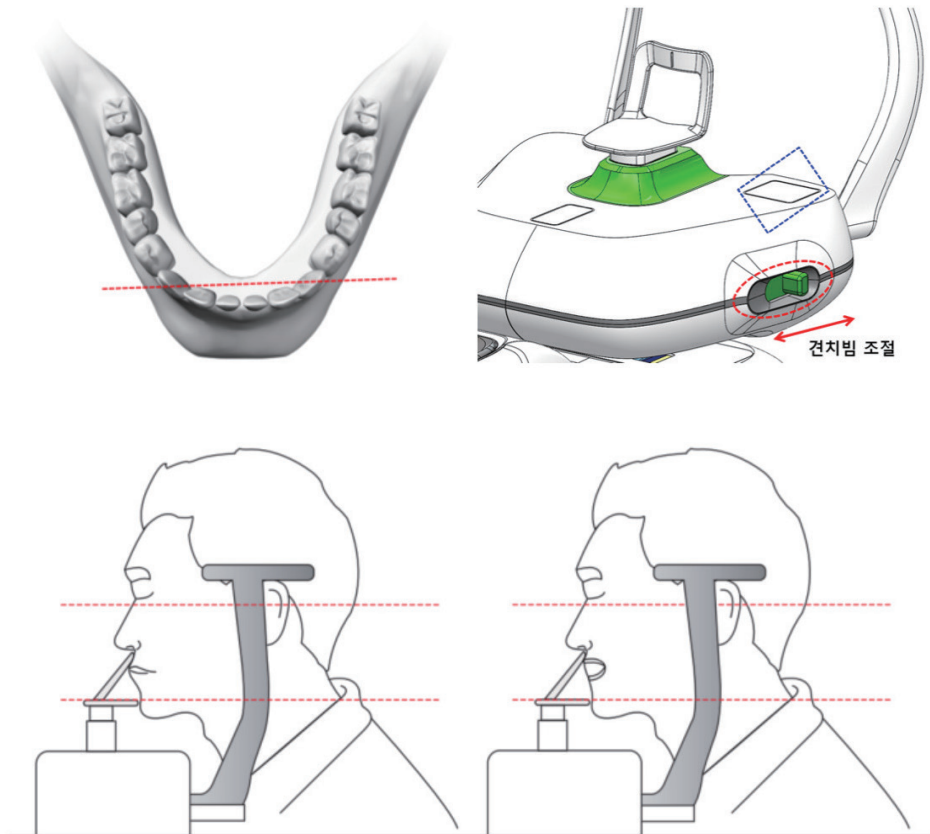
- You can turn On or Off the left or right shooting with this button.

5.4.4. TMJ shooting (temporomandibular joint) Open/Close mode

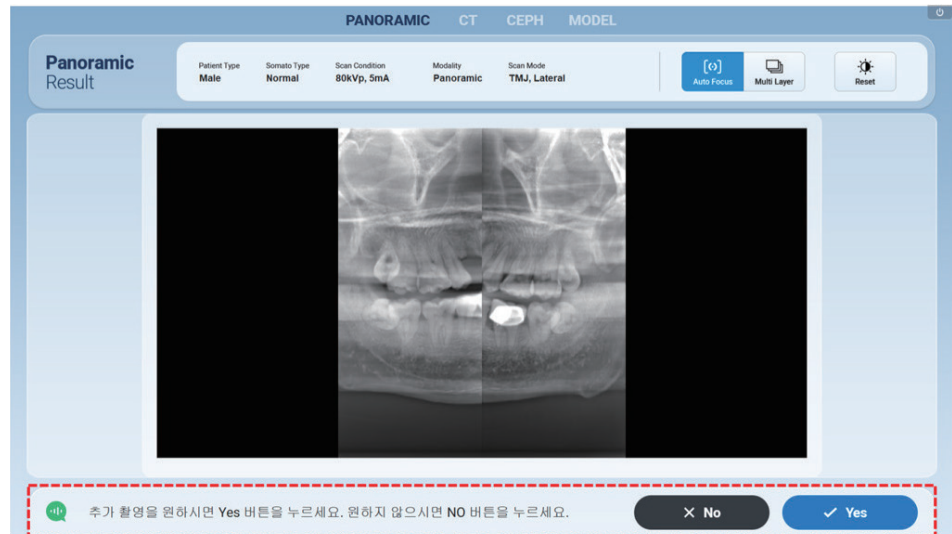
- TMJ has OPEN and CLOSE of two different modes. Operator can perform TMJ OPEN shooting immediately after the TMJ CLOSE shooting while keeping the same posture. Please align the patient in accordance with following sequence.
- Let the patient remove all of the metallic objects such as glasses, ear rings, hair pin etc. Metallic objects make artifacts on the images and degrade the quality of the image.



- Mount TMJ shooting module on the temple support.
- Guide the patient stand at the center of the equipment in the manner chin can be rested on the chin rest and hold the handle of the lower part of temple support, have the patient place the feet a little bit inside of straight line
- Adjust UP/DOWN switch and move lift column so that philtrum of the patient can be touched to the upper part of chin rest.
- Vertical beam: Vertical beam is fixed and place the patient in the manner that the vertical beam comes to the center of the face
- Horizontal beam: Match the horizontal beam so that it can be straight to the Frankfort Line of the patient's face. Frankfort Line means the imaginary line that connects between the point under the eye and the upper edge of external auditory meatus as shown in the picture.



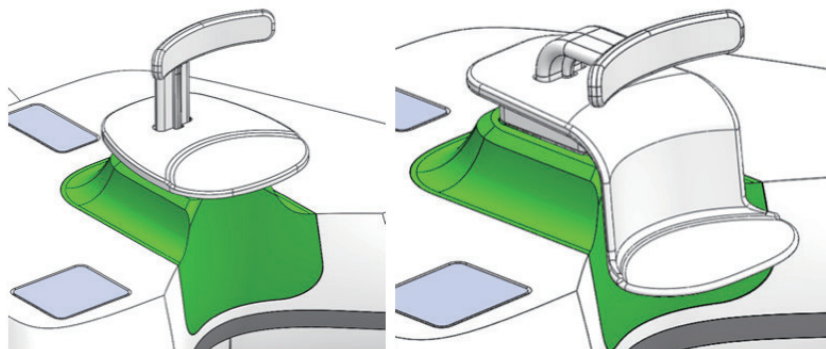
- TMJ Open : Let the patient swallow and open the mouth as much as possible. Guide the patient attach the tongue on the palatine and breath through the nose.
- Once the patient alignment is completed, push the Control switch OPEN/CLOSE button and fix both sides of the head of the patient.
- Guide the patient close the eyes and let him/her do not move until the shooting is completed.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready.
- Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.
- TMJ Close image shooting process can be processed immediately after the TMJ Open shooting process with the same posture.



- System will ask if TMJ image shooting process will be continued on the bottom of the screen (red box on the picture). You can push YES button and proceed with the 2nd TMJ shooting. System will not proceed with additional shooting further and ask if you will save current shooting image if you push No button. Push SAVE button if you want to save and finish the program and NO SAVE button if you do not want to save and finish the program.

5.4.5. SINUS SHOOTING MODE

- Let the patient remove all of the metallic objects such as glasses, ear rings, hair pin etc. Metallic objects make artifacts on the images and degrade the quality of the image.
- Mount Sinus chin rest module on the temple support.



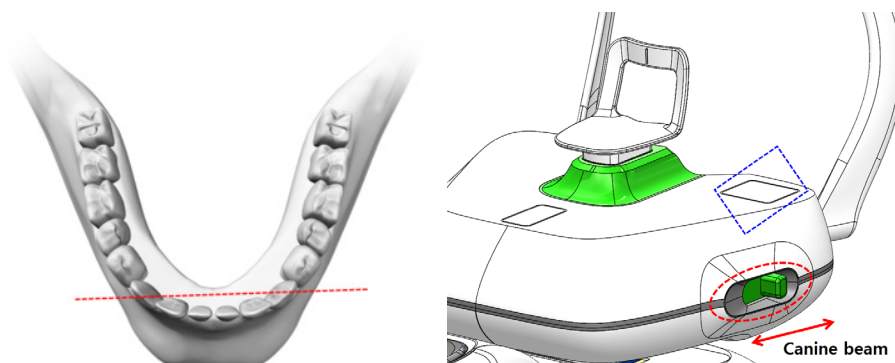
2 tile type SINUS Bite

1 tile type SINUS Bite

- Guide the patient stand at the center of the equipment in the manner chin can be rested on the chin rest and hold the handle of the lower part of temple support. have the patient place the feet a little bit inside of straight line
- Adjust the height with UP/DOWN switch so that chin of the patient can be seated on the chin rest stably.
- Patient needs to straighten up the cervical vertebrae (neck) as well
- Vertical beam is fixed and place the patient in the manner that the vertical beam comes to the center of the face



Be careful not to allow the patient look the laser beam in the eye as it can be the cause of fatal damages to the eyes.



- Adjust the canine beam handle and match it to the oral angle or center between canine tooth and premolar of the patient (match it while moving left or right).
- Once the patient alignment is completed, push the Control switch OPEN/CLOSE button and fix both sides of the head of the patient.
- Guide the patient close the eyes and let him/her do not move until the shooting is completed.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready.
- Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.



Note

X-Ray shooting sequence

1. Close the shield room door.
2. Push the shooting switch and start shooting process while monitoring the patient from outside of the shielding room.
3. Push and hold the button until the shooting is completed and release the button once the shooting process is completed.
4. Shooting will be terminated if the button is released in the middle of the process.



Caution

Release the irradiation switch or push emergency switch under the handle frame of the equipment and stop the operation immediately if problem found during the shooting process.

Operator needs to monitor the patient all the time and should be ready to take counter measures immediately in case problem occurred during the process.

5.4.6. Verifying the shooting image

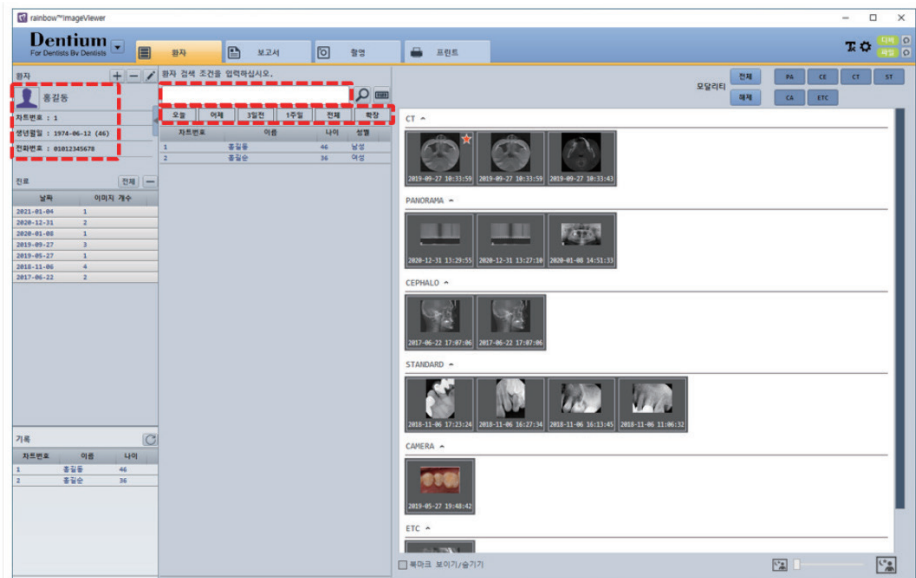
- You can push Save button and save the shooting image immediately after the process.
- Refer to the followings if you want to save the images with brighter or darker condition.

– Image brightness adjusting function

- Image brightness will be getting darker if you put the cursor on the panoramic image and push & hold the left button of the mouse and drag it to the left, and it will be brighter if you push & hold the left button and drag it on the right.
Adjust the brightness and save as desired.

■ Retrieving patient before start CT shootingn

- You can search the patient list by entering the name or chart number through the PC keyboard if the patient is registered already.
- You can also search the corresponding date image registered patient list by classifying them as today, yesterday, 3 days ago, 1 week ago, 1 month ago, whole and extension button on the bottom of the search window.
- You can see the detailed searched patient information on the left top of rainbow™ Image Viewer screen.



Note

You need to enter the whole chart number to find out the patient precisely. System will find out all of the patients whose name starts with corresponding letter if you search for the patient by name and enter even one letter only.

– Chart number and patient name searching method

- System will display the cursor to be used to enter if you click the input window.
- System will start the search of the patient if you enter the chart number or name of the patient and hit Enter key or click the magnifier icon on the right side of input window. If you want to search with virtual keyboard, click the keyboard button on the right side of the search window then the virtual keyboard will be activated. System will search all of the corresponding character included candidates' data even though you do not enter whole name or chart number.

환자 검색 조건을 입력하십시오.

홍길

오늘 어제 3일전 1주일 전체 확장

차트번호	이름	나이	성별
1	홍길동	46	남성
2	홍길순	36	여성

– Expanded search

- Below window will be activated if you click **확장** button on the bottom of the search window. Corresponding date included medical treatment received patients will be added on the search condition if you select the start and end date to search.

환자 검색 조건을 확장하십시오.

오늘 3일전 1주일 1달 전체 선택

2018년 3월 11일 일요일 15 ~ 2018년 4월 11일 수요일 15

파노라마 세팔로 씨티 스탠다드 카메라

기타 전체

검색 취소

- System will search for the patient based on corresponding search criteria only if you enter nothing on the chart number and patient name.
- Search result will be displayed as below and you can check the patient information, treatment received date and treatment image etc.

■ Shooting

- Retrieve the patient you want to take a shooting from the existing data or newly register the patient.
- Refer to the following rainbow™ Image Viewer window to process the shooting.

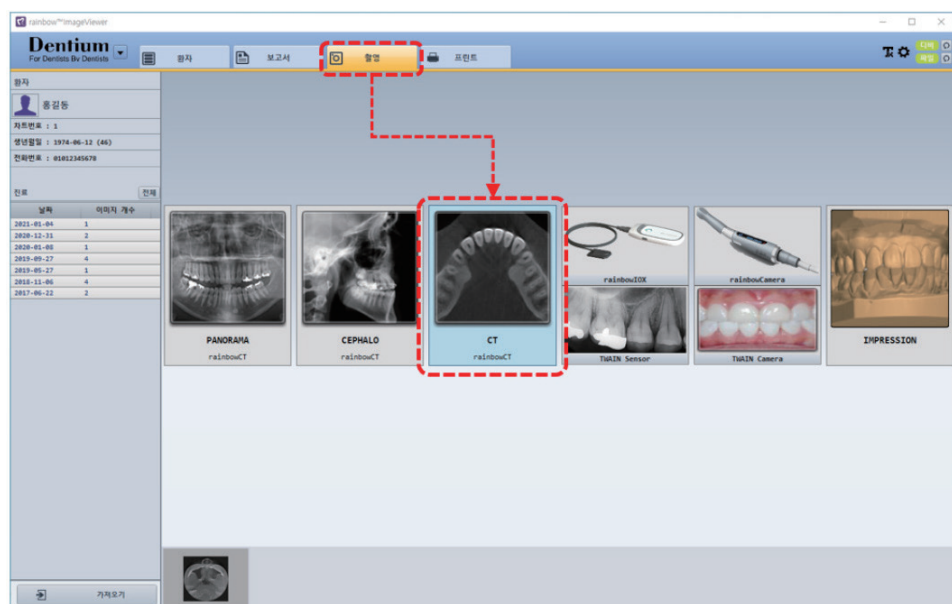


- System will display a window for the shooting if you click Shooting tab.
- Please select the shooting date of the patient from the list of the treatment received date.
- Refer to the following details for each of the shooting mode.

5.5. CT shooting

5.5.1. Starting CT shooting program

- Click Shooting tab from the rainbow™ Image Viewer on the screen.
- Retrieve the patient you want to take a shooting from the existing data or newly register the patient.
- Select CT mode from the following rainbow™ Image Viewer





Note

We do not recommend to update the computer OS program.

Before start shooting, verify that the information of the patient displayed on the patient information window on top right side of the shooting program corresponds to the actual patient's name who is taking an X-Ray.

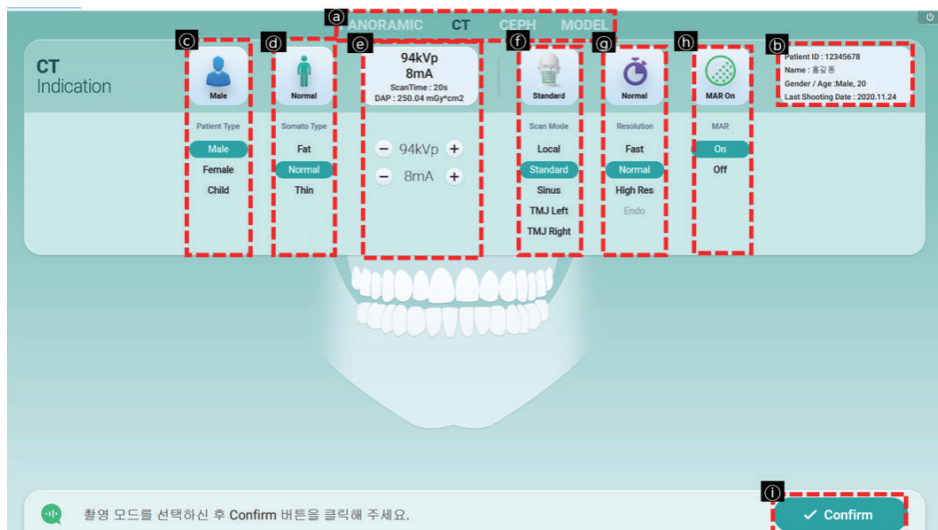
- System will display following main shooting screen.
- You can find out that CT Shooting menu is selected as shown on the red box in the following picture.



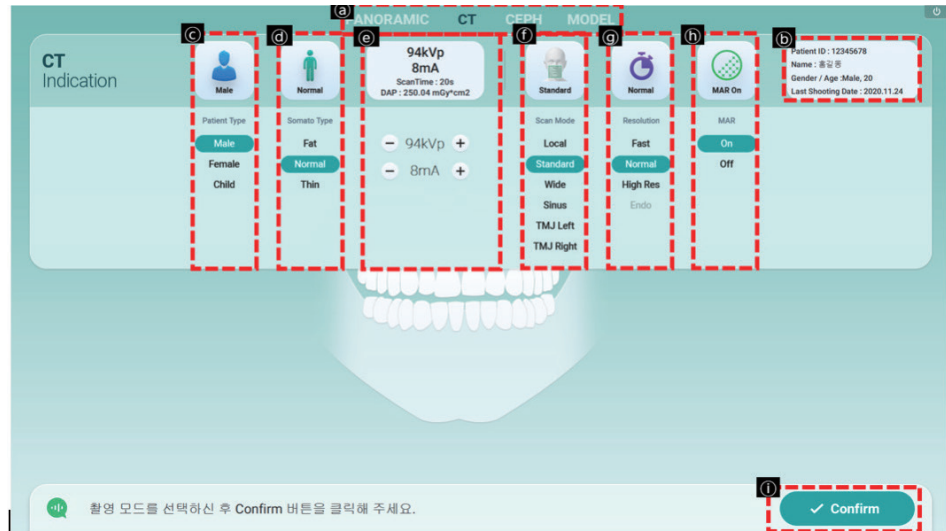
Move the mouse on top of the red box in the following picture to change the detailed shooting configuration.

5.5.2. Shooting configuration (screen for each of the equipment type)

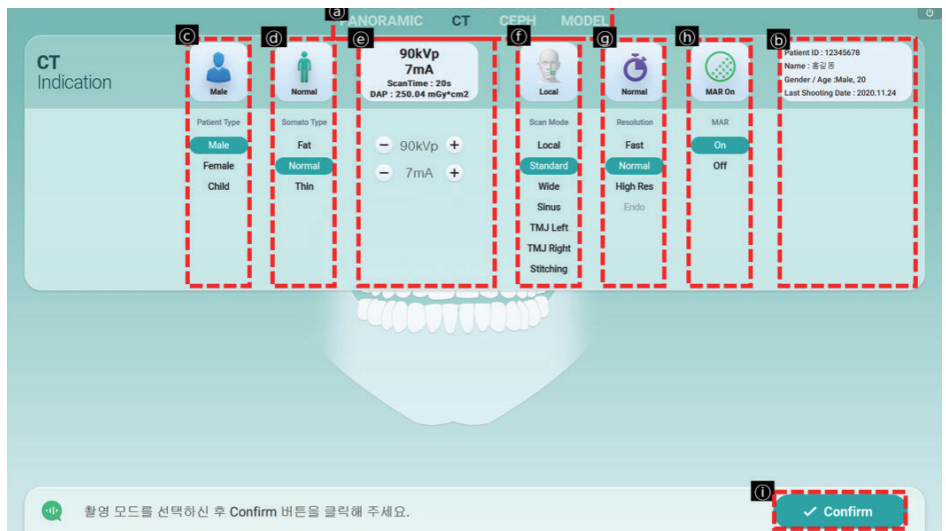
1Tile



2 Tile



2Tile Stitching



Shooting mode	No	Set up	Description
CT	(a)	Shooting mode selection	Shooting screen will select PANORAMIC shooting mode automatically if Panoramic is selected from rainbow™ Image Viewer. You can change to CT, CEPH, MODEL shooting mode manually if required.
	(b)	Patient information display	Patient information selected from the rainbow™ Image Viewer will be displayed. You cannot change corresponding information. You need to change from rainbow™ Image Viewer and rerun the program if you need to change this information.
	(c)	Patient's gender selection	You can change the gender of the patient.
	(d)	Patient's body type selection	You can change the body type of the patient.
	(e)	Shooting condition selection	X-Ray generator tube voltage & current value will be set automatically depending on the gender, age etc. of the patient. You can change this value with + and - key manually as required to improve the quality of the image.

CT	Ⓕ	Diagnosis area selection	You can change the diagnosis area.
	Ⓖ	Image resolution selection (RESOLUTION)	You can change the resolution of the image. – Please refer to the followings and change the resolution.
	Ⓗ	Select whether to use MAR function	Do not use this function unless artifact is concerned due to the metallic object.
	Ⓘ	Completion of shooting detailed option setup	– Choose detailed shooting options and select "CONFIRM" button consecutively.

- Verify that the patient information matches to the patient.
- Select the detailed shooting option from CT
- 1 TILE
(LOCAL, STANDARD, SINUS, TMJ LEFT, TMJ RIGHT)
- 2 TILE
(LOCAL, STANDARD, WIDE SINUS, TMJ LEFT, TMJ RIGHT)
- 2 TILE STITCHING
(LOCAL, STANDARD, WIDE, SINUS, TMJ LEFT, TMJ RIGHT, STITCHING)
- Select from Adult/Female/Children in accordance with the condition of the age.
- Select the body type of the patient.
- Tube voltage and current is set as a default by patient, body type and shooting mode and you can get better and more precise image if you adjust in accordance with the result of the images.



Note

You can fine tune the images matching to the patient if you need to adjust the tube voltage and current due to the image quality.

- For CT shooting, DEFAULT is the STANDARD mode.
- Each of the option of CT is as below.

– For 1Tile

■ CT FOV

ITEM	LOCAL	STANDRAD	Sinus	TmjLeft	TmjRight
FOV SIZE(cm)	5X5~10X9.5	12X9.5	10X9.5	5X9.5	5X9.5

- Default shooting mode is set to STANDARD mode.

■ Resolution (Local mode, TMJ Left, TMJ Right)

Item	FAST	NORMAL	HIGH RESOLUTION	ENDO
Voxel Size(um)	200	150	120	80

■ Resolution(Standard, Sinus)

Item	FAST	NORMAL	HIGH RESOLUTION
Voxel Size(um)	300	200	150

– For 2Tile

■ CT FOV

Item	LOCAL	STANDRAD	Wide	Sinus	TmjLeft	TmjRight
FOV SIZE(cm)	5X5~10X9.5	12X9.5	17.5x9.5	10X9.5	5X9.5	5X9.5

– Default shooting mode is set to STANDARD mode.

■ Resolution (Local mode, TMJ Left, TMJ Right)

Item	FAST	STANDARD	HIGH RESOLUTION	ENDO –Local (5X5) activation
Voxel Size(um)	200	150	120	80

■ Resolution (Standard, Sinus)

Item	FAST	STANDARD	HIGH RESOLUTION
Voxel Size(um)	300	200	150

■ Resolution (Wide)

Item	FAST	STANDARD	HIGH RESOLUTION
Voxel Size(um)	400	300	200

– For 2Tile Stitching

■ CT FOV

Item	LOCAL	STANDRAD	Wide	Sinus	TmjLeft	TmjRight	Stitching
FOV SIZE	5X5~10X9.5	12X9.5	17.5x9.5	10X9.5	5X9.5	5X9.5	17.5X15

– Default shooting mode is set to STANDARD mode.

■ Resolution (Local mode, TMJ Left, TMJ Right)

Item	FAST	STANDARD	HIGH RESOLUTION	ENDO –Local (5X5) activation
Voxel Size(um)	200	150	120	80

■ Resolution (Standard, Sinus)

Item	FAST	STANDARD	HIGH RESOLUTION
Voxel Size(um)	300	200	150

■ Resolution (Wide, Stitching)

Item	FAST	STANDARD	HIGH RESOLUTION
Voxel Size(um)	400	300	200

- Select FAST, NORMAL and HIGH RESOLUTION mode depending on the purpose of use (choose FAST for low resolution, NORMAL for normal resolution and HIGH for high resolution)
- Push Confirm button and move to the patient alignment step once all of the Shooting configuration is completed.
- Wait until the equipment is stopped and guide the patient to the shooting position in the shielded room and align the patient.
- Let the patient wear the protective cloth. We strongly recommend to have the patient wear the protective cloth so that he/she can be protected from the radiation.

5.5.3. Patient alignment and shooting



Note

Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and also, follow the instruction for the good quality images.



Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.



Caution

Let the patient wear protective cloth and thyroid guard before taking an X-Ray and especially children and pregnant women need to discuss with the doctor before start process.

■ Resolution (Local mode, TMJ Left, TMJ Right)

- Let the patient relax and keep the upright posture while straightening up the shoulder.
- Patient needs to straighten up the cervical vertebrae (neck) as well.
- Let the patient remove all of the metallic objects such as glasses, ear rings, hair pin, oral instruments etc. Metallic objects make artifacts on the images and degrade the quality of the image.
- Connect the standard Chin Rest and Tooth Bite block on the Chin Rest hole and cover the Tooth Bite block with sanitary cover (common to edentulous jaw patient).

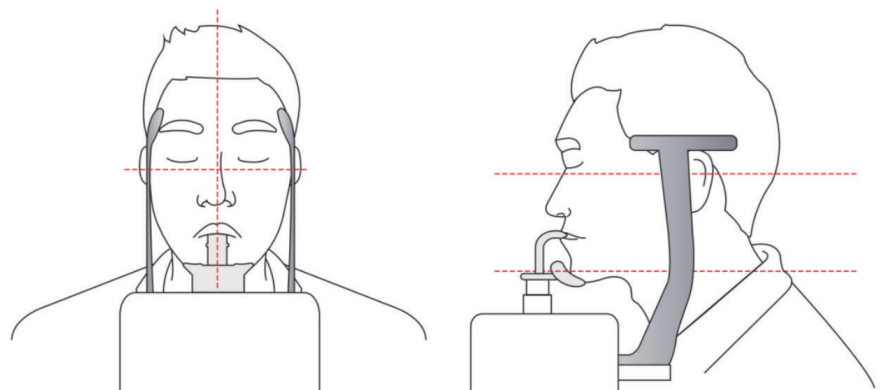


(Tooth Bite block)

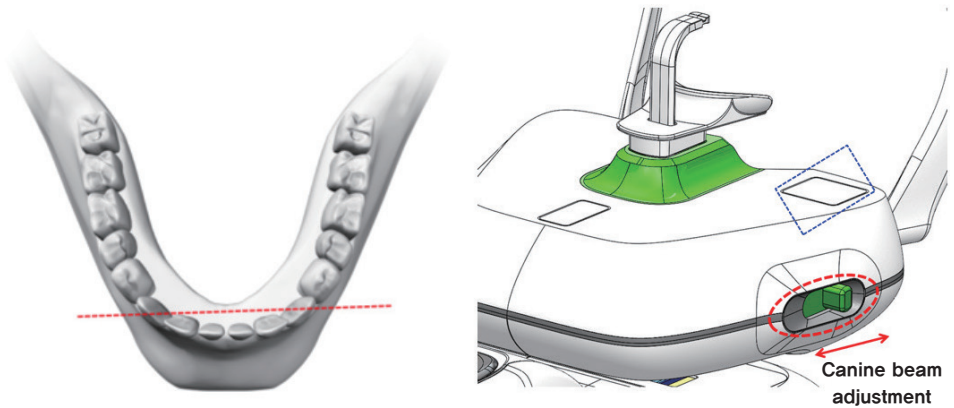


Replace the cover with the new one for the shooting of the next patient as it can be the cause of infection.

- If you push ON/OFF button, laser beam will be turned on, then proceed further following below instruction.
- Vertical beam is fixed and place the patient in the manner that the vertical beam comes to the center of the face.



- Match the horizontal beam so that it can be straight to the Frankfort Line of the patient' s face.
- Frankfort Line means the imaginary line that connects between the point under the eye and the upper edge of external auditory meatus as shown in the picture.
- Lower horizontal beam is fixed and the upper beam can be adjusted using control UP/DOWN switch.

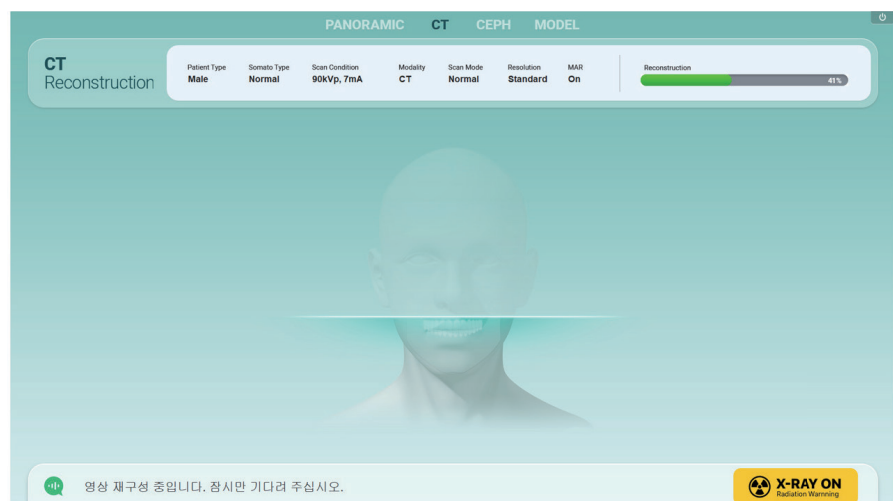


- Adjust the canine beam handle and match it to the oral angle or center between canine tooth and premolar of the patient (match it while moving left or right).



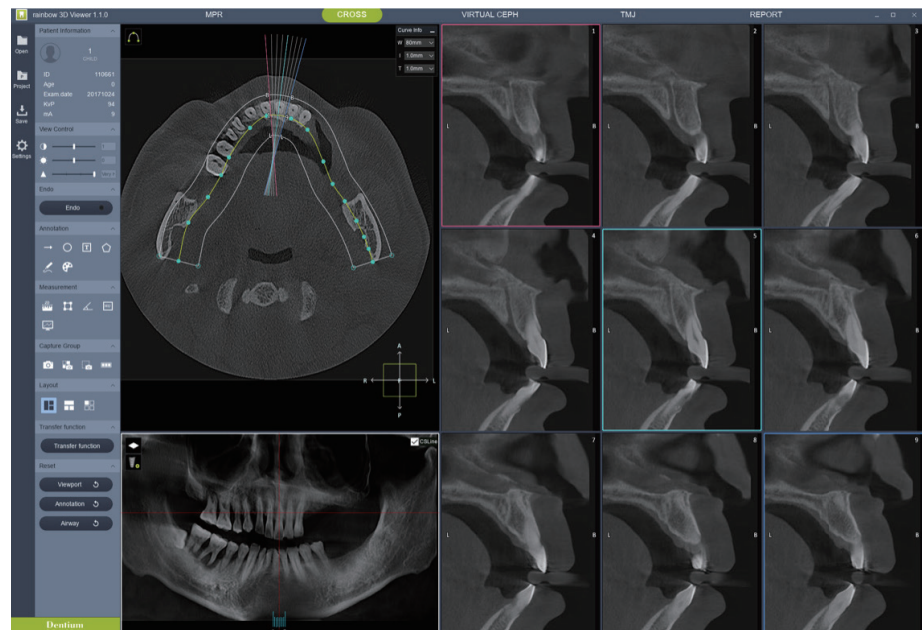
Be careful not to allow the patient look the laser beam in the eye as it can be the cause of fatal damages to the eyes.

- Once the patient alignment is completed, push the Control switch OPEN/CLOSE button and fix both sides of the head of the patient.
- Guide the patient close the eyes and let him/her do not move until the shooting is completed.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready. Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process.
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.
- Once the shooting process is completed, below screen will be displayed to reconfigure the image.



- Shooting image will be converted to DICOM file and will be saved in patient database.
- You can check the shooting image from rainbow™ Image Viewer.
- Recent shooting images will be arranged if you select the patient's name from the patient list.
- You can interlock the image with 3D viewer program if you double click the most recent image.

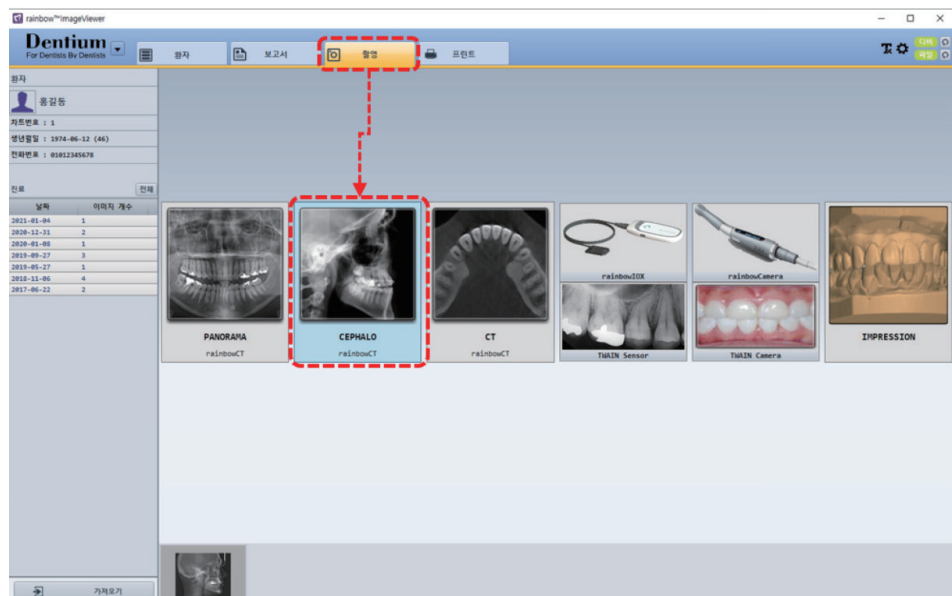
■ Reviewing the shooting image (rainbow™ 3D Viewer)



5.6. Shooting Cephalo images

5.6.1. Starting Cephalo shooting program

- You can take 5 kinds of shooting modes with Cephalo shooting program.
- They are Lateral, PA, SMV, Water's View and Carpus mode.
- Click the Shooting tab from the tab menu on top of the screen.
- Select CEPHALO mode to start Cephalo shooting program.



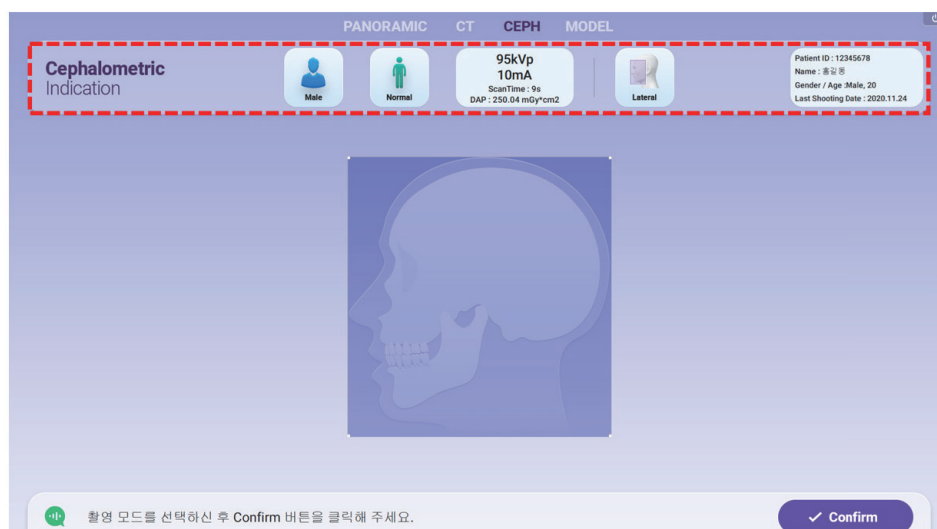


Note

- We do not recommend to update the computer OS program.
- Before start shooting, verify that the information of the patient displayed on the patient information window on top right side of the shooting program corresponds to the actual patient's name who is taking an X-Ray.



- System will display following main shooting screen.



- Move the mouse on top of the red box in the following picture to change the detailed shooting configuration.

5.6.2. Shooting configuration

Shooting mode	No	Setup	Description
CEPH	(a)	Shooting mode selection	- Shooting screen will select Ceph shooting mode automatically if Panoramic is selected from rainbow™ Image Viewer. - You can change to PANORAMIC, CT, MODEL shooting mode manually if required.
	(b)	Patient information display	Patient information selected from the rainbow™ Image Viewer will be displayed. You cannot change corresponding information. You need to change from rainbow™ Image Viewer and rerun the program if you need to change this information.
	(c)	Patient's gender selection	You can change the gender of the patient.
	(d)	Patient's gender selection	You can change the body type of the patient.
	(e)	Shooting condition selection	X-Ray generator tube voltage & current value will be set automatically depending on the gender, age etc. of the patient. You can change this value with + and – key manually as required to improve the quality of the image.
	(f)	Shooting condition selection	You can change the diagnosis area. – Please refer to the followings to change the area.
	(g)	Completion of shooting detailed option setup	Choose detailed shooting options and select “CONFIRM” button consecutively.

- Verify that the patient information matches to the patient.
- Setup the Cephalo shooting mode.
- Setup one mode out of 5 Cephalo mode (Lateral, PA, SMV, Water's View, Carpus).
- Select from Adult/Female/Children in accordance with the age conditions.
- Select the bone density depending on the body type of the patient.
- Tube voltage and current is set as a default and you can get better and more precise image if you adjust in accordance with the result.



Note

You can fine tune the images matching to the patient if you need to adjust the tube voltage and current due to the image quality.

- Proceed with patient posture alignment if all of the selection is completed.

5.6.3. Patient posture alignment and shooting



Note

Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and also, follow the instruction for the good quality images.



Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.



Caution

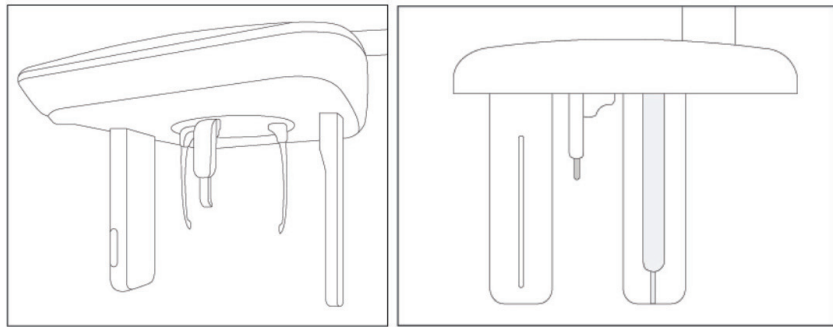
Let the patient wear protective cloth and thyroid guard before taking an X-Ray and especially children and pregnant women need to discuss with the doctor before start process.

■ Reviewing the shooting image (rainbow™ 3D Viewer)

- Let the patient relax and keep the upright posture while straightening up the shoulder.
- Patient needs to straighten up the cervical vertebrae (neck) as well.
- Let the patient remove all of the metallic objects such as glasses, ear rings, hair pin, oral instruments etc. Metallic objects make artifacts on the images and degrade the quality of the image.

■ Lateral mode

- Expand the Ear Load and secure the stable space for the patient posture alignment as shown below.



Note

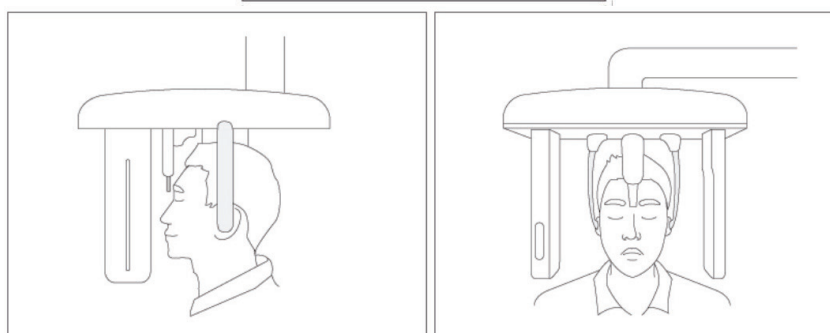
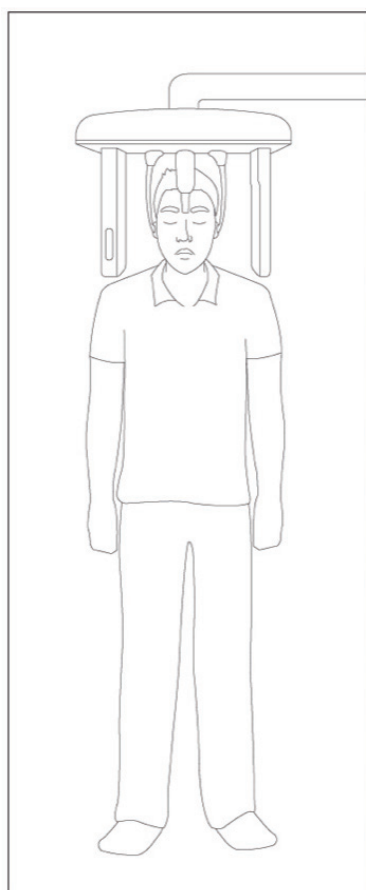
Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and also, follow the instruction for the good quality images.



Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.

- Move the patient to the Cephalo shooting position.
- Guide the patient stand upright.
- Adjust the Ear Load to be fit to the patient.

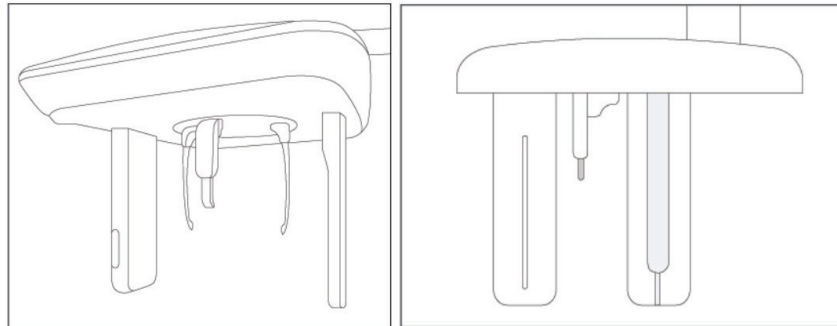


- Align the lower part of eye and upper part of ear of the patient to be parallel to the floor.
- Guide the patient to relax the neck and shoulder and stand in straight posture.
- Adjust the height of Cephalo unit to be fit to the patient using up/down switch on the lift column.
- Fit the Forehead Scale to the forehead point of the patient.
- Once the height adjustment is completed, adjust the Ear Load to be fit to the earhole of the patient.
- Guide the patient close the eyes and have him/her keep this state until the shooting is completed without movement.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready.

- Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.

■ PA mode

- Expand the Ear Load and secure the stable space for the patient posture alignment as shown below



Note

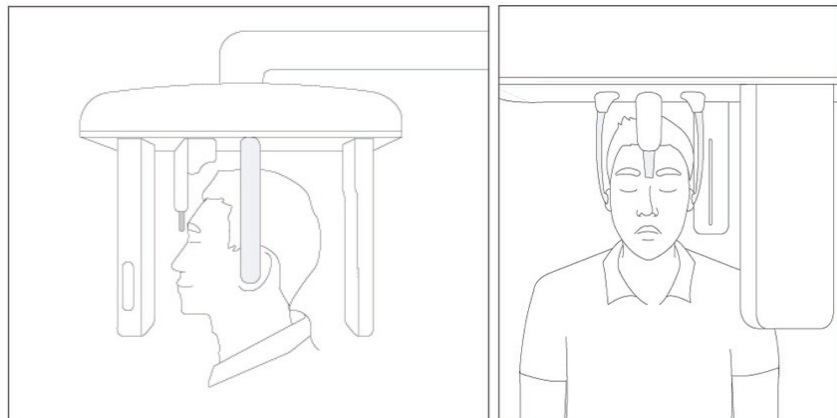
Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and also, follow the instruction for the good quality images.



Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.

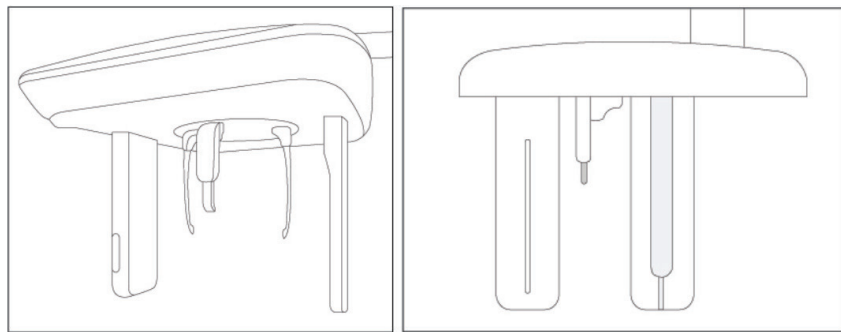
- Move the patient to the Cephalo shooting position.
- Guide the patient stand upright.
- Adjust the Ear Load to be fit to the patient.



- Align the lower part of eye and upper part of ear of the patient to be parallel to the floor.
- Guide the patient to relax the neck and shoulder and stand in straight posture.
- Adjust the height of Cephalo unit to be fit to the patient using up/down switch on the lift column.
- Fit the Forehead Scale to the forehead point of the patient.
- Once the height adjustment is completed, adjust the Ear Load to be fit to the earhole of the patient.
- Guide the patient close the eyes and have him/her keep this state until the shooting is completed without movement.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready.
- Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.

■ SMV (Submental – Vertex) mode

- Align the patient with the following sequence.
- Fold the Forehead Scale as shown below picture and adjust the Ear Load to secure enough space.



Note

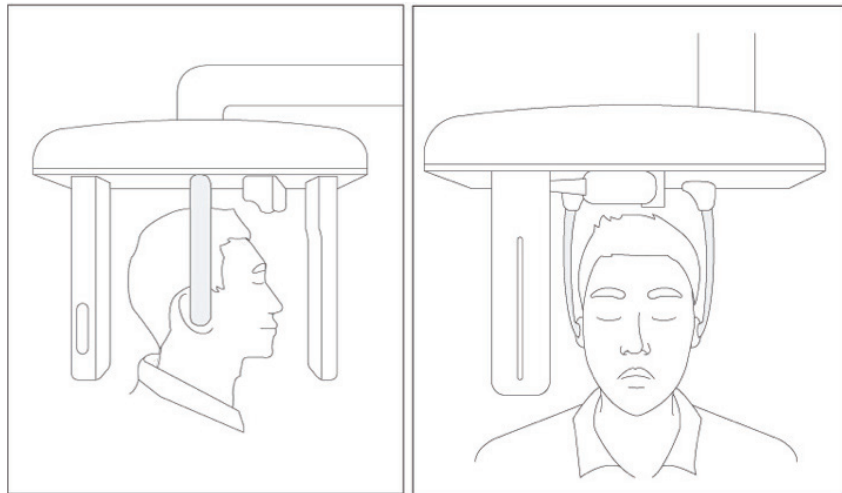
Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and also, follow the instruction for the good quality images.



Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.

- Guide the patient to the Cephalo unit and have him/her face straight to the X-Ray tube.



- Guide the patient to relax the neck and shoulder and stand in straight posture.
- Adjust the height of Cephalo unit to be fit to the patient using up/down switch on the lift column.
- Once the height adjustment is completed, adjust the Ear Load to be fit to the earhole of the patient.
- Let the patient tilt his/her head back and make the Frankfort plane to be vertical to the floor.



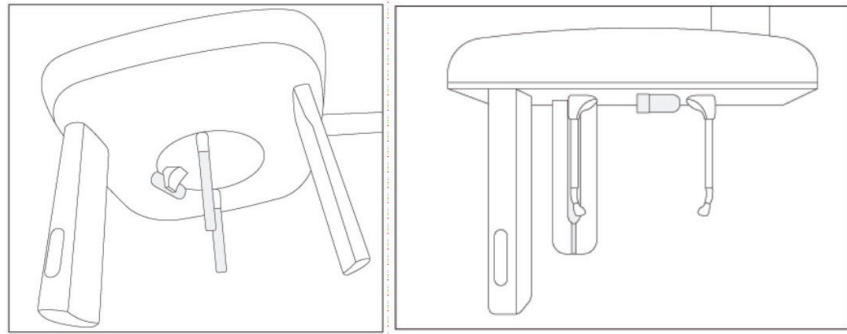
Release the irradiation switch or push emergency switch under the handle frame of the equipment and stop the operation immediately if problem found during the shooting process.

Operator needs to monitor the patient all the time and should be ready to take counter measures immediately in case problem occurred during the process.

- Guide the patient close the eyes and have him/her keep this state until the shooting is completed without movement.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready.
- Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room

■ Water' s View mode

- Align the patient with the following sequence.
- Fold the Forehead Scale as shown below picture and adjust the Ear Load to secure enough space.



Note

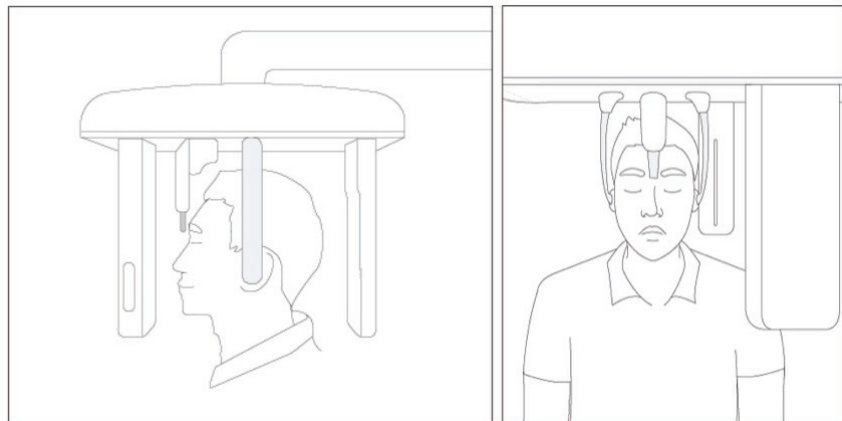
Patient's position alignment affects the image quality significantly. Therefore, please read the following procedure & guideline and also, follow the instruction for the good quality images.



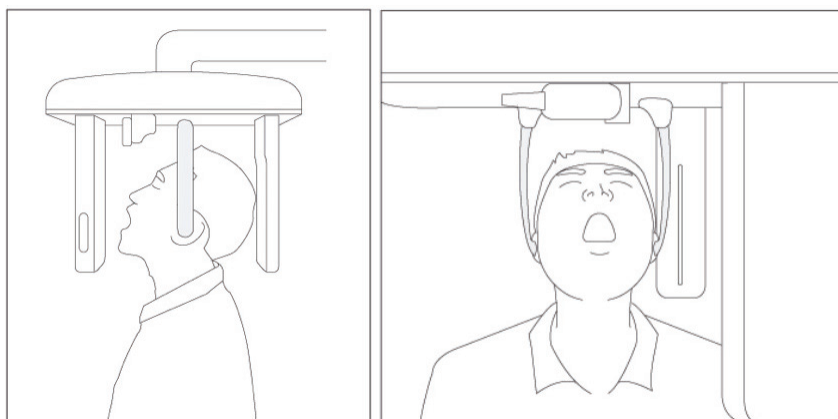
Caution

Patient must remove the metallic accessories (such as glasses, ear rings, hair pins, oral instruments etc.) before taking an X-Ray. Metallic objects make artifacts on the images and degrade the quality of the image.

- Guide the patient to the Cephalo unit and have him/her face straight to the X-Ray tube.



- Guide the patient to relax the neck and shoulder and stand in straight posture.
- Adjust the height of Cephalo unit to be fit to the patient using up/down switch on the lift column.
- Once the height adjustment is completed, adjust the Ear Load to be fit to the earhole of the patient.
- Let the patient tilt his/her head back and make the Frankfort plane to be 45° to the floor.



Caution

Release the irradiation switch or push emergency switch under the handle frame of the equipment and stop the operation immediately if problem found during the shooting process.

Operator needs to monitor the patient all the time and should be ready to take counter measures immediately in case problem occurred during the process.

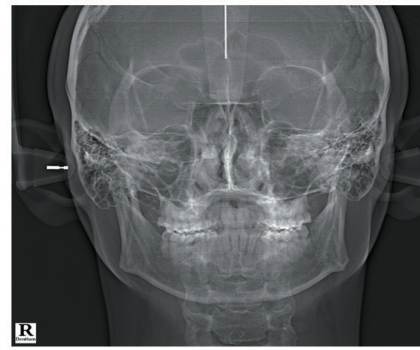
- Guide the patient close the eyes and let him/her do not move until the shooting is completed.
- Perform the shooting process in the condition that operator can communicate with the patient verbally or visually.
- Equipment will move to the shooting position if you push READY button on the right bottom of the shooting screen.
- Green lamp will be turned on once the movement is completed, which means that X-Ray irradiation process is ready. Push and hold the shooting button until the shooting process is completed. Shooting process will be terminated if you release this button in the middle of the process.
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting is completed.
- Once the shooting process is completed, lead the patient to the outside of the shielded room.

5.6.4. Checking up the Cephalo shooting image

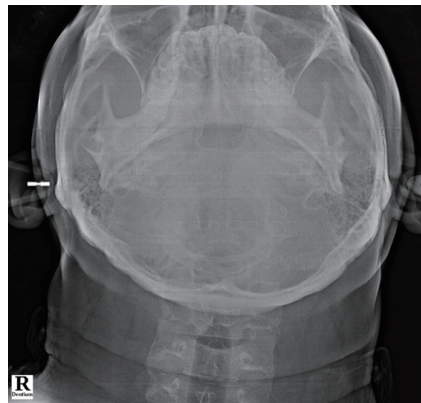
- Shooting image will be reconfigured and saved in rainbow™ Image Viewer. System will display the message asking whether the image will be saved. Push Finish button to save the image and Cancel button to cancel the saving process.
- Shooting image will be save to rainbow™ Image Viewer automatically and the image list will be newly arranged if you click the patient' s name. Most recent name will be located on the far left.
- You can enlarge the image if you double click the most recent one.



Lateral image



Lateral image



SMV image



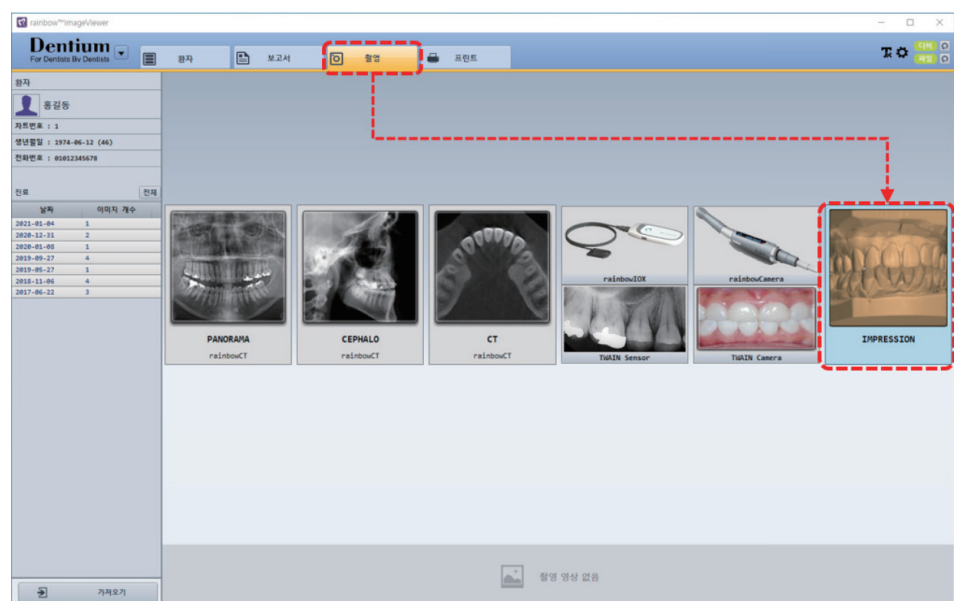
CARPUS image

- Refer to the followings if you want to save the images with brighter or darker condition.
- **Image brightness adjusting function**
- Image brightness will be getting darker if you put the cursor on the panoramic image and push & hold the left button of the mouse and drag it to the left, and it will be brighter if you push & hold the left button and drag it to the right.

5.7. Model shooting

5.7.1. Starting the Model shooting program

- Click the shooting tab from the Tab menu on top of the screen.
- Select IMPRESSION mode to start the Model shooting program



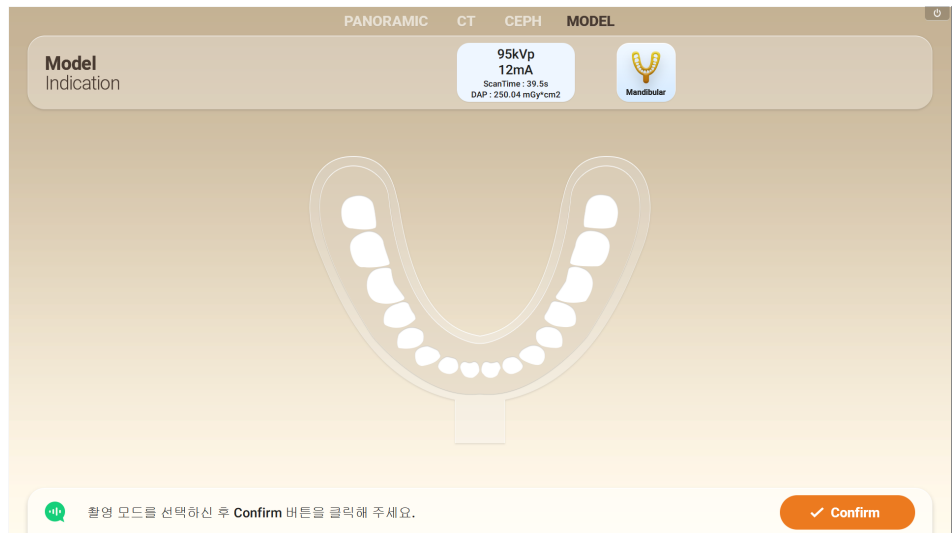


Note

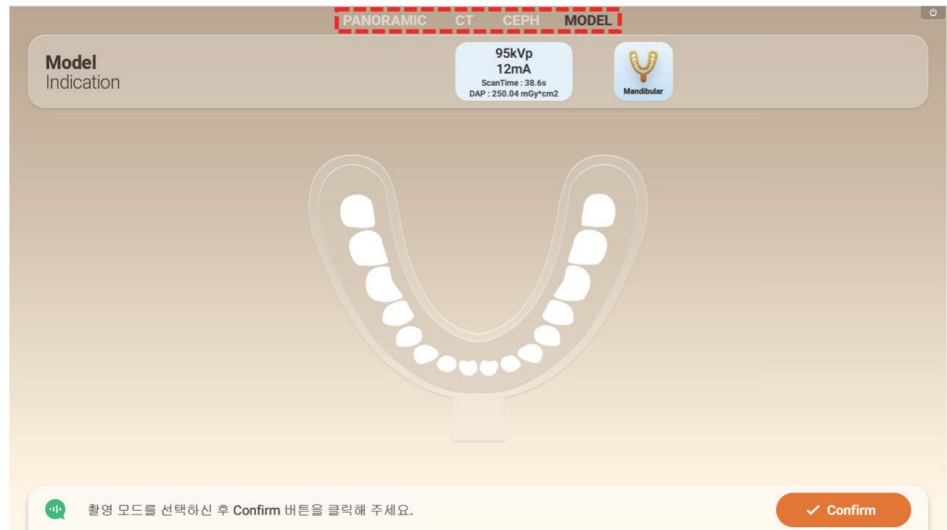
We do not recommend to update the computer OS program.

Before start shooting, verify that the information of the patient displayed on the patient information window on top right side of the shooting program corresponds to the actual patient's name who is taking an X-Ray.

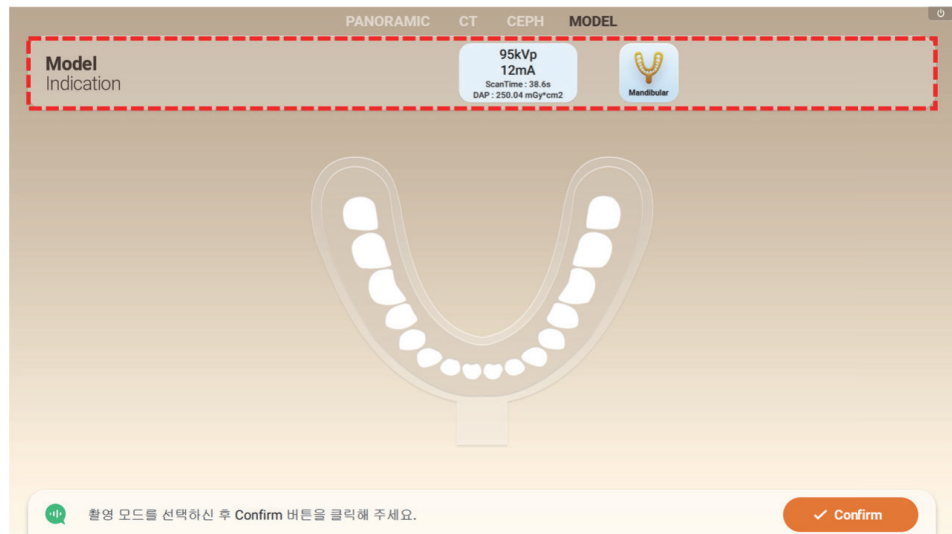
– Below main shooting screen will be displayed.



– You can see Model shooting menu is selected from the Red box.



– Move the mouse on top of the red box on following picture to change the detailed shooting configuration



5.7.2. Shooting configuration (screen for each of the equipment type)



Shooting mode	No	Setup	Description
MODEL	a	Shooting mode selection	- Shooting screen will select Ceph shooting mode automatically if Panoramic is selected from rainbow™ Image Viewer. - You can change to PANORAMIC, CT, MODEL shooting mode manually if required.
	b	Shooting condition selection	X-Ray generator tube voltage & current value will be set automatically depending on the gender, age etc. of the patient. You can change this value with + and - key manually as required to improve the quality of the image.
	c	Diagnosis area selection	- You can change the diagnosis area. - Please refer to the followings to change the area.
	d	Completion of shooting detailed option setup	Choose detailed shooting options and select "CONFIRM" button consecutively.

- Select detailed shooting option from Model (Maxillary, Mandibular, Occlusal)
- Tube voltage and current is set as a default and you can get better and more precise image if you adjust in accordance with the result of the images



You can fine tune the images matching to the patient if you need to adjust the tube voltage and current due to the image quality.

- Push Confirm button and move to Impression Tray arrangement step once all of the shooting configuration is completed.

5.7.3. Impression Tray arrangement and shooting

- Arrange the Impression Tray to be taken the shooting as below image.



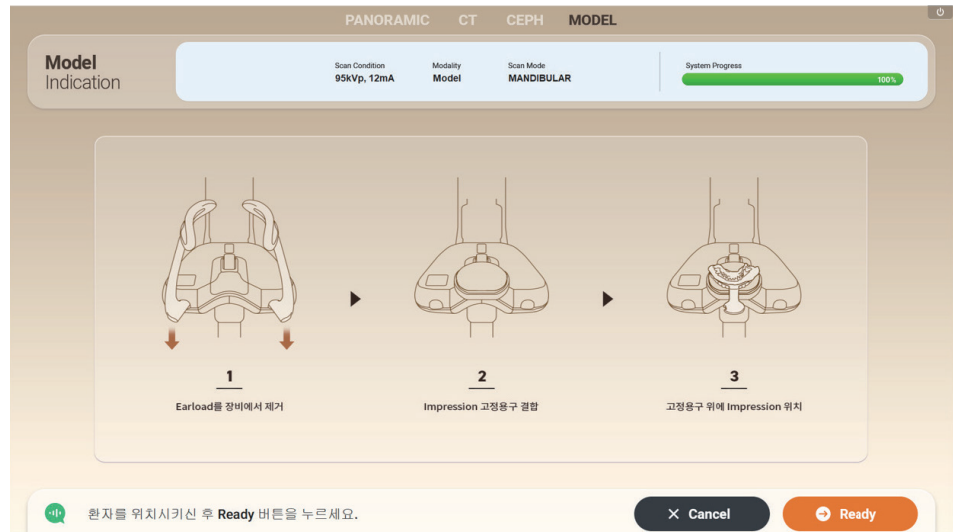
- Mount the Bite as shown in the above picture.
- Mount the Impression Model as shown in the below picture.



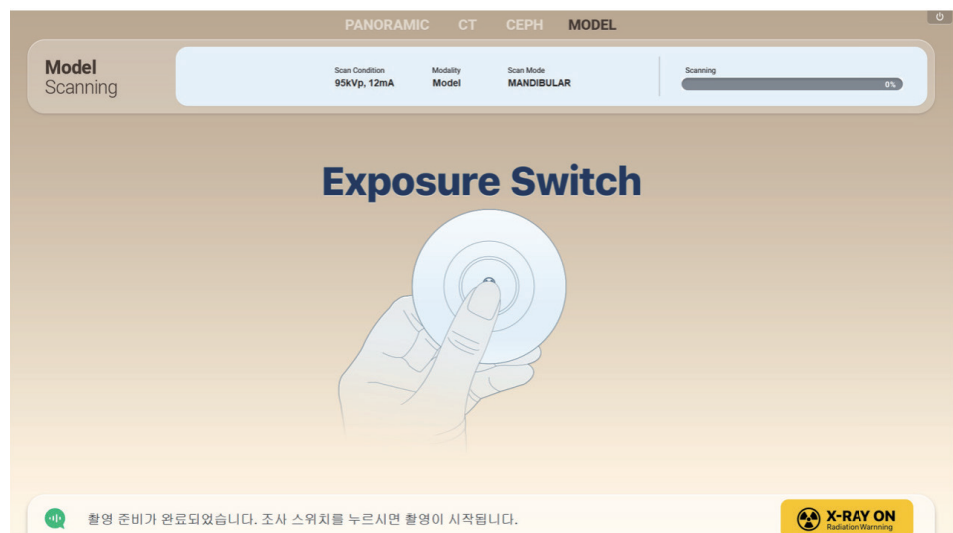
- Be careful not to put any of foreign substances other than the shooting model on the sponge



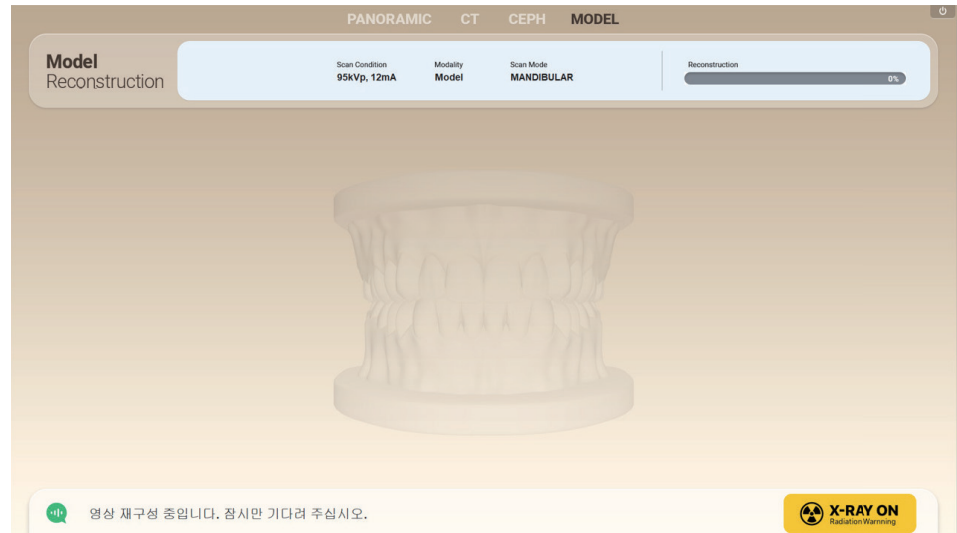
Materials other than plastic cannot be scanned on the Impression Tray. Please use plastic tray only.



- Equipment will move to the shooting position if you push READY button after the model alignment is completed.
- System is ready if the Green lamp on the outside of shield room shooting switch is turned on.



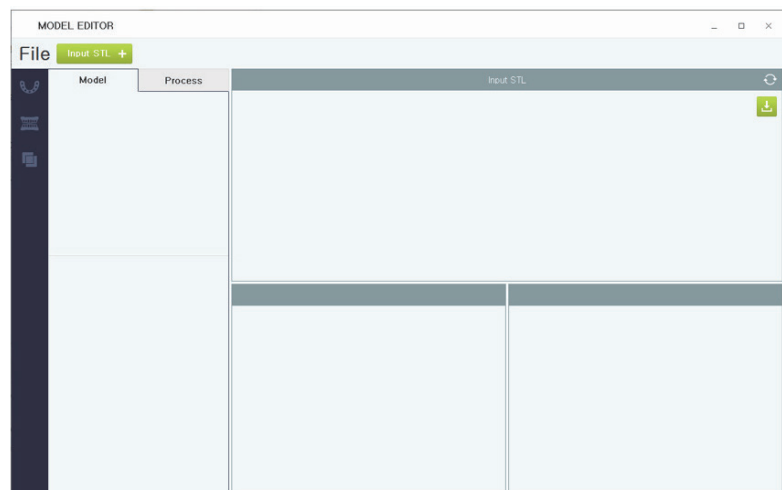
- Shooting process will be started if you push X-Ray Irradiation switch following the instruction on the shooting screen.
- Lamp color will be changed to Orange during the X-Ray irradiation process and it will be turned to Green once the shooting process is completed
- Remove the Model and shooting Jig once the shooting process is completed.
- Below screen will be displayed to reconfigure the image once the shooting process is completed.



- Reconfigured processing status will be displayed as the above picture once the shooting process is completed.
- Reconfigured processing completed DICOM file will be generated in .stl format through Model Builder SW.
- Generated stl file will be converted from intaglio to relief model through auto clamping function and then the dialog whether to save will be displayed on the screen.
- Designate the path and file name and save the file.

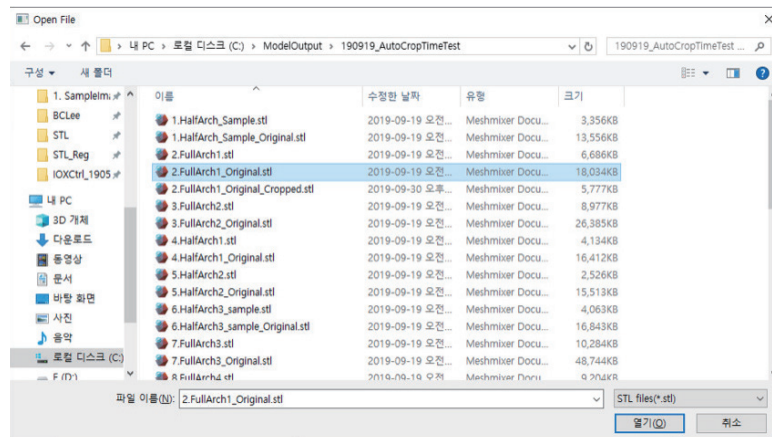
5.7.4. Way to use Model Editor

- Following is the manual model editing function.
- Double click Model Editor  icon on the desktop screen and activate the program.
- Below screen will be displayed.

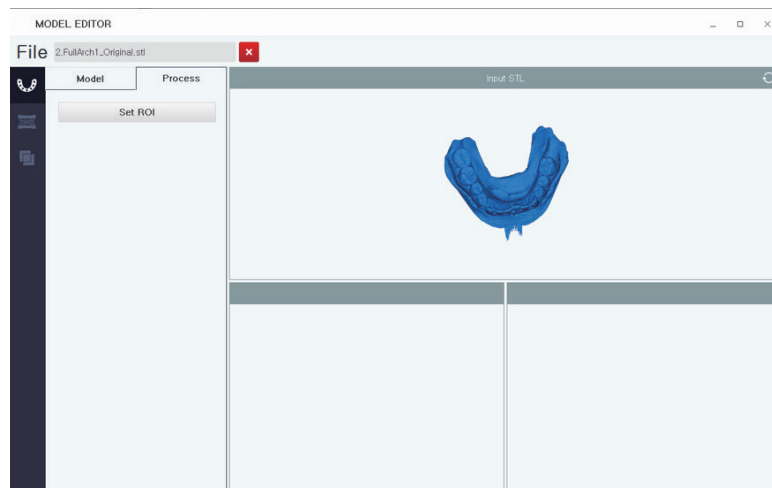


- Click  icon on the top left of the above screen and push green Input STL tab on top of the menu bar.

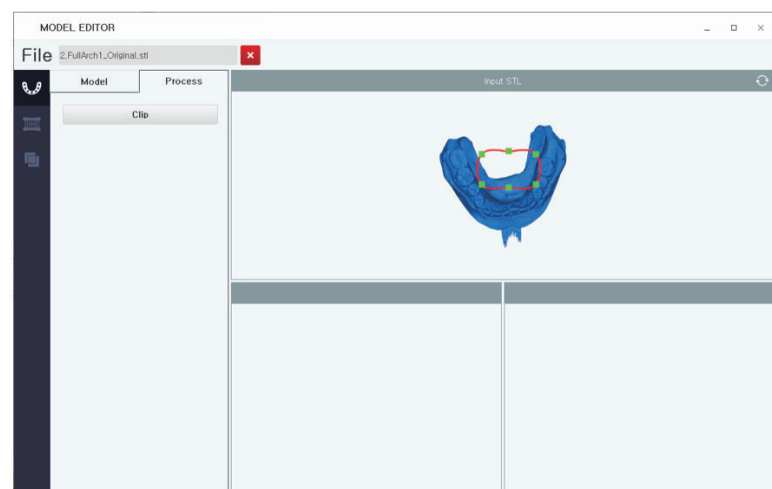
– File open window will be activated if you push the tab.



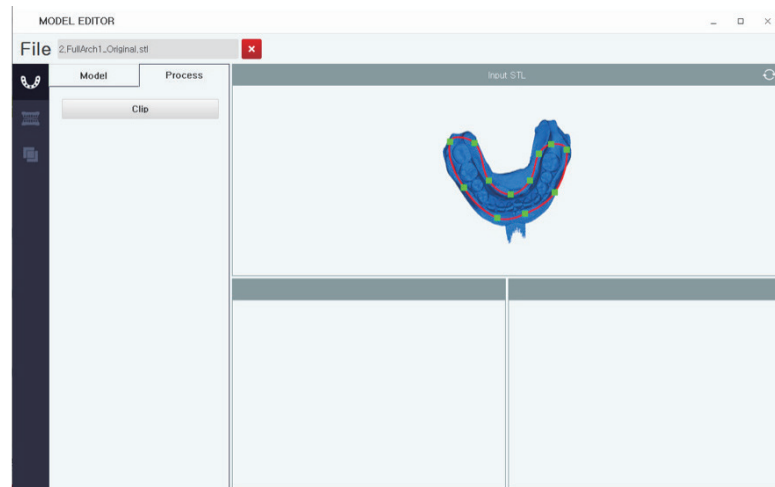
- Select STL file to be edited manually.
- Select the file and push OPEN (O) button.



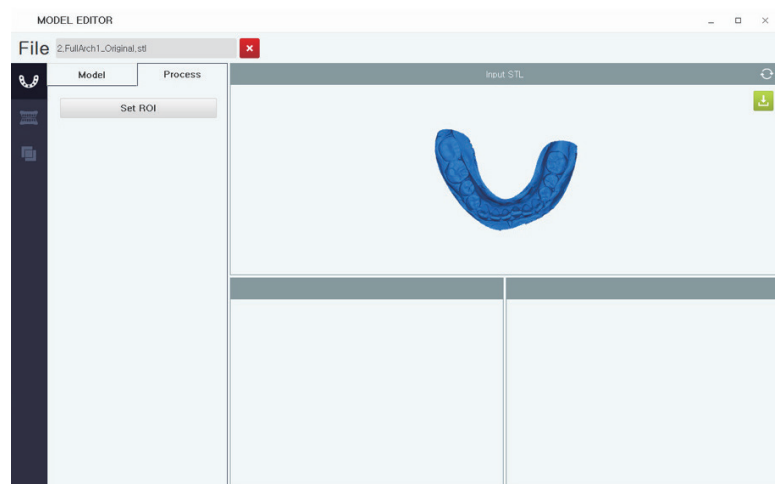
- Select Set ROI icon once the file is open.
- Red edit line will be generated as the picture below.
- Push the left mouse button and move the green point to set the editing area.



– Editing area is selected as below.



– You can cut the image using Clip button and the result will be displayed as below screen.



– You can rotate the image if you put the mouse on the image and also, you can move while clicking and holding the left mouse button. Check if the result is generated in relief model.

– Below is the generated relief model STL file image.



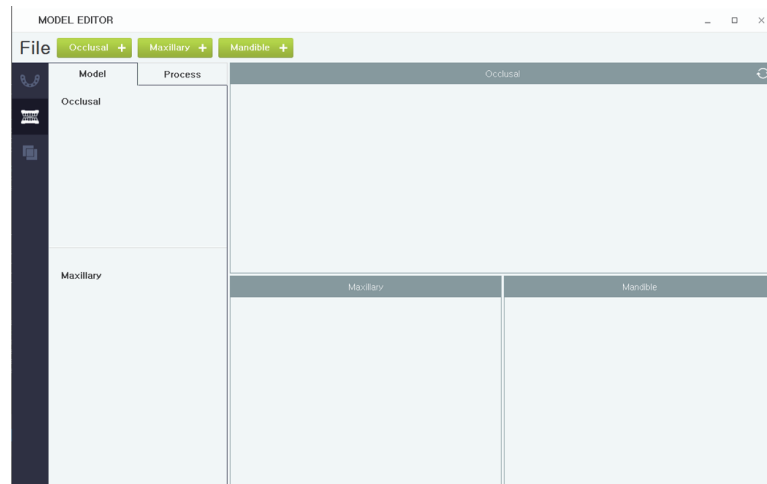
– Push Save  button on top right of the screen and save the file if the generated result is satisfactory.

– Push Reset  button to return the image to the original model and conduct clipping process again if the result is not satisfactory.

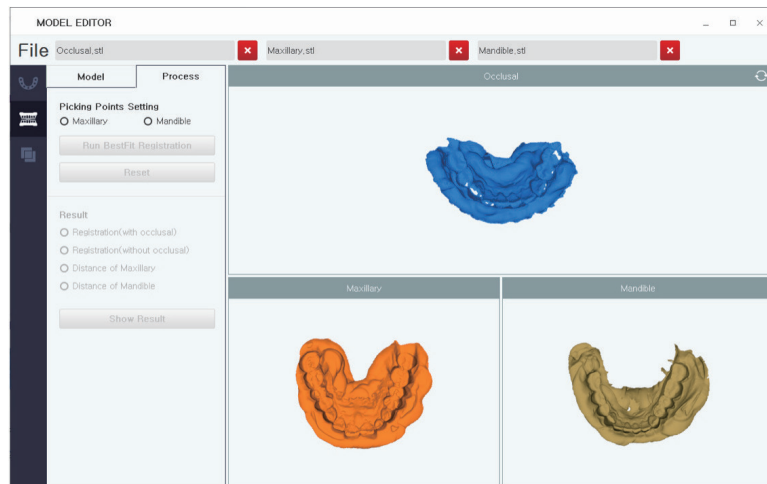
– Return to Set ROI and clip the image additionally if you want to clip more from the result.

5.7.5. Matching function

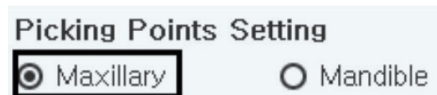
- This is the function to check the position of upper and lower jaw.
- Run Model Editor function.
- Push  tab in the middle of the left menu bar (refer to the following picture).

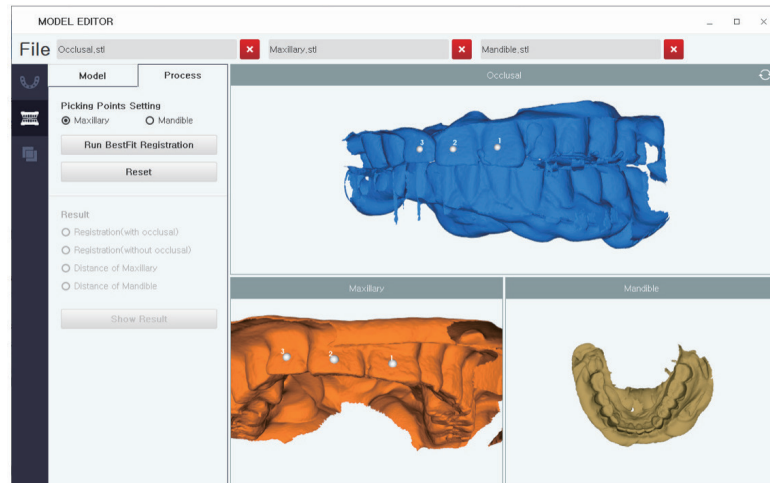


- Click  button and load the occlusion data.
- Click  button and load “upper jaw” data.
- Click  button and load “lower jaw” data.
- Screen will display the followings if you load 3 data.

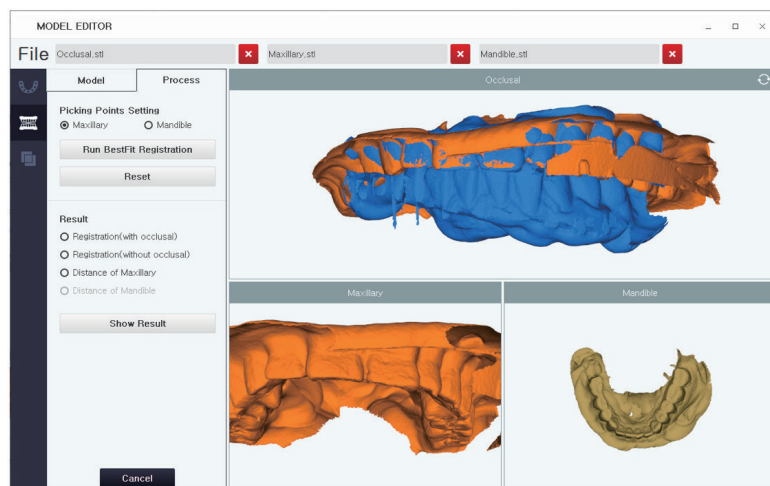


- Select the left top menu as shown below (Maxillary).

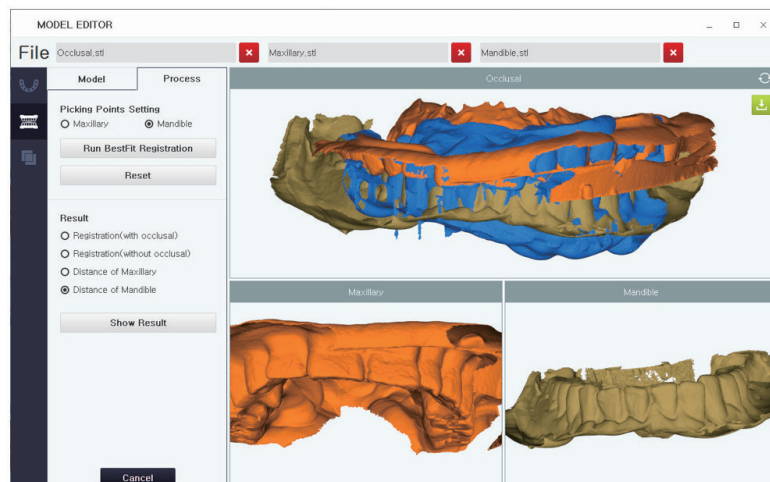




- Once the alignment process is completed, put 3 points using right mouse button as shown in the above picture.
- Once the pointing process is completed, push **Run BestFit Registration** button on top left and execute the matching process.
- Executed image is as follows.



- Repeat above process for the lower jaw as well and conduct the matching process again.
- Below is upper / lower jaw matched image.



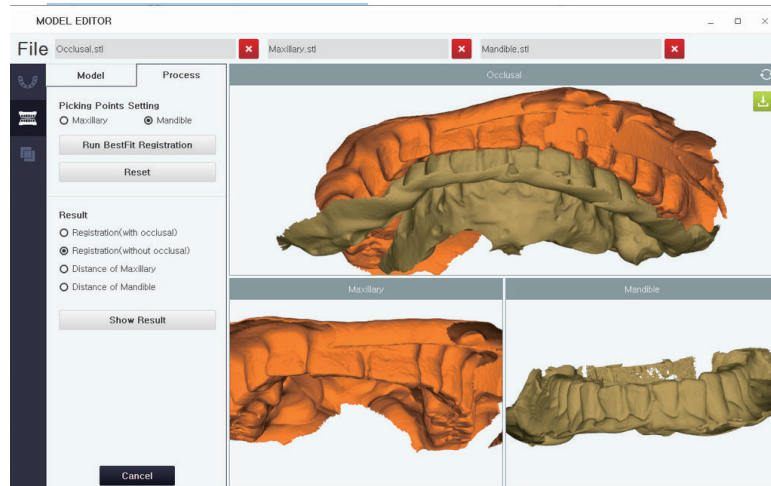
- You can check the models except for the Occlusal to review the matching position.
- Select Registration (without Occlusal) from the Result group.

Result

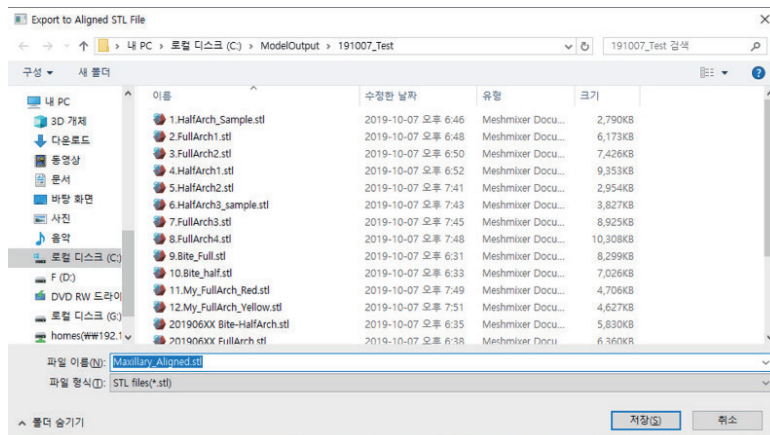
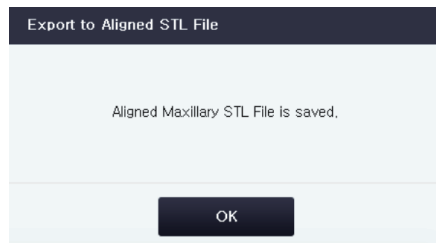
☐ Registration(with occlusal)
☒ Registration(without occlusal)
☐ Distance of Maxillary
☐ Distance of Mandible

Show Result

– Select the left top menu as shown below (Maxillary).

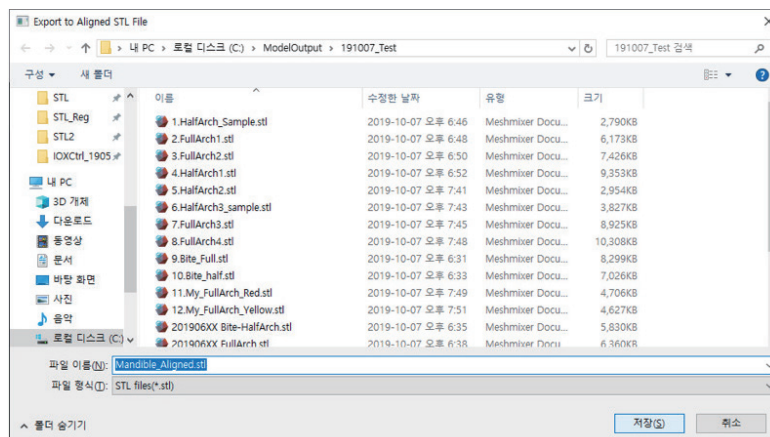
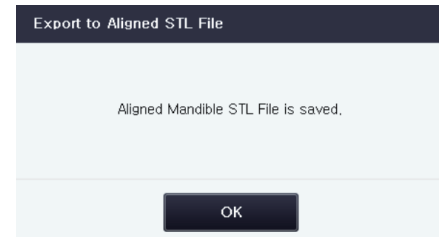


- Push  on the upper right of the screen and save the result of the match,
- Saving process is as below image.
- Saving upper jaw



- Saving the lower jaw

06 Maintenance



6.1. Regular maintenance and handing matters

- Power must be disconnected from the socket to clean the surface of the equipment.
- Rub the surface gently with flat and dry cloth to clean the equipment.
- Avoid slanted place or the place with vibration and shock.
- Do not leave the equipment or components in the wet or humid place.
- Do not put them in the place to be affected by the temperature, ventilation, sunlight, dust, salt etc.
- Do not pull the power plug forcibly. It can be the cause of mal-function and electric shock.
- Do not leave them near the chemical or gas storage place.

6.2. Checkup points during regular maintenance

- Equipment and configuring components need to be maintained in original state.
- Check if equipment can be operated without problem in case it is not used for extended period of time.
- Equipment should be inspected by the qualified specialist only.
- Check if the rated power consumption and voltage is used for the equipment.
- Check if the equipment is well grounded on the floor.

6.3. General maintenance

- Stop the operation of the equipment immediately and check the problem precisely if any problem found during the operation of the equipment.
- Please call for a help to the manufacturer if mal-operation found.

■ General cleaning

- Use alcohol based cleaning agent for the components to be contacted with the patient such as Chin Rest, Bite Block etc.

■ Cleaning method

- Spray alcohol based cleaning agent on the clean cloth and wipe gently instead of applying excessive force and be careful not to use sharp objects.

■ Cautions when cleaning

- Disconnect the power when cleaning the electronic components.
- Do not use compressed air or liquid.
- Be careful not to allow liquid or foreign substances to be penetrated inside of the equipment.
- Do not apply excessive force on the product as it can be the cause of malfunction.
- Do not disassemble the product arbitrarily (arbitrary disassembly may limit the free warranty).
- Turn off the power immediately if plenty of water or liquid penetrated inside of the equipment and ask for the help to the Dentium customer service center.
- Do not use aerosol or spray type cleaning agent. They can be the cause of fire and malfunction.

6.4. Warranty and services

6.4.1. Free warranty period

- Free warranty period would be 5 years after installation.

6.4.2. Cases that free warranty cannot be provided

- In case user disassembles, repairs, modifies the equipment arbitrarily.
- Product damages and accidents caused by the mistake of customer.
- For the case of natural disasters (falling of thunderbolt, fire, earthquake, storm and floor).
- If malfunction is caused by the components or expendables that the manufacturer does not guarantee the quality.



Caution

Do not modify the equipment without approval of the manufacturer as it can be the cause of injury and damages of the equipment if failed to follow.

6.5. Emergency treatment measures in case of equipment failure

- Please read the followings and take appropriate measures if malfunction found during the use of equipment.
- Please contact with adjacent sales office or customer service center if same problem repeats or the problem cannot be solved after taking the counter measure.



Caution

Please contact with adjacent sales office or customer service center if same problem repeats or the problem cannot be solved after taking the counter measure.

6.5.1. When the equipment does not operate

Symptoms	Countermeasures
Failed to turn on the equipment	Check if the power plug is connected to the socket correctly. Check if the power switch is turned on Check if the Emergency switch is pushed.
If mal-operation occurred	Turn off the power of the equipment and start again Turn off the power of the PC and start again.

6.5.2. When the laser beam is turned off and difficult to align the patient

Adjusting switch	Countermeasures
When control switch module laser button does not operate	Push the laser switch and perform the patient alignment. Turn off the power of the equipment and reboot again.
If same problem persists, please contact with adjacent service center.	

6.5.3. Equipment initialization problem

Symptoms	Countermeasures
Equipment initialization error	Turn off the power of the equipment and start again and check if it operates correctly. If same problem persists, please contact with adjacent service center.

6.5.4. Irradiation switch operation problem

Symptoms	Countermeasures
Irradiation error	Check if the shooting switch lamp turned on Green. Check if the Shooting Program Confirm button is pushed when the lamp is not turned on Green.
If same problem persists, please contact with adjacent service center.	

6.5.5. When lift column operation failure

Symptoms	Countermeasures
If the equipment operates even when the switch is not pushed.	Check if the switch is pushed.
If the equipment does not operates even when the switch is pushed.	Check if the connector of the equipment is connected correctly.
If same problem persists, please contact with adjacent service center.	

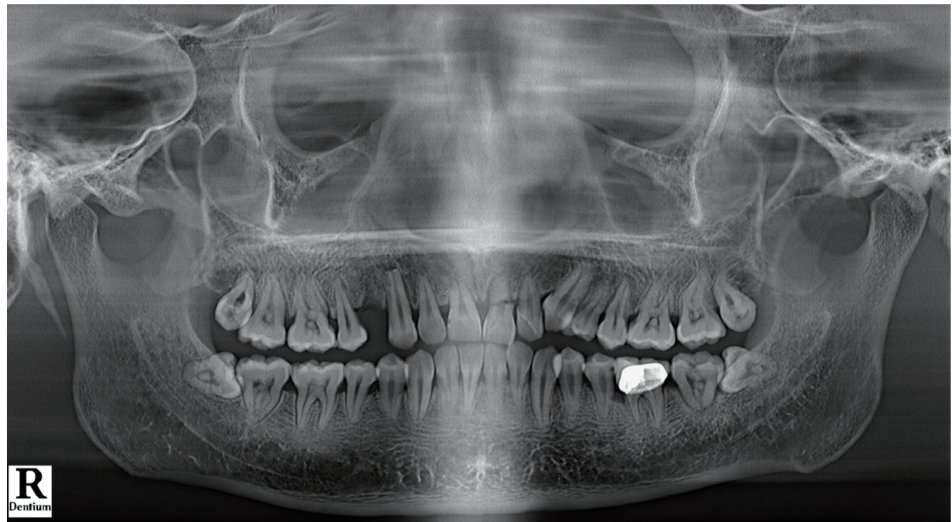


Warning

Do not change the installed product arbitrarily.
Appropriate test and inspection need to be followed for the safe use in case there was any modification with the equipment.

6.5.6. Guides for the positioning error of the patient

- Normal image



- Canine beam adjustment guide.



Canine is positioned center
which is normal

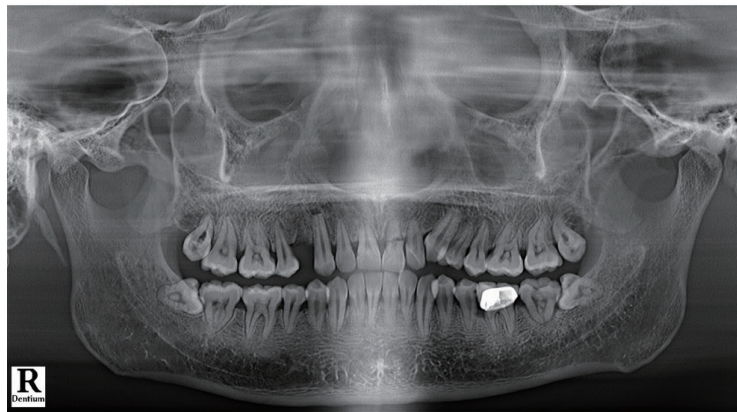


Canine beam adjustment error (front)

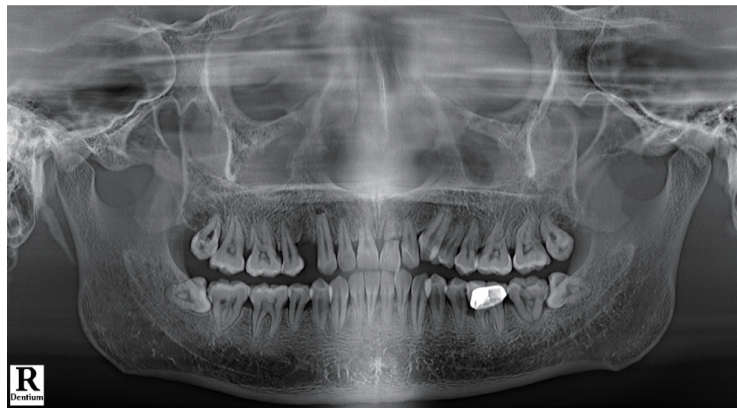


Canine beam adjustment error
(back)

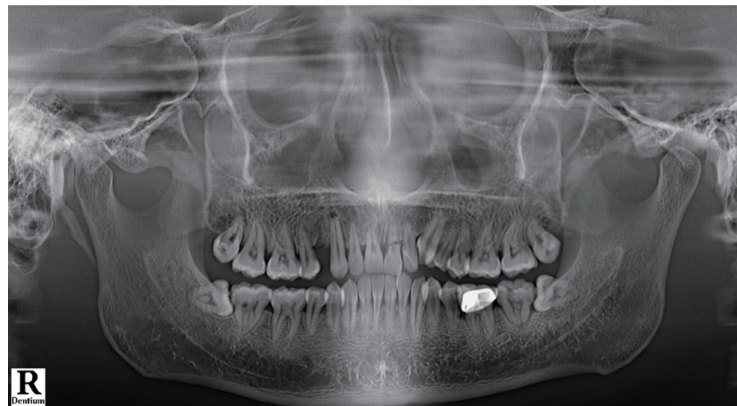
- Canine beam adjustment error (front)
- Phenomenon: Panoramic image is gathering together to the center of the image and the teeth overlapping image distortion phenomenon occurs
- If the image is set 3mm front of the center of canine tooth



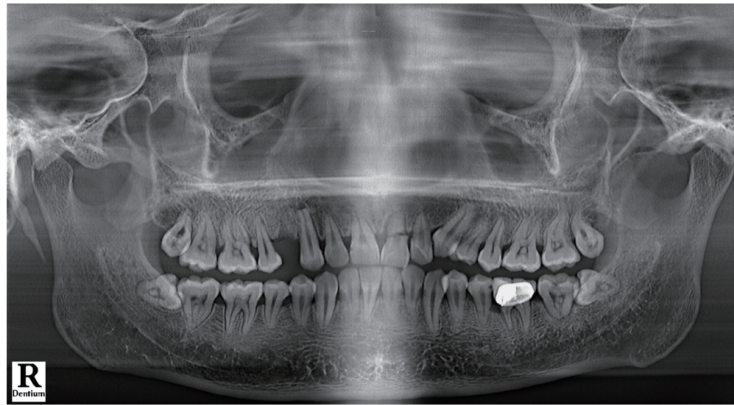
– If the image is set 6mm front of the center of canine tooth



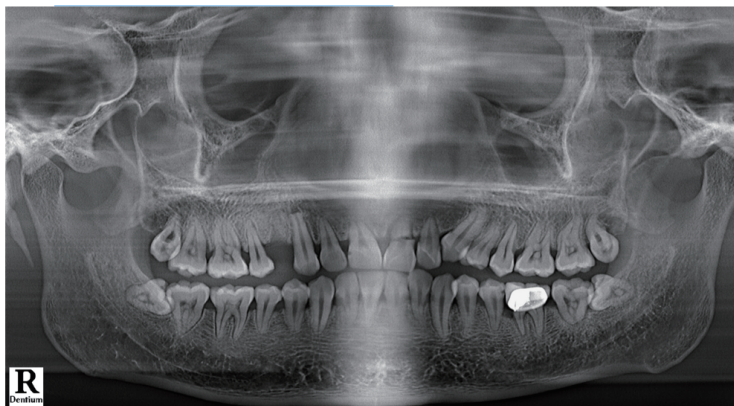
– If the image is set 12mm front of the center of canine tooth



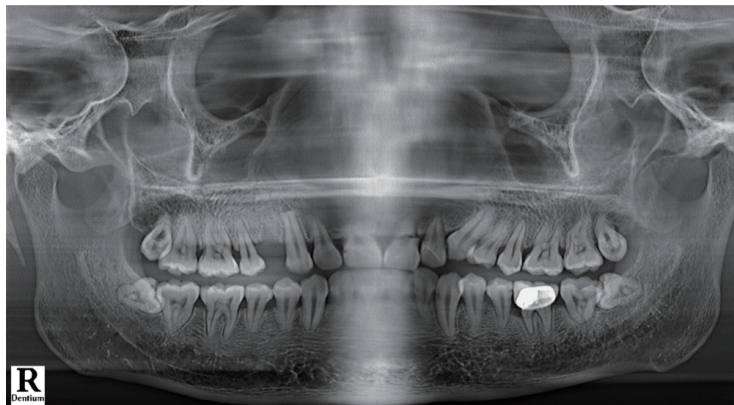
- Image quality when setting the laser beam to be backside of the center of the canine tooth during the alignment of patient.
- Phenomenon: Front teeth image quality deterioration and the image distortion phenomenon occurs such that image is stretched to the side.
- If the image is set 3mm back of the center of canine tooth



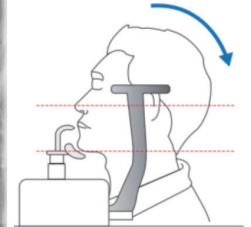
– If the image is set 6mm back of the center of canine tooth



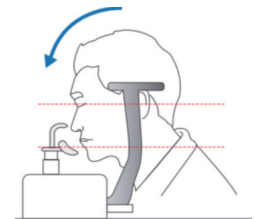
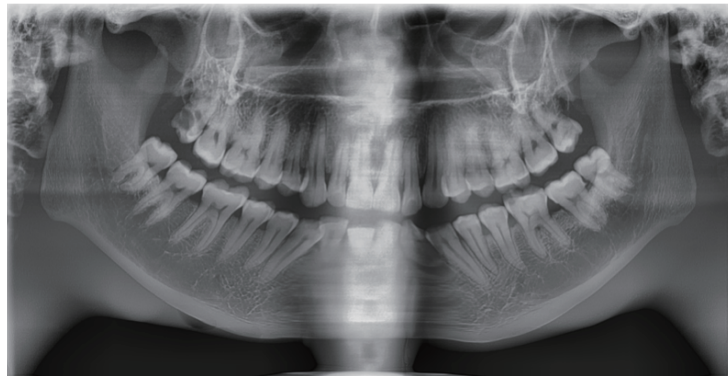
– If the image is set 9mm back of the center of canine tooth



- Cause: Image when the patient raises his/her head during the patient alignment
- Phenomenon: Arrangement of the teeth on the image has reverse smile shape and image distortion.



- Cause: Image when the patient lowers his/her head during the patient alignment
- Phenomenon: Arrangement of the teeth on the image has excessive smile shape and image distortion.



07

Technical information

7.1. General equipment specification

Item	Details
Shooting available mode	Panoramic, CT, Ceph, Model
X-Ray beam	Cone Beam
Image reconfiguration algorithm	Cone Beam image reconfiguration algorithm
Dynamic range	14 bits

Item	Details
Patient's posture	Erect posture, chair
X-Ray irradiation type	Continuous mode (Panoramic, Cephalo), Pulse mode (CT, Model)
Rotating glancing angle	Continuous mode (Panoramic, Cephalo), Pulse mode (CT, Model)
Number of patient alignment laser beam	4 (2 horizontal, 1 vertical, 1 canine teeth)
Reconfiguration time (based on standard mode)	LOCAL within 30 seconds, NORMAL within 1 minute, STITCHING within 2,5 minutes
Focal spot size	0.5mm x 0.5mm

7.2. CT FOV size

Item	FOV SIZE (Cm)
LOCAL	5X5 ~ 10 X 9,5
STANDARD	12 X 9,5
WIDE	17,5 X 9,5
SINUS	10 X 9,5
TMJ LEFT	5 X 9,5
X-Ray beam	Cone Beam
TMJ RIGHT	5 X 9,5
STITCHING	17,5 X 15

7.3. Cephalo FOV size

Item	FOV SIZE (Cm)
Lateral	28,0 X 29,0
PA	24,0 X 29,0
SMV	24,0 X 29,0
Water' s View	24,0 X 29,0
Carpus	24,0 X 29,0

7.4. Shooting time

Item	Shooting time (sec)	
Panoramic	Standard (Full, Incisor, Bitewing)	Adult : 11.8, Child : 10.74
	Sinus	8.4
	Tmj	Adult : 5.4, Child : 4.8
CT	Local	1Tile : Fast : 6.7 , Normal : 13.4, High : 20 2Tile : Fast : 10 , Normal : 15, High : 20
	Standard	1Tile : Fast : 6.7 , Normal : 13.4, High : 20 2Tile : Fast : 10 , Normal : 15, High : 20
	Wide	Fast : 10 , Normal : 15, High : 20
	Sinus	1Tile : Fast : 6.7 , Normal : 13.4, High : 20 2Tile : Fast : 10 , Normal : 15, High : 20
	Tmj Left, Tmj Right	1Tile : Fast : 6.7 , Normal : 13.4, High : 20 2Tile : Fast : 10 , Normal : 15, High : 20
	Stitching	Fast : 20 , Normal : 30, High : 40
Cephalo	Lateral	6
	PA	5.2
	SMV	5.2
	Water's View	5.2
	Carpus	5.2
Modeling	39.5	

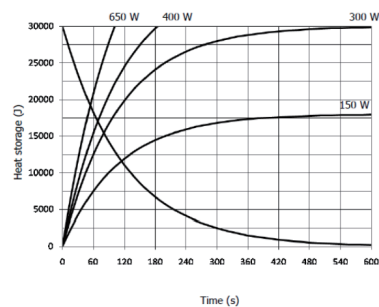
7.5. Electrical specification and operation environment

Item	Specification	Others
Input voltage	100V-230V~,50/60Hz	
Power consumption	2.0kVA	
Tube voltage range	60kV~100kV	
Tube current range	4~12mA	
Protection circuit	Over Current, Over Voltage	
INV FREQUENCY	80 kHz	
Communication method	Optical communication, RS-232 communication	
Environment	Operation condition Temperature: +10°C ~ +35°C, Humidity: 20% ~ 75%	
	Storage condition Temperature: -10°C ~ +50°C Humidity: 20% ~ 75%, Non-condensing Store the equipment on the flat surface.	
FDD (Focal spot to Detector Distance)	CT : 600mm	
	PANO : 600mm	
	Cephalo : 1,745mm	
FOD (Focal spot to Object Distance)	CT : 393mm	
	PANO : 443mm	
	Cephalo : 1,525mm	
Image magnification	CT : 1.526 : 1	
	PANO : 1.354 : 1	
	Cephalo : 1.14 : 1	
Added filter	2mm Al	

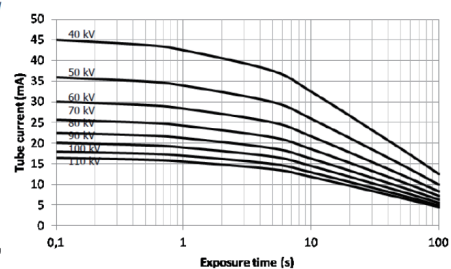
X-Ray tube specification

Factors	Factors
Maximum tube voltage(kV)	100 kV
Maximum tube Current(mA)	22 mA
Anode heat storage capacity	30 kJ
Max. anode heat consumption	300W

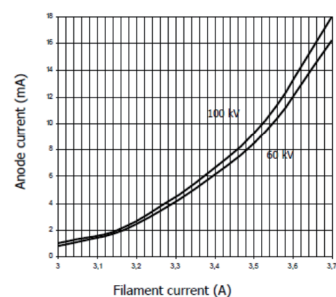
THERMAL CURVES



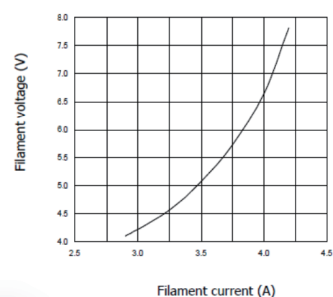
RATING CHARTS DC



EMISSION CHARACTERISTICS DC



FILAMENT CHARACTERISTICS



7.6. X-Ray detector specification

7.6.1. CT & Pano Detector specification (X-ray imaging detector)

Product	DTX1512	DTX1524	DTX2906 (Ceph)	[unit]
Pixel size	100 x 100	100 x 100	100 x 100	um
Active area	145 x 112	145 x 224	2900 x 60	mm
Pixel of number	1,450 x 1,120	1,450 x 2,242	2,900 x 60	EA
Digital output	14	14	14	bit
Interface	Optical	Optical	Optical	

7.7. Recommended pc and monitor specifications

Item	Specification	Remarks
CPU	Intel core i3 3.0Ghz	
RAM	16GB	
HDD	2TB	
Graphic card	NVIDIA GeForce GTX1660 6GB	
OS	WINDOWS 10 64BIT	
Serial Port	RS232 port	Communication between equipment and PC
Monitor	22" LED Resolution 1920 x 1080	

08

Standard application

8. Standard application

This equipment is designed and manufactured complying with the following standards.
EN 60601-1, EN 60601-1-3, EN 60601-2-28, EN 60601-2-32
EN 60601-1-2, EN61000-3-2, EN61000-3-3, EN ISO 9001, EN ISO13485

09

Electromagnetic compatibility

- Product name: bright CT
- Item: Components and accessories, Electromagnetic emission, Radio interference resistance, protection distance



Note

bright CT satisfies the Electromagnetic compatibility (EMC) conditions in accordance with the requirements of IEC60601-1-2.

bright CT will be called “machine” hereafter.

We guaranty the safe operation of the machine based on the EMC standard if you complying with the following requirements.

9.1. Important components

Control cable	Supplier	
Connects the peripheral to PC	Dentium	
EXPOSURE CABLE 10M	Dentium	
Optical CABLE 10M	Dentium	
RS232 CABLE 10M	Dentium	

In order for the proper operation, all of the components, accessories and spare parts authorized by Dentium must be used only. Emission amount will be increased or radio interference resistance will be reduced if not authorized components or spare parts are used.

Do not operate this machine besides the others. Please monitor the machine to see if the desired operation is properly performed if the machine needs to be used beside the others inevitably.

9.2. Electromagnetic emission

This machine is designed to be operated under the following electromagnetic environment. Customer or user of this machine needs to check if the machine is properly operated under this environment.

HF emission based on CISPR 11	Group 1	This machine uses HF energy for the internal functions only. Therefore, HF emission amount is very insignificant and the machines around hardly get interfered.
HF emission based on CISPR 11	Class B Class A	This machine can be used inside of the facilities that is directly connected to the public power to be supplied to the buildings for the residential purposes including residential area.
Harmonic wave based on IEC 61000-3-2		
Power fluctuation & flicker based on IEC 61000-3-3	Comply	

9.3. Radio interference resistance

This machine is designed complying with IEC 60601-1-2 standard.

This machine is manufactured to be operated under the following electromagnetic environment. Customer or user needs to check if the machine is being operated under this environment

9.3. Radio interference resistance

This machine is designed complying with IEC 60601-1-2 standard.

This machine is manufactured to be operated under the following electromagnetic environment. Customer or user needs to check if the machine is being operated under this environment

Radio interference resistance inspection	IEC60601-1-1-2 test level	Standard level to be complied	Electromagnetic environment guideline
Electrostatic discharge based on IEC 61000-4-2 (ESD)	6kV direct contact electric discharge 8 kV air gap electric discharge	6kV direct contact electric discharge 8 kV air gap electric discharge	Floor should be made with wood, cement or ceramic tile. For chemical synthetic materials floor, Relative Humidity should be at least 30%.
Fast transitional electrical disturbance / burst based on IEC 61000-4-4	For kV in/output line For 2 kV power line	For kV in/output line For 2 kV power line	Supplying power should be suitable for the general business place or hospital environment.
Surge voltage based on IEC 61000-4-5	1kV Pushpull Voltage 2Kv Pushpull Voltage	1kV Pushpull Voltage 2Kv Pushpull Voltage	Supplying power should be suitable for the general business place or hospital environment.
Supplying voltage drop, instantaneous interruption and fluctuation based on IEC 61000-4-11	<5% Ut (for 1/2 period) (> 95% of UT decline) 40% UT (for 5 times of period) (60% of UT decline) 70% UT (for 25 times period) (30% of UT decline) <5% UT (for 5 sec) (> 95% of UT decline)	<5% Ut (for 1/2 period) (> 95% of UT decline) 40% UT (for 5 times of period) (60% of UT decline) 70% UT (for 25 times period) (30% of UT decline) <5% UT (for 5 sec) (> 95% of UT decline)	Supplying power should be suitable for the general business place or hospital environment. We recommend to prepare Uninterruptable Power Supply or battery to operate the machine even in the power failure situation.
Magnetic field of the supplying frequency (50/60Hz) based on IEC 61000-4-8	3 A/m	3 A/m	Magnetic field of power frequency should be matched to the value being generally used in business place or hospital environment.

Reference: UT is the AC power before use the test level.

Radio interference resistance inspection	IEC60601-1-1-2 test level	Standard level to be complied	Electromagnetic environment guideline
Induced HF disturbance IEC 61000-4-6 Induced HF disturbance IEC 61000-4-3	3Veff 150 kHz ~ 80 MHz 3V/m 80MHz ~ 800MHz 3V/m 800MHz ~ 2,5GHz	3Veff 3Veff 3Veff	Do not use portable and mobile wireless devices within the places where the distance between the machine including cable is shorter than the recommended protection distance. Recommended protection distance can be calculated using the equation suitable for the transmitting frequency. Recommended protection distance: $d = [1, 2] P$ $d = [1, 2] P$ for 80MHz ~ 800MHz, $d = [2, 3] P$ for 800MHz ~ 2.5GHz, where, P is the rated output based on the data of the transmitter manufacturer (unit: W) and d is recommended protection distance (unit: m) Intensity of magnetic field of fixed type radio transmitter should be less than the standard complied level in all frequencies even though it is different by each of the site. There is a possibility of disturbance in the environment of the machine where the following symbol is attached. 

- Higher frequency range should be applied to 80MHz and higher than 800MHz frequencies.
- For instance, theoretical point of view, intensity of magnetic field of mobile phone and mobile service base station, amateur radio, AM & FM radio, television etc. cannot be decided precisely. Therefore, we recommend to investigate the corresponding location to decide the magnetic field environment of fixed type HF transmitter. Machine needs to be monitored if it is being operated without problem in all of the used location if decided intensity of magnetic field of the machine in its installed place exceeds above regulated level. You may need to take additional measures such as, for instance, change the direction of the machine or change the installation
- Intensity of magnetic field should be lower than 3V/m if frequency range exceeds 150kHz~80MHz.

10

Precautions for installation

9.4. Protection distance

- Recommended protection distance between portable & mobile HF communication device and this machine.
- This machine is designed to be operated in the discharged HF disturbance controlling electromagnetic environment.
- As described below, customers or users of this machine can prevent electromagnetic disturbance by maintaining the minimum distance between the portable & mobile HF communication device (transmitter) and this machine.

Rated output of transmitter (W)	Protection distance based on the frequency of the transmitter (m)		
	150kHz to 80MHz $d = 1,2\sqrt{P}$	80MHz to 800MHz $d = 1,2\sqrt{P}$	800MHz to 2.5GHz $d = 2,3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

- For the transmitters that the rated output is not specified on the above table, recommended protection distance (unit: m) can be decided by using corresponding equation on each row of the table. Where, P is the max. rated output (unit: W) based on the data of the transmitter manufacturer.

■ Reference 1

- Higher frequency range should be applied to 80MHz and higher than 800MHz frequencies.

■ Reference 2

- This guideline cannot be applied to all of the cases.
- Electromagnetic wave can be affected by the absorption and reflection of the buildings, objects and people around the machine.

10.1. Installation place

Install the equipment on a flat surface and also you need to secure enough space. It can be the cause of damages of the property or injury if the equipment is not operated in stable condition



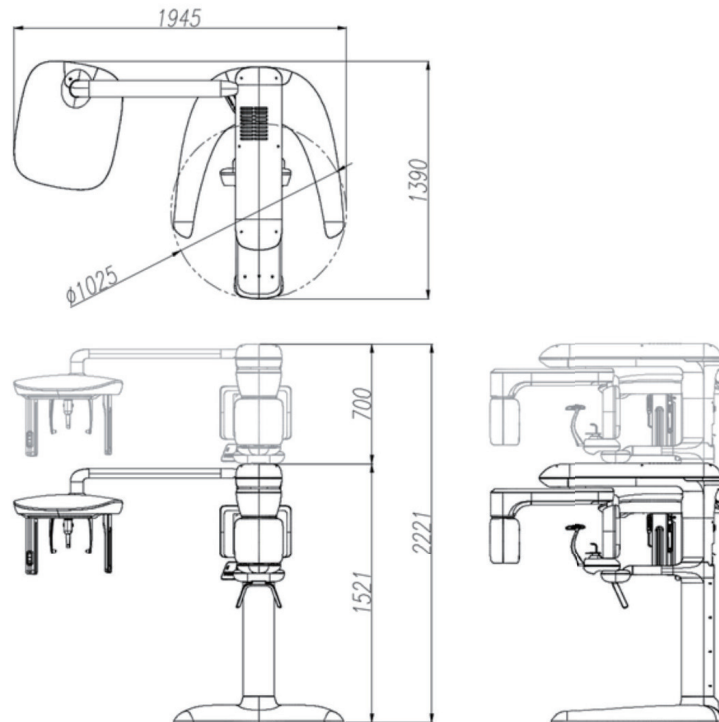
Caution

This equipment must be installed by qualified professional service engineer.

Dimension
(W x D x H mm)

This equipment must be installed by qualified professional service engineer.

- Configuration of the equipment and dimension (size of the equipment)



10.2. Power cable connecting method

Install the equipment on a flat surface and also you need to secure enough space.
It can be the cause of damages of the property or injury if the equipment is not operated in stable condition



-
- Connecting the main cable
 - A: Main Power switch
 - B: Power shut down switch (EMERGENCY switch)
 - C: AC power cable
 - D: PC image output cable (OPTICAL cable)
 - E: RS232 cable / EXPOSURE cable

This system does not provide power cable separately. Power cable needs to satisfy following conditions.

- Equipment cover should be removed by the qualified and authorized person in charge of service.
- System needs line conductor, neutral point and protective grounding conductor included 3 lines (14AWG) single phased AC power. We recommend to install exclusive power line that is connected to at least 15A of rated circuit breaker.
- Wiring needs to provide permanently grounded power line configuration.
- Line code needs to be installed to the system properly.
- Person in charge of installation must verify if the equipment is grounded correctly and the rating is satisfied.
- This equipment must be used in the spaces that can satisfy the related laws and recommendations for the electric safety and radiation to be suitable for the medical purposes. For instance, IEC for additional protective grounding regulation, America National Electric Code, VDE power connection (grounding) terminal etc.
- Line resistance: In order to satisfy the function requirements of dental X-Ray system, power line resistance must not exceed 0.4Ω of rated line voltage



Caution

In order to prevent the danger of electric shock, this equipment needs to be connected to the protective ground terminal.

Caution: Operator must not contact with any of SIP / SOP (ex: USB connector). All of the equipment to be connected to medical electric device must comply with IEC or ISO standard (data processing equipment, for instance, IEC 60950).

N

For permanently installed equipment, input power neutral connection point should be marked as the picture.



Note

Manufacturer has the right to revise this manual without prior notice to the customer.



Caution

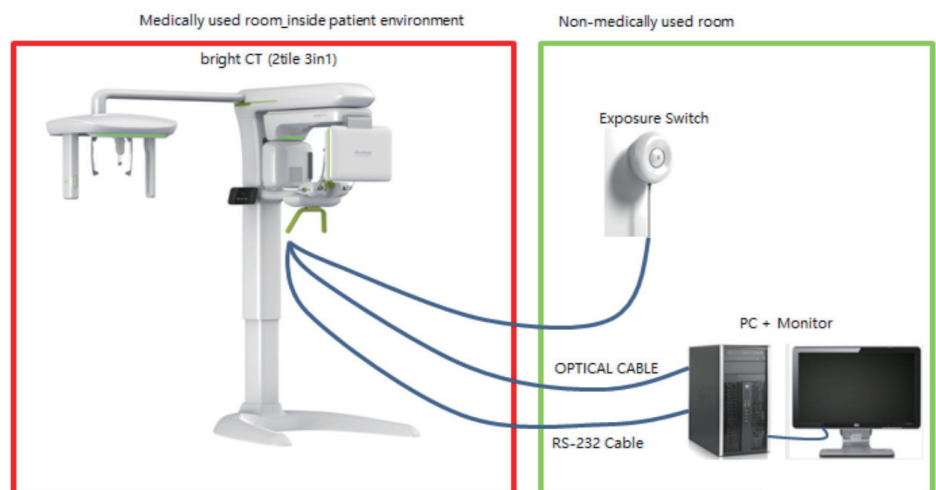
Equipment needs to be suitable for the requirements of medical electric system (IEC 60601-1-1 or clause 3 (16)). Each needs to refer to IEC 60601-1).

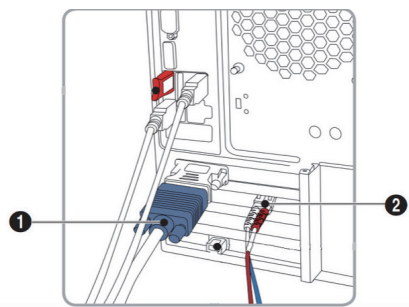
Anyone who connects the additional devices to the electric medical equipment must be responsible to comply with the requirements for the medical electric system that is consisted of corresponding medical system. Local law takes precedence over above requirements. Contact with the person in charge of corresponding area or technical service department.

Power of the equipment applied to dental X-Ray system should be supplied from the medical isolated power and medical insulated device should be used. There is a risk of enclosure leakage current which exceeds power supply safety level if the power is supplied from the non-isolated source. Accessories connected to non-isolated socket or the enclosure leakage current can be added to the enclosure leakage current of the enclosure leakage current of dental X-Ray system.

If non-medical PC is used, it cannot be connected not only to the dental X-Ray system but also to the patient in some way. There is a possibility of higher restriction of enclosure leakage current for the dental X-Ray system that is required by non-medical electric equipment related medical standard. Non-electric medical equipment is important to reduce the enclosure leakage current when it is used within the patient environment. All of the safety conditions should be satisfied if non-medical PC is used for dental X-Ray system. It is the responsibility of user to check if it satisfies the safety requirements when non-medical PC is combined with dental X-Ray system. Non-medical PC and medically approved isolated transformer should be used always.

10.3. Connecting peripheral devices





no	Description
1	RS232 Cable
2	Fiber Optic Cable

10.3.1. Peripheral devices and Accessory

– Dental X-Ray system needs to check the safety system as follows.

Item	Specification	Others
CPU	Intel core i3 3.0Ghz	
RAM	16GB	
HDD	1TB	
Graphic card	NVIDIA GeForce GTX1660 6GB	
OS	WINDOWS 10 64BIT	
Serial Port	RS232 port	Communication between equipment and PC

It can be the cause of EMC performance degradation if the cable or component other than the one provided by our company is used.

All of the configuration of the peripheral devices should be suitable for the medical electric system (IEC 60601–1–1 or clause 3 (16). Each needs to refer to IEC 60601–1).



Caution

CB approved components should be used for the PC of this equipment. It can be the cause of mal-operation if not approved component is used, and manufacturer is not responsible for this.

11 Precautions when dispose of the system

– Machine or components of the system should be disposed in accordance with the requirements of the regulation of corresponding country. Please note that collimator and X-Ray tube tank includes substances (lead, oil etc.) harmful for the human body.



– Above mark means that electric and electronic equipment cannot be disposed because not classified wastes of local government should be collected separately.

– If you need to dispose of the product or components, please contact with Dentium sales office or manufacturer to waste them in safe and appropriate way.

– This equipment is manufactured in the manner to be disposed without the contamination of environment. All of the internal & external parts except for the X-Ray module can be recycled.

Detailed information

Part name	Raw material	Whether to be recycled		Dangerous sunstances
Frame	Aluminum + Plastic	◆		
Cover	Plastic	◆		
Motor	Steel + Copper	◆		
Control board	Electronic components + PC	◆		
Cable	Copper + Steel + Oil	◆		
Package	Wood + cardboard	◆		
X-Ray generator	Oil + Lead			◆
Sensor	Dentium			

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