World's Best Dental Imaging Company

PaX-Duo3D

User Manual

Caring Insight

VATECH

Table of Contents

This user manual contains a description, operational instructions and other useful information for the PaX-Duo3D digital imaging system.

Conventions in this guide

The following symbols will be used throughout this manual for the users to keep better comprehension of their meaning. Make sure that you fully understand them and obey the instructions they contain.

This symbol indicates a note to help you get the best performances from the system. Carefully read these notes to bring about the best performance possible.

This symbol indicates a warning that should be obeyed with extreme cares. When missed, it may cause severe damage or physical injuries.

The radiation symbol warns you about radiation dangers.

This indicates a compulsory action or instruction.

Note to the user

X-Ray can be harmful and dangerous if not used properly. The instructions and warnings contained in this manual must be followed carefully.

As a manufacturer of radiology equipment that conforms to stringent protection standards in force throughout the world, we guarantee a maximum degree of protection against radiation hazards.

The room in which your radiology unit is to be installed must comply with all official regulations applicable to protection against radiation. You must install your radiology unit in a room protected against X-ray emission.

Chapter 1 Introduction

1.1 PaX-Duo3D overview

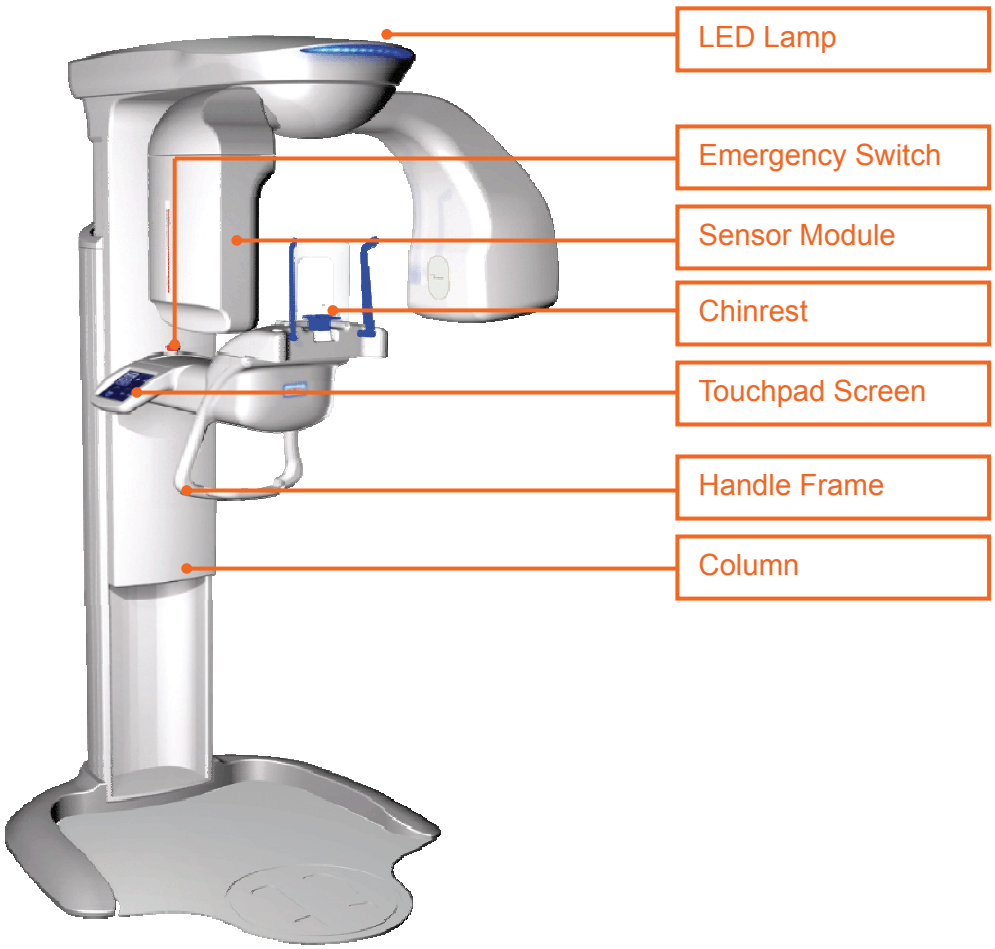
PaX-Duo3D is dental diagnostic imaging equipment that incorporates Digital Dental **Panoramic** Imaging and **Computed Tomography** System with Cone Beam Technology. This equipment features a considerably efficient diagnosis that is made possible by employing advanced digital imaging process and a real-time sharing of image information in a network. It also is equipped with the state-of-the-art CT sensor to capture 3D X-ray Computed Tomogram Scanned Images. The multi FOV (field of vision) are integrated into the Unit to limit X-ray exposure to localized areas, leading to reduced dose to patient, reduced scan and reconstruction time.

1.2 Product features

Its features include:

- Making the unit more economical, thanks to 2-into-1 combination of Panoramic and CT imaging.
- Automatically switching the sensors from panoramic mode to CT imaging mode or vice versa.
- Auto-focusing capability using the adaptive layer mode panoramic tomography in the panoramic mode. (Optional)
- Incorporating the multi FOV to reduce the X-ray dose to the patients.
- The Metal Reduction function is provided in order to acquire a clean tooth image in case a patient's tooth has metal artifact.
- Drastically reducing X-ray expose dose, compared with medical CT in consideration of patient's safety.
- Helps the patients understand the diagnosis result by viewing the invisible part with a 3-D viewer program, Ez3D2009.
- The disk space required for installation is no more than a general panoramic system is.
- A clear Tomography image up to minimum 0.1mm at any directions.
- You can set and control the examination program mode on the console PC.
- Support more accurate diagnosis imaging on touchpad screen as well as voice announcement function for patients and staffs.
- Supports the DICOM Format.

1.3 PaX-Duo3D components and functions



- **LED lamp :** Indicating the current X-ray emission activity of unit. While it stays green when the unit is idle, led lamp turns orange when the unit is in operation.

- **Emergency switch :** stop the movement of the unit when it abnormally operates.

- **Sensor module :** Digital X-ray image sensor module for Panoramic and Dental CT imaging units. With its Auto-Switching sensor technology, there is no need to change sensors when imaging mode changed.

- **Chinrest :** provide the patient comfort and rest while imaging, thus producing better image.

- **Touchpad screen :** the supporting device to monitor and control the Unit activity.

- **Handle frame :** is used for the patient to hold firmly while imaging to stabilize his or her position.

- **Column :** is used to adjust the unit height according to the height of patient.

This configuration may differ depending on the specification of your product.

1.4 Radiological examination options

The **PaX-Duo3D** has been designed to carry out the following radiological examinations.

Imaging mode		Sub mode	
Panorama	**Pano Standard**	Normal	Standard
			Fast
		TMJ	Open
			Close
		ETC	Front
			Left
			Right
			Sinus
	Pano Special	Maxillary Clear	Right
			Left
		Canal Clear	Right
			Left
		Incisor / Orthogonal	Incisor Clear
			Orthogonal
Dental CT	**Dental CT**	Mandible	
		Maxillary	
		Occlusion	
	Dental CT TMJ	Right	
		Left	

1.5 Product components

<Hardware Components>

- Equipment main system
- PC (includes keyboard, monitor, and mouse)
- User's manual
- Installation CD
- Accessories including Lock-Keys (Reconstruction Key and 3D Viewer Key)

<Software Components>

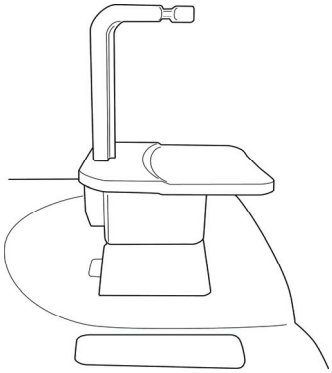
- Image Viewer program : **Ez3D2009 (3D Viewer program)**
- Imaging program **: EasyDent V4**

NOTE

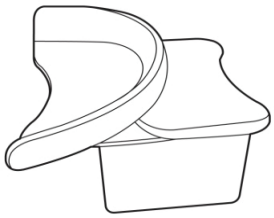
For improvement of product performance, the Components and specification of this product may be subjected to changes without any previous notice.

1.6 Accessories for positioning

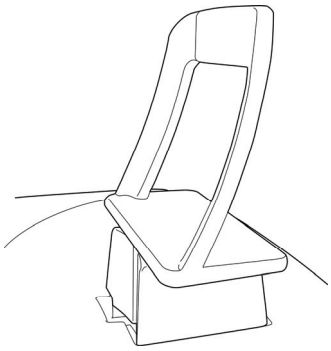
The unit comes with 4 different kinds of bite blocks/chinrests for positioning the patient properly that will be used for the various imaging modes the unit provides.



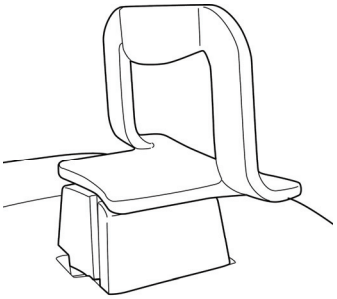
① Bite block & Chinrest (Normal)



② Chinrest (Toothless)



③ Chinrest (TMJ)



④ Chinrest (Sinus)

1.7 Marks & Graphic symbols

TYPE B Equipment

Radiation hazard

CE 0499

This CE symbol grants the product compliance to the European Directive for Medical Devices 93/42 as a class IIB device, as Authorized by Grand- Duche De Luxemburg.

Chapter 2 Safety and Warning

2.1 Safety precautions

WARNING

Make sure to observe the following statements.

1. Follow the specified process of operation for the safety of the users and patients.
2. Check the conditions of the product such as power, PC, and cable before using.
3. When capturing image, make sure to let Cooling Time (a process of cooling down the X-ray tube) pass before proceeding to the next imaging status, in accordance with a voice announcement from the device after capturing image.
4. Place this product away from water, moisture, or foreign substance since this product is a precision medical electronic device.
5. Turn off the power, immediately, if the product is exposed to water or foreign substance during use, resulting in abnormal operation. Contact the agent for technical support.

2.2 Warnings

Extreme care must be used when operation this system, due to the involvement of high voltage and multiple electrical components within the unit.

	Never expose the equipment to liquids or sprays - this may lead to electrical shock or damage to the equipment.
	Laser beams can cause permanent eye injuries. For maximum safety, advise the patient to never look directly at the laser beam. While positioning be sure that the beam is not directed into the patient's eyes.

1. You are responsible for the operation and maintenance of this unit. Only legally qualified persons can operate this unit. DO NOT open the cover of the unit. When necessary, have a trained authorized service technician carry out inspection and maintenance operations.
2. Install this Unit in an X-ray room that complies with current installation standards. From this location, you must be able to maintain visual or audio communication with the patient. This Unit must be permanently connected to the ground with a fixed power supply cable.
3. DO NOT place the PC and the peripheral equipment connected to it in the immediate vicinity of the patient in the Unit. Leave at least 2m distance between the patient and the Unit.
4. To obtain maximum image quality and visual comfort, position the screen to avoid direct light reflections from internal or external lighting.
5. X-ray equipment is hazardous to patients and the operator if you do not observe the exposure safety factors and operating instructions.
6. DO NOT place objects within the field of operation of the Unit.
7. The patient should wear a protective lead-lined shoulder apron.
8. Disinfect any parts of the Unit that come into contact with the patient and the operator after each patient has been exposed to X-rays.
9. While adjusting the height of the Unit, ensure that the patient is kept clear of the mechanism.
10. When the Unit is not in use, ensure that the ON/OFF switch is set to OFF (O).
11. To dispose of the Unit or its components, contact a service technician.
12. Ask the patient to remain still until the Unit arm has stopped moving and the RESET movement has completed.
13. DO NOT use this Unit in conjunction with oxygen-rich environments. This Unit is not intended for use with flammable anesthetics or flammable agents.

2.3 Electrical safety

1. Pull the plug itself, not the cord attached to it.
2. Disconnect the equipment that sparks and have it repaired immediately.
3. Always disconnect equipment before cleaning them.
4. Keep combustible materials away from lamps or heating devices.
5. Turn off the equipment when it is left for a while
6. Use extension cords only for temporary applications.

7. Keep electrical cords away from hot appliances.
8. Never turn on this equipment when standing or sitting in water. Shocks can be fatal.
9. Never overload a circuit by plugging in too many appliances.

2.4 Radiation protection policy

Users should comply with rules and regulations of your country on radiation safety and protection since they differ among countries.

1. User should wear lead apron or use protection wall to protect him / her from radiation during the imaging process.
2. User should provide protection devices such as lead apron to patient during the imaging process.
3. Children or pregnant women should consult with the doctor in charge before imaging.
4. User should be at least 2 m (6 feet) away from the equipment during imaging.

5. Equipment should be located inside an X-ray shield facility. During imaging; the worker should watch inside carefully, through the window, from outside the shield facility.
6. User should continuously check the patient and the equipment status during imaging.
7. User should immediately stop imaging if equipment malfunctions.

Please do not use PaX-Duo3D in an environment where dangers of explosion exist.

2.5 Manufacturer liability policy

The manufacturers / sellers of X-ray equipments, such as this product, only assume responsibility for a safe and normal operation of the product in the following cases ***if***

1. The product is installed by our authorized agent.
2. The product is installed in accordance with cautions and conditions for installation.
3. A genuine product is used, as approved by our company.
4. Maintenance / repair service is performed by our authorized agent.
5. The product is normally used in accordance with the user's manual.

Equipment damage or accident is not attributable to a mistake of the customer.

Chapter 3 Imaging software overview

3.1 Software components and functions

This chapter describes software architecture employed for an imaging software implementation and brief explanation on each function in details.

3.1.1 Panorama capturing program

The following is a main screen appearance of the imaging software running on the PC.

<With Panoramic Standard Mode>

① **Patient Information area**

Shows information of the patient such as name, age, and chart no.

② **Image Processing Status Bar (Progress bar)**

Shows the imaging and image processing progress status with a visual graph.

③ **Image display window**

Shows the target teeth position to be captured and the imaging progress status, as well as the final captured image. (shown in real-time)

④ **Imaging Instruction window**

Shows text instruction messages relevant to the imaging process.

⑤ **Select Pano Standard or Pano Special mode**

⑥ **Panoramic Imaging Mode selections**

Standard modes selection: Panoramic, Left, Front, Right, TMJ open, TMJ Close, Sinus

Special modes selection: Maxillary clear, Canal clear, Incisor clear, Orthogonal

⑦ **Arch Select**

Selections: Normal, Wide, Narrow, Child.

⑧ **Lamp Button**

Turn the lamp On/Off for patient beam alignment.

⑨ **Exit Button**

Exit the imaging program

⑩ **Imaging Mode selection**

Select one of the following imaging modes; Panorama or Dental CT.

⑪ **X-ray Setting Adjustment**

Shows the up and down arrow buttons for kVp, tube voltage value; and mA, tube current value adjustments.

⑫ **Patient Select**

For selecting the patient specifications such as gender (Man, Woman, Child) and bone density (Hard, Normal, and Soft).

⑬ **Confirm Button**

Confirm the current setting (press the 'Confirm' button after making all the necessary settings).

⑭ **Ready Button**

Perform imaging according to the instruction message after clicking the 'Ready' button.

⑮ **Setting Button**

This software architecture may differ depending on the specification of your product and may be subjected to changes without notice for the improvement of product performance.

3.1.2 Dental CT capturing program

① **Patient Information Window**

Shows information of the patient such as name, age, and chart no.

② **Image Processing Status Bar (Progress bar)**

Shows the imaging and image processing progress status with a visual graph.

③ **Image Display Window**

Shows the target teeth position to be captured and the imaging progress status, as well as the final captured image (shown on real time).

④ **Imaging Instruction display**

Shows text instruction messages during the imaging process.

⑤ **Dental CT Imaging Mode Selection**

Mandible, Maxillary, Occlusion, TMJ (Right, Left)

⑥ **Arch Select**

Selections: Normal, Wide, Narrow, Child

⑦ **Setting**

⑧ **Lamp**

Turn the lamp On/Off for patient beam alignment.

⑨ **Exit Button**

Exit the imaging program.

⑩ **Imaging Mode selection**

Select Panorama or Dental CT imaging mode.

⑪ **X-ray Setting Adjustment**

Shows the up and down arrow buttons for kVp, tube voltage value; and mA, tube current value adjustments.

⑫ **Patient Select Buttons**

Shows the selection of patient type (Adult or Weak).

⑬ **Confirm Button**

Confirm the current setting (press the **Confirm** button after making all the necessary settings).

⑭ **Ready Button**

Perform imaging according to the instruction message after clicking the **Ready** button.

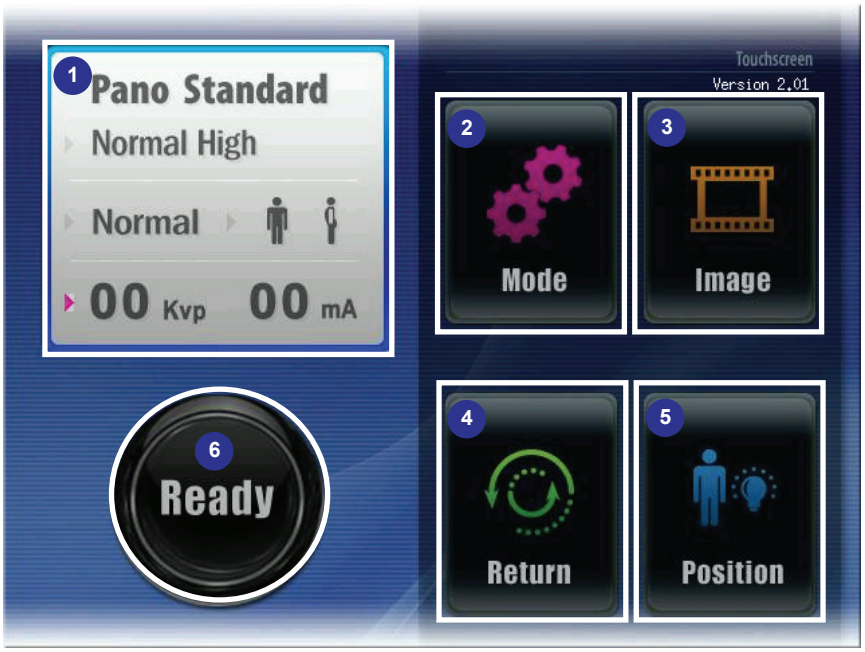
NOTE

This software architecture may differ depending on the specification of your product and may be subjected to changes without notice for the improvement of product performance.

3.2 Touchpad screen functions

3.2.1 Main screen

This section describes what the main screen of Touchpad Screen comprises of and how its individual functions contribute to the system performances.



① **Imaging Mode Display and Patient Setting**
Displays the imaging mode, patient type, and X-ray setting values

② **Mode selection**
Shows the selection of imaging modes (Pano Standard, Pano Special, Dental CT).

③ **Image**
Shows an image that is currently saved in the memory (up to 10 images can be saved).

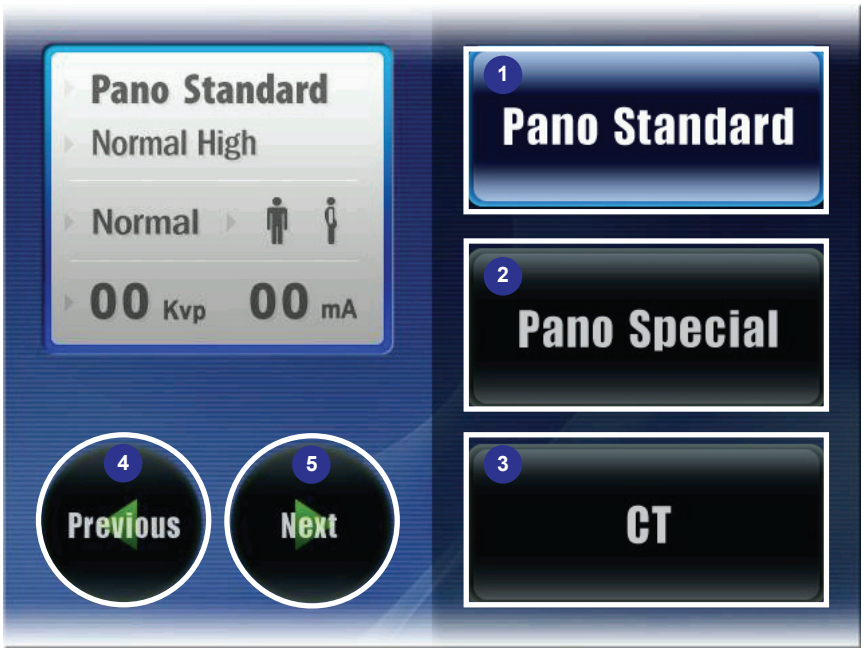
④ **Return**
Returns the rotating unit to position the lamp points to

⑤ **Position**
Activate the camera and the alignment beams in order to place the patient in position.

⑥ **Ready button**
Prepare for X-ray imaging according to the mode and conditions set.

3.2.2 Mode screen

This screen is invoked from the main screen by touching the ***Mode***.



① **Pano Standard**

Standard imaging mode selection: Normal, Front, Right, Left, TMJ, or Sinus.

② **Pano Special**

Special imaging mode selections: Orthogonal, Incisor Clear, Maxillary Clear, or Canal Clear

③ **CT**

Dental CT imaging mode selection: Mandible, Maxillary, Occlusion, TMJ Left, or TMJ Right.

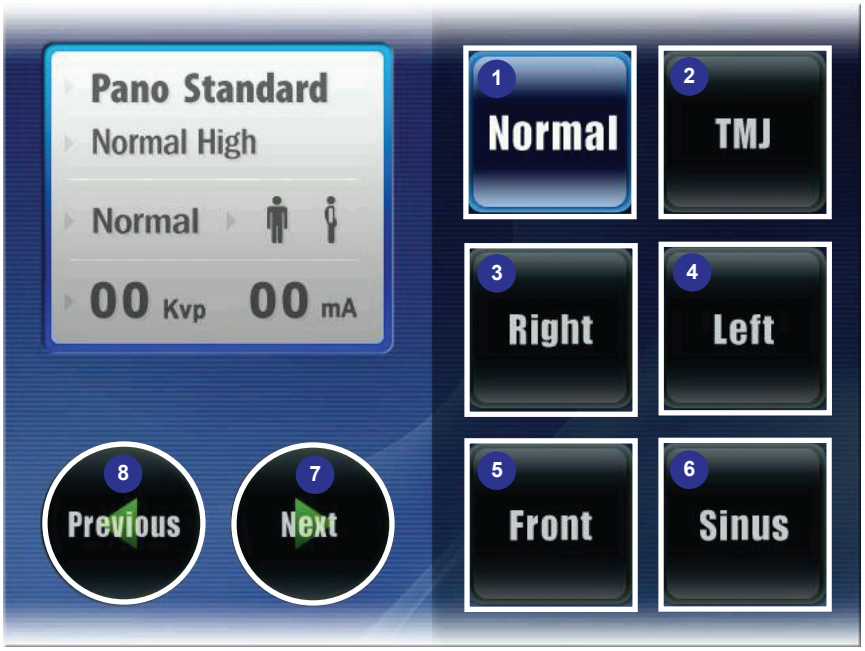
④ **Previous**

Select ‘Previous’ to cancel the current setting values and to go back to the previous stage.

⑤ **Next**

Select ‘Next’ to go to the next stage.

3.2.3 Pano Standard screen



① **Normal**

Press 'Normal' button if you want to take a panoramic image of the patient's entire teeth.

② **TMJ**

Press 'TMJ' button if you want to take images of the Temporomandibular joint (TMJ) of the patient. Images are shown on the PC in one view sheet in the following order: Right Open, Right Close, Left Close, and Left Open. However, LCD panel only displays the Open image during TMJ Open Imaging, and only the Close image during TMJ Close imaging.

③ **Front**

Press 'Front' for imaging the front teeth of the patient.

④ **Left**

Press 'Left' to capture an image of the teeth on the left side of the patient's mouth.

⑤ **Right**

Press 'Right' to capture an image of the teeth on the right side of the patient's mouth.

⑥ **Sinus**

Press 'Sinus' to capture an image that optimizes the sinus of the patient.

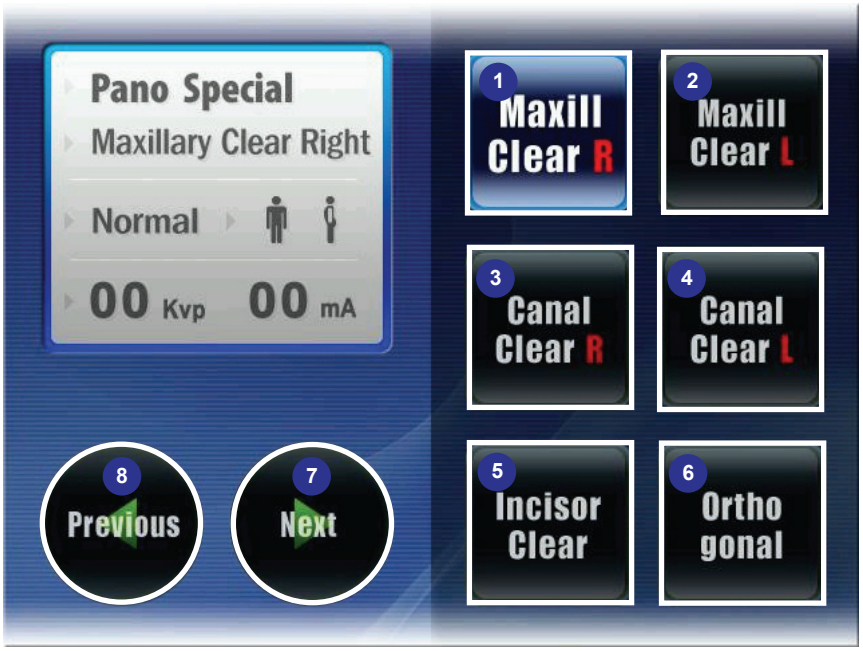
⑦ **Next**

Select 'Next' to go to the next stage.

⑧ **Previous**

Select ‘Previous’ to cancel the current setting values and to go back to the previous stage.

3.2.4 Pano Special screen



① **Maxillary clear R**

Press ‘Maxillary Clear R’ for capturing an image that optimizes the maxillary sinus (right side) of the patient.

② **Maxillary clear L**

Press ‘Maxillary Clear L’ for capturing an image that optimizes the maxillary sinus (left side) of the patient.

③ **Canal clear R**

Press ‘Canal clear R’ for capturing an image that optimizes the canal (right side) of the patient.

④ **Canal clear L**

Press ‘Canal Clear L’ for capturing an image that optimizes the canal (left side) of the patient.

⑤ **Incisor clear**

Press ‘Incisor Clear’ for capturing an image that optimizes the fore tooth of the patient.

⑥ **Orthogonal**

Press ‘Orthogonal’ for capturing an image that minimizes overlapping when the teeth overlap.

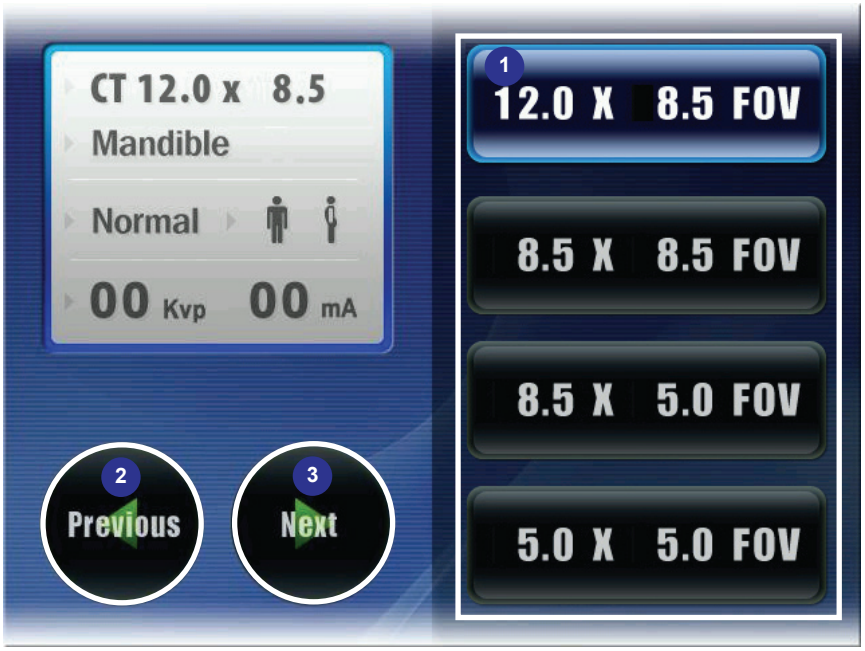
⑦ **Next**

Select ‘Next’ to go to the next stage.

⑧ **Previous**

Select ‘Previous’ to cancel the current setting values and to go back to the previous stage.

3.2.5 Dental CT screen



① **FOV selection**

Select the FOV size that is the closest imaging area of your interest.

It is recommended to localize imaging area for the less exposure to X-ray and reduced reconstruction time. That is one of reasons why multi FOV is employed.

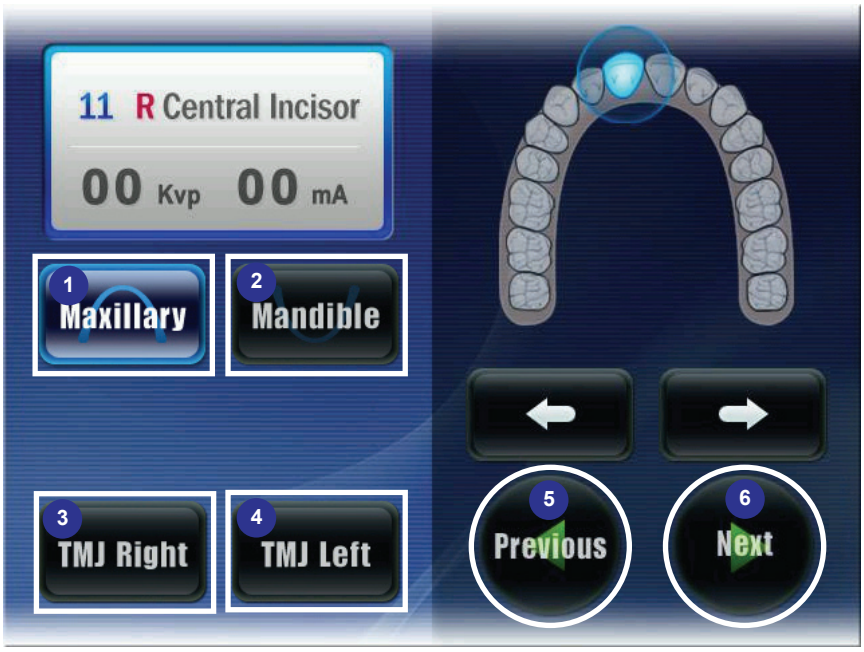
② **Next**

Select ‘Next’ to go to the next stage.

③ **Previous**

Select ‘Previous’ to cancel the current setting values and to go back to the previous stage

<FOV size: 50mm x 50mm>



① **Mandible**

Press 'Mandible' for capturing an image that optimizes the mandible of the patient.

② **Maxillary**

Press 'Maxillary' for capturing an image that optimizes the maxillary of the patient.

③ **TMJ Left**

Press 'TMJ Left' for capturing an image that optimizes the TMJ left of the patient.

④ **TMJ Right**

Press 'TMJ Right' for capturing an image that optimizes the TMJ right of the patient.

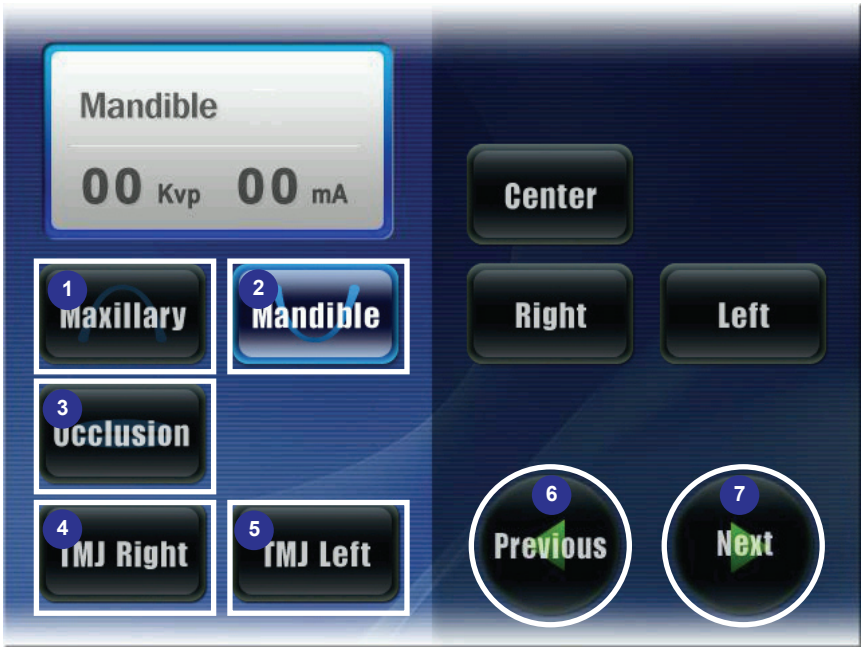
⑤ **Previous**

Select 'Previous' to cancel the current setting values and to go back to the previous stage.

⑥ **Next**

Select 'Next' to go to the next stage.

<FOV size: 85mmx85mm, 85mmx50mm and 120mmx85mm>



① **Mandible**

Press ‘Mandible’ for capturing an image that optimizes the mandible of the patient.

② **Maxillary**

Press ‘Maxillary’ for capturing an image that optimizes the maxillary of the patient.

③ **Occlusion**

Press ‘Occlusion’ for capturing an image that optimizes the occlusion of the patient.

④ **TMJ Left**

Press ‘TMJ Left’ for capturing an image that optimizes the TMJ left of the patient.

⑤ **TMJ Right**

Press ‘TMJ Right’ for capturing an image that optimizes the TMJ right of the patient.

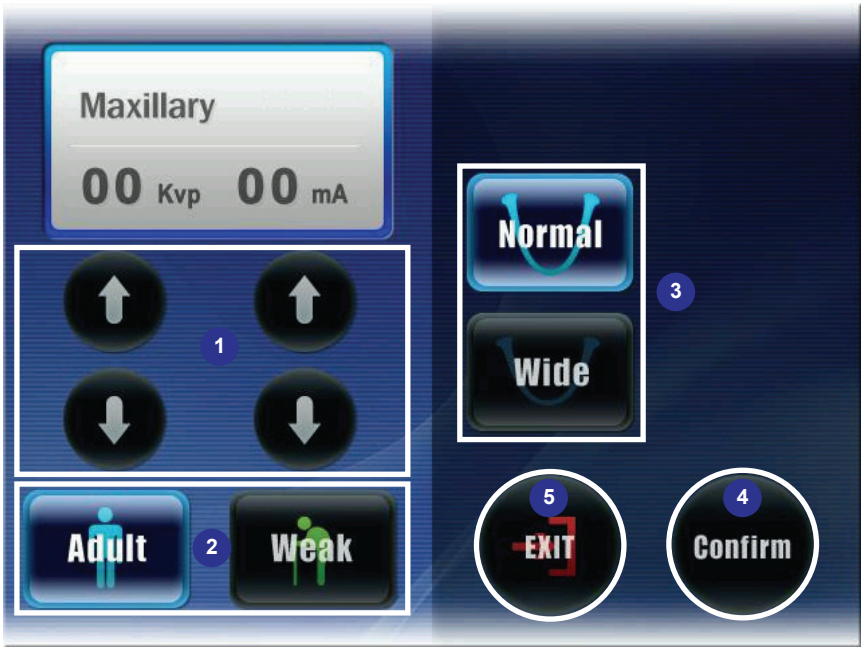
⑥ **Previous**

Select ‘Previous’ to cancel the current setting values and to go back to the previous stage.

⑦ **Next**

Select ‘Next’ to go to the next stage.

3.2.6 X-ray setting screen



① **X-ray Dose Setting**

Select kVp and mA of X-ray setting manually.

② **Patient Selection**

Select the features of the patient (bone density).

③ **Arch**

Select an arch that is suitable for the patient: Normal, Wide.

④ **Confirm**

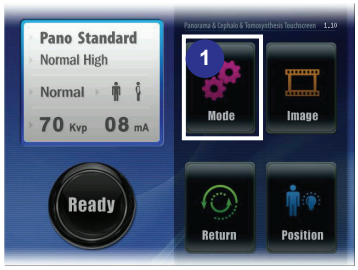
Confirm the current setting and go to the next stage.

⑤ **Exit**

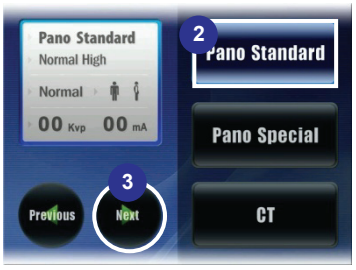
Cancel the current setting and go back to the previous stage.

3.3 Using touchpad screen

3.3.1 Pano Standard

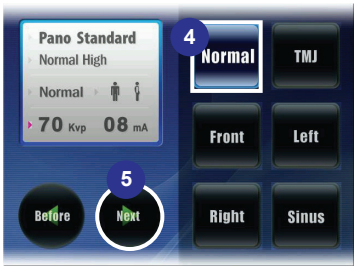


① **Mode** : Press 'Mode' button to choose the mode for capturing of image.



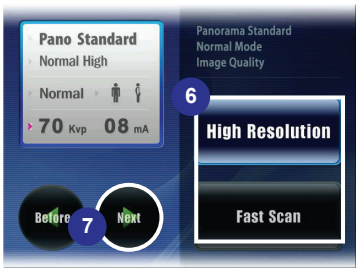
② **Pano Standard**: Press 'Pano Standard' to capture image on Pano Standard mode.

③ **Next**: Press 'Next' Button to move to the next stage.



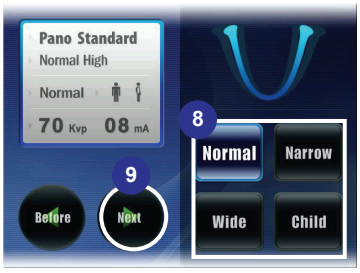
④ **Normal:** Press 'Normal' to capture image on normal panoramic mode (Press the Button of corresponding mode if you want to capture the image on TMJ, Sinus, Right, Front, or Left).

⑤ **Next**: Press 'next' to move to the next stage.
(Press 'Previous' to go back to the previous stage)



⑥ **High Resolution / High Scan**: Select the button to capture the image on High Resolution or on High Scan.

⑦ **Next:** Press to move to the next stage or press 'previous' to go back to the previous stage.



⑧ **Arch**: Select an arch that is suitable for the patient: Wide, Normal, Narrow, or Child.

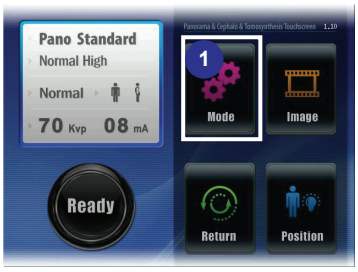
⑨ **Next:** Press 'Next' to move to the next stage. Press 'Previous' to go back to the previous stage.

⑩ Select the X-ray exposure conditions suitable for the features of the patient (sex / bone density).

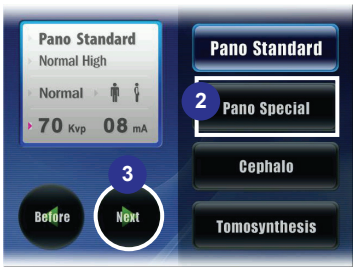
⑪ **KVp / mA** : Select the X-ray exposure amount suitable for the patient.

⑫ **Confirm** : Press to confirm the setting and to move to the main screen.

3.3.2 Pano Special

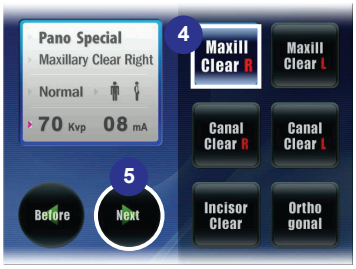


① **Mode** : Select the mode for imaging



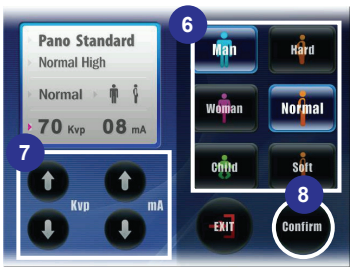
② **Pano Special** : Select 'Pano Special' to capture an image in Pano Special mode (Press the button of its corresponding mode to capture the image on Pano Standard or Cephalo mode).

③ **Next** : Move to the next stage.



④ **Maxillary Clear R** : For capturing the Maxillary Clear – Right image. (Press the other buttons to capture Orthogonal, Incisor Clear, Maxillary Clear–Left, Canal Clear–Right, Canal Clear-Left).

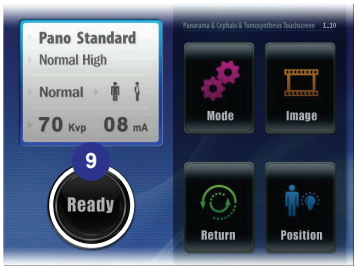
⑤ **Next** : Move to the next stage.



⑥ **Select Patient** : Select the X-ray exposure conditions suitable for the features of the patient (sex / bone density).

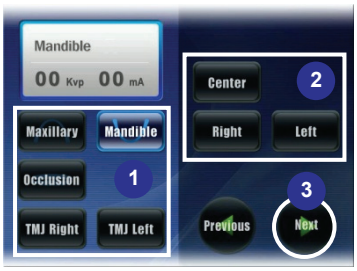
⑦ **Select kVp / mA** : Select the X-ray exposure amount suitable for the patient.

⑧ **Confirm** : Press to confirm the current setting.



⑨ **Ready button** : Press the ready button after finishing adjusting all values and completing the patient position.

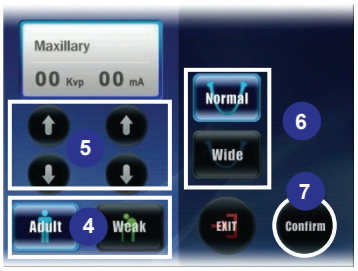
3.3.3 Dental CT



① Select the mode.

② Select position for taking image.

③ **Next** : touch this to move next steps.

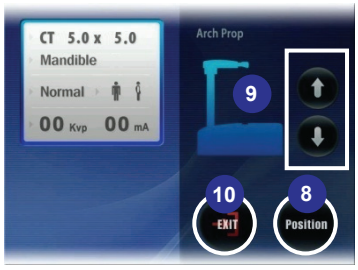


④ **Select Patient** : Select the X-ray exposure conditions suitable for the features of the patient (sex / bone density).

⑤ Select kVp / mA: Select the X-ray exposure amount.

⑥ Suitable shape of the patient.

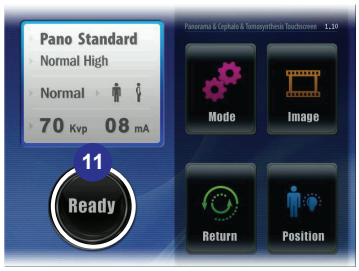
⑦ **Confirm** : Press to confirm the current setting.



⑧ **Position** : To activate the camera and alignment lamp in order to place the patient in position.

⑨ **Up / Down Arrows** : To move the Arch Prop up and down.

⑩ **Exit :** Exit the program.



⑪ **Ready button :** Press the ready button after finishing adjusting the said parameters and taking patient position.

3.4 PC system requirements

IMPORTANT

It is mandatory to check that the PC system configuration is compatible with the PC system requirements for the imaging software and image viewer software. If necessary you must update your PC system configuration. Do not place the PC and the peripheral equipment connected to it in the immediate vicinity of the patient in the Unit. Leave at least 2 m distance from the Unit.

<Applied Xmaru1215CF Sensor>

Minimum Acquisition Requirements	Model	HP Workstation XW 4600
	Operating System	Microsoft XP Professional Service Pack 2
	CPU	Intel Core 2 Duo E8400 @ 3.0GHz or higher
	HDD	250GB (prefer bigger capacity. Do not use RAID)
	Main Memory	2 GB DDR2 or higher
	Video Card	ATI Radeon HD 4850, 512MBytes
	Network	2 EA of 10/100/1000 Gigabit (Intel Gigabit Ethernet Card)
	Interface	1 EA of RS232(1ea), USB(4ea)
	ODD	DVD+/-RW
	Monitor	Min, resolution 1280*1024
Minimum Image Viewing Requirements	Operating System	Microsoft XP Professional Service Pack 2
	CPU	Intel Core 2 Duo E8400 @ 3.0GHz or higher
	Main Memory	2 GB DDR2 or higher
	Video Memory	ATI Radeon HD 4850, 512Mbytes
	Network	1 EA of 10/100/1000 Gigabit
	ODD	DVD+/-RW
	Monitor	Min, resolution 1280*1024

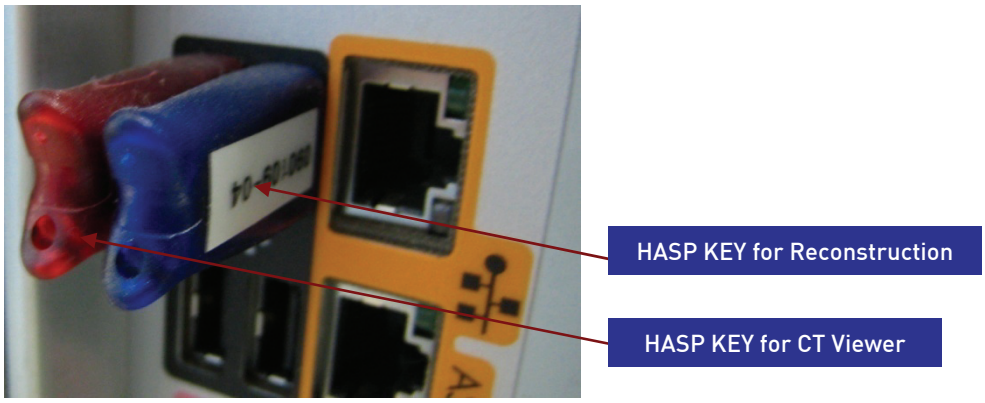
<Applied Xmaru1524CF Sensor>

Minimum Acquisition Requirements	Model	HP Workstation XW 8600
	Operating System	Microsoft XP Professional Service Pack 2
	CPU	Intel Xeon CPU E5420 @ 2.50GHz or higher
	HDD	1 TB (prefer bigger capacity. Do not use RAID)
	Main Memory	2 GB DDR2 or higher
	Video Card	NVIDIA Geforce GTX 260, 896MBytes
	Network	2 EA of 10/100/1000 Gigabit (Intel Gigabit Ethernet Card)
	Interface	1 EA of RS232(1ea), USB(4ea)
	ODD	DVD+/-RW
	Monitor	Min, resolution 1280*1024
Minimum Image Viewing Requirements	Operating System	Microsoft XP Professional Service Pack 2
	CPU	Intel Xeon CPU E5420 @ 2.50GHz or higher
	Main Memory	2 GB DDR2 or higher
	Video Memory	1GB (NVIDIA Geforce GTX 260)
	Network	1 EA of 10/100/1000 Gigabit
	ODD	DVD+/-RW
	Monitor	Min, resolution 1280*1024

Chapter 4 Getting started

4.1 HASP key installation

To capture, view and analyze images, the driver software for two keys first should be installed properly. Please refer to the HASP driver installation section for further details.



NOTE

Make sure that two (2) lock keys (Reconstruction key and Ez3D2009 Key-) are installed at the PC. You cannot capture and view the captured images without the two lock keys.

4.2 Starting the imaging software

Make sure that

- All the connections between the PaX-Duo3D and PC are properly connected.
- The PC is turned on.

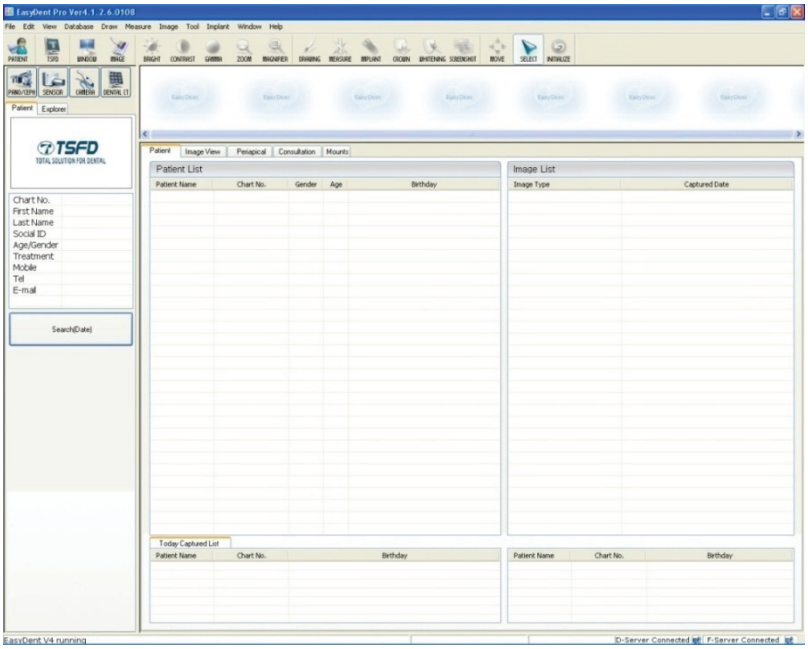
To start the imaging software, follow these steps.

1. On your desktop, double-click **EasyDent** or **Start > All Programs > EasyDent.** Then blank Patient Window is displayed.
2. Create or open an existing patient record.

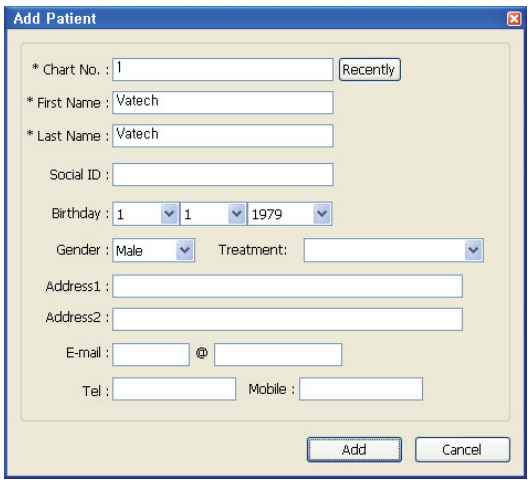
4.3 Creating a patient record

To create a new patient record, follow these procedures.

1. Run **EasyDent**, then the following main screen will come up.



2. From the menu bar, select **Database > New > Add.** Then the following dialog box will pop up.



NOTE **For the detailed operation on this software, please refer to the EasyDent user manual.**

3. Enter the required patient information. **Chart number, first name** and **Last name** are required fields to be filled in.
4. And other fields, although optional, are recommended to be filled in.
5. Once all the parameters entered, Click **Add** to save configurations.

4.4 Turning on the PaX-Duo3D

Before switching on the equipment, check that installation of the unit is complete.

To switch on the unit, follow these steps.

1. Press the **ON/OFF** switch on the column.

IMPORTANT

To increase the operating life of the X-ray tube, if the equipment has not been used for long time, you must pay special care before use.

2. Confirm that name of the patient appears in the Touch pad screen.
3. If it is the case, the equipment is now ready to be used for acquisition.

4.5 Calling the imaging software

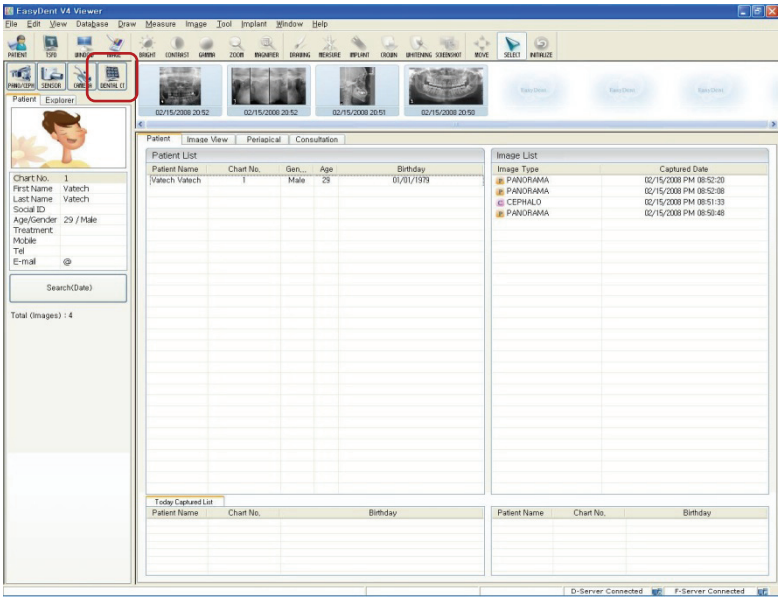
To get access to the image capture mode, take the following steps.

1. Run **EasyDent** program.

NOTE

At this point, it is supposed that you have entered all the relevant information about the patient.

2. From the main window, click **Dental CT** icon on the upper left corner of the screen to *run the imaging capture program.*



3. Then the following imaging program will run with the message **"initializing position of the unit".**

IMPORTANT

Do not operate the system and the capture program while the PC is initializing its communication with the sensor. Failure to observe this requirement may cause irreversible damage to components.

Now it is time to acquire images of your choice. To do this, go to the next chapter.

Chapter 5 Acquiring panoramic images

5.1 Acquiring standard panoramic image

First, select a patient from the EasyDent Program of the PC. Execute the image capturing program, and then select the capturing mode for the patient.

NOTE

An unregistered patient should be registered first before capturing an image. For more information, please refer to EasyDent V4 program user's manual, which is prepared separately.

5.1.1 Preparing the unit and setting the acquisition parameters

From the main screen on the PC, do the following procedures to prepare the parameters for a specific patient and mode.

1. Click the **Panorama**. Then the sensor will move to panoramic imaging initial position.
2. Click the **Pano Standard**.

3. Select the **Standard** from Normal pane.
4. Select the **Arch shape** for the patient-dependent feature among 4 different types.
5. Select the patient's gender among 3 selections - Man, Woman, Child.
6. Select the patient's bone density - Hard, Normal, Soft.
7. Adjust **kVp/mA** finely, if necessary.

NOTE

It is necessary to adjust exposure parameters manually to reflect the patient's unique features like structure of bone and its density. This is done through kVp/mA adjustment.

8. Click the **Confirm** for those parameters to take effect. Then a message asking whether you want to use the metal removal function appear in the main window.

9. When the patient's tooth has Metal Artifact, you can still get a clean image if you select Metal mode.

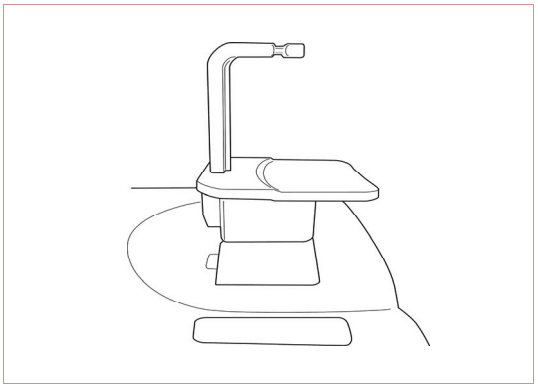
5.1.2 Preparing and positioning the patient

To prepare and position the patient, do follow the next steps.

IMPORTANT

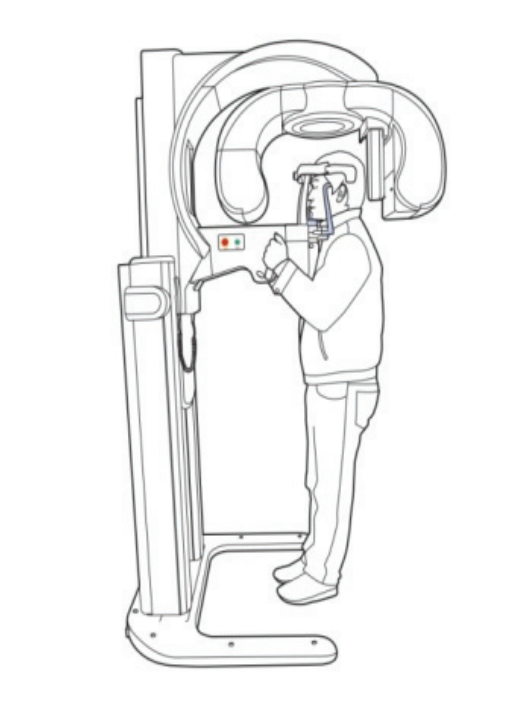
Correct posture is very important factor for the best image possible.
This is because it reduces the shadow of spinal column transferred to the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.



2. Insert the normal chinrest and bite block in the unit's chinrest receptacle. Place a hygienic cover over the bite block.

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

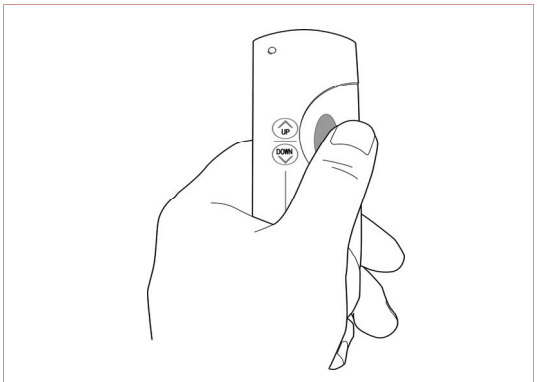


4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.

5. From the Touchpad Screen, press the Position buttons to activate the three Laser Beams (Vertical Beam, HorizontalBeam, and Canine Beam).

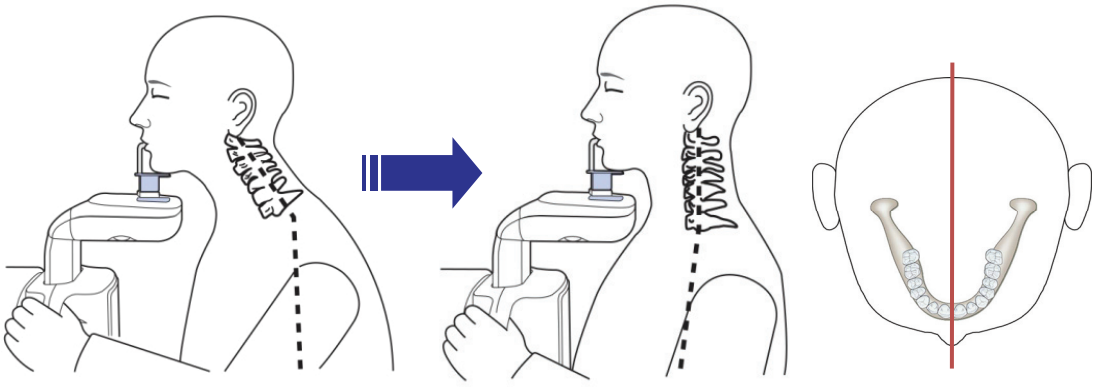
NOTE

The Light Beams automatically disappear after a given period. To re-activate the light beams, just press the position buttons again.

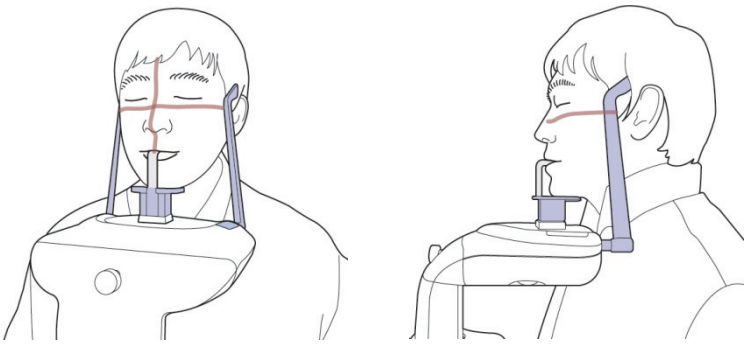


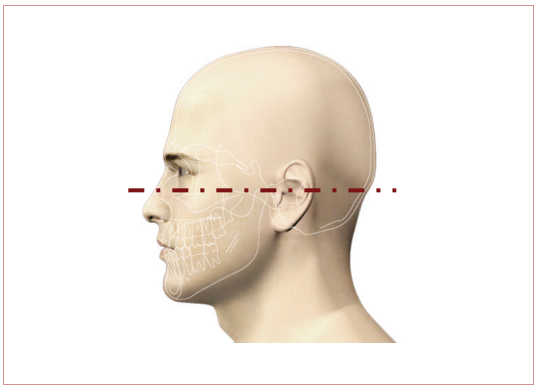
6. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest. Position the patient's chin on the normal chinrest.

7. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.

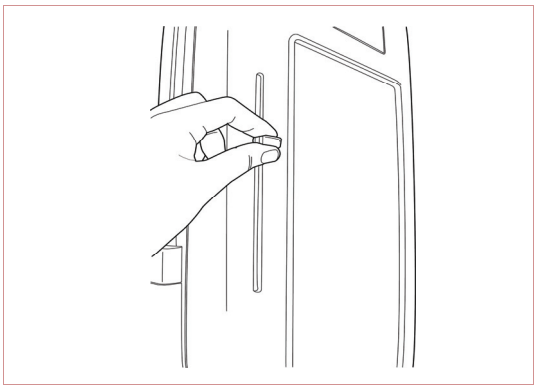


8. Have the patient bite the bite block along the grooves using their upper incisor. Ensure that the chin is in good contact with the chinrest.



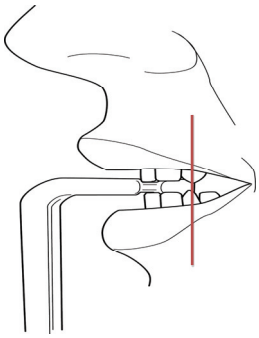


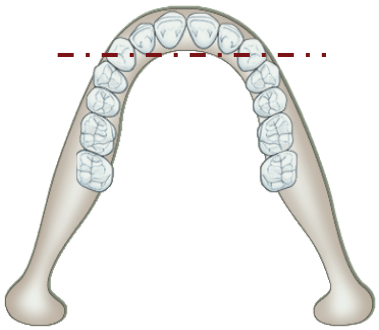
9. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).

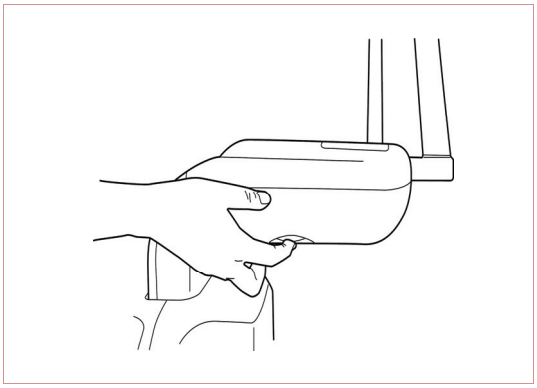


10. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

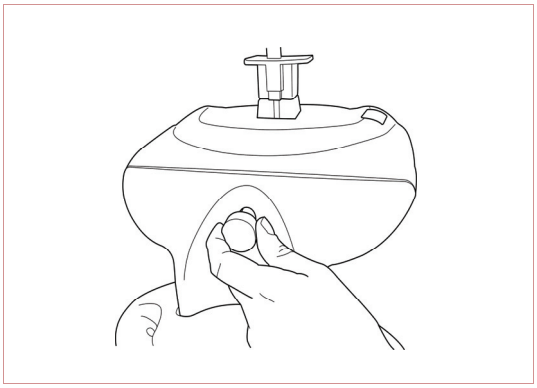
11. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.







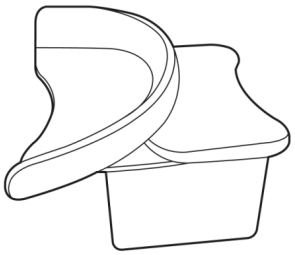
12. To adjust the canine beam position, rotate the canine beam adjuster that is located at the lower rear part of the patient chinrest.

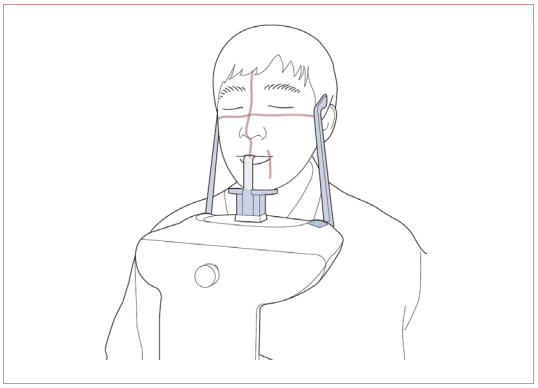


13. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

14. Have the patient close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.

15. For a patient with no teeth, the vertical laser beam should be positioned on the patient's mid-sagittal line. The horizontal laser beam should be aligned along the Frankfort plane. Align the canine beam on the fold on the side of the nose.





16. Ensure that the patient's eyes are closed. Press and hold the exposure switch button until image acquisition is complete.

17. Positioning has completed.

5.1.3 Launching the exposure and finishing acquisition

To launch the X-ray emission, do the following steps.

1. Leave the X-ray room and close the door. From outside of the X-ray room, you must consistently monitor and pay attention to the patient during acquisition.

WARNING

In cases of any problems, release the exposure switch button or press the red emergency stop button on the column.

2. After double checking position of the patient, click the **Ready**.

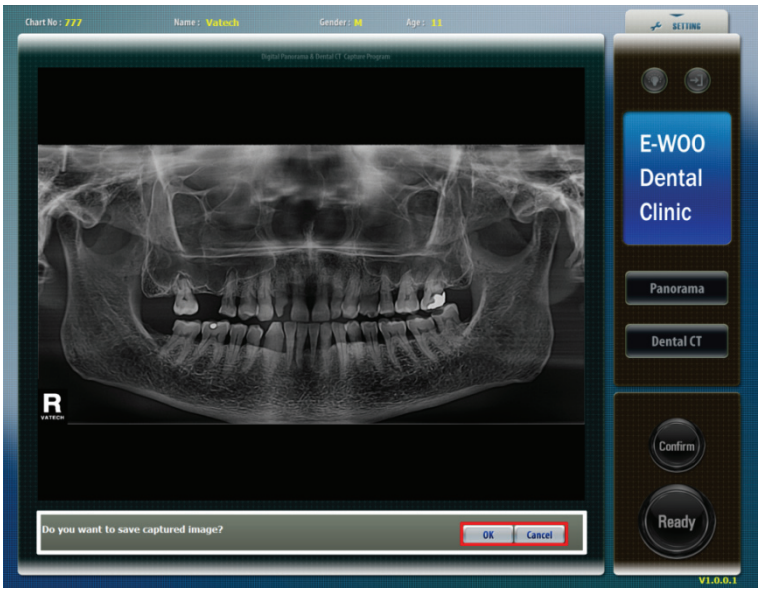
3. The red box in the following figure indicates it is ready to acquire image by pressing and holding the exposure switch.

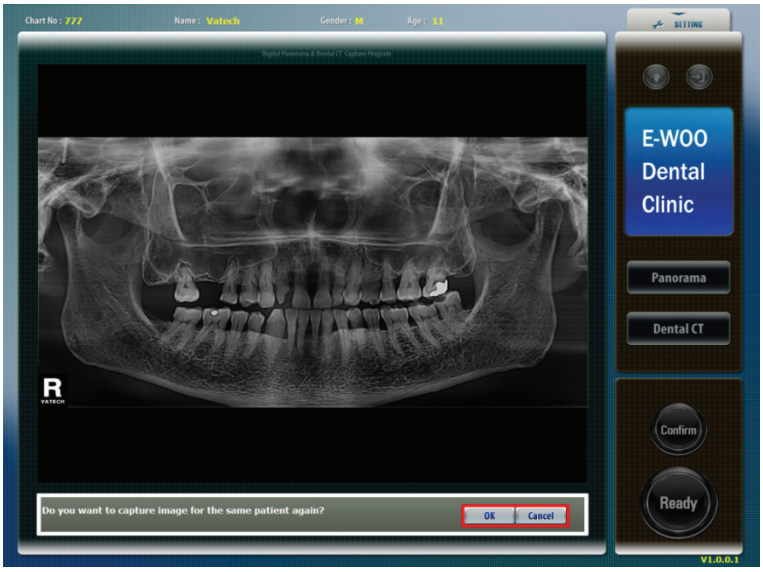
4. Press and hold the exposure switch to capture image. When X-ray is being exposed, the progress bar will be changed from blue to orange. Press and hold the exposure switch until the progress bar shows that the acquisition of image has been completed.

NOTE

You should hold the exposure switch until the system finishes the acquisition of image.

5. After capturing, click **OK** to save the image. If you don't want to save the captured image, click **Cancel**.

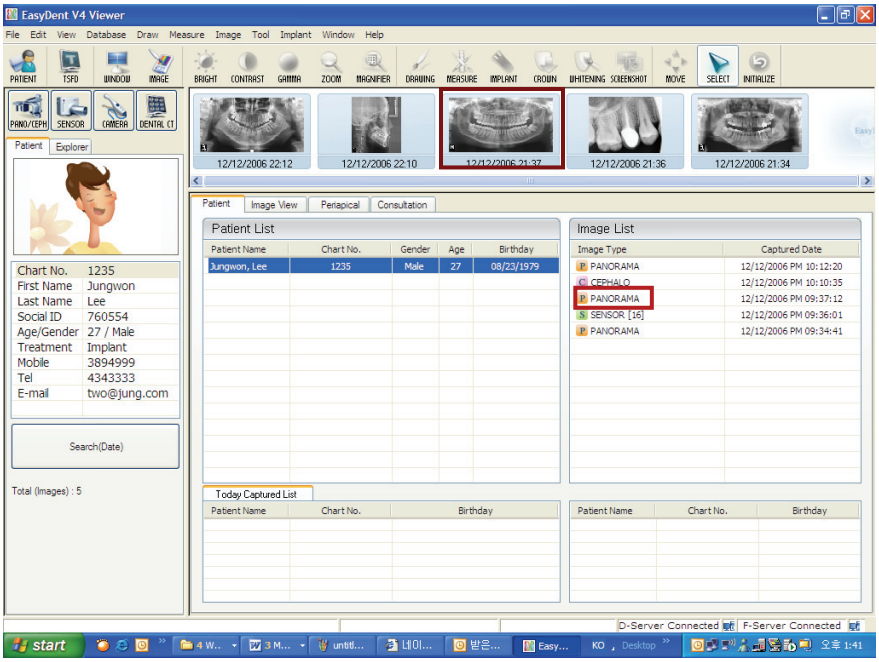




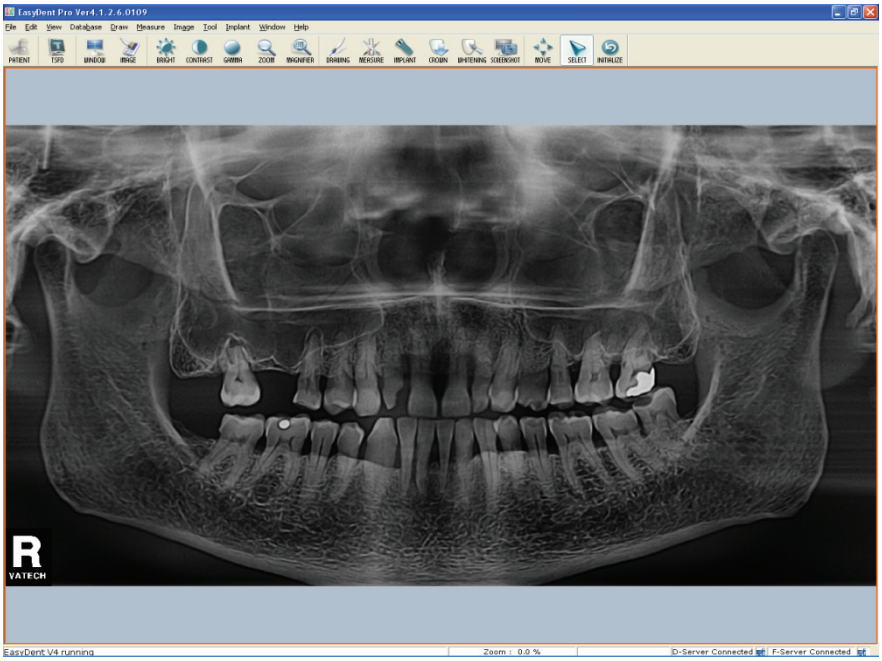
NOTE

If you want to capture an image of the same patient again, click Ok.

6. After imaging, when you click the name of the patient on the patient list of EasyDent V4, the image list will be rearranged. Thumbnail view of a recently captured image will appear on the left, as shown in the figure below. Double-click on it to check the image in detail.



※ Sample final panoramic image checked through EasyDent V4.



5.2 Acquiring TMJ open/ close image

First, select a patient from the EasyDent Program of the PC. Execute the image capturing program, and then select the capturing mode for the patient.

5.2.1 Preparing the unit and setting the acquisition parameters

From the main screen on the PC, do the following procedures to prepare the parameters for a specific patient and mode.

1. Click the **Panorama**. Then the sensor will move to panoramic imaging initial position.
2. Click the **Pano Standard**.

3. Select the **TMJ Open/Close** from mode selection pane.
4. Select the **Arch shape** for the patient-dependent feature among 4 different types.
5. Select the patient's gender among 3 selections - Man, Woman, Child.
6. Select the patient's bone density - Hard, Normal, Soft.
7. Adjust **kVp/mA** finely, if necessary.

NOTE

It is necessary to adjust exposure parameters manually to reflect the patient's unique features like structure of bone and its density. This is done through kVp/mA adjustment.

8. Click the **Confirm** for those parameters to take effect. Then a message asking whether you want to use the metal removal function appear in the main window.

9. When the patient's tooth has Metal Artifact, you can still get a clean image if you select Metal mode.

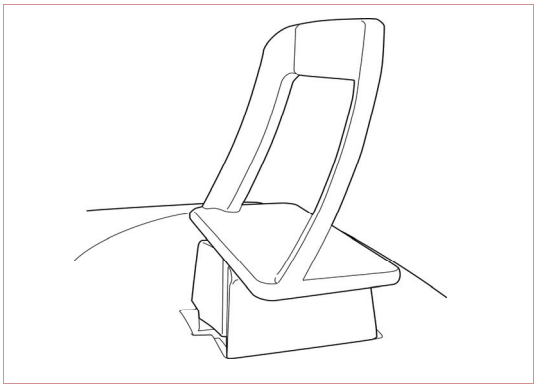
5.2.2 Preparing and positioning the patient

To prepare and position the patient, do follow the next steps.

IMPORTANT

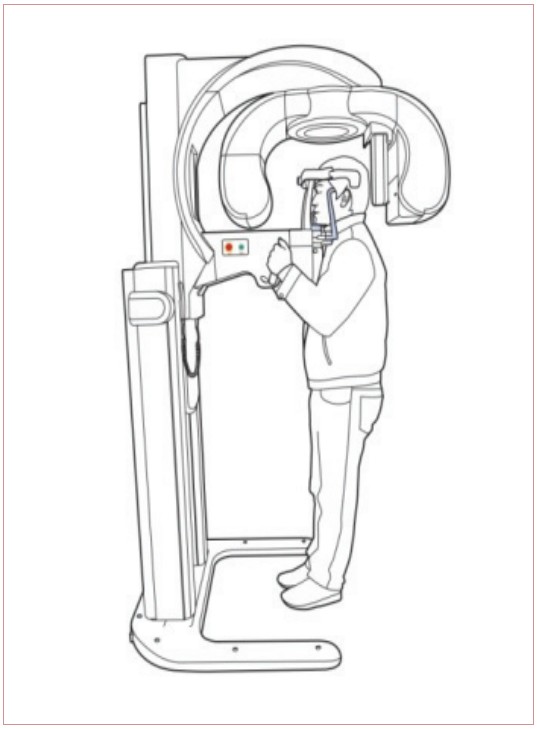
Correct posture is very important factor for the best image possible.
This is because it reduces the shadow of spinal column transferred to the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.



2. Insert the chinrest (TMJ).

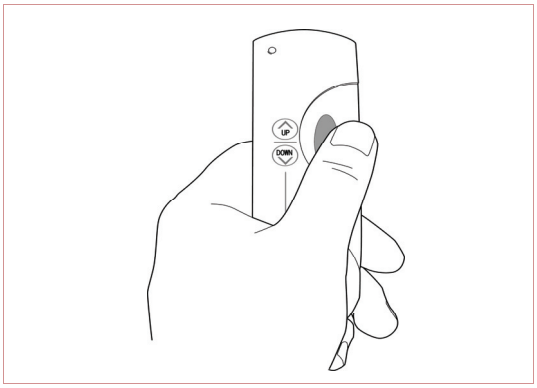
3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.



4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.

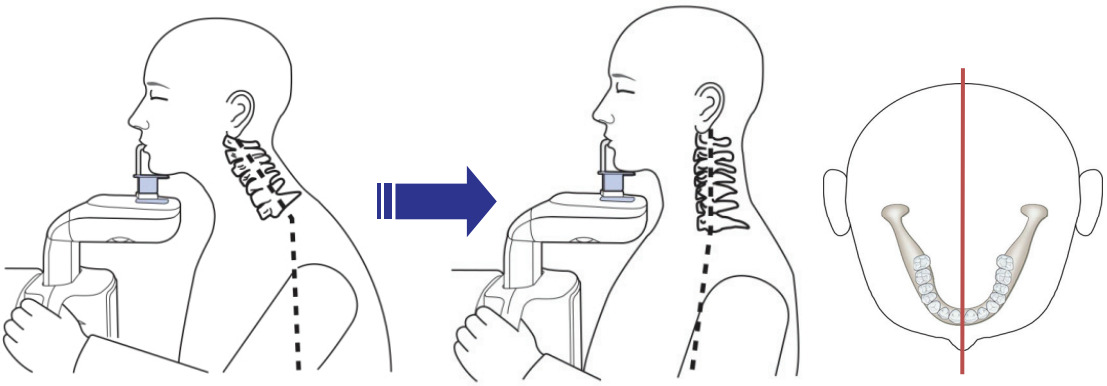
5. From the Touchpad Screen, press the **Position** buttons to activate the three Laser Beams (Vertical Beam, Horizontal Beam, and Canine Beam).

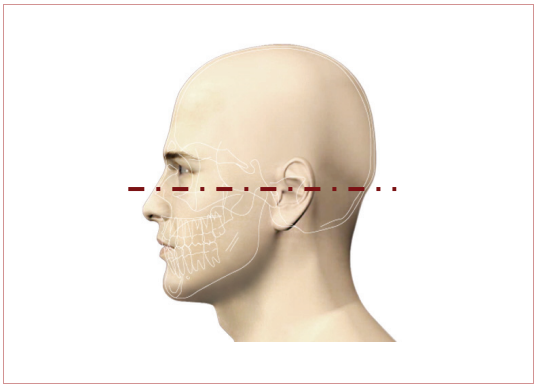
NOTE **The Light Beams automatically disappear after a given period. To re-activate the light beams, just press the position buttons again.**



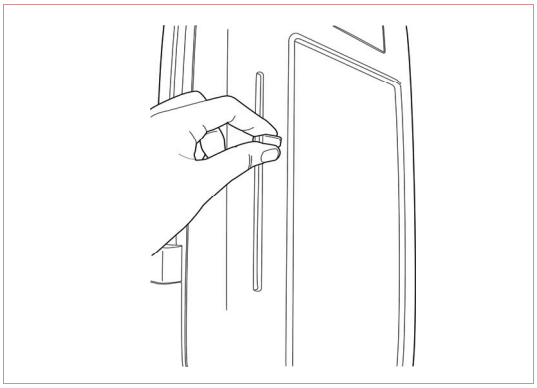
6. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest. Position the patient's chin on the normal chinrest.

7. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.



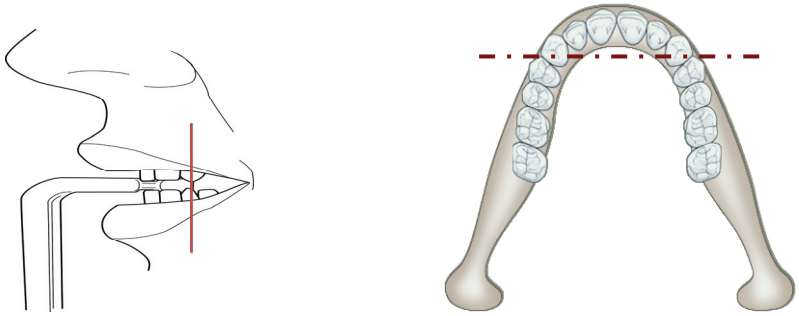


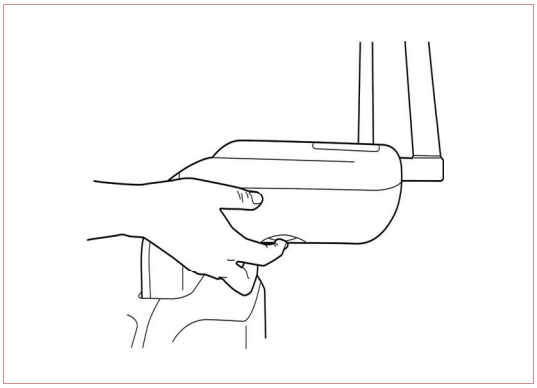
8. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).



9. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

10. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.

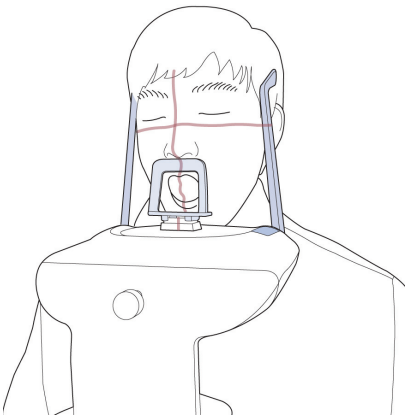


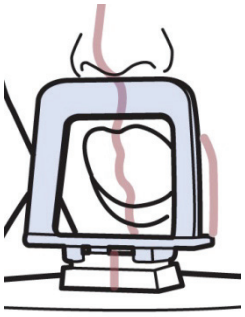


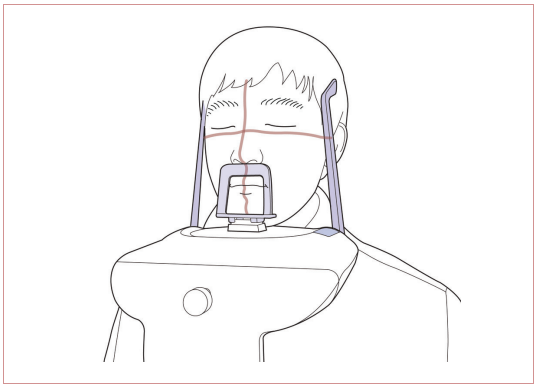
11. To adjust the canine beam position, rotate the canine beam adjuster that is located at the lower rear part of the patient chinrest.

12. Comfortably fix the positioning of the patient's head on both sides using the Temples Support Wheel button. The patient's head must be properly positioned. The Temple Support Wheel button is located at the front of the patient support rest.

13. **For TMJ Open imaging**, the patient's mouth should be opened as wide as possible. The top of the TMJ support and the patient's acanthion point must remain in contact.







14. **For TMJ Close imaging,** have the patient close their lips and keep their tongue positioned towards the palate throughout the exposure cycle. The upper lip must make contact with the TMJ support.

15. Check that the patient's posture and the beam position are proper.

16. Ask the patient to stay still and not move until the end of the image capturing process.

17. Ensure that the patient's eyes are closed.

5.2.3 Launching the exposure and finishing acquisition

To launch the X-ray emission, do the following steps.

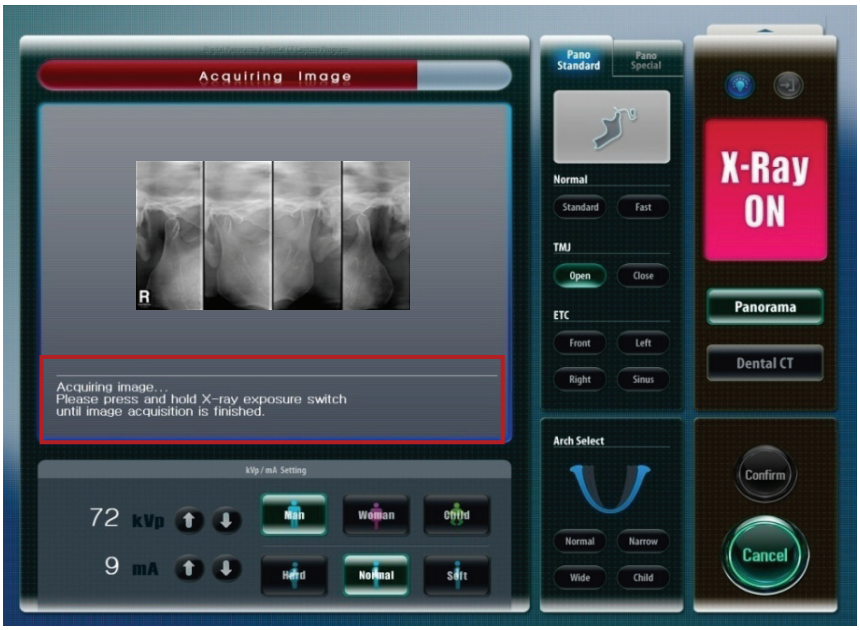
1. Leave the X-ray room and close the door. From outside of the X-ray room, you must consistently monitor and pay attention to the patient during acquisition.

WARNING

In cases of any problems, release the exposure switch button or press the red emergency stop button on the column.

2. After properly positioning the patient, click the **Ready** button.

3. Press and hold the exposure switch to capture image. When X-ray is being exposed, the progress bar will be changed from blue to red. Press and hold the exposure switch until the progress bar shows that the acquisition of image has been completed.



NOTE

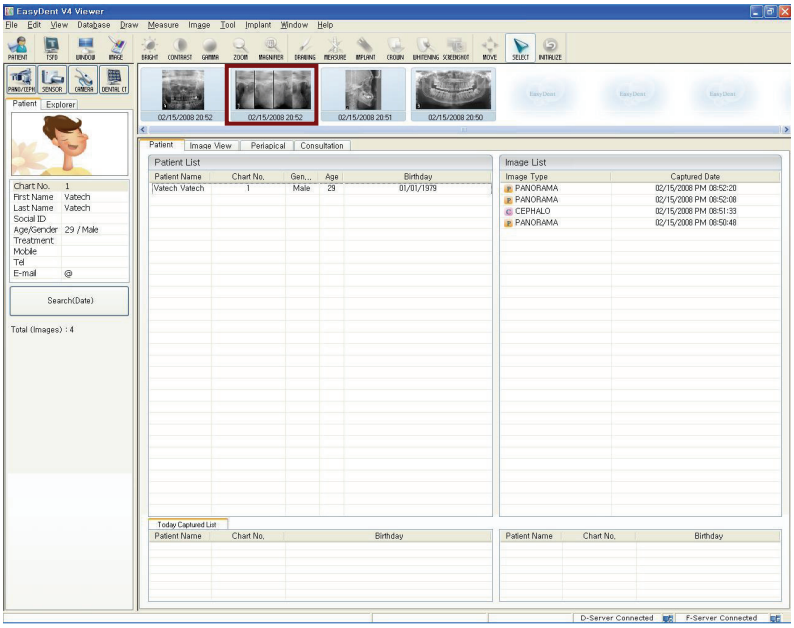
You should hold the exposure switch until the system finishes the acquisition of image.

4. The captured **TMJ Open/Close** image will be shown on the program after optimization.

5. If you want to capture the same patient again, click **OK**.

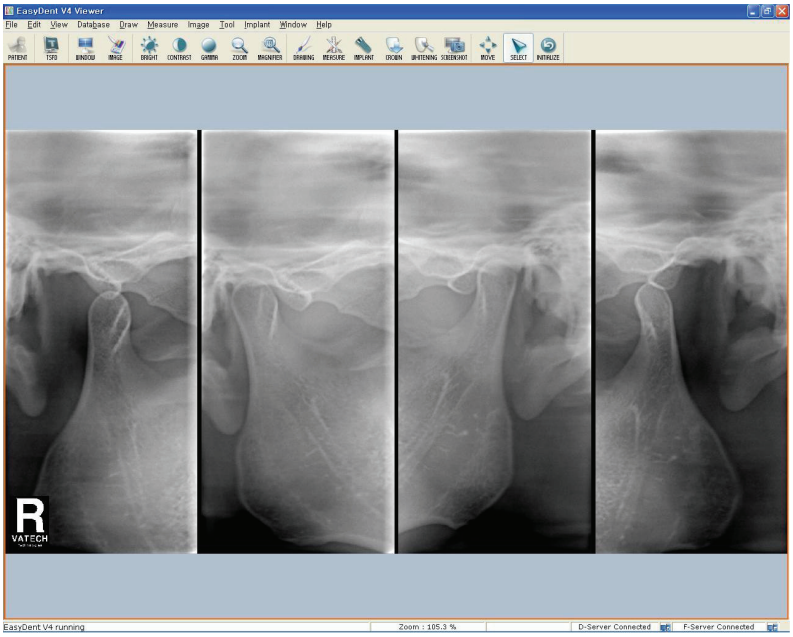
6. Click **OK** if you want to save the captured image to DB. Otherwise, click **Cancel**.

7. After imaging, when you click the name of the patient on the patient list of EasyDent V4, the image list will be rearranged. Thumbnail view of the recently captured TMJ image will appear on the left. Double-click on it to check the image in detail.



※ **Sample image**:

Final TMJ Open & Close images viewed through EasyDent.



5.3 Acquiring sinus image

From the Touchpad Screen, press the Position buttons to activate the three Laser Beams (Vertical Beam, Horizontal Beam, and Canine Beam).

5.3.1 Preparing the unit and setting the acquisition parameters

From the main screen on the PC, do the following procedures to prepare the parameters for a specific patient and mode.

1. Click the **Panorama**. Then the sensor will move to panoramic imaging initial position.
2. Click the **Pano Standard.**

3. Click the **Sinus** from mode selection pane.
4. Select the **Arch shape** for the patient-dependent feature among 4 different types.
5. Select the patient's gender among 3 selections - Man, Woman, Child.
6. Select the patient's bone density - Hard, Normal, Soft.
7. Adjust **kVp/mA** finely, if necessary.

NOTE

It is necessary to adjust exposure parameters manually to reflect the patient's unique features like structure of bone and its density. This is done through kVp/mA adjustment.
Refer to the look-up table for details.

8. Click the **Confirm** for those parameters to take effect. Then a message asking whether you want to use the metal removal function appear in the main window.

9. When the patient's tooth has Metal Artifact, you can still get a clean image if you select Metal mode.

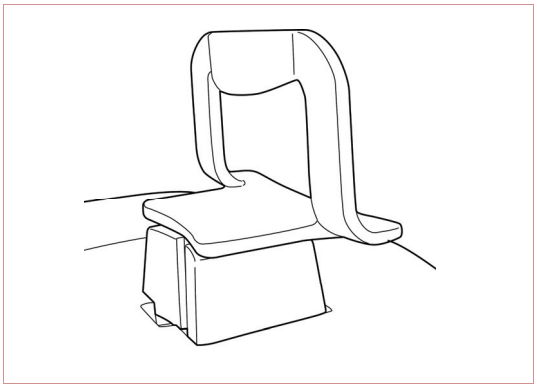
5.3.2 Preparing and positioning the patient

To prepare and position the patient, do follow the next steps.

IMPORTANT

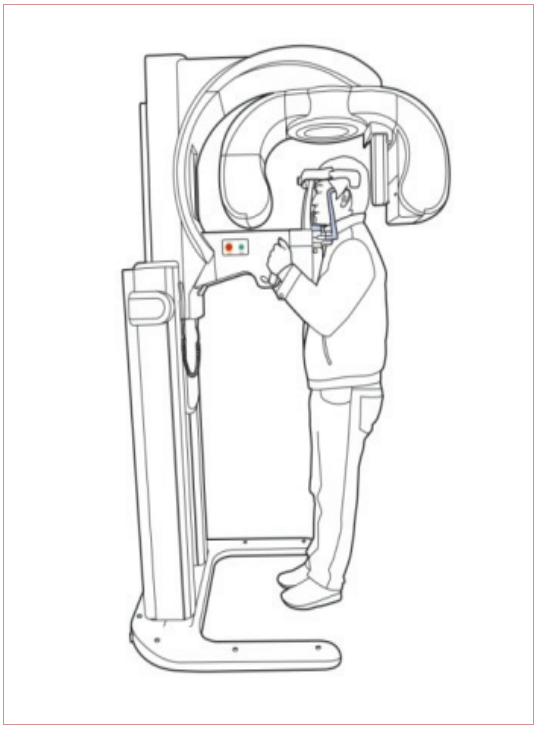
Correct posture is very important factor for the best image possible.
This is because it reduces the shadow of spinal column transferred to the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

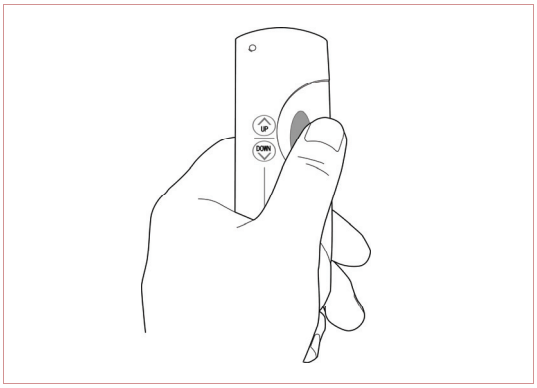


2. Insert the Chinrest (Sinus).

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

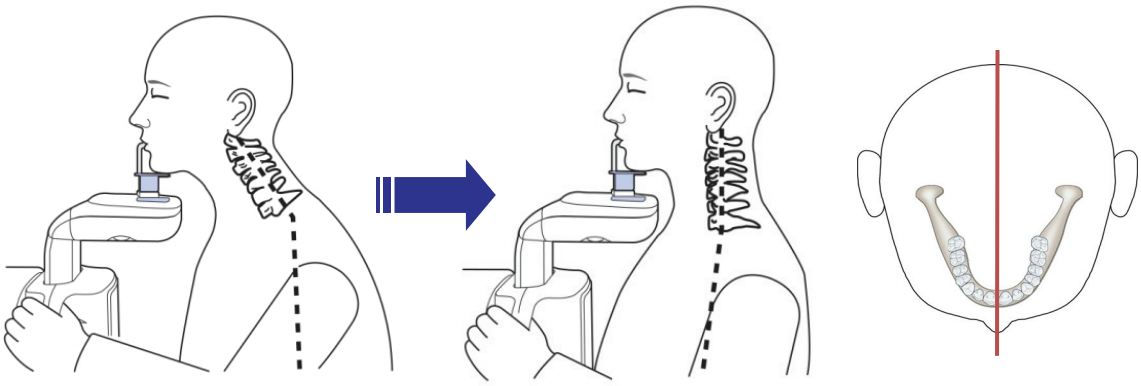


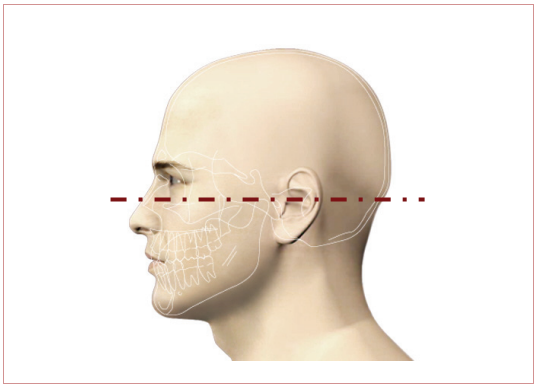
4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.



5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest. Position the patient's chin on the normal chinrest.

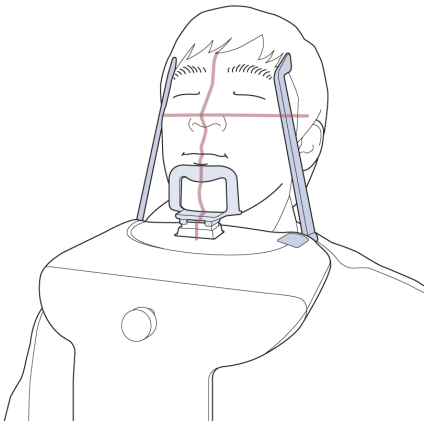
6. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.

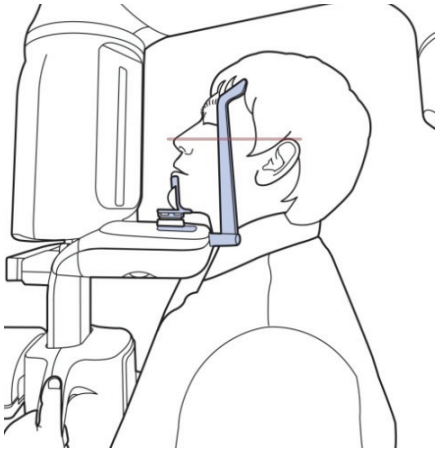


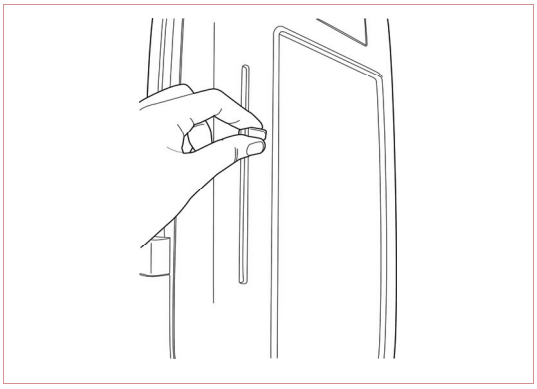


7. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).

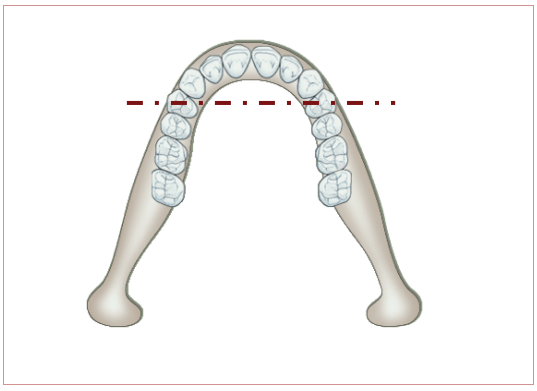
8. The horizontal light should fall on the tip of patient's nose. Therefore, you have to tilt the patient's head 10~15 degrees upward.







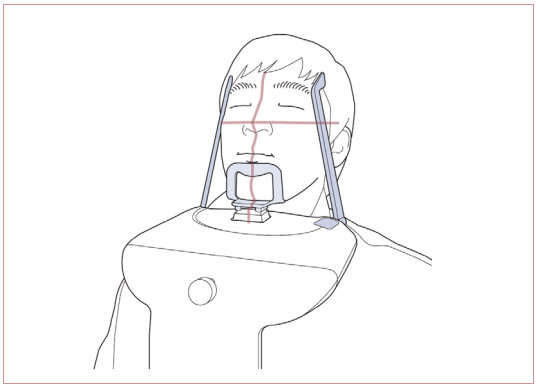
9. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.



10. Have the patient smile to properly position the canine laser beam at the center of the patient's premolars tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.

11. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

12. Have the patient close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.



13. Ensure that the patient's eyes are closed. Press and hold the exposure switch button until image acquisition is complete.

14. After properly positioning the patient, click the **Ready** button. The Rotating Unit automatically moves to panorama image capturing position.

15. All preparations for X-ray imaging are completed.

5.3.3 Launching the exposure and finishing acquisition

To launch the X-ray emission, do the following steps.

1. Leave the X-ray room and close the door. From outside of the X-ray room, you must consistently monitor and pay attention to the patient during acquisition.

WARNING **In cases of any problems, release the exposure switch button or press the red emergency stop button on the column.**

2. Press and hold the exposure switch to capture image. When X-ray is being exposed, the progress bar will be changed from blue to orange. Press and hold the exposure switch until the progress bar shows completed acquisition.

NOTE

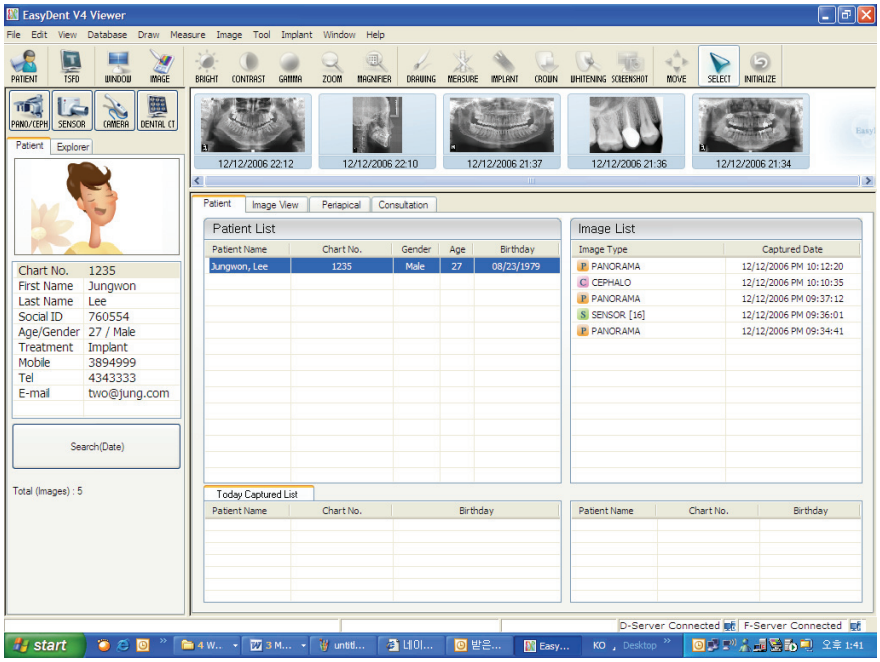
You should hold the exposure switch until the system finishes the acquisition of image.

3. After capturing, click ‘OK’ to save the image. If you want to cancel the captured image, click ‘Cancel’.

NOTE

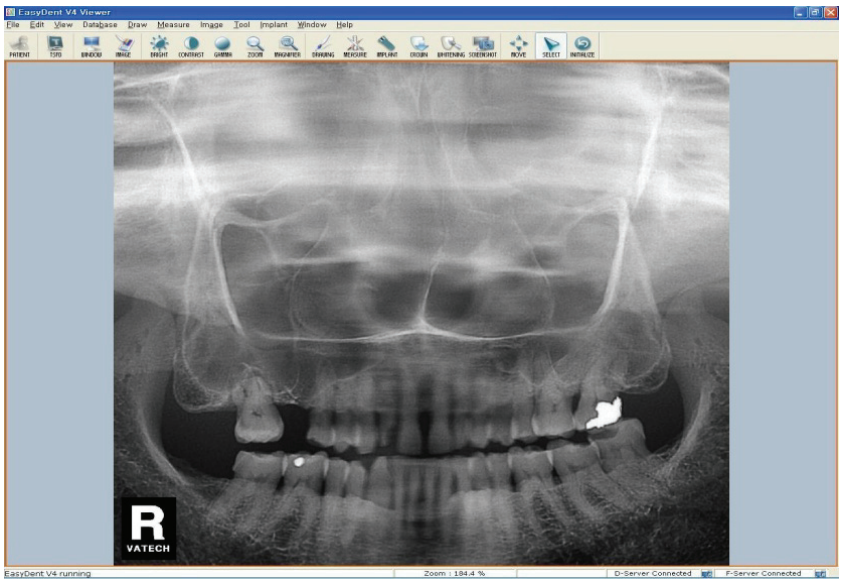
If you want to capture the same patient again, click ‘Ok’.

4. After imaging, when you click the name of the patient on the patient list of EasyDent V4, the image list will be rearranged. Thumbnail view of a recently captured image will appear on the left, as shown in the figure below. Double-click on it to check the image in detail.



※ Sample image:

Final sinus image viewed through EasyDent V4.



5.4 Acquiring panoramic special image

First, select a patient from the EasyDent Program of the PC. Execute the image capturing program, and then select the capturing mode for the patient.

5.4.1 Preparing the unit and setting the acquisition parameters

From the main screen on the PC, do the following procedures to prepare the parameters for a specific patient and mode.

1. Click the **Panorama**. Then the sensor will move to panoramic imaging initial position.
2. Click the **Pano Special**.

3. Select the **Pano Special** from mode selection pane.
4. Select the **Arch shape** for the patient-dependent feature among 4 different types.
5. Select the patient's gender among 3 selections - Man, Woman, Child.
6. Select the patient's bone density - Hard, Normal, Soft.
7. Adjust **kVp/mA** finely, if necessary.

NOTE

It is necessary to adjust exposure parameters manually to reflect the patient's unique features like structure of bone and its density. This is done through kVp/mA adjustment.
Refer to the look-up table for details.

8. Click the **Confirm** for those parameters to take effect. Then a message asking whether you want to use the metal removal function appear in the main window.

9. When the patient's tooth has Metal Artlfact, you can still get a clean image if you select Metal mode.

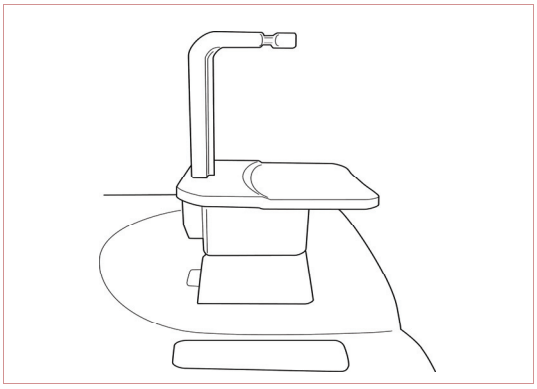
5.4.2 Preparing and positioning the patient

To prepare and position the patient, do follow the next steps.

IMPORTANT

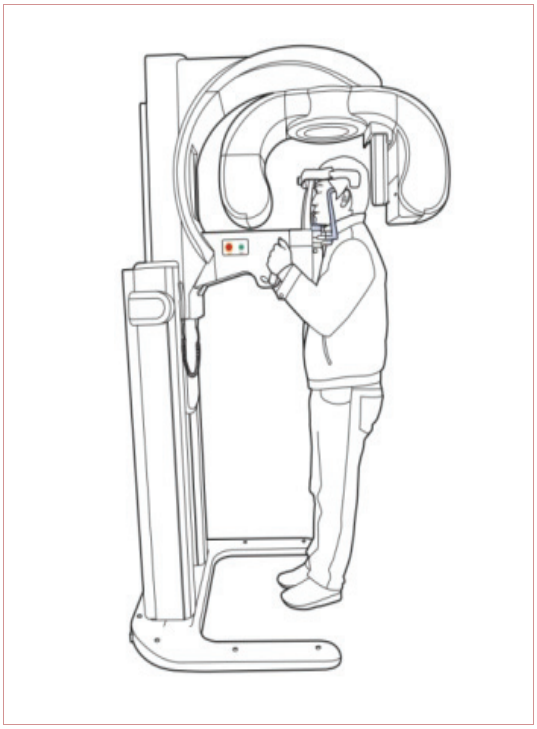
Correct posture is very important factor for the best image possible.
This is because it reduces the shadow of spinal column transferred to the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

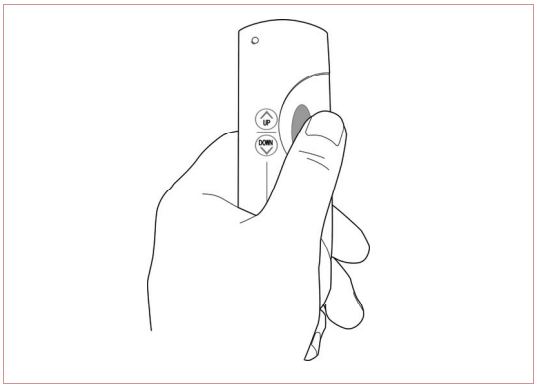


2. Insert the normal chinrest and bite block in the unit's chinrest receptacle. Place a hygienic cover over the bite block.

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

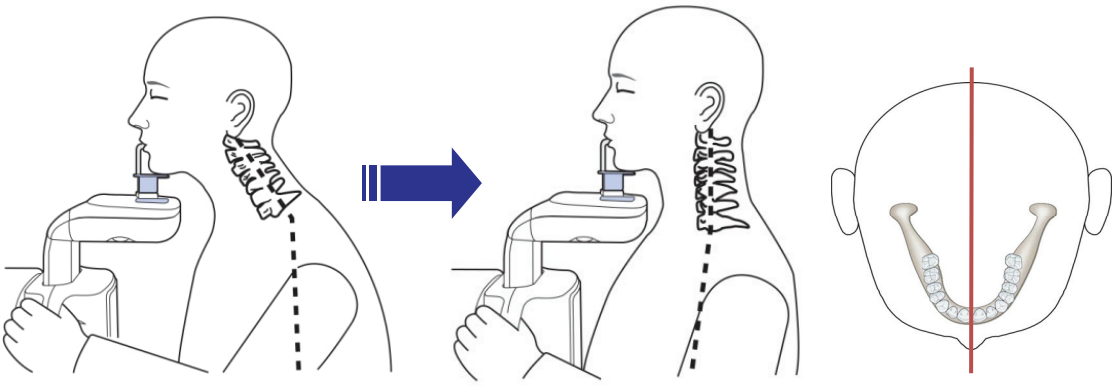


4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.

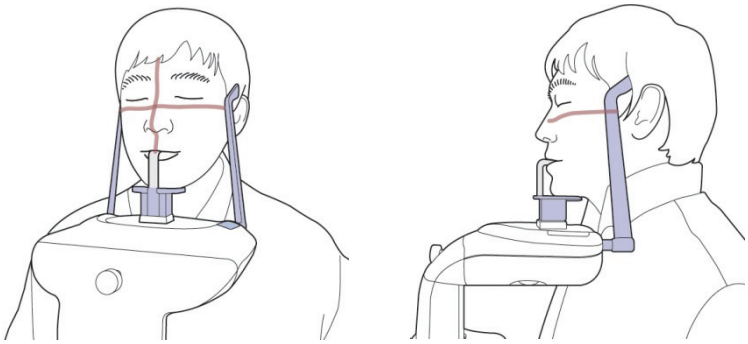


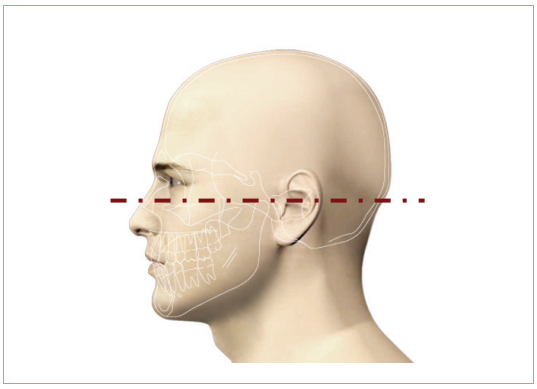
5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest. Position the patient's chin on the normal chinrest.

6. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.

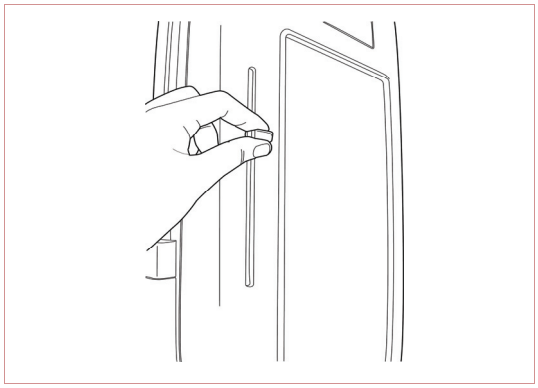


7. Have the patient bite the bite block along the grooves using their upper incisor. Ensure that the chin is in good contact with the chinrest.



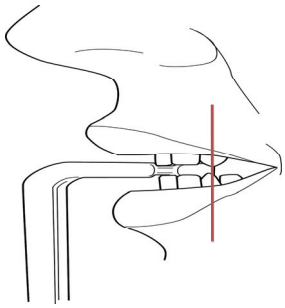


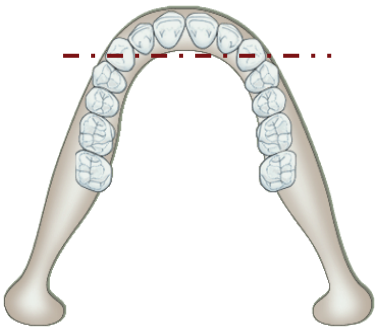
8. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).

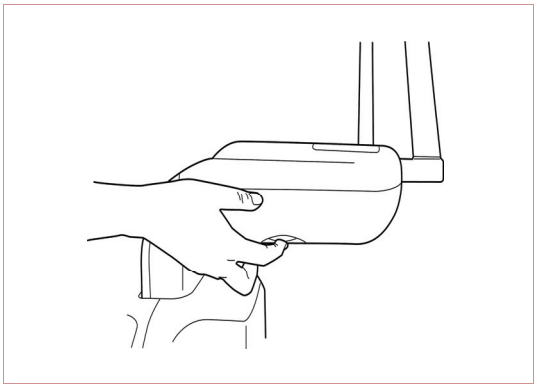


9. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

10. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.





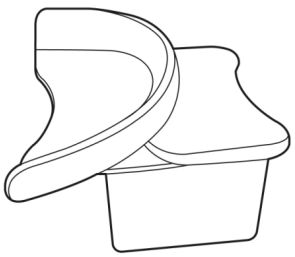


11. To adjust the canine beam position, rotate the canine beam adjuster that is located at the lower rear part of the patient chinrest.

12. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

13. Have the patient close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.

14. For a patient with no teeth, the vertical laser beam should be positioned on the patient's mid-sagittal line. The horizontal laser beam should be aligned along the Frankfort plane. Align the canine beam on the fold on the side of the nose.



15. Ensure that the patient's eyes are closed. Press and hold the exposure switch button until image acquisition is complete.

16. After properly positioning the patient, click the **Ready** button. The Rotating Unit automatically moves to panorama image capturing position.

17. All preparations for X-ray imaging are completed.

5.4.3 Launching the exposure and finishing acquisition

To launch the X-ray emission, do the following steps.

1. Leave the X-ray room and close the door. From outside of the X-ray room, you must consistently monitor and pay attention to the patient during acquisition.

WARNING

In cases of any problems, release the exposure switch button or press the red emergency stop button on the column.

2. Press and hold the exposure switch to capture image. When X-ray is being exposed, the progress bar will be changed from blue to orange. Press and hold the exposure switch until the progress bar shows that the acquisition of image has been completed.

NOTE

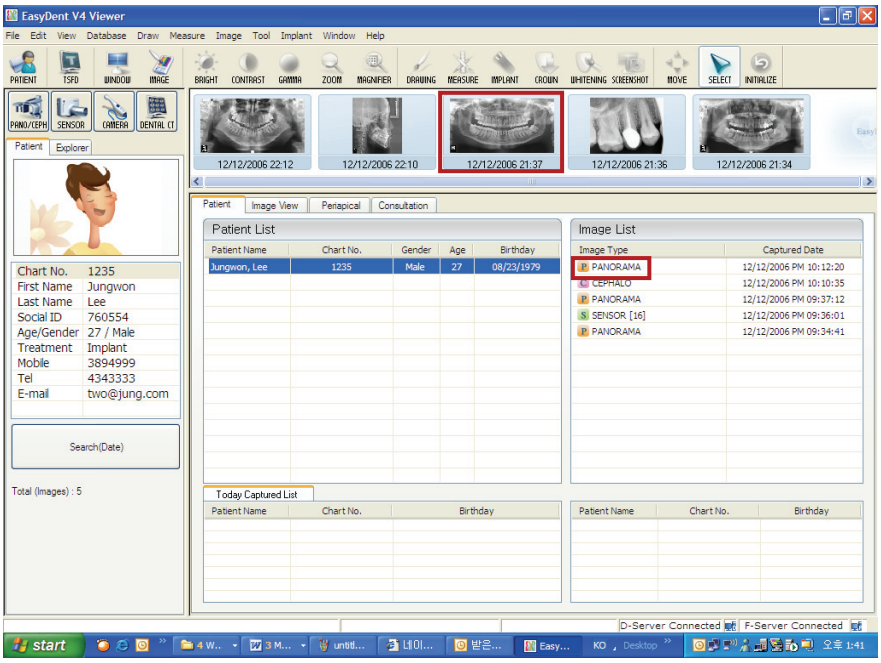
You should hold the exposure switch until the system finishes the acquisition of image.

3. After capturing, click **OK** to save the image. If you want to cancel the captured image, click **Cancel.**

NOTE

If you want to capture an image of the same patient again, click 'Ok'.

4. After imaging, when you click the name of the patient on the patient list of EasyDent V4, the image list will be reconfigured. Thumbnail view of a recently captured image will appear on the left, as shown in the figure below. Double-click on it to check the image in detail.

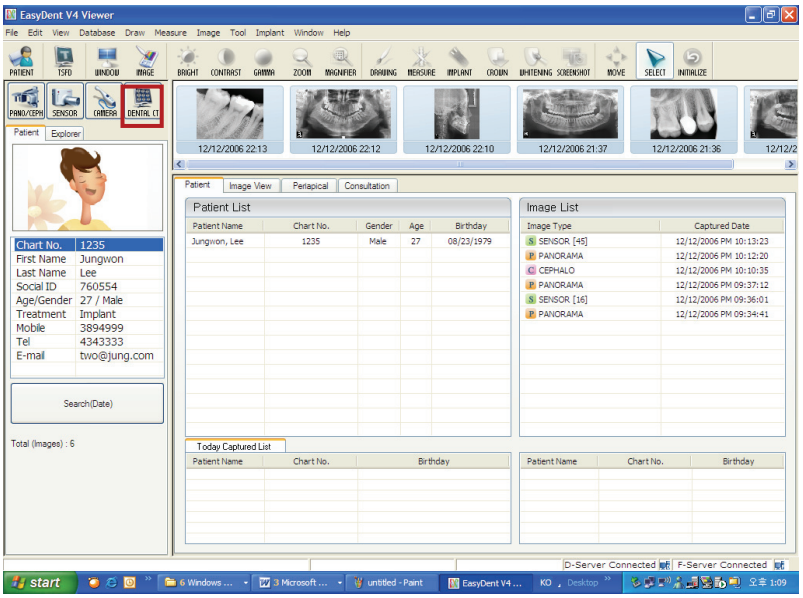


Chapter 6 Acquiring CT images

6.1 Dental CT imaging procedure

1. Turn on the power of PaX-Duo3D.
2. Execute EasyDent V4 program to search for and select the patient for imaging.
3. Click **Dental CT**(

) icon on the upper left of the main screen to execute the imaging program.



NOTE

An unregistered patient should be registered first before capturing an image. For more information, please refer to EasyDent V4 program user's manual, which is prepared separately.

WARNING

Do not operate the system and the capture program while the PC is initializing its communication with the sensor. Failure of observing this warning requirement may cause severe damages to the system.

4. Click **Dental CT**, and the sensor will automatically be switched from panoramic sensor to CT sensor. And the following figure will appear.

5. Select the FOV size and capturing mode. Adjust the kVp, mA. Then choose the patient's bone density, and arch figure.

A. 50x50mm

B. 85x50mm

C. 85x85mm

D. 120x85mm

NOTE

Image Reconstruction Time <Applied Xmaru1215CF Sensor>

FOV Mode	Voxel Size	Scan time	Recon time (sec)	Reconstruction time (Metal function)
S (120X85)	0.2*0.2*0.2	High (24 sec)	40	It takes twice the time compared to reconstruction without metal function.
		Normal (15sec)	31	
S (85X85)	0.16*0.16*0.16	High (24 sec)	39	
		Normal (15sec)	30	
S (85X50)	0.12*0.12*0.12	High (24 sec)	32	
		Normal (15sec)	25	
S (50X50)	0.08*0.08*0.08	High (24 sec)	59	
		Normal (15sec)	50	

*** Image reconstruction time can be changed by computer specification and/or its working condition.**

*** Computer: HP Workstation XW 4600, Windows XP ENG, 2GB RAM, ATI HD 4850(512MB) RAM.**

NOTE

Image Reconstruction Time <Applied Xmaru1524CF Sensor>

FOV Mode	Voxel Size	Scan time	Recon time (sec)	Reconstruction time (Metal function)
S (150X135)	0.25*0.25*0.25	High (24 sec)	122	It takes twice the time compared to reconstruction without metal function.
		Normal (15sec)	110	
S (120X85)	0.2*0.2*0.2	High (24 sec)	55	
		Normal (15sec)	47	
S (85X85)	0.16*0.16*0.16	High (24 sec)	52	
		Normal (15sec)	43	
S (50X50)	0.08*0.08*0.08	High (24 sec)	56	
		Normal (15sec)	46	

*** Image reconstruction time can be changed by computer specification and/or its working condition.**

*** Computer: HP Workstation XW 8600, Windows XP ENG, 2GB RAM, GTX 260(896MB) RAM.**

6. Click the **Confirm** button. Then, the chinrest will move to the selected position.

7. Choose **Metal** if you want to reduce metal artifact from the acquired image. The metal artifact reduction fuction is the most effective when the patient has less than 2 metals.

8. Select an image **Quality mode** (Normal or High).

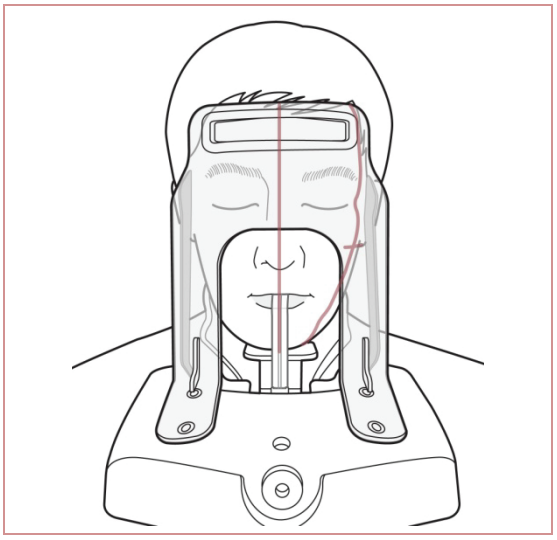
9. Guide the patient to the X-ray room to set position. Please follow the position guide as stated below.

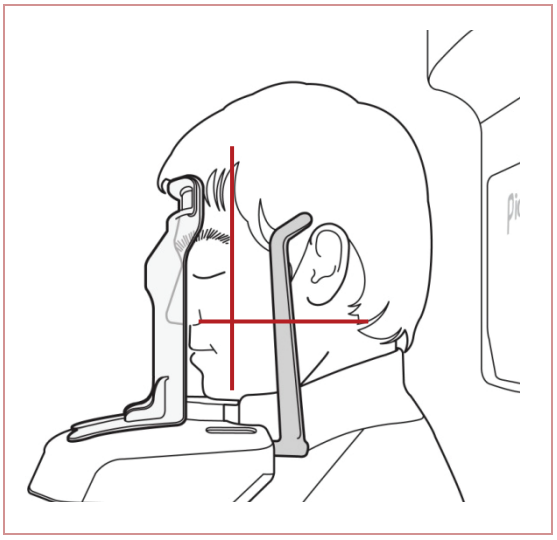
6.2 Patient positioning

WARNING

To avoid moving artifact, the patient must not move during the capturing process and the head should be secured with the headrest.

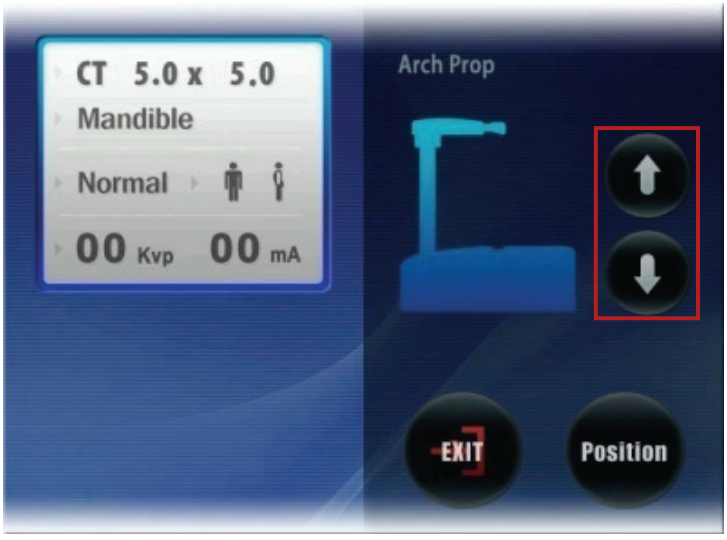
6.2.1 Maxillary capture mode



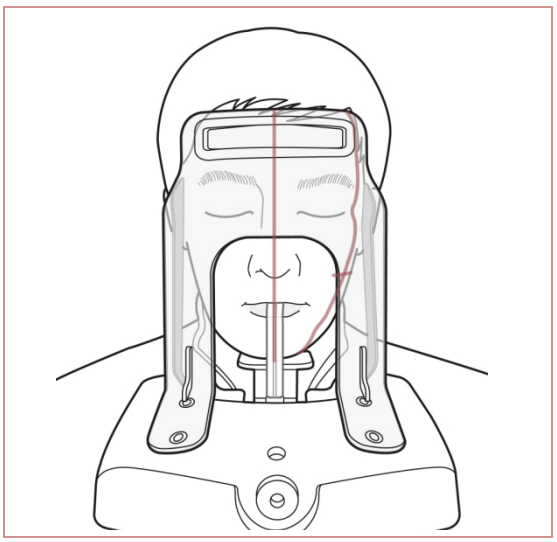


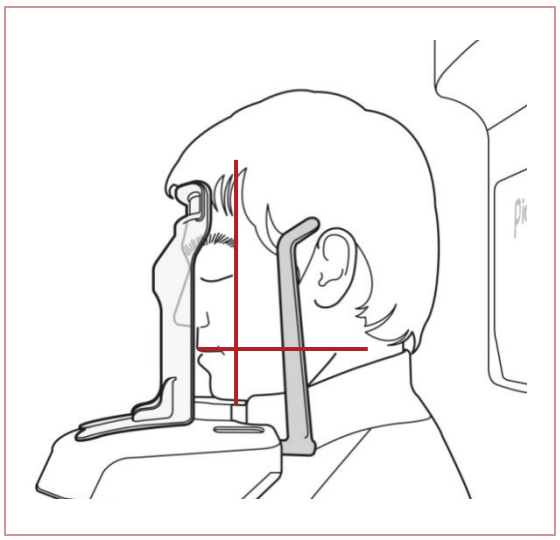
① When the Maxillary capture mode is selected, the chinrest will move automatically to the proper position.

② To focus on the maxillary area, the horizontal light should be aligned at 1.5cm above the patient's occlusion. Adjust the height of the chinrest through the **Touchpad Screen**, if necessary.



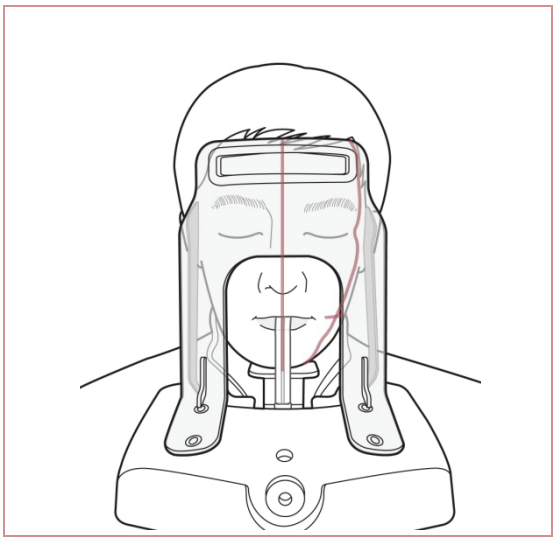
6.2.2 Occlusion capture mode

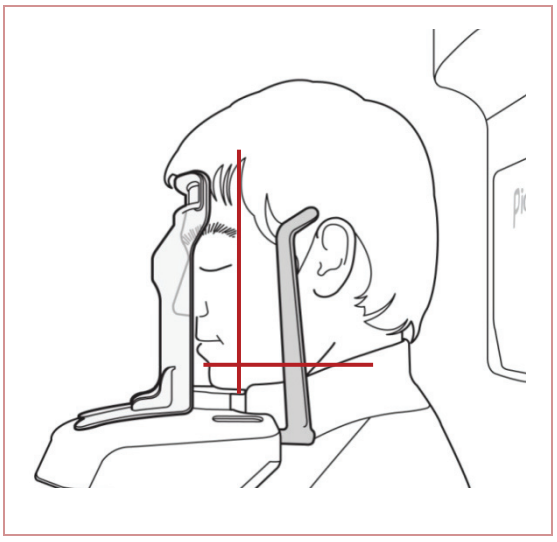




① When the **Occlusal** capture mode is selected; the chinrest will move automatically to the proper position. Then adjust the highs of the chinrest through with the **Touchpad Screen**.

6.2.3 Mandible capture mode



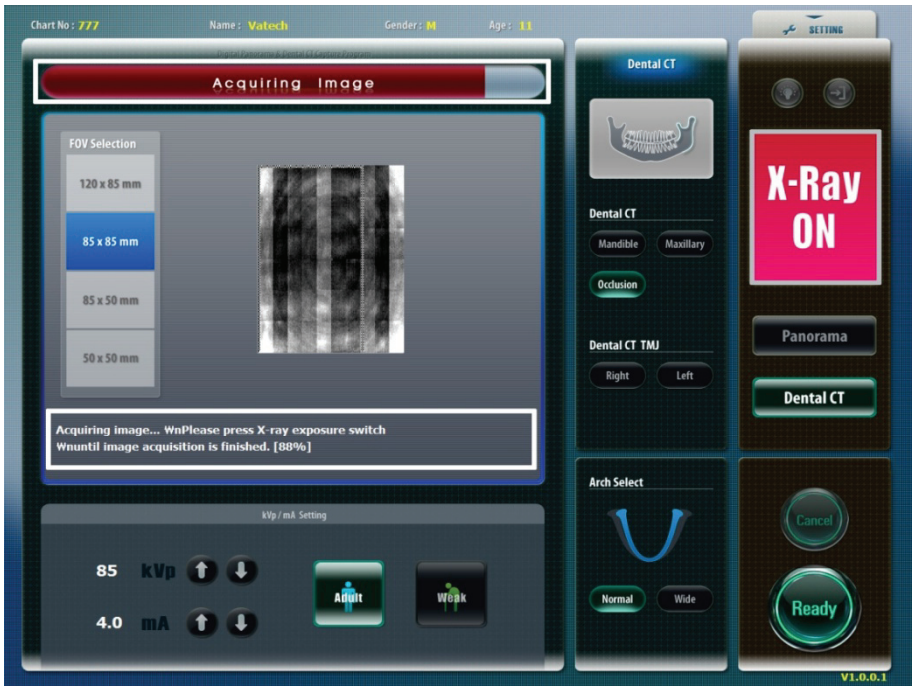


① When the **Mandible** capture mode is selected; the chinrest will move automatically to the proper position. Then adjust the highs of the chinrest through with the **Touchpad Screen.**

② To focus on the mandible area, the horizontal light should be aligned at 1.5cm below the patient's occlusion. Adjust the highs of the chinrest through **Touchpad Screen**.

10. Click the **Ready** button after properly positioning the patient.

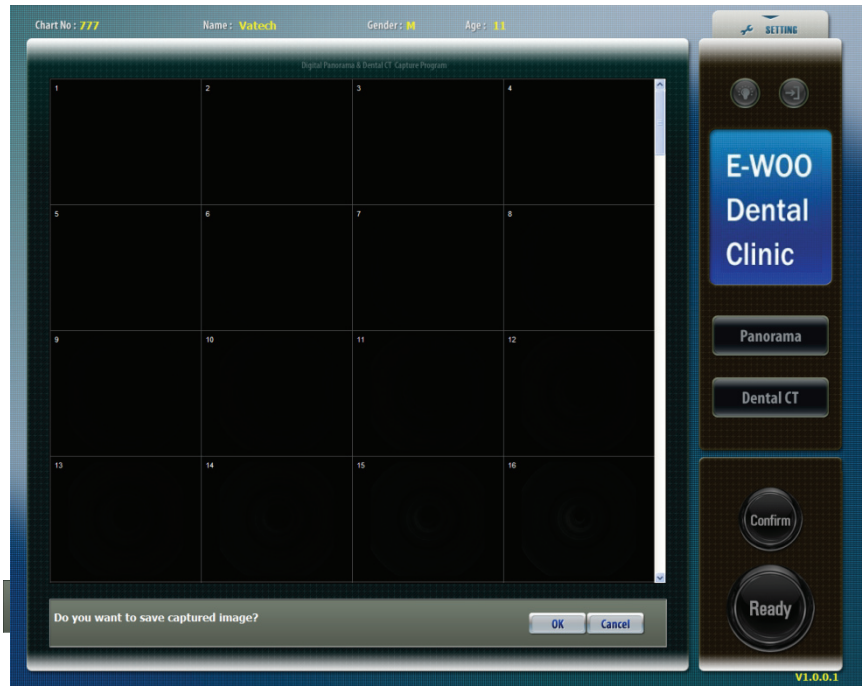
11. Press and hold the exposure switch to start image capturing according to the guidance message. You should see the active progressive bar. The captured image will be reconstructed. Wait until the program completes the image reconstruction.

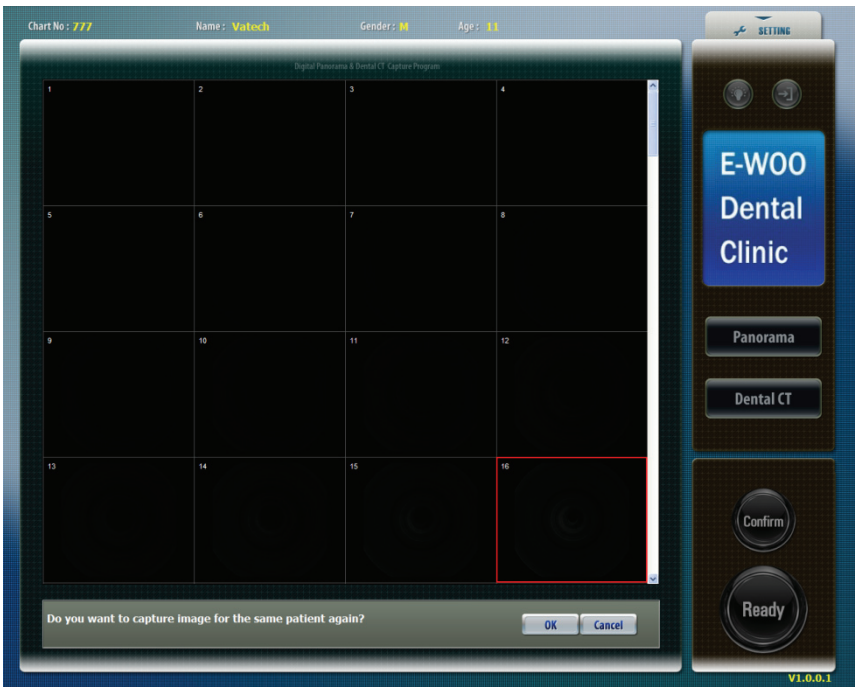


NOTE

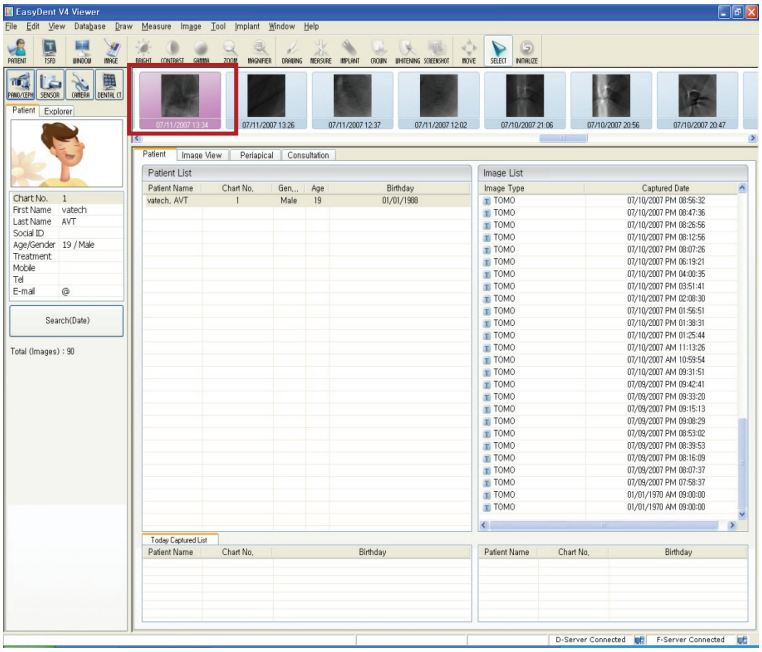
You should hold the exposure switch until the system finishes the acquisition of image.

12. Click **OK** to save the captured image. If you want to cancel the captured image, click **Cancel**.



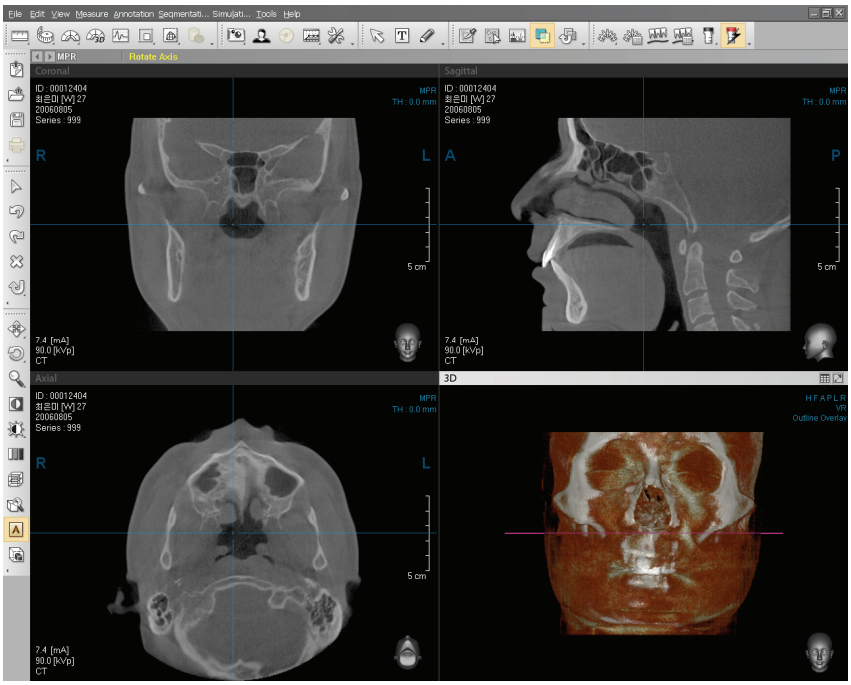


13. After imaging, when you click the name of the patient on the patient list of EasyDent V4, the image list will be reconfigured. Thumbnail view of a recently captured image will appear on the left, as shown in the figure below.



14. To check the image in detail, double-click on it and Ez3D2009, the CT viewer program will be run automatically.

<Viewing on the **Ez3D2009** program>



6.3 Operation after imaging

Once you are done with all the imaging procedures, check the following:

6.3.1 Cooling time

Cooling time is a process for the tube of the system to cool down. After imaging, the **cooling time** message will be shown on the capture program. After a few seconds, a voice guidance message will be heard telling that the cooling time is finished.

6.3.2 Move the rotator to lamp position

To move the rotator to lamp position, push the return button on the LCD touch screen after the cooling time.

Appendix 1 Auto-focusing capability (Optional)

The **PaX-Duo3D** incorporates the capability of auto-focusing the objects(patients), thus leading to the acquisition of much improved image free from the patient's faulty position and arch shape. This is made possible by the VATECH's proprietary adaptive layer mode panoramic tomography algorithm.

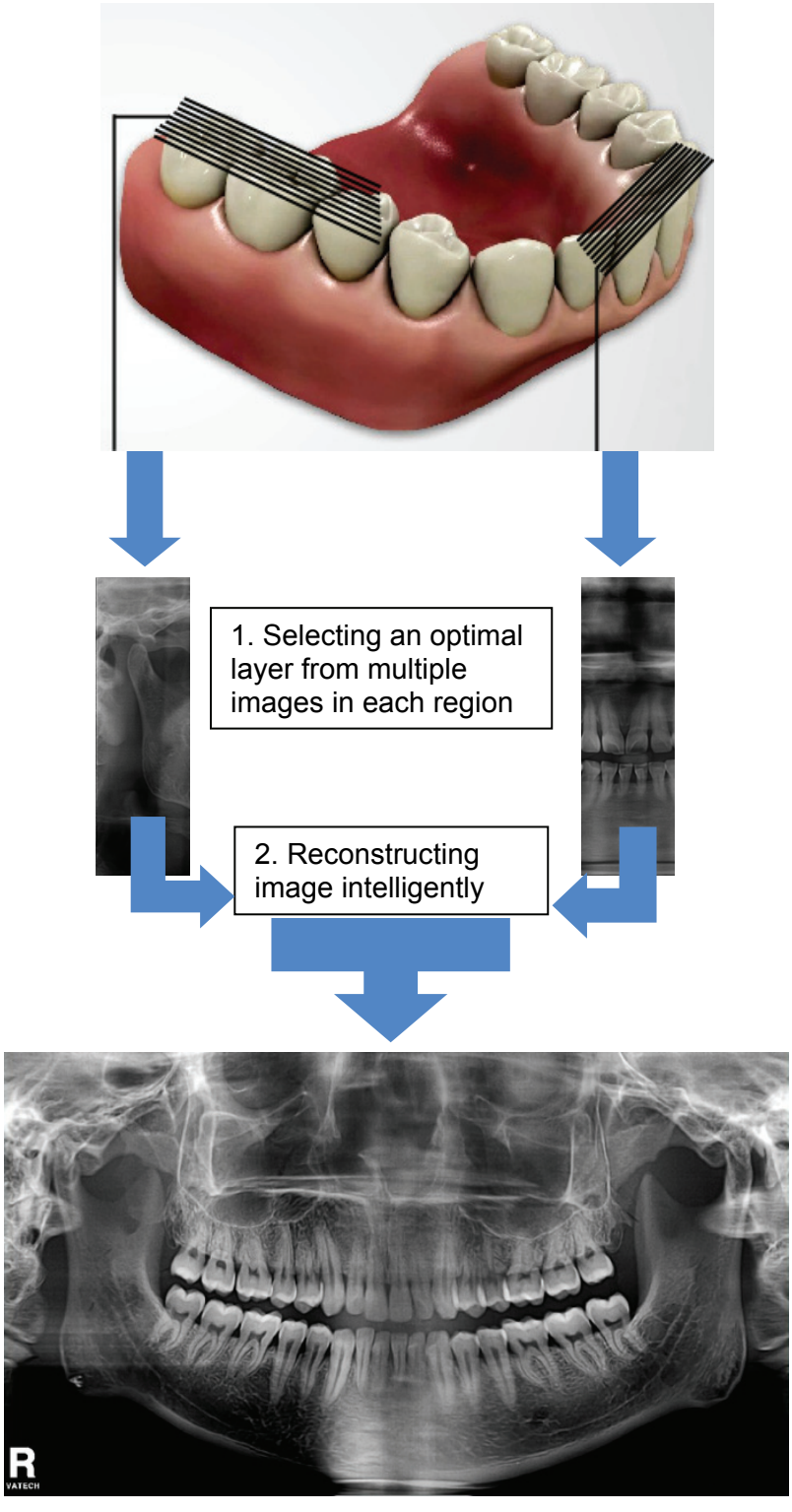
1.1 Imaging modes that support auto focusing capability

Mode		Arch Selection
Pano Standard	Normal (Standard)	Normal
		Wide
		Narrow
		Child
	Normal (Fast)	Normal
		Wide
		Narrow
		Child
Pano Special	Orthogonal	

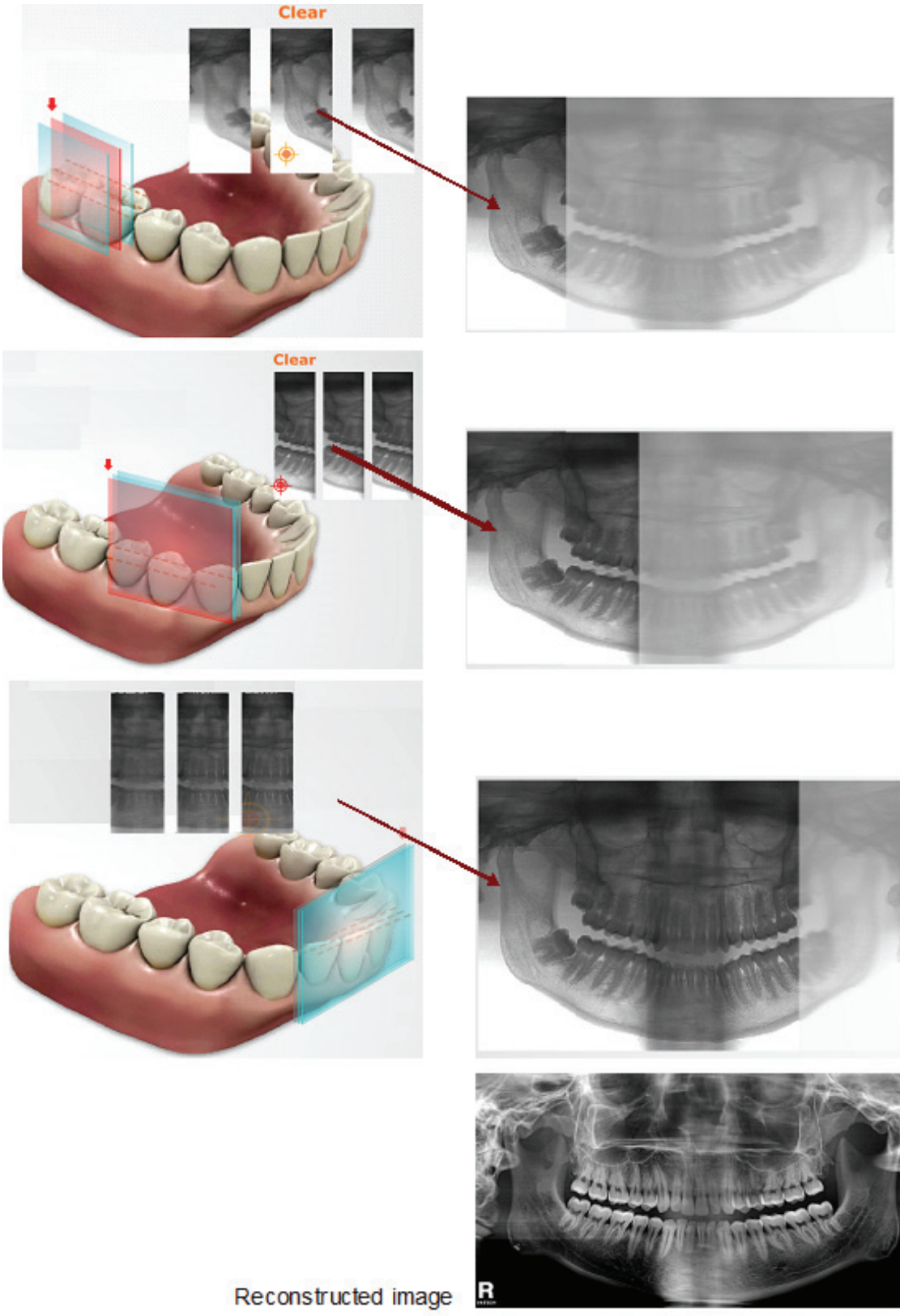
1.2 Reconstruction procedures

1. Acquire the multiple layers of the images in a region.
2. Select the best single layer closest to center of the patient teeth among them.
3. Place the optimal image layer on the appropriate region of interest.
4. Repeat 1 trough 3 until the entire region of the arch is scanned and imaged.
5. After internal manipulation for the further processing, the final reconstructed image is acquired.

1.3 Graphical explanation



<Typical example>

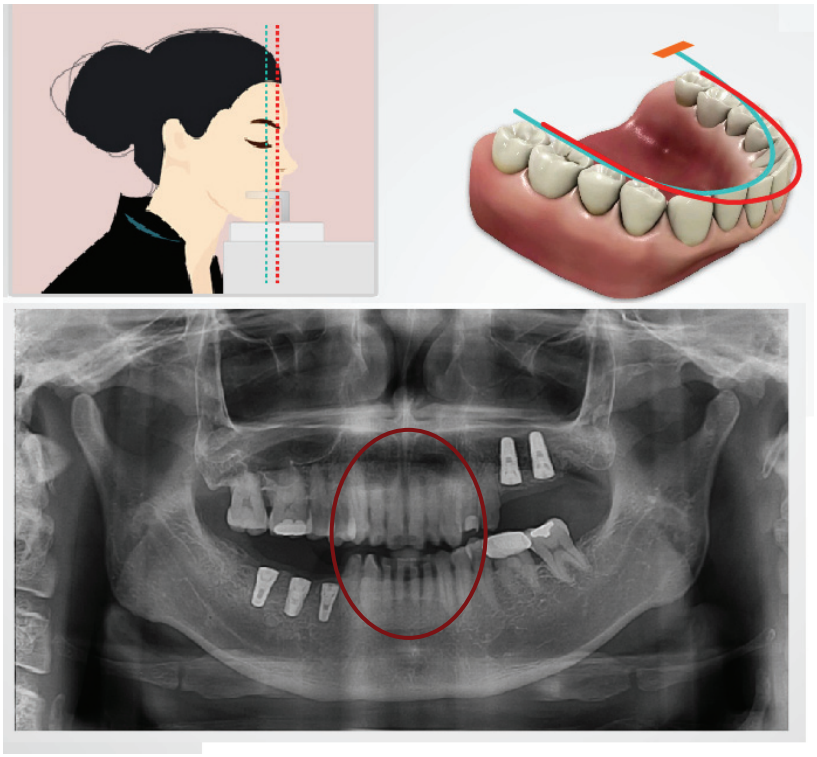


1.4 Comparisons between Standard and Auto-focusing imaging

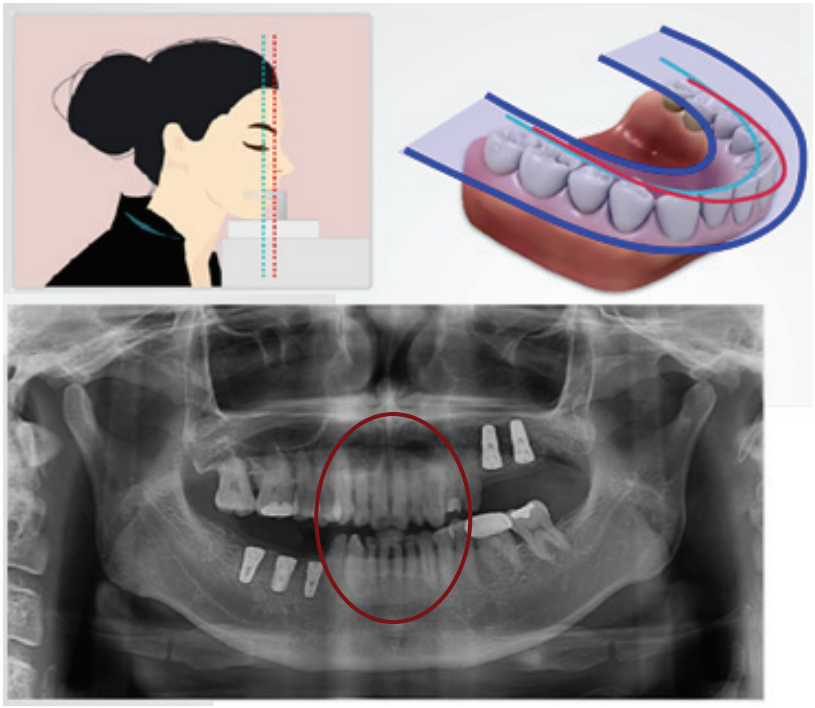
Case 1: Front teeth view is contracted

Circumstance: The bite block was inserted too deep into the mouth

<Standard (with the auto focusing disabled)>



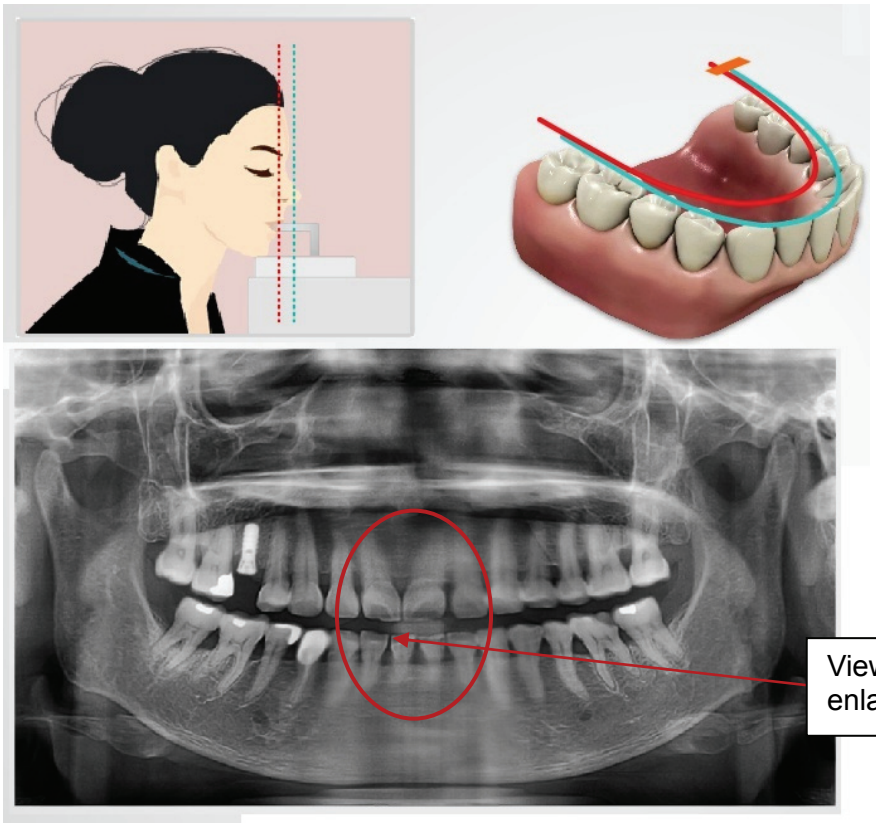
<Auto focusing enabled>



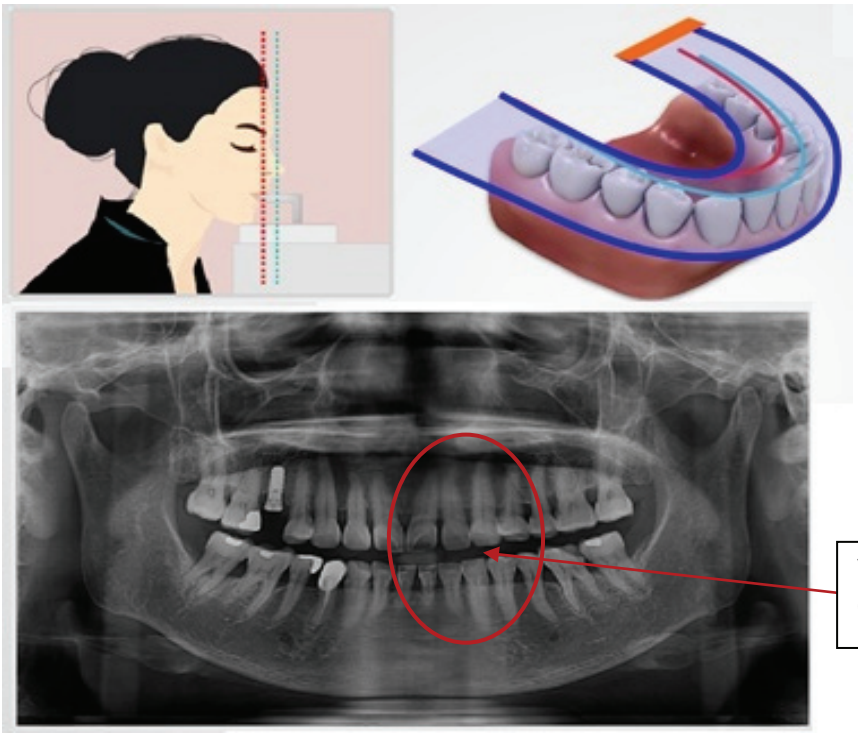
Case 2: Front teeth view is enlarged locally

Circumstance: the patient is positioned off the correct position

<Standard (with the auto focusing disabled)>



<Auto focusing enabled>



Appendix 2 Technical specification

2.1 Computed tomography detector

<Applied Xmaru1215CF Sensor>

- Technology CMOS photodiode array (Active Pixel Sensor: APS)
- Pixel size 200 ㎛
- Voxel size

FOV Mode (mm)	Voxel Size (mm)	Scan time (sec)	Data Size (MB)	Voxel Number
(120X85)	0.2*0.2*0.2	High (24 sec) Normal (15 sec)	291	600*600*424
(85X85)	0.16*0.16*0.16	High (24 sec) Normal (15 sec)	287	532*532*532
(85X50)	0.12*0.12*0.12	High (24 sec) Normal (15 sec)	397	708*708*416
(50X50)	0.08*0.08*0.08	High (24 sec) Normal (15 sec)	463	624*624*624

- Frame rate 30 fps
- Gray scale 14 bits
- Active area 144 mm * 121.6 mm
- Limiting Resolution 2.5 lp/mm in detector space

<Applied Xmaru1524CF Sensor>

- Technology CMOS photodiode array (Active Pixel Sensor: APS)
- Pixel size 200 ㎛

- Voxel size

FOV Mode (mm)	Voxel Size (mm)	Scan time (sec)	Data Size (MB)	Voxel Number
(150X135)	0.25*0.25*0.25	High (24 sec) Normal (15 sec)	721	748*748*676
(120X85)	0.2*0.2*0.2	High (24 sec) Normal (15 sec)	291	600*600*424
(85X85)	0.16*0.16*0.16	High (24 sec) Normal (15 sec)	288	532*532*532
(50X50)	0.08*0.08*0.08	High (24 sec) Normal (15 sec)	463	624*624*624

- Frame rate 30 fps
- Gray scale 14 bits
- Active area 144 mm * 241.6 mm
- Limiting Resolution 2.5 lp/mm in detector space

2.2 Panoramic image detector

- Technology CMOS sensor with Cesium Iodie (CsI) scintillator screen.
- Pixel size 100 ㎛
- Active area 6 mm * 150.4 mm
- Limiting Resolution 5 lp/mm
- Gray scale 14 bit

2.3 Computed tomography examination programs

- 3-D Volume Rendering
- Axial View / Coronal View / Sagittal View / Cross-Sectional View / Panoramic View
- MPR – Multi-Planar Reconstruction
- Region of Interest [ROI] – Analysis Bone Density [Hounsfield Units]
- Normal, Metal Artifact Reduction

2.4 Panoramic examination programs

In each program the compensation for the spinal column is obtained by means of exposure parameter modulation, optimized in accordance with the selected anatomic program.

- Normal Panoramic
- Fast Scan Panoramic
- Hemi-Panoramic (Left and Right)
- Frontal Dentition
- TMJ Open/Close mouth: 4 views [Right Open–Right Close–Left Close–Left Open] are taken on the same image
- Maxillary Sinus
- Normal, Metal Artifact Reduction

2.5 Anatomic programs

- Patient Type : CT - adult, weak
- Examination Region : **Applied Xmaru1215CF Sensor**
  CT (FOV, mm*mm) - 120*85, 85*85, 85*50, 50*50
  Applied Xmaru1524CF Sensor
  CT (FOV, mm*mm) -150*135, 120*85, 85*85, 50*50
  Pano – Normal, Left, Right, Center, TMJ
- Arch Shape : Pano – normal, narrow, wide, child

2.6 Additional filter

- Xmaru1215CF sensor: 5mm Aluminum filtered
- Xmaru1524CF sensor: 0.5mm copper filtered

2.7 Frame grabber

- Xmaru1215CF sensor: Anygrabber grabber
- Xmaru1524CF sensor: National Instrument(N.I) grabber

2.8 Image magnification

- CT Examination Programs 1.60:1
- Panoramic Examination Programs 1.30:1

2.9 FOD, ODD, FDD(mm)

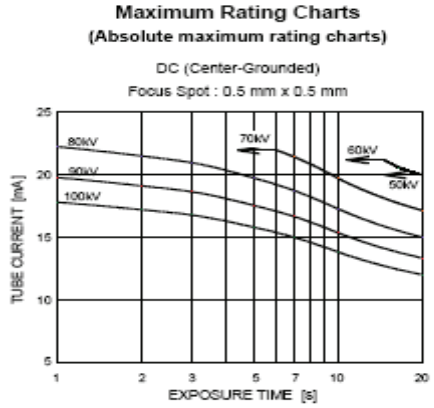
Mode	FOD (Focal Spot to Object Distance)	ODD (Object to Detector Distance)	FDD (Focal Spot to Detector Distance)
CT	437.5	262.5	700
PANO	465.5	144.3	609.8

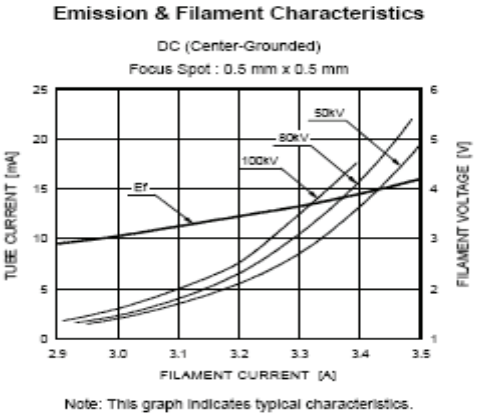
2.10 X-ray generator

- X-ray Beam Formation — Cone Beam
- High frequency generator, constant potential, micro processor controlled
- Ripple — < 5.5%
- Tube type — D-051, stationary anode type
- Tube voltage — 50 – 90 kV
- Tube current — 2 – 10 mA
- High voltage — DC
- Exposure time

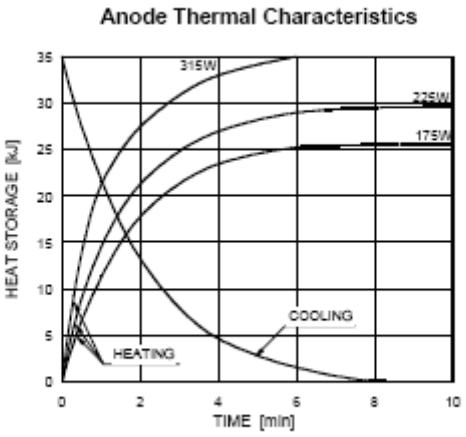
Panoramic Examination Programs

Standard Panoramic Adult/Child	13.5 sec / 12.0 sec
Hemi-Panoramic (Left and Right)	6.8 sec
Frontal Dentition	10.6 sec
TMJ Open/Close mouth	11.2 sec (4 * 2.8 sec)
Maxillary Sinus	11.0 sec





Note: This graph indicates typical characteristics.



2.11 X-ray tube

- Focal spot: 0.5 mm
- Heat storage capacity 35kj(40kHu)
- Total filtration: 2.8 mm Al

2.12 Collimator

- Primary collimator Changeable by FOV Size
  Motorized positioning for PANO

2.13 Environmental characteristics

- Operating temperature 10 ~ 30℃
- Operating relative humidity 30 ~ 75%
- Operating atmospheric pressure 700 ~ 1060 hPa
- Transport and storage temperature -20 ~ 70℃
- Transport and storage relative humidity < 90% non-condensing
- Transport and storage atmospheric pressure 500 ~ 1060 hPa

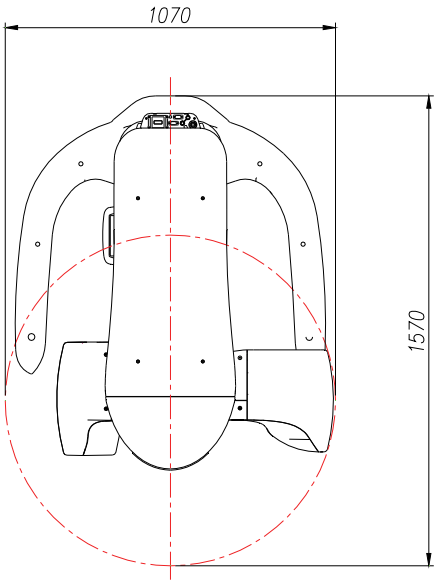
2.14 Electrical characteristics

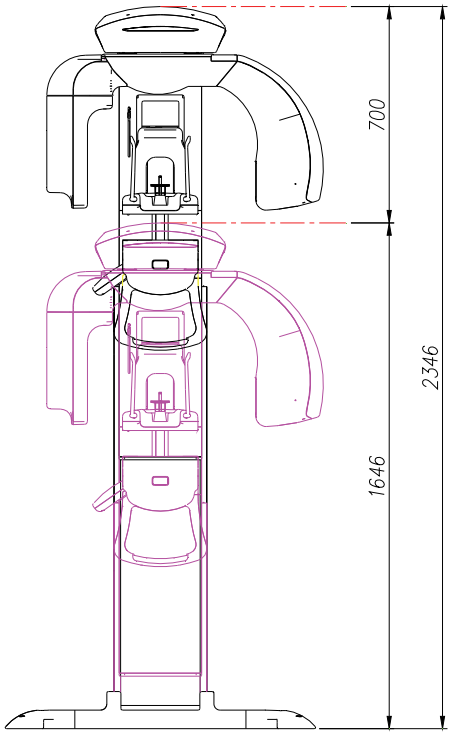
- Power supply voltage — AC 110/230V ± 10%
- Frequency — 50/60 Hz
- Power rating — 2KVA

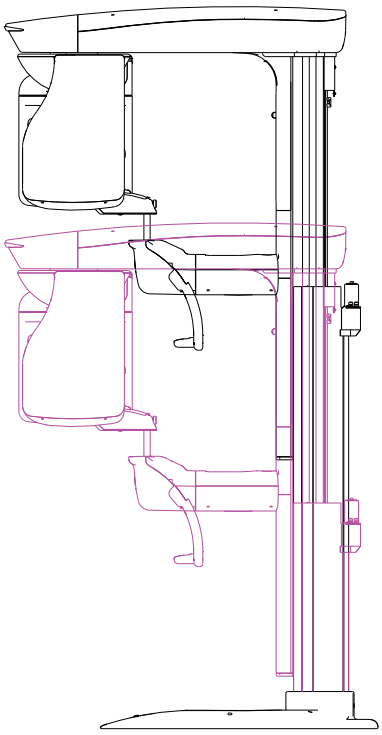
2.15 Mechanical characteristics

- Source to Image distance [Focal spot to Sensor]
  - Computed Tomography — 700 mm
  - Panoramic — 609.8 mm
- Vertical column movement — Max. 700 mm
- Vertical column movement — Max. 700 mm
- Total Weight — 220.00 kg
- Total height — 2,346 mm
- Length x Width — 1070 x 1570
- Type of installation — Base Stand

2.16 Dimentions(Indicated in mm)







Appendix 3 Maintenance

3.1 Storage and transportation

- Ambient temperature: -**20**℃ **~ 50**℃
- Relative humidity: 10%~ 90%
- Ambient, atmospheric pressure: 500~1060 hPa
- Although it can be allowed to be stored up to 10 degree of slope, it is recommended that equipment be used and stored on flat, even surface.

3.2 Sterilization and disinfection

- Sterilization and disinfection should be performed thoroughly for the items like handle frame, chin rest and bite block among other things, with which patients' contacts frequently are made.
- Disinfect the affected area with 2% ammonia solution and in particular the bite block used by previous users should be sterilized for more than 15 min. at **121**℃.
- Ultrasonic cleansing, if necessary, should be carried out.

3.3 Regular maintenance and treatment

- Don't unplug various kinds of cables by force.
- Don't keep equipments or items susceptible to water or humidity.
- Keep those in places not affected by temperature, ventilation, sun light, dust, salt and so forth.
- Avoid the area vulnerable to some degree of slope, vibration and shock.
- Avoid area near to chemical storage and gas-filled storage.
- Keep miscellaneous materials well organized for next use.
- In case of cleaning equipment, wipe gently the surface with soft, dry tissue evenly
  In extreme case of water or any forms of liquid being spilled into the inside equipment, turn off equipment immediately and ask help for a qualified person.

3.4 Regular check-up

- Equipment and components should be maintained on regular basis.
- When you are trying to use equipment after it has left unused for long time, always make sure that equipment are running without any problems and then put into operation.
- Qualified persons only are allowed to get access to equipment.

- Confirm voltage frequency and power consumption meet the requirement specified on the equipment.
- Make sure that the equipment is well grounded.

3.5 General notes

3.5.1 Preoperational stage

1. Check the very basic things like switch contact and polarity and cable conditions are met with requirement.
2. Equipment ground condition is satisfactory.

3.5.2 In-use stage

1. Keep always eyes on the patient and equipment during operation to make sure something wrong might happen.
2. If so, stop operation immediately and care must be taken to correct problems.
3. In case of equipment malfunctioning, there are few things that can be done on the field except for replacing fuses. Do not make wild guess to jump into wrong decision. Always ask help from the manufacturer for the further information.
4. Never try to revise equipment, including wires or cables. There is nothing that can be changed on the field. By doing so, it can cause problems that may be beyond the repair.

3.6 X-ray generation and warning

1. Use the extended cable, while taking image, to make operators less susceptible to X-ray source.
2. This equipment is made dental service and generates X-ray safely. But inappropriate handling may do the patient and operator harm.
   Thus the unauthorized never try to operate this equipment, let alone to repair.
3. The operators have all the responsibilities to check conditions of equipment regularly.
   This is well defined in the code of manual and in internal education session.
4. Any means of warning signal should be employed to keep patient and operator on alert when something unexpected happens.
5. For the pregnant and the patient having needs for particular attention, consult with medical doctor before taking images.
6. Always keep in mind that all the requirements and conditions specified on the international law should be applied for installing and using this kind of X-ray equipment.

3.7 Daily maintenance tasks

Accessories	Maintenance tasks
Panoramic bite block	Sterilize with cold sterilization or autoclave up to134 degree before the next patient is X-rayed
Temple support	Sterilize the head support and chin rest with medical-grade 76% alcohol disinfectant before next patient is X-rayed
Chinrest(panoramic, sinus and TMJ)	Sterilize the head support and chin rest with medical-grade 76% alcohol disinfectant before next patient is X-rayed
All components that come into contact with patient and operator	Sterilize components with medical-grade 76% alcohol disinfectant before next patient is X-rayed
Outer covers of Unit	Wipe the unit with a dry cloth at the end of each day's operation.  **Do not use detergents or solvents to clean outer covers of the unit.**

Appendix 4 Emergency measures

If a problem occurs while operating the product, do take the very basic emergency measures by consulting the following tables. If problem persists, please request support through the customer support information service at point of contact appeared on the back of this manual.

If device is not moving	
Cause	**Resolution**
Power failure	Check the power supply to the device.
Initialization status	Wait until the device has initialized and then try again.
Control PC connection failure	Check the connection status of Serial Port (RS232) connecting PC and device.

If exposure switch is not working	
Cause	**Resolution**
Ready status	Check whether it is ready for capturing at the imaging program.

If imaging cannot be performed	
Cause	**Resolution**
Initialization status	Wait until the device has initialized and then try again. If the same problem persists, turn it off and start again.

If laser beam is turned off by itself and patient alignment cannot be performed	
Cause	**Resolution**
Time assigned for alignment expired	Press LAMP Button and carry out patient alignment.

Moisture may cause fatal damage to the electric equipments. Be careful not to allow leakage or penetration of water around it.

Appendix 5 Disposal of the unit

In order to reduce the environmental contamination, this unit is basically designed to be as safe as possible to use and dispose. Many parts inside and outside the unit except for some like X-ray tube are environment-friendly and can be recycled for the next uses.
All parts and components containing hazardous materials must be disposed of according to the regulation governing these issues.

Part	Main materials to be disposed	Recyclable materials	Waste disposal site	Hazardous waste Needs separate collection
Frame and covers	Aluminum and plastics	●		
Motors		●		
Boards		●		
Cables and transformer	Copper	●		
	Steel	●		
	Oil		●	
Packing	Wood	●		
	Cardboard	●		
	Paper	●		
X-ray tube				●
Sensor head	Return sensor head to E-WOO			
Other parts			●	

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CE 0499 CE symbol grants the product compliance to the European Directive for Medical Devices 93/42 as a class IIB device. Authorized by **Grand-Duche De Luxemburg**.

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