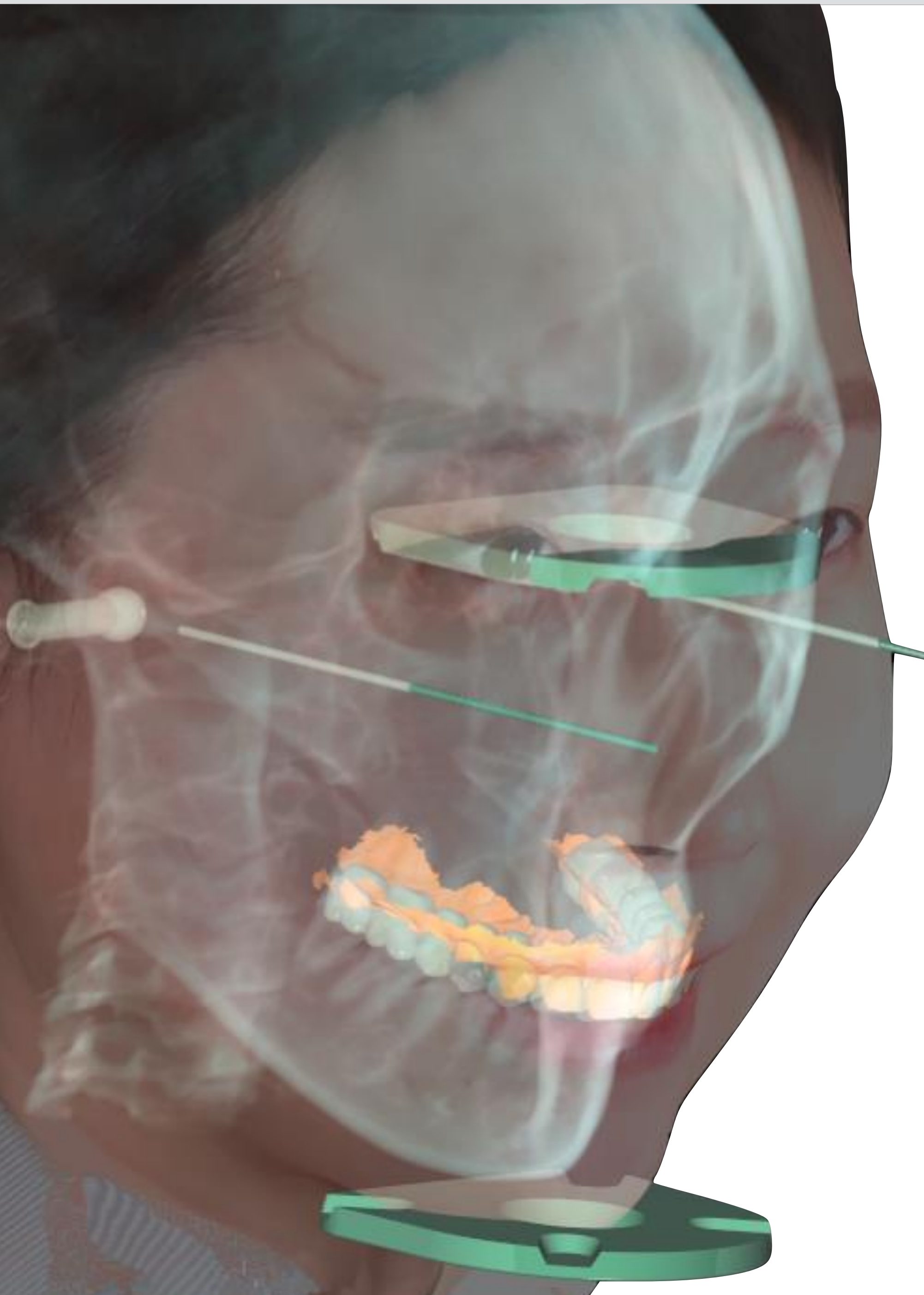




R2GATE™ 2.0

Digital Oral Design



Prediction, Time and Effort...

Collecting patient information and establishing diagnosis treatment plan to produce a predictable , more aesthetic and functional prosthesis has been an essential process in dental care treatment.

There has been numerous researches of the means and methods to combine and utilize data obtained from various tool and equipment from impression acquisition and modeling, face-bow, mounting and articulators, radiography, optical scanners to shooting technique and on the other hand, they also have been validated, selected and supplemented through clinical evaluations.

However, it still requires additional cost, time and effort to perform the process above and there are still limitations for assembling combination, analysis and sharing due to different forms and formats of collected data.

Digital age, what we call nowadays as, our mission is to create a collection of data that is more convenient, objective and easy to reproduce by applying and integrating the process mentioned above which has been developed over time into digital process.

Our mission in this rapidly evolving digital age is...

Realization of Digital Patient(Virtual Patient)

A digital patient is a virtual patient generated by collecting and integrating data of a patient that can effectively establish objective diagnosis and treatment plans, and a collection of data that reproduces essential information anytime, anywhere and shared among all members of dental care.

With the launch of R2GATE, the first virtual diagnostic software of Korea in 2012, MegaGen has focused on the possibility of CBCT and has continued research and development aiming the realization of digital patient (virtual patient).

R2 STUDIO and R2GATE Digital Oral Design are the most innovative result of this effort.
We expect all members of dental care to share and enjoy the results.

Rudder & Compass

Set and Share Goals & Directions

Dental treatment is a total treatment which every members are involved (Dental Lab Clinicians, Staff, and Lab Technicians).

Defining and sharing the direction and goals you want to achieve is the beginning of reasonable treatment.

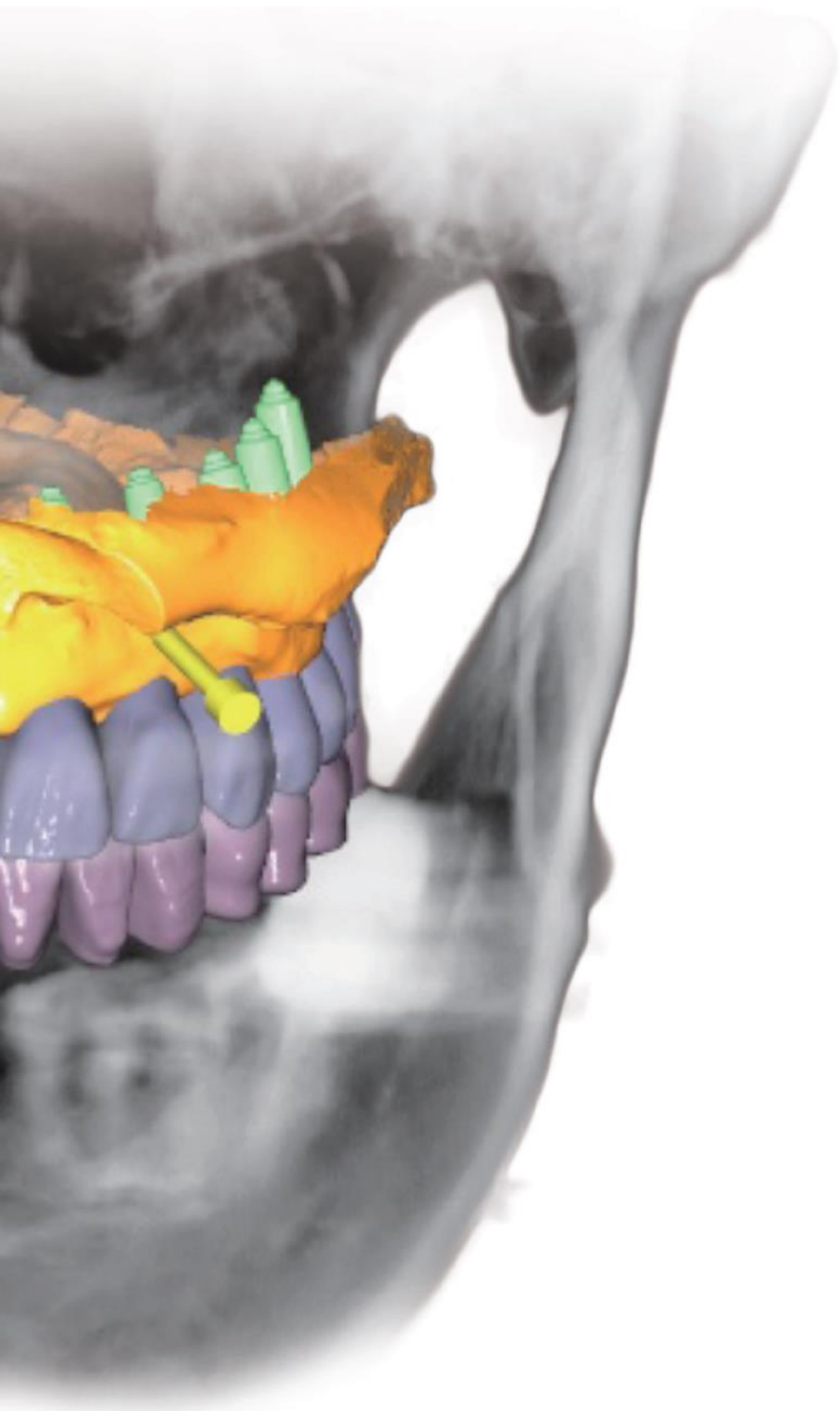
Assemble the collected information obtained from R2GATE Digital Oral Design to realize perfect Digital Patient(Virtual Patient).

Operators can utilize Digital Patient for precise and specific diagnosis and treatment planning. With this information, it is possible to communicate with all members involved in treatment with objective and visible data so that the participants can share and collaborate on a single goal.



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R2GATE™
Turning imagination into reality
since 2012

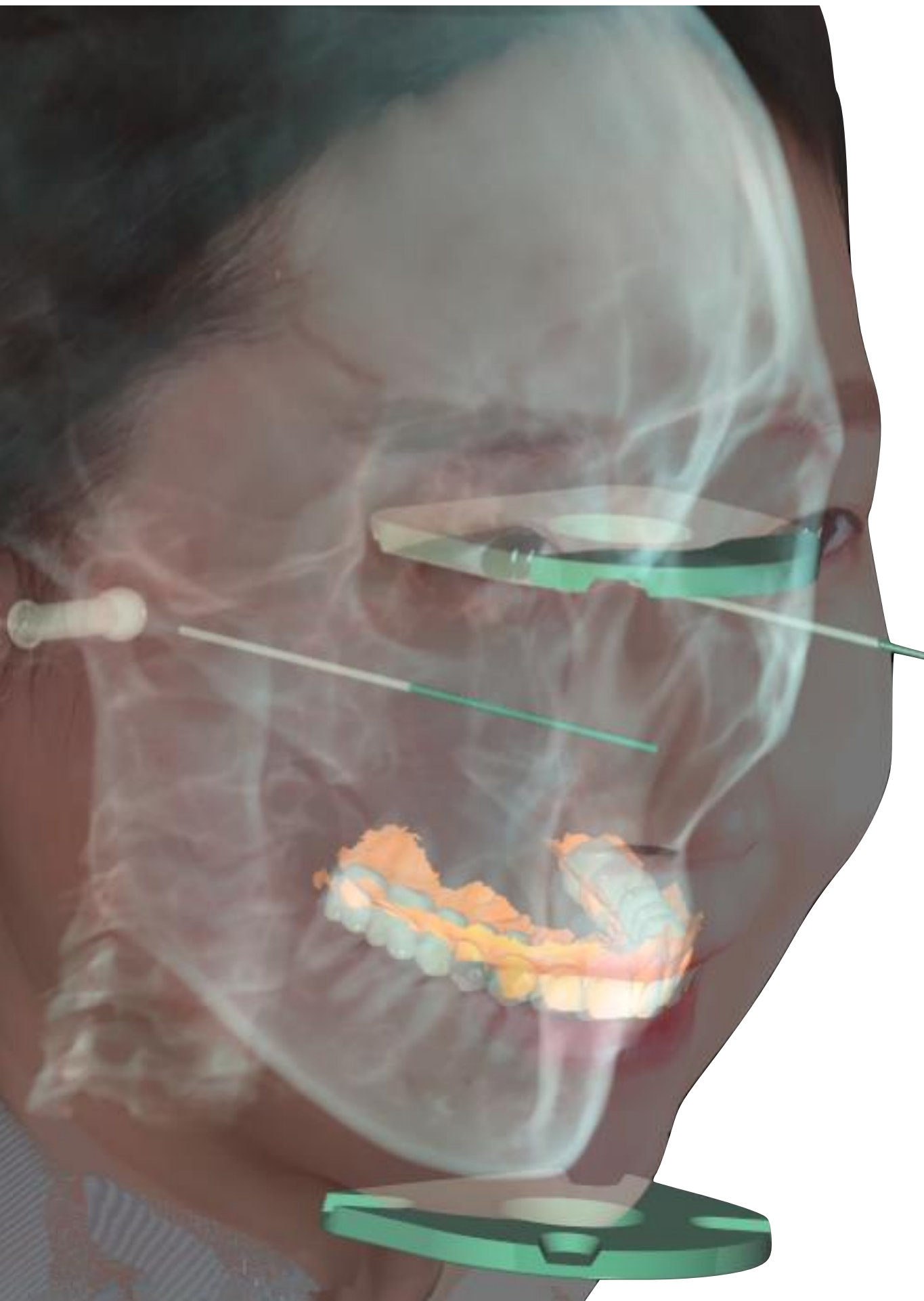


About R2 GATE™ -For DOD

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R2GATE™

Turning imagination into reality



1 Digital Oral Design Installation



Sign-up & download



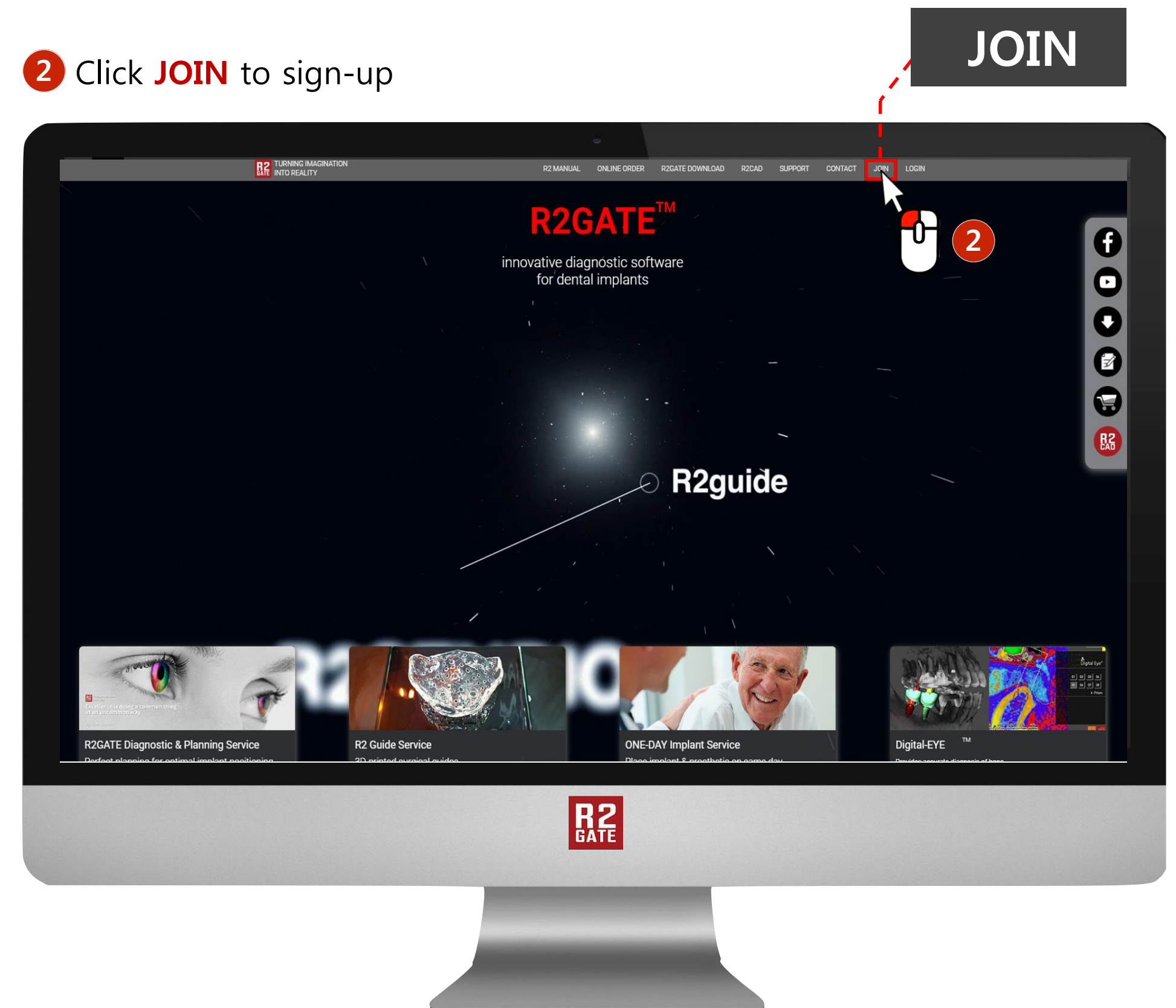
Installation

Note: User ID is required to use R2GATE. Get access to R2GATE website and sign-up to create a new ID.

1 Connect to www.r2gate.com



2 Click **JOIN** to sign-up



1 Select **MEMBER TYPE**

- Clinician
- Dental Lab
- R2 Sales Rep (Dealer or Distributor)
- R2 Centre



Note:

Clinicians & Dental Lab do not require approval,
R2 Sales Reps & R2 Centre require approval to access the website

2 Click **Privacy Notice & Terms & Conditions**

3 Click **NEXT**

The screenshot displays the 'R2GATE MEMBERSHIP SIGN UP' form. At the top, a progress bar indicates three steps: 1. MEMBER TYPE, 2. REGISTRATION, and 3. COMPLETION. The first step, 'MEMBER TYPE', is active. Below the title, there is a dropdown menu for selecting a member type. The dropdown is open, showing options: 'Please select a type', 'Dental Clinician', 'Dental Lab', 'R2 sales Rep', 'R2 Digital Center', 'R2 Agency', and 'R2 Service Team'. A red circle with the number '1' and a mouse cursor icon points to the 'Dental Clinician' option. Below the dropdown, there are two checkboxes: 'Terms and Conditions' and 'Privacy Notice'. Each checkbox has a 'VIEW' button next to it. A red circle with the number '2' and a mouse cursor icon points to the 'Terms and Conditions' checkbox. At the bottom of the form, there is a 'NEXT' button. A red circle with the number '3' and a mouse cursor icon points to the 'NEXT' button. The R2 GATE logo is visible in the bottom right corner of the form area.

- 1 Enter personal information to sign-up
- 2 Click **NEXT**
- 3 To download R2GATE, click the "[here](#)"



R2GATE MEMBERSHIP SIGN UP

1

2

3

MEMBER TYPE REGISTRATION COMPLETION

1 ACCOUNT

Full Name...

Email Address...

Password...

Confirm the password...

Select Image

MEMBERSHIP

Dentist

NATIONALITY

Alaska(U.S.A)

CELL PHONE

+1 Number...

DATE OF BIRTH

DD MM YYYY

GENDER

Male Female

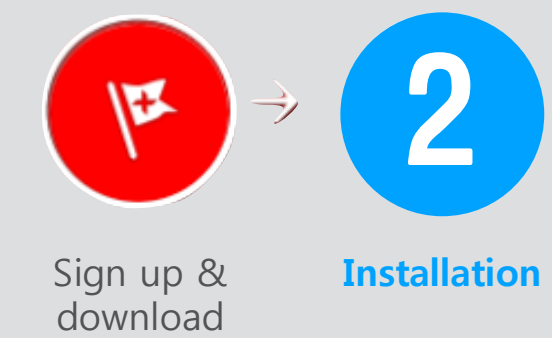
OFFICE[CLINIC]

Office name...

PREVIOUS

NEXT

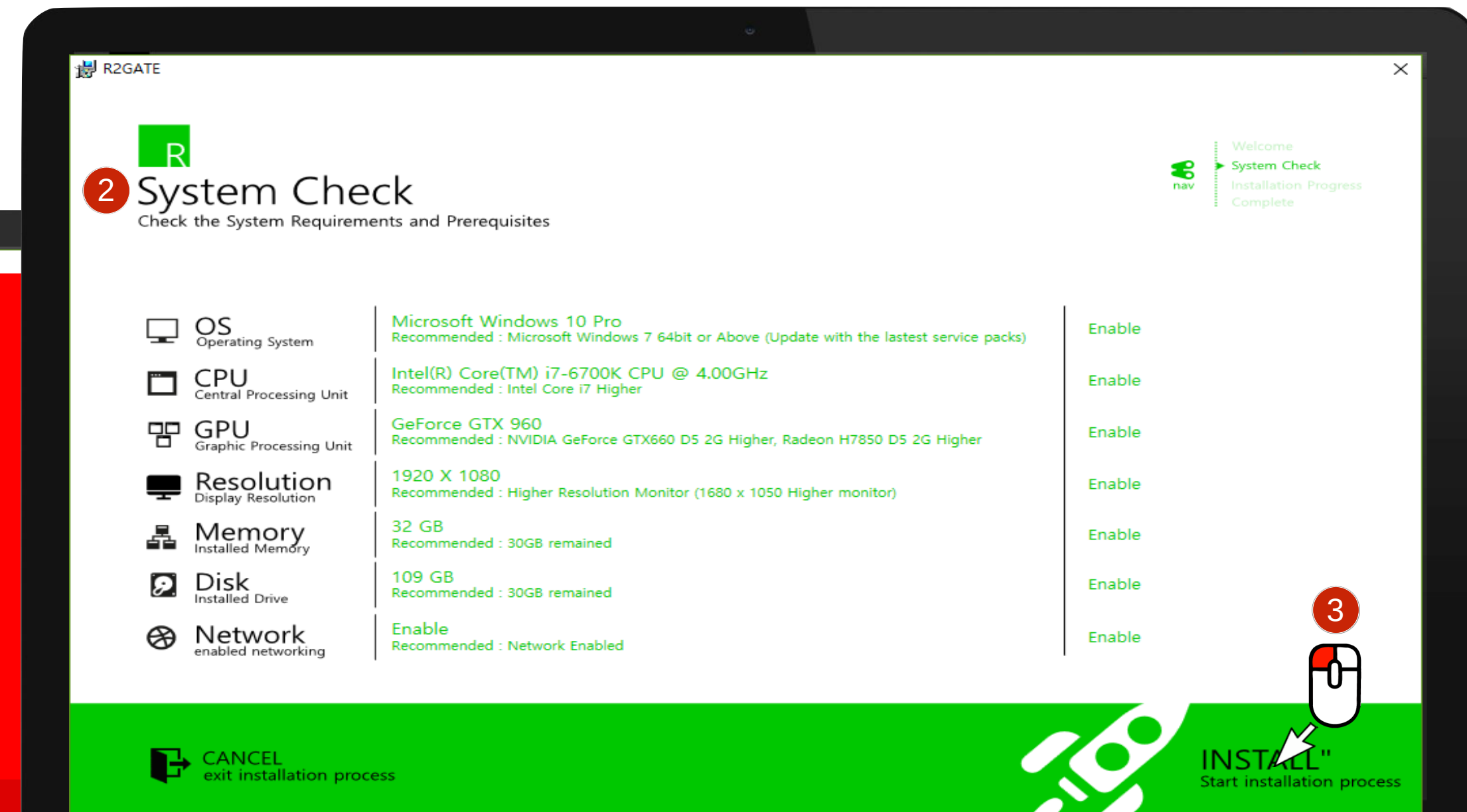
1.2 R2GATE™ DOD Installation



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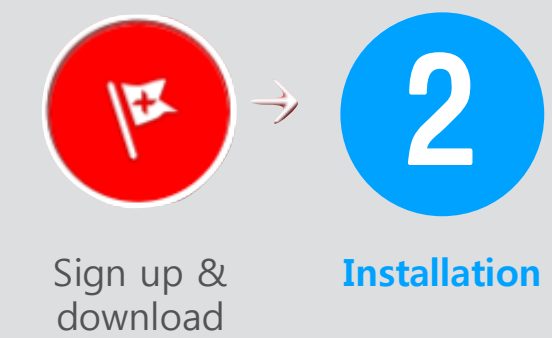
- 1 Run R2GATE installer  R2GATE installer.exe
- 2 Check the system specifications for R2GATE installation (Refer to the next page)
- 3 When the system check turns green, click **INSTALL**



Note:
Contact R2GATE HQ if the installer displays red for the specification
Email : service@r2gate.com
r2b@r2gate.com



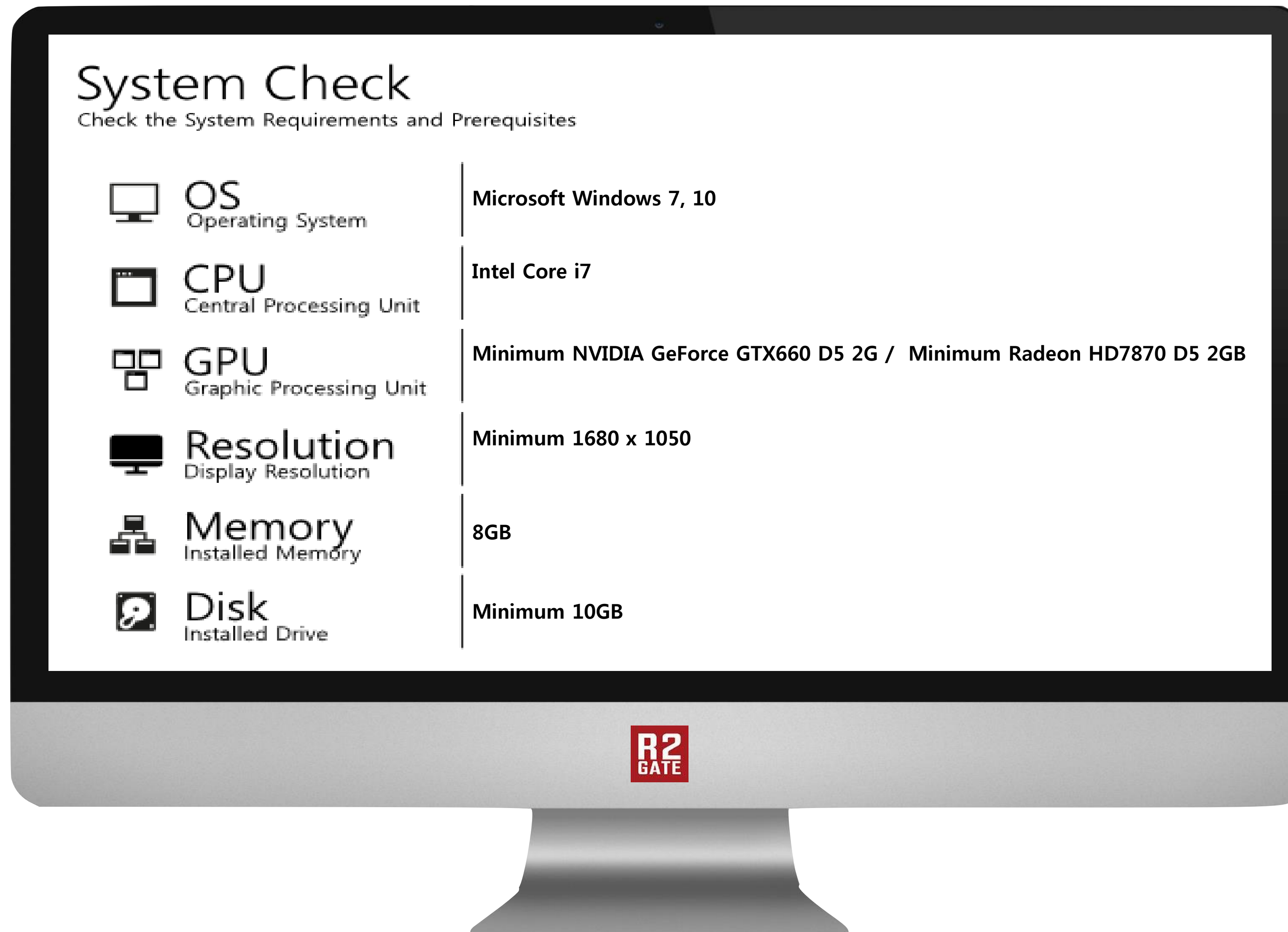
1.2 R2GATE™ DOD Installation



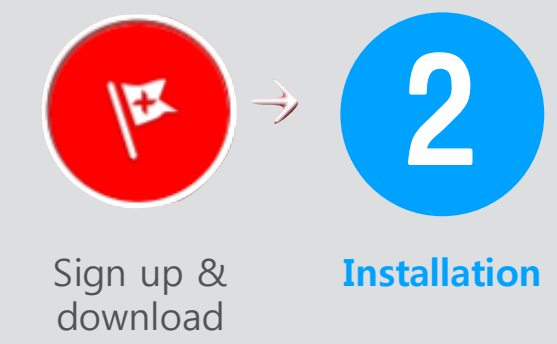
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GATE**

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R2GATE System Specifications



1.2 R2GATE™ DOD Installation



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- 1 R2GATE installation is complete

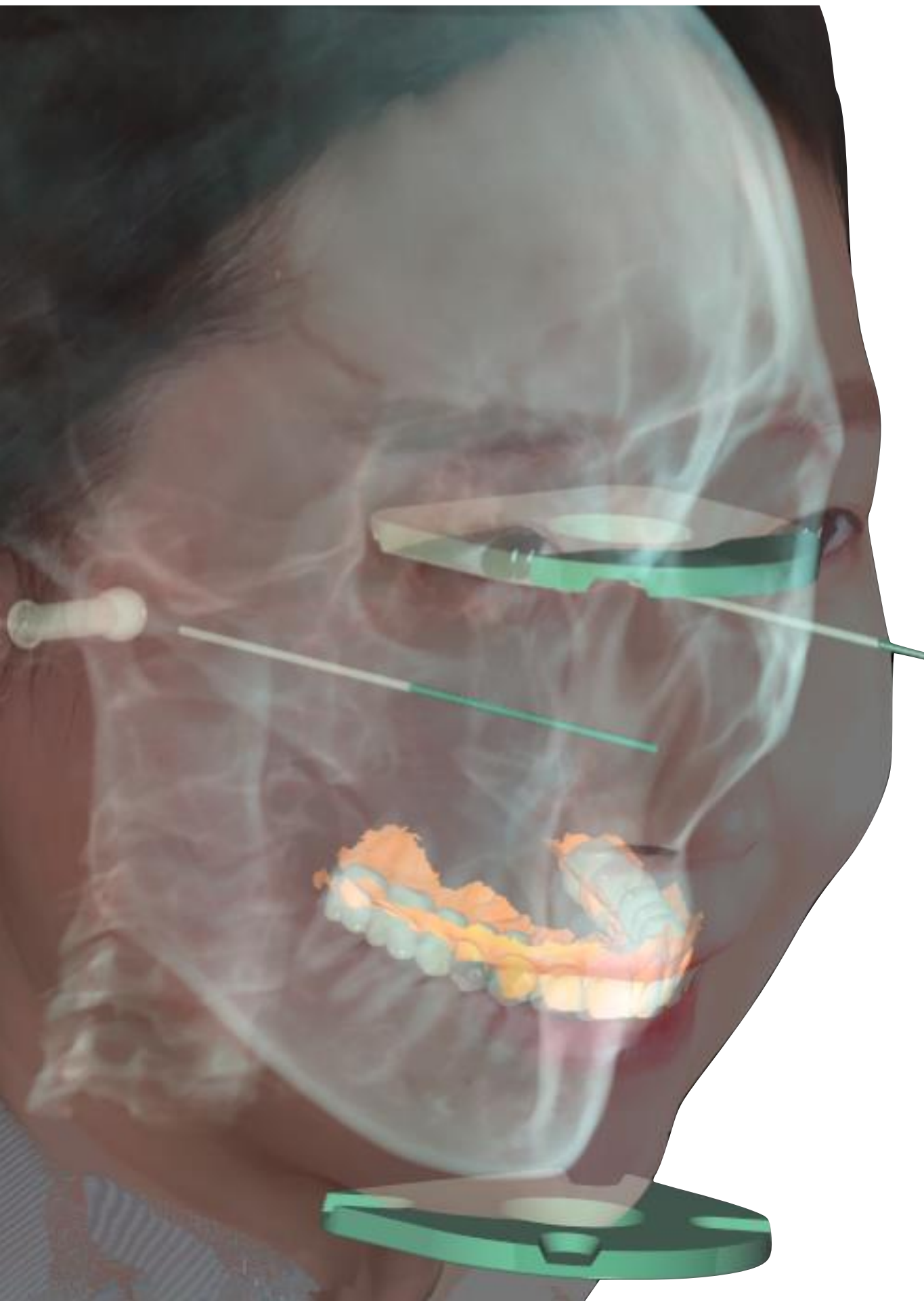


- 2 When the installation is complete, **R2GATE Windows**, **R2DATA**, **R2 Ware** folders will be created on the desktop



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2 Digital Oral Design CBCT & STL Matching



Windowing(EN)

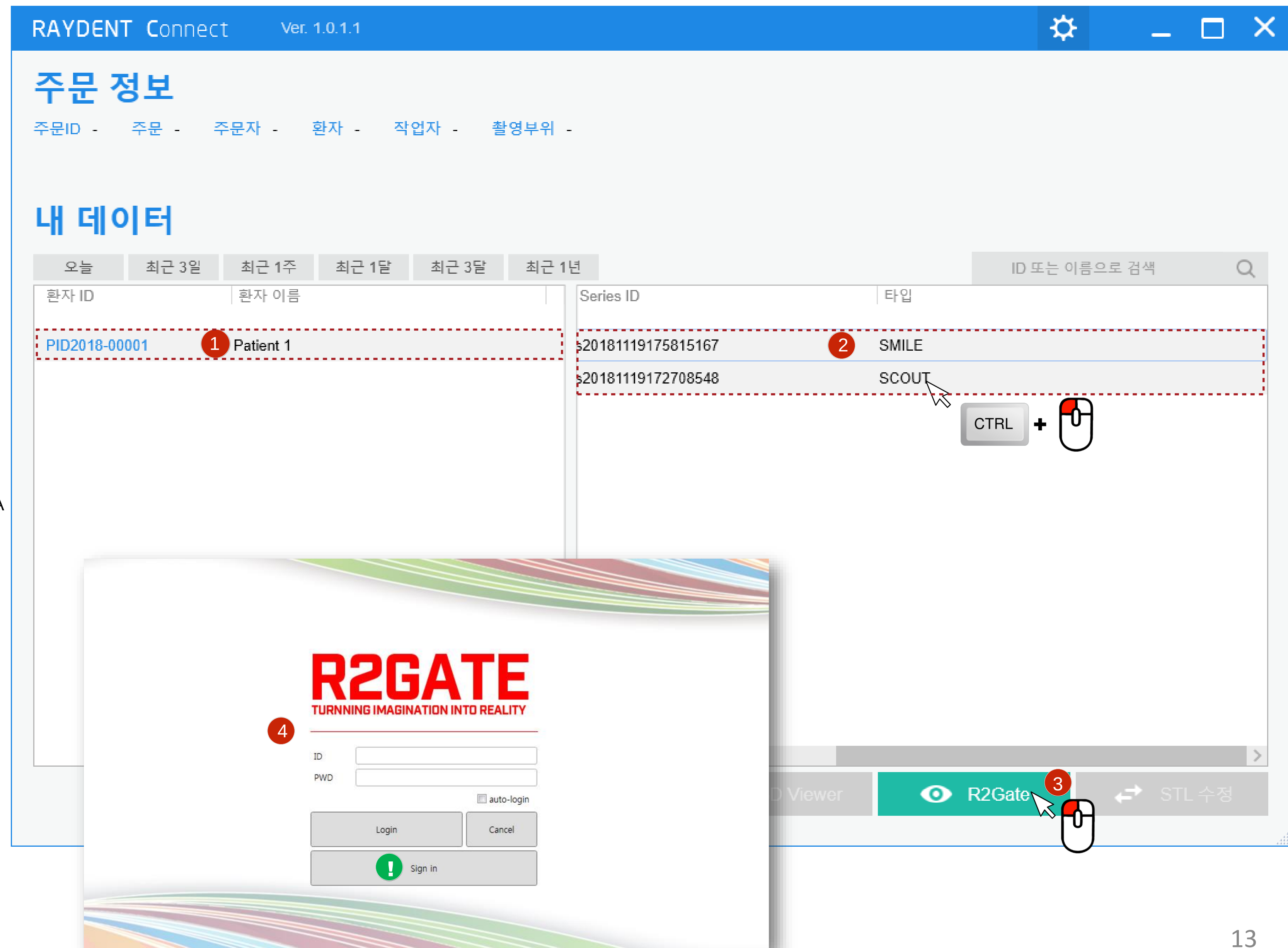


STL Matching(EN)

R2STUDIO- In case of using RAYDENT Connect

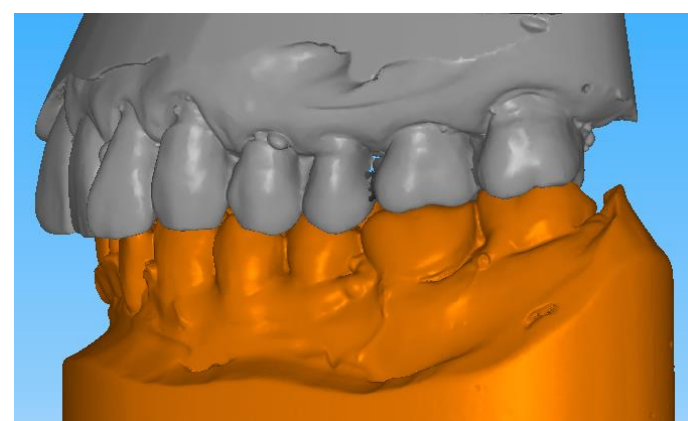
Designate running folder to R2GATE

- 1 Select a patient to export files
- 2 Ctrl+Left click to Select Scout(Dicom) and Smile DATA at the same time
- 3 Click 
- 4 CBCT and 3D Facial files will be copied automatically to R2DATA folder and R2GATE will open
- ! Refer to the next page to manually insert DATA
- 5 Enter ID and PWD to access
- ! Refer to page 8- how to sign-up



Manual DATA Preparation (CBCT, Smile & Scout Facial files , Model Scans)

- 1 Create patient folder in R2DATA folder
 - 2 Upload CBCT & OBJ(*.obj, *.mtl, *.bmp) & STL files to patient folder
- ! R2 connector automatically detects folders with DICOM files, so create new patient folder in R2DATA folder & insert all the data files



Scan data (STL format)

- Upper : Maxilla scan data
- Lower : Mandibular scan data

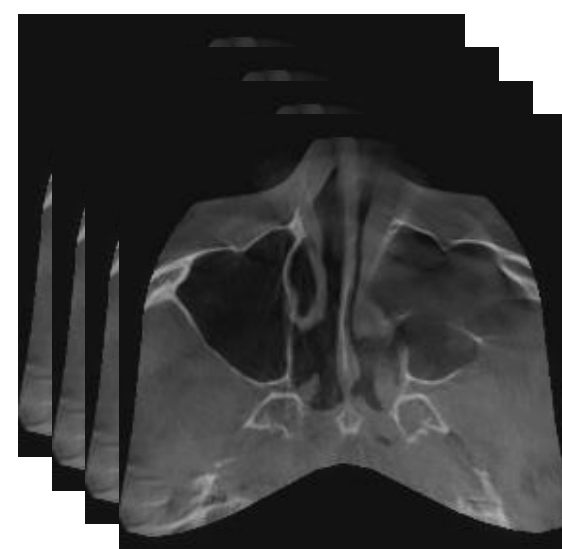


Smile/Scout facial files (obj ,mtl, bmp files)

- Smile : Smiling figure
- Scout : Eyes closed

<Cautions when shooting CBCT>

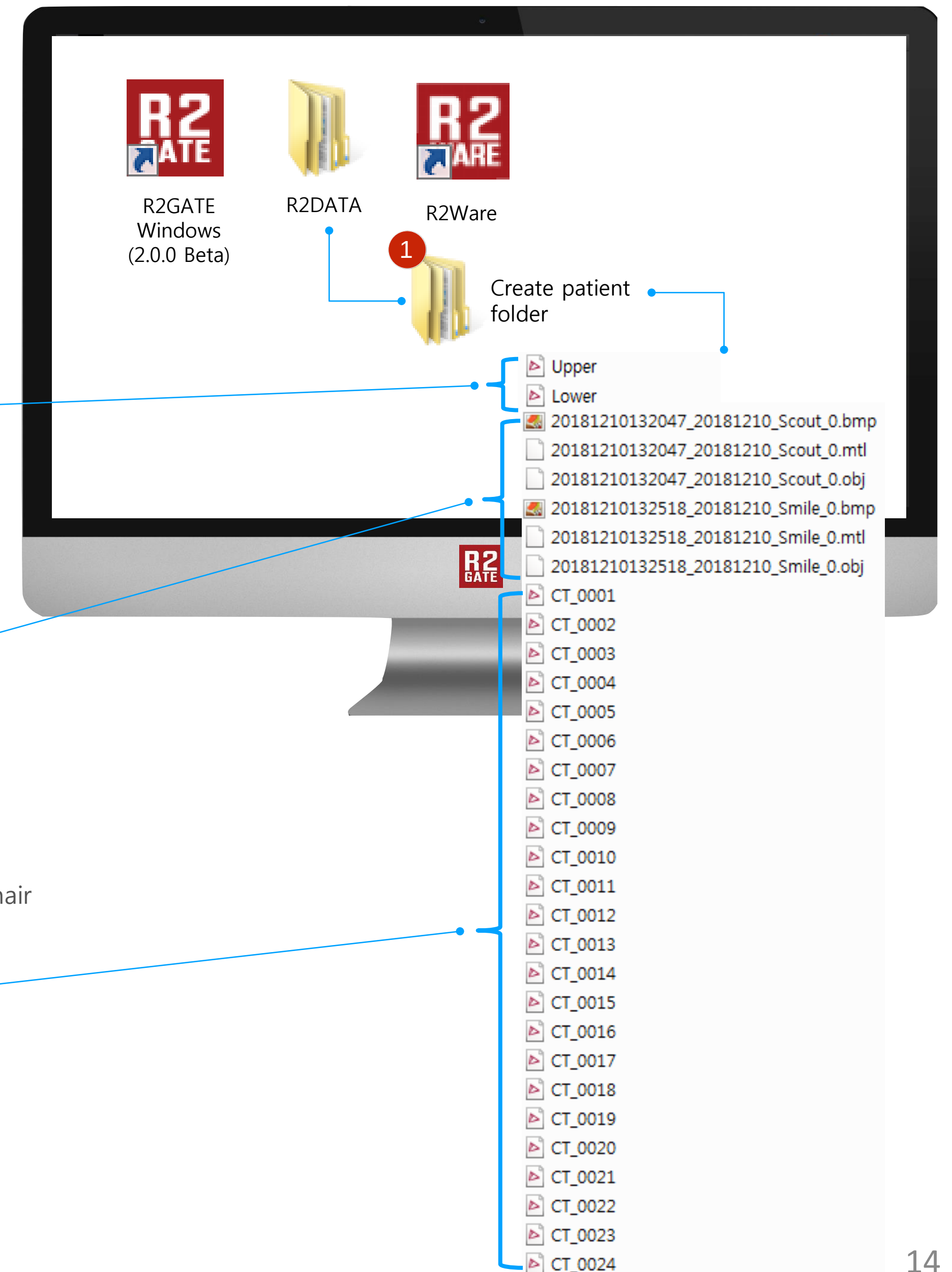
- Shoot with exposing patient's forehead line and ears.
- Wear hair bands when shooting.
(Hair looks distorted in the OBJ file, so be careful not to let the hair appear on the face)



CBCT(Sliced DICOM)

- All CBCT data should be uploaded in multiple-frame DICOM format & zipped

- ! DICOM files according to 20x20 FOV are more than 600 pages and more than 200 pages for smaller FOV



2.3 R2GATE™ DOD R2 Connector

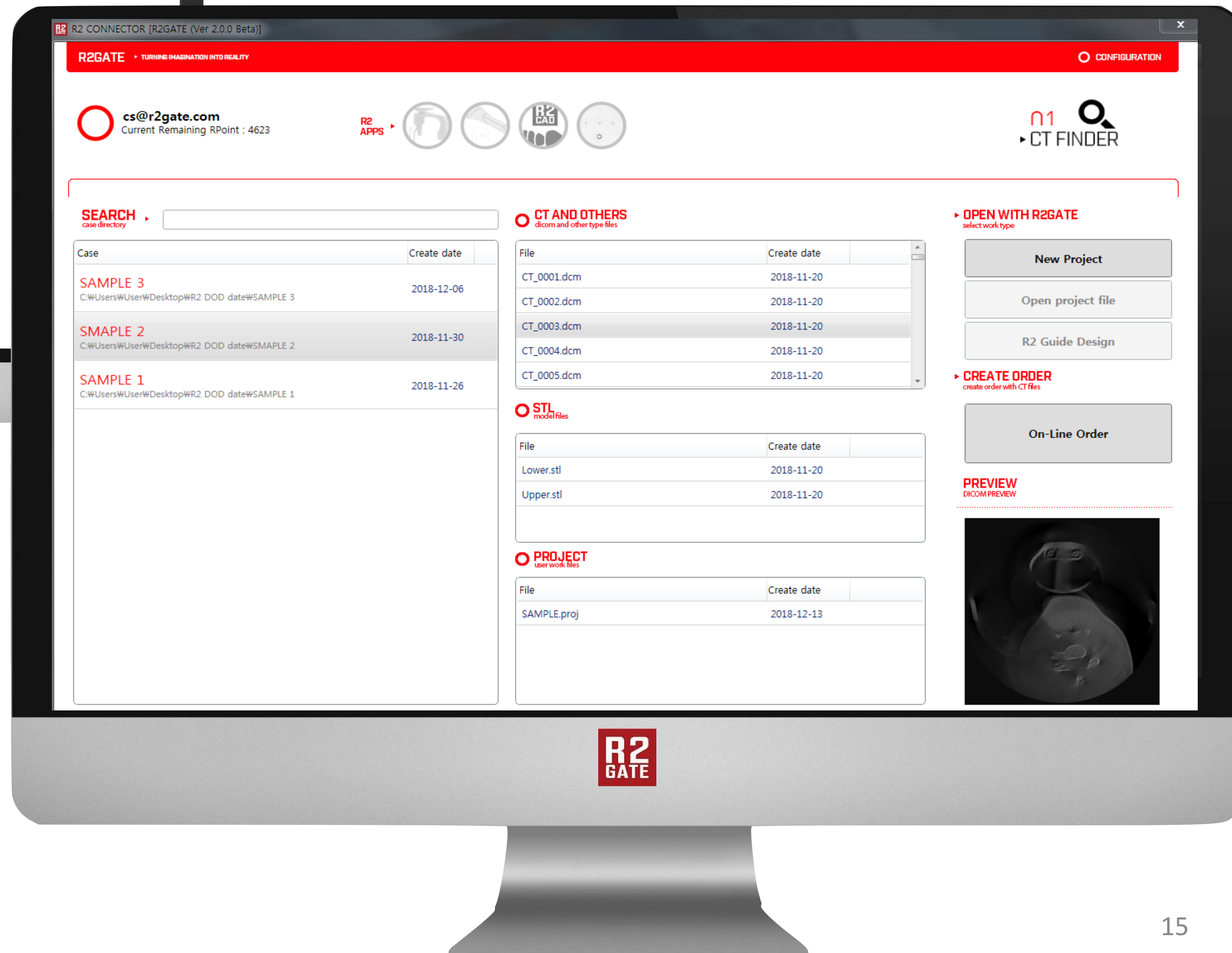
R2
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1 Double click **R2GATE Connector**



2 R2GATE Connector window

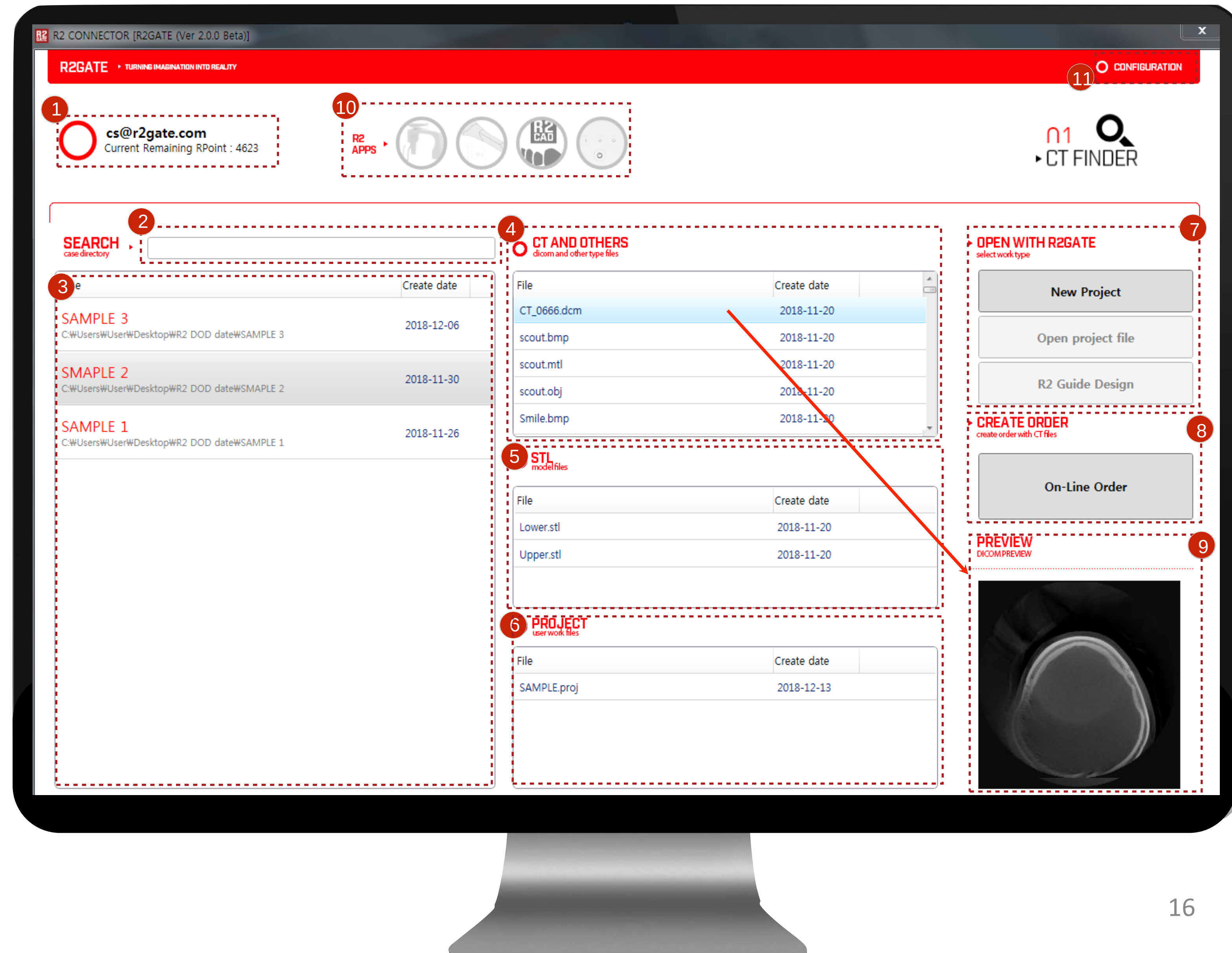


R2 Connector

Convenient interface for all digital solutions:

- R2DATA folder for patient data management
- R2GATE for implant planning
- R2WARE for R2 Guide design
- R2CAD for CAD design
- CBCT, IOS, 3D printer software

- 1 User ID & R point status
- 2 Search function for patient folder in R2DATA folder
- 3 List of patient data in R2DATA folder
- 4 DICOM, Facial (smile & scout) file list of selected folder
- 5 STL file list of selected folder
- 6 Project file list of selected folder
- 7 Command button for R2GATE & Guide design
- 8 On-line order: upload CBCT data to web order system
- 9 Preview selected DICOM & STL data
- 10 R2 APPs: additional functions as intra oral scanner, CBCT program, R2CAD and 3D printer software
- 11 Configuration: Designate working R2DATA folder



2.3 R2GATE™ DOD New Project

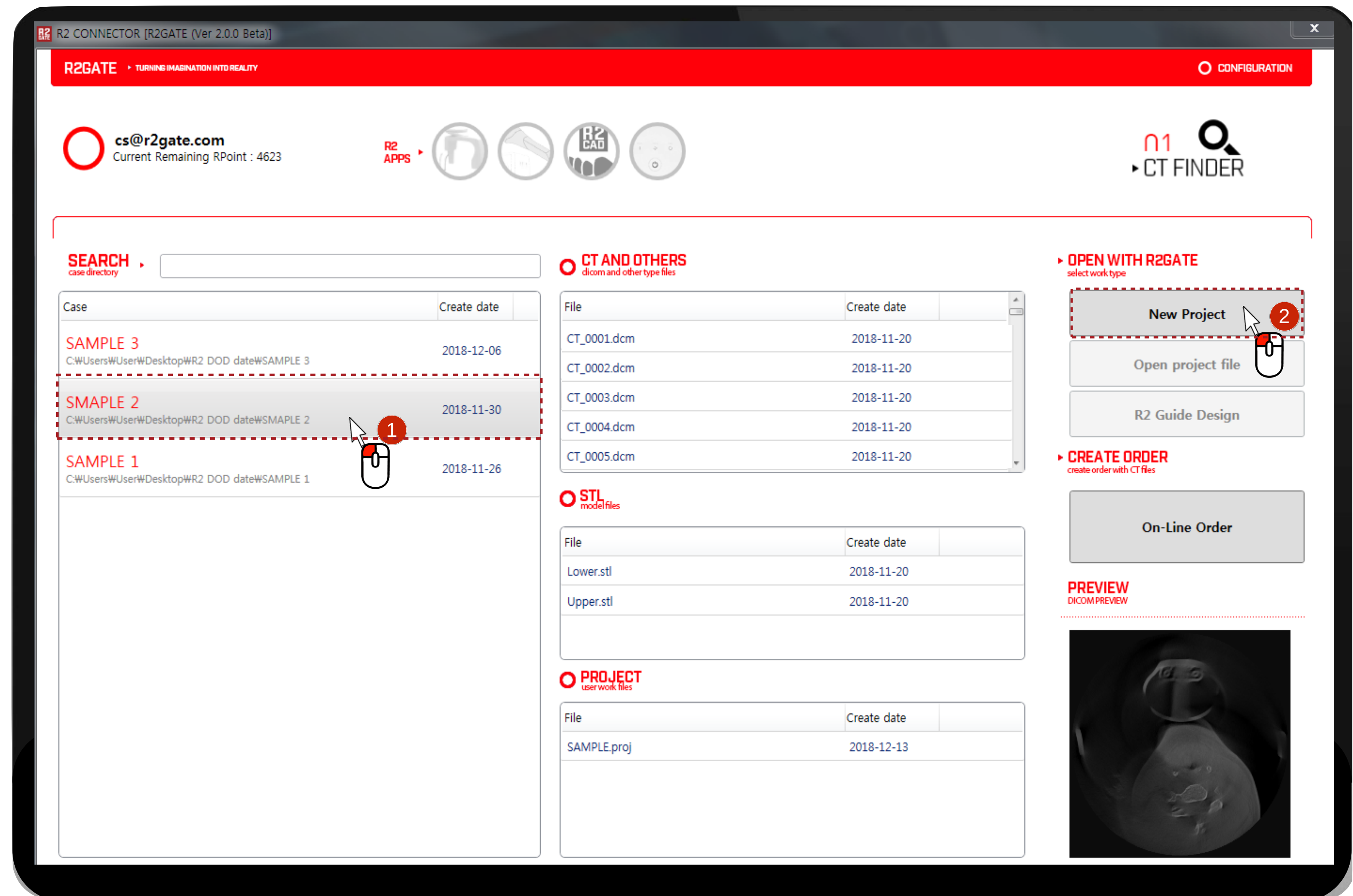
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Create New Project

Step to create new projects for implant diagnosis or Digital Oral Design

- 1 Select patient folder to work with
- 2 Click **New Project**



2.3 R2GATE™ DOD New Project

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Create New Project



2.4 R2GATE™ DOD Control Buttons

1
CBCT & STL matching

Fine tuning of matched STL & OBJ

CBCT ReOrientation & Digital face bow

Facial Analyzer

Digital Oral Design

EZ Wax Up

Mandibular Nerve tracing

Implant surgery

Quick Guide

Face Guide

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GATE

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Control Buttons

Control brightness & contrast of 3D view

Available to change to desired background color

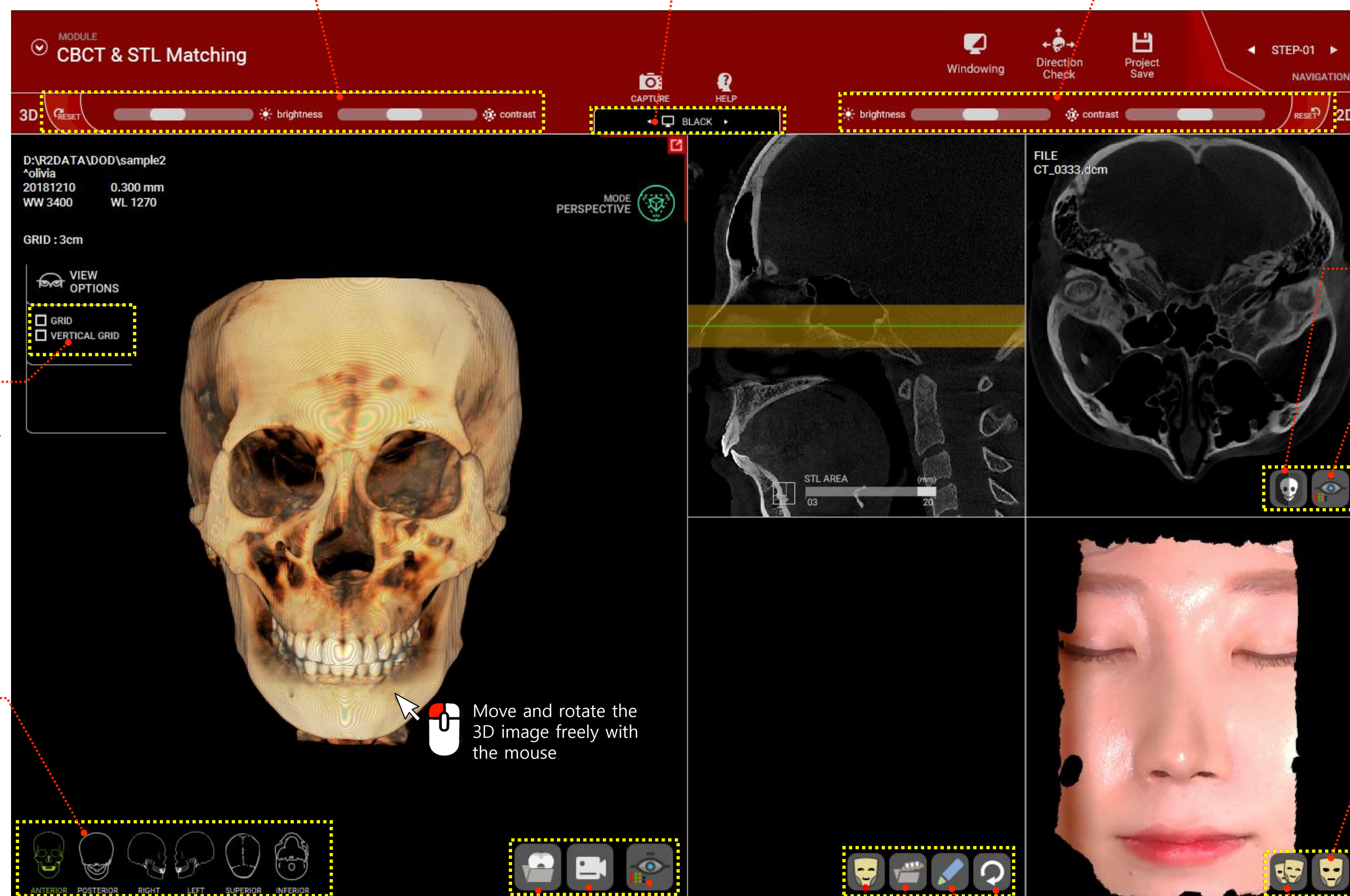
Control brightness & contrast of 2D view

Grid & Vertical Grid

Move the green line to see the image of the CBCT cut into cross-section of the head

3D Volume control

Click the skull icon OR
Use the mouse to rotate the skull and click the desired plane



Convert section of CBCT to STL format for merging with Model STL file

CBCT filter adjustment

Import Scout Facial file

Diagnostic wax-up menu

Camera rotation control

CBCT filter adjustment

Import Smile OBJ file

Import STL file(cast)

Initialize Matching status

Set 3 points to STL & STLization model to match them

Matching Smile Facial & Scout Facial

2.5 CBCT Windowing

1
CBCT & STL matching

Fine tuning of matched STL & OBJ

CBCT ReOrientation & Digital face bow

Facial Analyzer

Digital Oral Design

EZ Wax Up

Mandibular Nerve tracing

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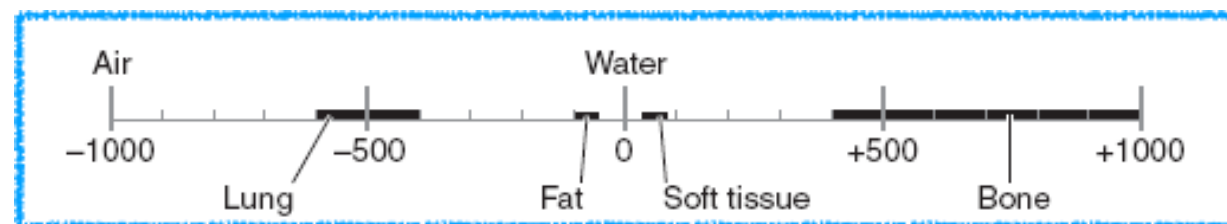
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R2GATE CBCT Windowing

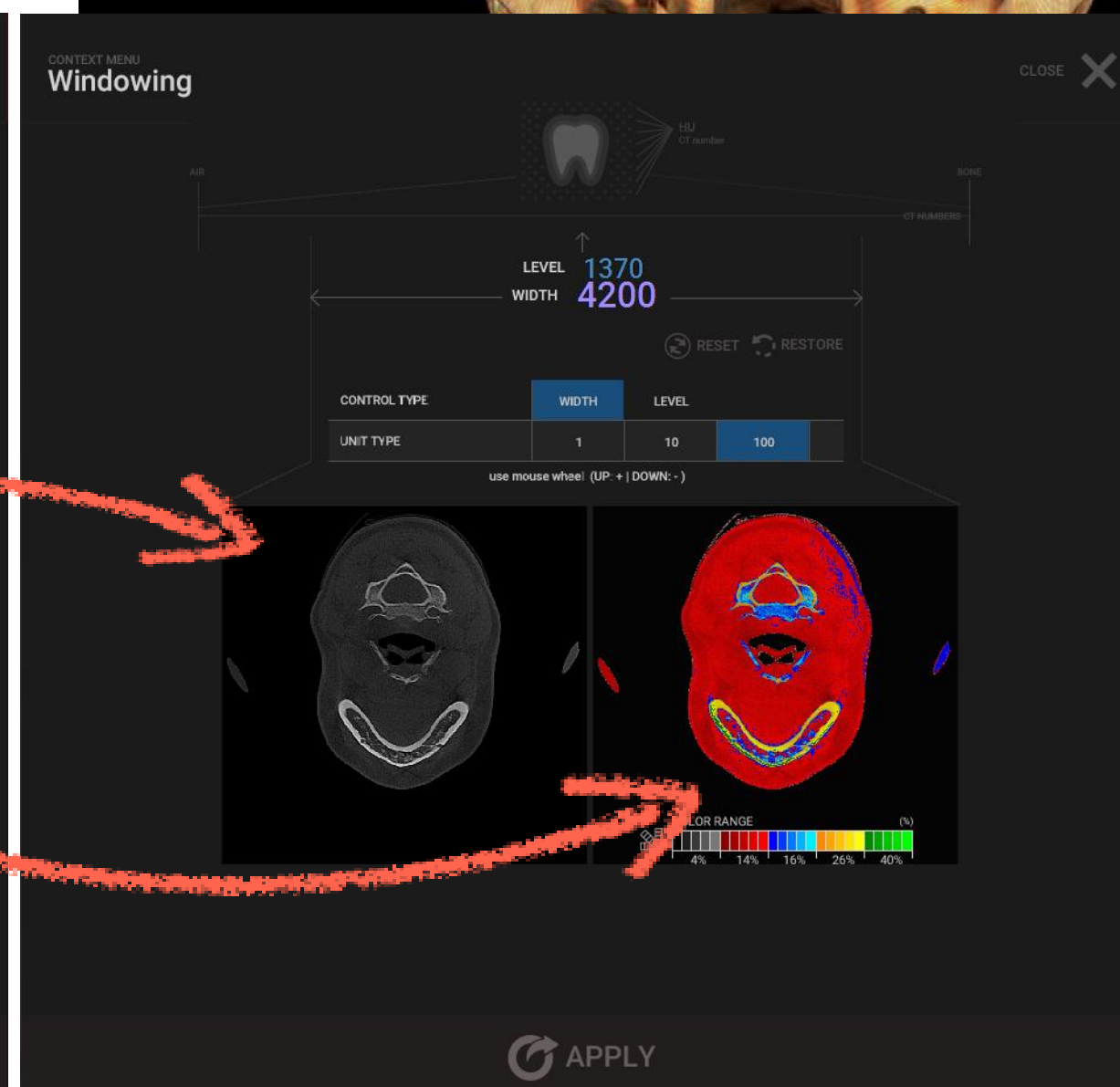
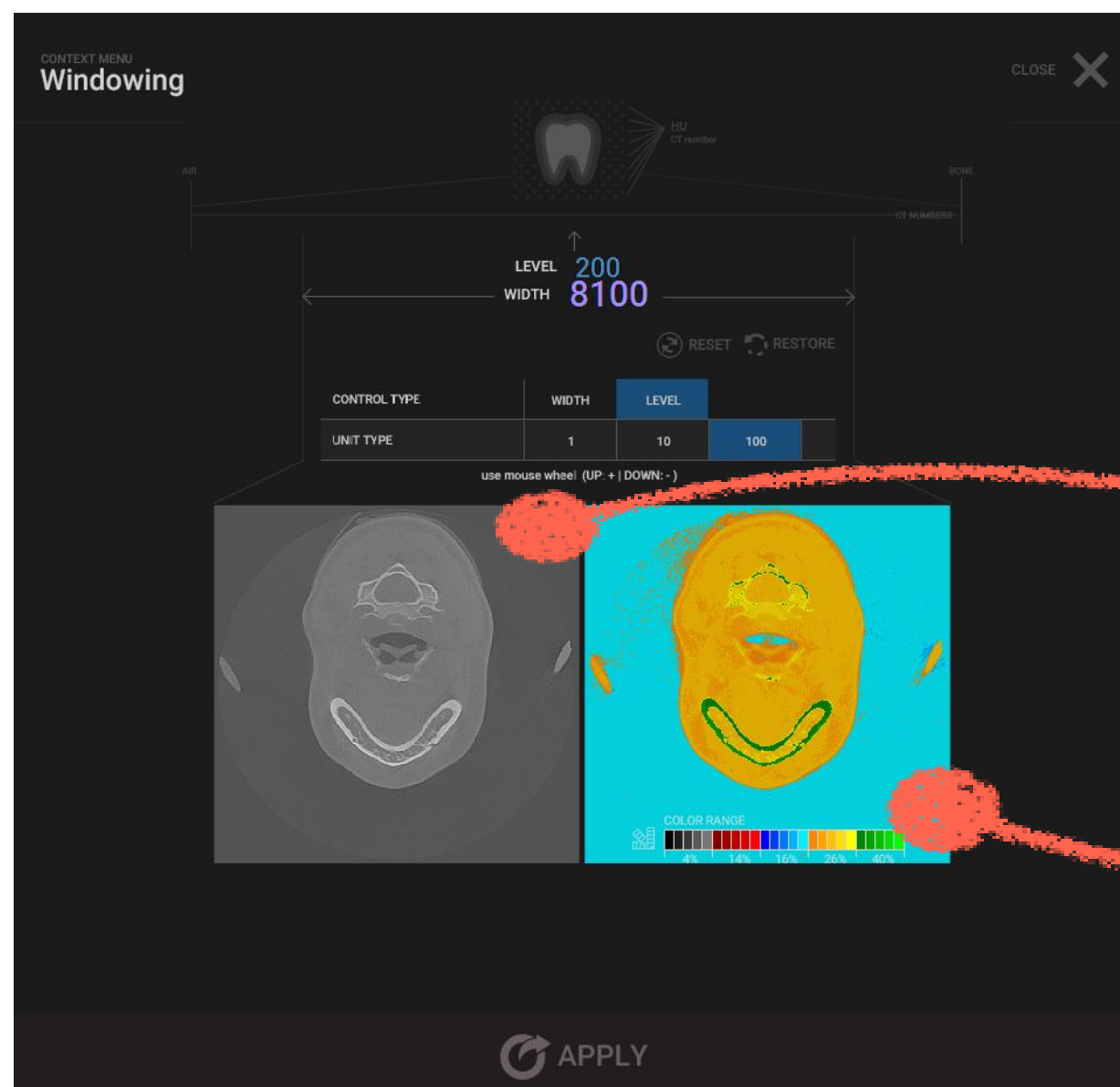
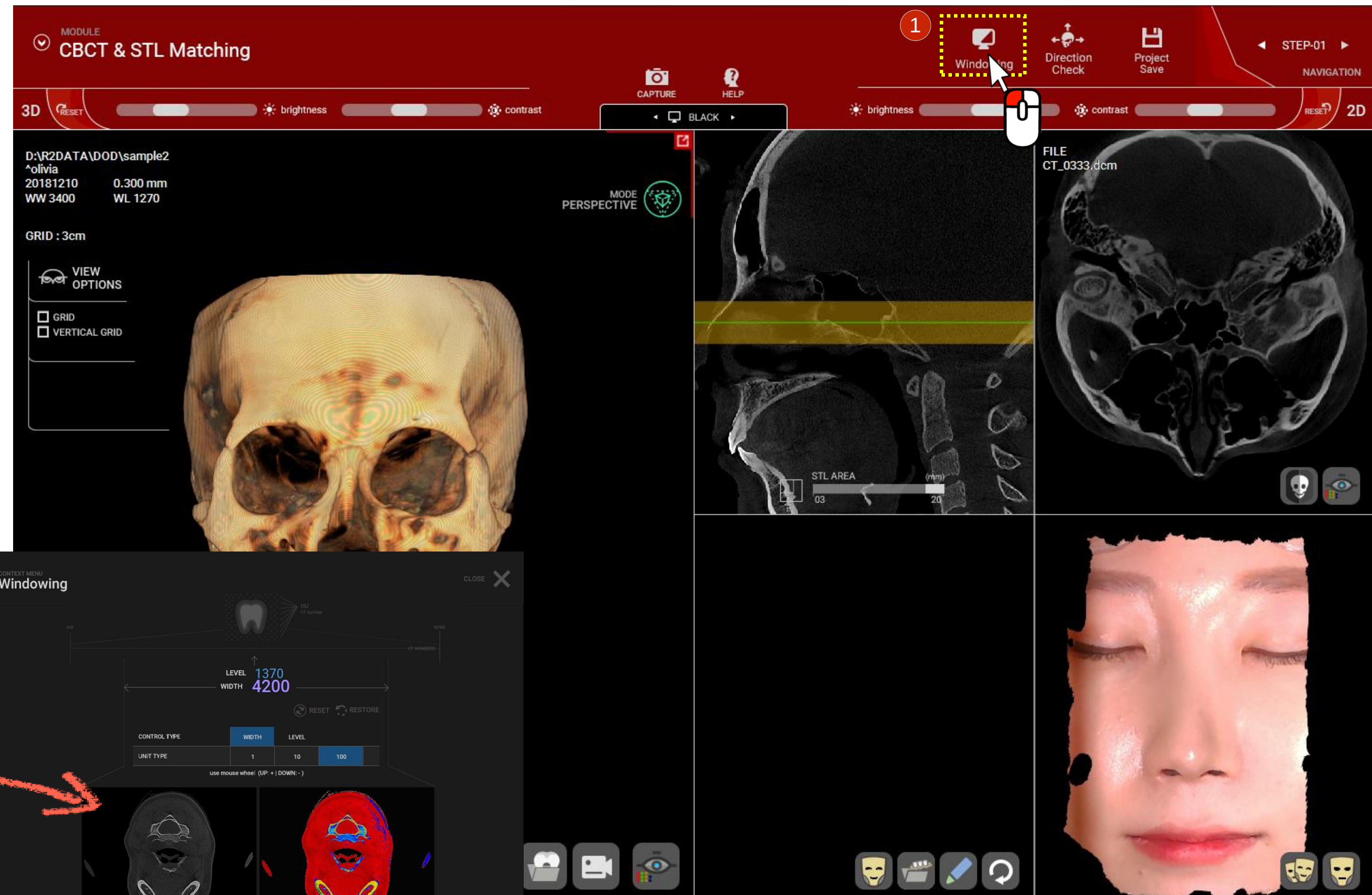
- When importing CT taken by R2 STUDIO, the value of windowing is automatically standardized, so skip this step.

- Click **Windowing** menu
Special windowing function that standardizes brightness levels from different CBCTs using Hounsfield unit (HFU) scale

HFU scale for medical CBCTs



- R2GATE rearranges CBCT HFU values to express and display the real bone density using 256 colors



2.5 CBCT Windowing



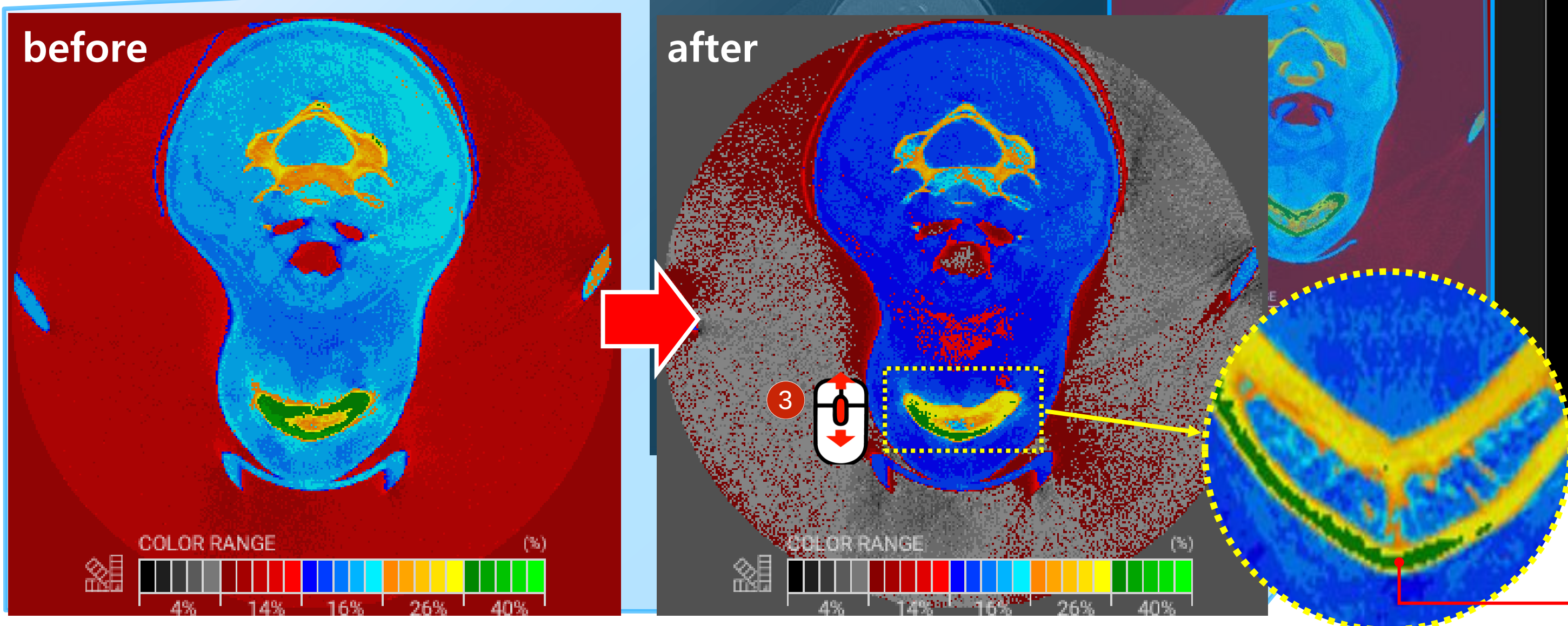
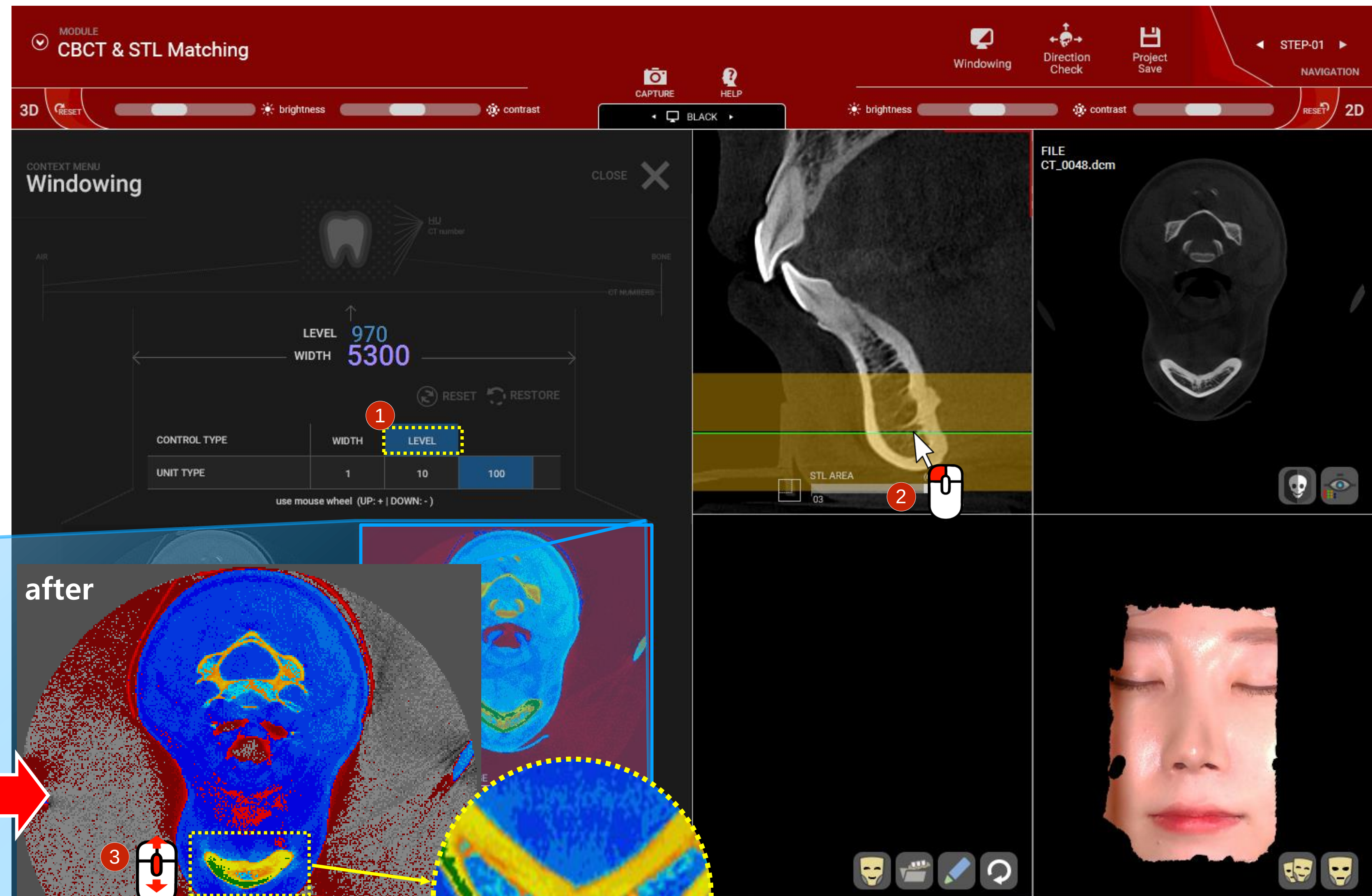
R2
GATE

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Mar. 2019

R2GATE CBCT Windowing

- 1 Select **LEVEL** option first
- 2 Right click & drag the green line towards mandibular and place it.
- 3 Adjust the green line to the hard bone first as a reference by SCROLLING the mouse.

Align the hardest part of the mandible to yellow and green.



Align the hardest part of the mandible to yellow and green.

2.5 CBCT Windowing

1
CBCT & STL matching

Fine tuning of matched STL & OBJ

CBCT ReOrientation & Digital face bow

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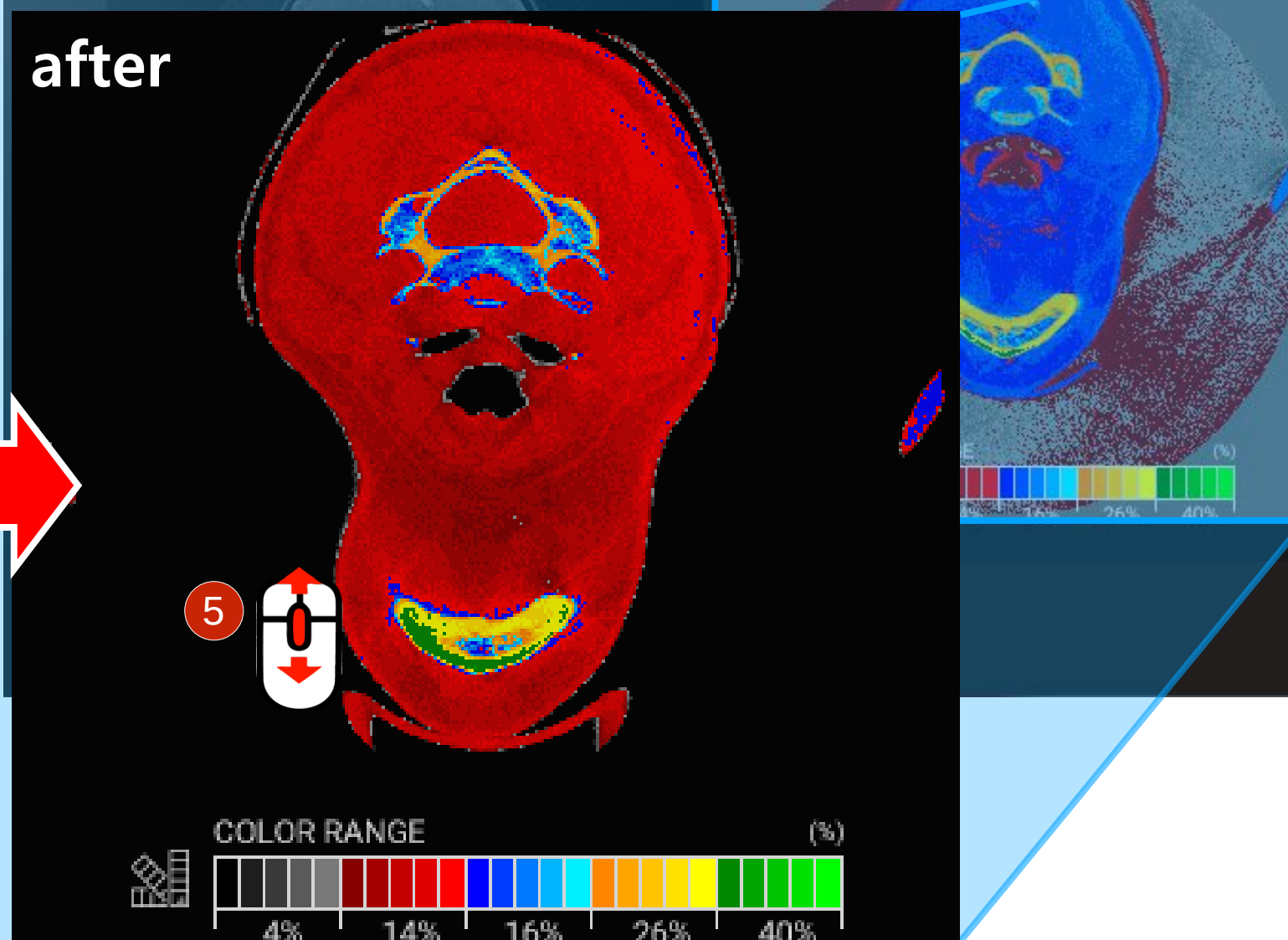
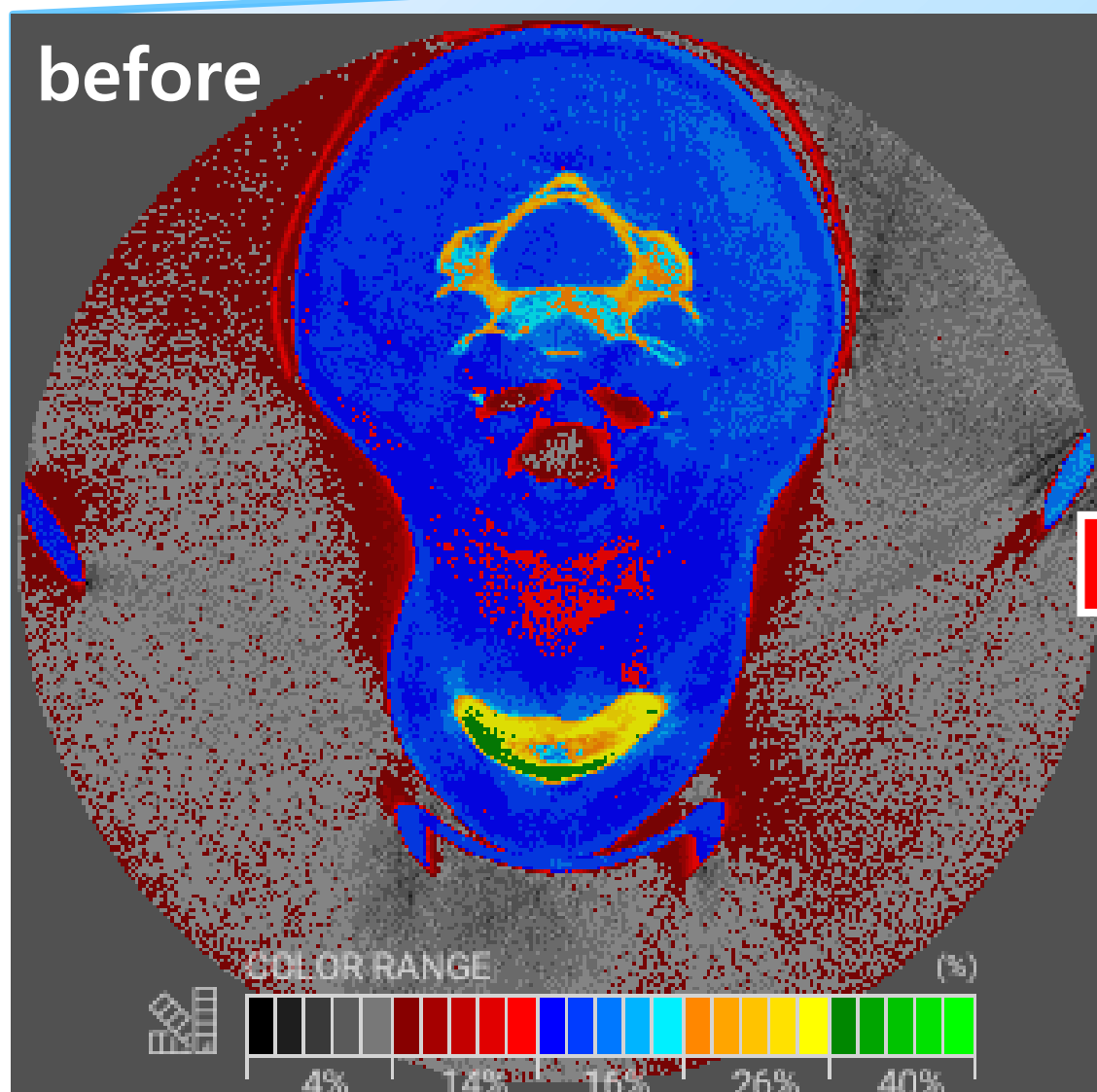
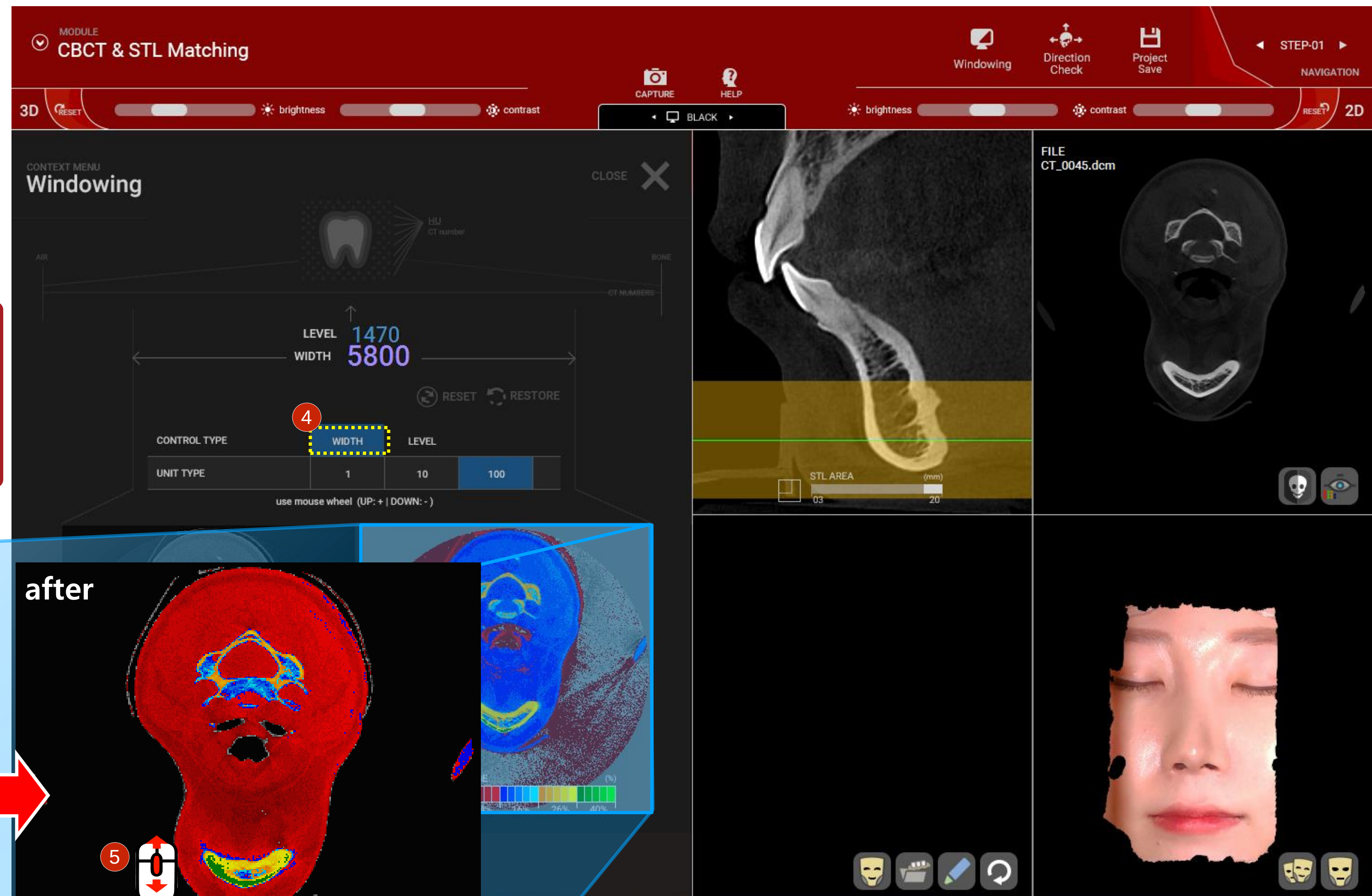
R2GATE CBCT Windowing

4 Select **WIDTH** option

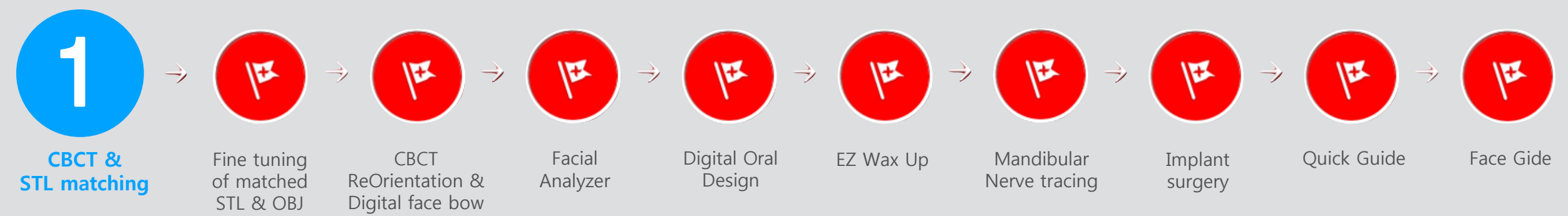
5 According to the CBCT color values below, adjust other sections by scrolling the mouse

Ideal CBCT color values:

- Teeth & prosthesis: GREEN [Level]
- Cortical bone: YELLOW or GREEN [Level]
- Medium bone: BLUE or SKY BLUE [Level]
- Soft bone: RED [Width]
- Air: BLACK [Width]



2.5 CBCT Windowing



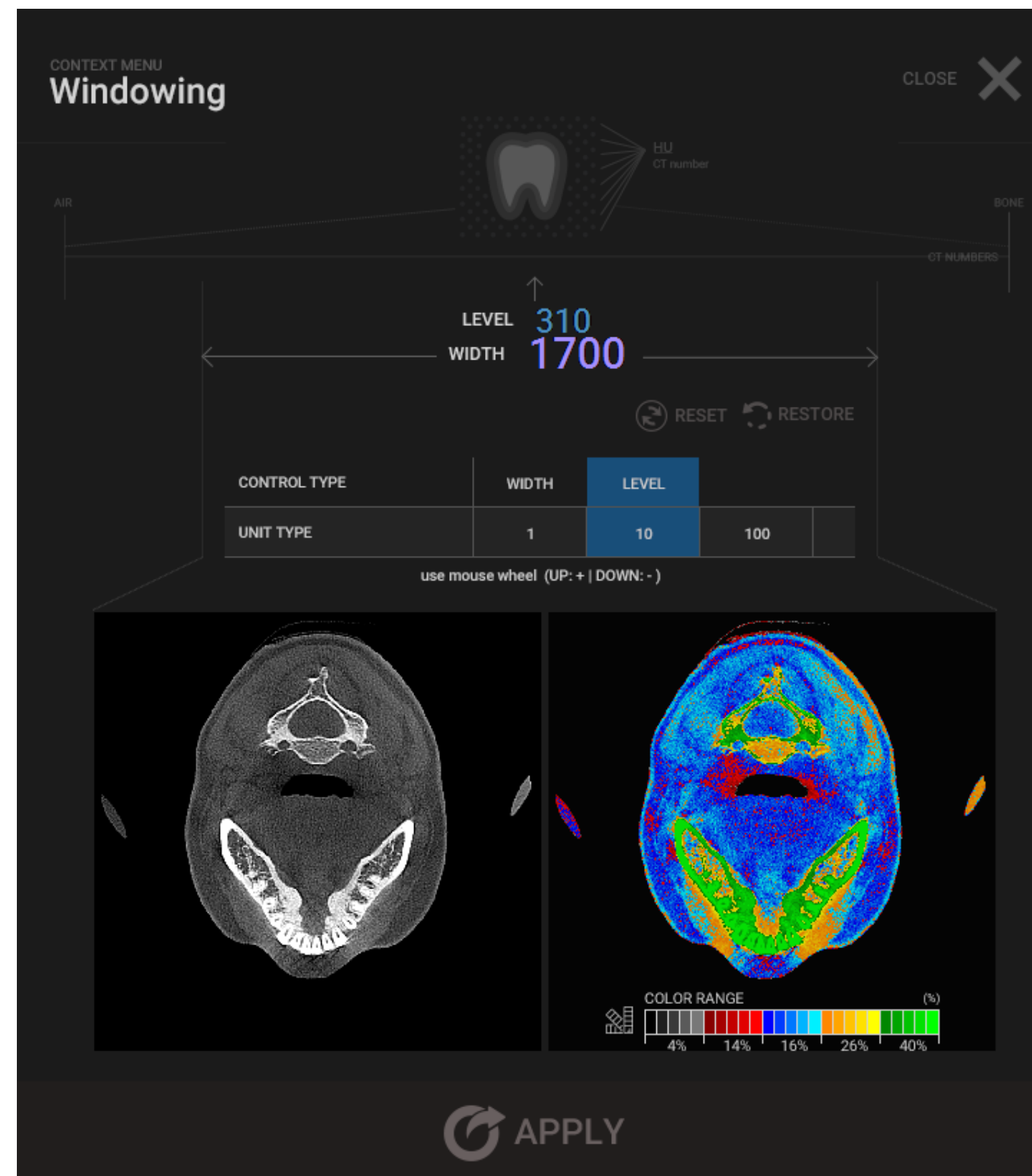
**R2
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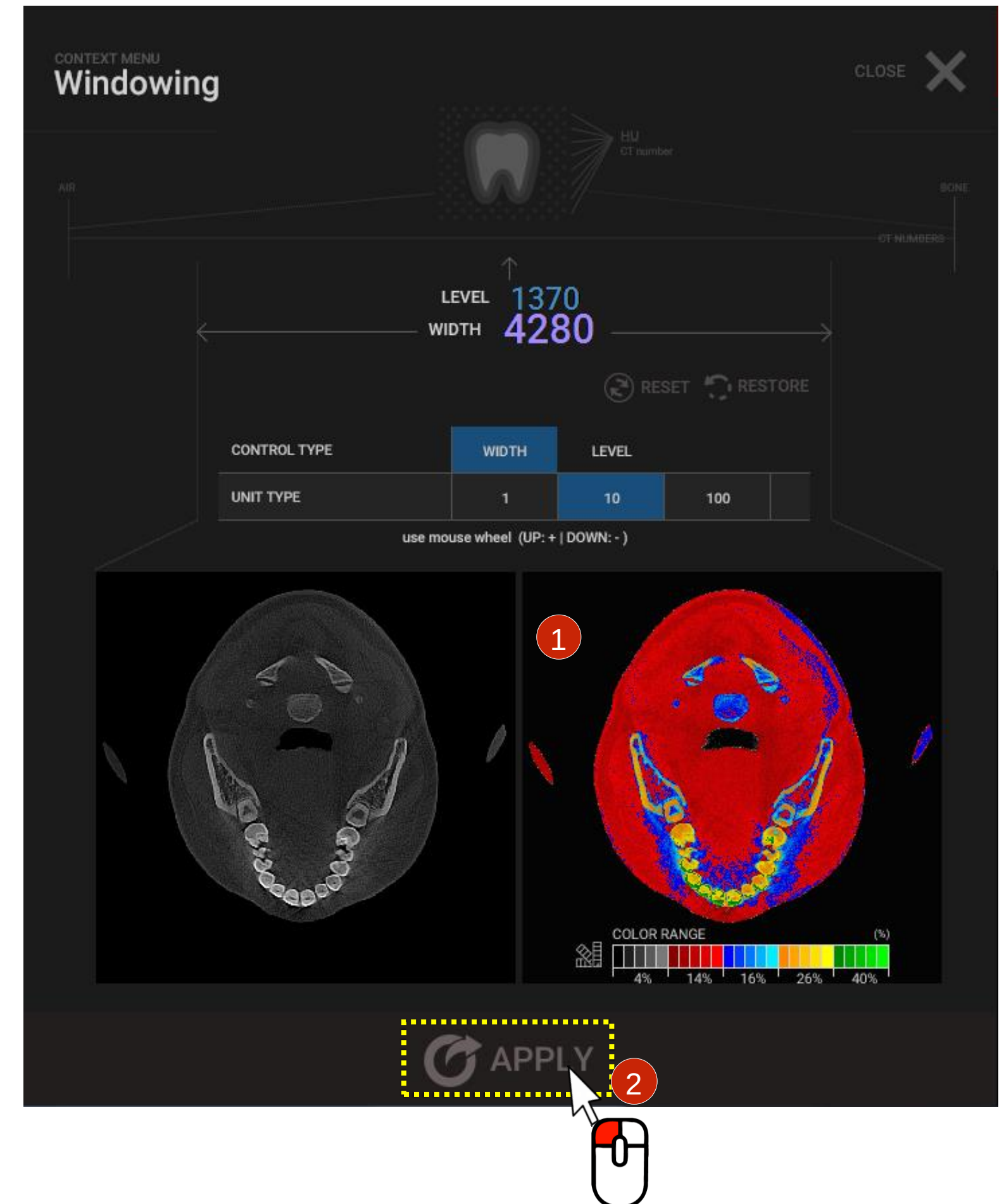
R2GATE CBCT Windowing

- 1 To view colour values, left click & drag the green line up & down
 - ! CBCT is divided into 256 color levels to allow easy bone quality identification with the naked eye
 - ! If CBCT data has very narrow HFU scale, CBCT will only show 2-3 colors
- 2 Click **APPLY** to change

[Before Windowing]



[After Windowing]



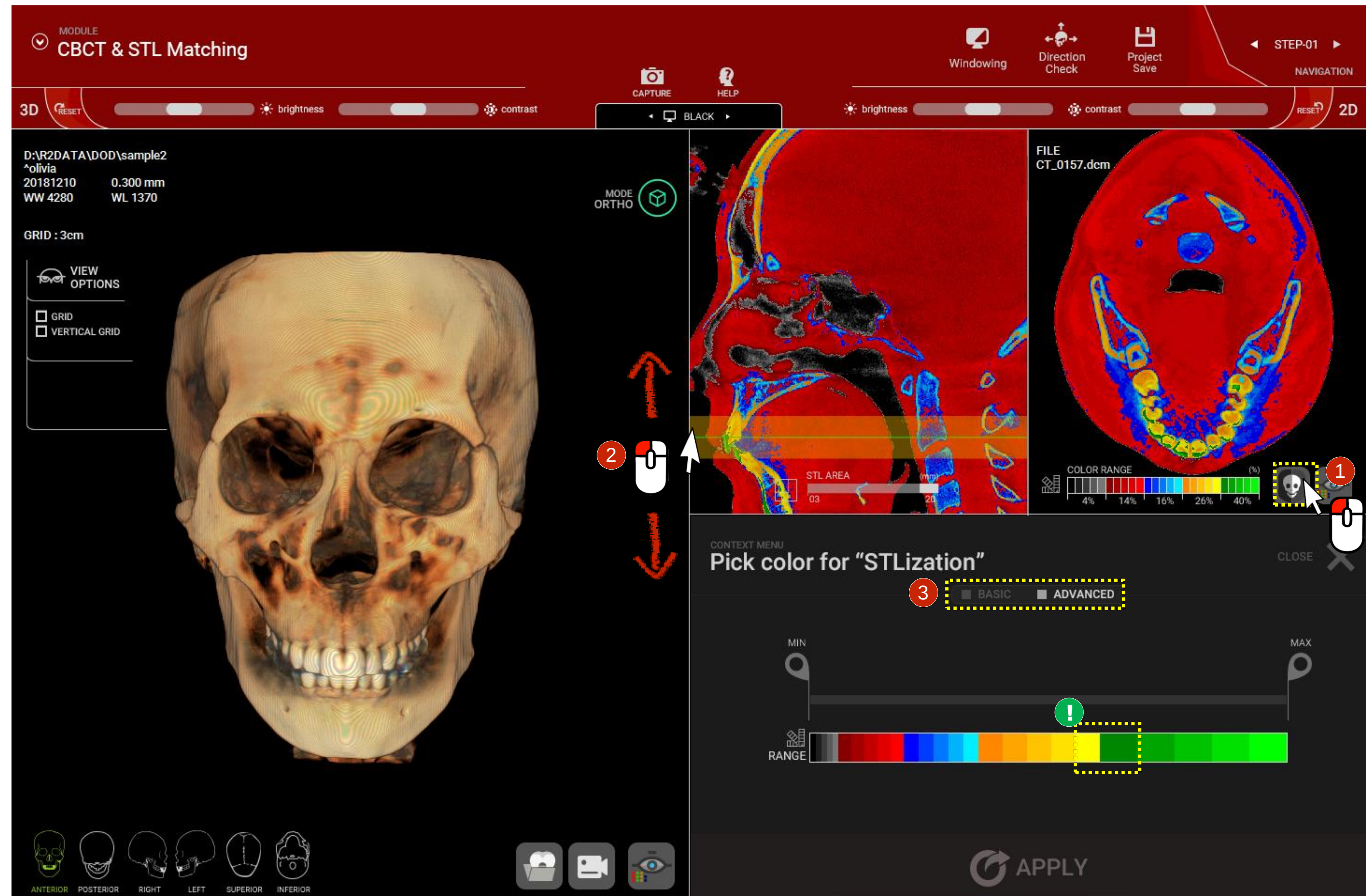
R2GATE has two matching modes:
auto & precise

Auto Matching

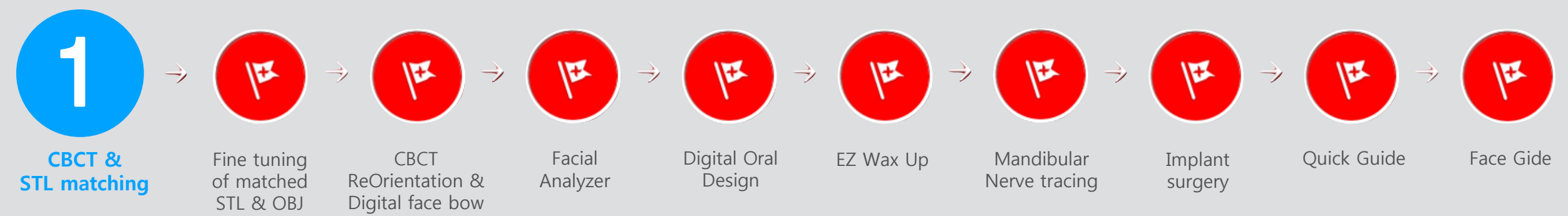
STL-ization:

Conversion of CBCT to STL format for superimposing with model STL file

- 1  Click **STL-ization**
- 2 Move green line to set conversion range & adjust width of conversion zone
- 3  The teeth and R2TRAY should be placed in the yellow area
- 3  Select appropriate color so that parts that need STLization appear. Select **BASIC / ADVANCED** to convert
- 3  For more detailed colors of selection, refer to the next page



2.6 STL Matching Auto Matching



R2GATE has two matching modes:
auto & precise

Auto Matching

STL-ization:

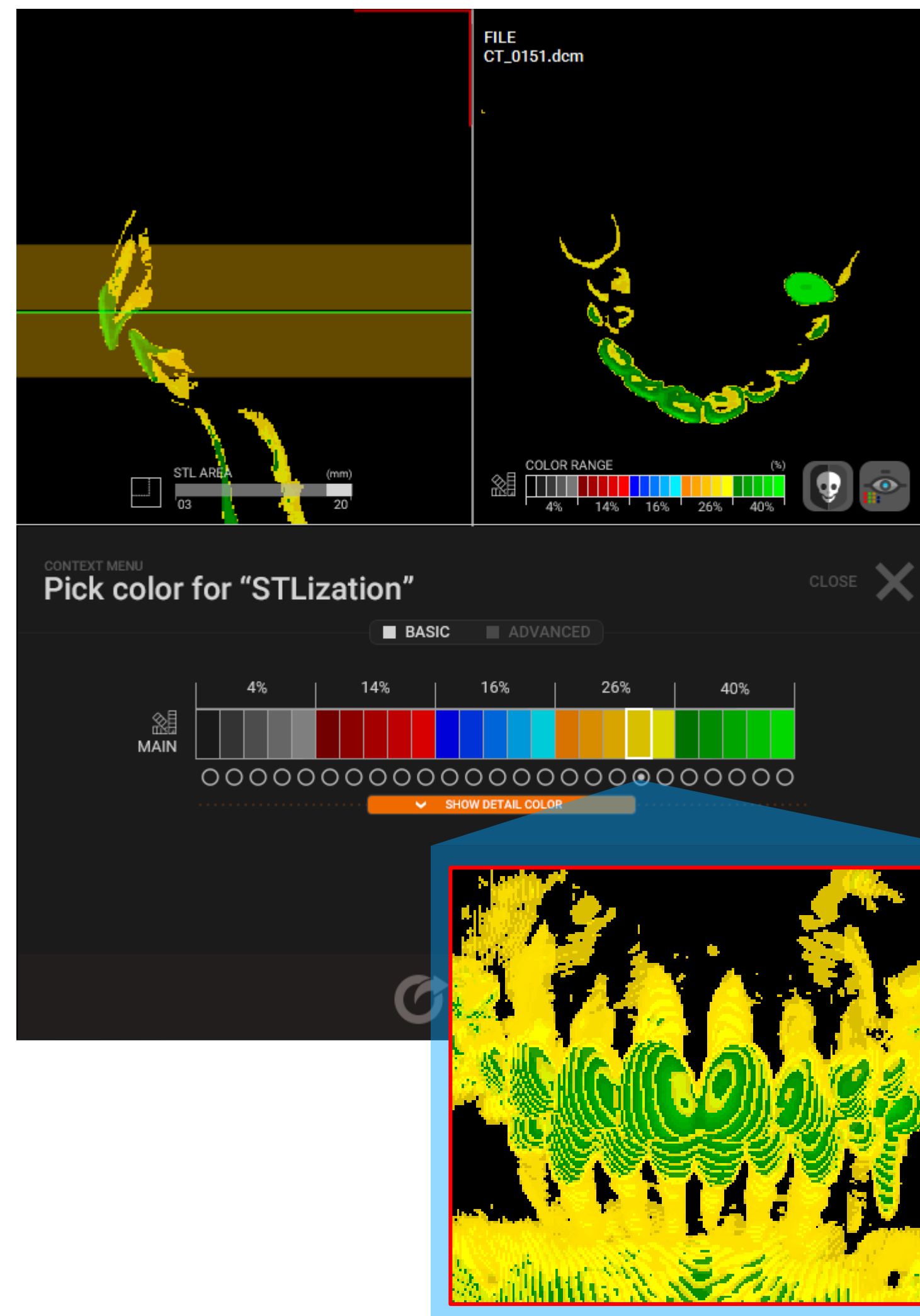
Conversion of CBCT to STL format for superimposing with model STL file

4 To match with the teeth of CBCT, select the teeth color from orange to yellow

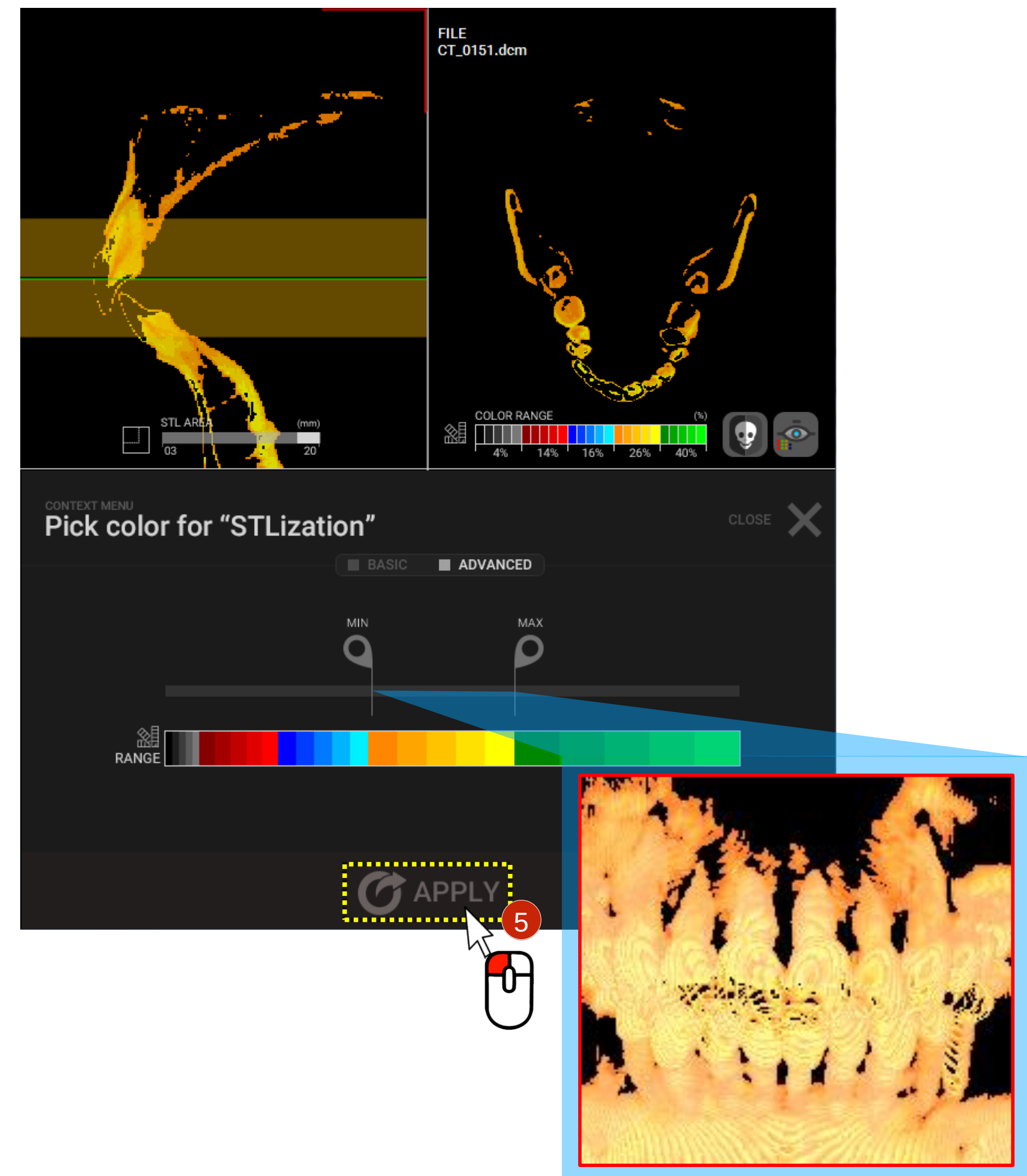
- **BASIC** : Select desired range of colors
- **ADVANCED** : Specify desired range of area to specify more in detail

5 Click **APPLY** to convert

[BASIC]



[ADVANCED]



2.6 STL Matching Auto Matching

1
CBCT &
STL matching



Fine tuning
of matched
STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
Analyzer



Digital Oral
Design



EZ Wax Up



Mandibular
Nerve tracing



Implant
surgery



Quick Guide



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R2GATE has two matching modes:
auto & precise

Auto Matching

STL-ization:

To merge Model STL file and CBCT, convert
sections of CBCT to STL format



Adjust the transparency of CBCT and check if every teeth are completely converted
(If they are not converted properly, please try again)



2.6 STL Matching Auto Matching

1
CBCT & STL matching

Fine tuning
of matched
STL & OBJ

CBCT
ReOrientation &
Digital face bow

Facial
Analyzer

Digital Oral
Design

EZ Wax Up

Mandibular
Nerve tracing

Implant
surgery

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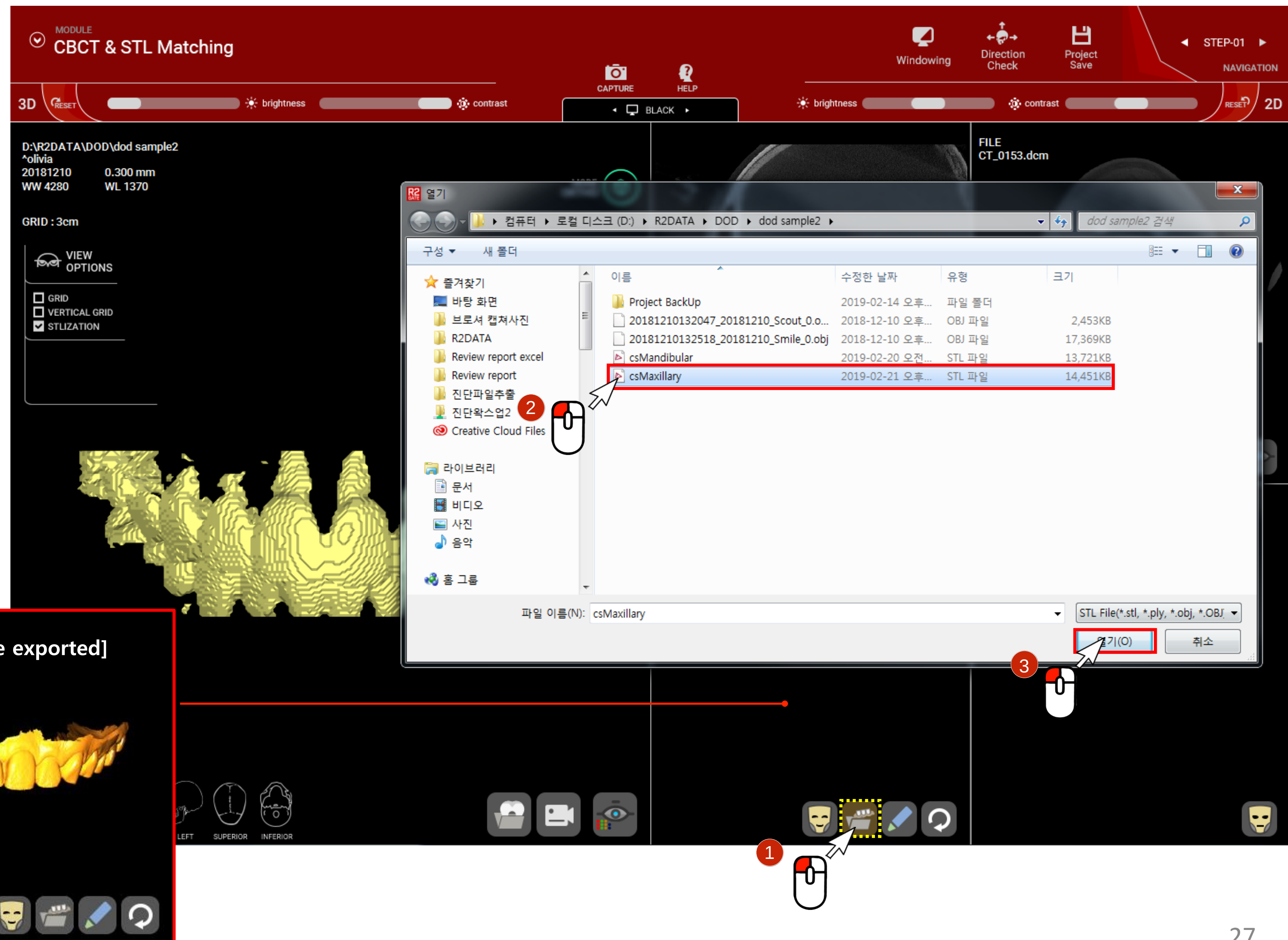
R2GATE has two matching modes:
auto & precise

Auto Matching

Loading model file (STL)

Import Model STL to merge with CBCT
converted to STL format

- 1  Click the icon to import STL file
- 2 Select model file (STL)
- 3 Click **"Open(O)"** to import the chosen files



2.6 STL Matching Auto Matching

1
CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



Face Gide

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GATE

Digital Oral Design
Mar. 2019

R2GATE has two matching modes:
auto & precise

Auto Matching

3-point Auto Matching

Use pen function to mark same 3 points on model STL file & STL-ized teeth file converted from CBCT

1 Click pen icon

2 Right click to mark 3 points on the Model STL file

! Mark the first point on the mesiolabial point angle of the incisor
First point will be the rotating axis of the model!

3 Mark 3 points identically on the STL-ized file

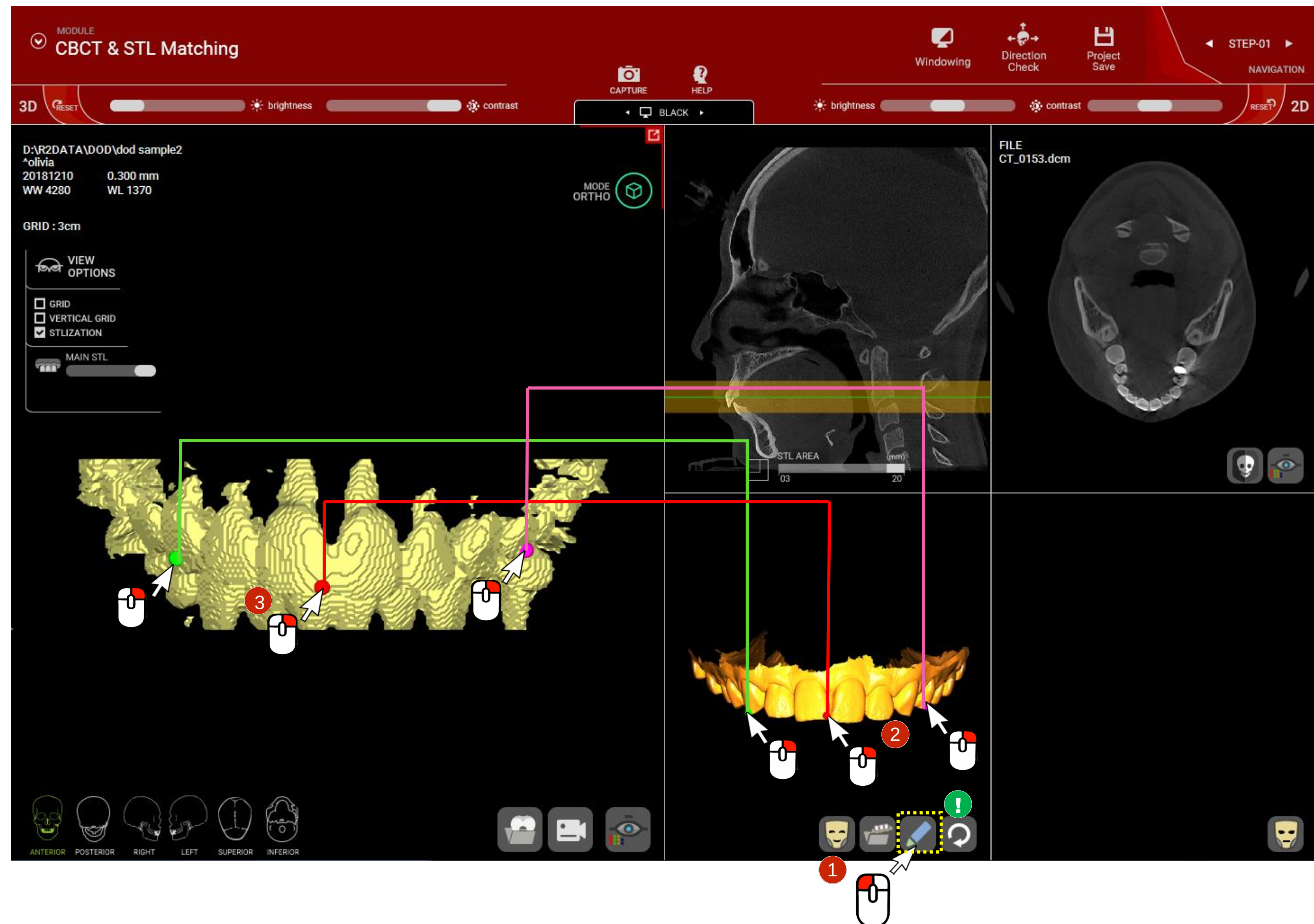
Left click : STL movement & rotation

Drag : STL zoom in & out

Right click: point marking

Wheel click: Remove previous point

! If Matching goes wrong, press reset button and try again



2.6 STL Matching Auto Matching



R2
GATE

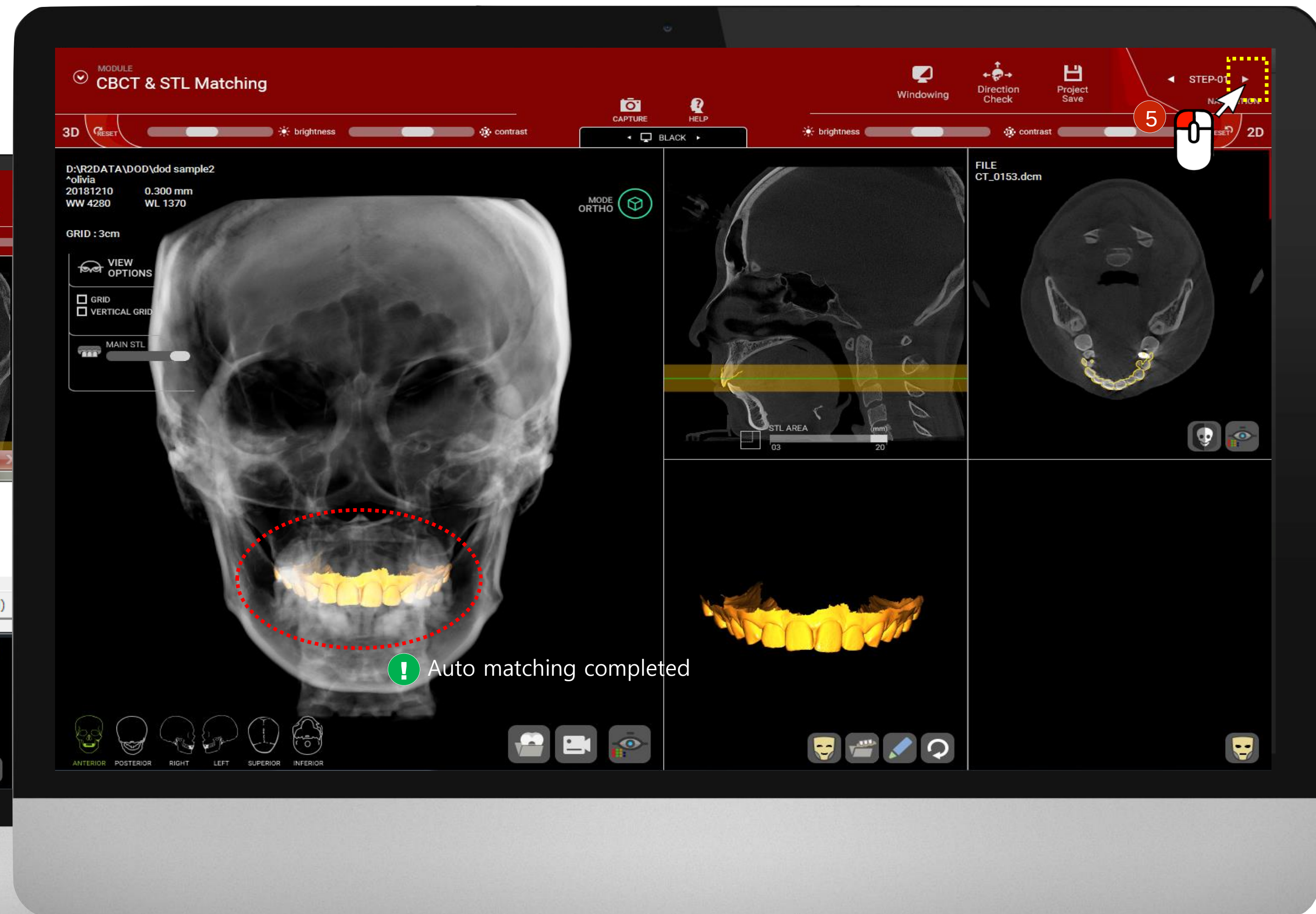
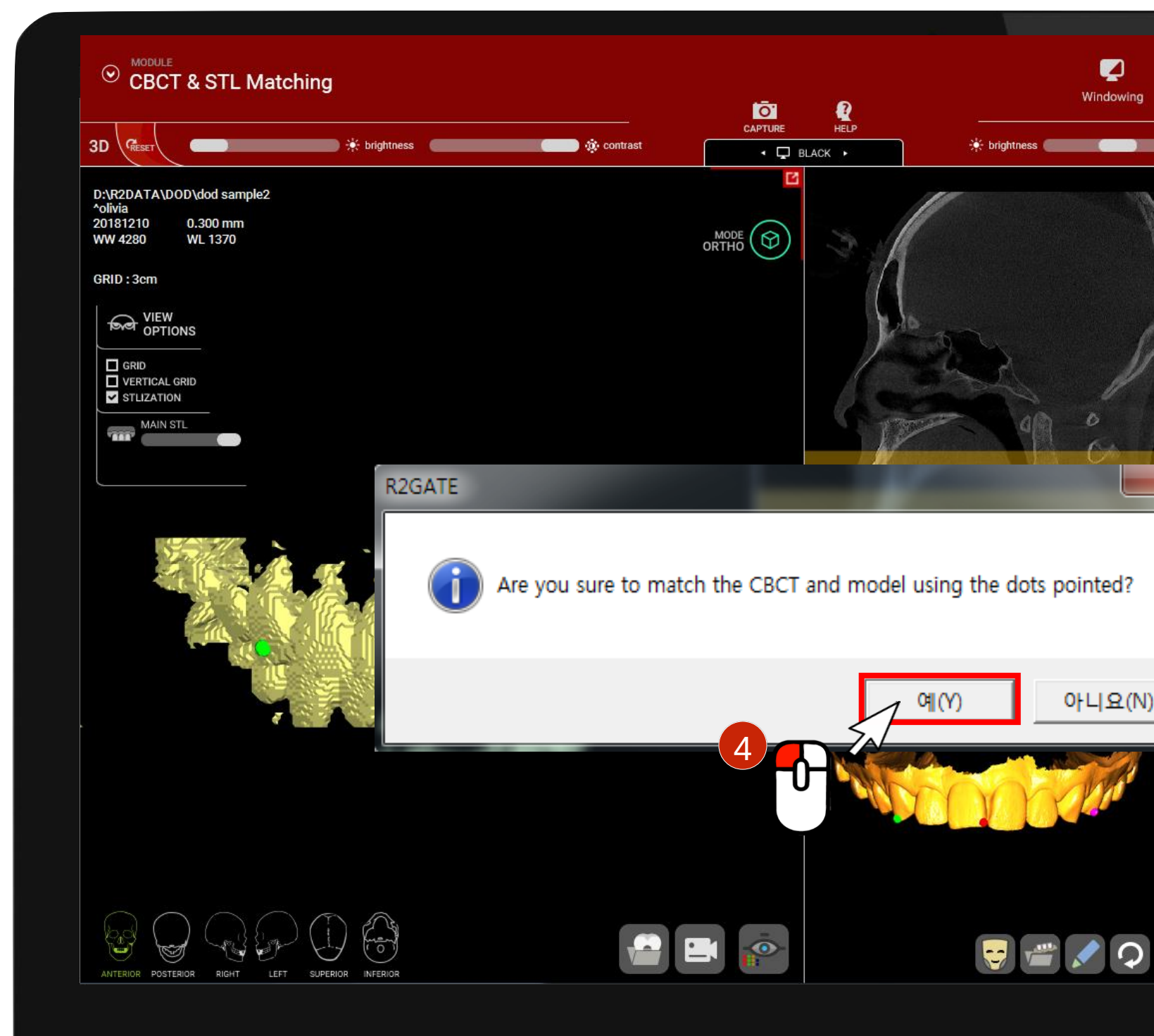
Digital Oral Design
Mar. 2019

R2GATE has two matching modes:
auto & precise

Auto Matching

4 Click **Yes(Y)** to complete Auto Matching

5 Click to proceed to next step



R2
GATE

2.7 R2GATE™ DOD Control Buttons



**R2
GATE**

Digital Oral Design
Mar. 2019

R2GATE has two matching modes:
auto & precise

Precise Matching

Control Buttons

Control function for accurate Model & CBCT Matching
Able to view and adjust Matching status in multi-section views

1 Check points

- R : Right
- L : Left
- C : Center (Anterior)

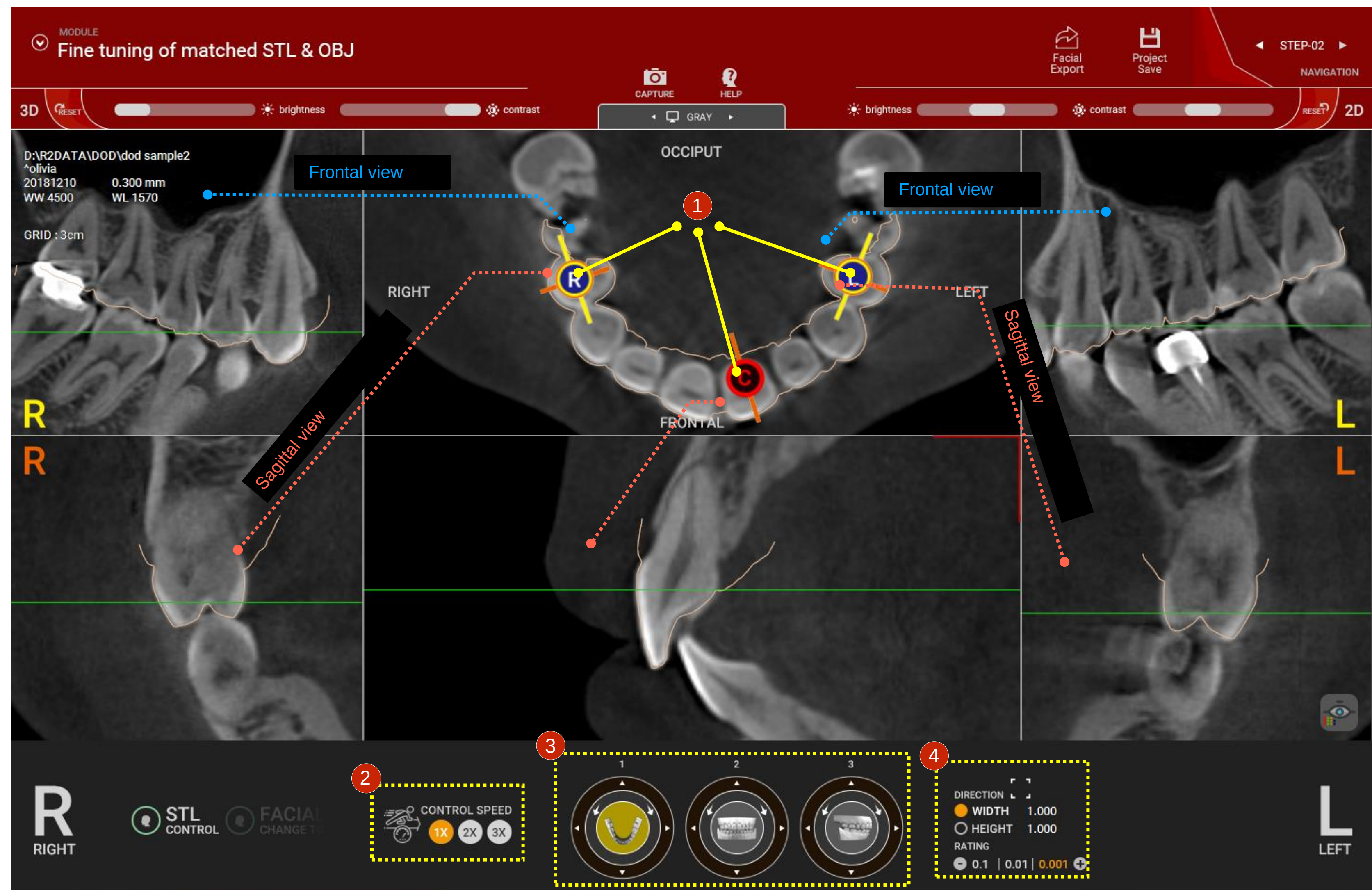
Move the points to each tooth & check the accuracy of Matching

2 Control Model Scan file(STL) movement

- ! X1 : Move 0.05mm
- X2 : Move 0.5mm
- X3 : Move 5mm

3 STL movement control key

4 CBCT ratio control (Not generally required)



2.7 R2GATE™ DOD Control Buttons



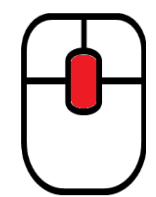
**R2
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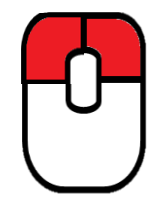
R2GATE has two matching modes:
auto & precise

Precise Matching

Mouse Controls

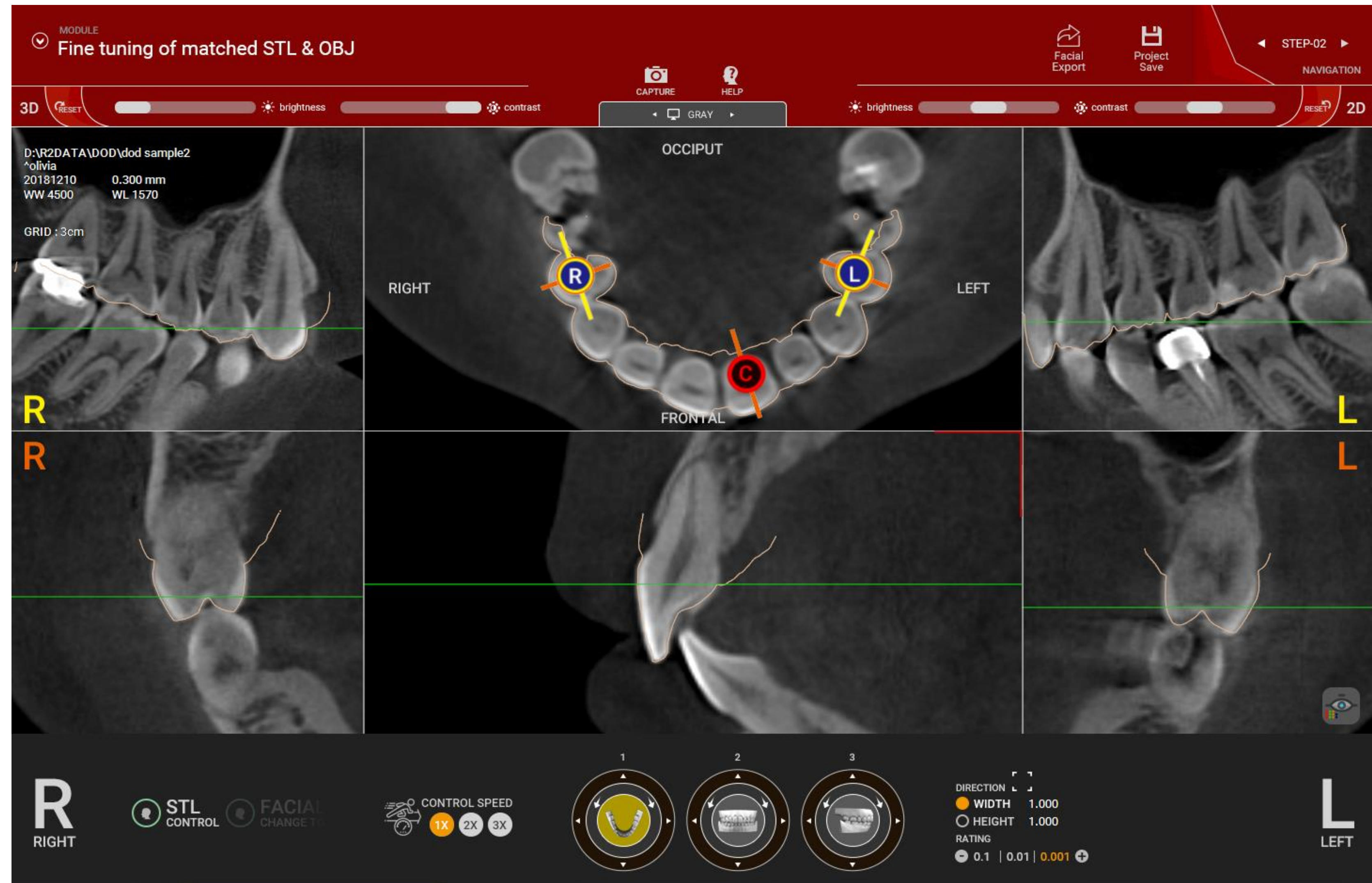
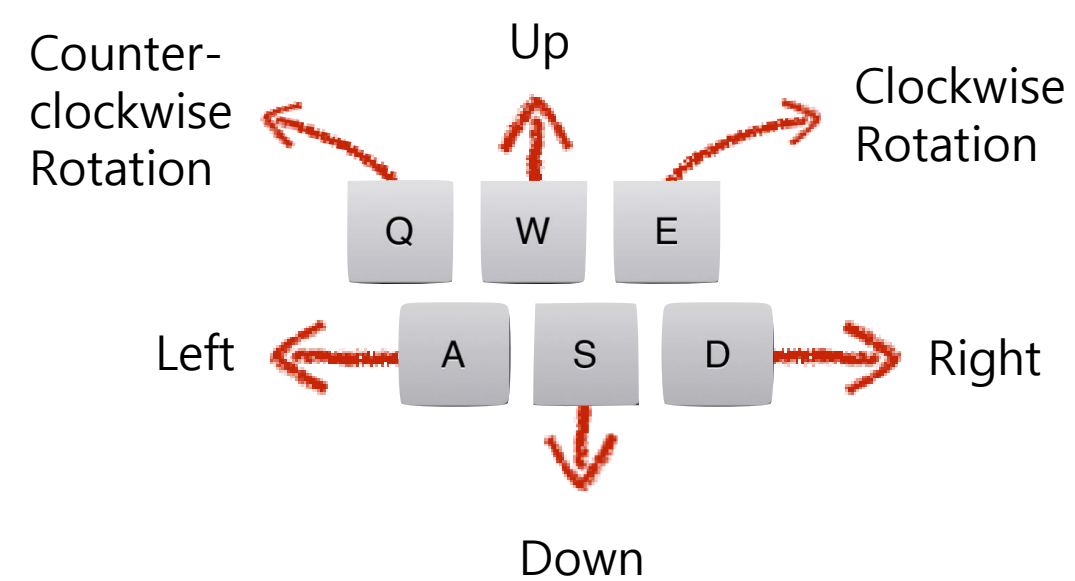


Wheel scrolling
: CBCT view zoom in & out



Right & left click
: CBCT view movement

Keyboard Shortcut



2.7 Fine Tuning of Matched STL

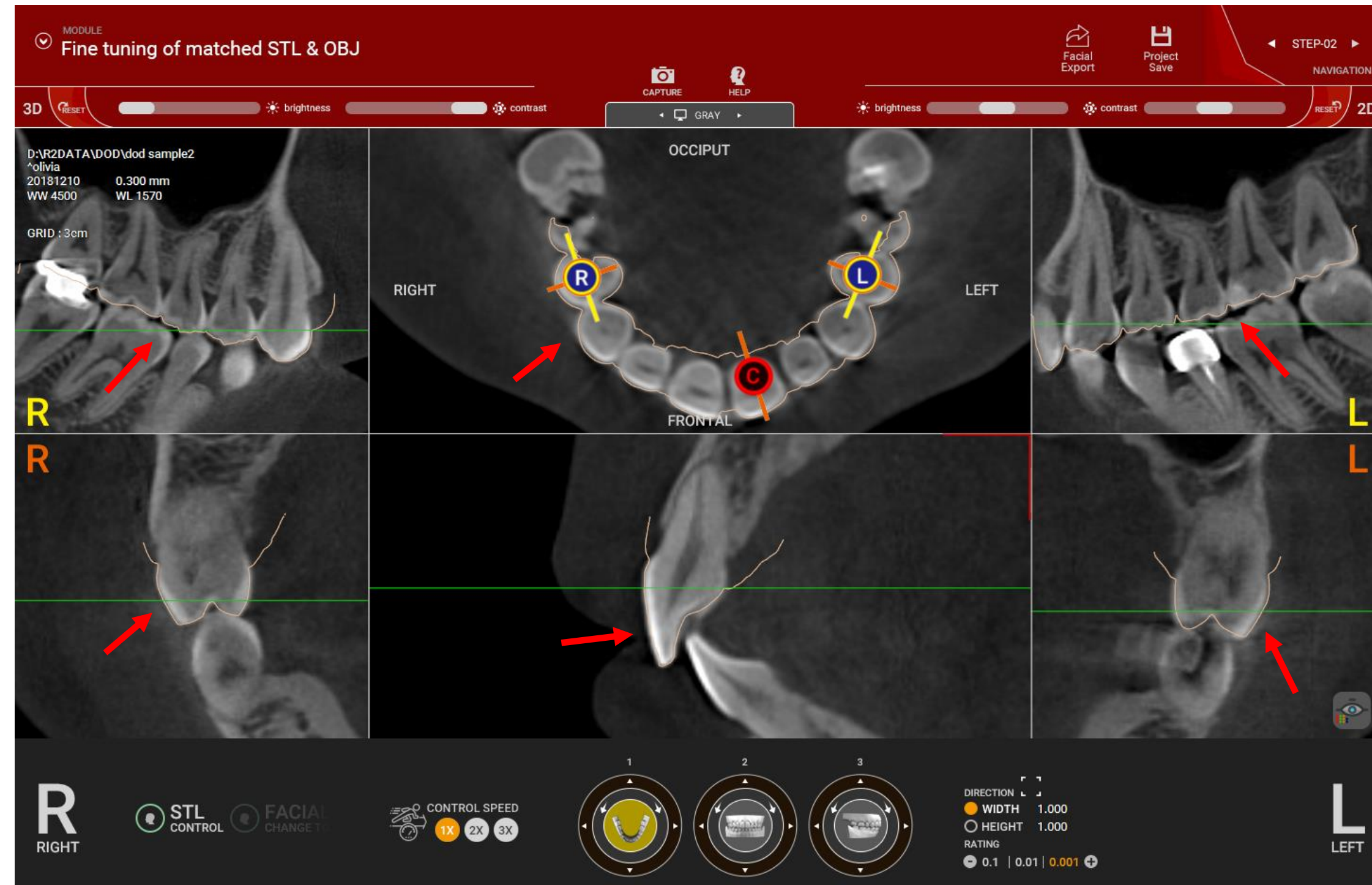


R2GATE has two matching modes:
auto & precise

Precise Matching

- 1 Natural dentition : Matching natural teeth to model in CBCT
- 2 Edentulous dentition : Using customized R2 Tray for Matching

[Precise Matching: Natural Dentition]



[Precise Matching: Edentulous Dentition]



2.7 Fine Tuning of Matched STL



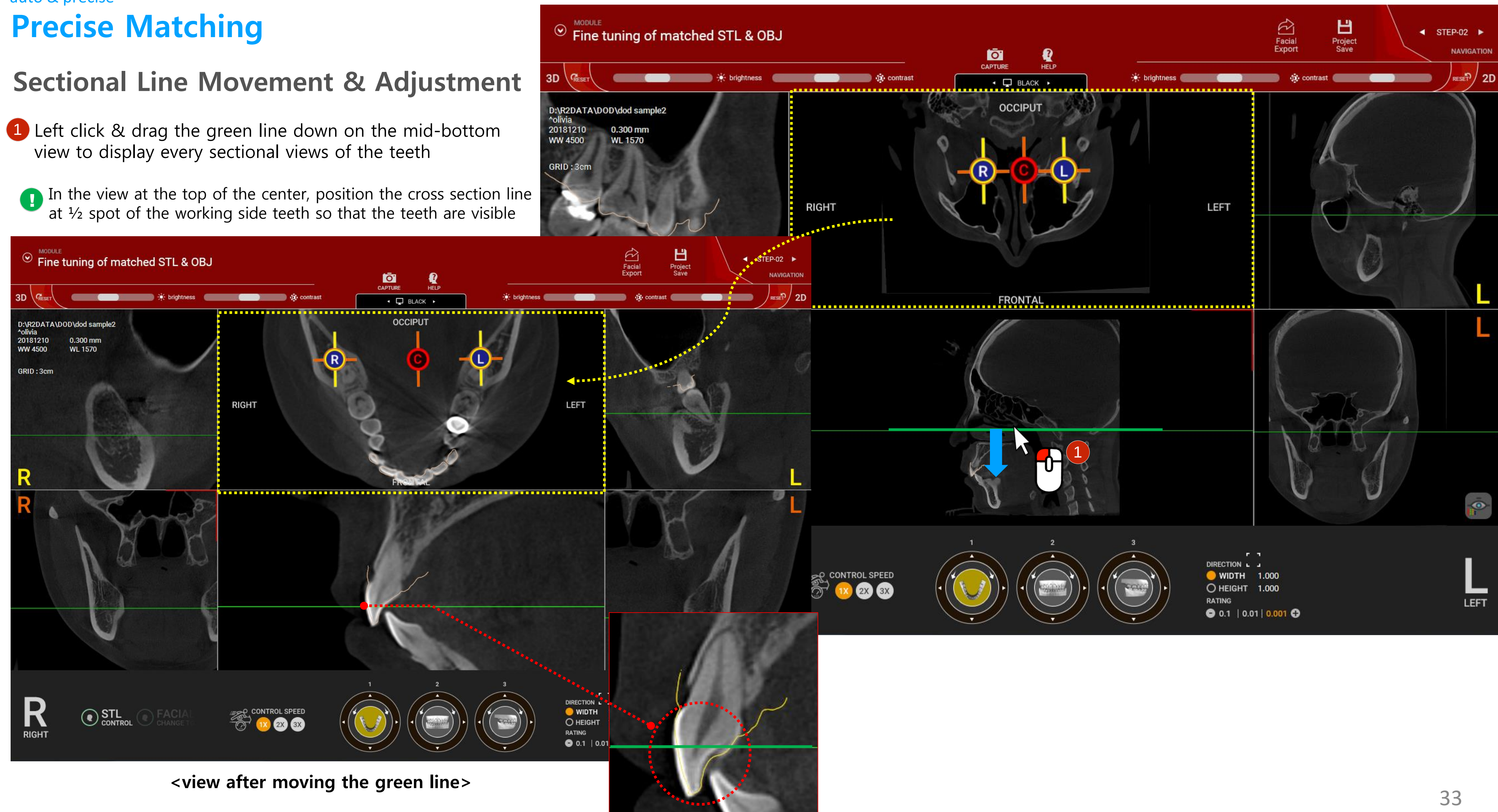
R2GATE has two matching modes:
auto & precise

Precise Matching

Sectional Line Movement & Adjustment

1 Left click & drag the green line down on the mid-bottom view to display every sectional views of the teeth

! In the view at the top of the center, position the cross section line at 1/2 spot of the working side teeth so that the teeth are visible



2.7 Fine Tuning of Matched STL



R2GATE has two matching modes:
auto & precise

Precise Matching

Fine Tuning Point Movement

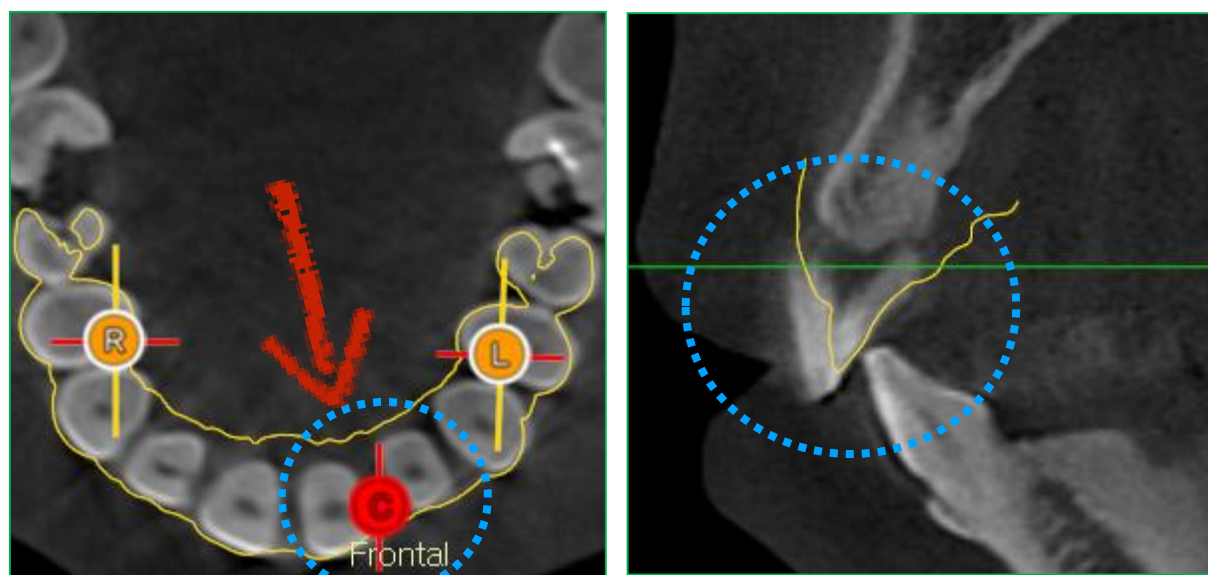
2 Move the mouse over to the desired view to see the cross section of the tooth, then use the mouse wheel to zoom-in & out.

3 Left click & move the icon on top of each tooth.

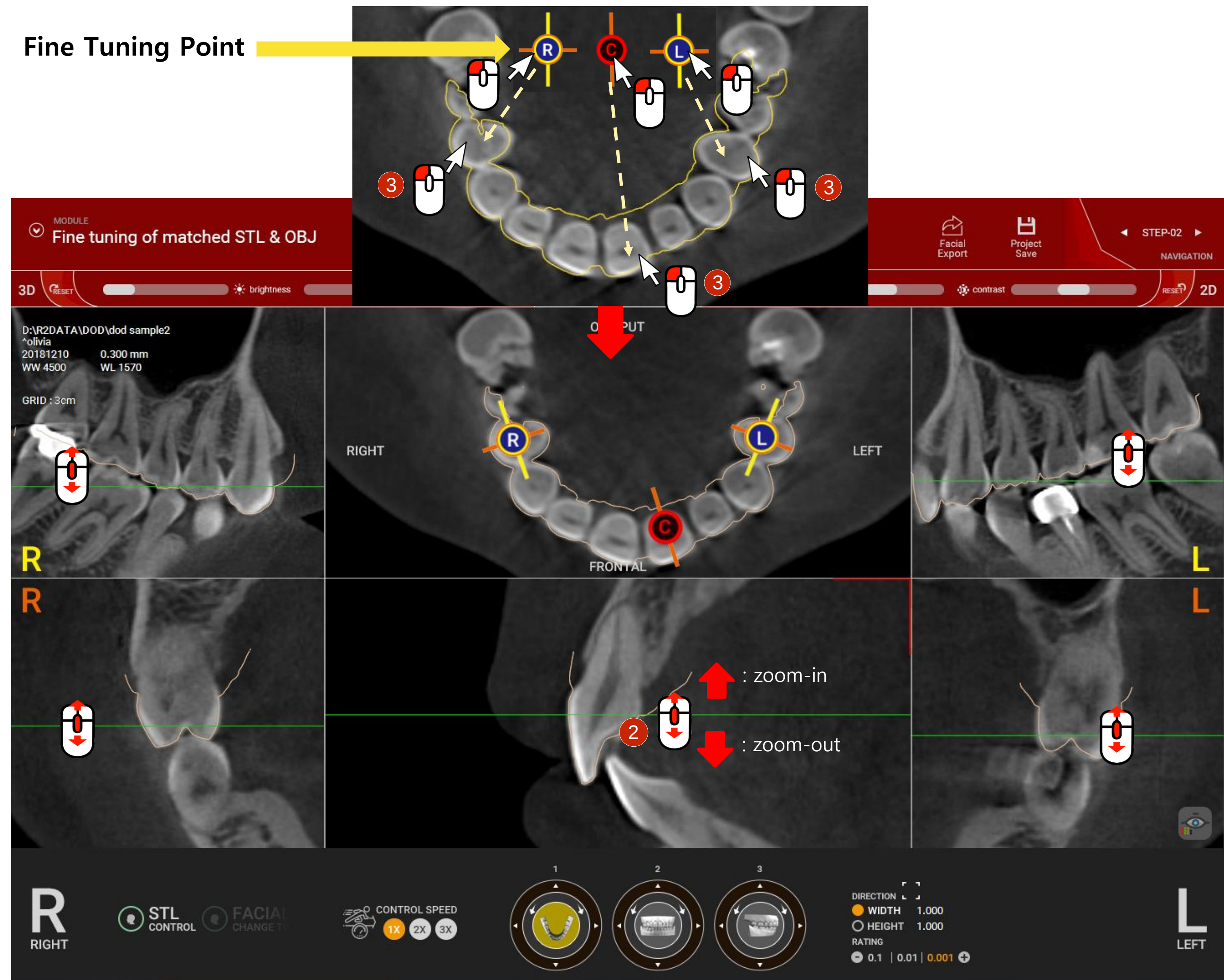
- R point: Right
- L point: Left
- C point: Center (Anterior teeth)

! In case of prosthesis, the exact shape of the teeth is not detected due to metal scattering, so move the icon to natural teeth rather than prosthesis

! If the icon is positioned between the teeth, the exact correct section view of the teeth can not be seen, so place the icon in the center of each tooth



Fine Tuning Point



2.7 Fine Tuning of Matched STL



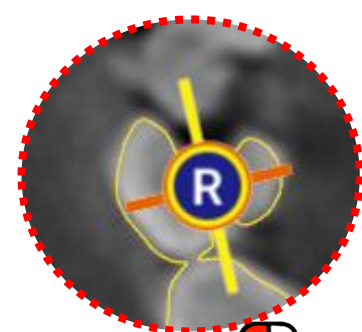
R2GATE has two matching modes:
auto & precise

Precise Matching

Rotation of the cross-sectional axis of the Fine Tuning point

In order to achieve the correct Matching result, the Matching status of each tooth has to be checked by adjusting the rotation axis of the Fine Tuning Point in the direction of the arch so that the mesio-distal panorama view is displayed.

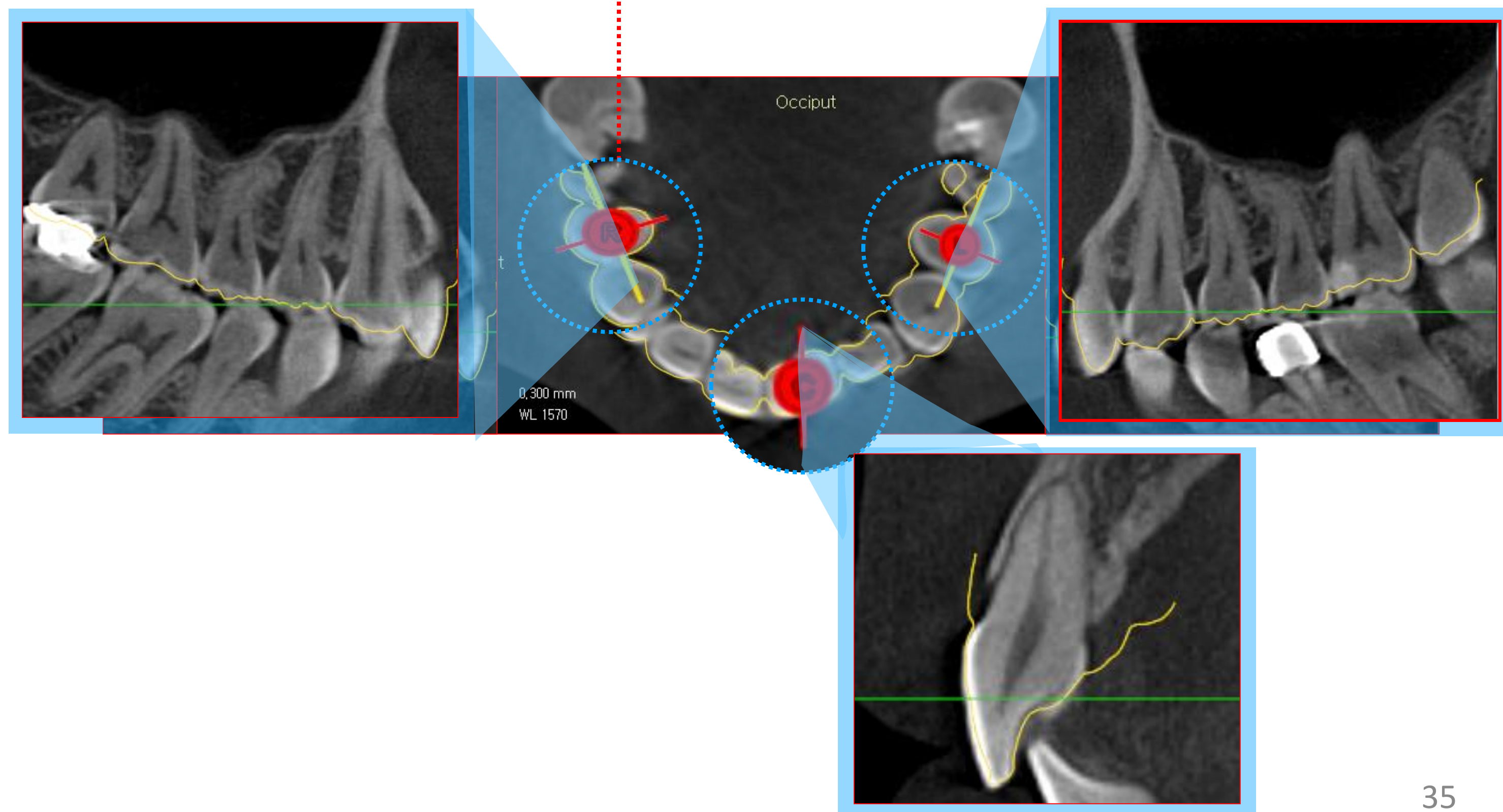
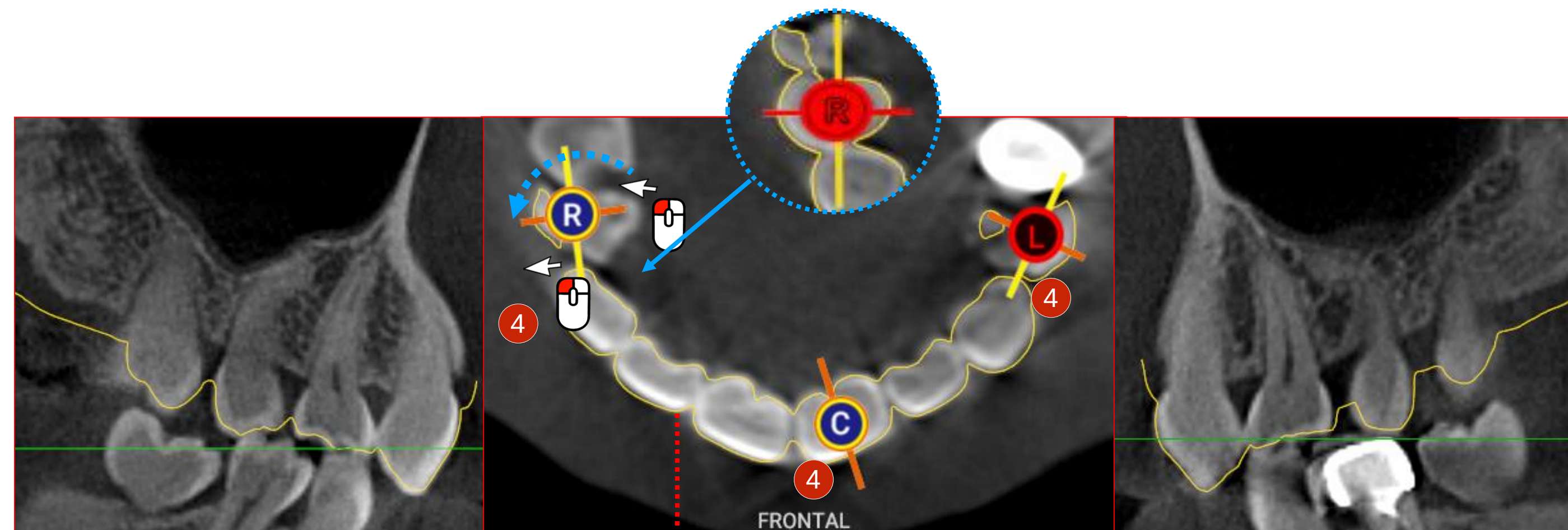
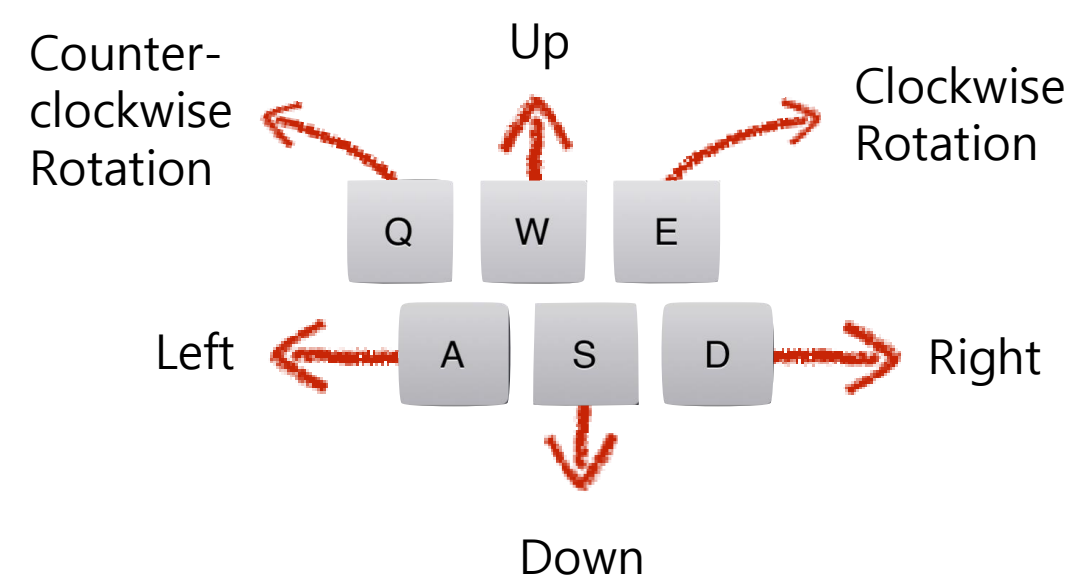
- 4 Select the Fine Tuning Point by left click and drag each cross section line to follow the arch



- Coronal line : Orange line
- Sagittal line : Yellow line

Left click on the point and drag to adjust the cross-section line

- ! **Keyboard Shortcuts**
(Click on the points and use the keyboard shortcuts for adjustment)



2.7 Fine Tuning of Matched STL



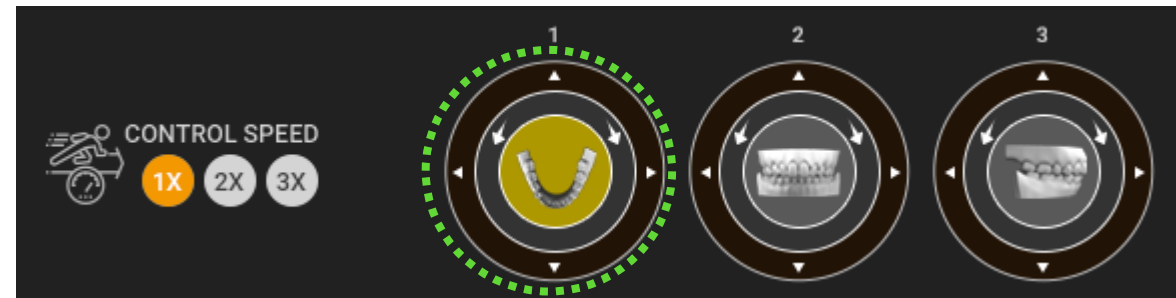
R2GATE has two matching modes:
auto & precise

Precise Matching

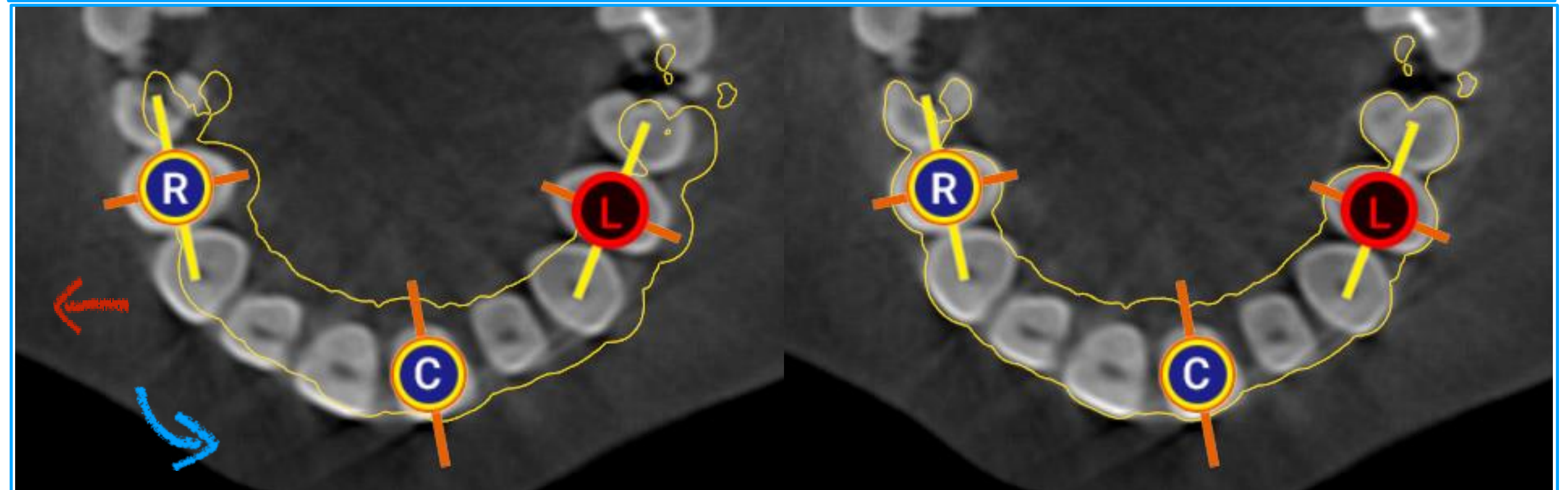
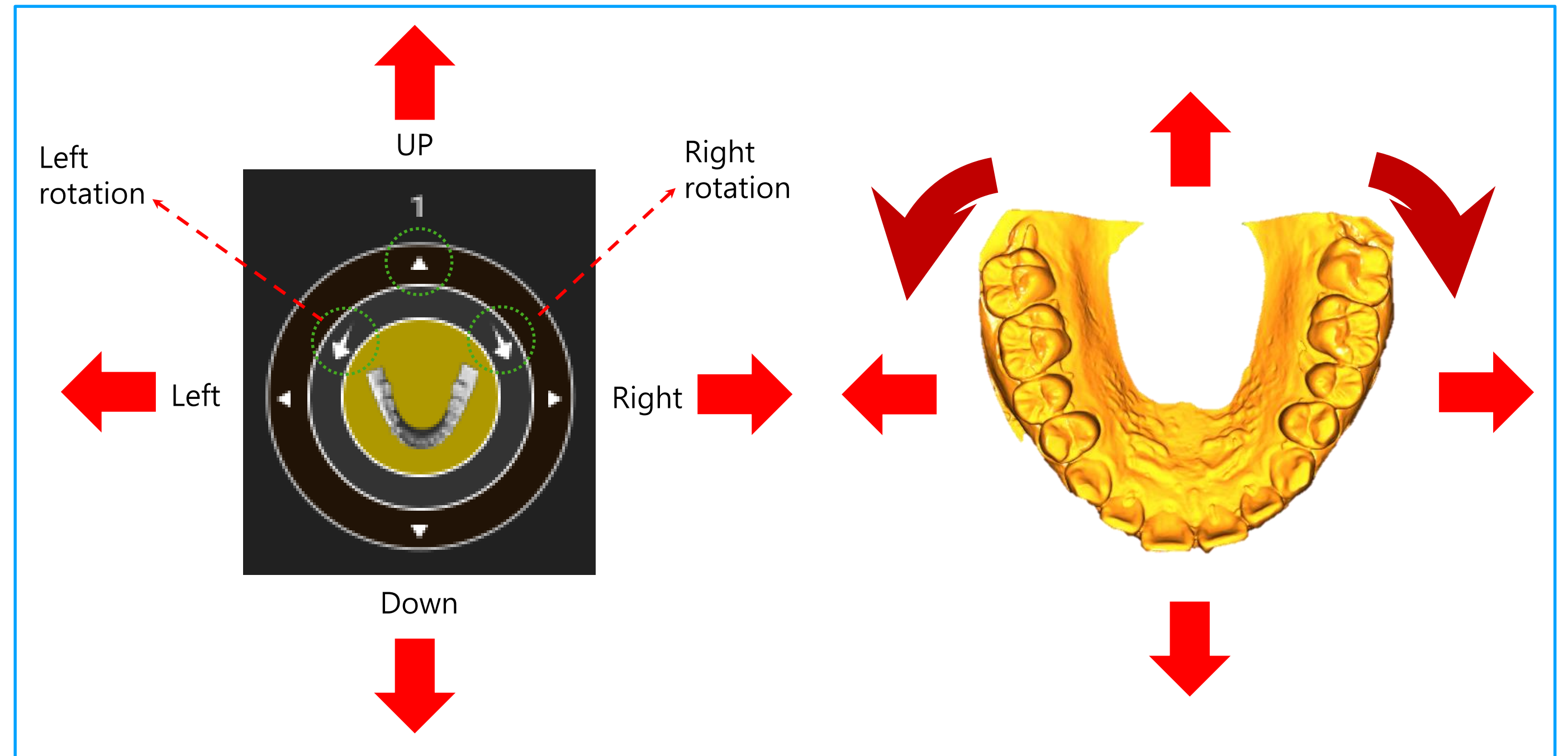
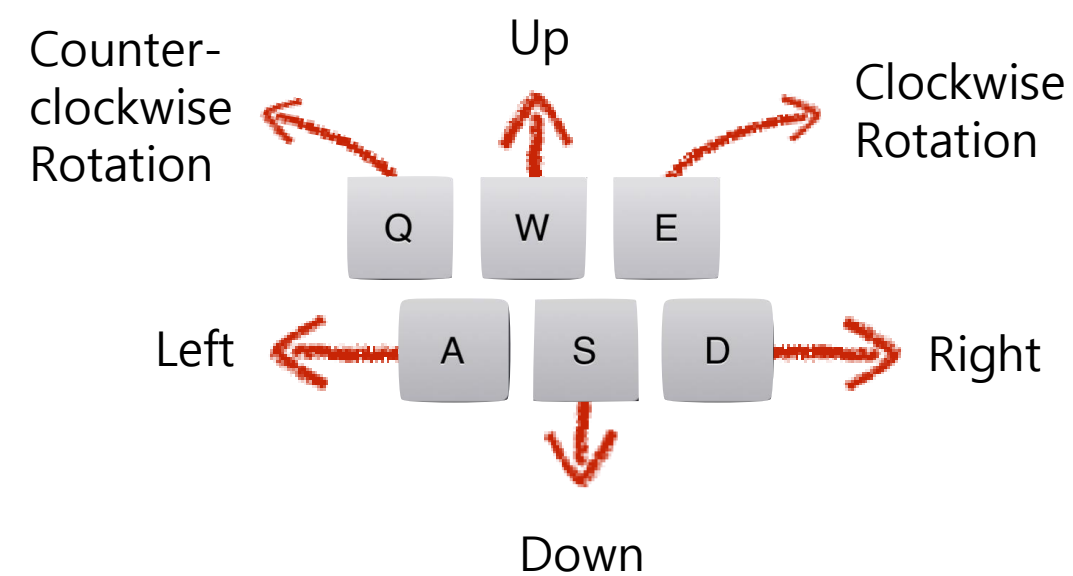
Precise Matching Adjustment using STL Control Keys

Adjust STL (Model) file precisely to complete the Matching with CT

- 5 Use the arrows in Control 1 to adjust the position of STL in the occlusal view



- Keyboard Shortcuts
(Click on the points and use the keyboard shortcuts for adjustment)



2.7 Fine Tuning of Matched STL



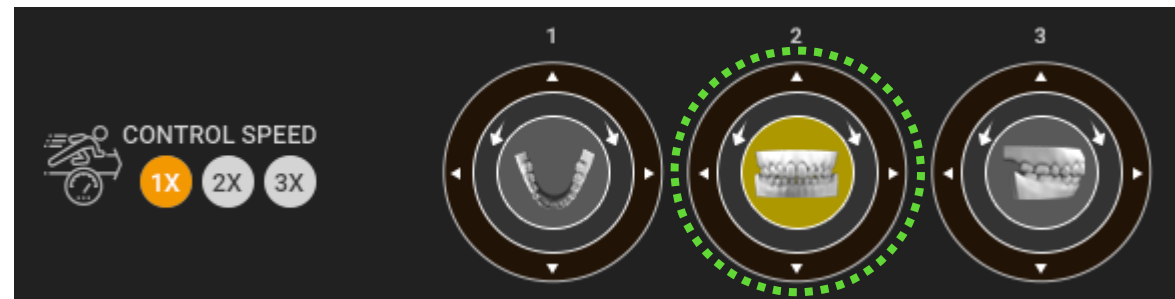
R2GATE has two matching modes:
auto & precise

Precise Matching

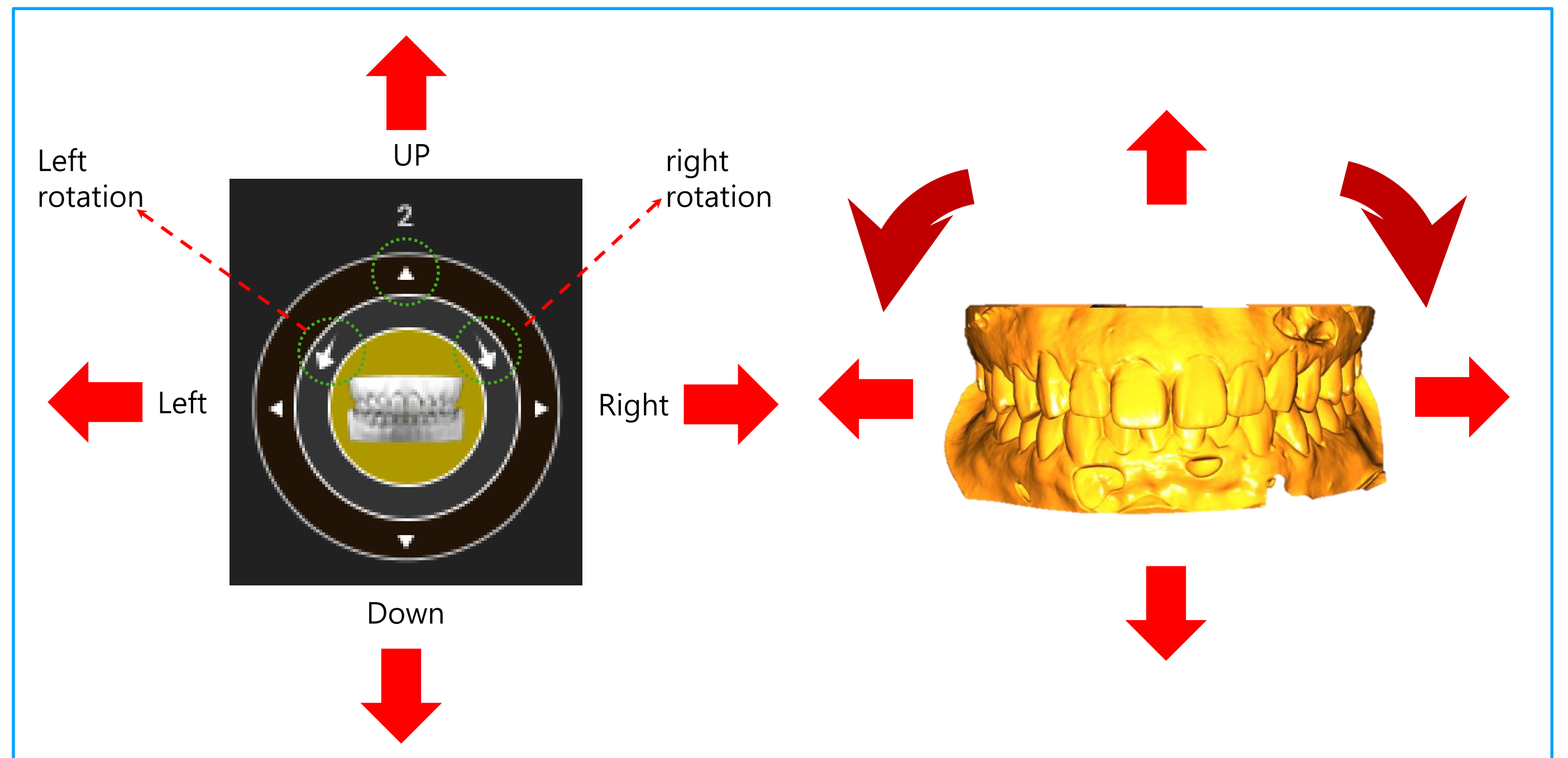
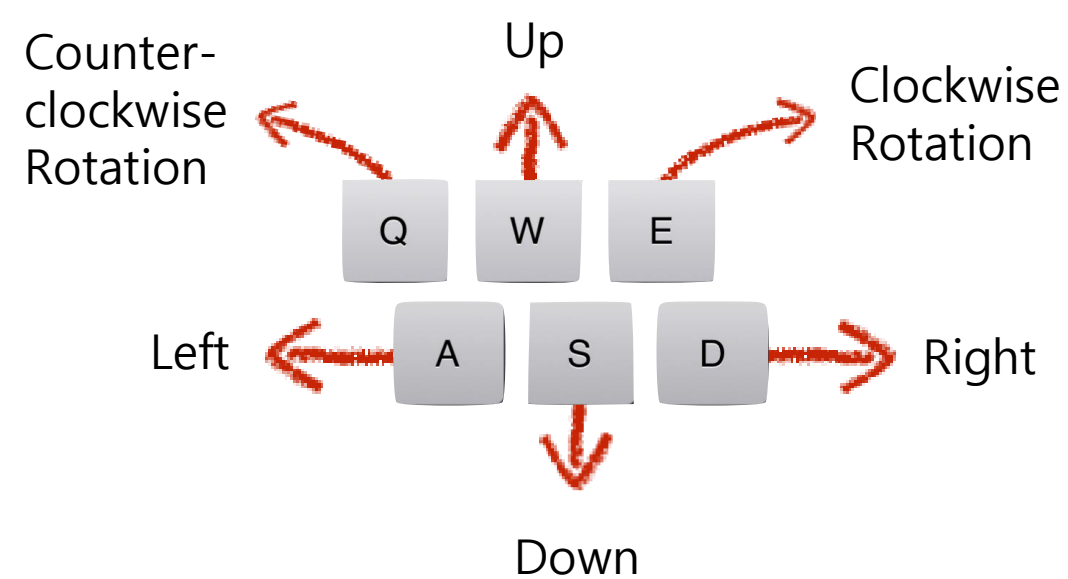
Precise Matching Adjustment using STL Control Keys

Adjust STL (Model) file precisely to complete the Matching with CT

- Use the arrows in Control 2 to adjust the height and position in the frontal view



- Keyboard Shortcuts**
(Click on the points and use the keyboard shortcuts for adjustment)



2.7 Fine Tuning of Matched STL



R2GATE has two matching modes:
auto & precise

Precise Matching

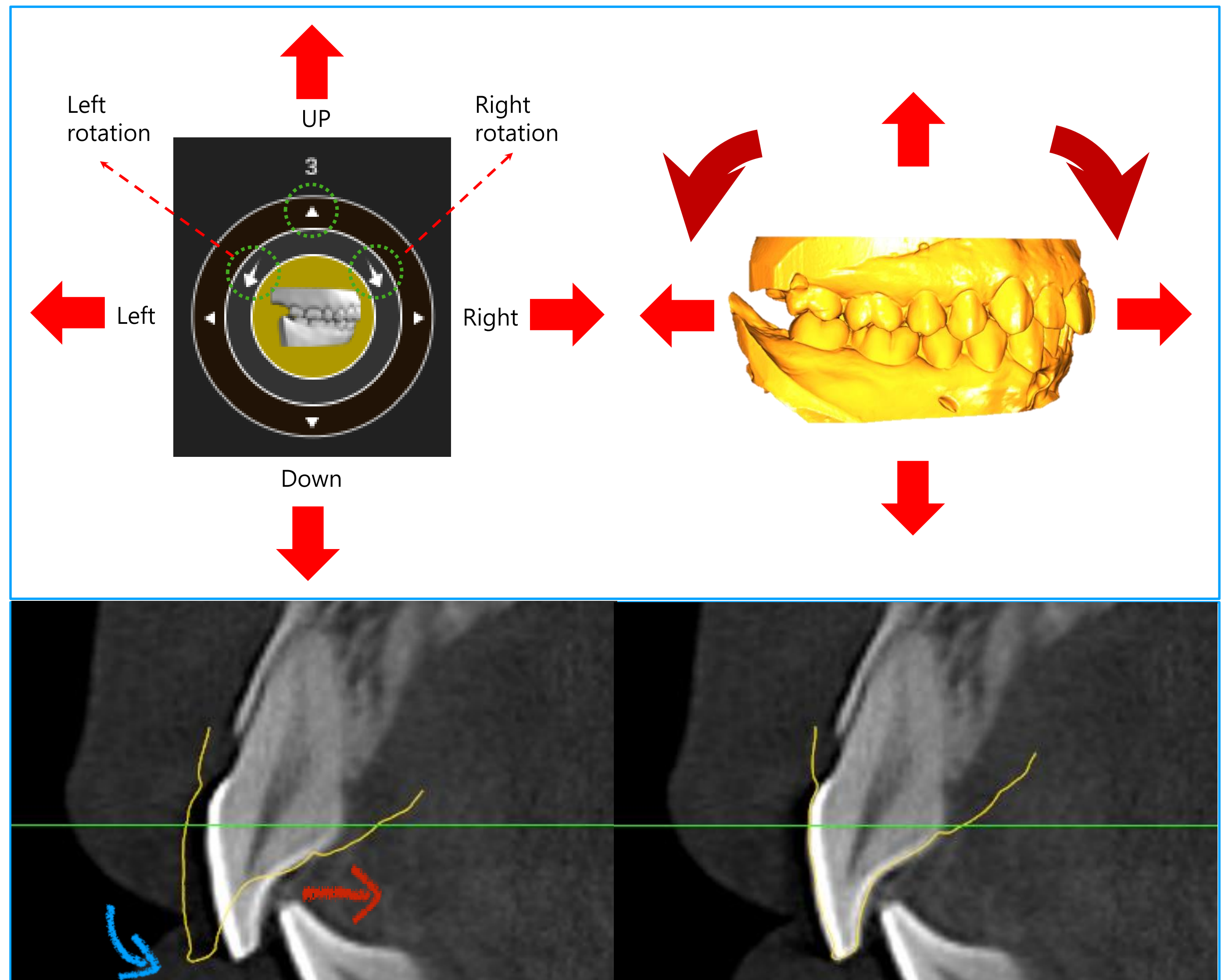
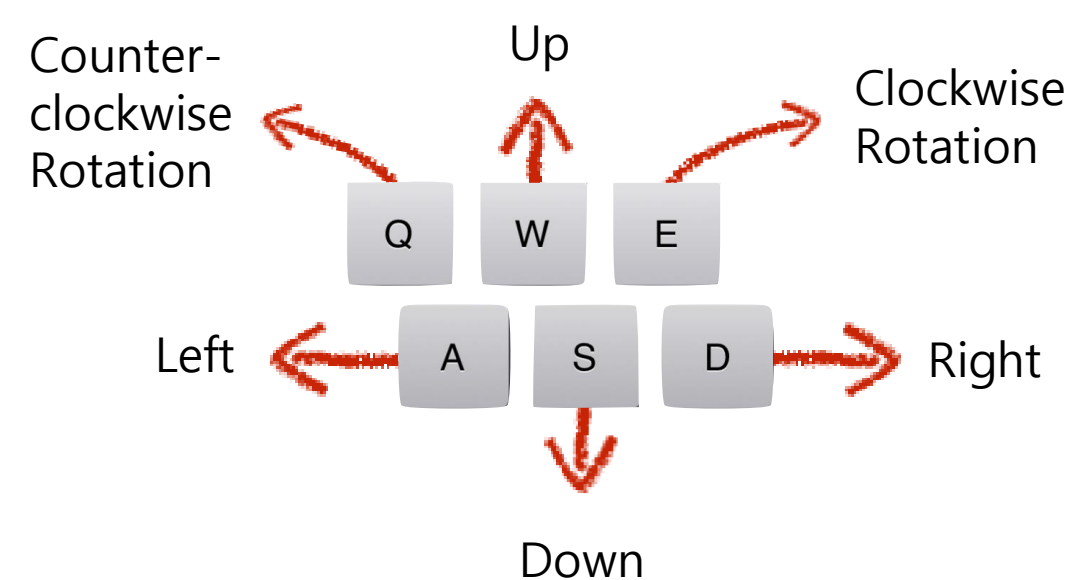
Precise Matching Adjustment using STL Control Keys

Adjust STL (Model) file precisely to complete the Matching with CT

- 7 Use the arrows in Control 3 to adjust the height and position in the sagittal view
- 8 Check each views again and repeat the process to adjust the parts that do not fit properly



Keyboard Shortcuts
(Click on the points and use the keyboard shortcuts for adjustment)



2.7 Fine Tuning of Matched STL



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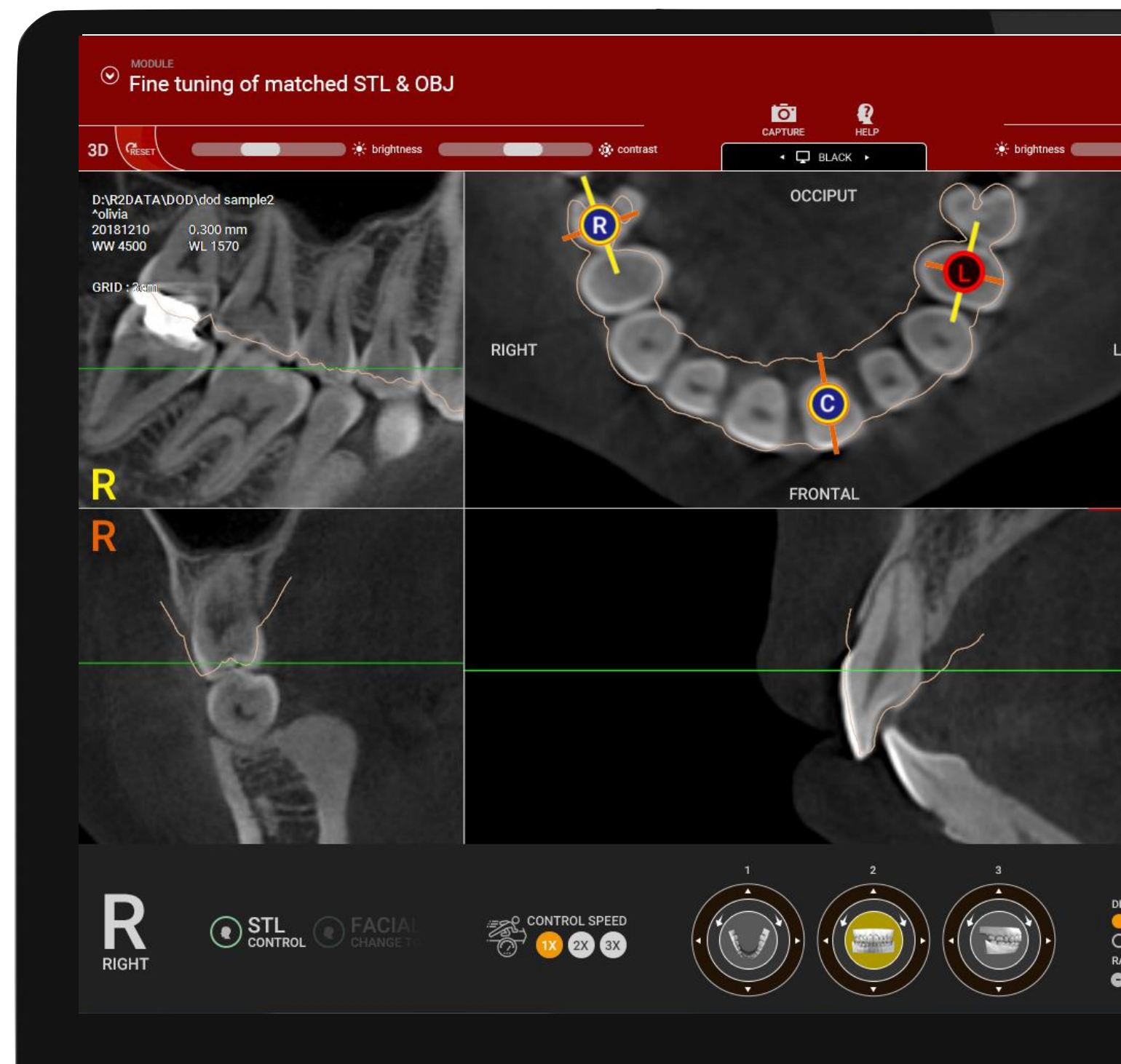
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R2GATE has two matching modes:
auto & precise

Precise Matching

Precise Matching Adjustment using STL Control Keys

9 Precise Matching is complete



[정밀매칭 전]

**R2
GATE**

**R2
GATE**

2.7 Fine Tuning of Matched STL



**R2
GATE**

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R2GATE has two matching modes:
auto & precise

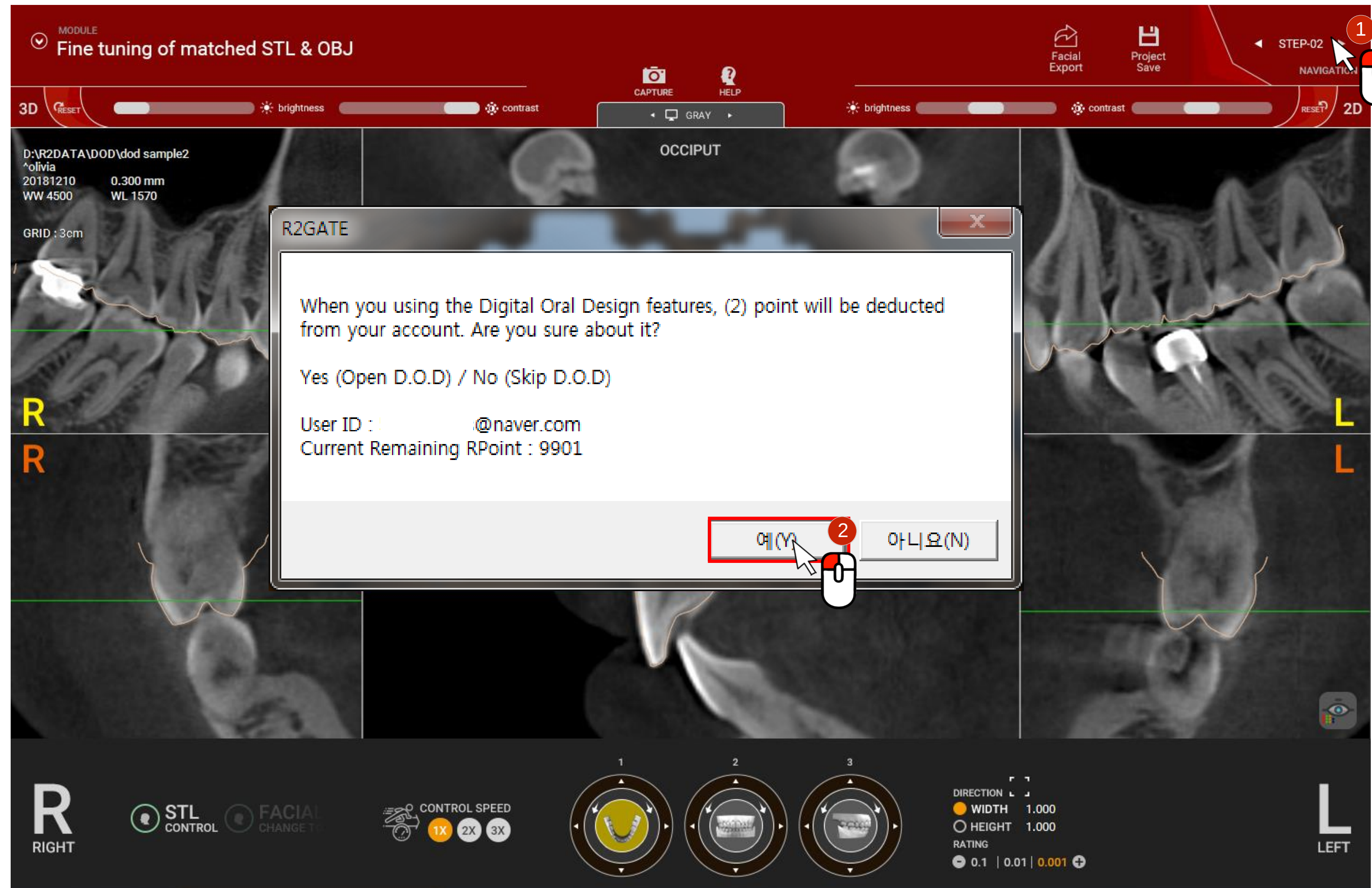
Precise Matching

1 Click to proceed to next step

2 To open DOD step, click **Yes(Y)**

! 2 points will be deducted per CBCT

Click No(N) to skip DOD and it will be proceeded to STEP6 EZ wax up



2.8 How to Edentulous Case

1
CBCT & STL matching

Fine tuning
of matched
STL & OBJ

CBCT
ReOrientation &
Digital face bow

Facial
Analyzer

Digital Oral
Design

EZ Wax Up

Mandibular
Nerve tracing

Implant
surgery

Quick Guide

Face Gide

R2
GATE

Digital Oral Design
Mar. 2019

FAQ) How about edentulous cases?

- Special matching procedure is required due to absence of teeth to match the model
- Customized R2 Tray has radiopaque resin base that shows clearly on CBCT image
- Matching is performed using the outline of resin base & scan file of customized R2 Tray



[Customized R2 Tray]



2.8 How to Edentulous Case

1
CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



Face Guide

R2
GATE

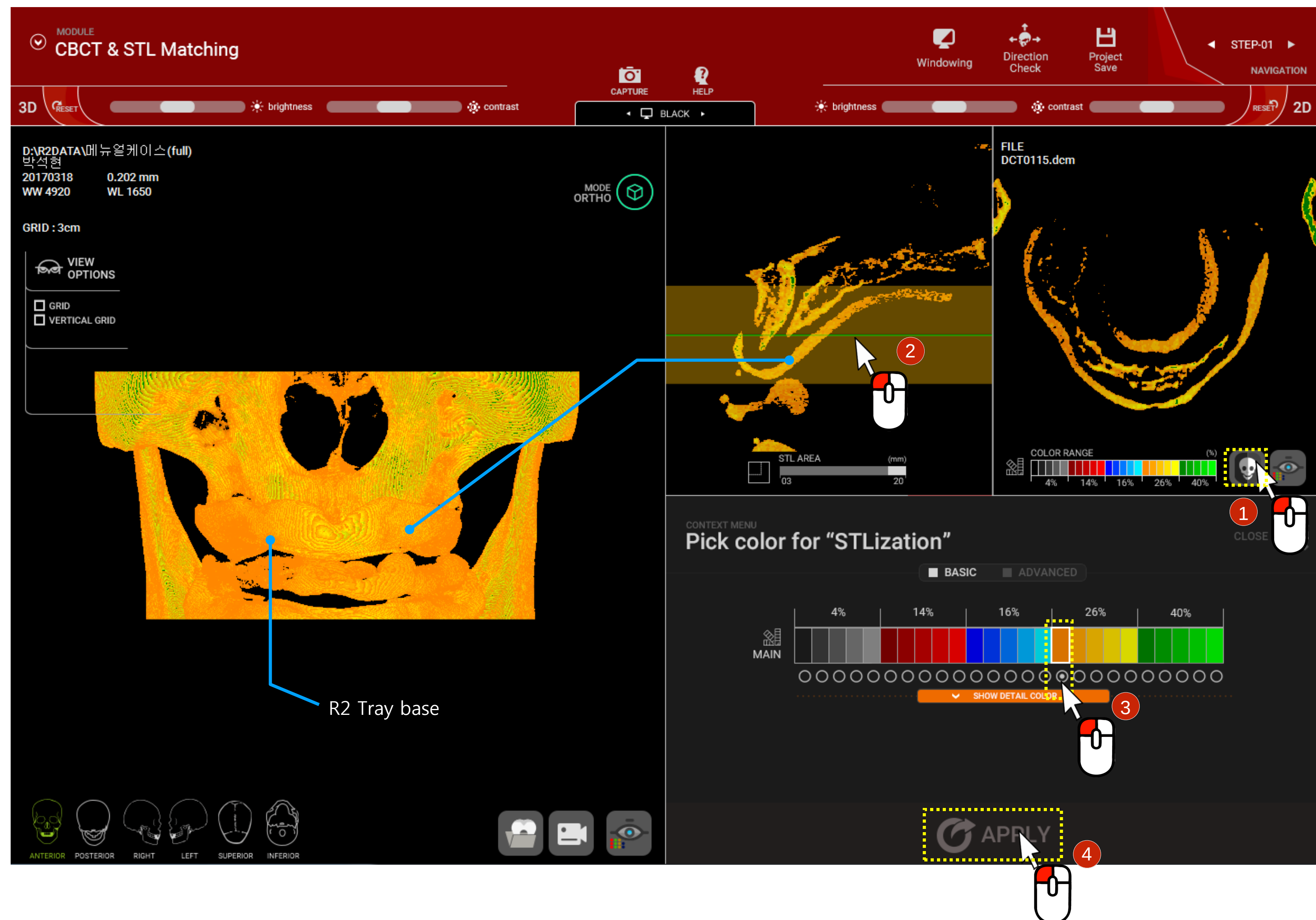
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Matching Procedure for Edentulous Case

STL-ization:

Conversion of CBCT to STL format for superimposing with model STL file

- 1  Click **STL-ization** icon
- 2 Move green line to adjust range & width of conversion zone
- 3 Select color of the tray base
- 4 Click **APPLY** to convert



2.8 How to Edentulous Case

1
CBCT & STL matching

Fine tuning of matched STL & OBJ

CBCT ReOrientation & Digital face bow

Facial Analyzer

Digital Oral Design

EZ Wax Up

Mandibular Nerve tracing

Implant surgery

Quick Guide

Face Guide

R2
GATE

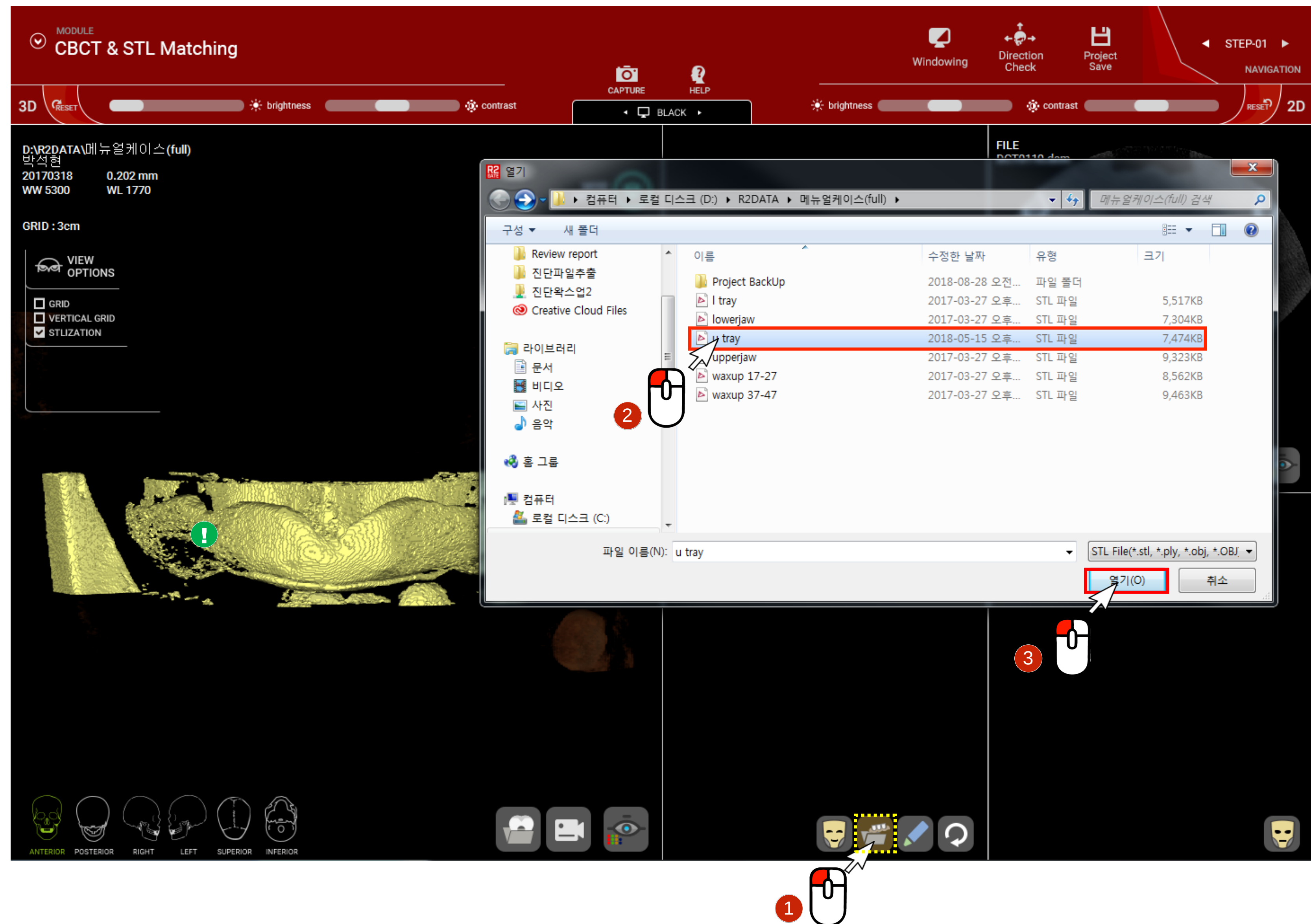
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Matching Procedure for Edentulous Case

Loading model file (STL)

Import Model STL to merge with CBCT converted to STL format

- 1 Click **STL List** icon
 - 2 Select Customized R2 Tray(STL) file for Matching
 - 3 Click **Open(O)**
- ! Check the status of STL-ized file converted from CBCT



2.8 How to Edentulous Case

1
CBCT & STL matching

Fine tuning of matched STL & OBJ

CBCT ReOrientation & Digital face bow

Facial Analyzer

Digital Oral Design

EZ Wax Up

Mandibular Nerve tracing

Implant surgery

Quick Guide

Face Guide

R2
GATE

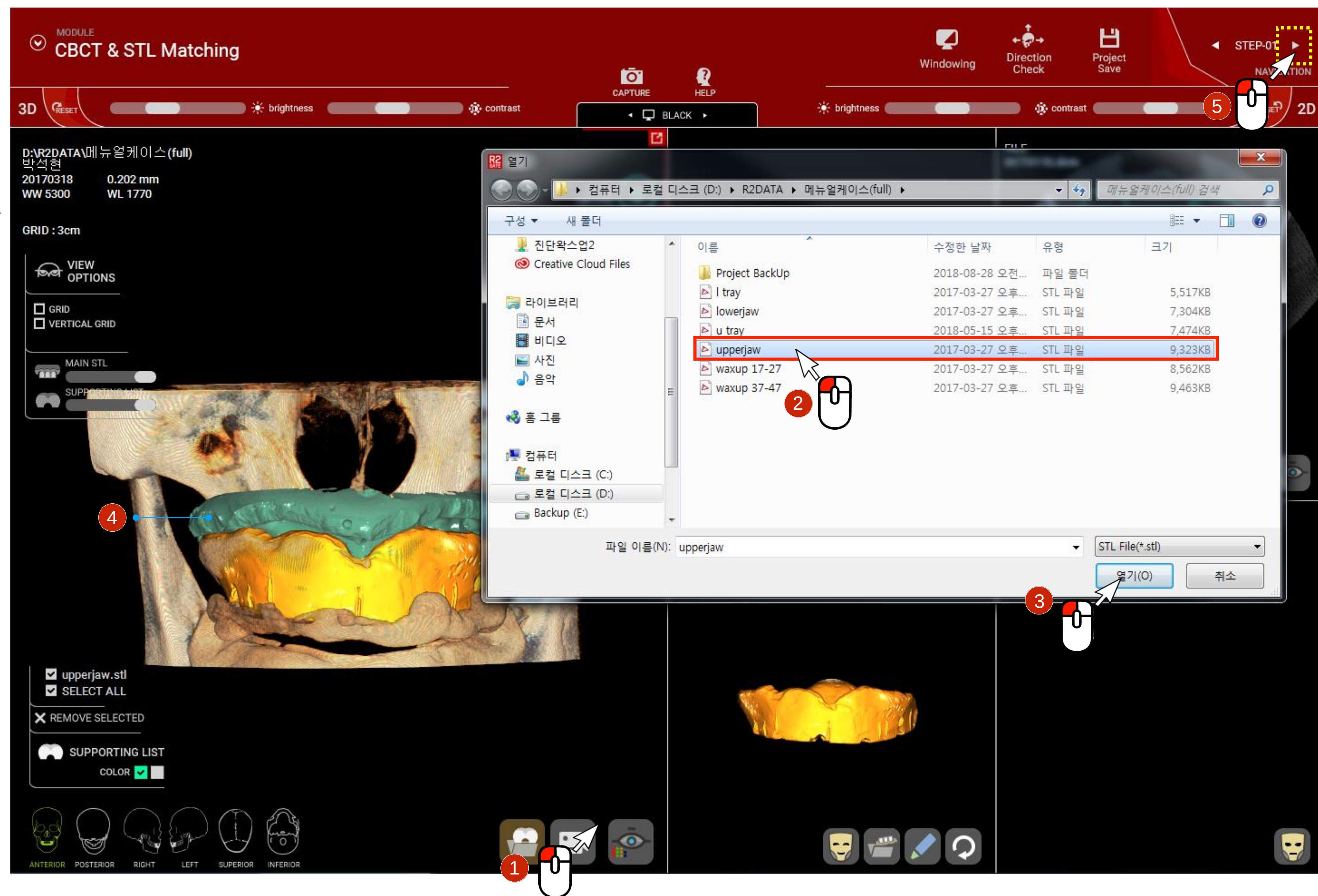
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Matching Procedure for Edentulous Case

Model Scan File (STL)

Metal scattering from metal-based prosthesis causes difficulties when Matching. R2 Tray is made of radiopaque materials & used as index for Matching

- 1  Click the icon to import model STL
- 2 Select model scan file(STL)
- 3 Click **Open(O)**
- 4 The coordinates of the model scan file(STL) and the customized R2 Tray(STL) have to match
- ! A separate scan procedure is required to coordinate the R2 Customized R2 Tray & Model Scan File (STL) (See Appendix)
- 5  Click to proceed to next step



2.8 How to Edentulous Case



Matching Procedure for Edentulous Case

Control function for accurate model & CBCT Matching
Check and adjust Matching status in various section views

1 Check Points

- R: Right
- L: Left
- C: Center (Anterior Teeth)

Move point to each tooth & check accuracy of Matching

2 Control Model Scan file(STL) movement

3 STL movement control key

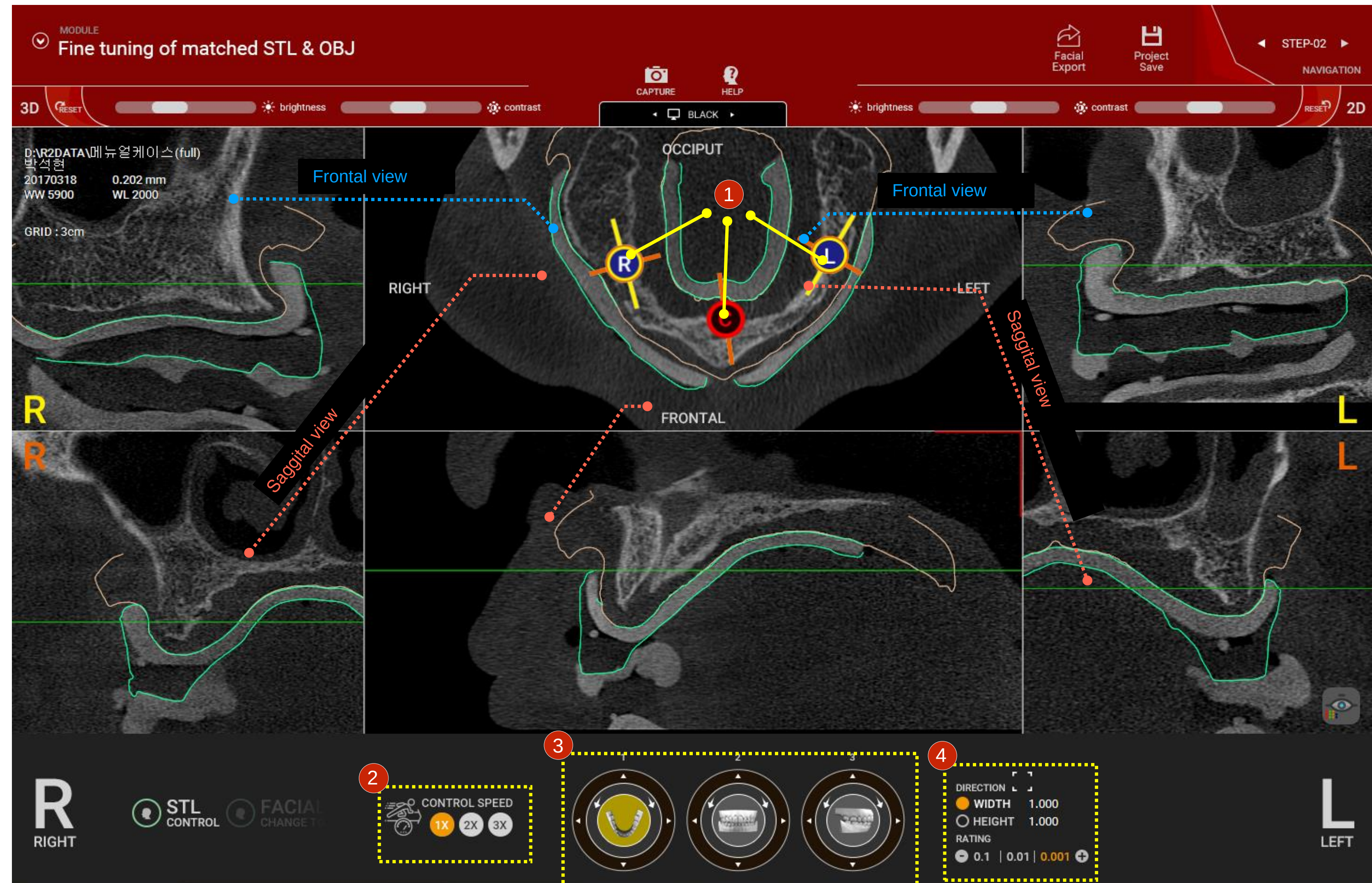
4 CBCT ratio control (Not generally required)

- Green: model outline



- Grey: CBCT image

- Yellow: outline of customized R2 Tray



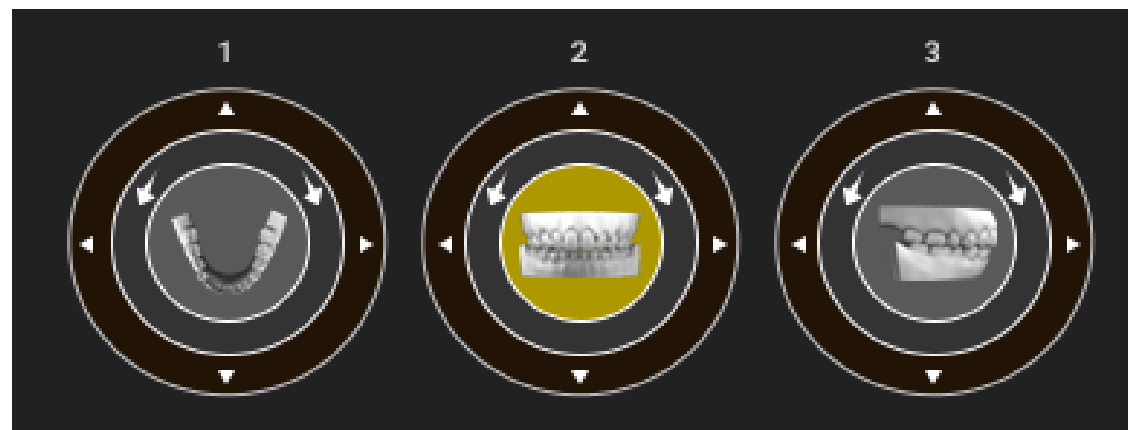
2.8 How to Edentulous Case



Matching Procedure for Edentulous Case

Precise Matching Complete

Adjust customized R2 Tray scan file(STL)
using three STL control keys



! Refer to P38 for Matching procedure

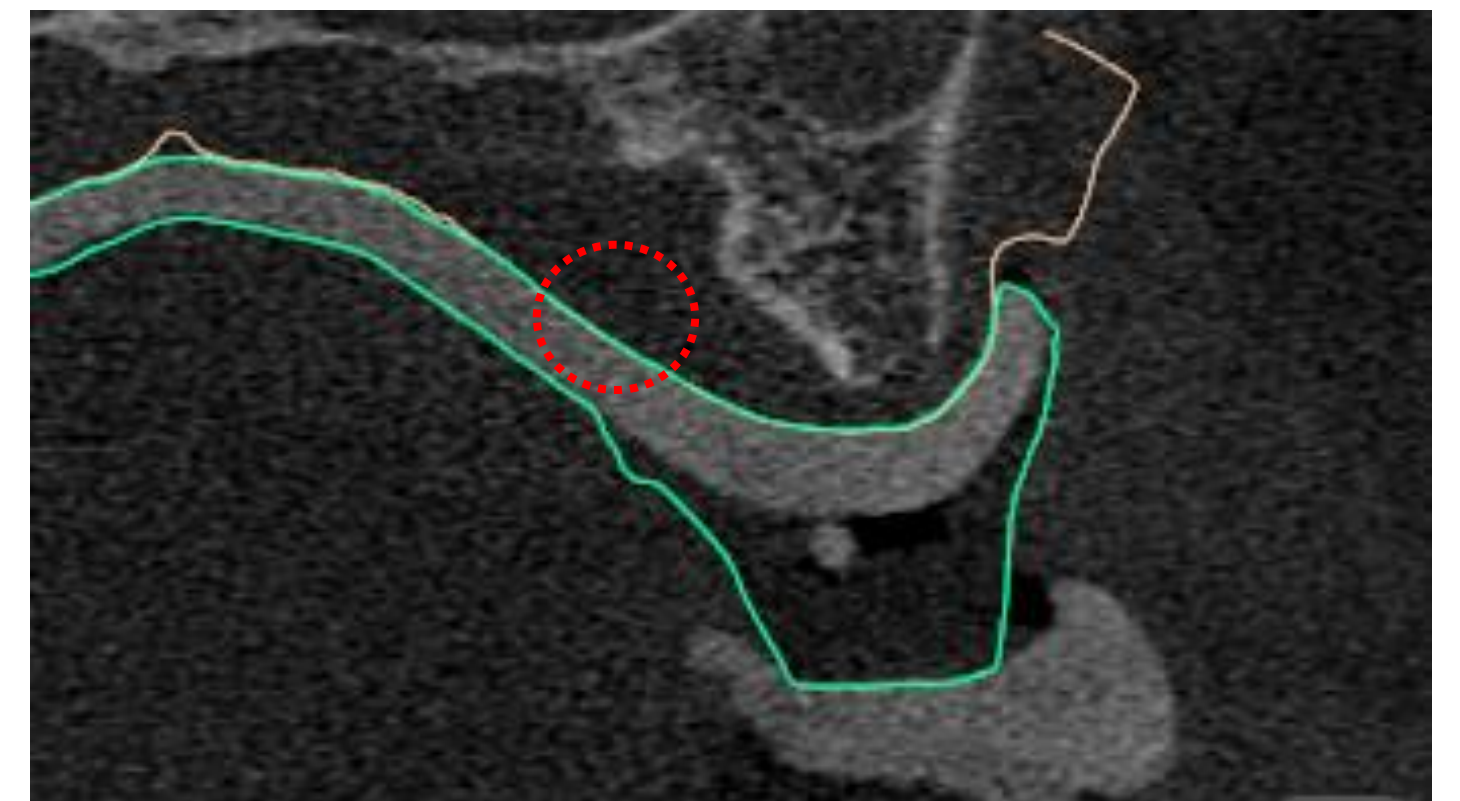
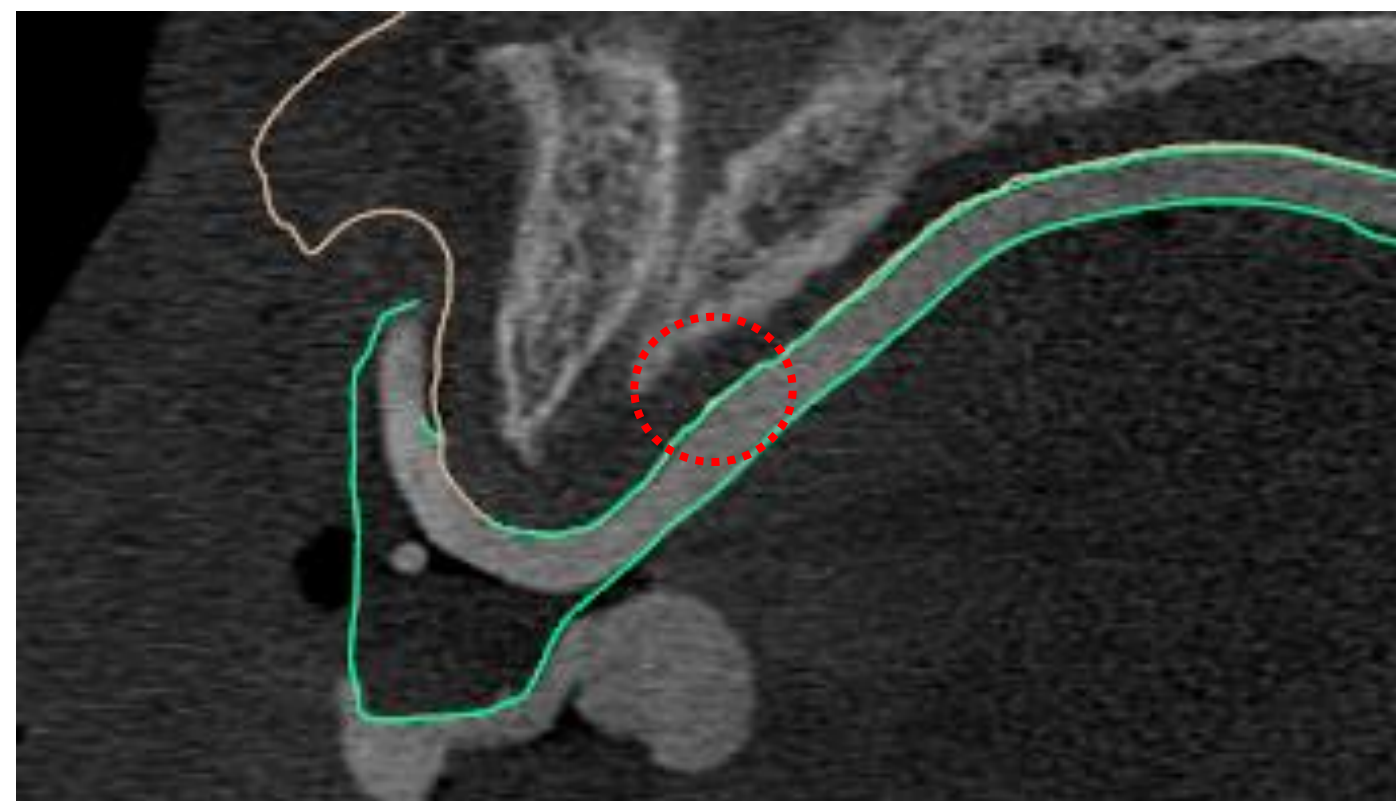
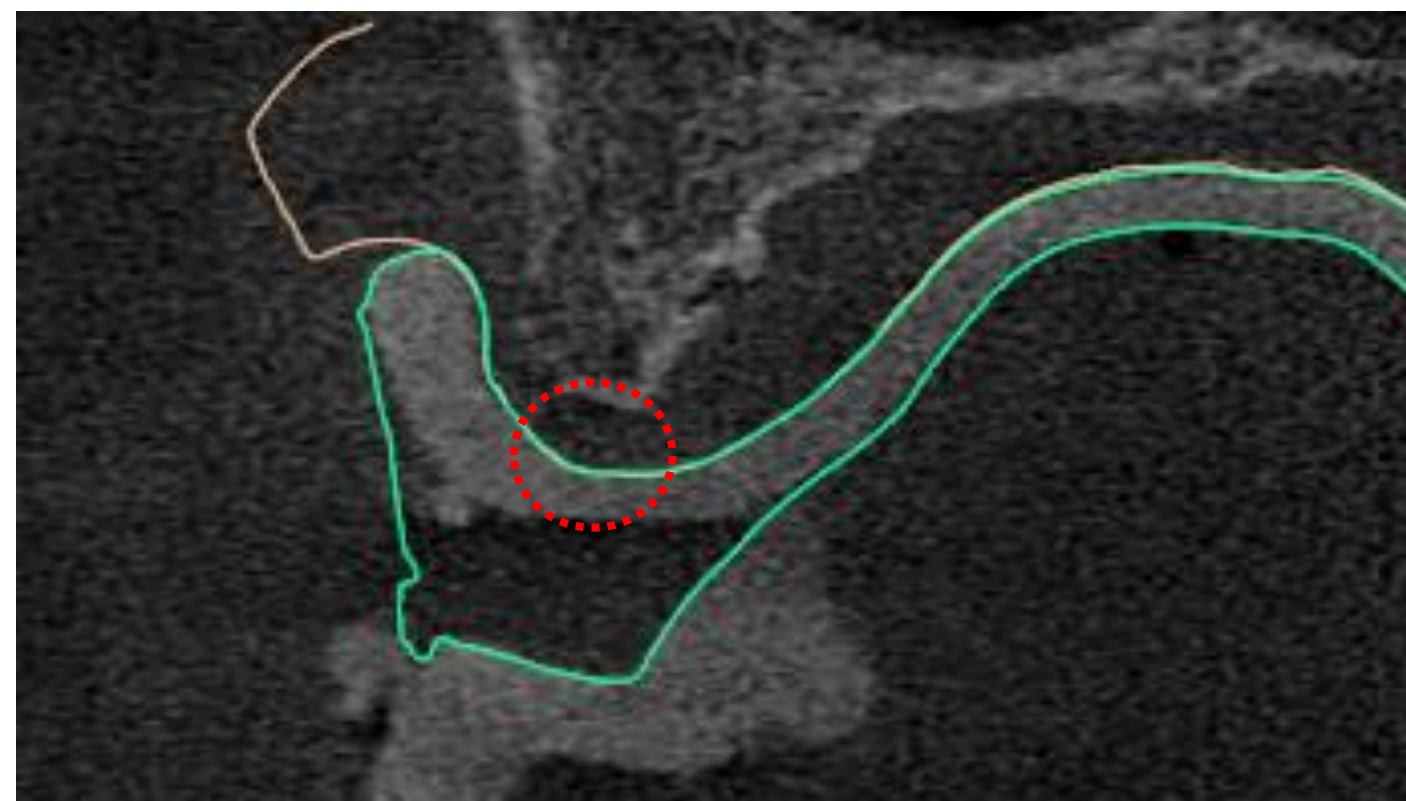
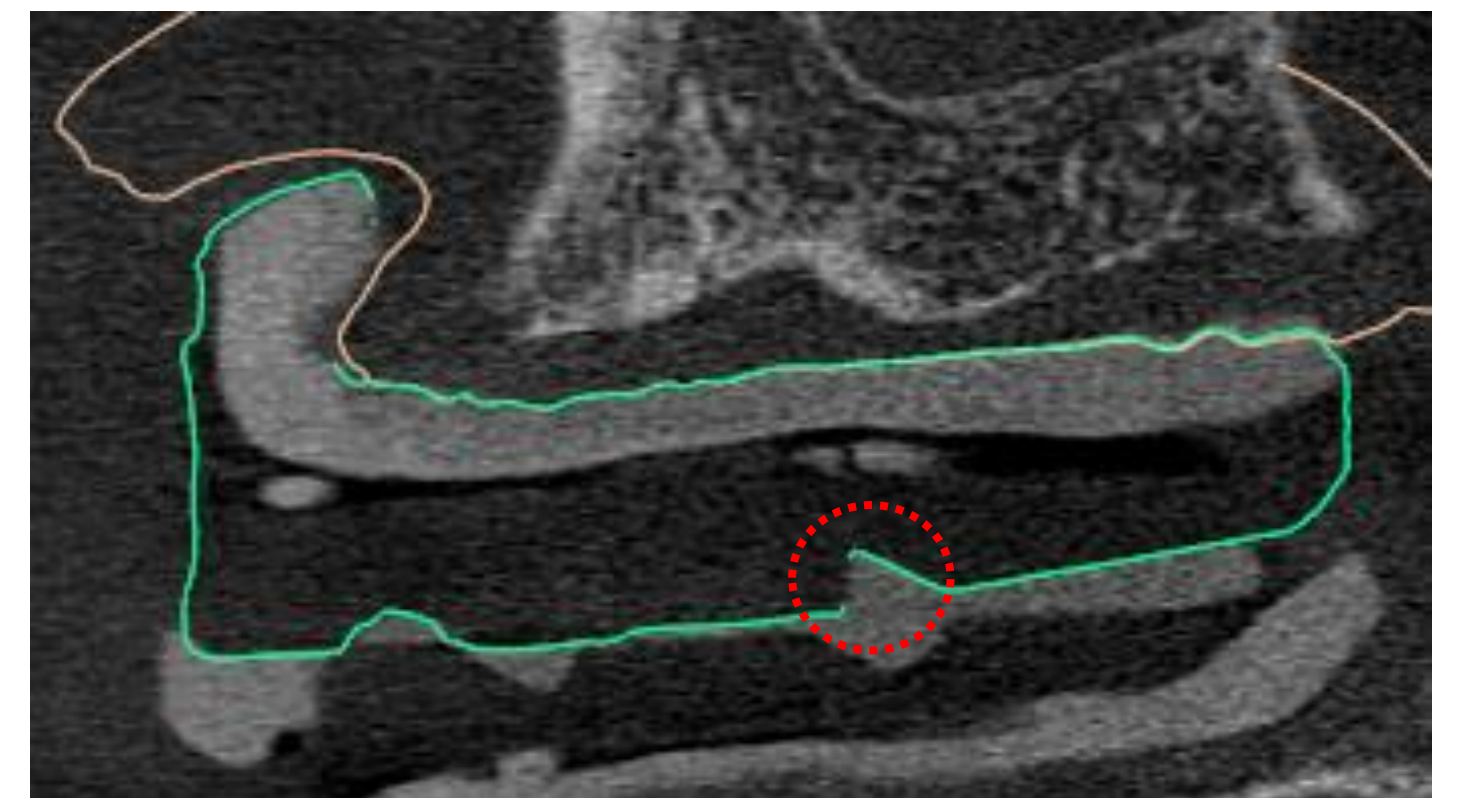
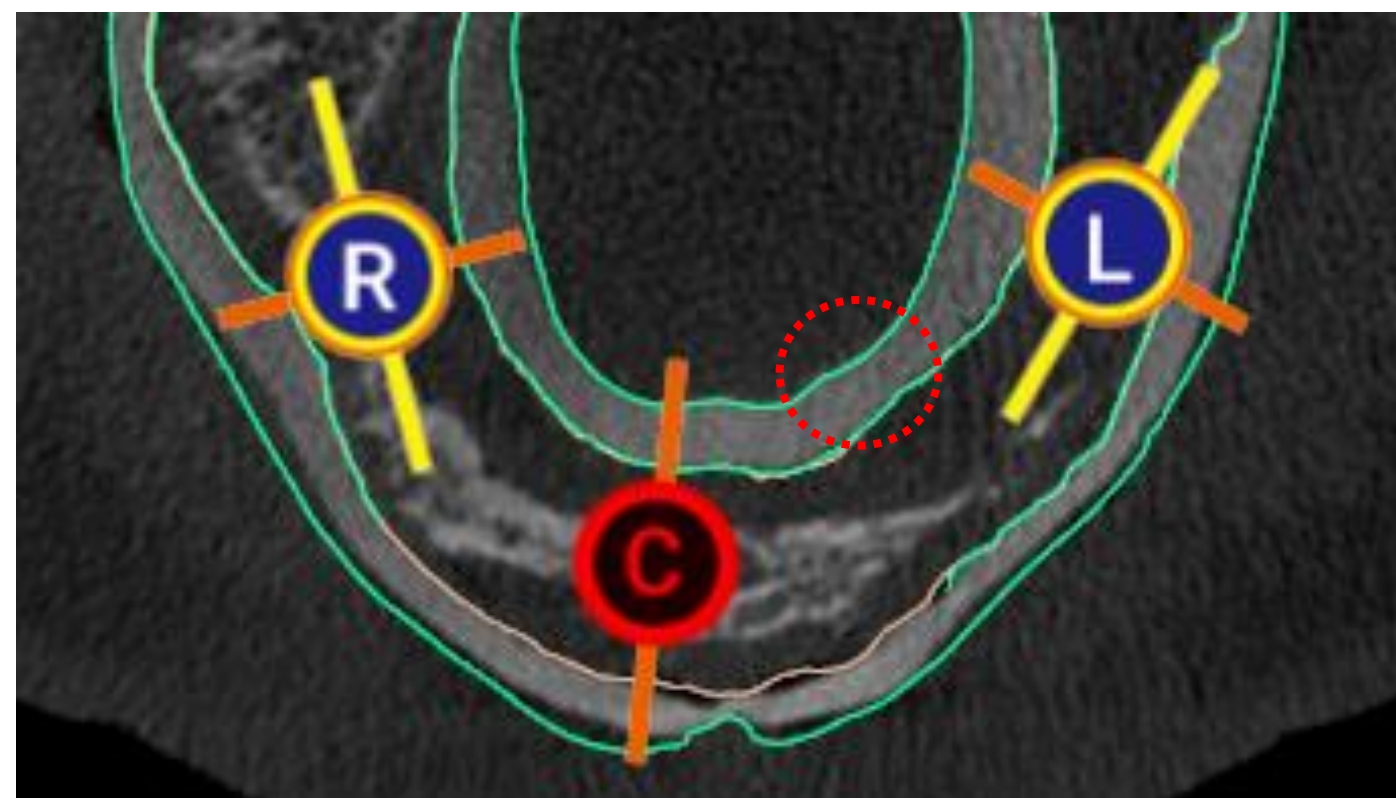
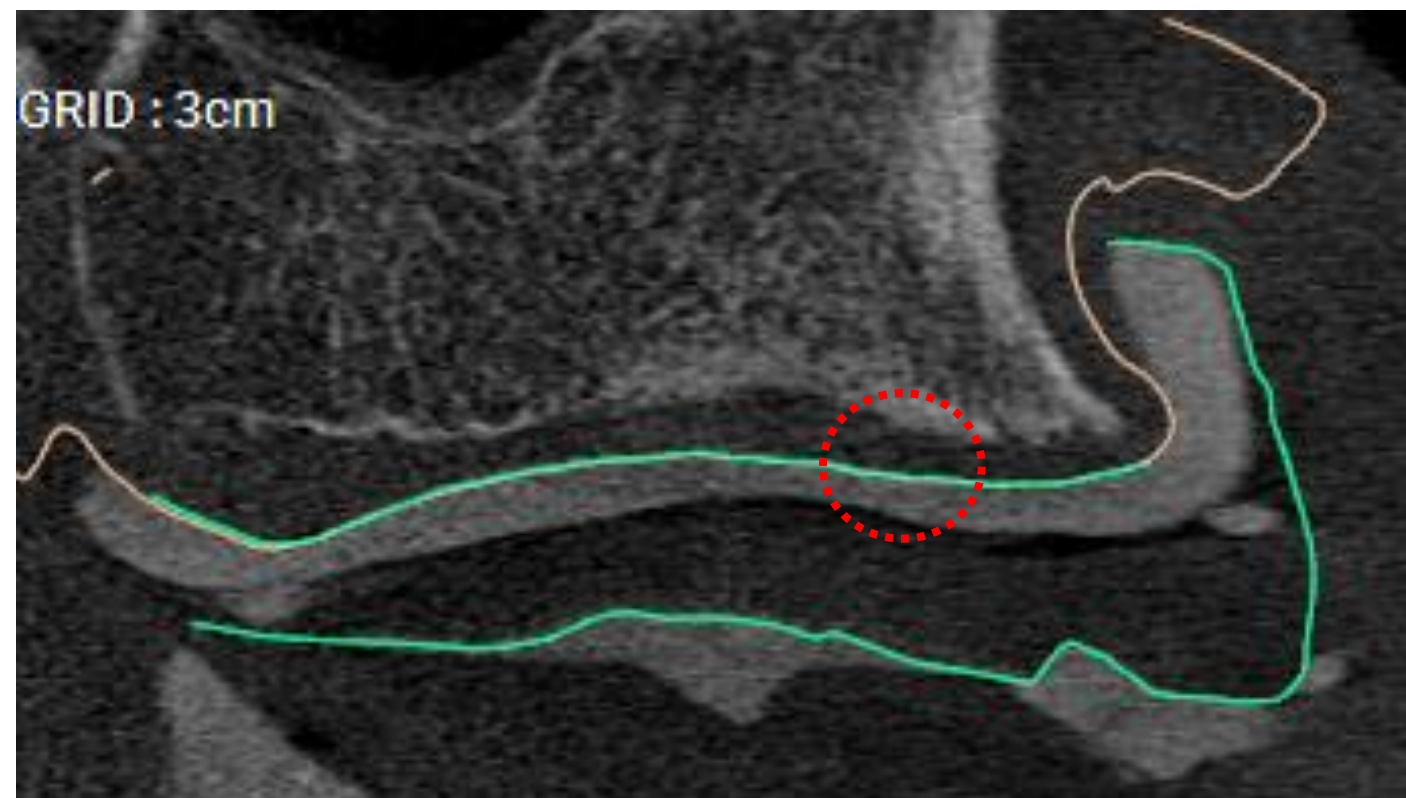


2.8 How to Edentulous Case



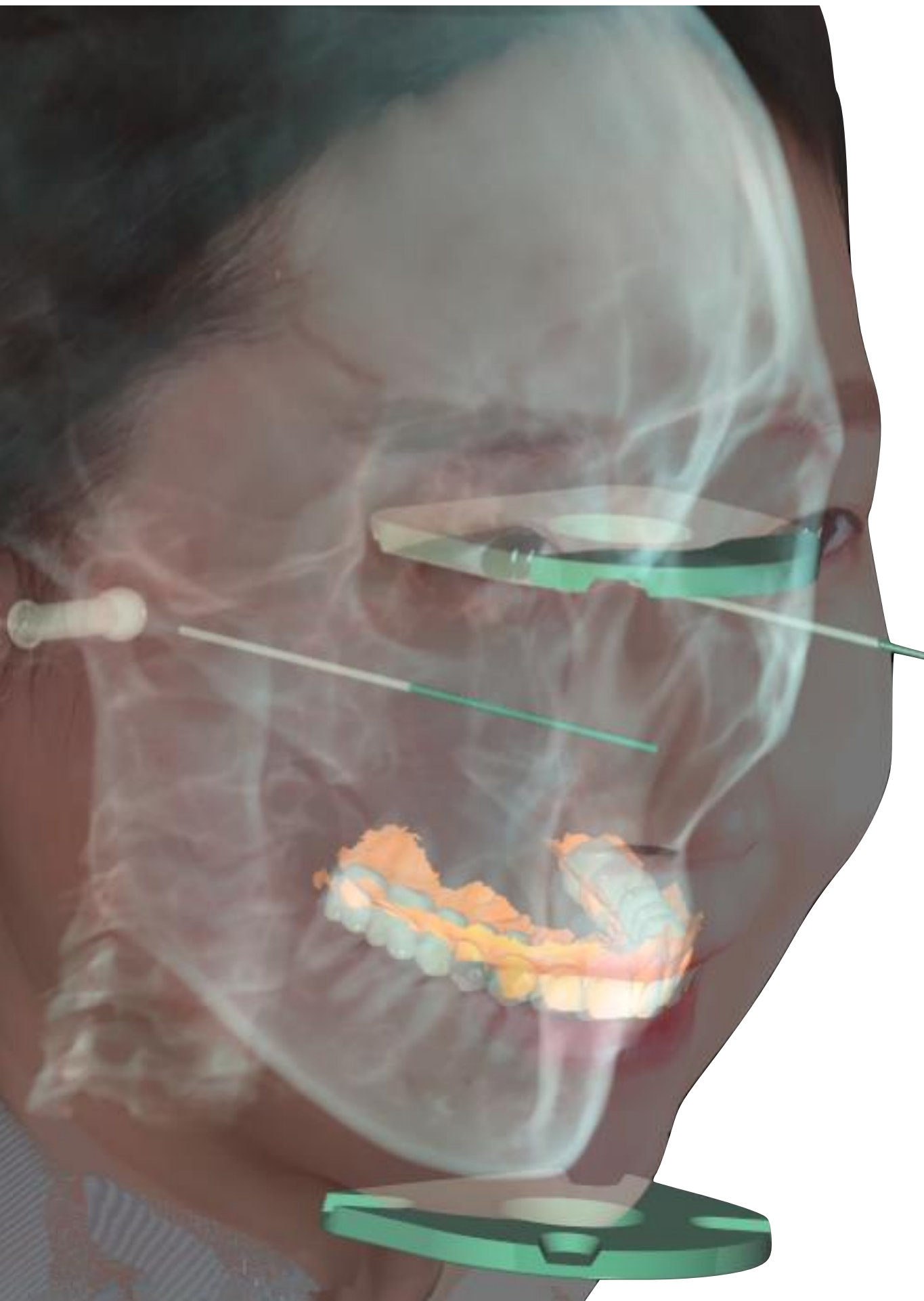
Matching Procedure for Edentulous Case

When using customized R2 Tray, match and check the palatal line with V notch in wax-rim



R2GATE™

Turning imagination into reality

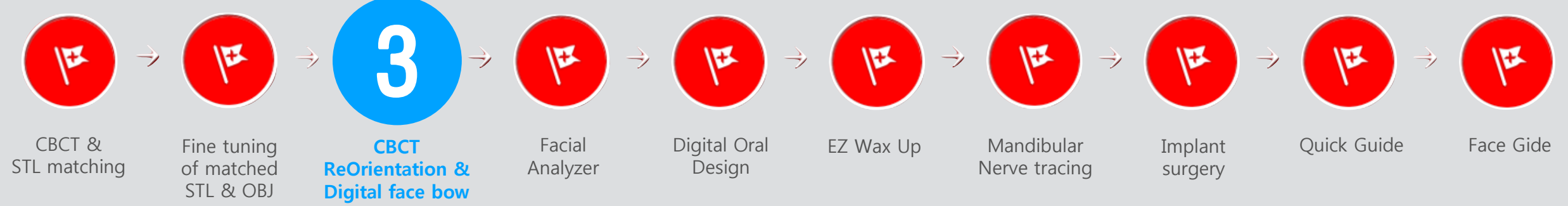


3 Digital Oral Design CBCT ReOrientation



ReOrientation(EN)

3.1 R2GATE™ DOD Control Buttons



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Control Buttons

Display grid on the 3D window view of CBCT

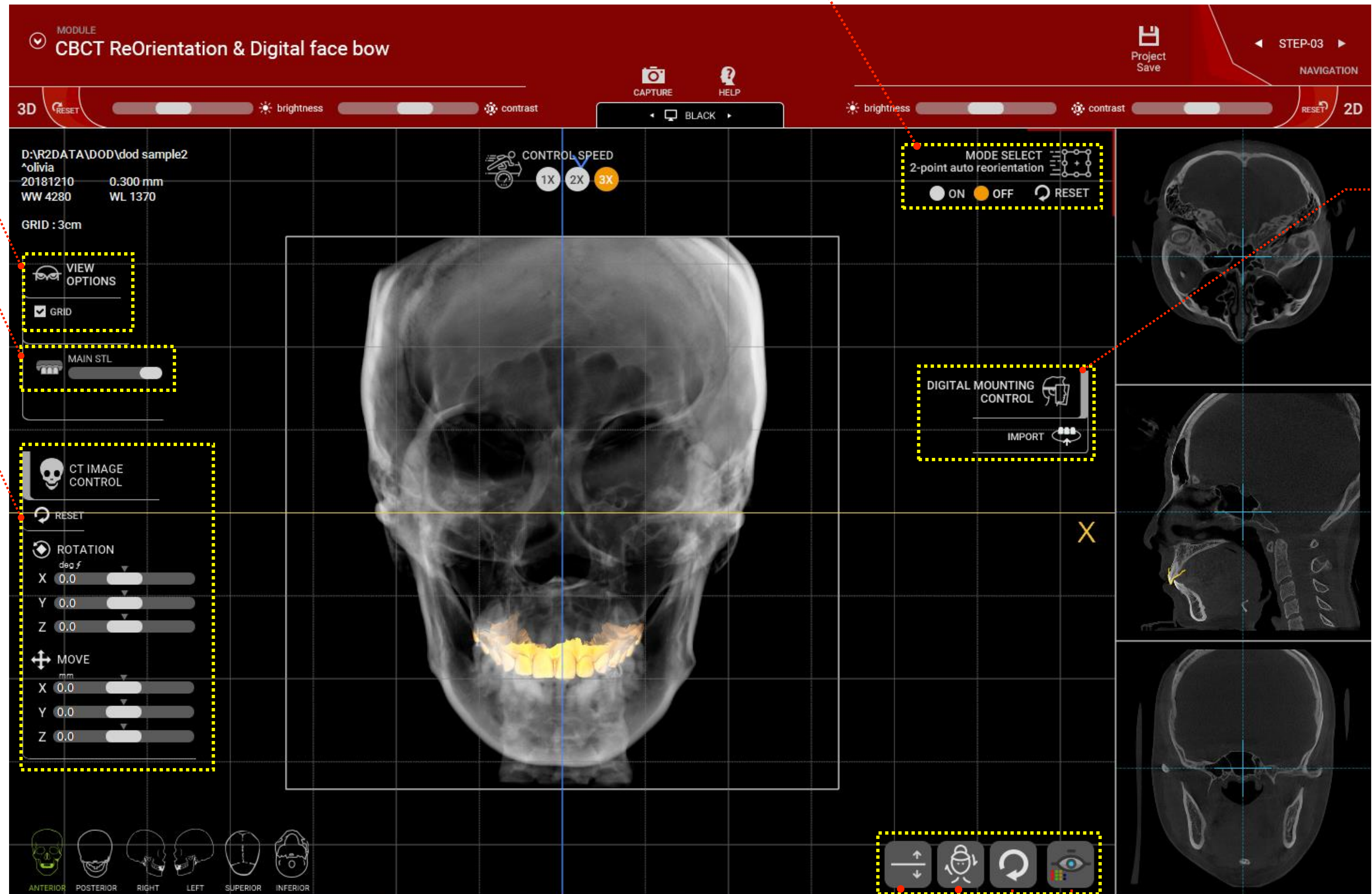
STL transparency control bar

CBCT Control Tool

Reset
Reset to initial position

Rotation
Rotate based on the X, Y, Z axis

Move
Move based on the X, Y, Z axis



Auto Reorientation option
Automatic alignment to the reference line that is generated with two points on the CBCT coordinates

Import digital articulator library

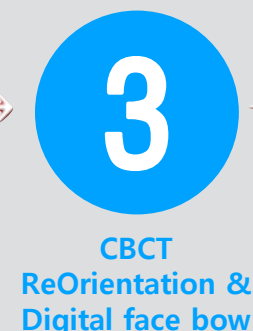
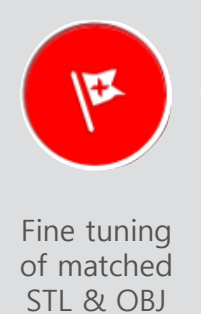
Display reference line on CBCT

Save the reoriented CBCT

CBCT filter adjustment

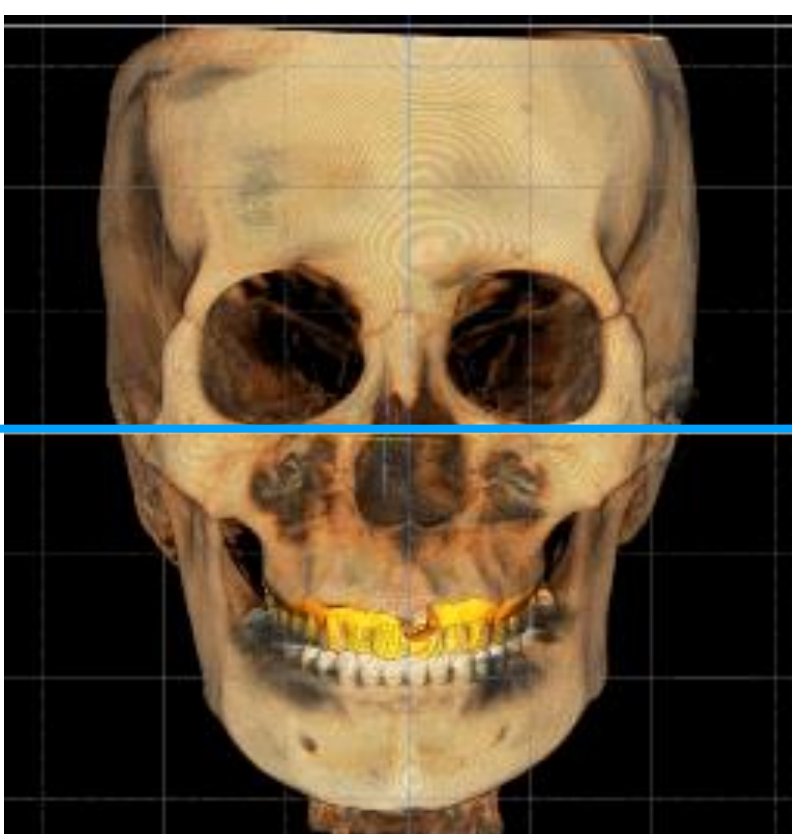
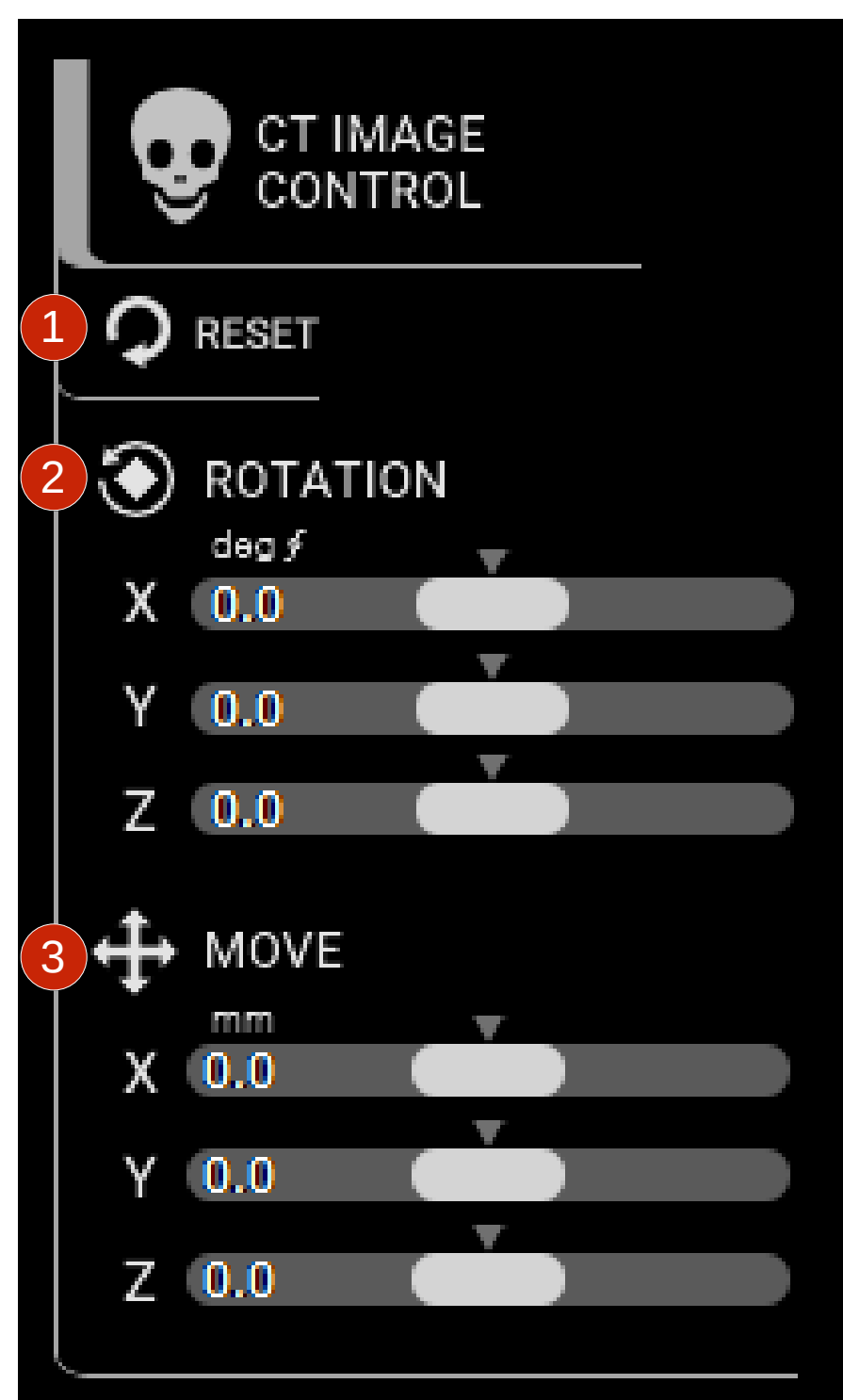
Reset saved Reorientation to existing position

3.1 R2GATE™ DOD Control Buttons

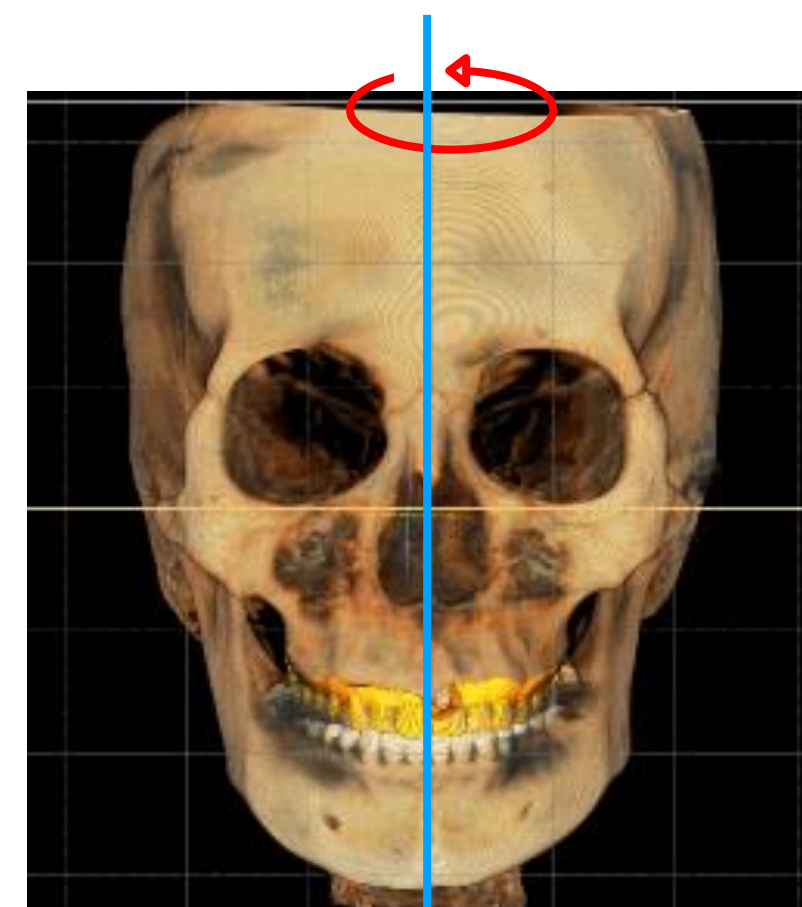


CBCT Control Tool

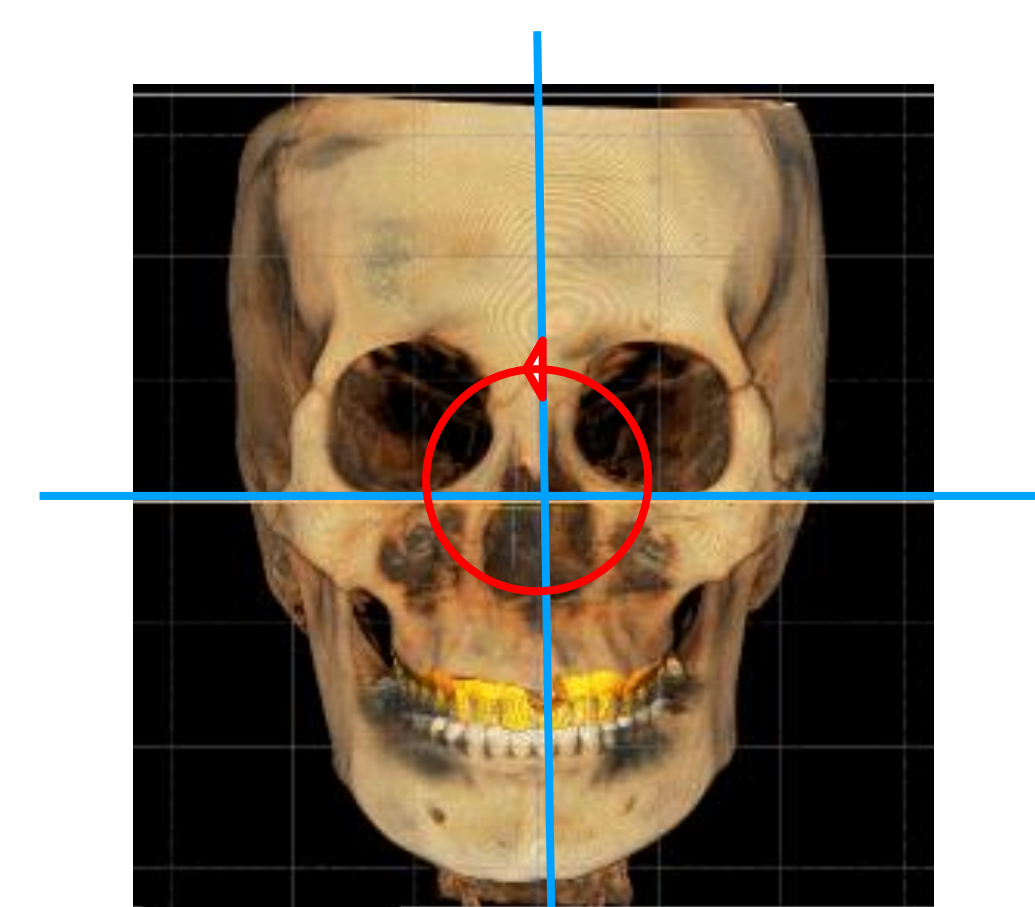
- 1 **Reset**
Reset to initial position
- 2 **Rotation**
Rotate based on the X, Y, Z axis
- 3 **Move**
Move based on the X, Y, Z axis



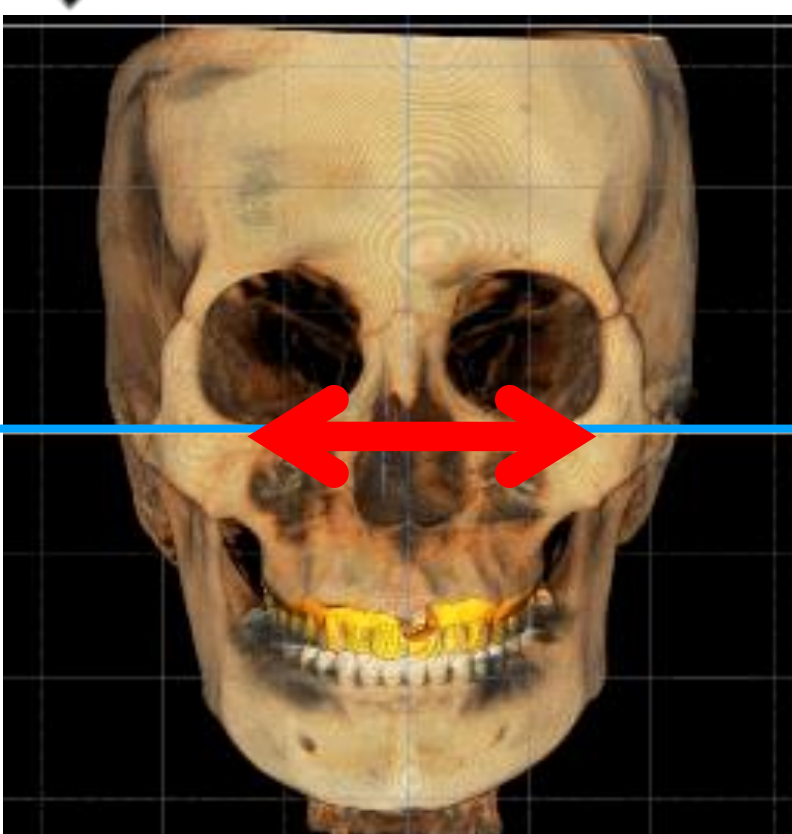
X-axis Rotation
(Pitch)



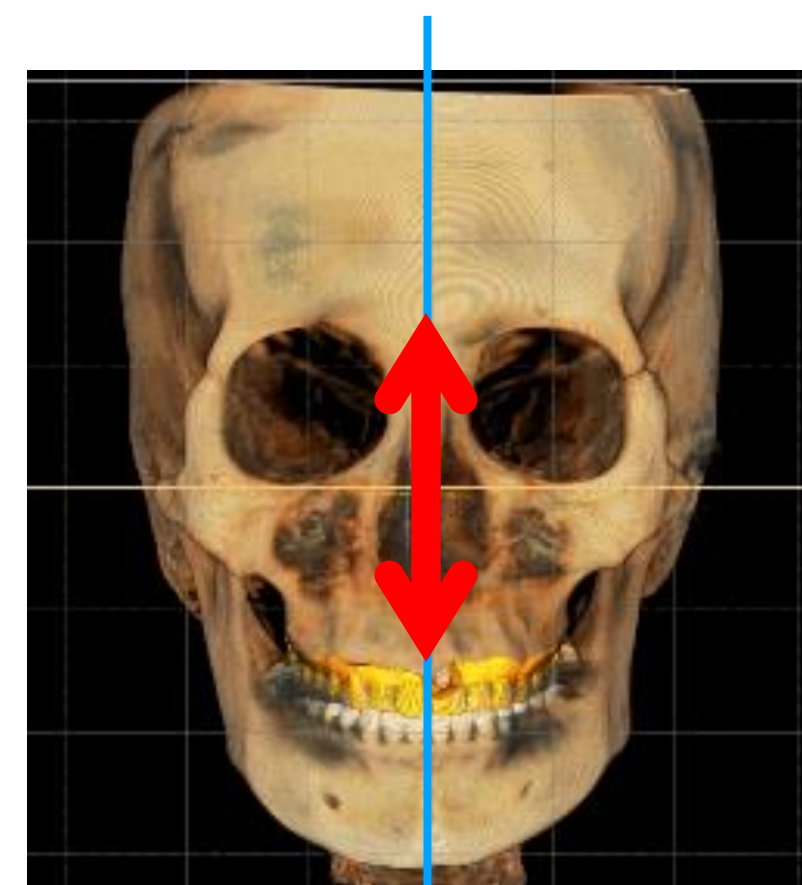
Y-axis Rotation
(Yaw)



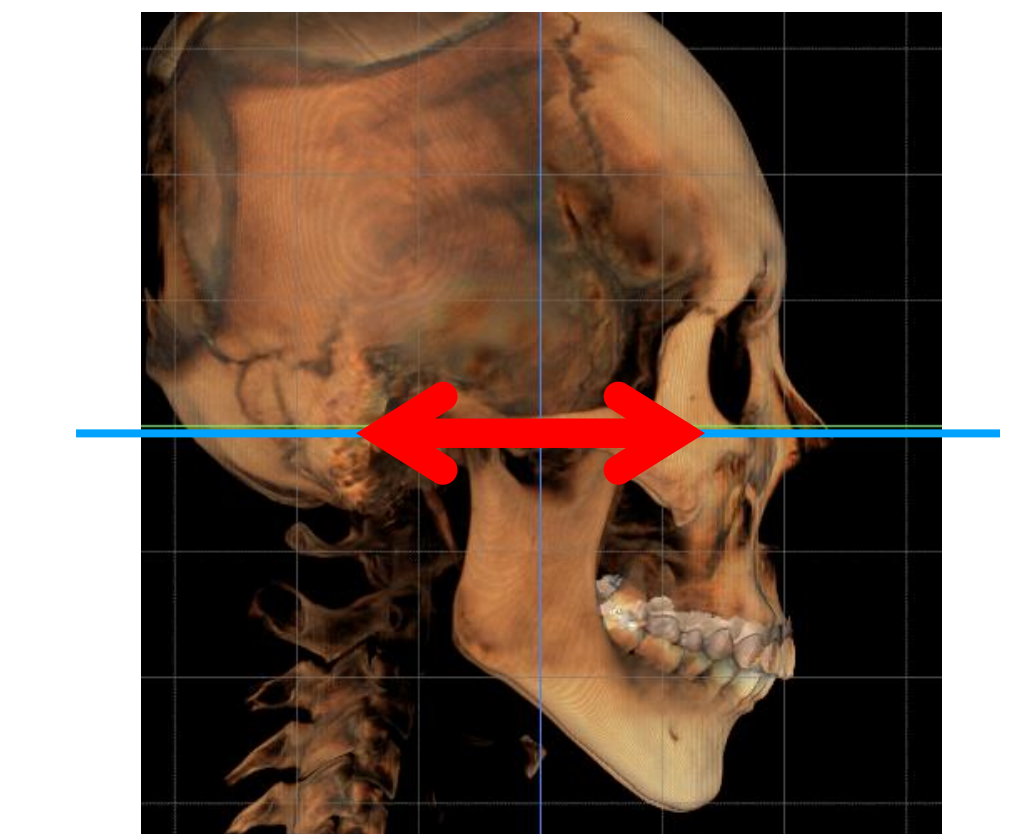
Z-axis Rotation
(Roll)



X-axis Movement

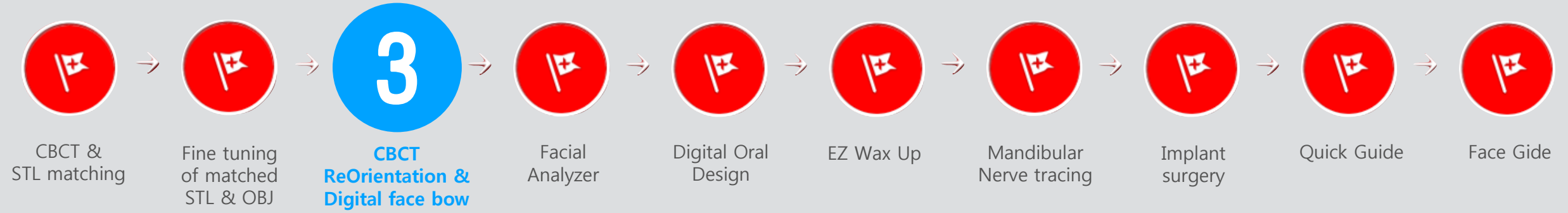


Y-axis Movement



Z-axis Movement

3.2 CBCT ReOrientation

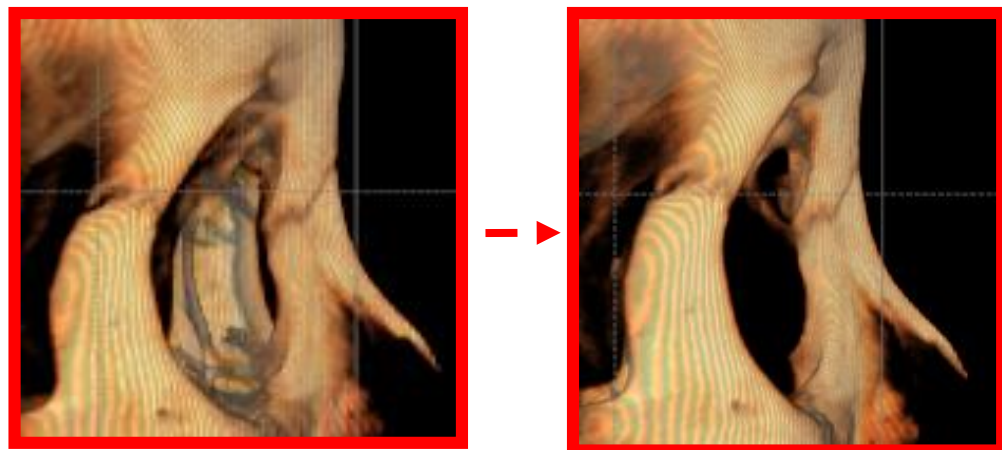


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CBCT ReOrientation Using Patient's Orbitale (Yaw & Pitch Adjustment)

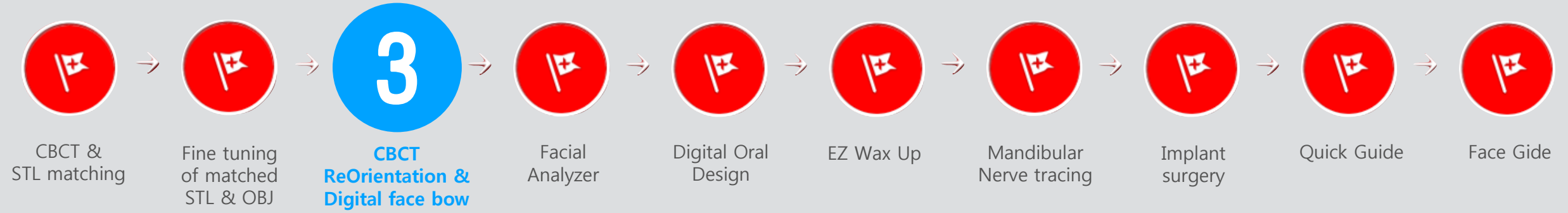
- 1 Change to filter **02** to observe the outline of the skull clearly
- 2 Click patient's side view (sagittal view)
 - ! Adjust the brightness and contrast ratio to view the patient's bone condition more clearly.
- 3 Adjust Y, Z axis rotation control bar to process ReOrientation for both orbits to match as one
 - ! Fine adjustment is available by scrolling the mouse



- ! Adjust to make the opposite side of the orbitale to be not shown
(Process same as the other side)

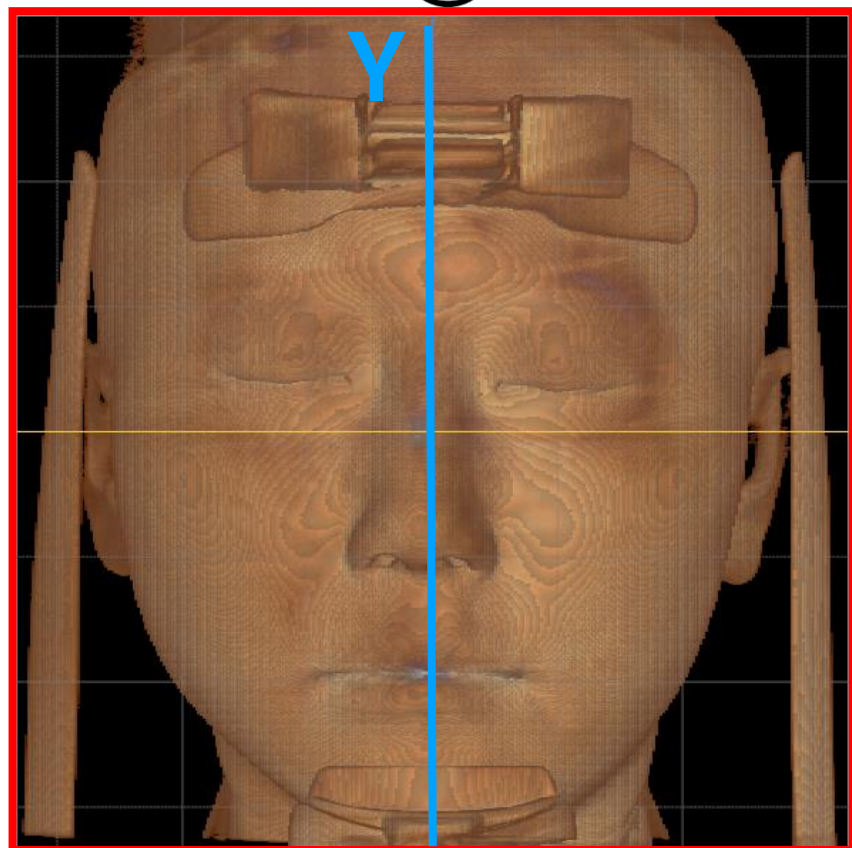


3.2 CBCT ReOrientation

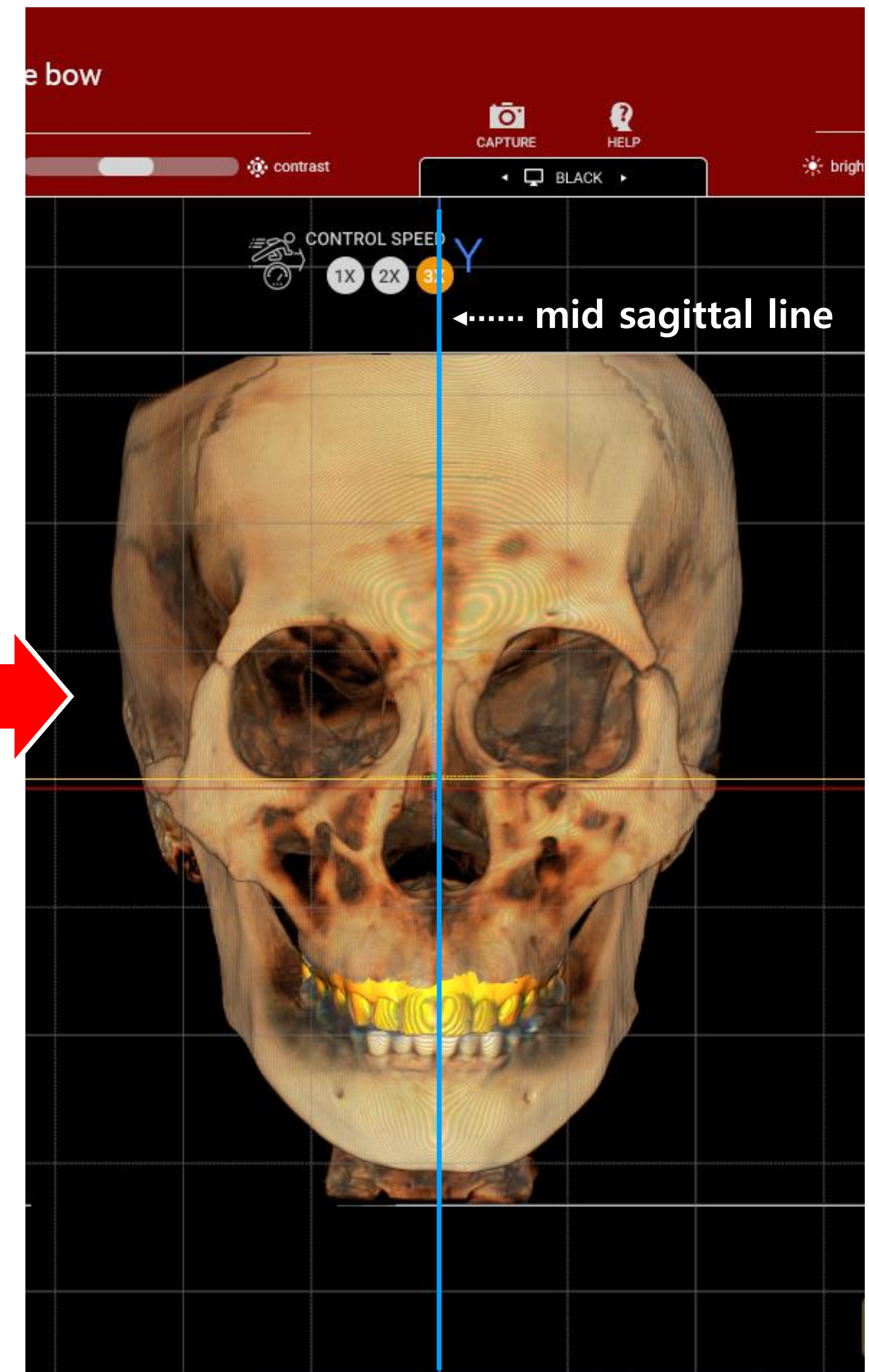
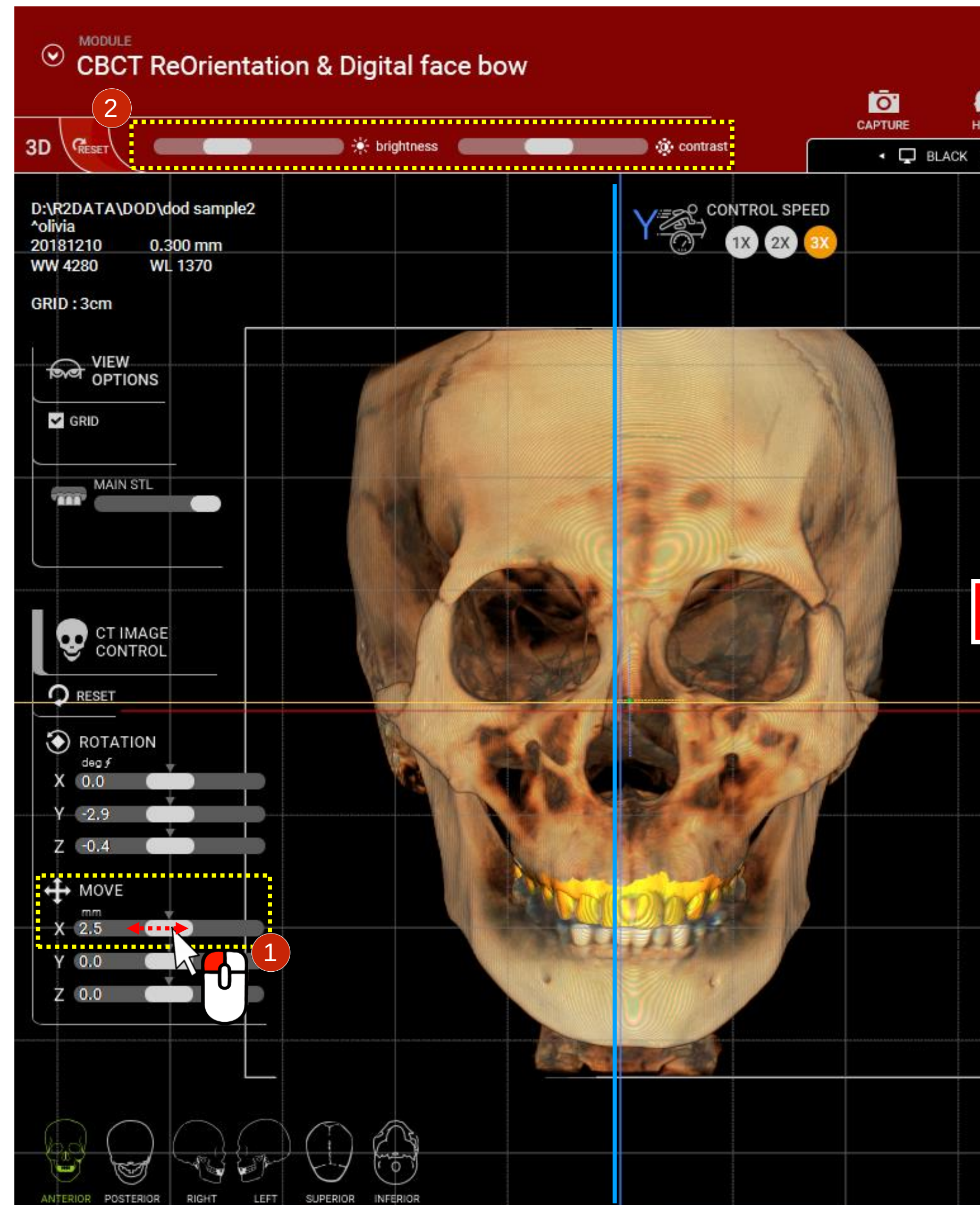


ReOrientation Using Patient's Orbitale (Mid-facial Plane Setting)

- 1 Use the X-axis of Move to align the mid-sagittal line on the Y-axis line
 - ! Based on between the incisors and the position of nasal bone
- 2 Adjust the brightness and contrast to make soft tissue appear. Align with the soft tissue image as well



! Mid-facial plane on the soft tissue

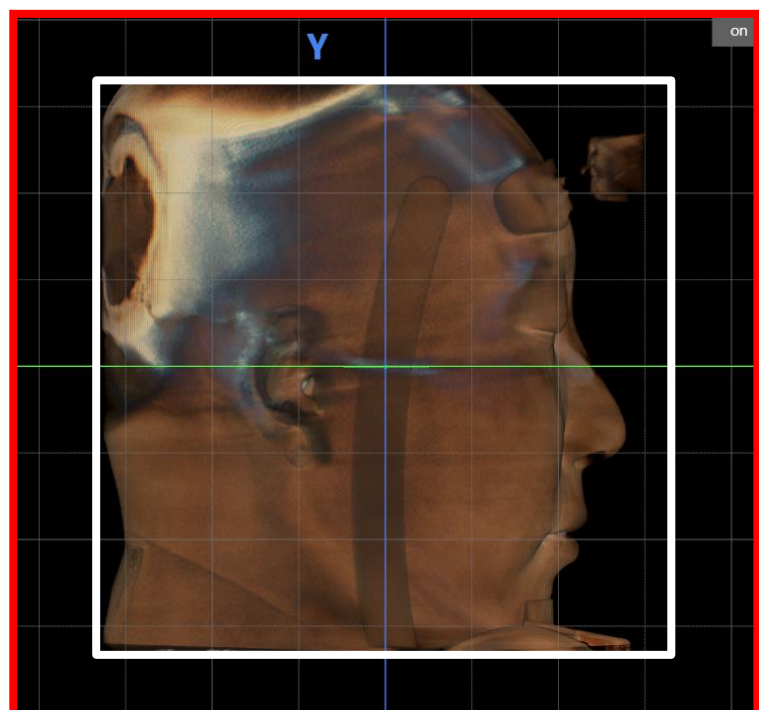


3.2 CBCT ReOrientation

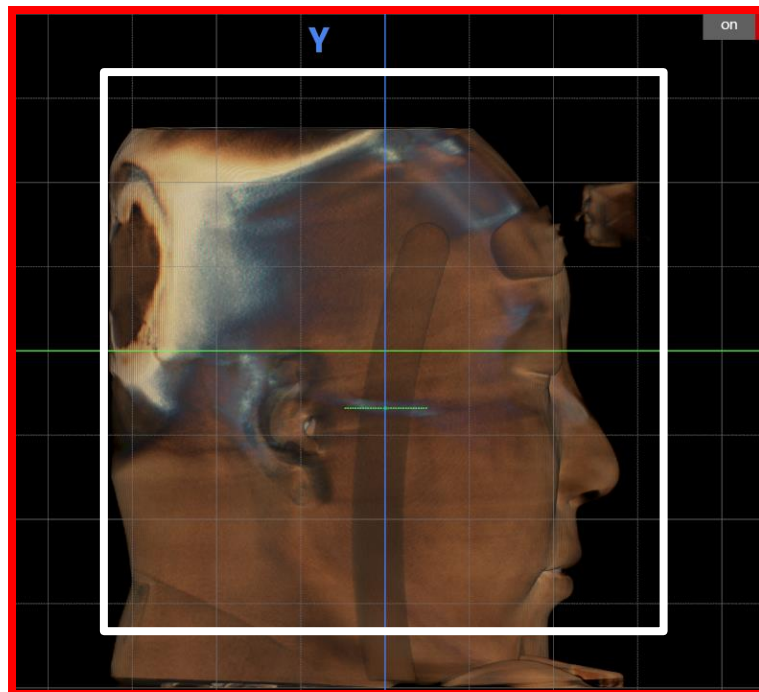


ReOrientation Using Patient's Orbitale

- On the soft tissue screen of the CBCT, make sure that all the patient's major parts (especially the mandible) are in the white square



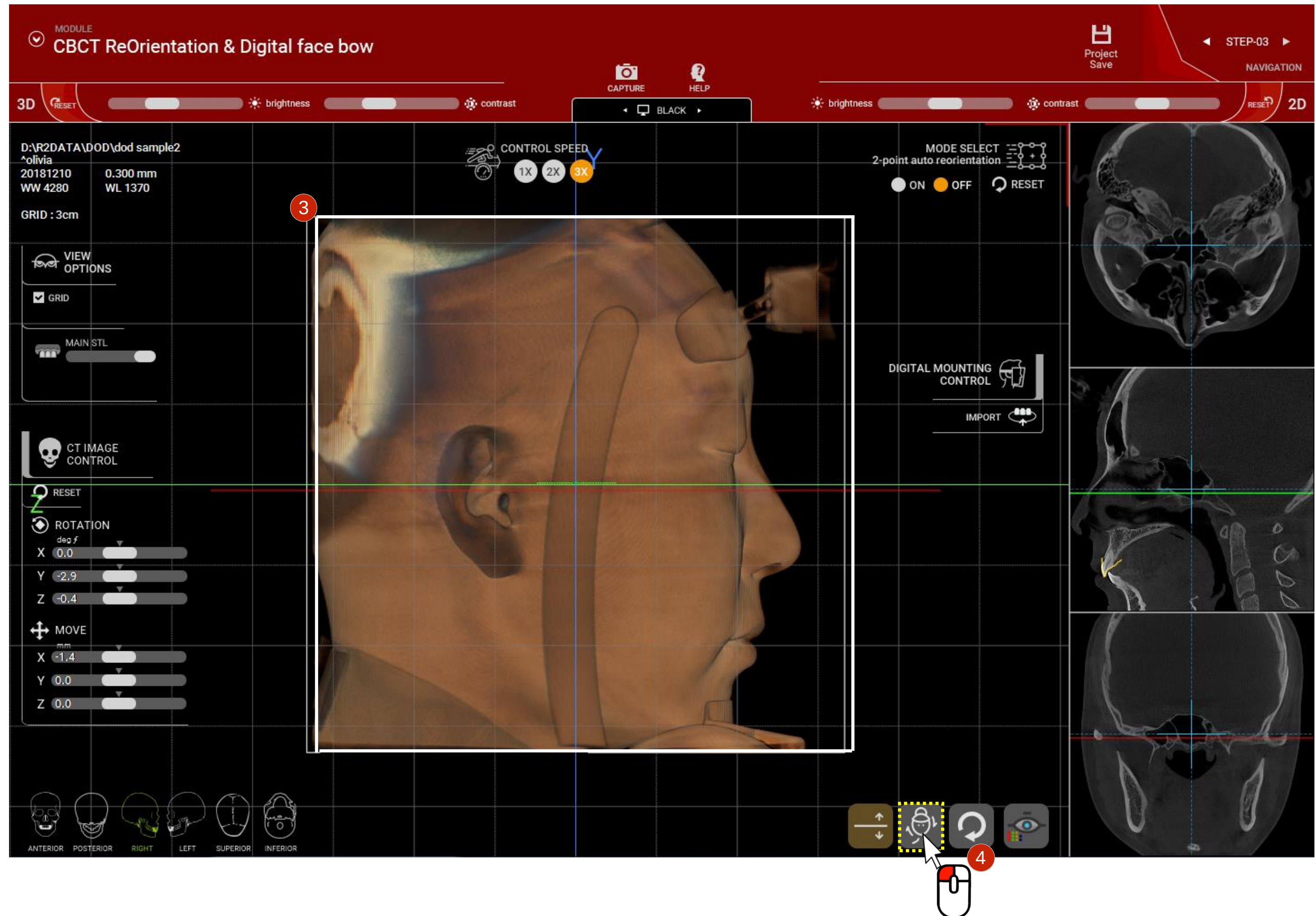
(O)



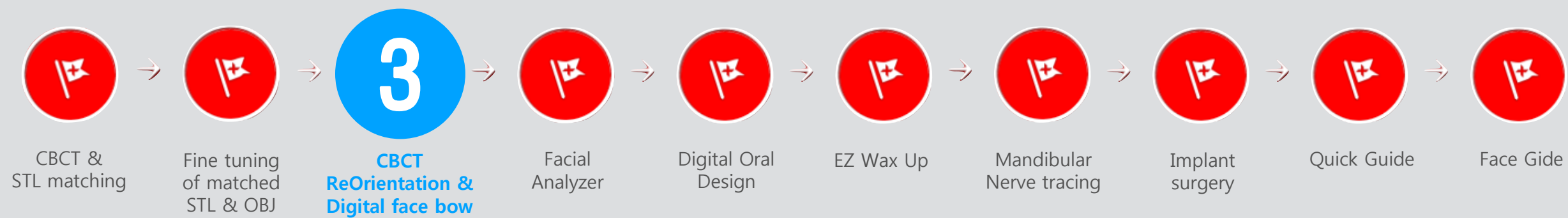
(X)

- The jaw part is more important than the forehead so the jaw part should not be cut

- Save CBCT Reorientation



3.3 FH Plane ReOrientation

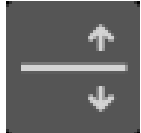


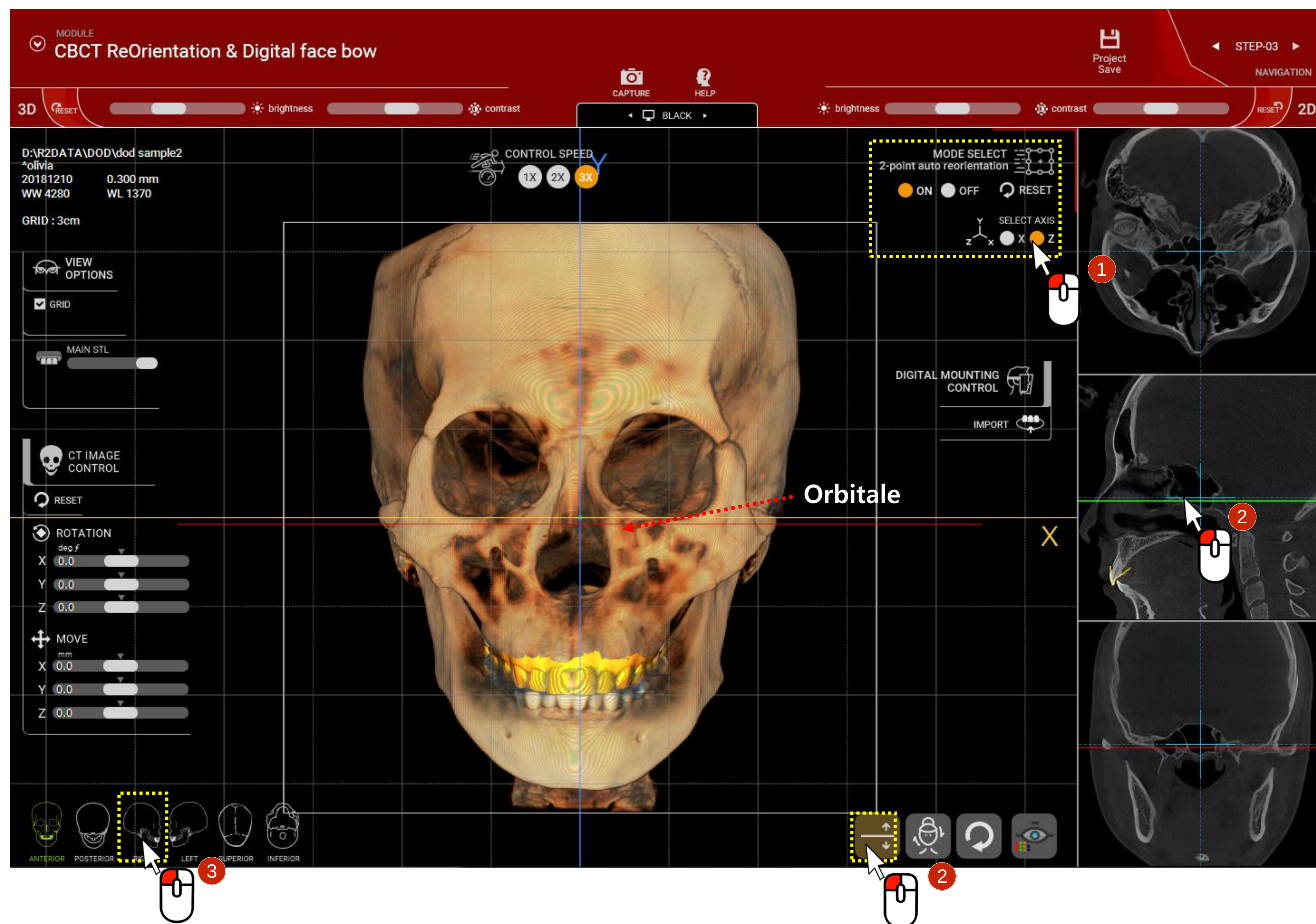
ReOrientation According to FH plane

FH(Frankfort horizontal plane)

Horizontal plane that connects the lowest point of the orbitale and the highest point of the porion

ReOrientation is processed on the FH basis in DOD, however it is possible to select X and Y axis according to operator's criteria to ReOrientate CBCT to preferred head position

- 1 Click ON to 2-point auto reorientation and select Z-Axis.
- 2  Click to mark the position of the orbitale
- 3 Click the side view to find the FH plane



3.3 FH Plane ReOrientation

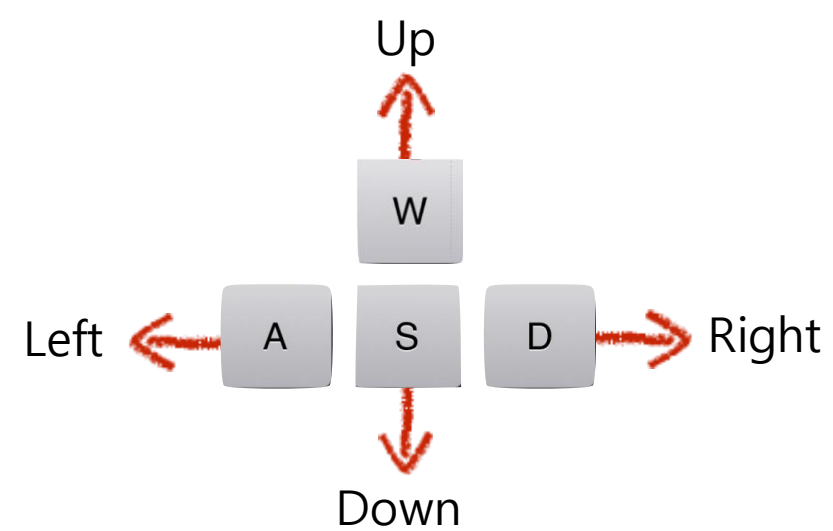


ReOrientation According to FH plane

- 1 Drag the center of the cross line in the 2D sagittal view of CBCT to find the orbitale of the 3D side view.

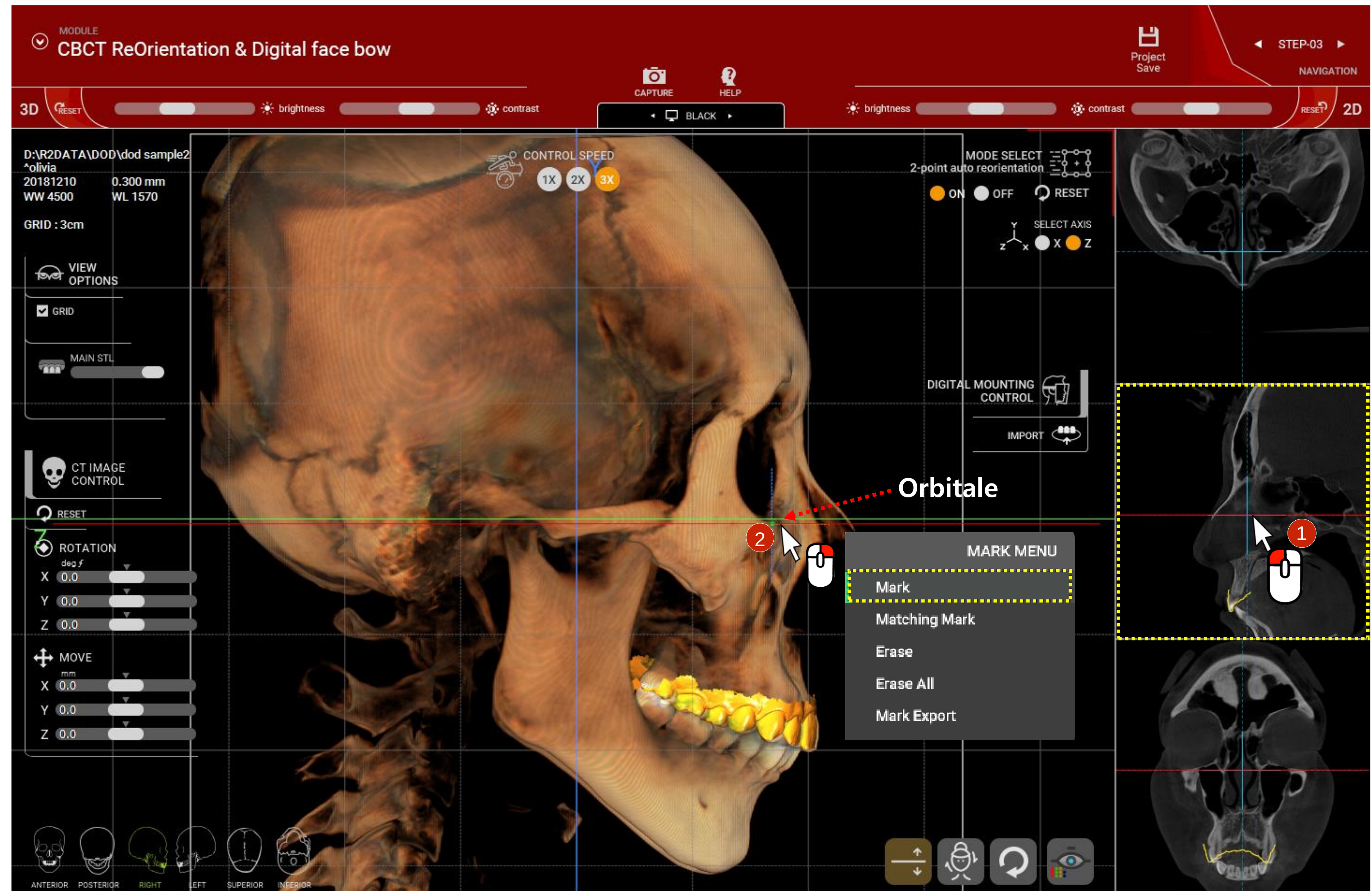
! The cross line can only be moved on a 2D CBCT cross-section and can be moved by dragging the center of the cross line.

! The cross line can be moved with keyboard (Place the mouse on the 2D CBCT view and control with the keyboard)



! When the icon changes to a hand shape, be careful with clicking

- 2 Adjust the cross line and place it on the orbitale. Right click on the cross line and select Mark from the pop-up menu

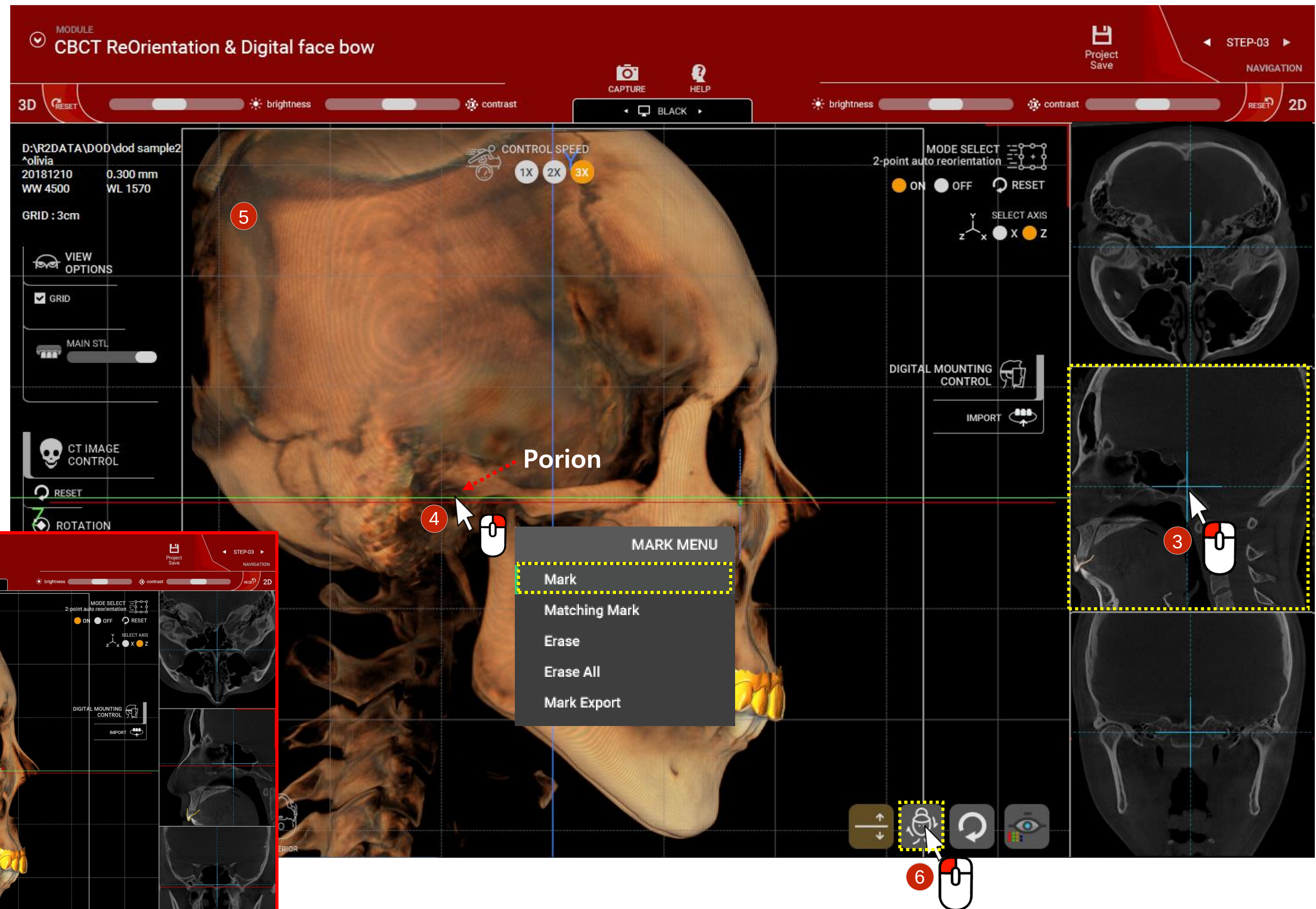


3.3 FH Plane ReOrientation



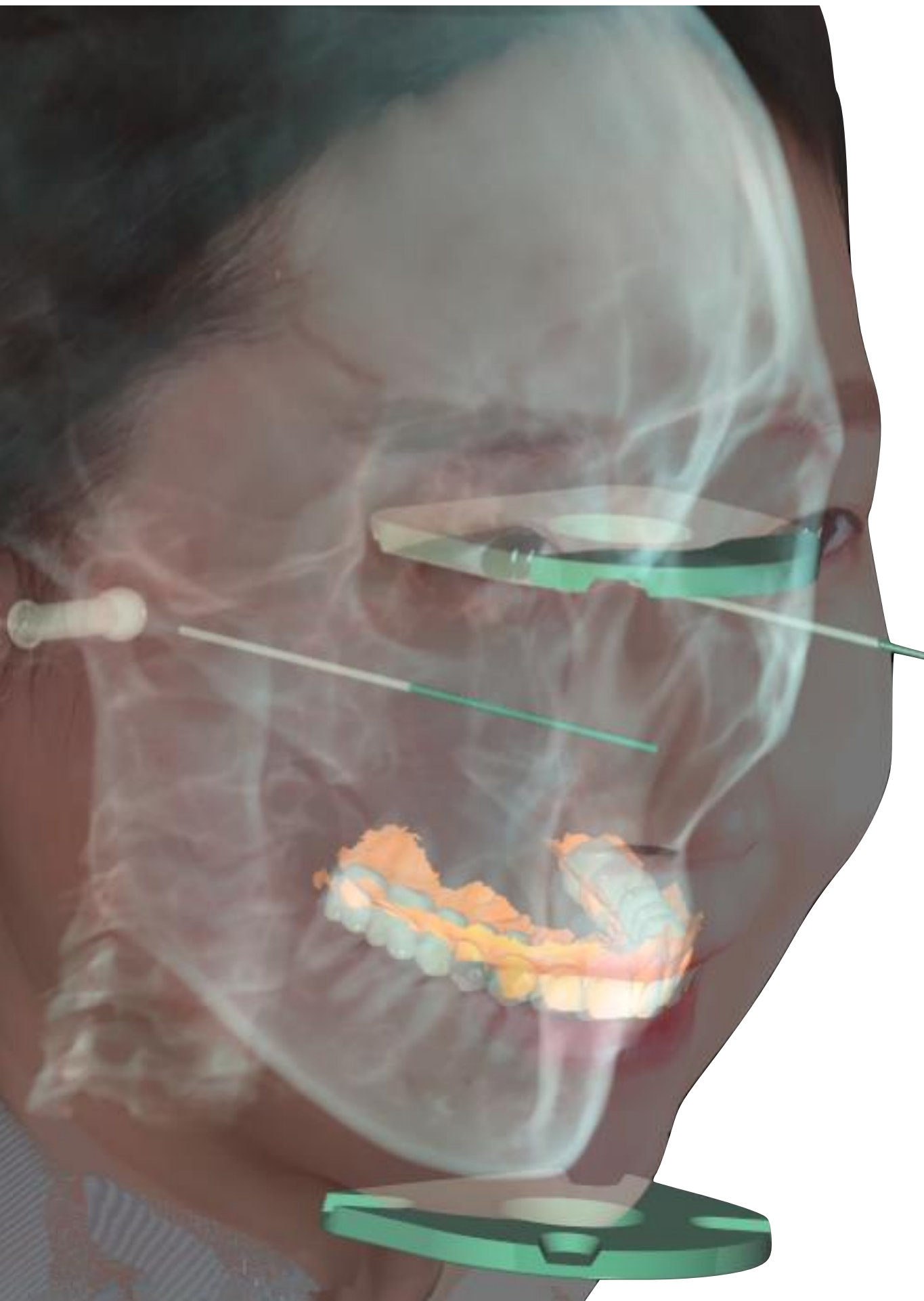
ReOrientation According to FH plane

- 2D Sagittal view in CBCT, drag the center of the cross line or move the keyboard to find the porion in the 3D side view
- Right click on the cross line on the porion and select Mark from the pop-up menu
- The position of CBCT automatically adjusts(Roll) on the FH plane
- Save CBCT ReOrientation based on FH basis



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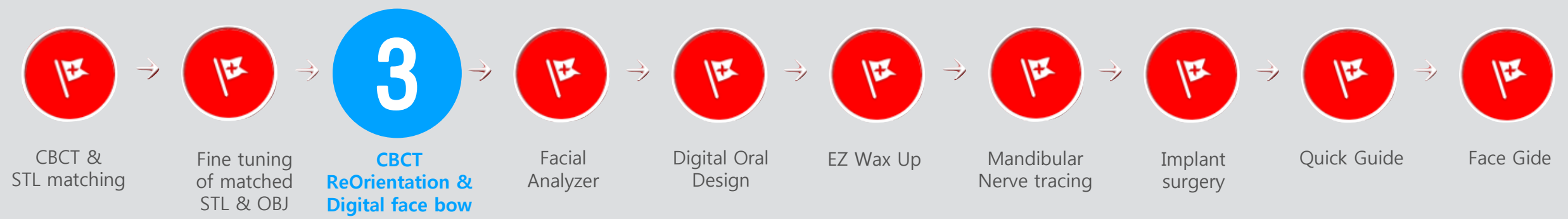


4 Digital Oral Design Facial Matching



Facial Matching(EN)

4.1 Facial Matching Auto Matching



Smile Facial Scan Matching

Because shooting for CBCT requires closed eyes, separately taken Smile Face scan (*.obj) needs to be matched with Scout

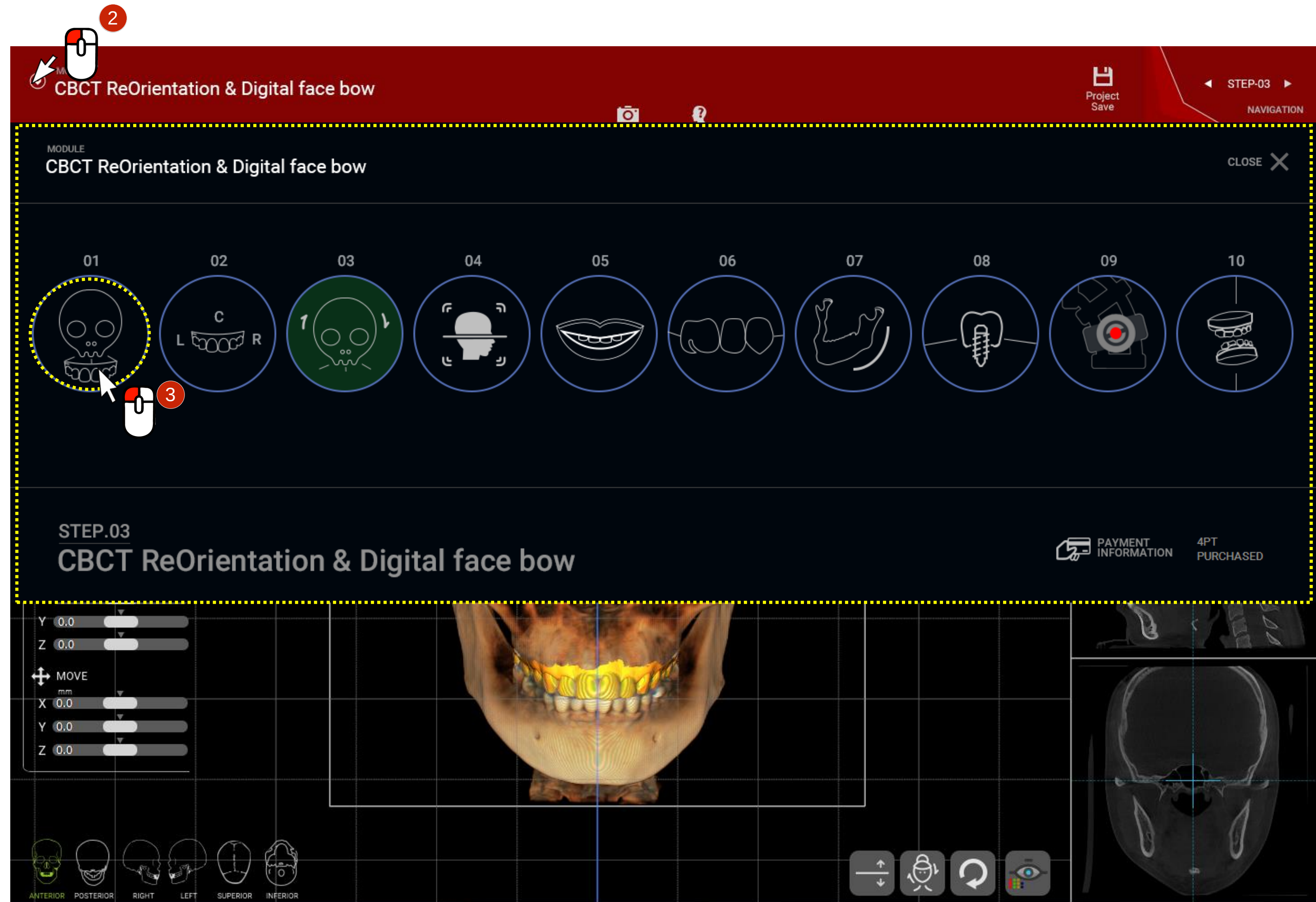
*Smile object

: Separately taken Smile 3D Facial Scan

*Scout object

: Initial Facial Scan taken during CBCT shooting

- 1 When Reorientation is complete, Proceed to STEP .01 for Facial Matching
- 2 First, Click the Main Menu Bar on top
- 3 Click **STEP.01**



4.1 Facial Matching Auto Matching

1
CBCT &
STL matching



Fine tuning
of matched
STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
Analyzer



Digital Oral
Design



EZ Wax Up



Mandibular
Nerve tracing



Implant
surgery



Quick Guide



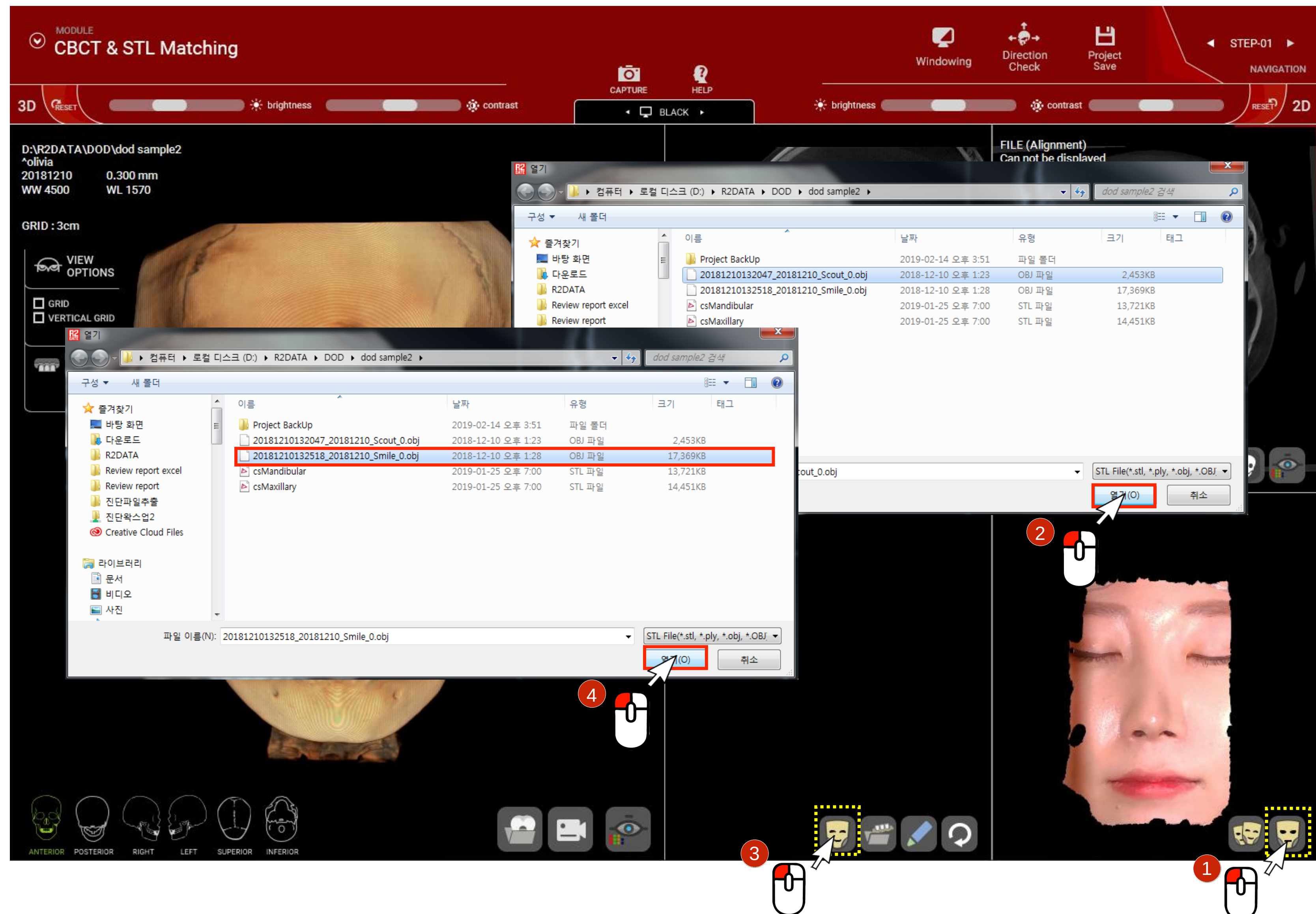
Face Gide

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Smile Facial Scan Matching

- 1 Click the icon to import Scout (*.obj) file
- 2 Select Scout(*.obj) file and import the file with **Open(O)**
- 3 Next, click the icon to import Smile (*.obj) file
- 4 Select Smile(*.obj) file and click **Open(O)**



4.1 Facial Matching Auto Matching

1
CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



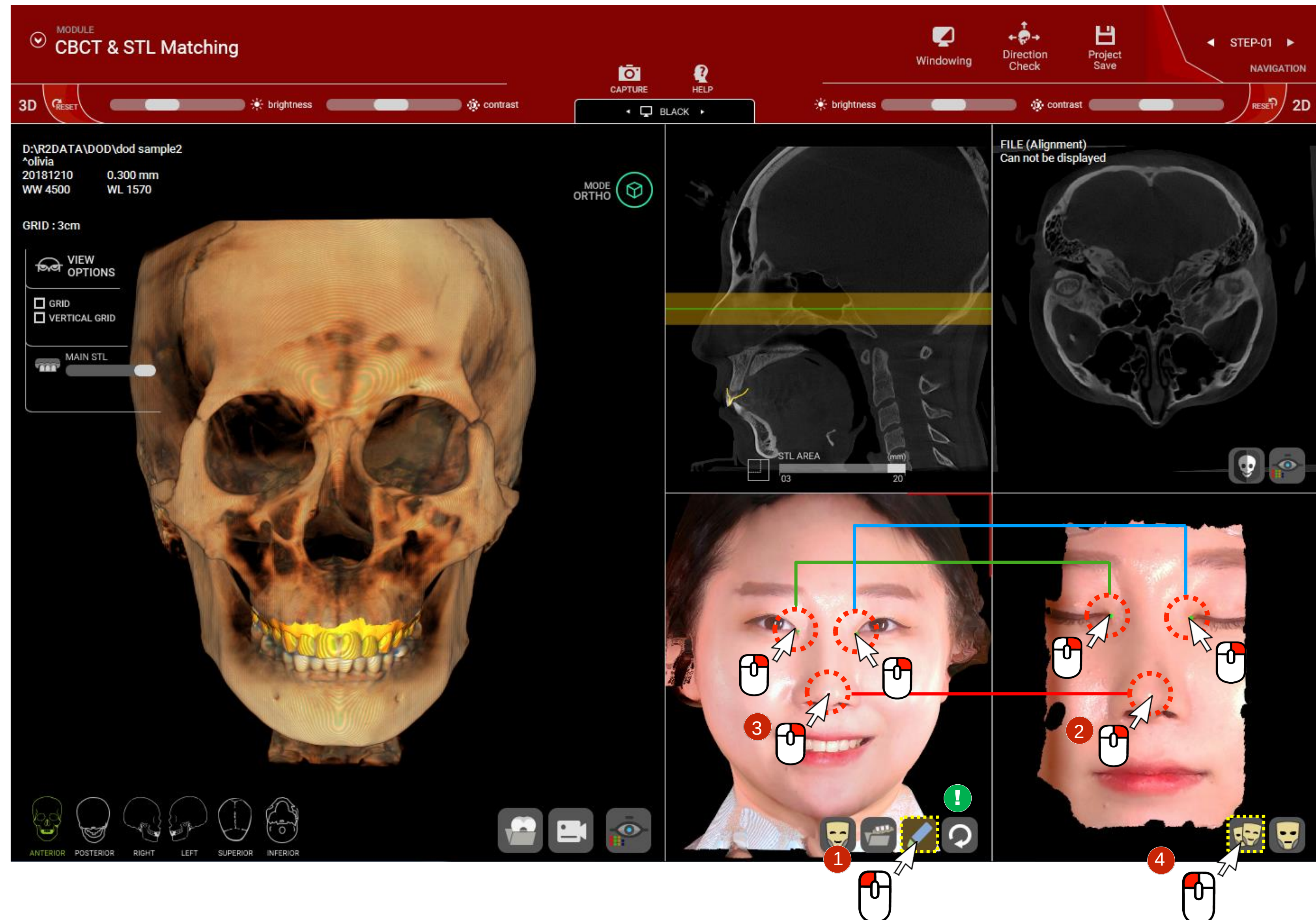
Face Guide

R2
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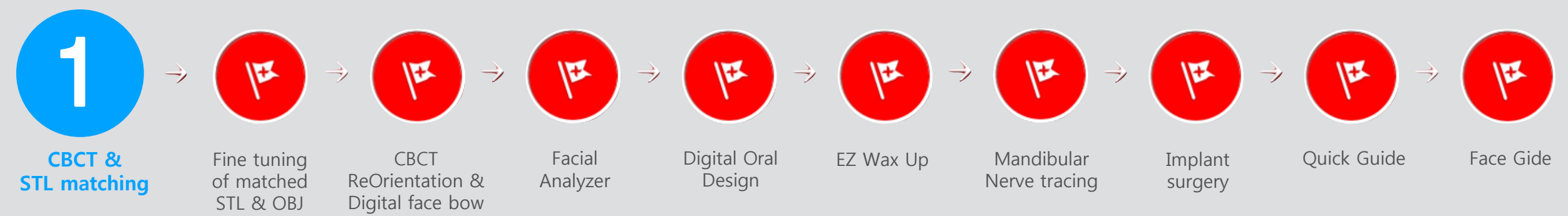
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Smile Facial Scan Matching

- 1 Click the pen icon
- 2 Right click on the Scout Facial file to mark 3 points
 - ! For 3-point Matching, Nose tip to nose tip and the front part of both eyes(internal canthus) are reference points
- Left click : OBJ movement & rotation
 - Drag : OBJ zoom in & out
 - Right click: point marking
 - Wheel click: Remove previous point
- 3 Mark 3 points in the same position on the Smile Facial file
- 4 Click Matching icon to match Scout and Smile
- ! If Matching goes wrong, click the reset icon and try again



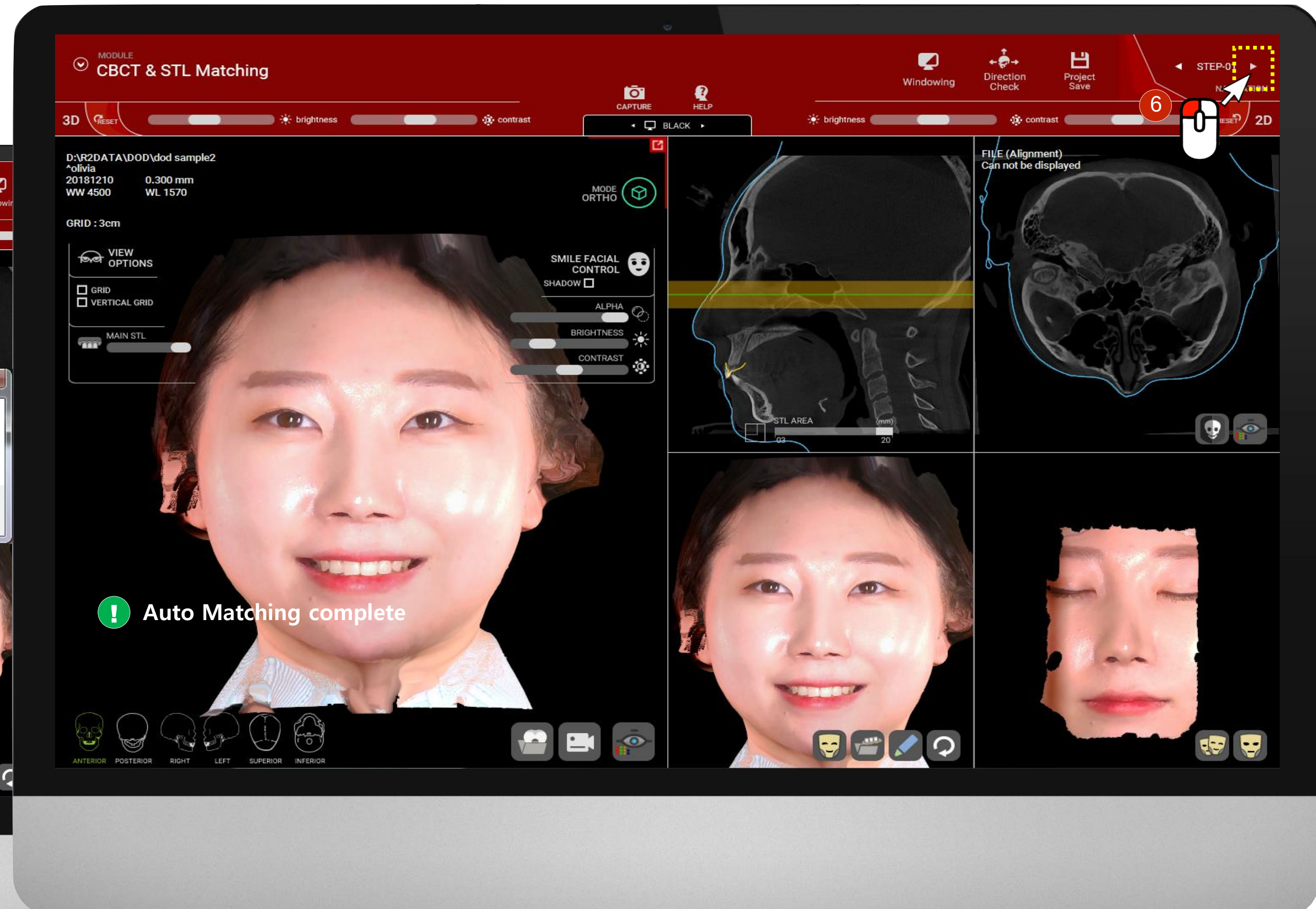
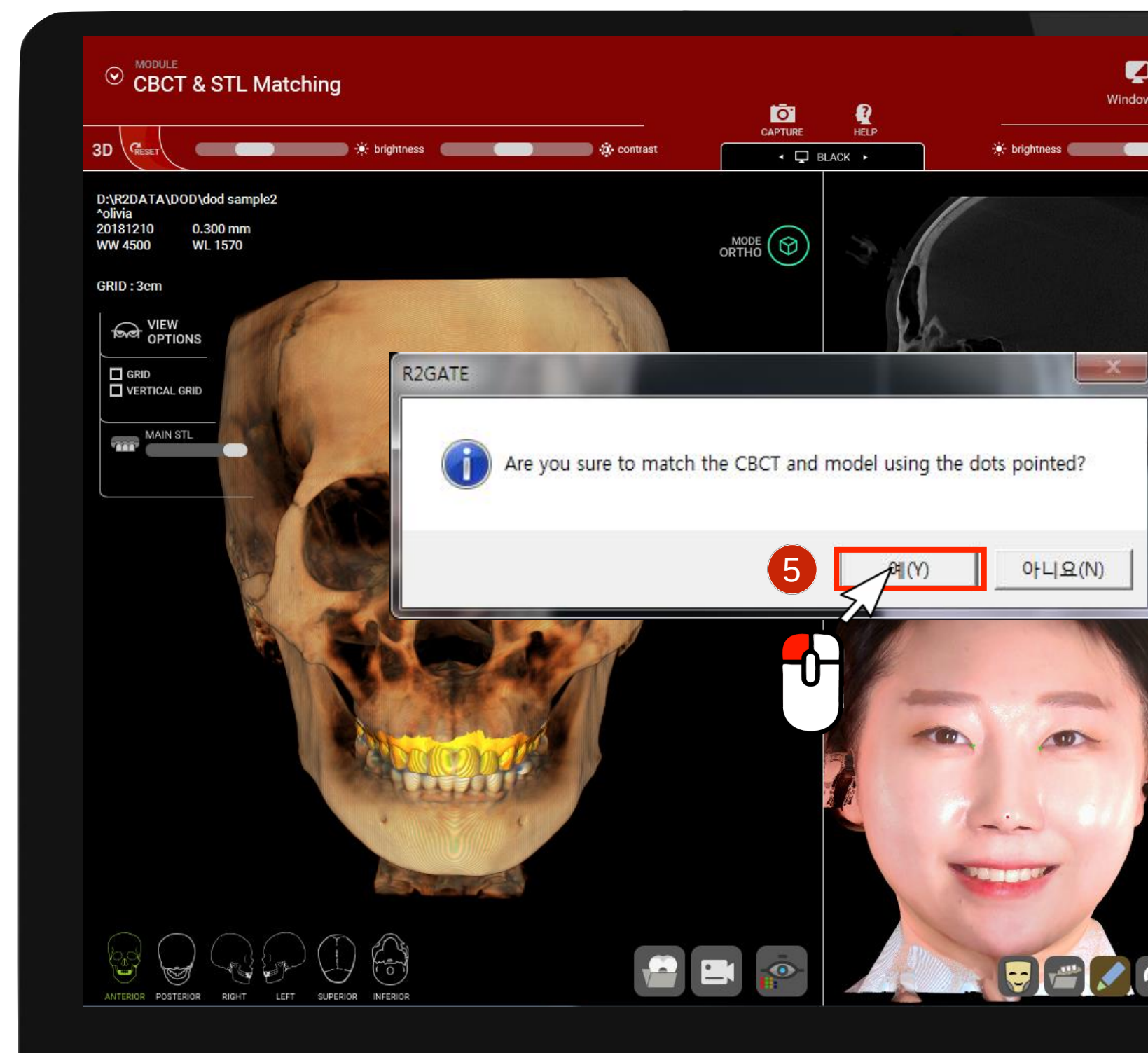
4.1 Facial Matching Auto Matching



Smile Facial Scan Matching

5 Click **Yes(Y)** button to complete Auto Matching

6 Click to proceed to next step

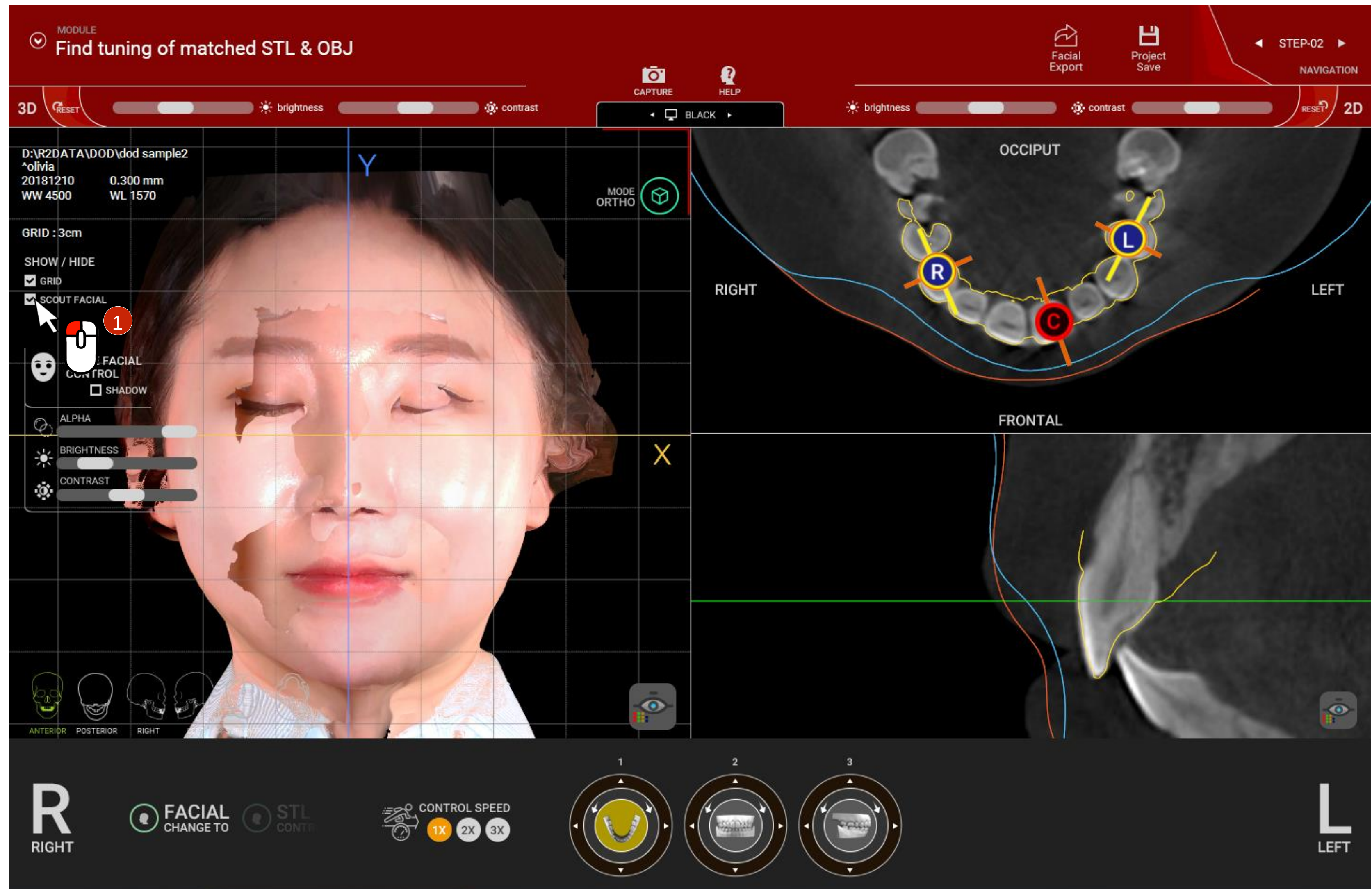
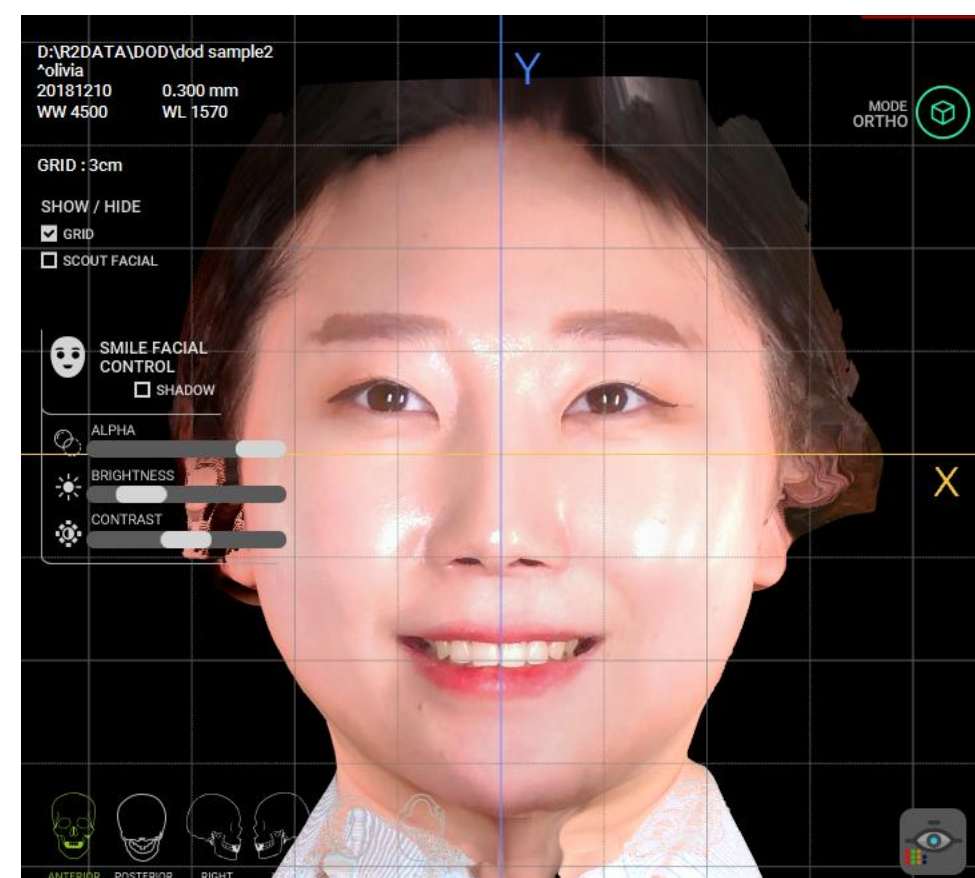
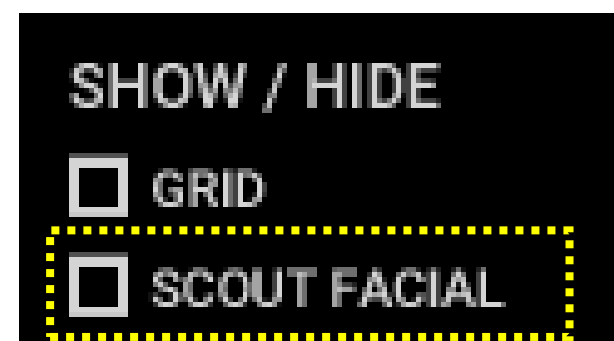


4.2 Fine Tuning of Matched OBJ



Smile Facial Scan Matching Fine Tuning

- By unchecking **SCOUT FACIAL**, the scout image used for Auto Matching can be hidden



4.2 Fine Tuning of Matched OBJ



Smile Facial Scan Matching Fine Tuning

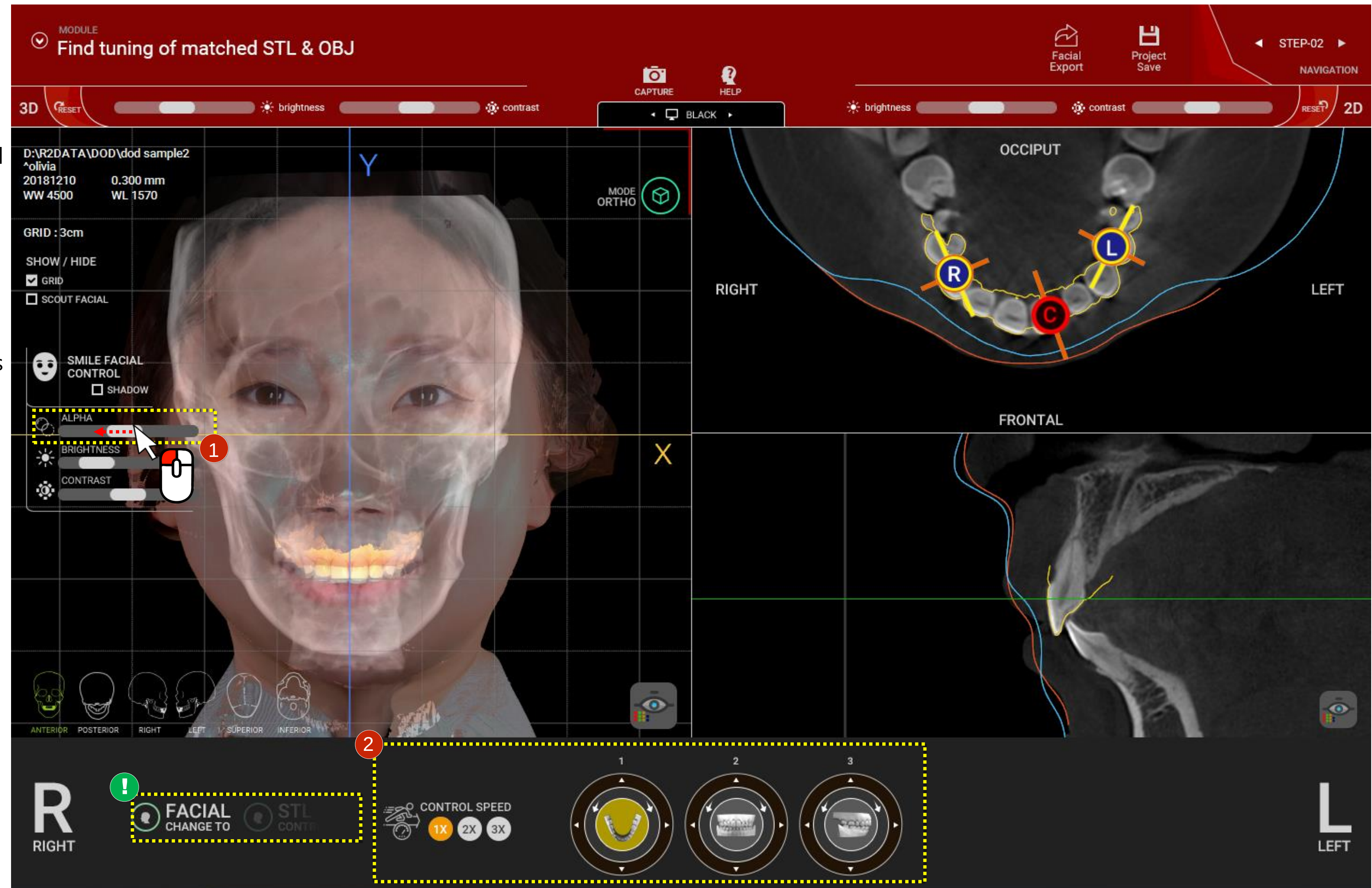
1 For convenient matching, drag Smile Facial Alpha bar to adjust the transparency

2 Using Facial Controller, process Fine Tuning of Smile Facial in order of the teeth, soft tissue and frontal lobe of CBCT

Refer to the next page for detailed process

! Facial muscles tend to not change when smiling so check the part that does not change

! To modify cast matching during Facial Matching, click the icon to switch to STL Matching step

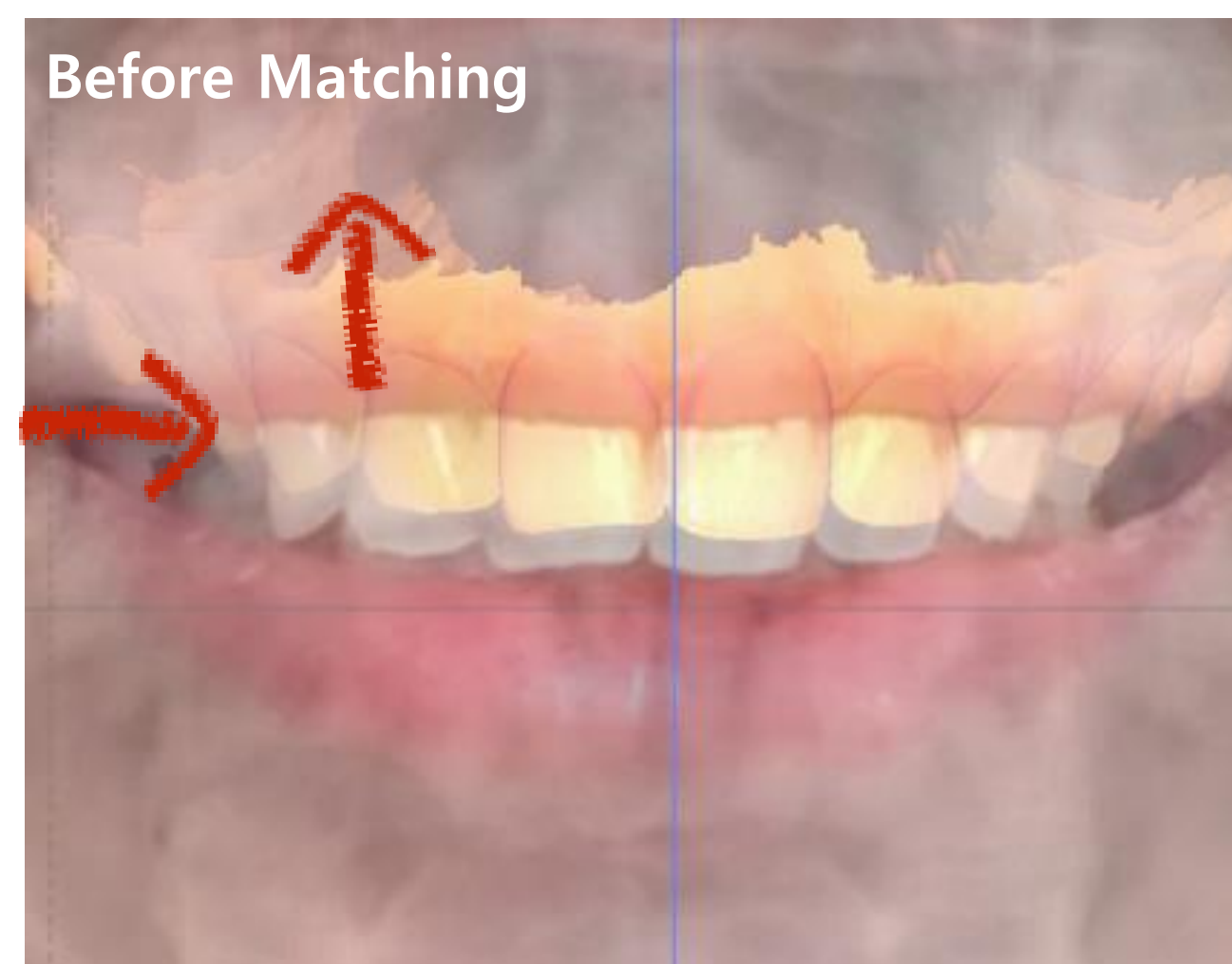
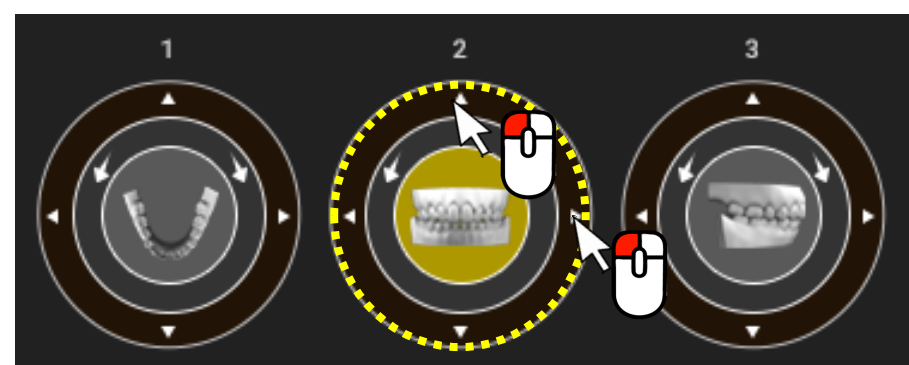


4.2 Fine Tuning of Matched OBJ



Smile Facial Scan Matching Fine Tuning

- Using **Control 2**, match the anterior teeth of STL Model that is matched with CBCT to Smile Facial identically.

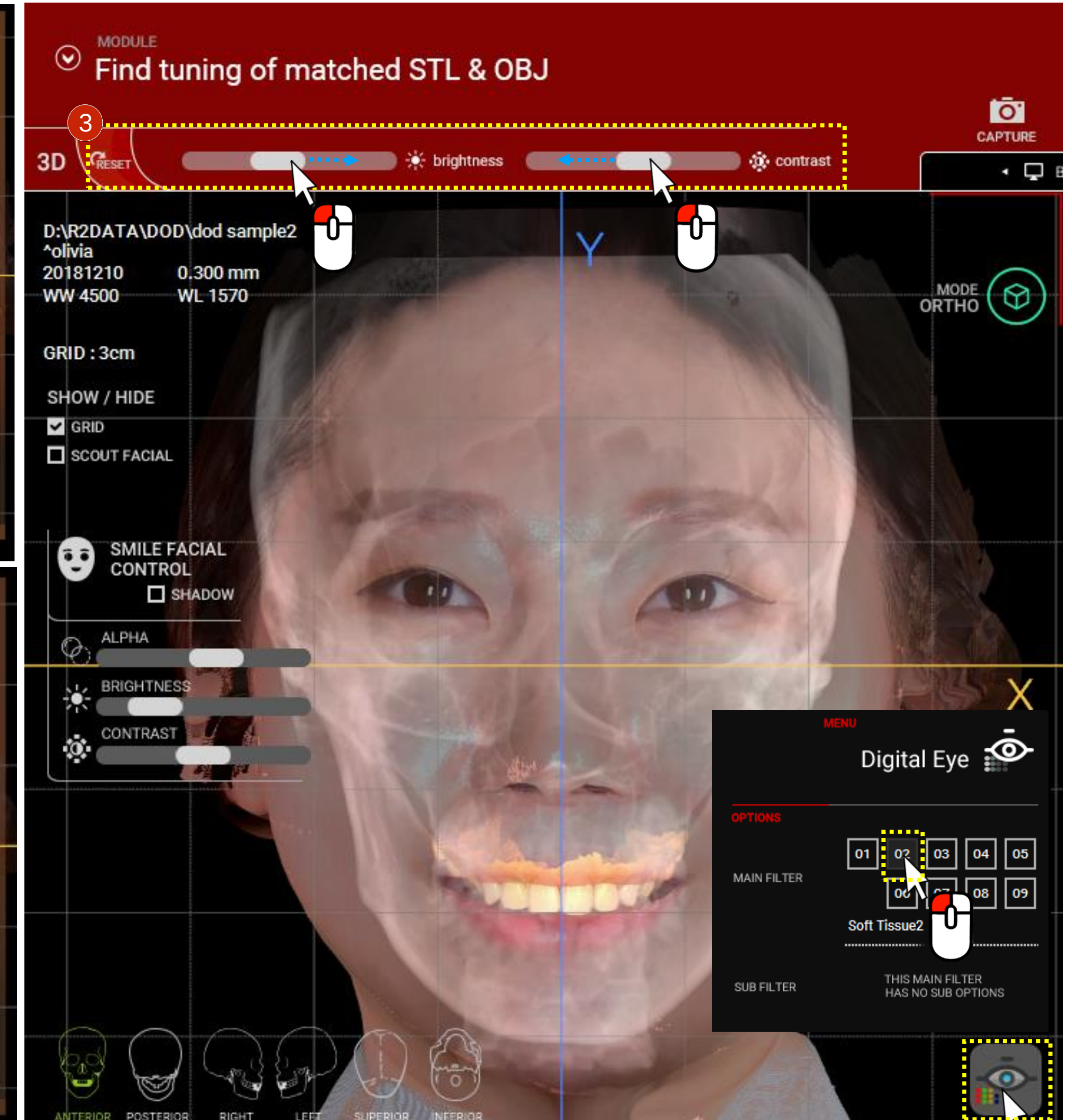
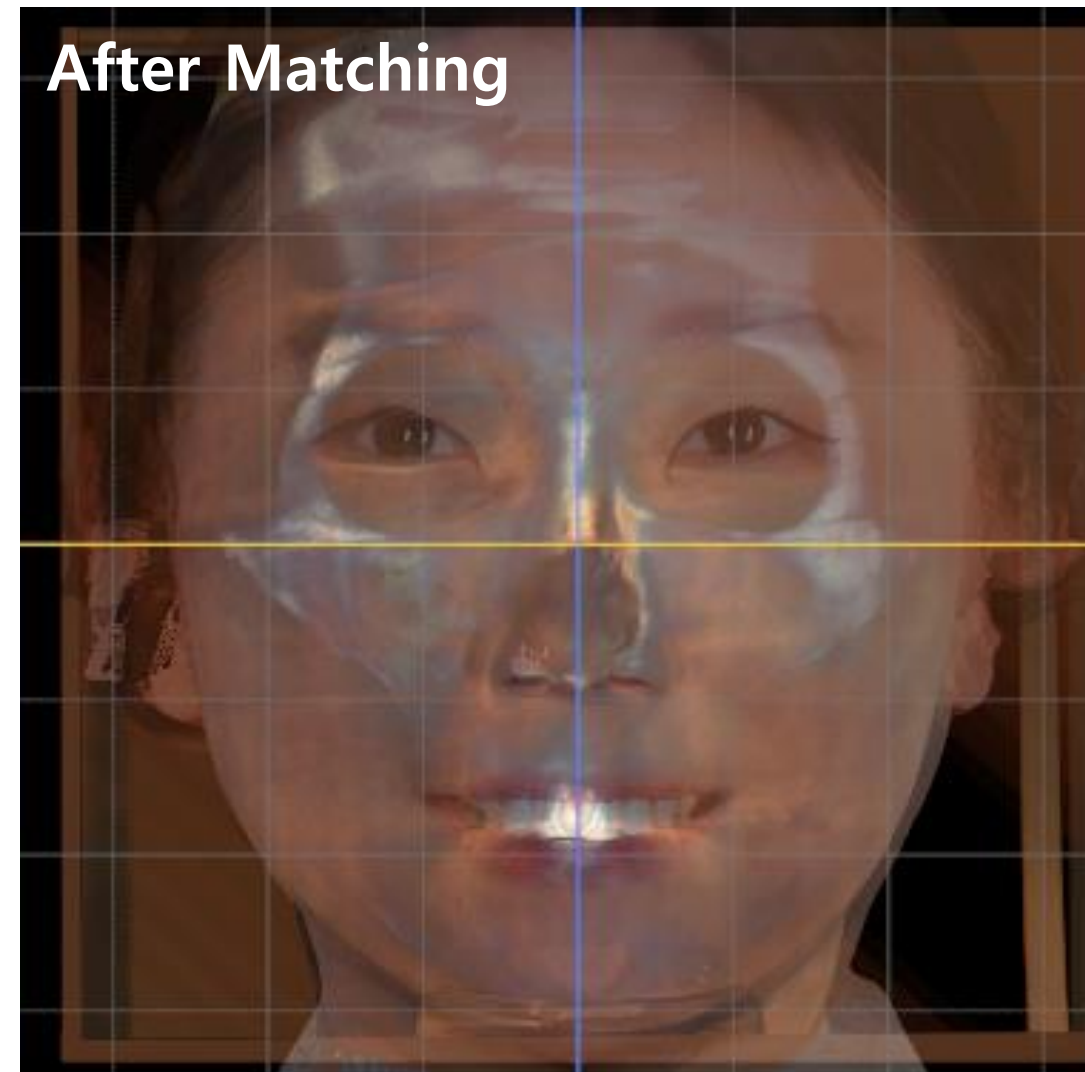
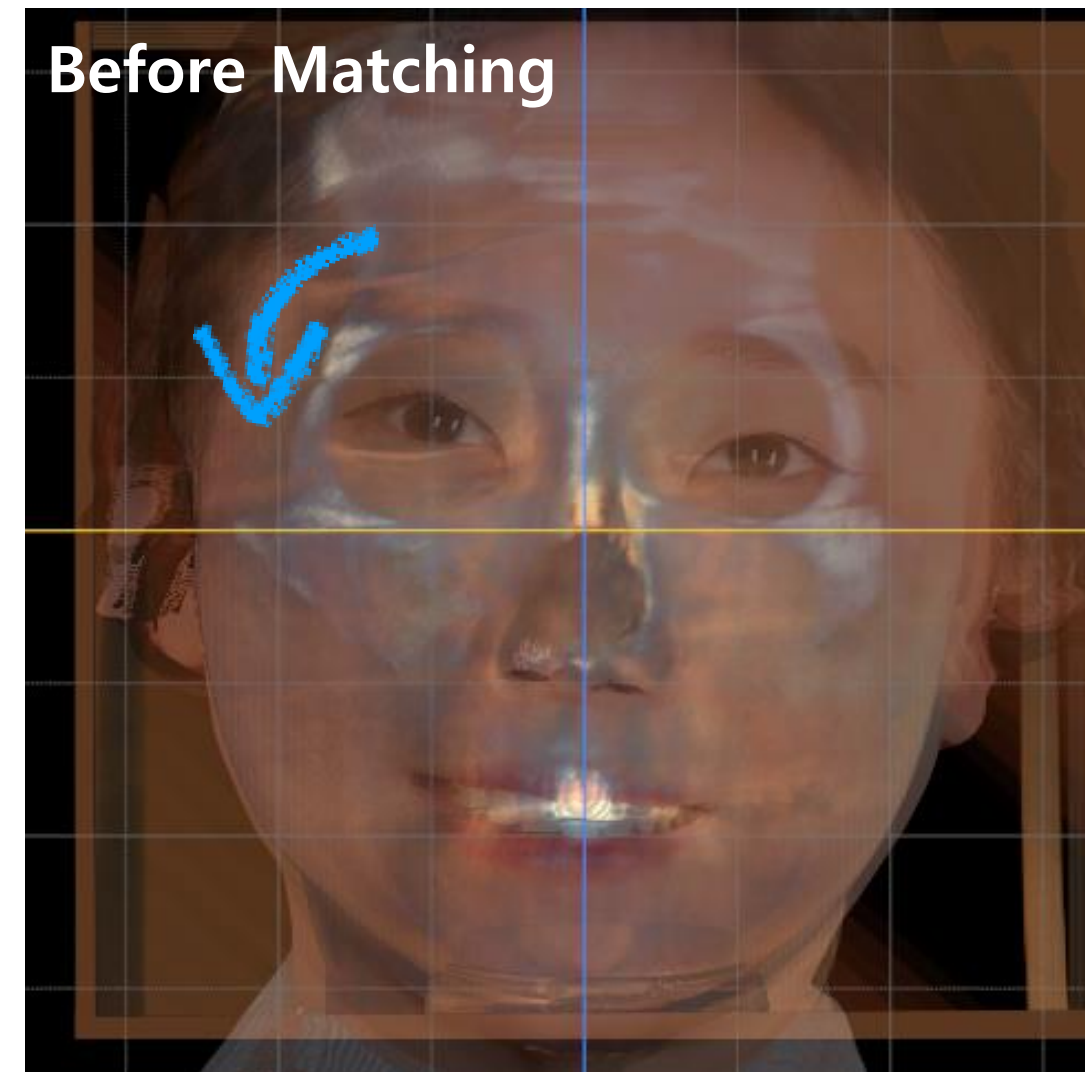
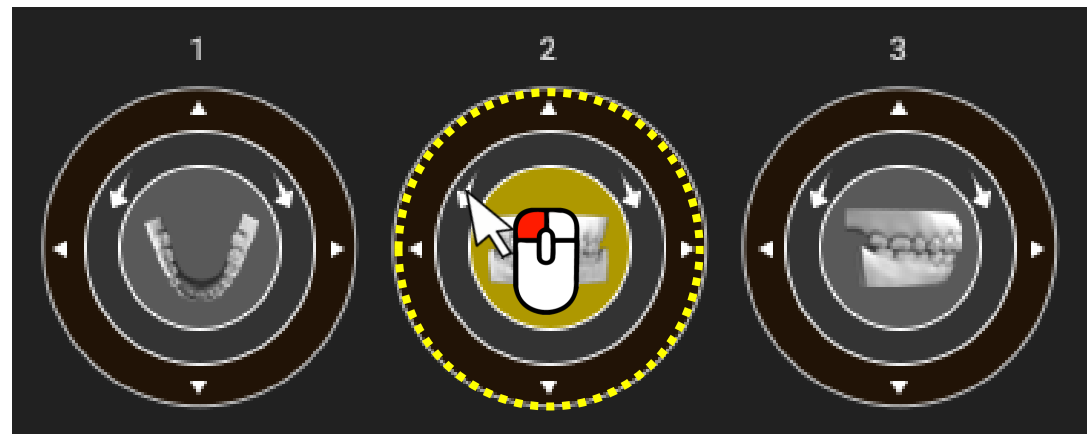


4.2 Fine Tuning of Matched OBJ

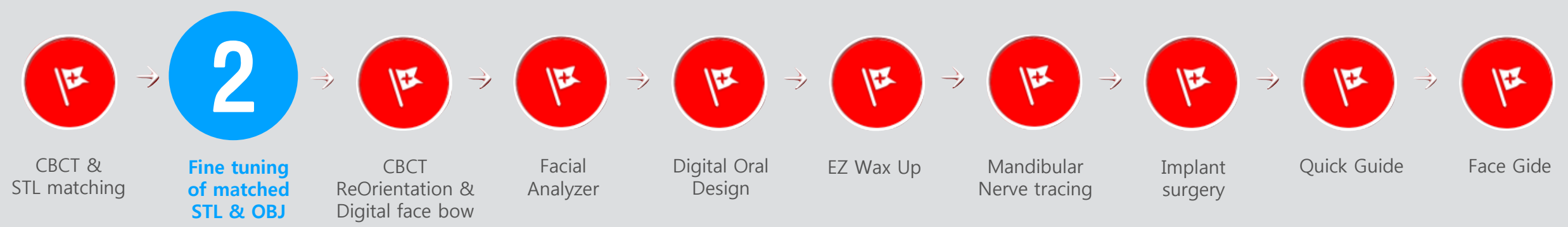


Smile Facial Scan Matching - Fine Tuning (Roll)

- To check the soft tissue of CBCT, click the filter icon to set the filter to 02
- Adjust the brightness and contrast to display the soft tissue and use the second Controller to check and adjust the position of the orbitals and nose

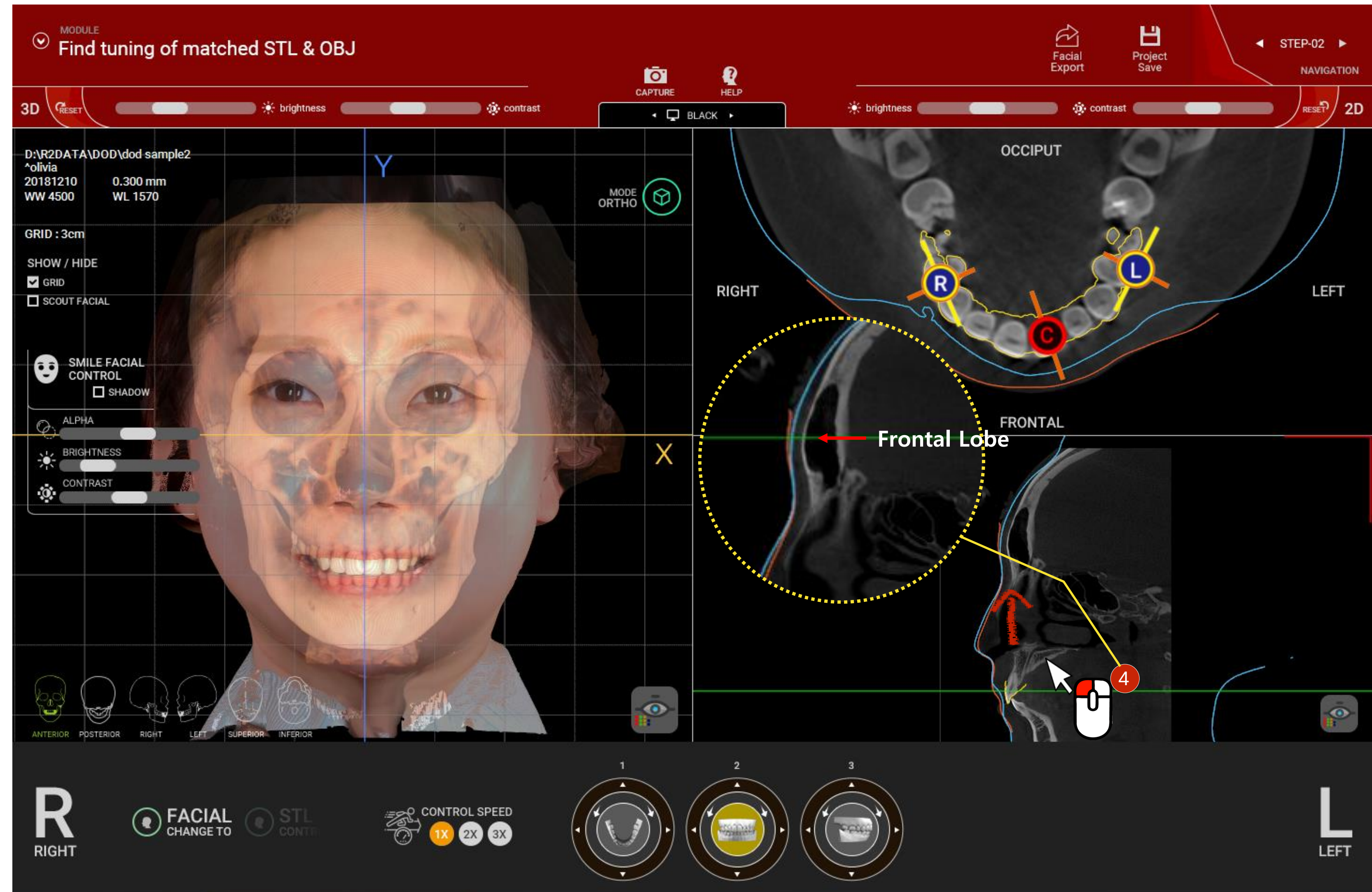


4.2 Fine Tuning of Matched OBJ

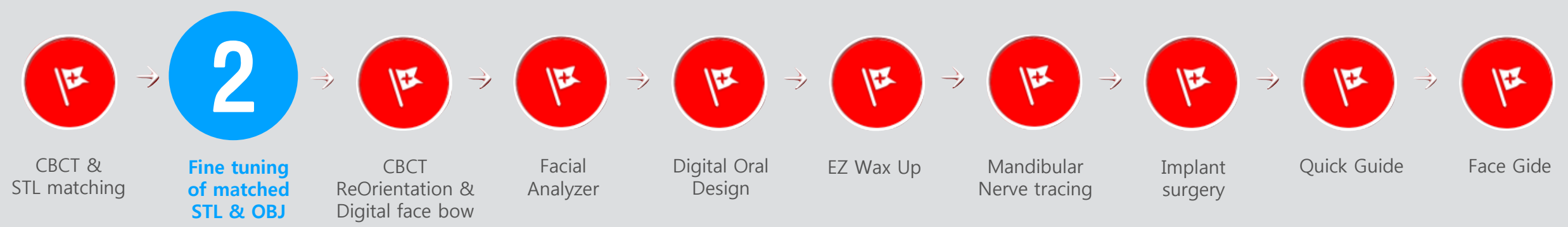


Smile Facial Scan Matching - Fine Tuning (Yaw&Pitch)

- 4 Drag the cross section line towards the frontal lobe

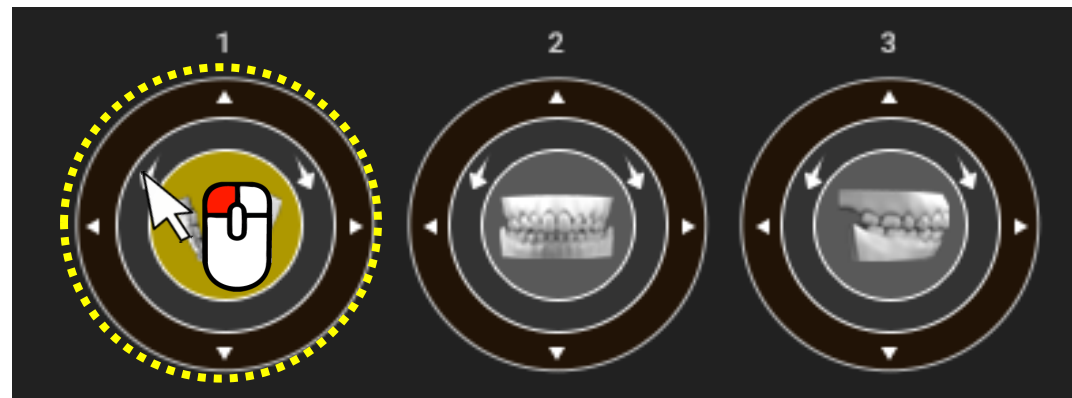


4.2 Fine Tuning of Matched OBJ

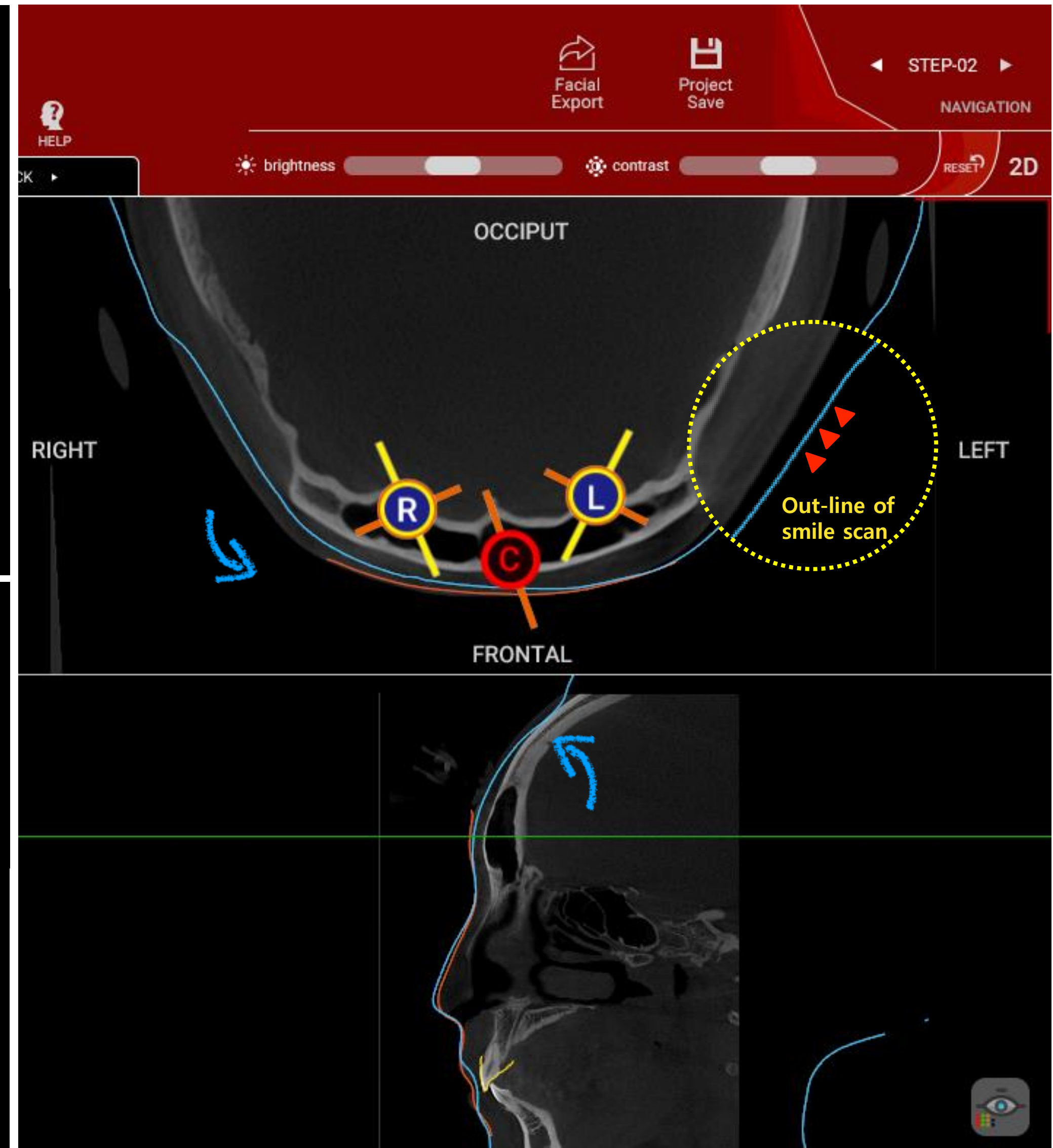
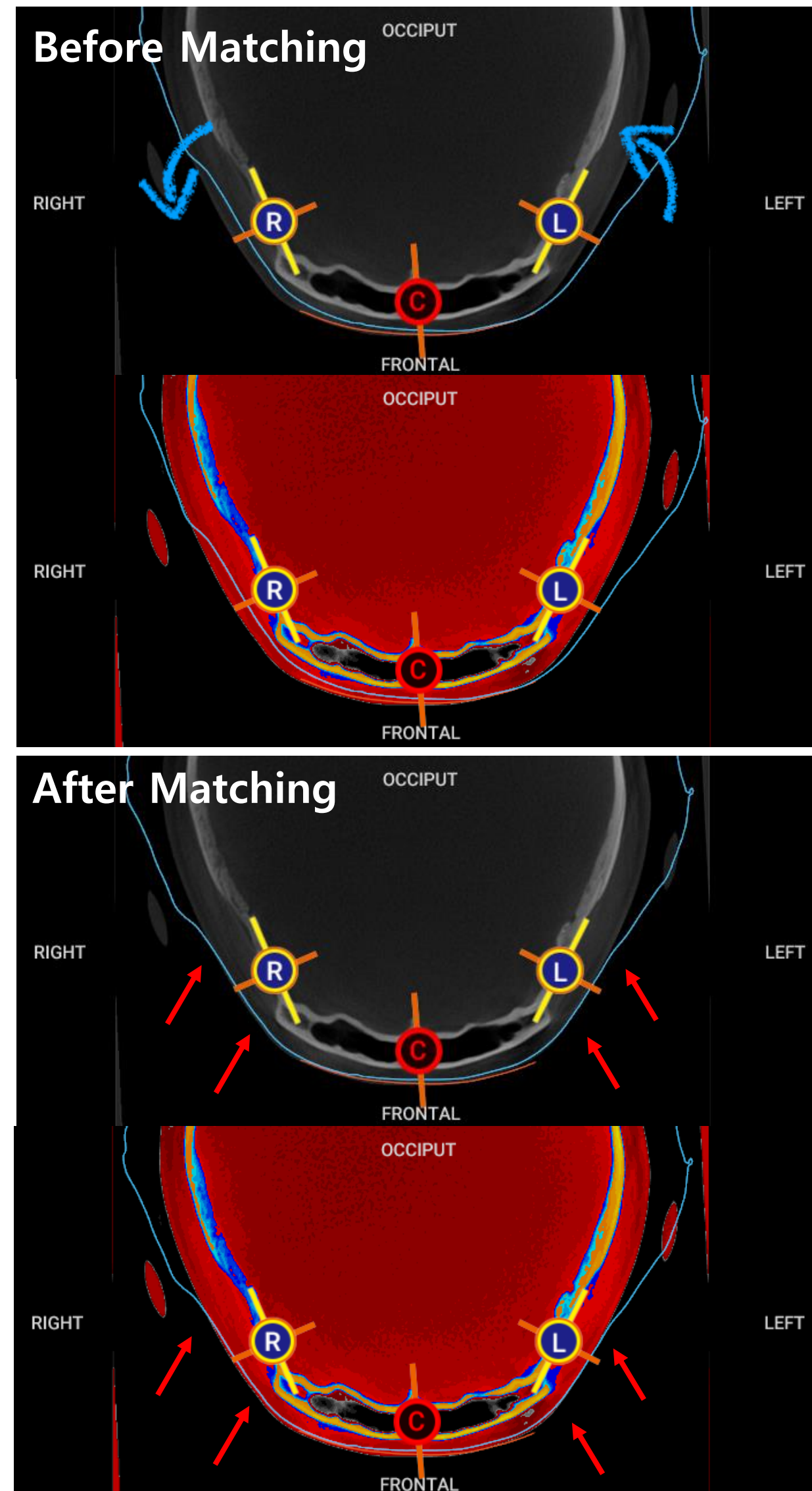


Smile Facial Scan Matching - Fine Tuning (Yaw&Pitch)

- 5 Using **Control 1**, match the soft tissue part to the frontal lobe identically.



- ! Use Digital EYE to clearly check the outline of the soft tissue

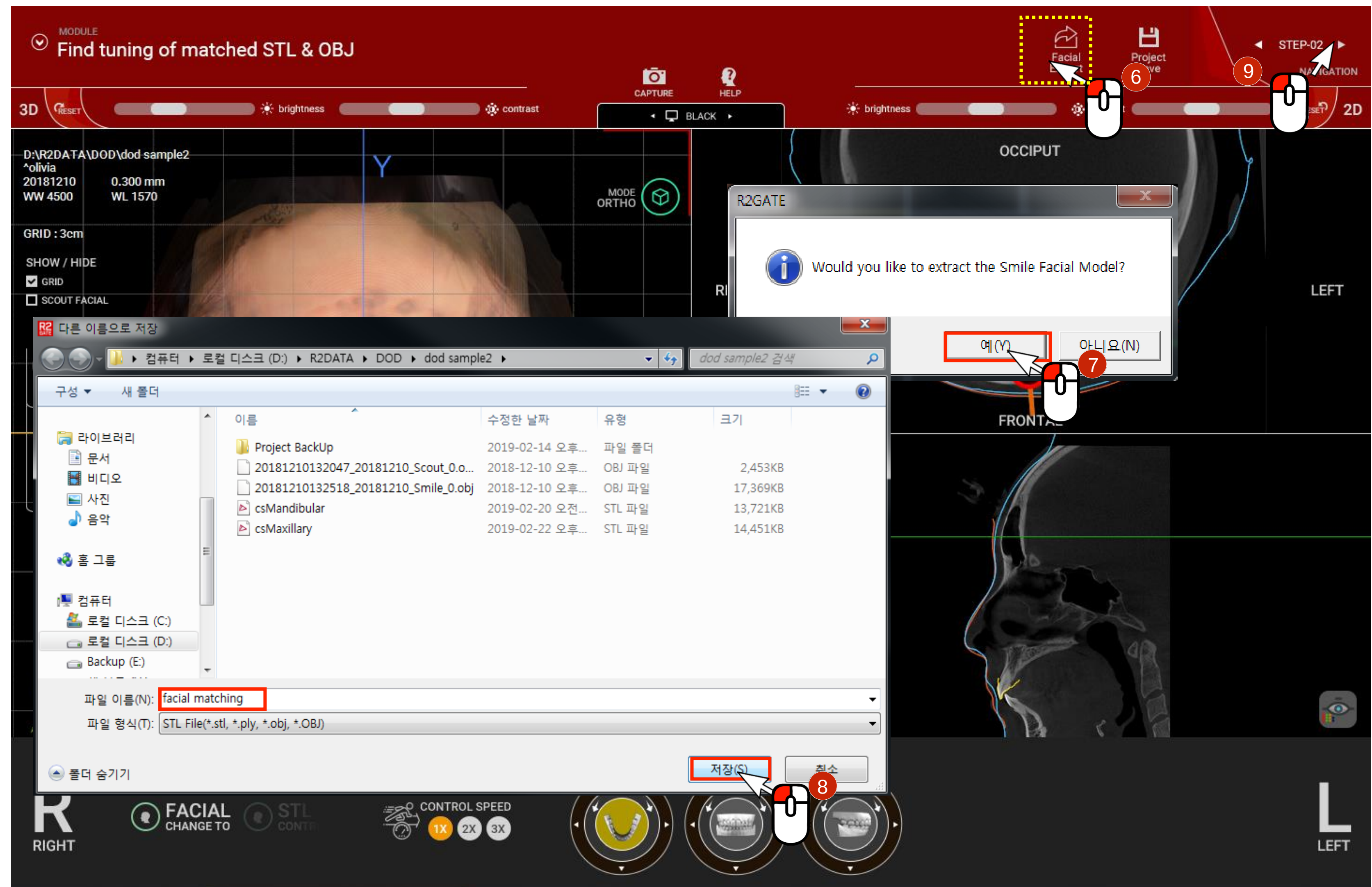


4.2 Fine Tuning of Matched OBJ

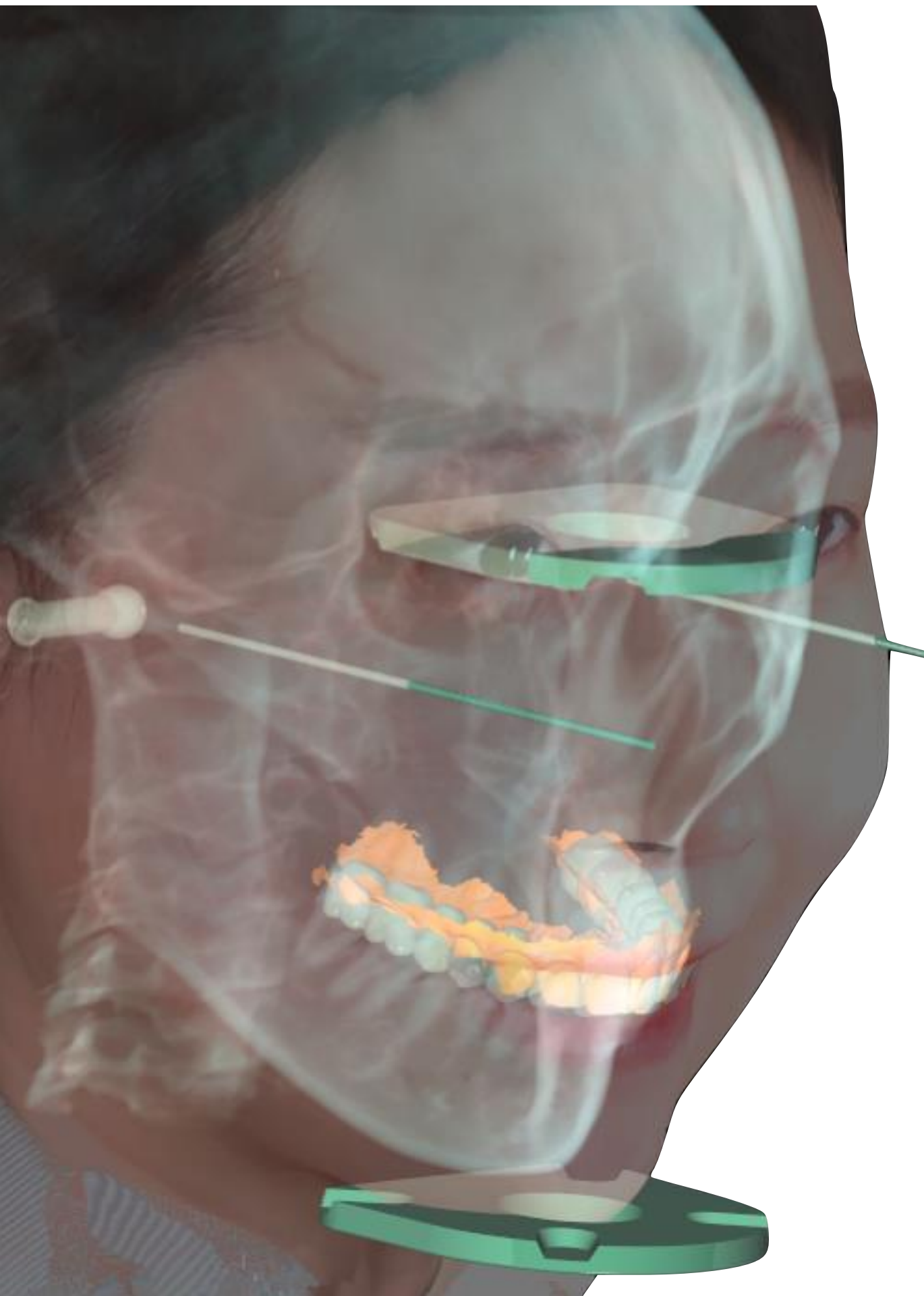


Smile Facial Scan Matching Fine Tuning

- Check the teeth and soft tissue once again to match them perfectly
-  Click Facial Export when Matching is complete
- Click **Yes(Y)**
- Enter desired file name and save
-  Click to proceed to next step



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5 Digital Oral Design Digital Face Bow



Digital Face bow(EN)

5.1 Digital Face bow Digital Mounting



CBCT &
STL matching



Fine tuning
of matched
STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
Analyzer



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Nerve tracing



Implant
surgery



Quick Guide



Face Gide

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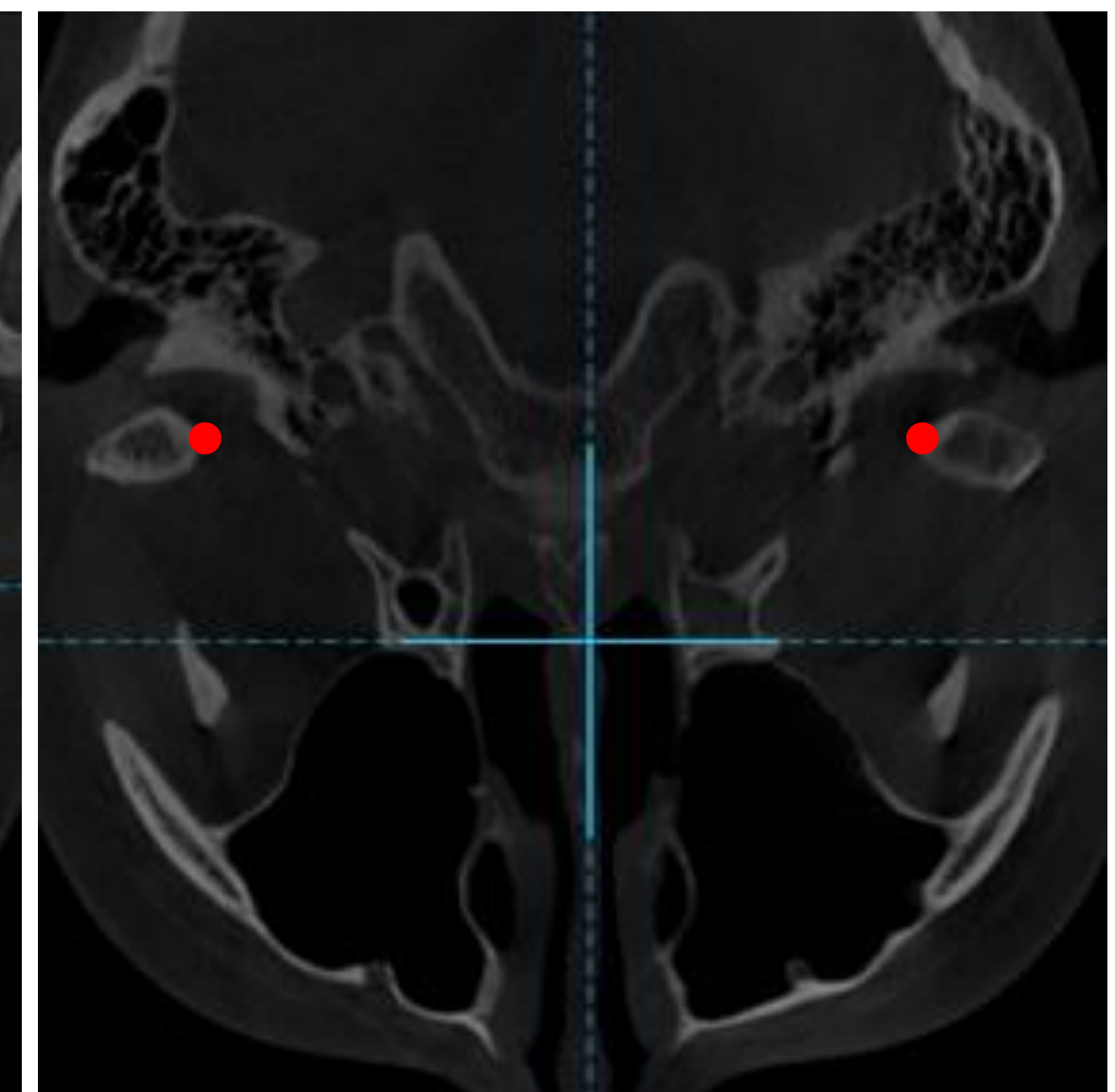
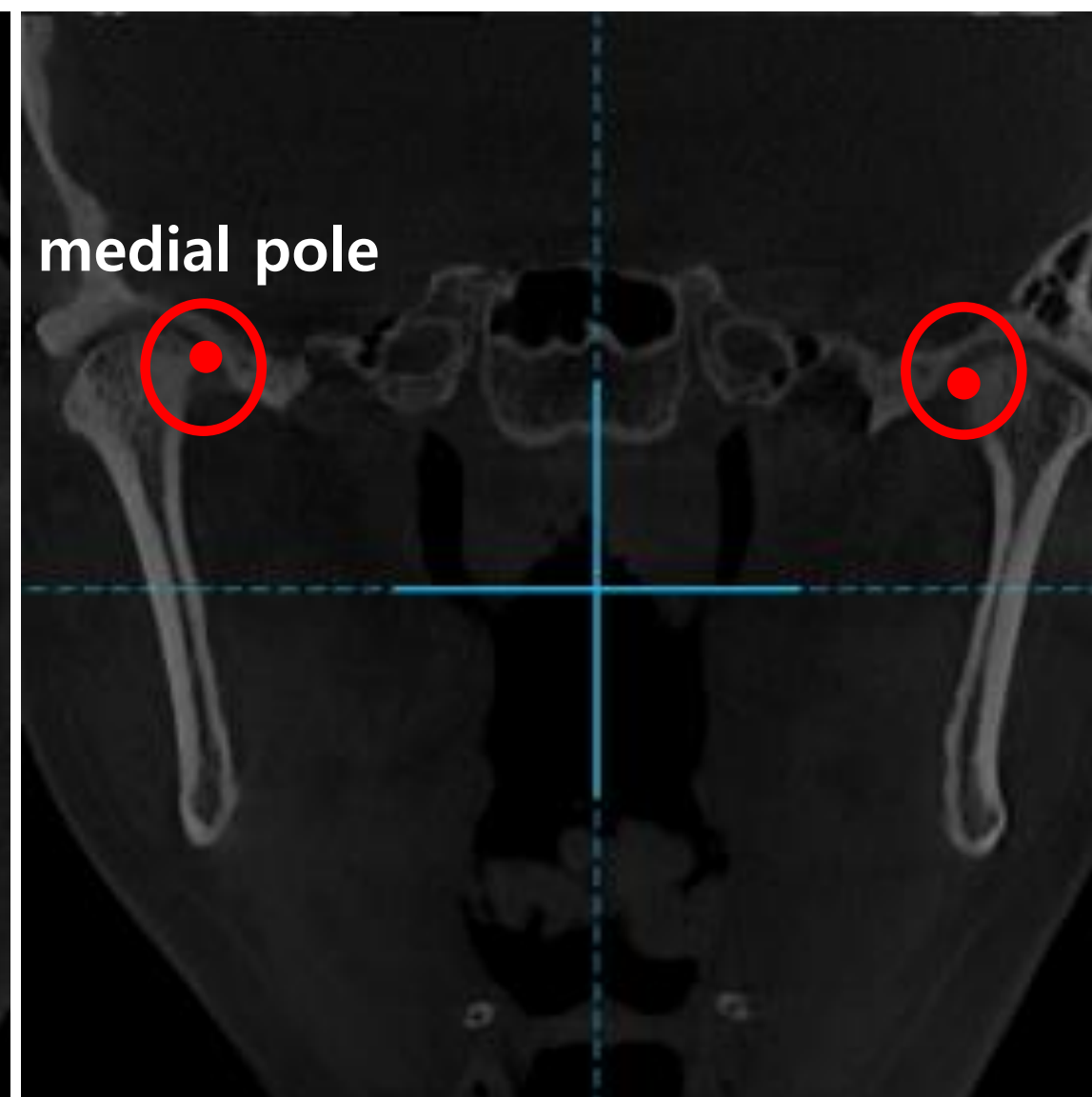
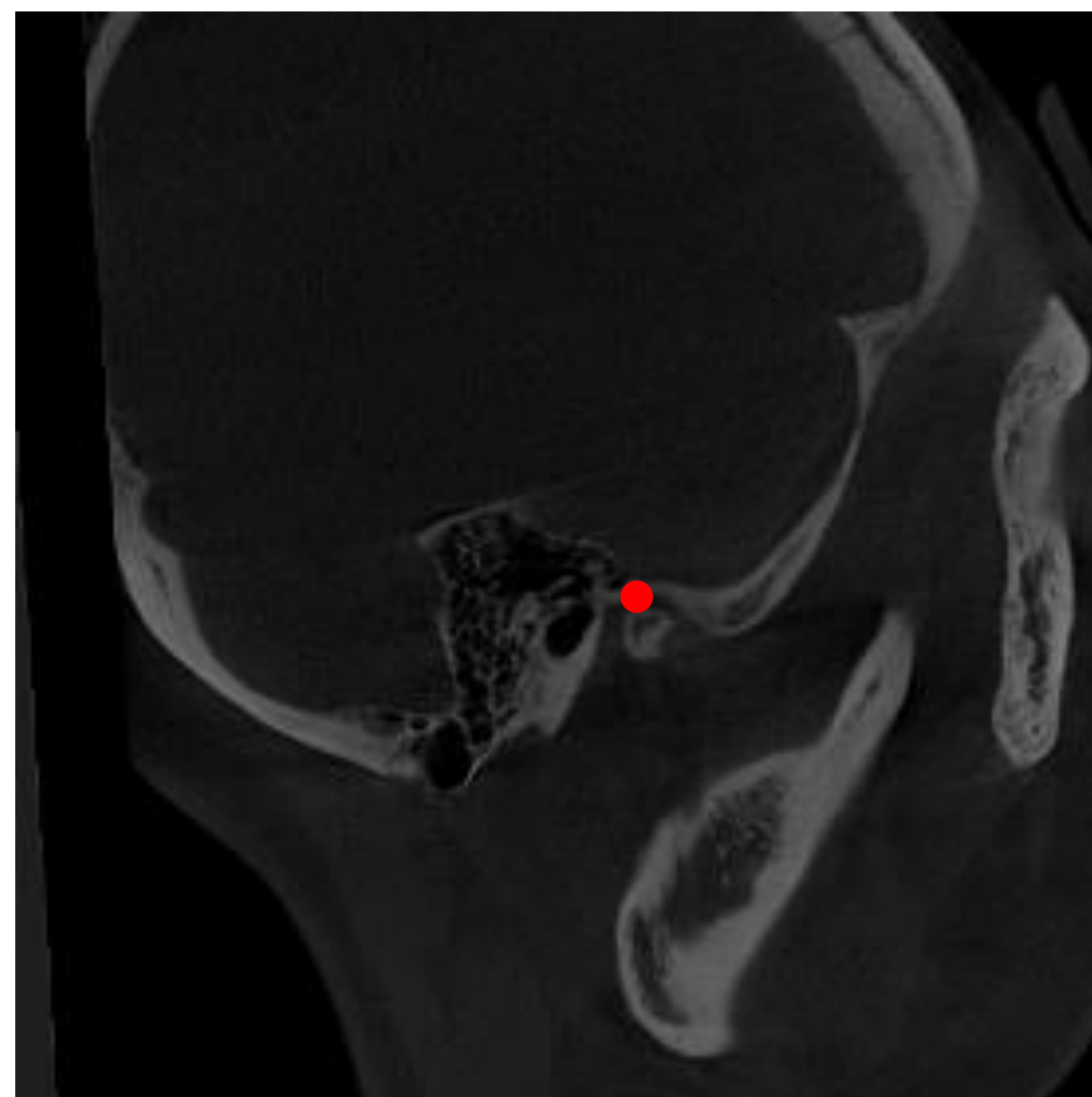
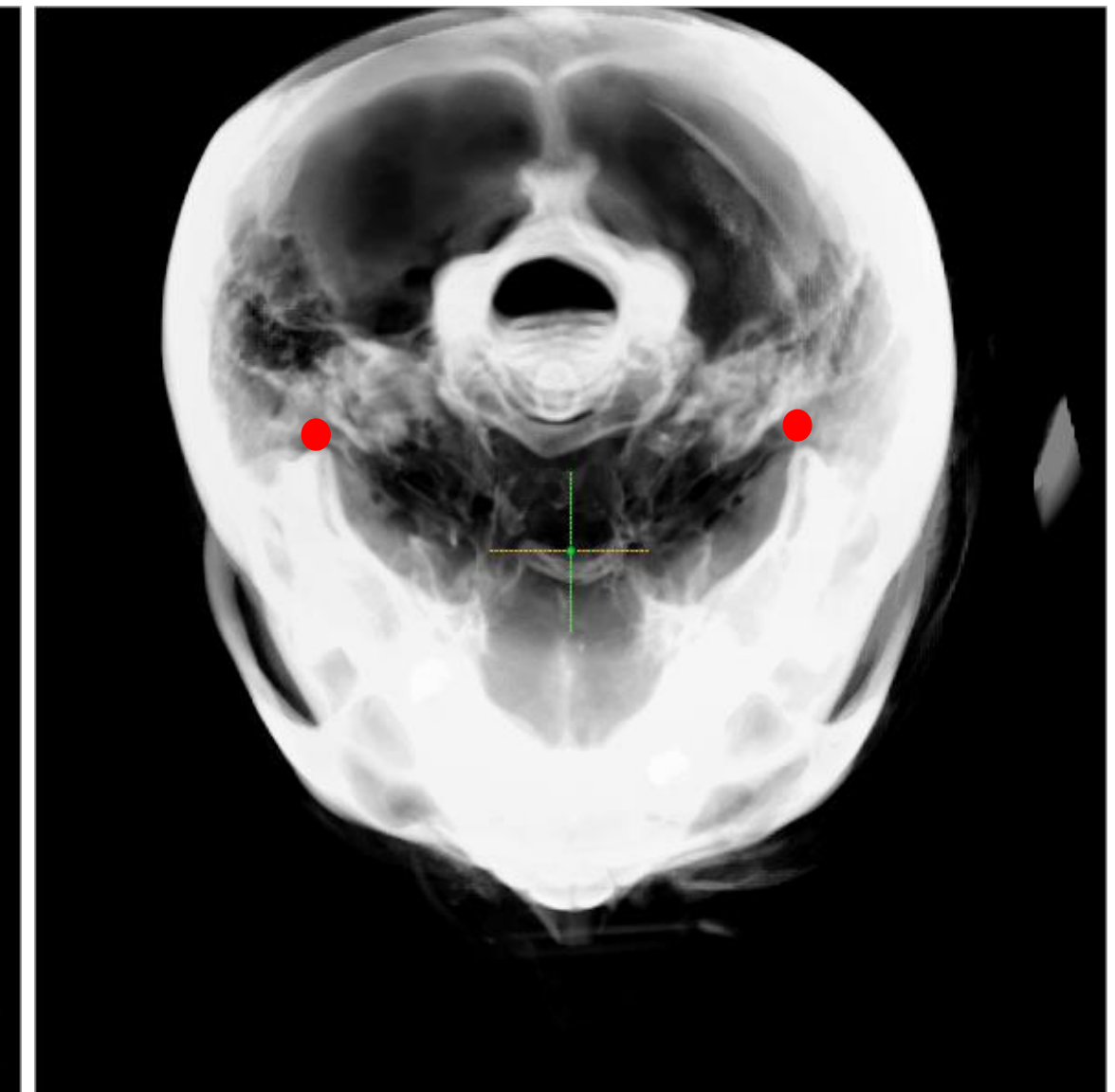
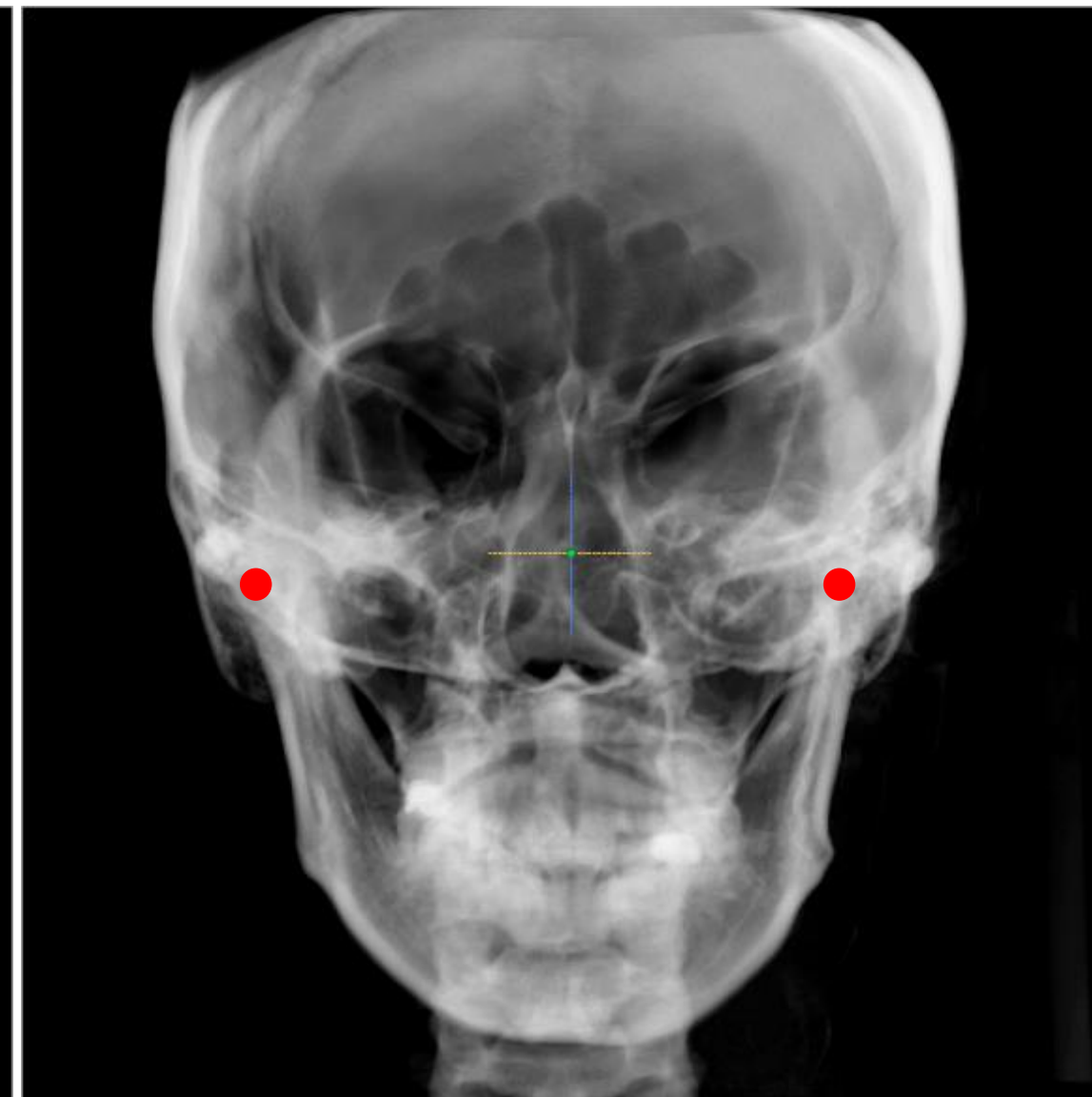
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Condyle Hinge Axis Medial Pole

Hinge Axis of the Condyle

The horizontal axis where the hinge movement occurs

In this manual, the hinge axis of the condyle is processed based on the medial pole



5.1 Digital Face bow Digital Mounting



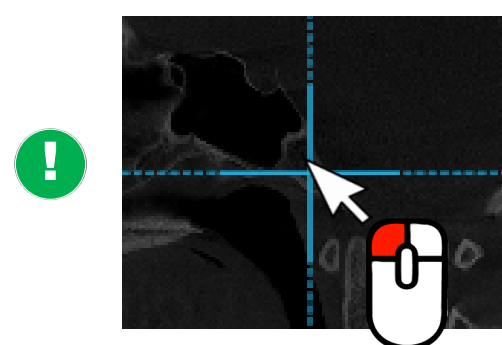
Digital Face bow

You can create Digital Face bow by utilizing the position of the condyle and maxilla model (STL) of CBCT

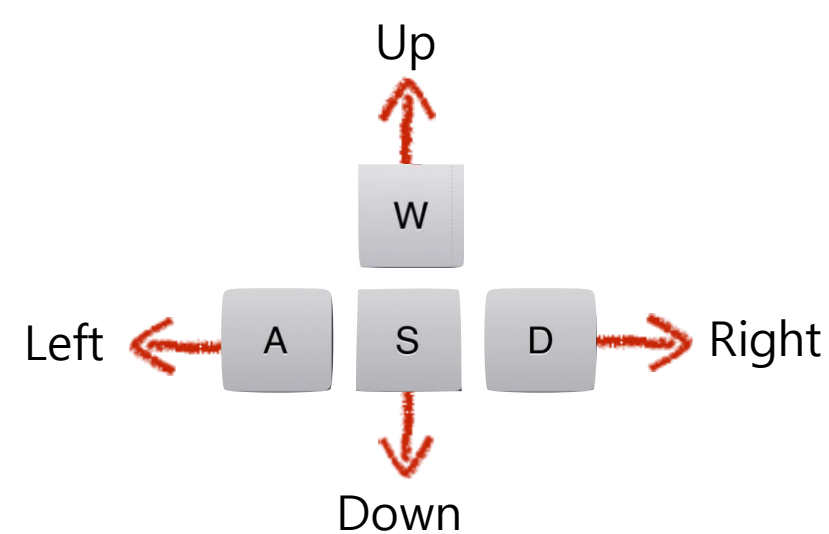
You can transfer this information to the analogue articulator to complete mounting without the face bow

Set Reference Point for Digital Face bow(Hinge Axis)

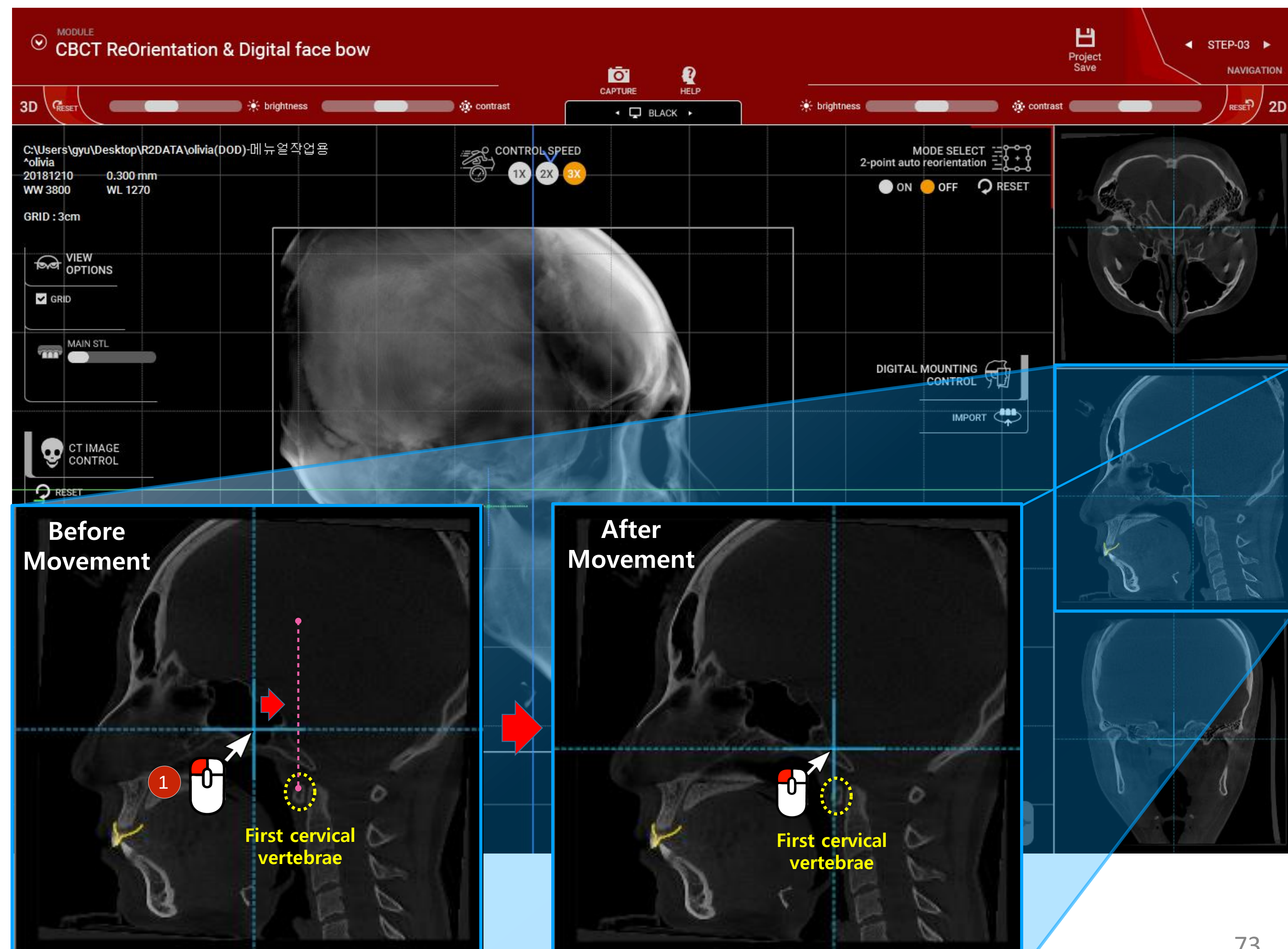
- 1 To find the position of the condyle, move the cross line from the sagittal view and place it on the upper part of the **first cervical vertebrae**



"Drag the **center** of the cross line to move"



"It is easier to move with the keyboard"



5.1 Digital Face bow Digital Mounting



CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



Face Guide

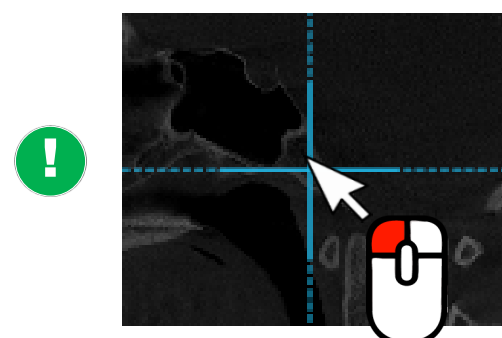
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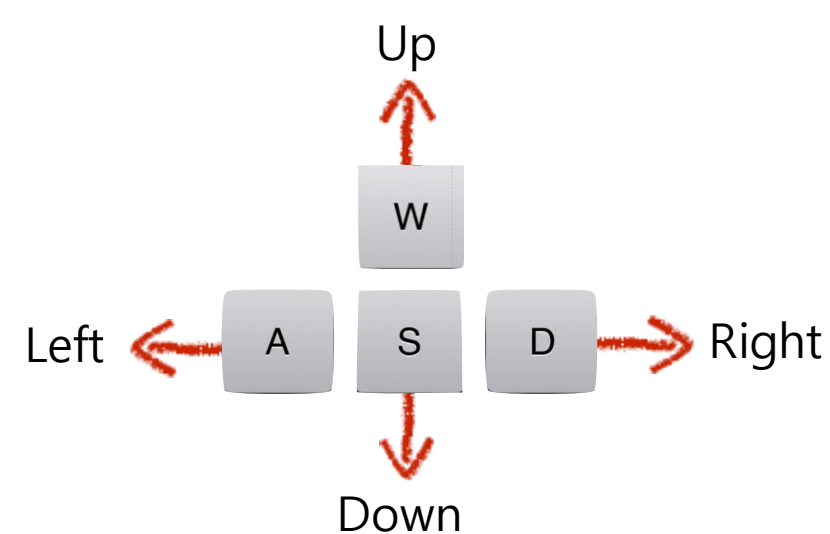
Digital Face bow

Set Reference Point for Digital Face bow(Hinge Axis)

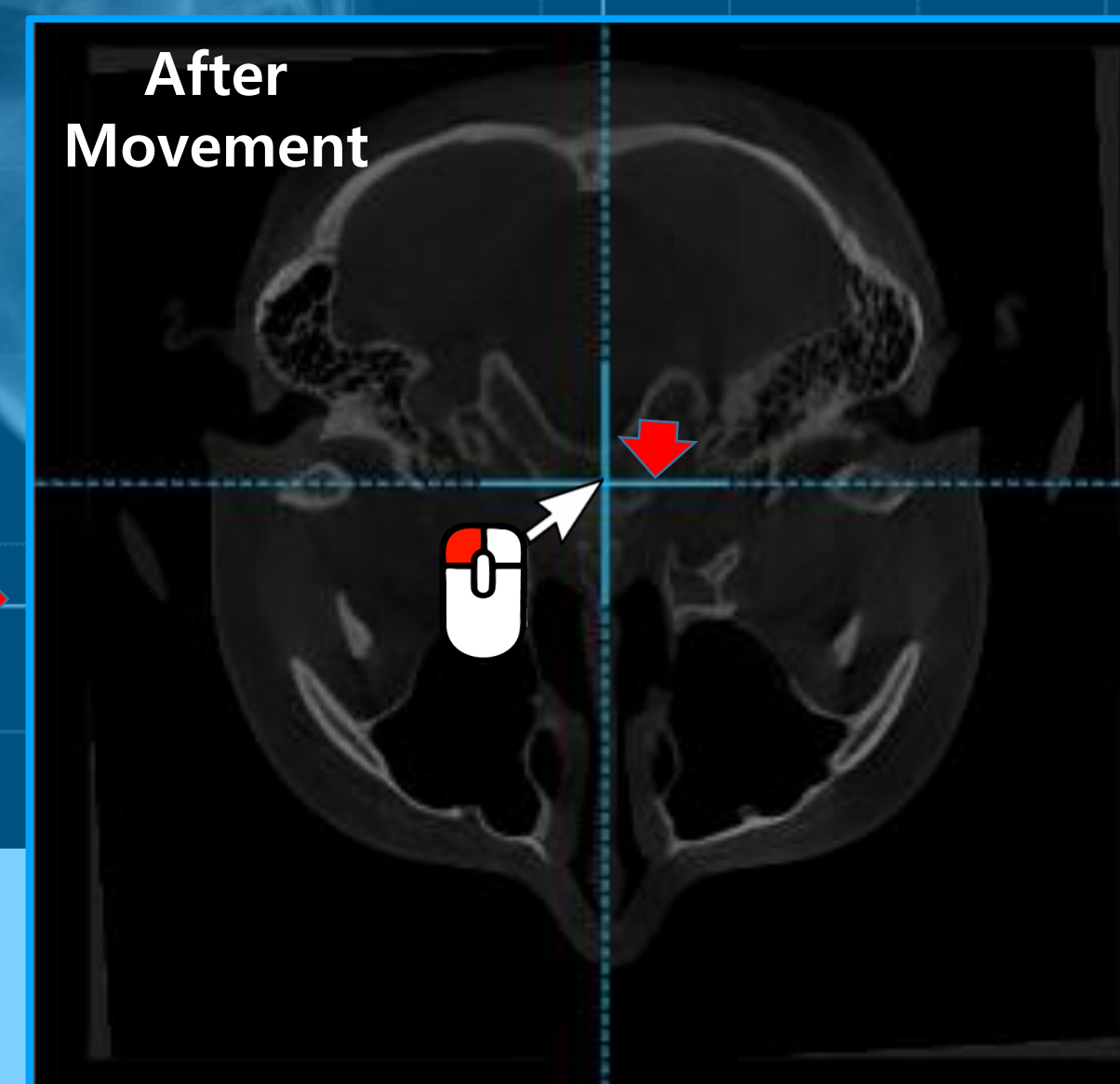
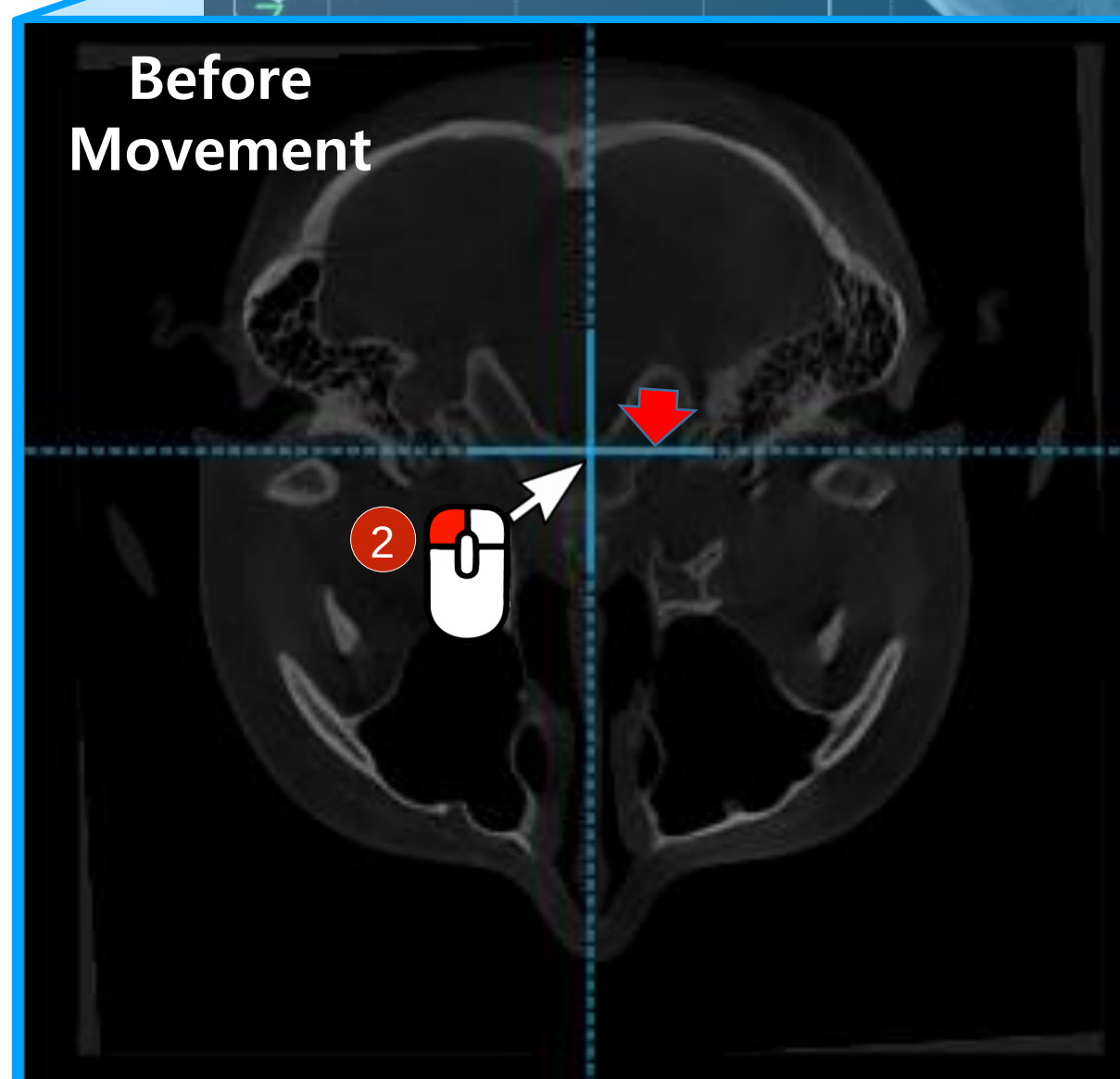
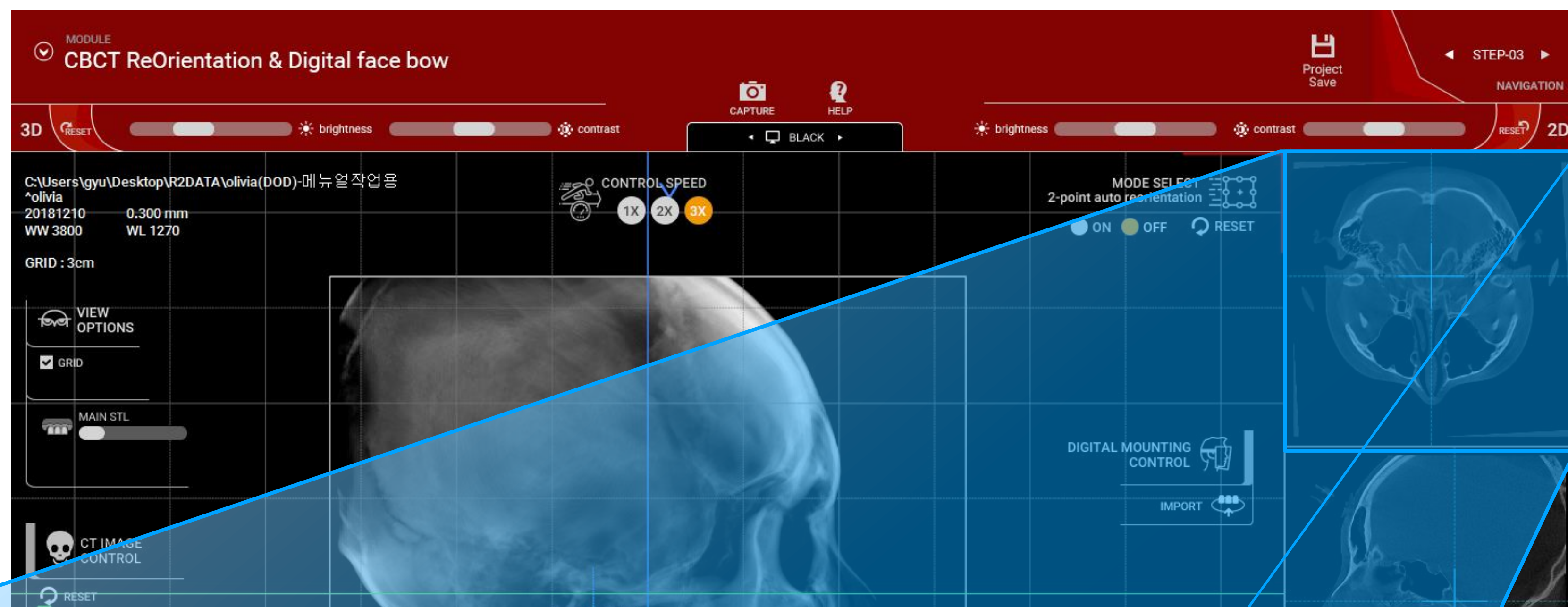
- Place the cross line on the center of the medial pole of the condyle in the axial view



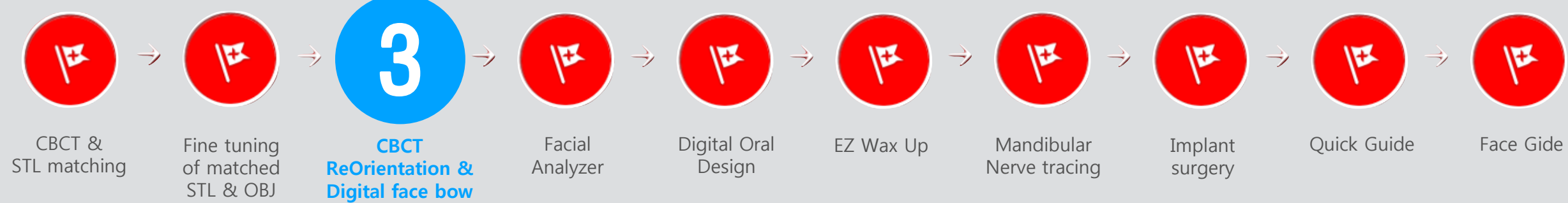
"Drag the **center** of the cross line to move"



"It is easier to move with the keyboard"



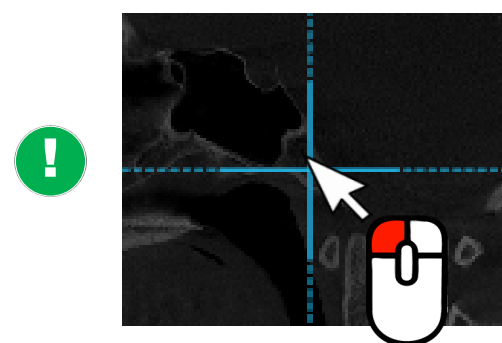
5.1 Digital Face bow Digital Mounting



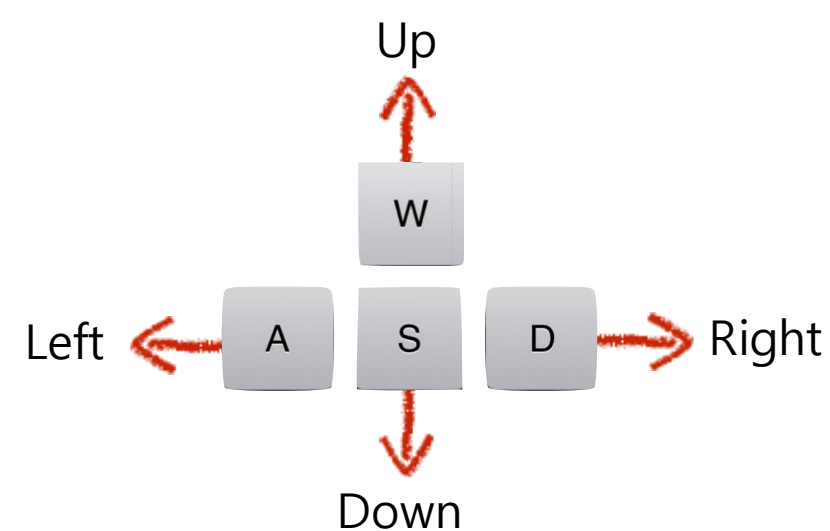
Digital Face bow

Set Reference Point for Digital Face bow(Hinge Axis)

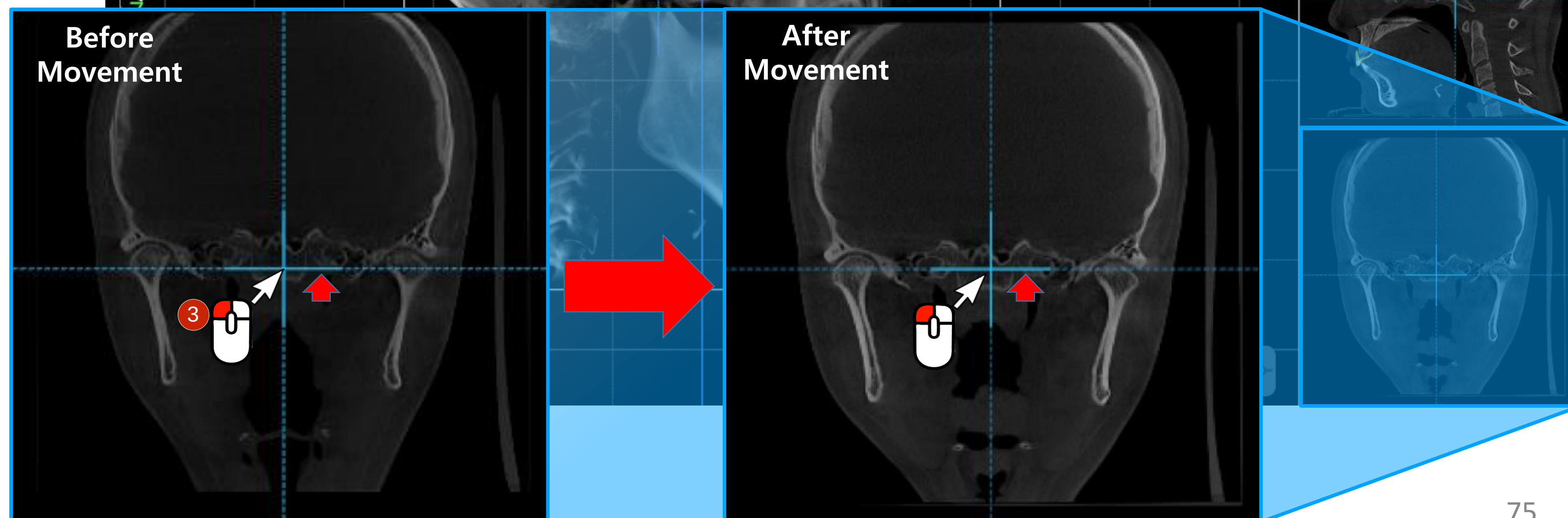
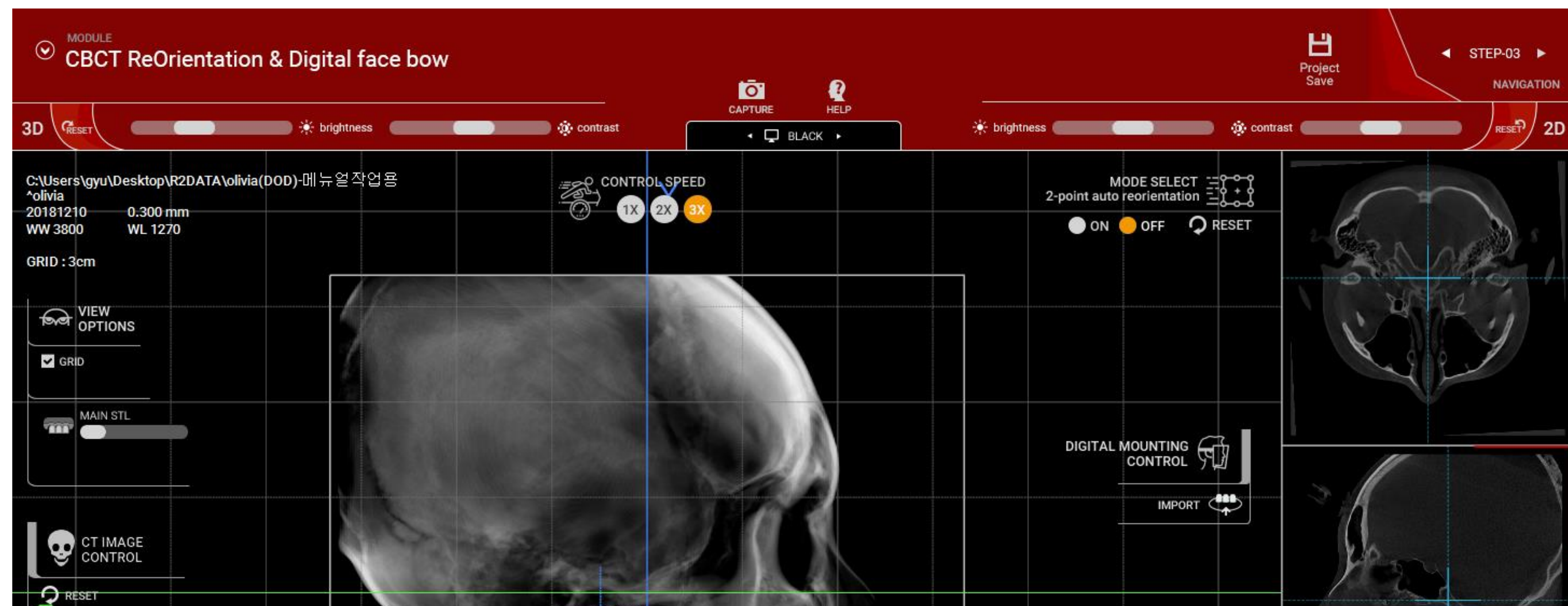
- Place the cross line on the center of the medial pole of the condyle in the coronal view



“Drag the **center** of the cross line to move”



“It is easier to move with the keyboard”



5.1 Digital Face bow Digital Mounting



CBCT &
STL matching



Fine tuning
of matched
STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
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Mandibular
Nerve tracing



Implant
surgery



Quick Guide



Face Gide

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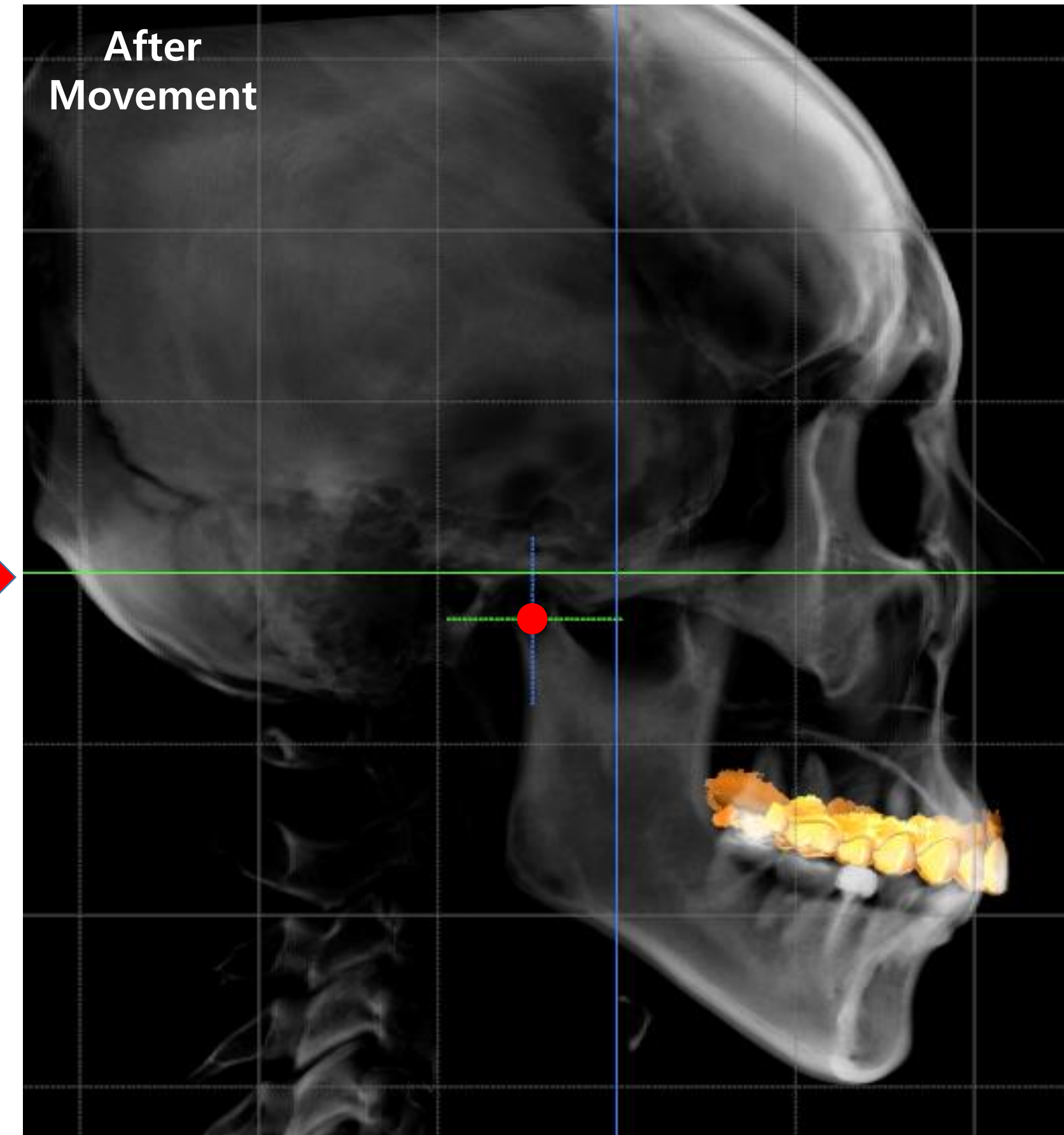
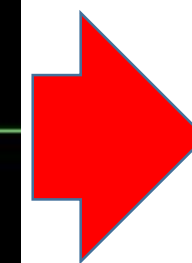
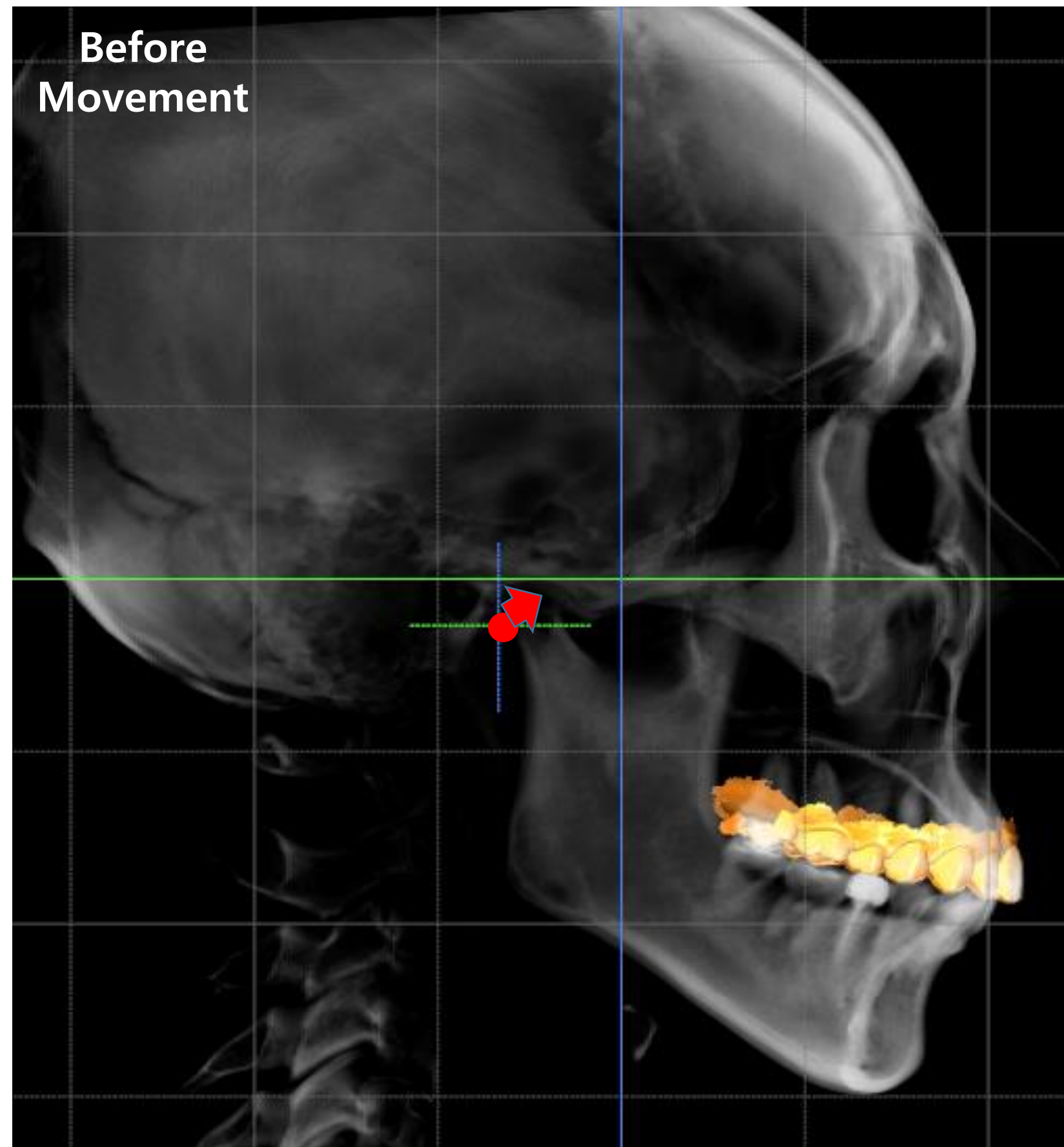
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Digital Face bow

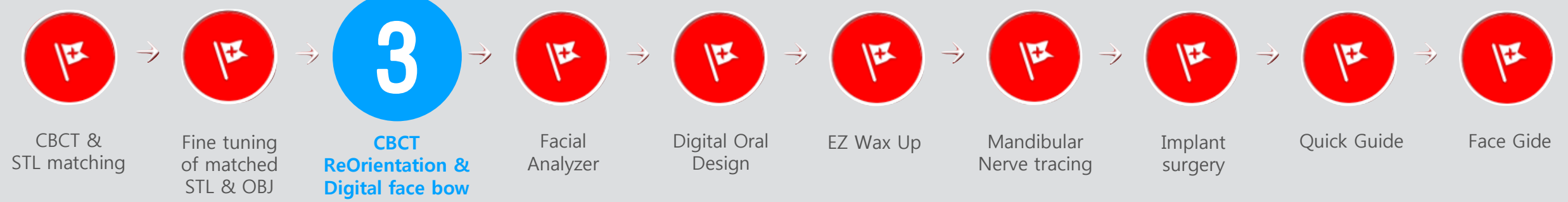
Set Reference Point for
Digital Face bow
(Hinge Axis)



Observe the transition in position of
the cross line in the Main CT screen



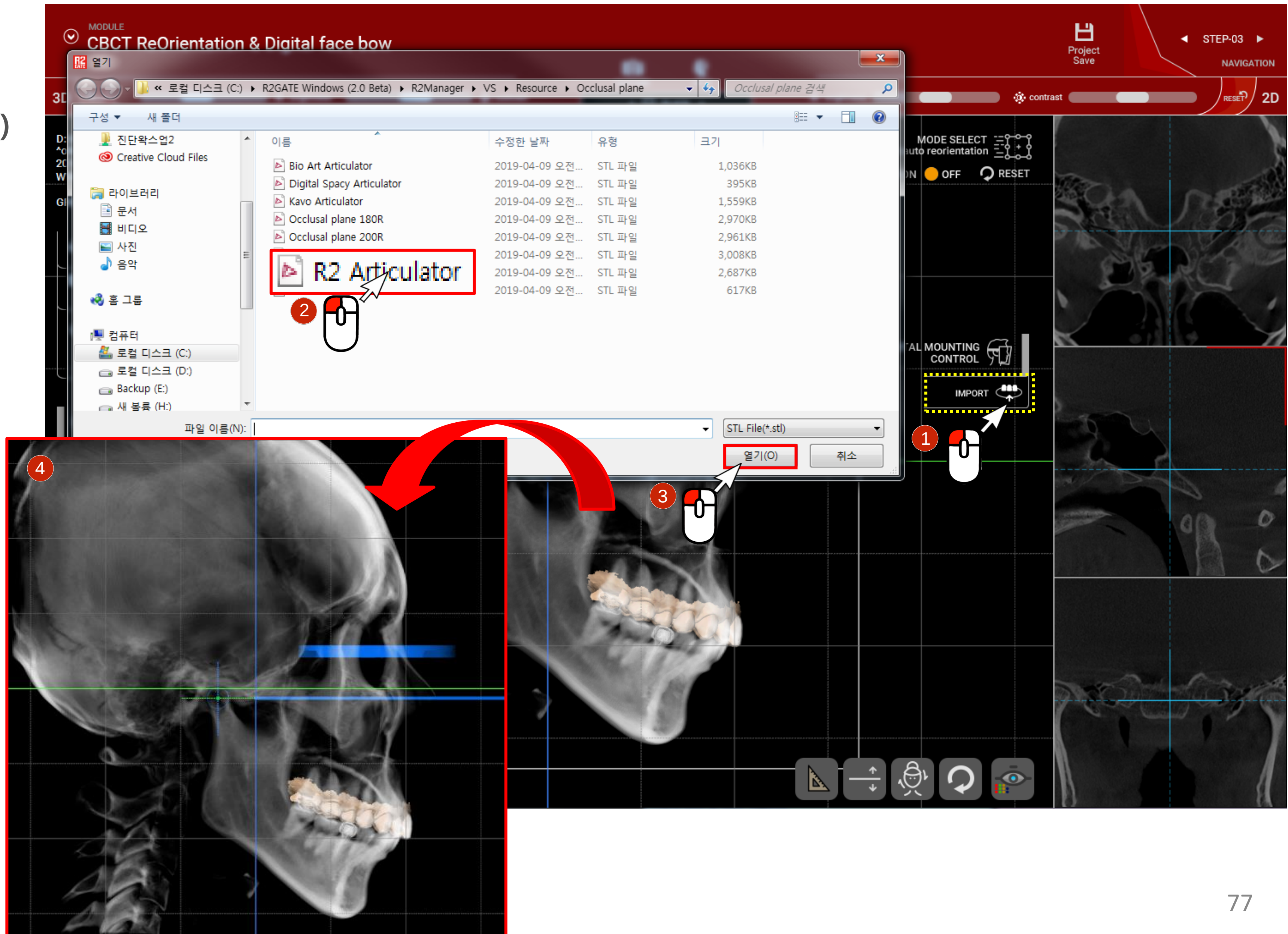
5.1 Digital Face bow Digital Mounting



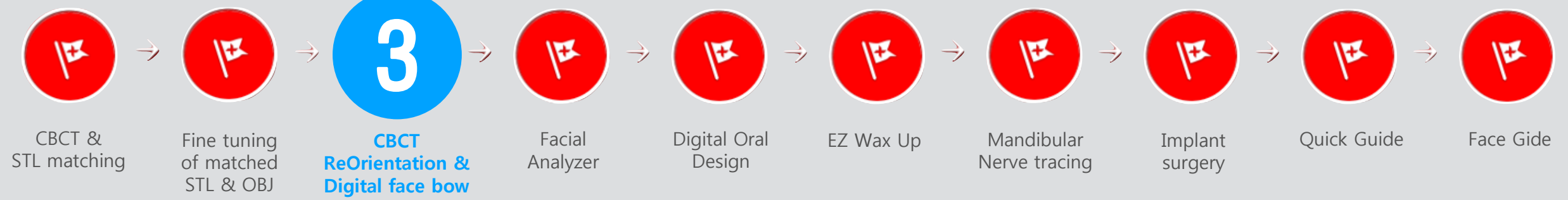
Digital Face bow

Import Articulator File(STL)

- 1 **IMPORT**  Click the icon
- 2 Select R2 Articulator(STL) as default
(Select Kavo Articulator for 3Shape)
- 3 Click **Open(O)** to import the file
- 4 The position of the articulator automatically fits on the position of the set medial pole



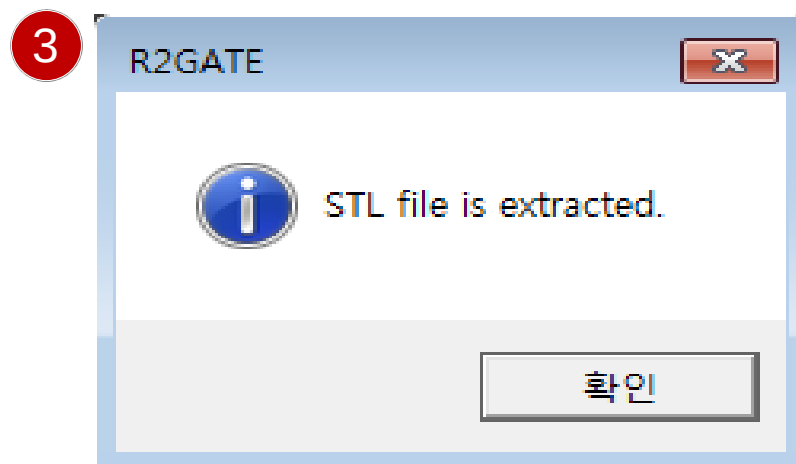
5.1 Digital Face bow Digital Mounting



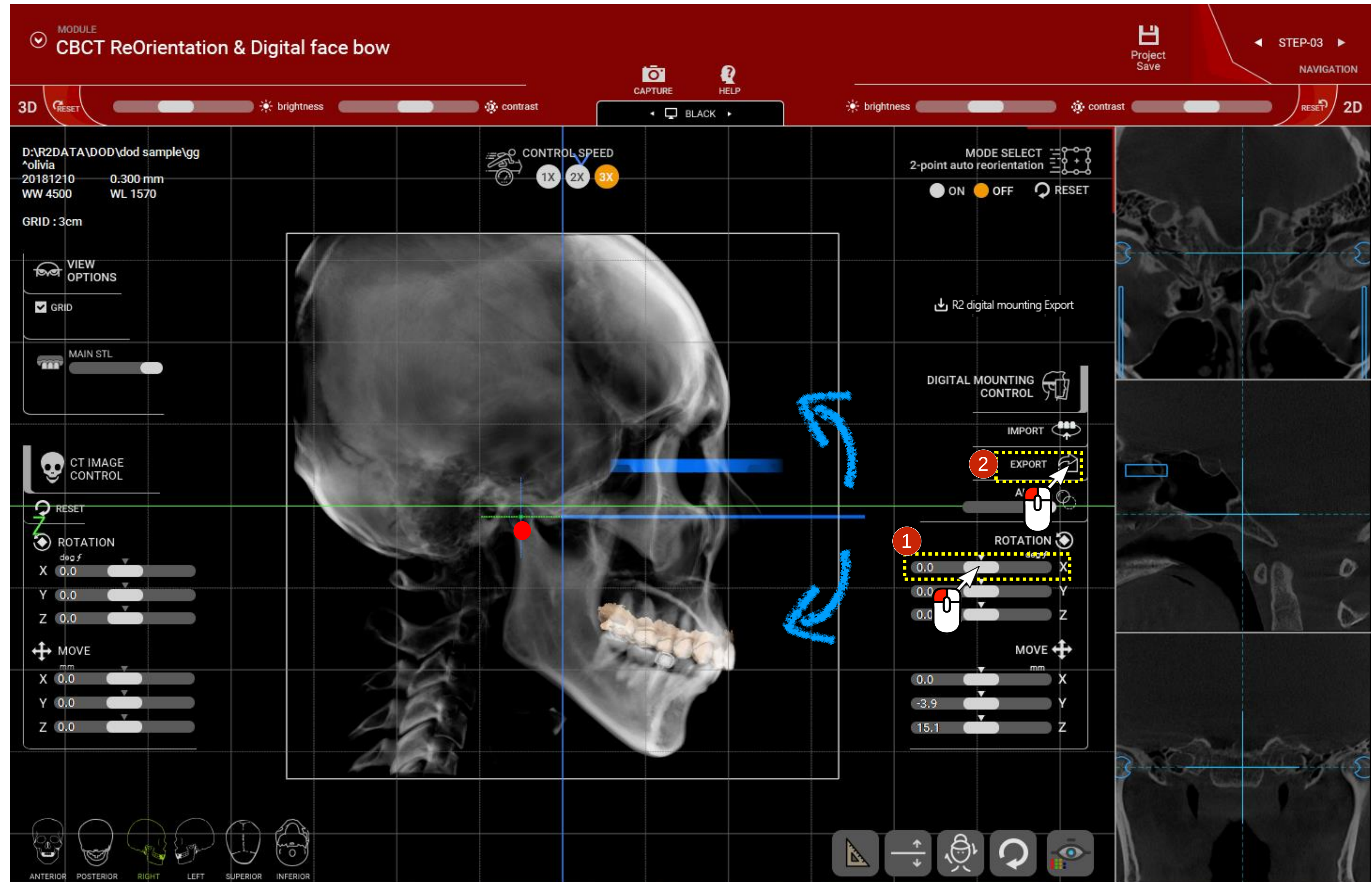
Digital Face bow

Set Reference Plane of the Digital Articulator (X-axis Rotation)

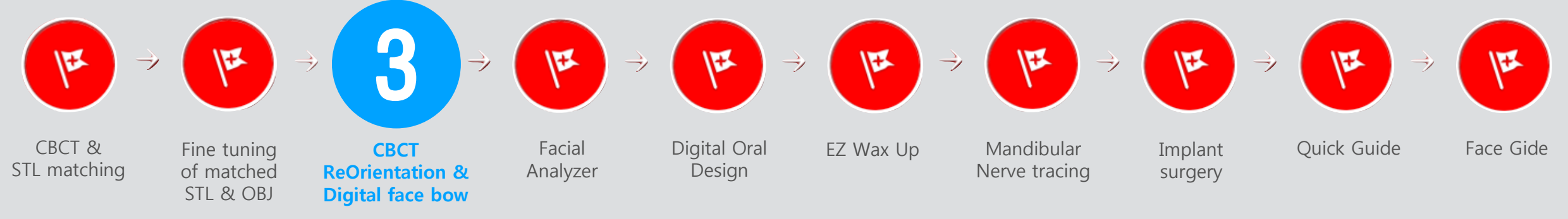
- 1 Set the reference plane of occlusion using X-axis of Rotation
 - FH Plane
 - Camper Plane
 - Axis-Orbitale Plane
- 2 When setting is complete for the adjustment of the condyle position and the reference plane of occlusion, extract the articulator STL file



Converted articulator file will be saved to patient's folder when the pop-up window appears



5.2 Digital Face bow OP finder

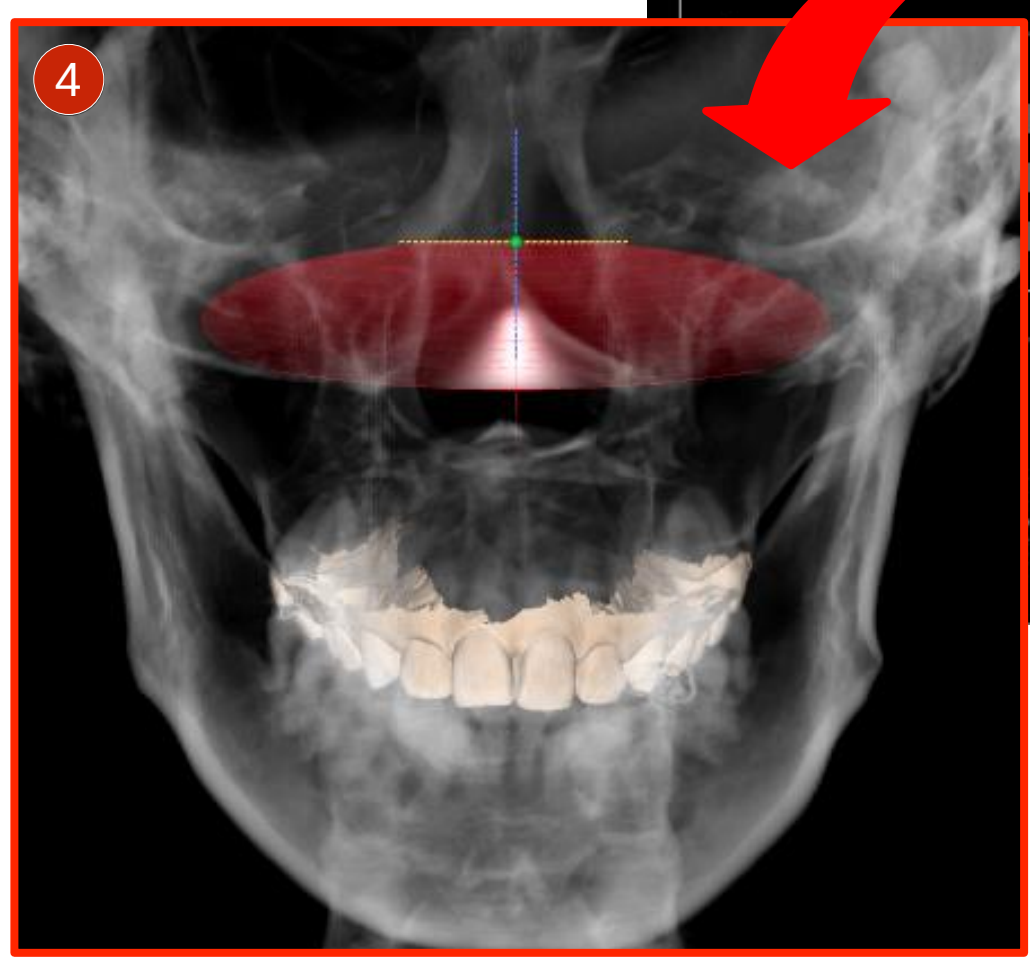
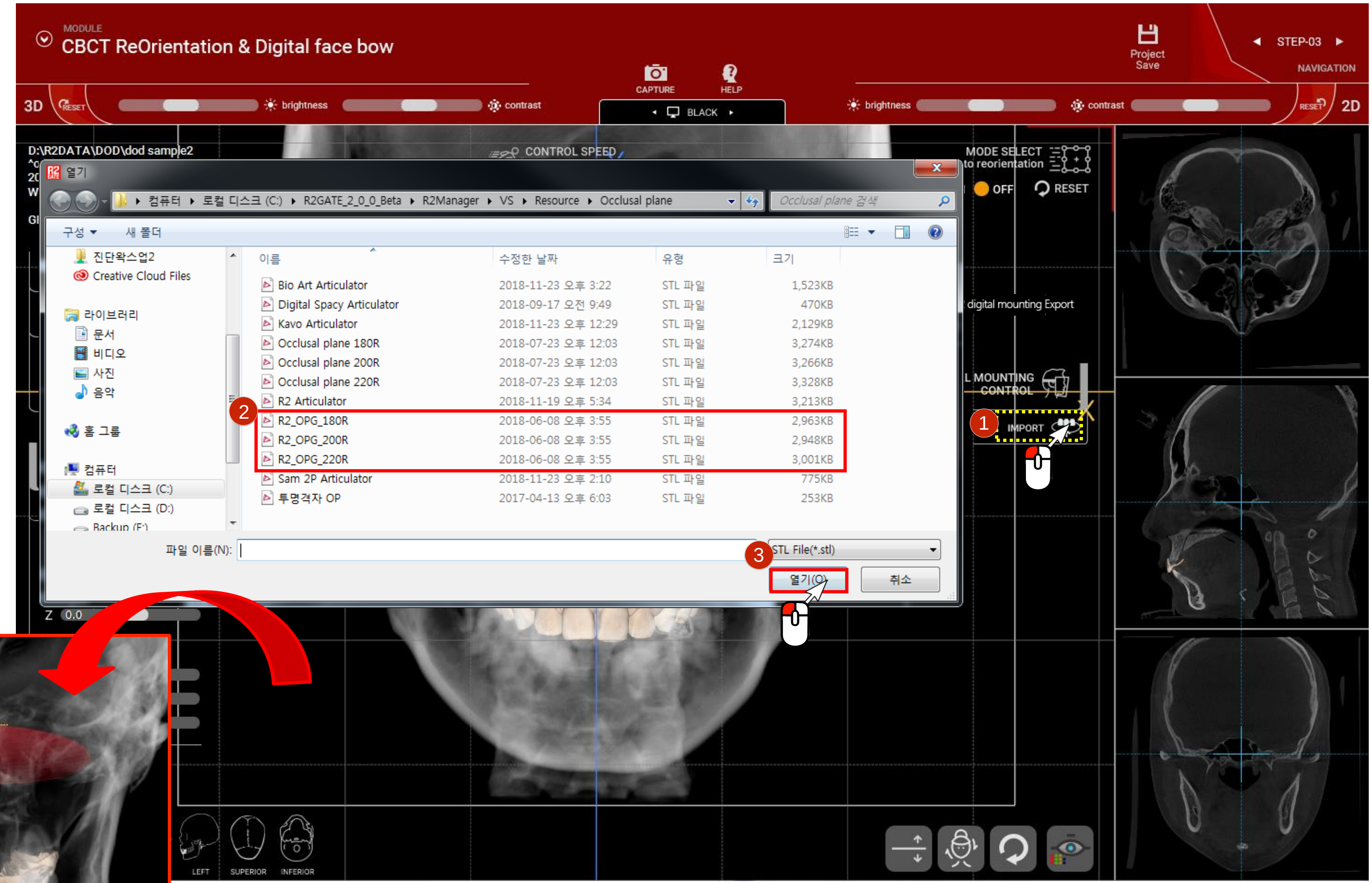


OP finder

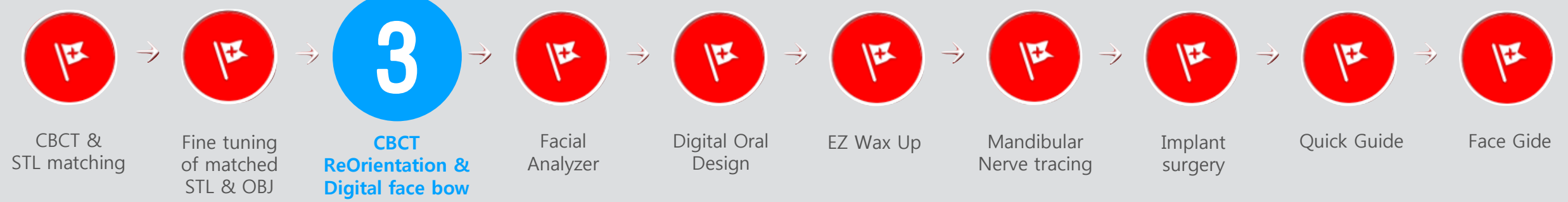
Occlusal Plane Setting

Set occlusal plane using OP finder

- 1  Click the icon
- 2 Select OP finder that fits the size of patient's arch
 - OPG_180R : For females with small arch
 - OPG_200R : For normal females
 - OPG_220R : For normal males
- 3 Click Open(O) to import files
- 4 OP finder imported



5.2 Digital Face bow OP finder



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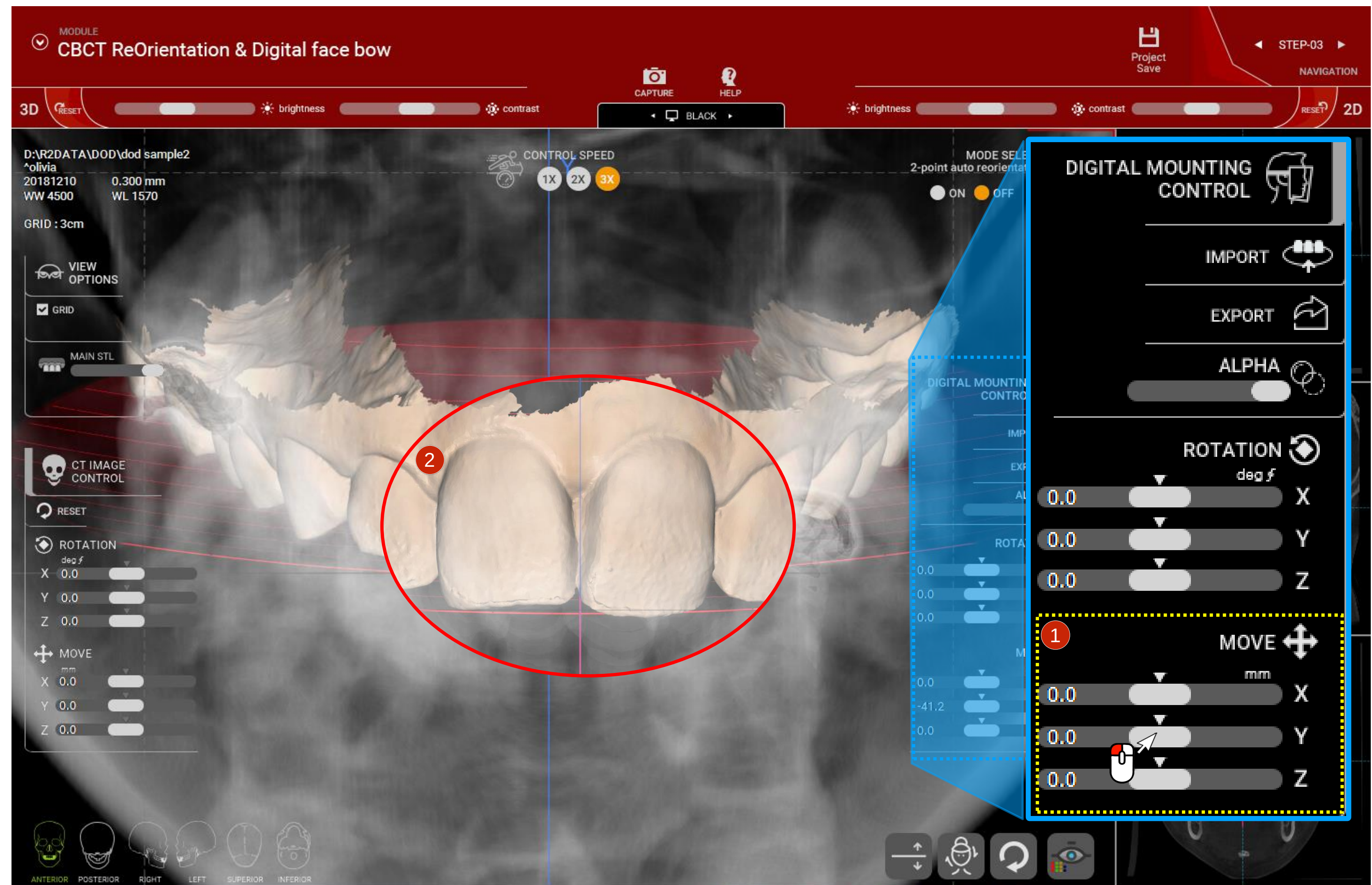
Digital Oral Design
Mar. 2019

OP finder

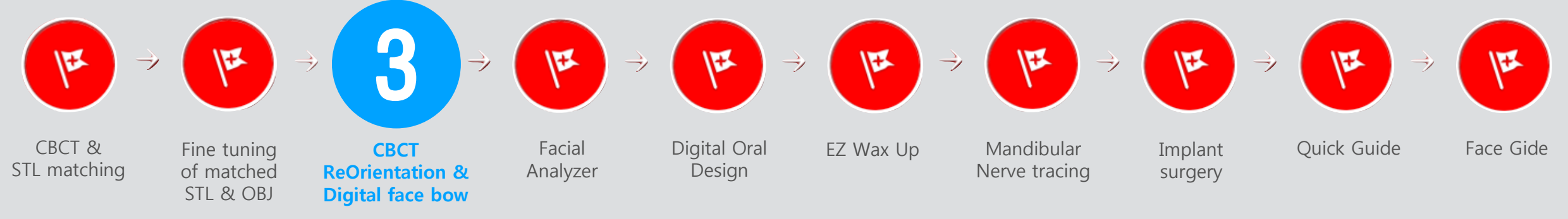
Occlusal Plane Setting

Set occlusal plane using OP finder

- 1 Use **R2 Digital mounting control** to adjust the end of the plane of OP finder to the desired end point of the central incisors
Do not move Rotation if possible
- 2 Check the position in 3D view



5.2 Digital Face bow OP finder

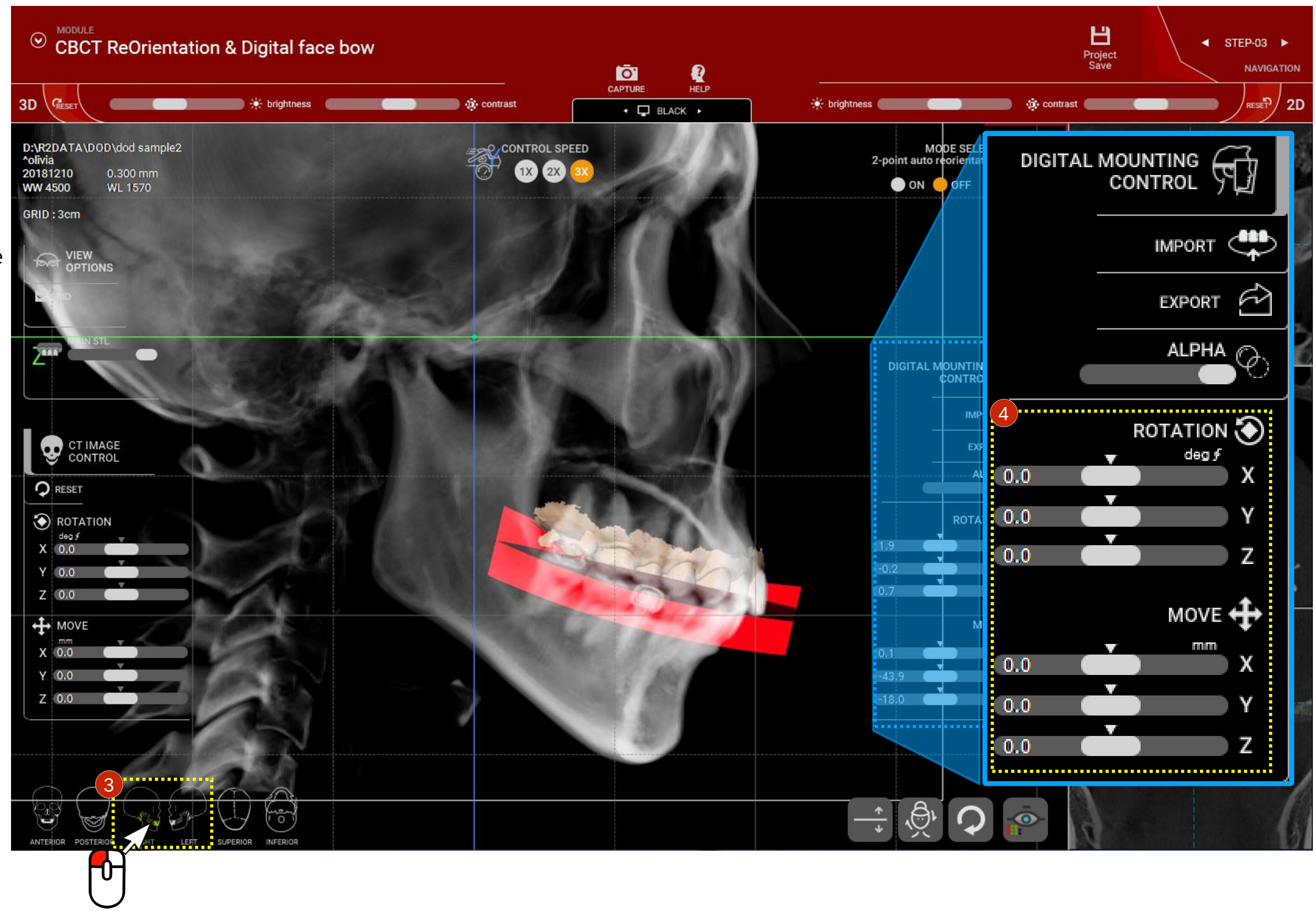


OP finder

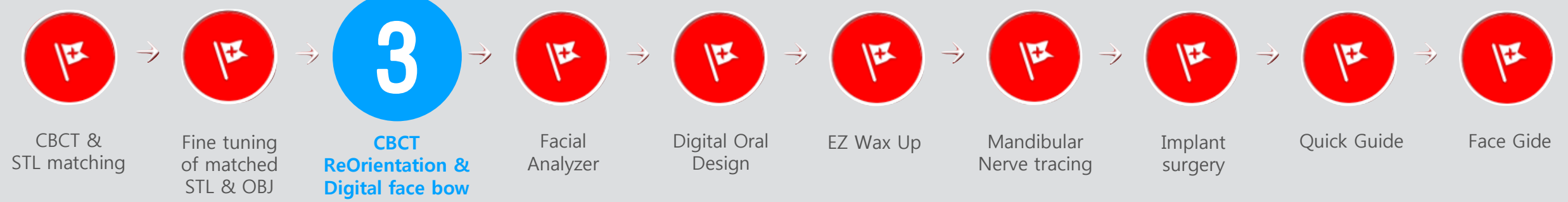
Occlusal Plane Setting

Set occlusal plane using OP finder

- Click **Right** or **Left** icon to adjust the angle of occlusal plane in the sagittal view
- Use **R2 Digital mounting control** to adjust the position of the OP finder according to the user's standard
- Place the occlusal plane almost to the center of the mandible



5.2 Digital Face bow OP finder



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Digital Oral Design
Mar. 2019

OP finder

Occlusal Plane Setting

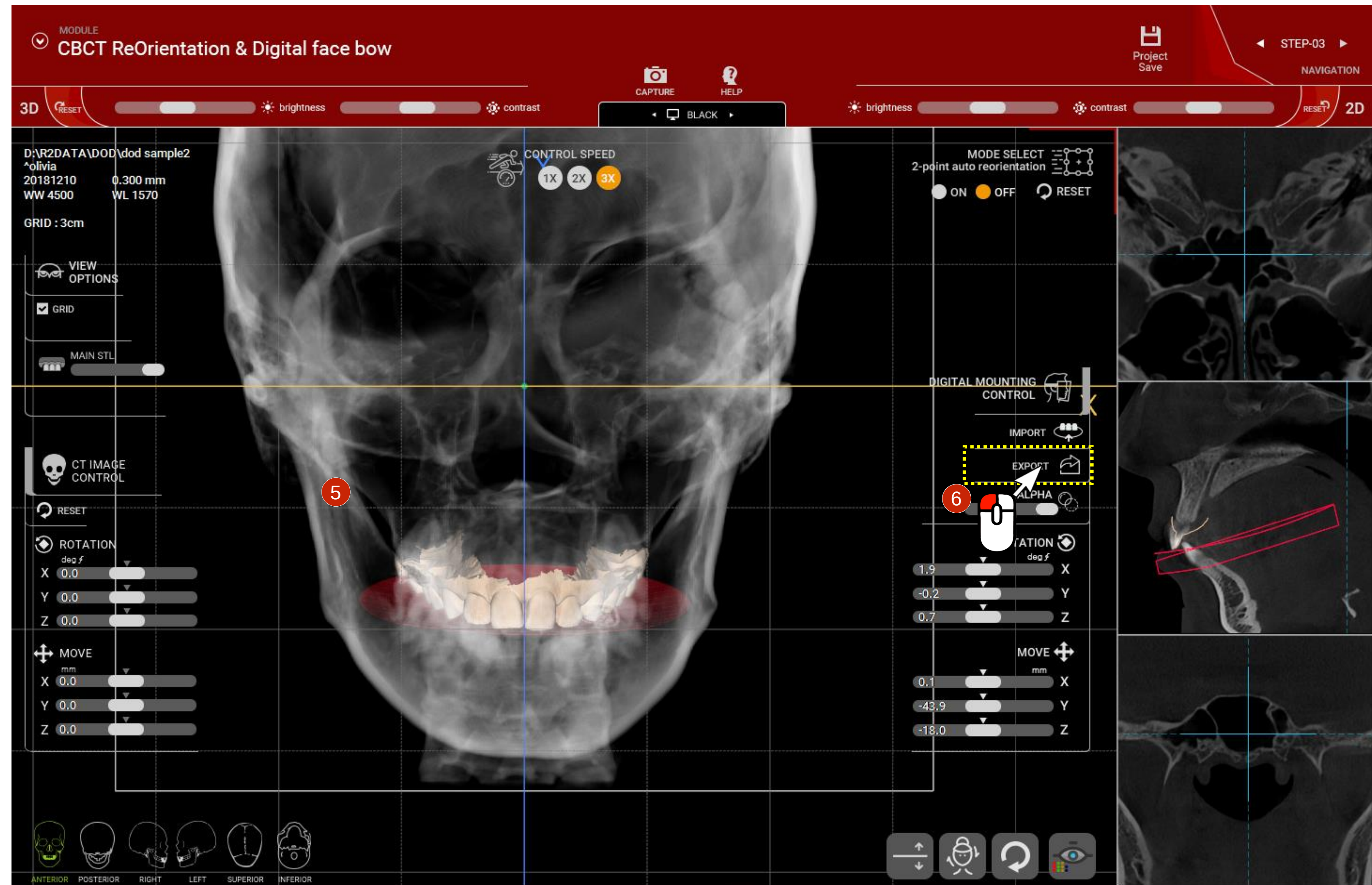
Set occlusal plane using OP finder

5 Check the position of set OP finder

6 **EXPORT**

Click the icon to export the OP finder to the position you set

! It can be utilized in CAD along with the extracted articulator file.



5.3 Digital Face bow Benefit

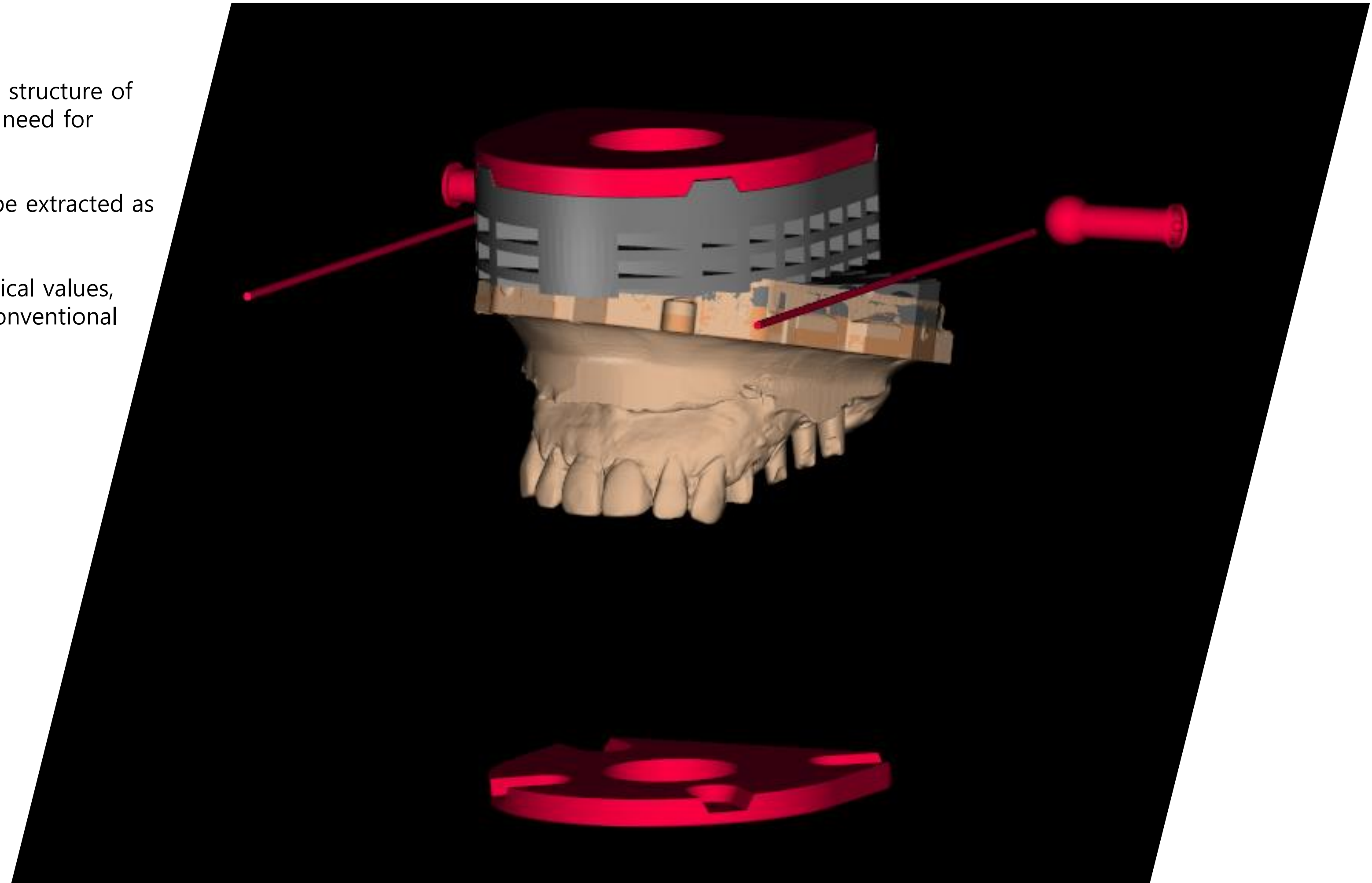


Benefit

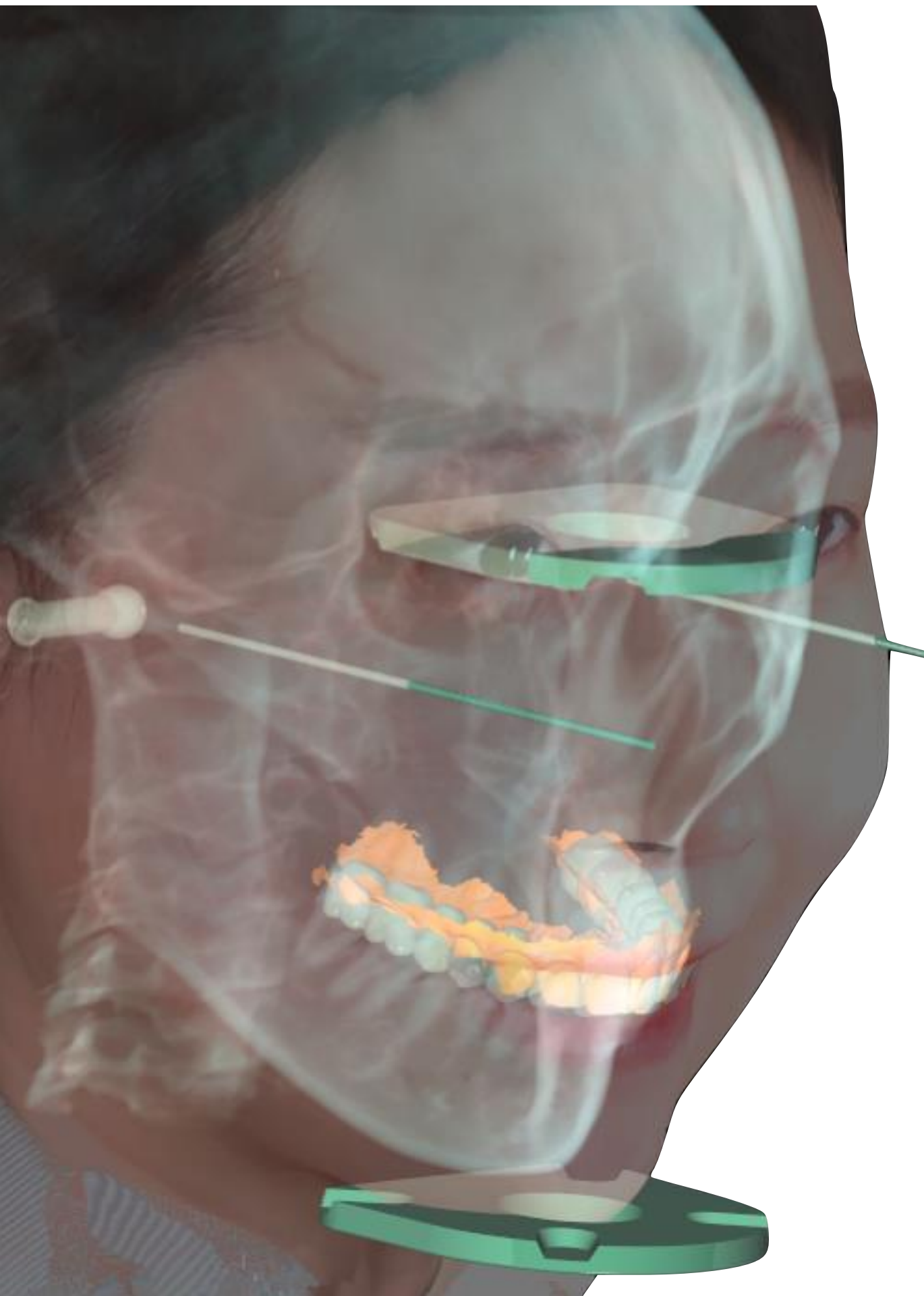
The Digital Articulator can digitally reconstruct the oral structure of the patients and can be digitally mounted without the need for actual mounting.

The digital articulators that are digitally mounted can be extracted as an STL file and imported into another CAD programs.

Since the errors can be measured with accurate numerical values, the errors are significantly reduced compared to the conventional analog method.



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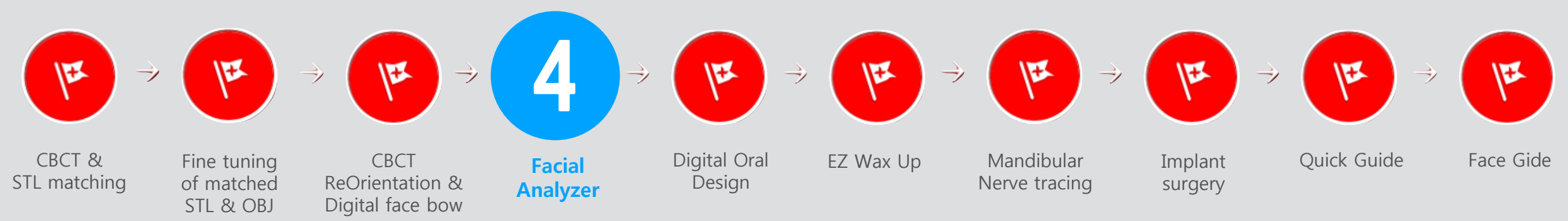


6 Digital Oral Design Facial Analyzer

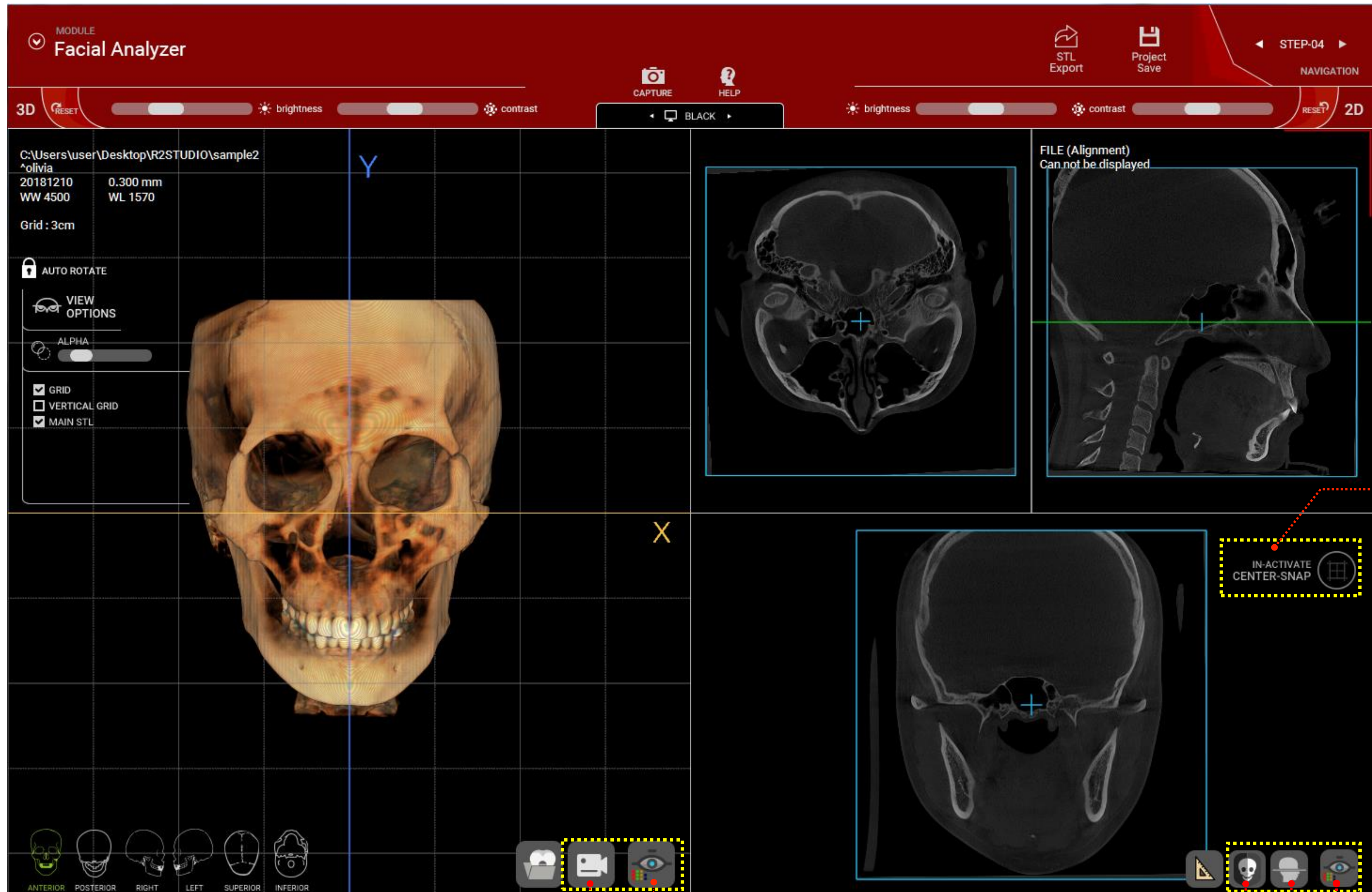


Facial Analyzer(EN)

6.1 R2GATE™ DOD Control Buttons



Control Buttons



Adjustment of X,Y-axis midline

CBCT filter adjustment

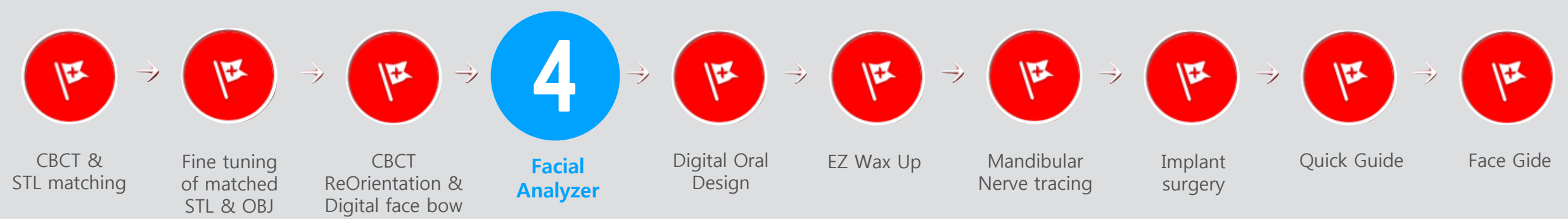
Convert CBCT to STL format

Facial Analyzer icon
Display in 2D & 3D view

CBCT filter adjustment

Activate cross-section function of CBCT

6.2 R2GATE™ DOD Facial Analyzer

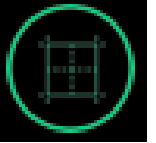


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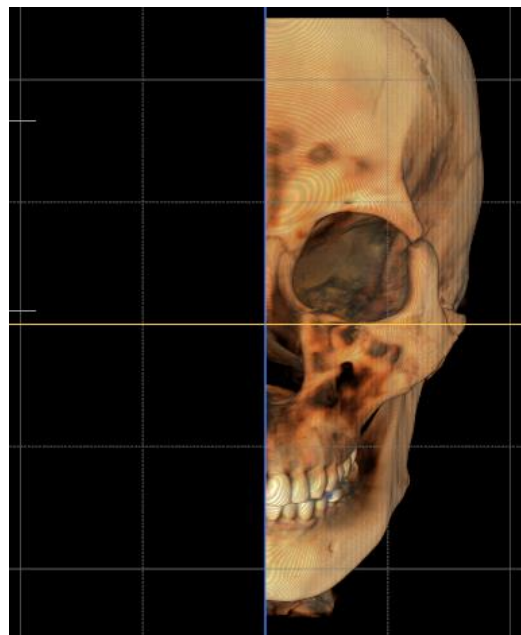
R2GATE Facial Analyzer

Facial Analysis

1  Activate reference line of cross-section of CBCT by clicking the icon

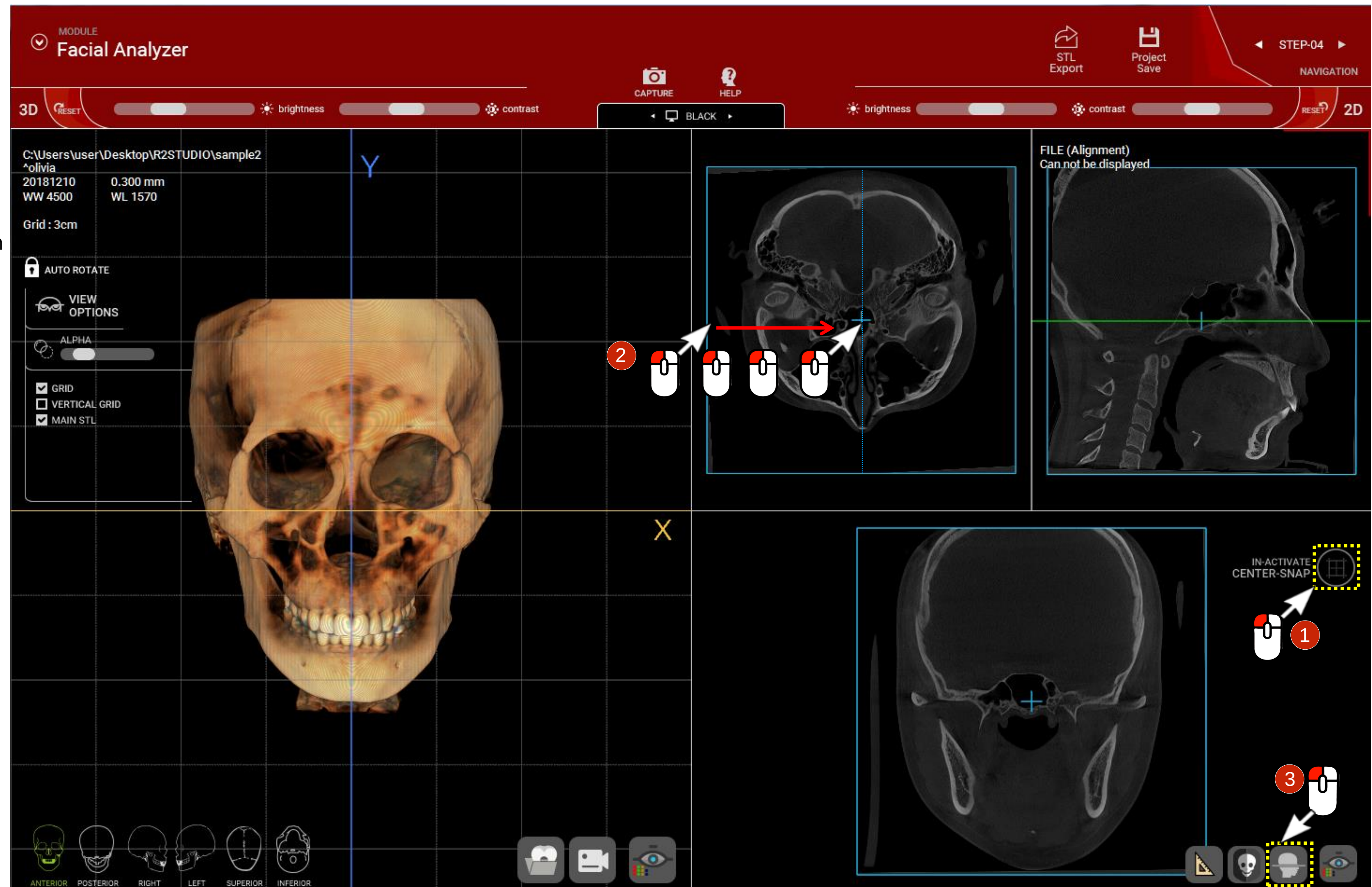
2 Left click & drag the blue line and align it to the center of the horizontal plane

! Drag the blue line towards the mid sagittal line and it automatically aligns to the line

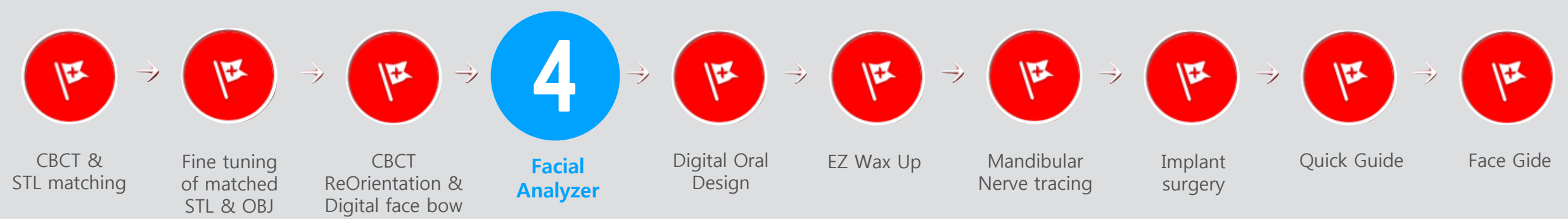


After step 2, the skull image will be cut in half

3  Click Facial Analysis icon



6.2 R2GATE™ DOD Facial Analyzer



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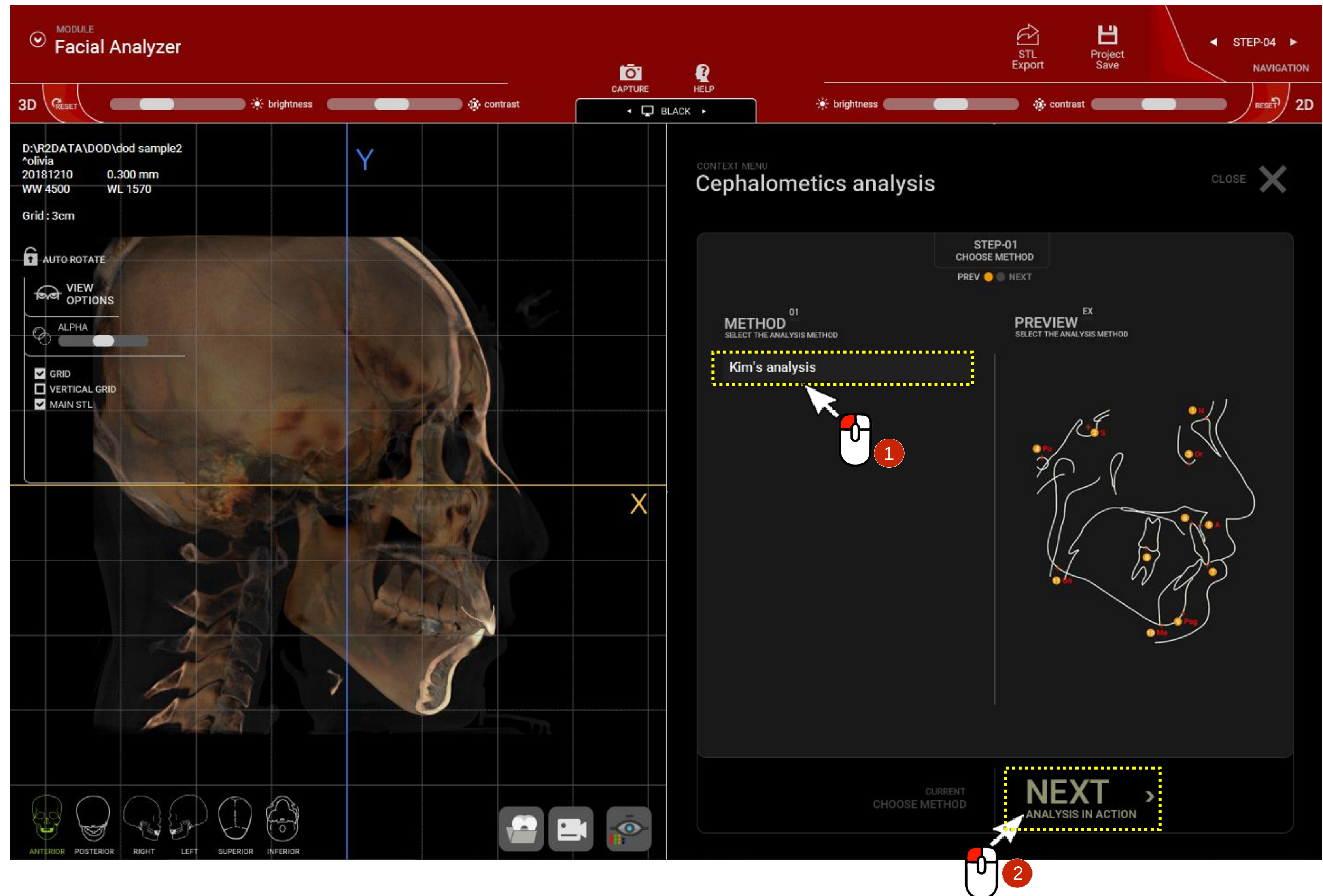
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R2GATE Facial Analyzer

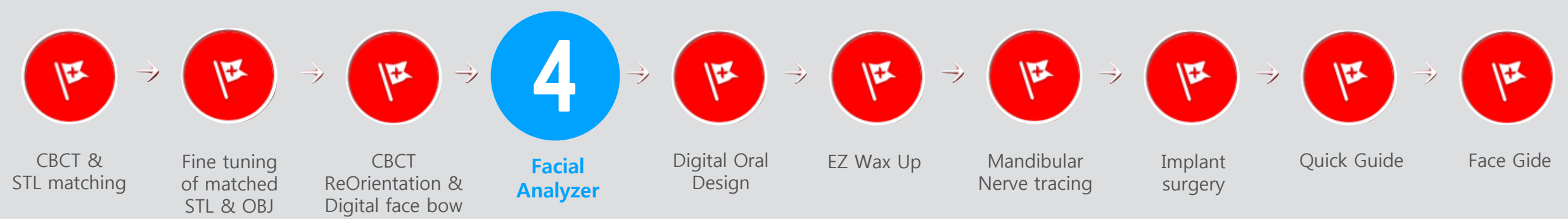
Facial Analysis

- 1 Select Facial Pattern Analysis method
- ! Send any desired Facial analysis method and information to R2 service team to add in the Analysis list
- 2 Select Analysis list and click **NEXT**

R2 service team
service@r2gate.com



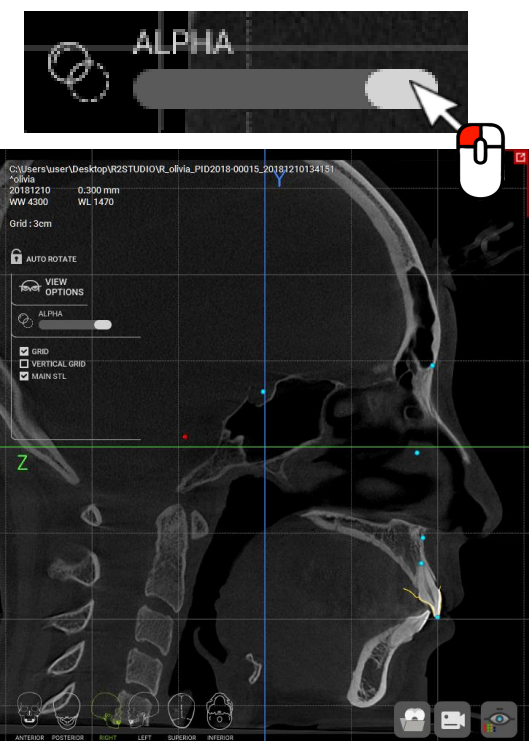
6.2 R2GATE™ DOD Control Buttons



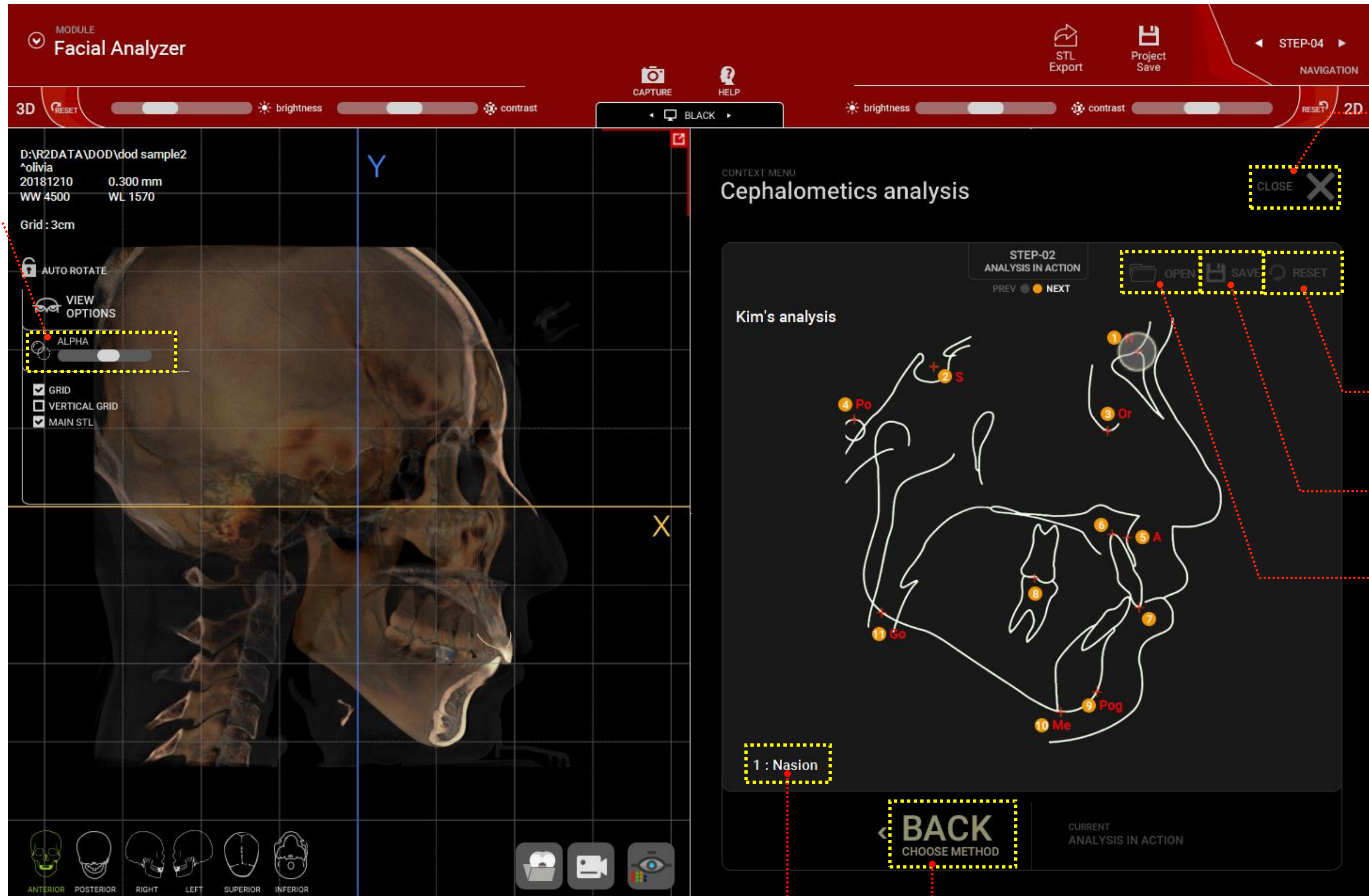
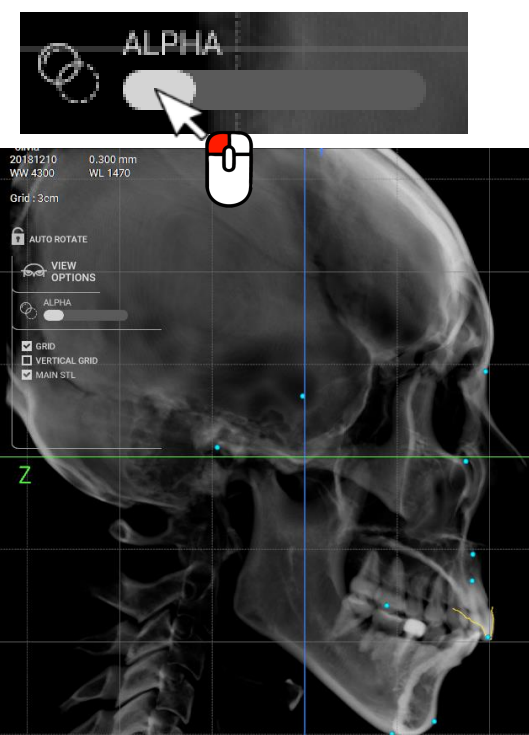
Control Buttons

Adjust the transparency of CBCT
To choose 2D & 3D view

2D view



3D view



Close Facial
Analyzer, Return
to previous step

Import saved
analysis file

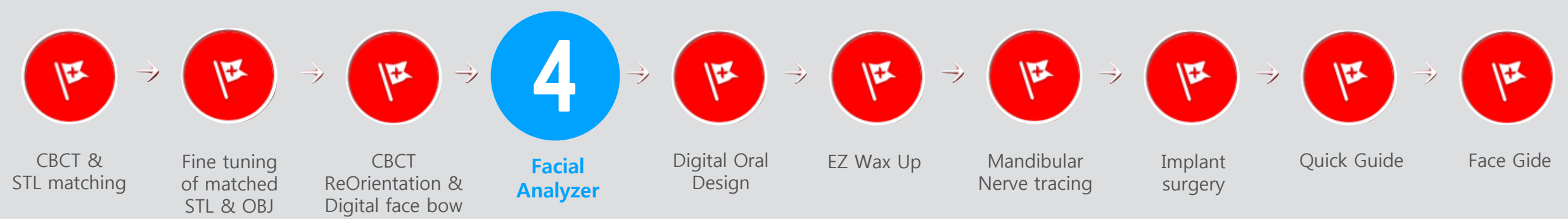
Save analysis file

Reset the
Pattern Analysis

Name of each points

Return to select Analysis method

6.2 R2GATE™ DOD Facial Analyzer



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R2GATE Facial Analyzer

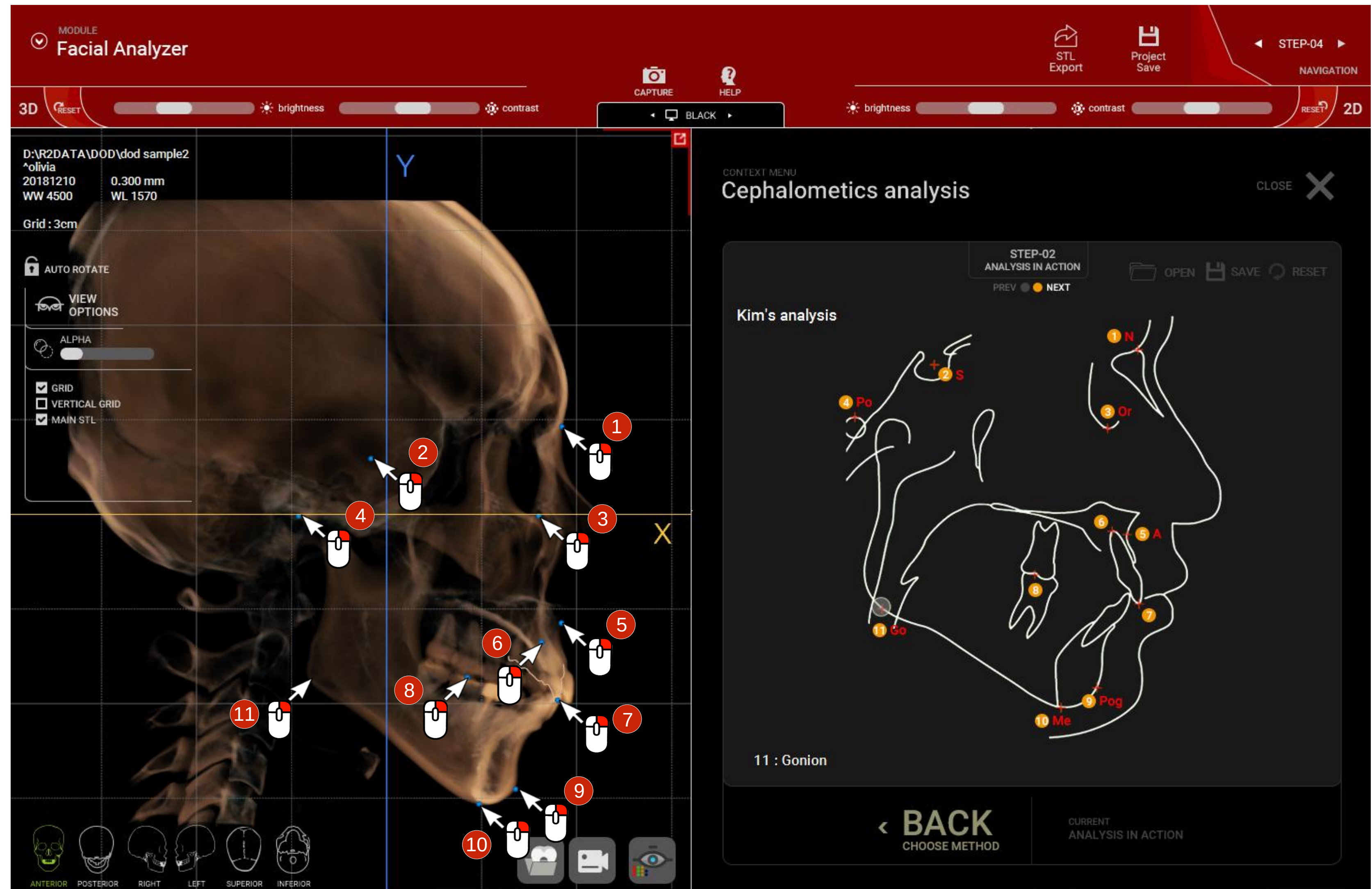
Marking Analysis points

For Facial Pattern Analysis, mark each points in order shown on the guide screen on the right

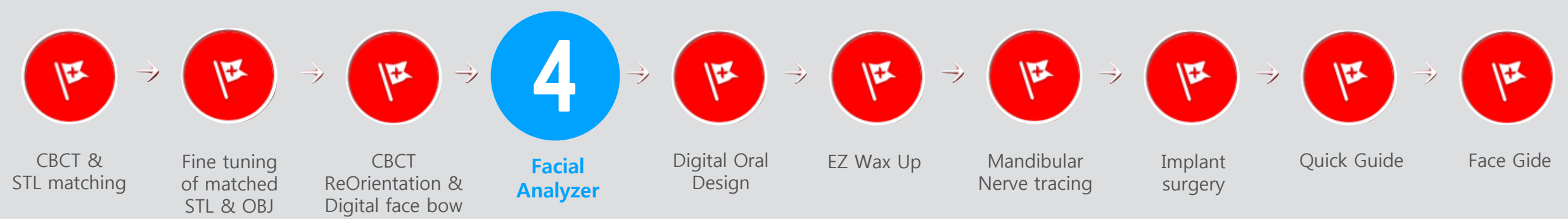
- 1 Nasion [2D view]
- 2 Sella. [2D view]
- 3 Orbitale [3D view]
- 4 Porion [3D view]
- 5 Subspinale [2D view]
- 6 Upper incisor root apex [2D view]
- 7 Upper incisal incision(edge) [2D view]
- 8 Posterior point of occlusion [3D view]
- 9 Pogonion [3D view]
- 10 Menton [3D view]
- 11 Gonion [3D view]

Points addition will be disabled and automatic Facial Pattern Analysis will start when the **11th** point is marked

- ! Right click to mark the points
- ! Left click and drag to adjust the point positions



6.2 R2GATE™ DOD Facial Analyzer



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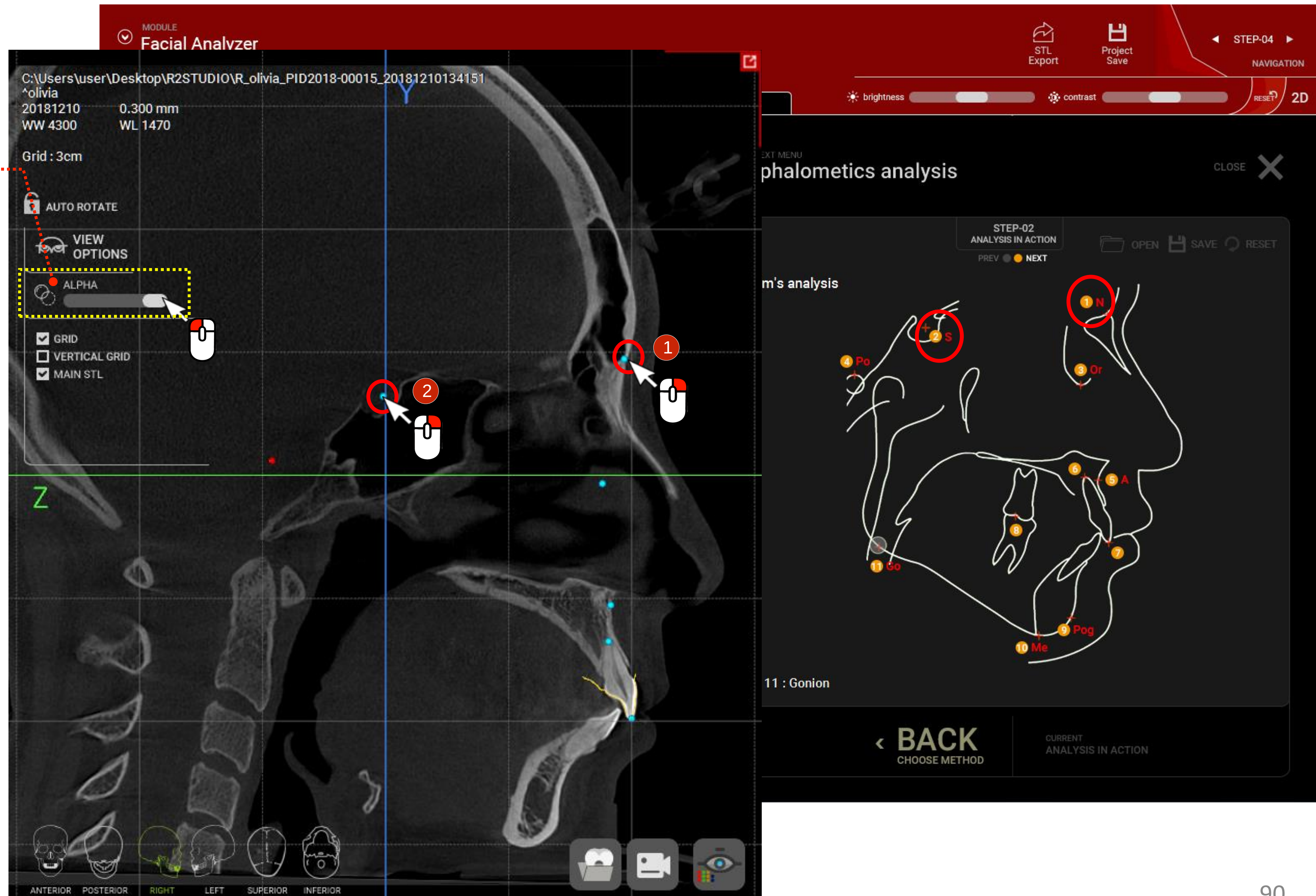
R2GATE Facial Analyzer

Points on the 2D view

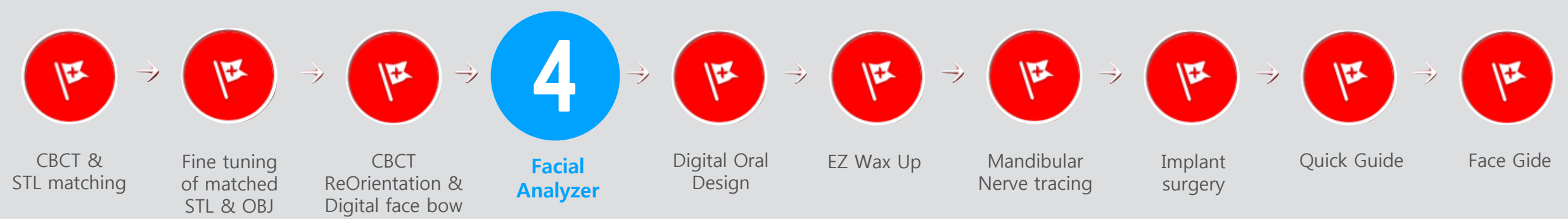
Adjust the transparency of CBCT by sliding the bar to the **right** to make **2D view**



- 1 Click the position of Nasion
- 2 Click the position of Sella



6.2 R2GATE™ DOD Facial Analyzer



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R2GATE Facial Analyzer

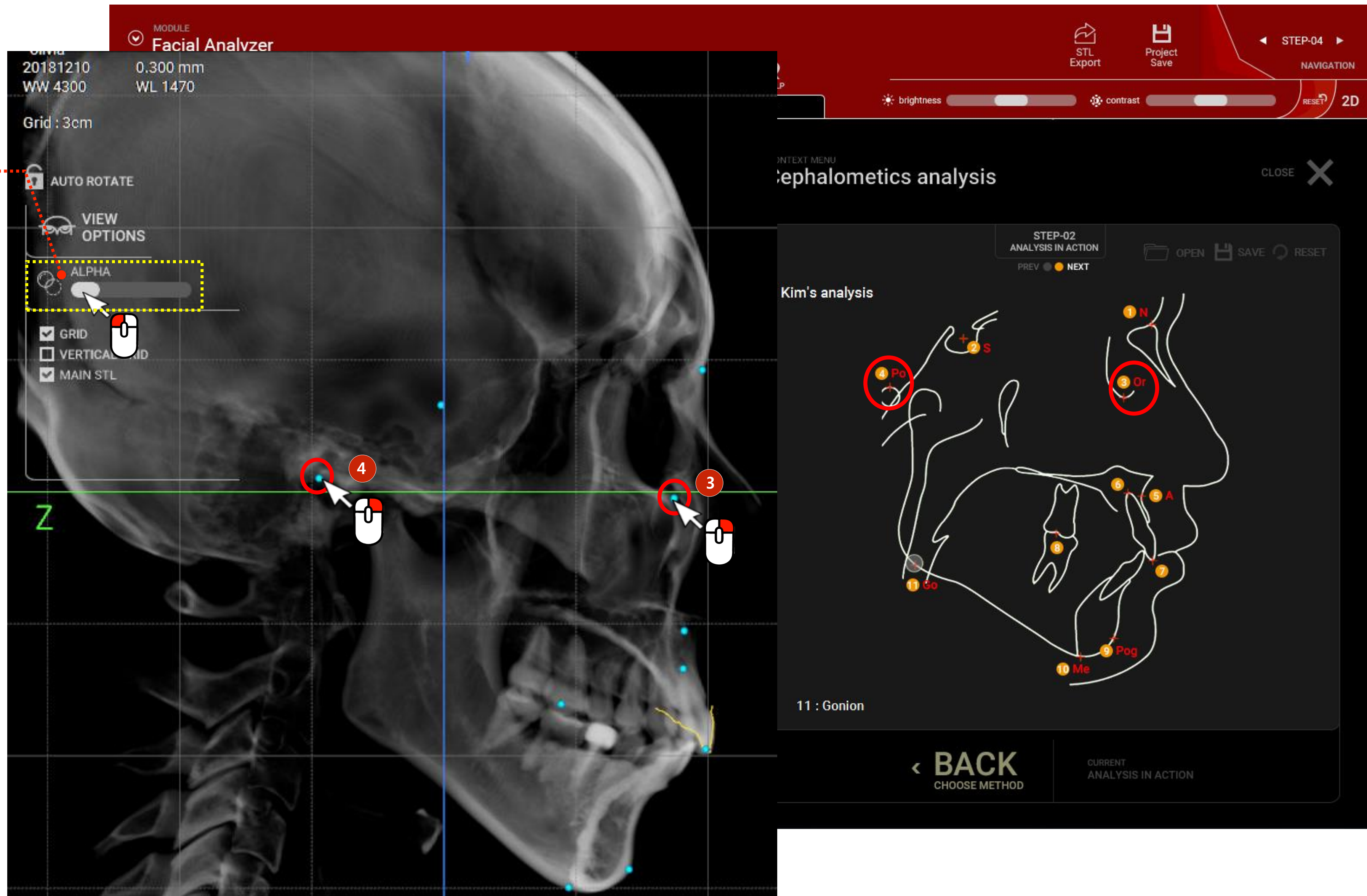
Points on the 3D view

Adjust the transparency of CBCT by sliding the bar to the **left** to make **3D view**

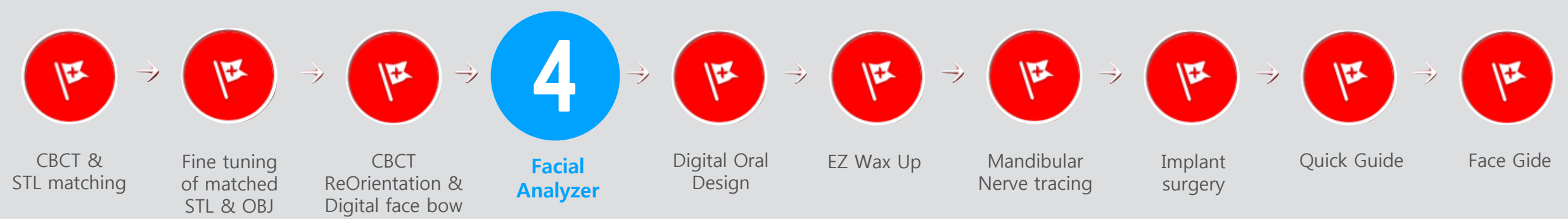


3 Click the position of Orbitale

4 Click the position of Porion



6.2 R2GATE™ DOD Facial Analyzer



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R2GATE Facial Analyzer

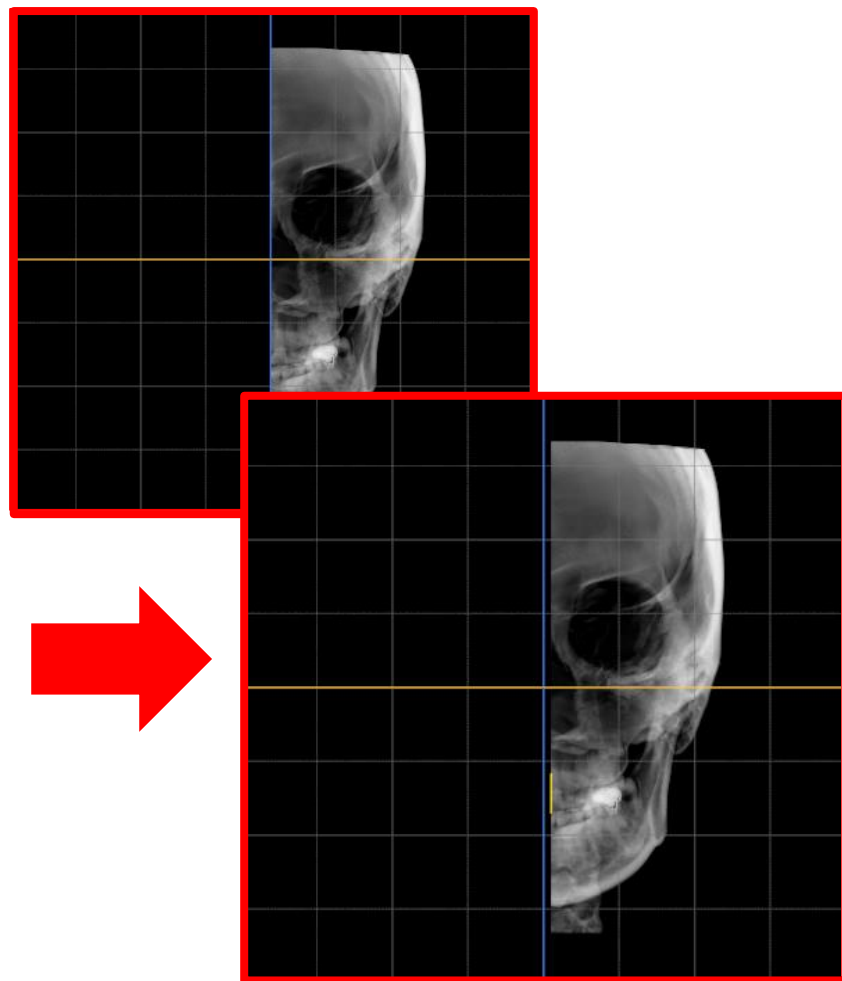
Points on the 2D view

Adjust the transparency of CBCT by sliding the bar to the right to make 2D view

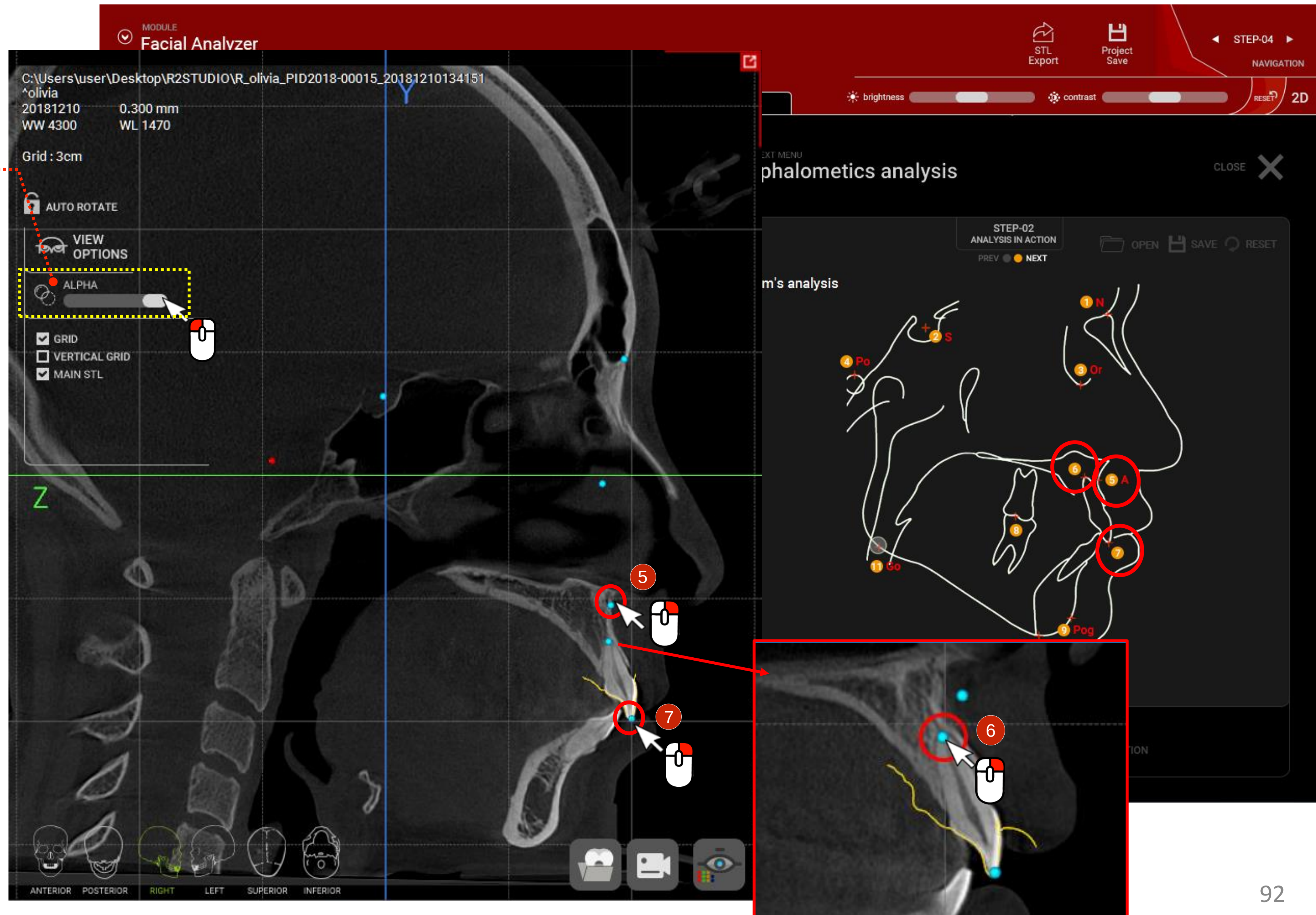


5 Click the position of Subspinale

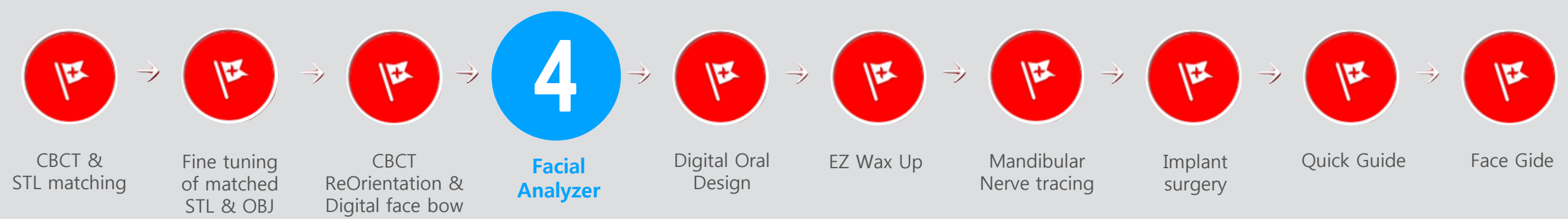
6 Click the position of Upper incisor root apex
Move the blue line to the center of the upper incisor



7 Click the position of Upper incisal incision(edge)



6.2 R2GATE™ DOD Facial Analyzer



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R2GATE Facial Analyzer

Points on the 3D view

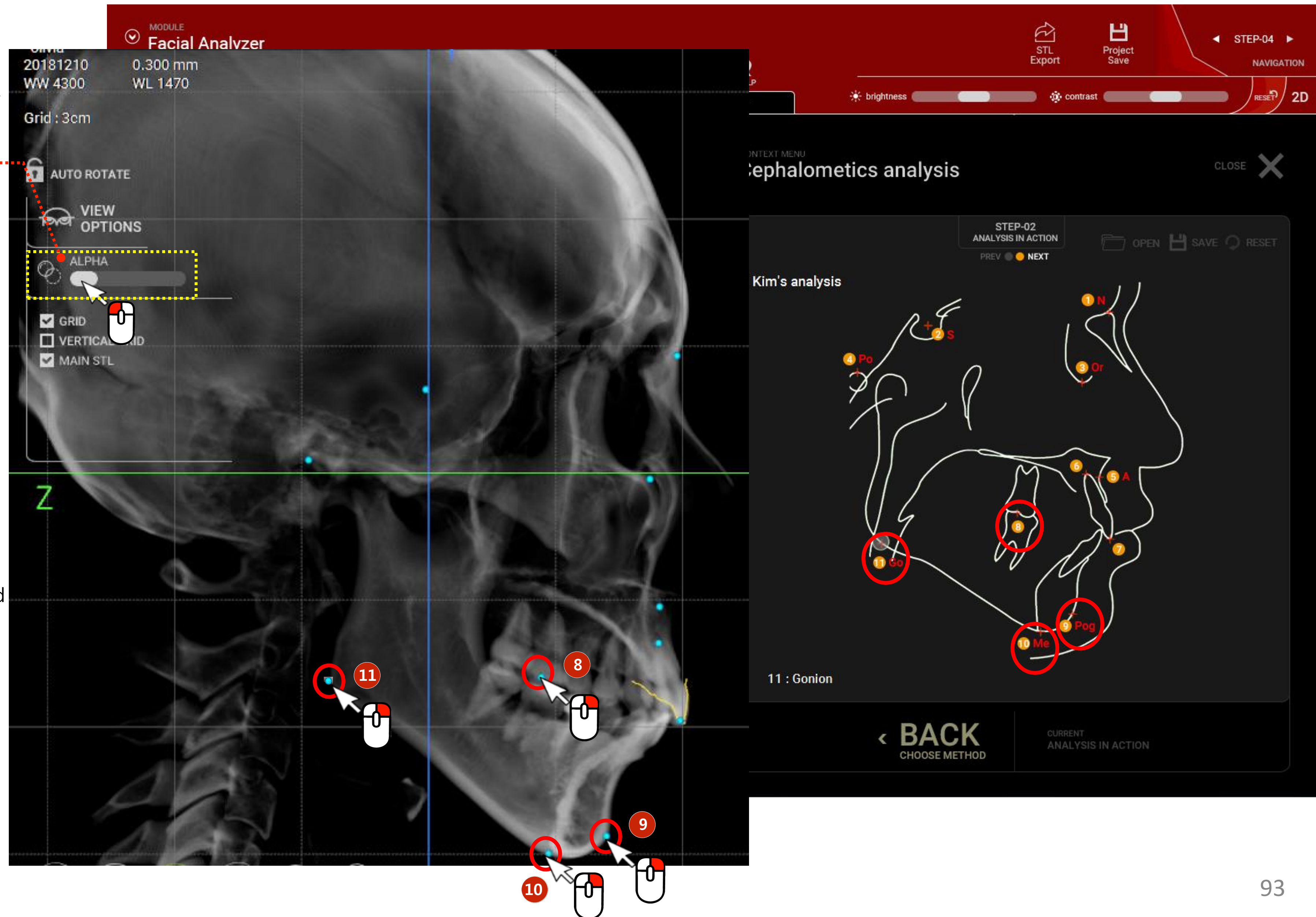
Adjust the transparency of CBCT by sliding the bar to the left to make 3D view



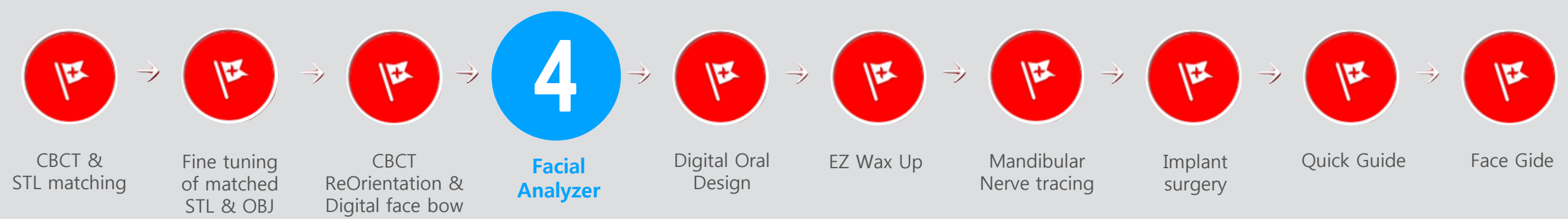
- 8 Click the position of posterior point of occlusion (Occlusal surface of the first upper molar)
- 9 Click the position of Pogonion
- 10 Click the position of Menton
- 11 Click the position of Gonion

Points addition will be disabled and automatic Facial Pattern Analysis will start when the **11th** point is marked

- ! Right click to mark the points
- ! Left click and drag to adjust the point positions



6.2 R2GATE™ DOD Facial Analyzer



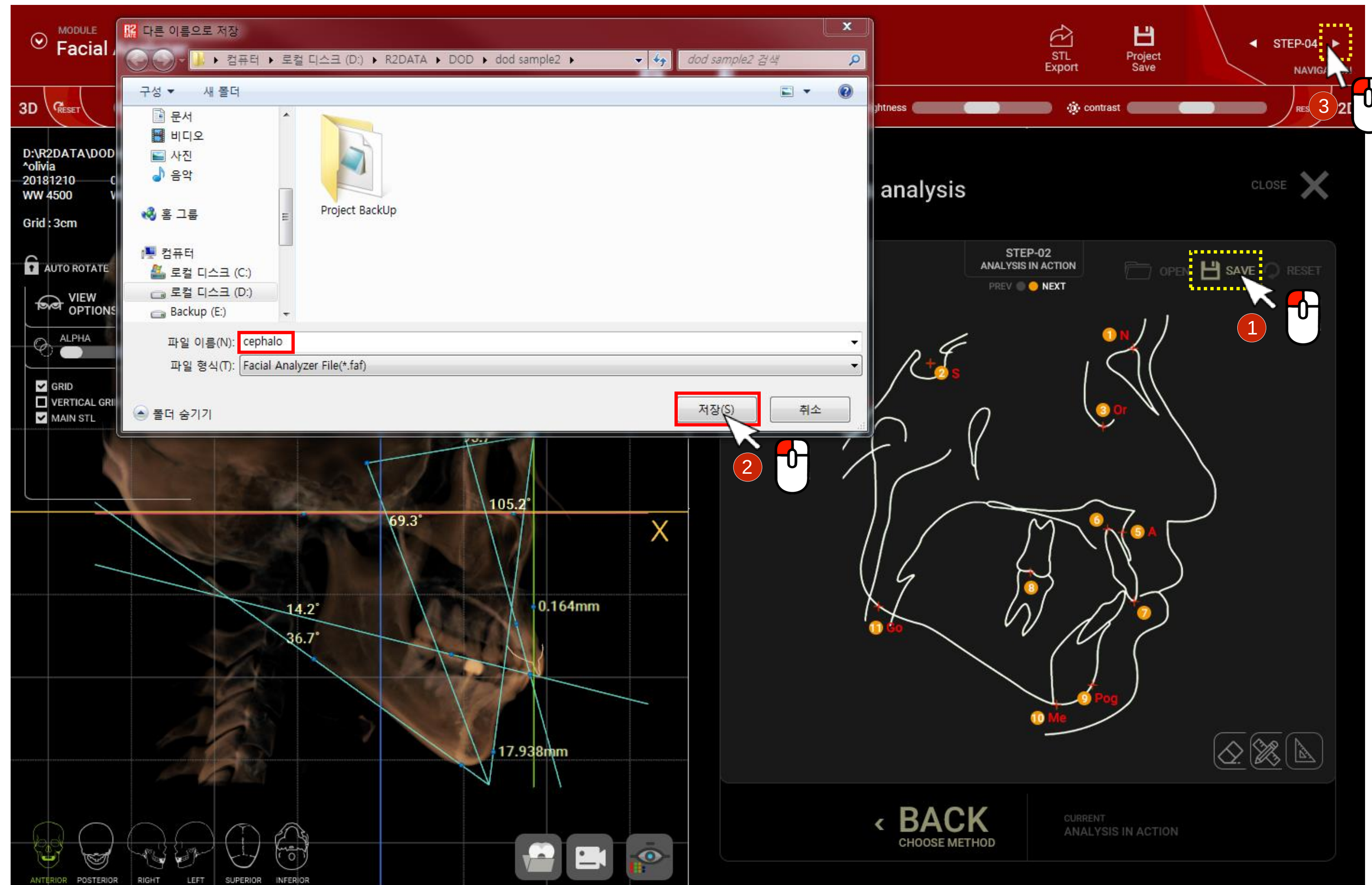
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R2GATE Facial Analyzer

SAVING

- 1  Click the icon to save the analyzed Analysis result
- 2 Enter file name and click **SAVE(S)** to save Facial Analysis
- 3  Click to proceed to **STEP. 05**



R2GATE Facial Analyzer

Pattern Analysis according to McNamara Analysis

An analytical method that calculates the distance and angle of each anatomical points and **McNamara line**(perpendicular line connecting **Nasion** and **FH plane**) to compare it with the average data

The Normal Jaw Position

Maxilla : Matching Subspinale to Mcnamara line

Mandible : Pogonion to Mcnamara line
(Male: 2~4mm, Female: 4~6mm)

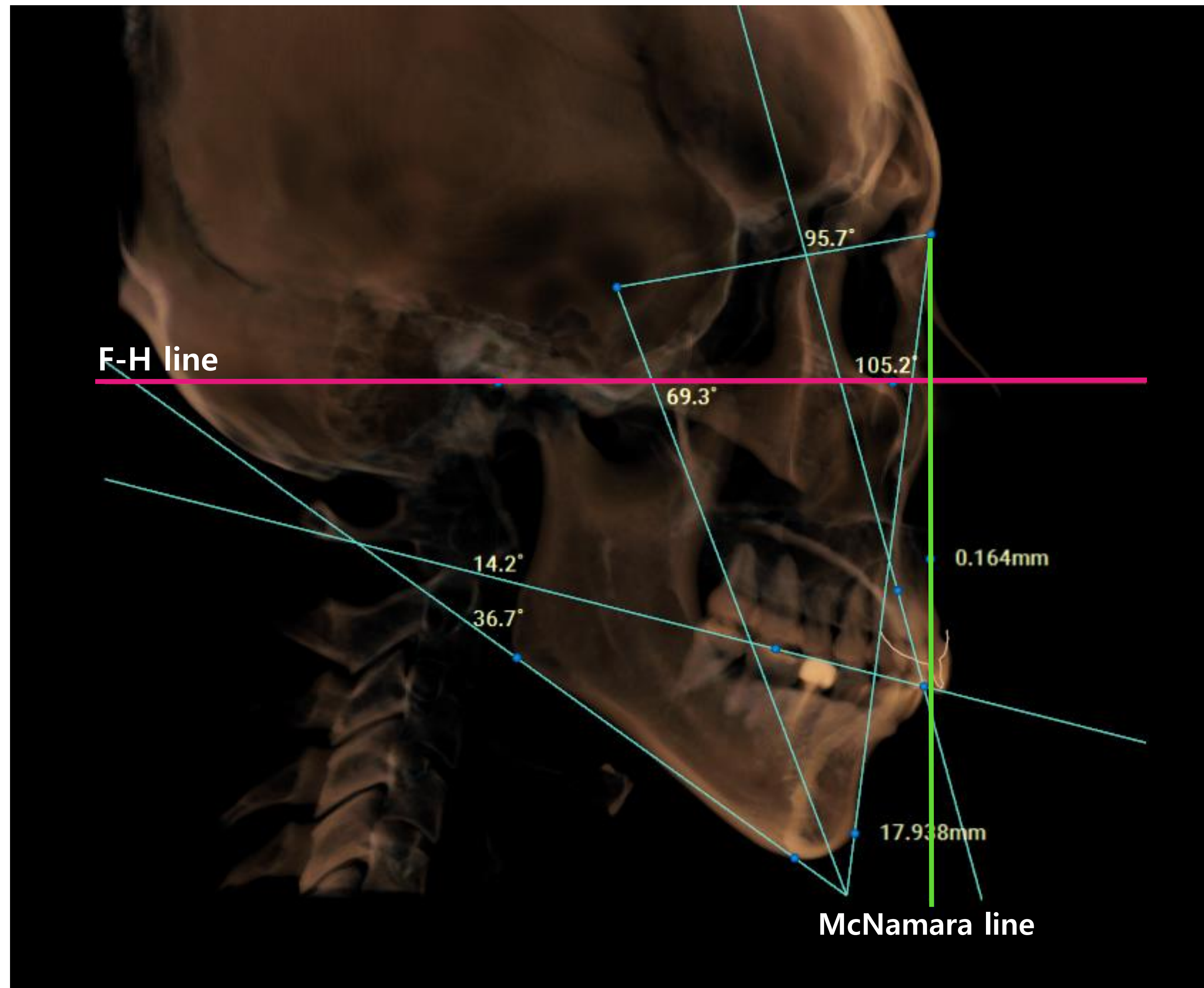
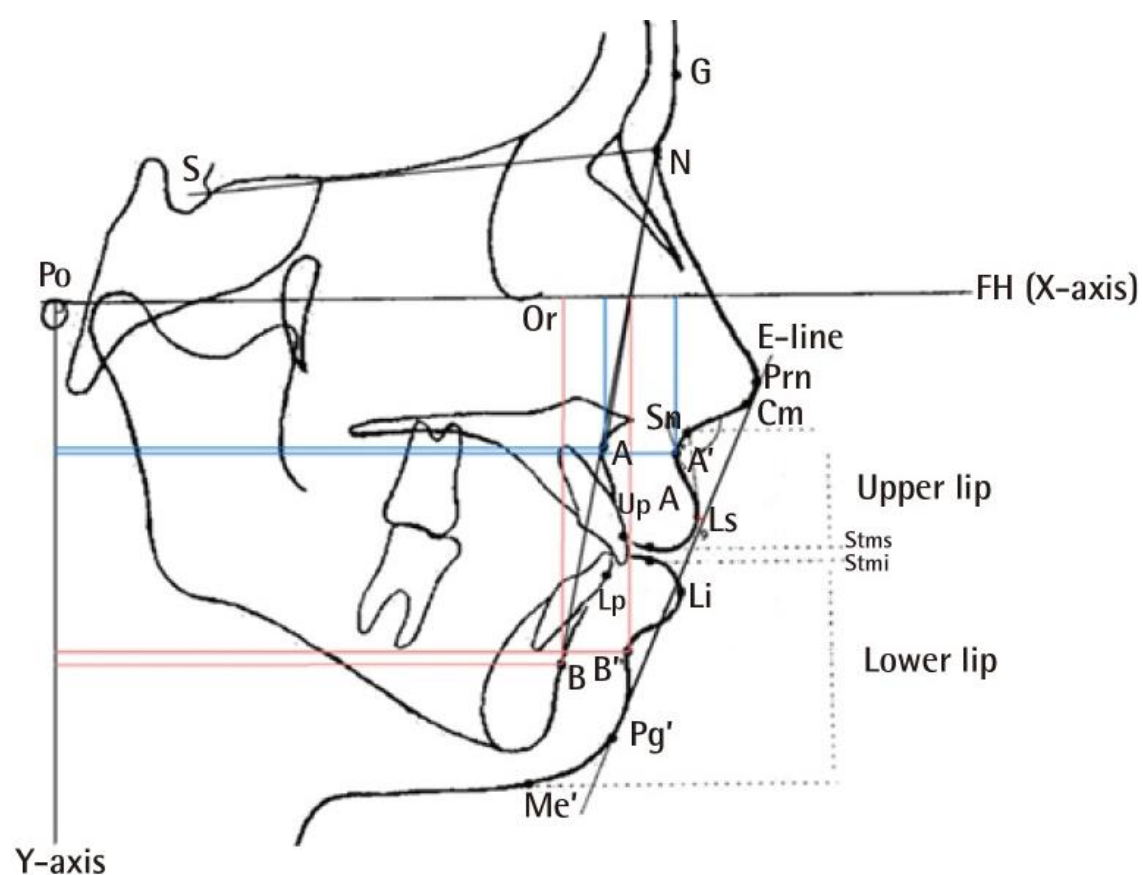
Ricketts Lip Analysis

E line(Nose tip to soft tissue pogonion) :

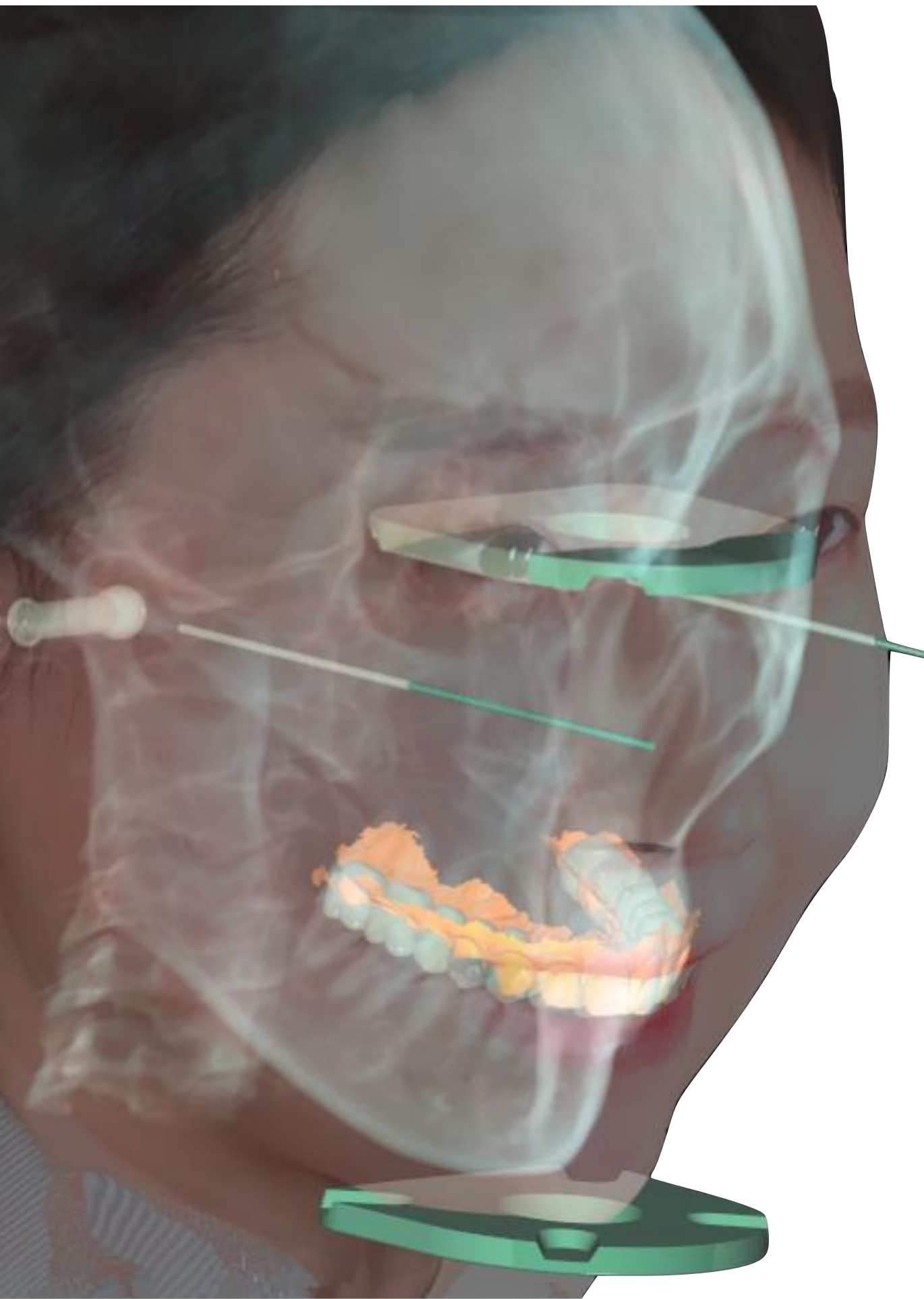
A line connecting the tip of the nose with the upper lip, the lower lip and the tip of the chin.

In general,

maxilla: 2 ~ 3mm, mandible: inside 1 ~ 2mm



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7 Digital Oral Design Ideal Teeth Position



Digital Oral Design(EN)

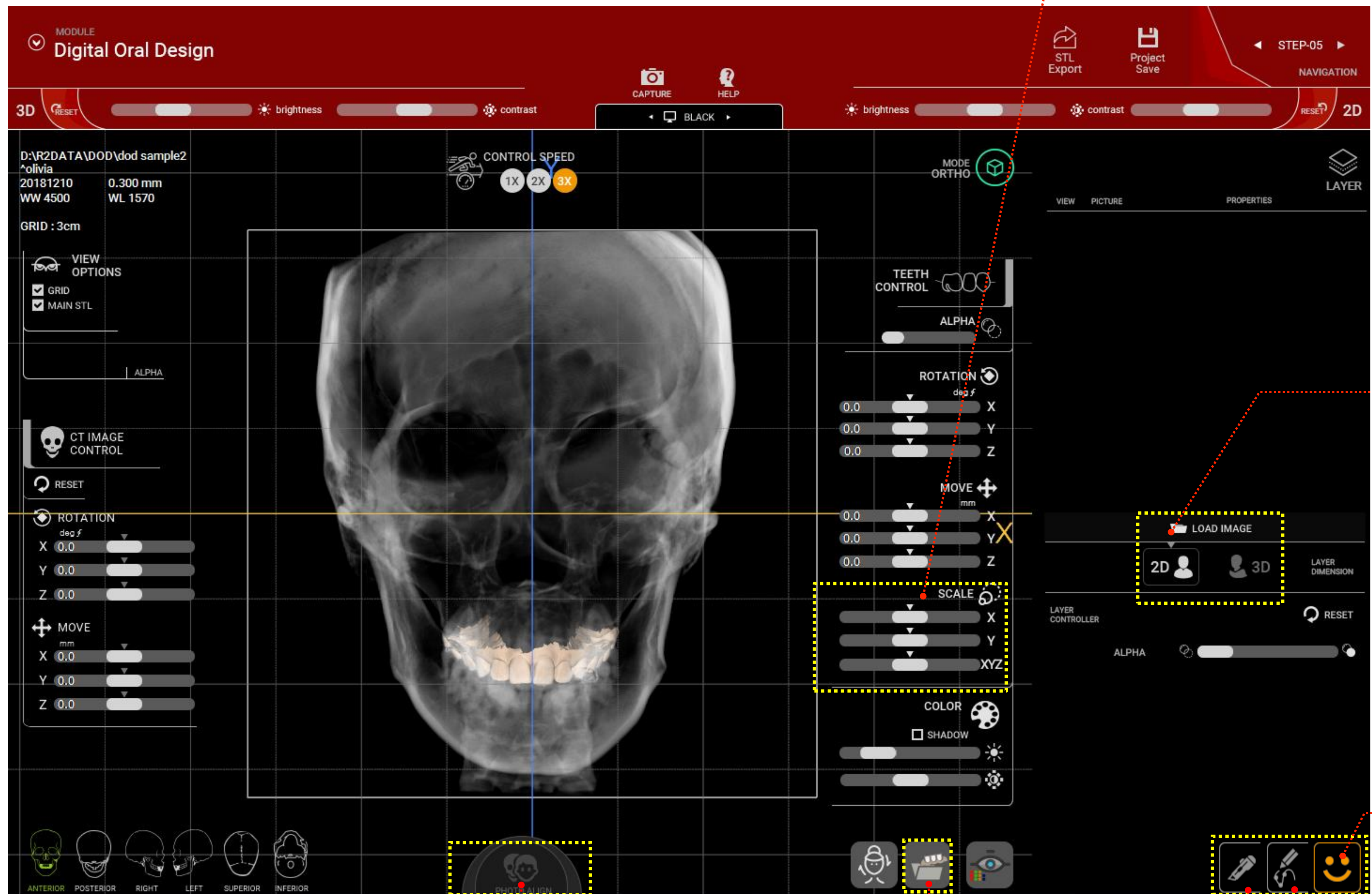
7.1 R2GATE™ DOD Control Buttons



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Control Buttons



Adjust the size of the teeth from the library

Import 2D or 3D Smile Scan data

Click to activate Smile edit mode

2-Point Matching with Smile Photo and CBCT

Import tooth library

Cut designated Smile area

Designate Smile area

7.2 R2GATE™ DOD Digital Oral Design

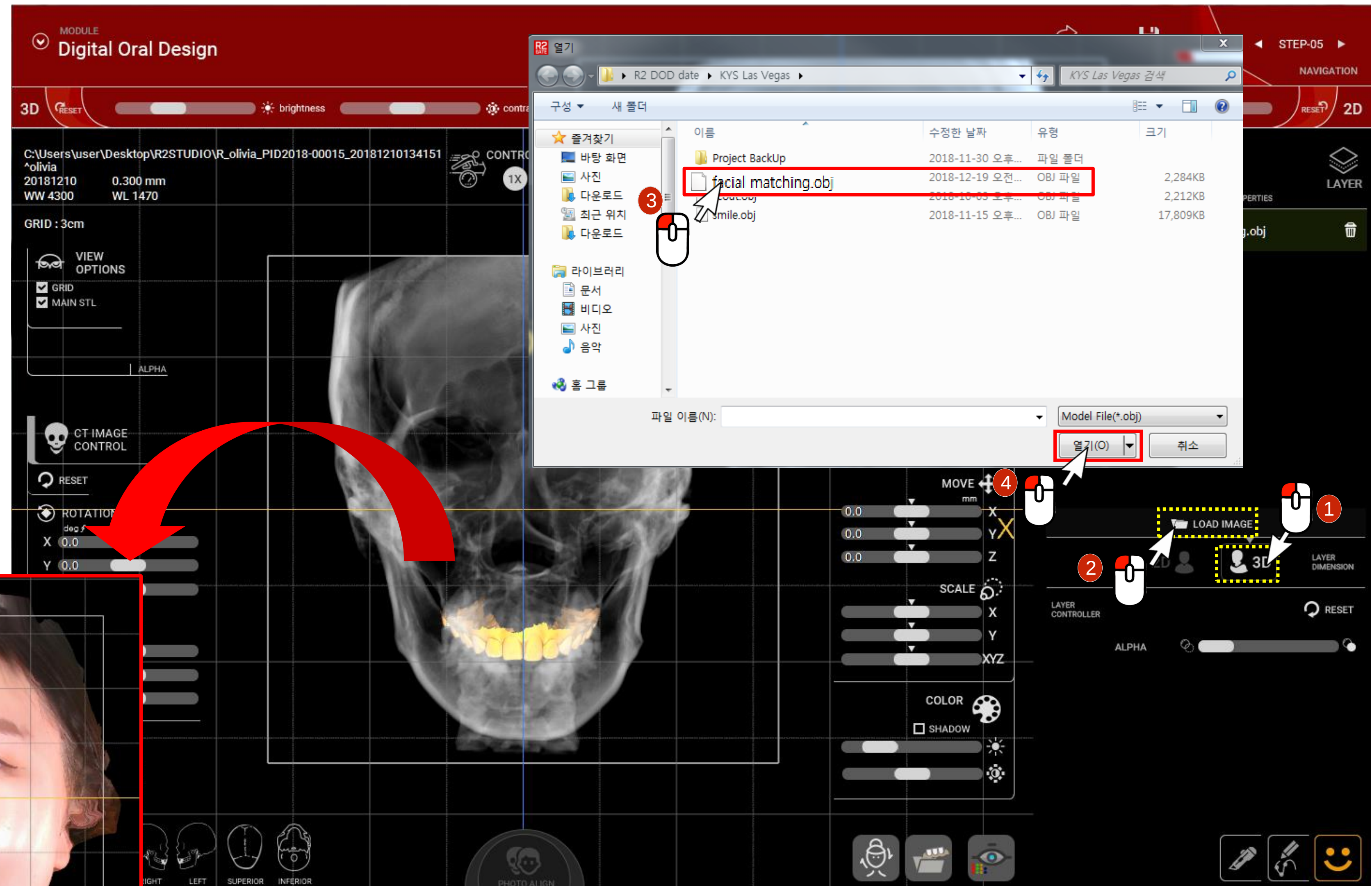
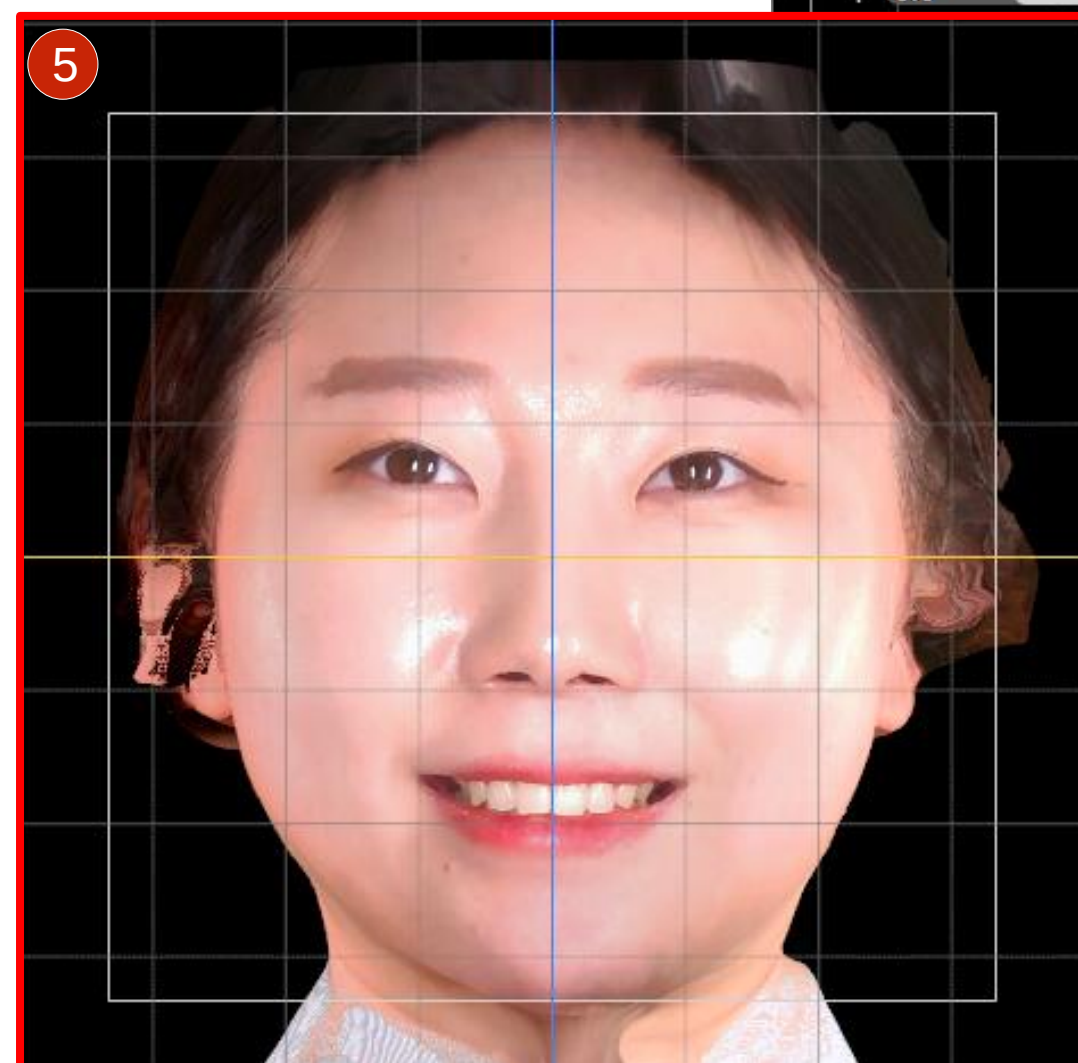


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- 1  Click the icon to import 3D Facial Scan file
- 2  Click the icon
- 3 Select the Facial Matching file (obj.) done in STEP02
- 4 Click **Open(O)**
- 5 The 3D Facial Scan file will load with matching coordinates of CBCT



7.2 R2GATE™ DOD Digital Oral Design

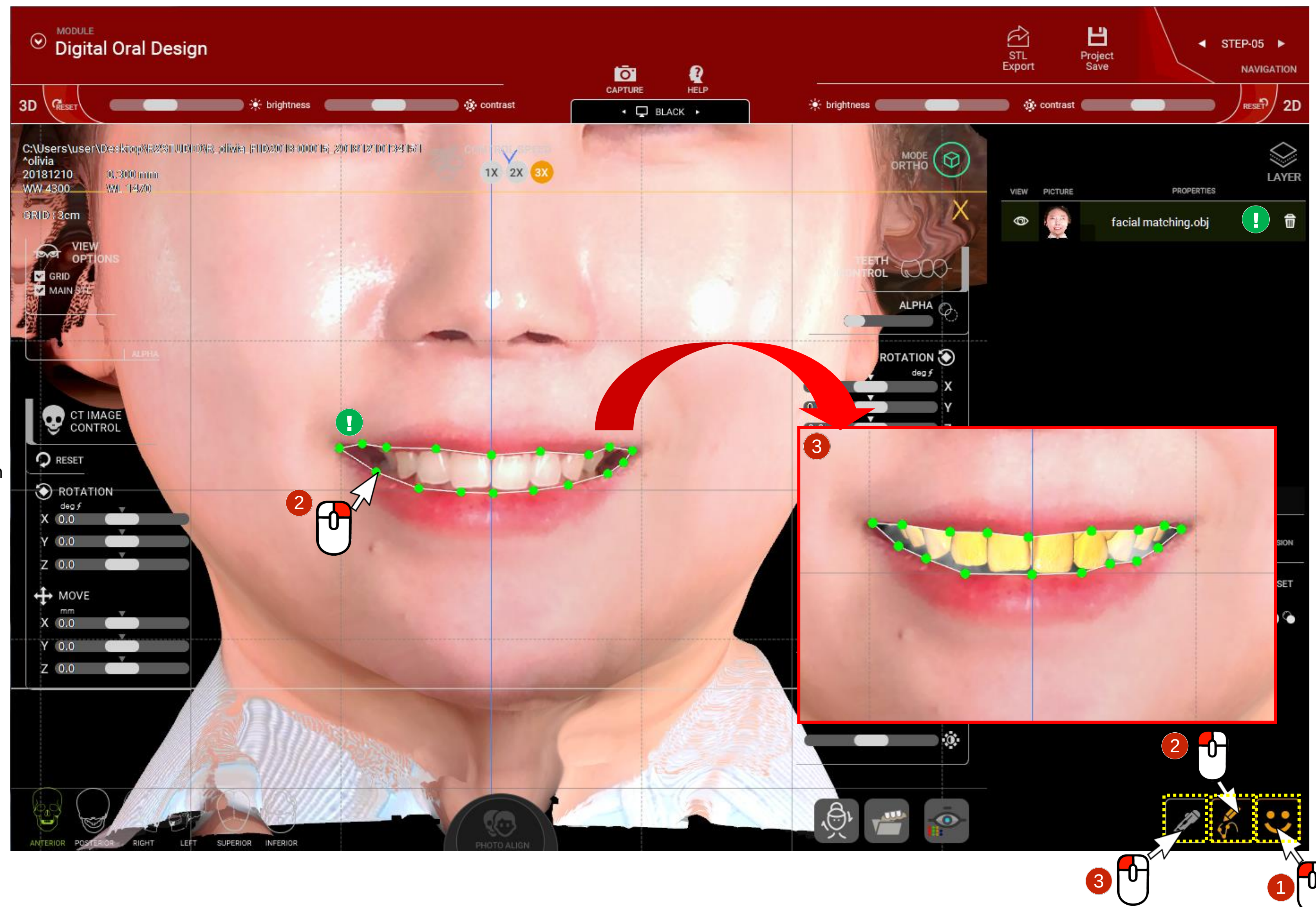


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- 1 Click **Smile Edit Mode** to activate the functions
 - 2 Click the icon and right click on the 3D image of patient to designate the Smile Line
 - 3 Click Crop icon to cut the drawn line
- ! The position of the points can be modified with left click
- ! If the points are set, click delete and try again



7.2 R2GATE™ DOD Digital Oral Design



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R2GATE Digital Oral Design

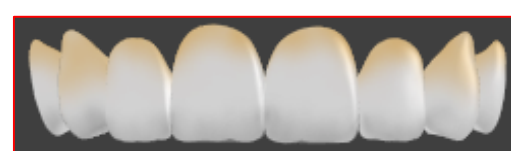
- 1 Click **Tooth Library**
- 2 Select appropriate shape of the tooth library to match patient's face



Oval



Rectangular



Square



Triangular

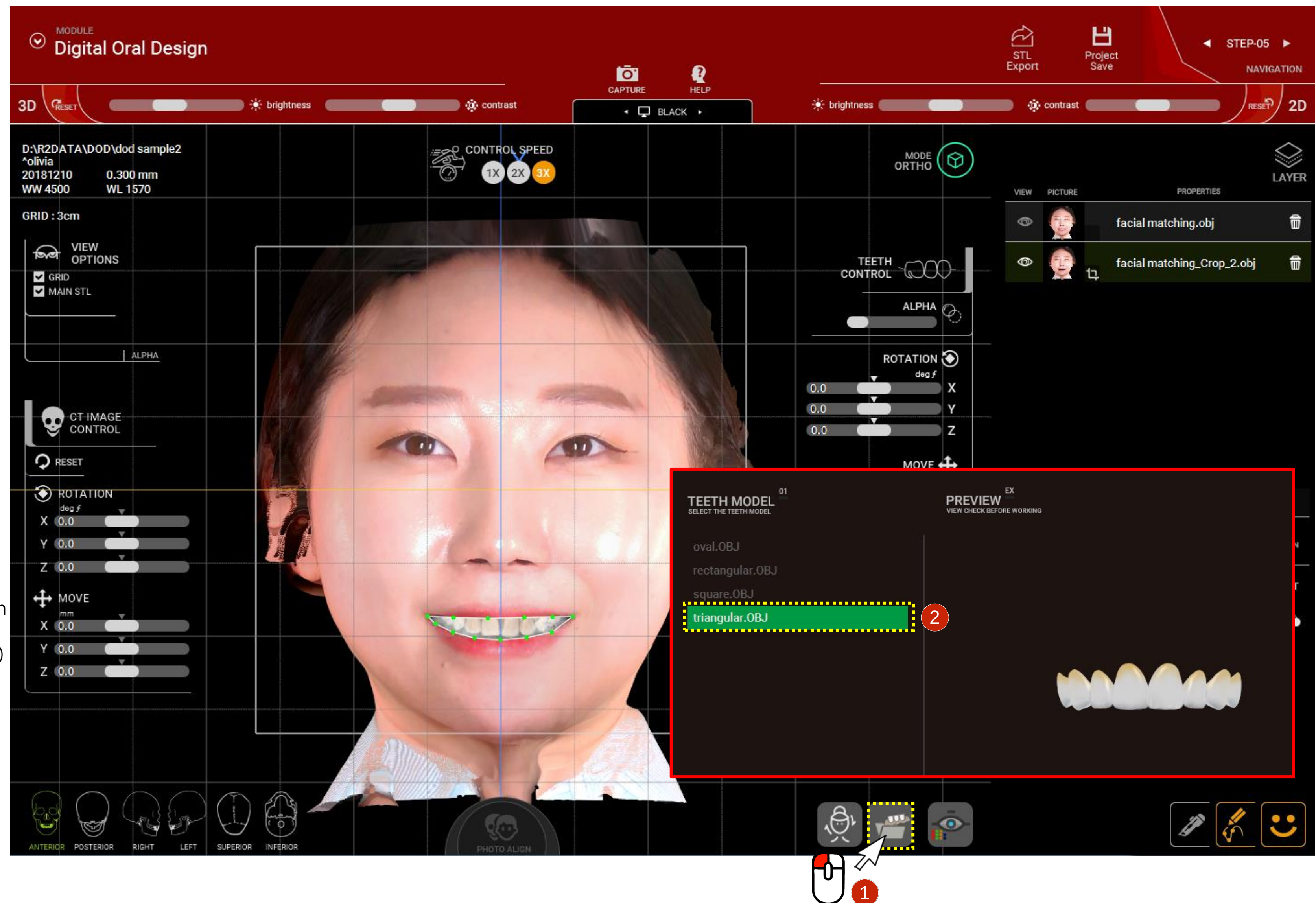
[Feminine Smile Line]

Characterized by incisal edges of the maxillary teeth that correspond to the curvature of the lower lip. (typically, high smile line is characteristic of women) ex) triangular

[Masculine Smile Line]

Straight incisal edge gives masculine impression. (Low smile line is a typical male's characteristic) ex) square

Buccal corridor is also an important aesthetic element that gives depth and charm to smile by giving it a three-dimensional feel



7.2 R2GATE™ DOD Digital Oral Design



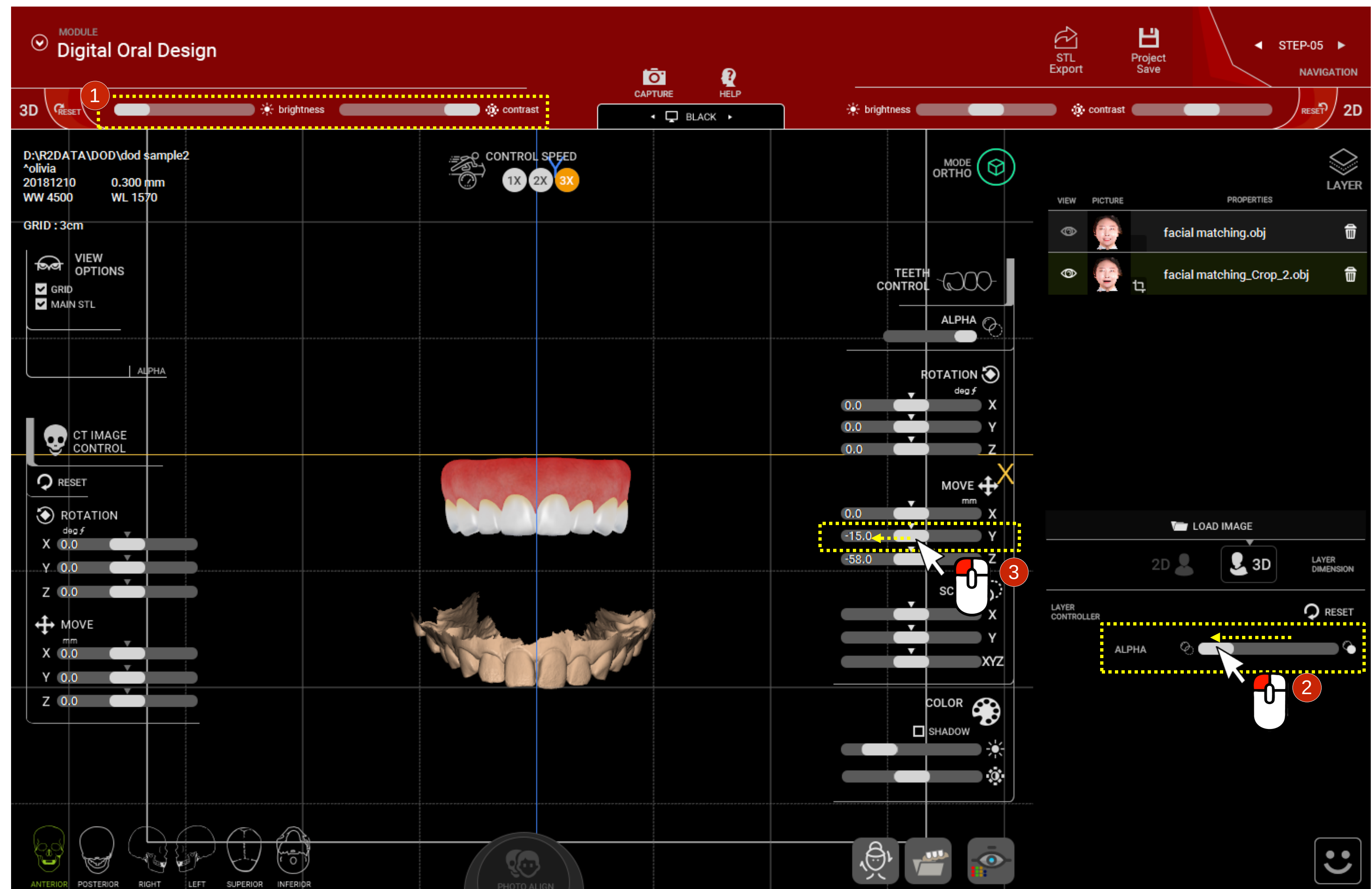
R2
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R2GATE Digital Oral Design

Tooth Library Aligning

- Adjust the transparency of CBCT to make the tooth library clearly visible
- Drag the bar to the left of **ALPHA** function, 3D Facial Scan file will change transparent
Make 3D Facial Scan transparent to make the tooth library clearly visible
- Drag the Y-axis of **Move** to the left to move the tooth library to the position of the model



7.2 R2GATE™ DOD Digital Oral Design



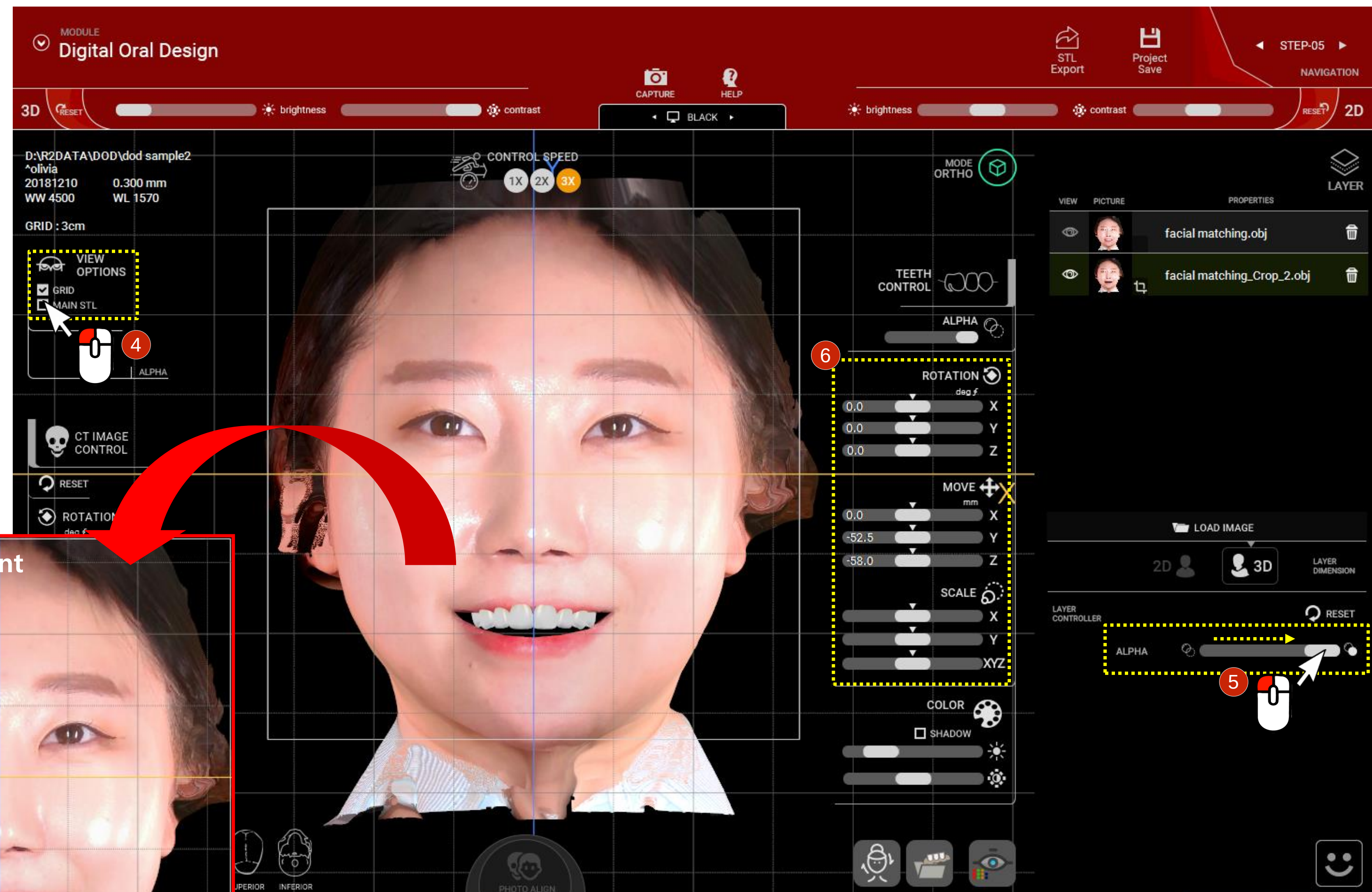
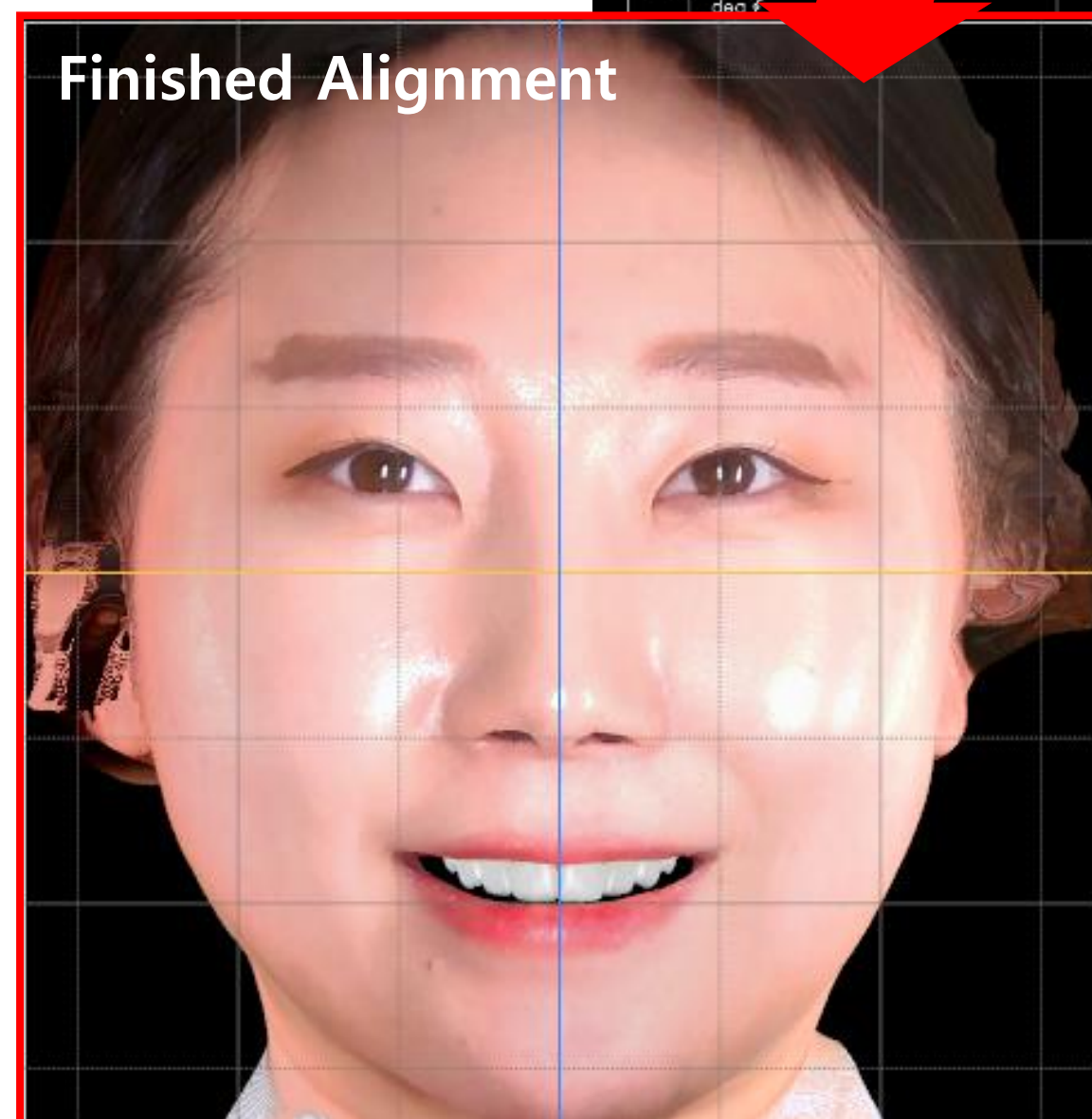
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R2GATE Digital Oral Design

Tooth Library Aligning

- 4 Uncheck **MAIN STL** icon to make the cast disappear
 - 5 Drag the bar of **ALPHA** to the right to make 3D Facial Scan file appear again
 - 6 Use **Rotation, Move, Scale** control keys to align the tooth library to natural position of the smile line
- ! Refer to the next page for Control Key Operation Method



7.2 R2GATE™ DOD Digital Oral Design



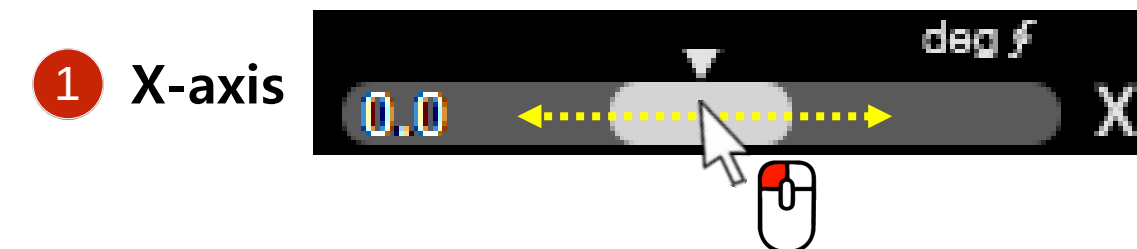
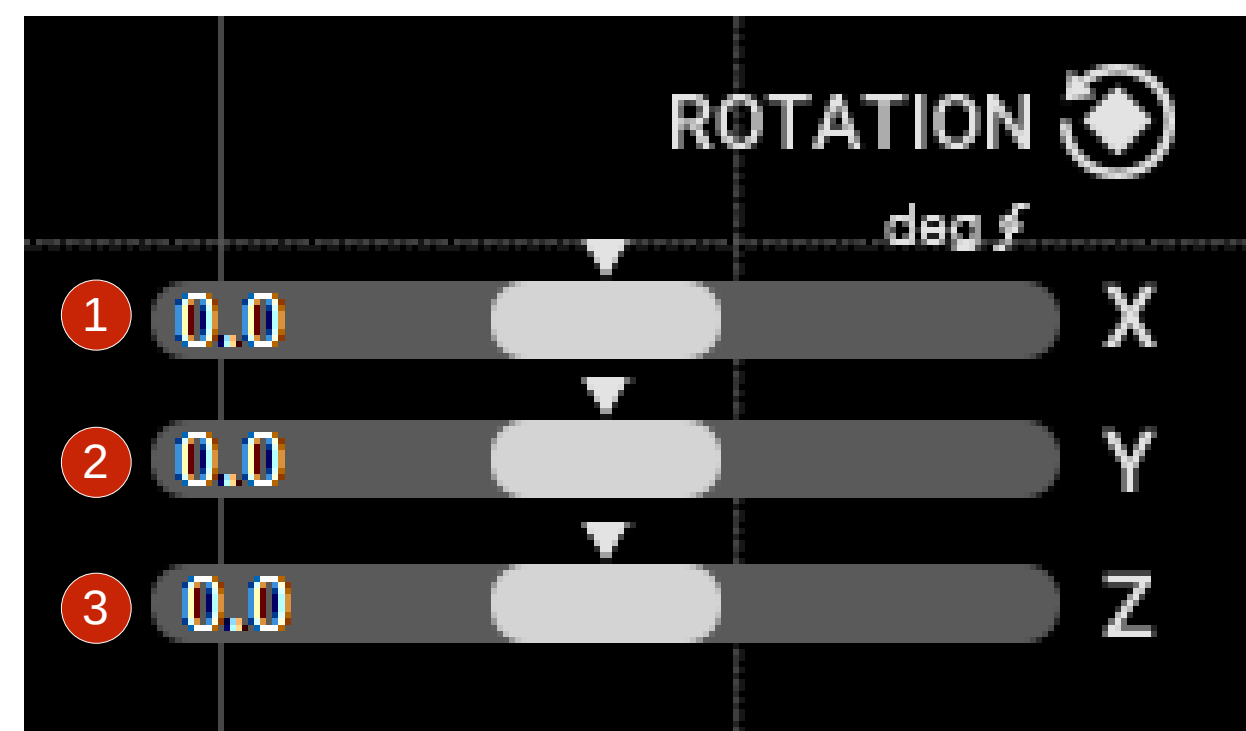
**R2
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R2GATE Digital Oral Design

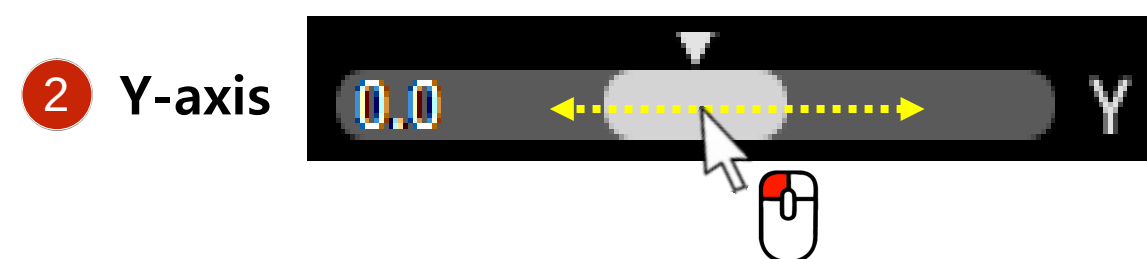
Control Key Operation Method

Rotation



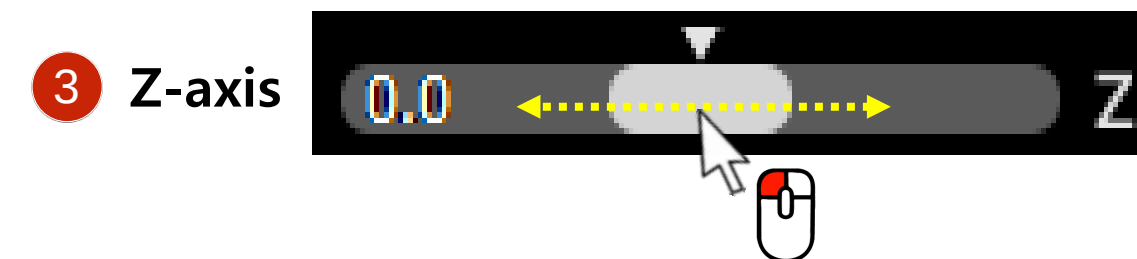
Drag to Right(+) : Rear Rotation

Drag to Left(-) : Front Rotation



Drag to Right(+) :Left Rotation

Drag to Left(-) : Right Rotation



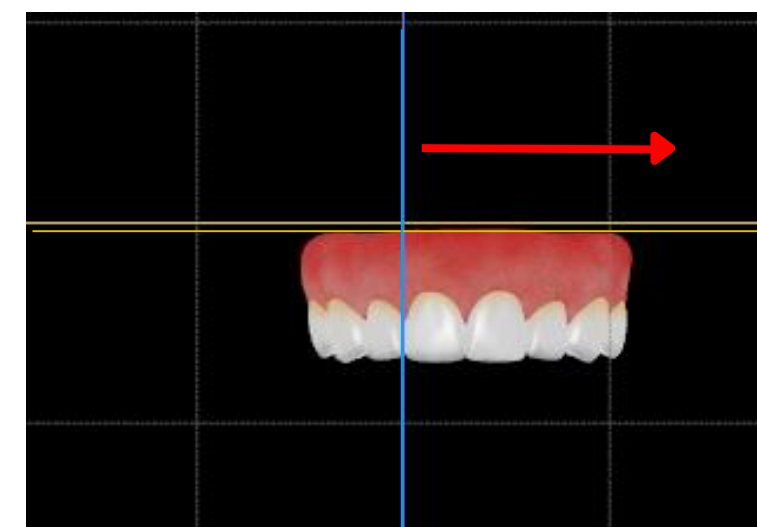
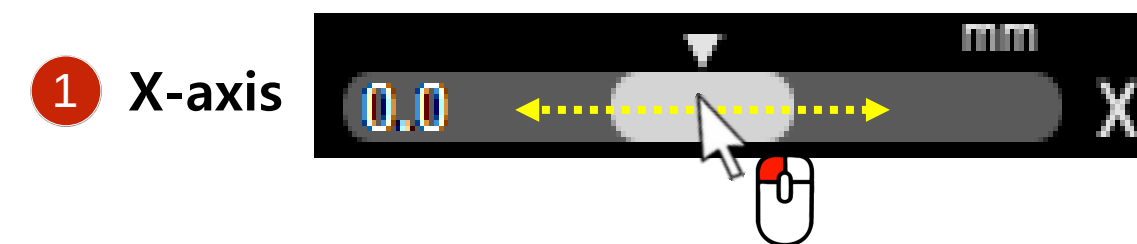
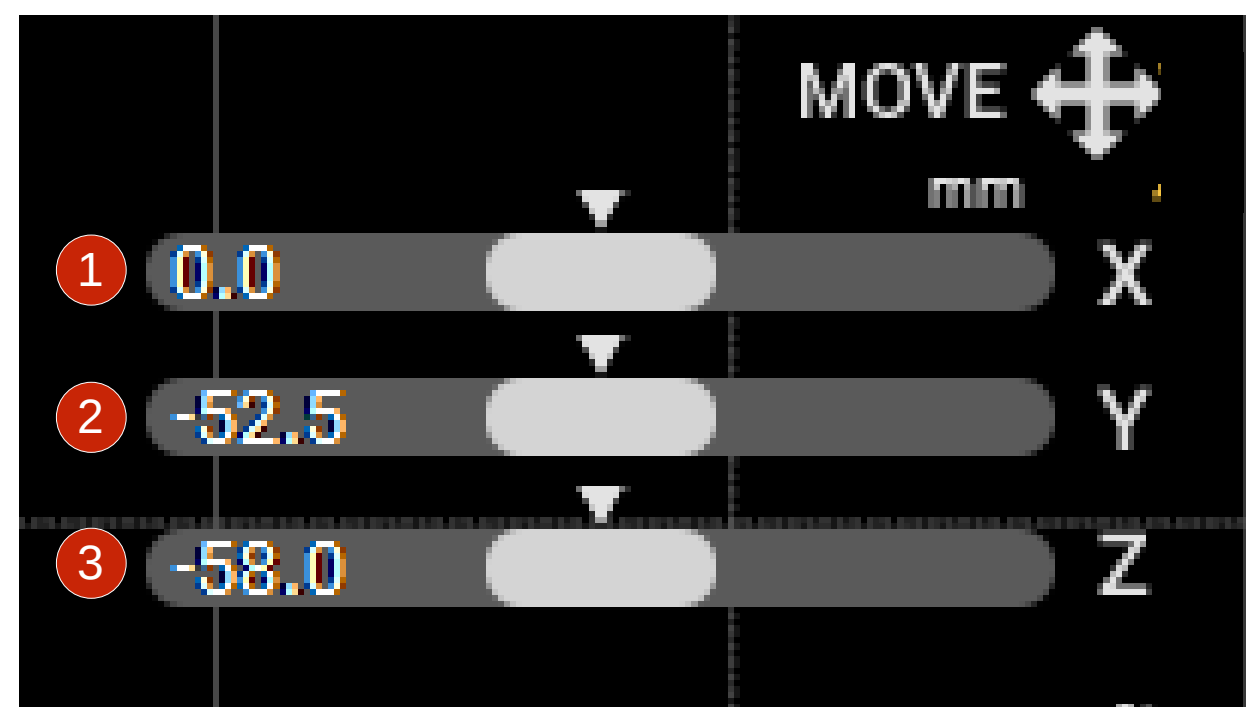
Drag to Right(+) : Clockwise

Drag to Left(-) : Counter-Clockwise

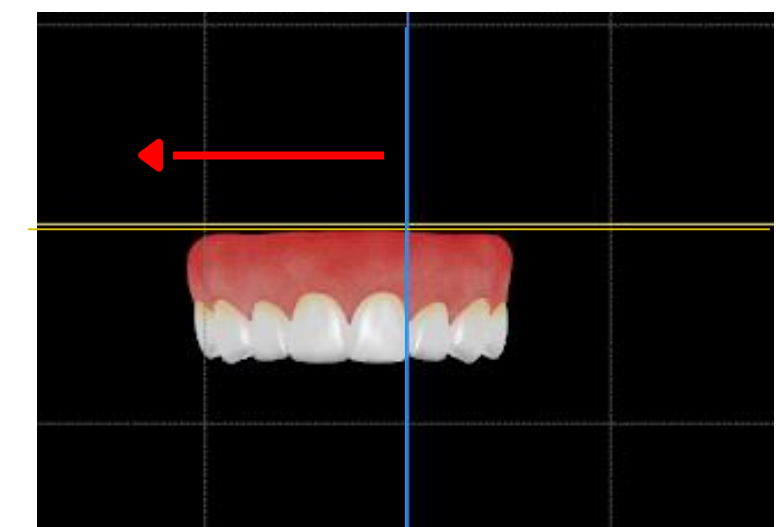
R2GATE Digital Oral Design

Control Key Operation Method

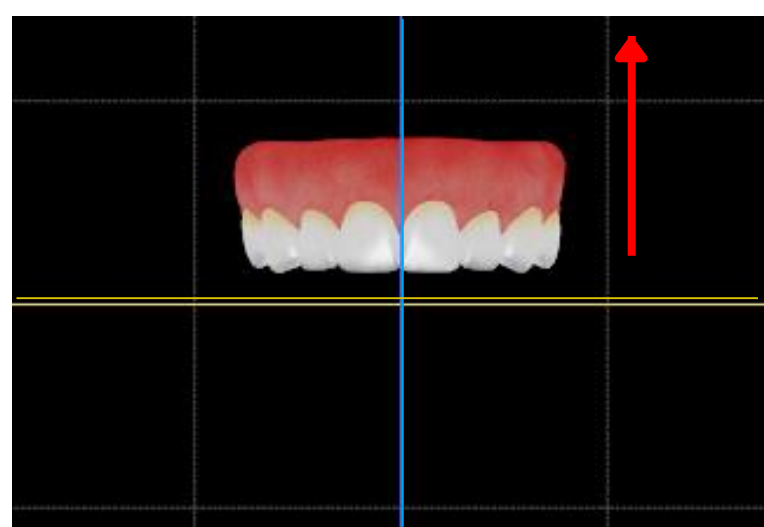
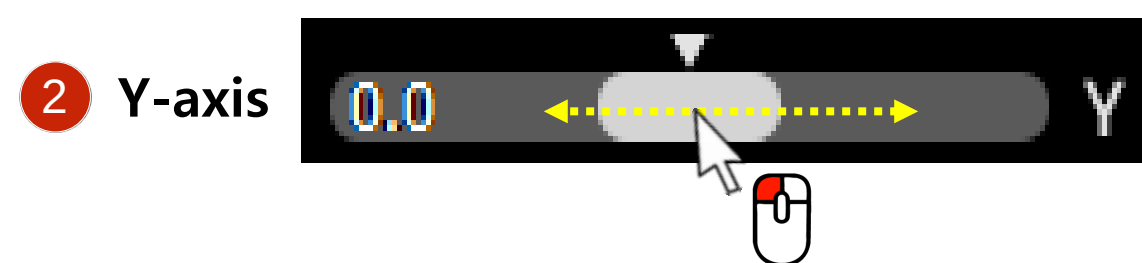
Move



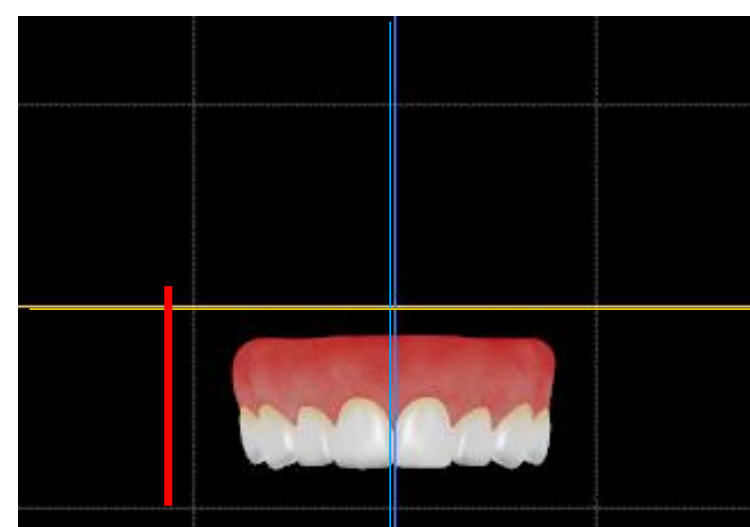
Drag to Right(+) : Move to Right



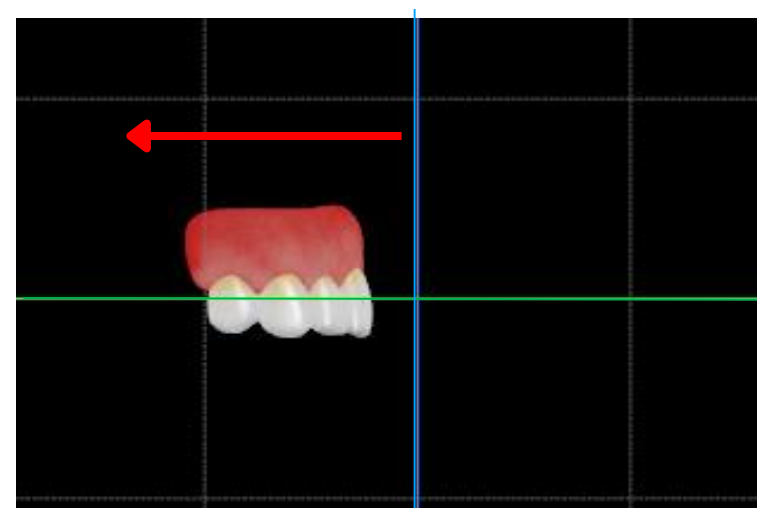
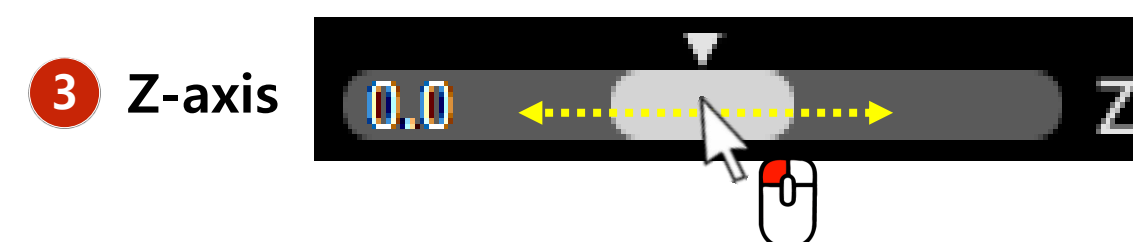
Drag to Left(+) : Move to Left



Drag to Right(+) : Move Up



Drag to Left(+) : Move Down



Drag to Right(+) : Move Rear

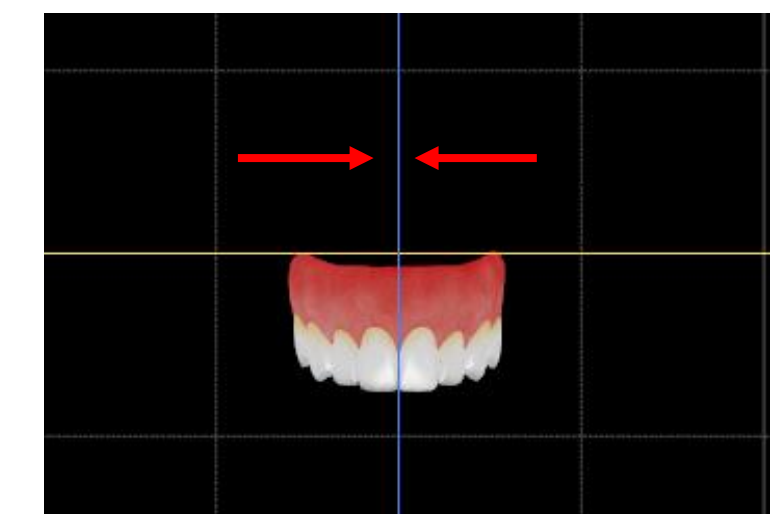
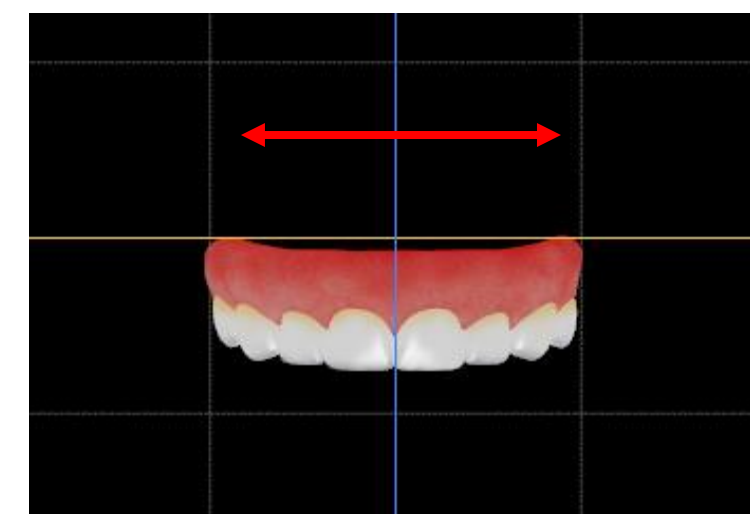
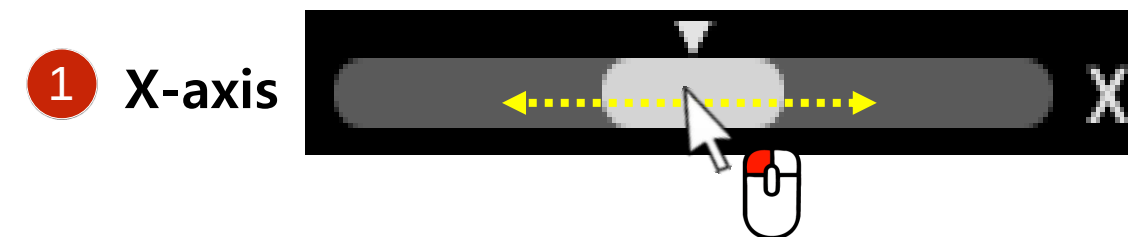
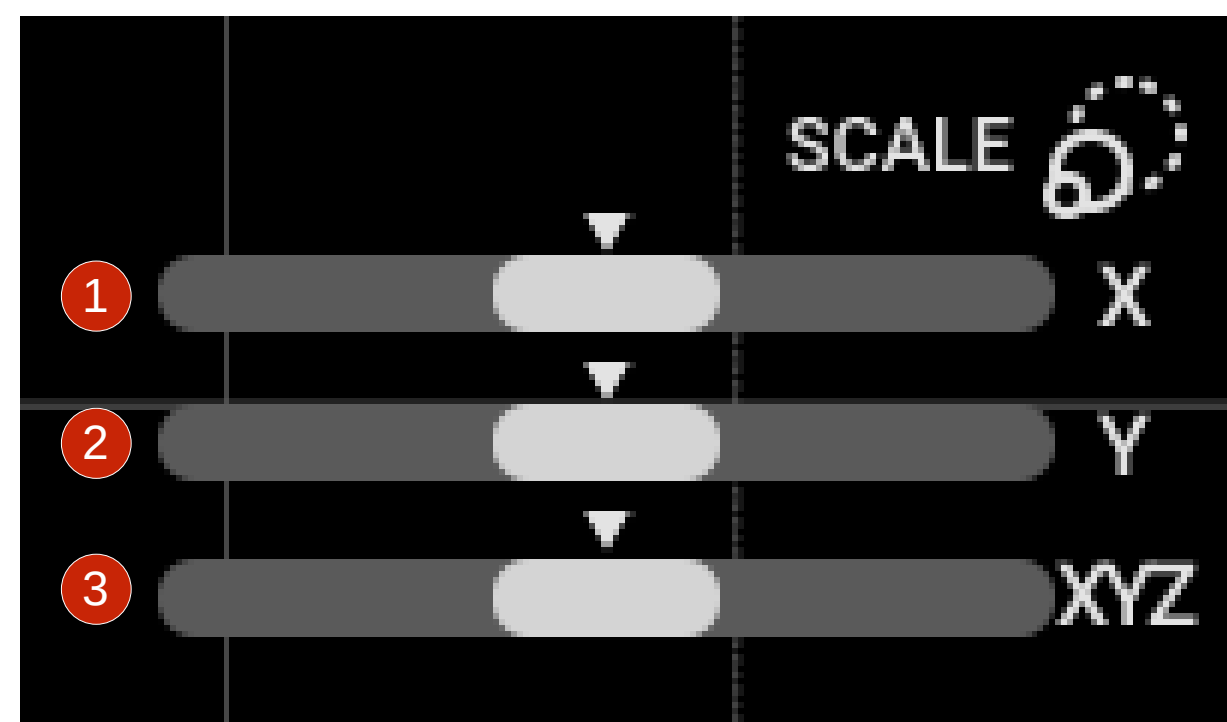


Drag to Left(-) : Move Front

R2GATE Digital Oral Design

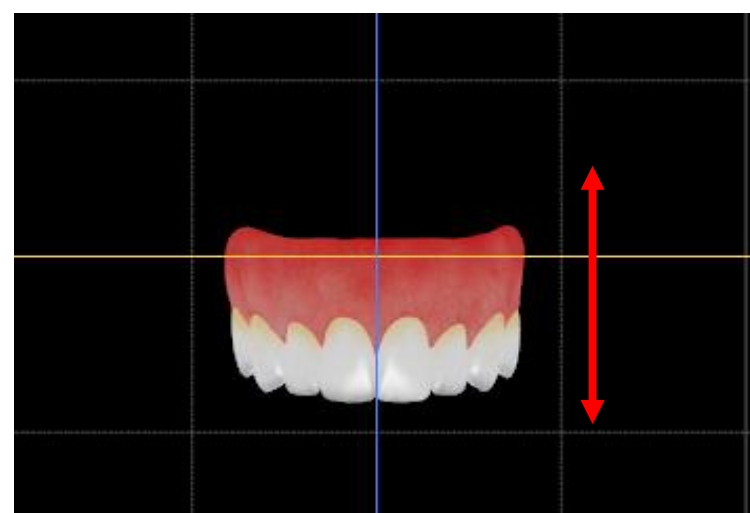
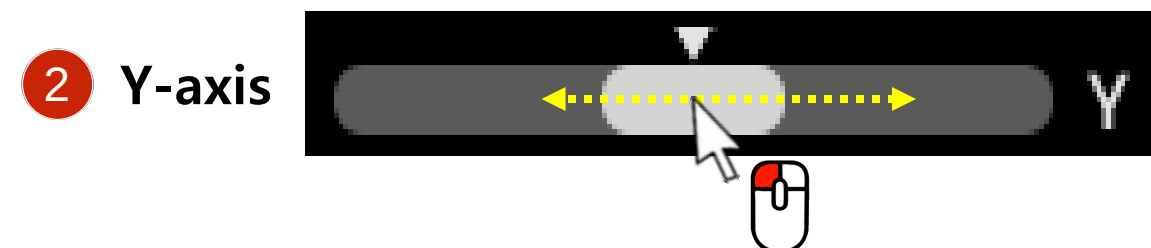
Control Key Operation Method

Scale



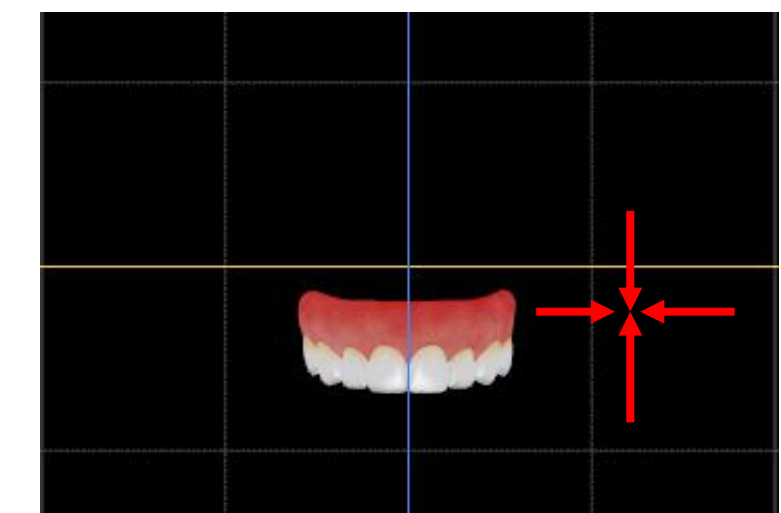
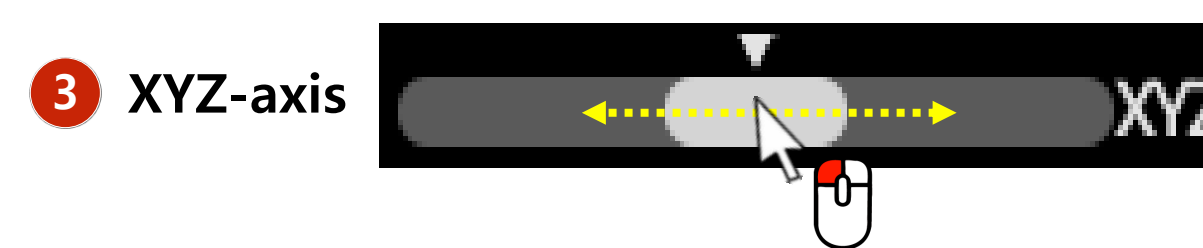
Right Drag : Left & right magnification

Left drag: Left& Right reduction



Right Drag : Upper & Lower magnification

Left drag: Upper & Lower reduction



Right Drag : Zoom-in

Left drag : Zoom-out

7.2 R2GATE™ DOD Digital Oral Design



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R2GATE Digital Oral Design

1 Click **STL Export** button to export the library after the arrangement is complete

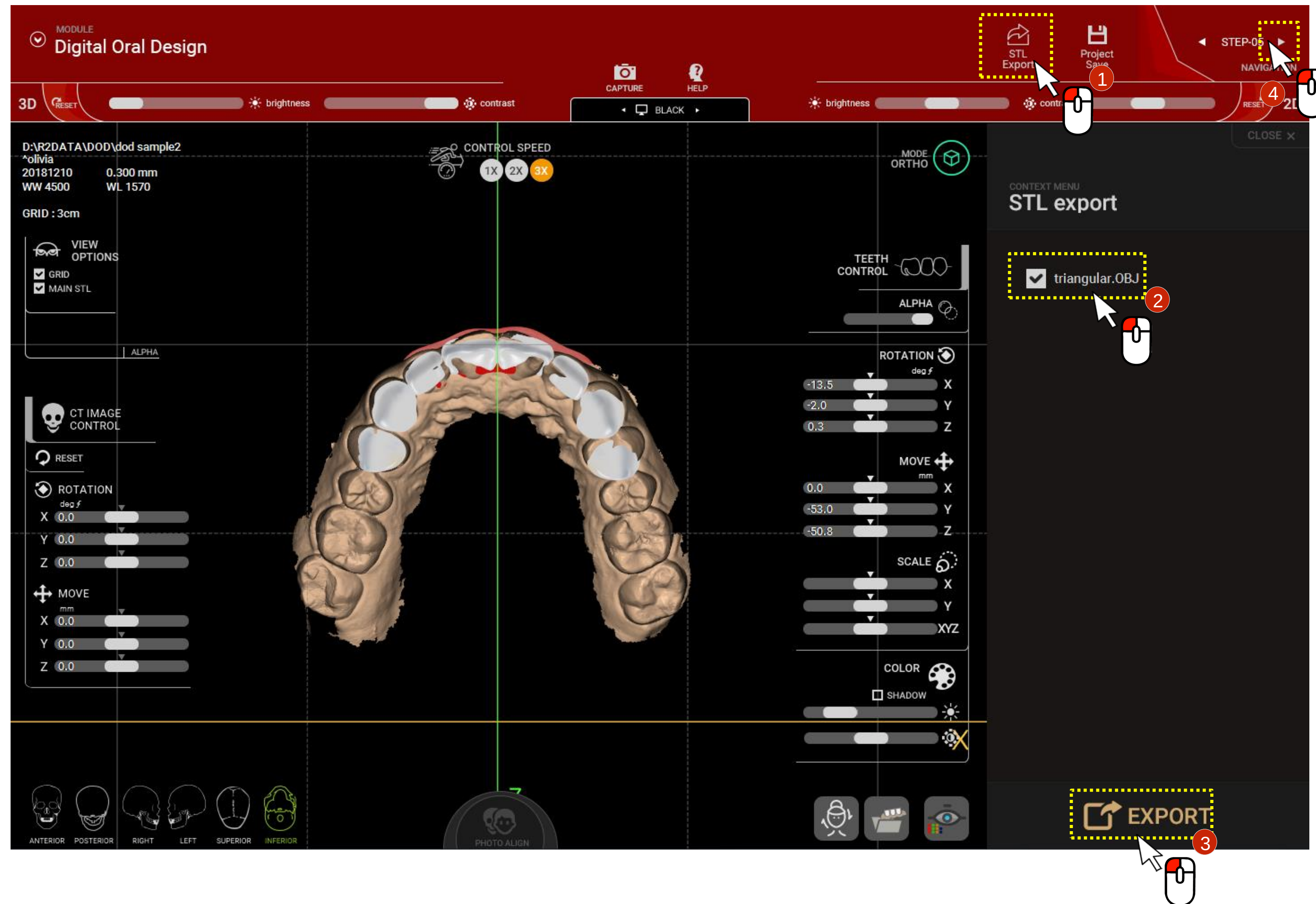
2 Select STL file to export

3 Click to **EXPORT**

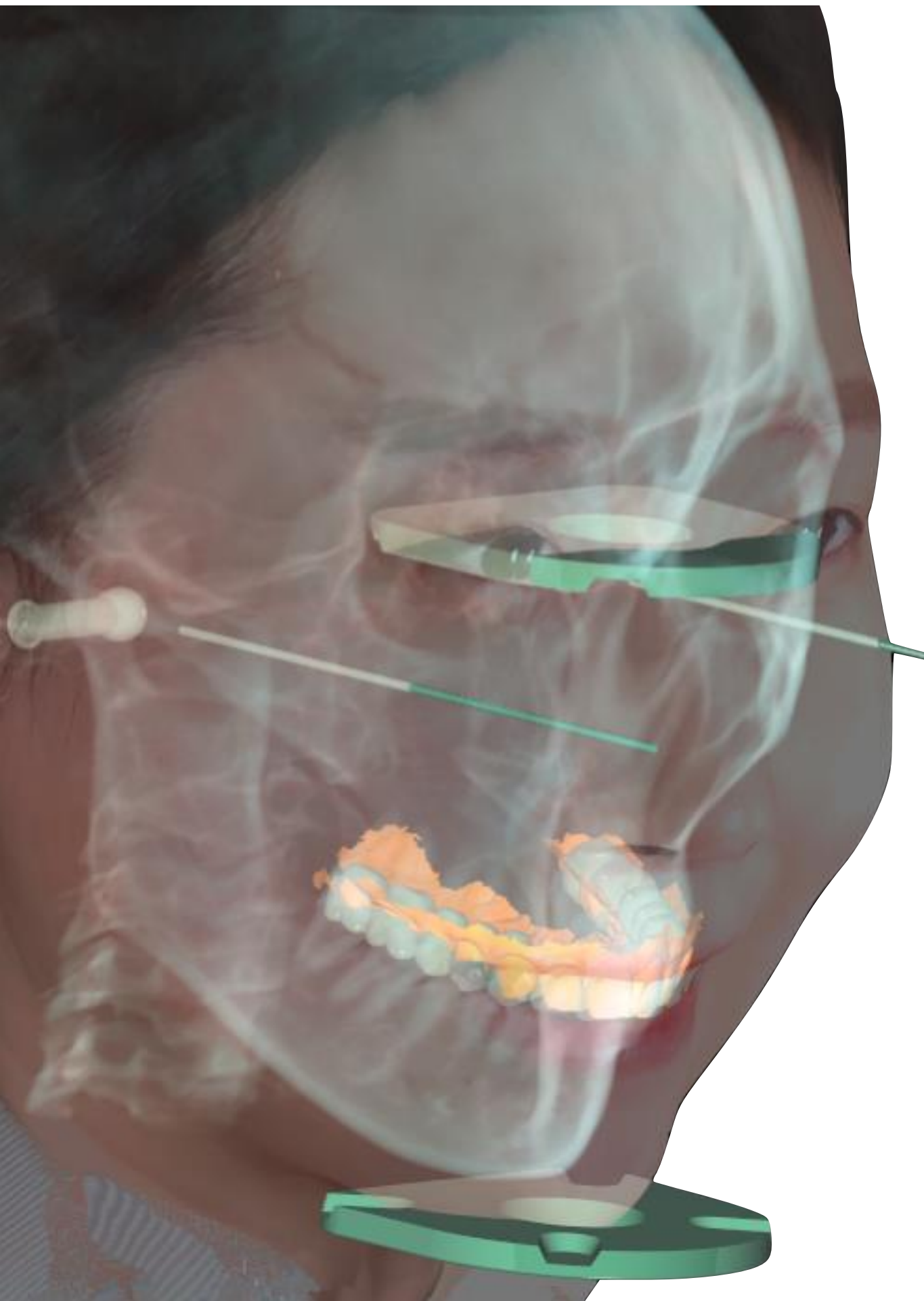
! Where can it be checked?

! More precise prosthesis design is possible by referring to the extracted file of fully arranged teeth library in desired CAD software

4 Proceed to **STEP.06 EZ-Wax up** for detailed diagnosis wax-up design



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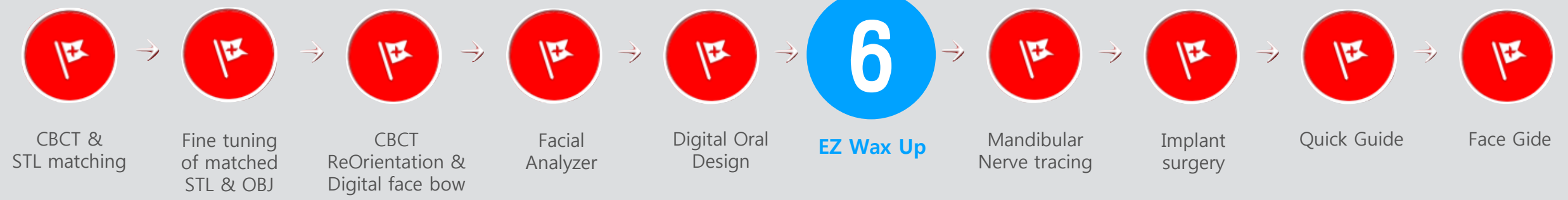


8 Digital Oral Design EZ Wax up



EZ wax-up(EN)

8.1 R2GATE™ DOD Control Buttons

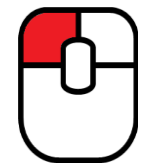


**R2
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Control Buttons

Control Keys



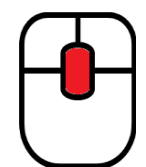
Left click:

Model Rotation and Library Movement



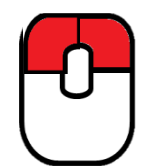
Right click:

Library Arrangement



Wheel scrolling:

Model Zoom-in & out

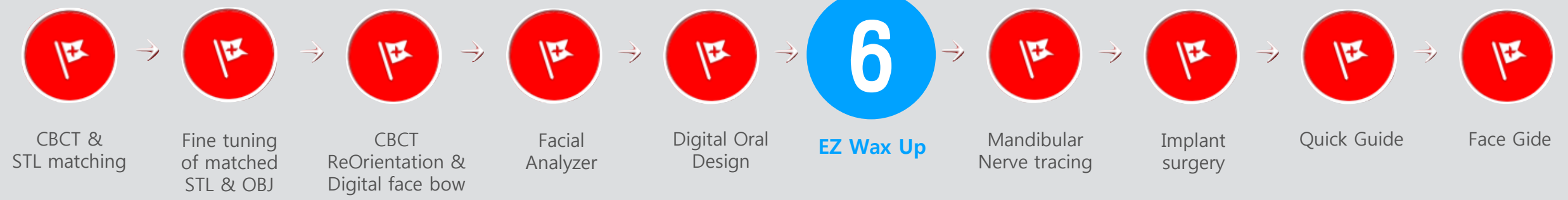


Right & left click:

Model Movement



8.1 R2GATE™ DOD Control Buttons



**R2
GATE**

Digital Oral Design
Mar. 2019

Control Buttons

Import 2D image (ADD IMAGE button)

2D Image Control Keys (VIEW, PICTURE, NAME buttons)

3D Volume Control (Click skull icon, Use the mouse to rotate the skull and to click on the desired plane)

Distance measurement function (Ruler icon)

Import R2 Digital Mounting Model (Folder icon)

Import antagonist (Antagonist icon)

Rotation function according to X&Y-axis (Rotation icons)

Mock up export (Export icon)

Wax up export (Wax up icon)

Delete wax-up (Delete icon)

Set tooth extraction area (Tooth extraction icon)

Save deleted model (Save icon)

Restore to original model (Reset icon)

Tooth extraction (APPLY button)

Apply selected wax-up library (UPPER, LOWER buttons)

Standard library transparency adjustment (Transparency sliders)

Wax-up transparency adjustment (Transparency sliders)

Select wax-up library dentition (LIBRARY POSITION button)

GRID ON/OFF Display main STL (GRID, MAIN STL buttons)

UPPER WAXUP (UPPER WAXUP slider)

LOWER WAXUP (LOWER WAXUP slider)

TEETH (TEETH slider)

VIEW OPTIONS (VIEW OPTIONS button)

Project Save (Project Save button)

STEP-06 (STEP-06 button)

NAVIGATION (NAVIGATION button)

3D (3D button)

2D (2D button)

Reset (Reset button)

Contrast (Contrast slider)

Brightness (Brightness slider)

Alpha (Alpha slider)

Rotation (Rotation slider)

Move (Move slider)

Scale (Scale slider)

RESET (RESET button)

ANTERIOR (ANTERIOR button)

POSTERIOR (POSTERIOR button)

RIGHT (RIGHT button)

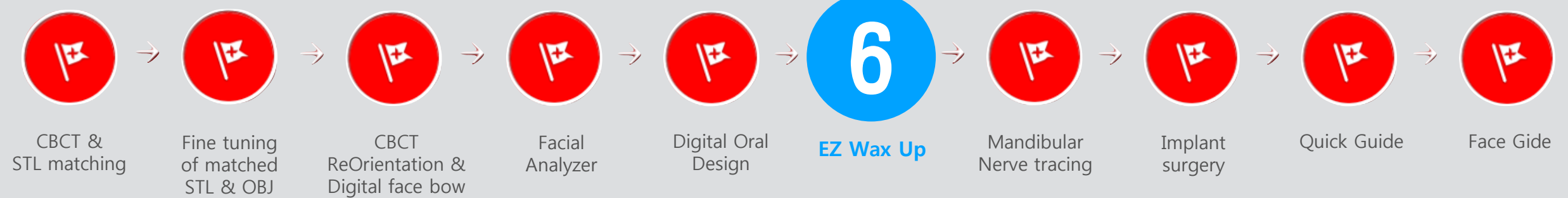
LEFT (LEFT button)

SUPERIOR (SUPERIOR button)

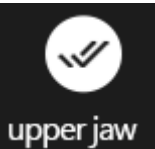
INFERIOR (INFERIOR button)

8.2 EZ Wax up

Diagnosis wax up

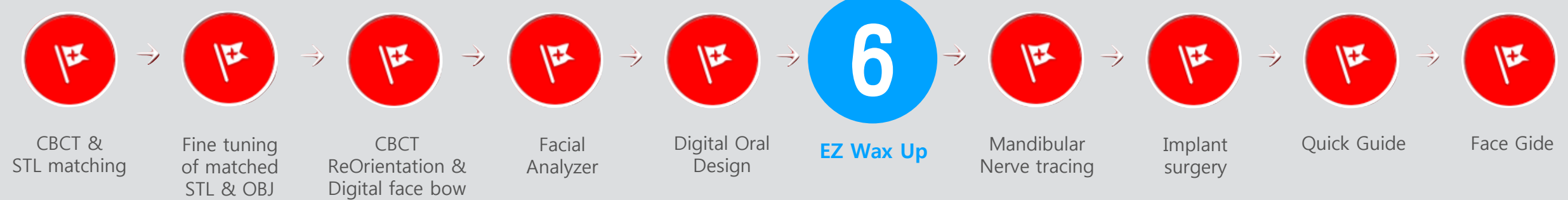


Diagnosis wax up

- 1 Left click on the tooth to work with
- ! Click on one tooth and click Ctrl+Click tooth : Possible to select numerous numbers of teeth
- !  : Select whole teeth
- 2 Click **APPLY** to create wax-up library
- 3 Place the library to a desired position and right click to fix it in place



8.2 EZ Wax up Diagnosis wax up



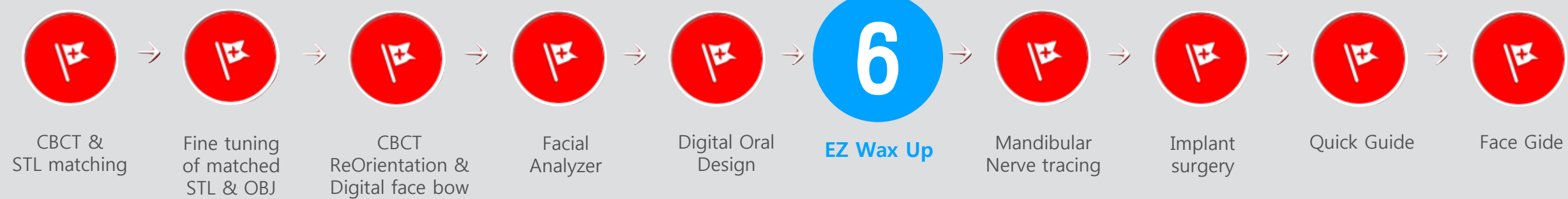
Diagnosis wax up

- 1 After arranging the library, Use the control key to design in desired position and shape

Right click to select by group in the pop-up window
- a Group : Control whole teeth by group
- b Ungroup : Control individual teeth
- ! Adjust the wax-up transparency if needed



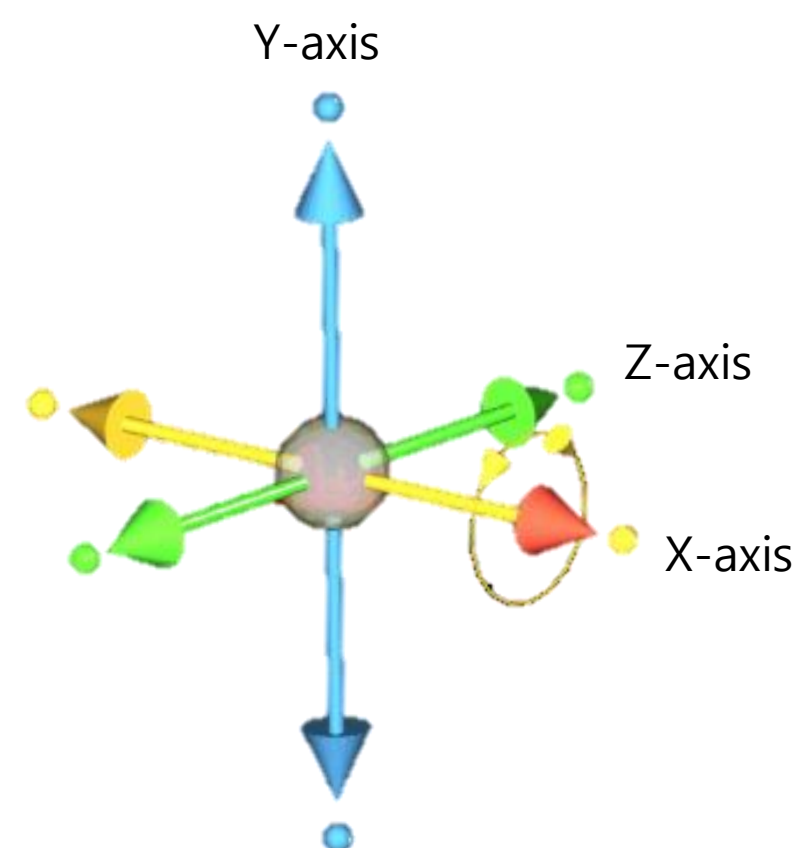
8.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

- 1 Use X, Y and Z Axis control keys to adjust the size and position of the wax up

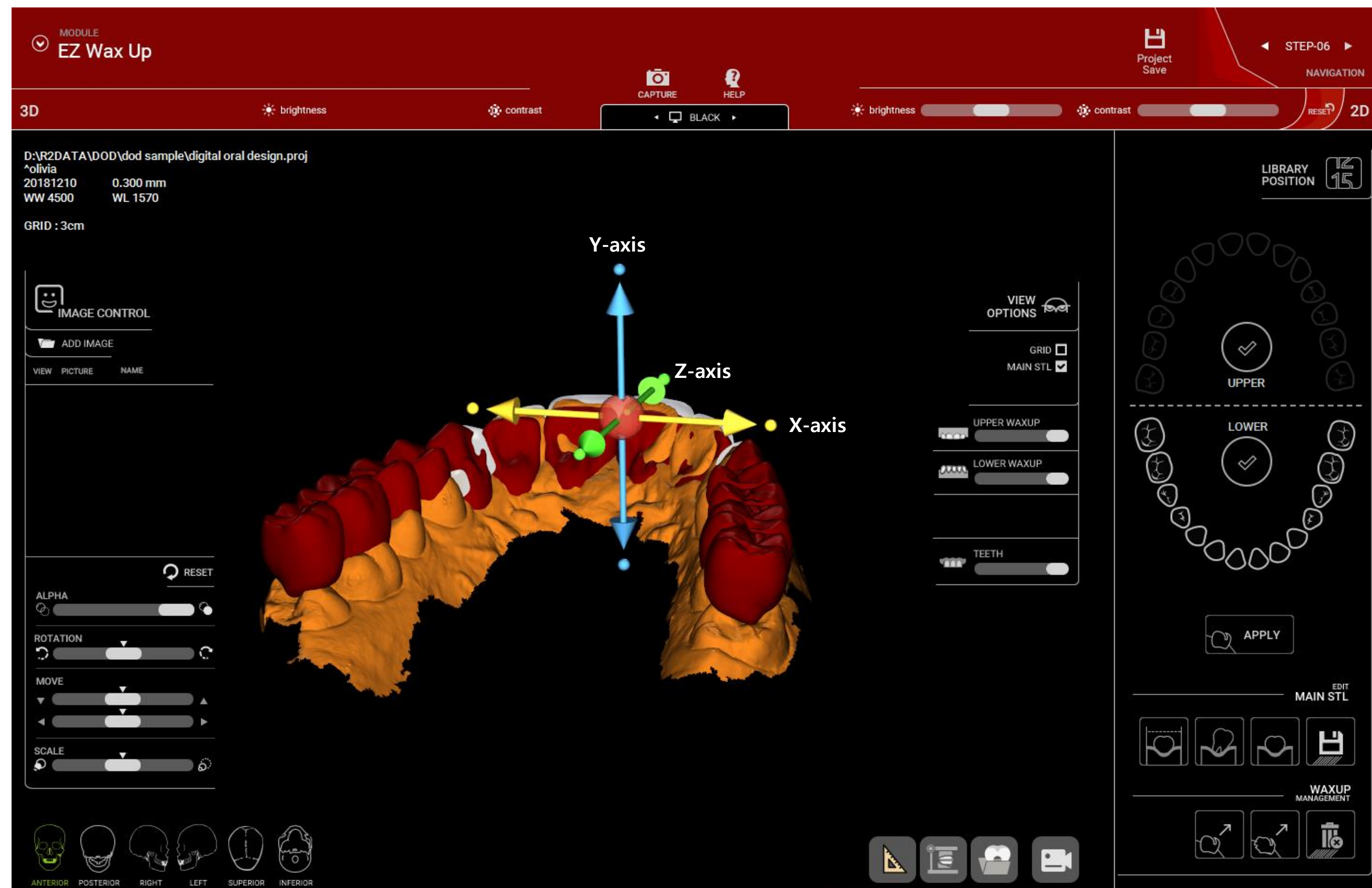
X, Y, Z Axis Control Key



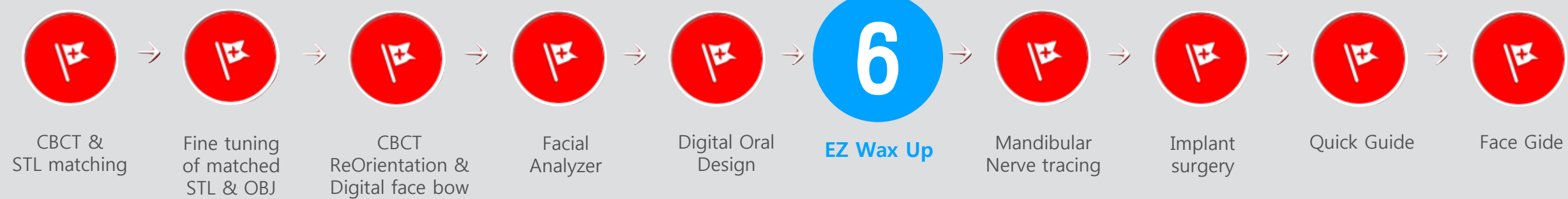
Can be operated **ONLY** with the mouse wheel

- Point : Library size adjustment by axis
- Arrow : Library rotation adjustment by axis
- Line : Library position adjustment by axis
- Center ball : Library Movement

! Refer to the next page for Control Key Operation Method

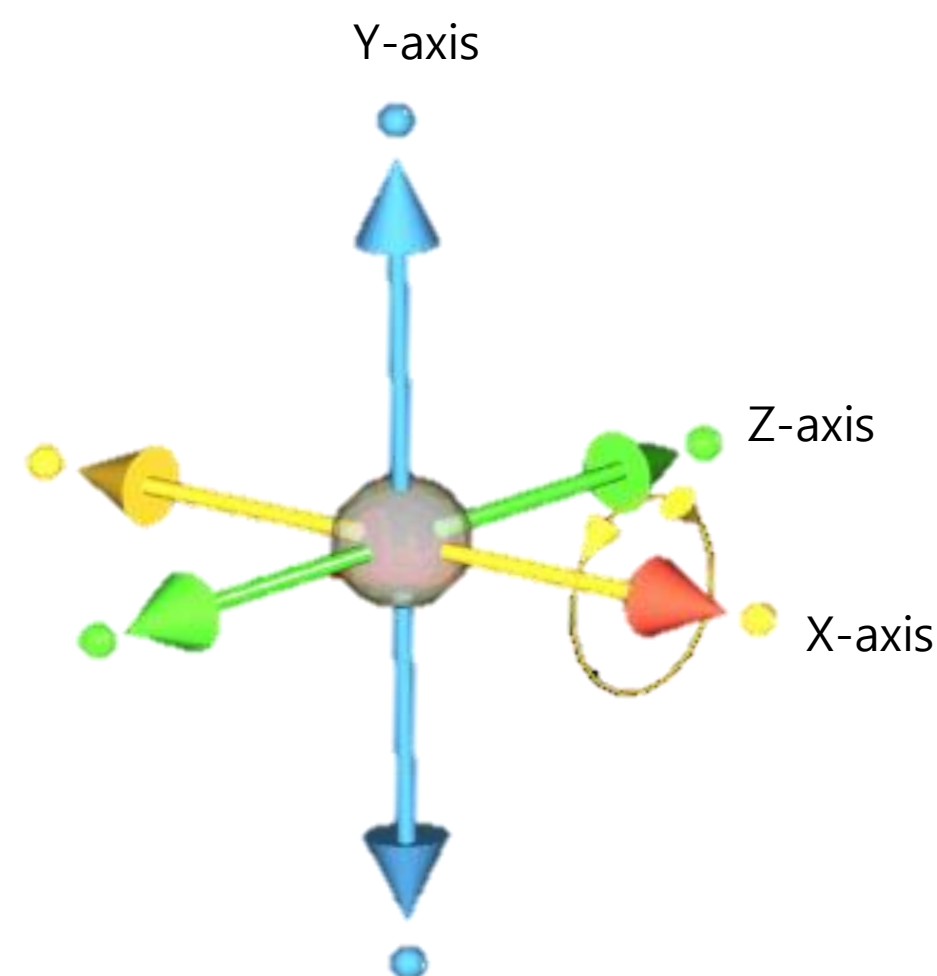


8.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

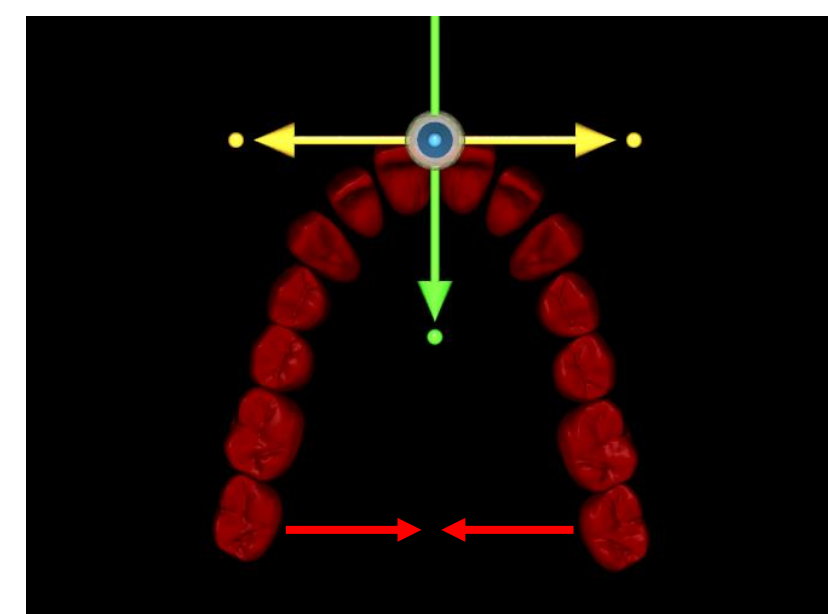
X, Y, Z Axis Control Key



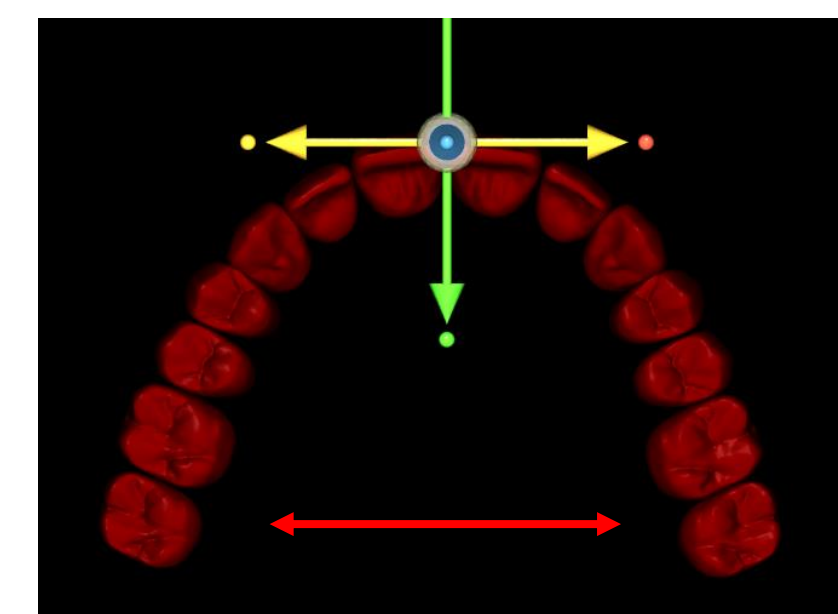
Click a point, arrow and line that is to be controlled and move with the mouse wheel.

1 Point: Library size adjustment by axis

a X-axis

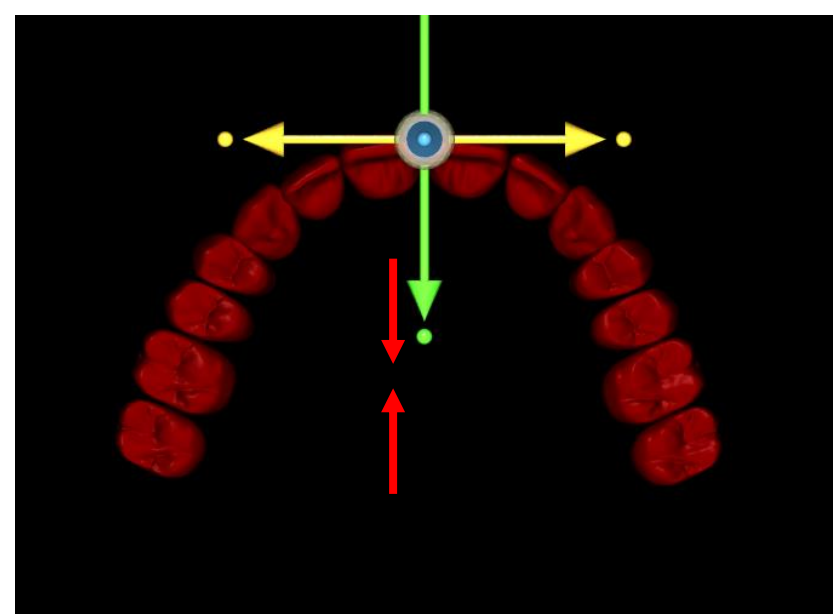


Drag downward(-): X-axis reduction

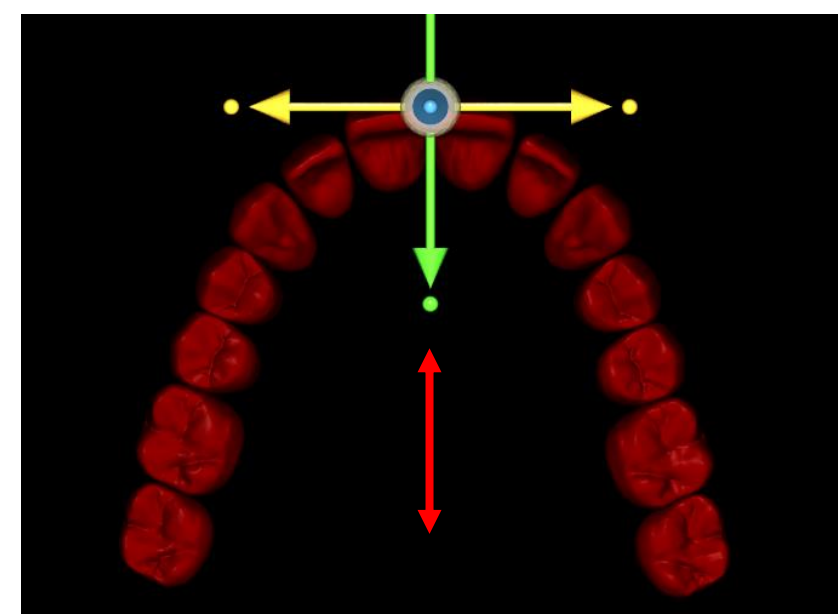


Drag upward(+): X-axis magnification

b Y-axis

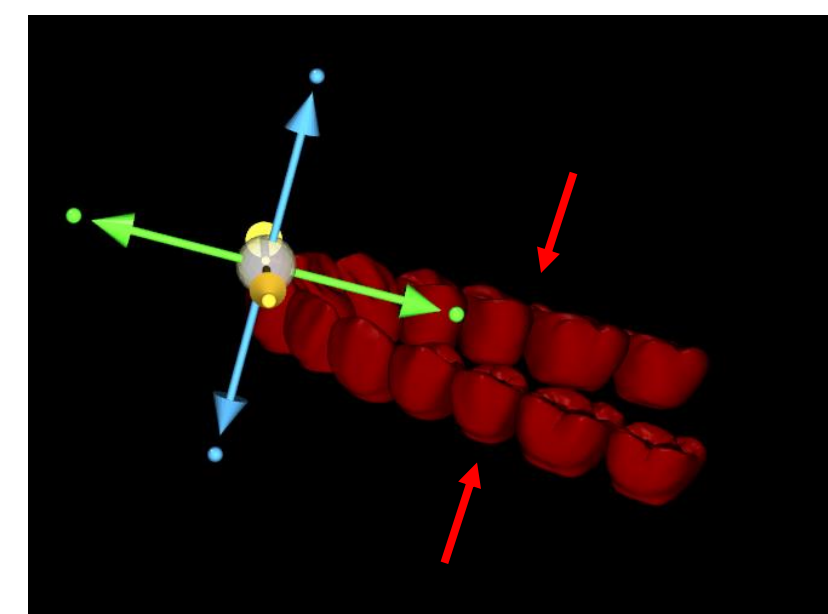


Drag downward(-): Y-axis reduction

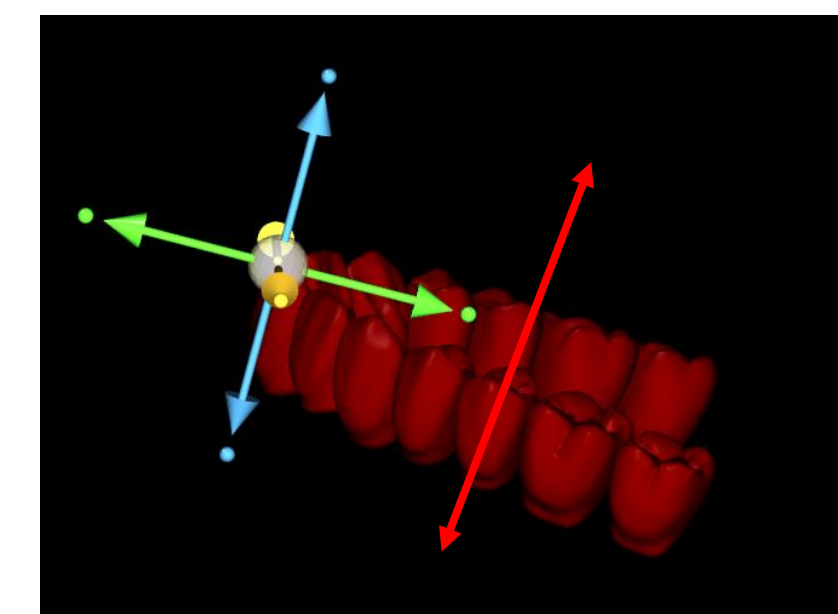


Drag upward(+): Y-axis magnification

c Z-axis



Drag downward(-): Z-axis reduction



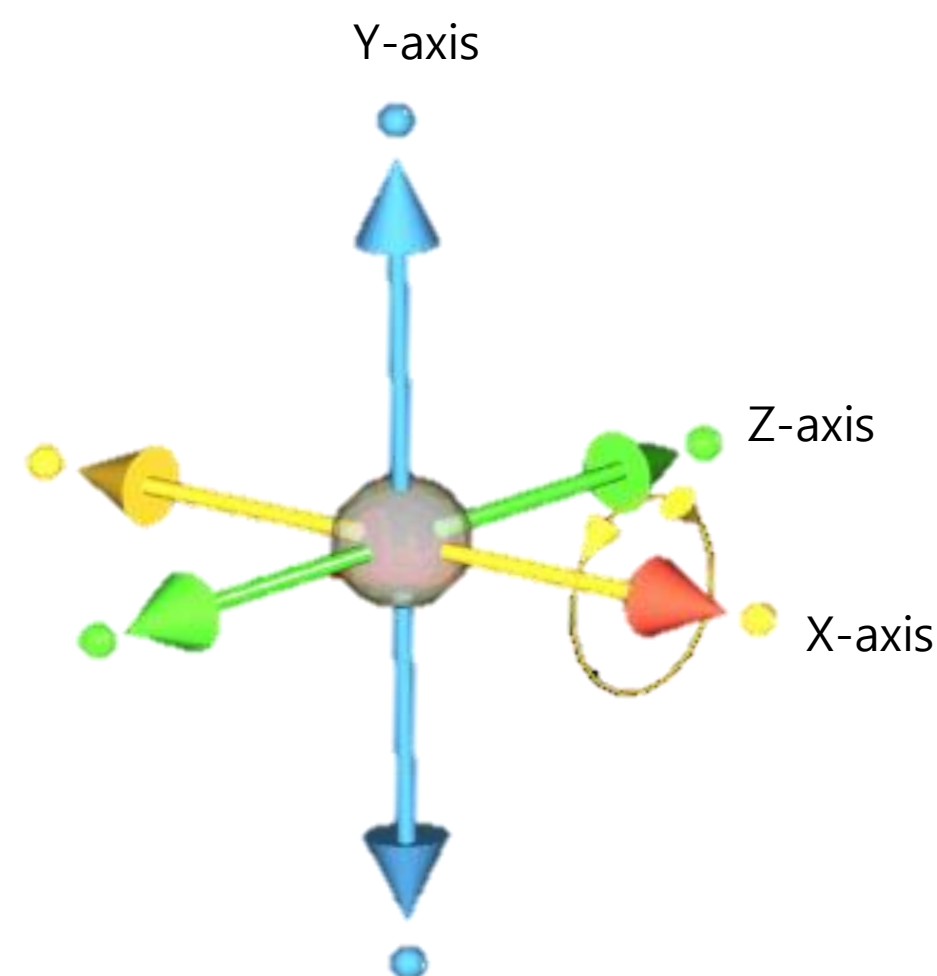
Drag downward(-): Z-axis reduction

8.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

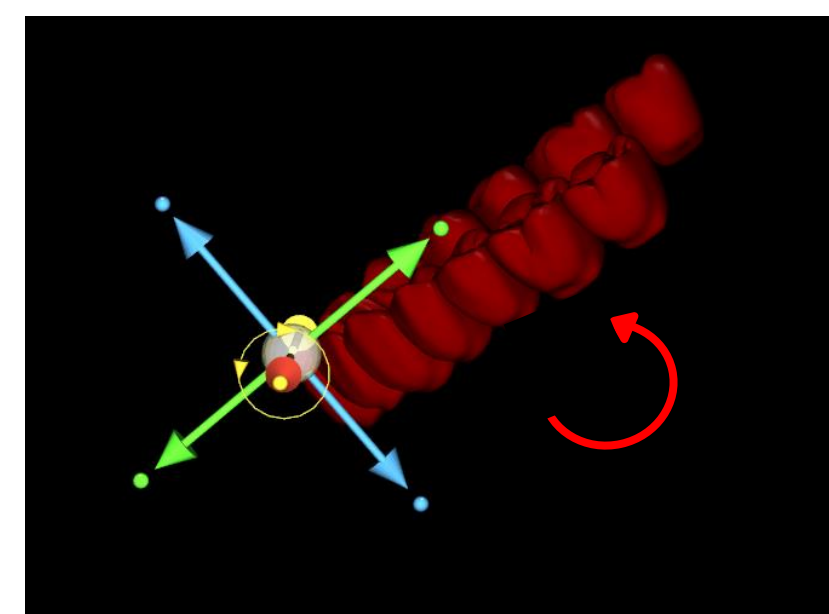
X, Y, Z Axis Control Key



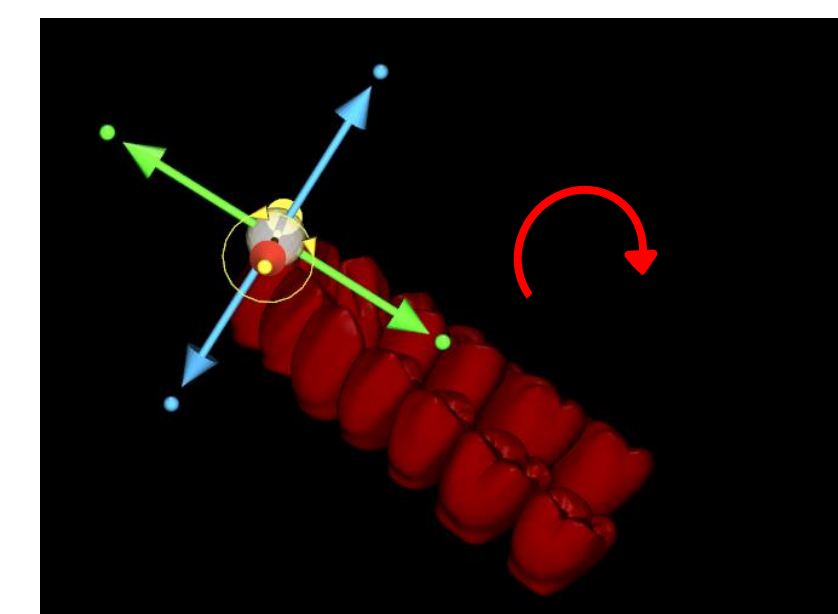
Click a point, arrow and line that is to be controlled and move with the mouse wheel.

2 Arrow: Library rotation adjustment by axis

a X-axis

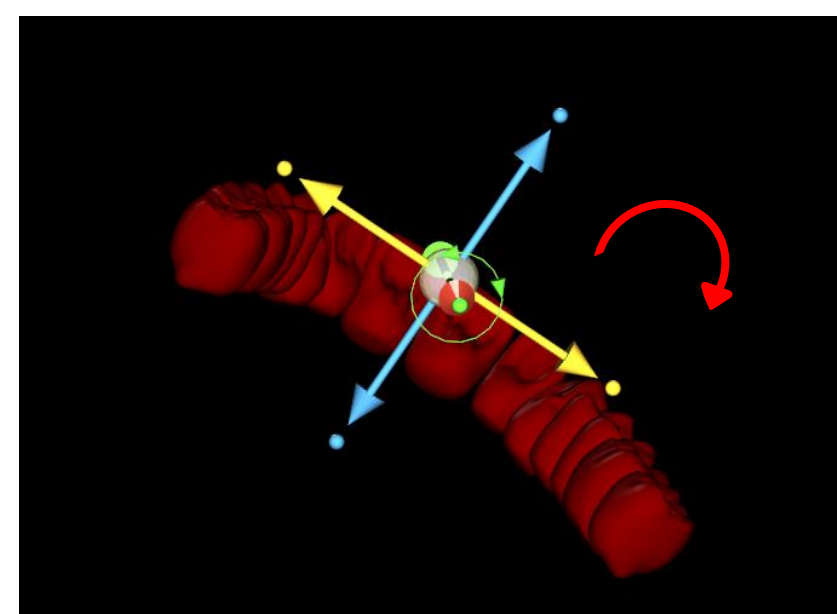


Drag downward (-): Rotate counterclockwise by X-axis

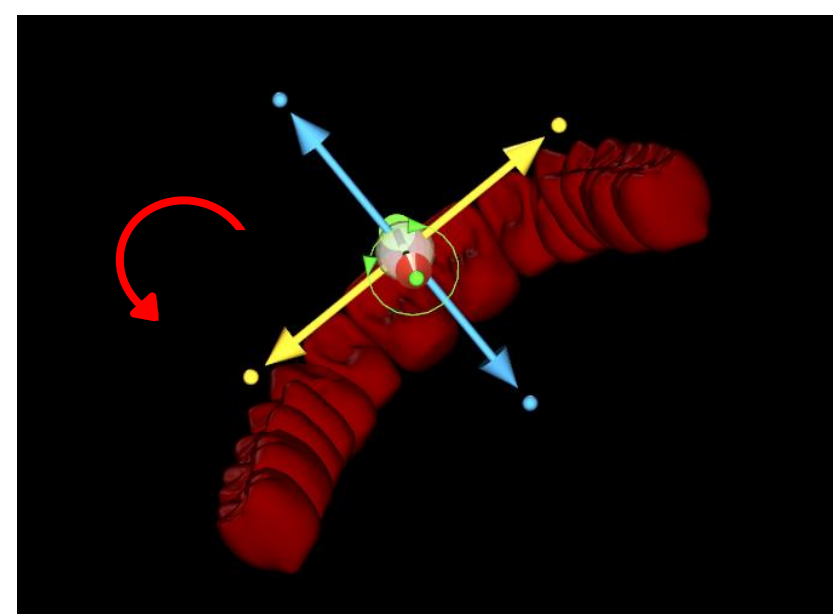


Drag upward (+): Rotate clockwise by X-axis

b Y-axis

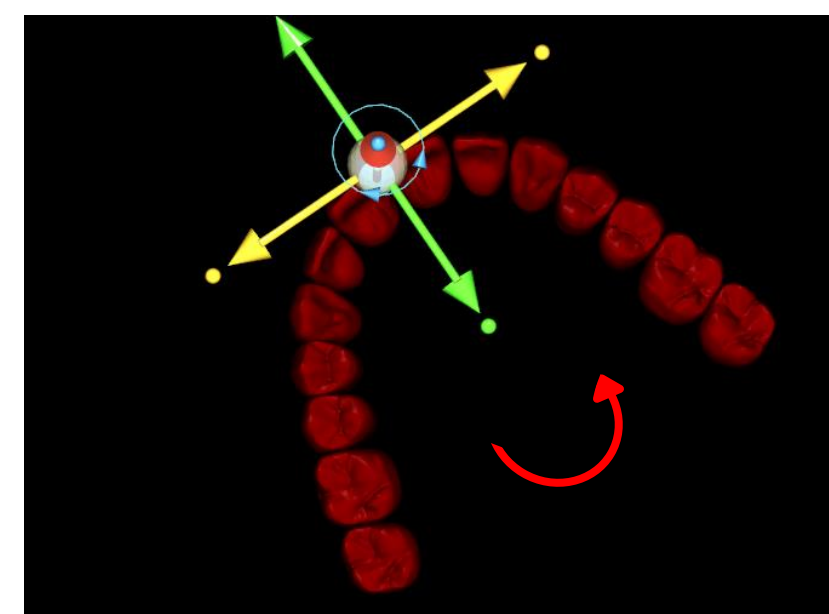


Drag downward (-): Rotate clockwise by Y-axis

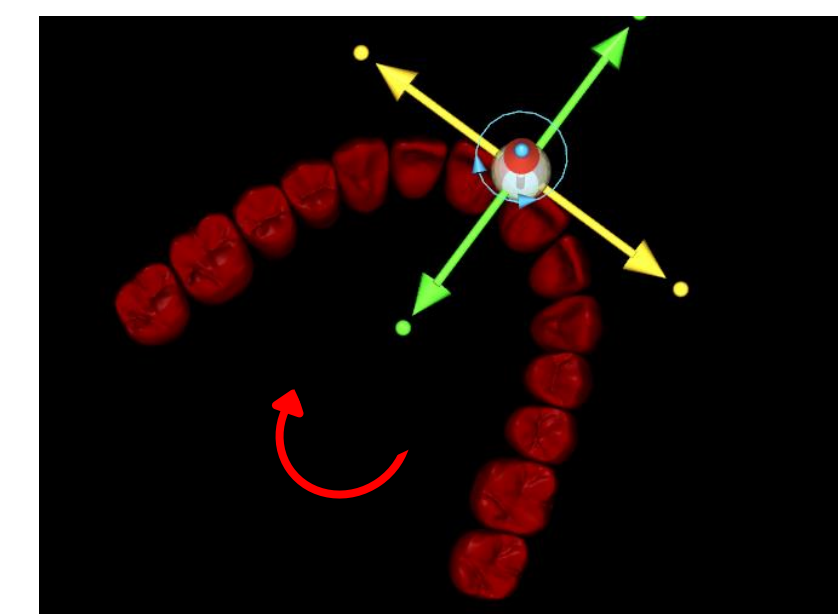


Drag upward (+): Rotate counterclockwise by Y-axis

c Z-axis



Drag downward (-): Rotate counterclockwise by Z-axis



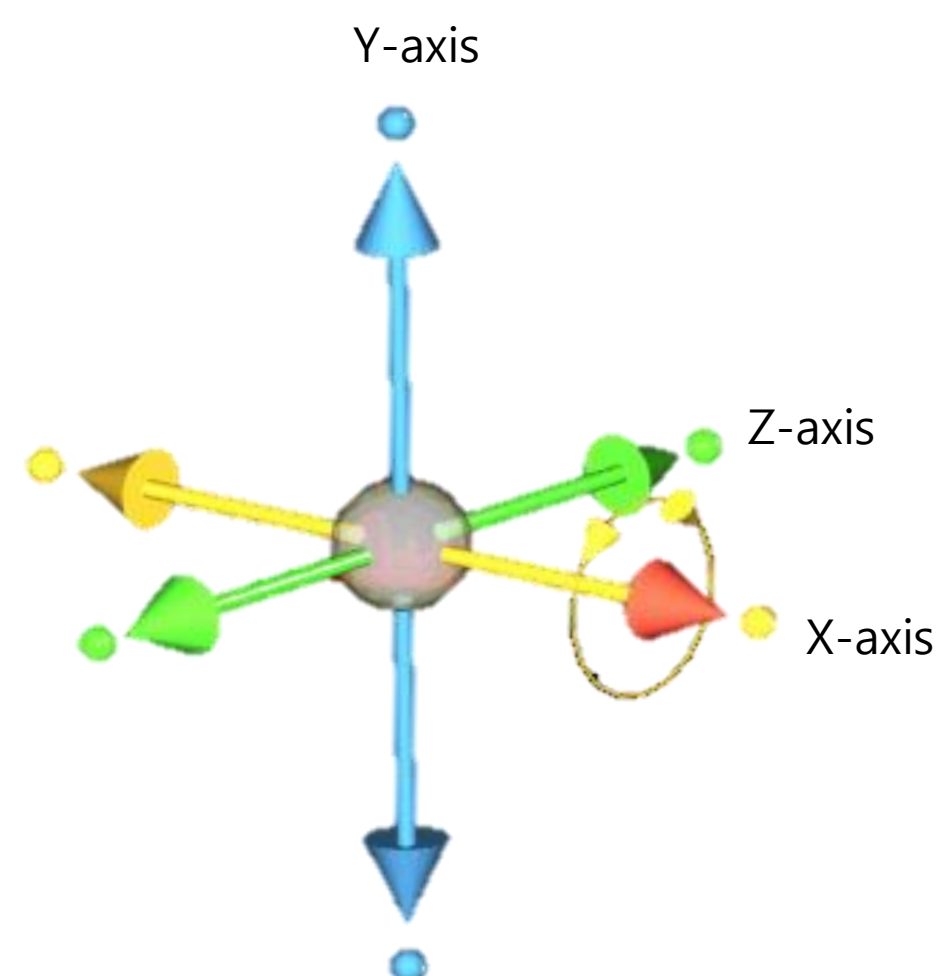
Drag upward (+): Rotate clockwise by Z-axis

8.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

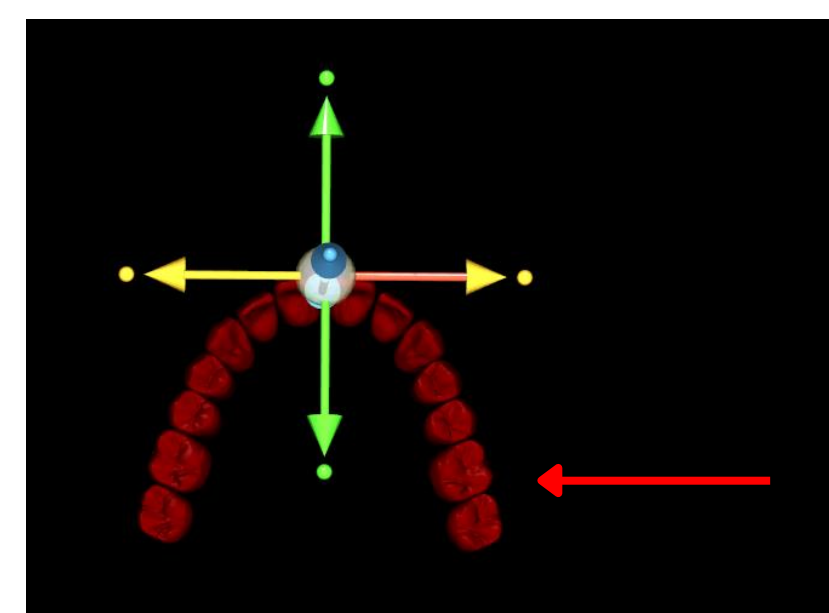
X, Y, Z Axis Control Key



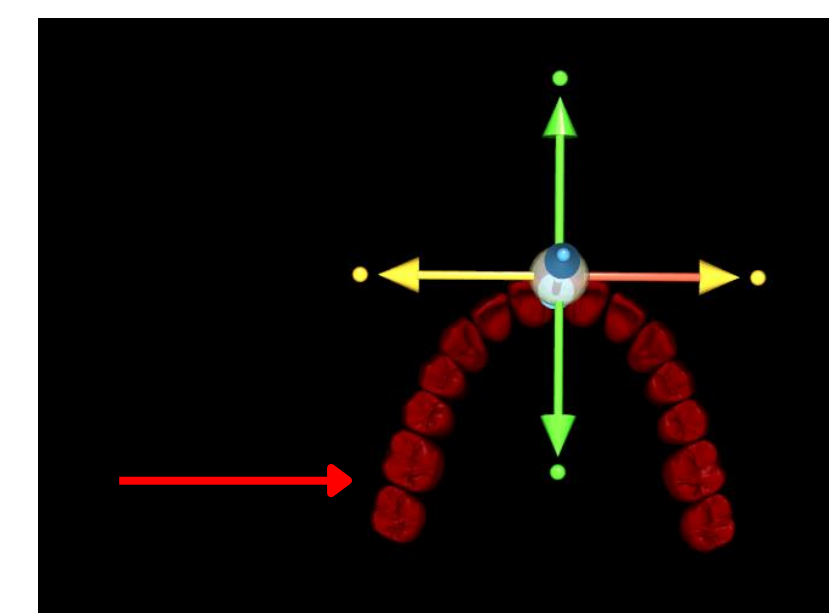
Click a point, arrow and line that is to be controlled and move with the mouse wheel.

3 Line : Library position adjustment by axis

a X-axis

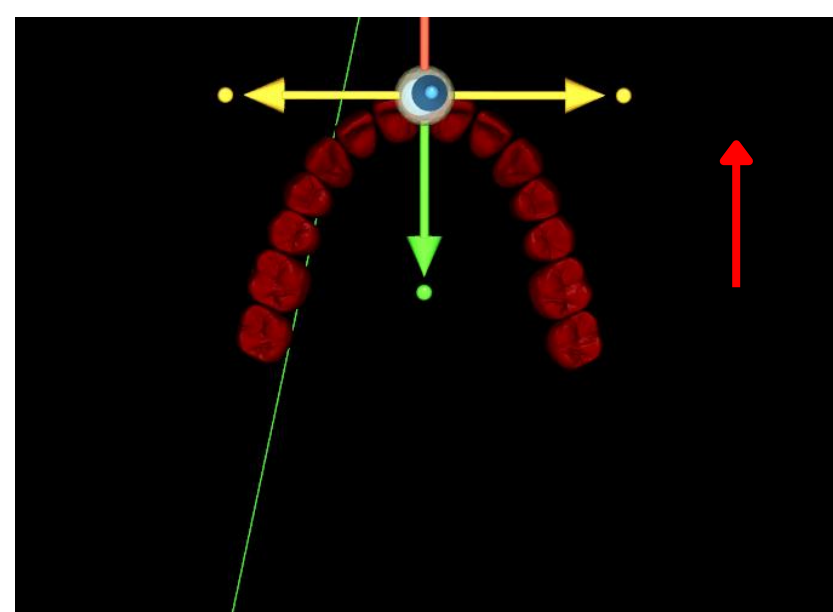


Drag downward (-): Move left

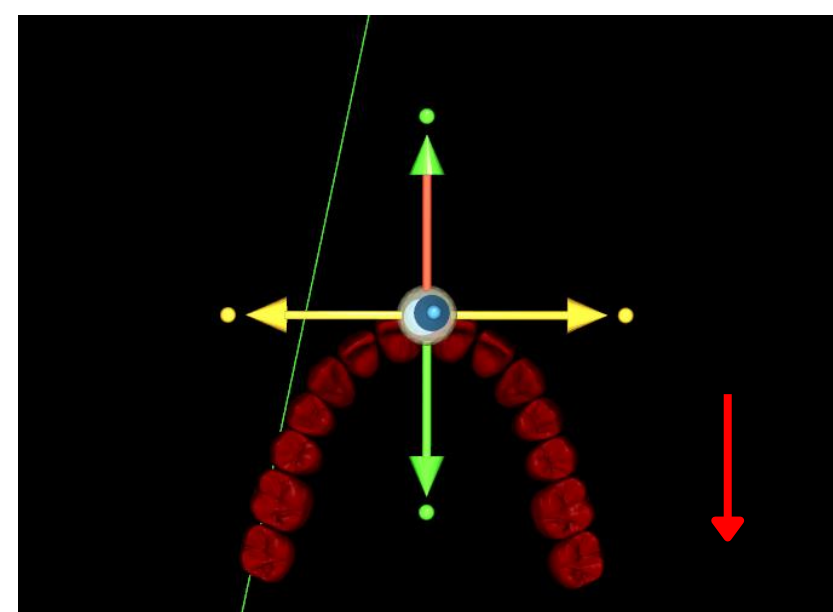


Drag upward (+): Move right

b Y-axis

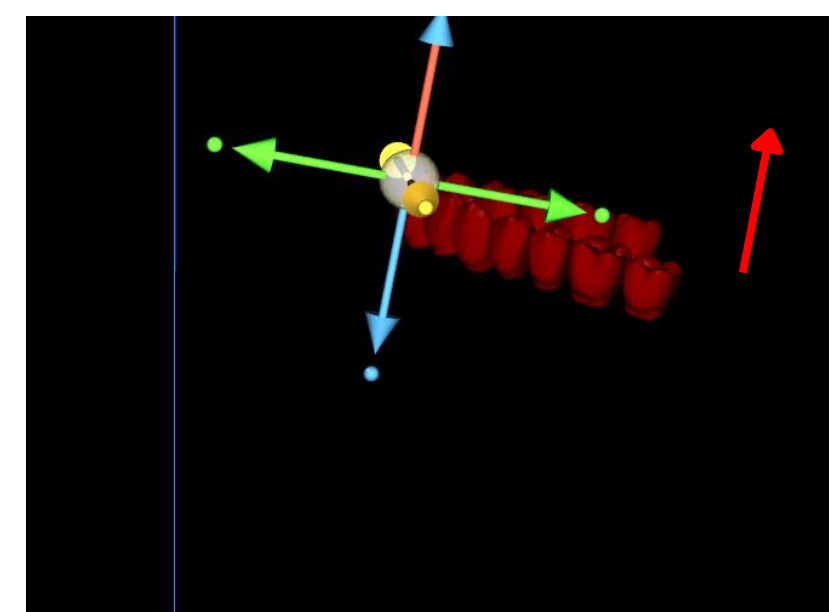


Drag downward (-): Move up

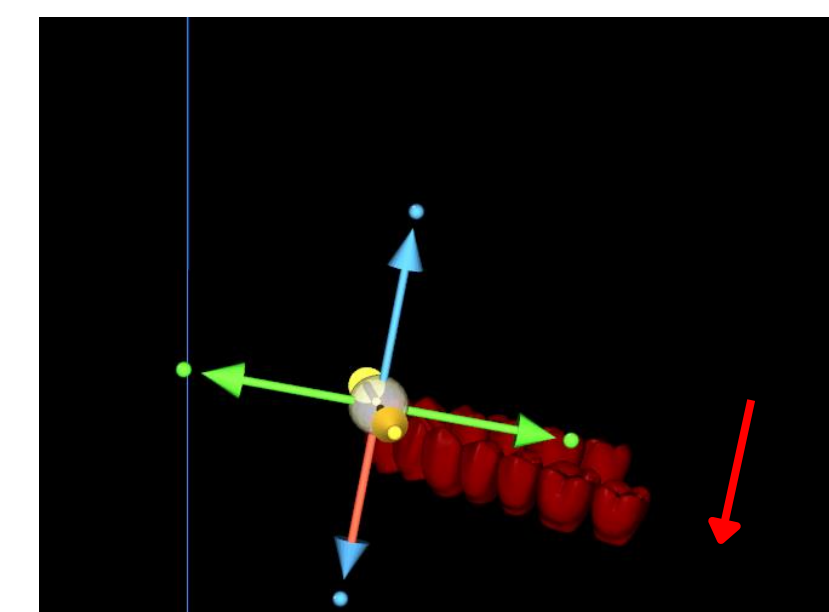


Drag upward (+): Move down

c Z-axis

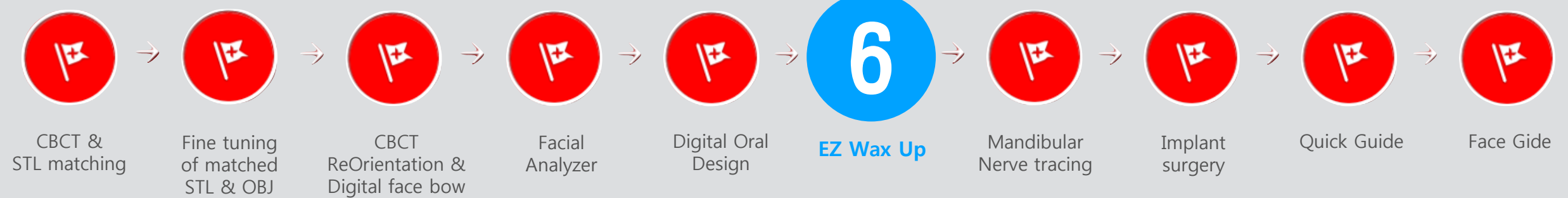


Drag downward (-): Move up



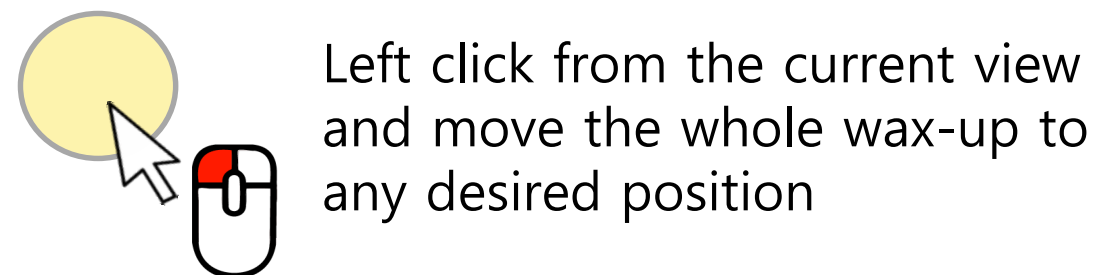
Drag upward (+): Move down

8.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

3 Center ball : Library Movement

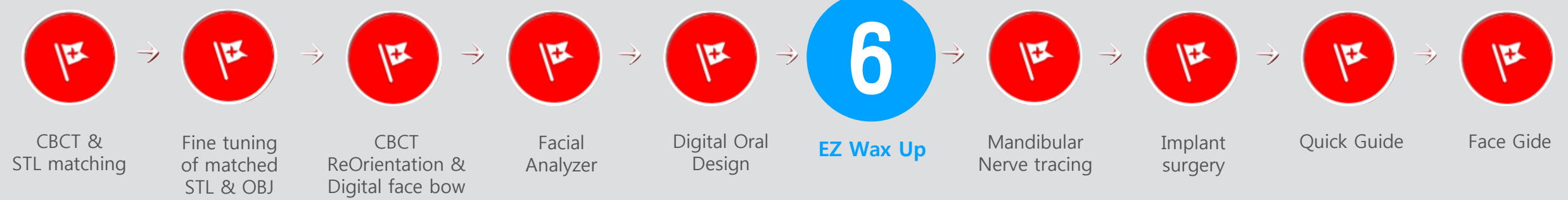


! Using 3D Volume control, Wax-up in various views is possible

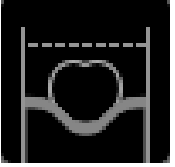
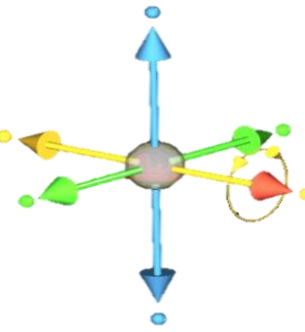
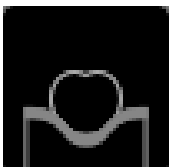
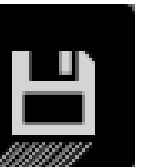
4 When designing is complete, click **Export** icon to extract wax-up file(STL)

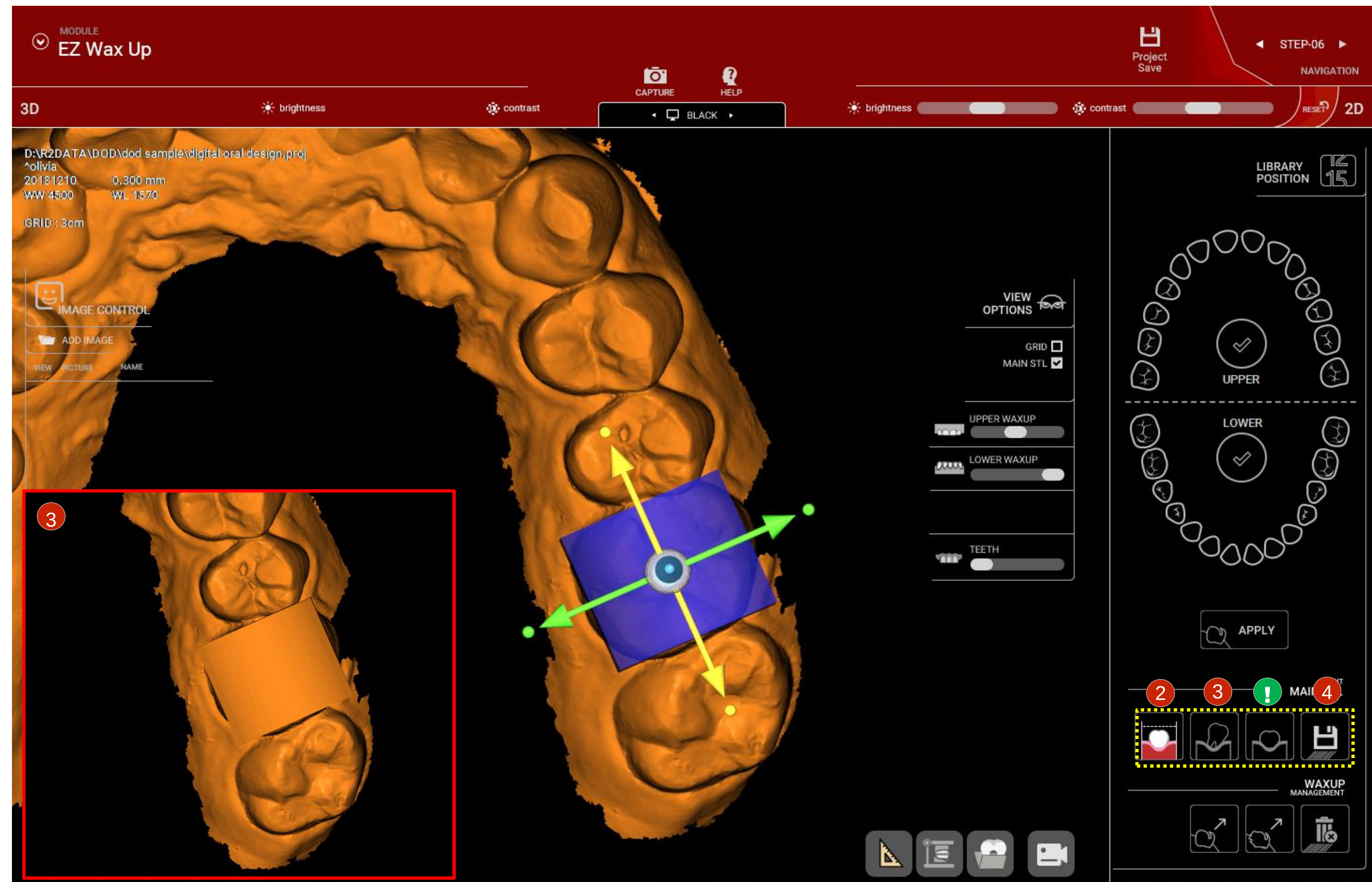


8.3 EZ Wax up Extraction



Extraction

- 1 In case of processing immediately after tooth extraction, remove desired teeth from the model
- 2  Click the icon to set the area of removal
 Place the library to a desired position and right click to fix it in place
 Use X, Y and Z Axis control keys to adjust the position of the library
- 3  Click **Extraction** icon to delete the set area
 Be careful not to delete the adjacent tooth
  Restore to original model
- 4  Click **Save** icon to save the deleted model file as STL



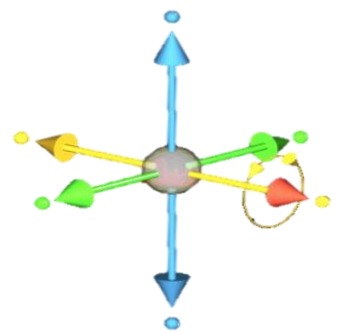
8.4 EZ Wax up Mock up



Mock-up Function

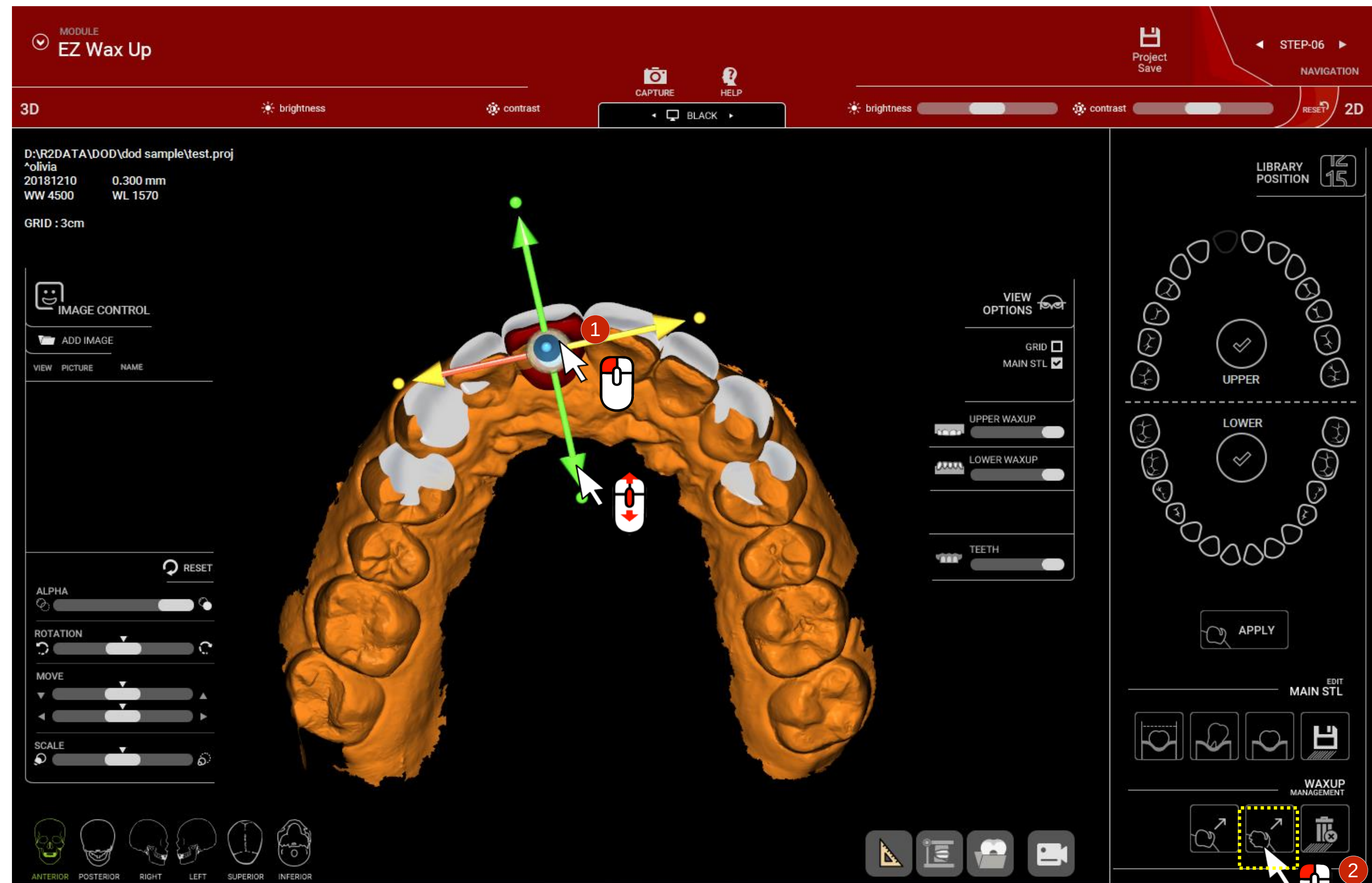
In case of laminate,
Mock-up function can be utilized

- 1 Design wax-up using the control keys



Use X, Y and Z Axis control keys to adjust the position of the library

- 2 When designing is done, left click **Mock-up Export** icon to extract as STL file

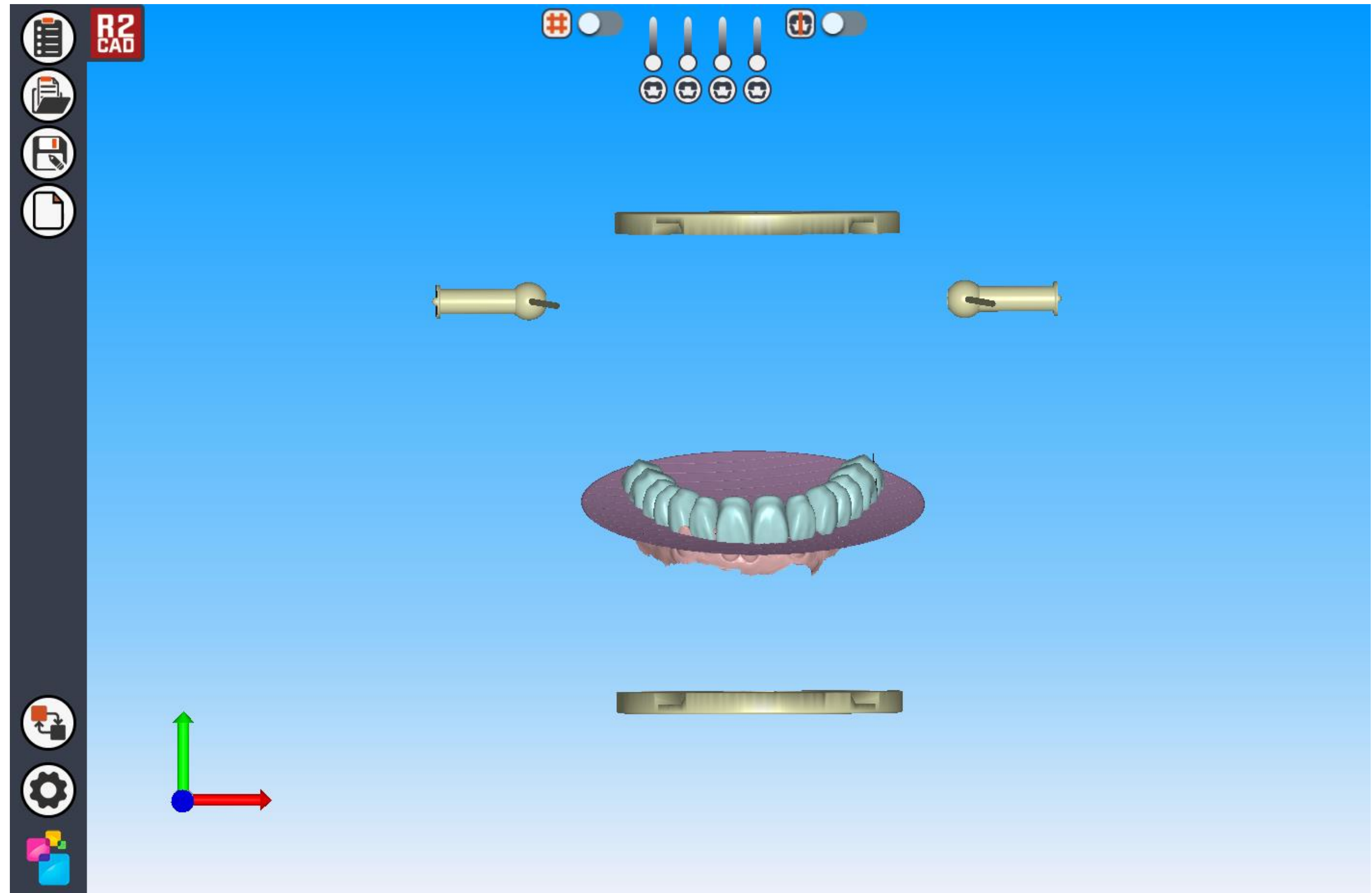


8.5 EZ Wax up Apply for CAD

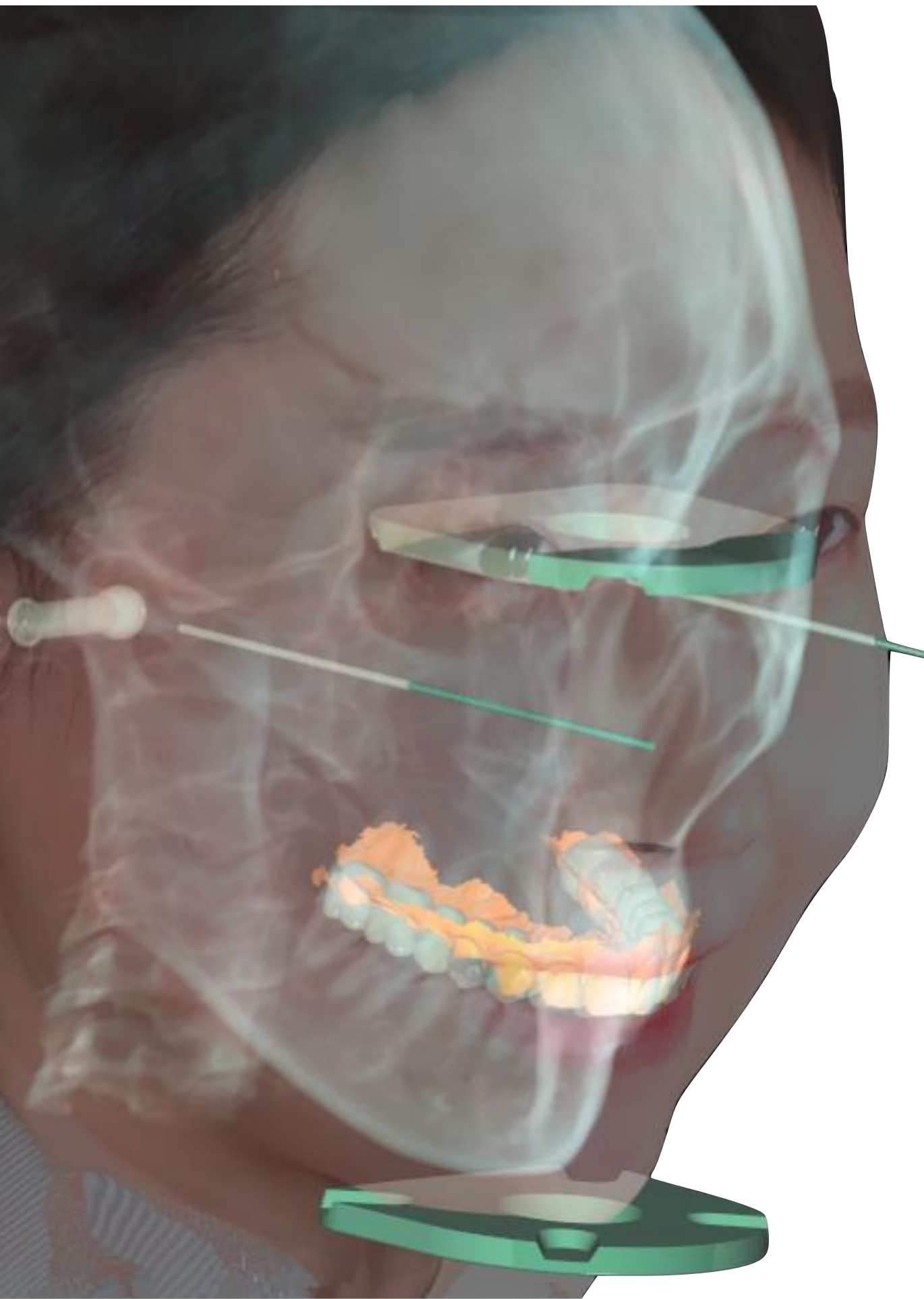


Apply wax-up for CAD

The Model + Articulator + Wax-up files exported from R2GATE can be imported to CAD software to produce more accurate and precise final prosthesis



R2GATE™
Turning imagination into reality

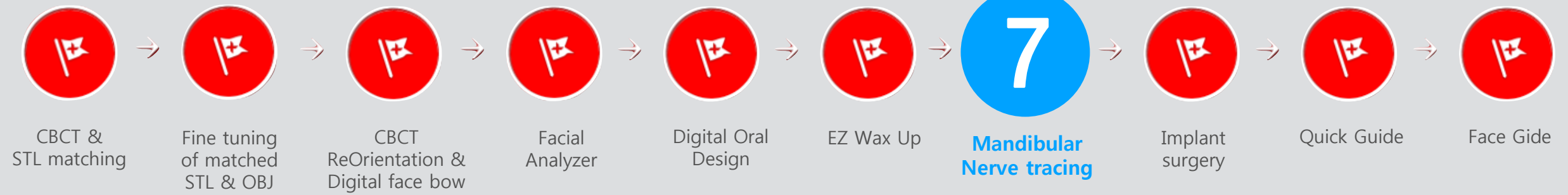


9 Digital Oral Design Nerve Tracing



Nerve Tracing(EN)

9.1 R2GATE™ DOD Control Buttons



**R2
GATE**

Digital Oral Design
Mar. 2019

Control Buttons

Order of locating the neural tube

Adjustment of the cross section view of the mandibular neural tube

Vertical axis section

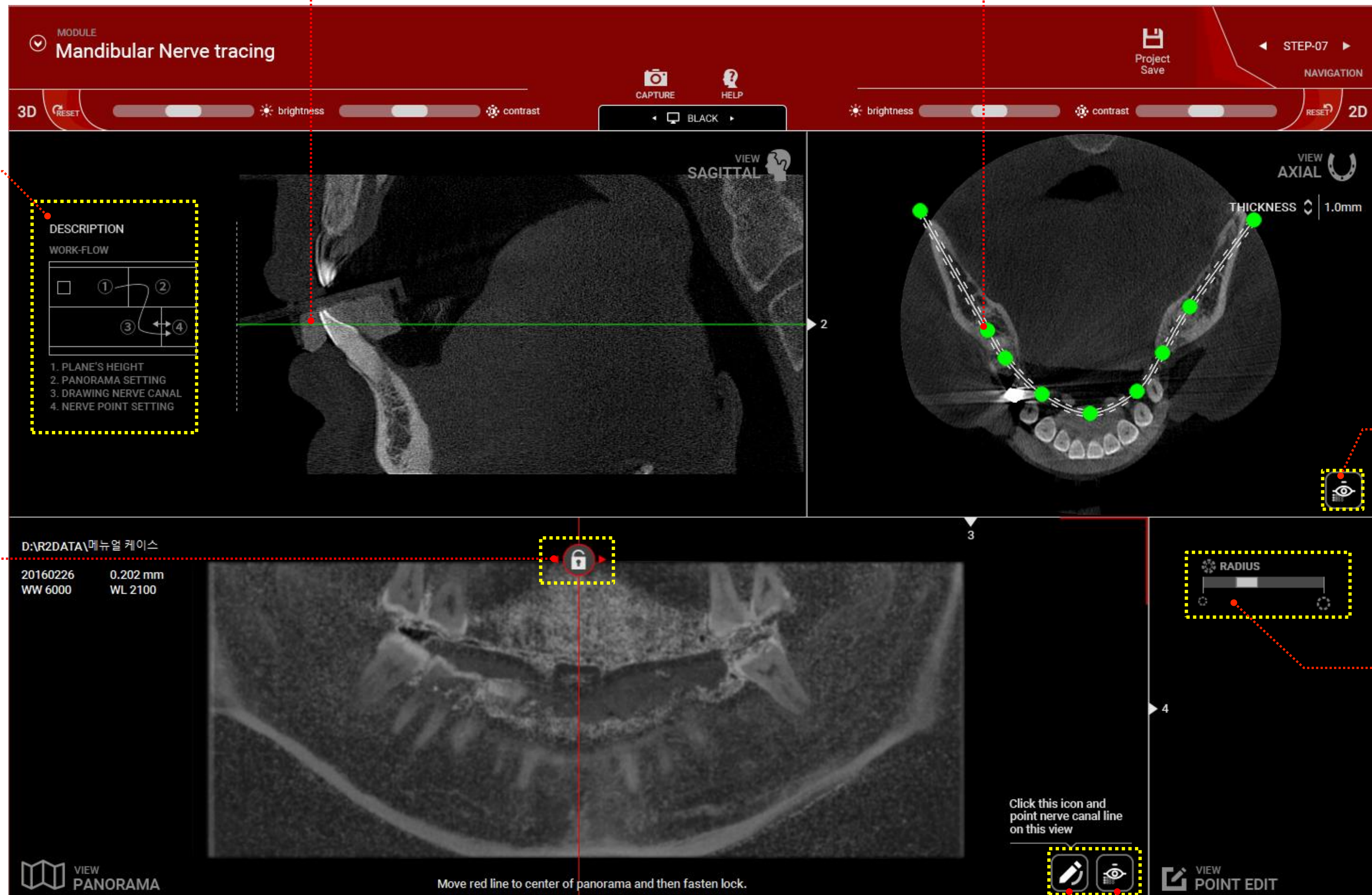
Setting Midline

CBCT filter adjustment

Nerve size adjustment

Drawing the nerve tube

Panoramic filter adjustment



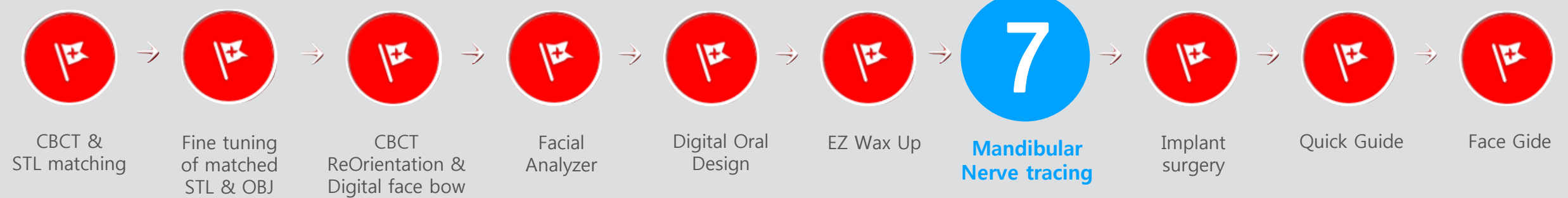
Locate mandibular nerve tube

Mandibular Nerve

- 1 Left click on the green line and move it to mandibular nerve(mental foramen)
- 2 To find the mandibular neural tube, click the white line and drag it to the mandibular arch
- 3 Click & drag each green points in the panoramic view to find mandibular nerve line
- ! Move the first end point to sideways to make the nerve line appear clearly
- 4  Click **LOCK** icon after locating the mandibular nerve tube
- 5  To draw the nerve tube, click on **NERVE DRAWING** icon
- 6 Right click on the mandibular neural tube in order starting from the mental foramen in the panoramic view
- 7 Double click on the last point
- !  To reset the nerve drawing, click the **LOCK** icon again and edit



9.2 R2GATE™ DOD Nerve Tracing



R2
GATE

Digital Oral Design
Mar. 2019

Locate mandibular nerve tube

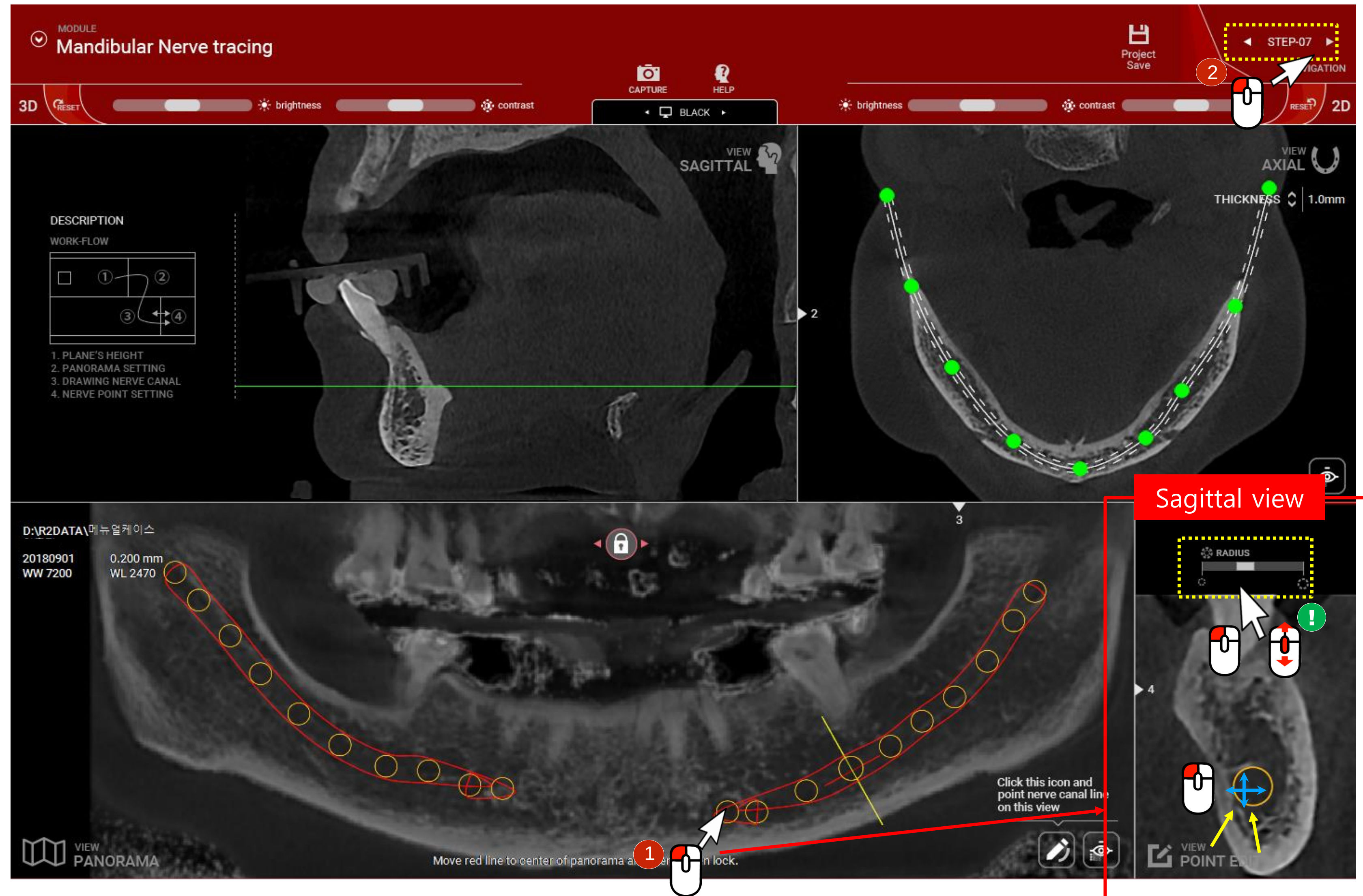
Mandibular Nerve

- 1 Click on a circle of the mandibular neural tube to check once again

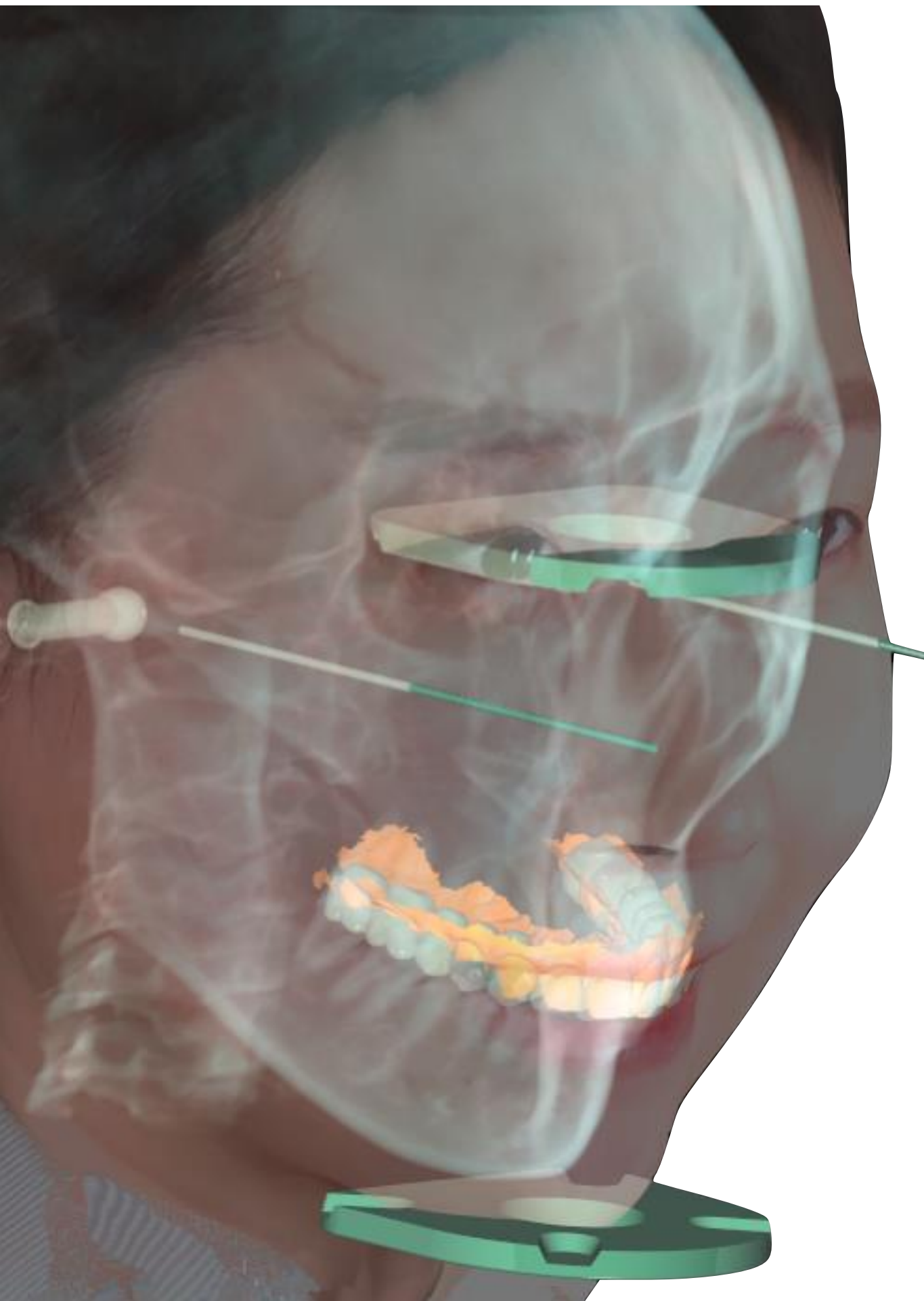
Click on the circle and adjust the size and position of the nerve tube in the sagittal view

- ! Use **Radius** to adjust the size of the mandibular neural tube

- 2 Click to proceed to next step when checking is done



R2GATE™
Turning imagination into reality

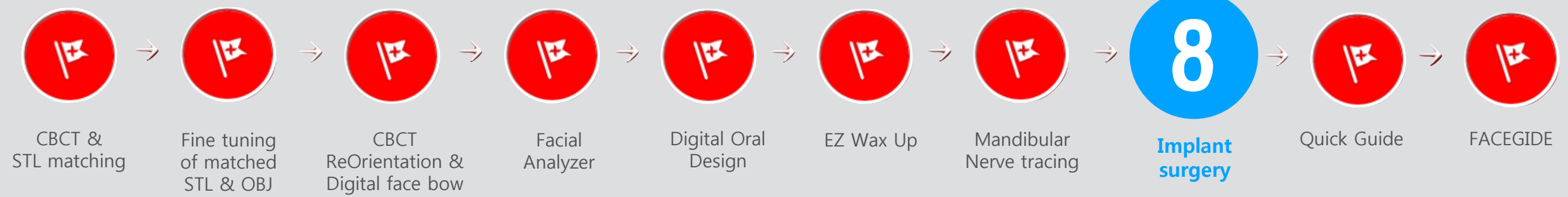


10 Digital Oral Design Implant Surgery



Implant planning(EN)

10.1 R2GATE™ DOD Control Buttons



**R2
GATE**

Digital Oral Design
Mar. 2019

Control Buttons

1 3D Volume & STL

This is the 3D window view of CBCT. The shape of the jaw bone, diagnostic wax-up and cast scan file are merged altogether to indicate the 3D position of the implant in the oral.

2 Transverse plane

The original image of the CBCT, representing the cross section plane of the head. Determines the position of the implant in the jaw bone

3 Sagittal plane

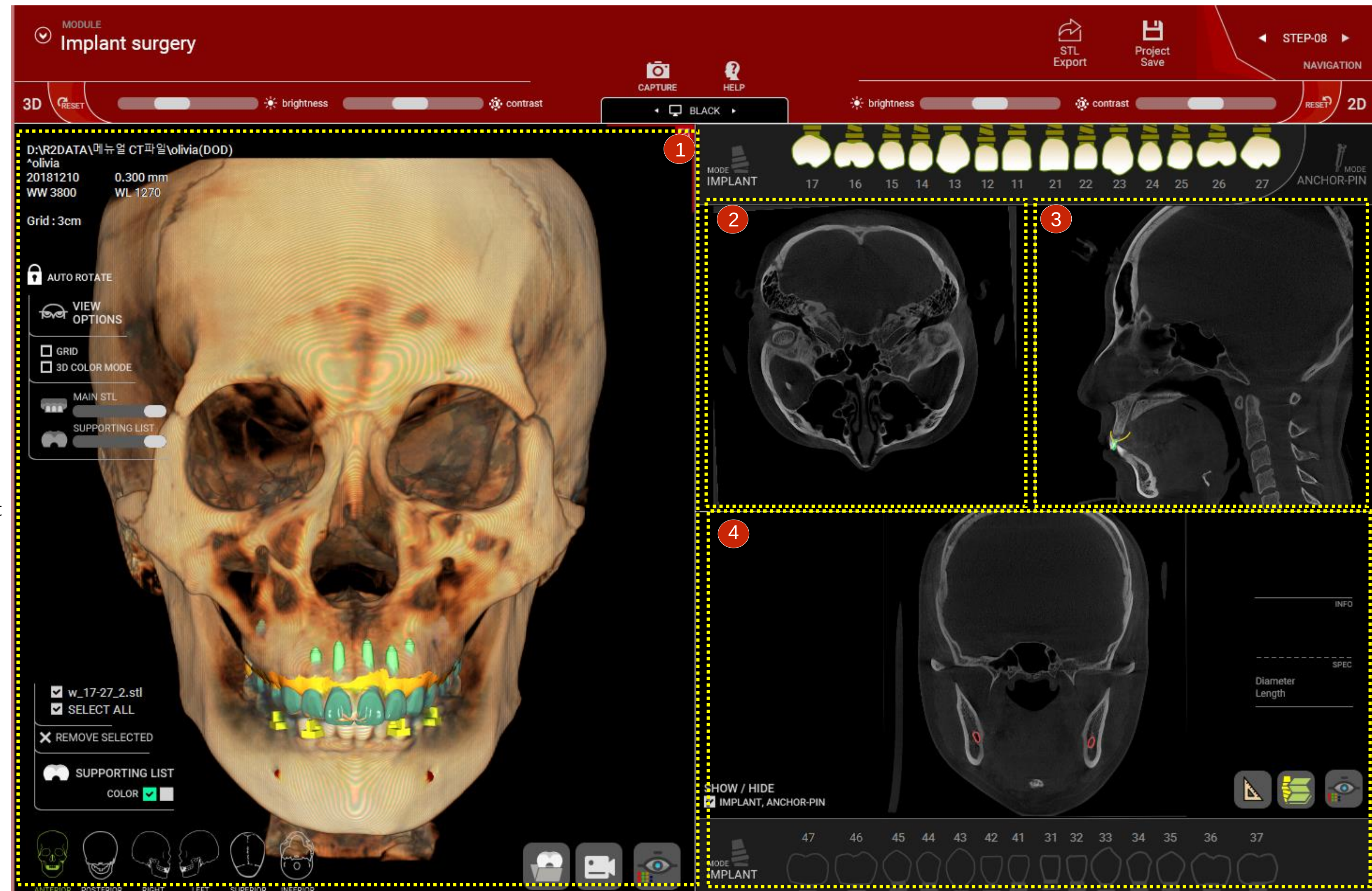
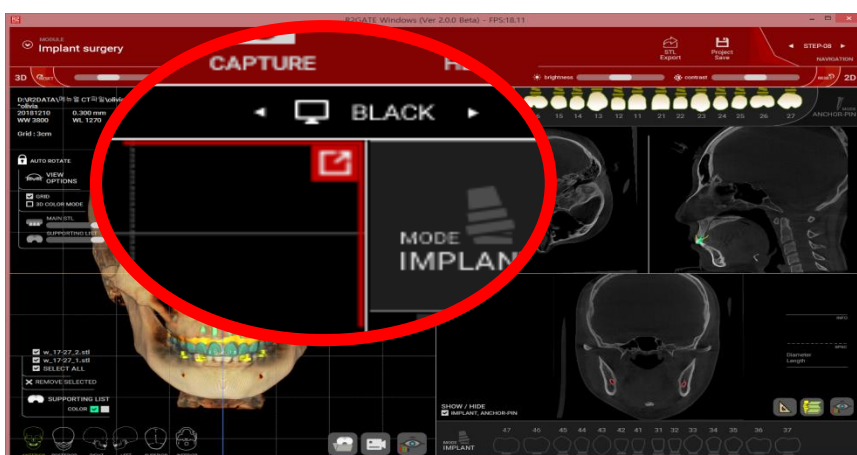
Indicates the sagittal plane of the head. When diagnosing the anterior teeth, the cross section of the anterior teeth is shown to determine the implant's labio-lingual relationship. During the diagnosis of the posterior teeth, check the mesio-distal and the occlusion relationship of the implant

4 Frontal plane

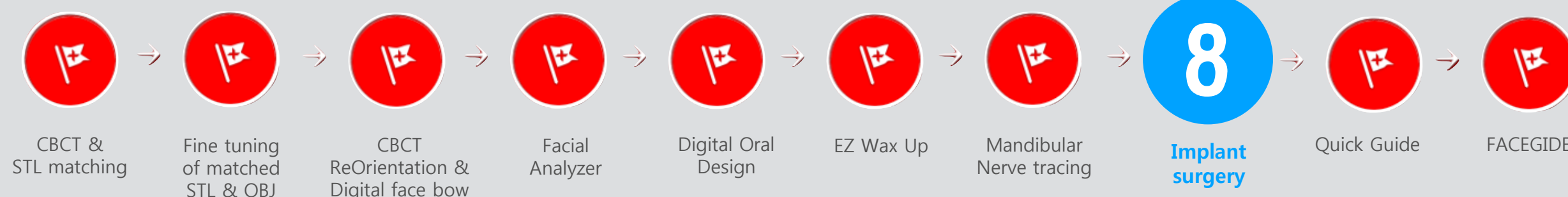
It represents the frontal plane of the head. Check the bucco-lingual relationship and occlusion relationship of the implant in the posterior teeth. In the anterior teeth, check the mesio-distal relationship.

Mouse-over activation

R2 simulation screen consists of four windows. Mouse over on each windows to activate them and an activation mark in the upper right corner appears.



10.1 R2GATE™ DOD Control Buttons



**R2
GATE**

Digital Oral Design
Mar. 2019

Control Buttons

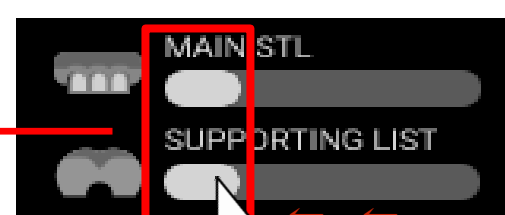
- 1 Background Color**
Available to change into desired background color
- 2 Brightness & Contrast**
Use the slide bars to adjust the brightness and contrast of 2D & 3D

- 3 Cast & Wax-up Transparency Adjustment**
Adjust the transparency of the cast and wax-up(STL)



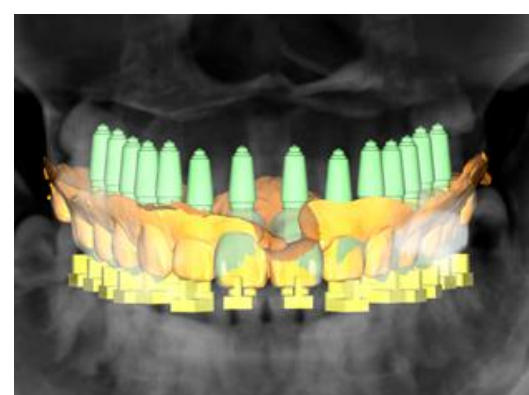
The more the cursor moves to the right, the more OPAQUE it gets

The more the cursor moves to the left, the more TRANSPARENT it gets

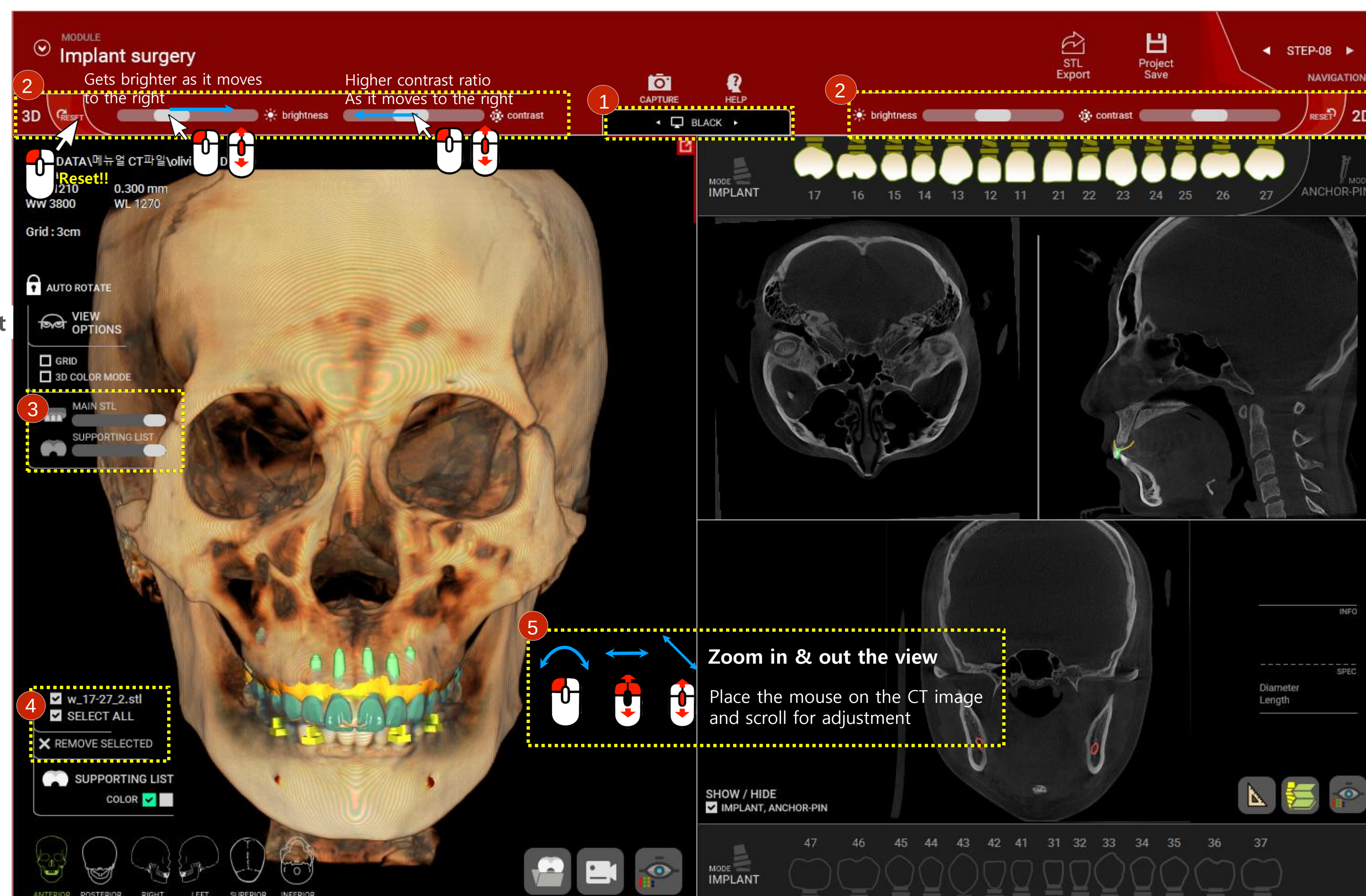


- 4 Hide Wax up**
☐ Hide wax up
☒ Display wax up

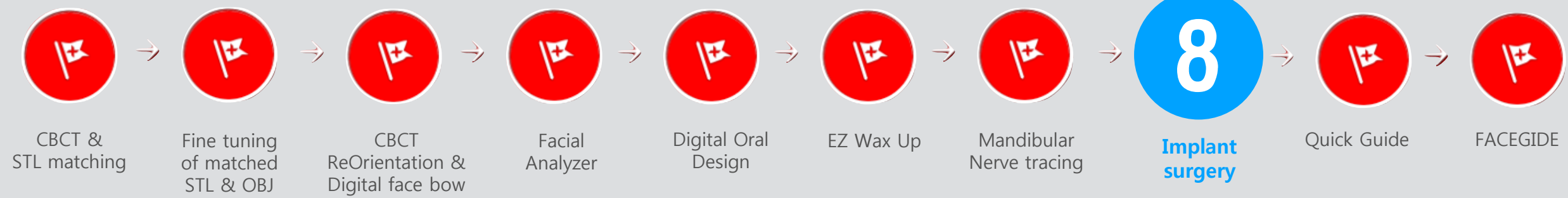
- 5 3D Image Control**



Move and rotate freely by clicking on the image with the mouse



10.1 R2GATE™ DOD Control Buttons



**R2
GATE**

Digital Oral Design
Mar. 2019

Control Buttons

1 Capture & Help
Able to save images & Use help function

2 Export & Save
STL file export & Save project file

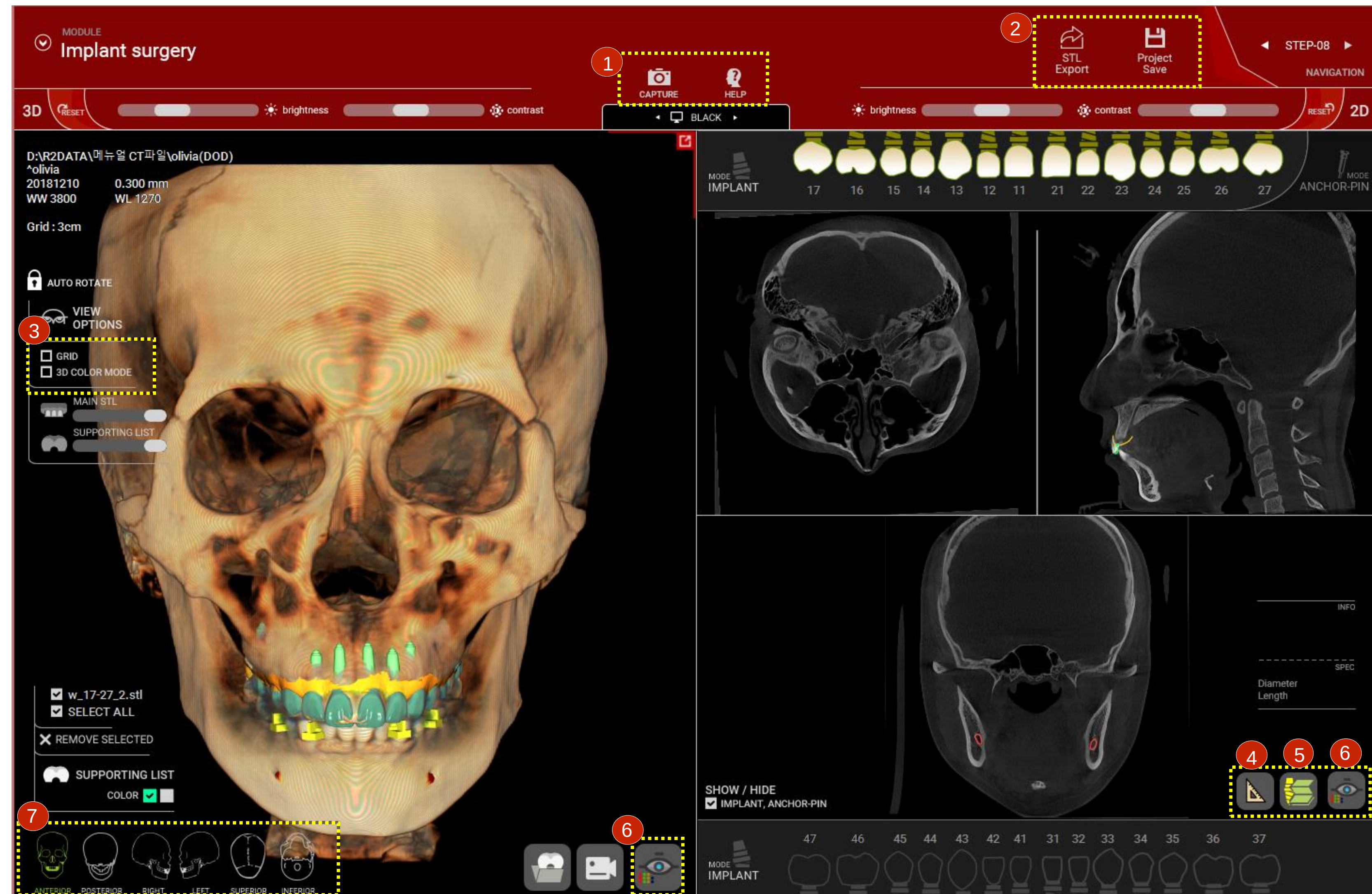
3 Grid & Fixture color mode
Grid activation on 3D screen & Activate color mode of the fixture on 3D screen

4 Activate Distance Measurement Mode

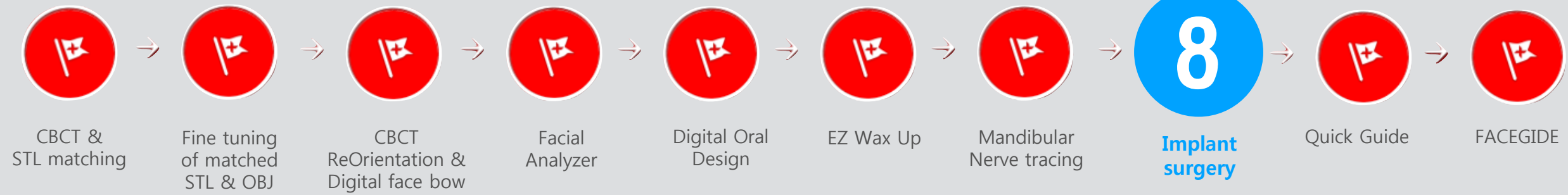
5 Activate Cross-section Display
Mark the area around the selected implant in 16 cross-sections in the designated direction and spacing

6 Digital EYE
View of 2D section & 3D volume

7 3D Volume view control



10.1 R2GATE™ DOD Control Buttons

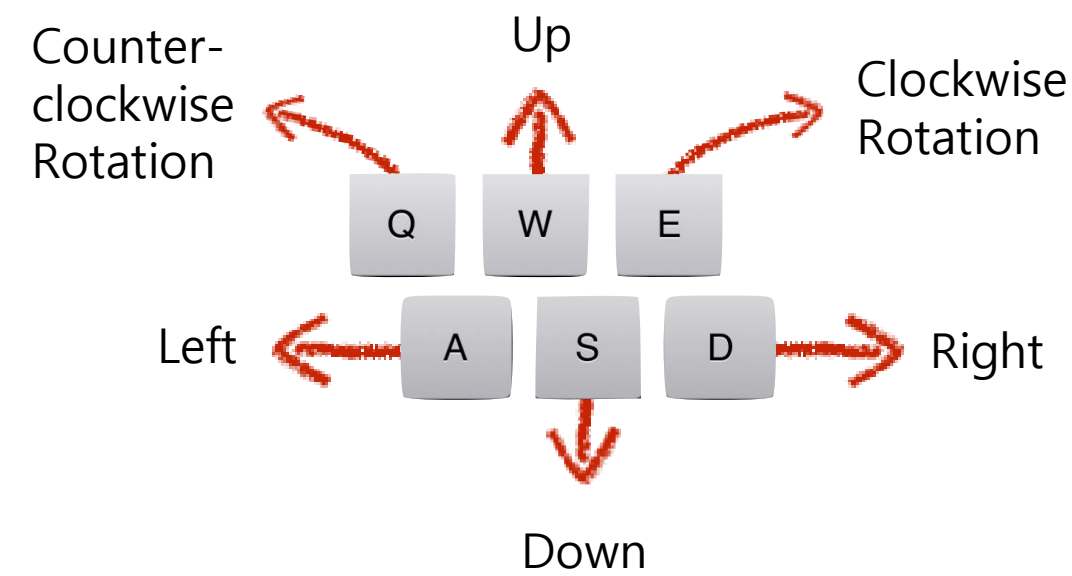


**R2
GATE**

Digital Oral Design
Mar. 2019

Control Buttons

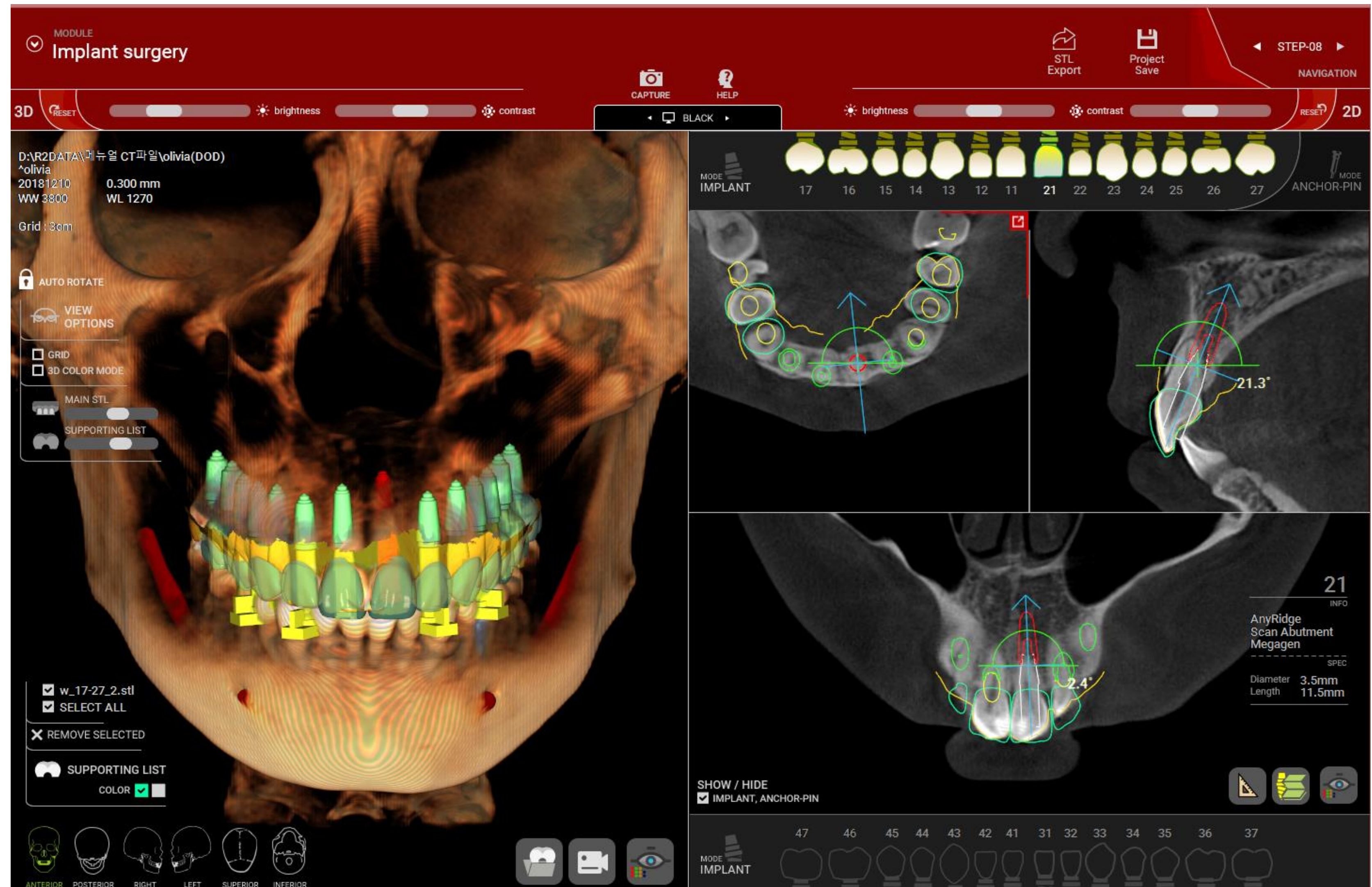
Implant Control Keyboard Shortcuts



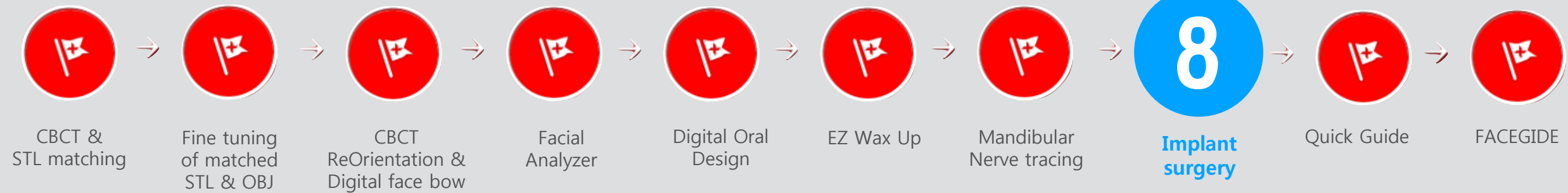
Hide Implant Function



If the implant image interferes analyzing the bone density,
Temporarily hide the implant by pressing the '~' key
To view the hidden implant again, press the '~' key once again to restore it



10.2 Implant Surgery Implant Planning



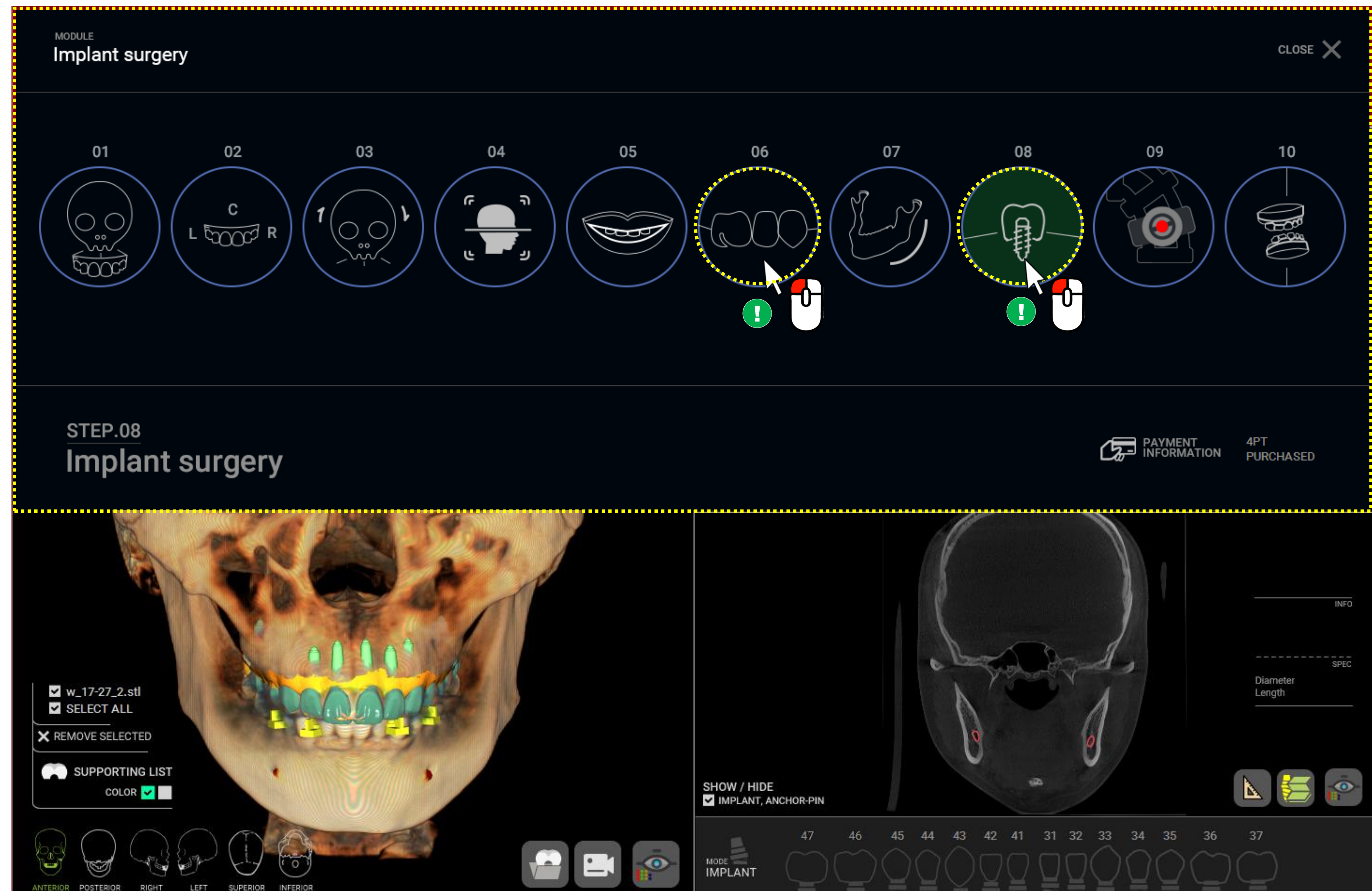
R2
GATE

Digital Oral Design
Mar. 2019

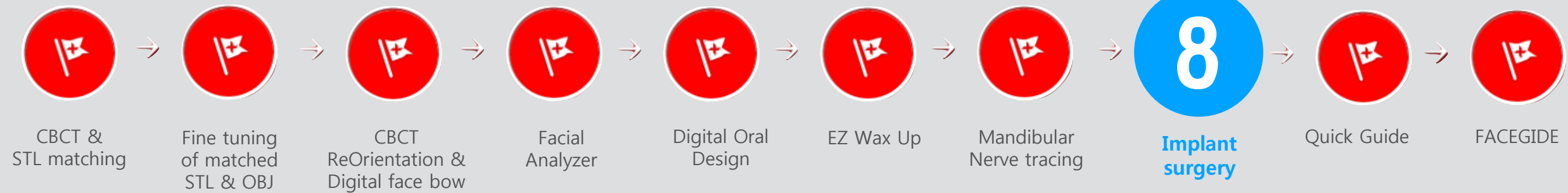
Implant Planning

If you design wax-up in **STEP 6**, In Implant planning of **STEP 8**, the implant fixture(narrow drill core) will be automatically placed to the designed wax-up position(center of the crown)

! Click the top bar to move on to desired STEP



10.2 Implant Surgery Implant Planning



R2
GATE

Digital Oral Design
Mar. 2019

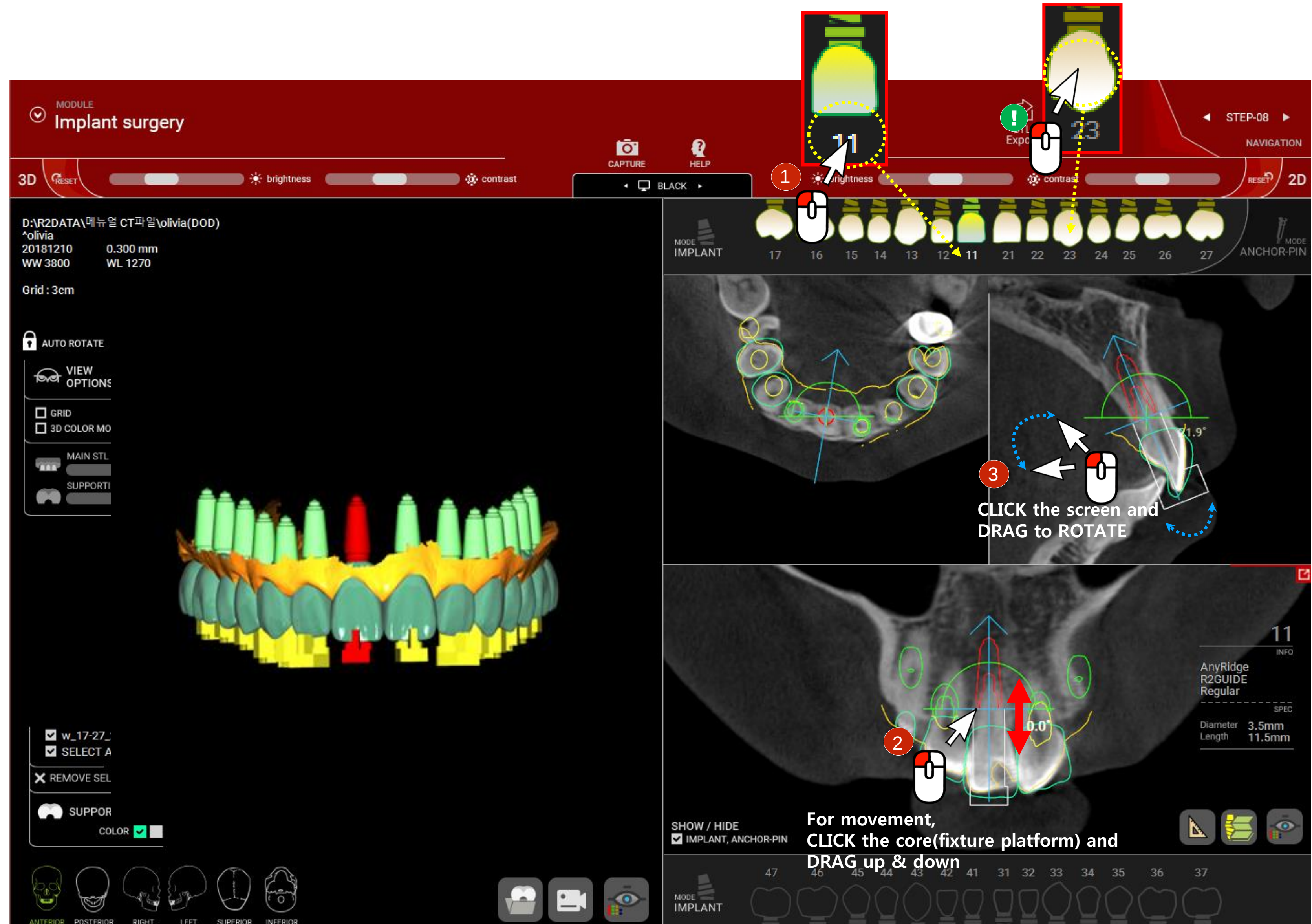
Implant Planning

Movement & Rotation of the Fixture Position

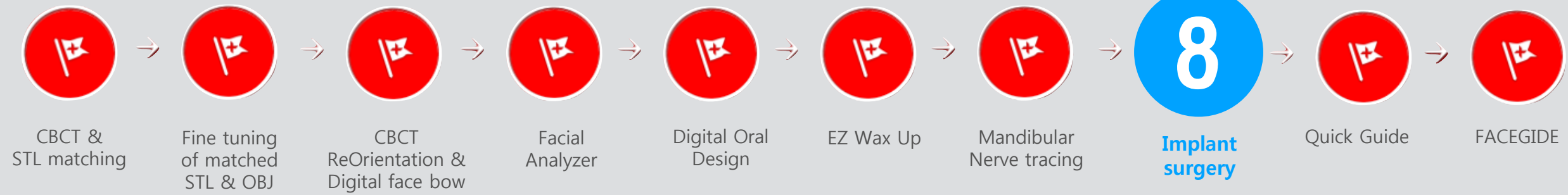
- 1 Click the dentition to modify
 - 2 Click the core of the fixture(platform) and drag up and down to place it in the desired position
 - 3 Click the screen of the cross-section view with the fixture you want to rotate and drag to adjust the angle of the fixture
- ! Use keyboard shortcuts for fine adjustment

Fixture Removal

To delete a implant, click on the tooth of the implant to be removed



10.2 Implant Surgery Implant Planning



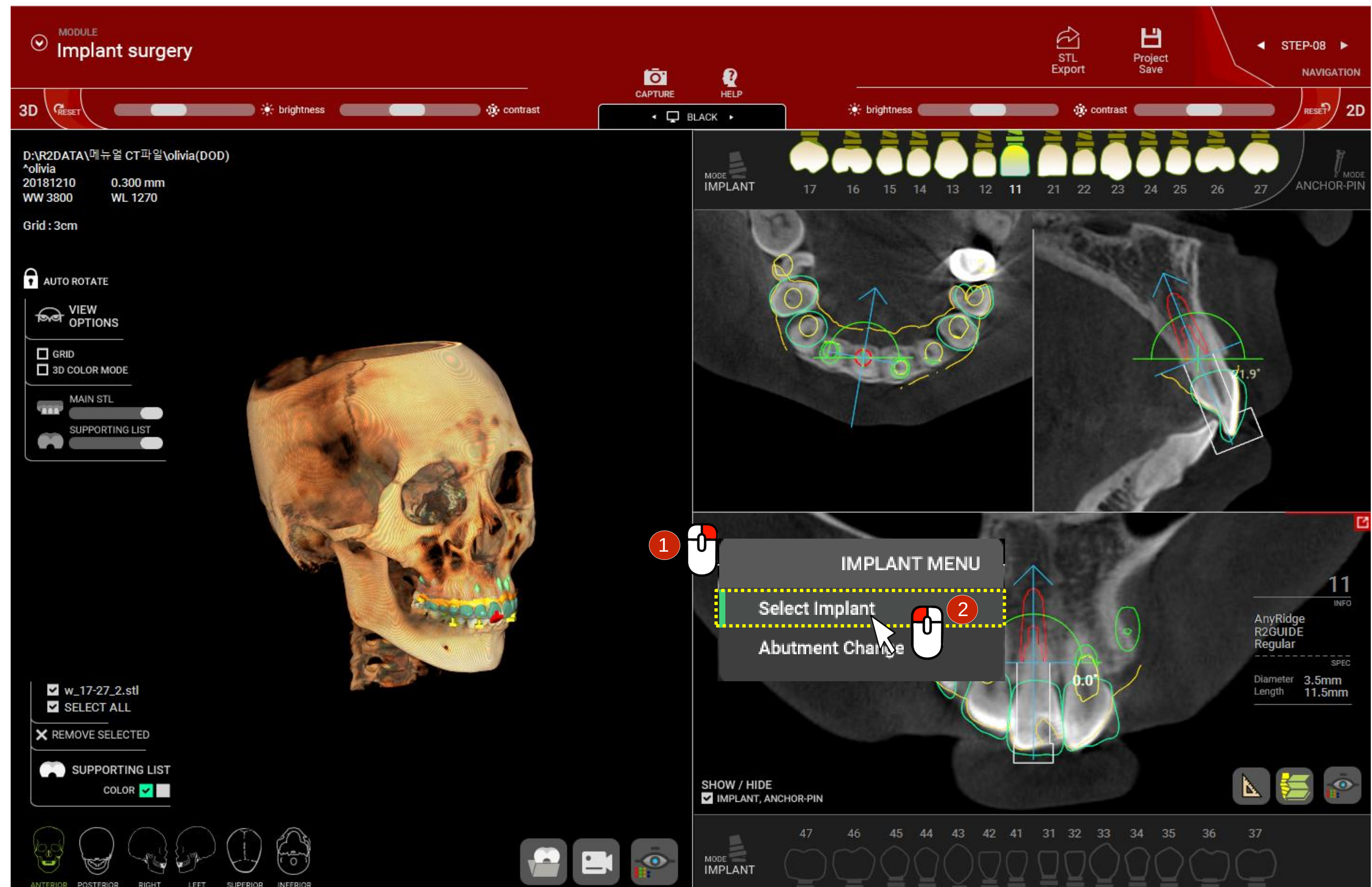
R2
GATE

Digital Oral Design
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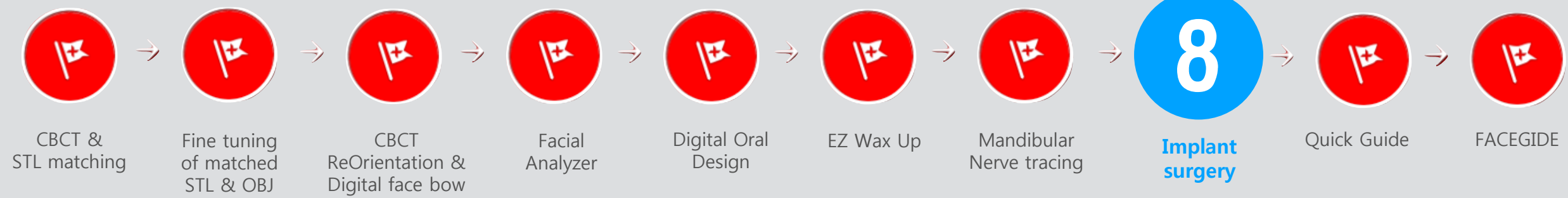
Implant Planning

System & Size Selection

- 1 Right click on the screen for a pop-up window
- 2 Click **Select implant**



10.2 Implant Surgery Implant Planning



**R2
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Implant Planning

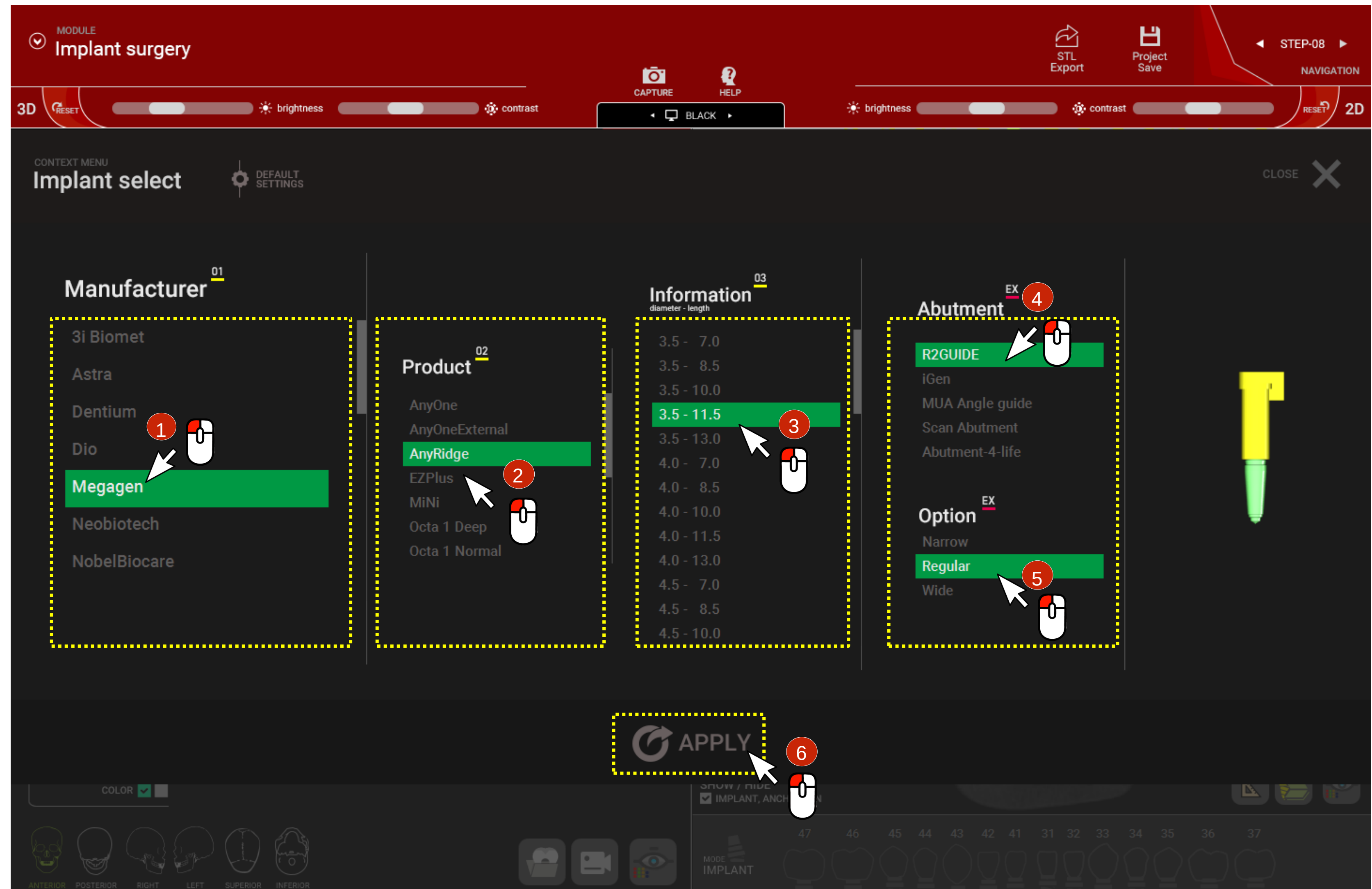
System & Size Selection

- 1 Select desired manufacturer
- 2 Select implant size
- 3 Select the size (Diameter-Length)
- 4 Select the type of abutment
(In case of guide manufacture, select R2 GUIDE)

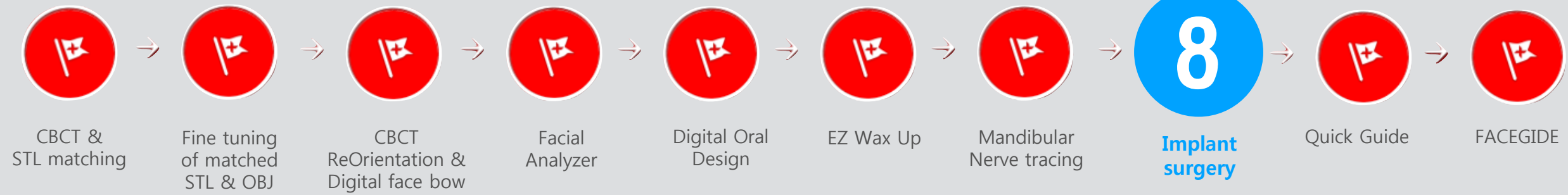
- 5 Select the size option of the drill core

Drill core	Fixture diameter (real)
Narrow	Less than Φ 3.5 / Mini implant
Regular	Φ 3.5 ~ Φ 4.5
Wide	More than Φ 5.0

- 6 Click **APPLY** to set



10.2 Implant Surgery Implant Planning



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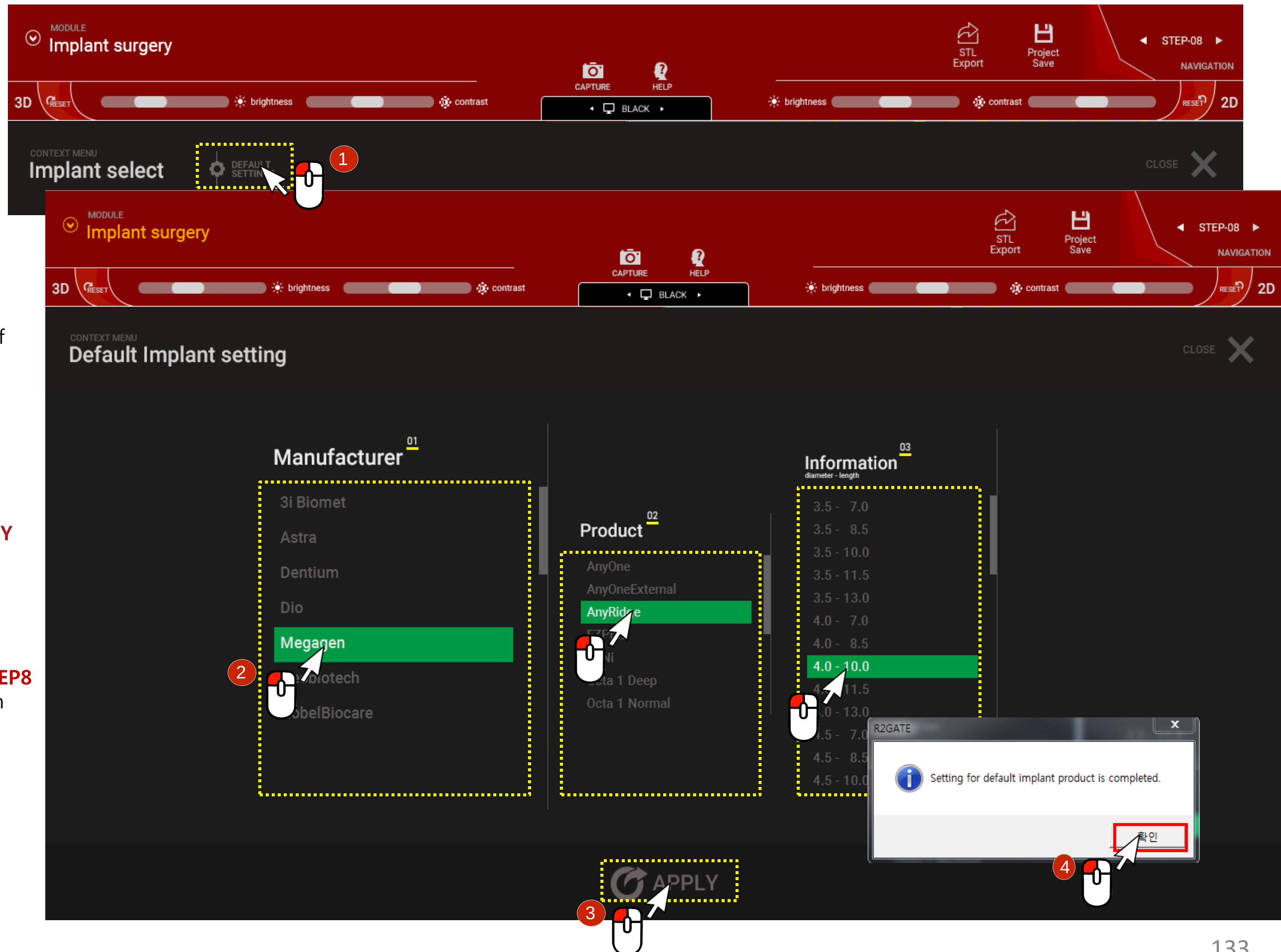
Implant Planning

Default Setting

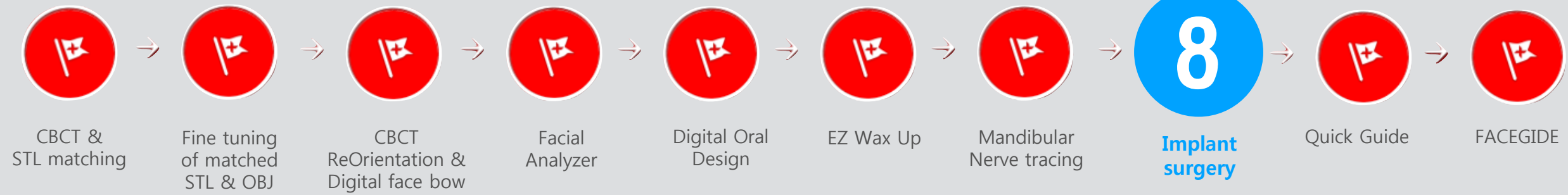
Default setting function allows to set the commonly used implant system & size to a fixed setting

- 1 Click **DEFAULT SETTINGS** of the top of Implant Select
- 2 Select manufacturer, implant system and size
- 3 When selection is complete, click **APPLY**
- 4 Press OK for default setting

After wax-up in **STEP6**, Proceed to **STEP8** to automatically set the implant system and size with default setting



10.2 Implant Surgery Implant Planning



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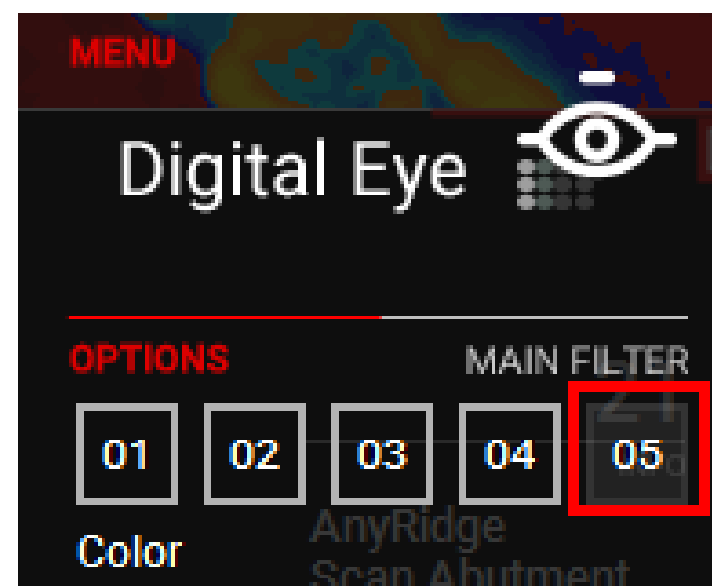
Intuitive Analyzation of the Bone Density

Digital EYE

- Intuitive analyzation of CBCT is achievable with Digital EYE mode
- Various color options of 3D volume and cross-section
- 256 Color Code Analysis

1 Click **Digital EYE** icon to display pop-up window

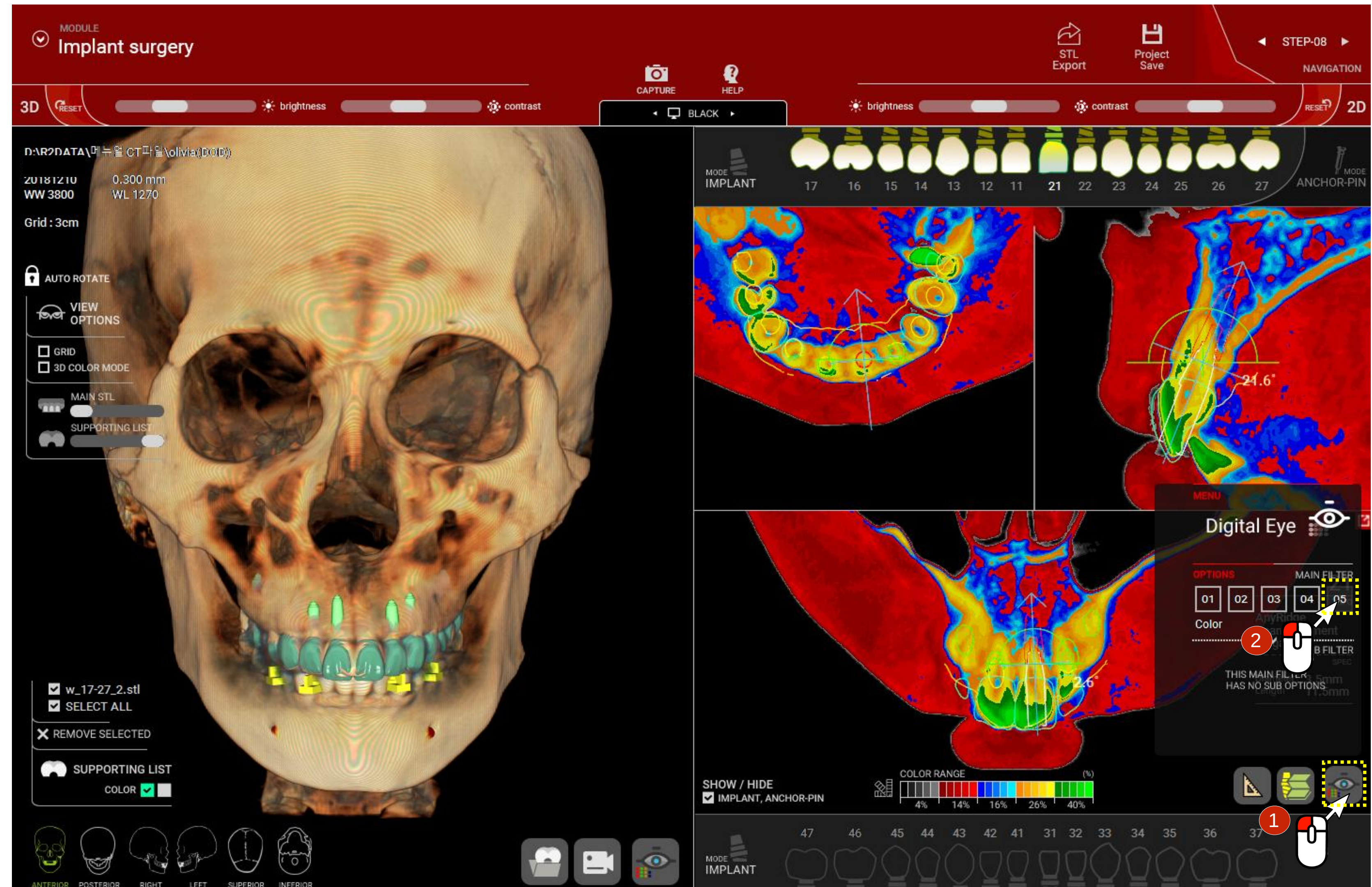
2 Click **05** to display Digital EYE view



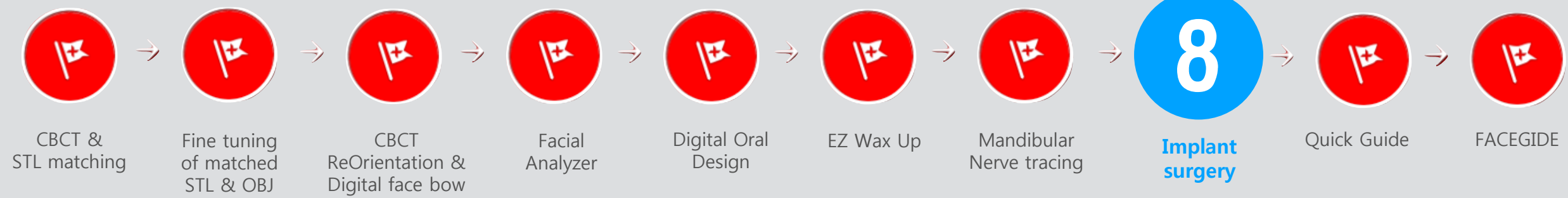
! Keyboard Shortcut



Press 'TAB' key to check the bone density with Digital EYE
Press 'TAB' once again to restore to the original filter



10.2 Implant Surgery Implant Planning



Intuitive Analyzation of the Bone Density

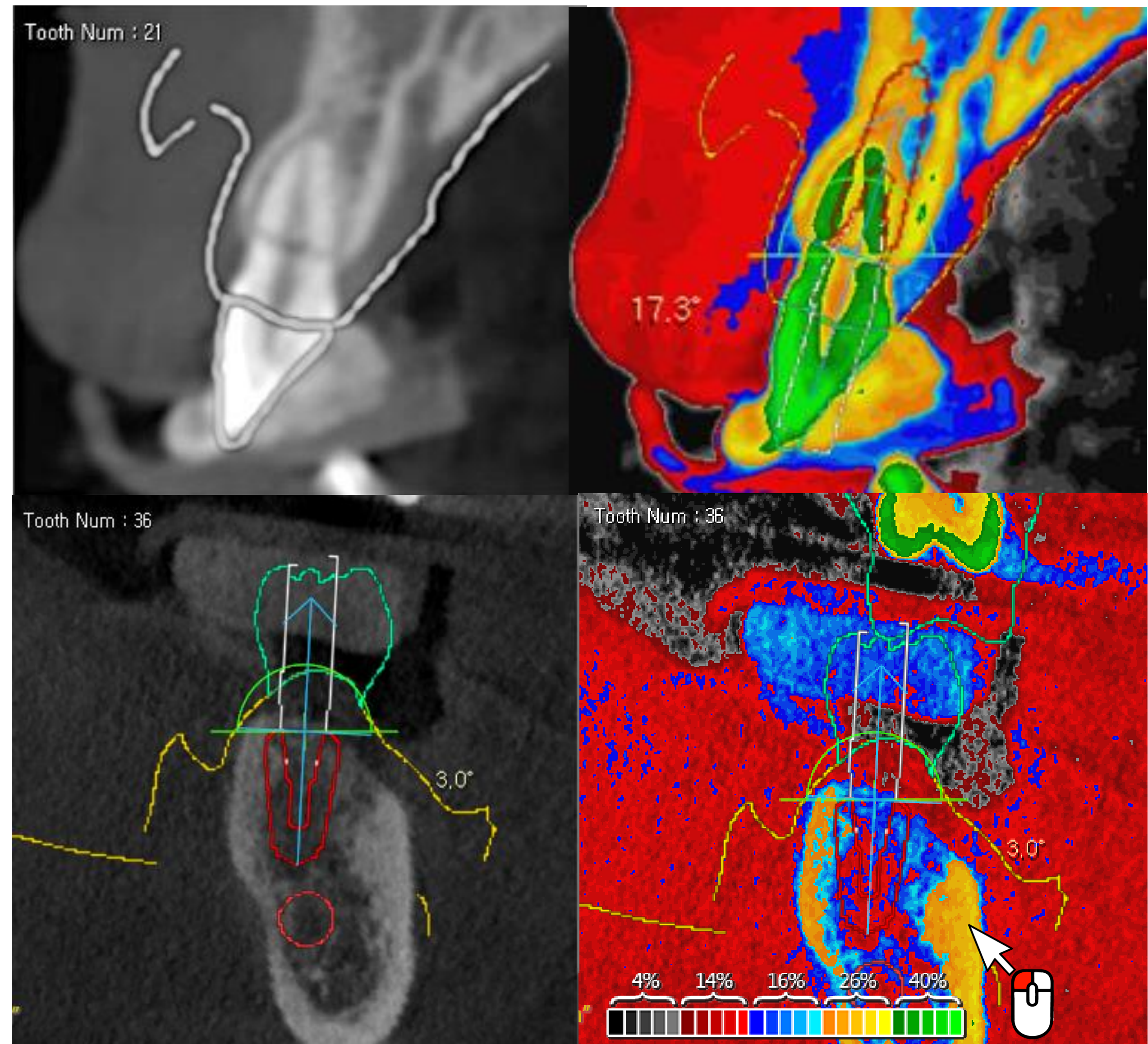
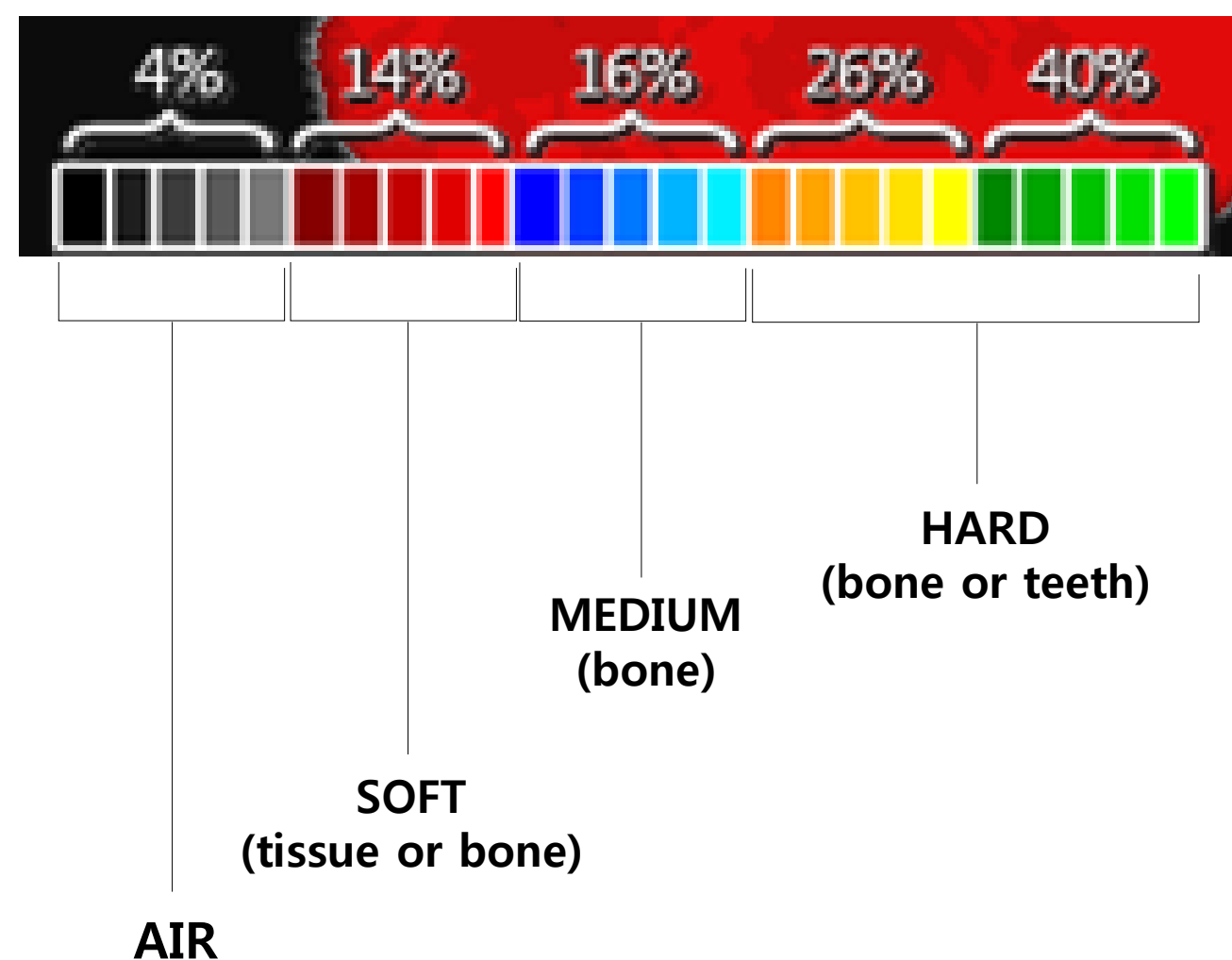
Digital EYE

Color-coded Analysis of Bone Morphology & Density

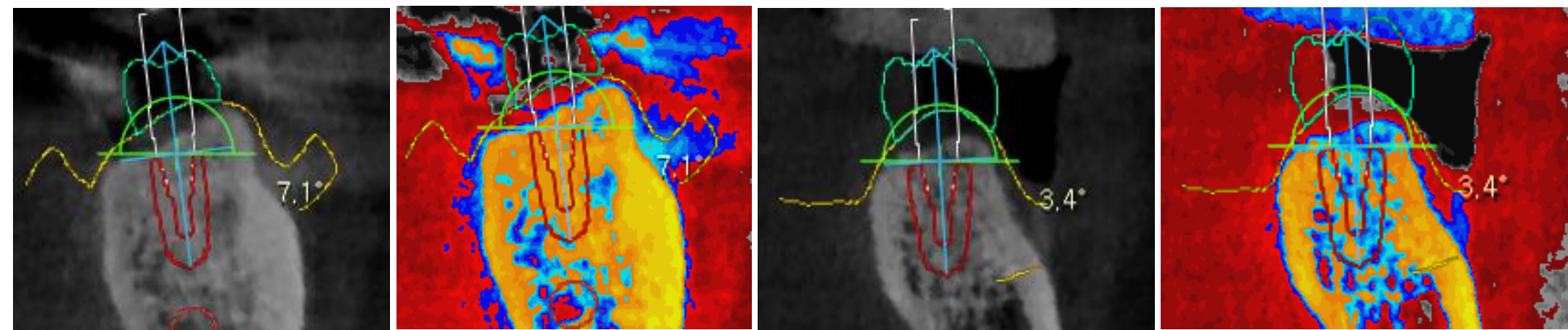
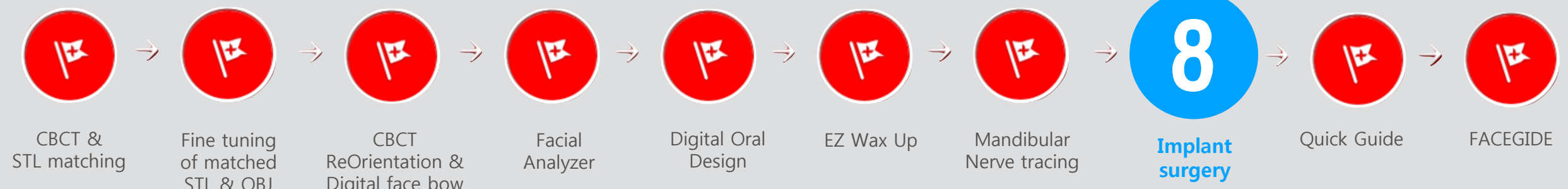
In general, CBCT analyzes data in 256 black and white shades. However, with the naked eye, only 16 steps (6%) can be distinguished

R2GATE Digital EYE expresses 256 shades in color, showing the state of the bone that is absolutely detailed and intuitively understandable

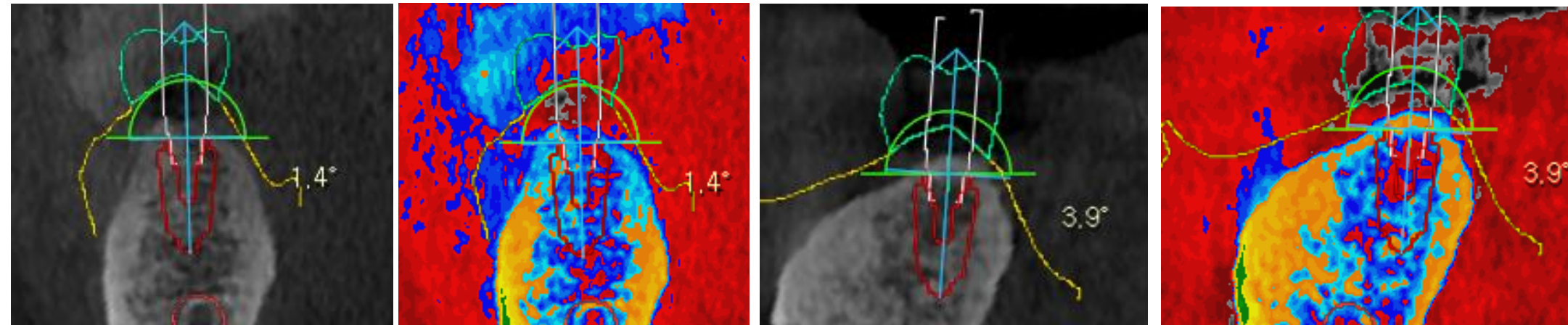
This information can be used to determine the implant position, size and drill sequence, and to predict the initial stability during immediate loading (ONE-DAY IMPLANT)



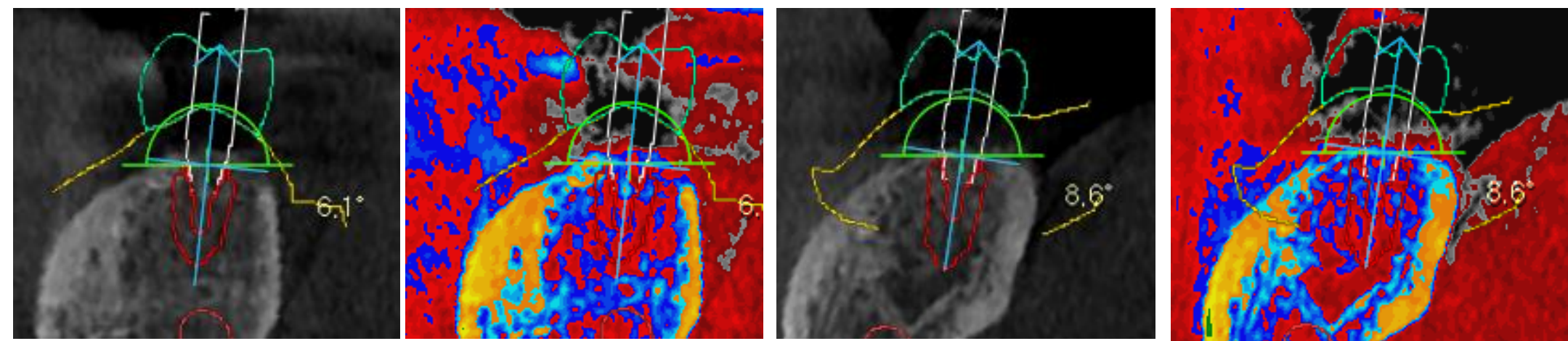
10.2 Implant Surgery Implant Planning



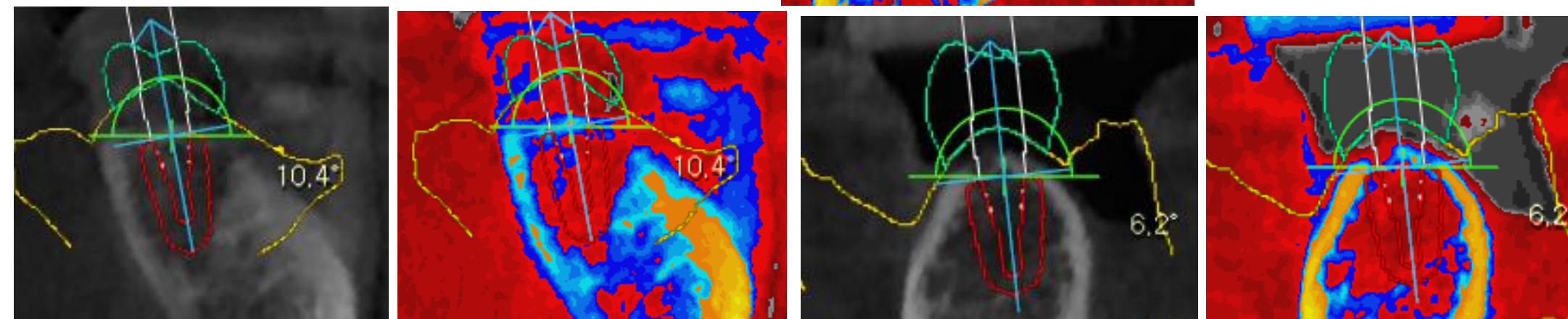
D1



D2

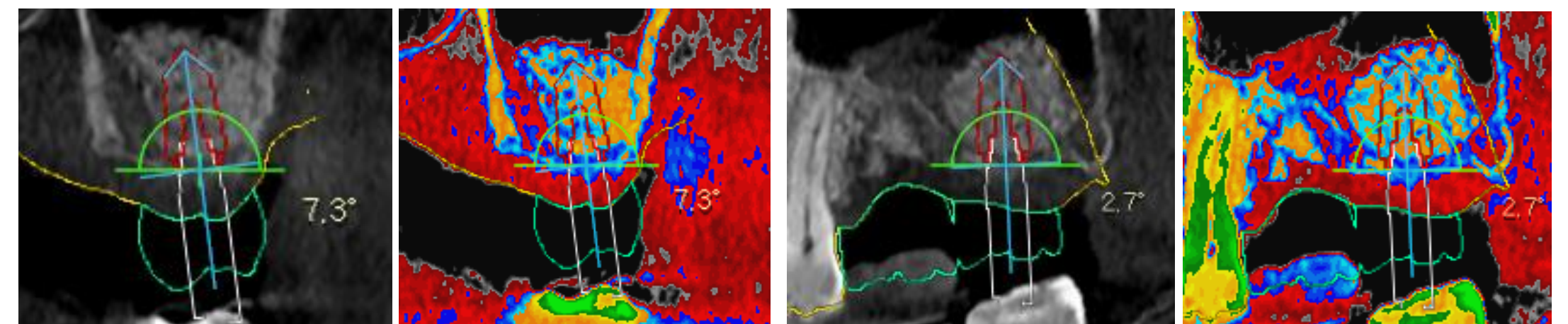


D3

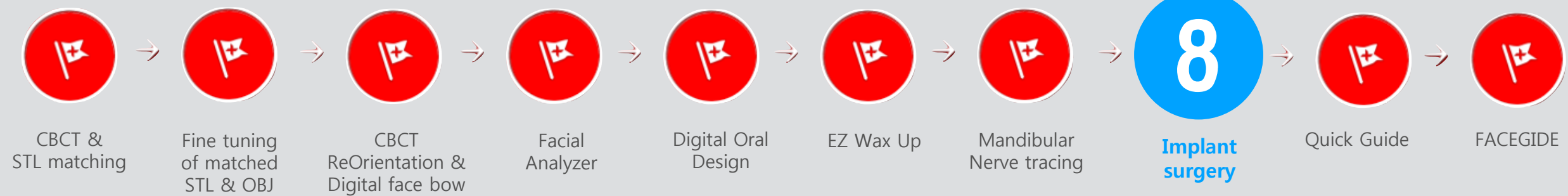


D4

Exception



10.2 Implant Surgery Implant Planning



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Implant Planning

Distance Measurement Function

- 1  If you click **RULER** icon, **PENCIL/ERASER** icons will be activated
- 2  Click **PENCIL** icon
- 3 Left click to mark two points for measurement
- 4  To delete the measurement lines, click the points or lines and click **ERASE**



10.3 Implant Surgery Anchor Pin Design



CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



FACEGIDE

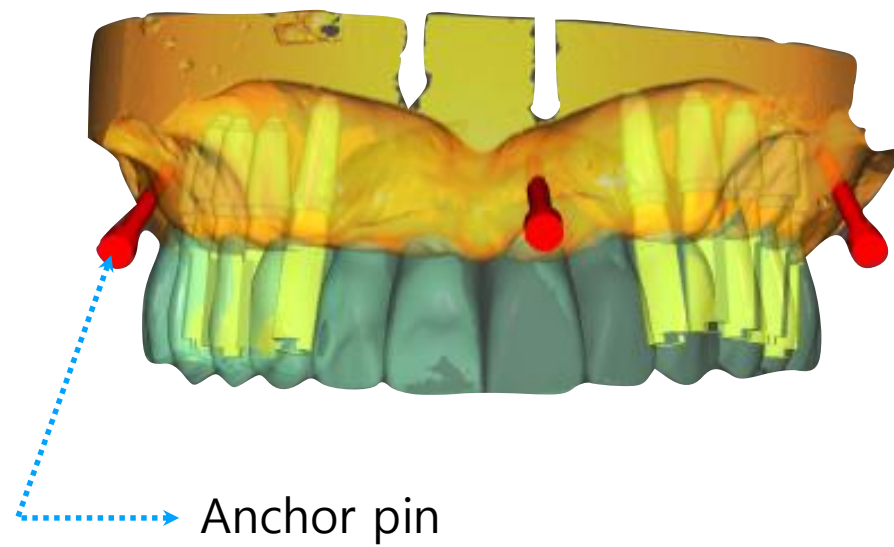
R2
GATE

Digital Oral Design
Mar. 2019

Implant Planning

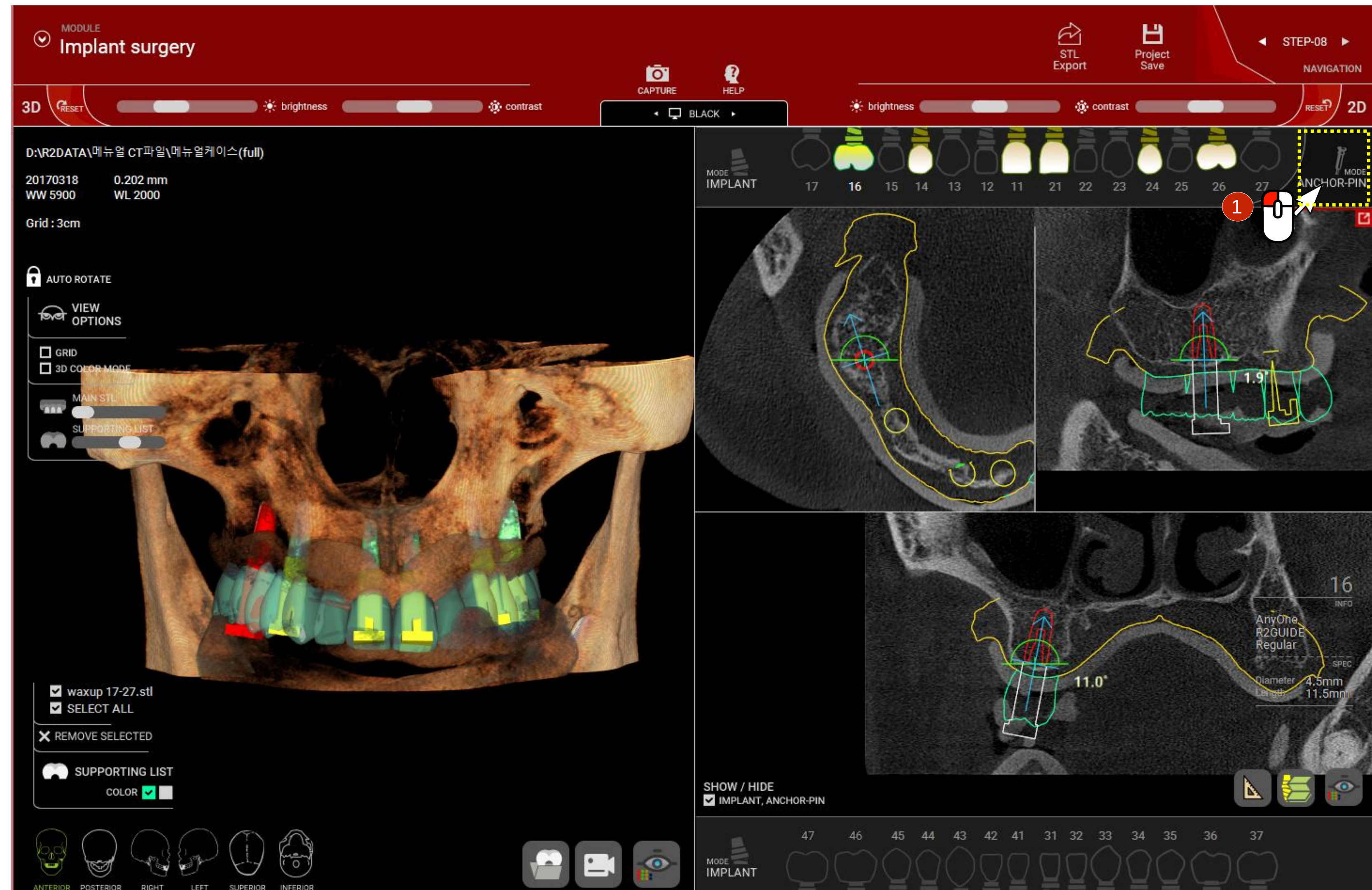
Anchor Pin Design for Edentulous Case

In case of edentulous case, implant the anchor pins to fix the guide

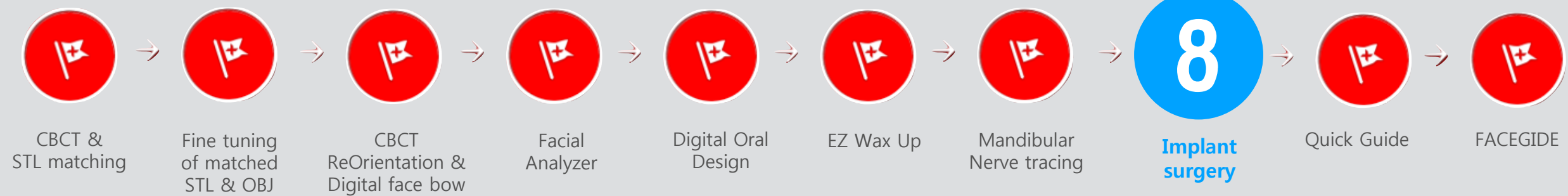


Anchor pin

- 1 Click **ANCHOR PIN** menu to implant anchor pins



10.3 Implant Surgery Anchor Pin Design



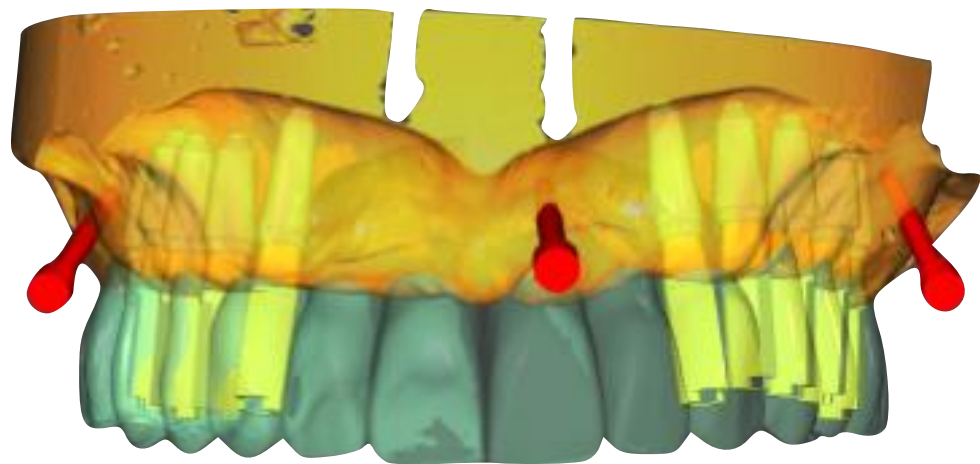
R2
GATE

Digital Oral Design
Mar. 2019

Implant Planning

Anchor Pin Design for Edentulous Case

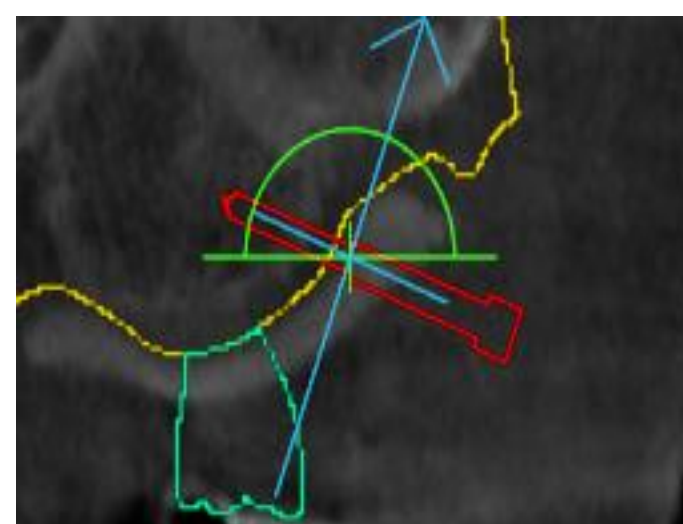
- 1 Click grey pin icon to create a new **ANCHOR PIN**
- 2 Click and drag the center of the anchor pin to the desired position.
- 3 Right click on the screen and click **SELECT ANCHOR PIN**
- 4 Select the appropriate size of the anchor pin



Full Edentulous Case

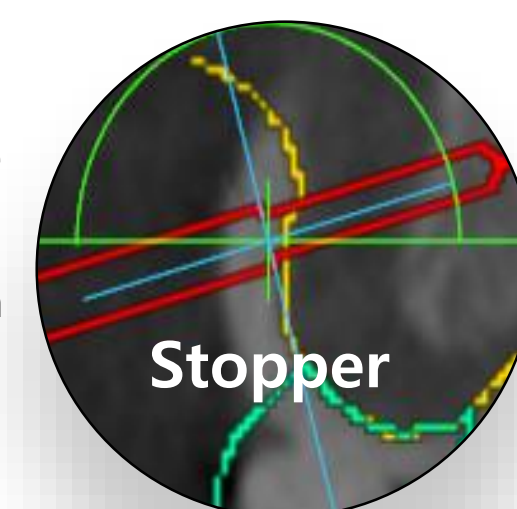
The Anchor pin designs three in total- left, right and front

In the case of Mandible, make sure that the mandibular nerve tube is not touched
For Maxilla, be careful not to pierce the sinus



Place the implant more than **2mm** into the bone

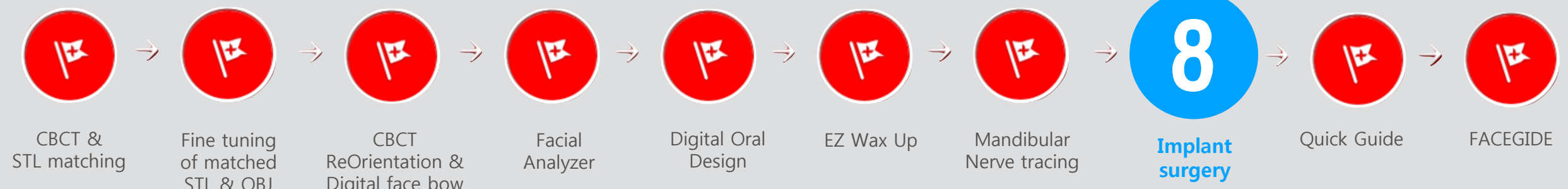
Place the implant **as much as possible** based on the condition and position of the bone



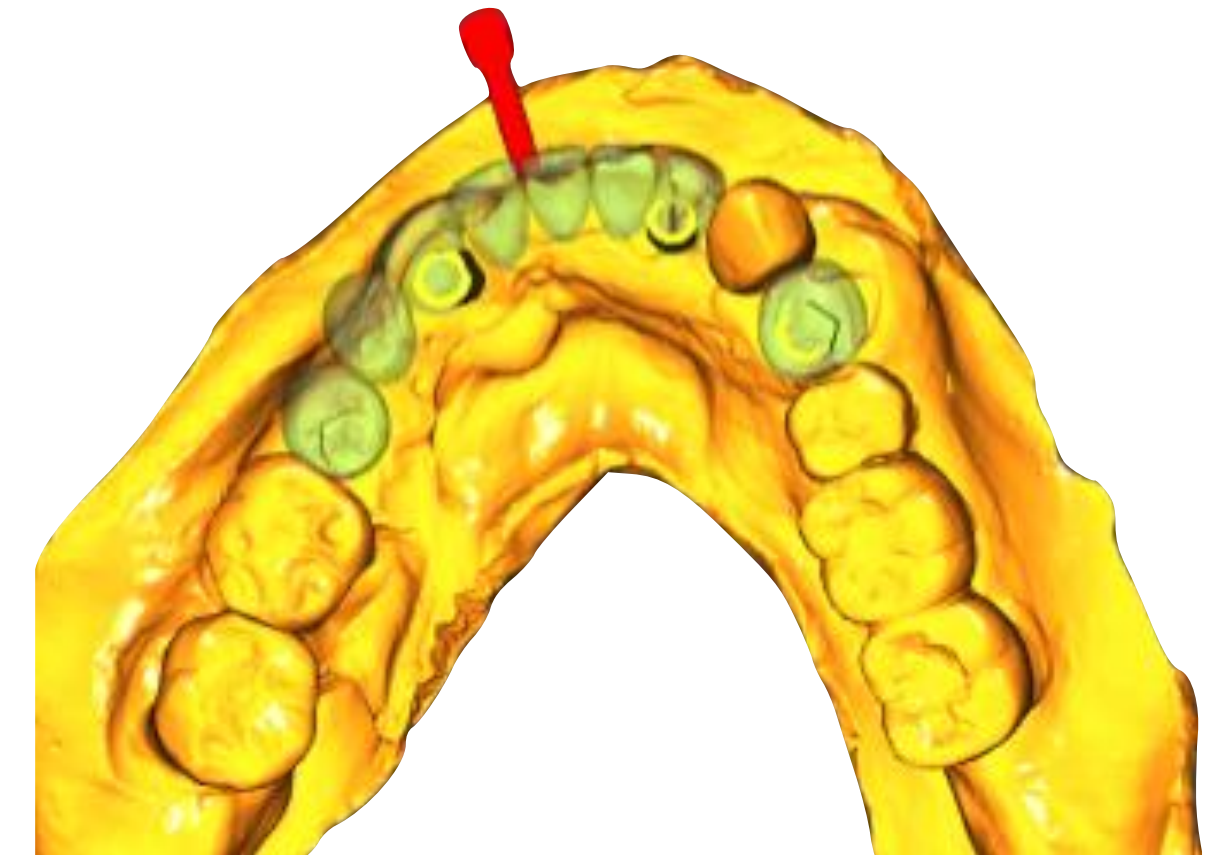
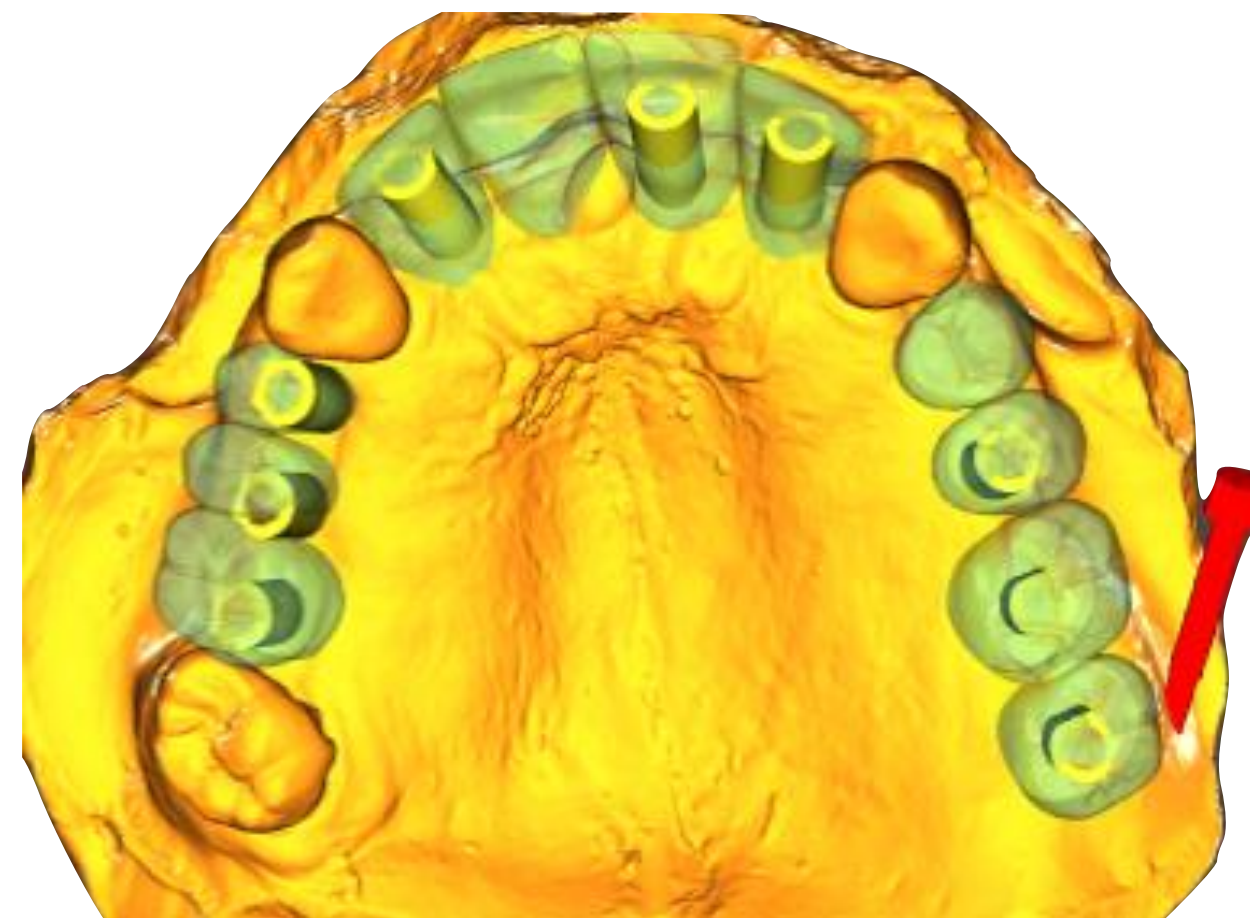
Make sure to not design the stopper part of the anchor pin to be inside of the **tissue**

Make sure that the anchor pin does not touch the **drill core, fixture and teeth**

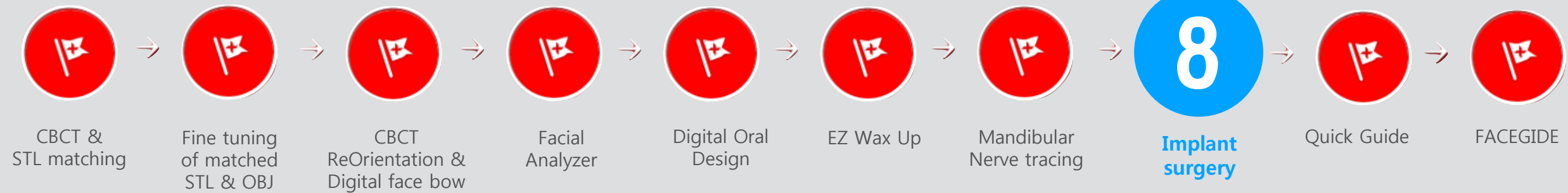
10.3 Implant Surgery Anchor Pin Design



If more than FOUR teeth are missing, it is recommended to set the anchor pin to secure the R2 Guide



10.4 Implant Surgery Implant Planning



R2
GATE

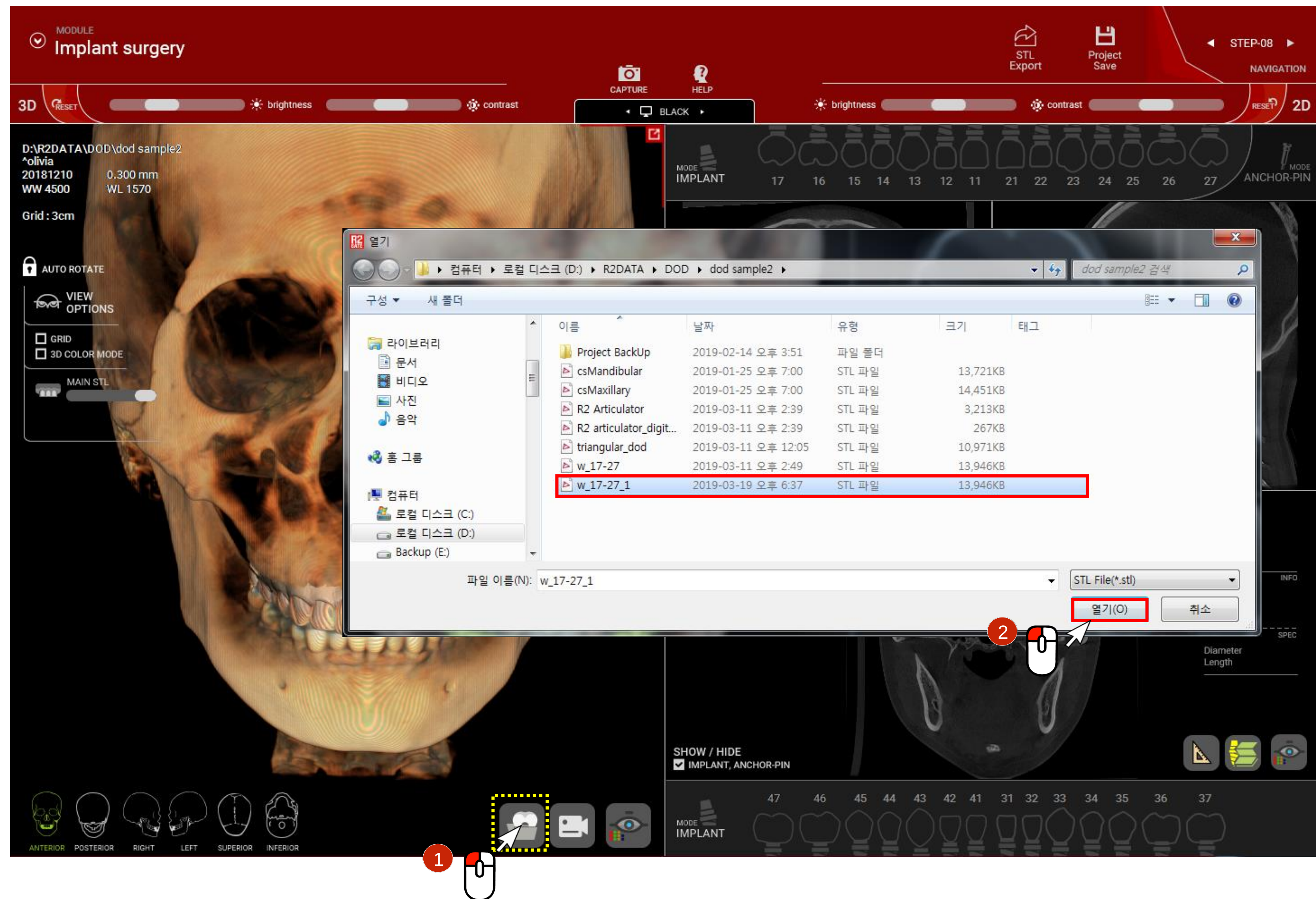
Digital Oral Design
Mar. 2019

Implant Planning

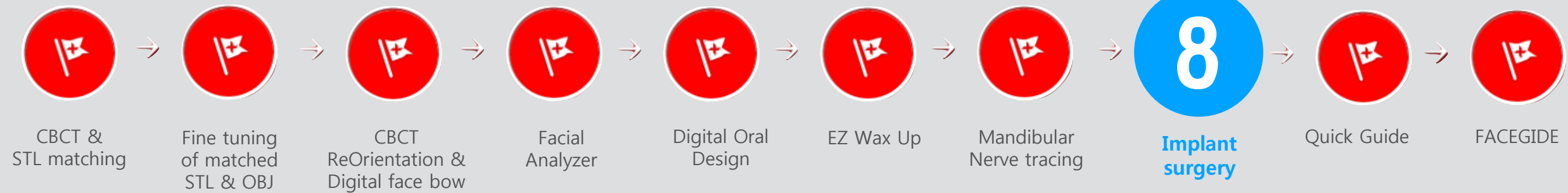
Import Diagnosis Wax-up

In case diagnostic wax-up is designed with other CAD programs without using EZ wax-up

- 1  Click **STL List** icon
- 2 Select a file and click **Open(O)** to import wax-up file



10.4 Implant Surgery Implant Planning



Implant Planning

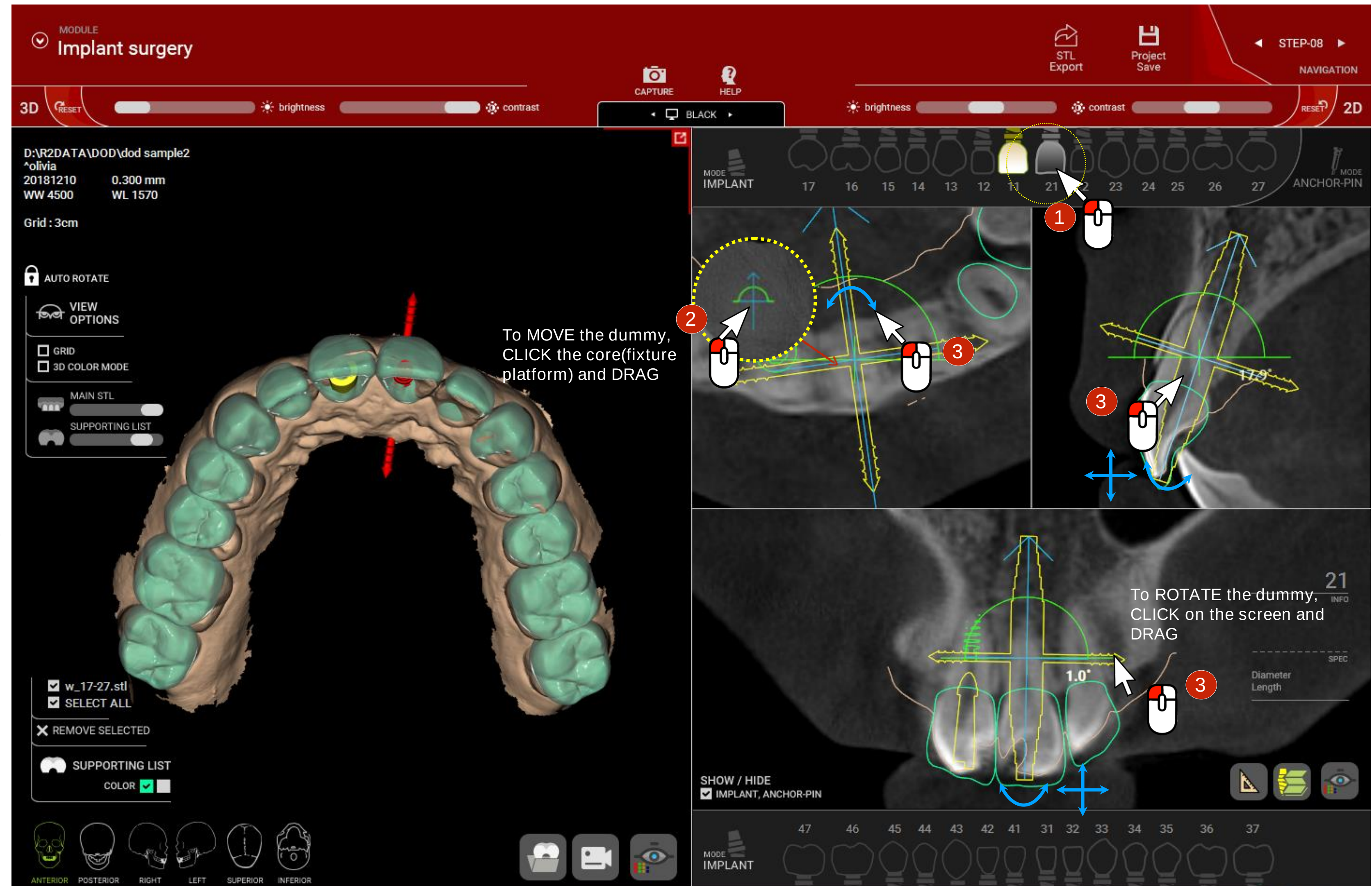
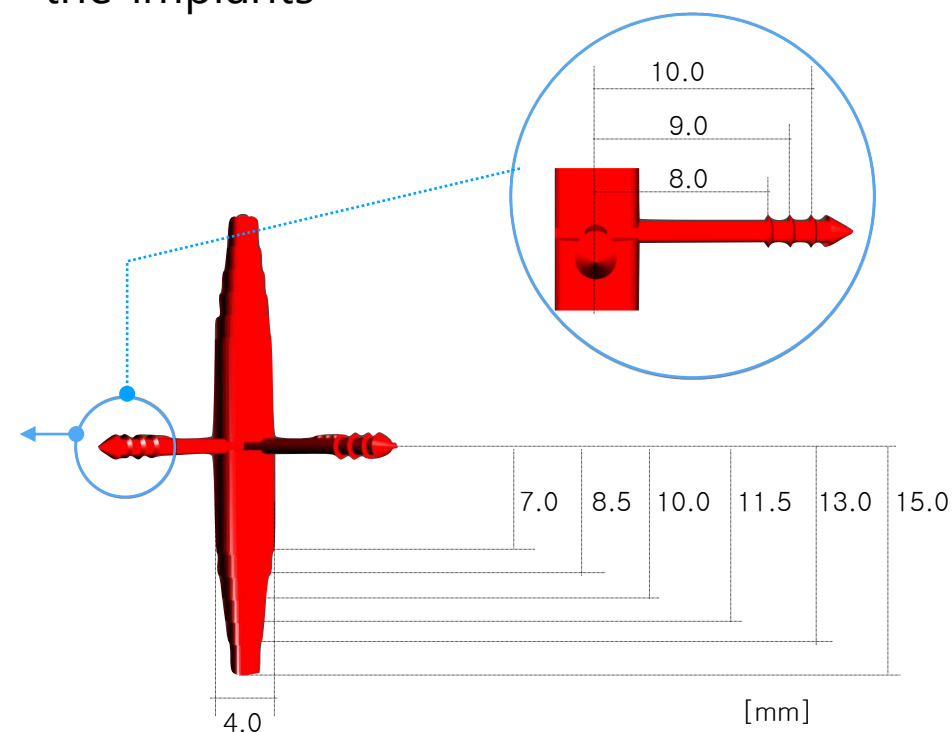
Create Dummy Implant

- 1 Click on the dentition icon to for diagnosis and dummy will be created
- 2 Click the core of dummy and drag to the position of implant placement
- 3 Adjust the axis of rotation of dummy and the position of the plane at the cross section view

! Dummy System Information

Use dummy to predict the size of the implant
Diameter: 4.0 mm. / Length: 7.0 - 15.0 mm

Use the 8, 9, and 10 mm arrows at the core of the dummy to indicate the distance between the implants



- ! Fixture Removal, implant system & size setting : Same as 128 page

10.4 Implant Surgery Implant Planning



CBCT &
STL matching



Fine tuning
of matched
STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
Analyzer



Digital Oral
Design



EZ Wax Up



Mandibular
Nerve tracing



Implant
surgery



Quick Guide

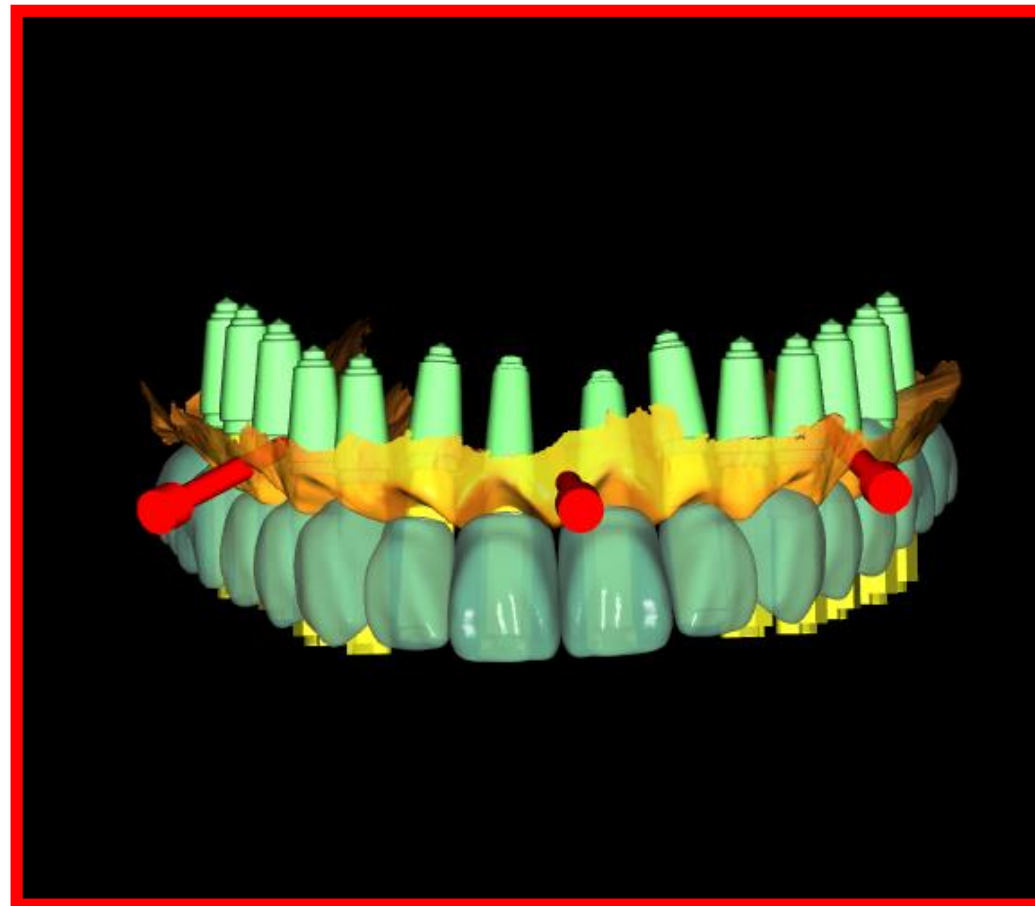


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FINISHED!!



10.5 Implant Surgery

Save & Export



CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



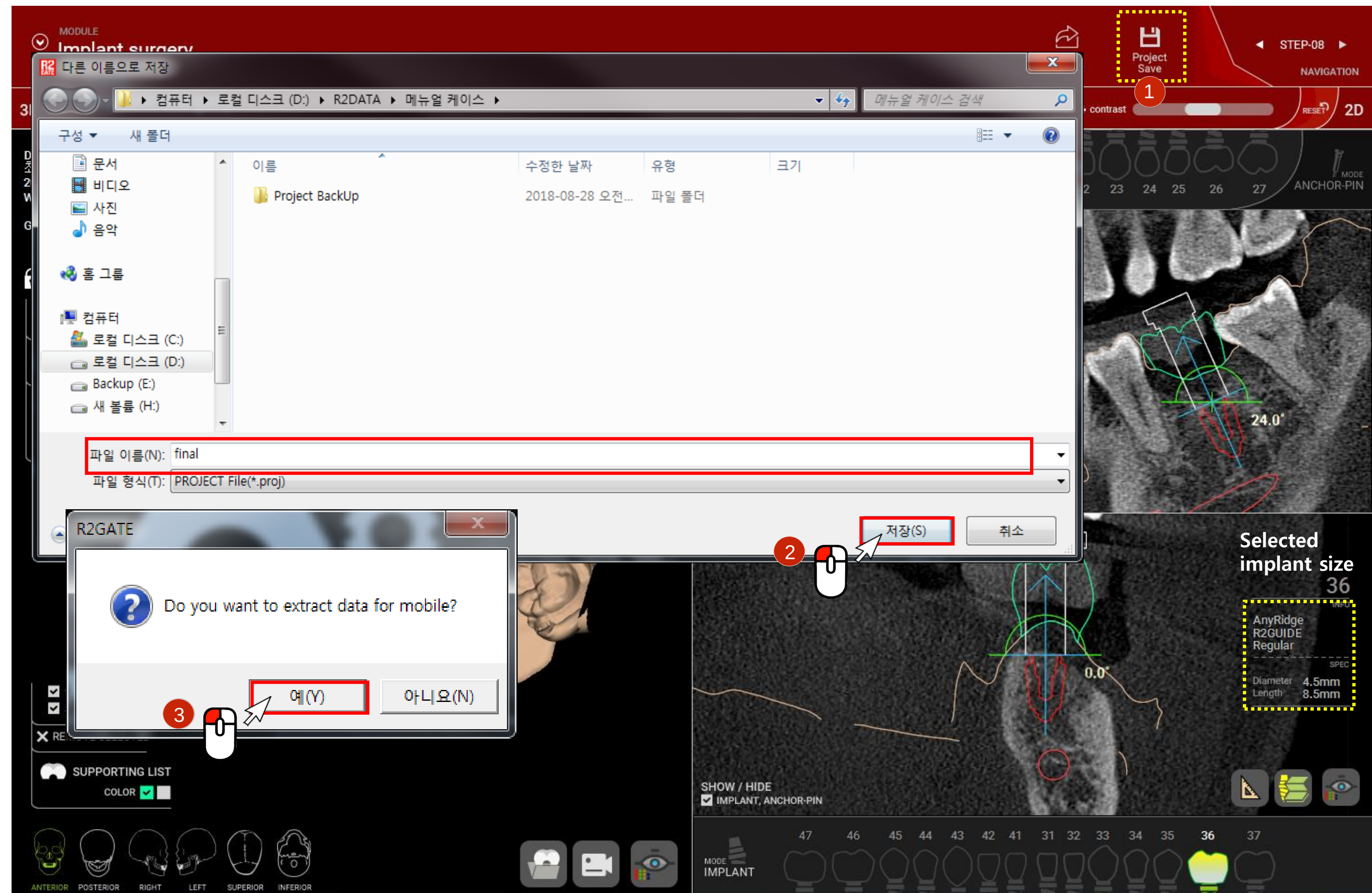
FACEGIDE

R2
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Project Save & R2 Lite Mobile Data Extraction

- 1 Click **PROJECT SAVE**
 - 2 Enter file name and click Save(S) button
 - 3 Click Yes(Y) button to also extract R2 Lite data for mobile
- ! Check treatment planning using R2GATE Lite



10.5 Implant Surgery

Save & Export



CBCT & STL matching



Fine tuning of matched STL & OBJ



CBCT ReOrientation & Digital face bow



Facial Analyzer



Digital Oral Design



EZ Wax Up



Mandibular Nerve tracing



Implant surgery



Quick Guide



FACEGIDE

R2
GATE

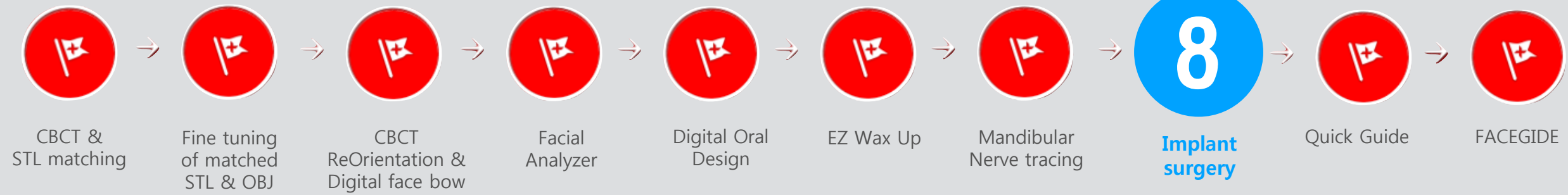
Digital Oral Design
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RWS export for R2 Guide design using R2Ware

- 1 Rotate drill core & set window position to buccal or anterior direction
- 2 Click **STL Export**



10.5 Implant Surgery Save & Export



**R2
GATE**

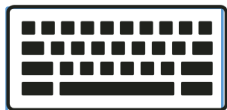
Digital Oral Design
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RWS export for R2 Guide design using R2Ware

1 Set destination of RWS file

Default destination is set same as default patient folder

2 Insert file name



3 Select guide type

- R2 Guide (Normal)

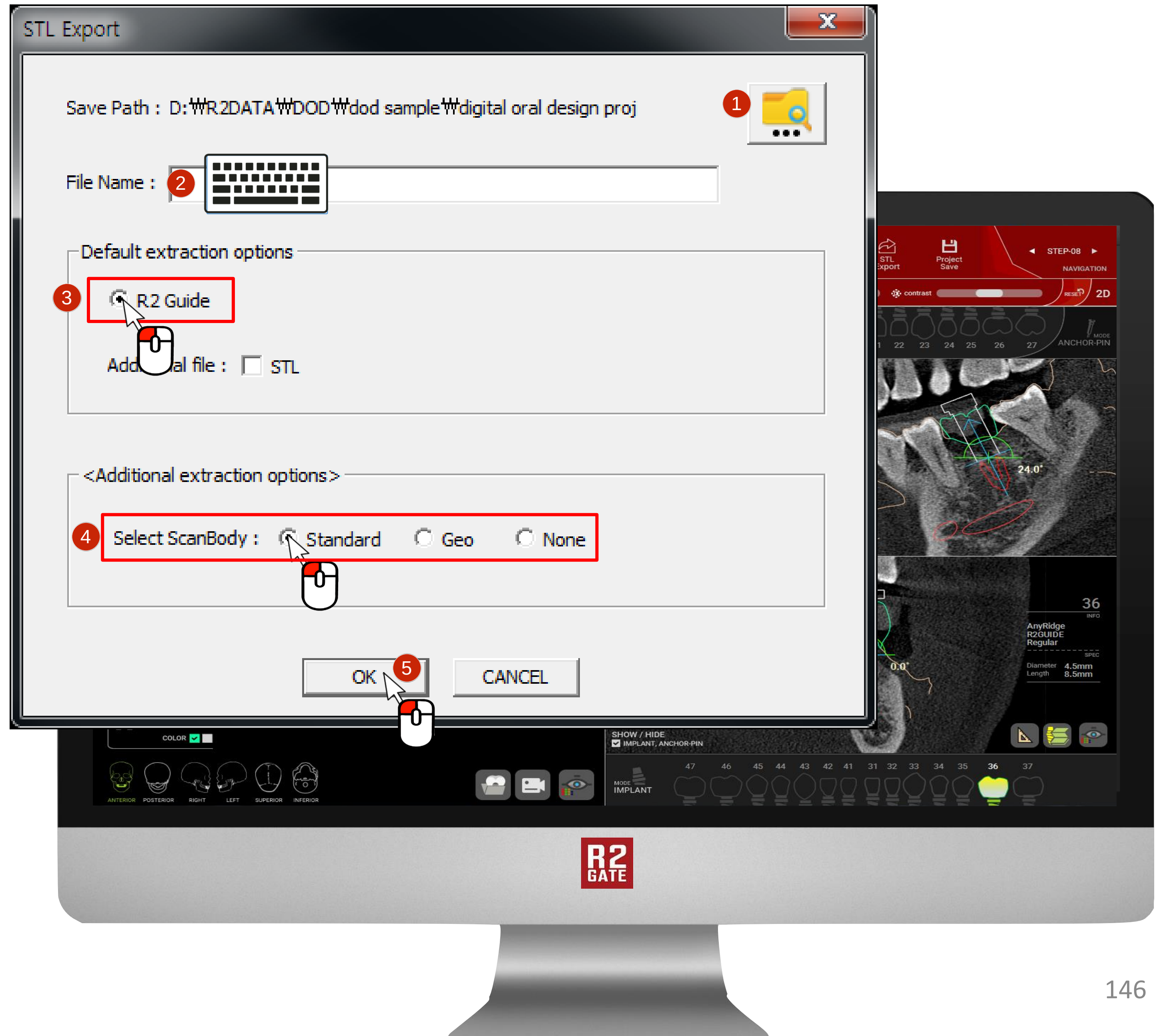


4 ScanBody (abutment) options

- Standard (MEGAGEN abutment)
- Geo (other system abutment)
- None

For ONE-DAY prosthesis, select scan body for CAD design

5 Click OK to export RWS file



10.5 Implant Surgery

Save & Export



CBCT &
STL matching



Fine tuning
of matched
STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
Analyzer



Digital Oral
Design



EZ Wax Up



Mandibular
Nerve tracing



Implant
surgery



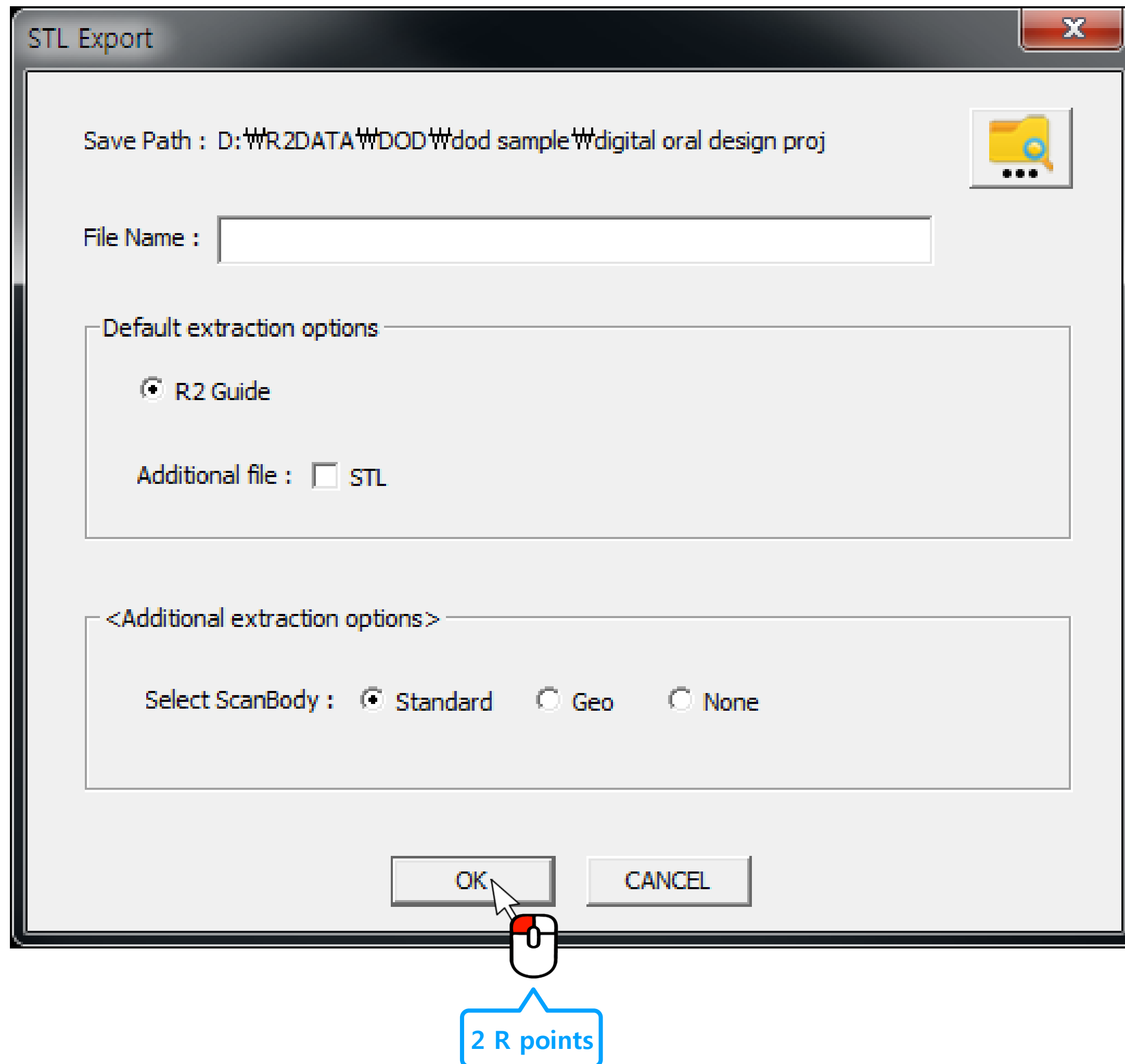
Quick Guide



FACEGIDE

R2
GATE

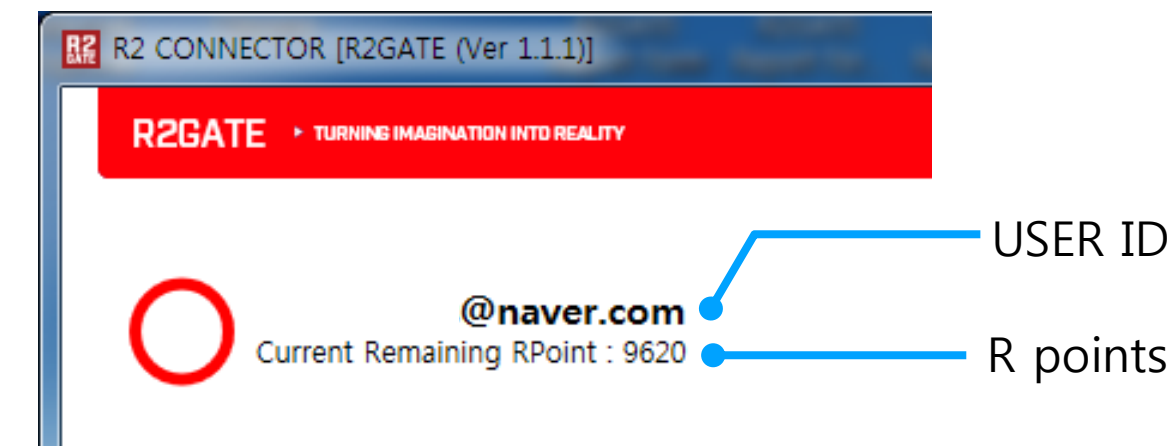
Digital Oral Design
Mar. 2019



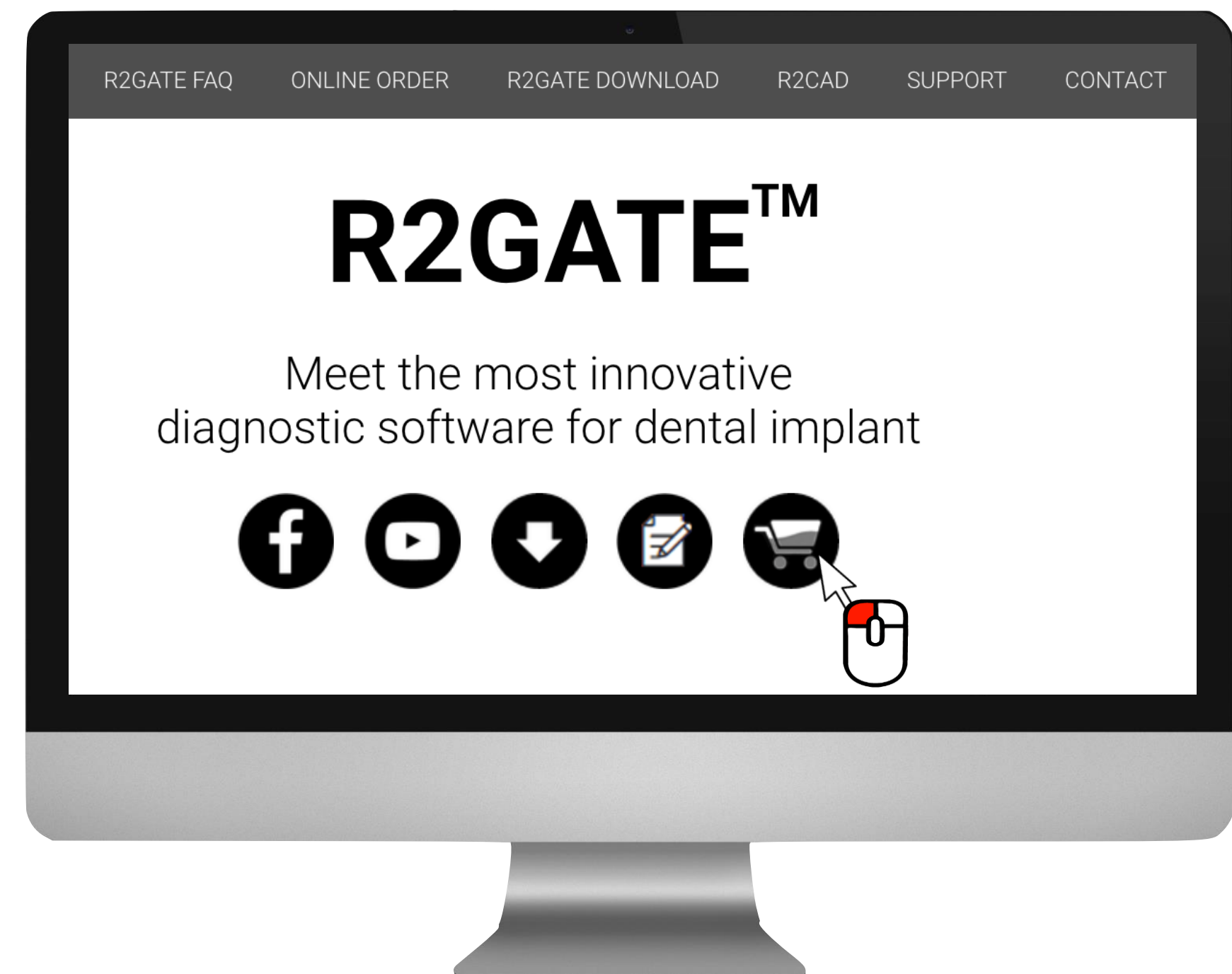
Case fee for exporting RWS file

- Exporting fee is 2 R points per case, which are deducted from user's account when RWS file is exported
- User can export up to 5 times for same case

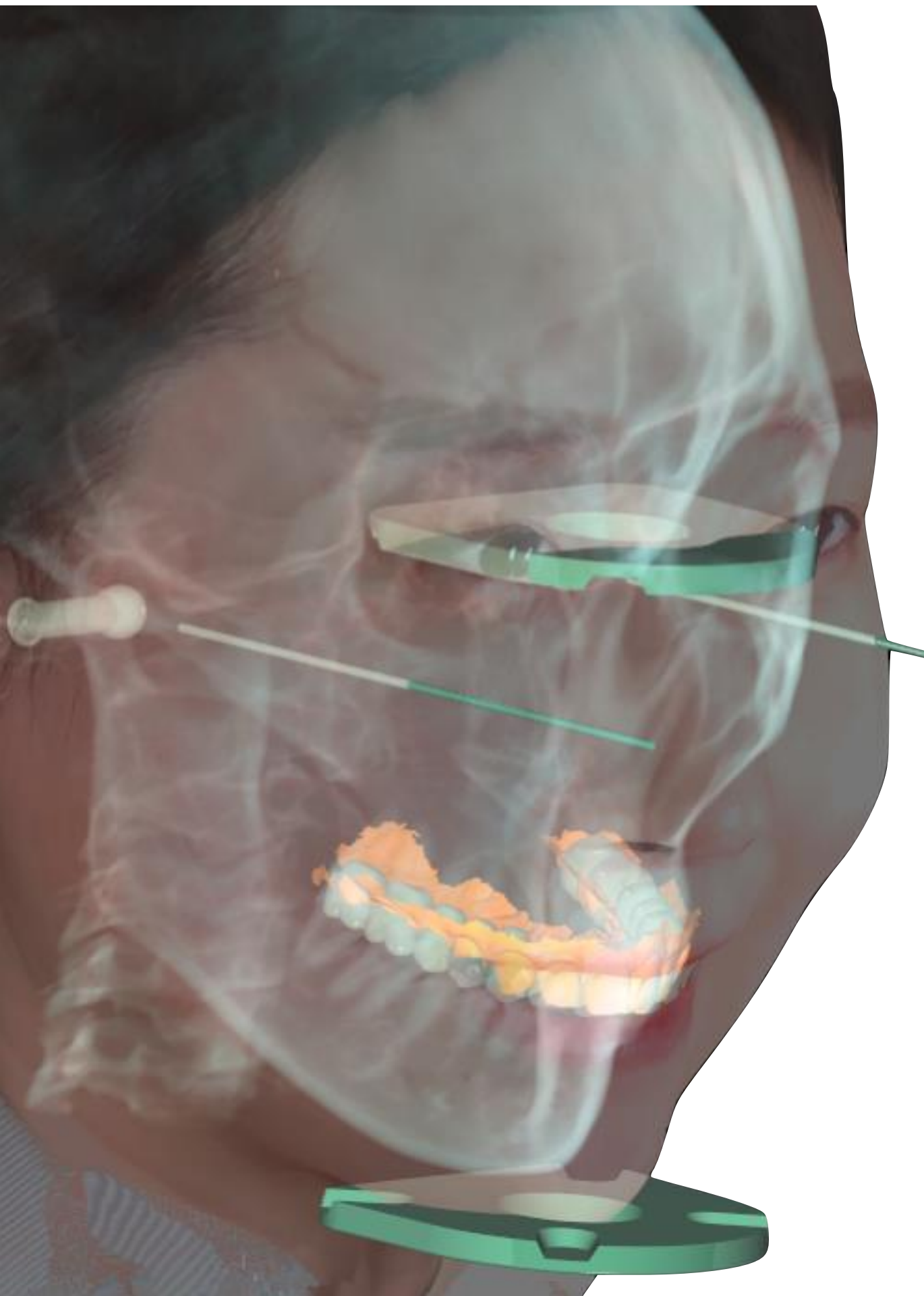
Check your R points using R2 Connector..



Purchase R points at Online shop



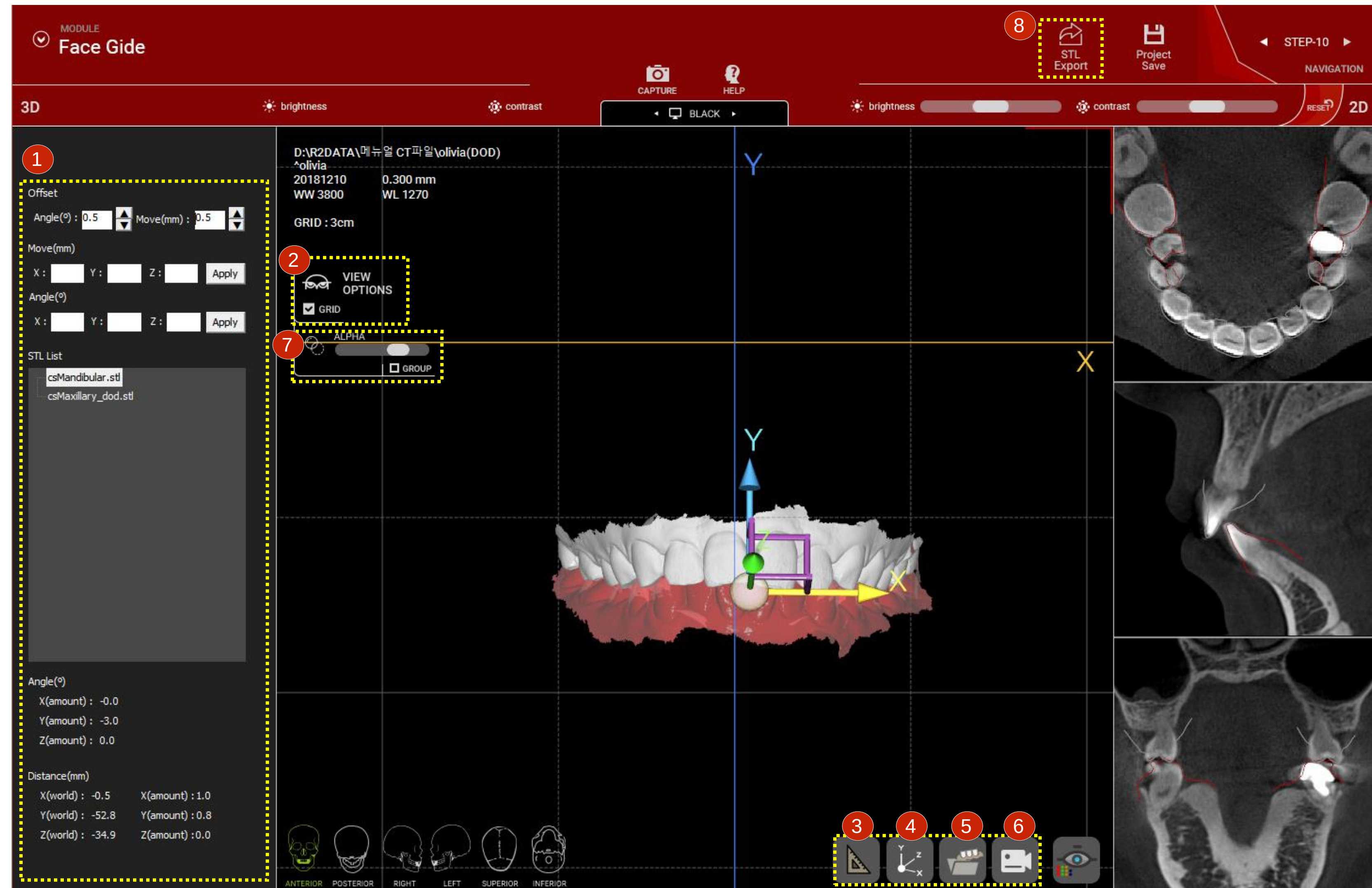
R2GATE™
Turning imagination into reality



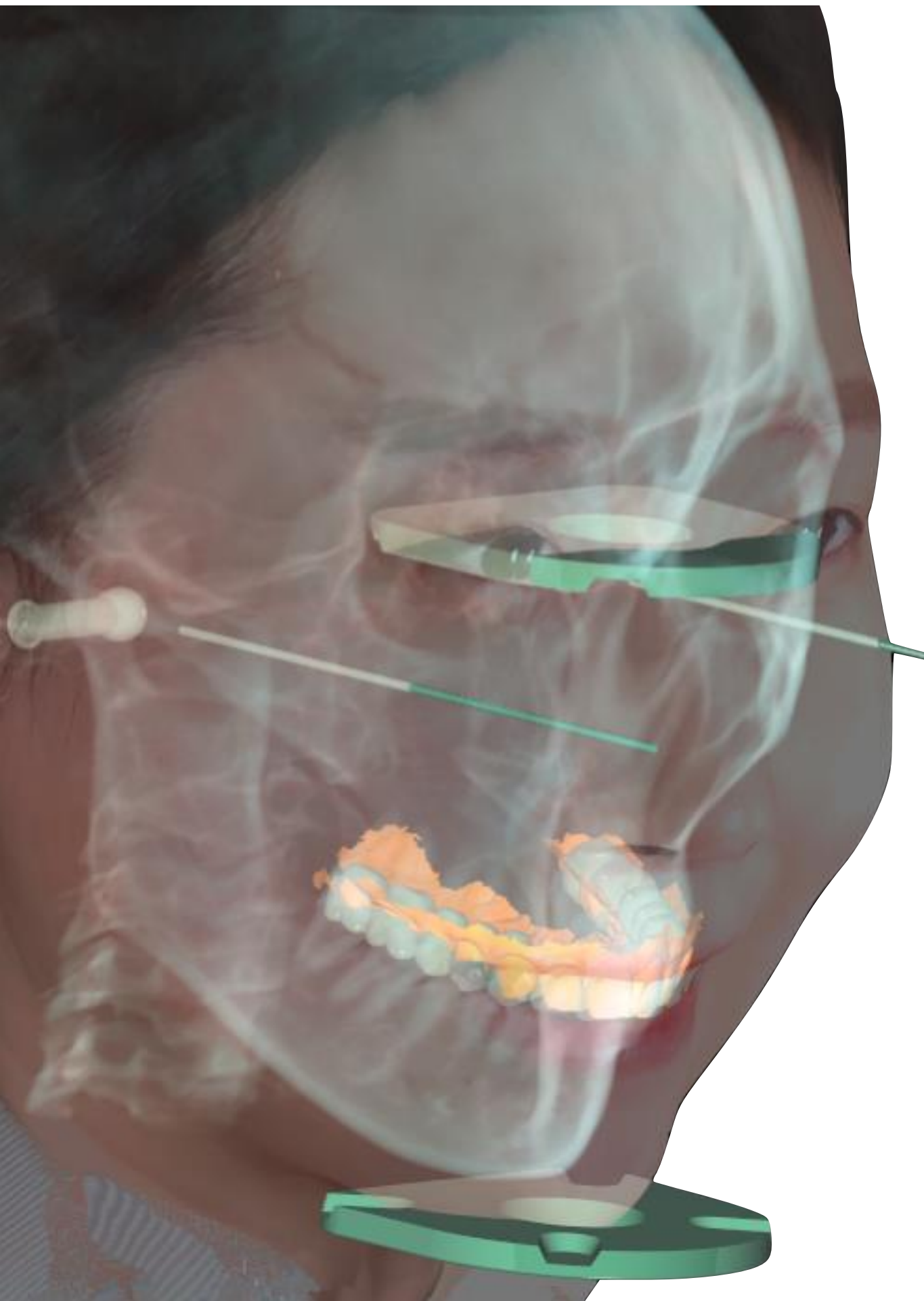
11 Digital Oral Design FACEGIDE

Control Buttons

- 1 Modify the position and angle of the scan file by entering the values
- 2 Adjust Grid display in the 3D view of CBCT
- 3 Measure the distance of the shifted coordinate value
 Mark a point
 Delete a point
- 4 Activates after STL file loading, the coordinates of STL file can be manually modified
- 5 Import Cast(STL) file
- 6 Adjust the center line of X,Y-axis
- 7 Adjust the transparency of selected STL file
- 8 Extract the file in STL format as the coordinates of the selected file

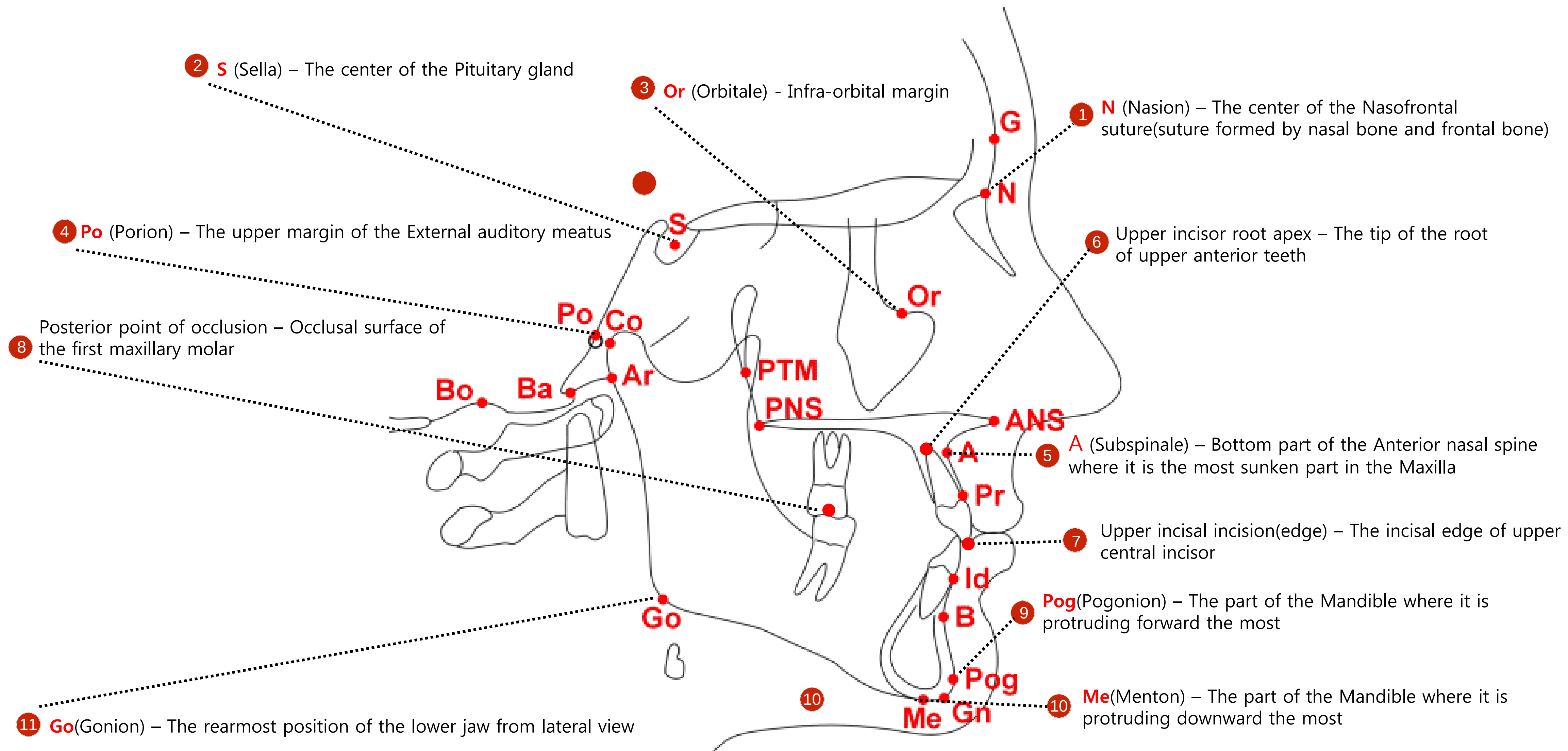


R2GATE™
Turning imagination into reality



12 Digital Oral Design Appendix

Anatomical Terms and Locations for Facial Analysis



Anatomical Terms and Locations for Facial Analysis

1 FH Plane(Frankfort horizontal plane)

A horizontal line connecting the Orbitale and the upper margin of the External auditory meatus(Porion)

2 Camper Line

A line connecting the upper margin of the External auditory meatus and ala of the nose

3 Axis orbital plane

A line connecting Infra-orbital margin(Orbitale) and the upper margin of the External auditory meatus

4 Mcnarama Line

A vertical line connecting Nasion and FH plane

