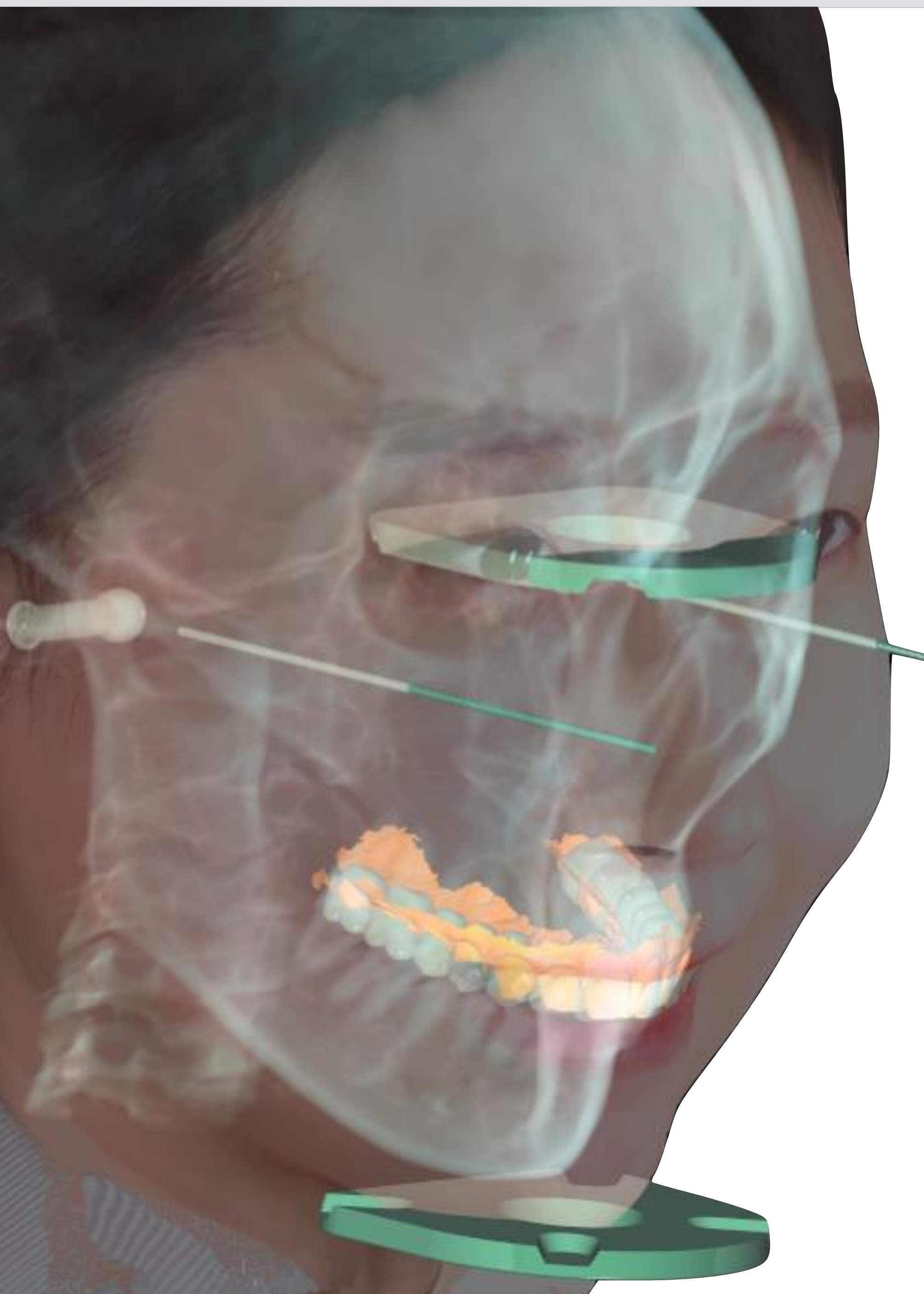




R2GATE™ 2.0

R2 Guide



About...

R2GATE™

Innovative diagnostic software that analyzes the Full oral condition to determine the optimal position for dental implant treatment

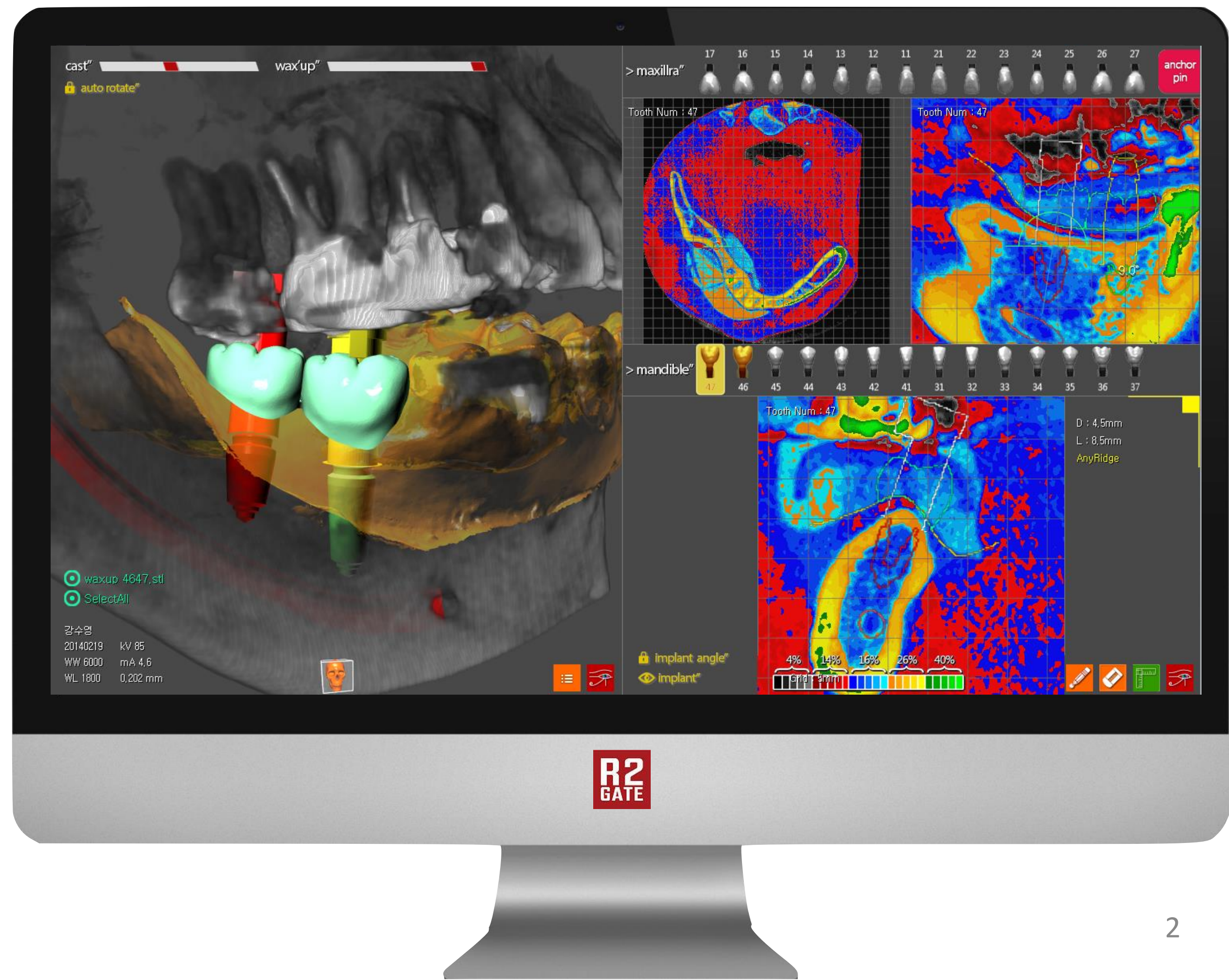
Integrating all information required for prosthesis-driven(top-down) implant planning

- prosthetic design
- skeletal information
- gingival form
- occlusal relationship

Creating the reality of ONE-DAY IMPLANTS!

- accurate productive diagnosis
- reduced chair-time
- minimally invasive surgery
- immediate loading
- excellent clinical results

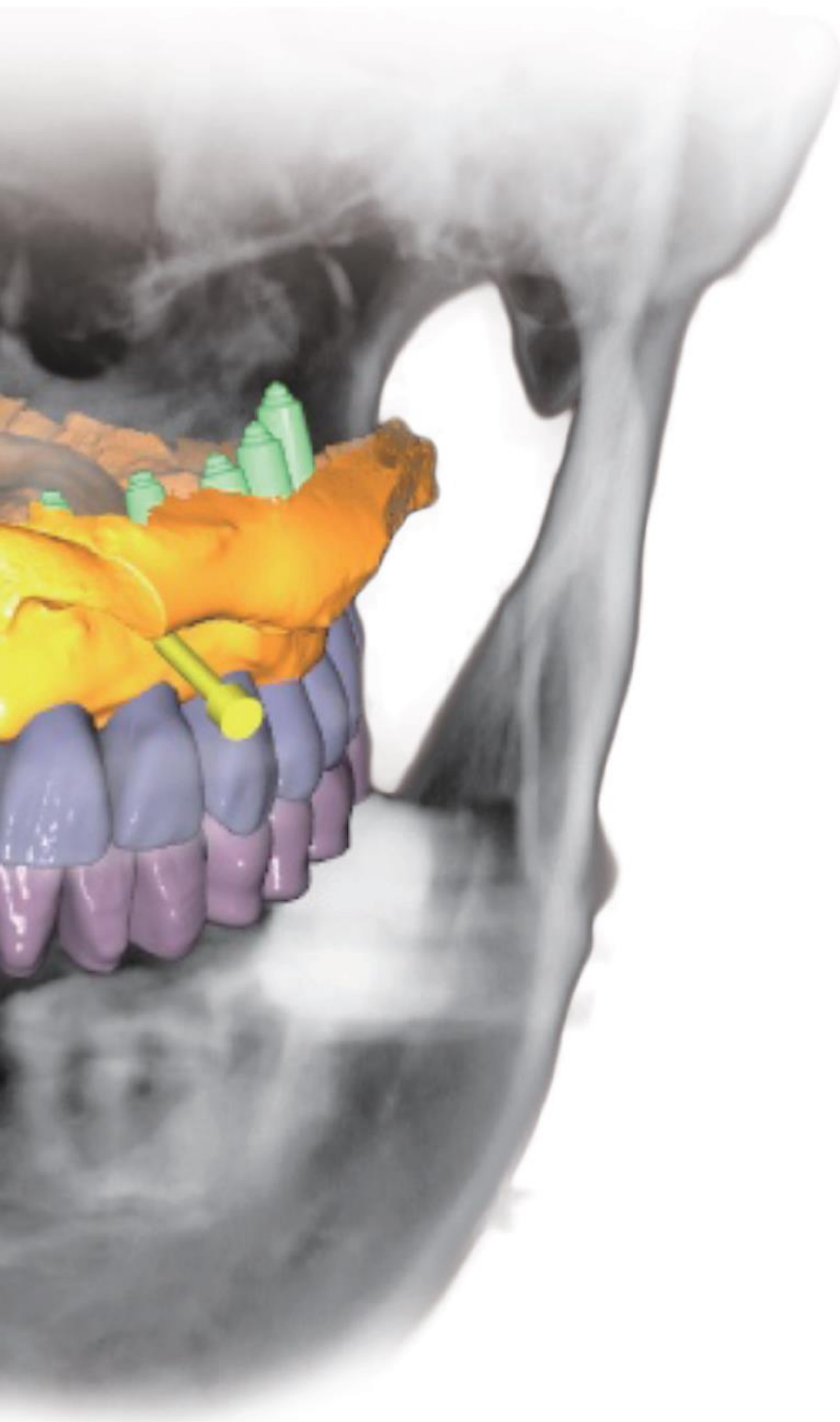
Compatible with all major implant systems



INDEX

R2GATE™

Turning imagination into reality
since 2012

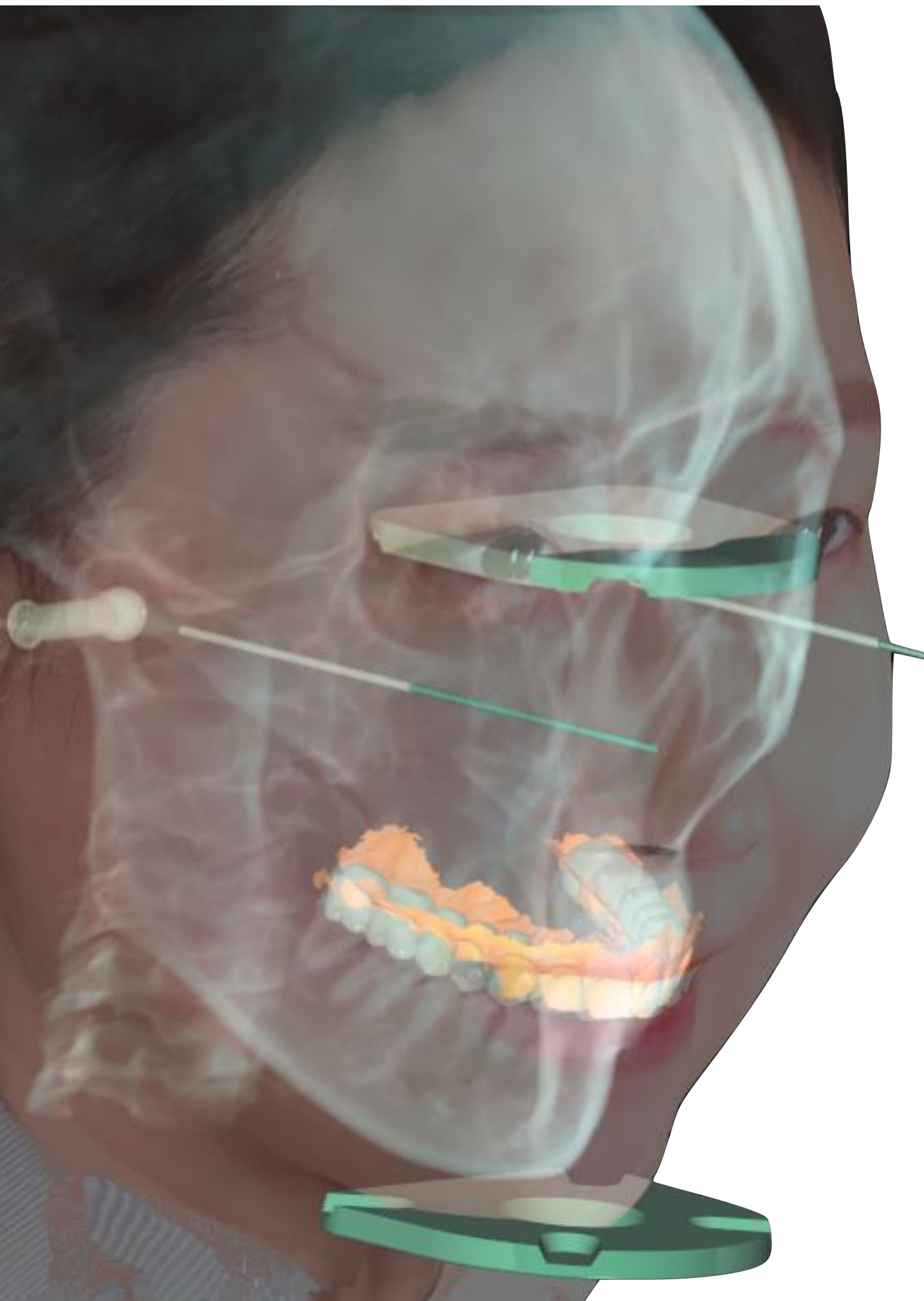


About R2 GATE™ -For R2 Guide

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R2GATE™

Turning imagination into reality



1 R2GATE™ 2.0 Installation



Sign-up & download



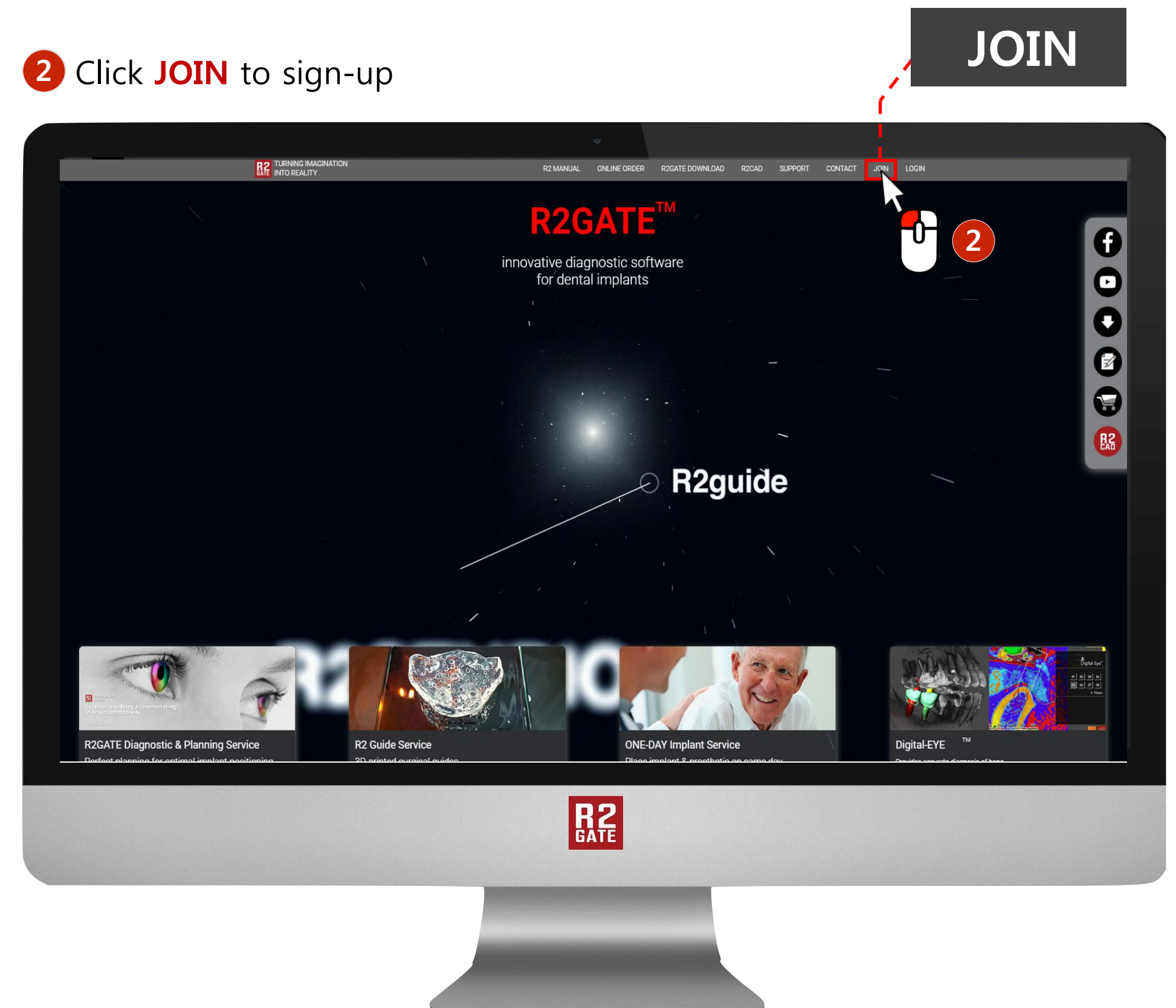
Installation

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





Sign-up & download



Installation

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**

- 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

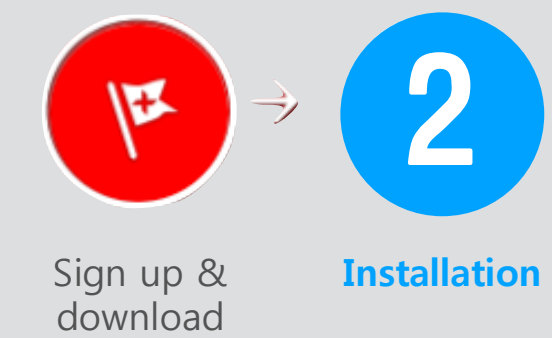
OFFICE[CLINIC]

Office name...

PREVIOUS

NEXT

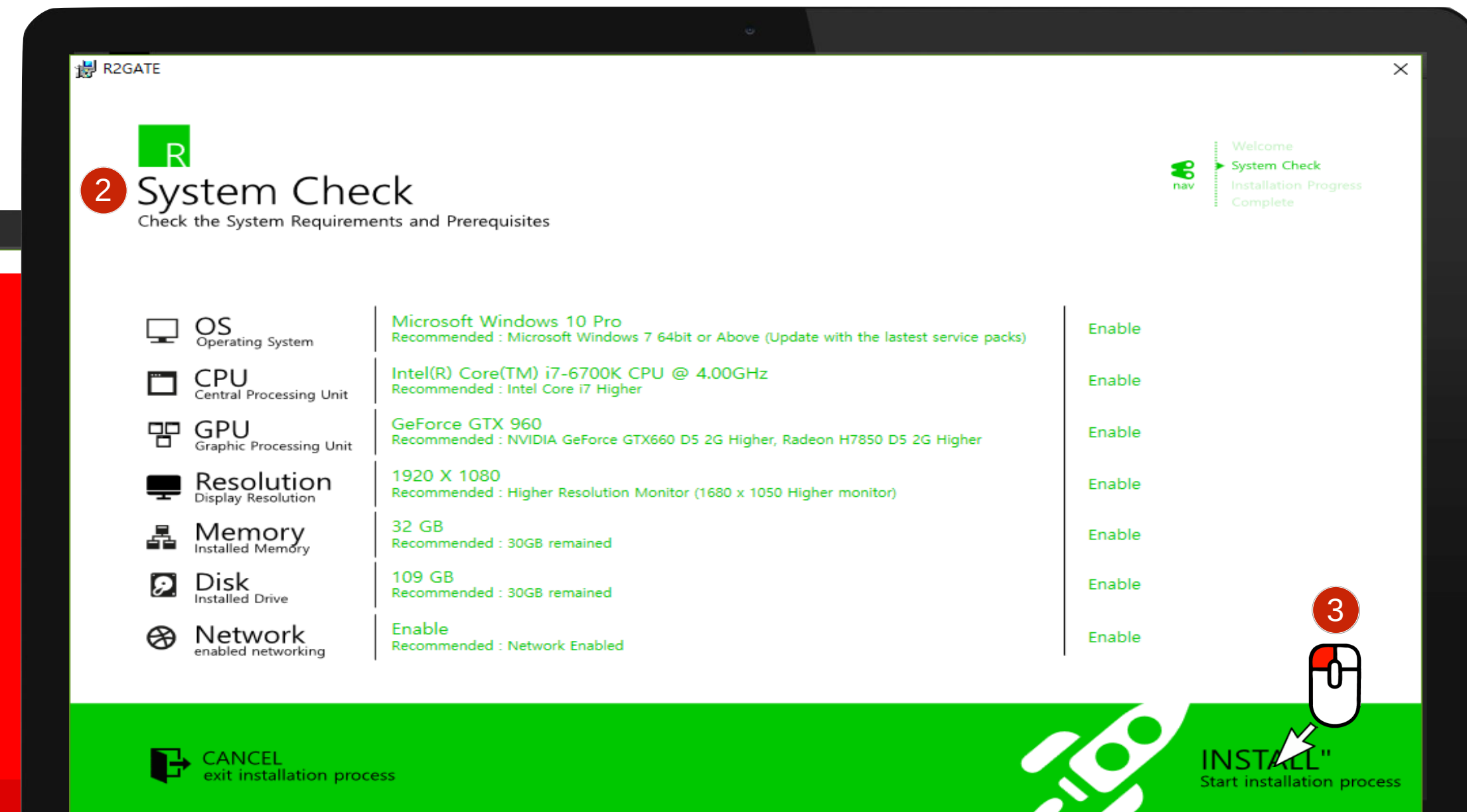
1.2 R2GATE™ 2.0 Installation



**R2
GATE**

R2GATE 2.0
Apr. 2019

- 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.com1



1.2 R2GATE™ 2.0 Installation



Sign up &
download

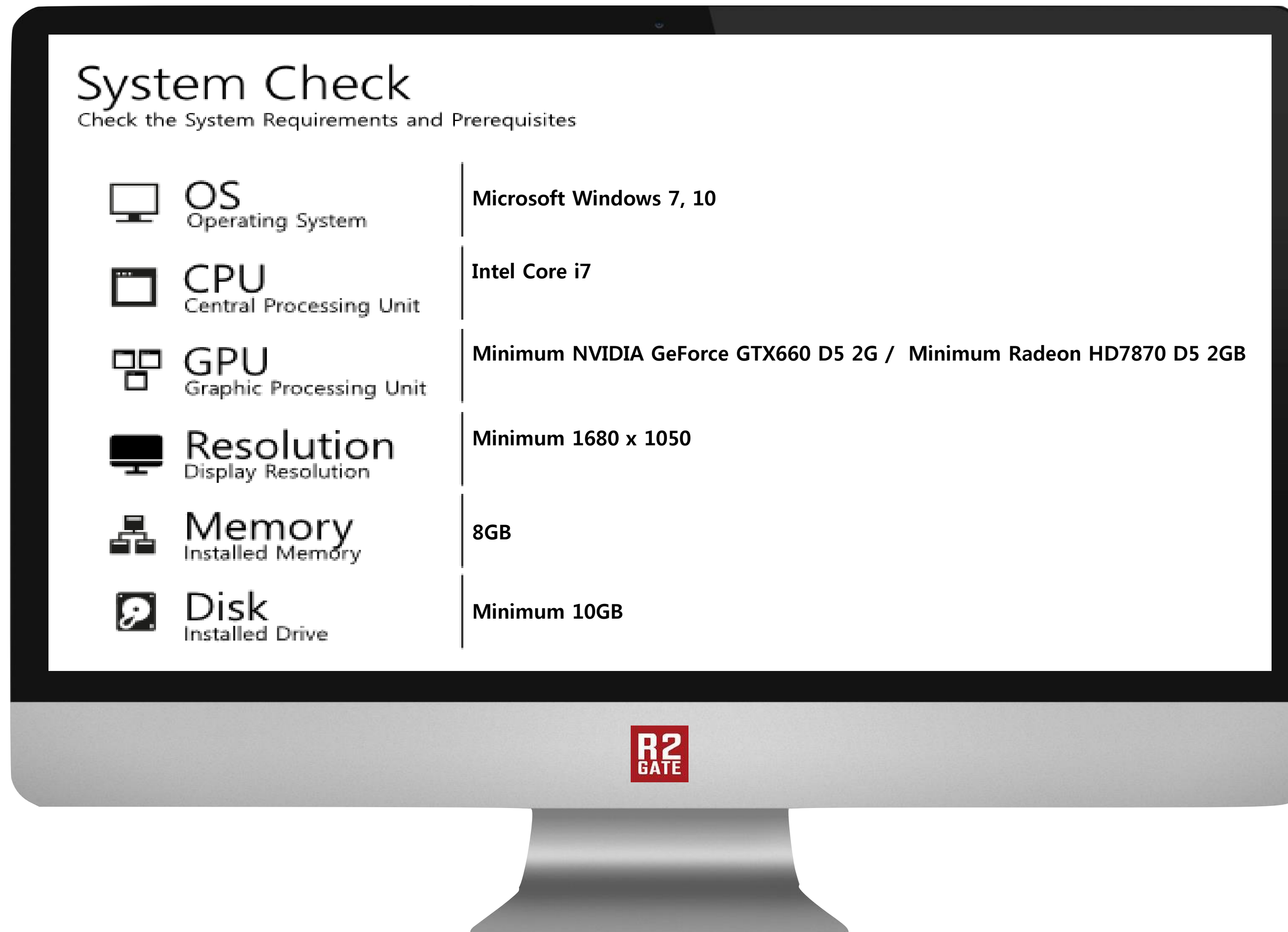


Installation

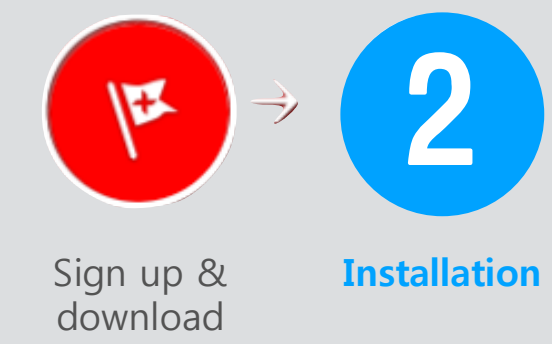
**R2
GATE**

R2GATE 2.0
Apr. 2019

R2GATE System Specifications



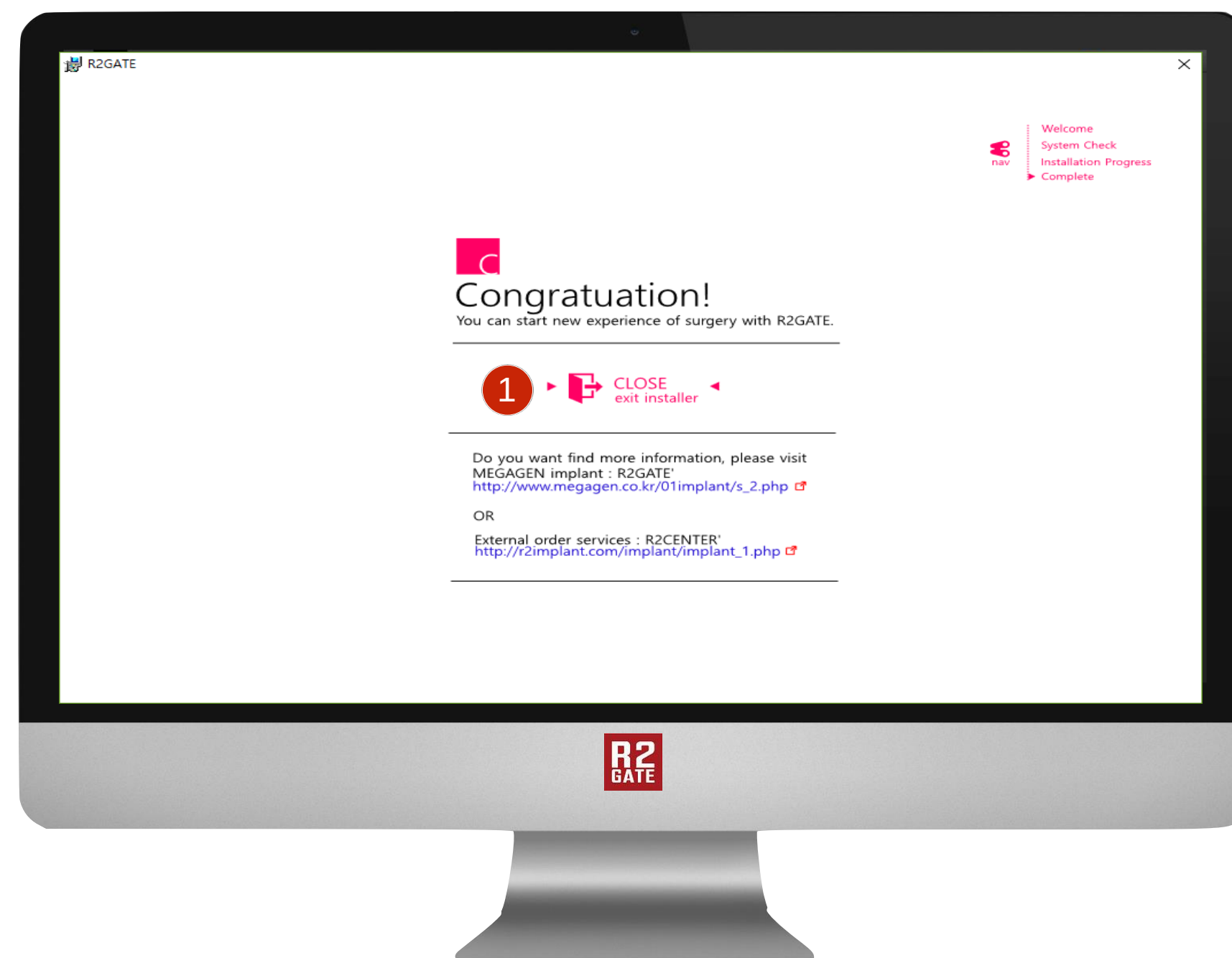
1.2 R2GATE™ 2.0 Installation



**R2
GATE**

R2GATE 2.0
Apr. 2019

- 1 R2GATE installation is complete

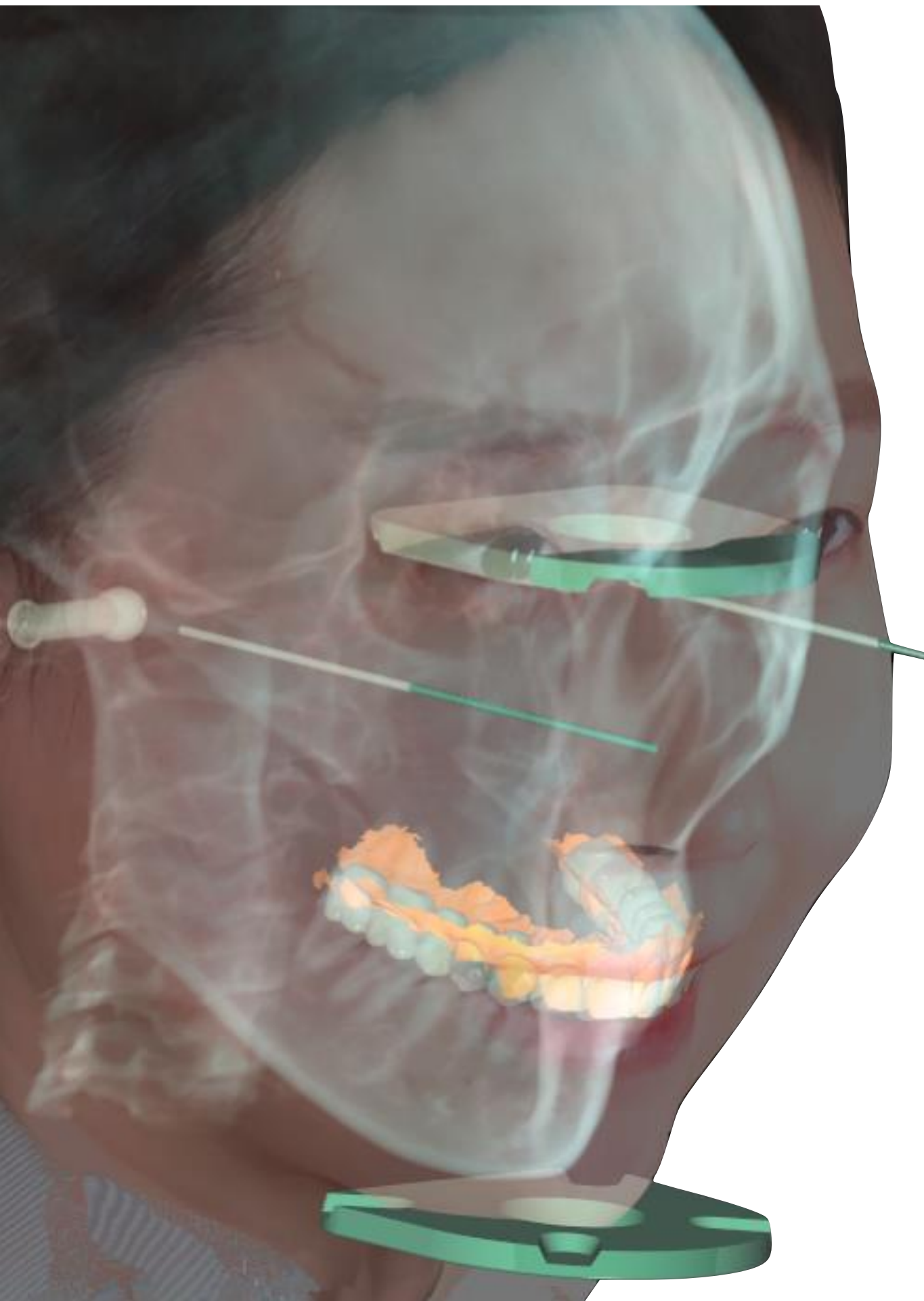


- 2 When the installation is complete, **R2GATE Windows**, **R2DATA**, **R2 Ware** folders will be created on the desktop



R2GATE™

Turning imagination into reality



2 R2GATE™ 2.0 CBCT & STL Matching



Windowing(EN)



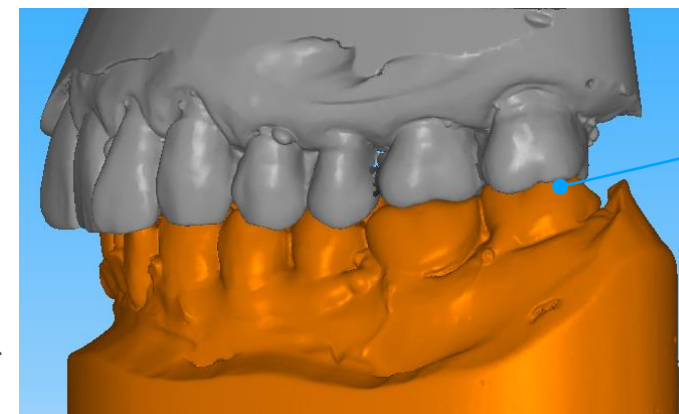
STL Matching(EN)

Manual DATA Preparation (CBCT, Model Scans)

- 1 Create patient folder in R2DATA folder
 - 2 Upload CBCT & 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

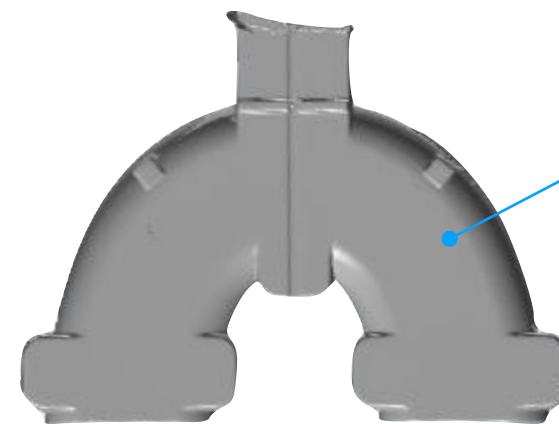
Scan data (STL format)

- Upper: trimmed model scan in case of immediate loading
- Lower: trimmed model scan in case of immediate loading
- Occlusion: required in case of immediate loading*
- R2 Tray: required in case of metal prostheses around implant site*



* Occlusion: unnecessary in case of R2 GUIDE without prosthesis

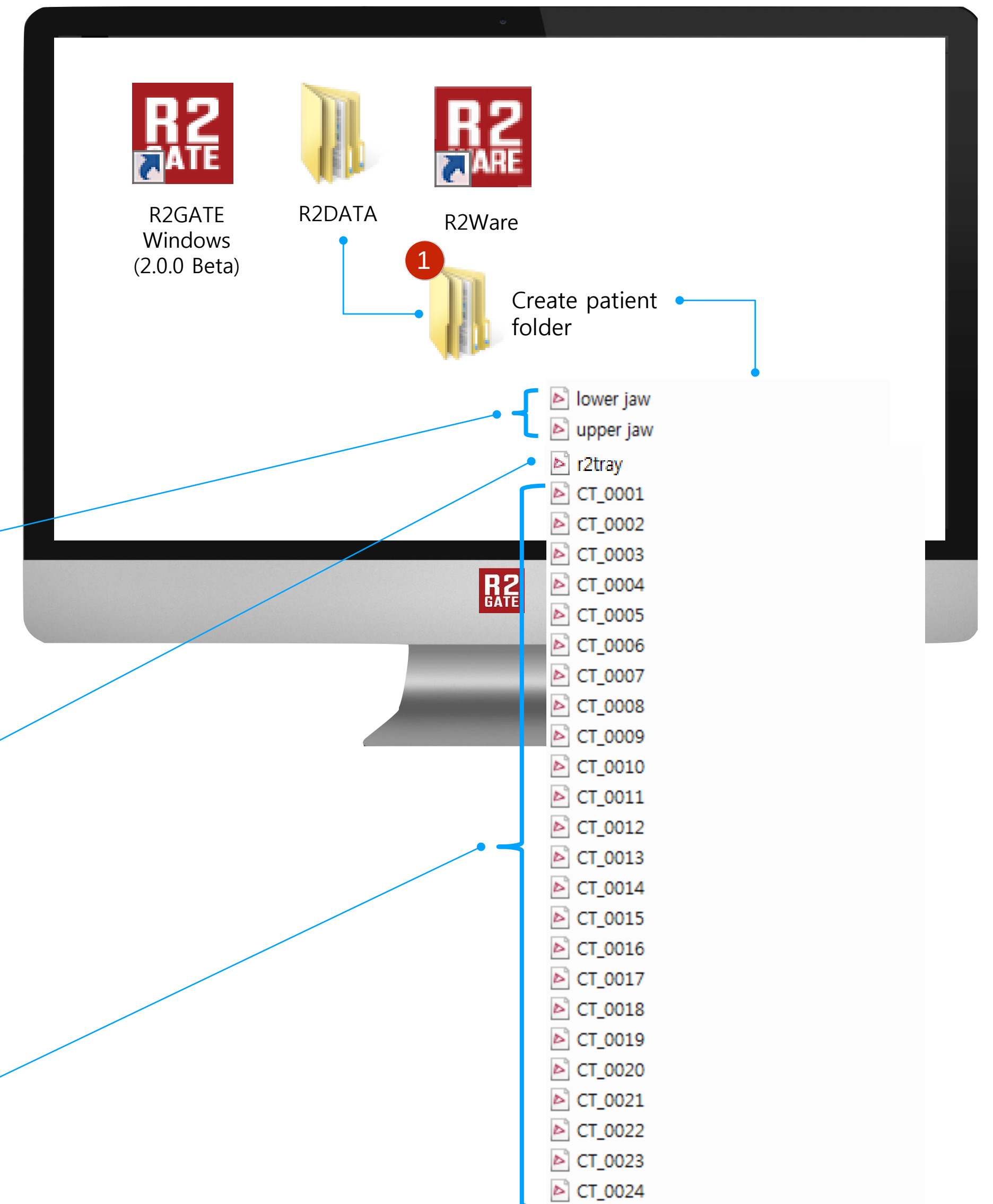
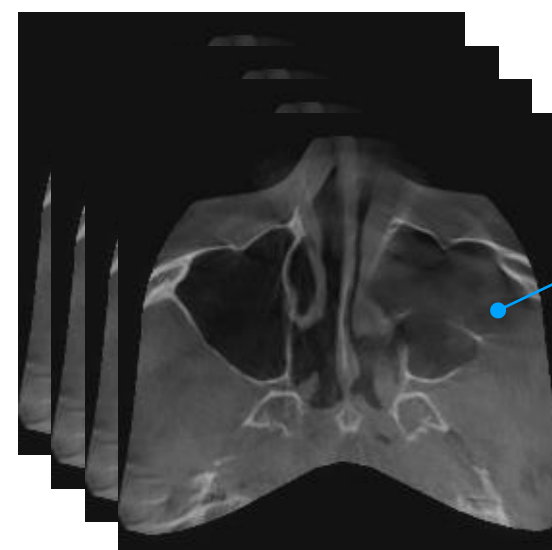
* R2 Tray: used to superimpose CBCT & STL files



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



2.2 R2GATE™ 2.0 R2 Connector

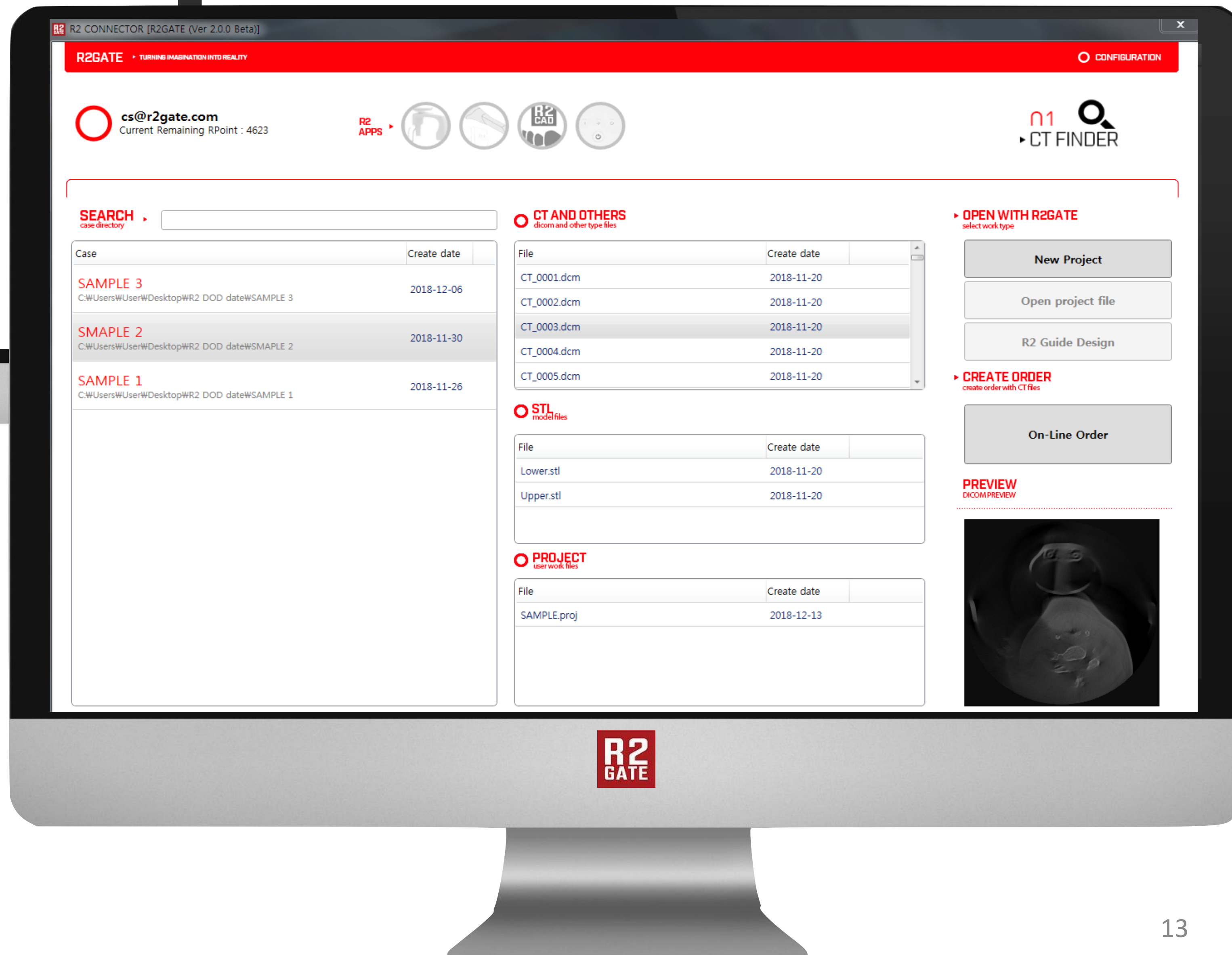
R2
GATE

R2GATE 2.0
Apr. 2019

1 Double click **R2GATE Connector**



2 R2GATE Connector window

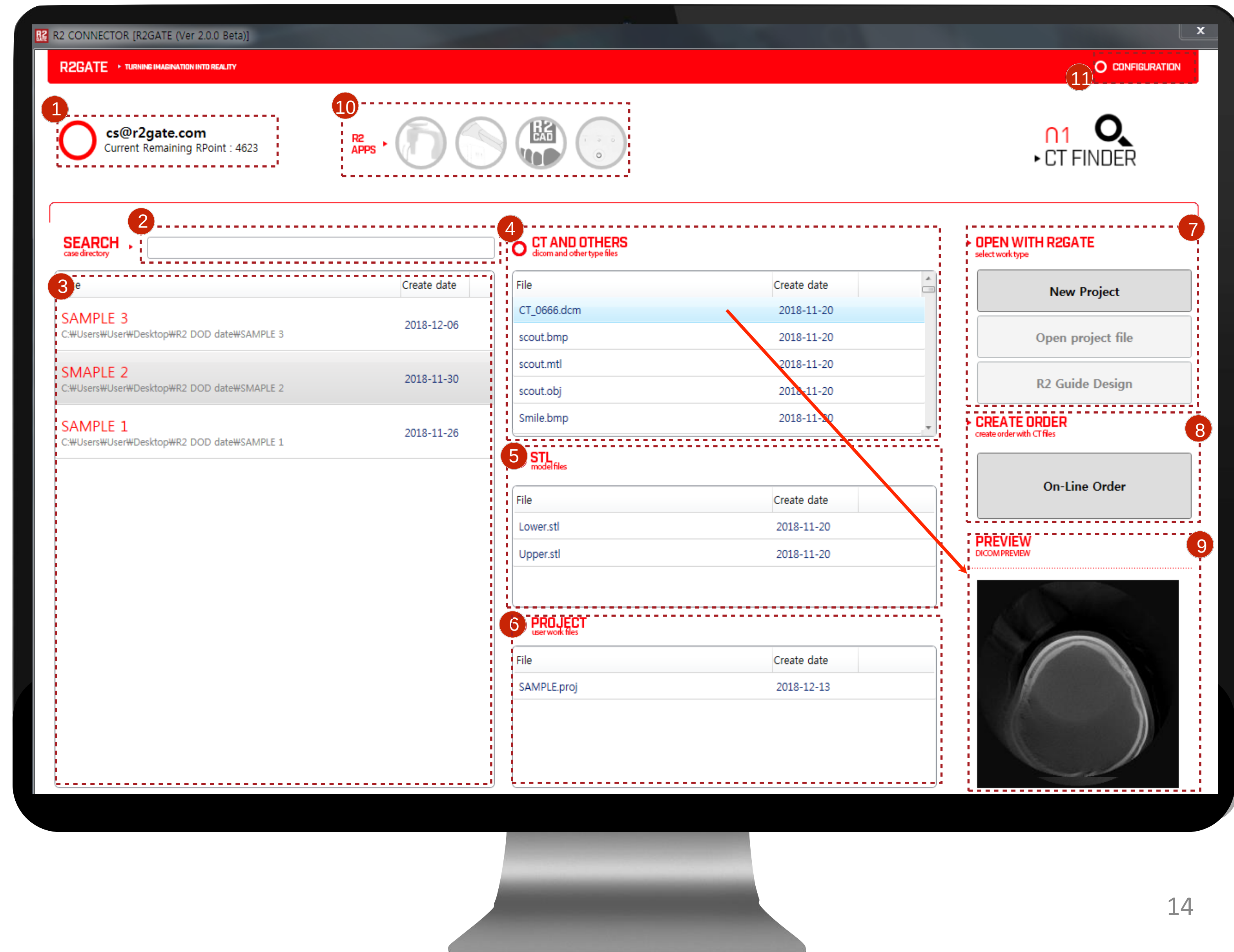


R2 Connector

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



2.2 R2GATE™ 2.0 New Project

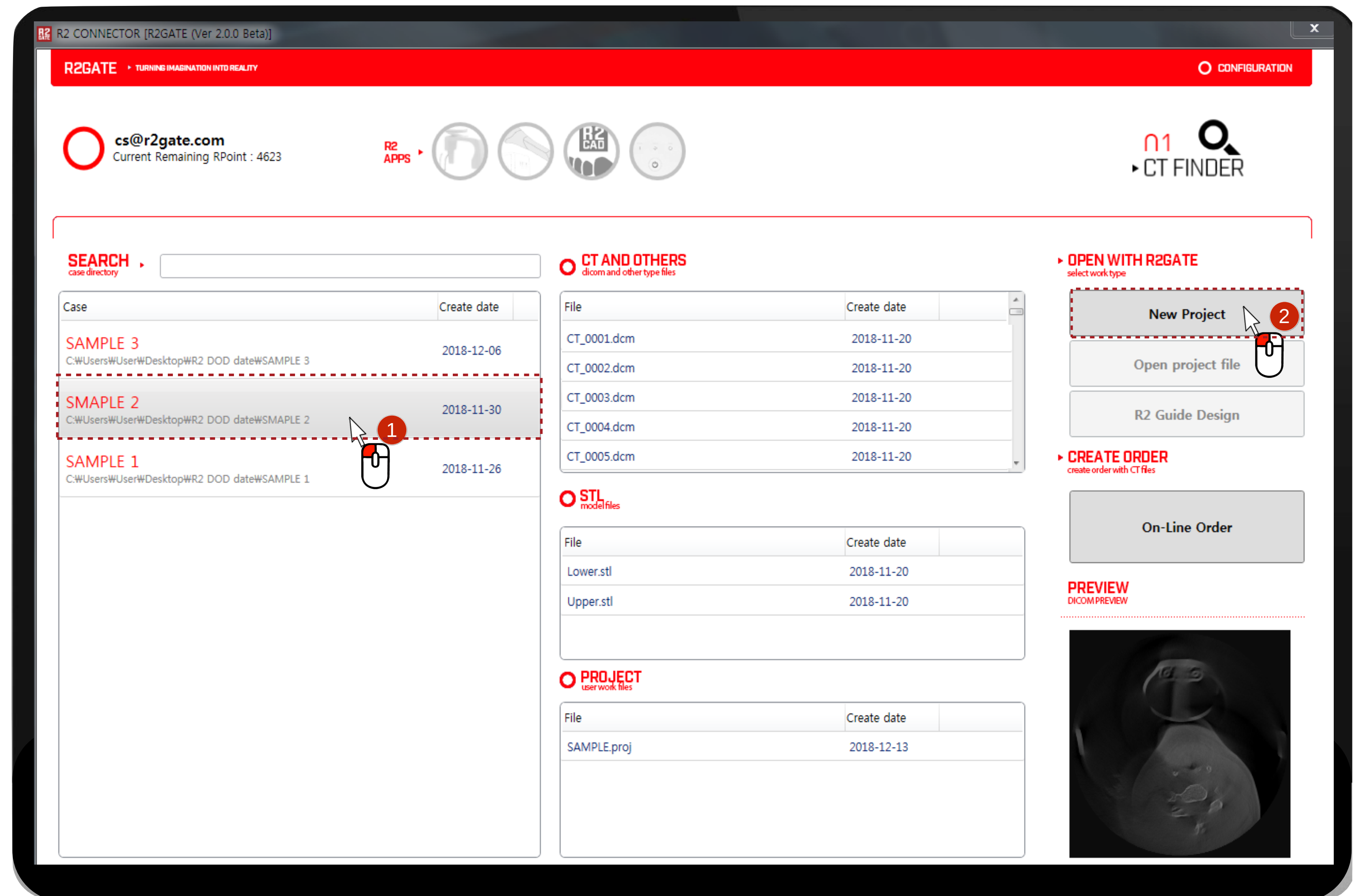
R2
GATE

R2GATE 2.0
Apr. 2019

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**



2.2 R2GATE™ 2.0 New Project

R2
GATE

R2GATE 2.0
Apr. 2019

Create New Project



2.3 R2GATE™ 2.0 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

R2
GATE

R2GATE 2.0
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Control Buttons

Control brightness & contrast of 3D view

Available to change to desired background color

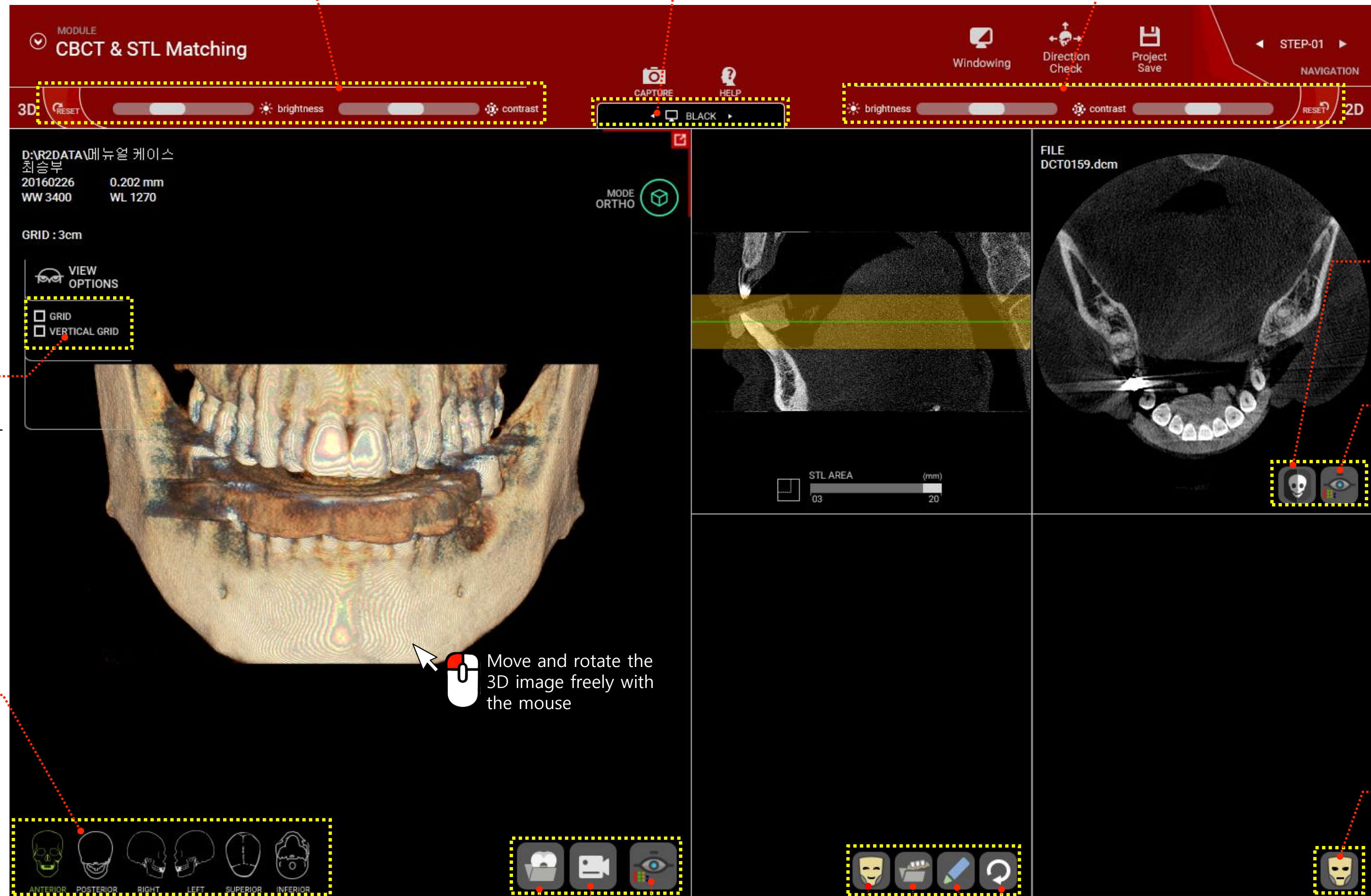
Control brightness & contrast of 2D view

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



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

2.4 CBCT Windowing



R2
GATE

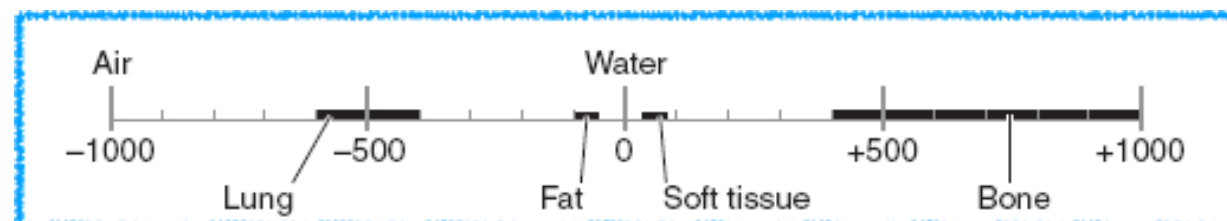
R2GATE 2.0
Apr. 2019

R2GATE CBCT Windowing

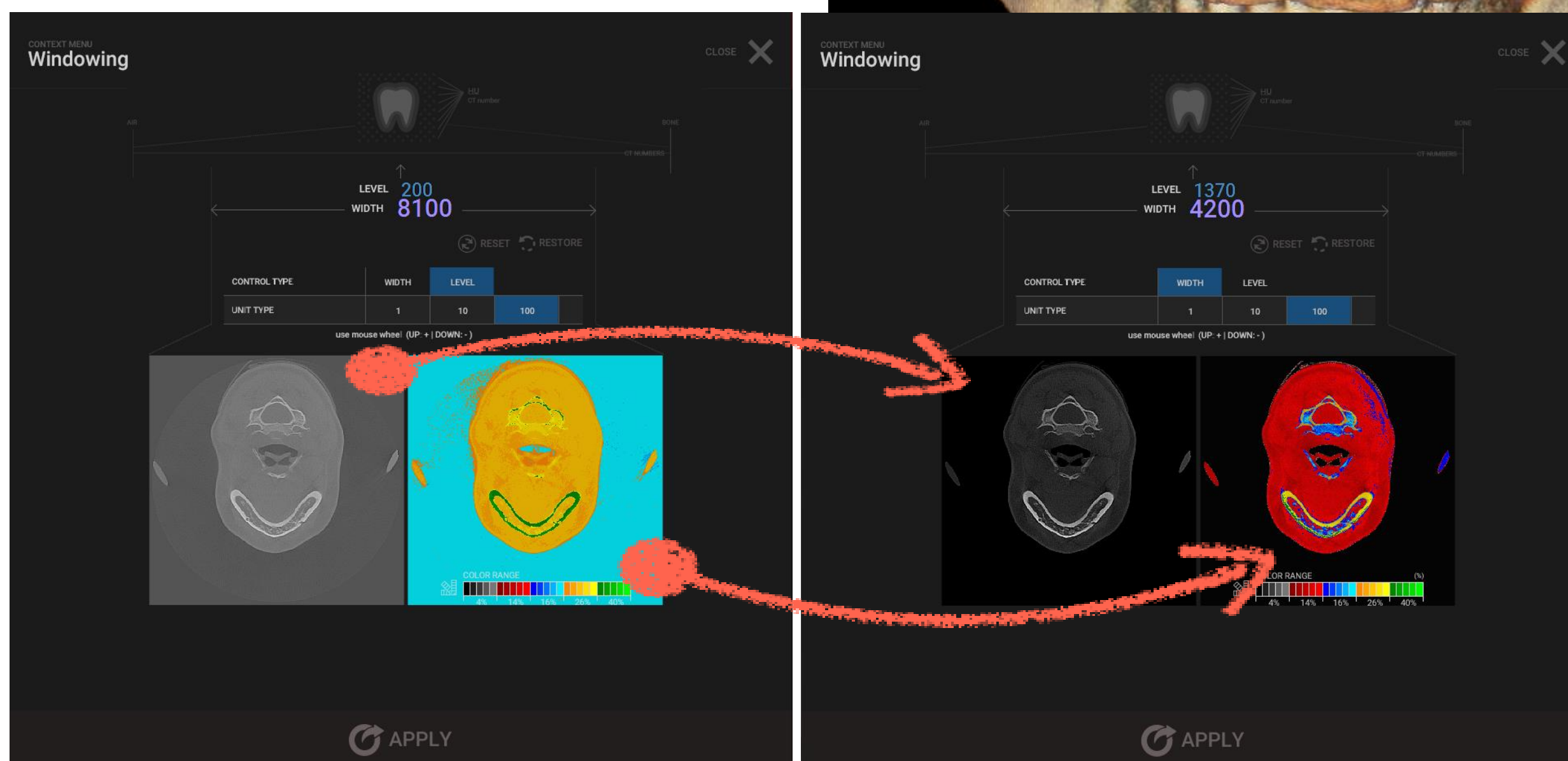
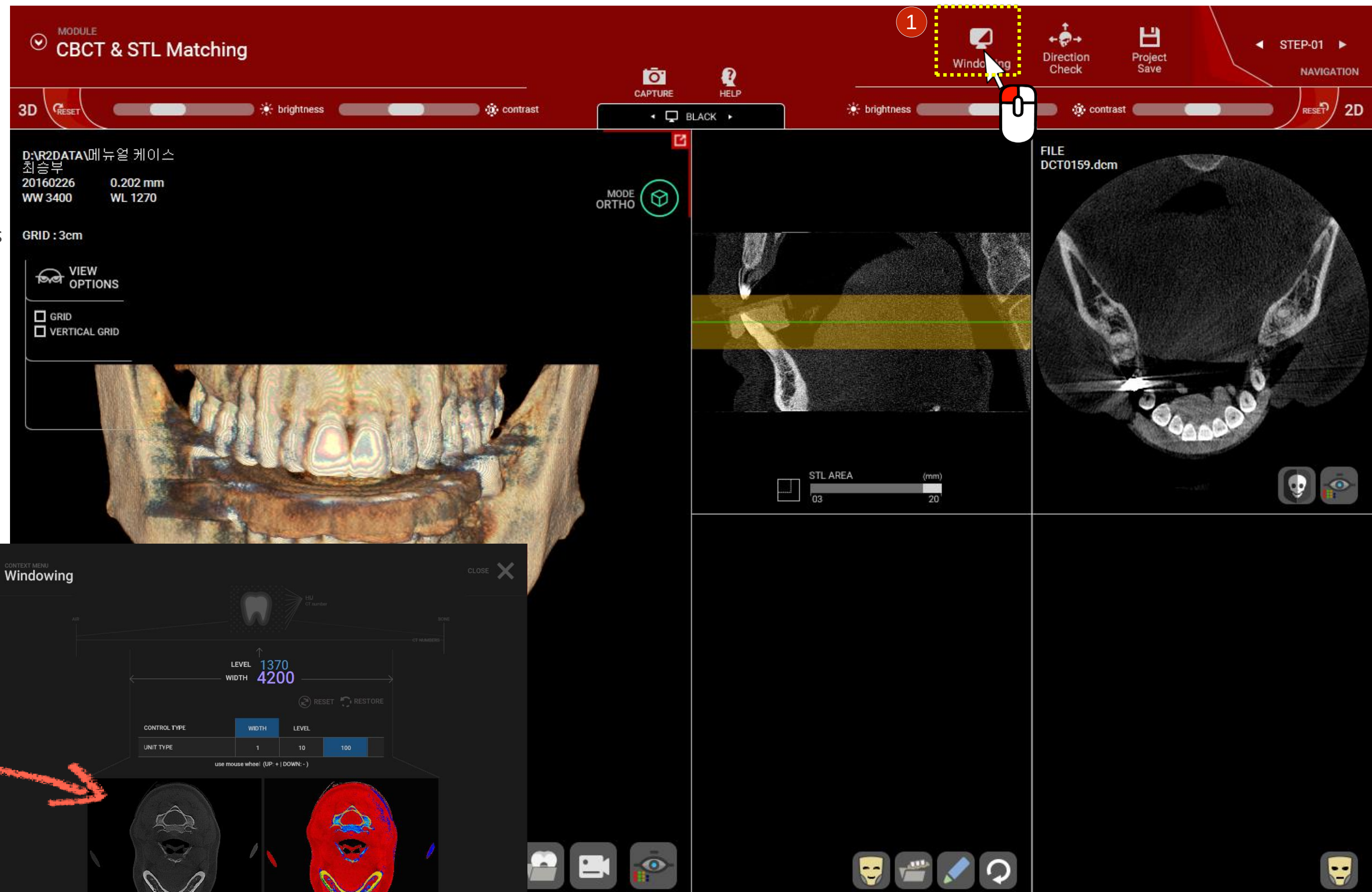
- When importing CT taken by R2 STUDIO, the value of windowing is automatically standardized so skip this step.

- 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



2.4 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



Implant surgery



Quick Guide



Face Guide

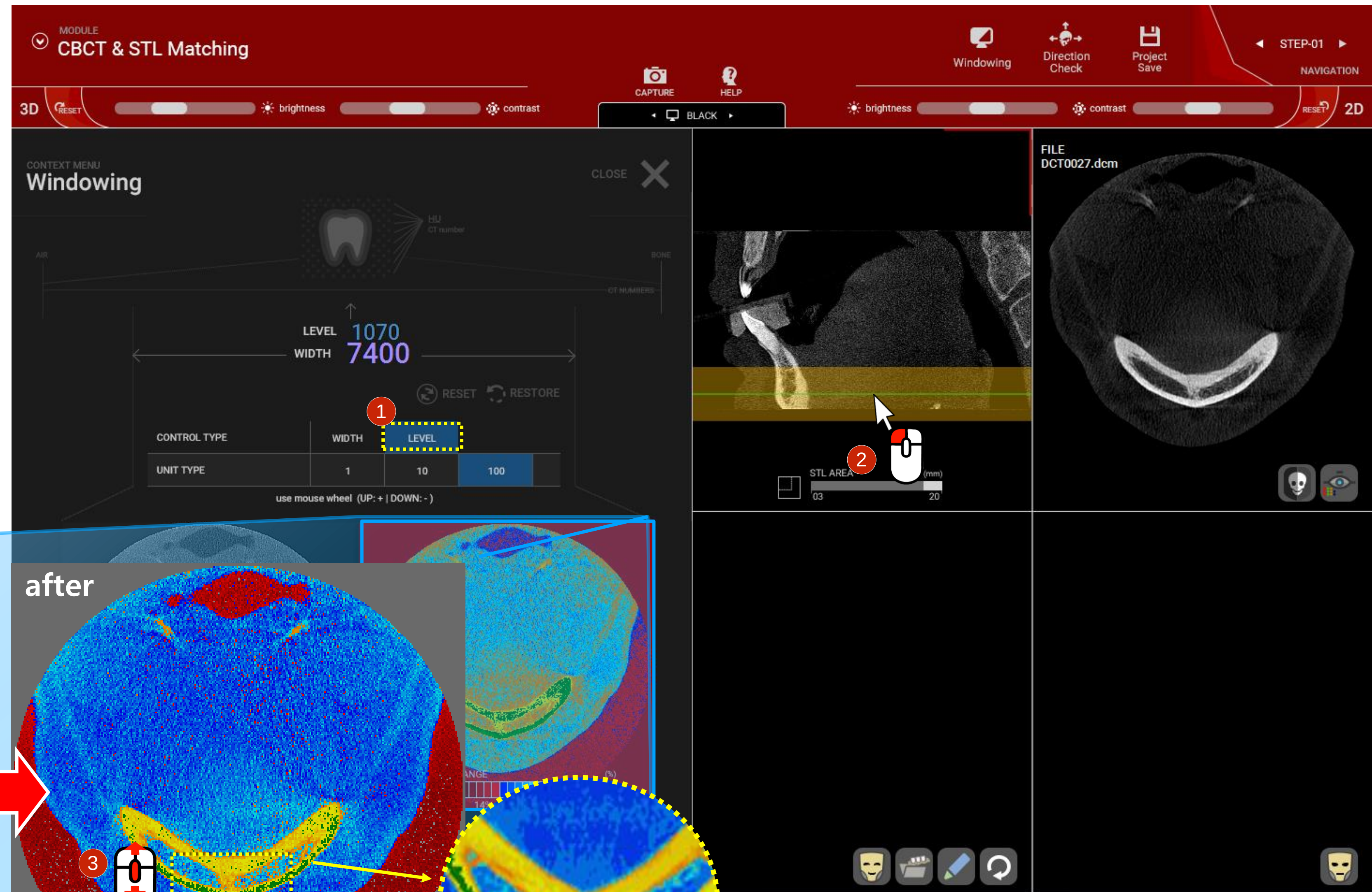
R2
GATE

R2GATE 2.0
Apr. 2019

R2GATE CBCT Windowing

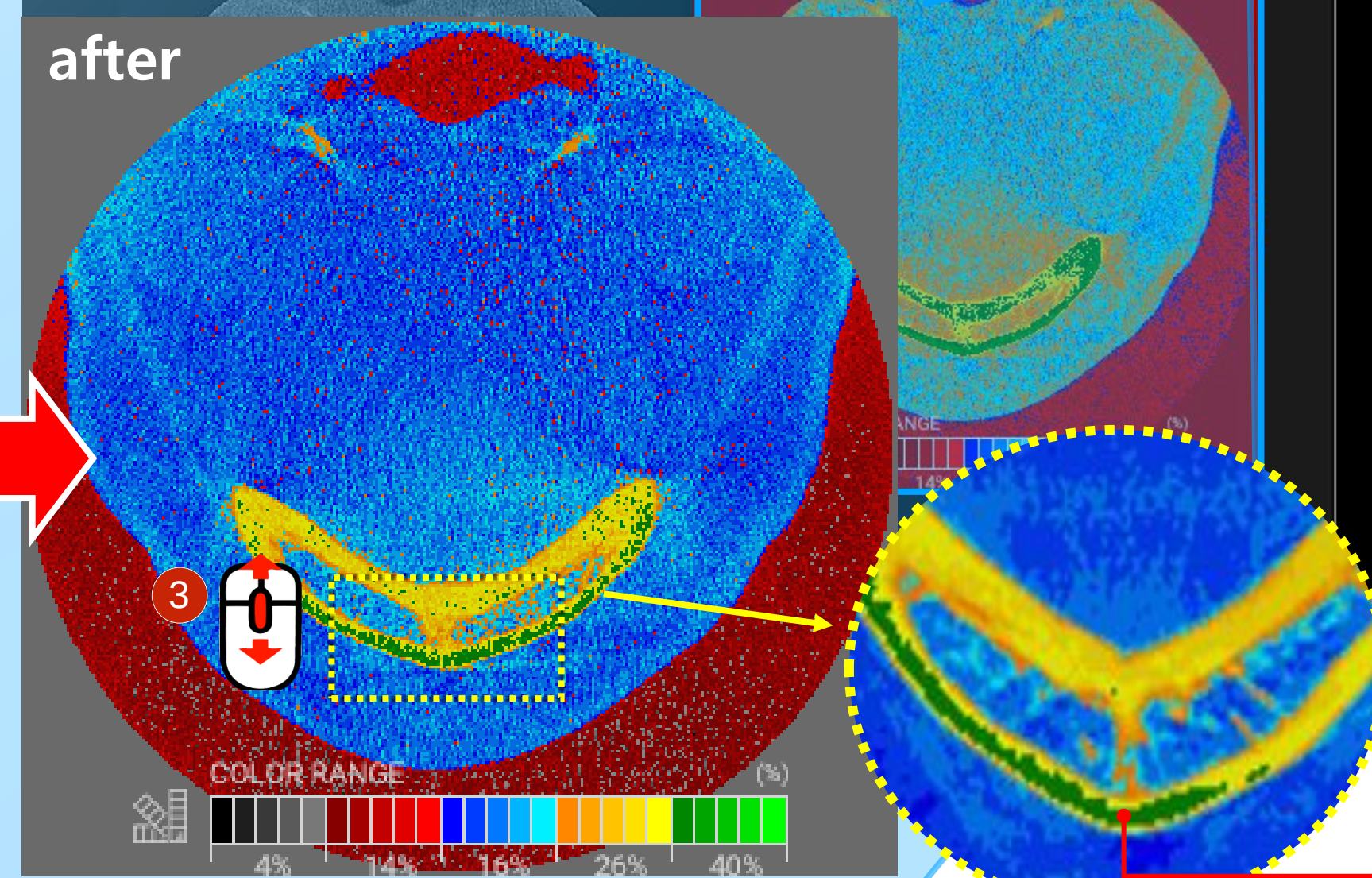
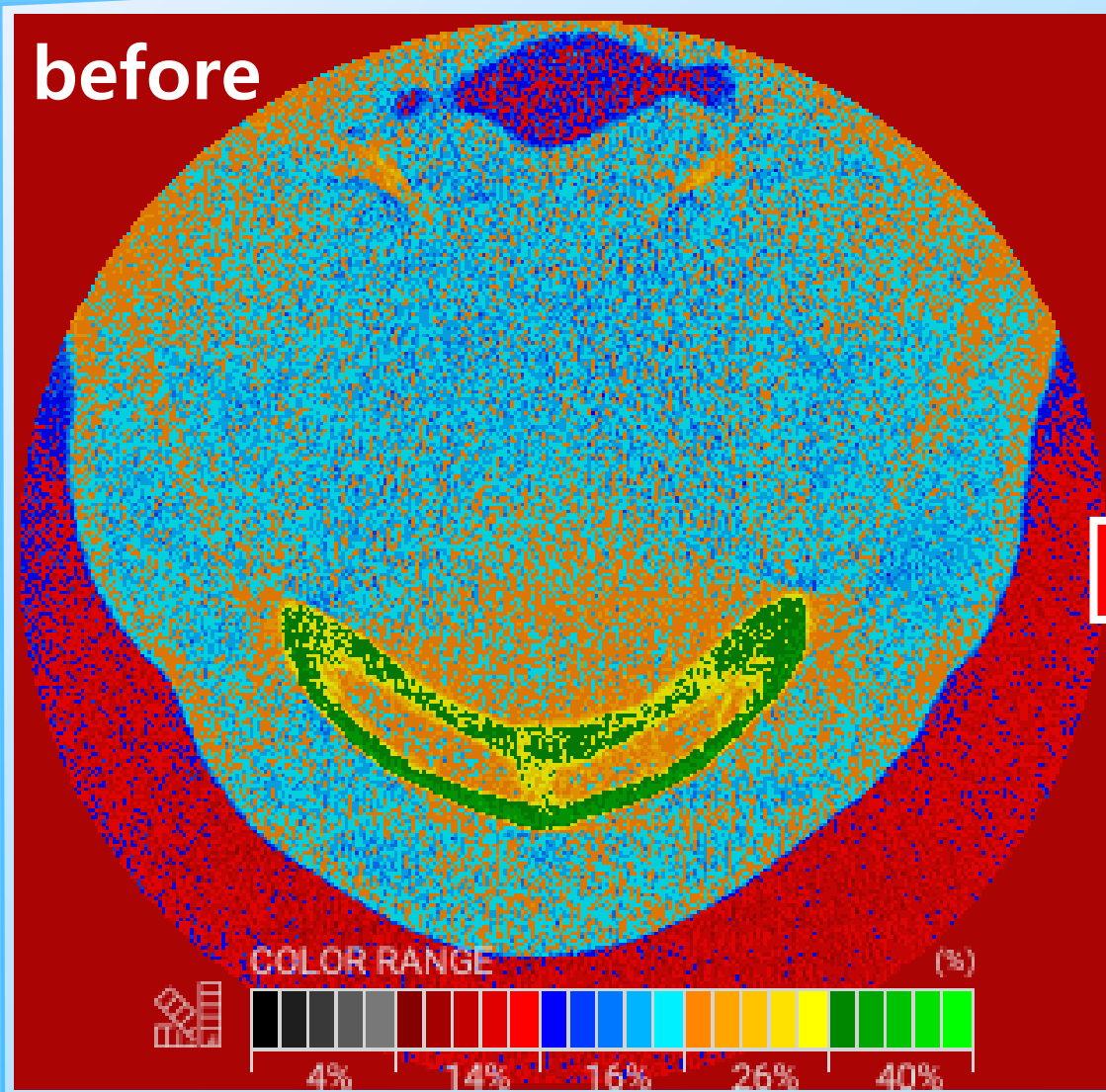
- 1 Select **LEVEL** option first
- 2 Right click & drag the green line towards mandibular and place it.
- 3 Adjust the green line to the hard bone first as a reference by SCROLLING the mouse.

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



before

after



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

2.4 CBCT Windowing



R2
GATE

R2GATE 2.0
Apr. 2019

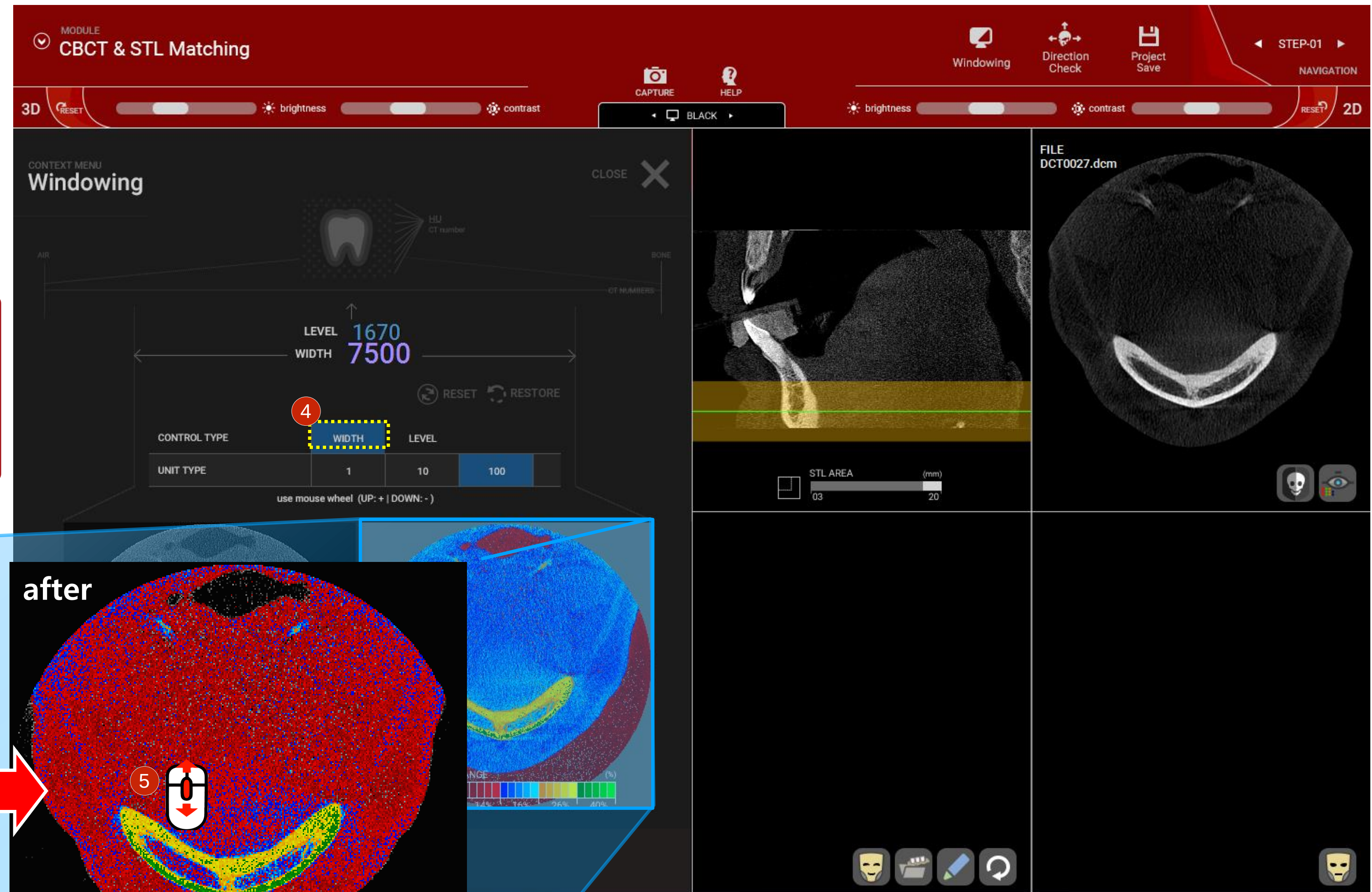
R2GATE CBCT Windowing

4 Select **WIDTH** option

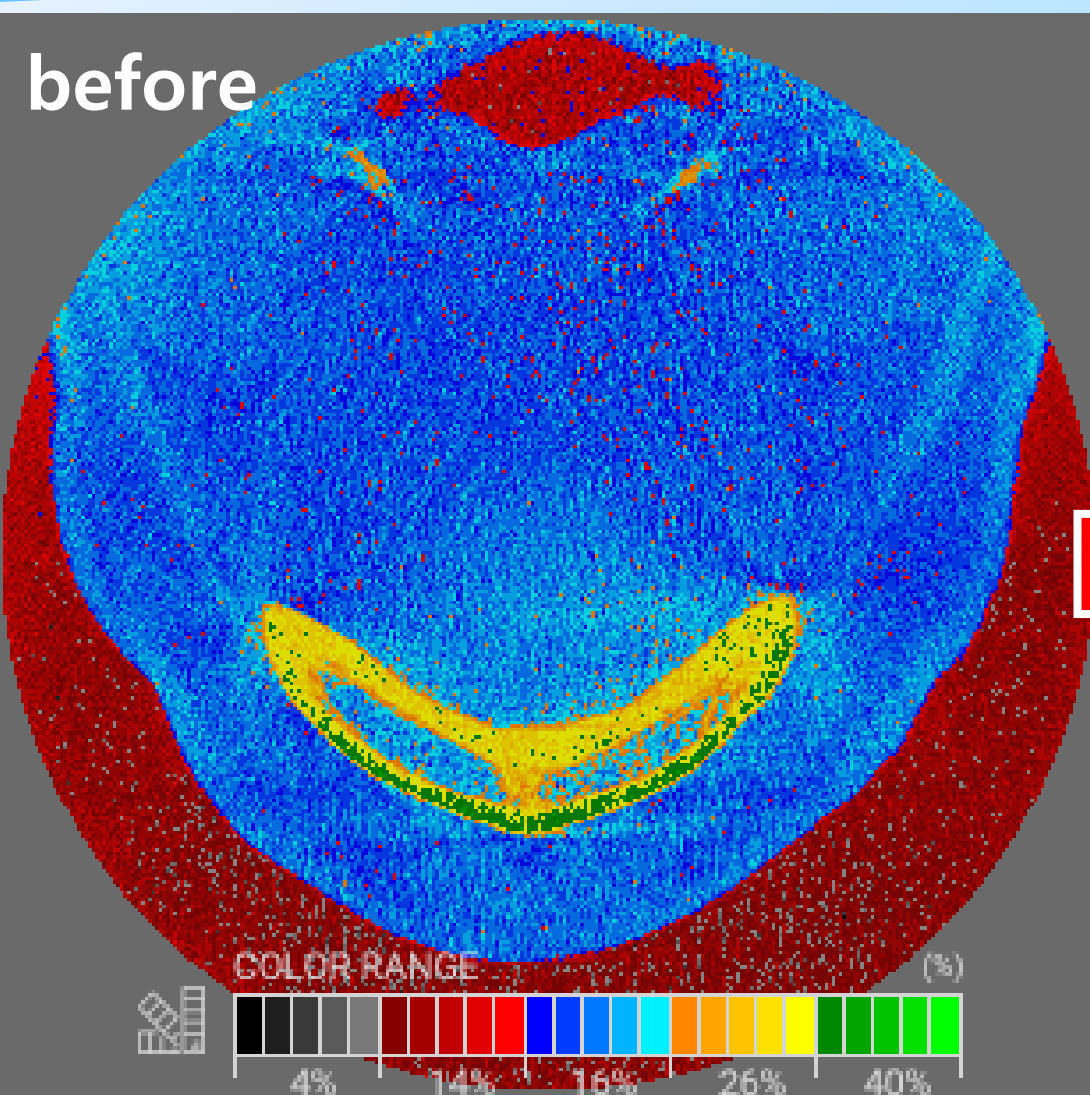
5 According to the CBCT color values below, adjust other sections by scrolling the mouse

Ideal CBCT color values:

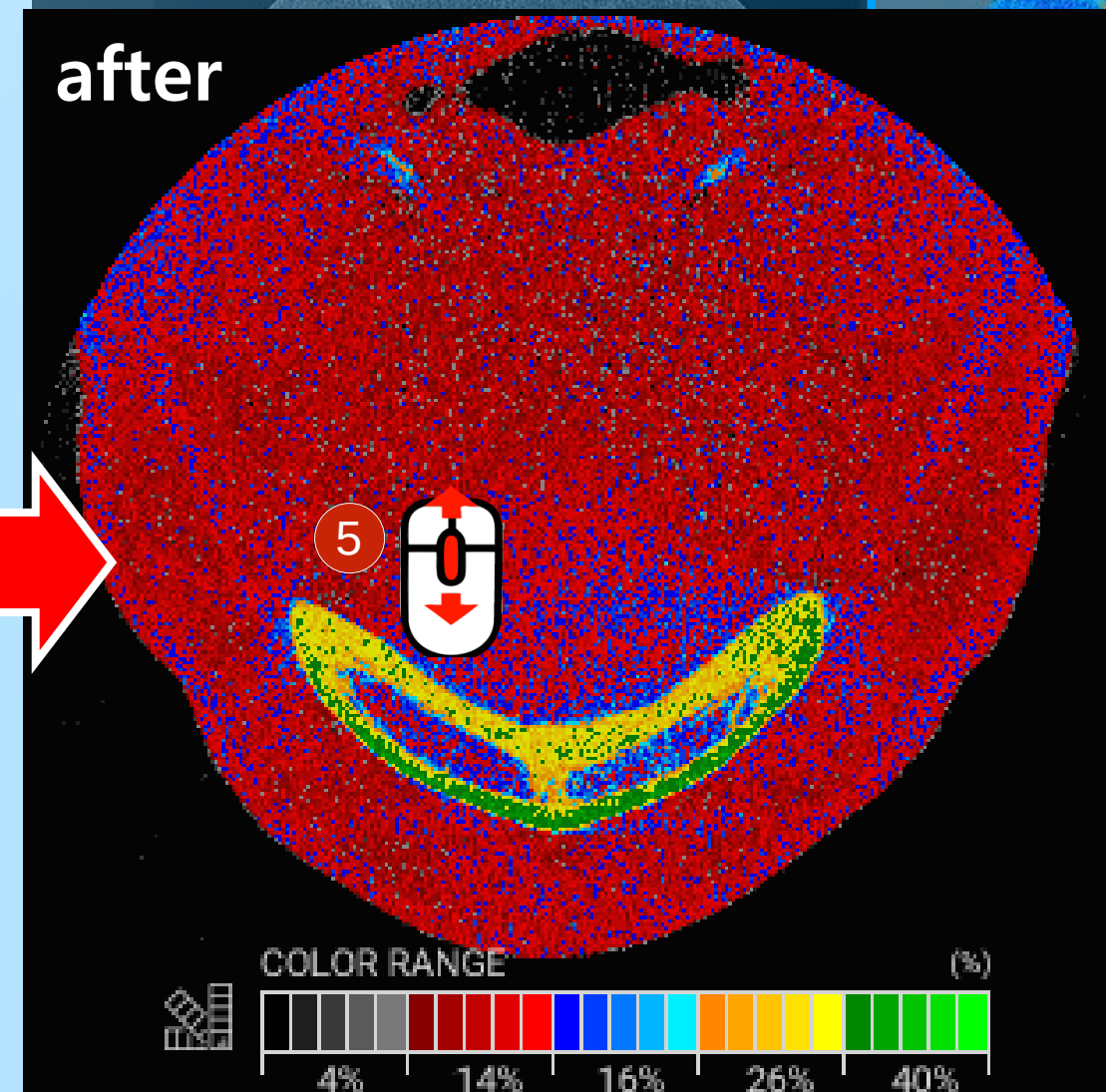
- Teeth & prosthesis: GREEN [Level]
- Cortical bone: YELLOW or GREEN [Level]
- Medium bone: BLUE or SKY BLUE [Level]
- Soft bone: RED [Width]
- Air: BLACK [Width]



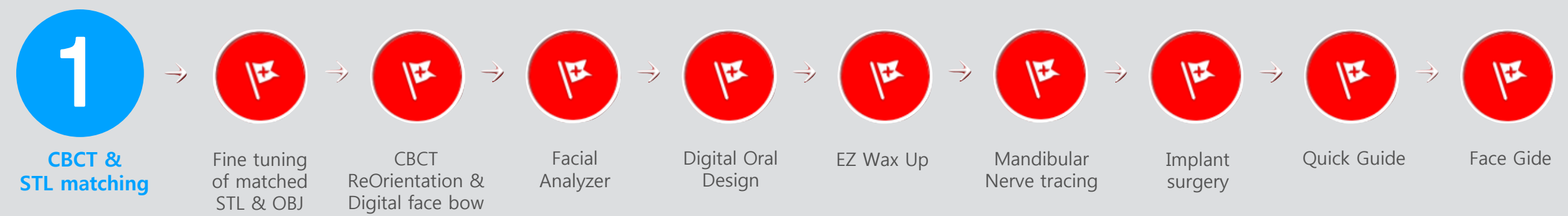
before



after



2.4 CBCT Windowing



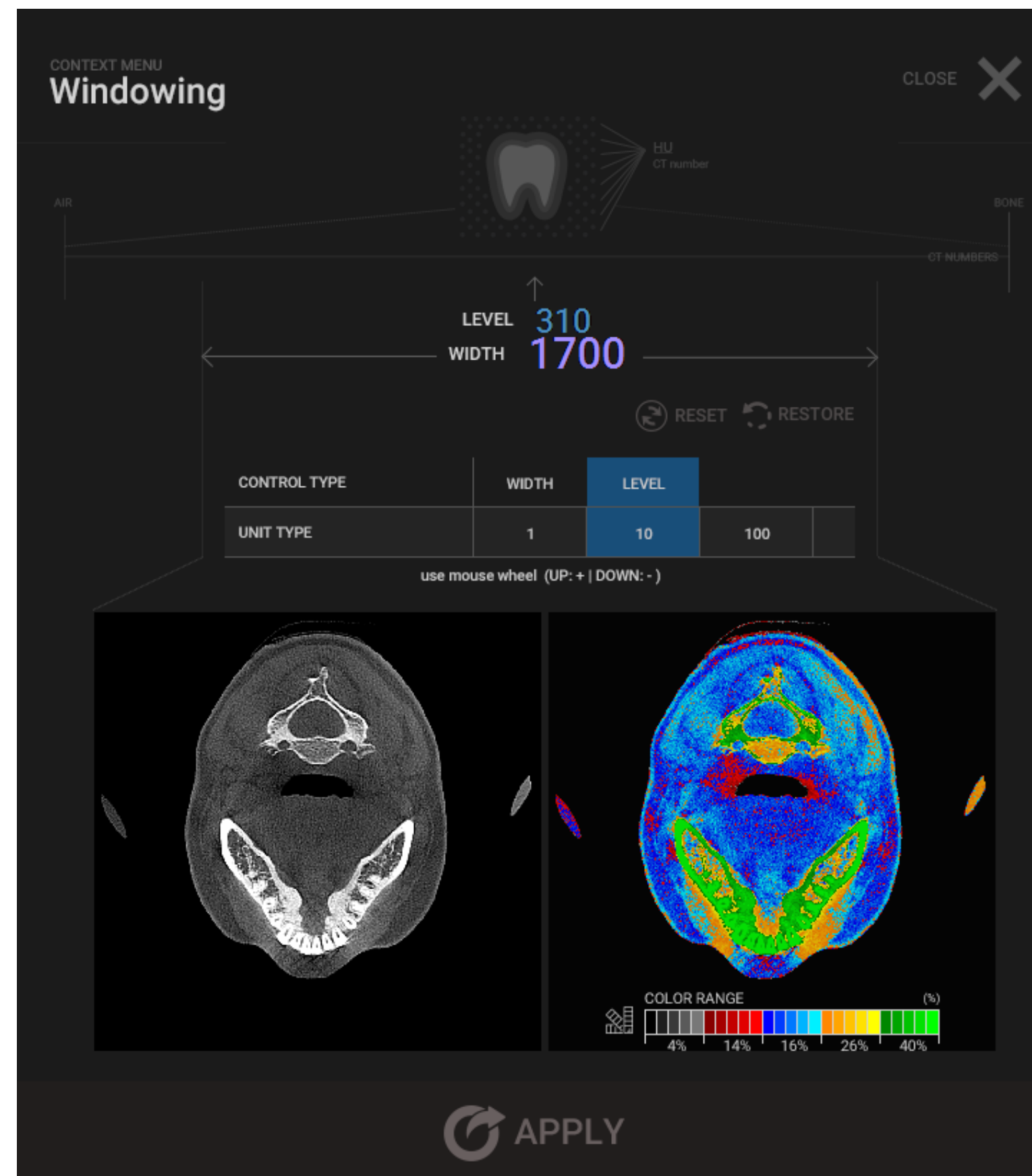
**R2
GATE**

R2GATE 2.0
Apr. 2019

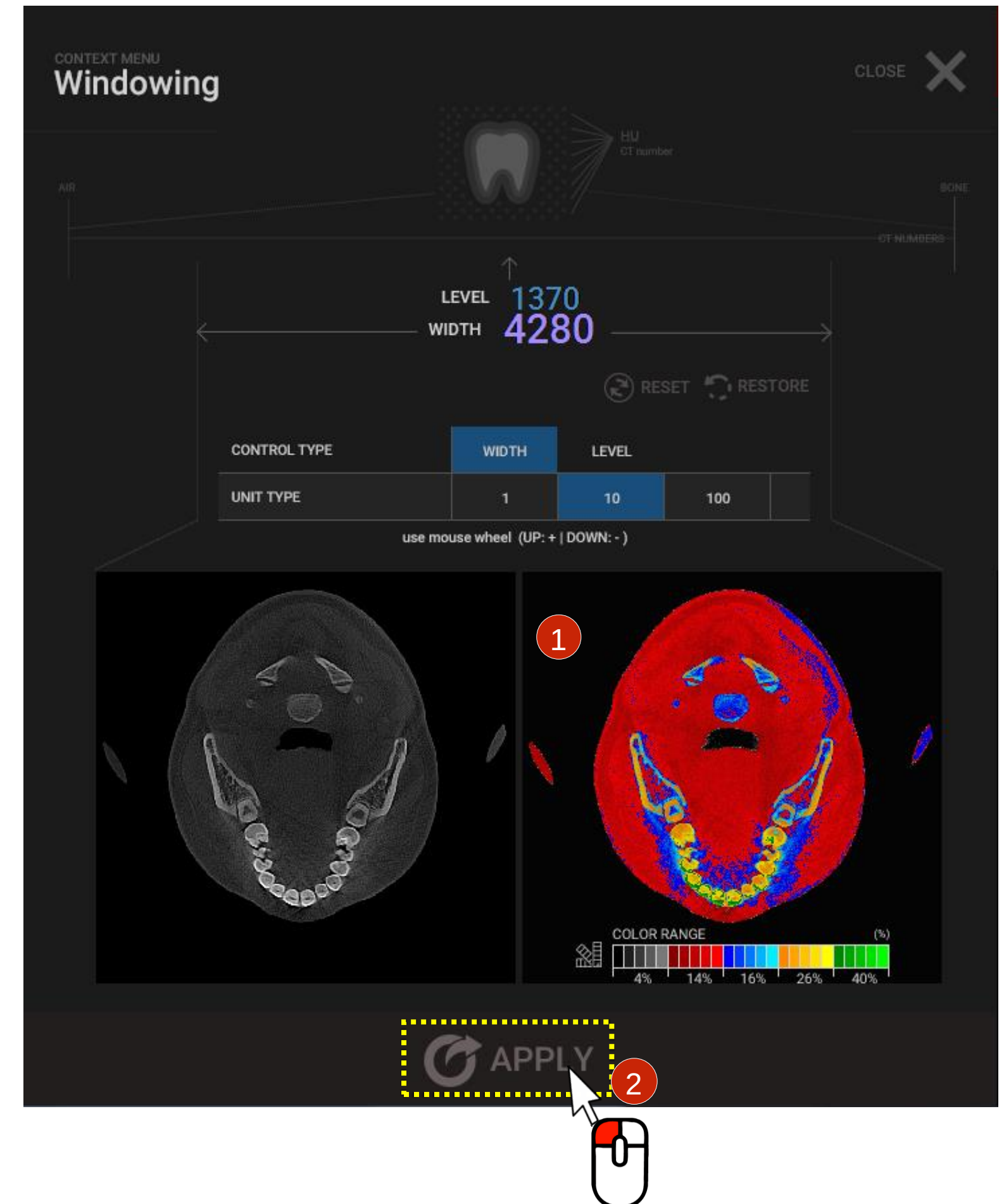
R2GATE CBCT Windowing

- 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]



2.5 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 Guide

R2
GATE

R2GATE 2.0
Apr. 2019

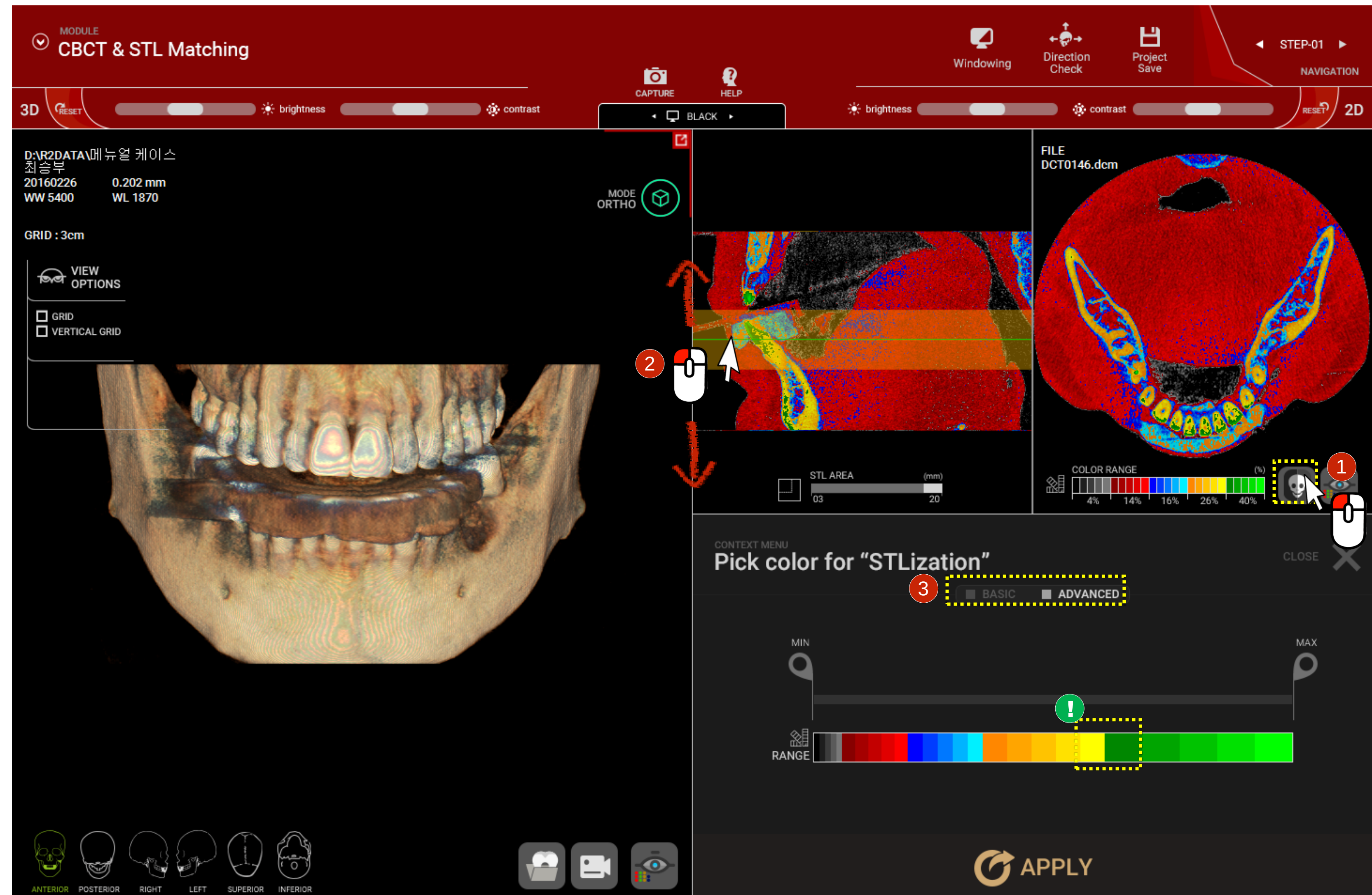
R2GATE has two matching modes:
auto & precise

Auto Matching

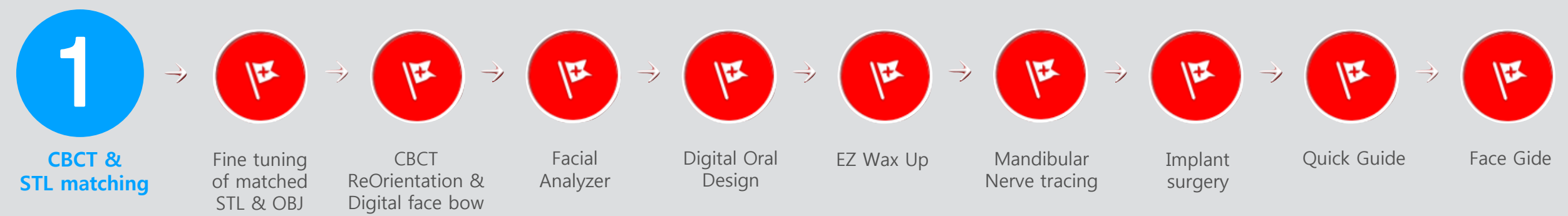
STL-ization:

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
 - ! 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
 - ! For more detailed colors of selection,
refer to the next page



2.5 STL Matching Auto Matching



R2
GATE

R2GATE 2.0
Apr. 2019

R2GATE has two matching modes:
auto & precise

Auto Matching

STL-ization:

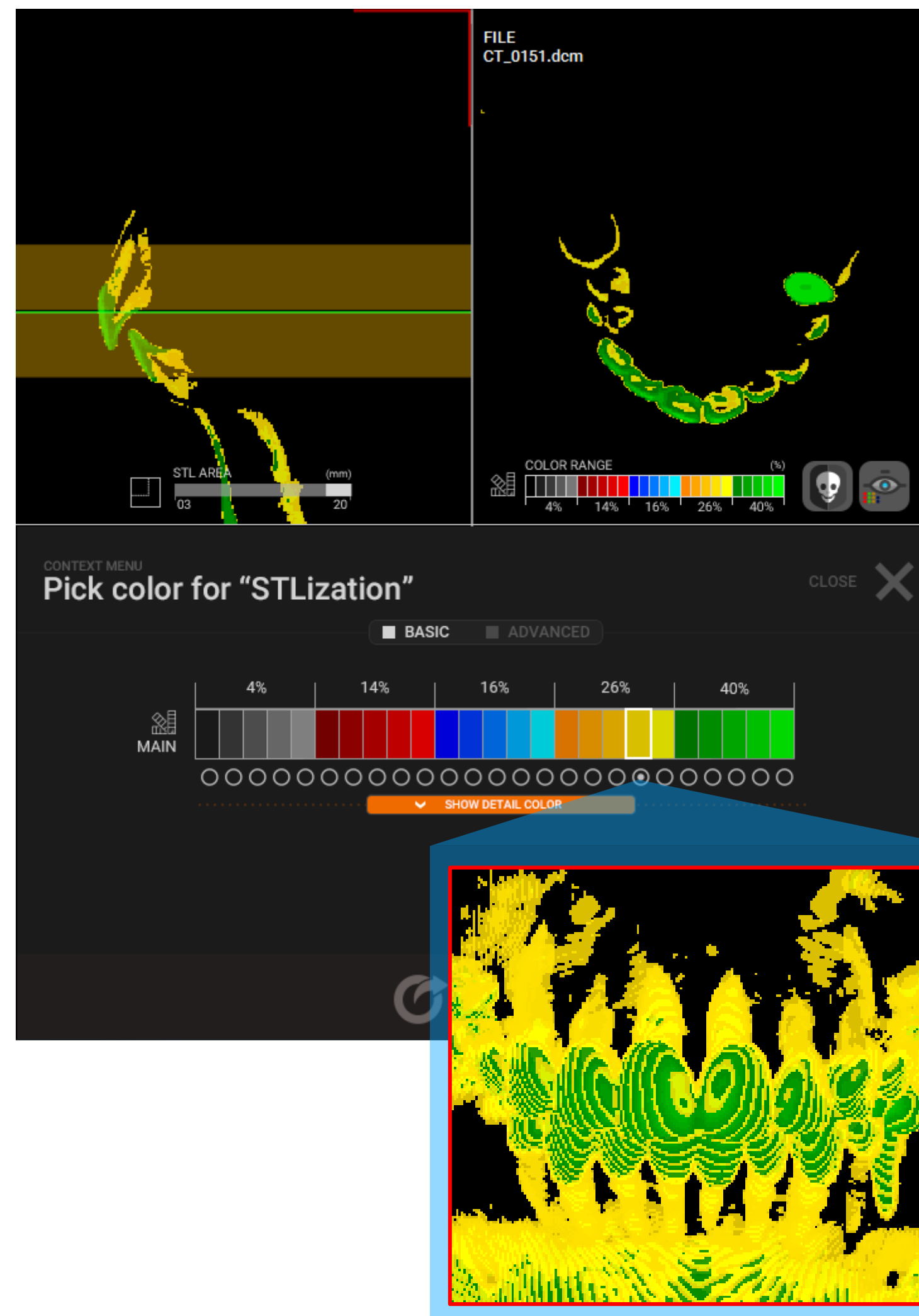
Conversion of CBCT to STL format for superimposing with model STL file

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

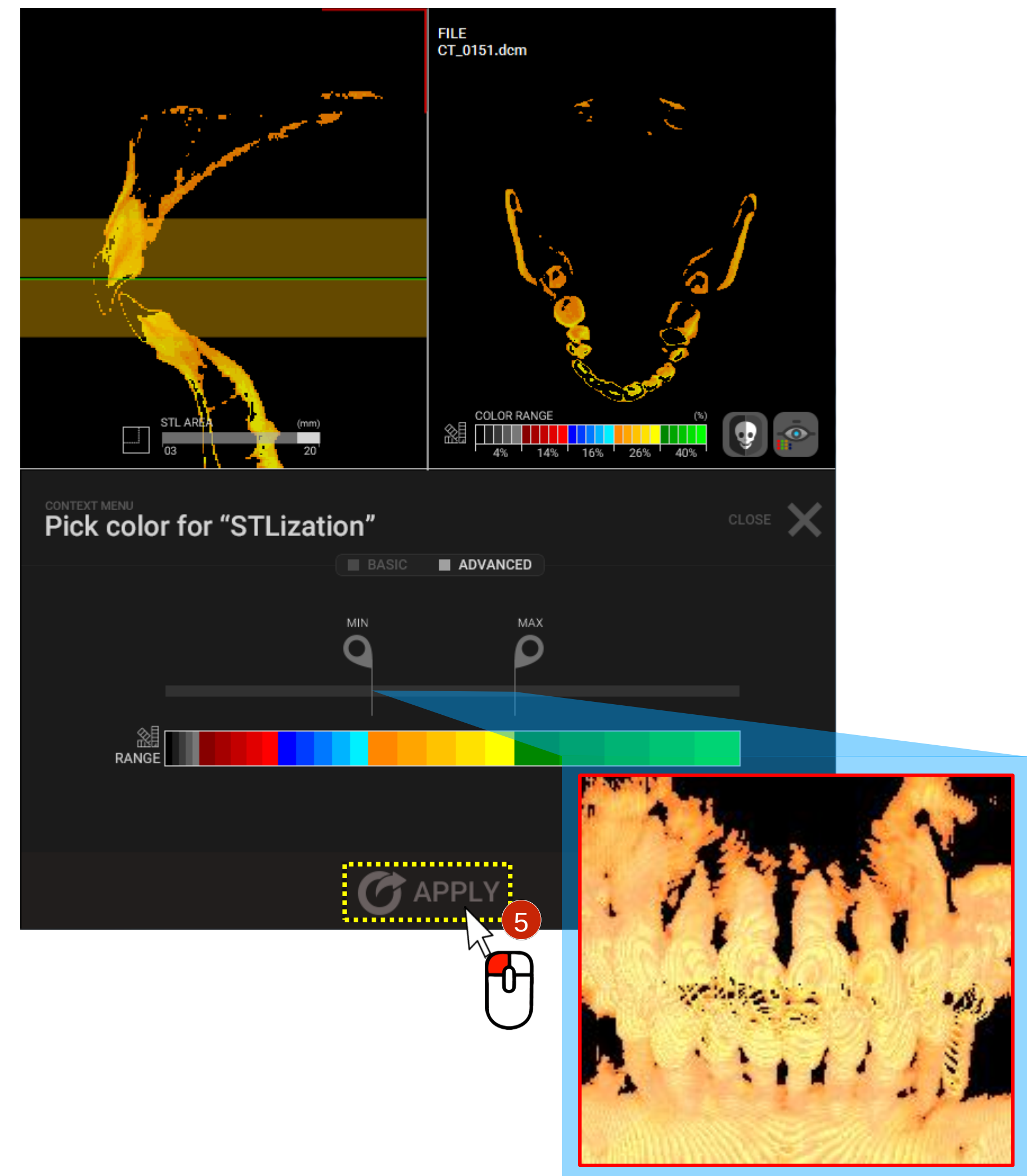
- **BASIC** : Select desired range of colors
- **ADVANCED** : Specify desired range of area to specify more in detail

5 Click **APPLY** to convert

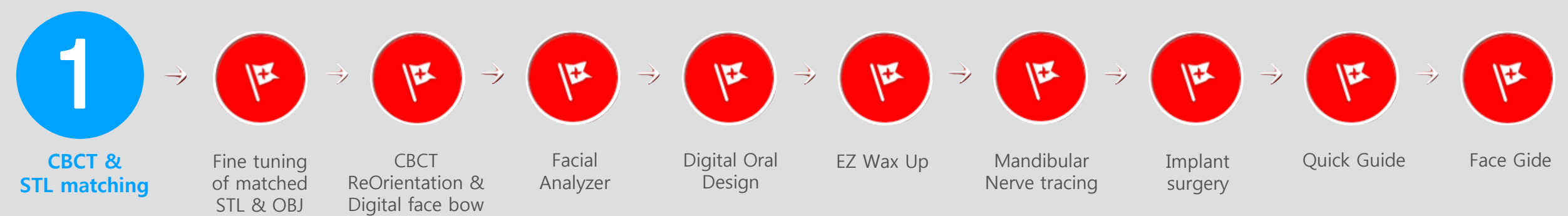
[BASIC]



[ADVANCED]



2.5 STL Matching Auto Matching



R2
GATE

R2GATE 2.0
Apr. 2019

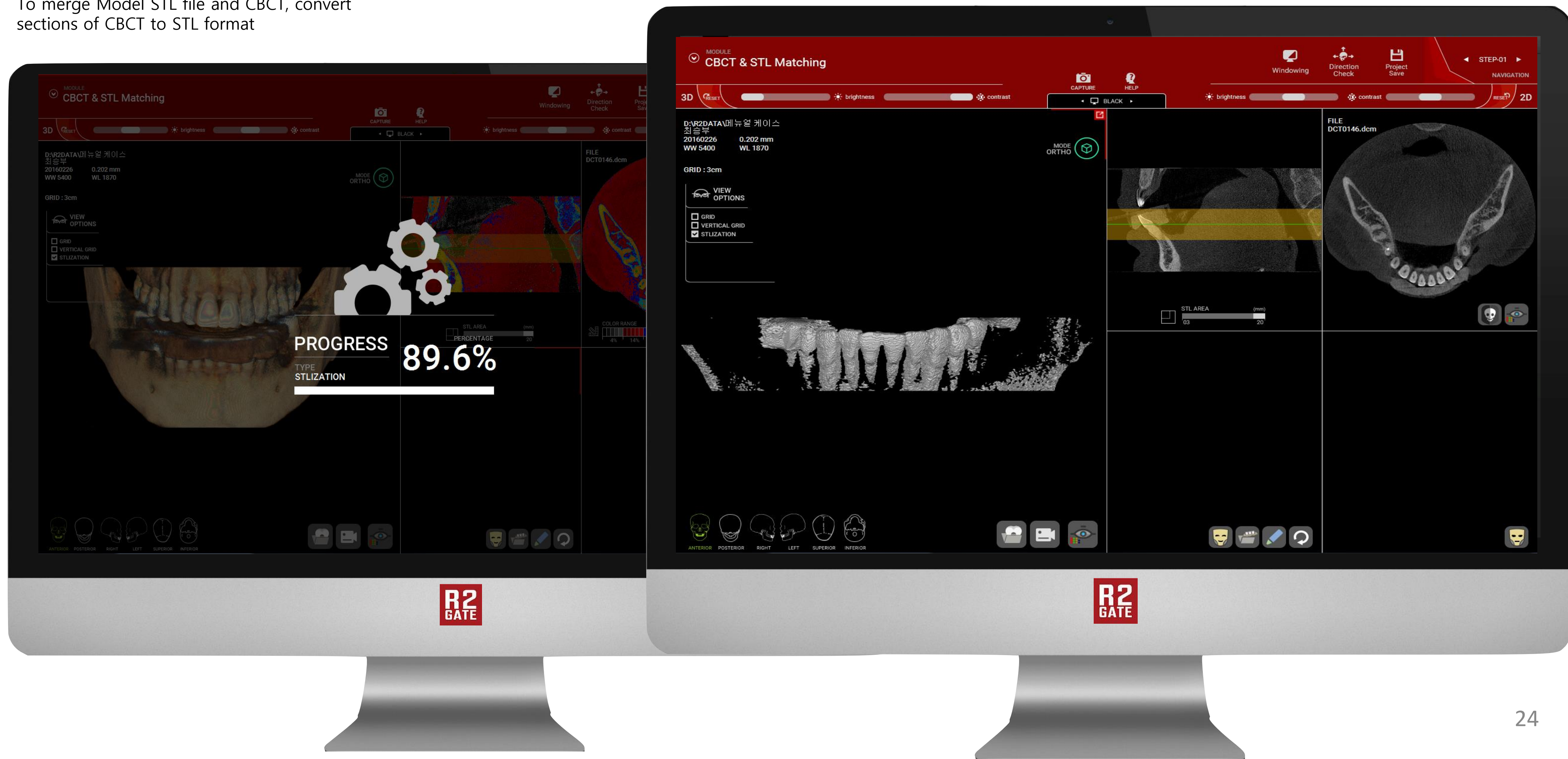
R2GATE has two matching modes:
auto & precise

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)



2.5 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

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R2GATE 2.0
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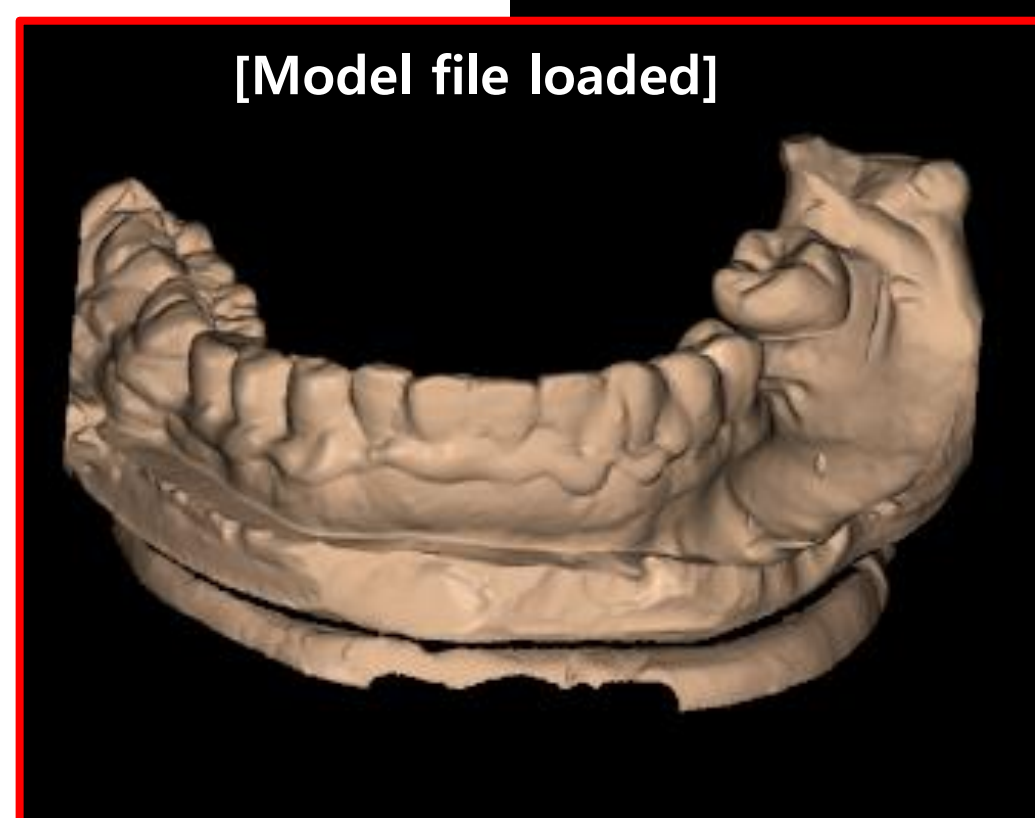
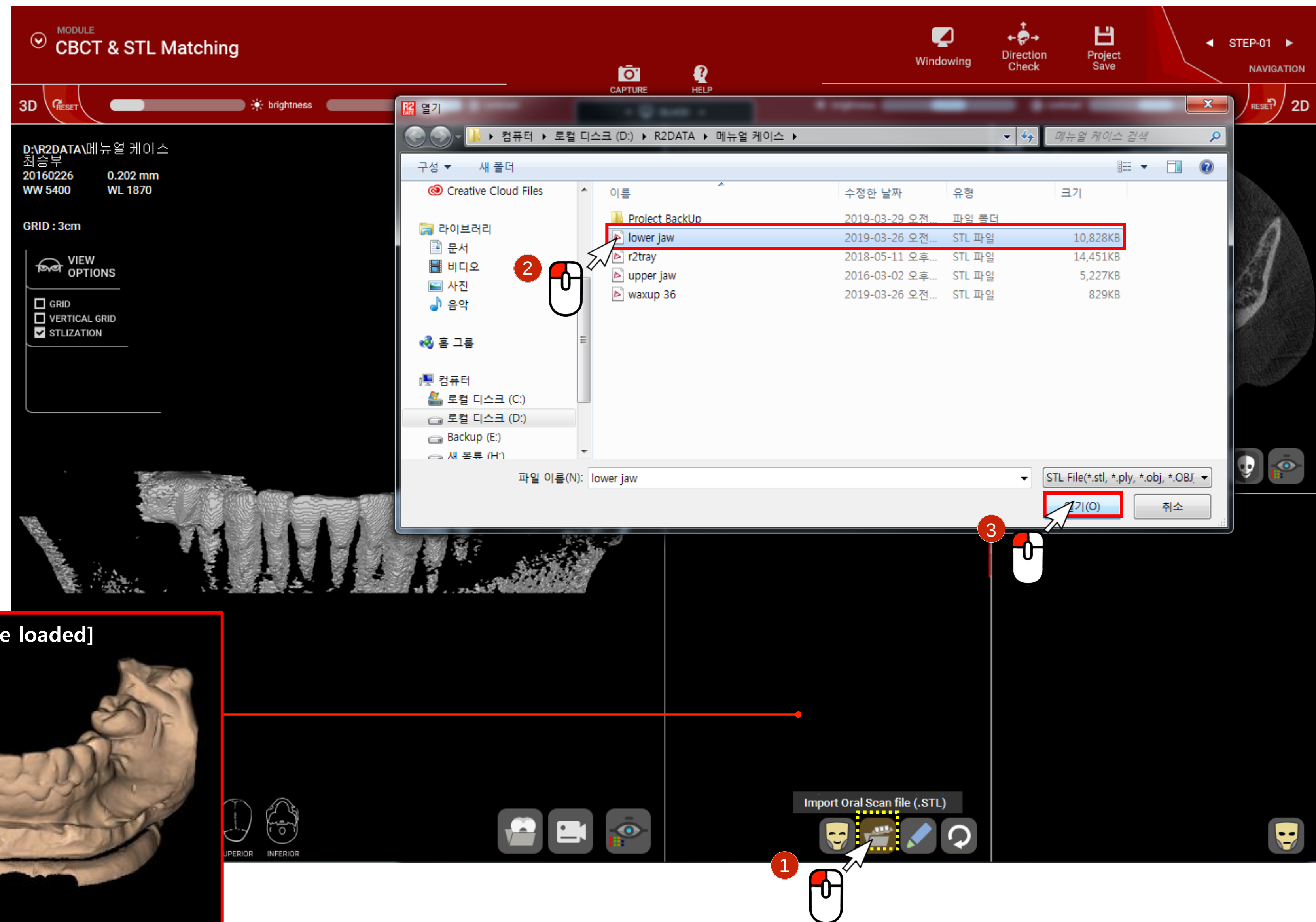
R2GATE has two matching modes:
auto & precise

Auto Matching

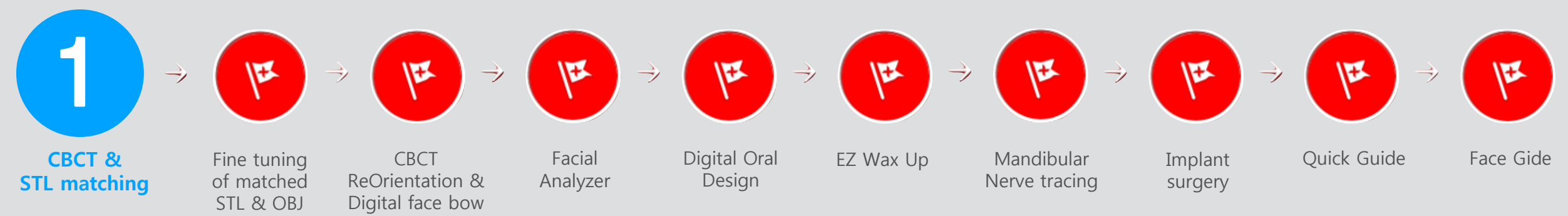
Loading model file (STL)

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



2.5 STL Matching Auto Matching



R2
GATE

R2GATE 2.0
Apr. 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

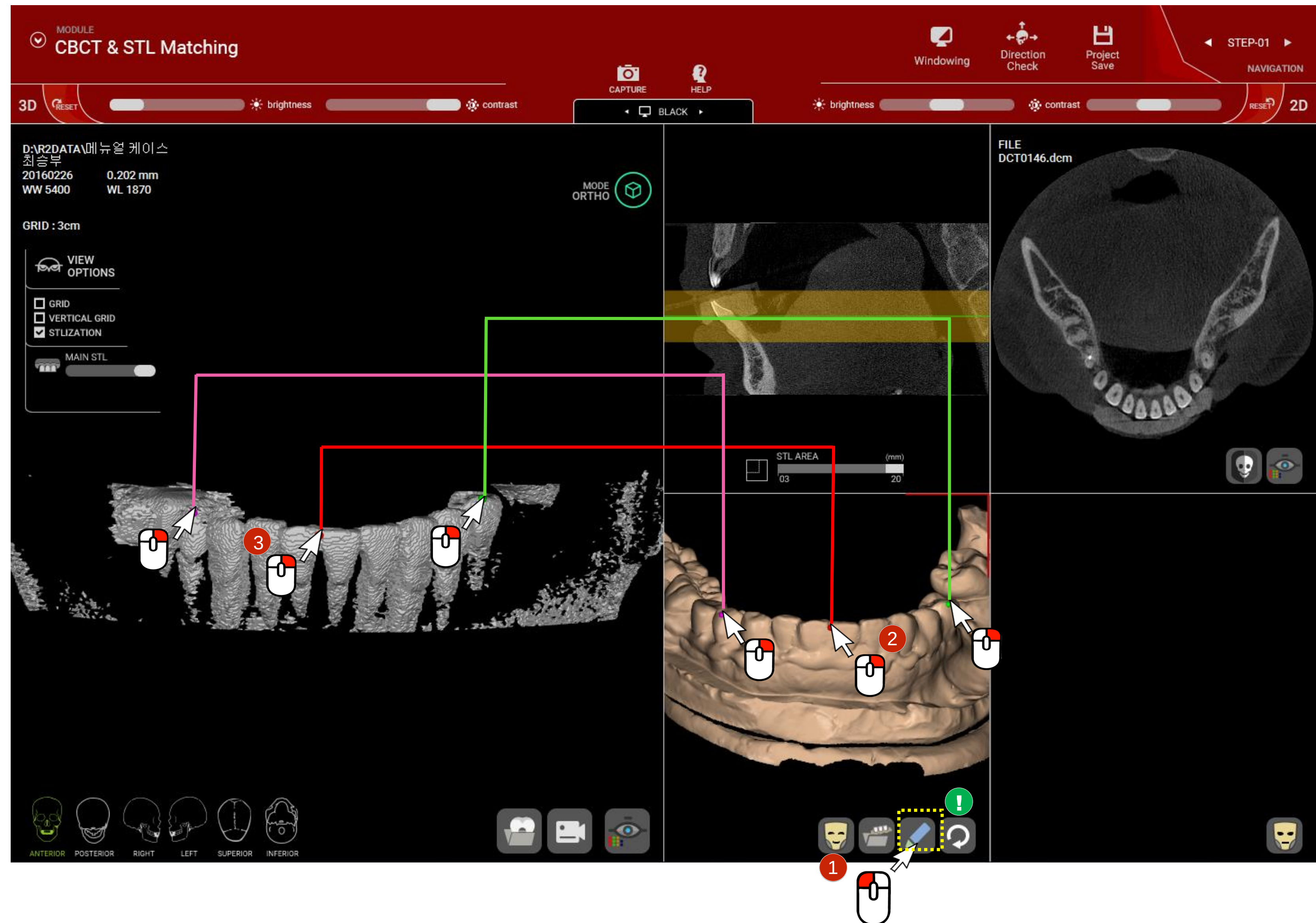
 Left click : STL movement & rotation

 Drag : STL zoom in & out

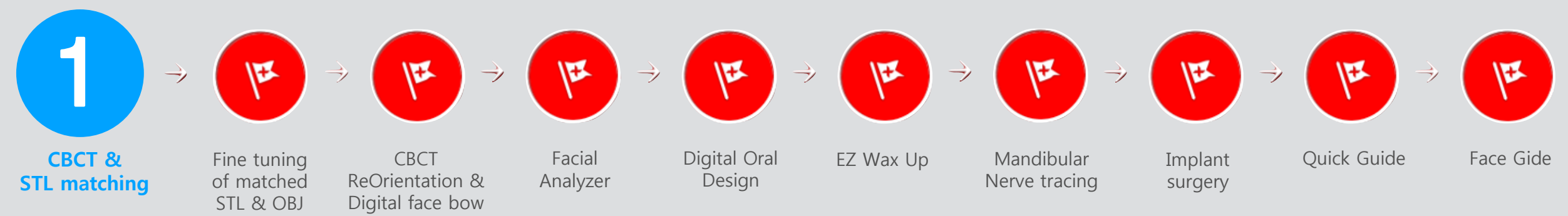
 Right click: point marking

 Wheel click: Remove previous point

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



2.5 STL Matching Auto Matching



R2
GATE

R2GATE 2.0
Apr. 2019

R2GATE has two matching modes:
auto & precise

Auto Matching

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



2.5 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



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surgery



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R2
GATE

R2GATE 2.0
Apr. 2019

R2GATE has two matching modes:
auto & precise

Auto Matching

R2 Tray scan file

Metal scattering from metal-based prostheses
causes difficulties when superimposing

R2 Tray is made of radiopaque materials &
used as index for superimposing

1  Click the icon to import R2 Tray file

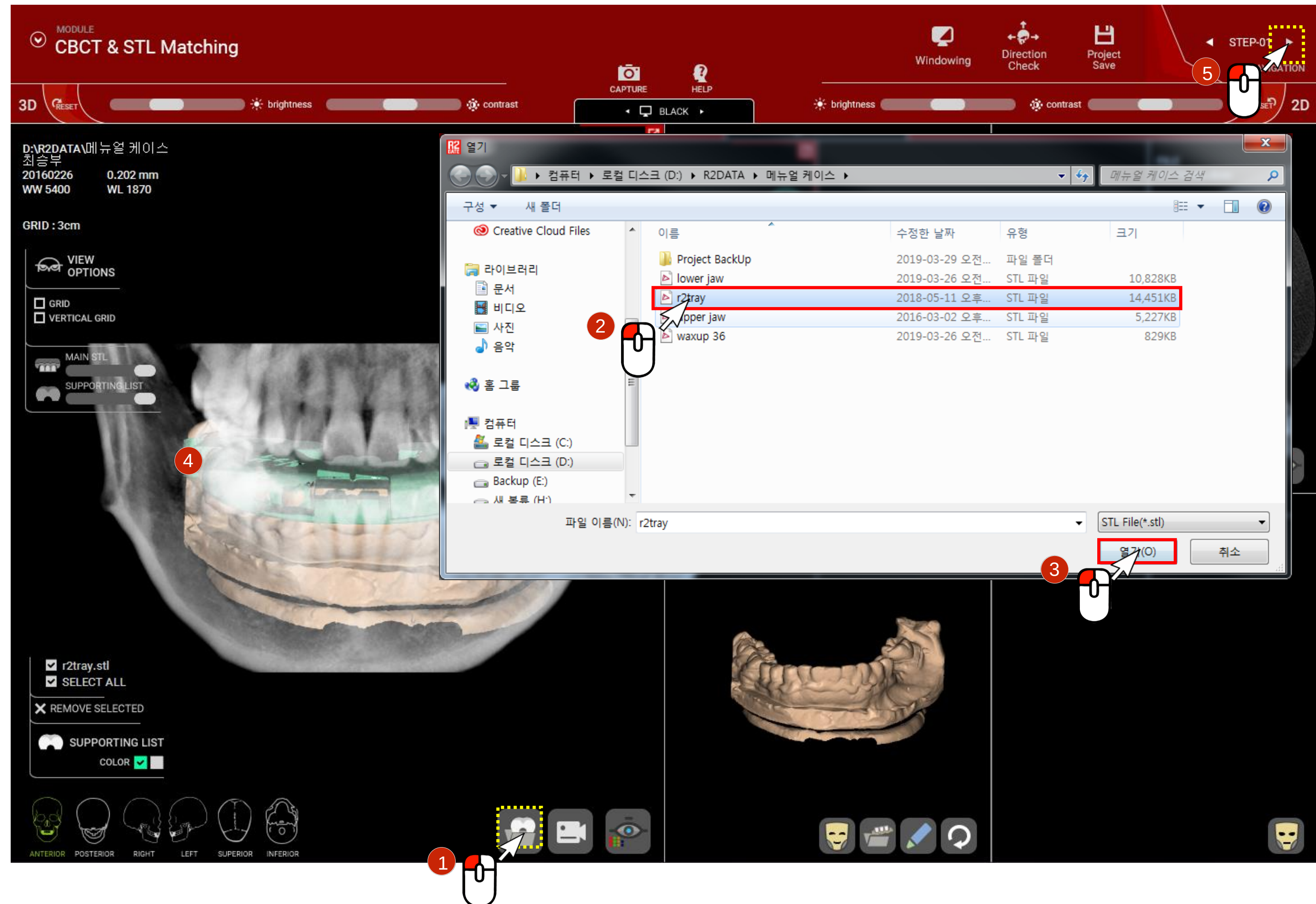
2 Select R2 Tray scan file(STL)

3 Click **Open(O)**

4 R2 Tray is positioned on model scan
file(STL)

! 3D matching of R2 Tray & model
scan file(STL) requires special 3D scan
procedure, see Appendix

5  Click to proceed to next step



2.6 R2GATE™ 2.0 Control Buttons



**R2
GATE**

R2GATE 2.0
Apr. 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

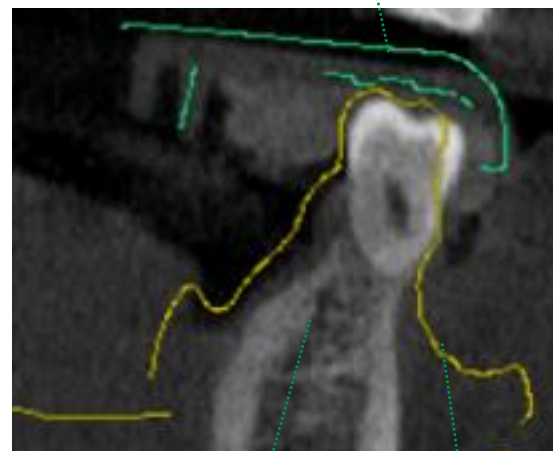
2 Control Model Scan file(STL) movement

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

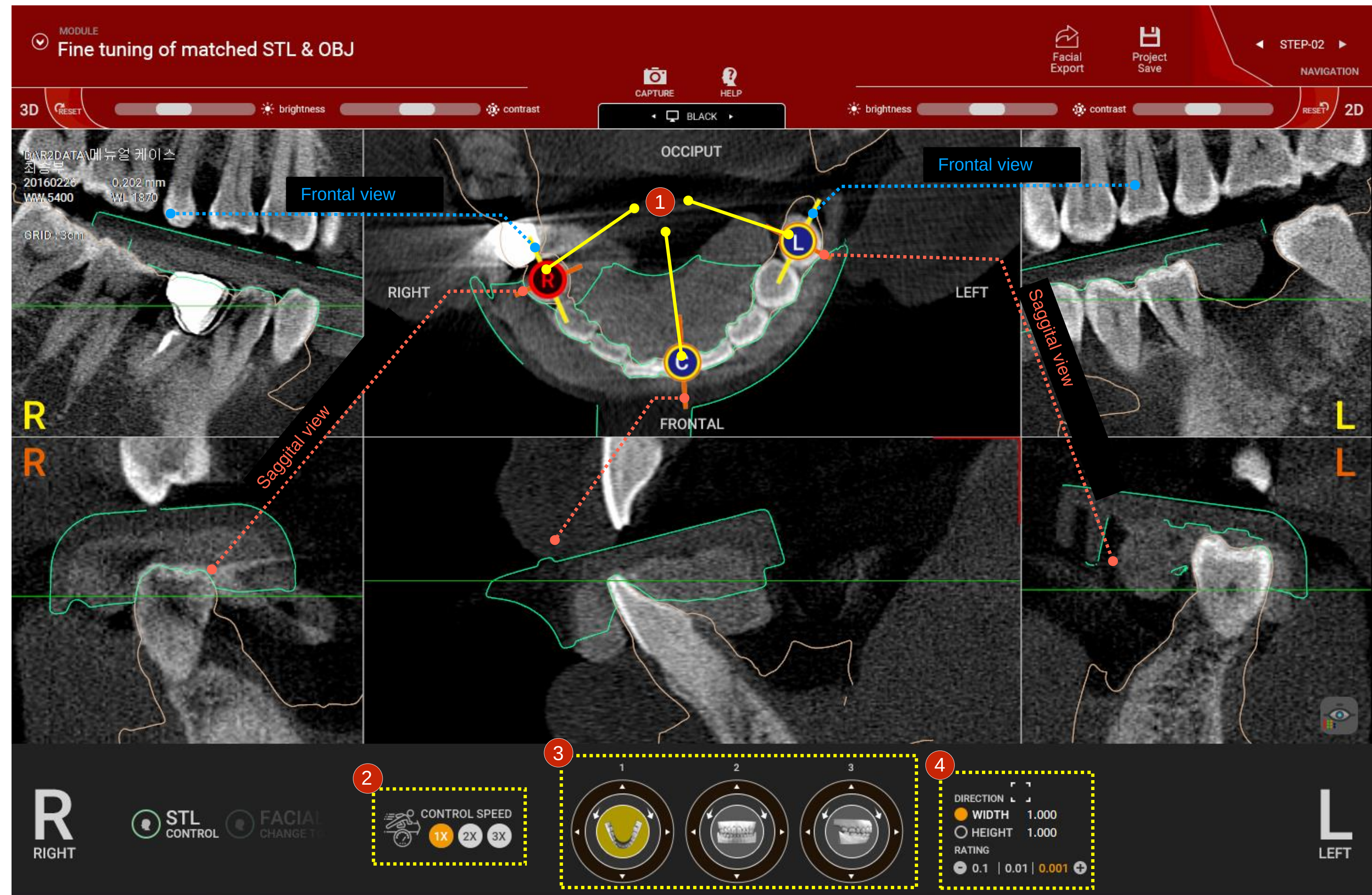
3 STL movement control key

4 CBCT ratio control (Not generally required)

- Green: outline of R2Tray (or wax-up)



- Grey: CBCT image
- Yellow: outline of model scan file(STL)



2.6 R2GATE™ 2.0 Control Buttons



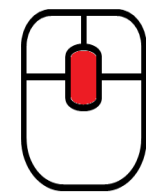
**R2
GATE**

R2GATE 2.0
Apr. 2019

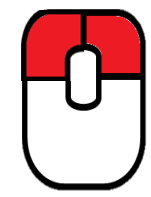
R2GATE has two matching modes:
auto & precise

Precise Matching

Mouse Controls

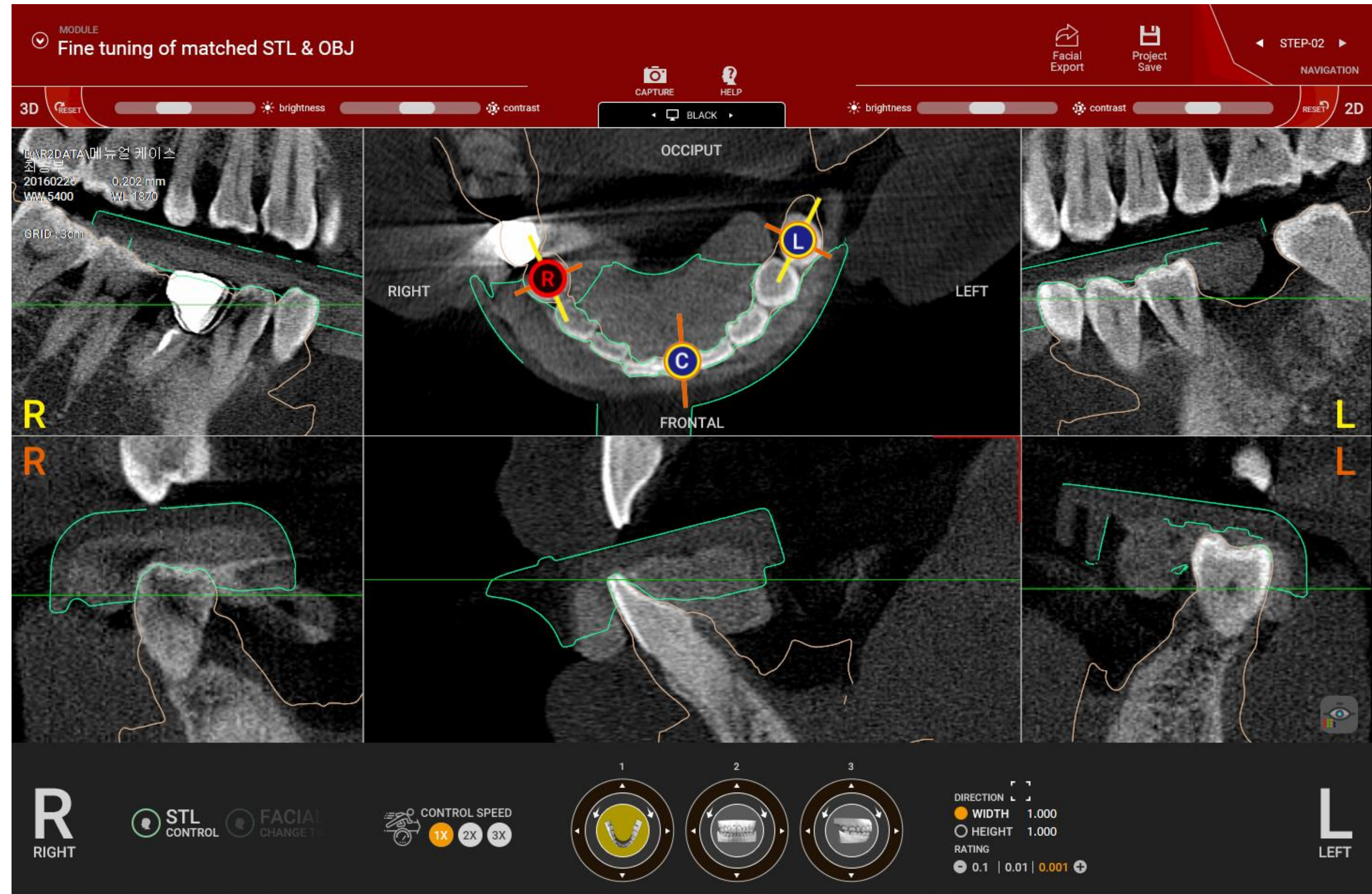
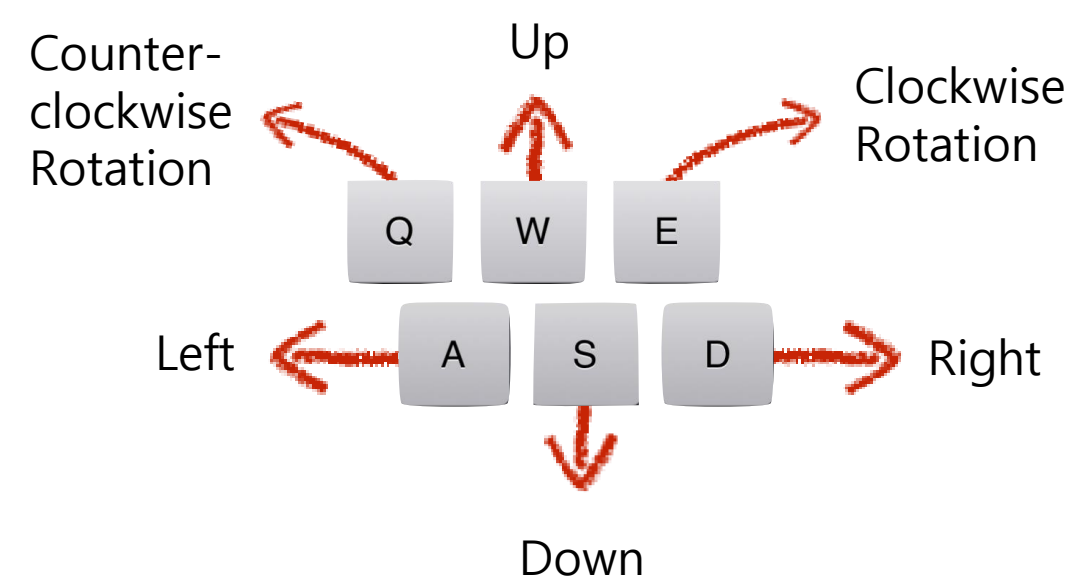


Wheel scrolling
: CBCT view zoom in & out

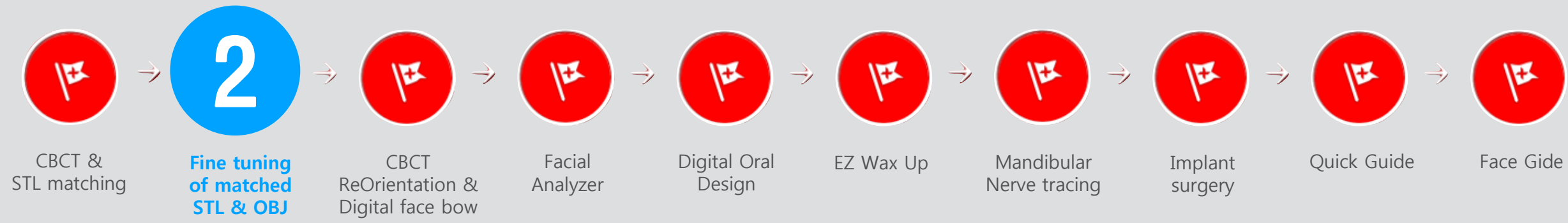


Right & left click
: CBCT view movement

Keyboard Shortcut



2.7 Fine Tuning of Matched STL

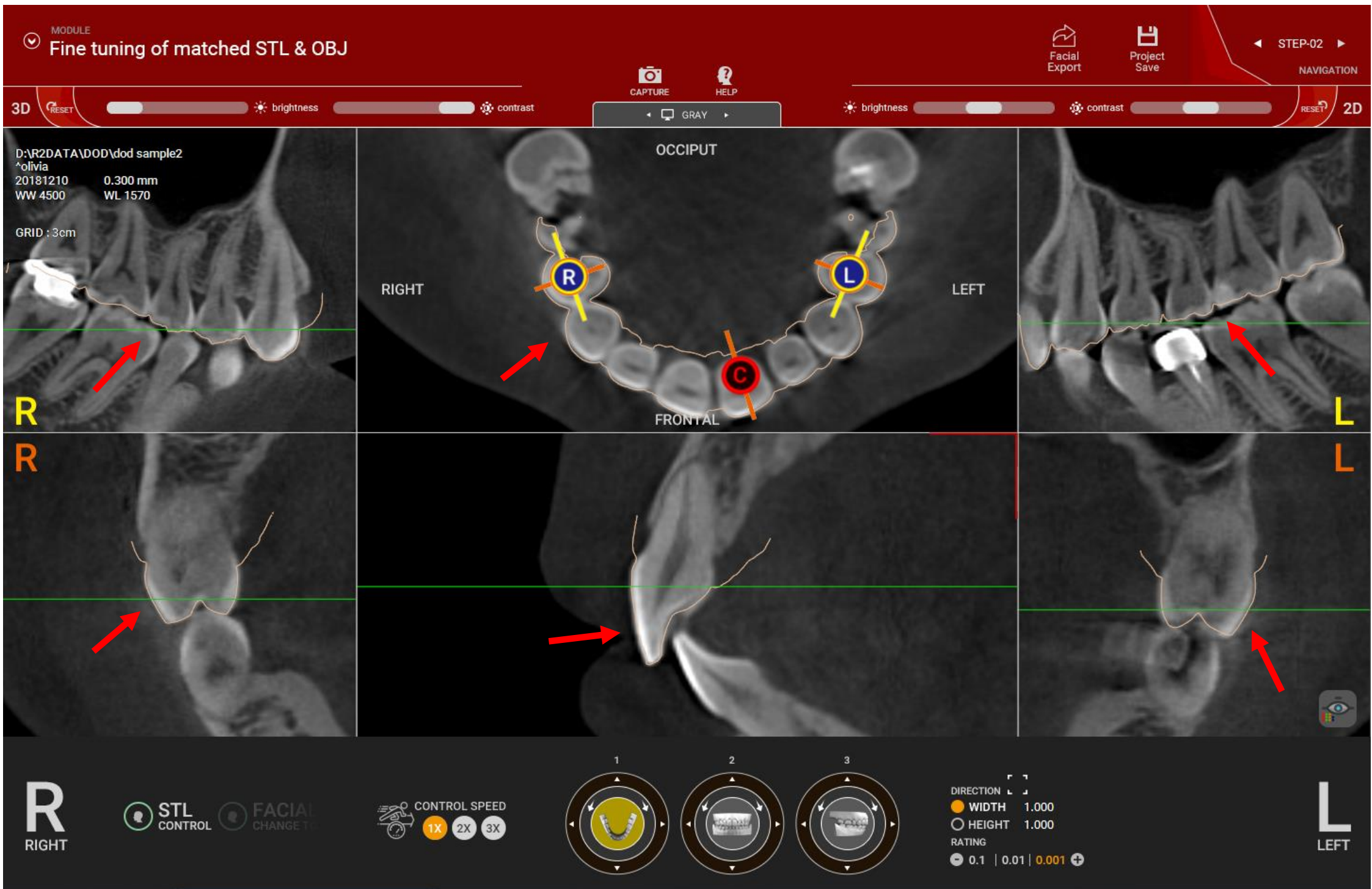


R2GATE has two matching modes:
auto & precise

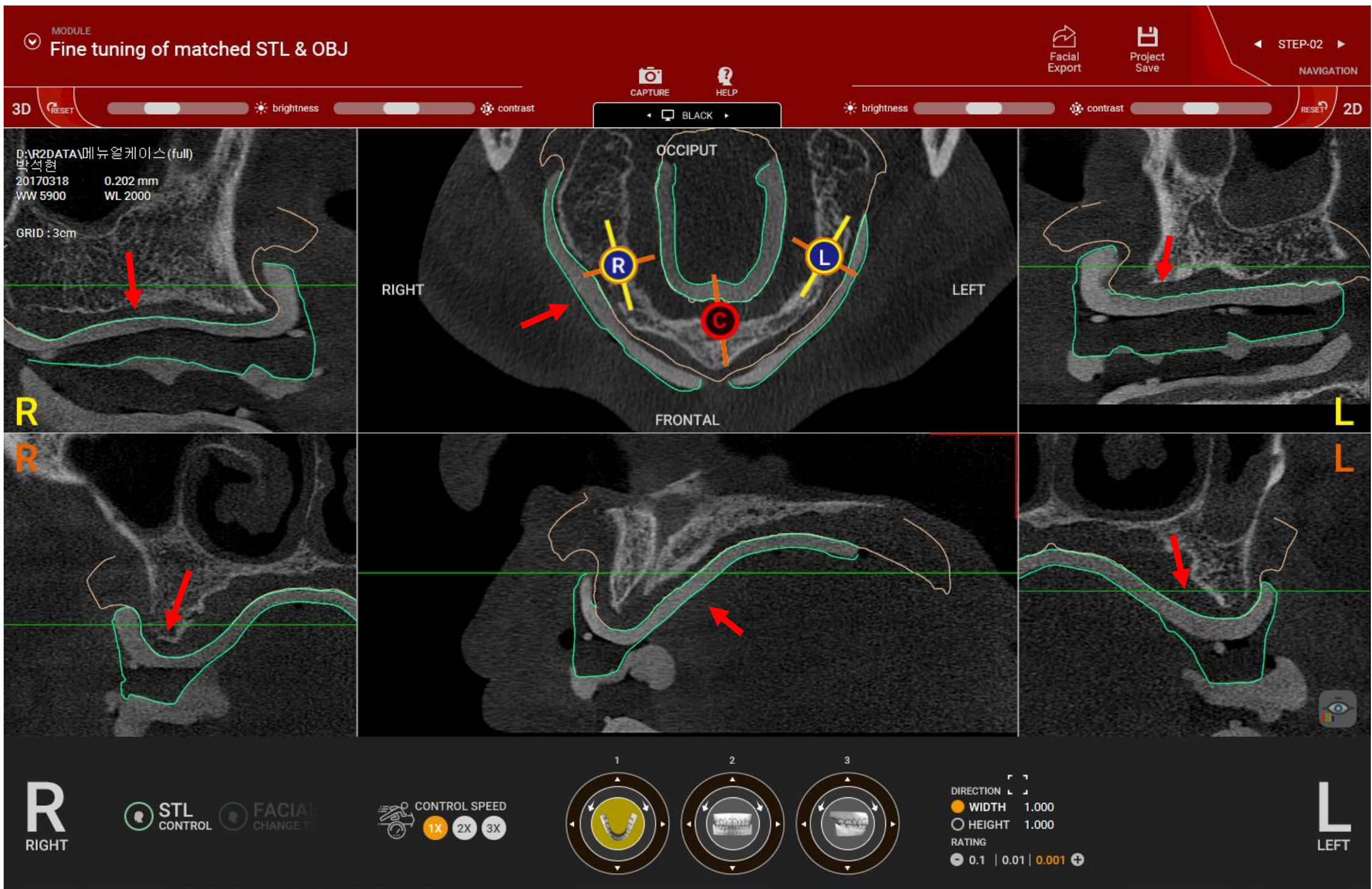
Precise Matching

- 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



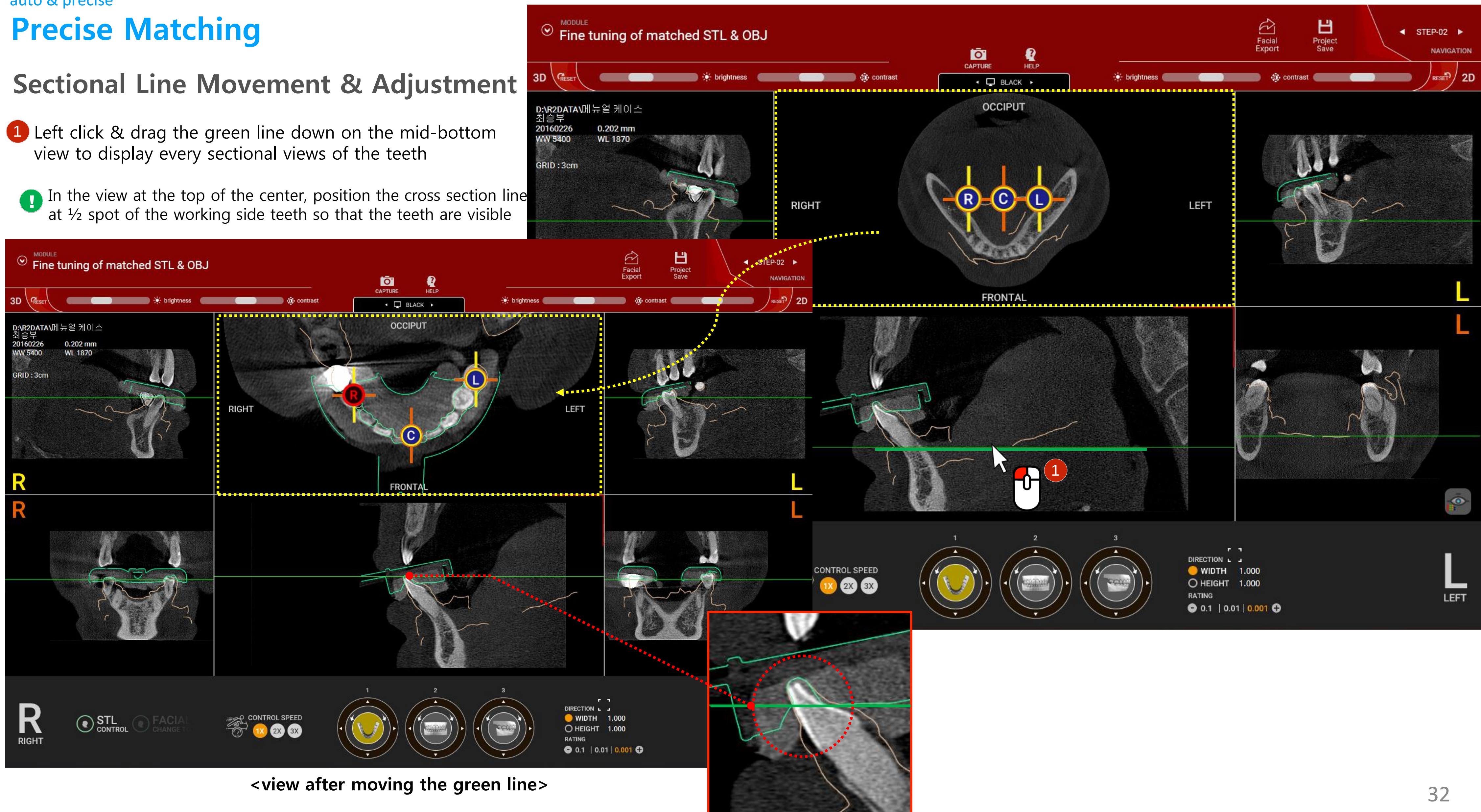
R2GATE has two matching modes:
auto & precise

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

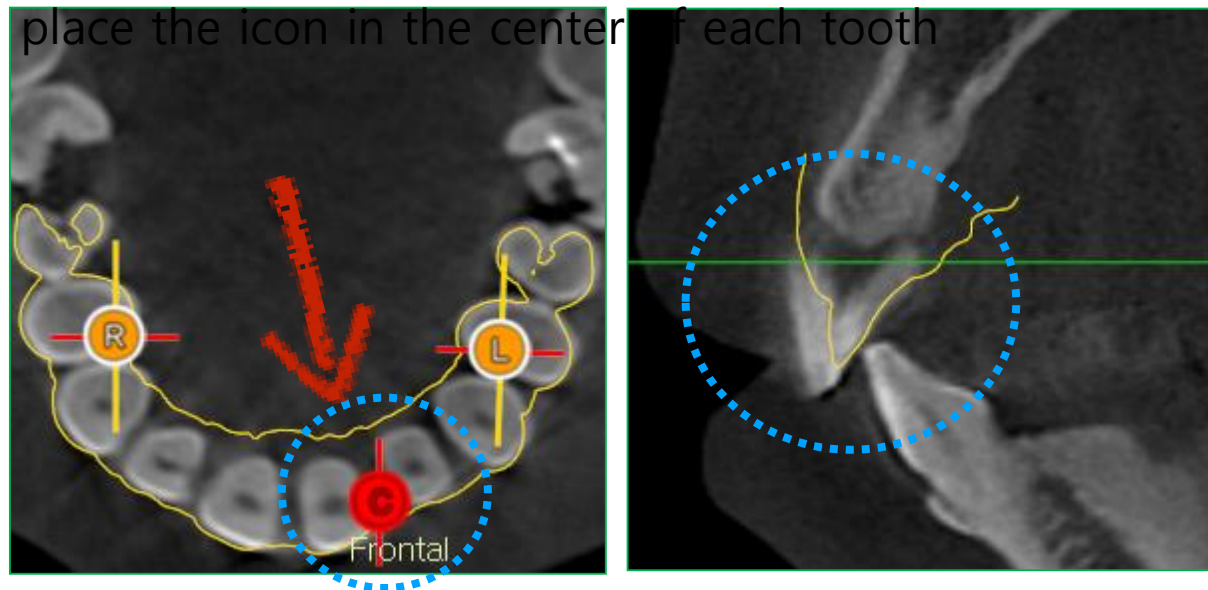
2 Move the mouse over to the desired view to see the cross section of the tooth, then use the mouse wheel to zoom-in & out.

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

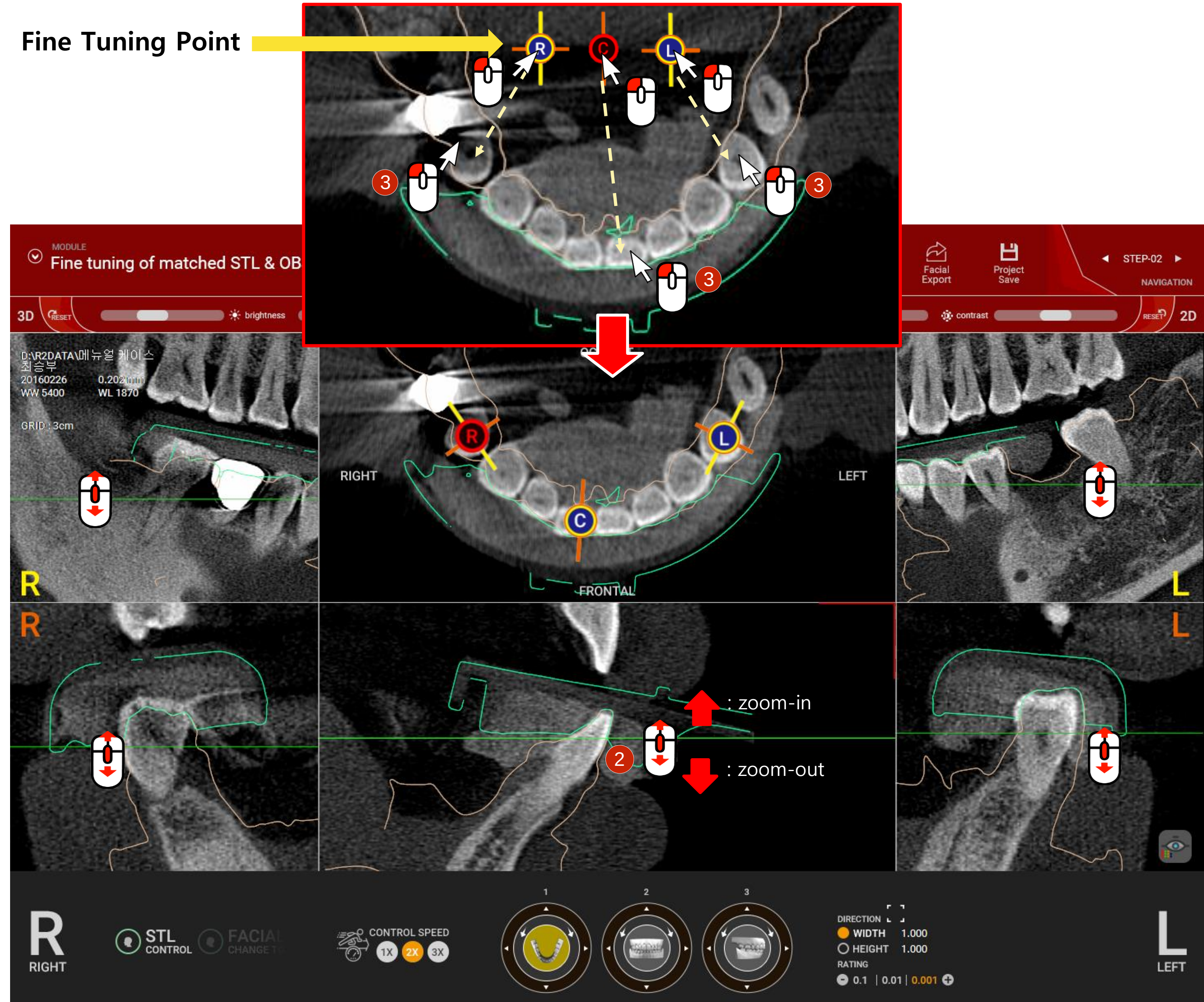
- R point: Right
- L point: Left
- C point: Center (Anterior teeth)

! 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



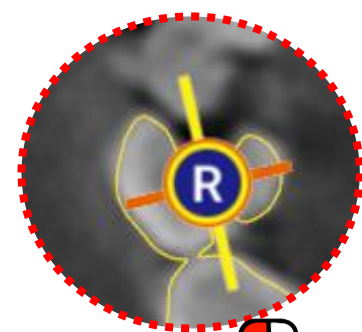
R2GATE has two matching modes:
auto & precise

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

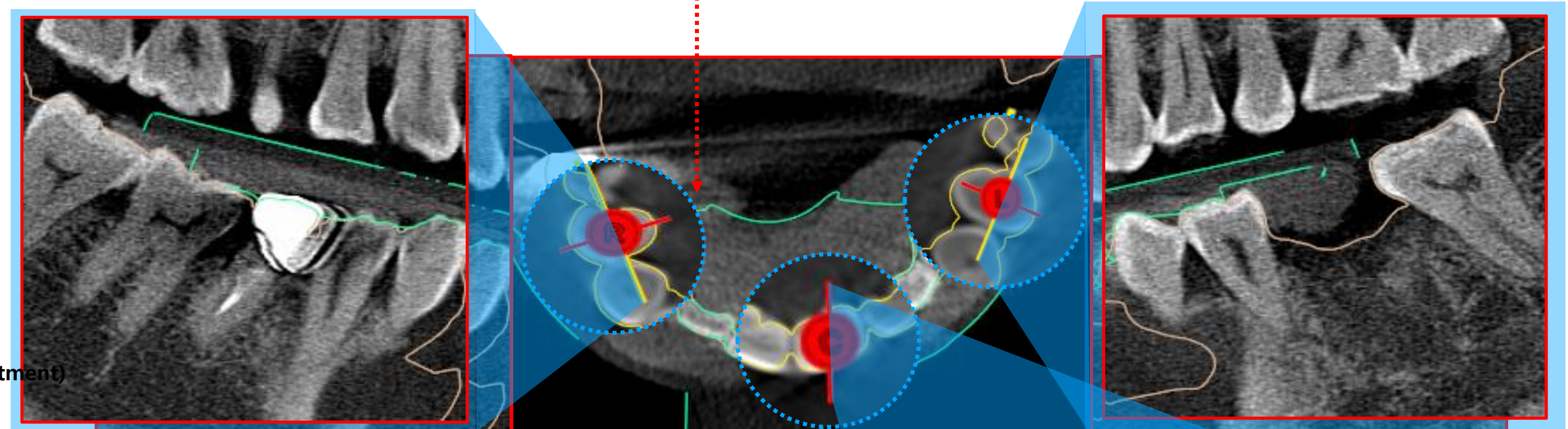
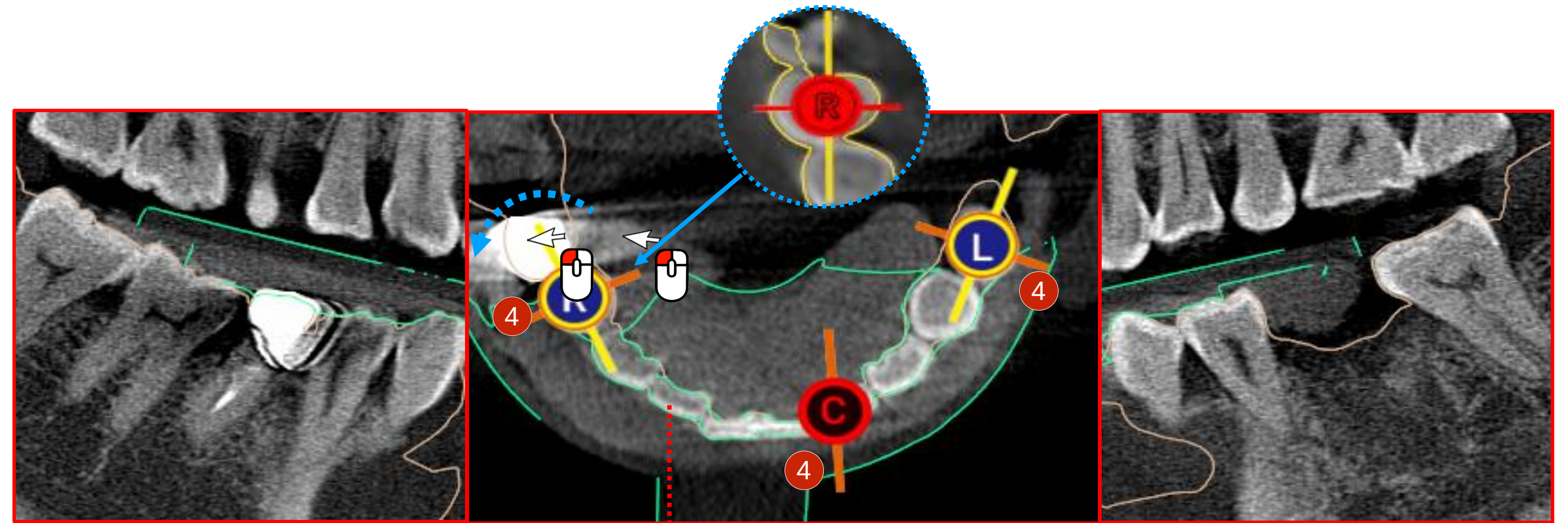
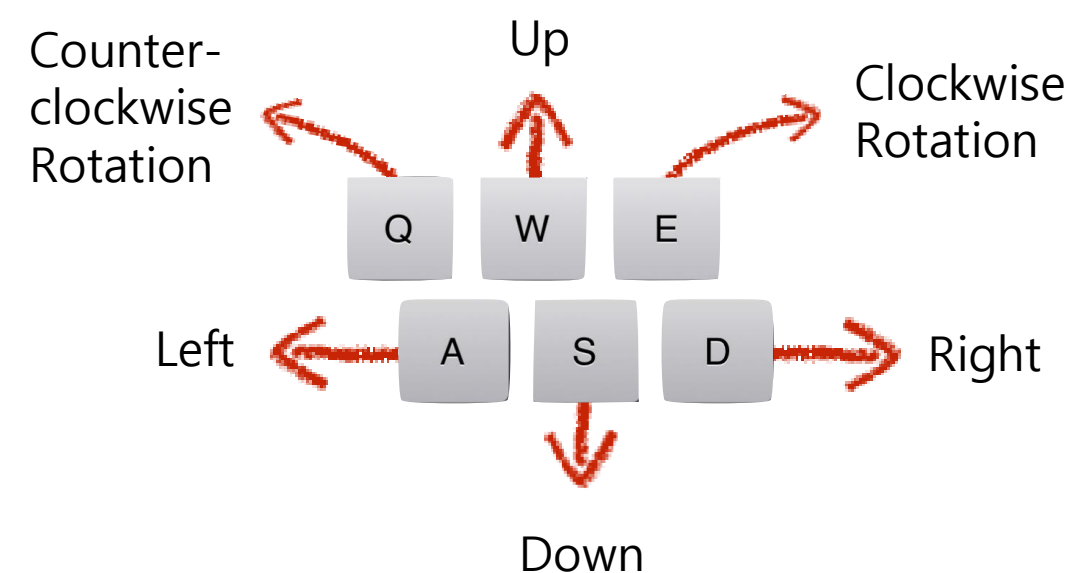


- Coronal line : Orange line
- Sagittal line : Yellow line



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



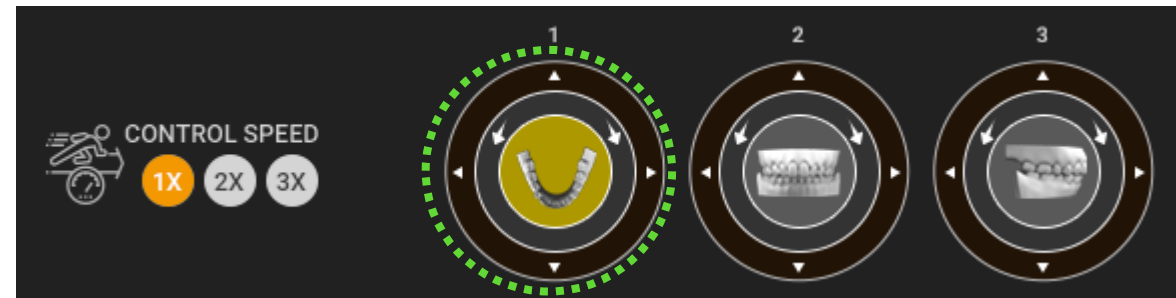
R2GATE has two matching modes:
auto & precise

Precise Matching

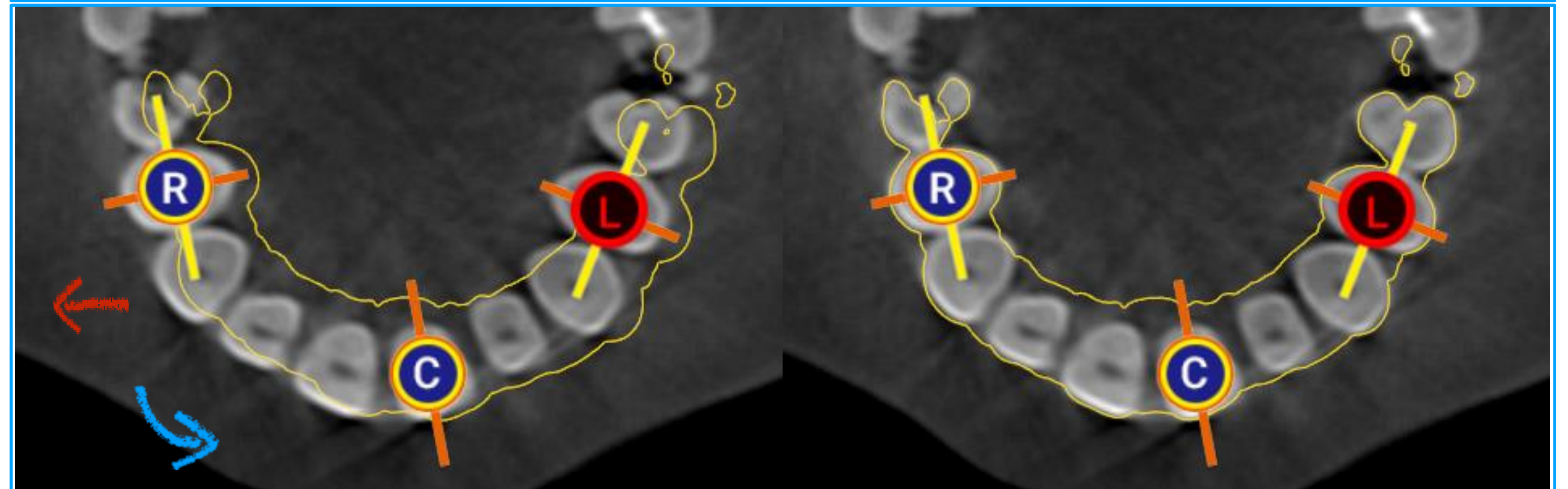
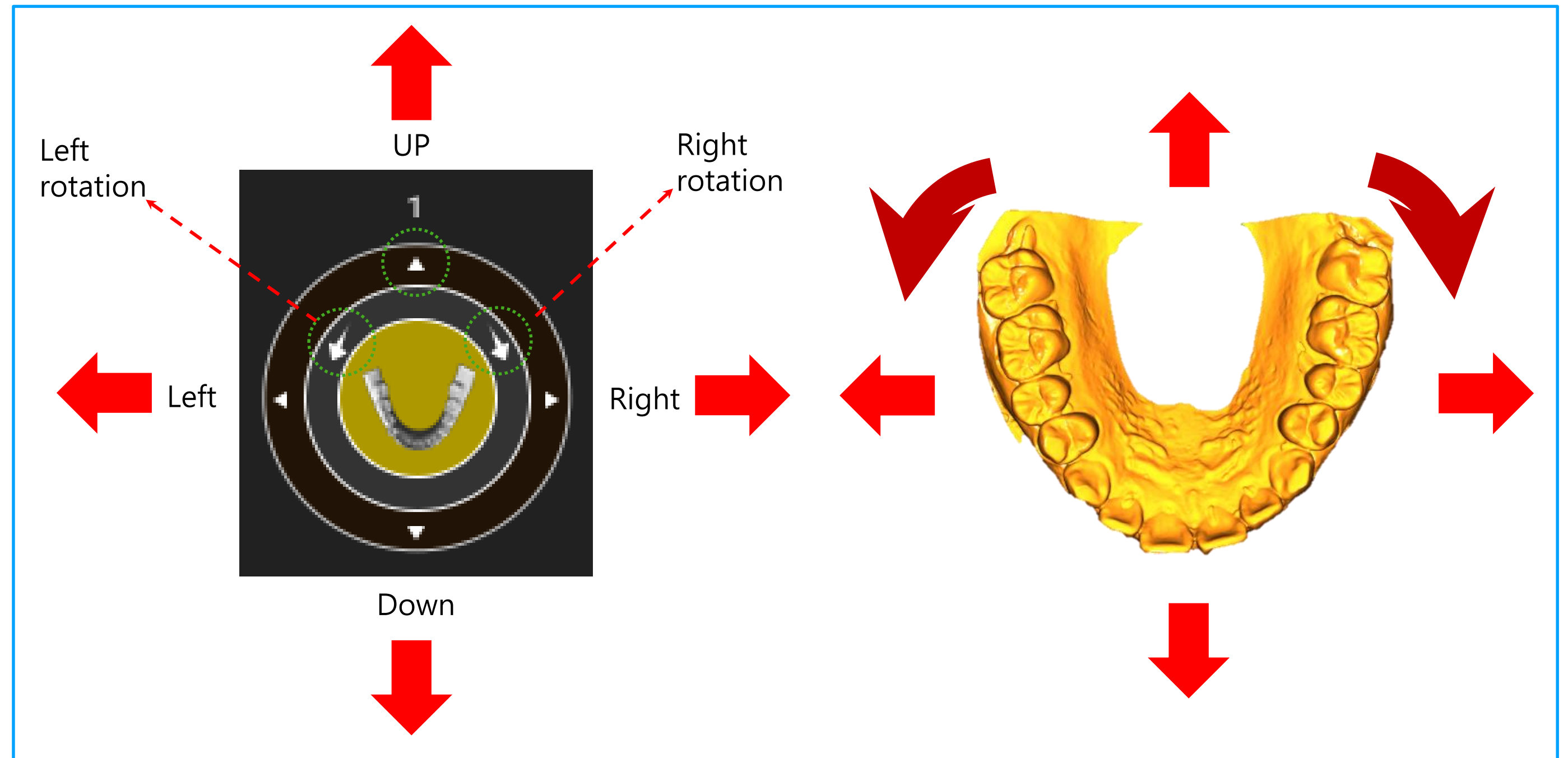
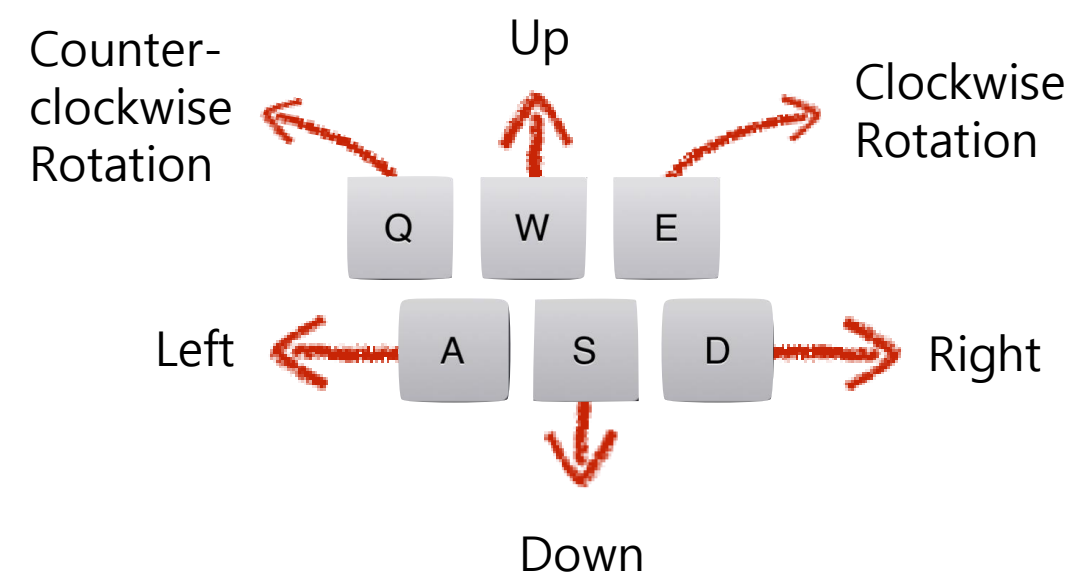
Precise Matching Adjustment using STL Control Keys

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



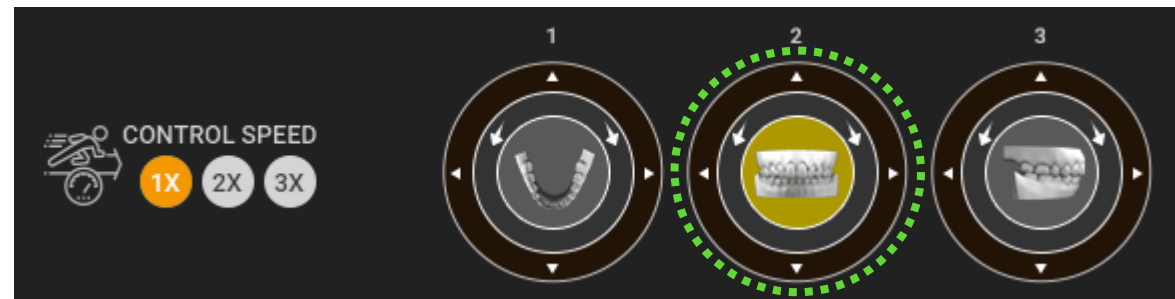
R2GATE has two matching modes:
auto & precise

Precise Matching

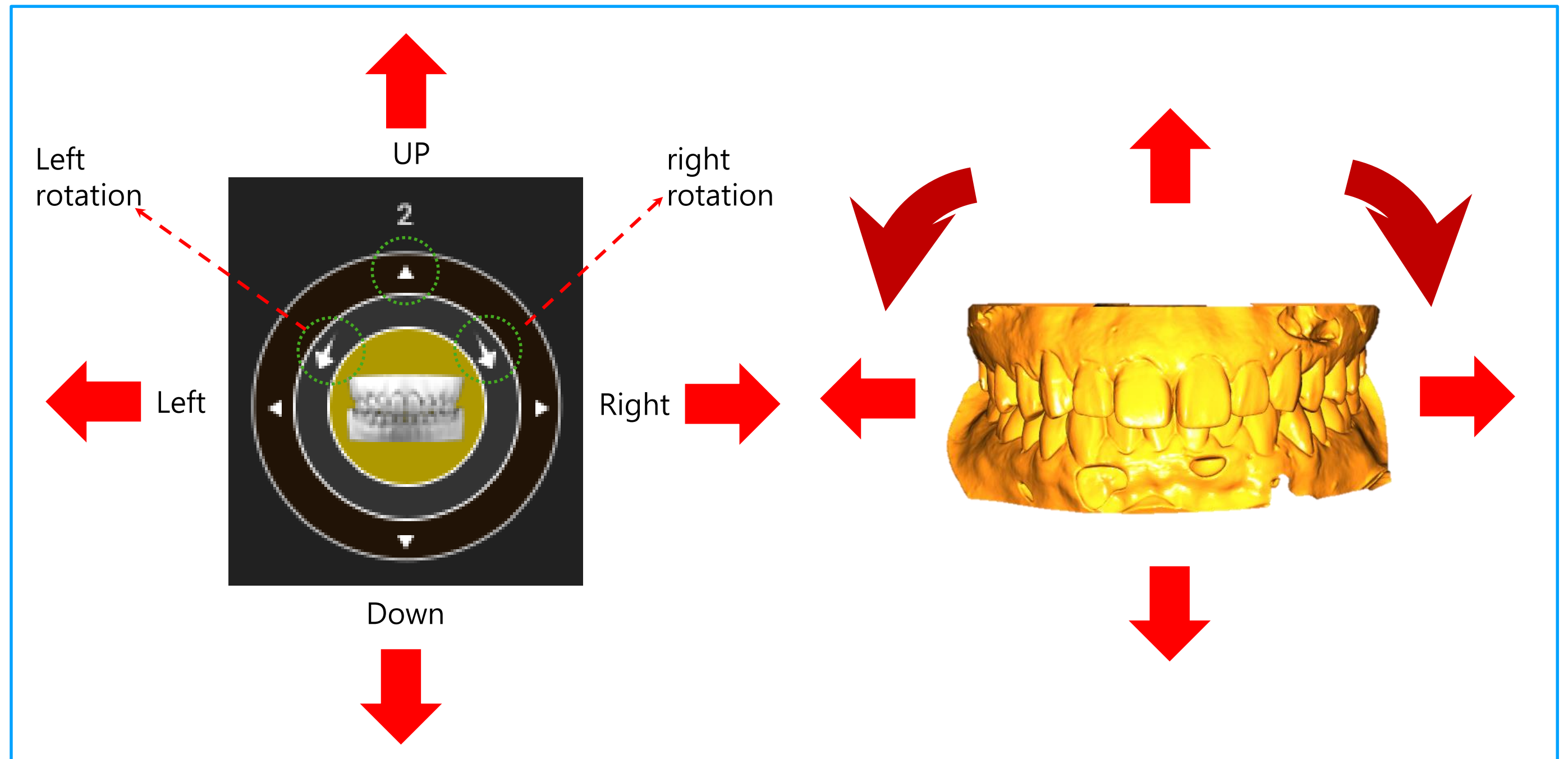
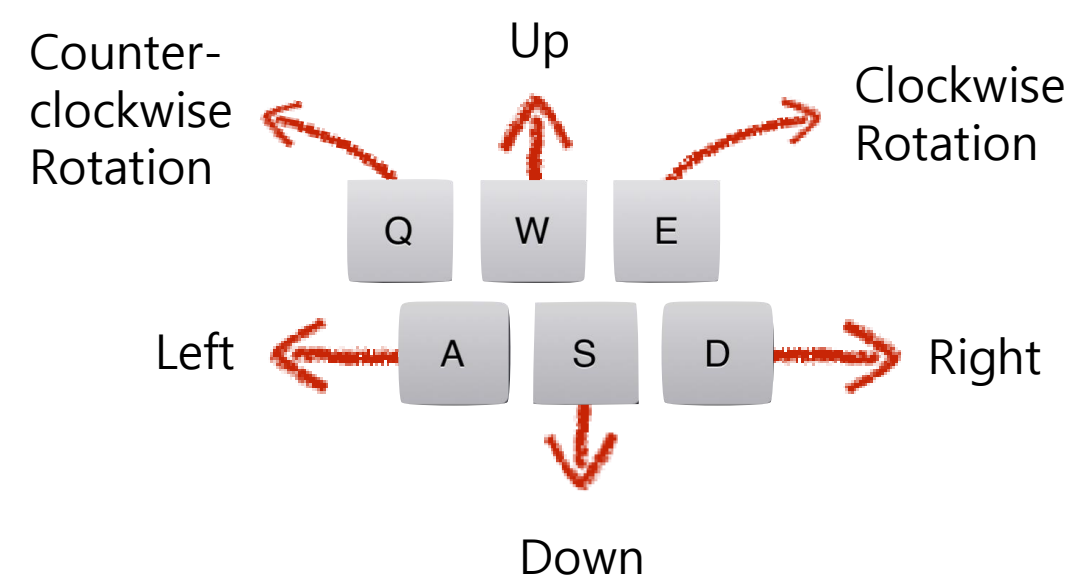
Precise Matching Adjustment using STL Control Keys

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

- 6 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

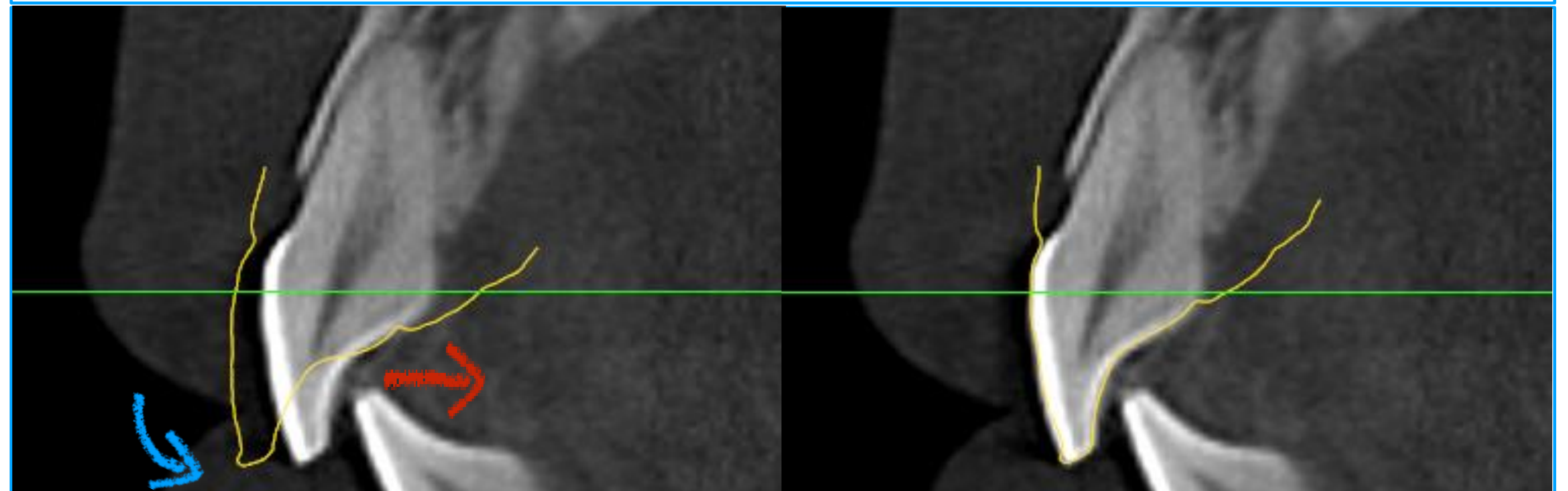
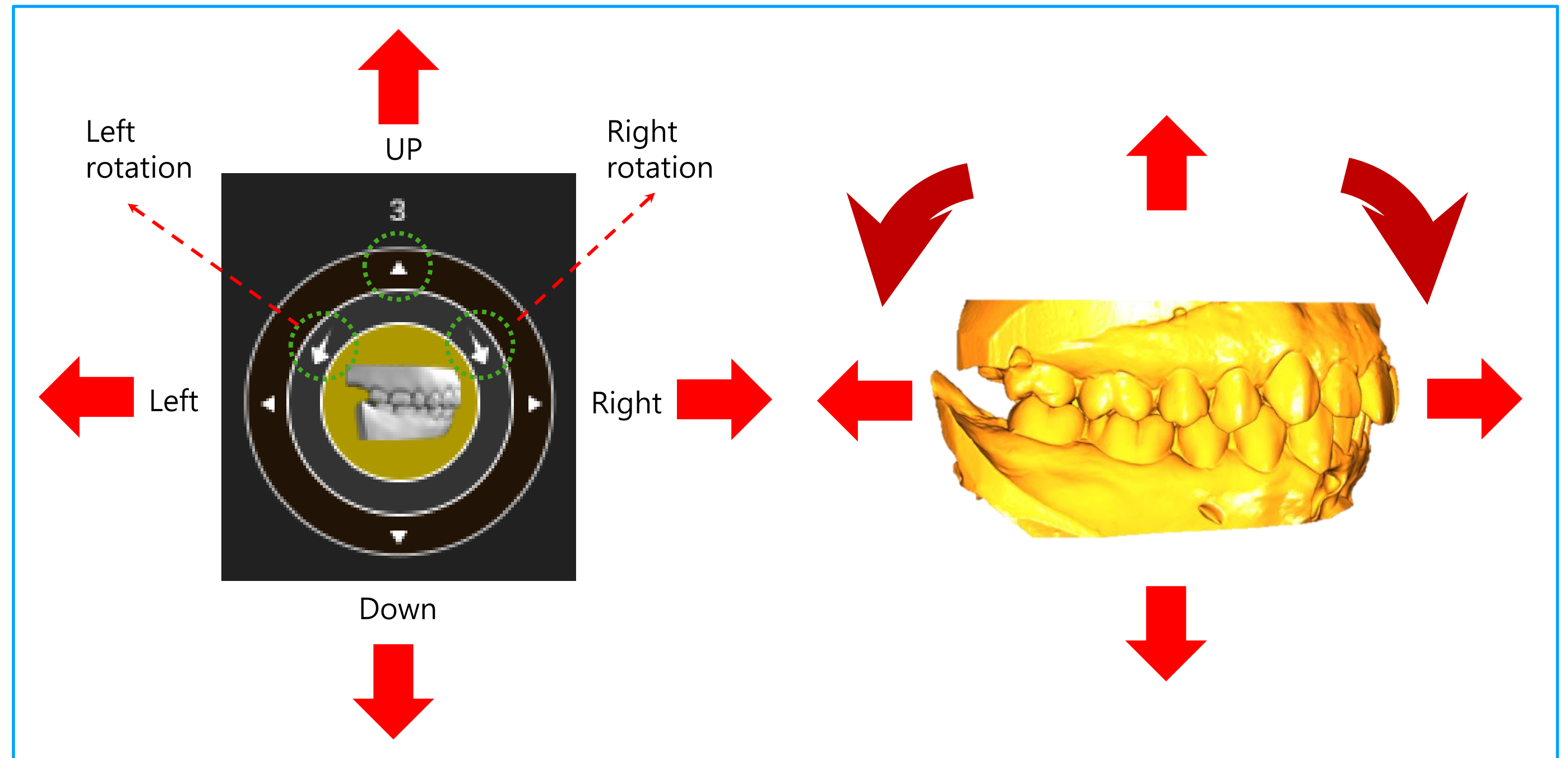
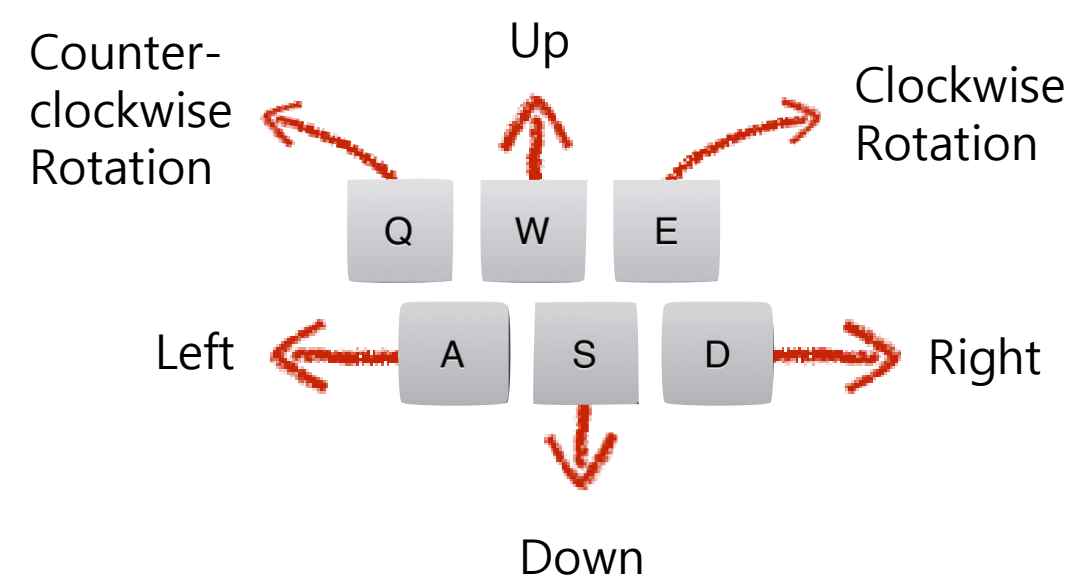
Precise Matching Adjustment using STL Control Keys

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

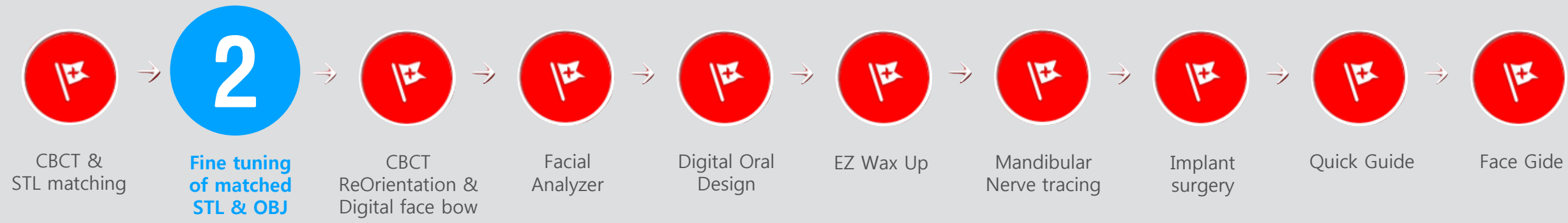
- 7 Use the arrows in Control 3 to adjust the height and position in the sagittal view
- 8 Check each views again and repeat the process to adjust the parts that do not fit properly



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



2.7 Fine Tuning of Matched STL

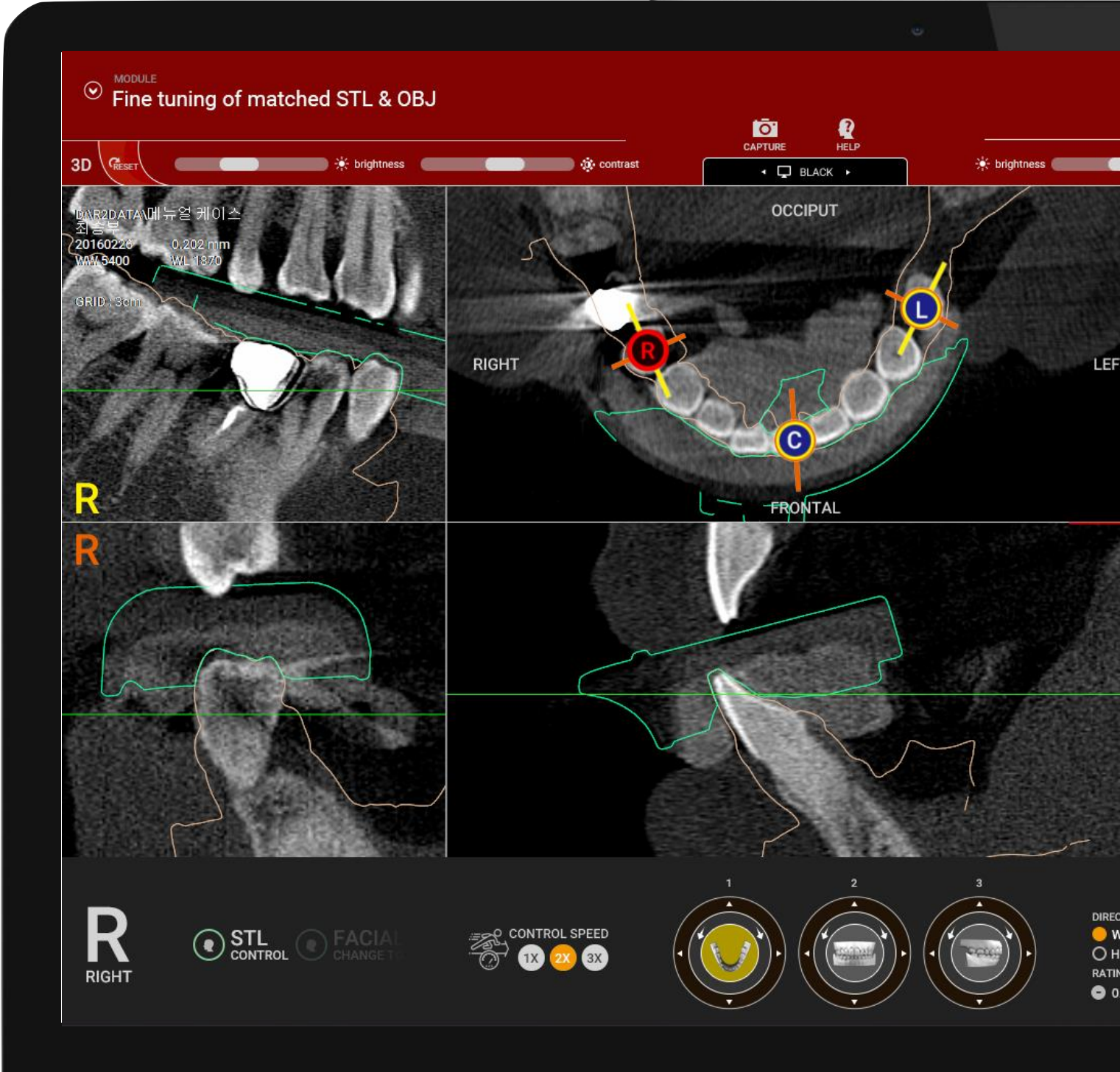


R2GATE has two matching modes:
auto & precise

Precise Matching

Precise Matching Adjustment using STL Control Keys

9 Precise Matching is complete



[After fine tuning matching]

[Before fine tuning matching]



2.7 Fine Tuning of Matched STL



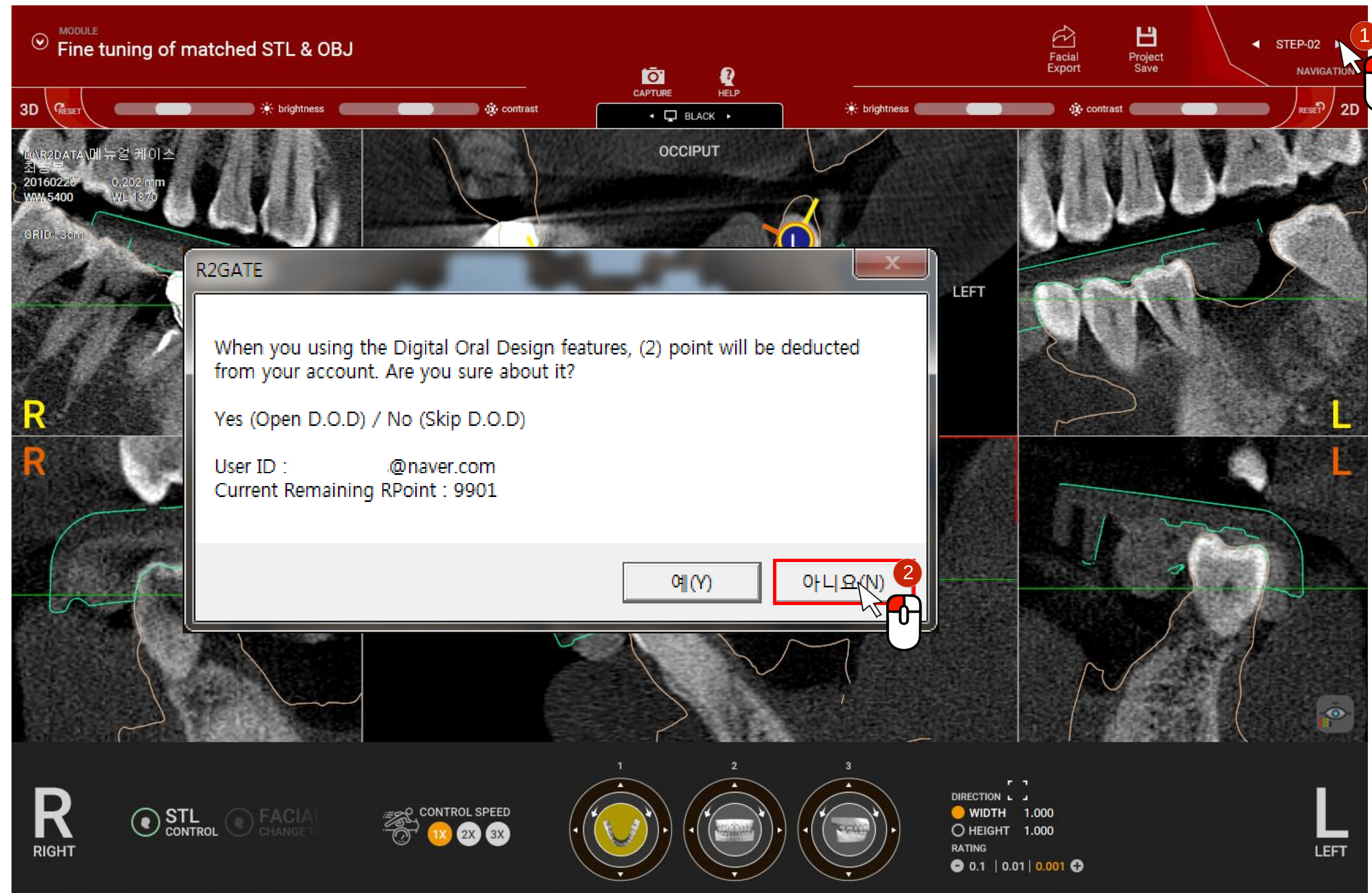
**R2
GATE**

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Apr. 2019

R2GATE has two matching modes:
auto & precise

Precise Matching

- 1 Click to proceed to next step
- 2 If you create R2 Guide, click **No(N)** to skip DOD step
- ! Click Yes(Y) to open DOD step and points is deducted
(2 points will be deducted per 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

R2GATE 2.0
Apr. 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

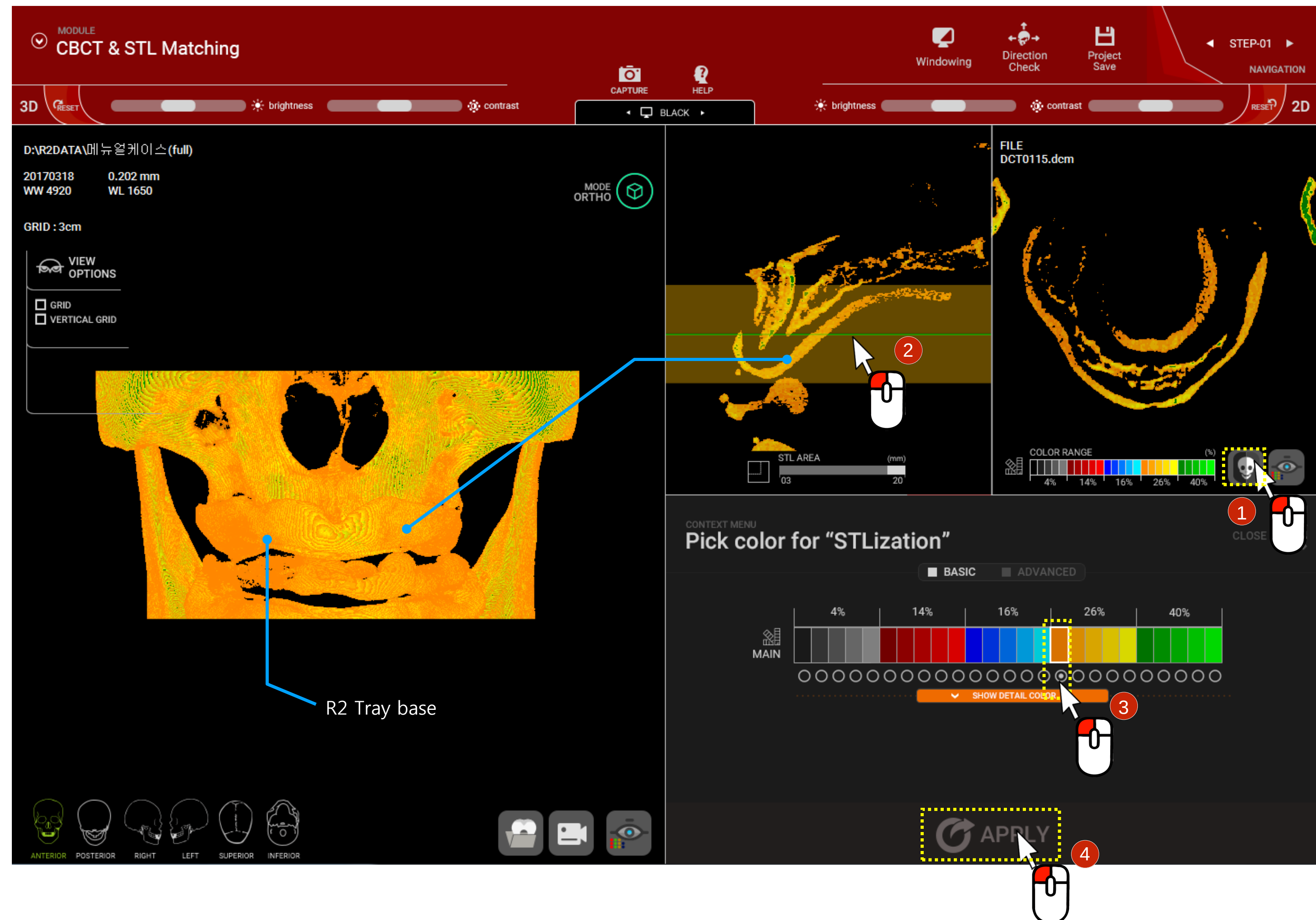
R2GATE 2.0
Apr. 2019

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

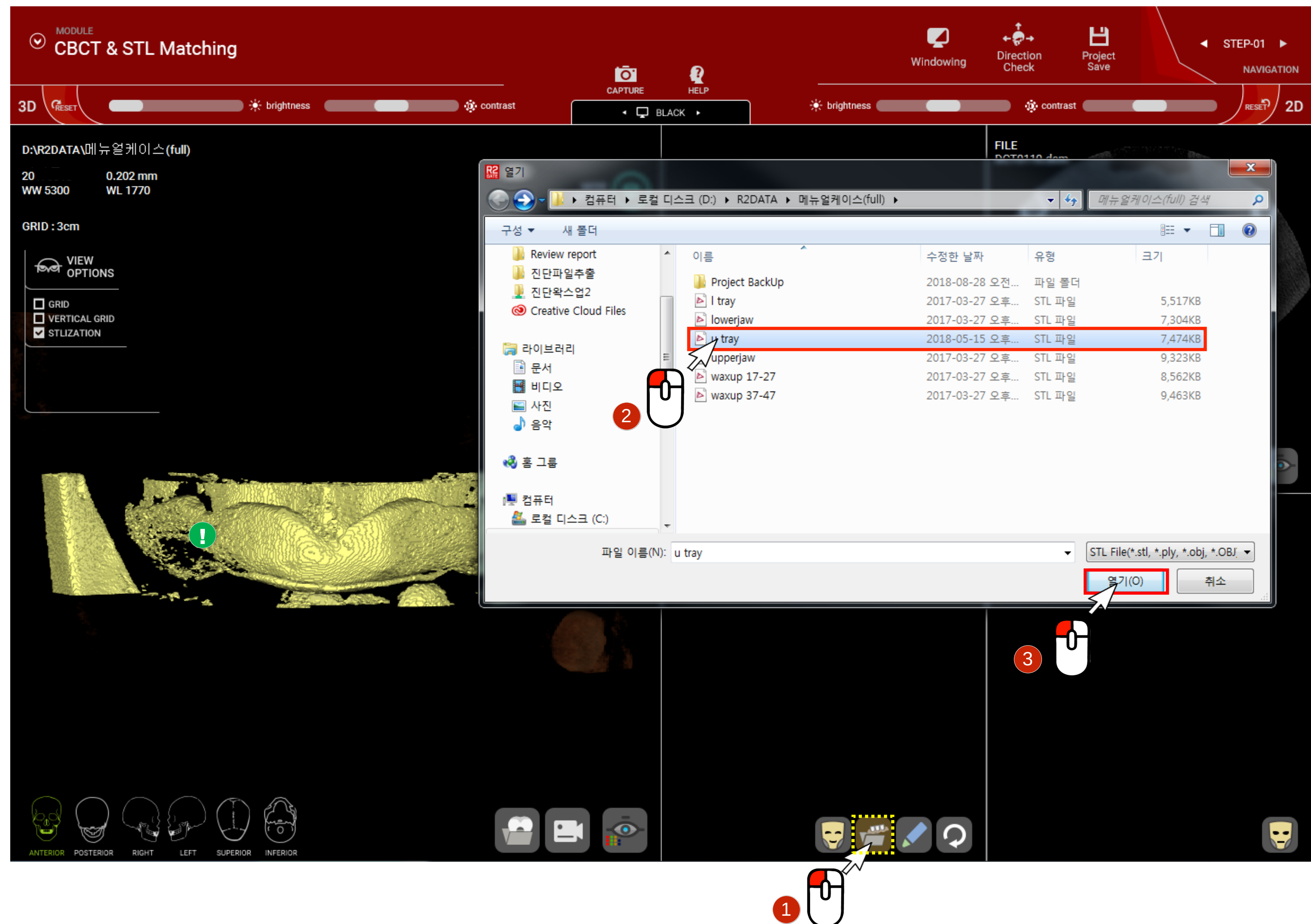
R2GATE 2.0
Apr. 2019

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 Gide

R2
GATE

R2GATE 2.0
Apr. 2019

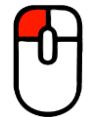
Matching Procedure for Edentulous Case

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 on a customized R2 Tray STL file to mark 3 points
- 3 Mark 3 points on the same positions of STL-ized file that is converted

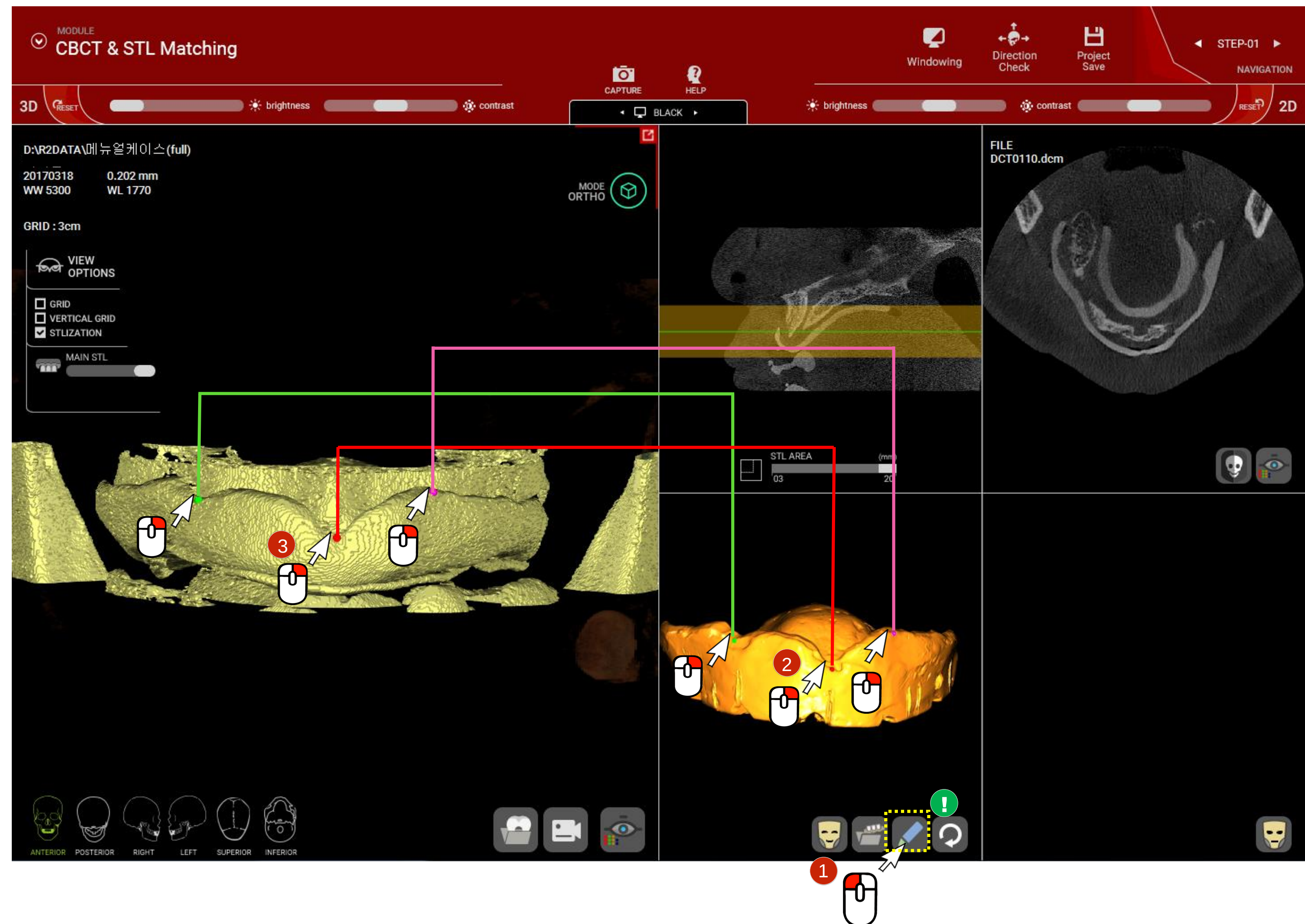
 Left click : STL movement & rotation

 Drag : STL zoom in & out

 Right click: point marking

 Wheel click: Remove previous point

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



2.8 How to Edentulous Case

1
CBCT & STL matching



Fine tuning
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surgery



Quick Guide



Face Gide

R2
GATE

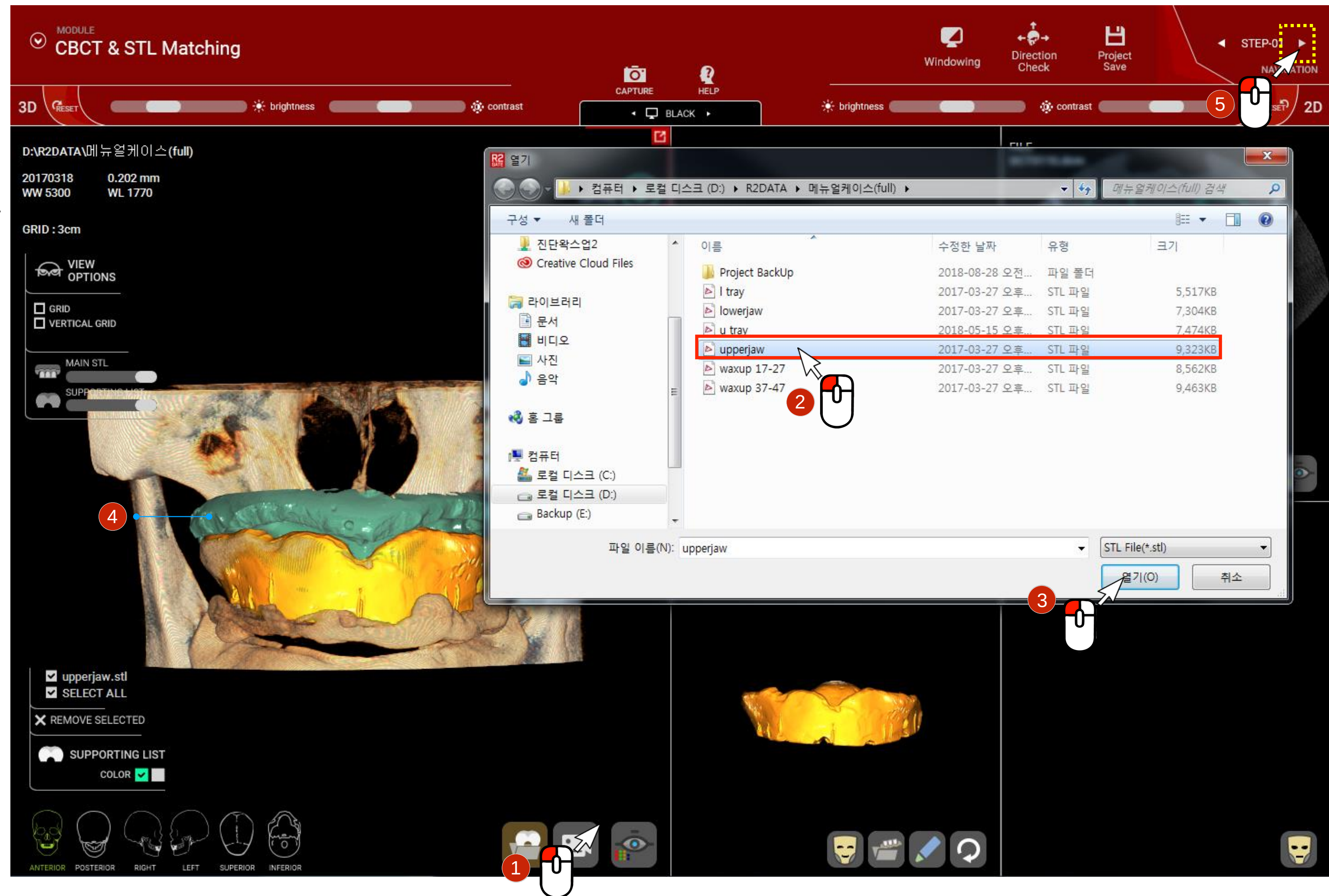
R2GATE 2.0
Apr. 2019

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

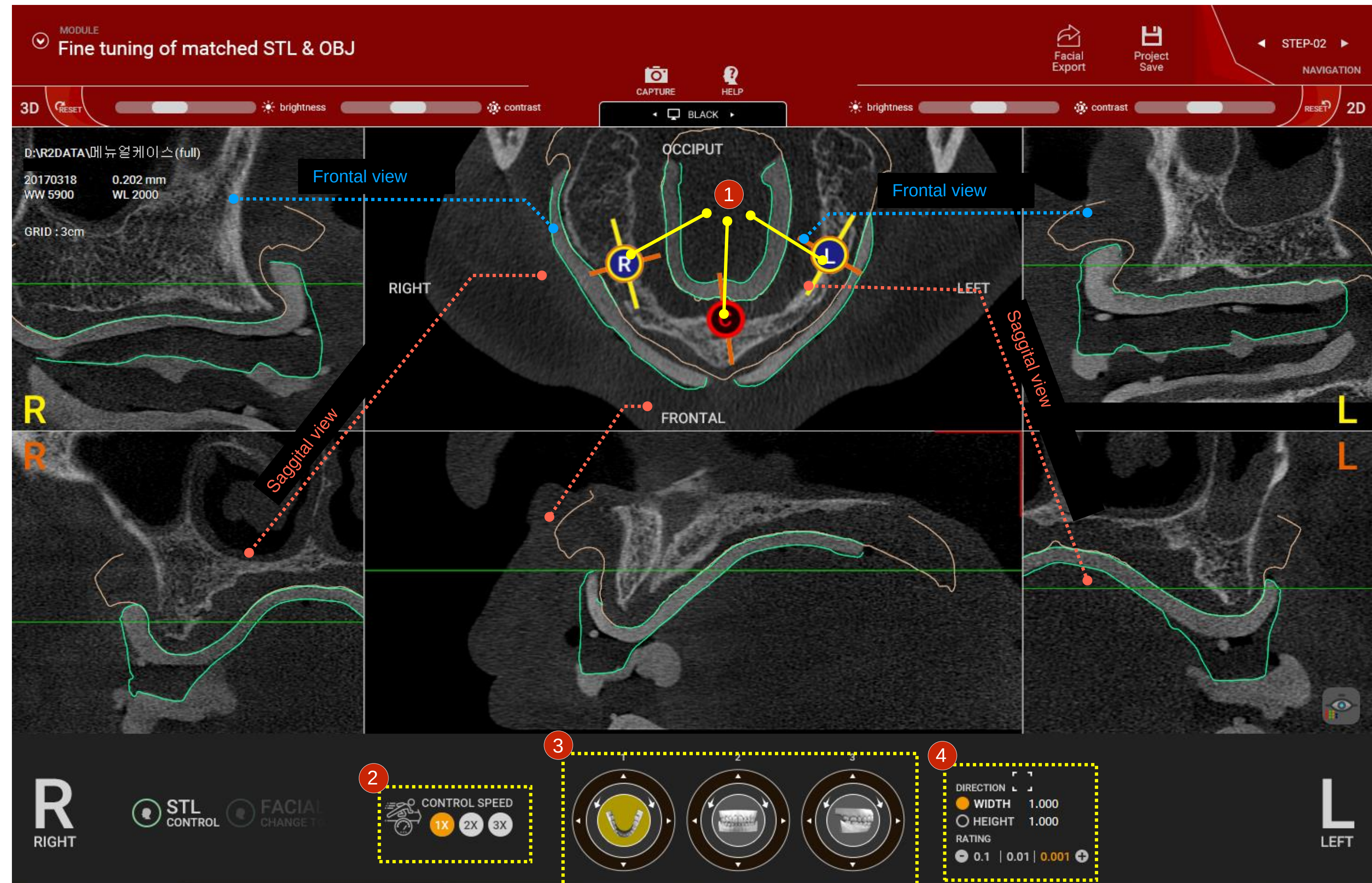
4 CBCT ratio control (Not generally required)

- Green: model outline



- Grey: CBCT image

- Yellow: outline of customized R2 Tray



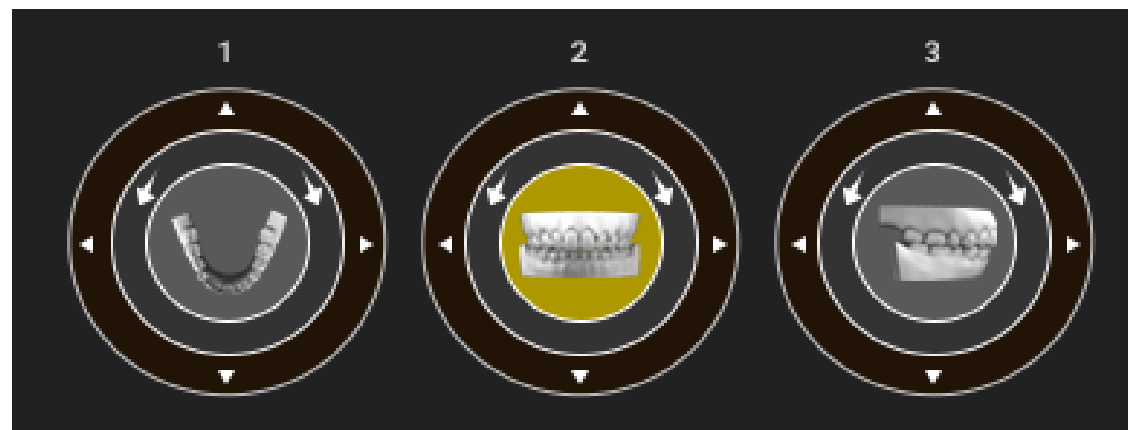
2.8 How to Edentulous Case



Matching Procedure for Edentulous Case

Precise Matching Complete

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



! Refer to P34 for Matching procedure

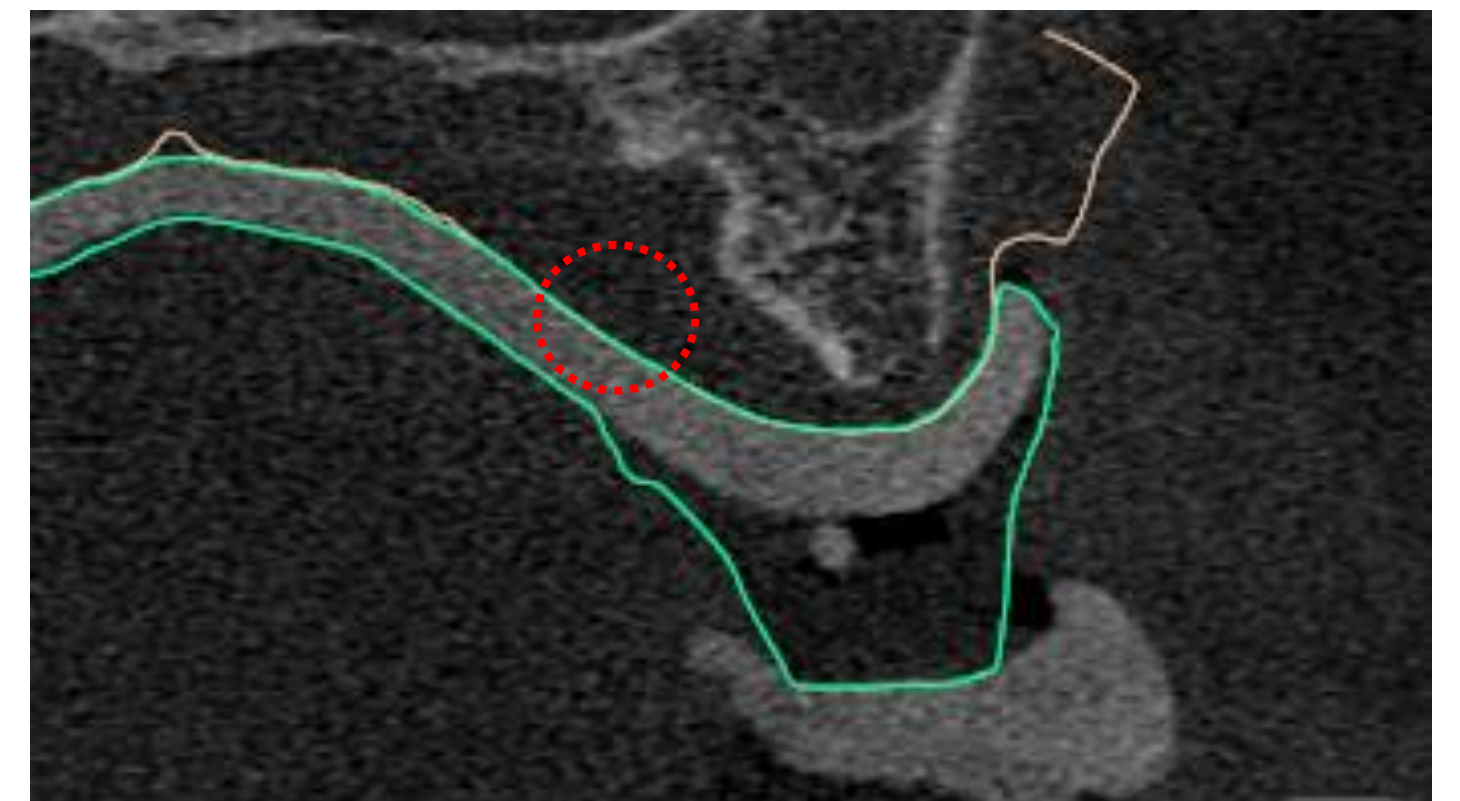
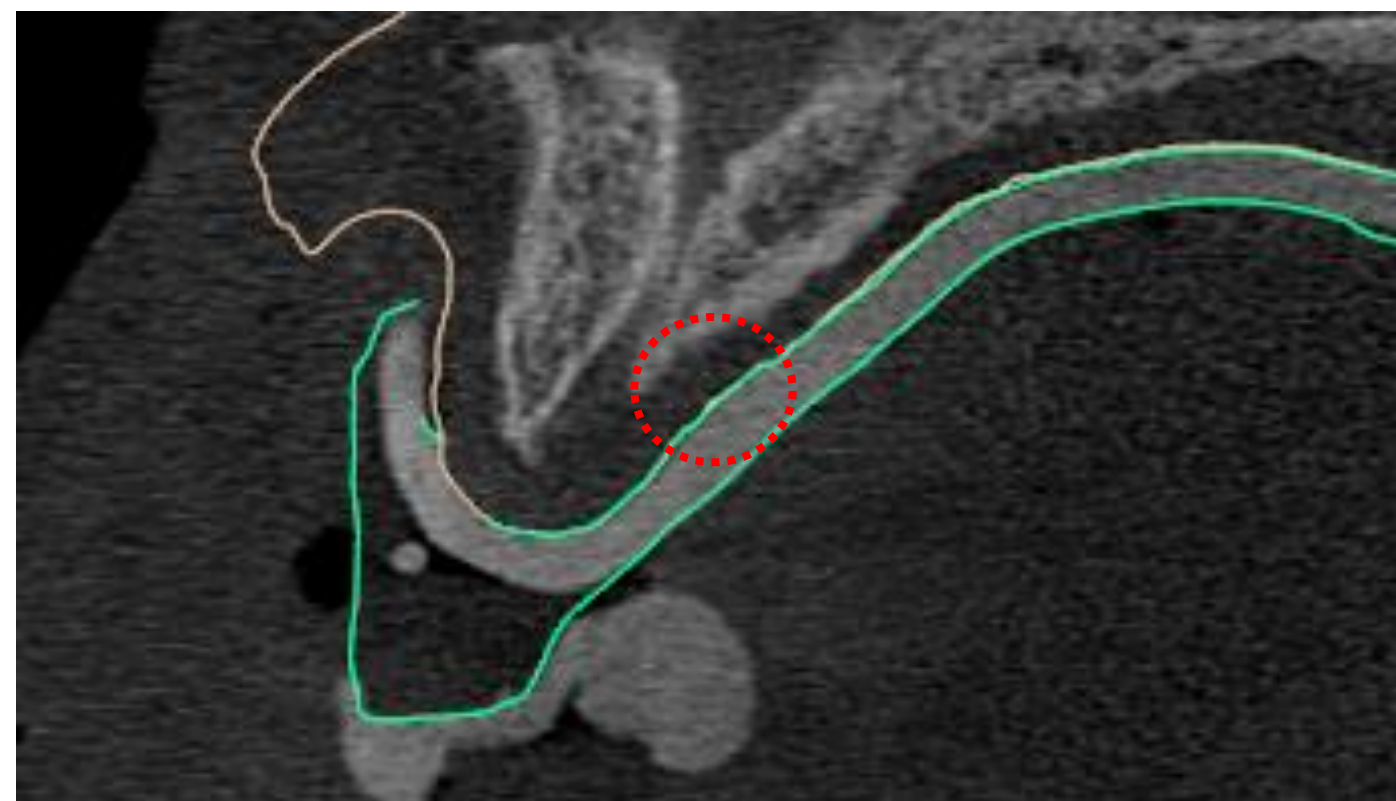
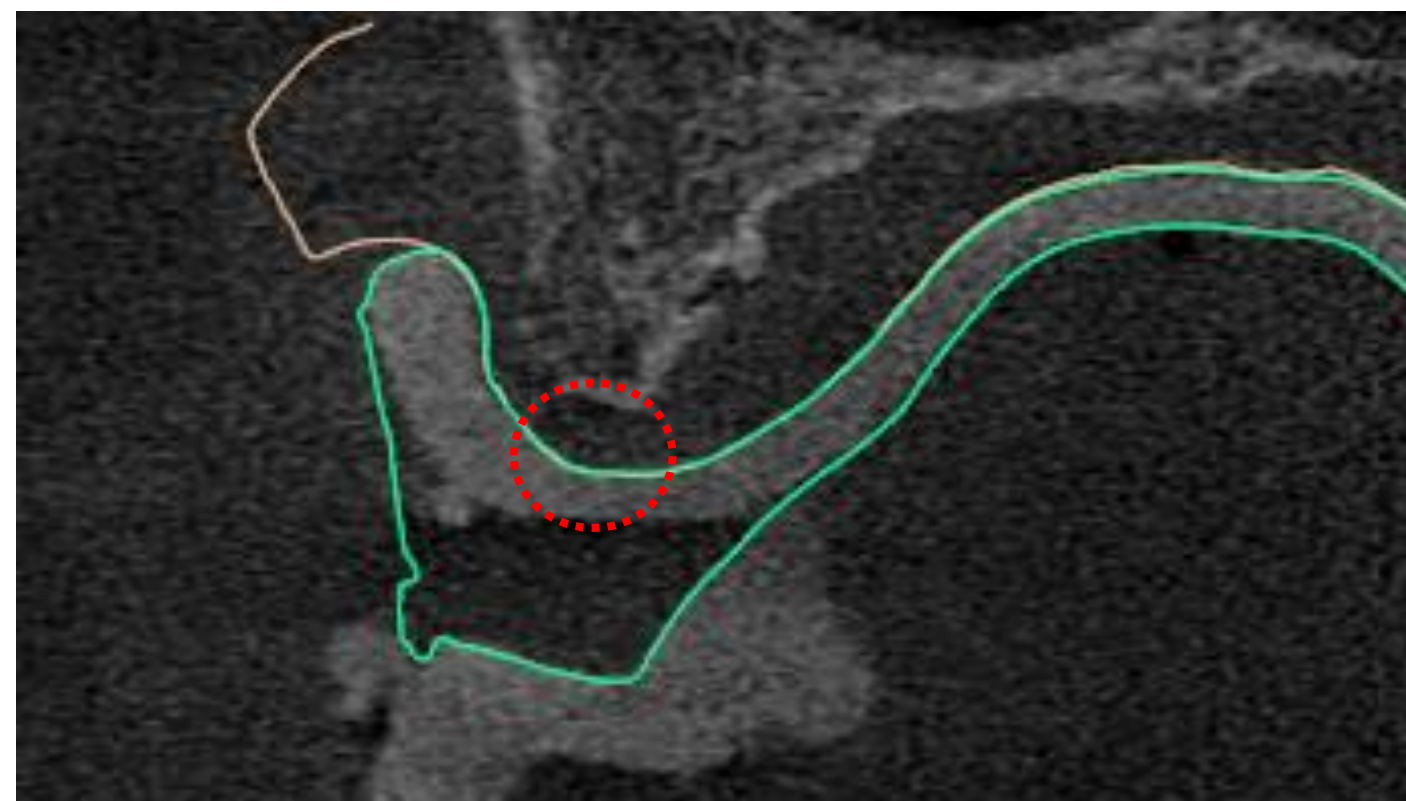
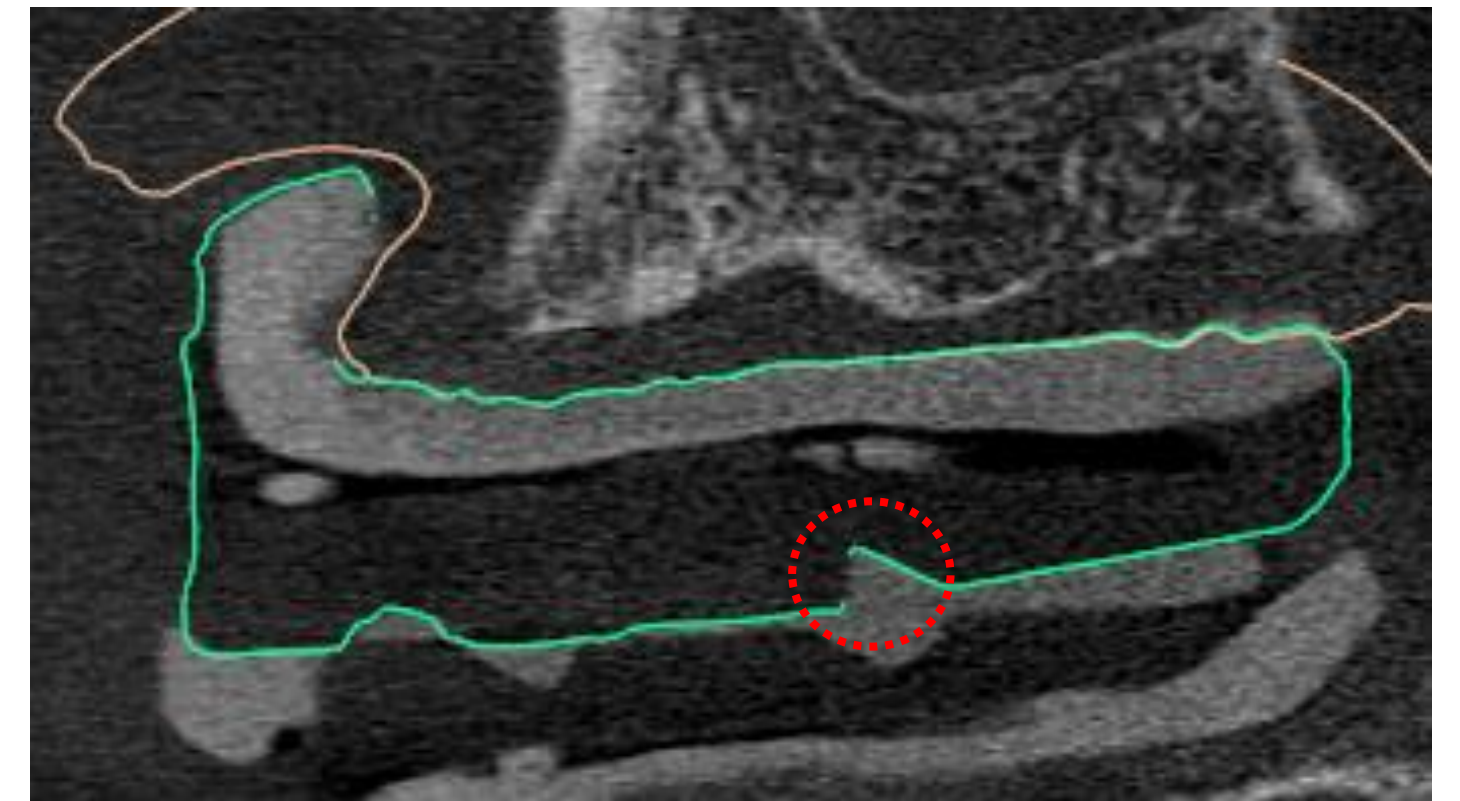
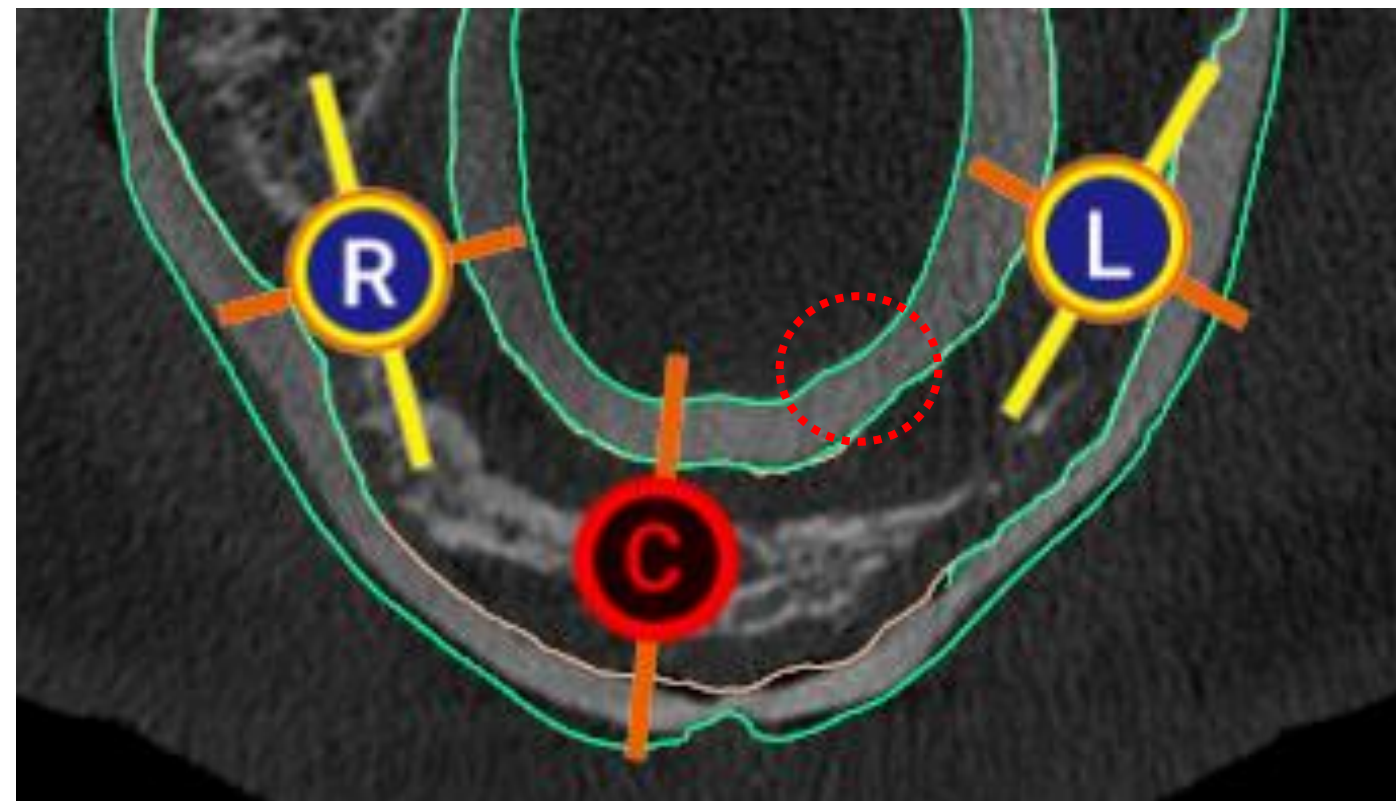
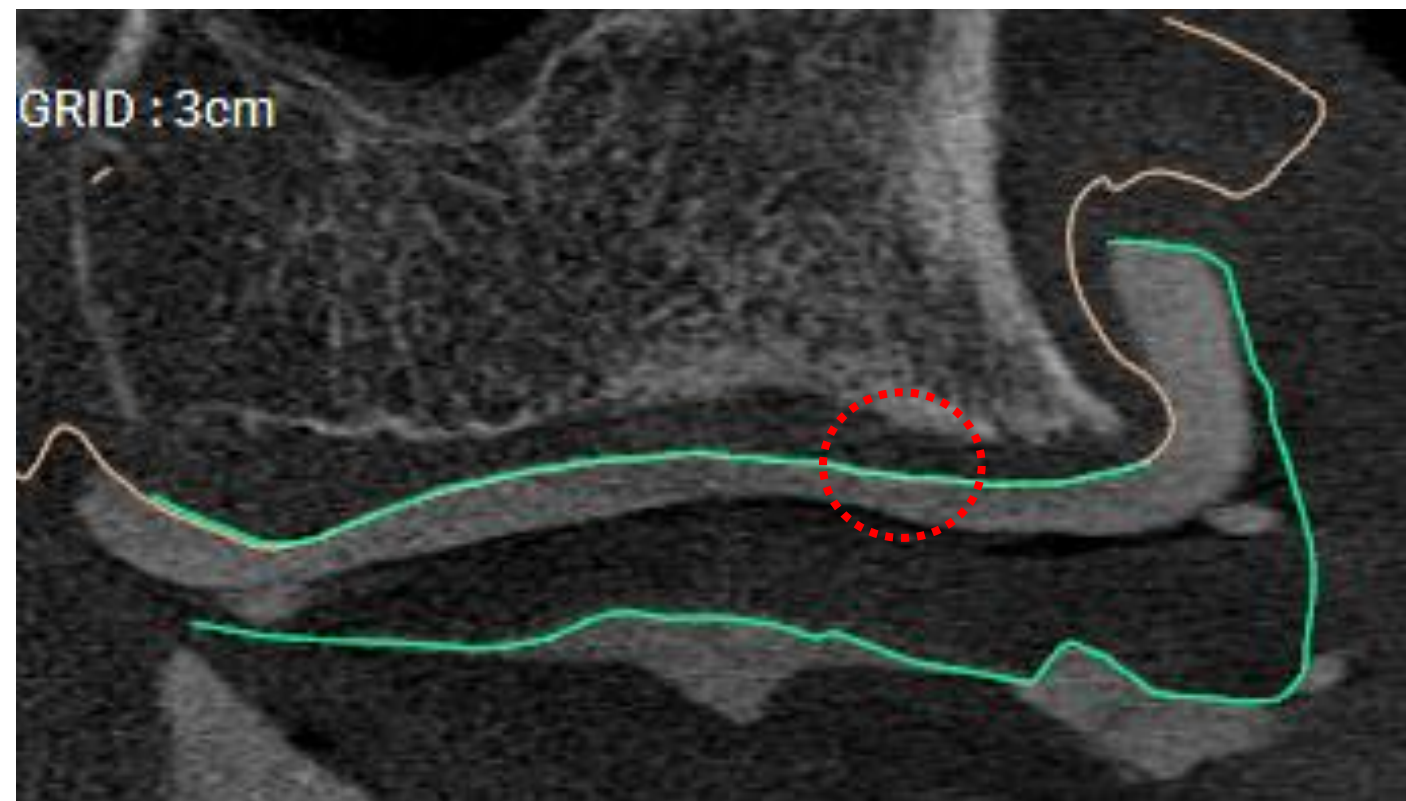


2.8 How to Edentulous Case

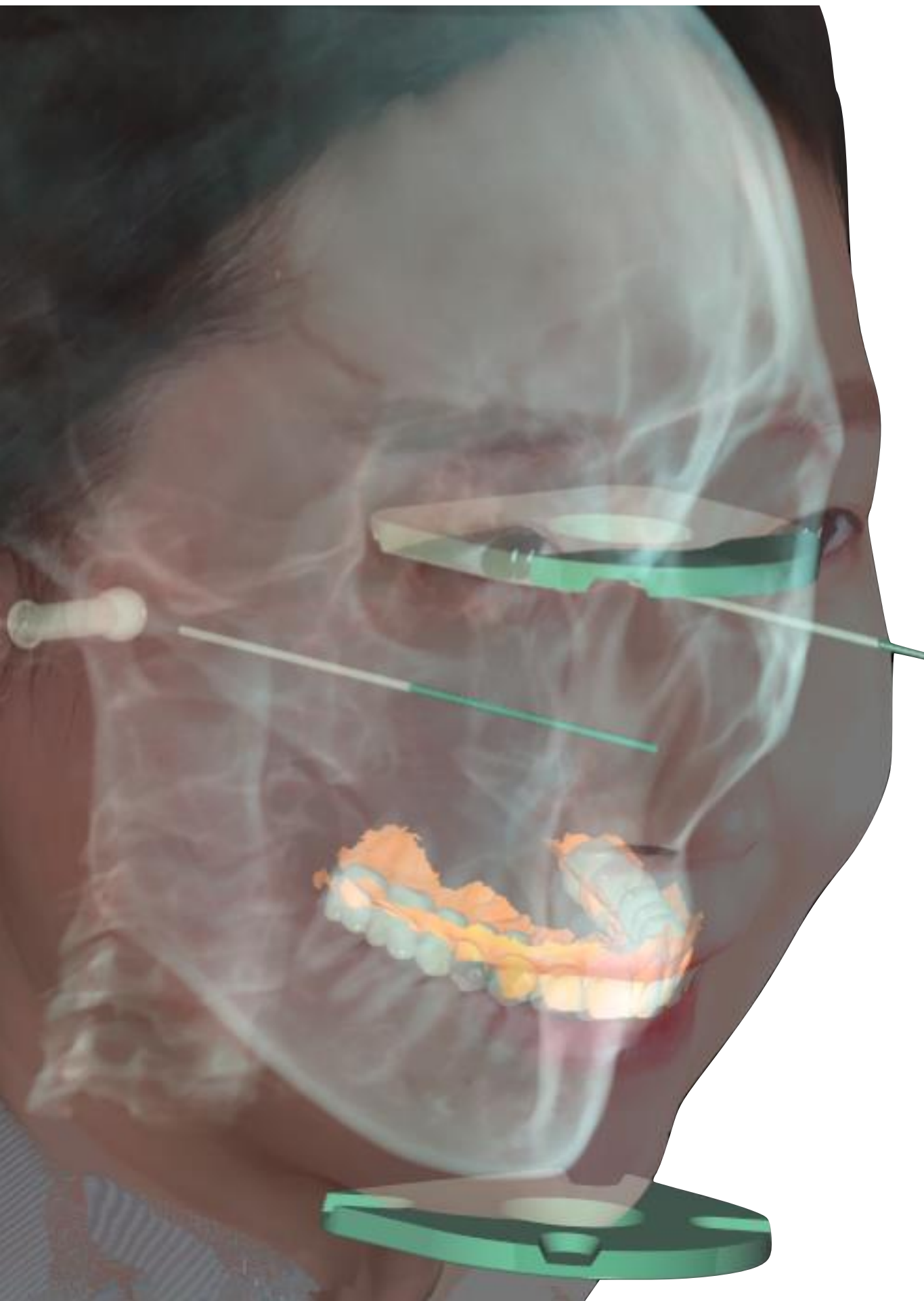


Matching Procedure for Edentulous Case

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



R2GATE™
Turning imagination into reality

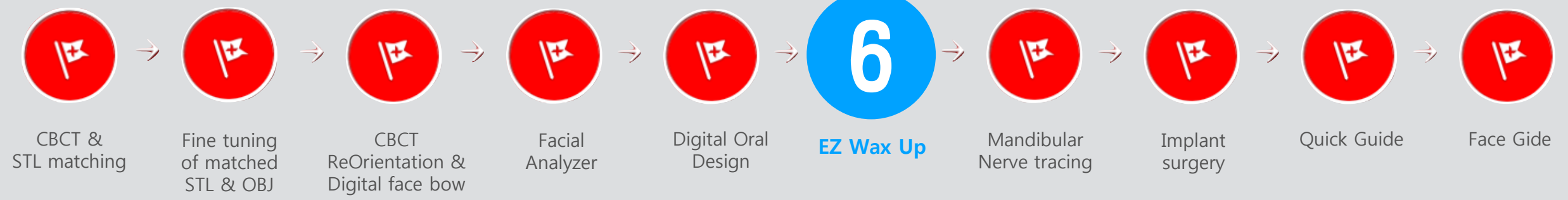


3 R2GATE™ 2.0 EZ Wax up



EZ wax-up(EN)

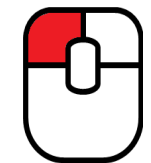
3.1 R2GATE™ 2.0 Control Buttons



**R2
GATE**

R2GATE 2.0
Apr. 2019

Control Buttons



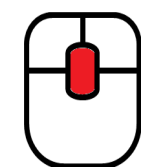
Left click:

Model Rotation and Library Movement



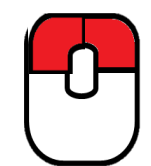
Right click:

Library Arrangement



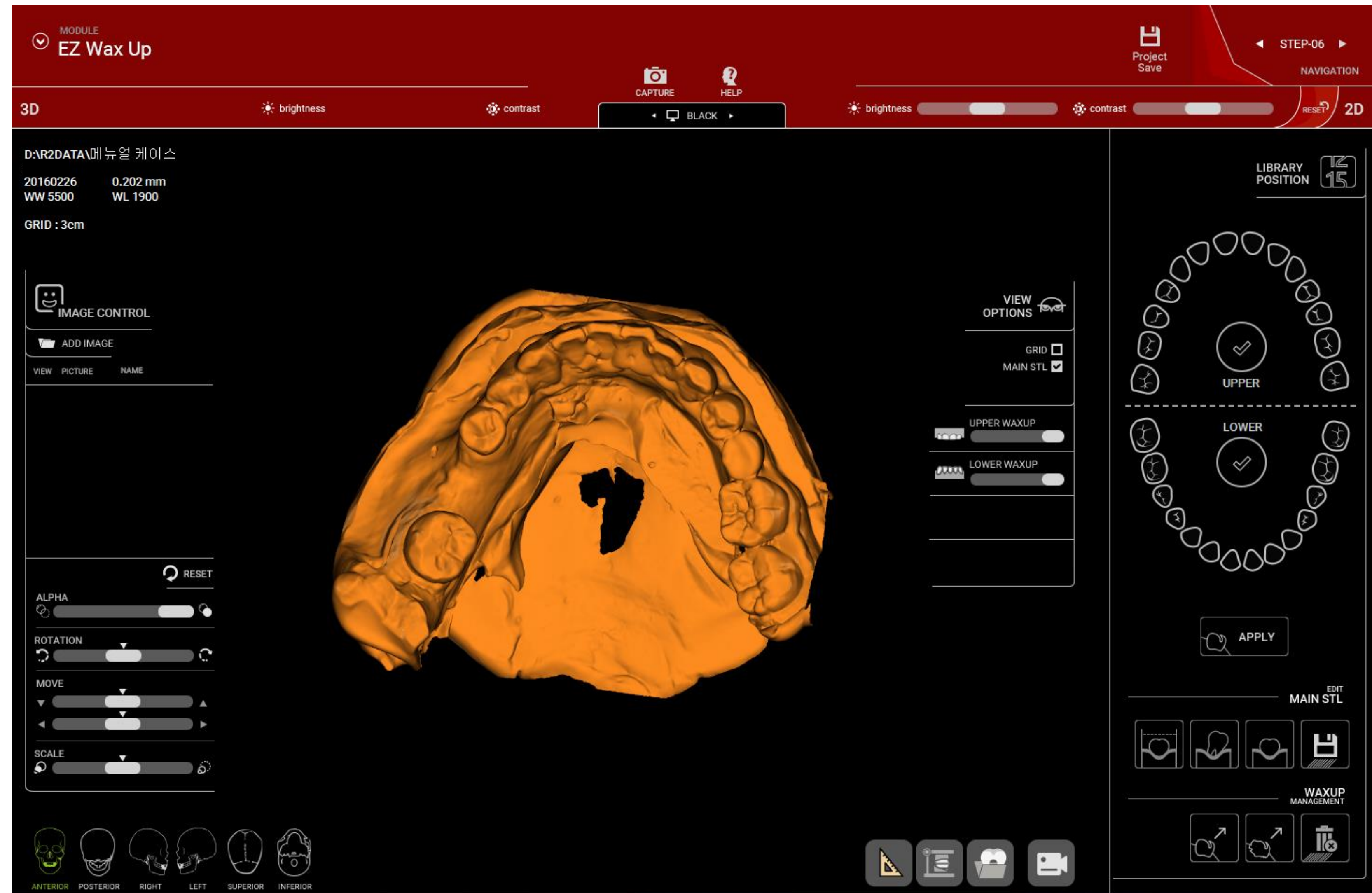
Wheel scrolling:

Model Zoom-in & out

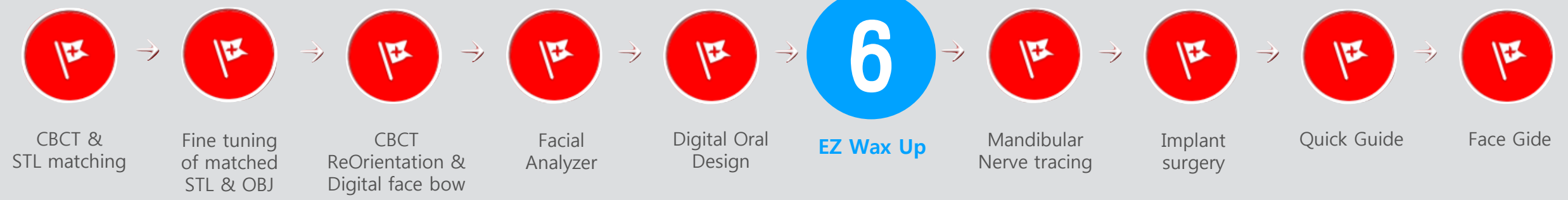


Right & left click:

Model Movement



3.1 R2GATE™ 2.0 Control Buttons



**R2
GATE**

R2GATE 2.0
Apr. 2019

Control Buttons

Import 2D Image

2D Image Control Keys

3D Volume control

Distance Measurement Function

Import R2 Digital Mounting Model

Import The Antagonist

GRID ON/OFF Display Main STL

Select wax-up library dentition

Wax-up Transparency Adjustment

Apply selected wax-up library

Tooth Extraction

Restore to original model

Save deleted model

Set tooth extraction area

Delete wax-up

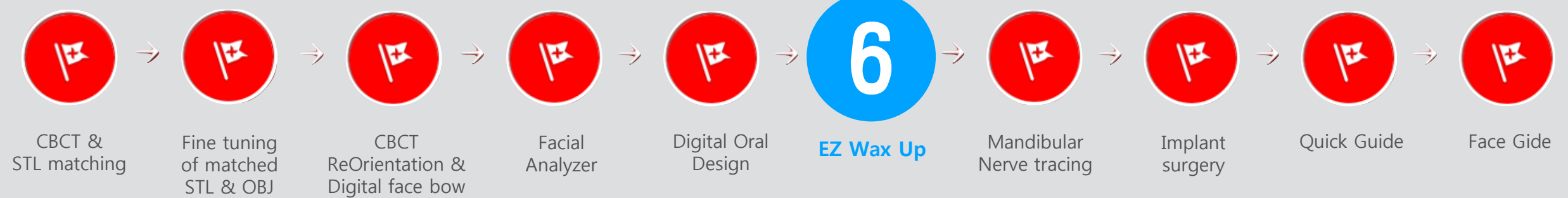
Mock up export

wax up export

Rotation Function According To X,Y-axis

50

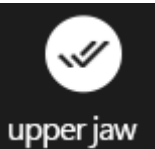
3.2 EZ Wax up Diagnosis wax up

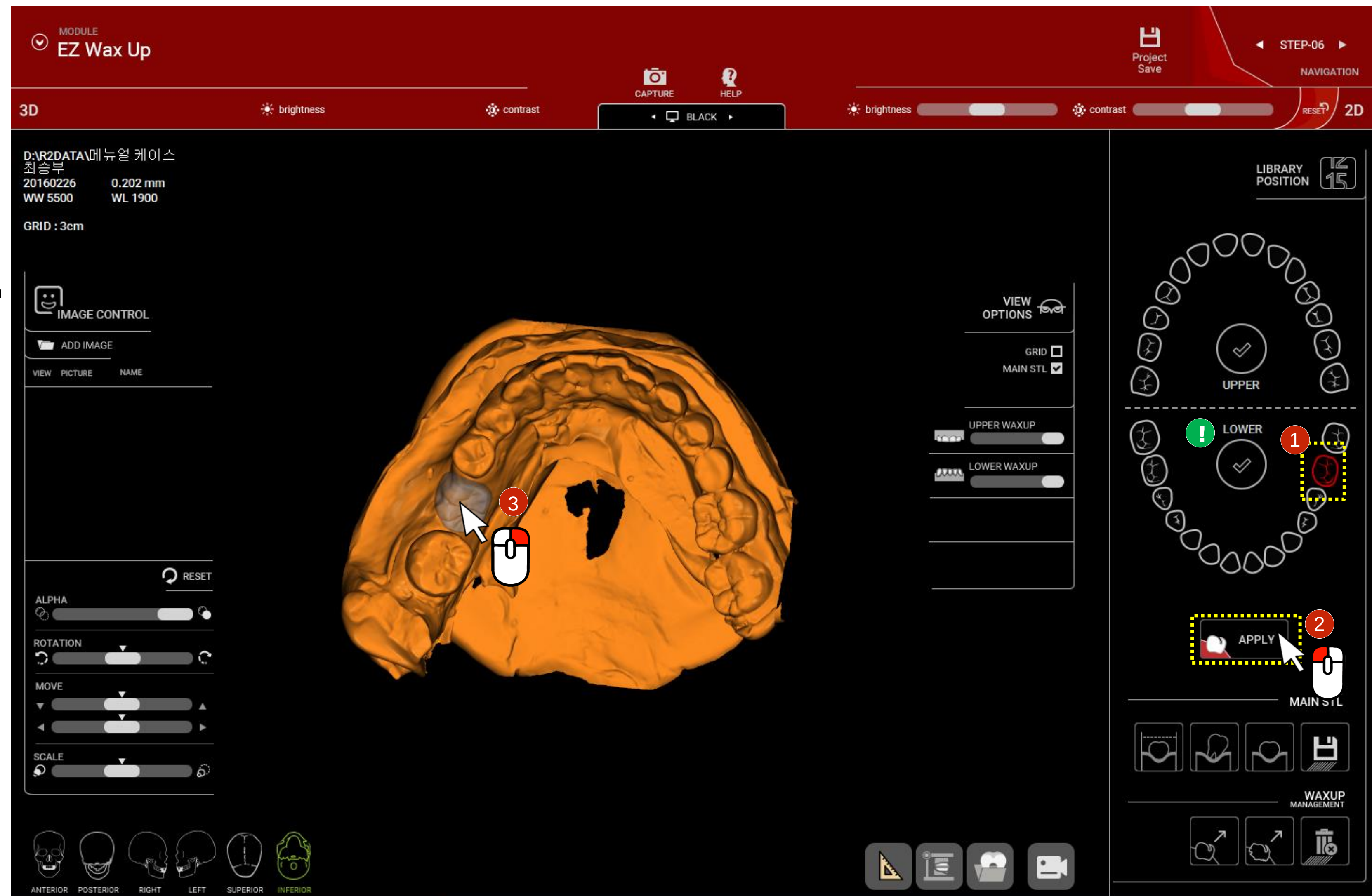


**R2
GATE**

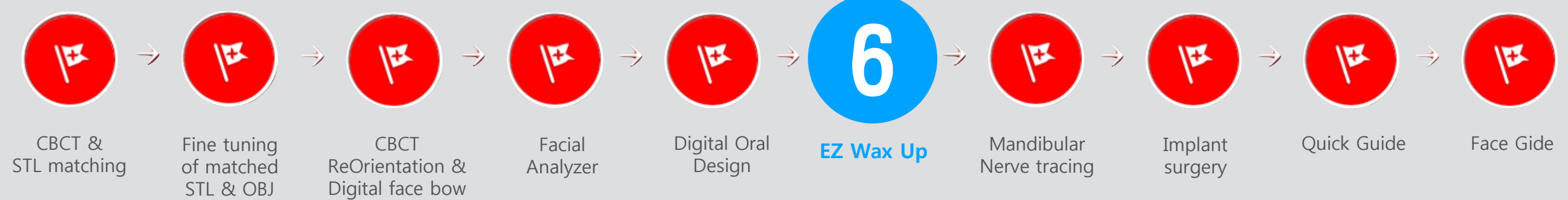
R2GATE 2.0
Apr. 2019

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



3.2 EZ Wax up Diagnosis wax up

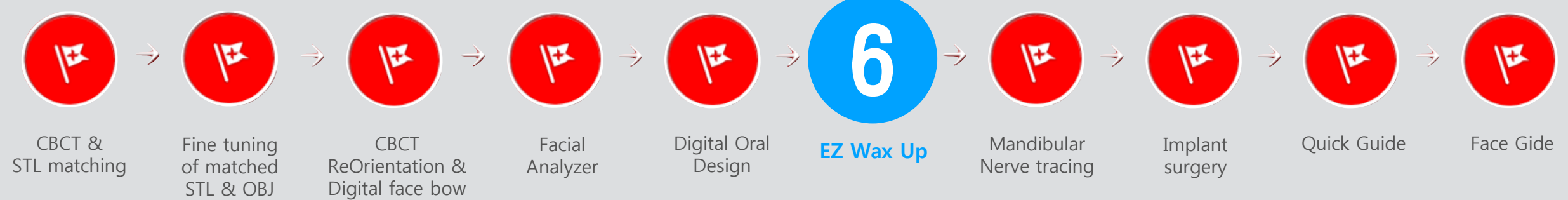


Diagnosis wax up

- 1 After arranging the library, 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



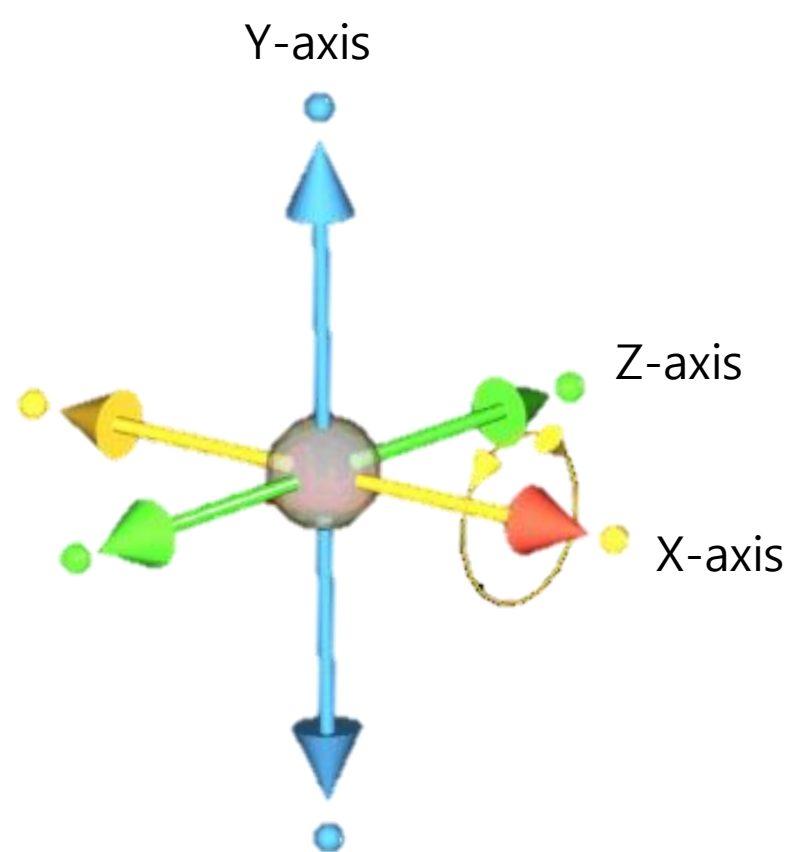
3.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

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

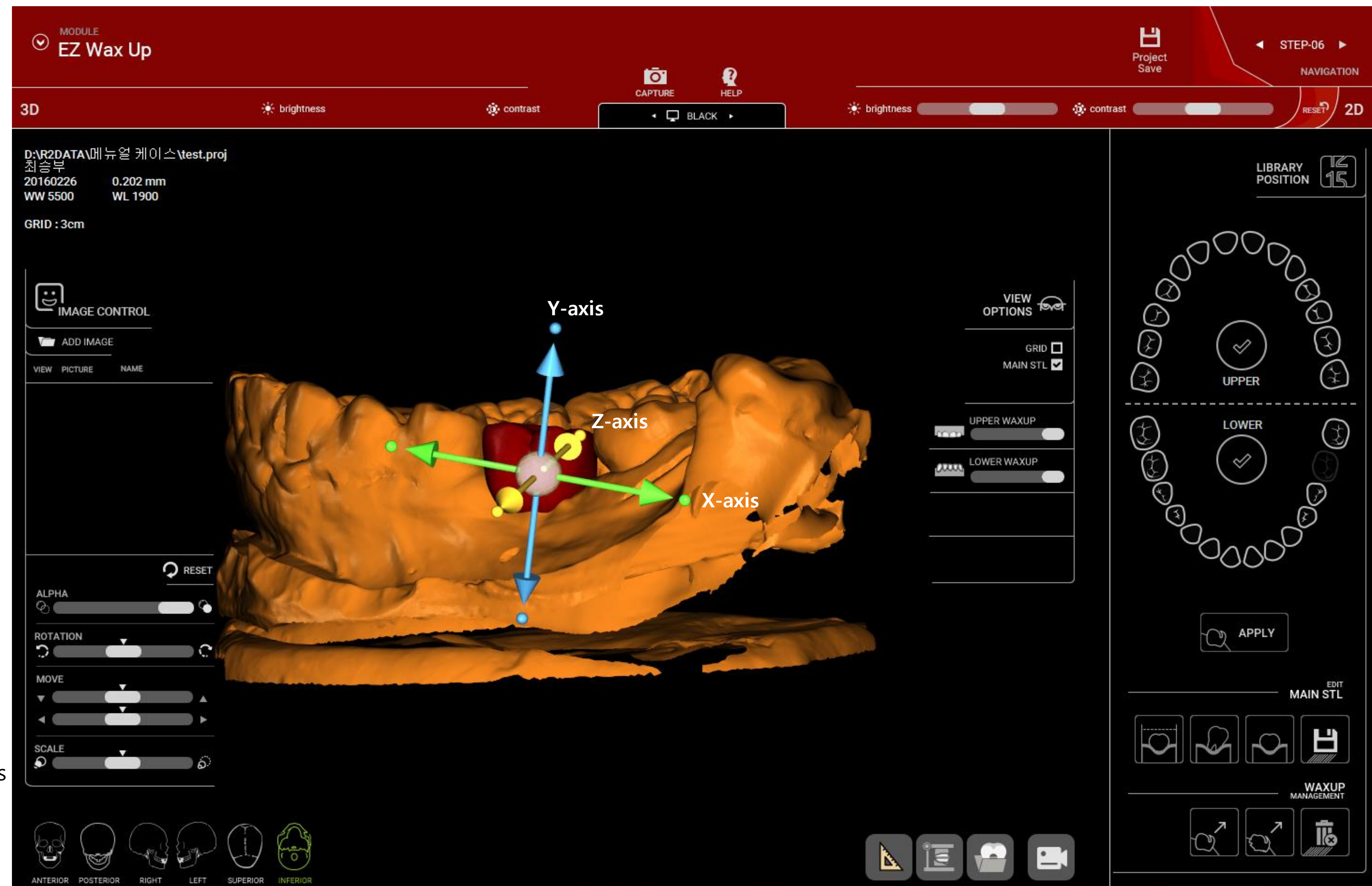
X, Y, Z Axis Control Key



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

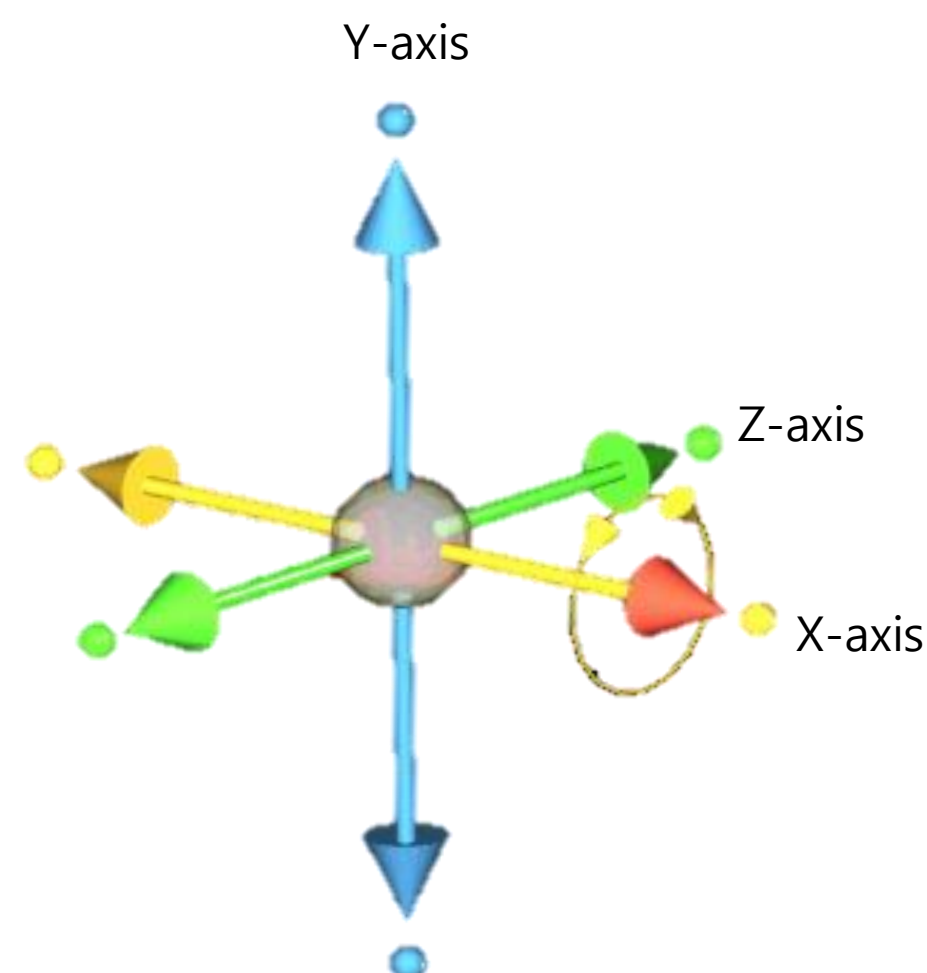


3.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

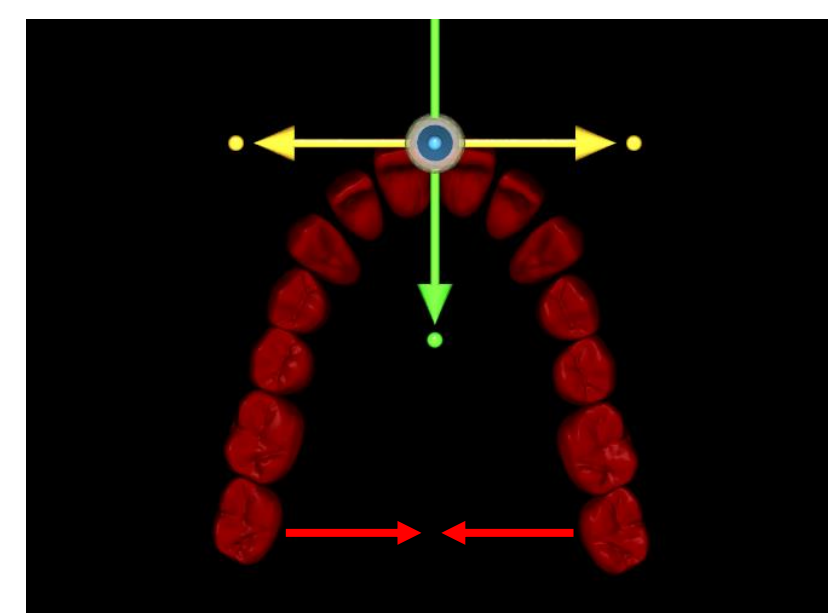
X, Y, Z Axis Control Key



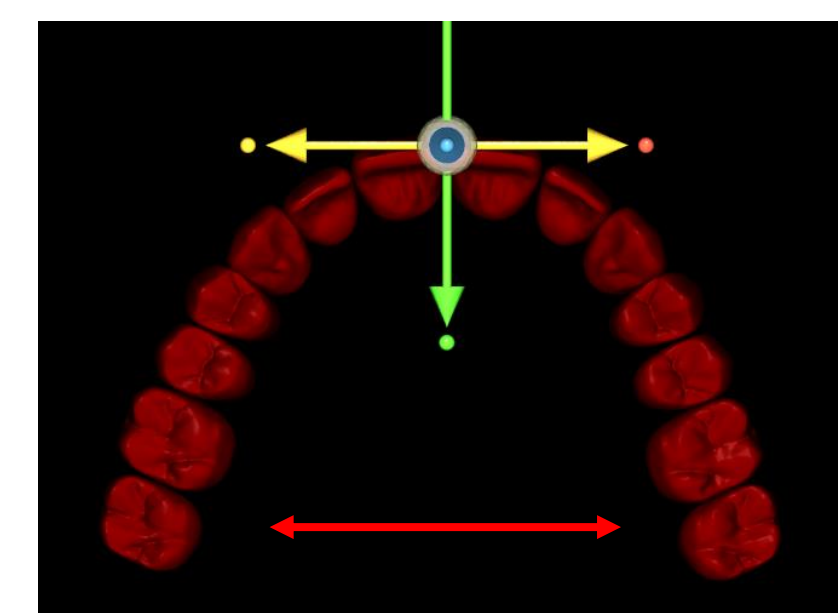
Click a point, arrow and line that is to be controlled and move with the mouse wheel.

1 Point: Library size adjustment by axis

a X-axis

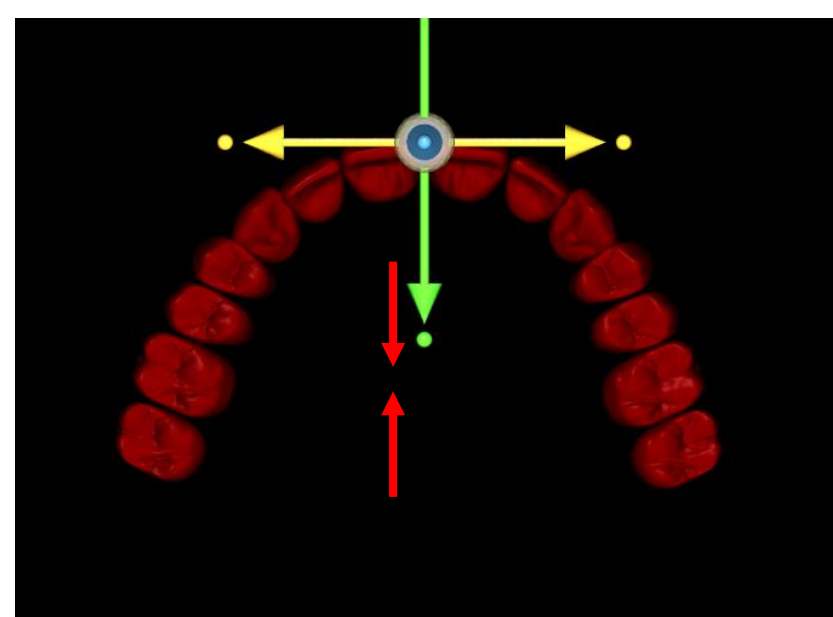


Drag downward(-): X-axis reduction

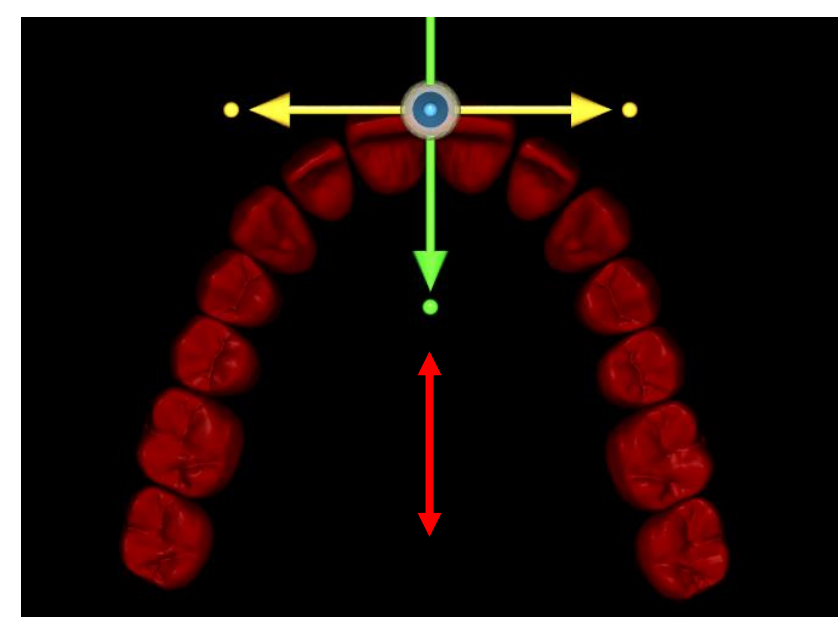


Drag upward(+): X-axis magnification

b Y-axis

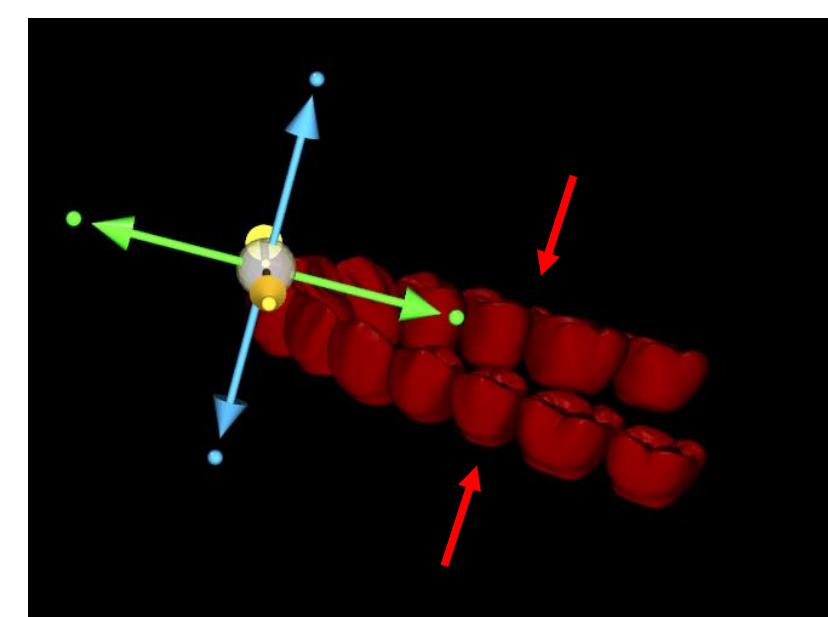


Drag downward(-): Y-axis reduction

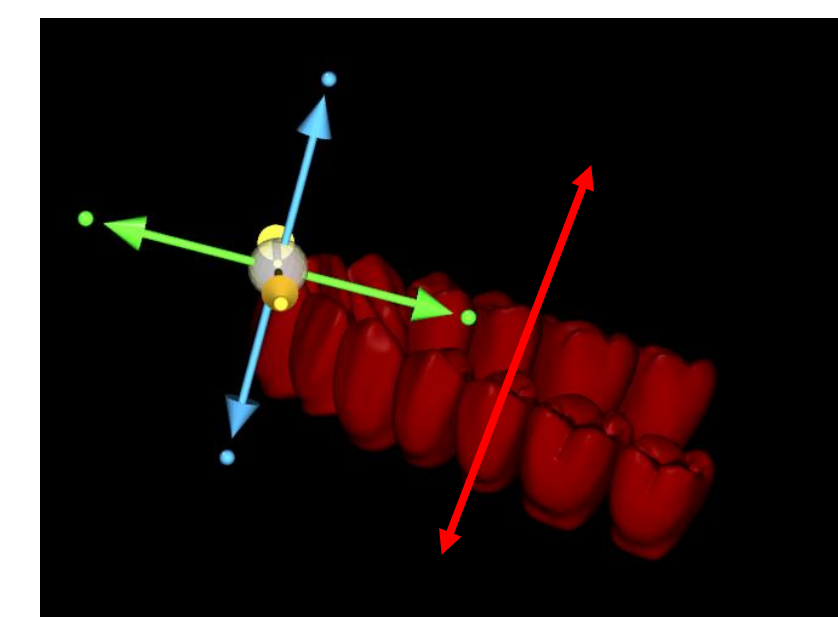


Drag upward(+): Y-axis magnification

c Z-axis

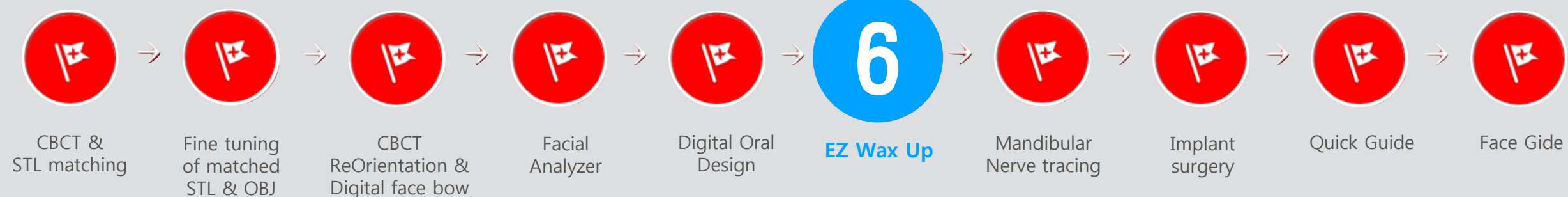


Drag downward(-): Z-axis reduction



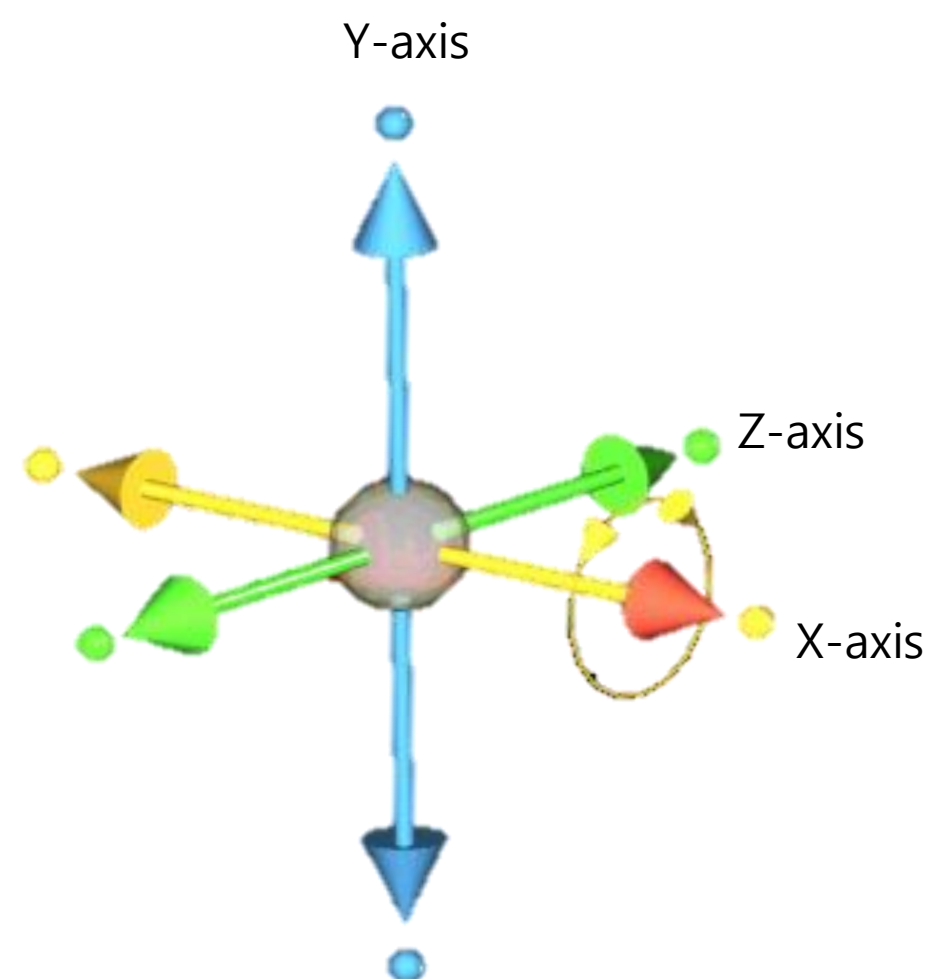
Drag downward(-): Z-axis magnification

3.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

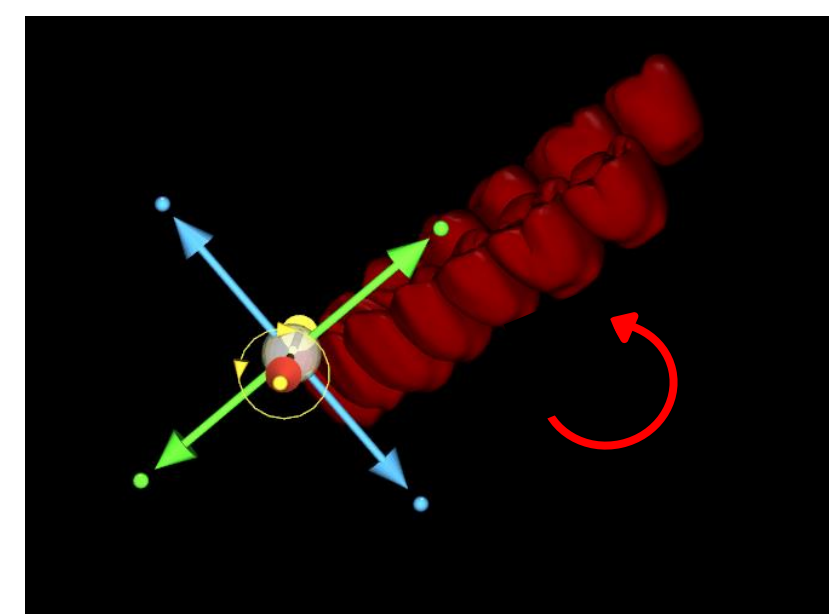
X, Y, Z Axis Control Key



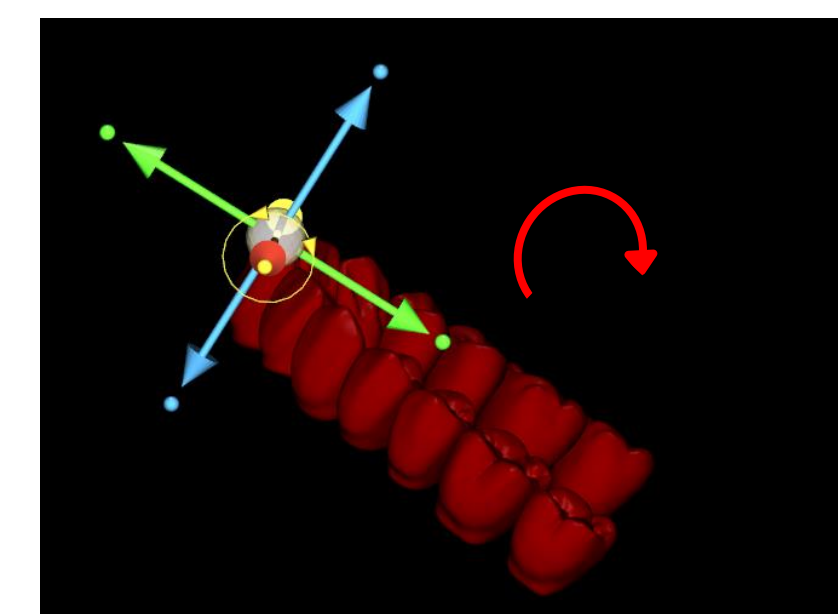
Click a point, arrow and line that is to be controlled and move with the mouse wheel.

2 Arrow: Library rotation adjustment by axis

a X-axis

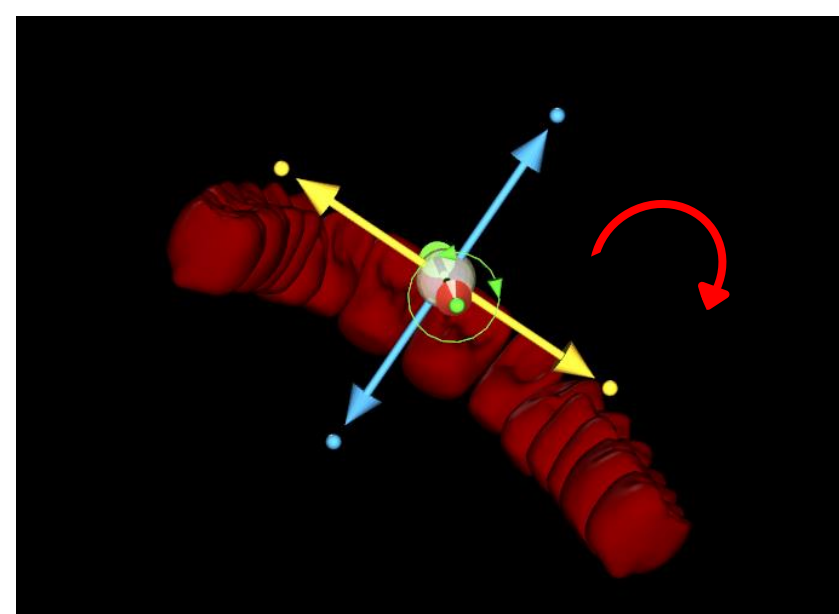


Drag downward (-): Rotate counterclockwise by X-axis

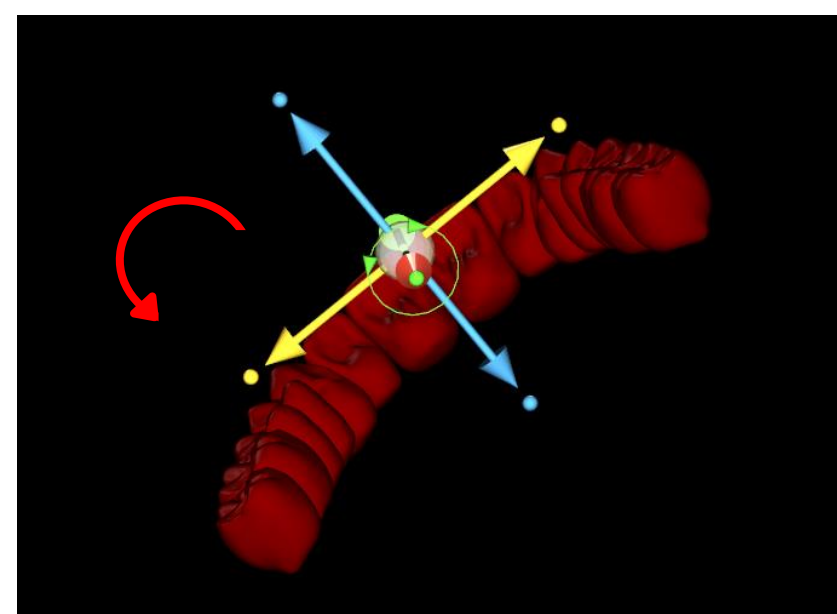


Drag upward (+): Rotate clockwise by X-axis

b Y-axis

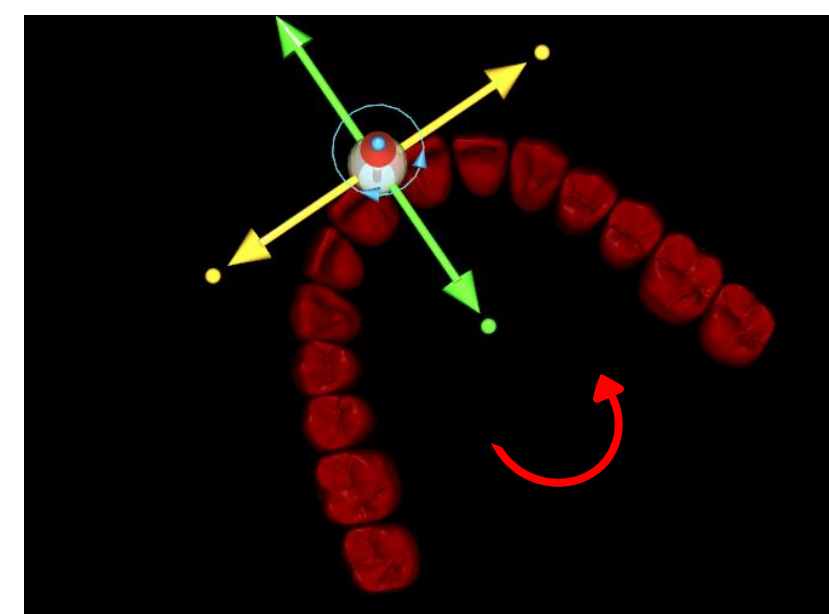


Drag downward (-): Rotate clockwise by Y-axis

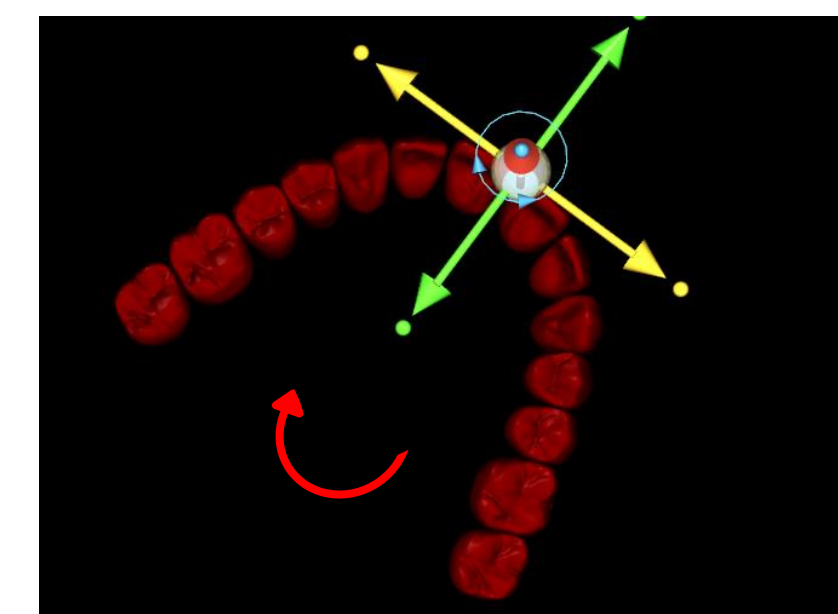


Drag upward (+): Rotate counterclockwise by Y-axis

c Z-axis

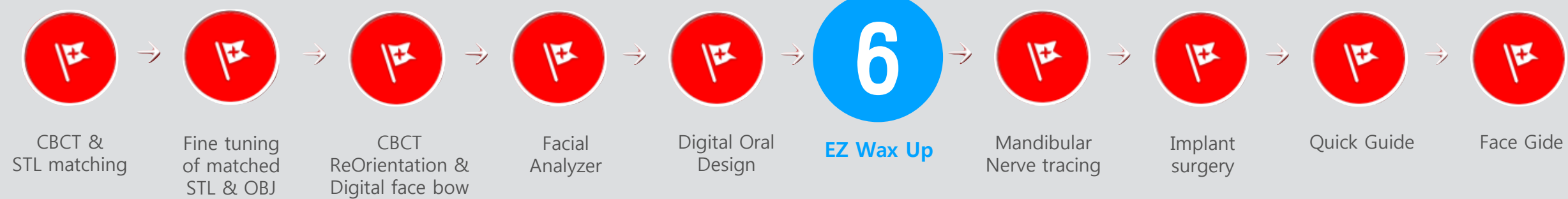


Drag downward (-): Rotate counterclockwise by Z-axis



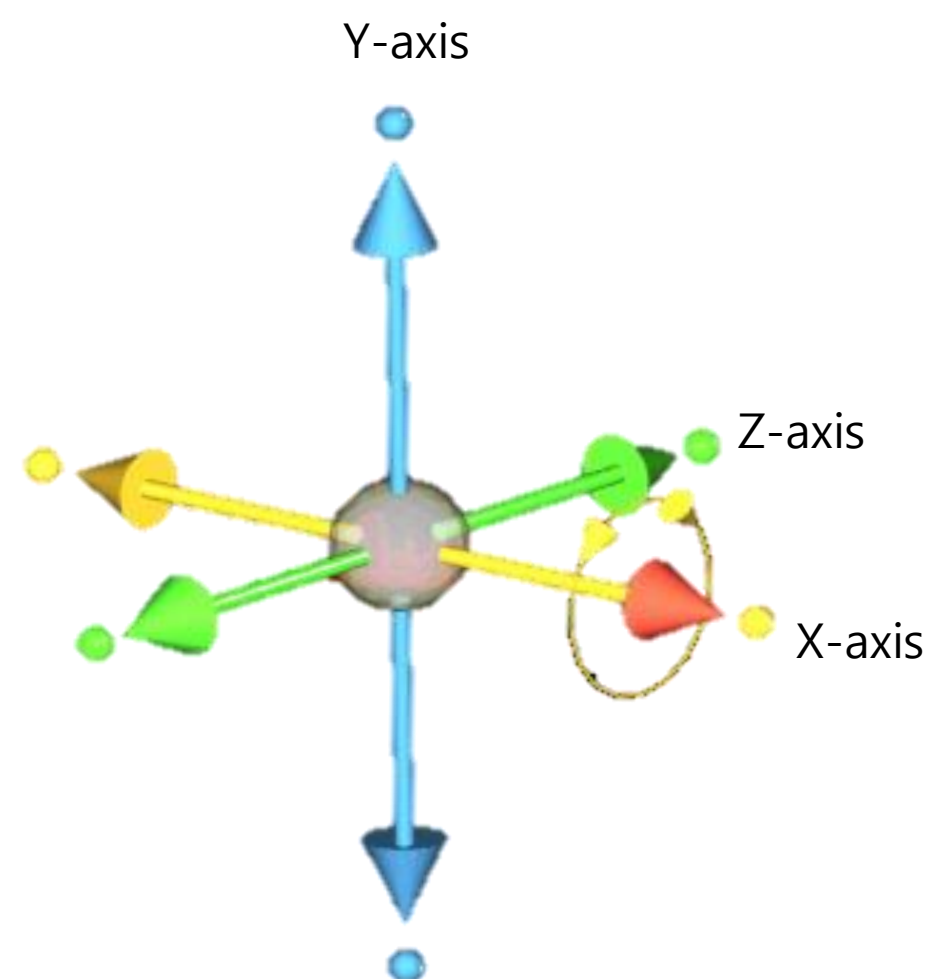
Drag upward (+): Rotate clockwise by Z-axis

3.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

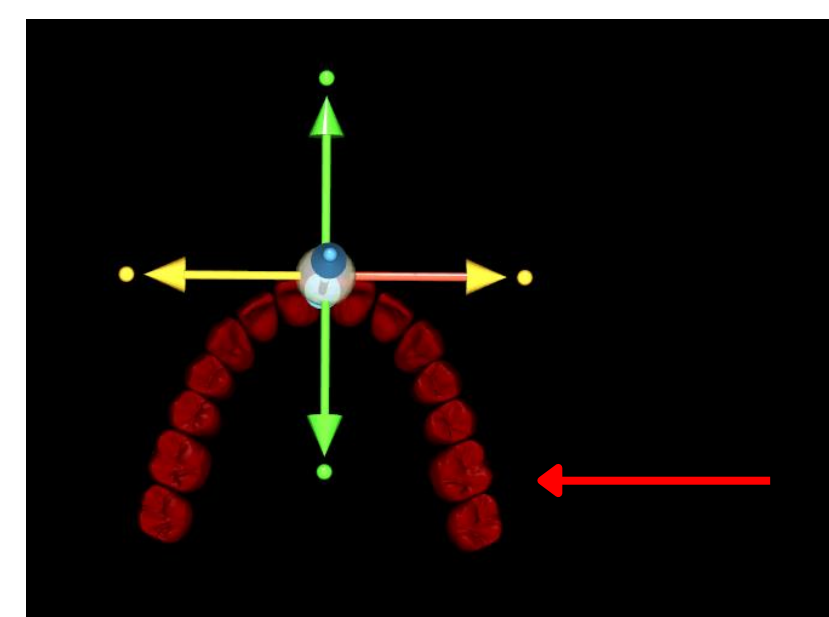
X, Y, Z Axis Control Key



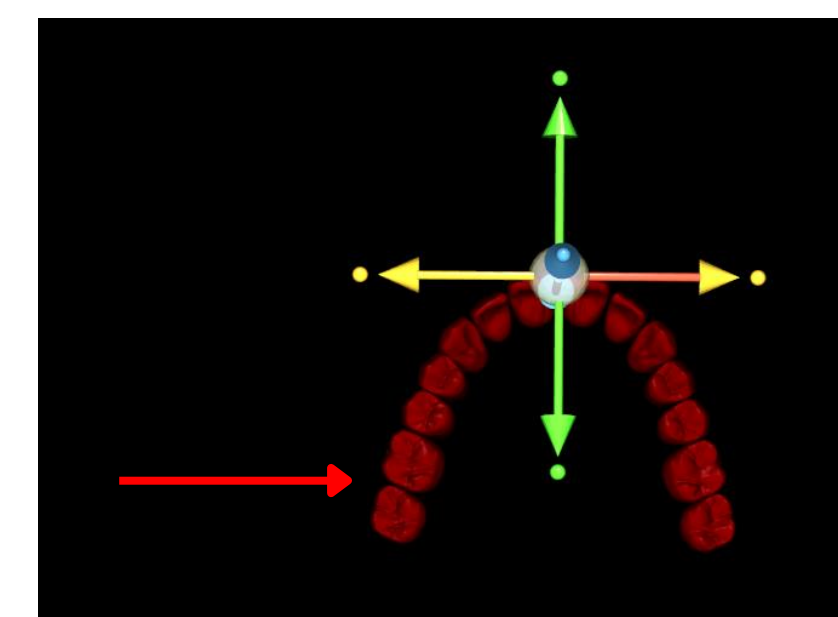
Click a point, arrow and line that is to be controlled and move with the mouse wheel.

3 Line : Library position adjustment by axis

a X-axis

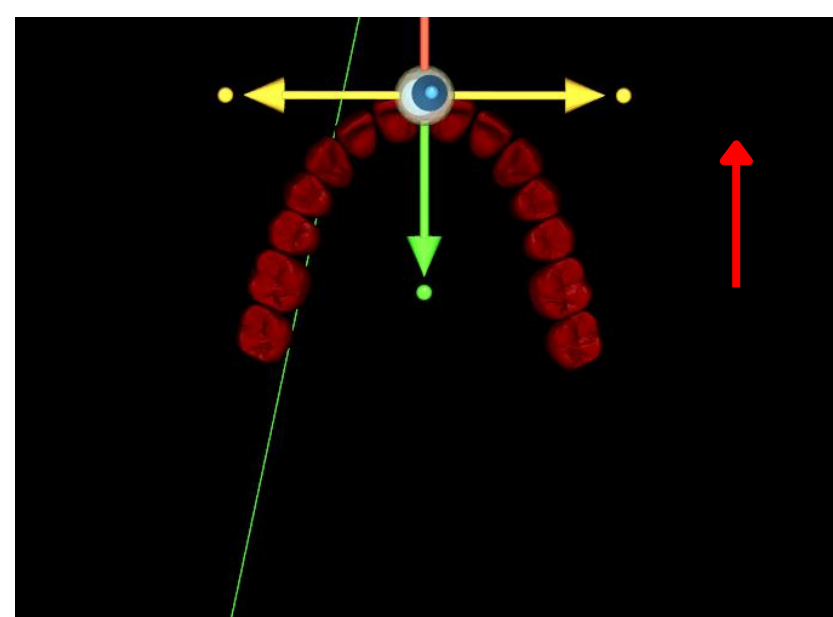


Drag downward (-): Move left

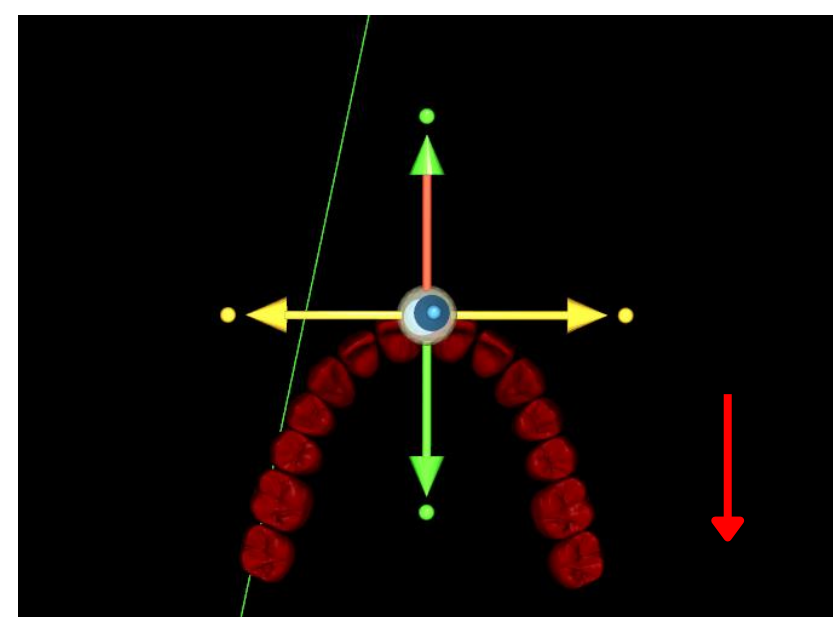


Drag upward (+): Move right

b Y-axis

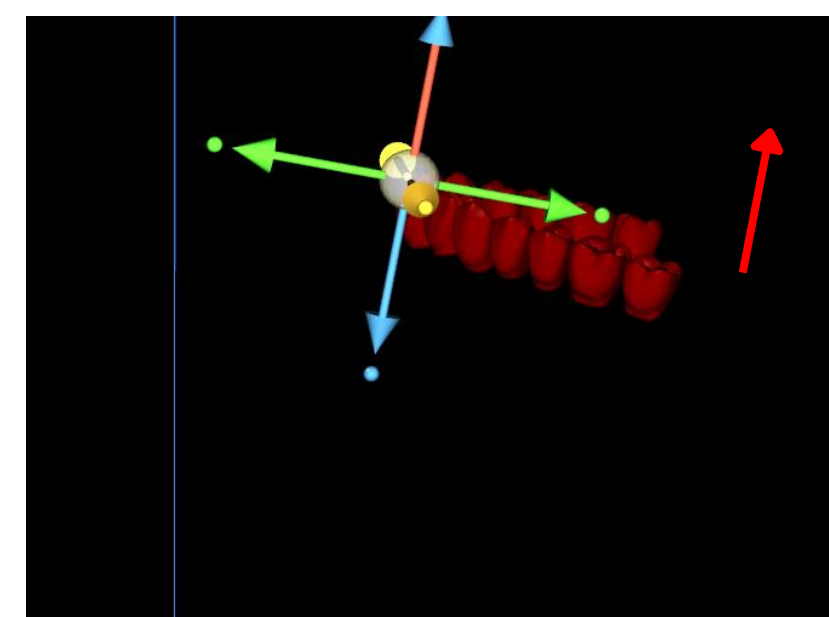


Drag downward (-): Move up

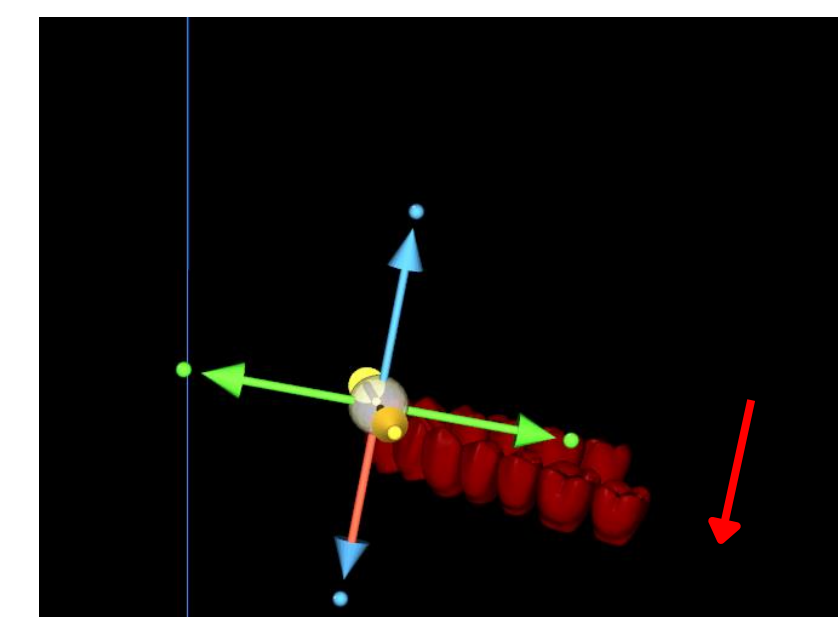


Drag upward (+): Move down

c Z-axis

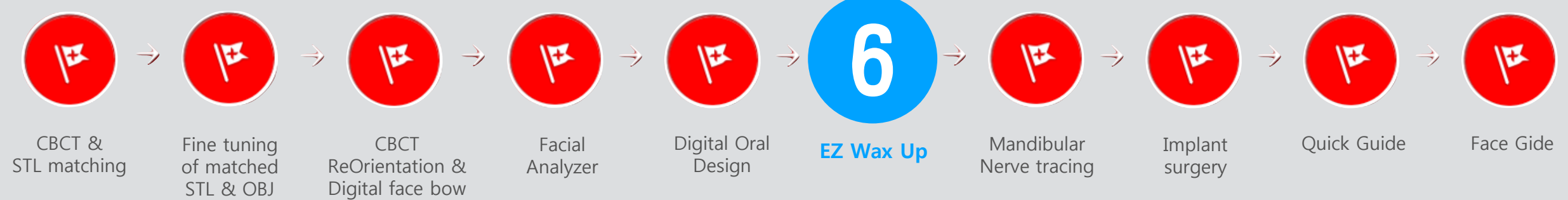


Drag downward (-): Move up



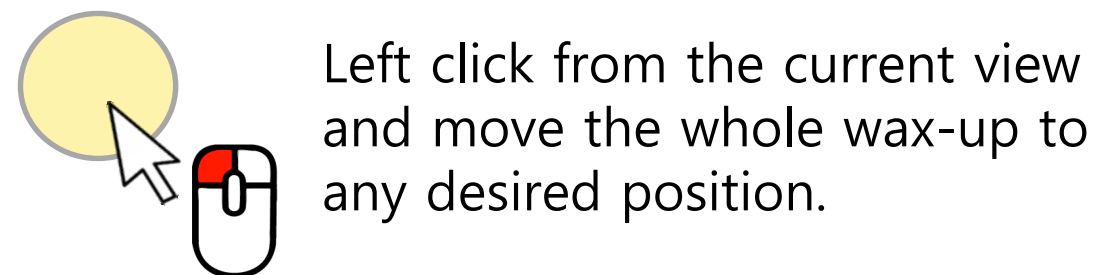
Drag upward (+): Move down

3.2 EZ Wax up Diagnosis wax up



Diagnosis wax up

3 Center ball : Library Movement

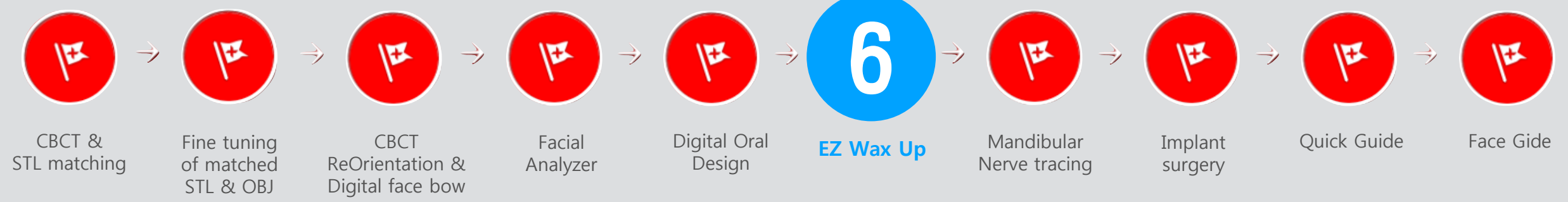


! Using 3D Volume control, Wax-up designing is possible on various views

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



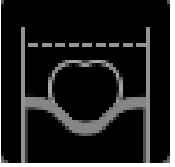
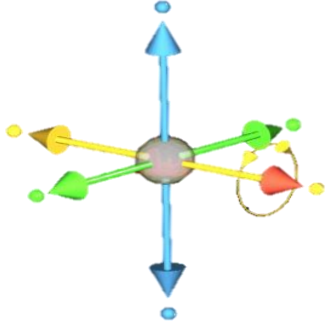
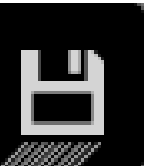
3.3 EZ Wax up Extraction

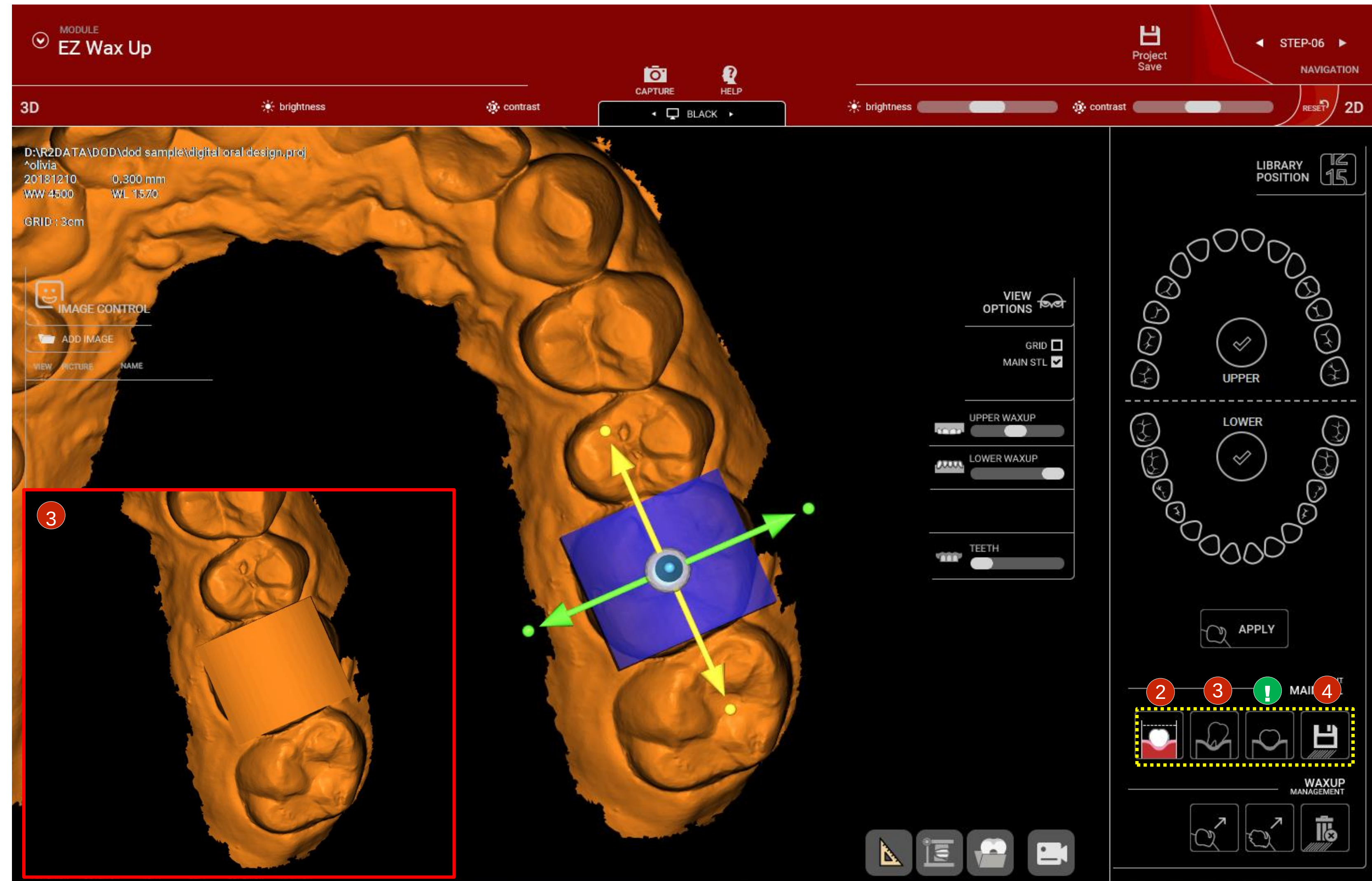


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Extraction

- 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



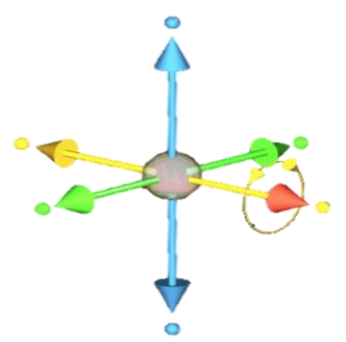
3.4 EZ Wax up Mock up



Mock-up Function

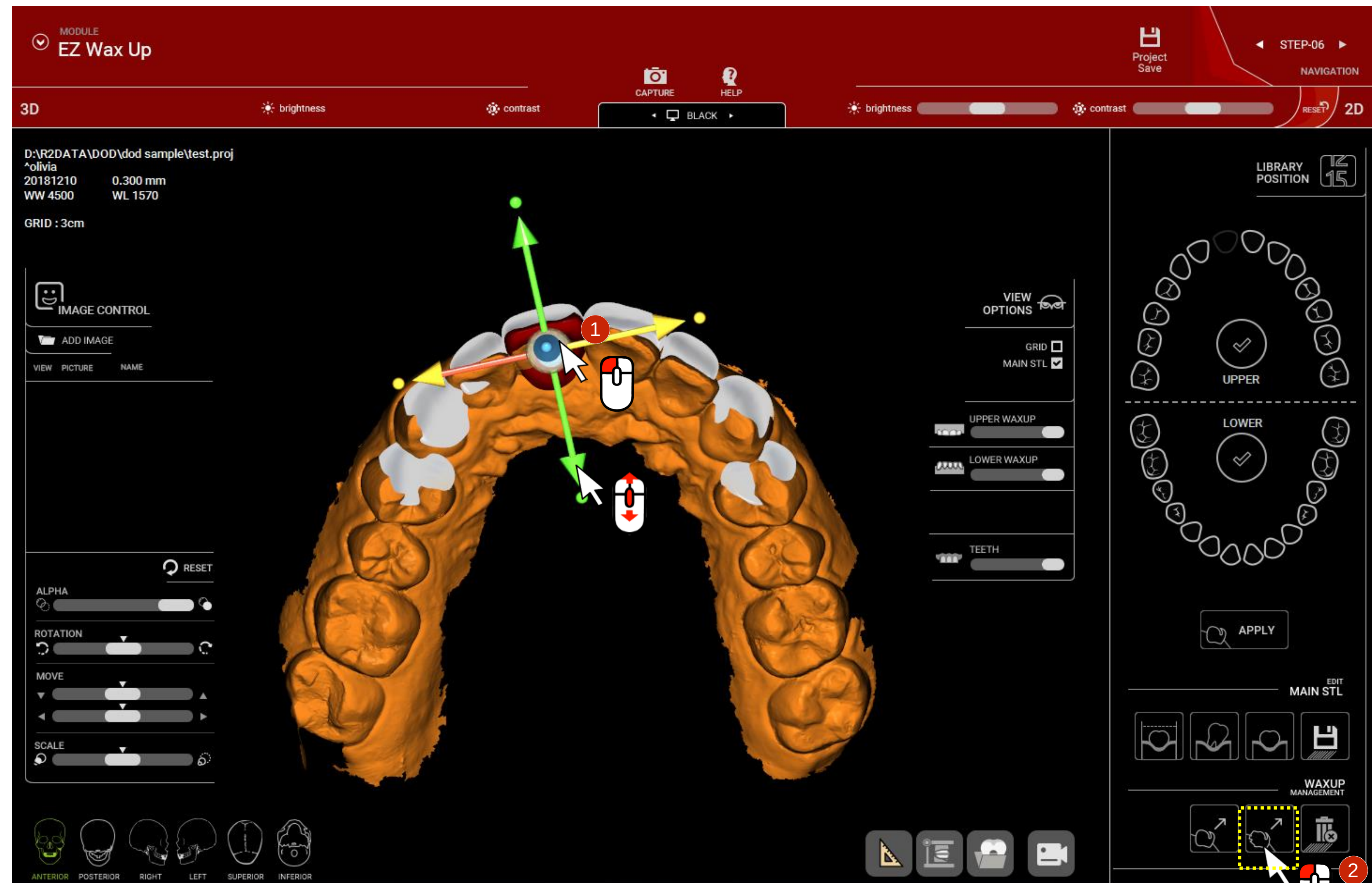
In case of laminate,
Mock-up function can be utilized

- 1 Design wax-up using the control keys

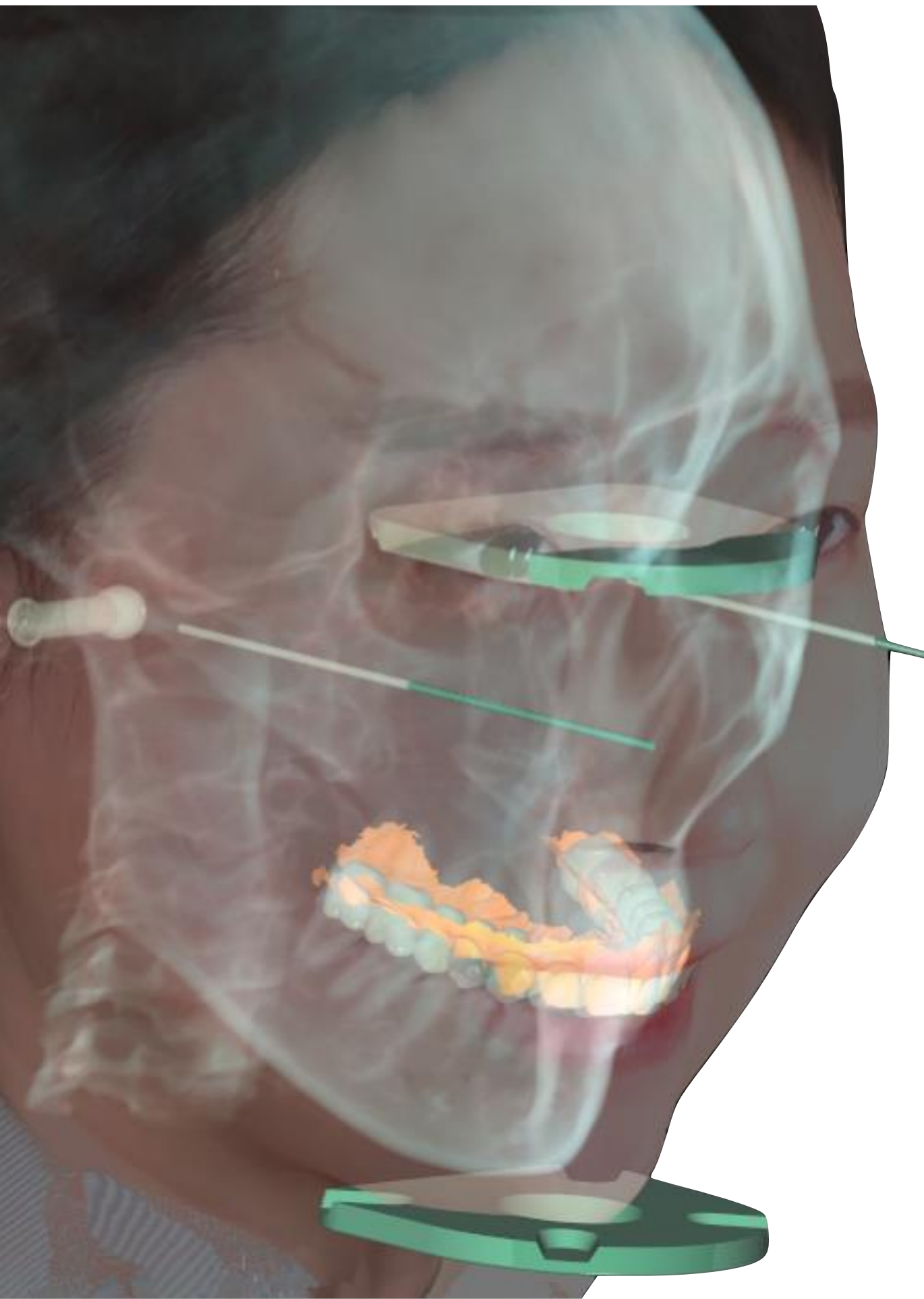


Use X, Y and Z Axis control
keys to adjust the position
of the library

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



R2GATE™
Turning imagination into reality

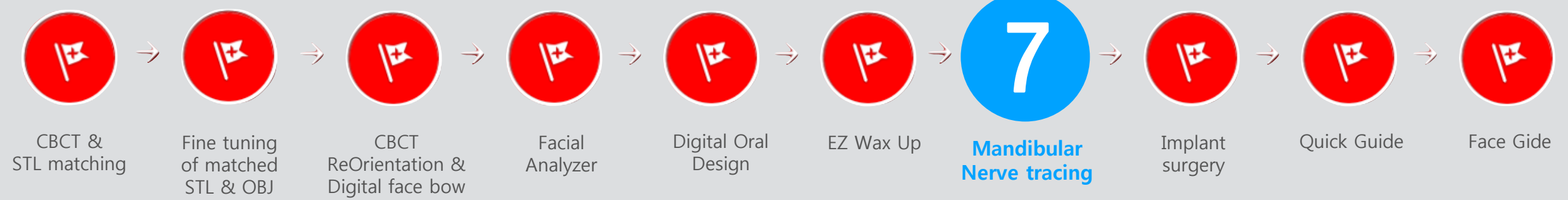


4 R2GATE™ 2.0 Nerve Tracing



Nerve Tracing(EN)

4.1 R2GATE™ 2.0 Control Buttons



**R2
GATE**

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Control Buttons

Order of locating the neural tube

Adjustment of the cross section view of the mandibular neural tube

vertical axis section

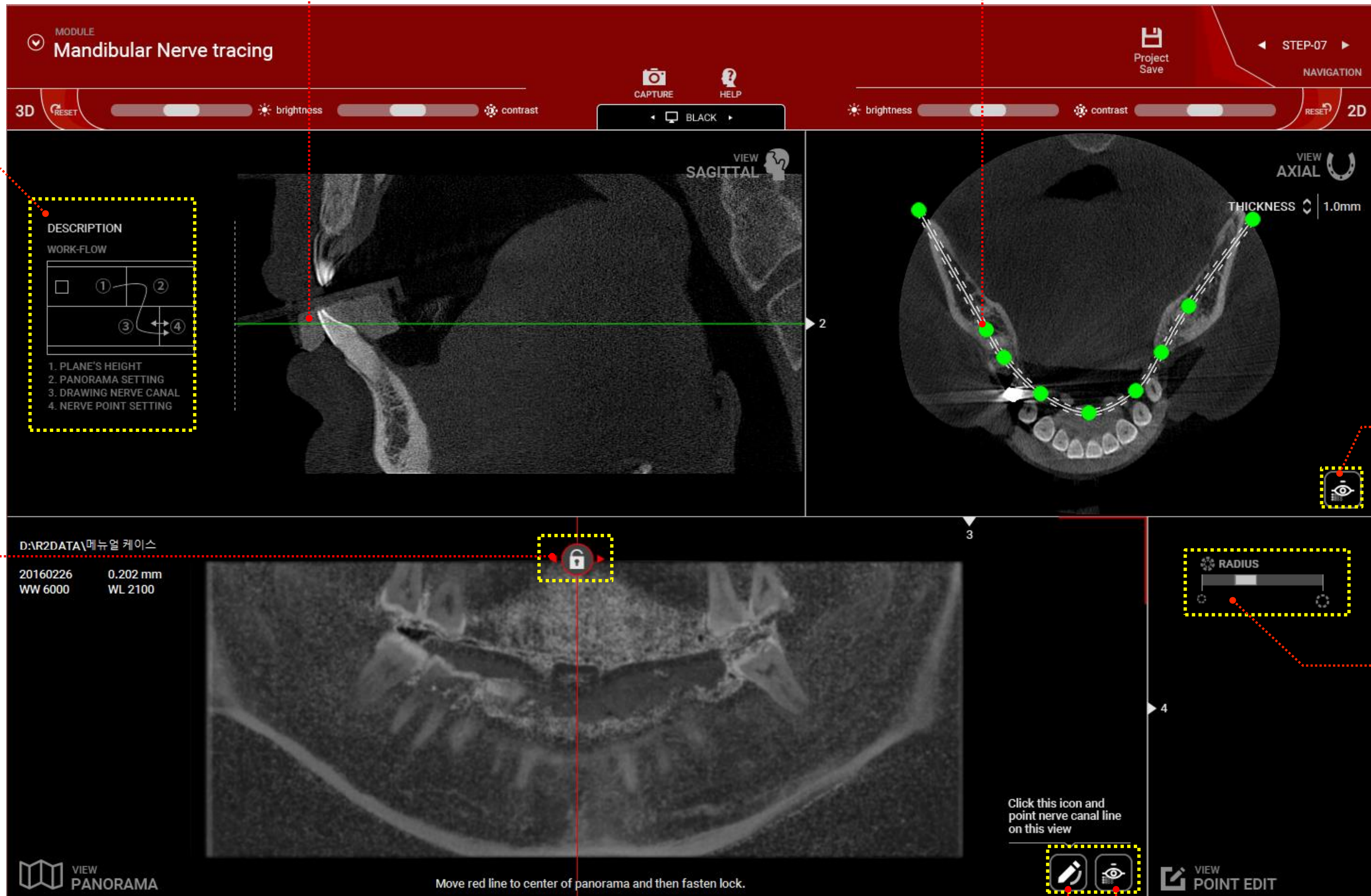
Setting Midline

CBCT filter adjustment

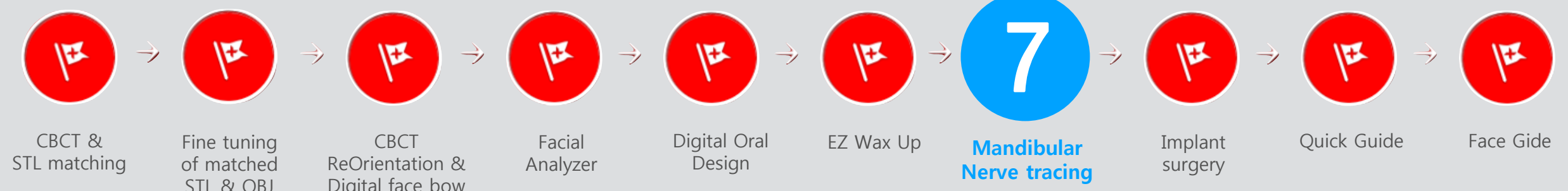
Nerve size adjustment

Drawing the nerve tube

Panoramic filter adjustment



4.2 Mandibular Nerve Tracing



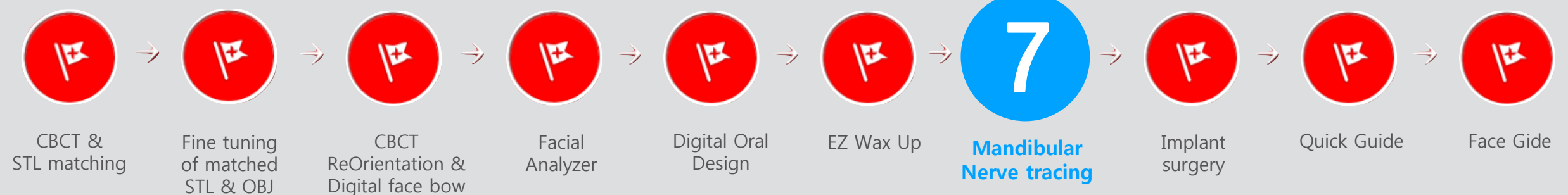
Locate mandibular nerve tube

Mandibular Nerve

- 1 Left click on the green line and move it to mandibular nerve(mental foramen)
- 2 To find the mandibular nerve 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 nerve 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



4.2 Mandibular Nerve Tracing



Locate mandibular nerve tube

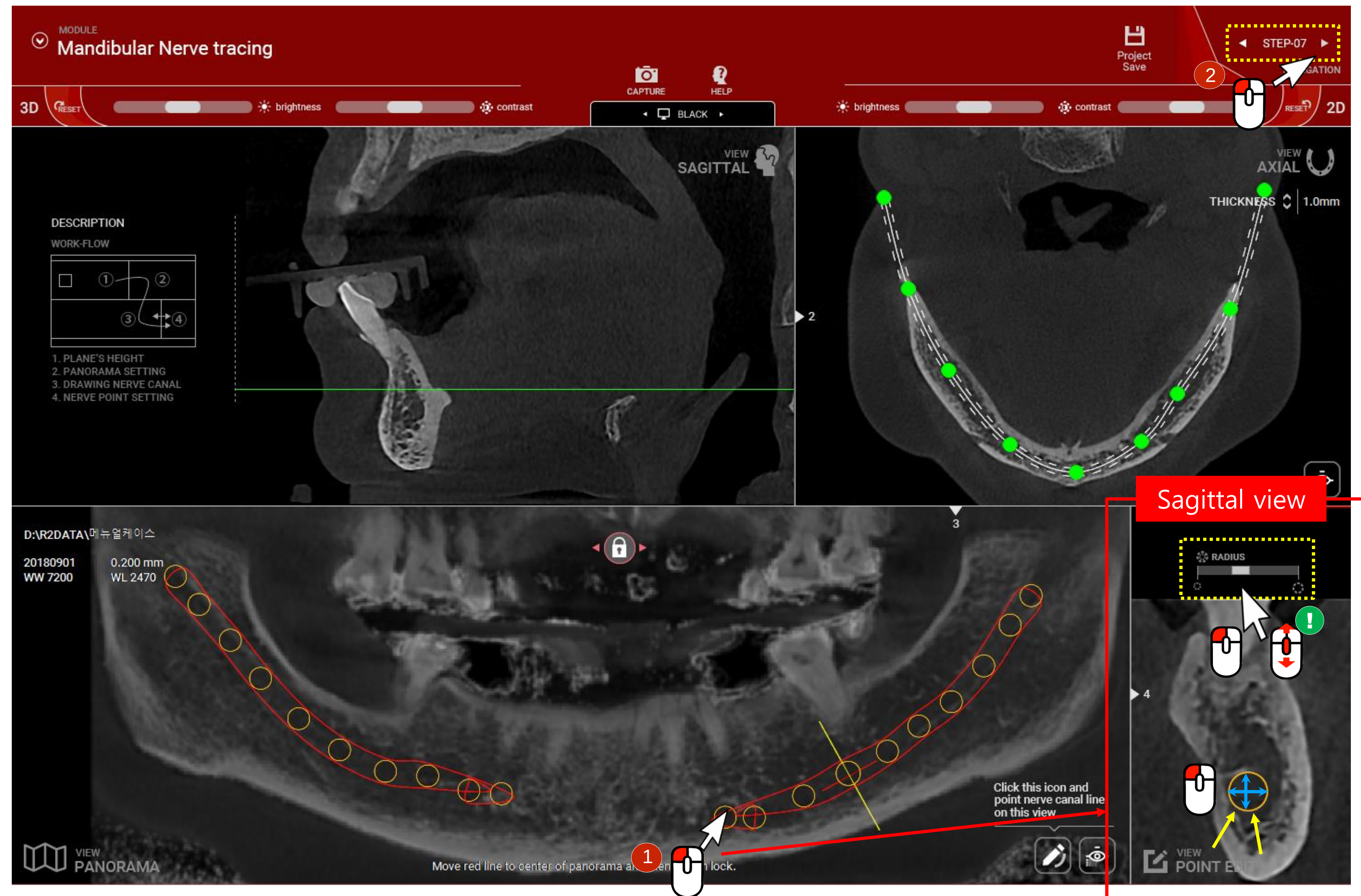
Mandibular Nerve

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

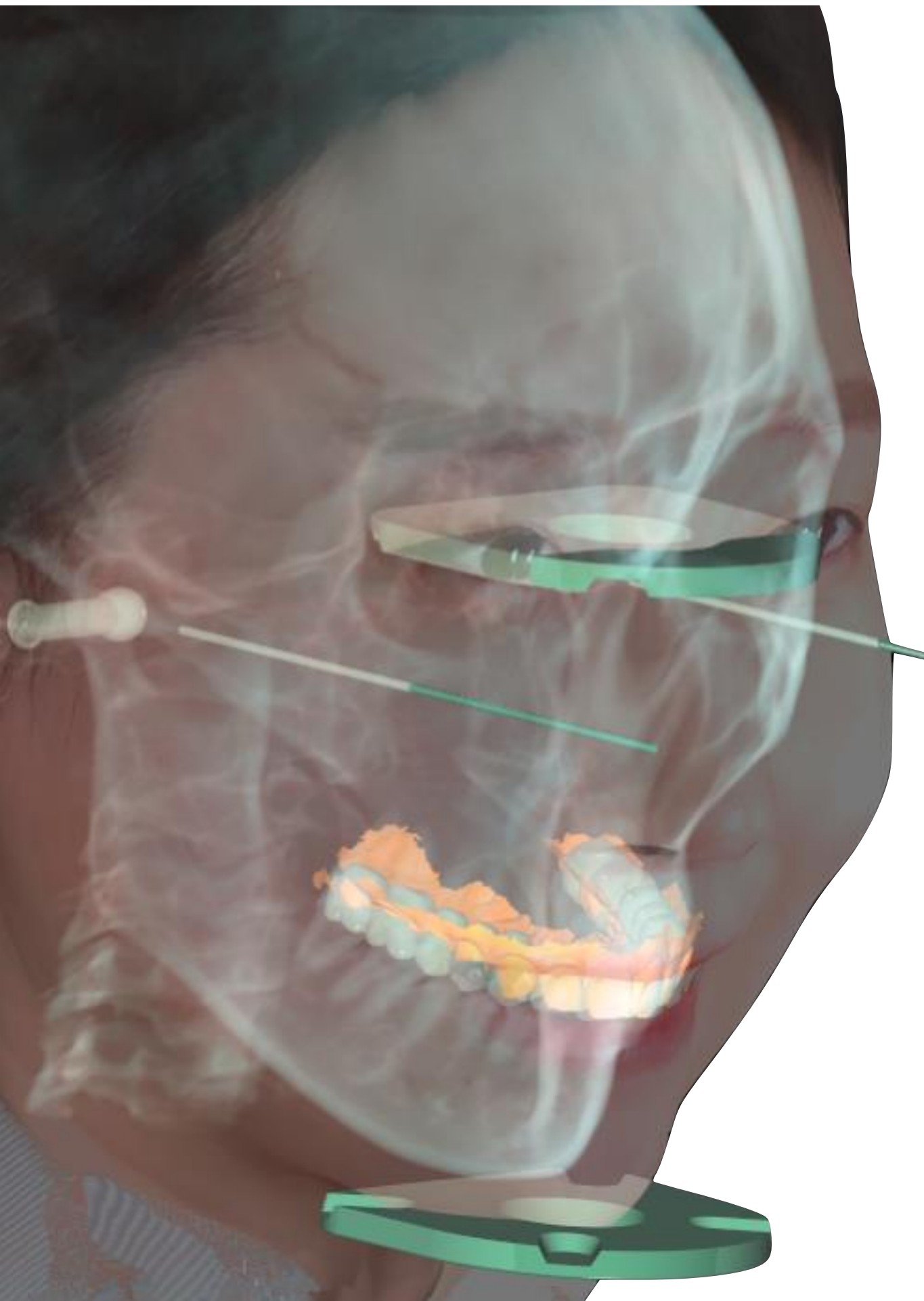
Click on the circle and adjust the size and position of the nerve tube in the sagittal view

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

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



R2GATE™
Turning imagination into reality

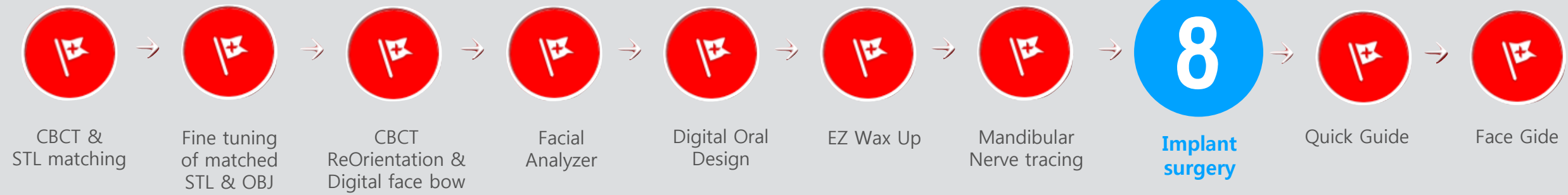


5 R2GATE™ 2.0 Implant Surgery



Implant planning(EN)

5.1 R2GATE™ 2.0 Control Buttons



**R2
GATE**

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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

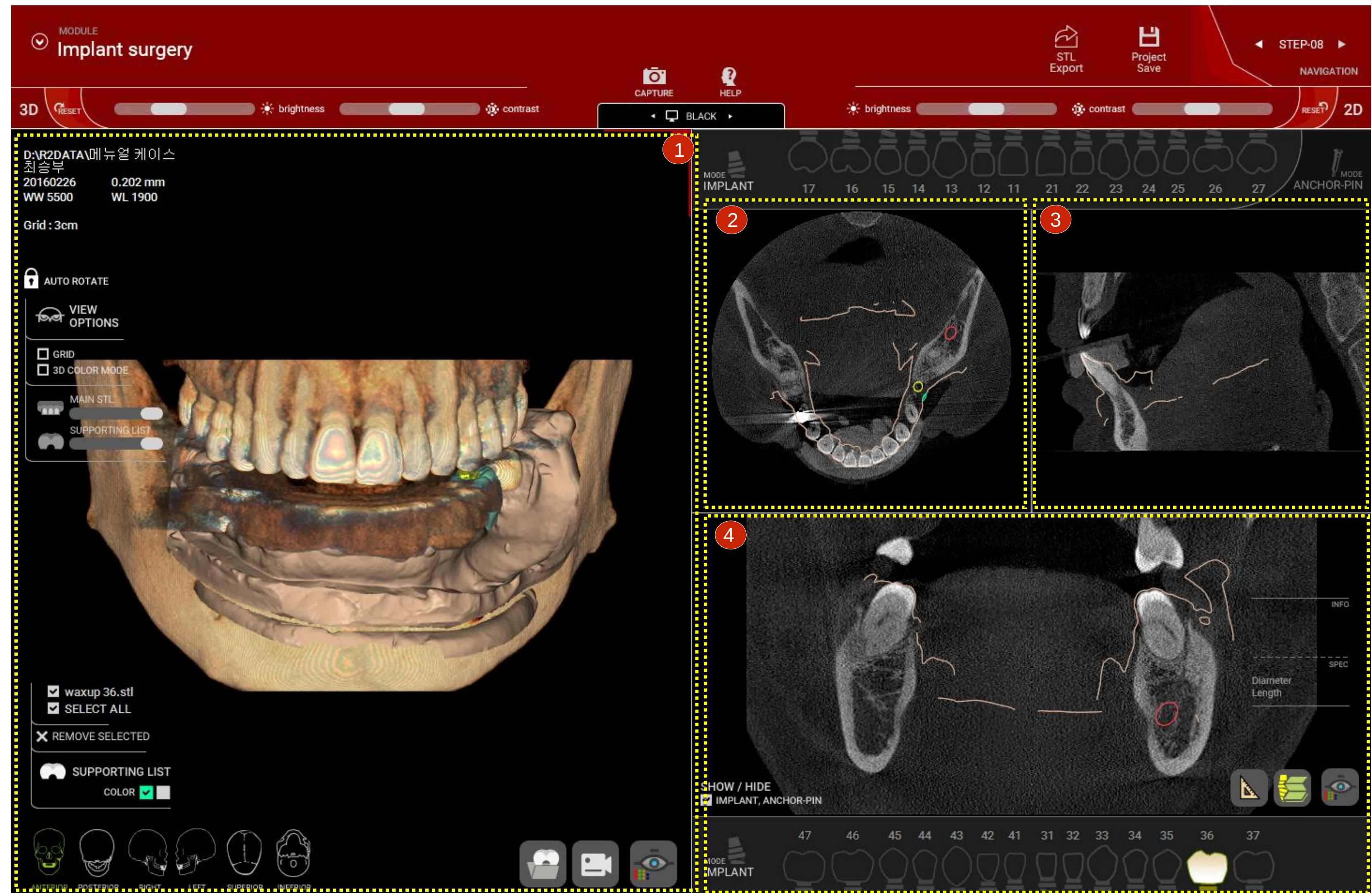
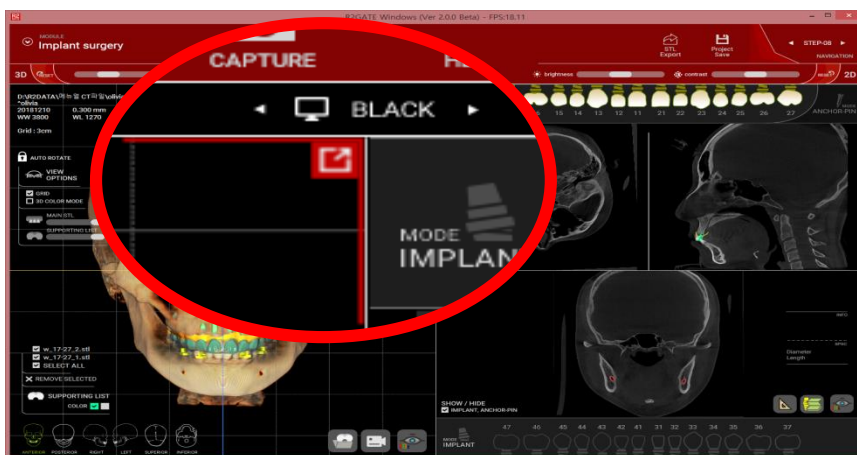
Indicates the sagittal plane of the head. When diagnosing the anterior teeth, the cross section of the anterior teeth is shown to determine the implant's labio-lingual relationship. During the diagnosis of the posterior teeth, check the mesio-distal and the occlusion relationship of the implant

4 Frontal plane

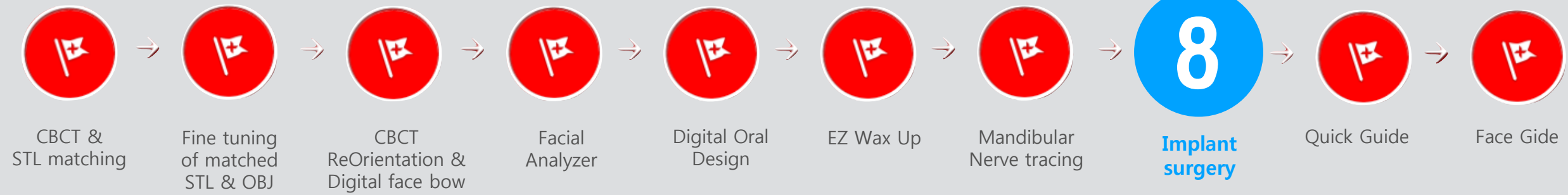
It represents the frontal plane of the head. Check the bucco-lingual relationship and occlusion relationship of the implant in the posterior teeth. In the anterior teeth, check the mesio-distal relationship.

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.



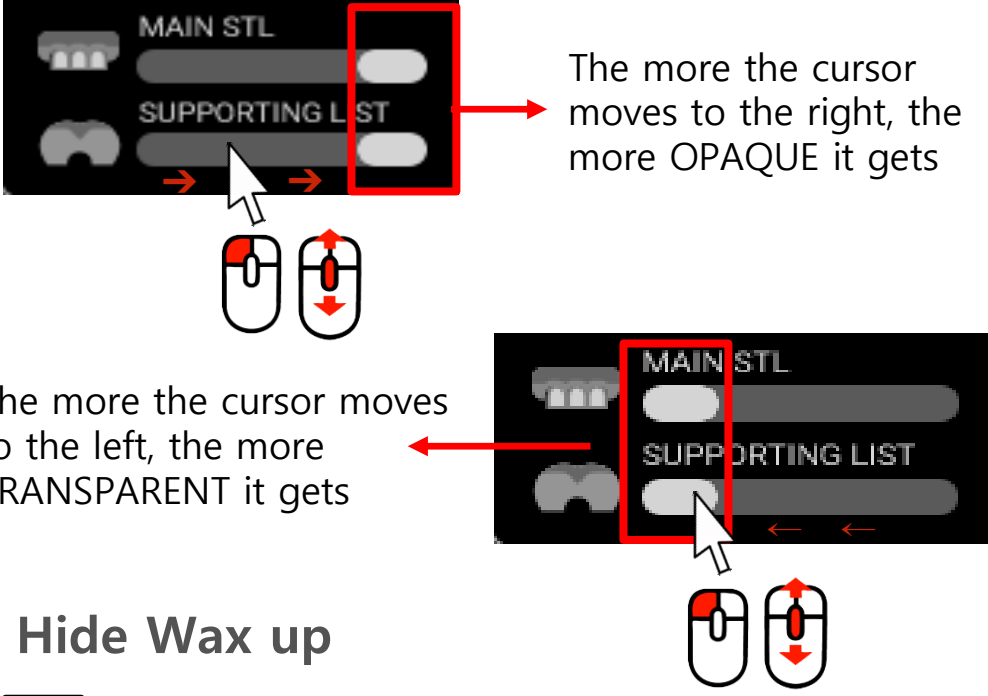
5.1 R2GATE™ 2.0 Control Buttons



**R2
GATE**

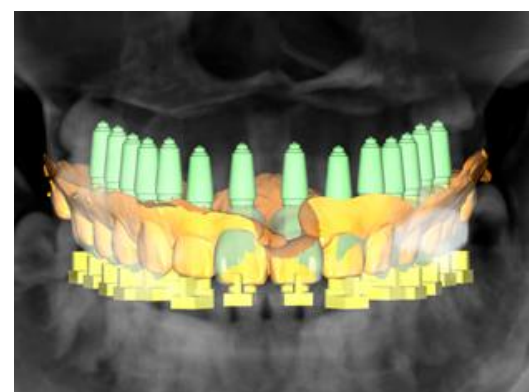
R2GATE 2.0
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Control Buttons

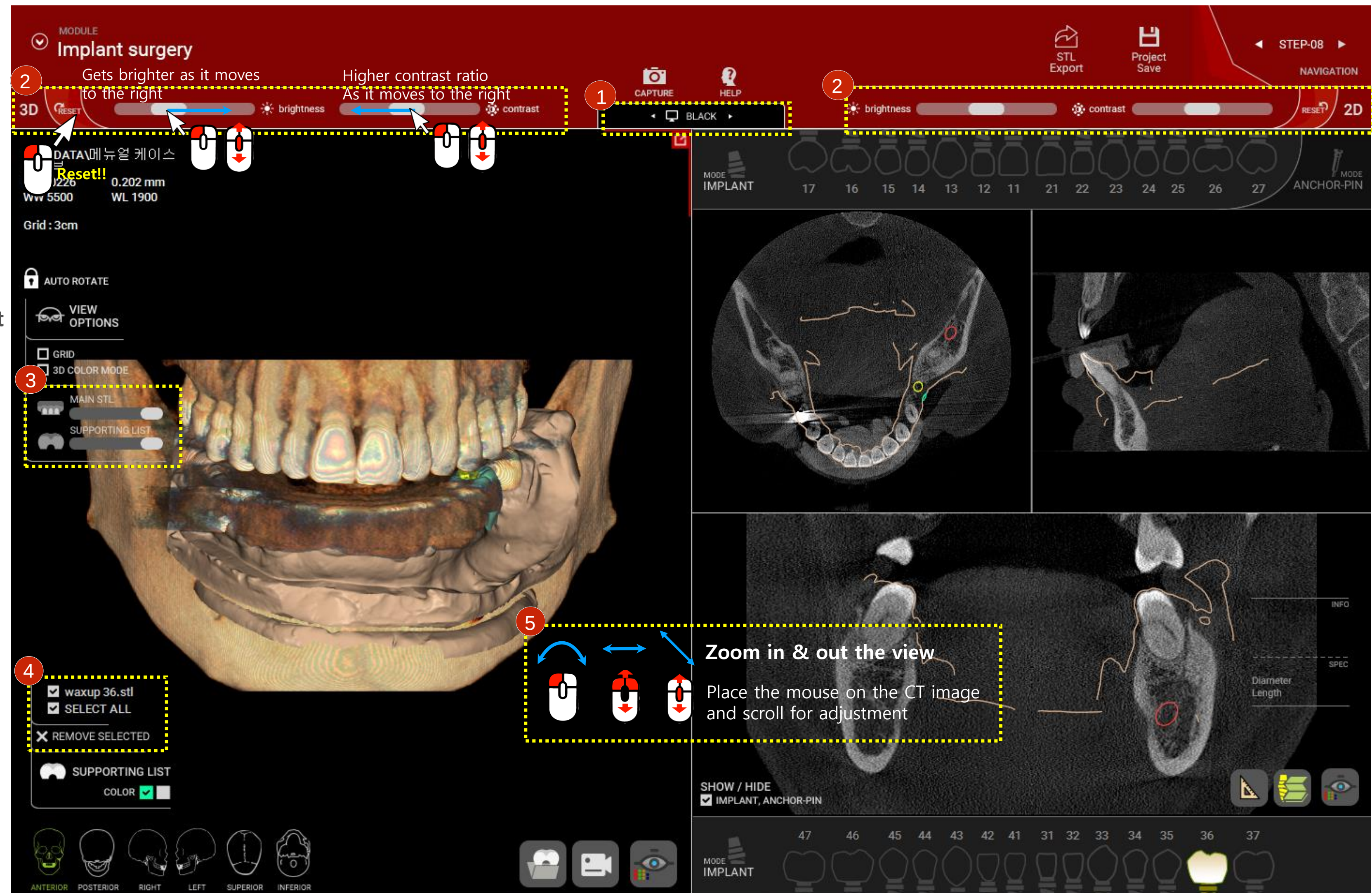
- 1 Background Color**
Available to change into desired background color
- 2 Brightness & Contrast**
Use the slide bars to adjust the brightness and contrast of 2D & 3D
- 3 Cast & Wax-up Transparency Adjustment**
Adjust the transparency of the cast and wax-up(STL)


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

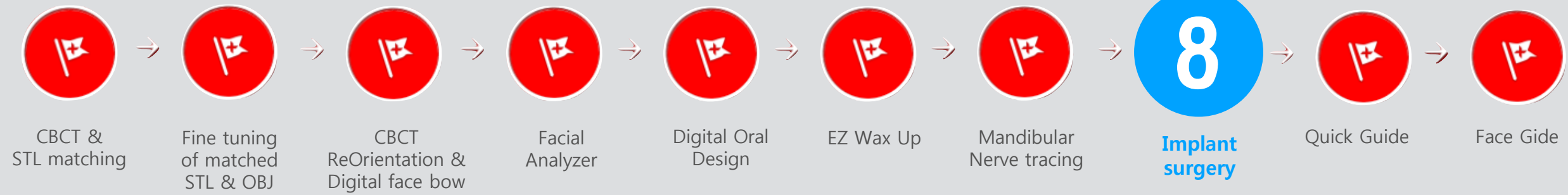
The more the cursor moves to the left, the more TRANSPARENT it gets
- 4 Hide Wax up**
☐ Hide wax up
☒ Display wax up
- 5 3D Image Control**



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



5.1 R2GATE™ 2.0 Control Buttons



**R2
GATE**

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Apr. 2019

Control Buttons

1 Capture & Help

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

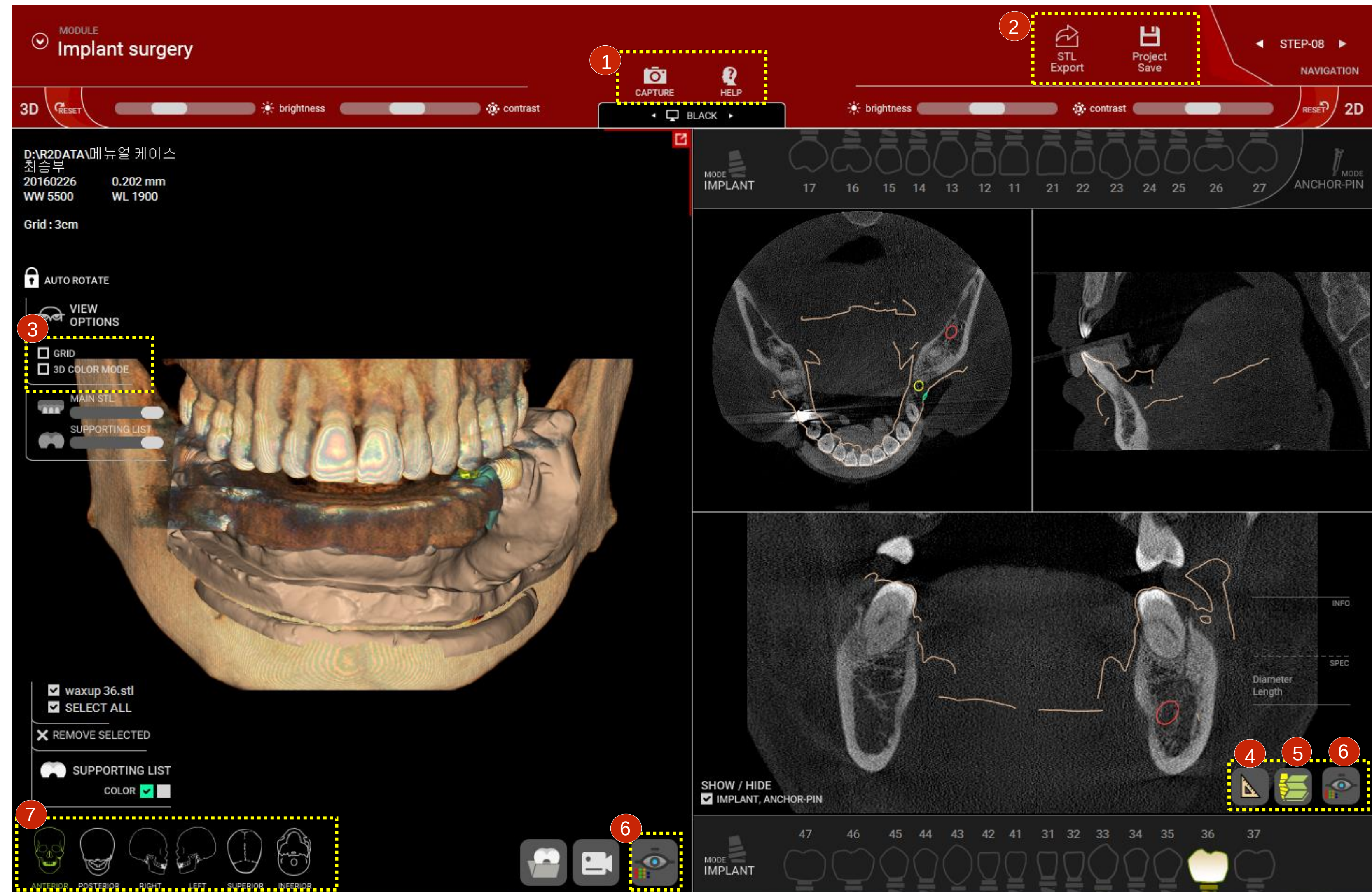
5 Activate Cross-section Display

Mark the area around the selected implant in 16 cross-sections in the designated direction and spacing

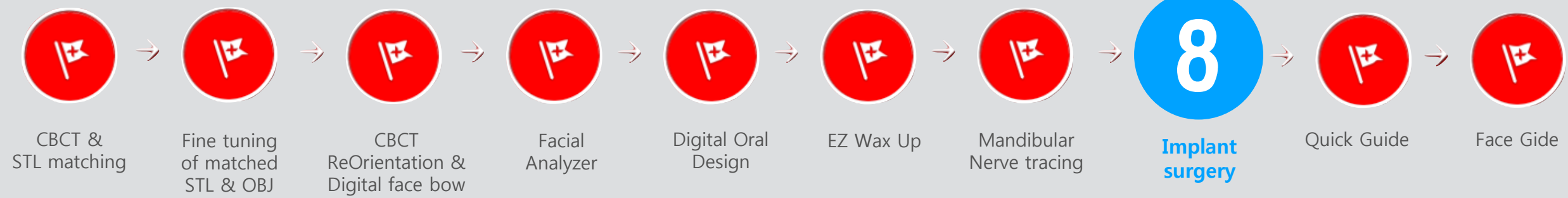
6 Digital EYE

View of 2D section & 3D volume

7 3D Volume view control



5.1 R2GATE™ 2.0 Control Buttons

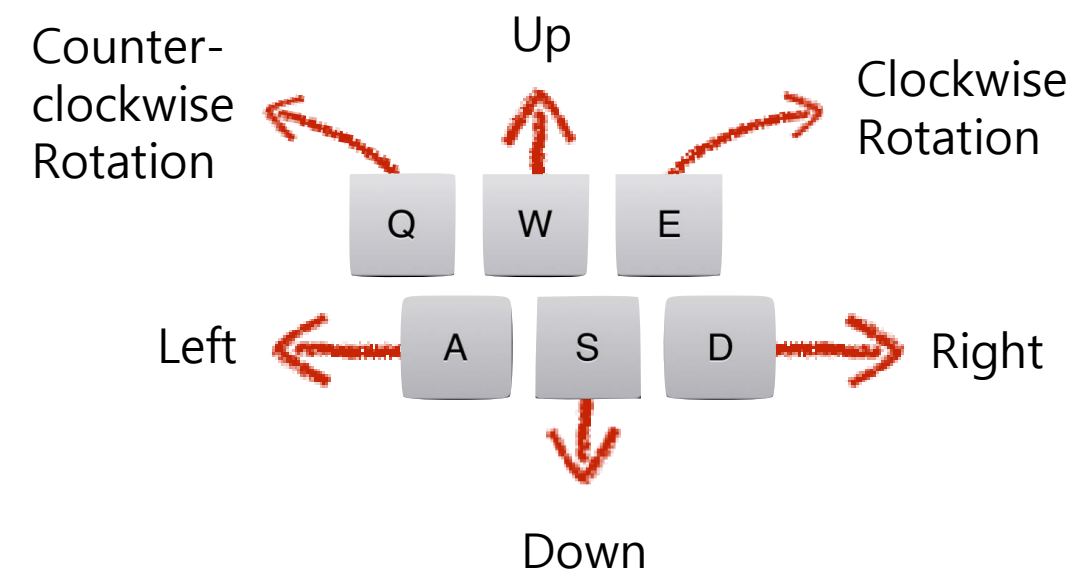


**R2
GATE**

R2GATE 2.0
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Control Buttons

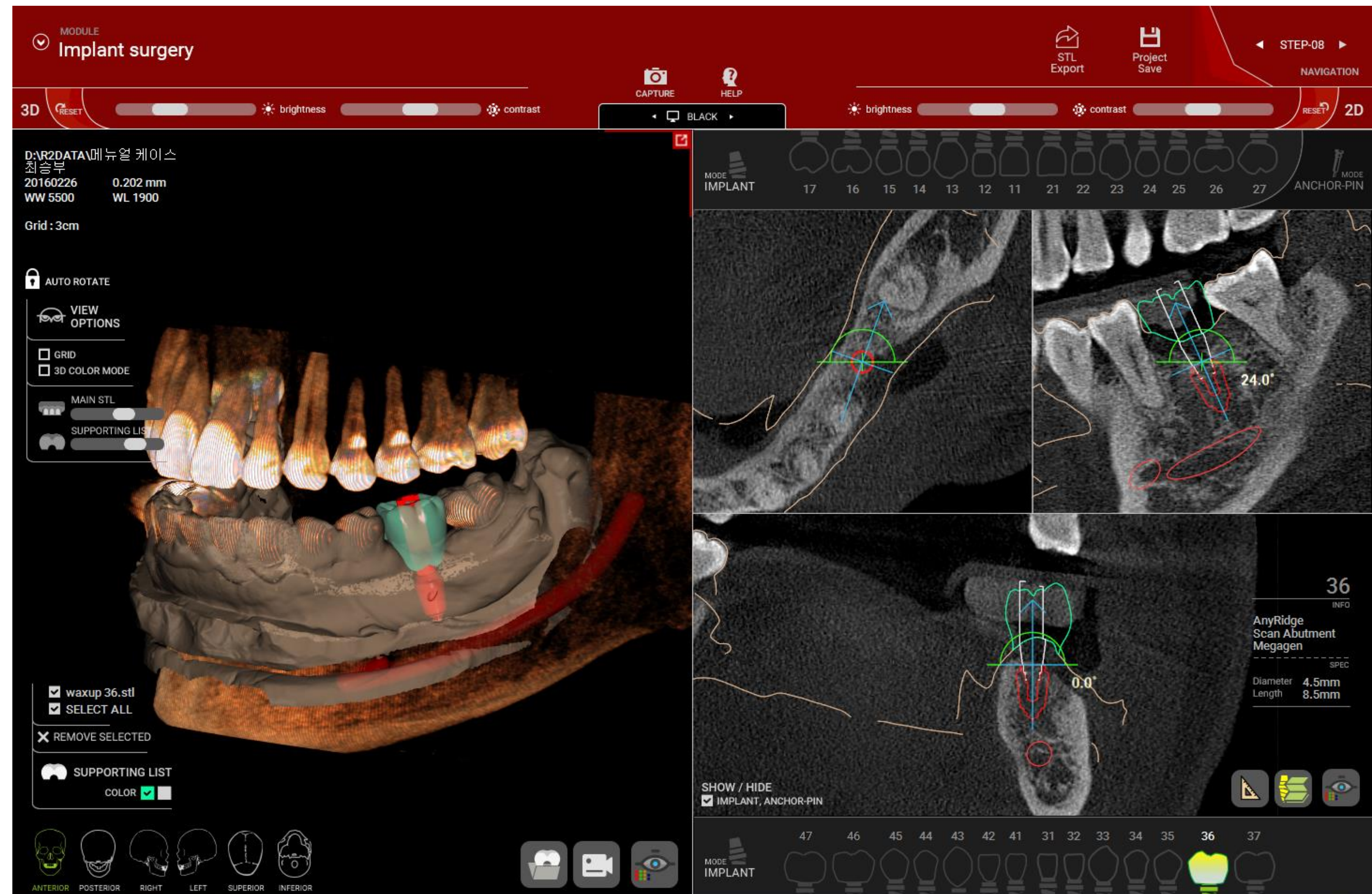
Implant Control Keyboard Shortcuts



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

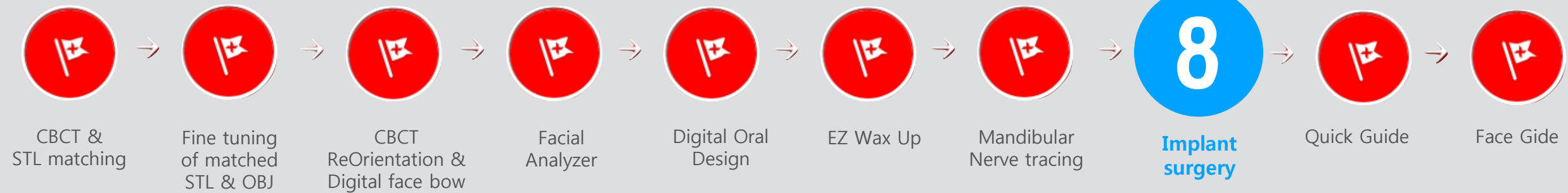


CBCT & STL matching → Fine tuning of matched STL & OBJ → CBCT ReOrientation & Digital face bow → Facial Analyzer → Digital Oral Design → EZ Wax Up → Mandibular Nerve tracing → **8** **Implant surgery** → Quick Guide → Face Guide

 Click the top bar to move on to desired STEP



5.2 Implant Surgery Implant Planning



**R2
GATE**

R2GATE 2.0
Apr. 2019

Implant Planning

Movement & Rotation of the Fixture Position

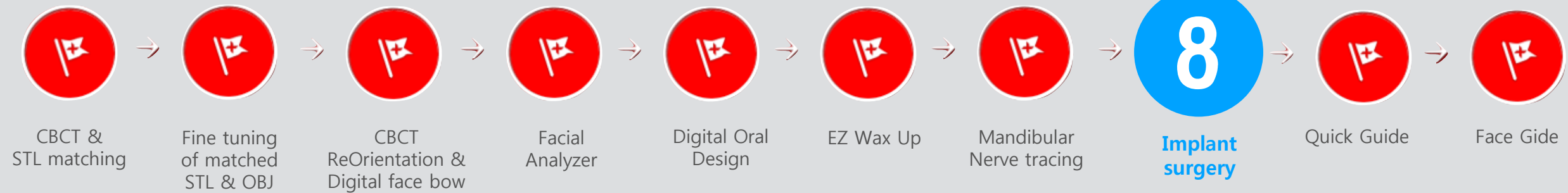
- 1 Click the dentition to modify
 - 2 Click the core of the fixture(platform) and drag up and down to place it in the desired position
 - 3 Click the screen of the cross-section view with the fixture you want to rotate and drag to adjust the angle of the fixture
- ! Use keyboard shortcuts for fine adjustment

Fixture Removal

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



5.2 Implant Surgery Implant Planning



**R2
GATE**

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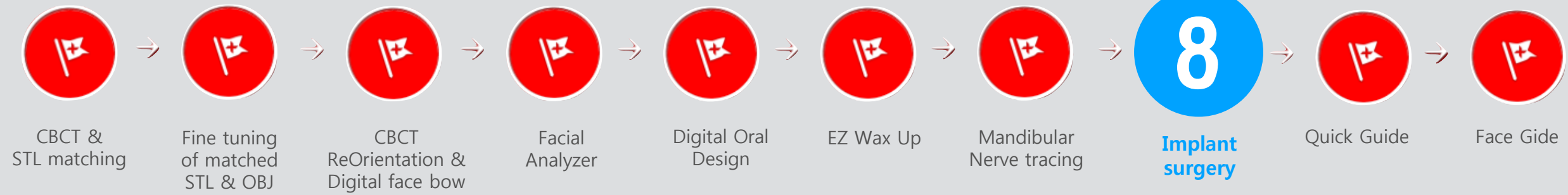
Implant Planning

System & Size Selection

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



5.2 Implant Surgery Implant Planning



**R2
GATE**

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Implant Planning

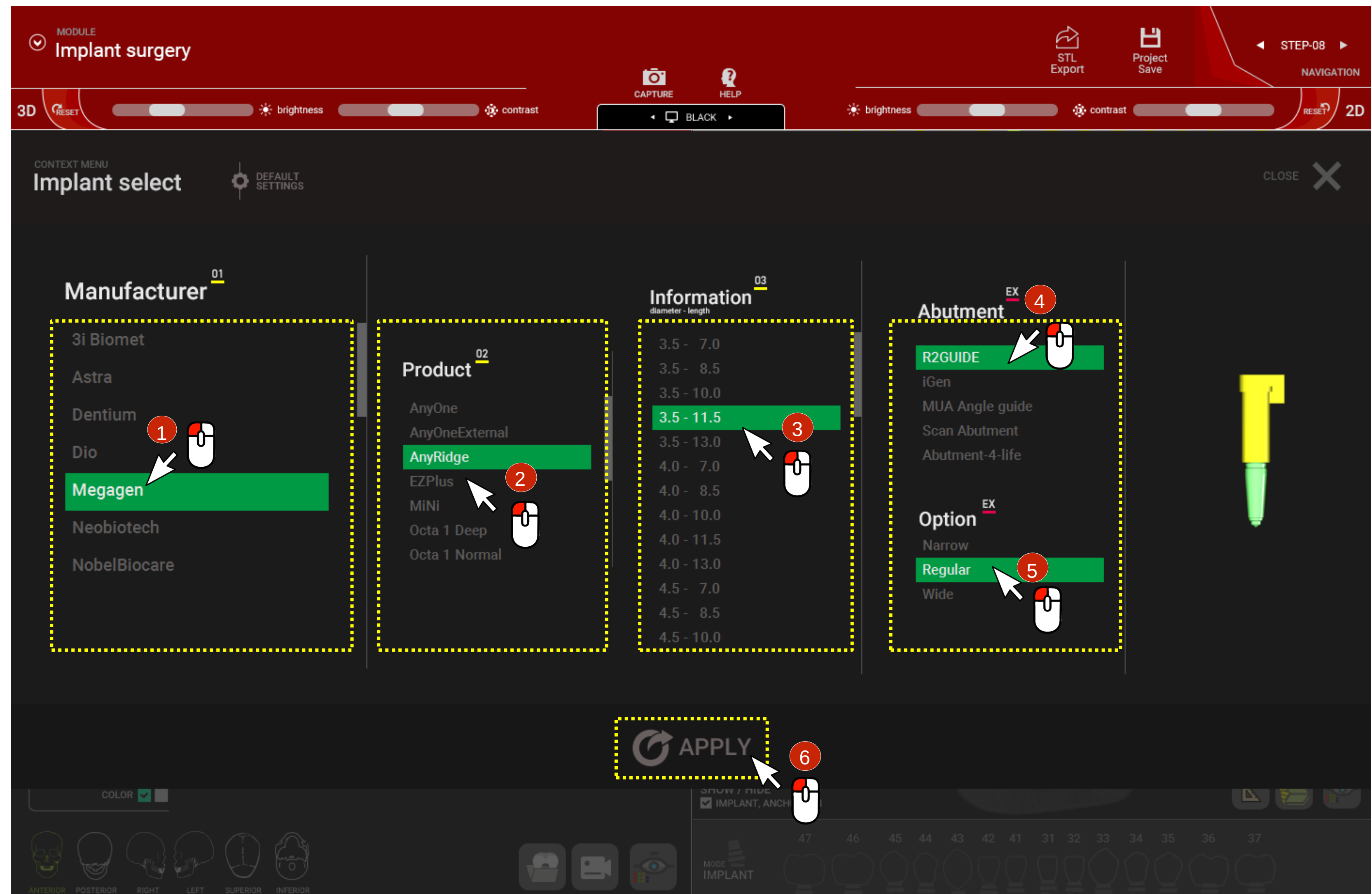
System & Size Selection

- 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)

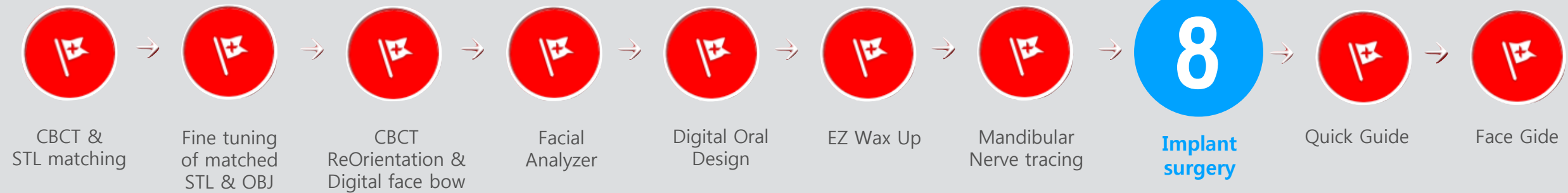
- 5 Select the size option of the drill core

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



5.2 Implant Surgery Implant Planning



R2
GATE

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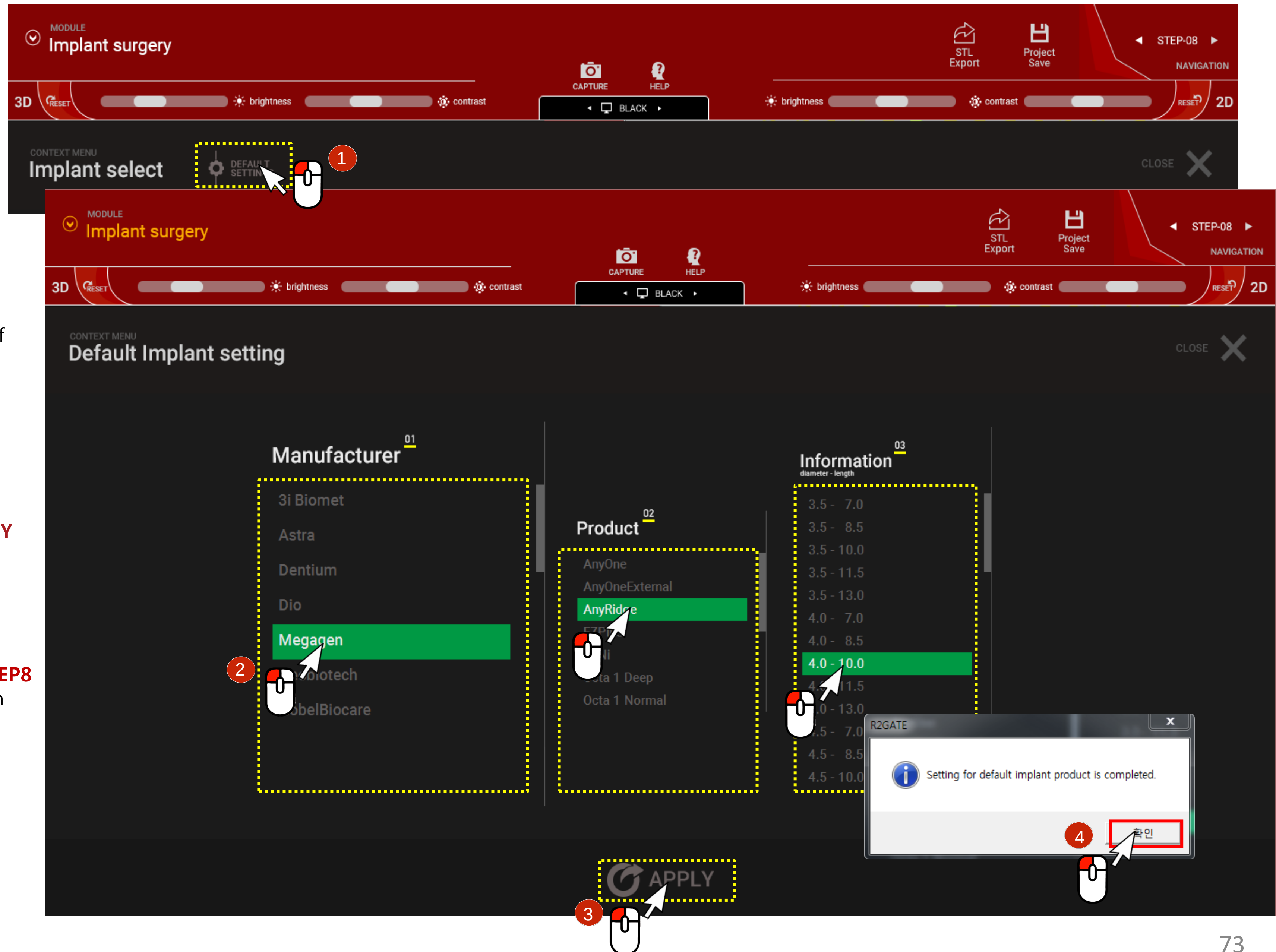
Implant Planning

Default setting

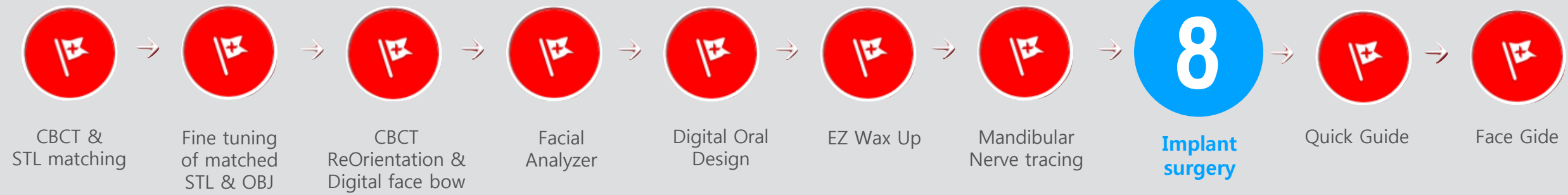
Default setting function allows to set the commonly used implant system & size to a fixed setting

- 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



5.2 Implant Surgery Implant Planning



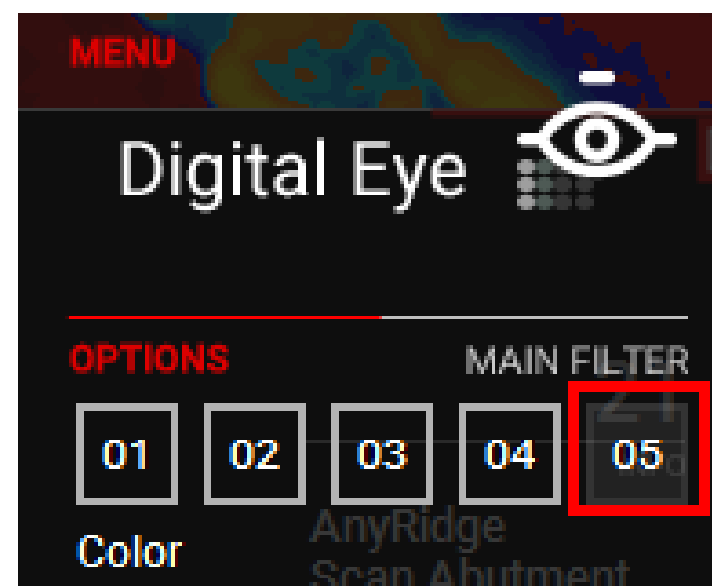
Intuitive Analyzation of the Bone Density

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

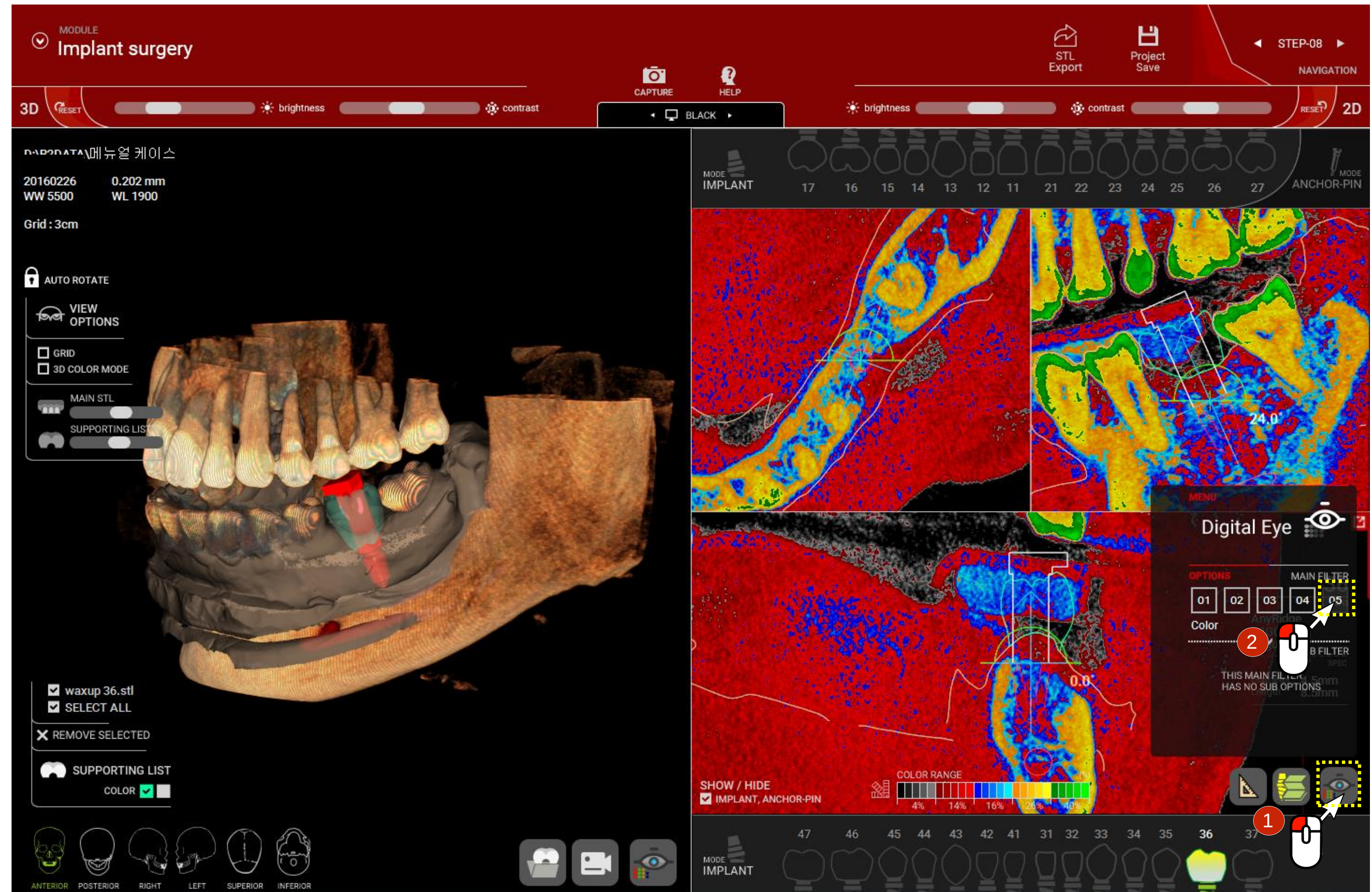
2 Click **05** to display Digital EYE view



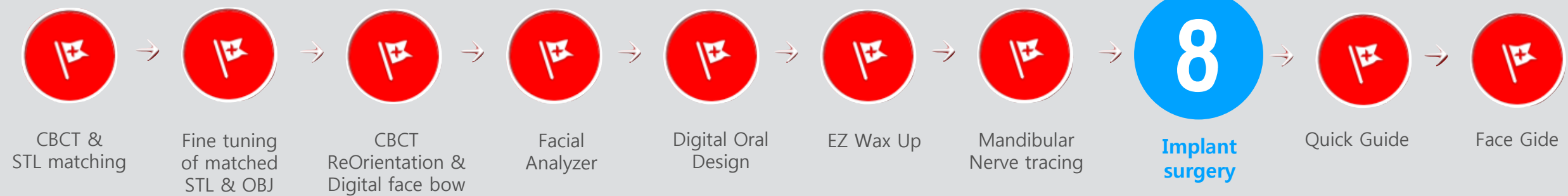
! Keyboard Shortcut



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



5.2 Implant Surgery Implant Planning



**R2
GATE**

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Apr. 2019

Intuitive Analyzation of the Bone Density

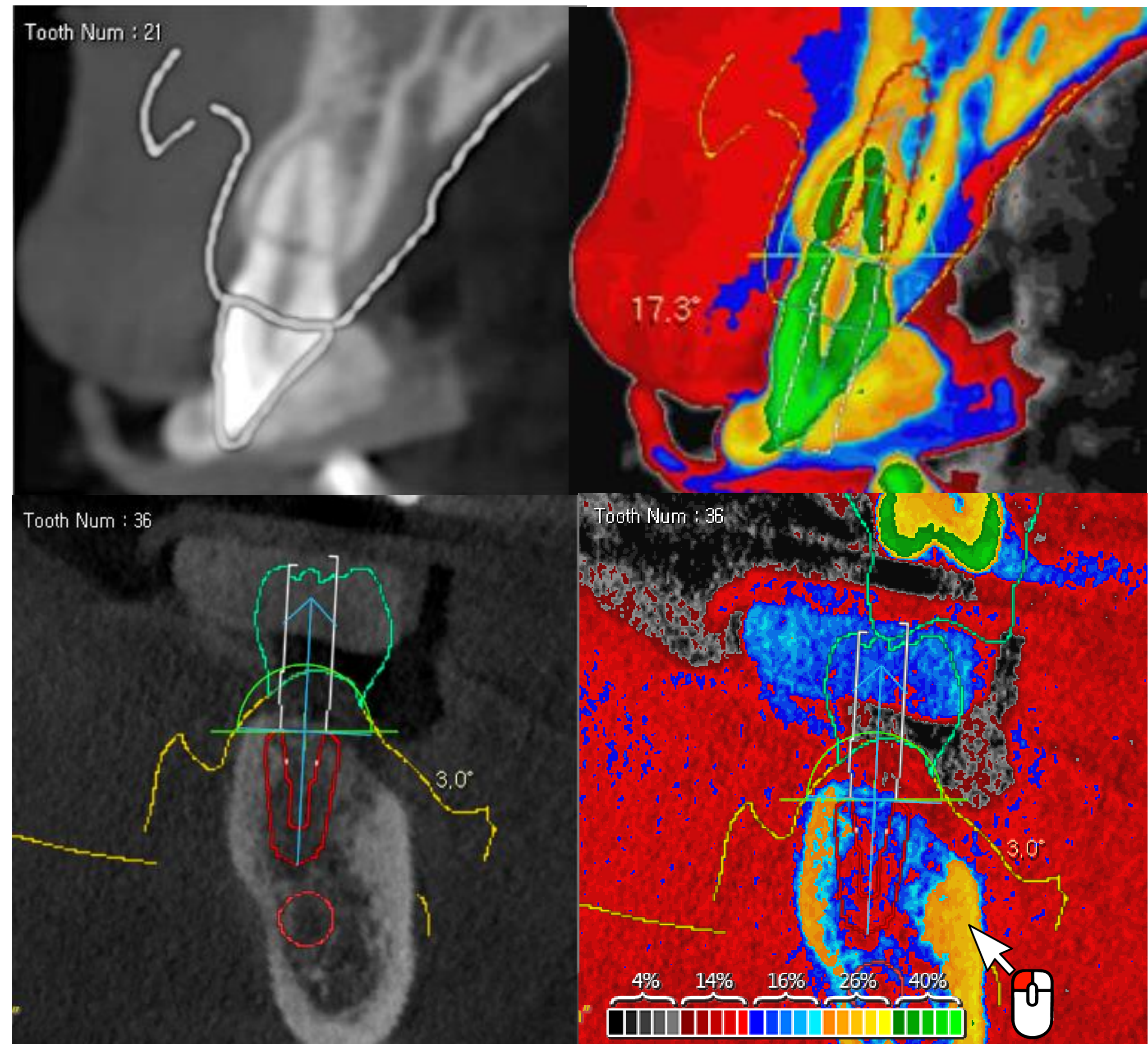
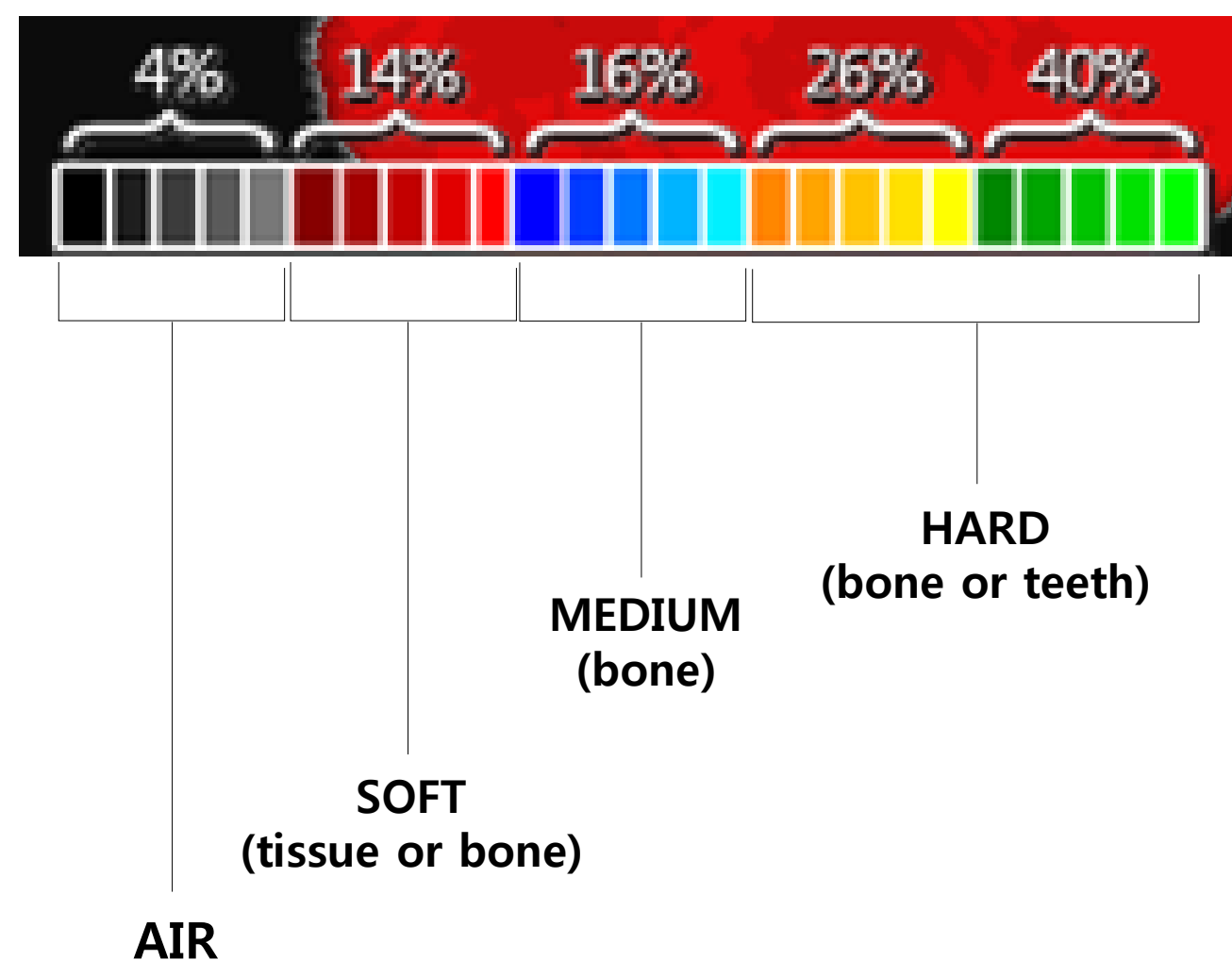
Digital EYE

Color-coded Analysis of Bone Morphology & Density

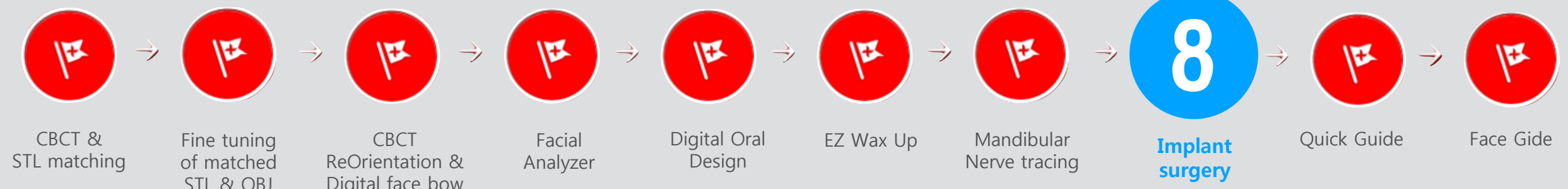
In general, CBCT analyzes data in 256 black and white shades. However, with the naked eye, only 16 steps (6%) can be distinguished

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)

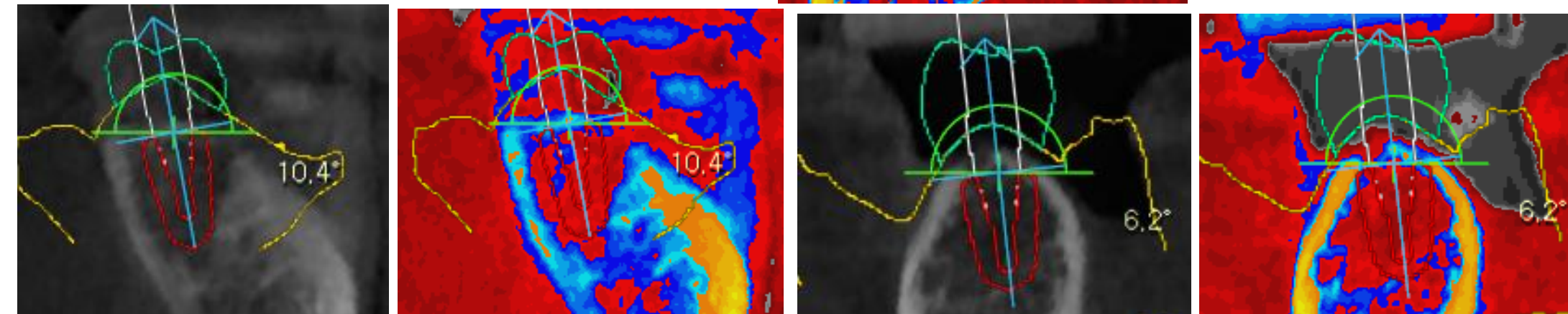
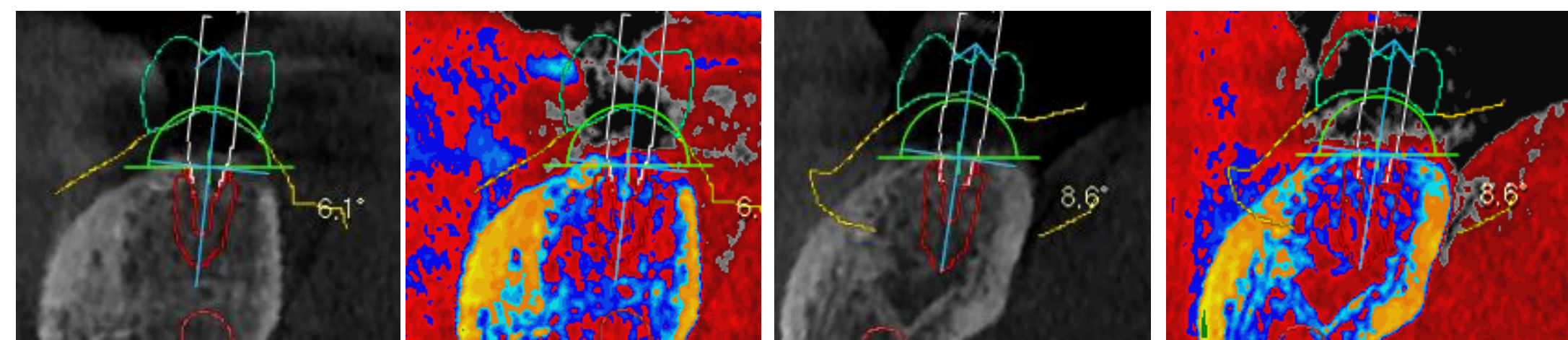
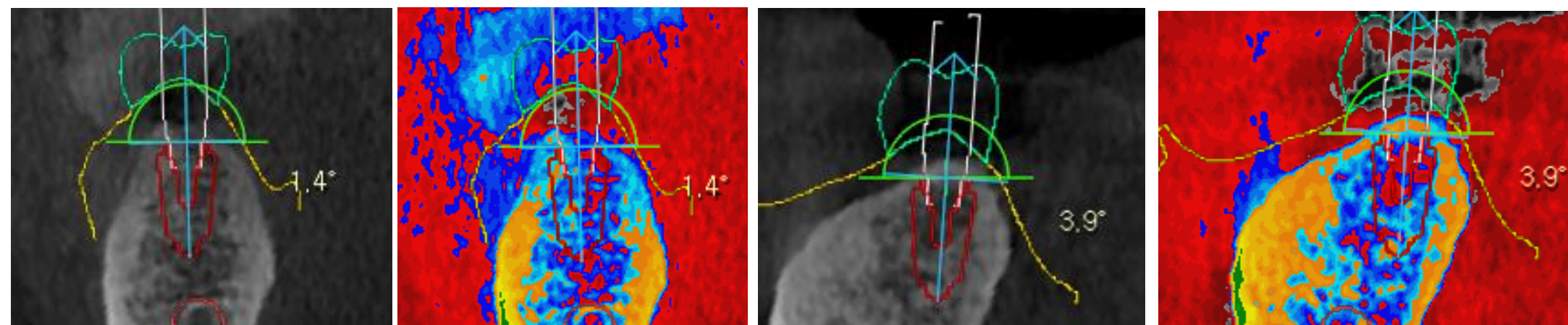
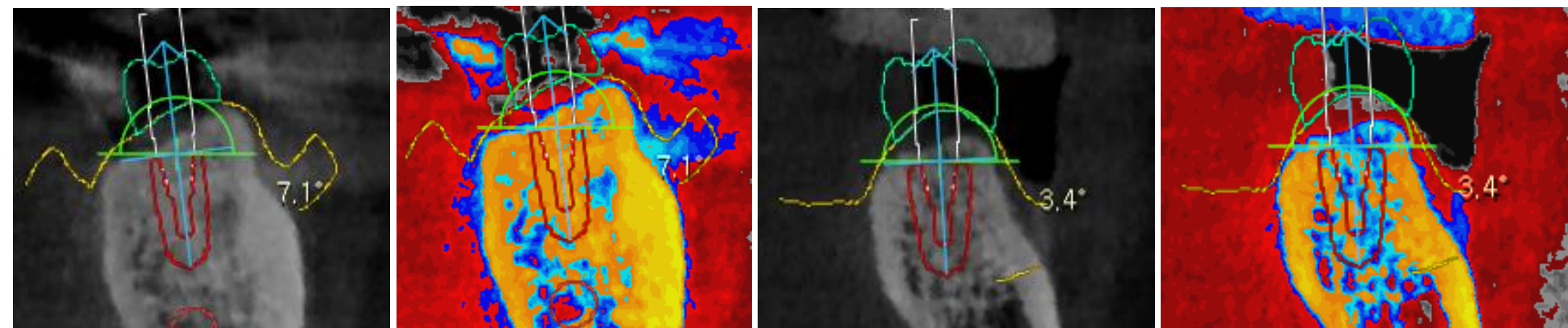


5.2 Implant Surgery Implant Planning

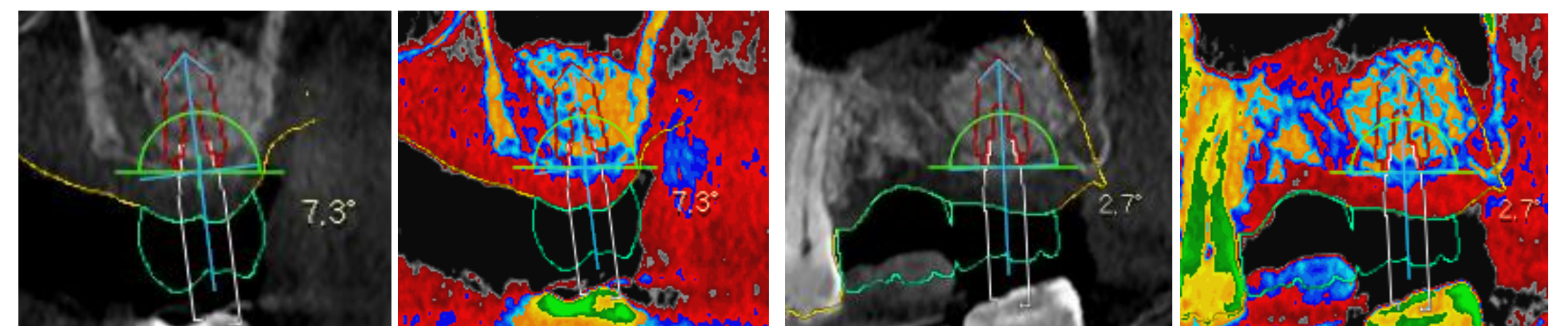


**R2
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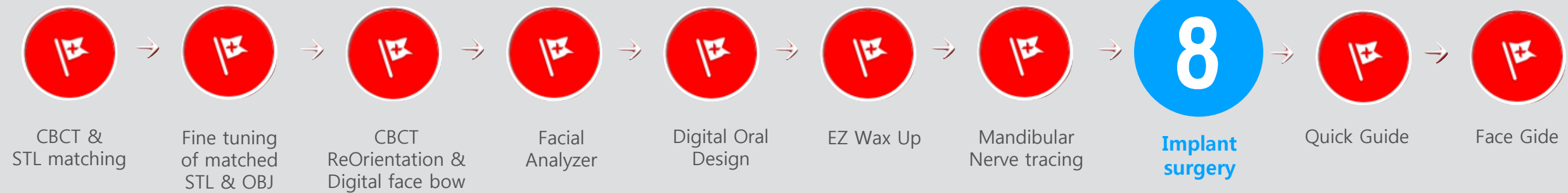
R2GATE 2.0
Apr. 2019



Exception



5.2 Implant Surgery Implant Planning



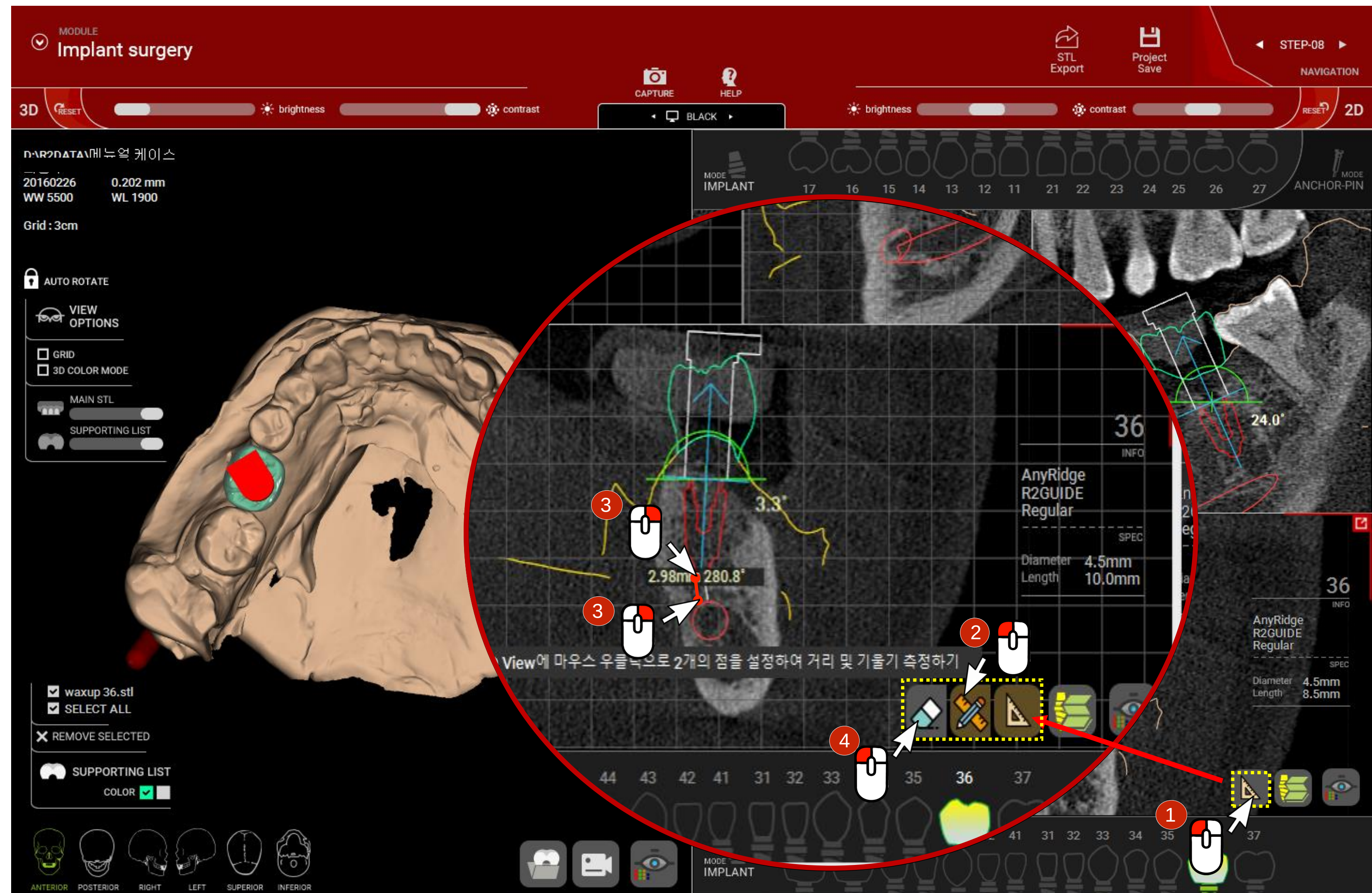
**R2
GATE**

R2GATE 2.0
Apr. 2019

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**



5.3 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



Face Guide

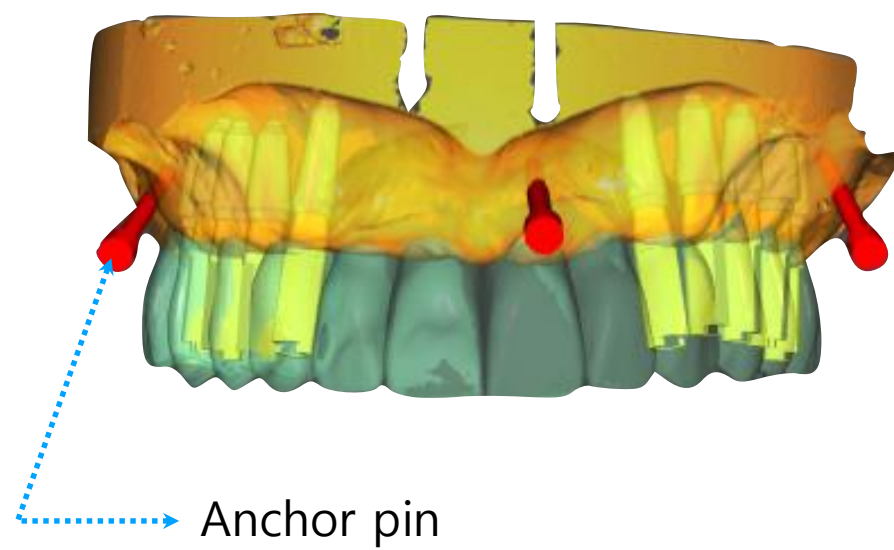
R2
GATE

R2GATE 2.0
Apr. 2019

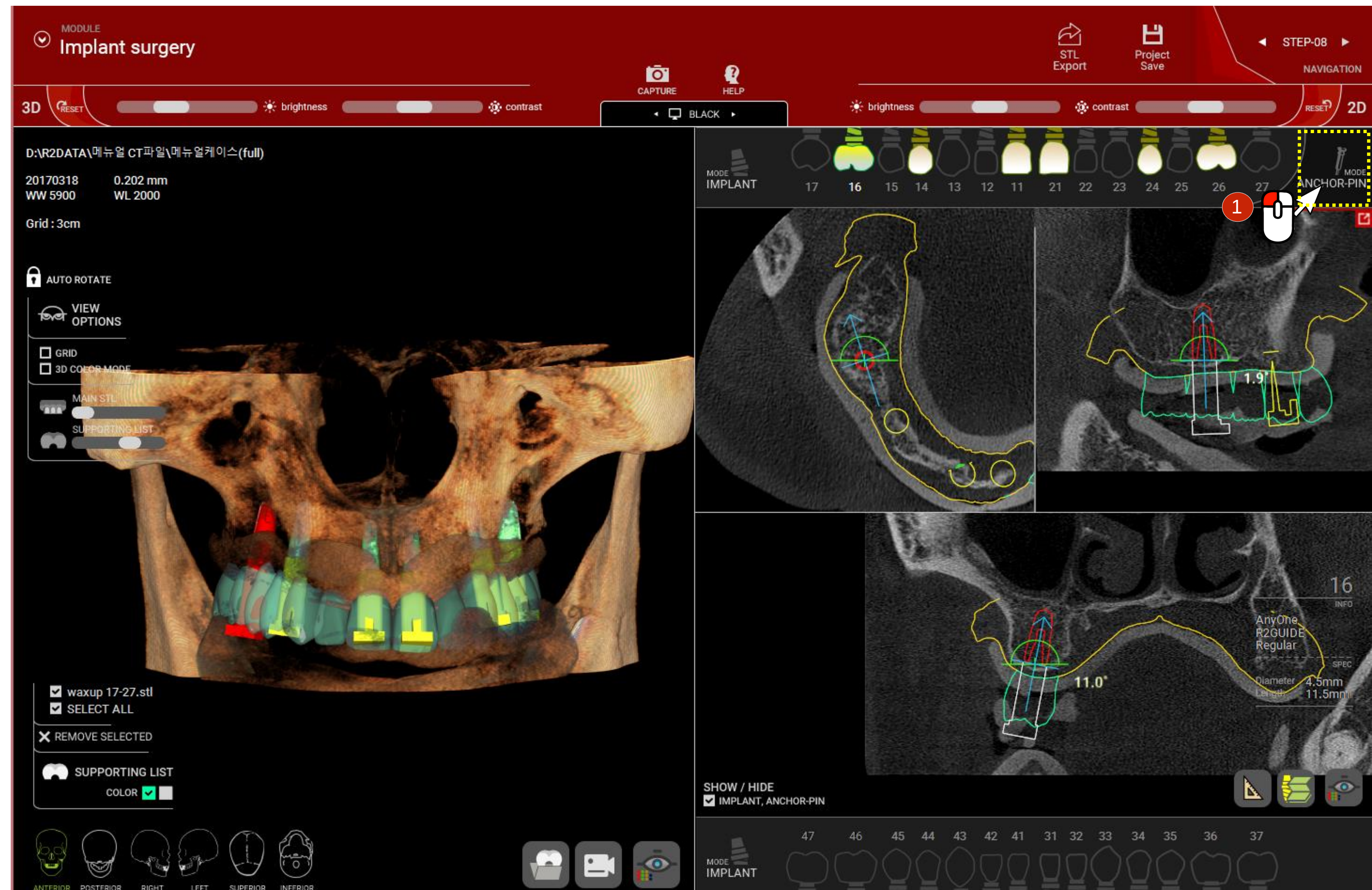
Implant Planning

Anchor Pin Design for Edentulous Case

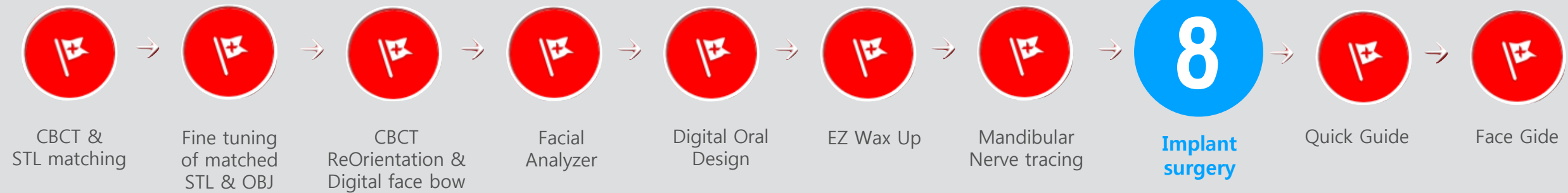
In case of edentulous case,
implant the anchor pins to fix the guide



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



5.3 Implant Surgery Anchor Pin Design



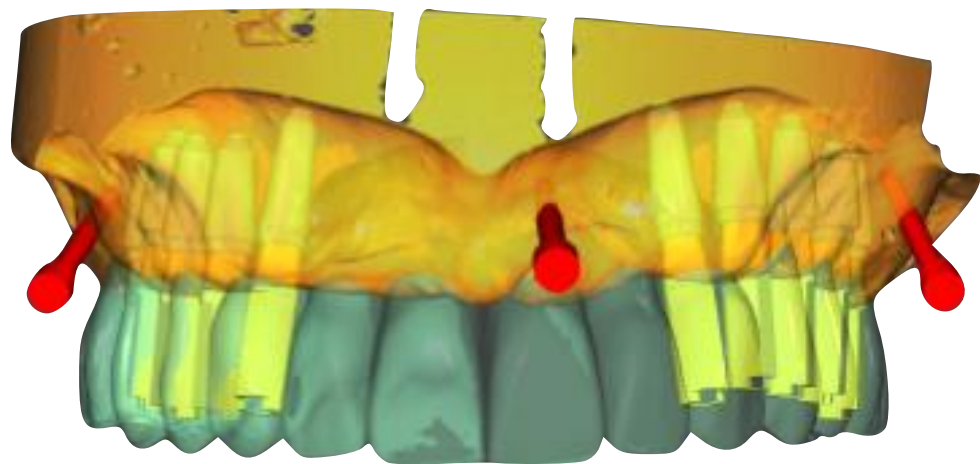
R2
GATE

R2GATE 2.0
Apr. 2019

Implant Planning

Anchor Pin Design for Edentulous Case

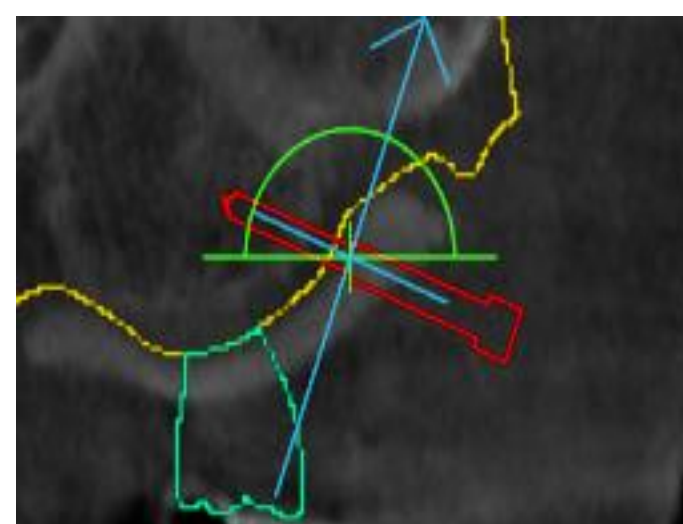
- 1 Click grey pin icon to create a new **ANCHOR PIN**
- 2 Click and drag the center of the anchor pin to the desired position.
- 3 Right click on the screen and click **SELECT ANCHOR PIN**
- 4 Select the appropriate size of the anchor pin



Full Edentulous Case

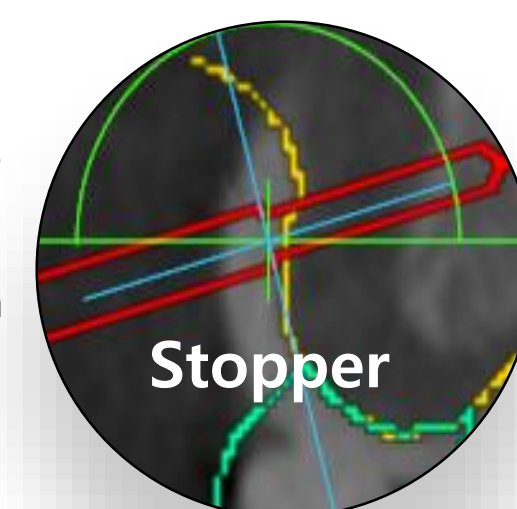
The Anchor pin designs three in total- left, right and front

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**

5.3 Implant Surgery Anchor Pin Design



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Design



EZ Wax Up



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Implant
surgery



Quick Guide

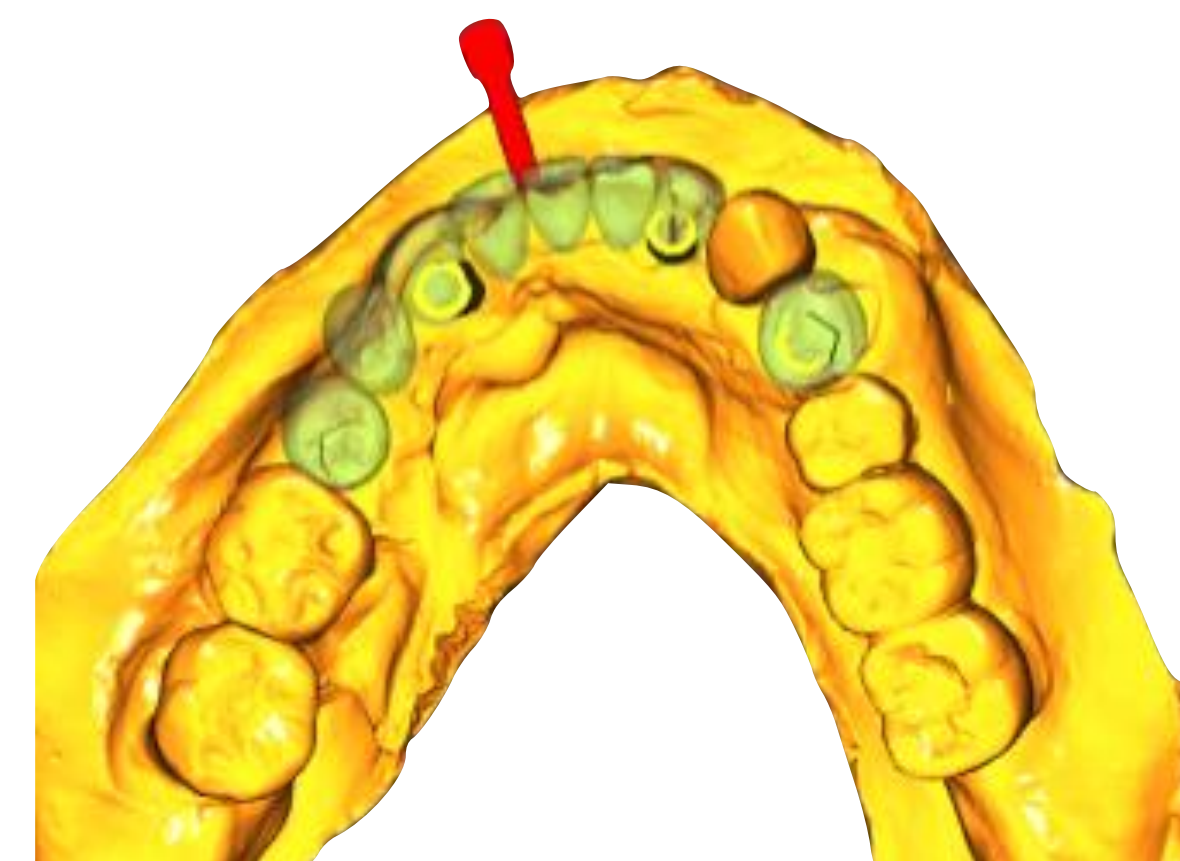
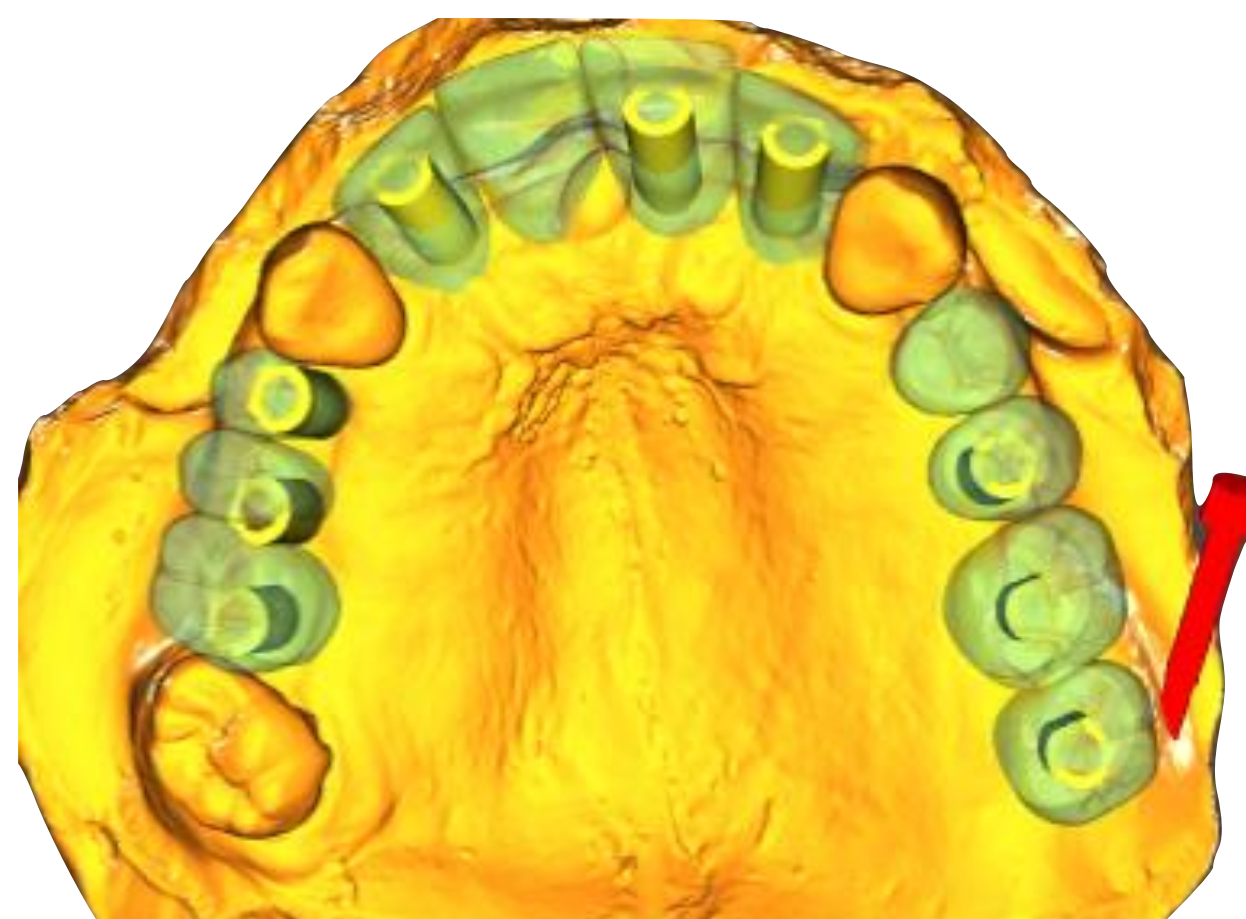


Face Gide

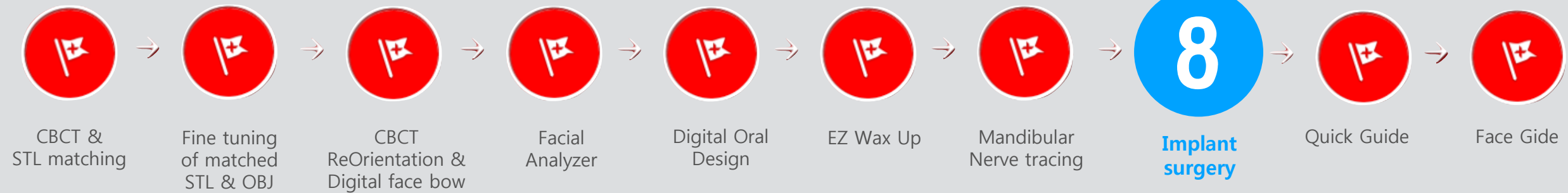
R2
GATE

R2GATE 2.0
Apr. 2019

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



5.4 Implant Surgery Implant Planning

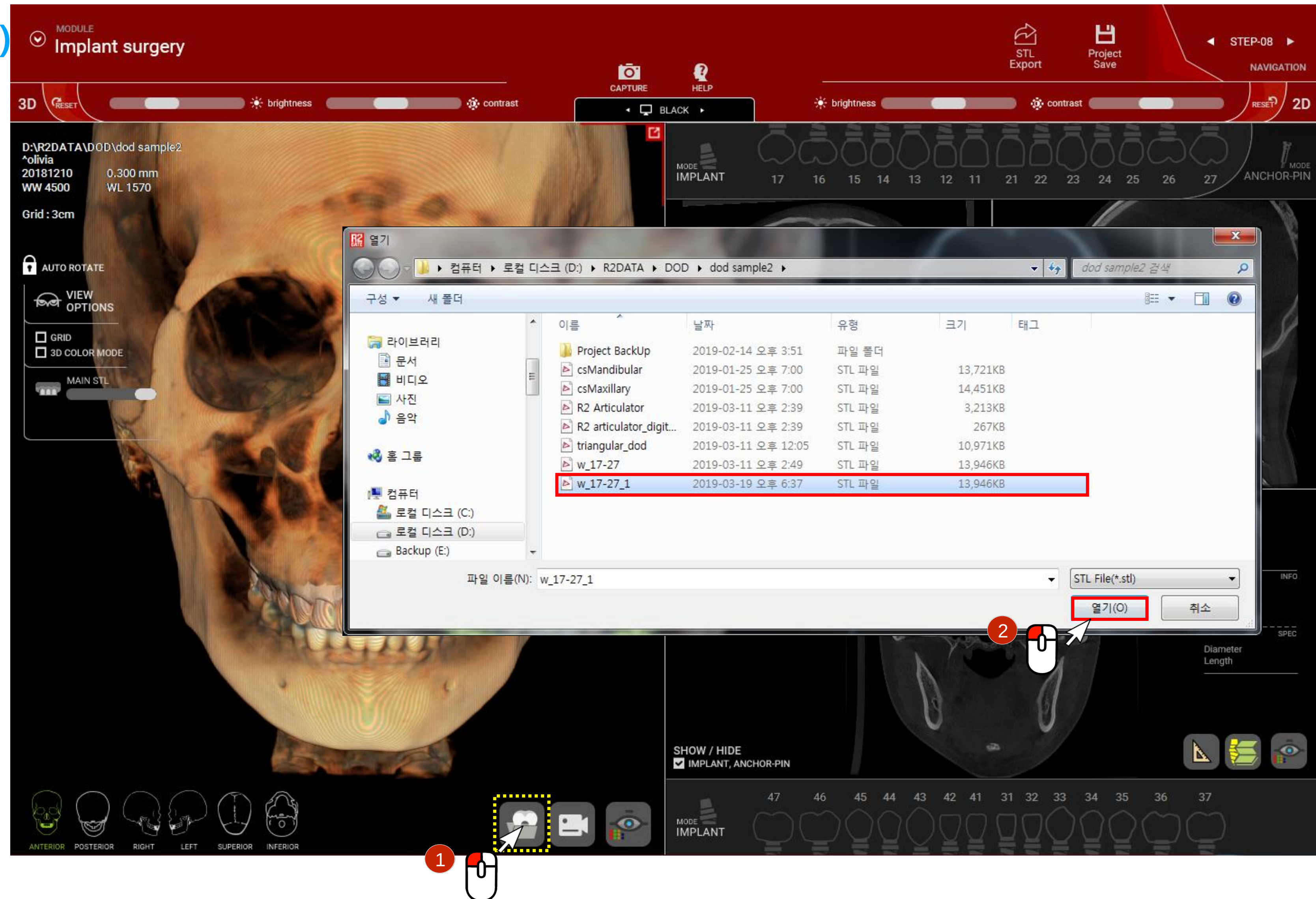


Implant Planning(manual)

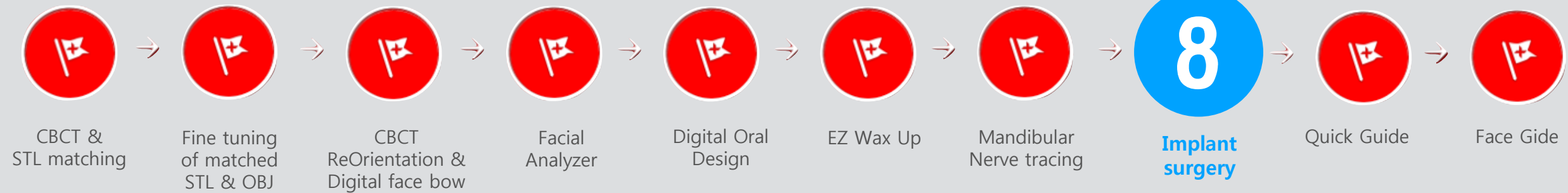
Import Diagnosis Wax-up

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



5.4 Implant Surgery Implant Planning



Implant planning(manual)

Create Dummy Implant

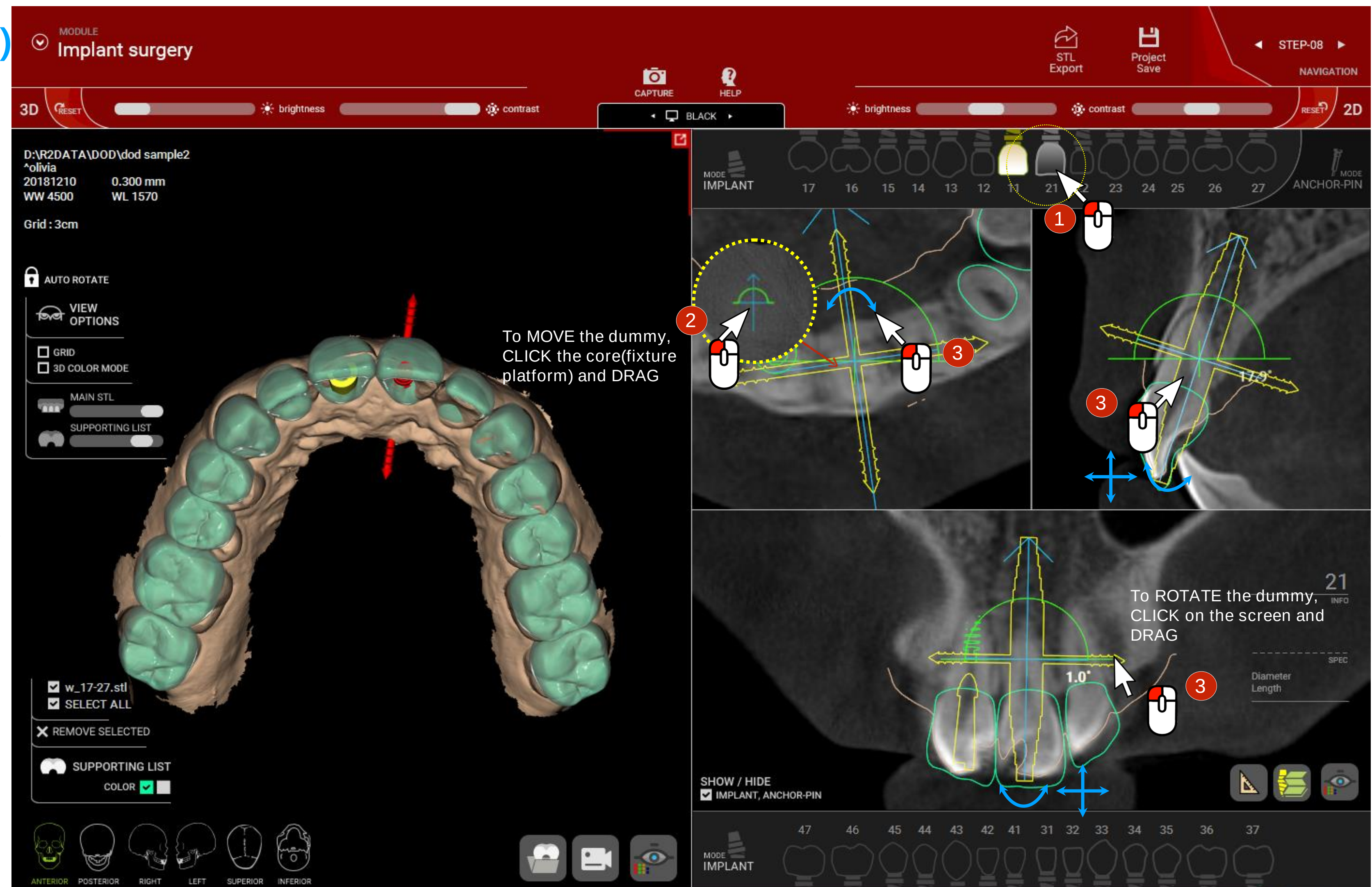
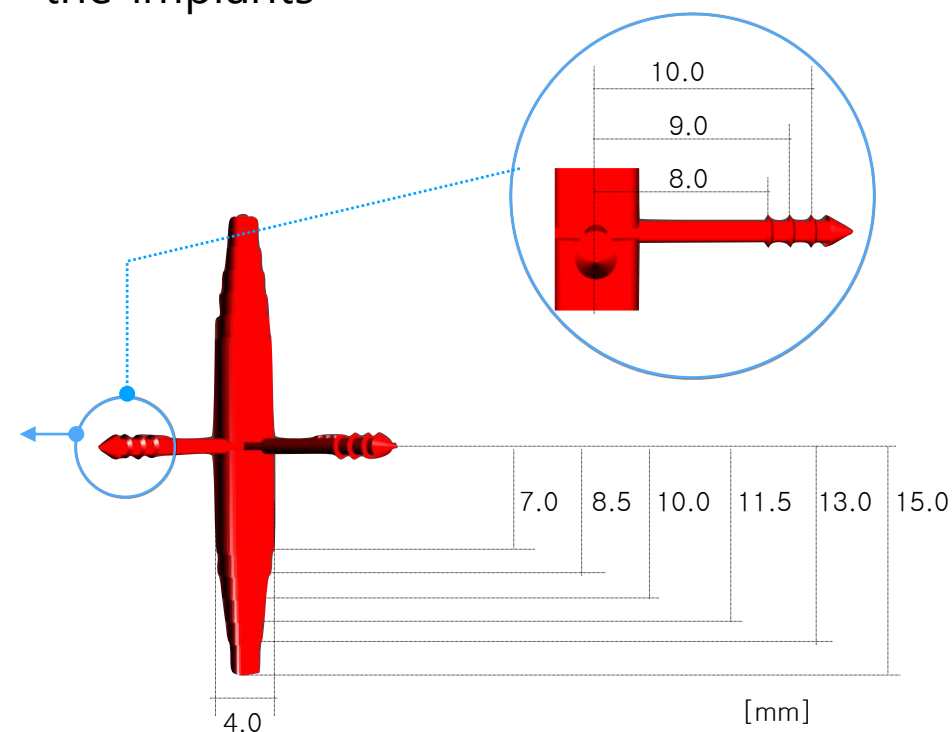
- 1 Click on the dentition icon to for diagnosis and dummy will be created
- 2 Click the core of dummy and drag to the position of implant placement
- 3 Adjust the axis of rotation of dummy and the position of the plane at the cross section view

! 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 66 page

5.5 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



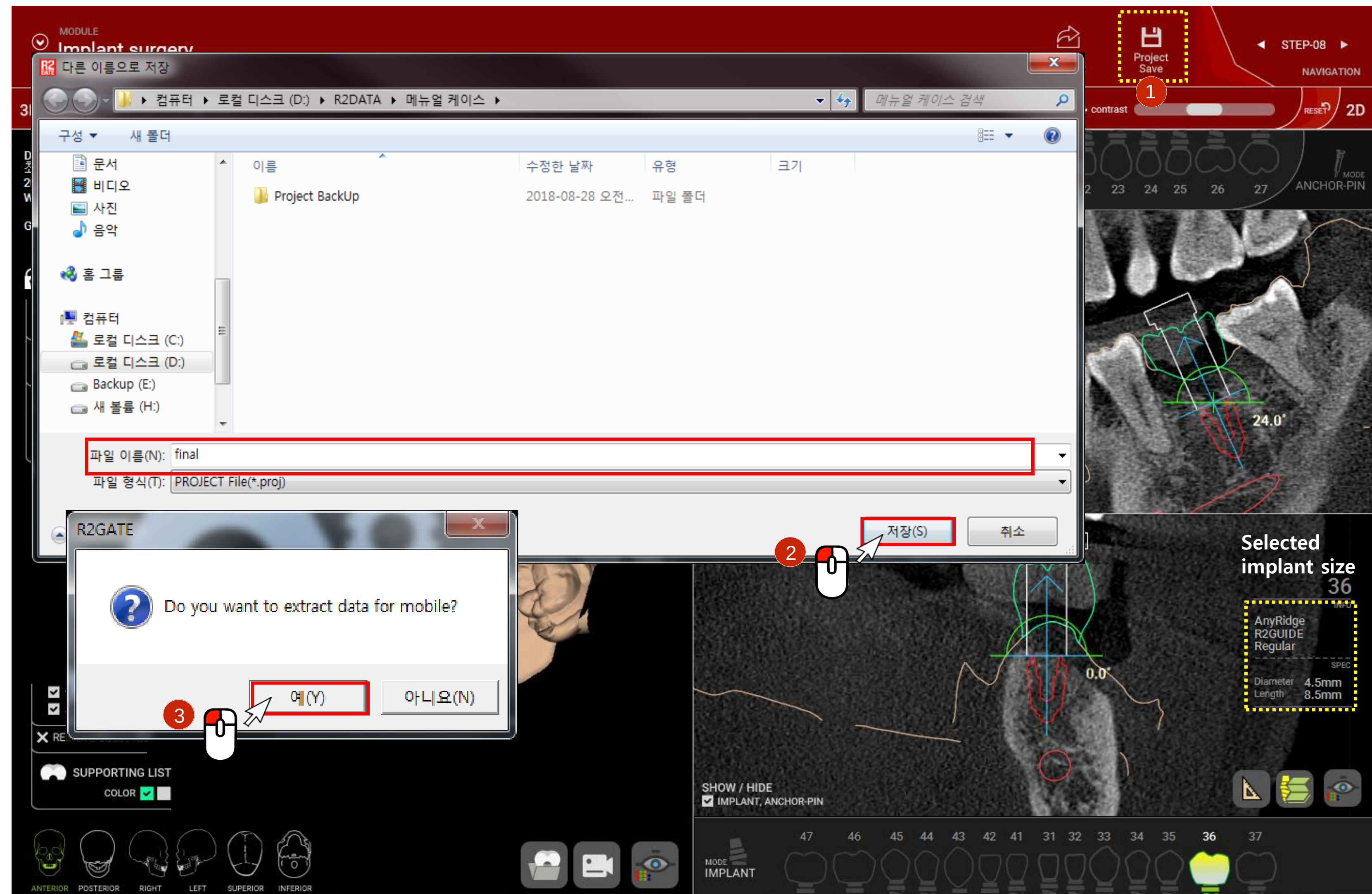
Face Guide

**R2
GATE**

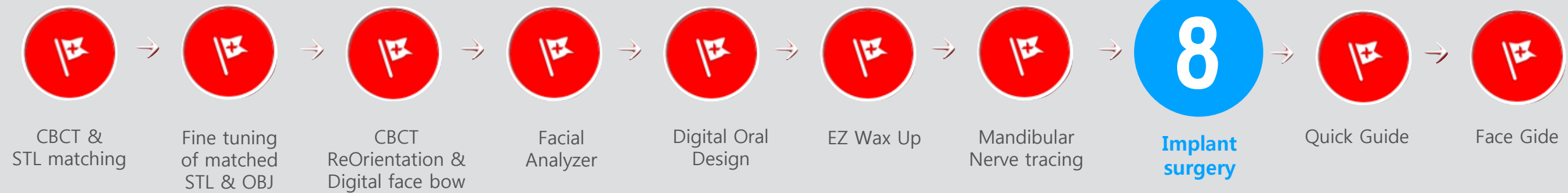
R2GATE 2.0
Apr. 2019

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



5.5 Implant Surgery Save & Export



**R2
GATE**

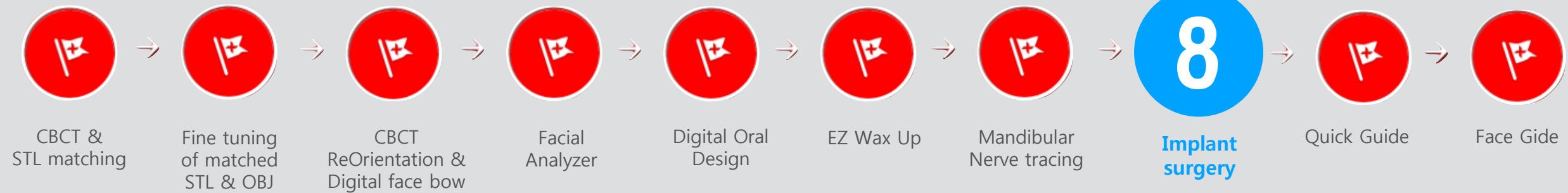
R2GATE 2.0
Apr. 2019

RWS export for R2 Guide design using R2Ware

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



5.5 Implant Surgery Save & Export



**R2
GATE**

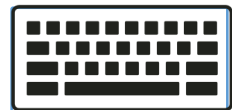
R2GATE 2.0
Apr. 2019

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)

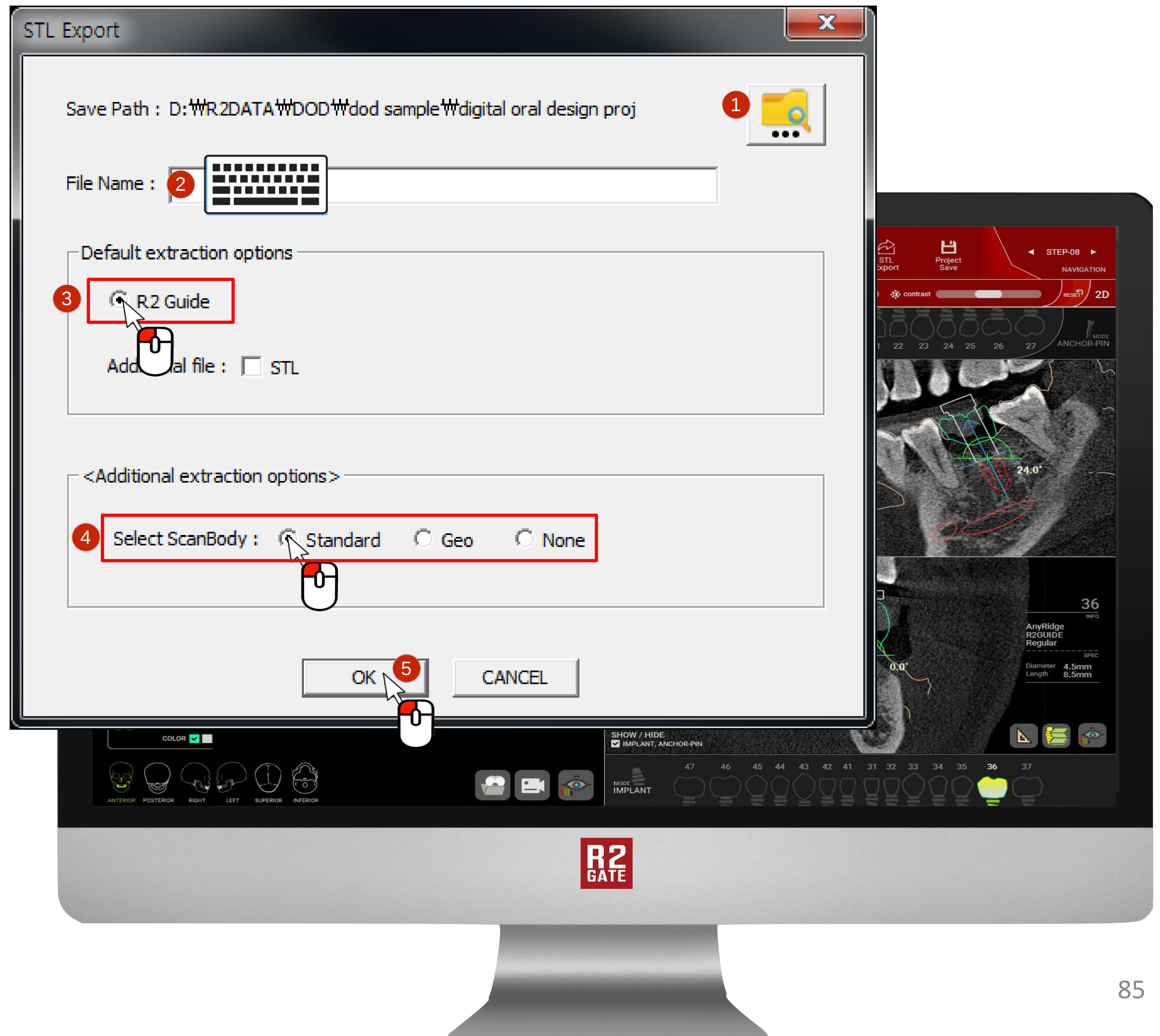


4 ScanBody (abutment) options

- 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



5.5 Implant Surgery Save & Export



CBCT &
STL matching



Fine tuning
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STL & OBJ



CBCT
ReOrientation &
Digital face bow



Facial
Analyzer



Digital Oral
Design



EZ Wax Up



Mandibular
Nerve tracing



Implant
surgery



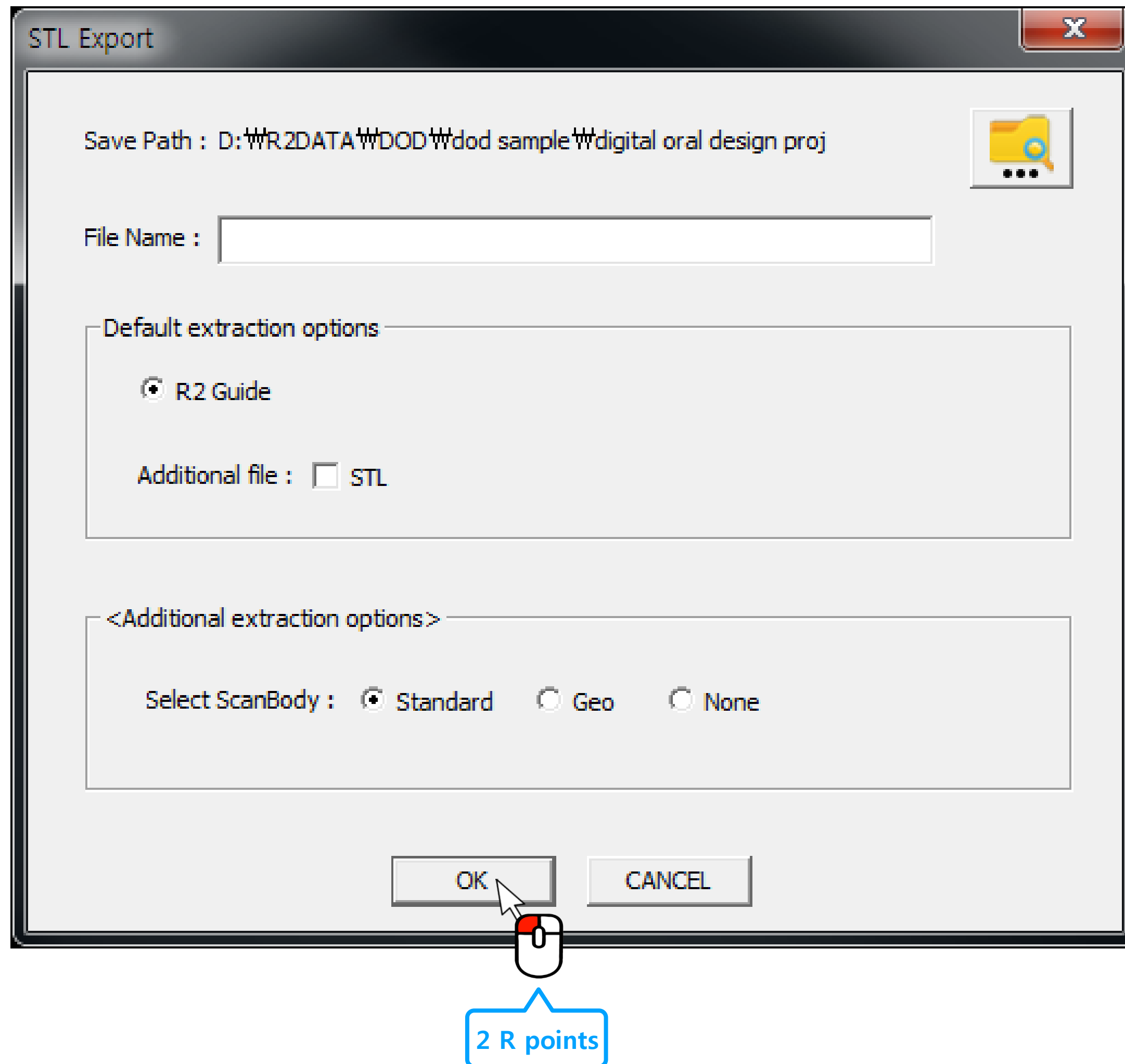
Quick Guide



Face Gide

R2
GATE

R2GATE 2.0
Apr. 2019



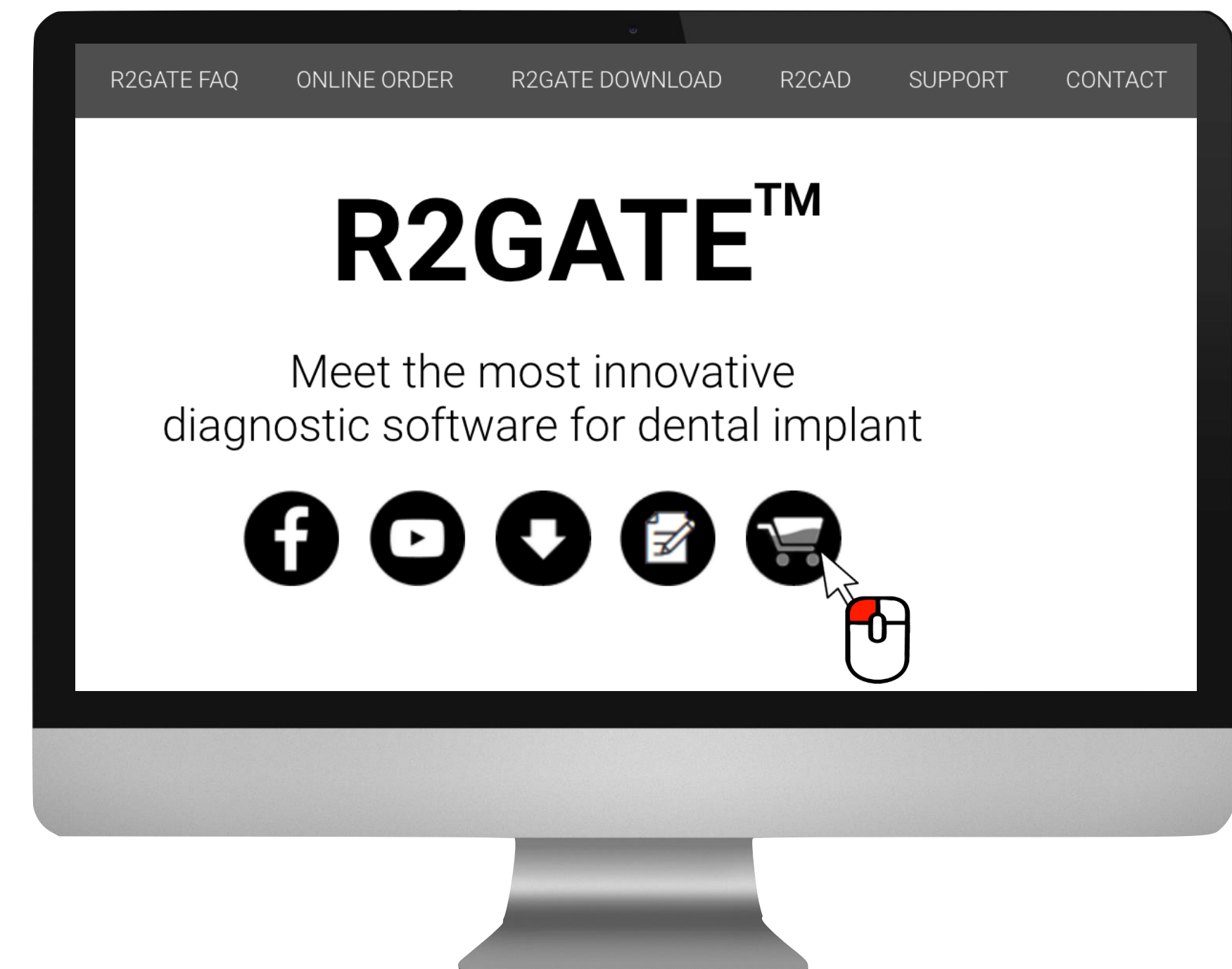
Case fee for exporting RWS file

- 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..

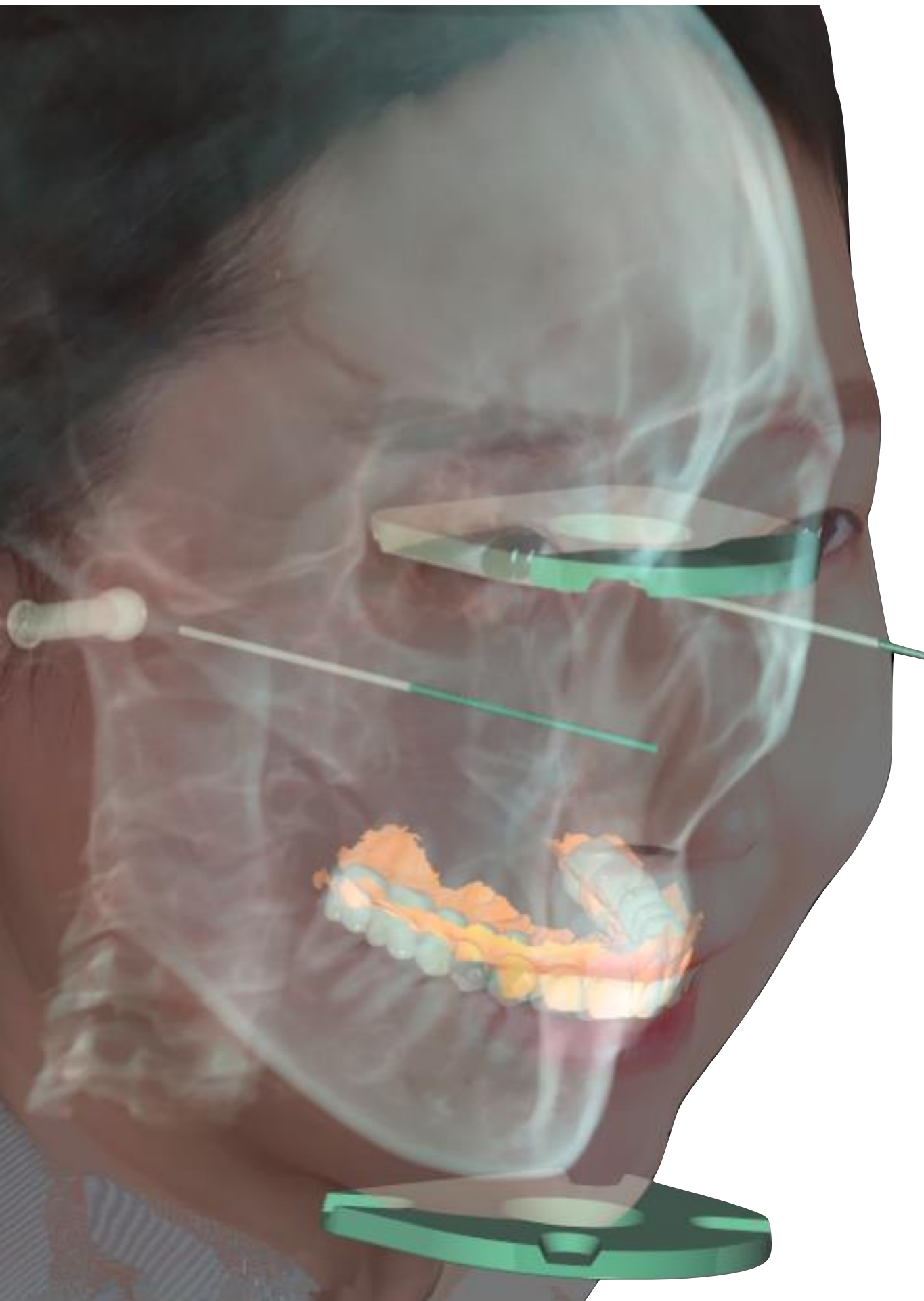


Purchase R points at Online shop



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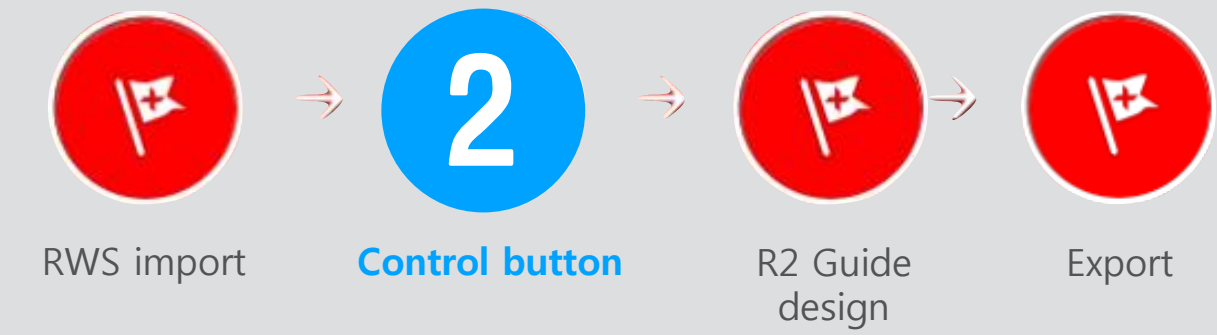
6 R2WARE R2 Guide Design

Execute R2WARE

- 1 Select patient folder
- 2 Select R2WARE.rws file in STL window
- 3 Click R2 Guide Design



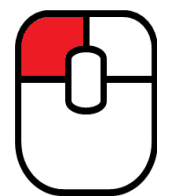
6.2 R2WARE™ Control Buttons



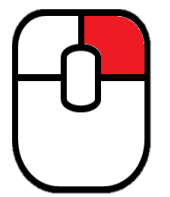
**R2
GATE**

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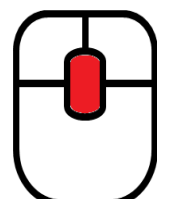
Mouse Control



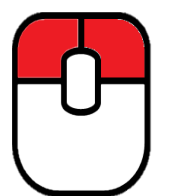
Left click:
select menu



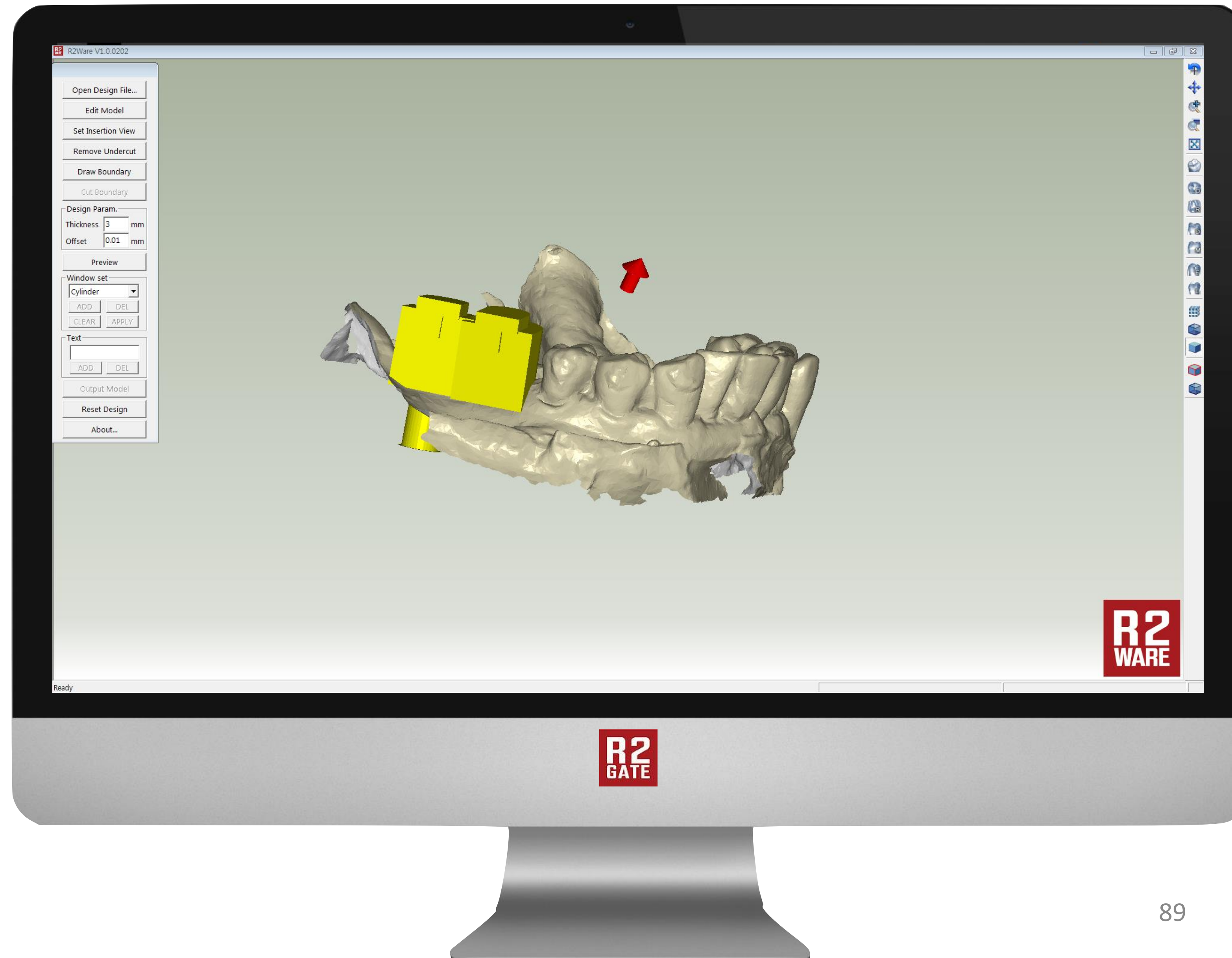
Right click:
model rotation



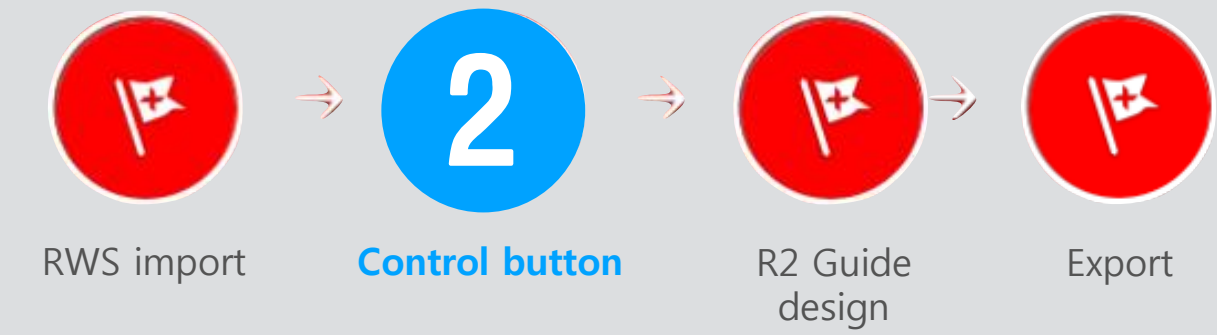
Wheel scrolling:
zoom in & out



Right & left click:
move model



6.2 R2WARE™ Control Buttons



**R2
GATE**

R2GATE 2.0
Apr. 2019

Menu Function

! In most cases, RWS files can be opened as R2 Connector

- Open Design File... → Manually import RWS file
- Edit Model → (Linked to Manually import RWS file)
- Set Insertion View → Set insertion pass of R2 Guide
- Remove Undercut → Remove undercut (Block out)
- Draw Boundary → Drawing boundary line for R2 Guide
- Cut Boundary → Set boundary line
- Design Param.
 - Thickness 3 mm
 - Offset 0.01 mm
 → Set thickness & offset for R2 Guide
- Preview
- Window set
 - Cylinder
 - ADD DEL
 - CLEAR APPLY
 → Set window
- Text
 - ADD DEL
 → Add text
- Output Model → Save R2 Guide design
- Reset Design
- About...

Model Edit

Mesh Select

- Polyline → Draw boundary line for select
- Extend → Select all mesh
- Revert → Revert selected mesh
- Clear → Deselect mesh
- Delete → Cut selected area

Mesh Fix

- Bridge
- Fill Hole

Mesh Deform

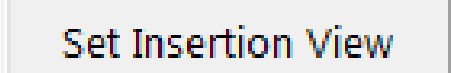
- Add
- Remove → Add & remove brush touch
- Smooth
- Area & range of brush

Navigation icons: Undo, Redo, Confirm

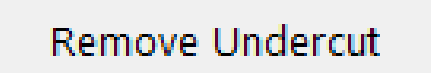
R2 Guide Design

Set Insertion Pass

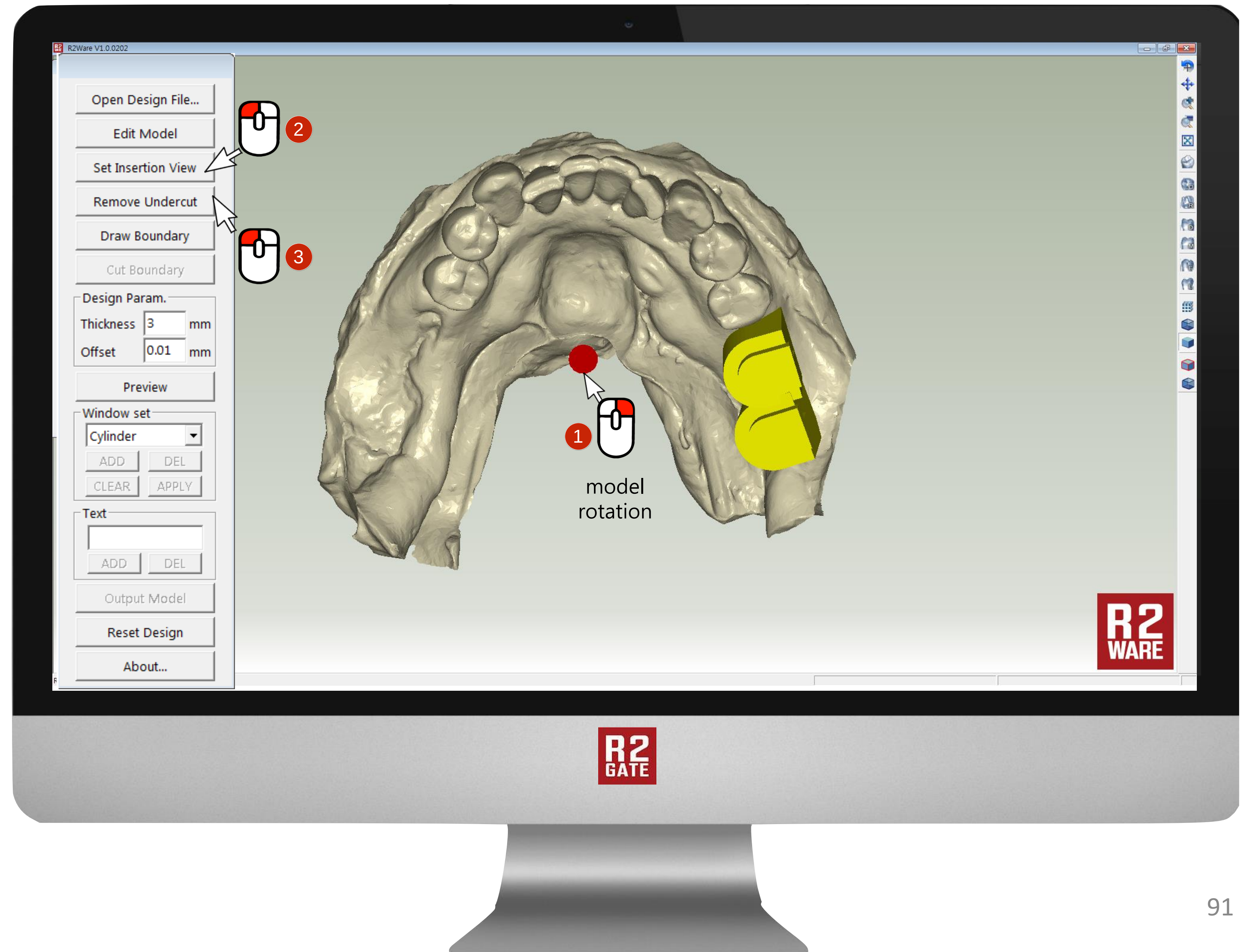
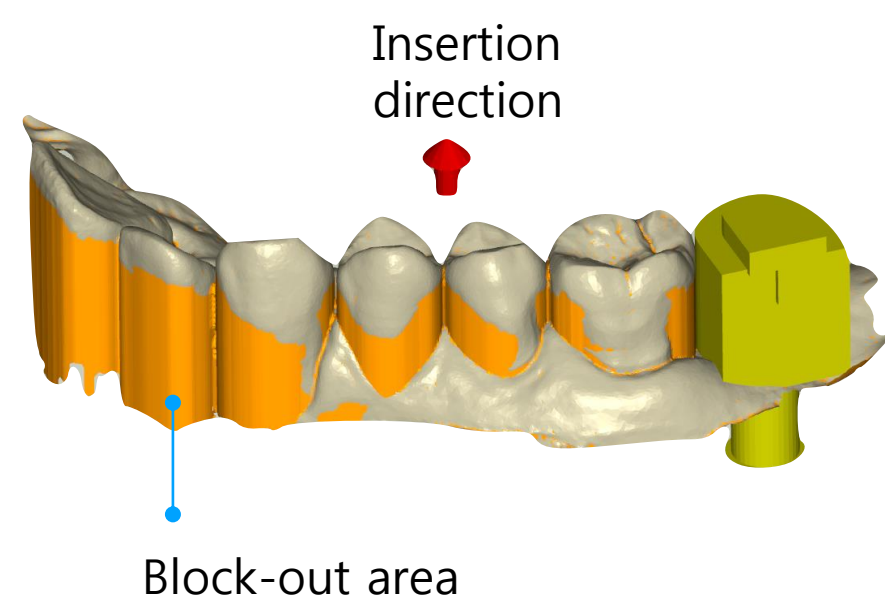
- 1 Rotate model to occlusal view,
Set angulation of insertion pass for R2 Guide

- 2  Click the icon

Block-out (remove undercut)

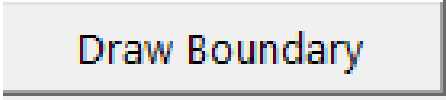
- 3  Click the icon

-  For maximum guide retention, minimize block-out

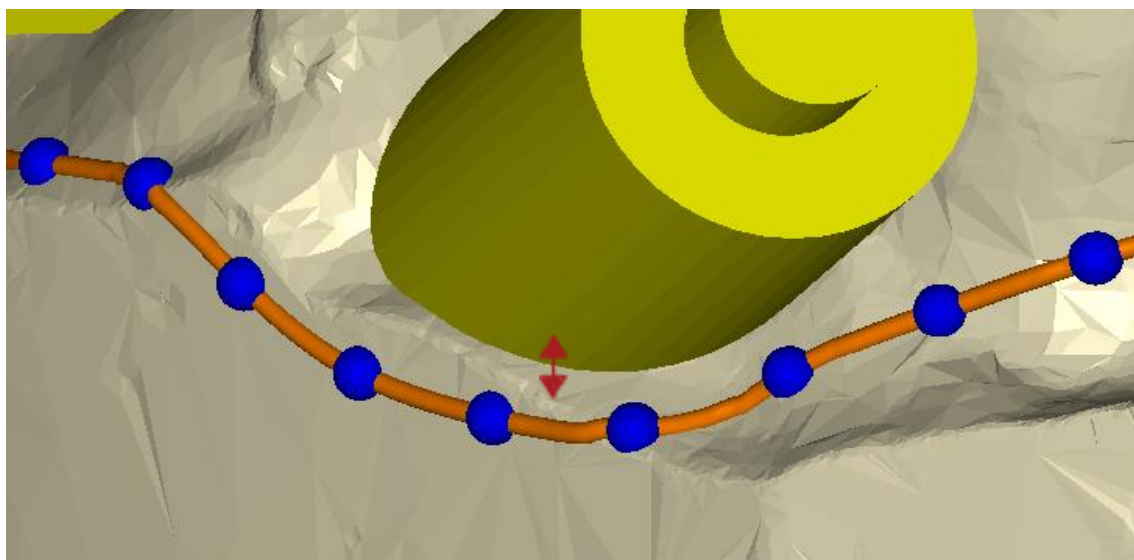


R2 Guide Design

Draw Boundary for R2 Guide

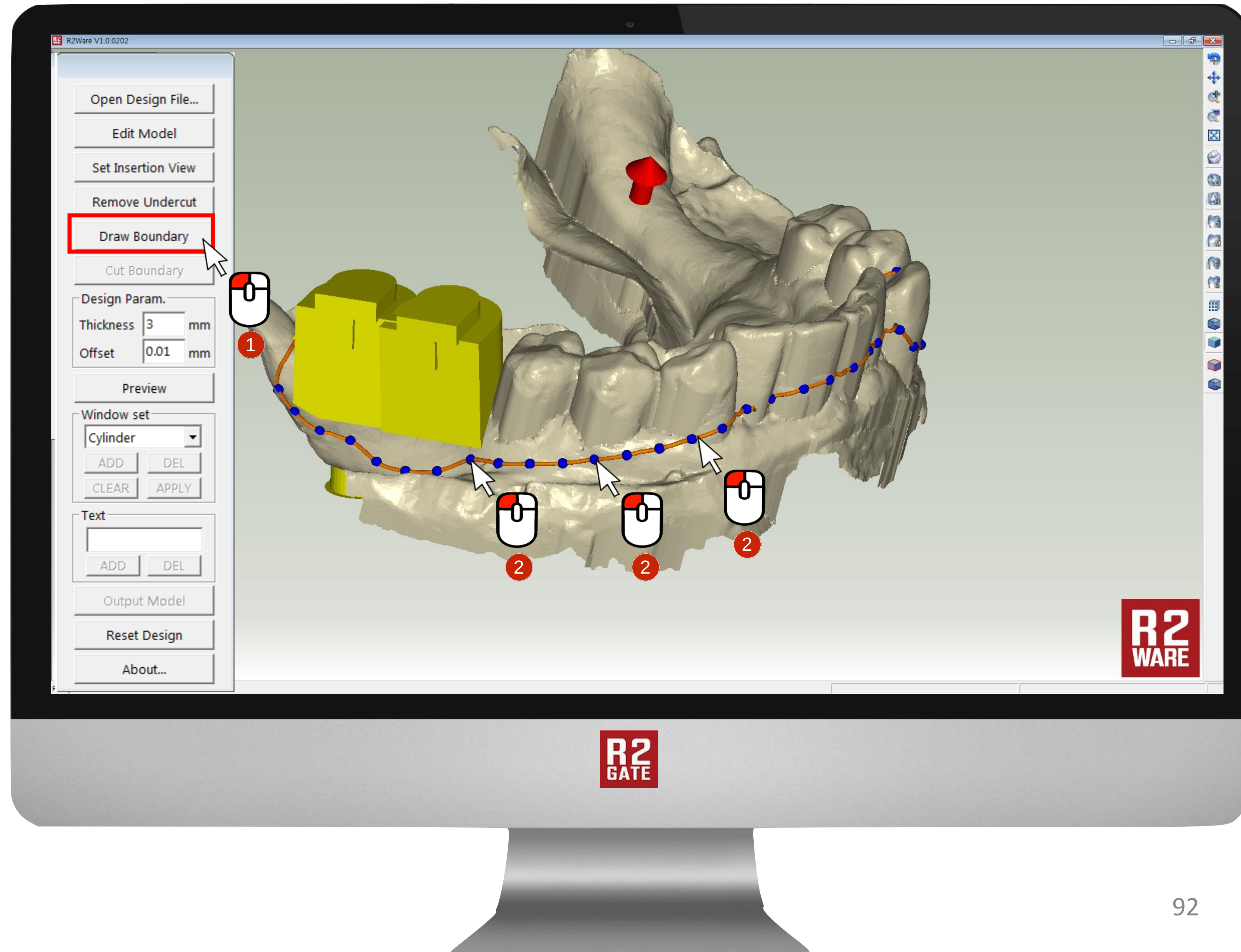
- 1  Click the icon
- 2 Draw boundary line by clicking mouse in sequence
 - * To adjust boundary line, click on point & drag

*** IMPORTANT!**



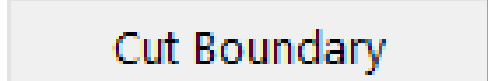
Make sure boundary line covers drill core & anchor pins

Distance between drill core/anchor pin & boundary line should be more than 2mm



R2 Guide Design

Cut Boundary of R2 Guide

1  Click the icon

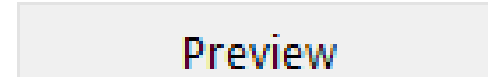
2 Set parameters for R2 Guide

Design Param.

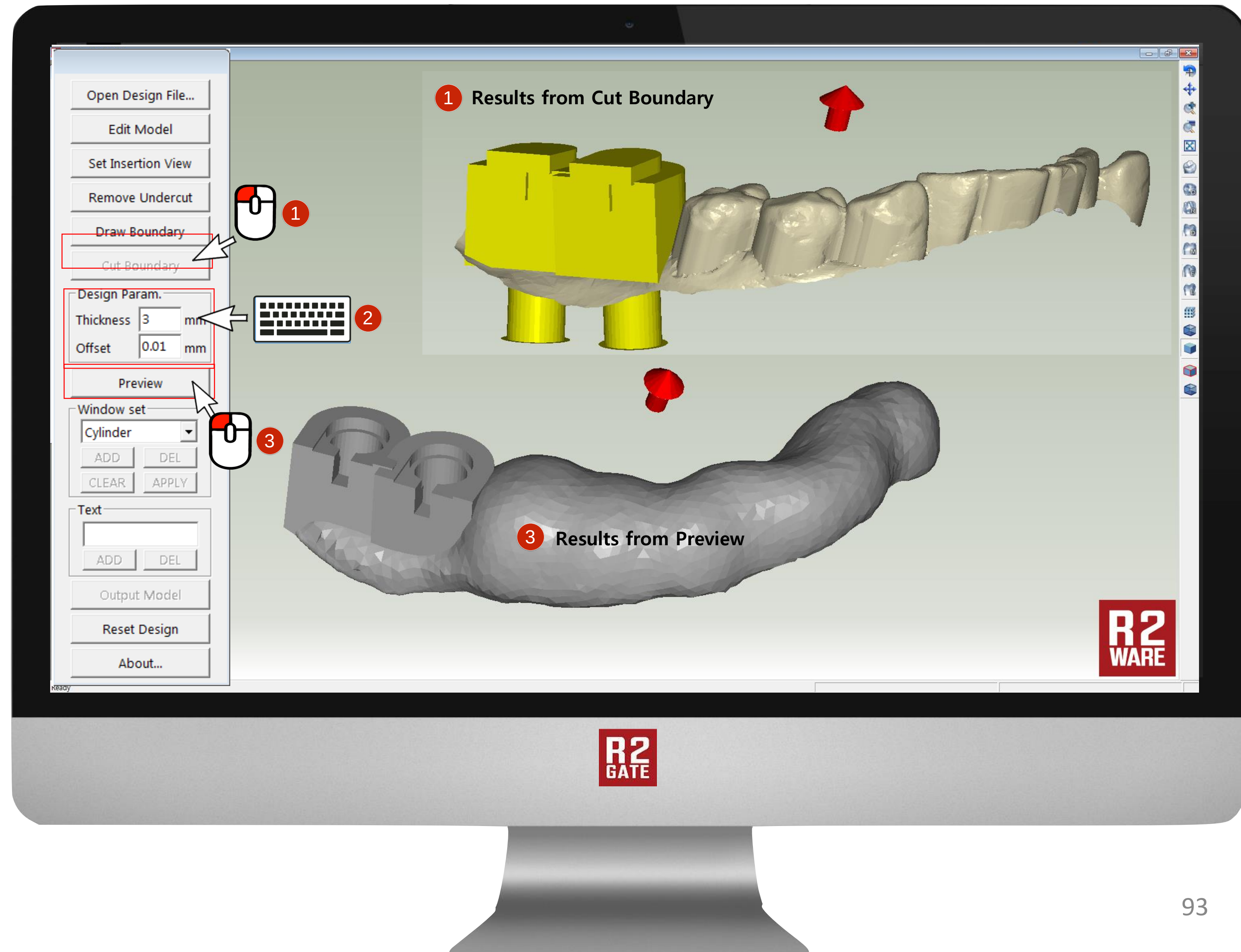
Thickness mm

Offset mm

Insert offset value for 3D printer
(e.g. MEG Printer II = 0.06)

3  Preview

Click to preview R2 Guide



Seating Hole (cooling hole)

- 3 Click **APPLY**

94

R2 Guide Design

Add Text on R2 Guide

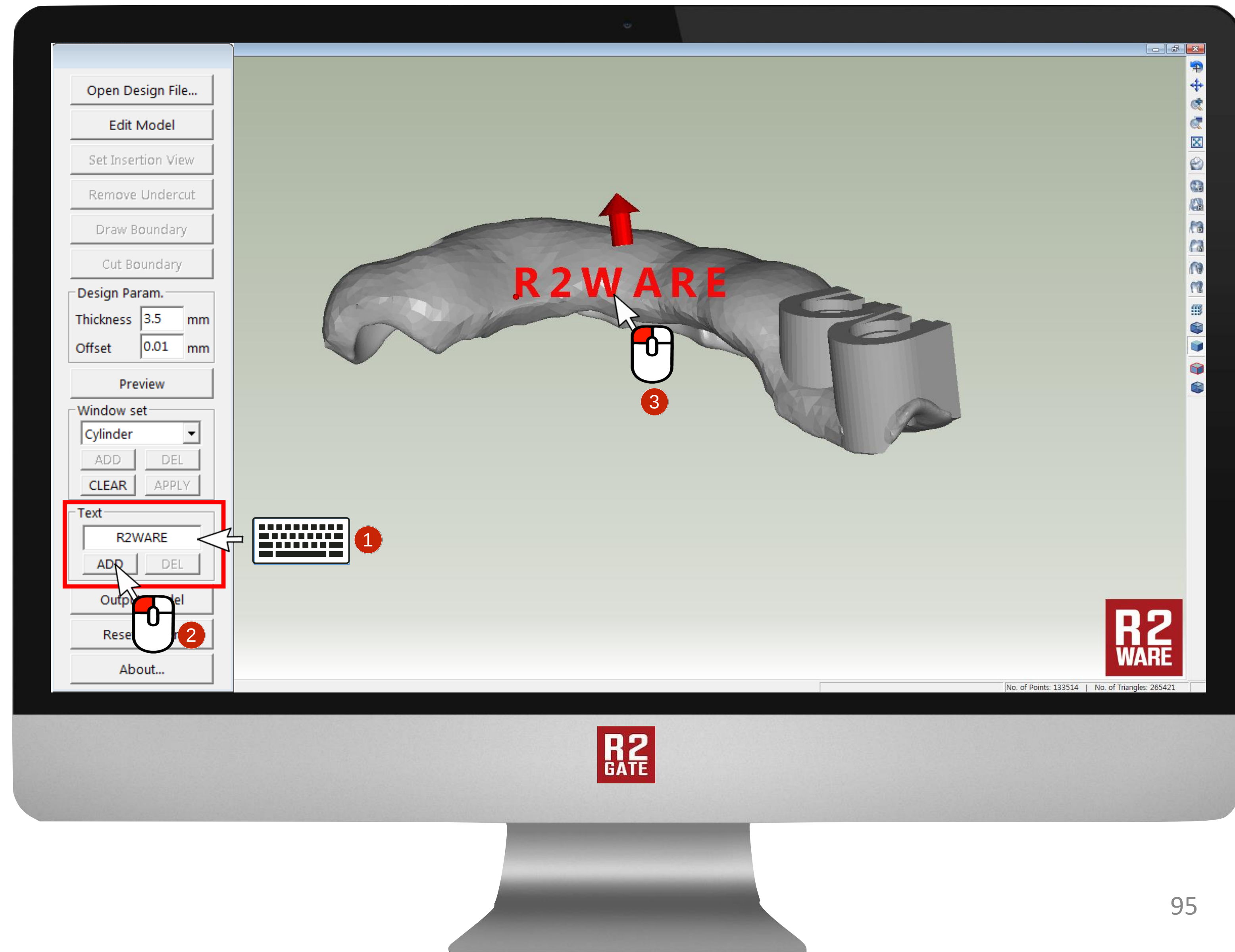
1 Type Text



2 Click **ADD**



3 Set position of text and left click



R2 Guide Design

Modify R2Guide

- 1  Click the icon
To change thickness or smooth surface of R2 Guide

- 2 Click appropriate button:

Mesh Deform

 Add

 Remove

 Smooth

 Range

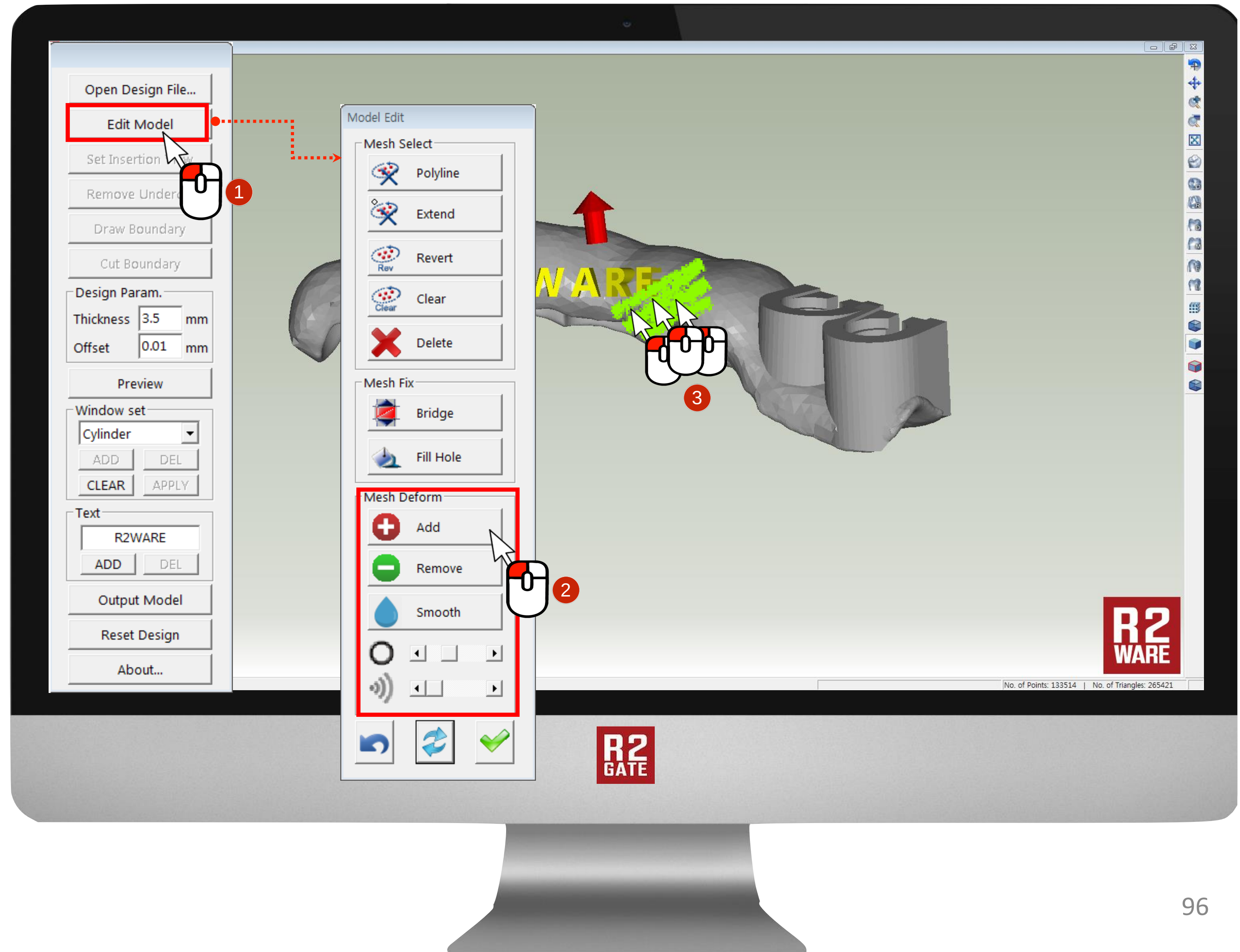
 Pressure

Add thickness

Remove thickness

Smooth surface

- 3 Swipe surface of R2 Guide while left-clicking mouse



6.4 R2WARE™ R2 Guide Design Export



**R2
GATE**

R2GATE 2.0
Apr. 2019

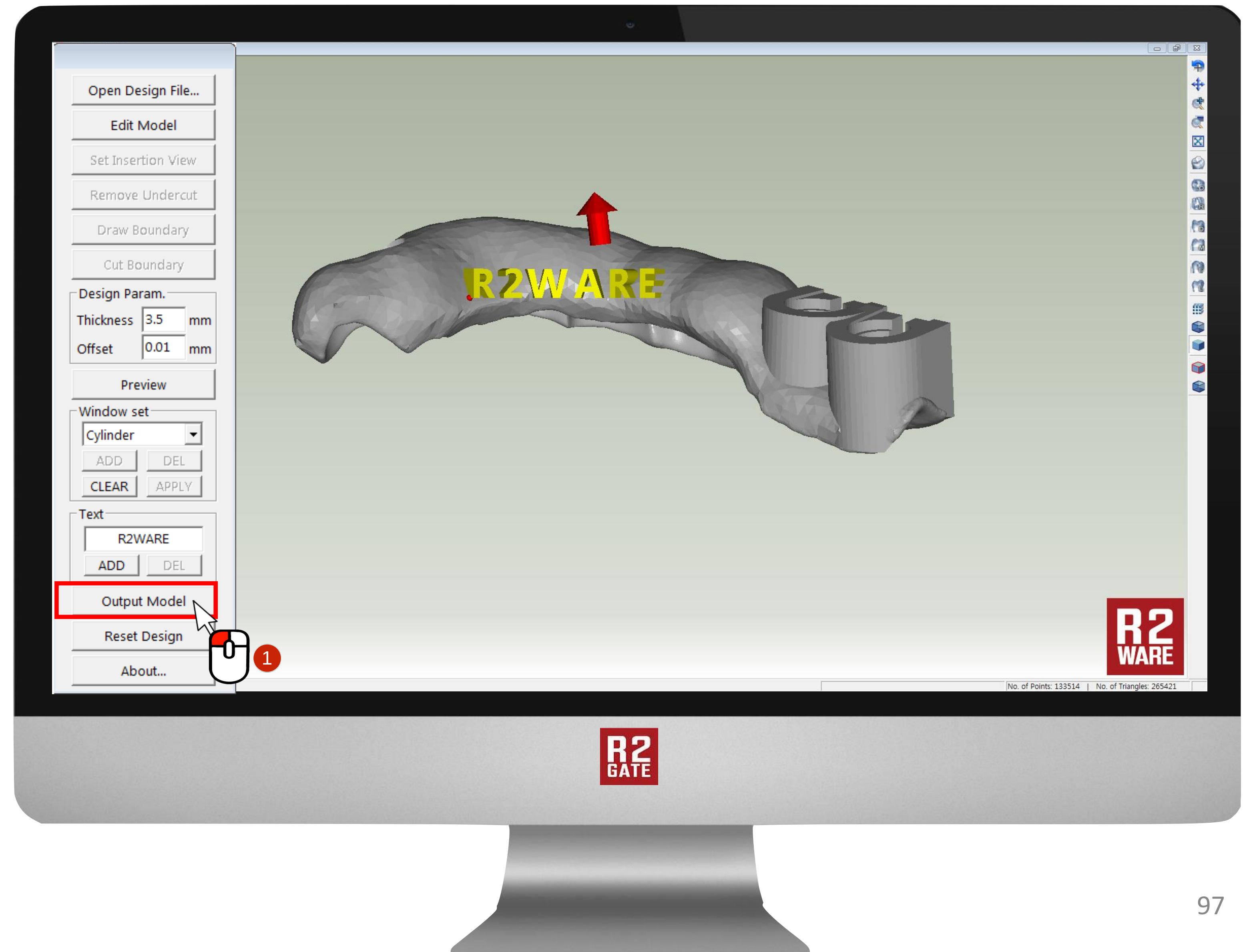
R2 Guide Design Export

Export STL file of R2 Guide

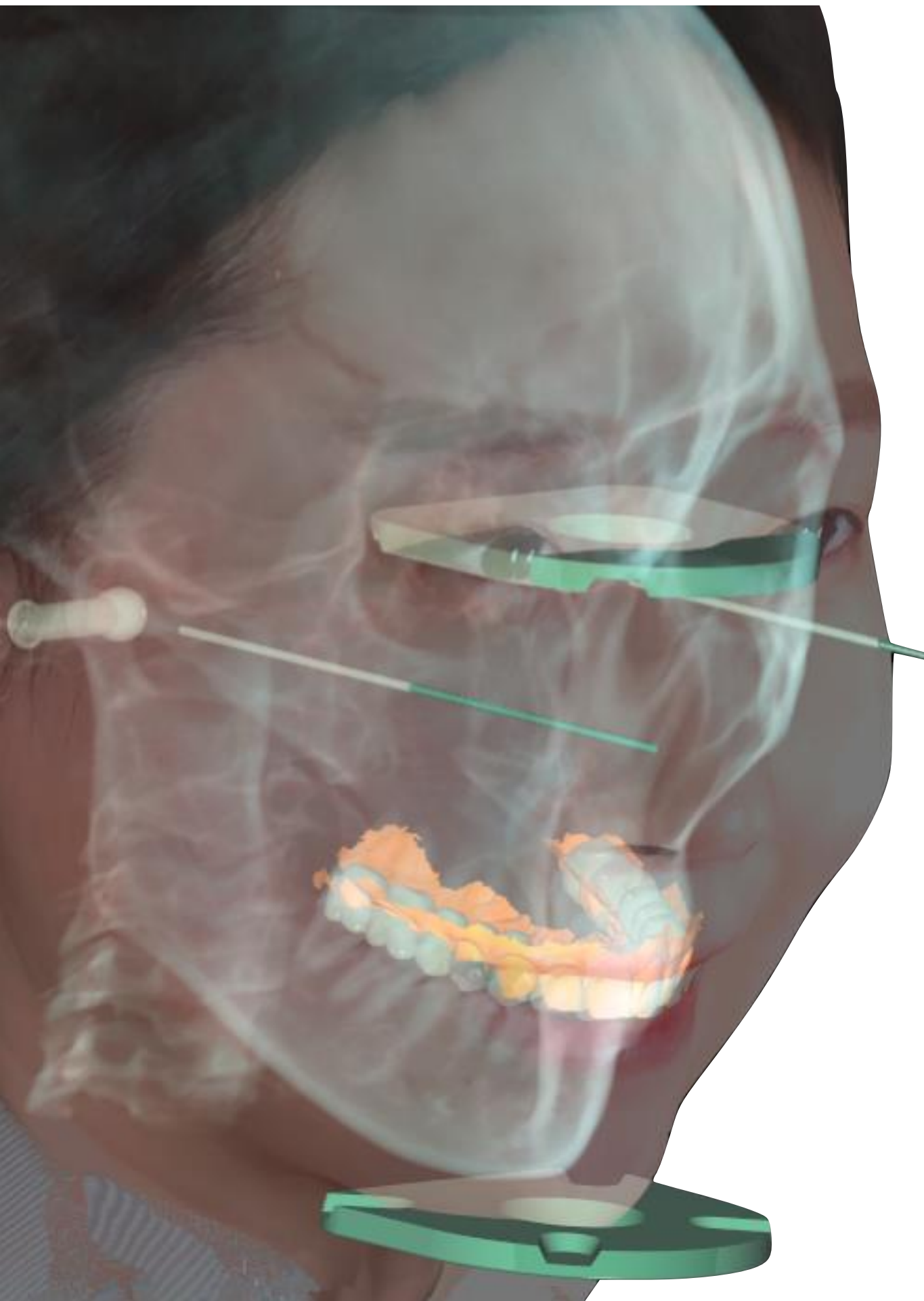
1

Output Model

Click **OUTPUT MODEL** to export & save STL file



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Turning imagination into reality



7 R2 Guide Printing & Finishing

7.1 R2 Guide Printing & Finishing 3D Printer



3D printing



3D printer
settings



Cleaning



Trimming &
finishing

**R2
GATE**

R2GATE 2.0
Apr. 2019

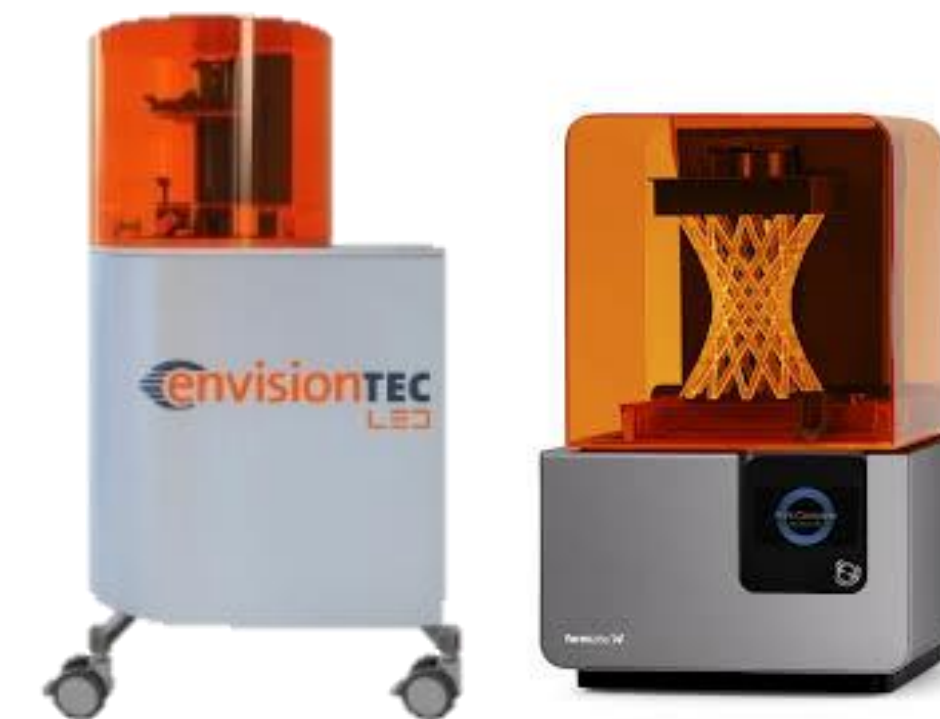
Type of 3D printer

- **FDM** Plastic filament is pulled from 3D printer head, passed through hot nozzle, melted, stacked, & quickly hardened
- **SLA** Light-curing liquid resin is stacked & hardened
- **SLS** Same as SLA, except material is powder
- **DLP** Similar to SLA, yet size of printable output is small & more precise
 - ! Recommended for printing R2 Guide



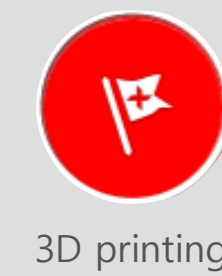
Recommendations for DLP 3D printers

- Use laminate thicknesses of at least 100 microns
- Use sample output (single type, bridge type, full case) suitable for model
- After drilling into implant hole, clearance must be precise to proceed
- Printer output software should be as scalable as possible
- For material, less deformation over long period is better



7.2 R2 Guide Printing & Finishing

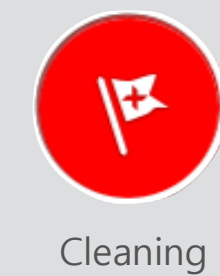
3D Printer Settings



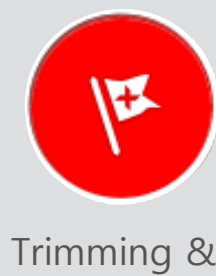
3D printing



3D printer settings



Cleaning



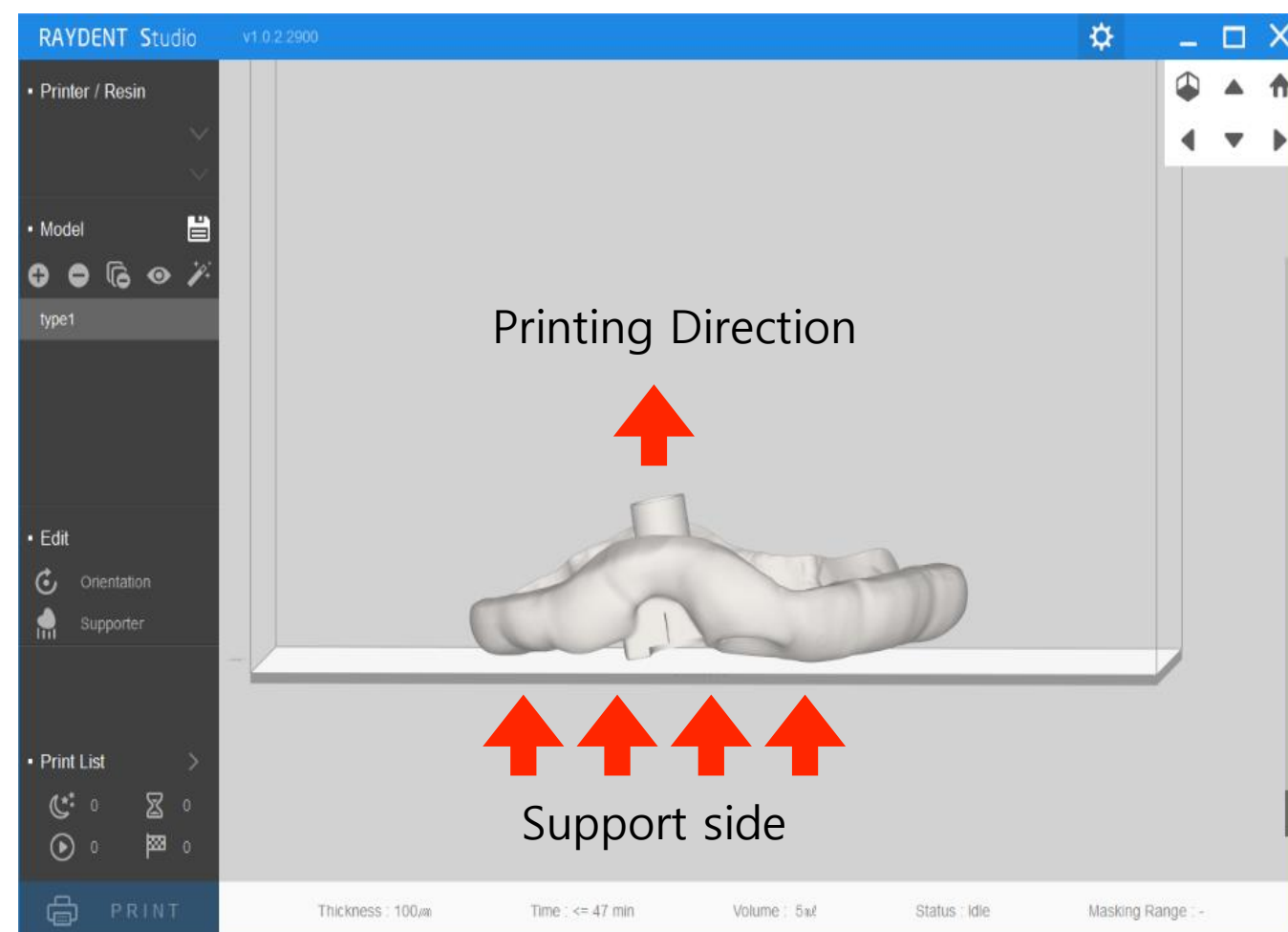
Trimming & finishing

R2
GATE

R2GATE 2.0
Apr. 2019

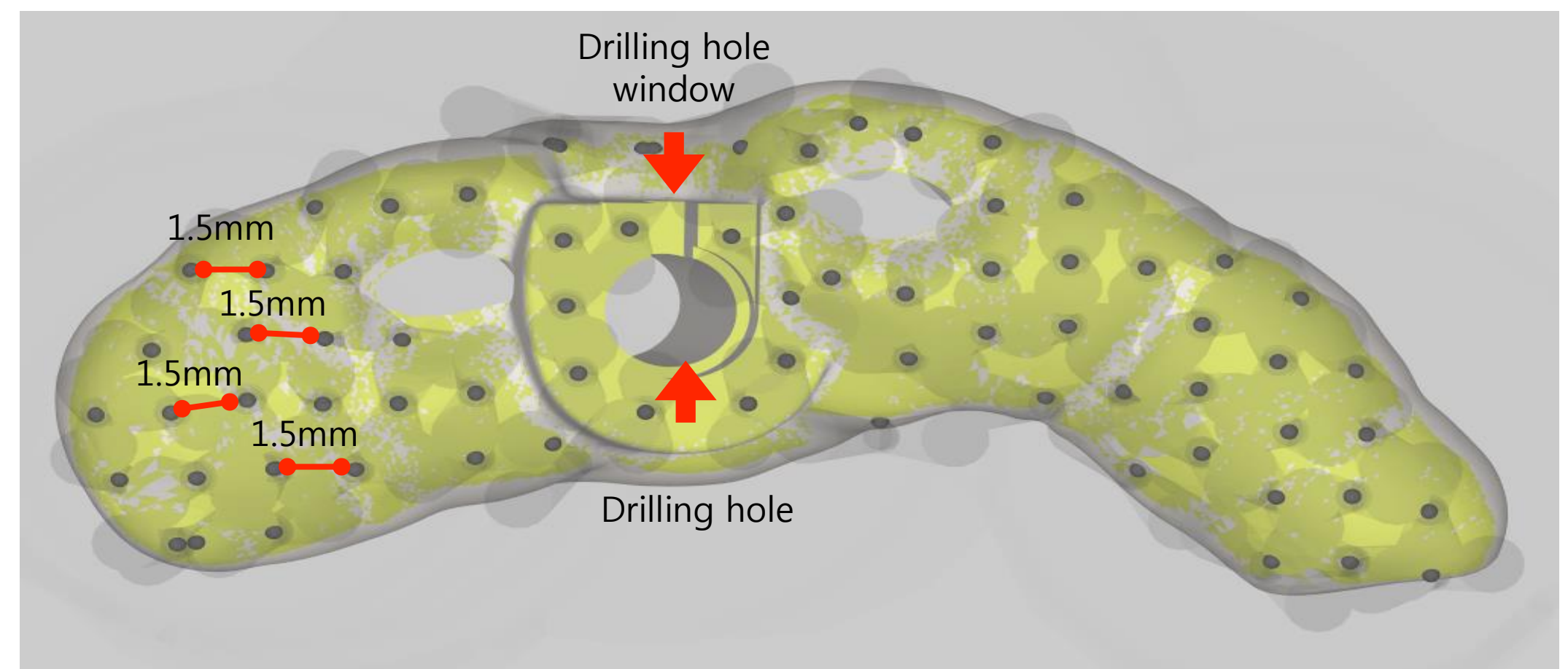
1 Printing direction of R2 Guide

R2 Guide 출력 시 **교합면이 바닥을 향하도록** 해야 용이합니다.



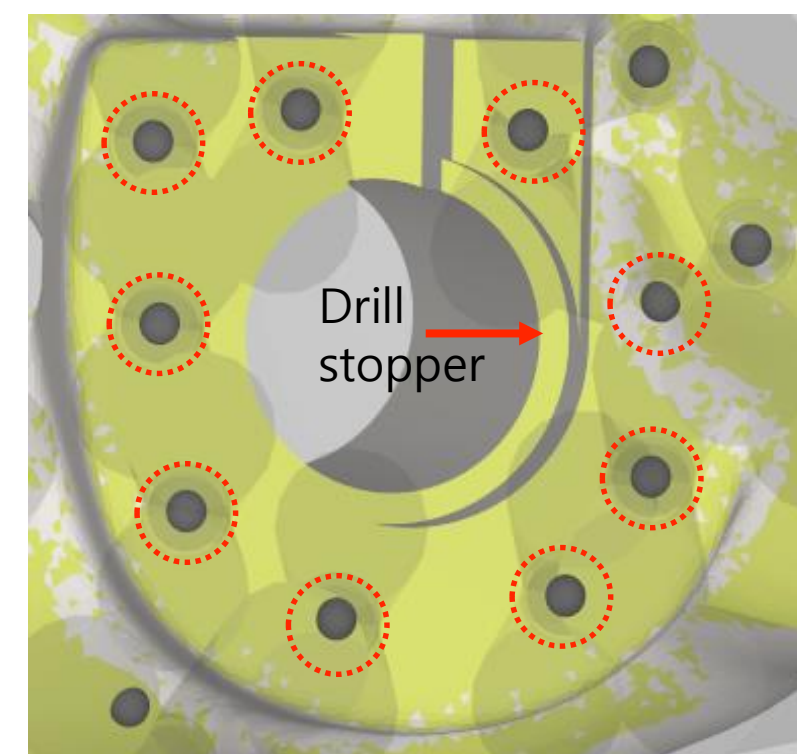
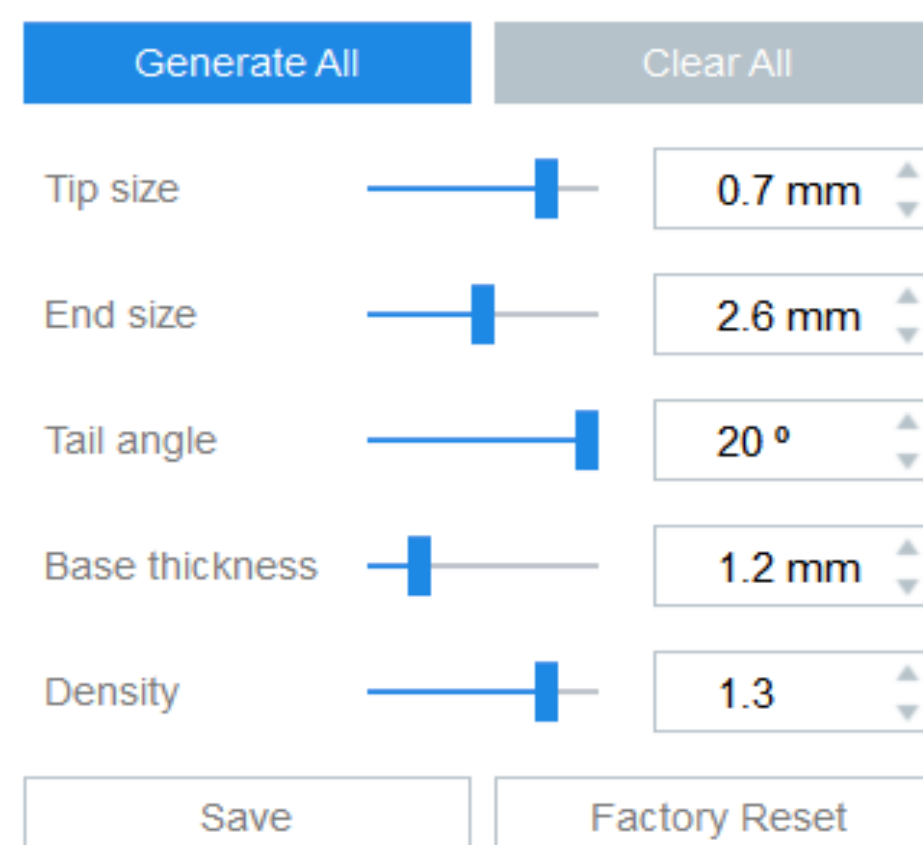
3 Number & location of supports

- Ideal distance between supports is **1.5mm**
- Number of supports is not fixed, but should be determined based on test printing
- Too many supports wastes material & complicates finishing
- Insufficient supports can result in printing failure

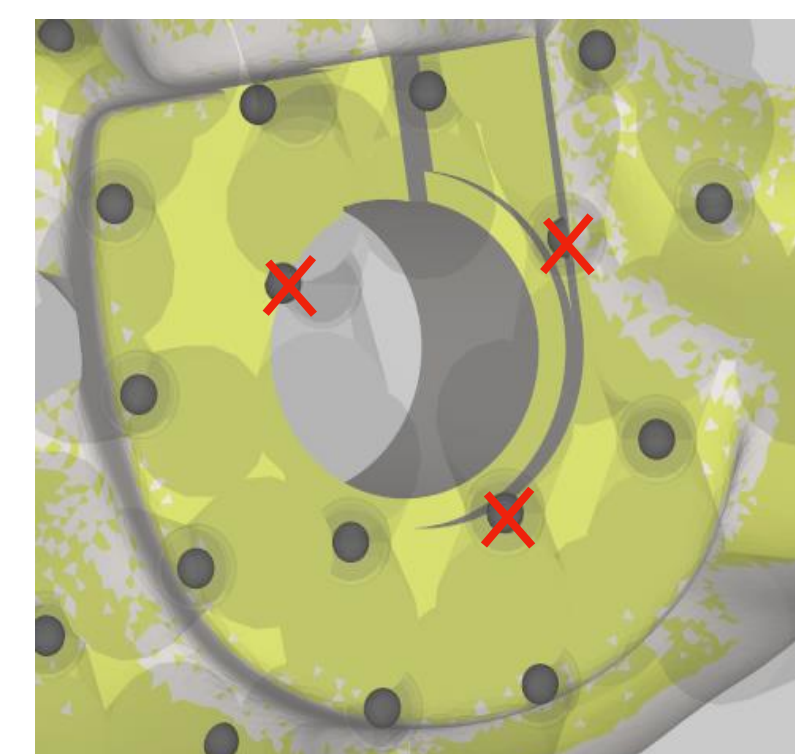


2 3D printer settings

- To avoid failure, test 3D printer before printing R2 Guide
- Sample settings used with Meg Printer II



Attach at least 10 supports around top of drilling hole



Do not attach supports inside drilling hole

7.3 R2 Guide Printing & Finishing

Cleaning



3D printing



3D printer settings



Cleaning



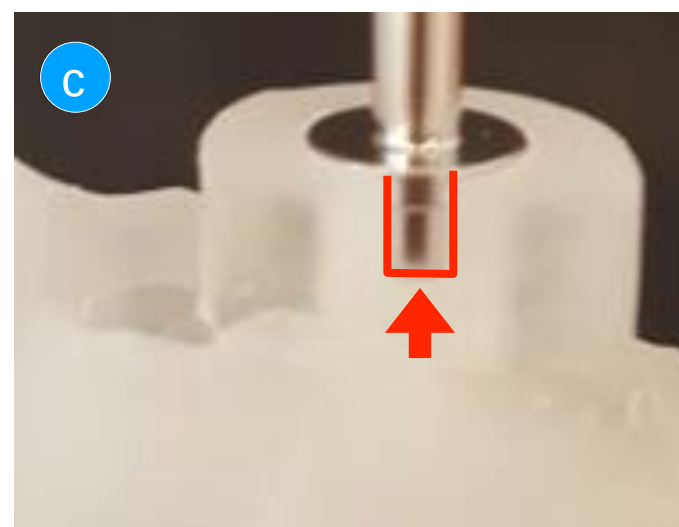
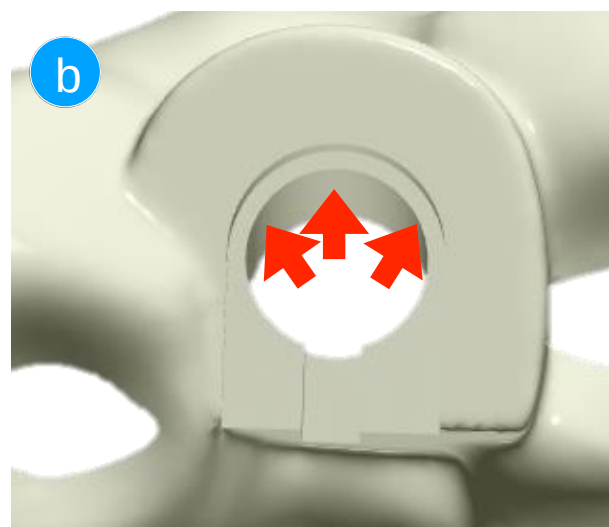
Trimming & finishing

R2
GATE

R2GATE 2.0
Apr. 2019

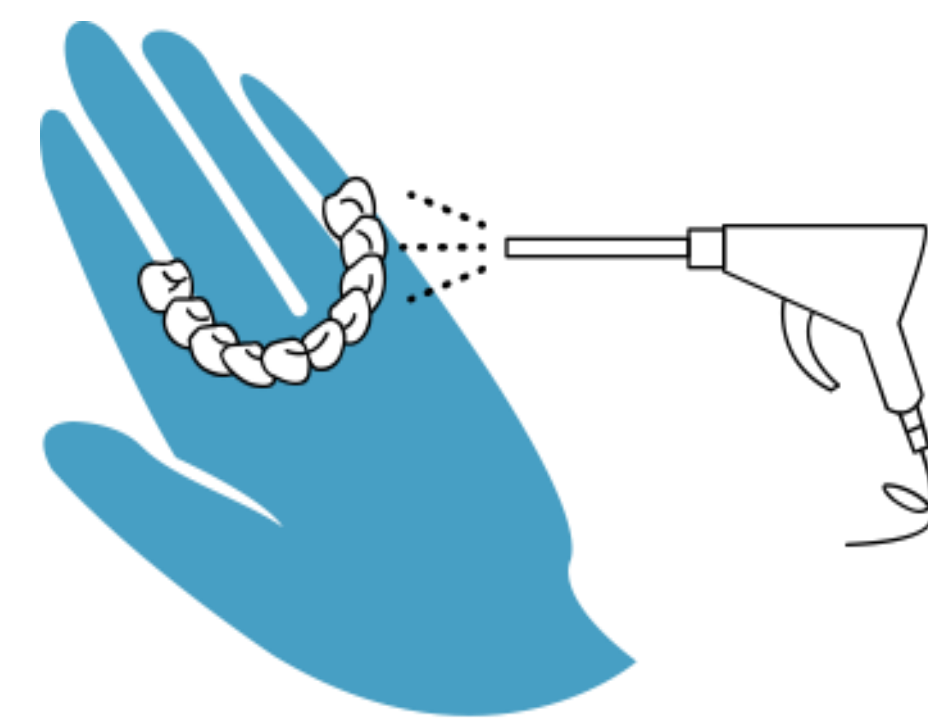
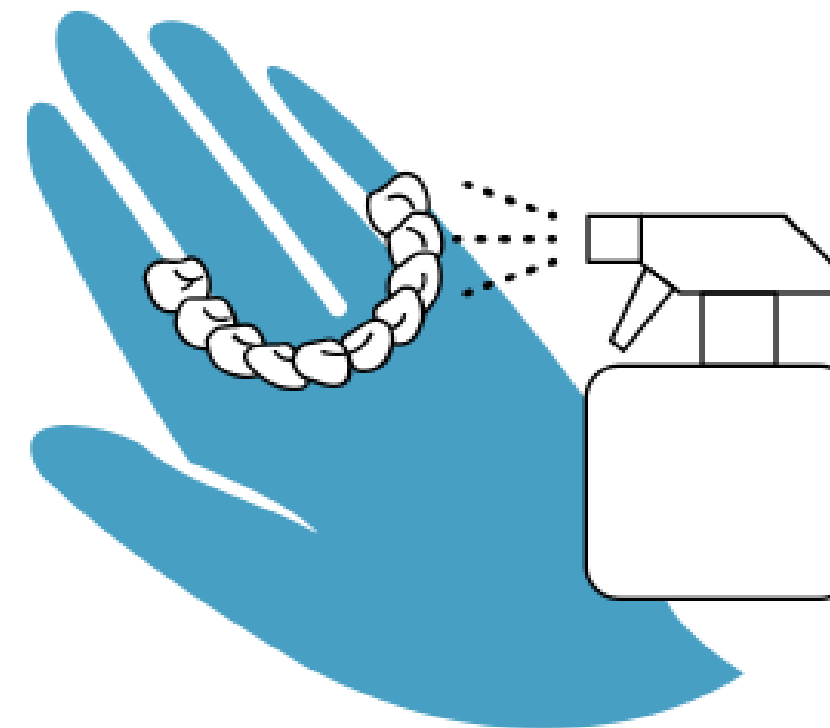
1 Points to check after printing

- a Overall form of R2 Guide
- b Drill stopper inside guide hole
- c Guide hole window



2 Cleaning with alcohol(IPA)

Spray IPA onto R2 Guide & dry using air-gun



! Ultrasonic cleaning



Extended immersion in alcohol (over 5 min) weakens internal structure of R2 Guide

7.4 R2 Guide Printing & Finishing

Trimming & Finishing



3D printing



3D printer settings



Cleaning



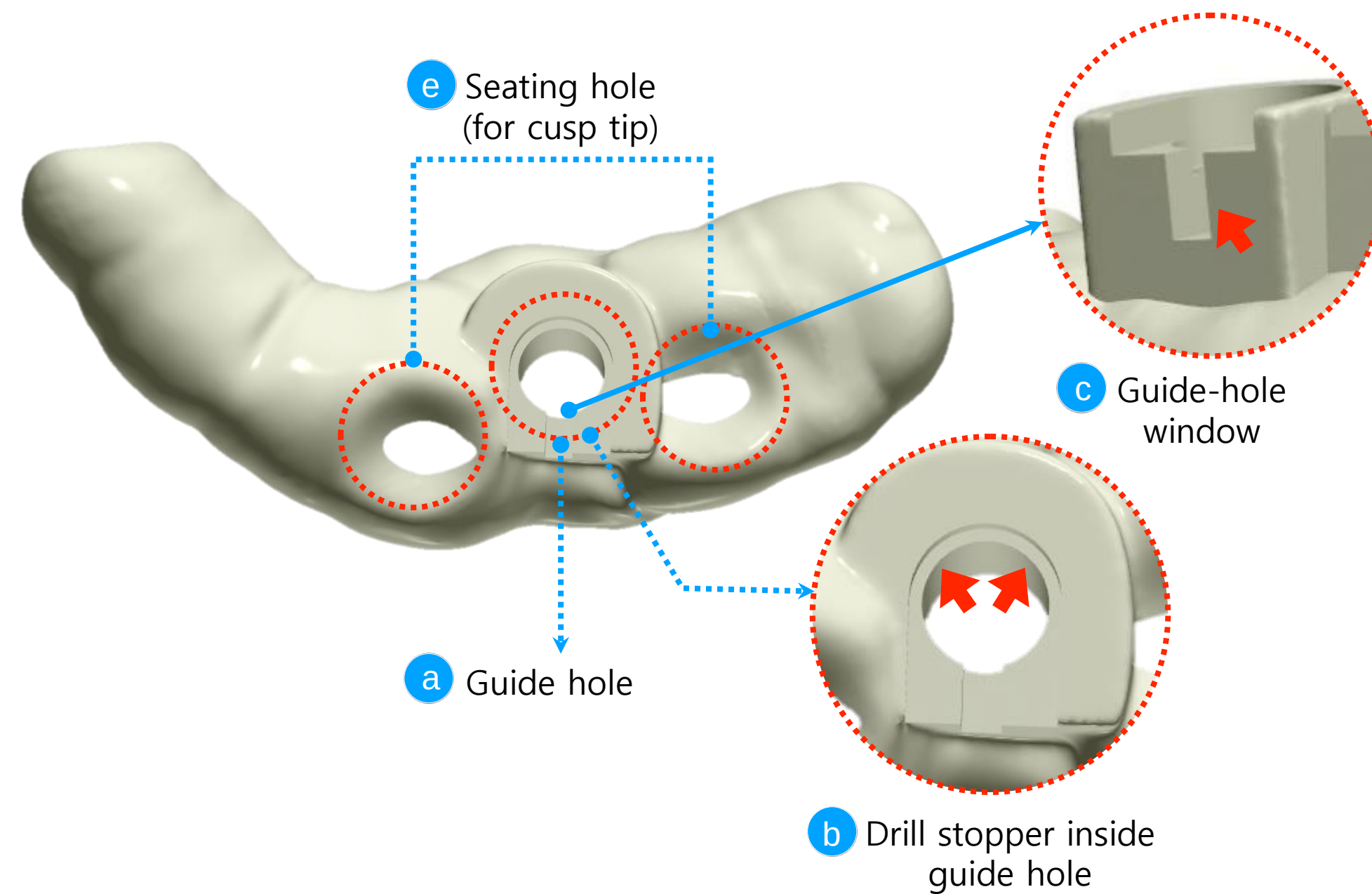
Trimming & Finishing

R2
GATE

R2GATE 2.0
Apr. 2019

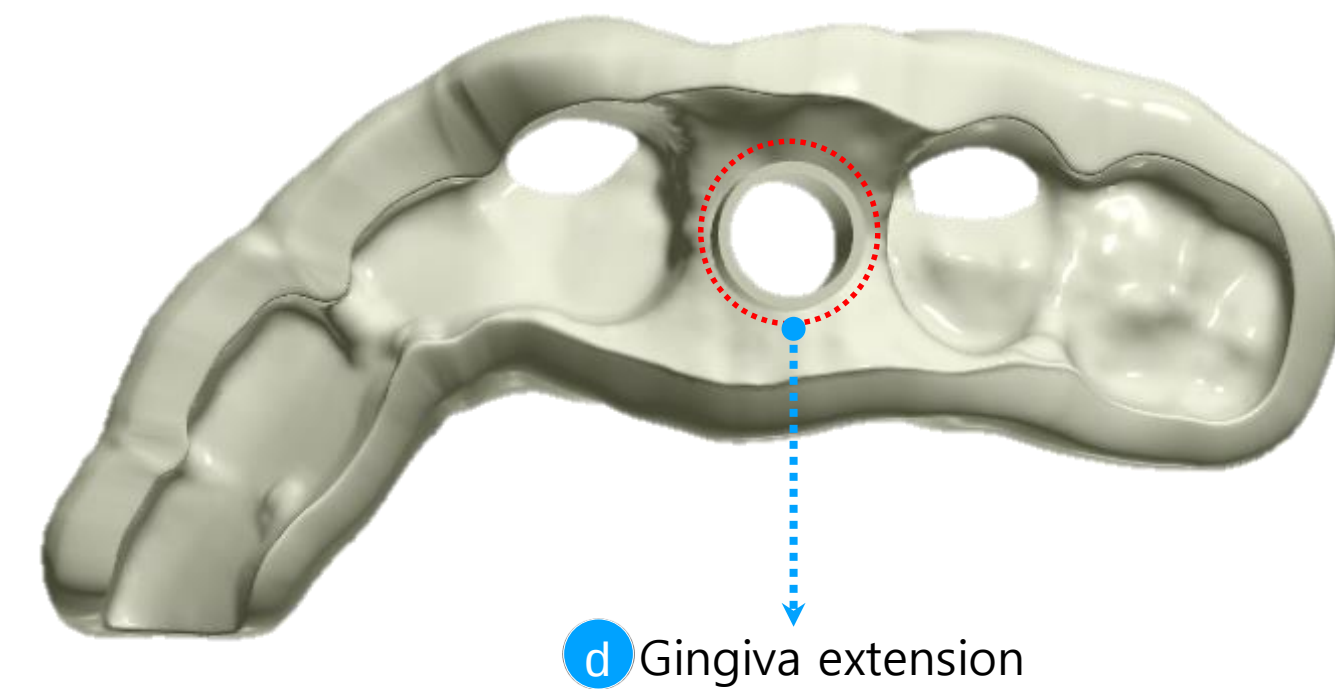
Understanding R2 Guide

1 Occlusal view

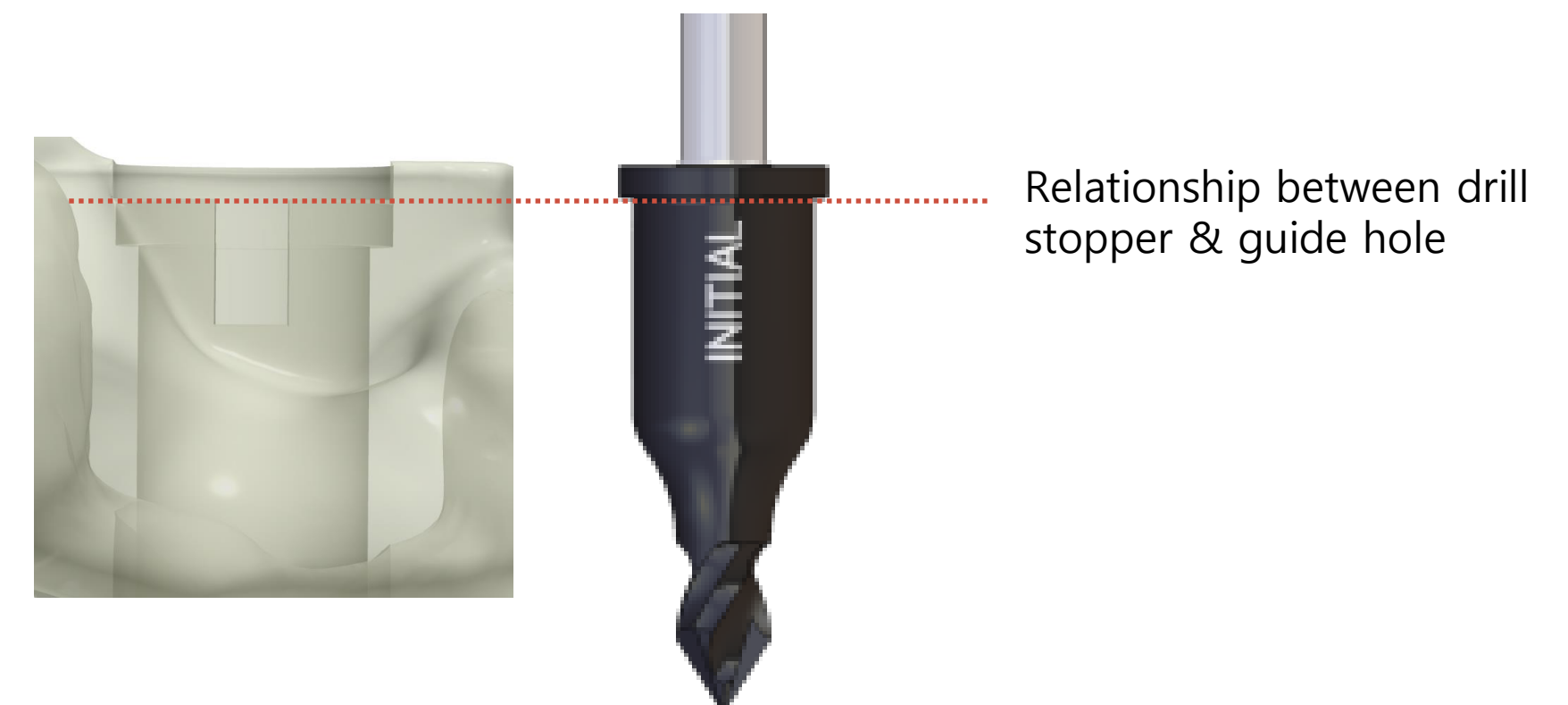


- a Guide hole for drilling & implant placement
- b Drill stopper to control drilling depth
- c Guide-hole window to control depth & hex of implant
- d Gingiva extension: guide hole is extended to sub-gingiva
Normally trimmed, but retained in case of open-flap surgery
- e Seating holes: check fit with cusp tips

2 Inside view



3 Inside guide hole



7.4 R2 Guide Printing & Finishing

Trimming & Finishing



3D printing



3D printer settings



Cleaning



Trimming & Finishing

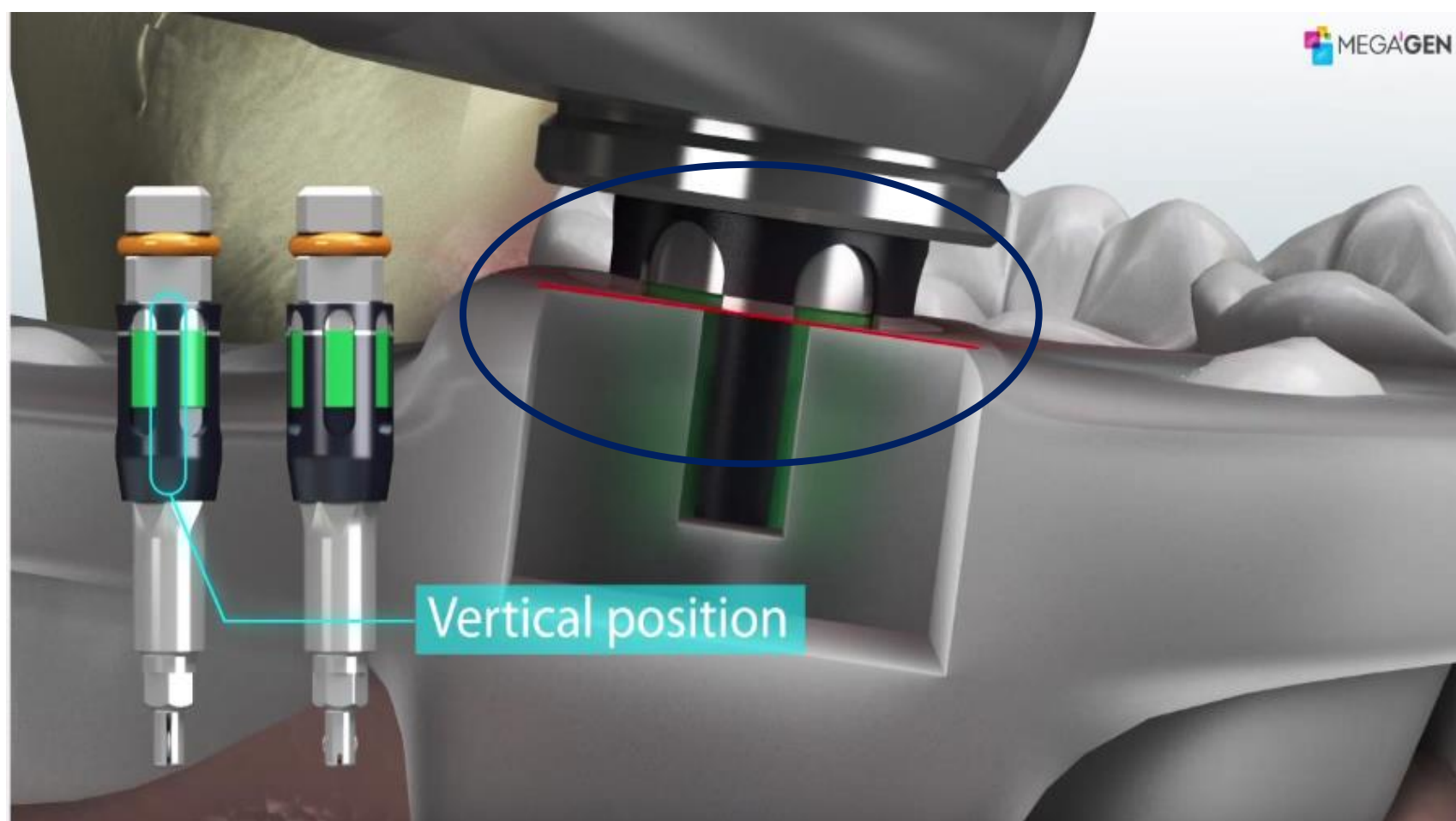
R2
GATE

R2GATE 2.0
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Understanding R2 Guide

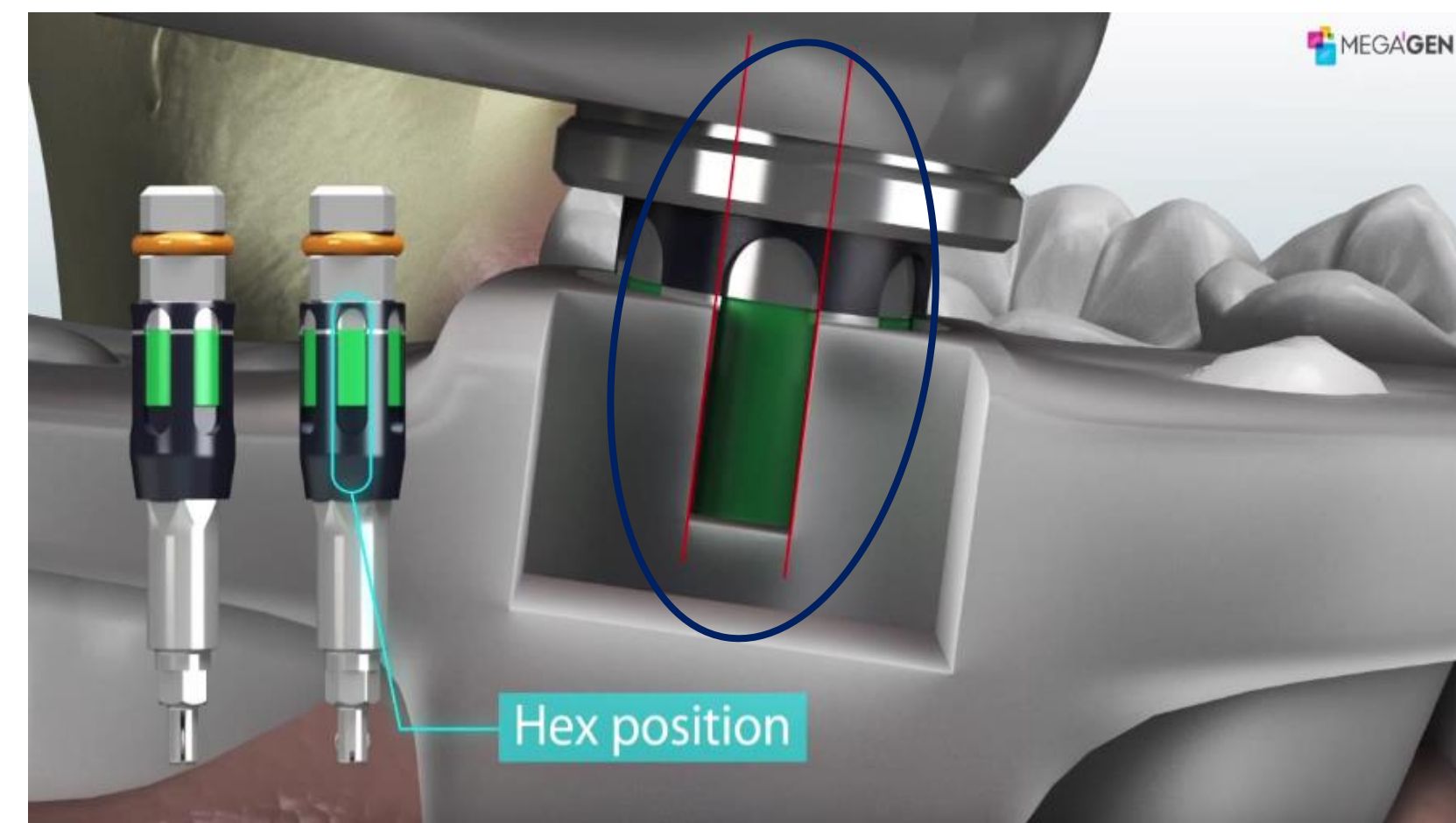
1 Implant depth control

Match vertical position on implant carrier with guide-hole window



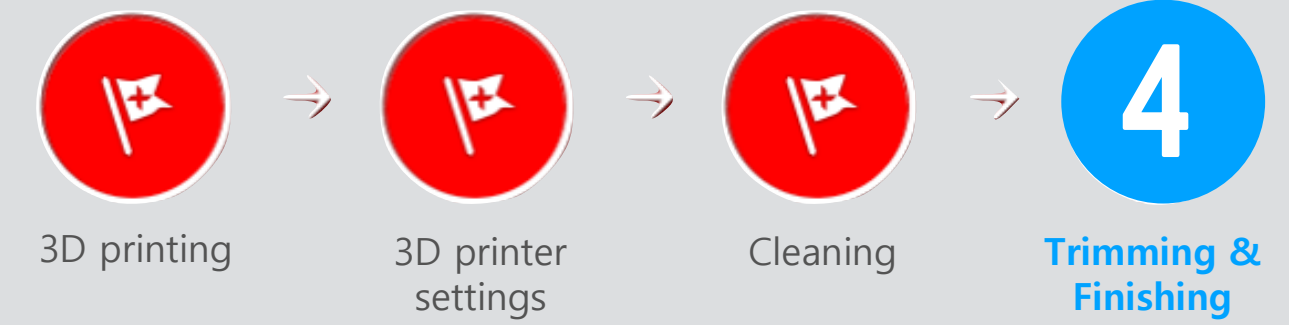
2 Hex position control

Match hex position on implant carrier with guide-hole window



7.4 R2 Guide Printing & Finishing

Trimming & Finishing



R2 Guide trimming시 필요한 재료

1 Nippers for removing supports



2 Trimmers

a				b			
	AGHTN2	AGHTR2	AGHTW2		AGHTN3	AGHTR3	AGHTW3
	Ø3.5	Ø5.0	Ø6.5		Ø3.5	Ø5.0	Ø6.5

a Drill stopper trimmer

b Guide hole trimmer

3 Denture burs

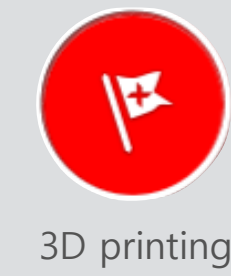


079ECE045

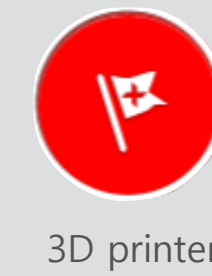
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7.4 R2 Guide Printing & Finishing

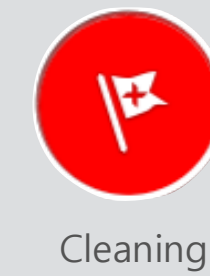
Trimming & Finishing



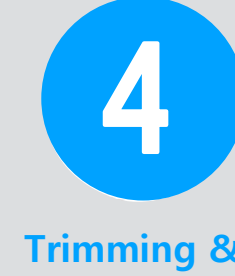
3D printing



3D printer settings



Cleaning



Trimming & Finishing

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Overview of finishing process

1 Clip supports using nippers



2 Smooth support areas using denture bur



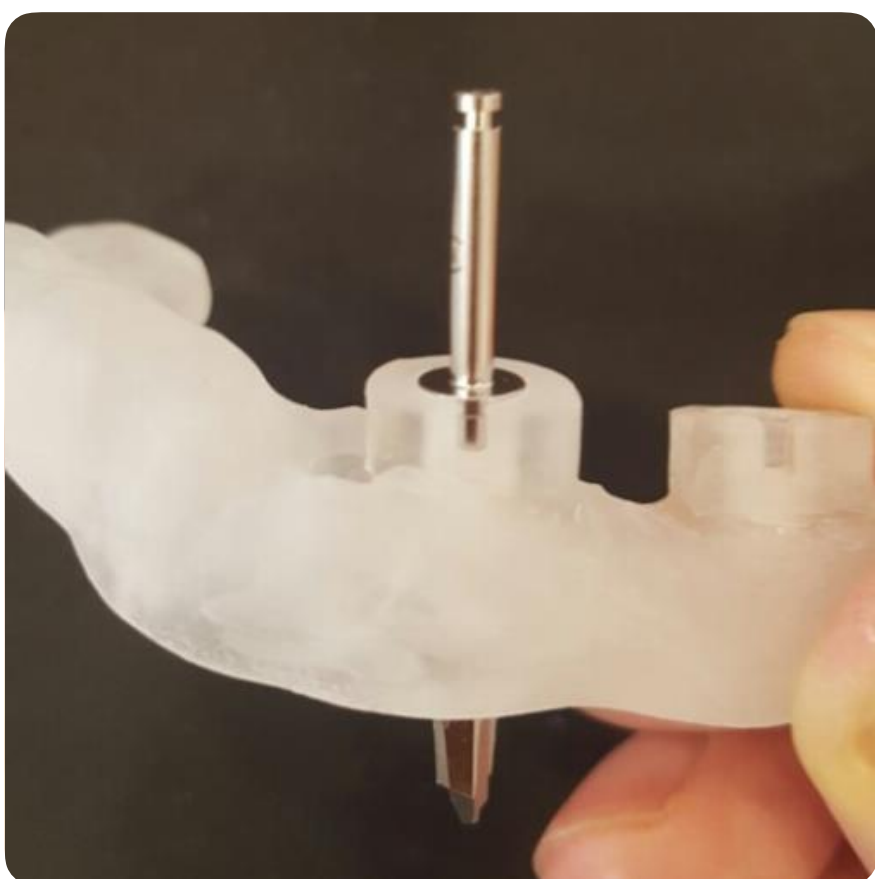
3 Trim guide hole & check insertion direction



4 Trim top of window carefully



5 Check height of drill stopper



6 Trim any anchor pin holes using 2mm drill



7 Trim undercut inside R2 Guide



8 Check fit of seating holes & cusp tips



7.4 R2 Guide Printing & Finishing

Trimming & Finishing



3D printing



3D printer settings



Cleaning



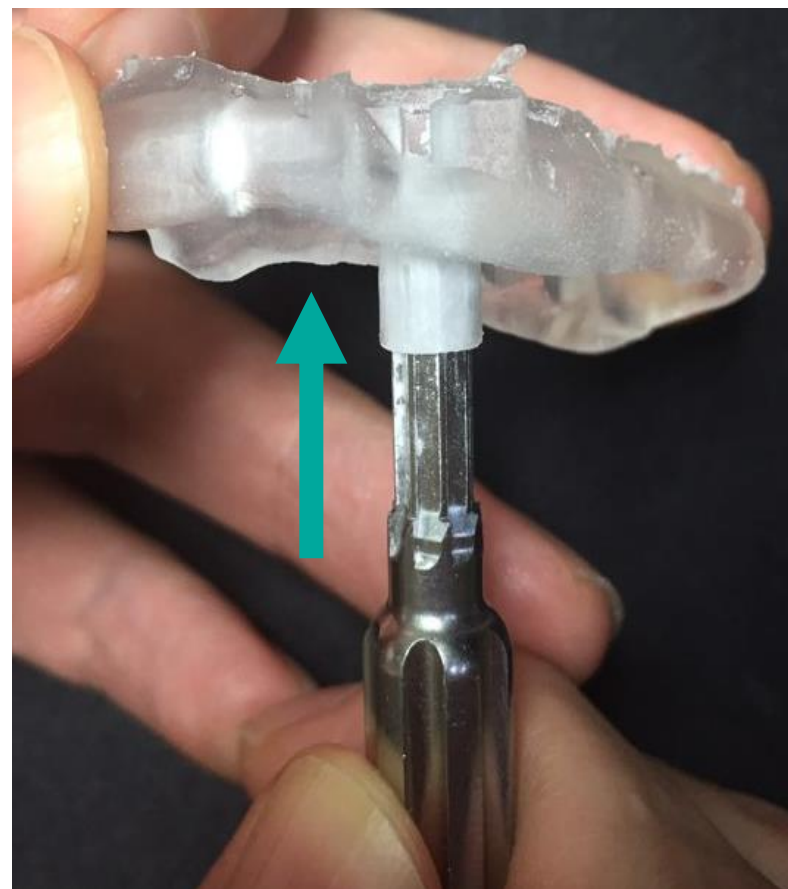
Trimming & Finishing

R2
GATE

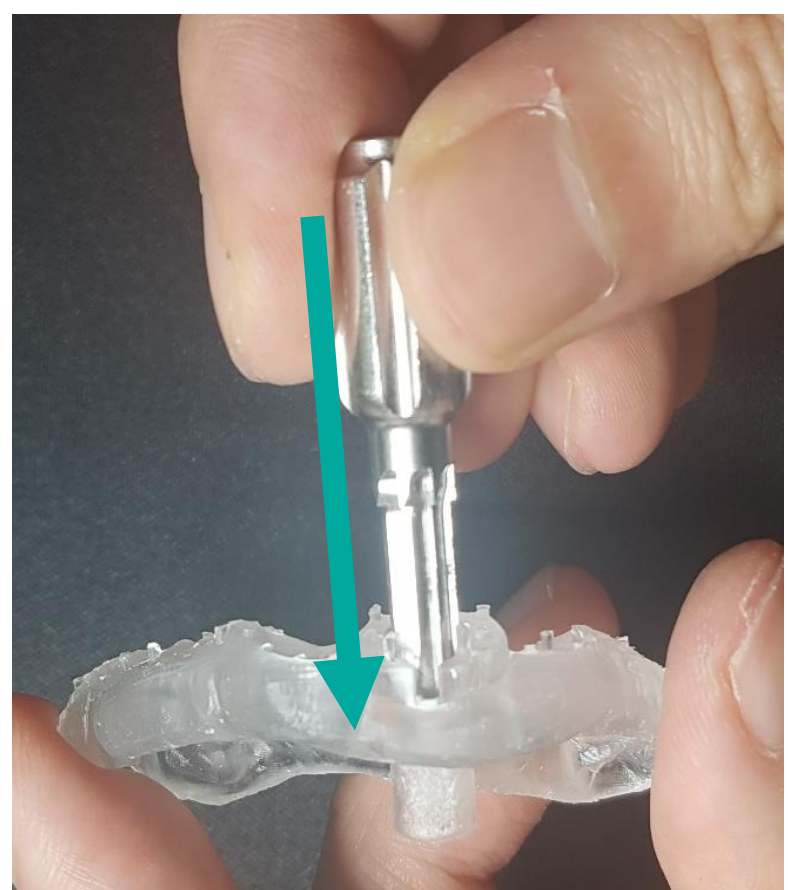
R2GATE 2.0
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Drill core

- 1 Insert trimmer slowly into gingiva extension of guide hole to prevent over trimming or tilting of insertion pass

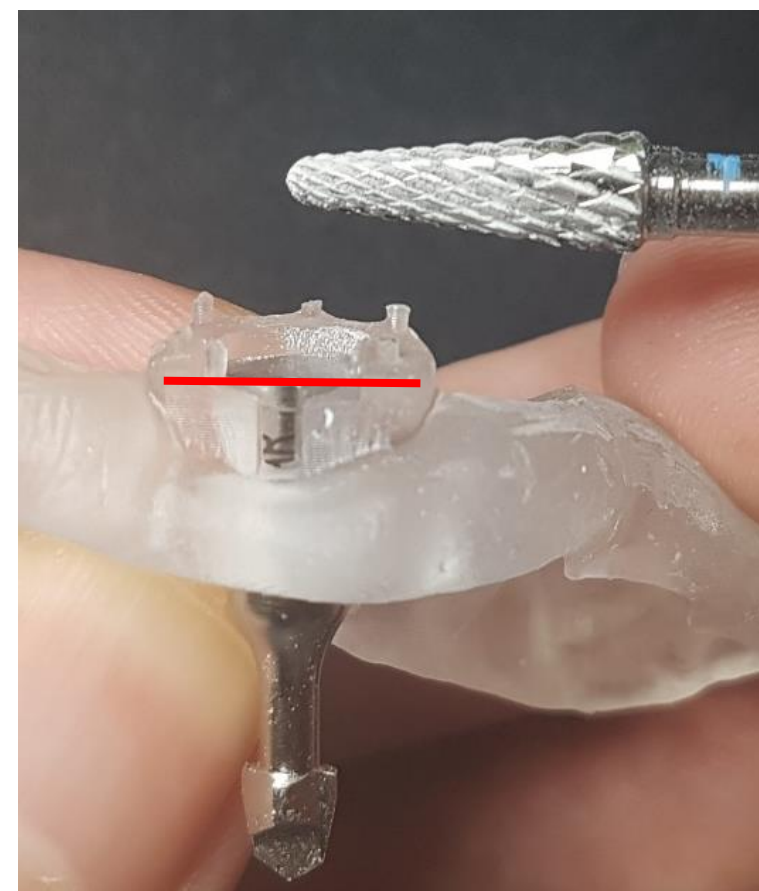


- 2 Insert trimmer into top of guide hole & rotate slowly, then remove debris carefully

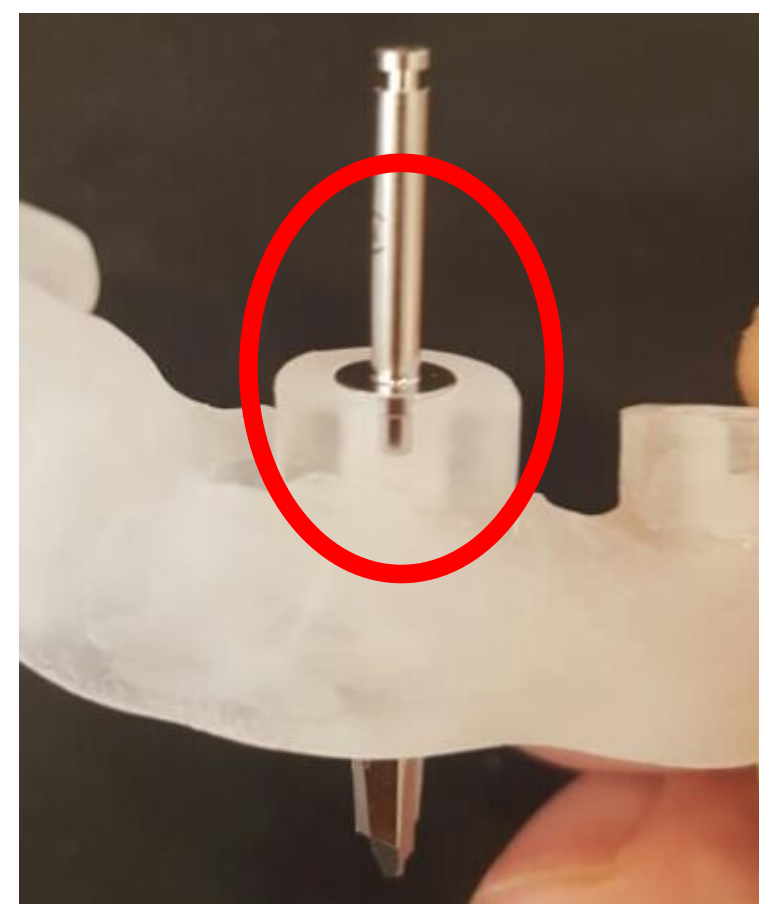


Drill stopper

- 1 Use stopper drill to parallel trim top of guide hole



- 2 Check top of guide hole is parallel

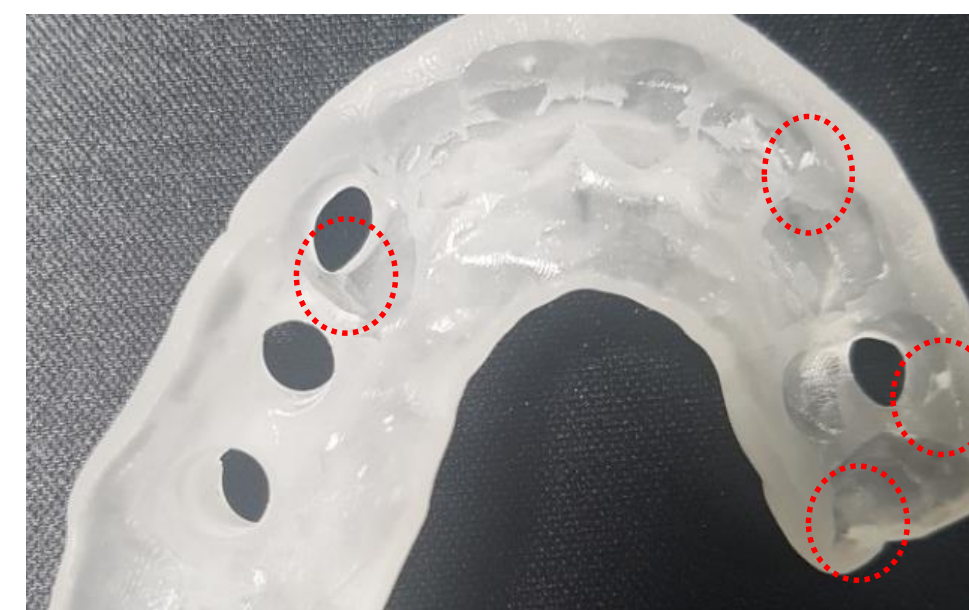


Fit check

- 1 Check fit between model & seating holes in R2 Guide



- 2 Trim undercut inside R2 Guide & check fit repeatedly



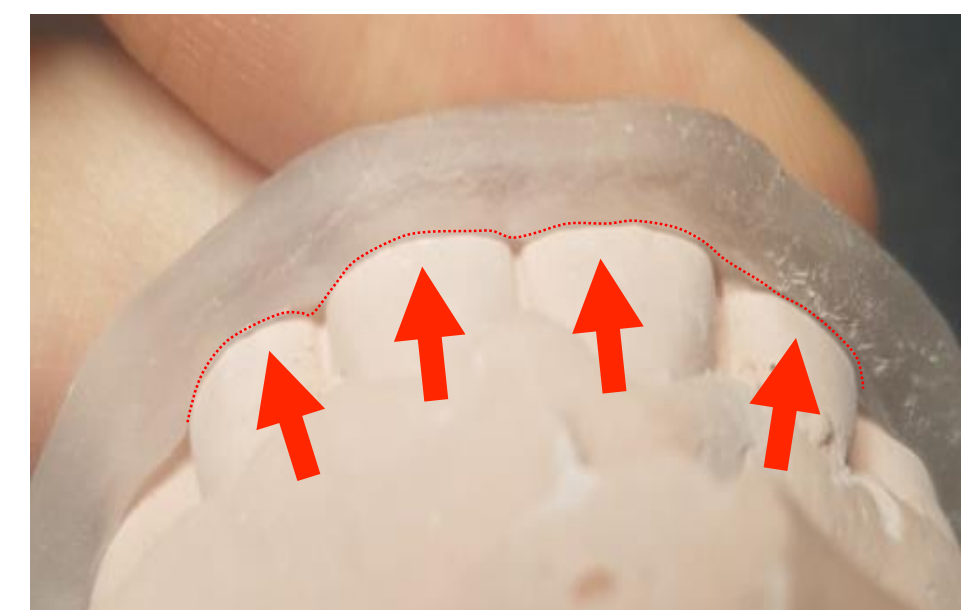
- 3 Check seating holes & cusps after trimming



- 4 Check fit between R2 Guide margin & model

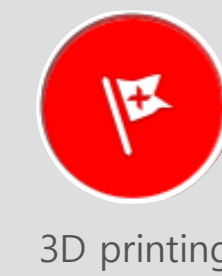


- 5 Check fit between R2 Guide margin & model of teeth

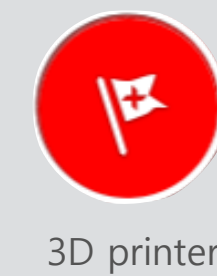


7.4 R2 Guide Printing & Finishing

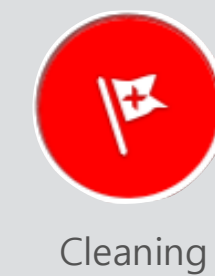
Trimming & Finishing



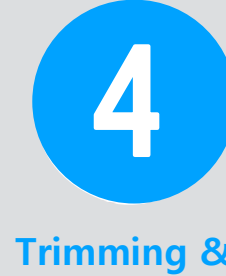
3D printing



3D printer settings



Cleaning



Trimming & Finishing

R2
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Anchor pinholes

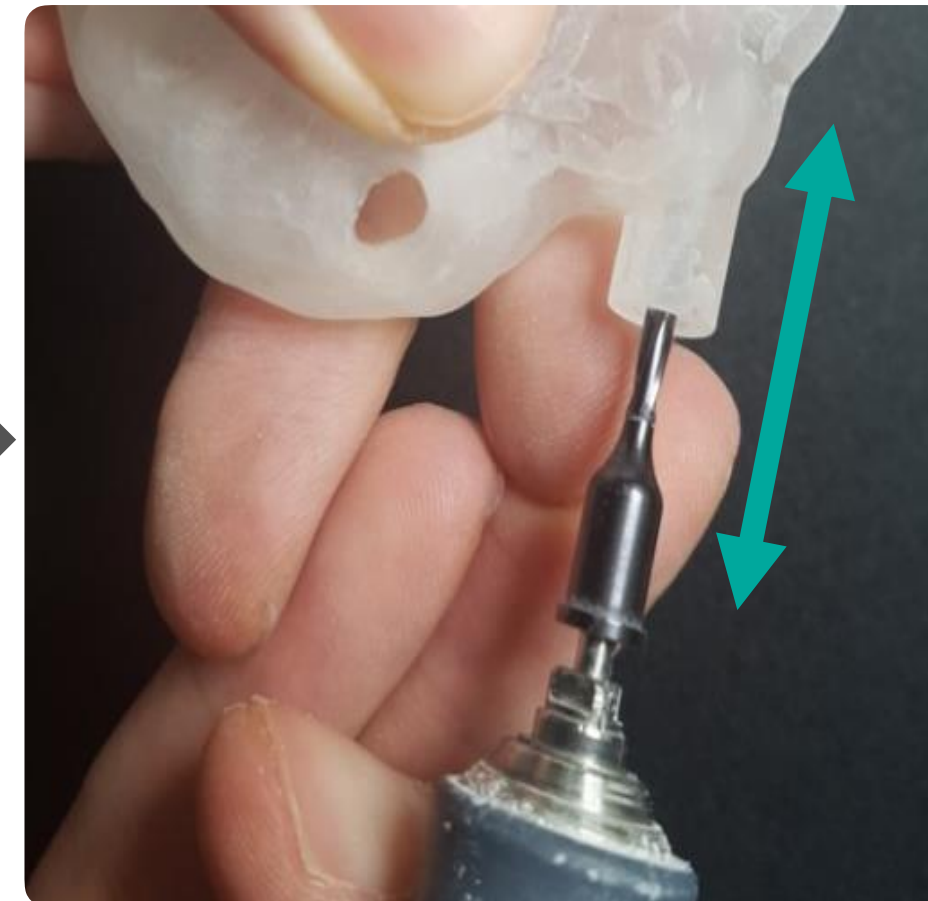
- 1 Insert anchor pin into pinhole & check clearance



- 2 Trim anchor pinhole using 2.0mm twist drill



- 3 Insert twist drill parallel to anchor pinhole path



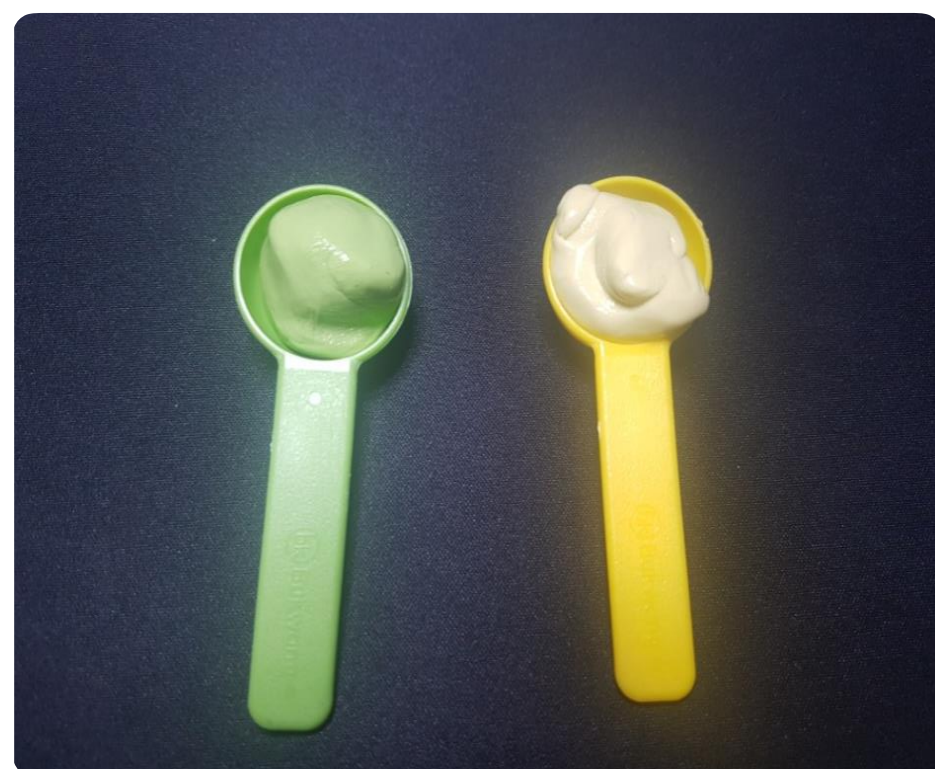
- 4 Check if anchor pin is fully engaged



Putty bite for seating R2 Guide

For edentulous or partially edentulous case, putty bite is required for stable seating of R2 Guide on residual ridge: mount upper & lower model using hinge articulator

- 1 Prepare putty: one spoon is enough



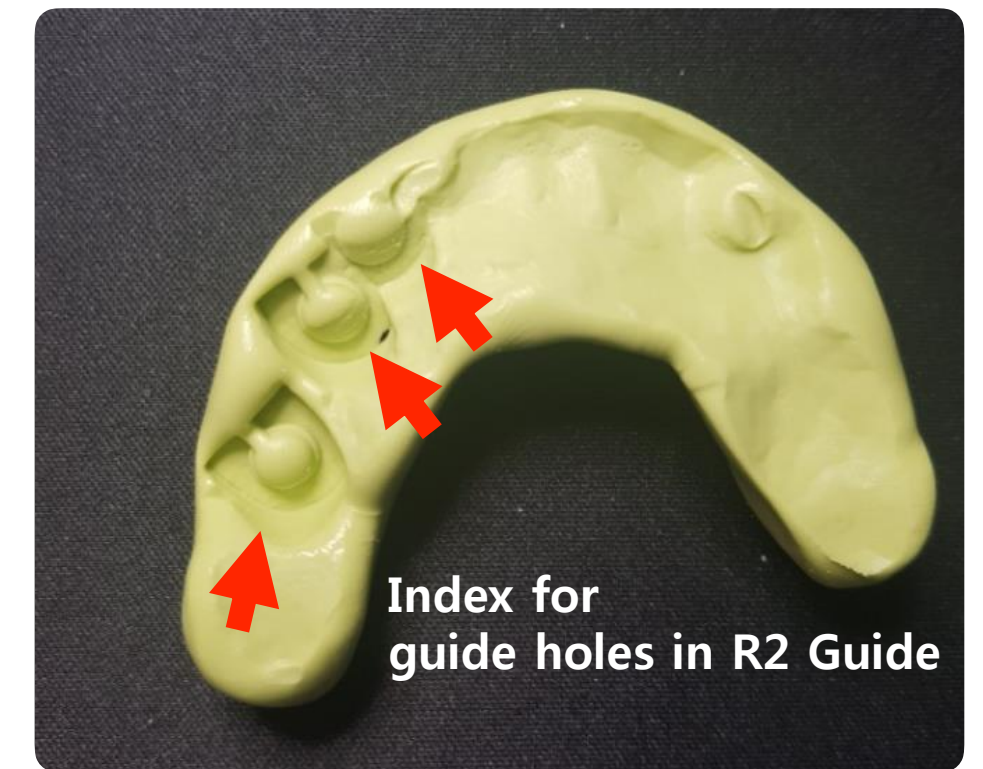
- 2 Mix putty & make dough



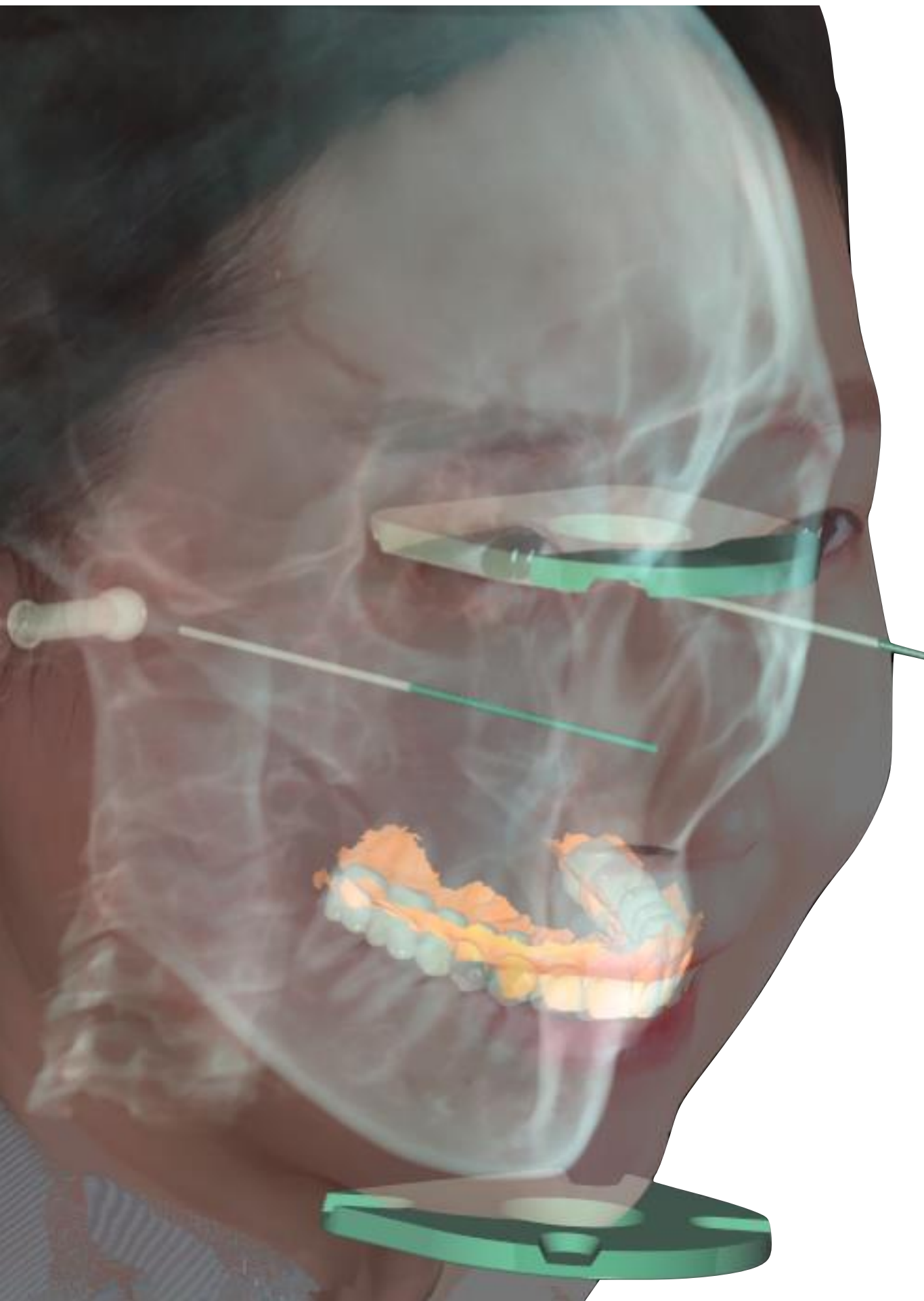
- 3 Place R2 Guide on model & take putty impression



- 4 After it solidifies, remove putty bite from model



R2GATE™
Turning imagination into reality



8 R2 Guide Surgery

8.1 R2 Guided Surgery Pre-surgery checkpoints

1

Pre-surgery
checkpoints



R2 Guide
fitting



Drilling
protocol



ONE-DAY
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R2 Guide™

Virtual planning to reality!

- 3D printed based on approved treatment plan
- One body combining drill guide hole(s), drill stopper(s), & hex control



1 Sterilization of R2 Guide & prosthesis

Sterilize R2 Guide & prosthesis in **ANTISEPTIC** (e.g. chlorhexidine or gluconate) for 30 minutes before surgery



! Do NOT use autoclave

- Autoclave causes distortion of R2 Guide
- Only sterilize R2 Guide using antiseptic



2 Wide implant (over Ø5.0mm - real size)

In this case, R2 Centre provides two R2 Guides:

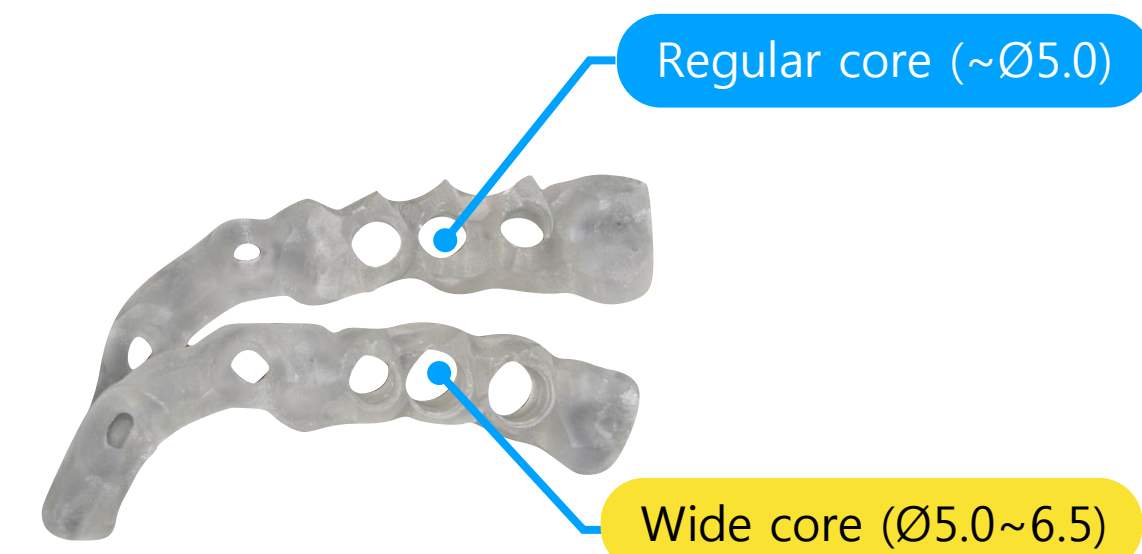
- regular drill guide hole (Ø5.0)
- wide drill guide hole (Ø5.0-6.5)

Use up to 4.8mm drill with regular drill guide hole, then use wide drill guide hole to finish drilling & place wide implant

R2 Guide surgery

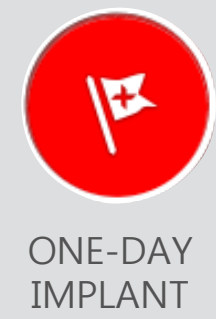
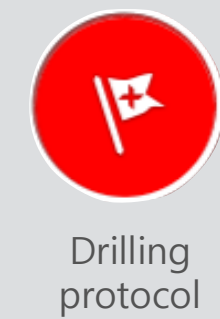
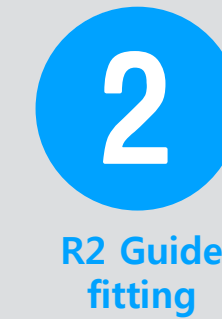
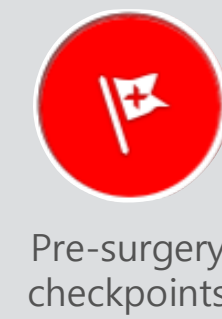
Highly accurate & convenient

- All drills consist of drill, drill guide & drill stopper as one body
- No need for metal sleeves or spoons!
- Shorter surgery time!



8.2 R2 Guided Surgery

R2 Guide fitting



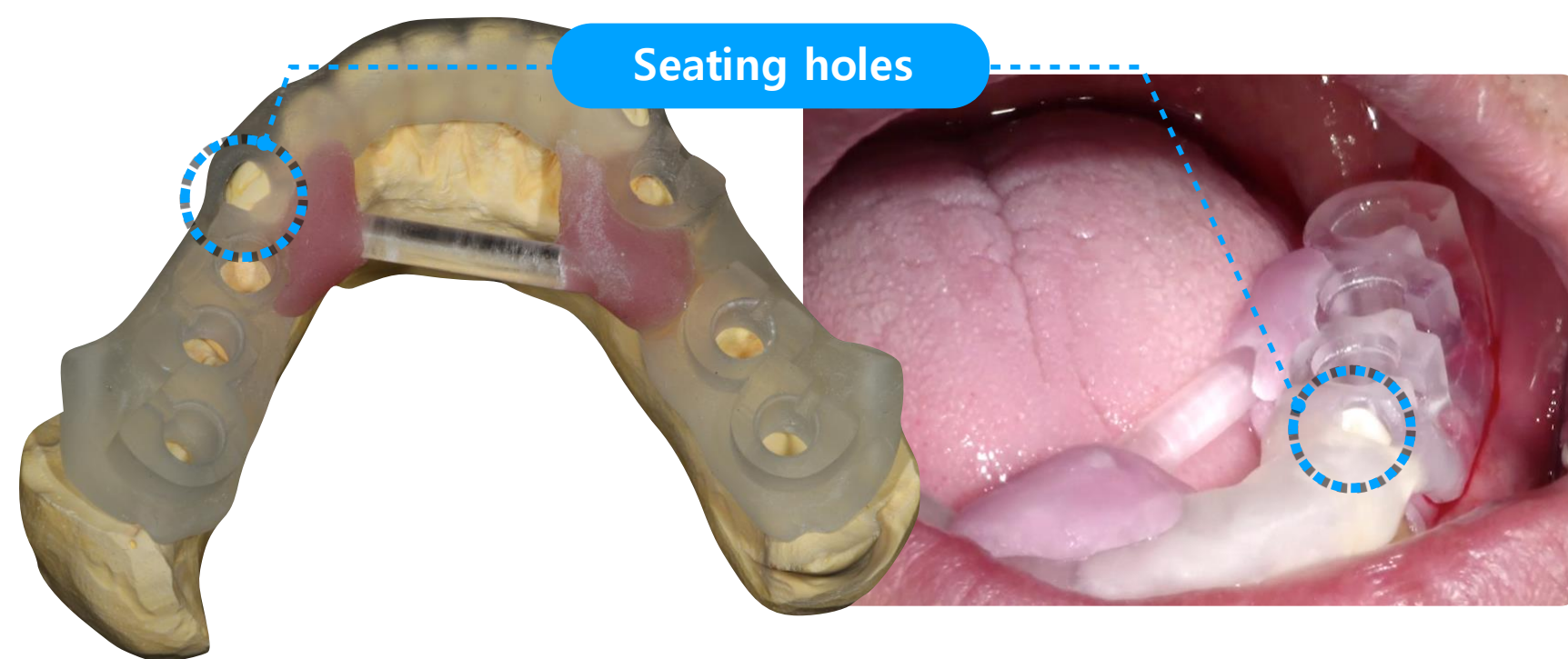
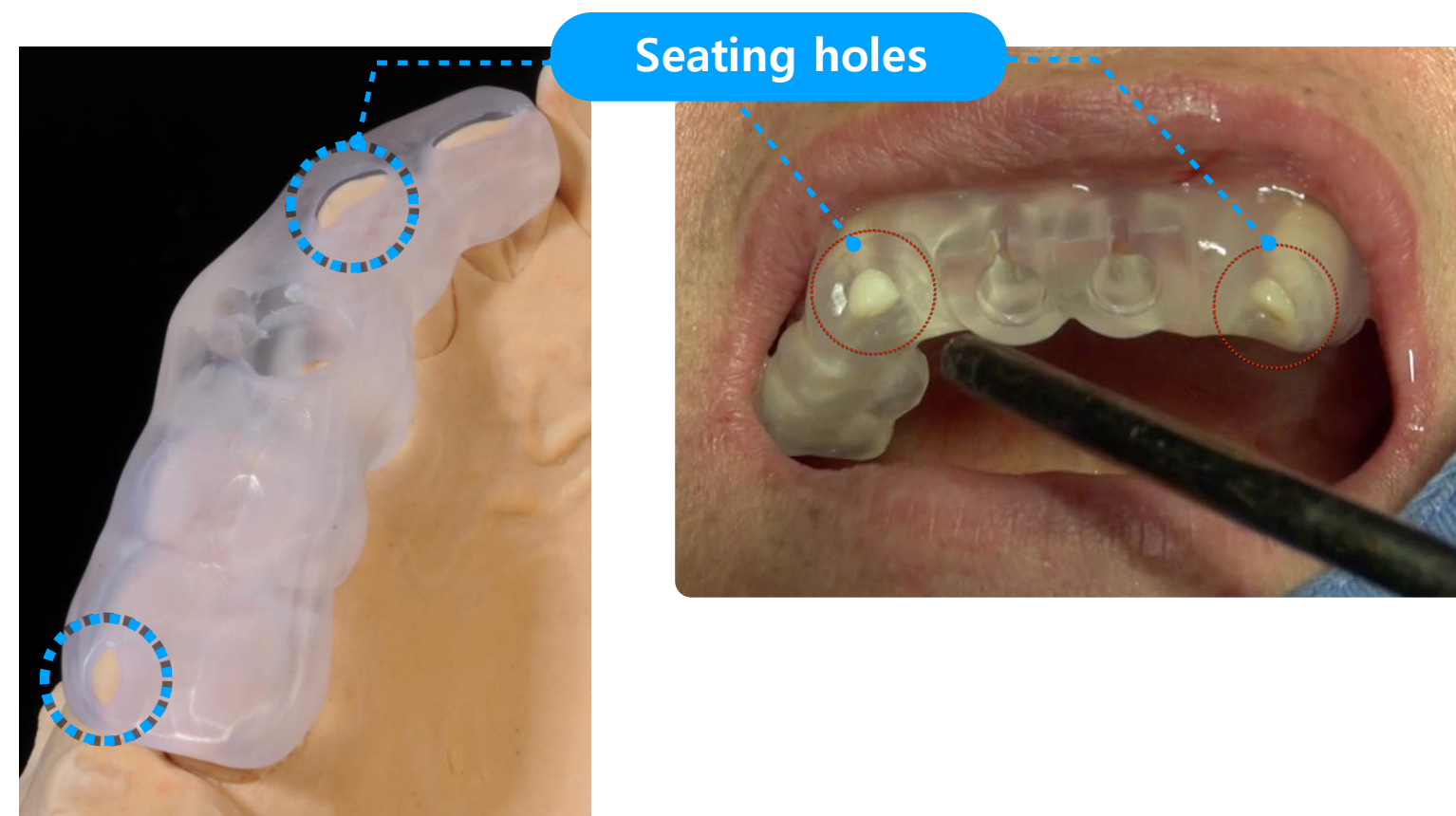
**R2
GATE**

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1 Tooth & tissue support

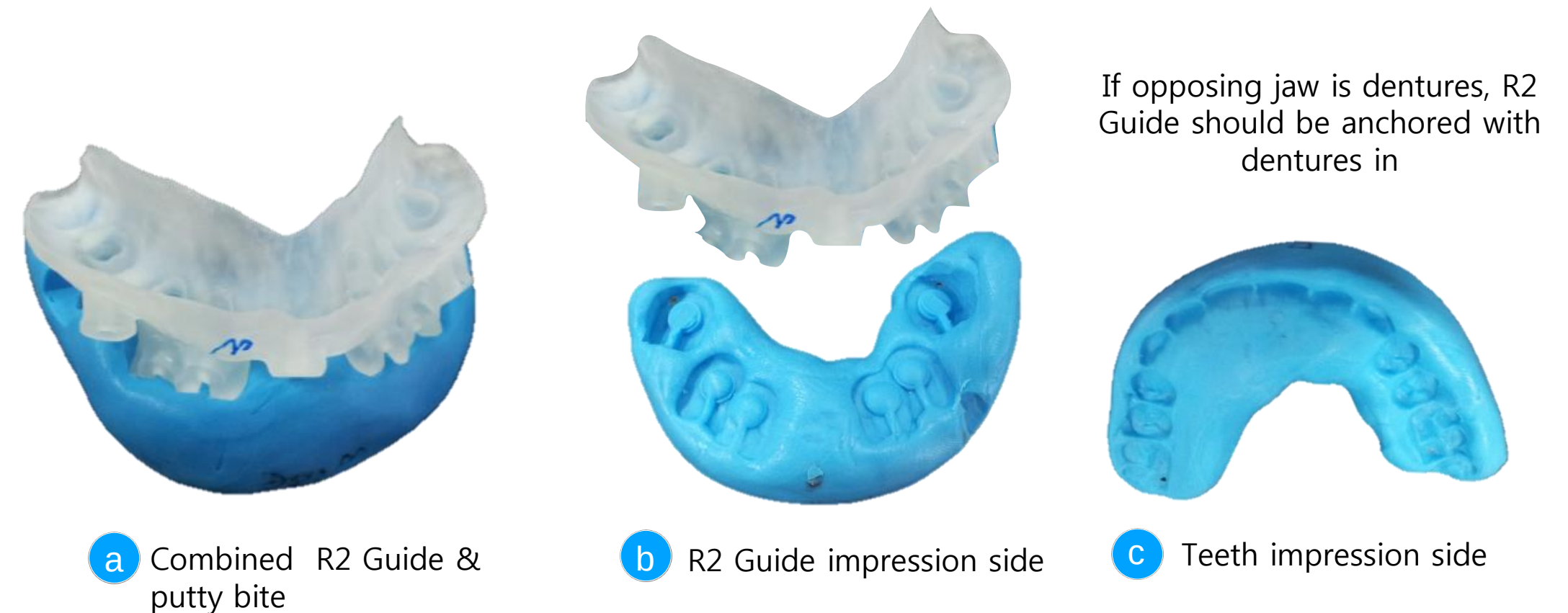
For improved accuracy, R2 Guide is seated using several seating holes for neighbouring teeth

Once R2 Guide is seated, check fit of seating holes & cusp tips of neighbouring teeth



2 Tissue-only support (edentulous case)

In this case, R2 Guide is seated using putty bite & specially designed anchor pins



Anchor kit:

R2 Guide is fixed using anchor pins inserted via pinholes in R2 Guide

Triangular format of anchor pins is recommended for better fixation



Place R2 Guide & putty bite in mouth together



Bite with maximum occlusal force



Screw anchor pins into pinholes using hand driver



Advance drilling (2.0 x 13mm) can be used in case of hard bone (mandible)

8.3 R2 Guided Surgery Drilling protocol



Pre-surgery
checkpoints



R2 Guide
fitting



Drilling
protocol



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R2GATE™

Compatible with all major implant systems



R2 Surgical Kits

Various kits available!



- 1 R2 Full Kit**
Complete set of drills + system-specific implant carriers for MegaGen implant systems [AnyRidge, AnyONE]



- 2 R2 Universal Kit**
Essential drills (initial - Ø2.8 drills) for all major implant systems
Implant carriers & final drills can be added for preferred implant system



- 3 R2 Narrow Kit**
For MINI implant system
Ø3.5mm drill guide is designed for narrow surgical sites, such as anterior mandible or close adjacent teeth

8.3 R2 Guided Surgery Drilling protocol



Pre-surgery
checkpoints



R2 Guide
fitting



Drilling
protocol



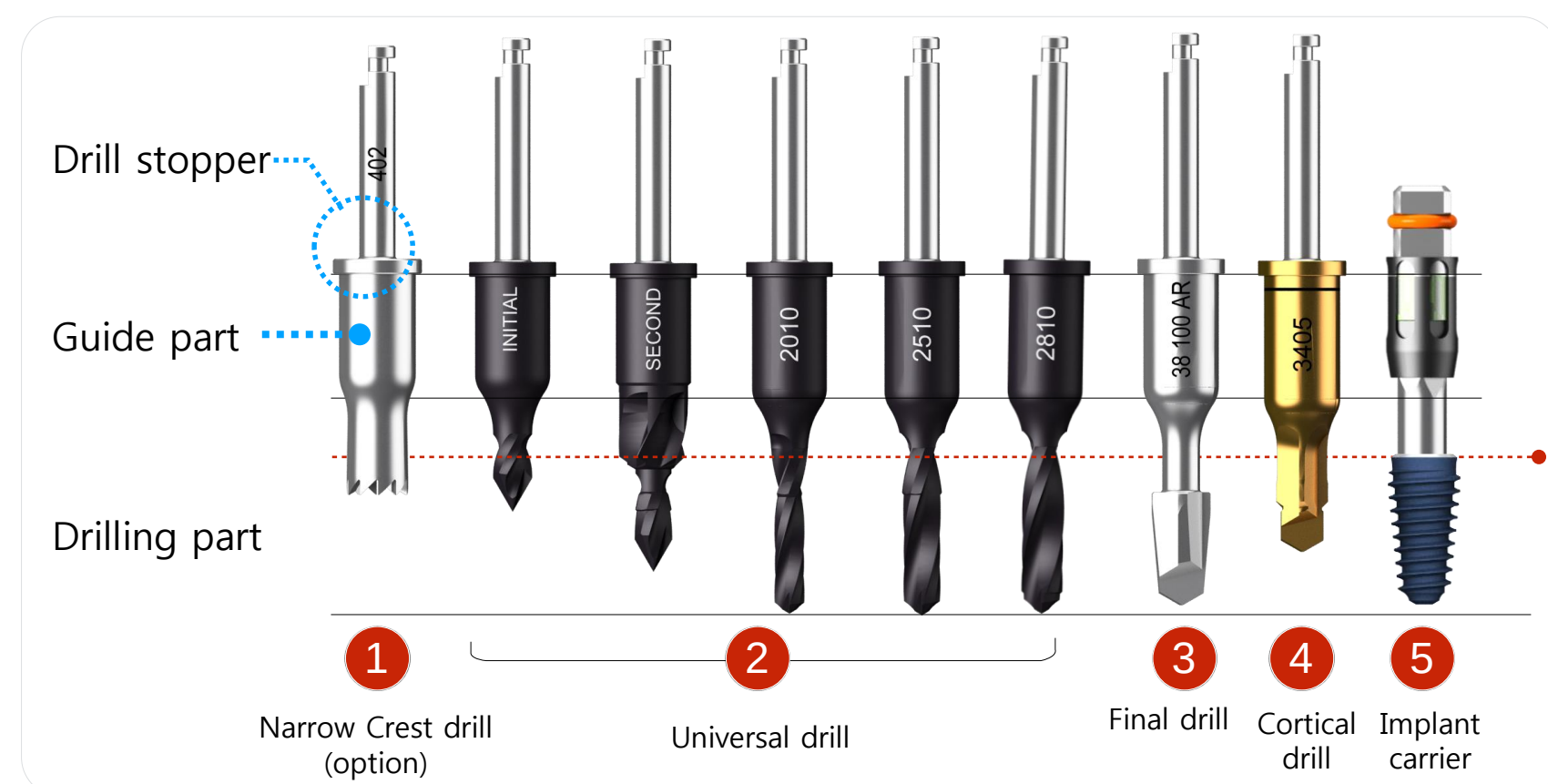
ONE-DAY
IMPLANT

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R2 GUIDE drilling protocol

- All drills consist of drill, drill guide, and drill stopper as one body
- No need for metal sleeves or spoons!
- Shorter surgery time!
- Disposable final drill provided for each surgery to optimize initial stability

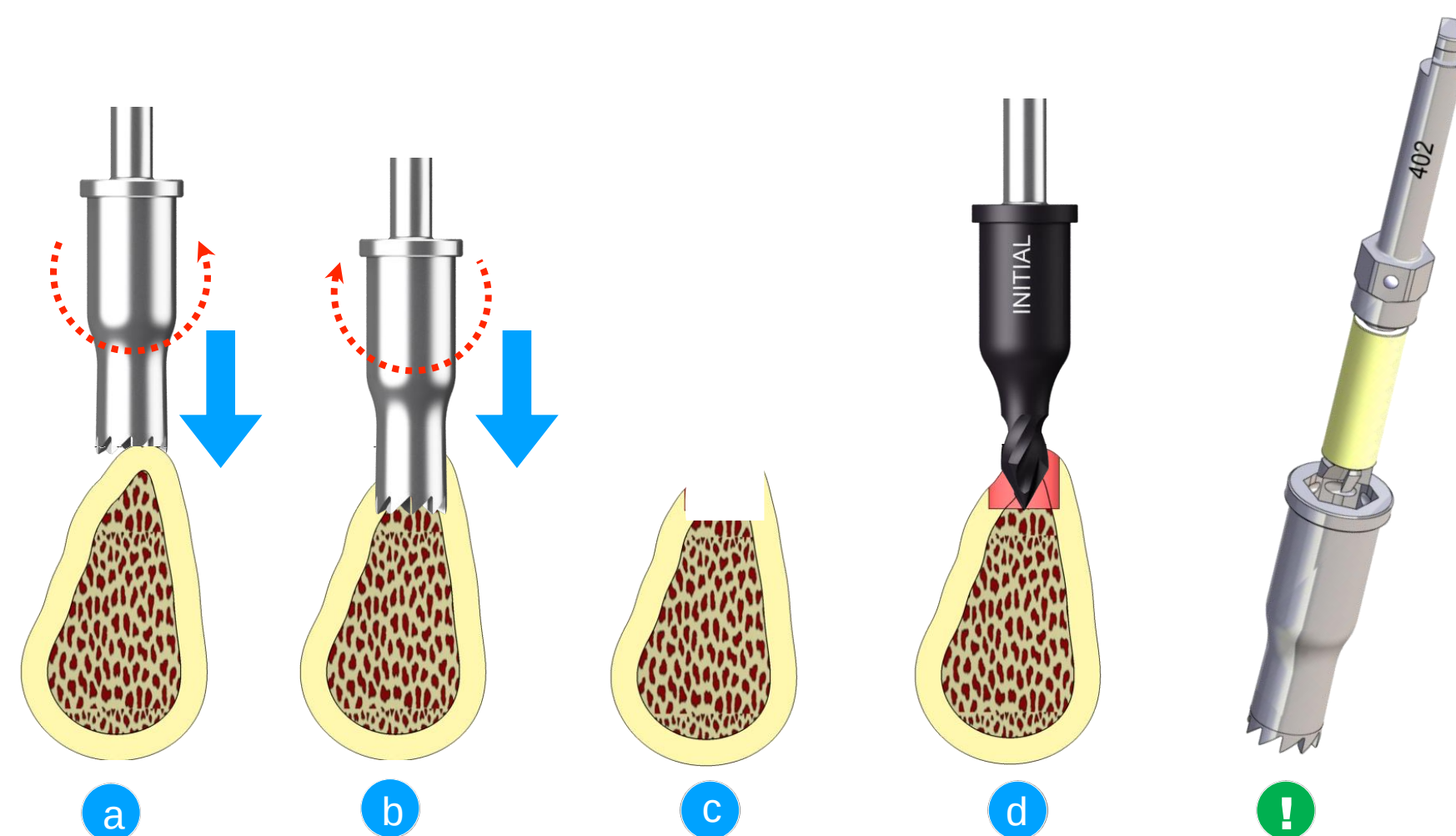


R2 Universal Kit ▶



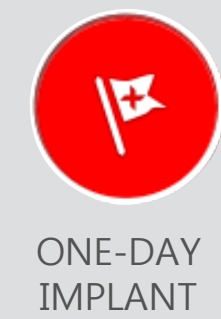
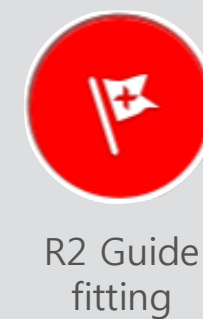
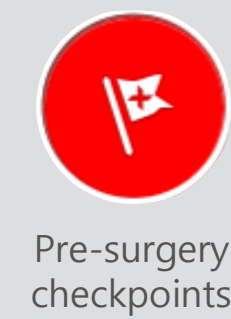
1 Narrow crest drill for narrow or steep alveolar ridge

To prevent slipping in cases of narrow or steep alveolar ridge, use narrow crest drill first to flatten drilling area



- a Engage bone when drilling counter-clockwise at less than 100 RPM
- b Drill clockwise at 400~600 RPM until drill is stopped by drill stopper
- c Withdraw drill
- d Mark drilling start point on bone using initial twist drill
- ! Autogenous bone can be harvested from shank of narrow crest drill

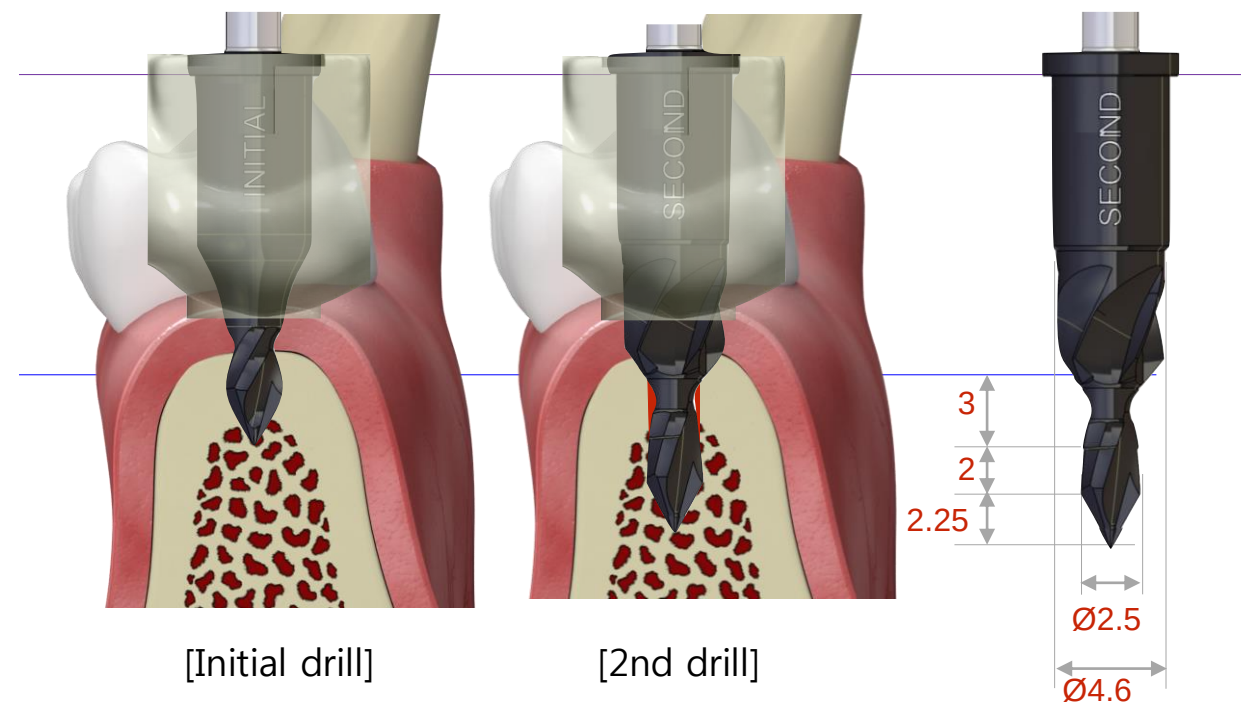
8.3 R2 Guided Surgery Drilling protocol



R2 GUIDE drilling protocol

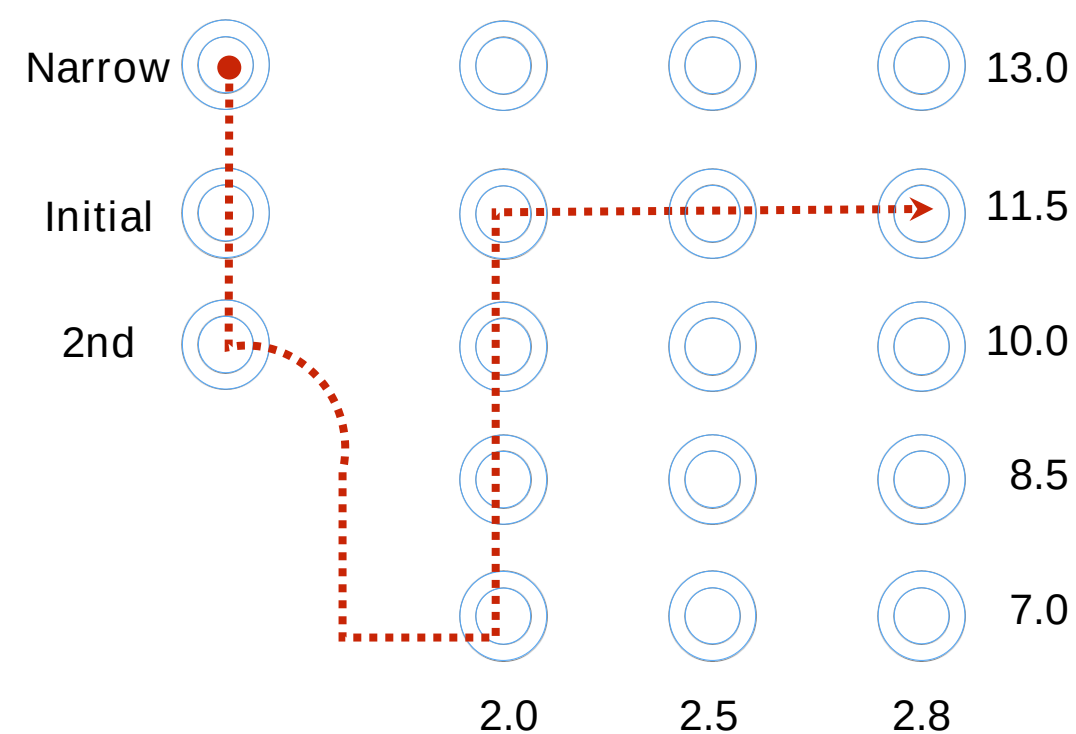
2 Initial & 2nd drill

- Use initial drill to mark drilling start-point on bone
- 2nd drill also removes excess bone above fixture platform for better connection with prosthesis
- In case of dense bone, use 2nd drill right before fixture placement



3 Graduated drilling: Critical to success!

- Use graduated drilling sequence to increase osteotomy depth & diameter
- E.g. when placing 11.5mm fixture: narrow drill -> initial drill -> 2nd drill -> 2.0x7 -> 2.0x8.5 -> 2.0x10 -> 2.0x11.5 -> 2.5x11.5 -> 2.8x11.5 -> final drill -> cortical bone drill



4 Drill guide: for maximum accuracy

- Do NOT start drilling until drill guide is completely inserted into guide hole
- Always start drilling at low RPM[300~500 RPM]



5 Slow UP & DOWN drilling motion

Increase osteotomy depth in 1mm increments using slow up & down motions until drill stopper reaches stopper position in drill guide



8.3 R2 Guided Surgery Drilling protocol

Pre-surgery checkpoints

R2 Guide fitting

3
Drilling protocol

ONE-DAY IMPLANT

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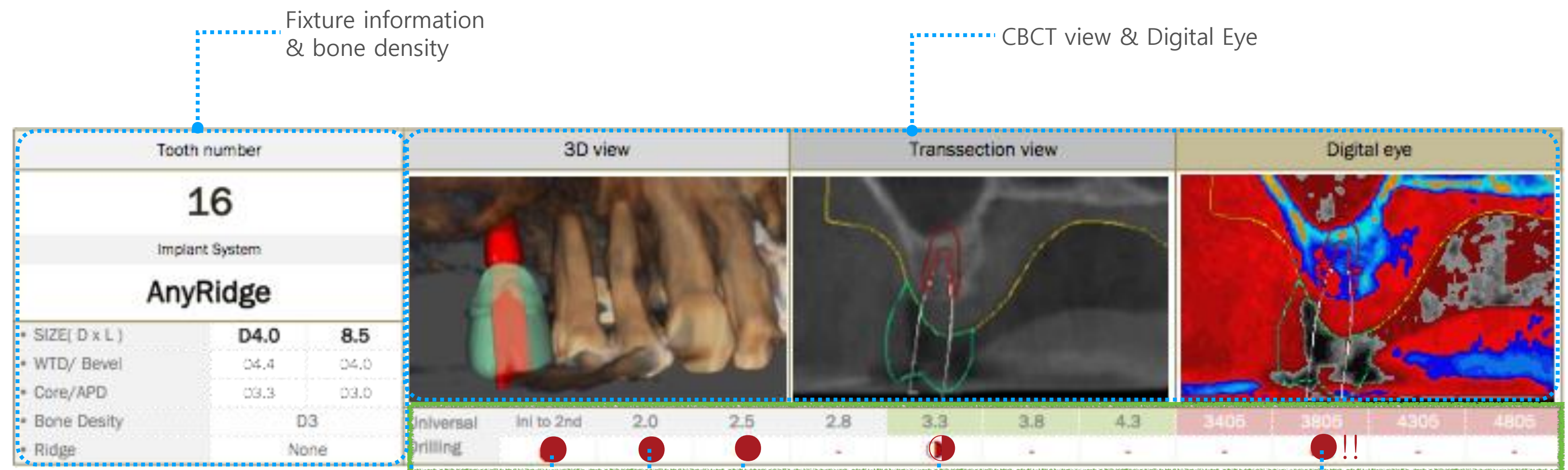
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R2 GUIDE drilling protocol

6 Drilling strategy according to bone density

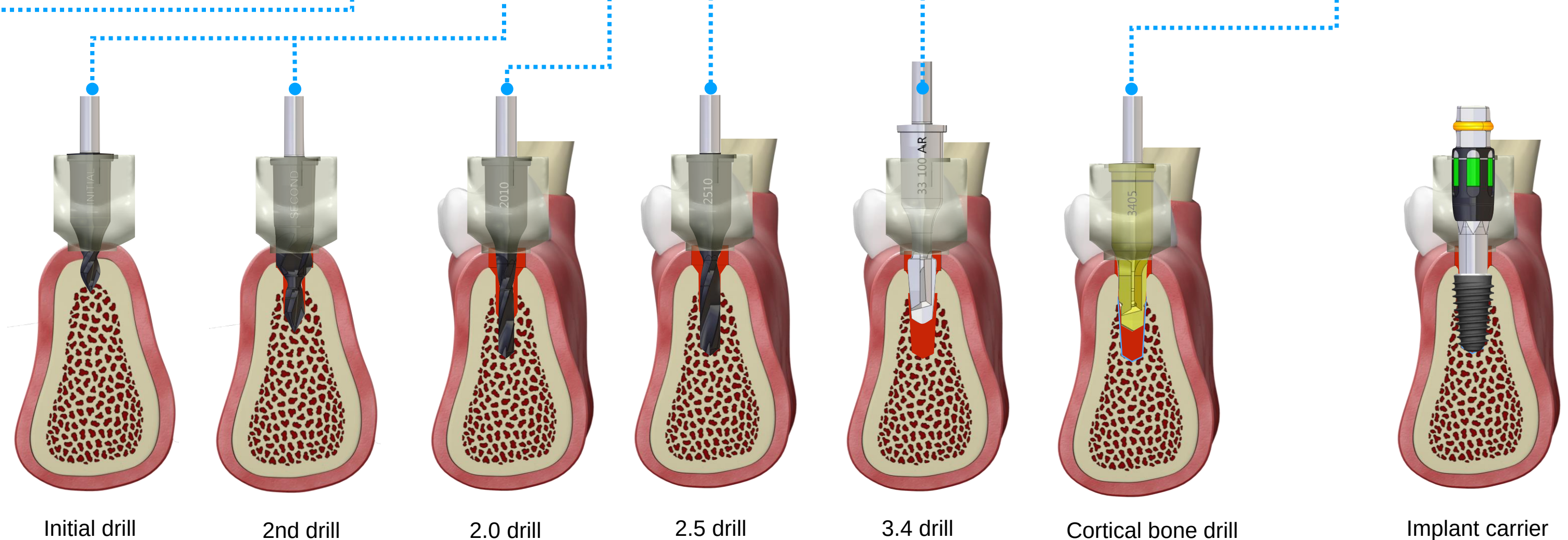
Color-coded analysis of bone morphology identifies invisible bony structure for predicting optimal drilling sequence to achieve strong initial stability

Recommended drilling speed **500 ~ 800 RPM**

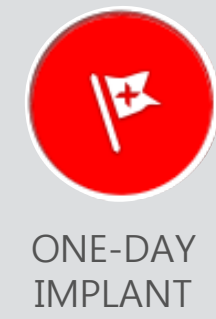
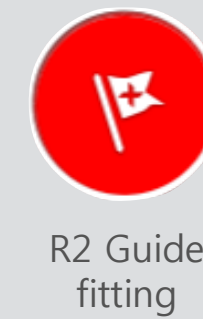
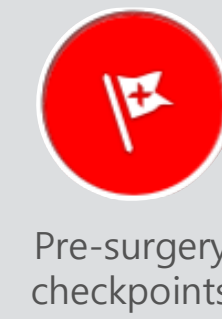


Symbols used in drilling protocol

- Full-depth drilling
- ◐ Half-depth drilling
- !! Optional drilling depending on decision of clinician



8.3 R2 Guided Surgery Drilling protocol



**R2
GATE**

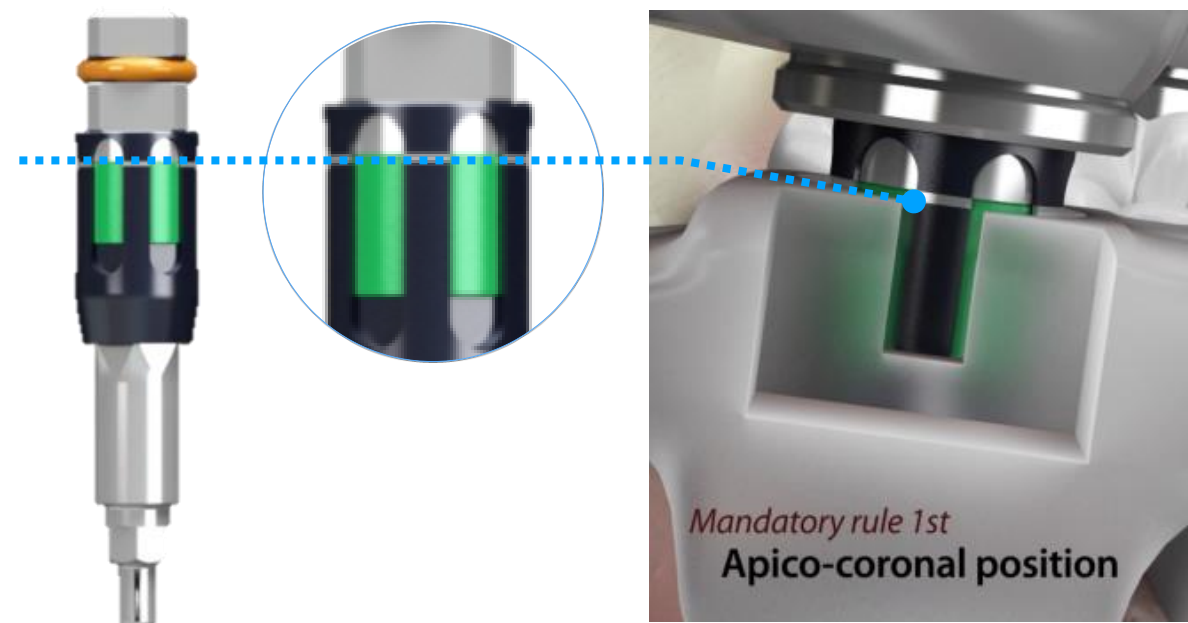
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Apr. 2019

7 Fixture delivery using implant carrier

Fixture is delivered via R2 Guide using implant carrier

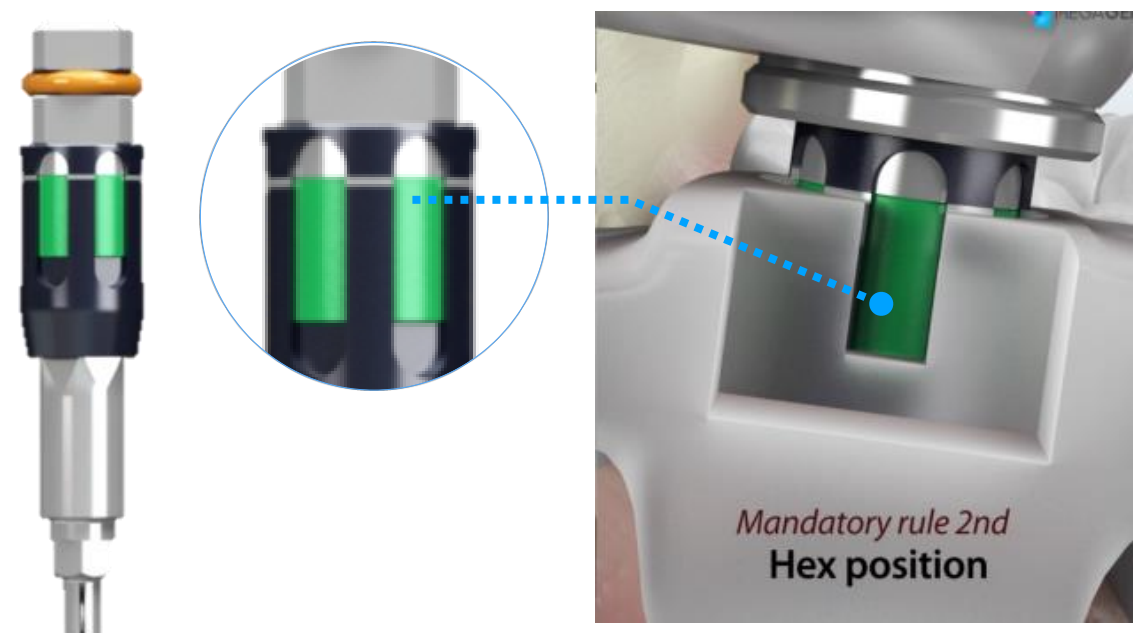
a Fixture depth control

Align upper line of implant carrier with R2 Guide window



b Hex position control

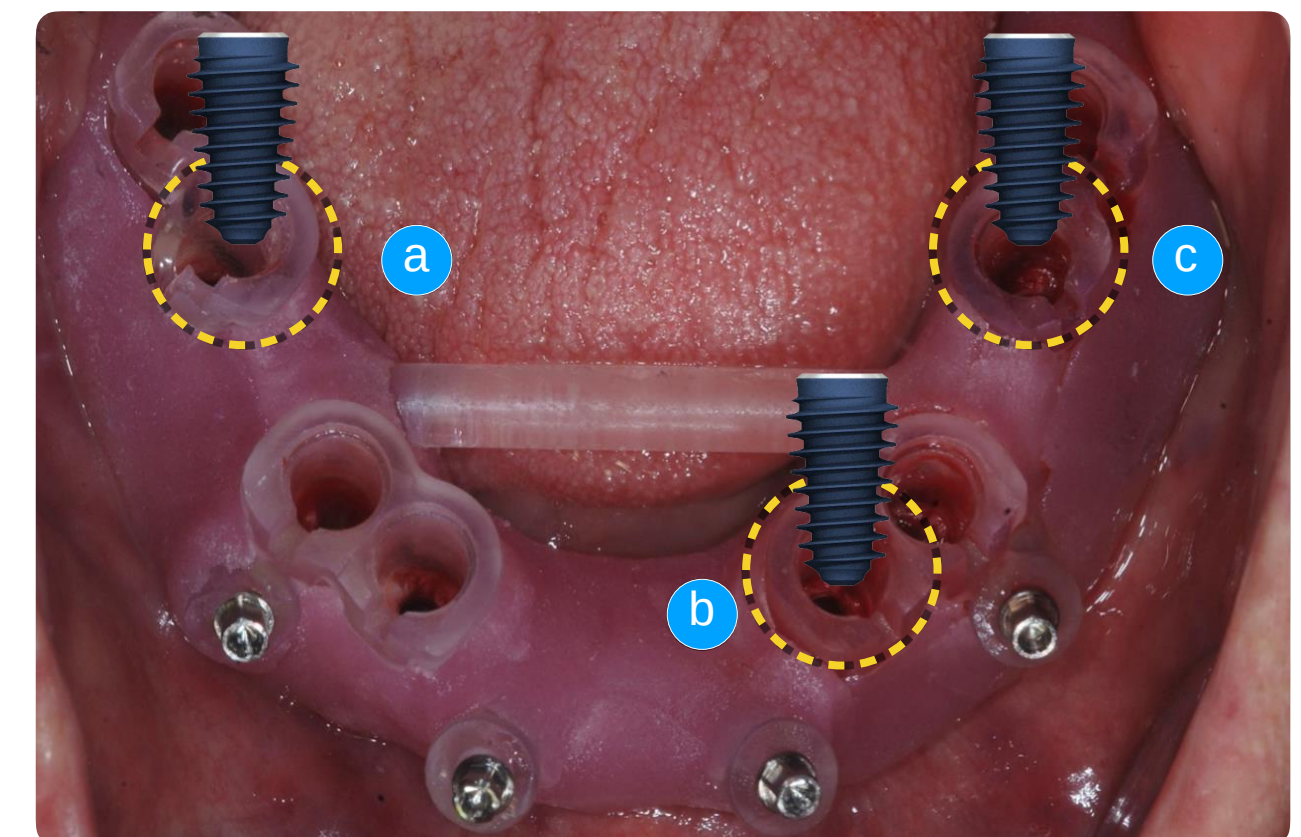
Align green part of implant carrier with R2 Guide window turning in buccal direction



Implant placement in fully edentulous case

Anchor screws

For fully edentulous guide, placing fixtures & connecting anchor screws in triangular formation is highly recommended for better fixation

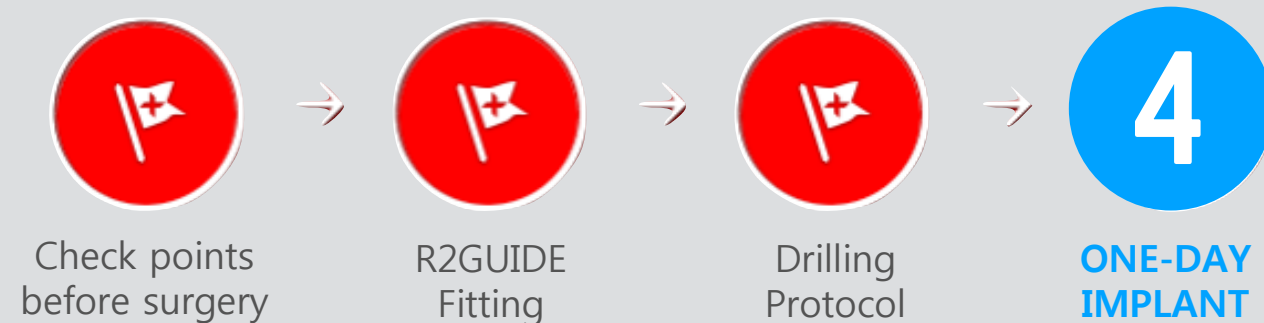


Regular & wide fixtures

- When placing regular & wide fixtures, R2 Centre will provide two R2 Guides
- Place regular fixtures first & use same anchor screw positions for placing wide fixtures



8.4 R2 Guided Surgery ONE-DAY IMPLANT



**R2
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ONE-DAY IMPLANT™

Effective reality!

R2GATE treatment planning enables pre-fabrication of customized drilling guide and prosthetics before surgery, thereby reducing chair-time, minimizing surgical procedures, and allowing for immediate loading

Customized prosthetics

Customized abutment & crown



- ZrGEN (TiBase)
- Customized abutment
- Zirconia/ Titanium provisional restoration



Screw-retained crown (All-in-One)



- ZrGEN (TiBase)
- PMMA CAD/CAM provisional restoration



All-on-Four(Six) type



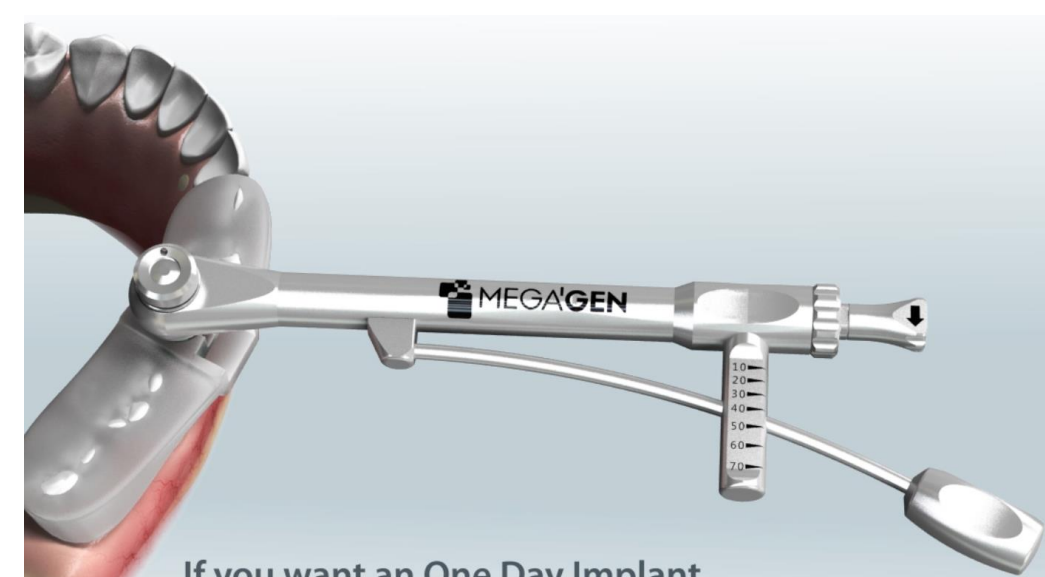
- Customized abutment
- Multi-unit abutment
- 3D printed or milled denture



Recommended conditions for immediate loading (One-Day Implant)

Based on extensive clinical trials, two key values need to be checked [only with AnyRidge system]

a Insertion Torque Value (ITV): >45Ncm

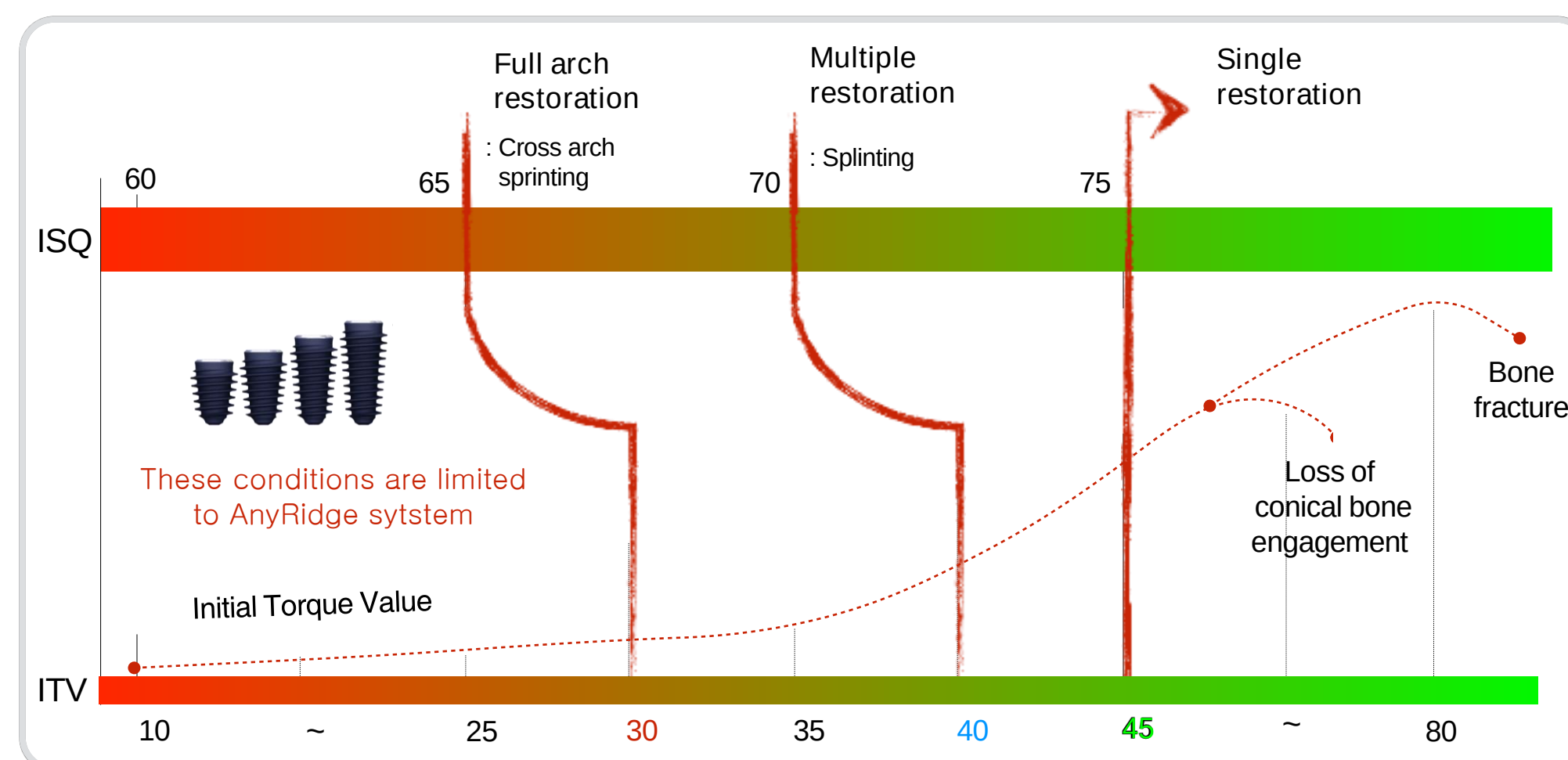


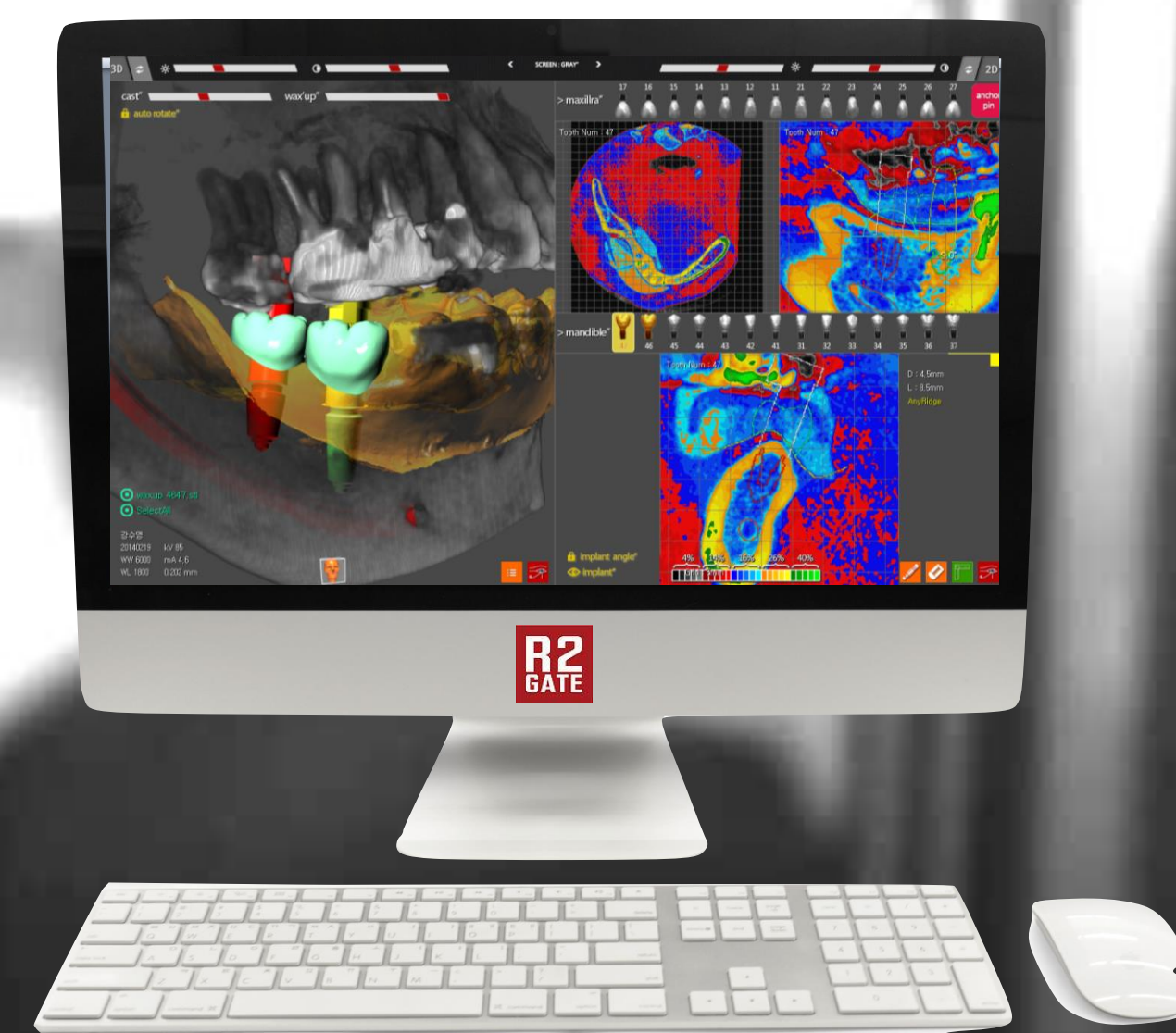
b Implant Stability Quotient (ISQ): > 70



! If either value is insufficient, loading should be delayed

ISQ & ITV conditions for various restorations





Any questions,
we are here to help!
Contact us...

Experienced Expert R2 Online Support Team

R2 Digital Business Division

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