

# Planmeca Romexis® 3D Ortho Studio

*user's manual*

EN

Surdent - Distribuidor exclusivo Planmeca en Chile

<https://surdent.cl>

[planmeca@surdent.cl](mailto:planmeca@surdent.cl)

30025002

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- installation, calibration, modification and repairs are carried out by qualified authorised personnel
- electrical installations are carried out according to the appropriate requirements such as IEC 60364
- equipment is used according to the operating instructions.

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# 1 Introduction

This manual describes how to use Planmeca Romexis 3D Ortho Studio module.

Planmeca Romexis 3D Ortho Studio can be used for preparation of digital dental models, making dental model analysis, treatment planning in 3D and model series creation.

The software is created by AGE Solutions S.r.l.

## NOTE

Read this manual carefully before using the system.

## NOTE

This manual is valid for the software revision of Planmeca Romexis 3D Ortho Studio 5 or later delivered with Planmeca Romexis 6.0 or later.

## 2 Associated documentation

- Planmeca Romexis User's manual (publication number 10014593)
- Planmeca Romexis Installation manual (publication number 10014600)
- Planmeca Romexis Technical manual (publication number 10037884)

## 3 System requirements

### NOTE

Planmeca Romexis 3D Ortho Studio can be used with 64 bit Microsoft Windows 10. Planmeca Romexis conforms to Windows user interface standards.

### NOTE

User organization must take care of protecting the computer and the network by using up-to-date virus and malware protection software and fire wall.

### NOTE

If necessary save the following for backup of ortho studio data: *C:\Program Files\Planmeca\Romexis\client\orthostudio\*

### NOTE

In order to use the software Planmeca Romexis 3D Ortho Studio USB license dongle has to be inserted into the client computer USB port.

### NOTE

Administrator privileges are required. See "Configuring Ortho Studio to start with administrator privileges" on page 91.

### NOTE

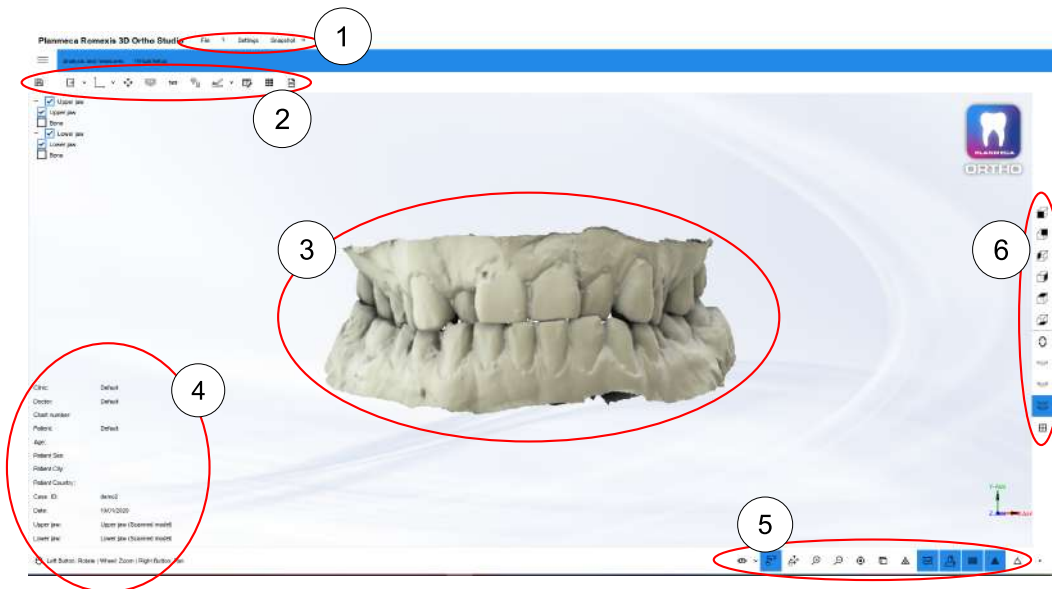
Ortho Studio digital dental model requirements:

The models:

- must be manifold
- must NOT have:
  - tunnels, handles or holes
  - degenerate triangles (i.e. zero area triangles)
  - duplicate triangles
  - unreferenced vertices.
- the triangles must have all the same orientation
- must be in STL or PLY format.

# 4 User interface

The Planmeca Romexis 3D Ortho Studio user interface consists of the following elements:



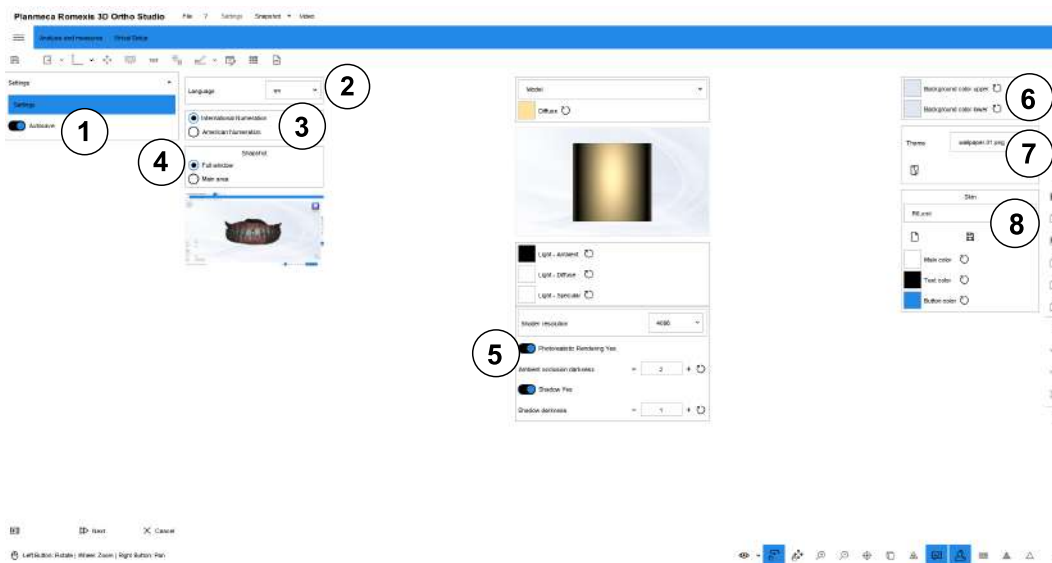
- 1 Top toolbar
- 2 Main toolbar
- 3 Visualization/editing area
- 4 Information area
- 5 Display toolbar
- 6 Sidebar

## 4.1 Top toolbar



### File menu

In the *File* menu you can exit the application.



- 1 Auto save



- 2 Change interface language
- 3 Numbering (International, American)
- 4 Screen capture mode
- 5 Render Settings
- 6 Background colour
- 7 Background image
- 8 User interface colour scheme

### Help menu

In the *Help* menu you find instructions and information about the software version and the license.

### Snapshot menu

In the *Snapshot* menu you can:

- Take a snapshot of the current screen.
- Copy snapshot to clipboard.
- Print snapshot.

### Video menu

For detailed information on how to record a video see section "Video record" on page 88.

## 4.2 Main toolbar

### 4.2.1 Home tab



#### Order management

See sections "Importing cases" on page 26, "Adding and editing data entries" on page 23 and "Continuing with existing case in Planmeca Romexis 3D Ortho Studio" on page 21.



#### Save case

Click this button to save the case you are currently working on.



#### Exports the original models



#### Change local origo / Swap upper and lower

Click on the drop-down menu to see all options:

- **Change local origo initial positioning/precise positioning**

Use these tools to change the orientation of the models in reference to each other, see section "Adjusting orientation of models" on page 30.

- **Swap upper and lower**

Use this tool to swap upper and lower models if imported incorrectly.









#### Adjust occlusion

See section "Adjusting teeth occlusion" on page 31.










#### Add virtual base

See section "Adding virtual base" on page 32.

-  **Label**
-  **Brackets removal**
-  **Sculpting**  
Click on the drop-down menu to see all sculpting options. See section "Smoothing and sculpting models" on page 35.
-  **Note**  
See section "Adding notes to models" on page 38.
-  **Multiple views**
-  **2D images**

#### 4.2.2 Analysis and measures tab

-  **Occlusion inspection**  
See section "Occlusion inspection" on page 40.
-  **4D Motion**  
See section "Planmeca 4D Jaw Motion" on page 41.
-  **Sections**  
See section "Cross section measurements" on page 42.
-  **Tooth width measurements**  
See section "Teeth width measurements" on page 43.
-  **Arch length measurements**  
See section "Measuring arch length" on page 45.
-  **Measures**  
See section "Free measurements" on page 46.
-  **3D comparison**  
See section "3D comparison" on page 47.

### 4.2.3 Virtual setup tab



#### Tooth segmentation menu

- Draw an outline for each tooth

Click on the drop-down menu to access more options



- **Cutting line:** combines the outlines of separated neighbouring teeth.
- **Change local origo:** adjust tooth origo, axes and rotation centres



#### Virtual setup

See section "Virtual setup" on page 55.

Click on the drop-down menu to access **Attachment designer**



#### Bracket placement

Click on the drop-down menu to reach **Bracket designer**

See section "Brackets placement" on page 77.

See section "Creating custom bracket library" on page 60.



#### Models builder

See section "Models builder" on page 70.



#### Clear aligner

See section "Clear aligner" on page 84.



#### Cut and close (Cutting line)

See section "Cut and close tool" on page 73

Click on the drop-down menu to access **Cut and close (Plane)**



#### 3D labels on transition models

See section "Adding labels to models" on page 37.

#### List of all virtual models



#### Animation



Click on the drop-down menu to access **Animation (loop)** option.



#### **PDF exports**

See section "Creating analysis and treatment plan report in PDF format" on page 76.



#### **Video report**

See section "Video record" on page 88.



#### **Exports**

Click on the drop-down menu to access more options

See section "Export" on page 74.

### **4.3 Visualization/editing area**

The images and models are opened and edited in the visualization area.

In the visualization area it is possible:

- To create virtual bases.
- Show the occlusion visualization between maxillary and mandibular arches.
- Measure distance between teeth.
- Perform virtual setup.

To view and examine the models displayed in the visualization/editing area you can set camera parameters (position, scale and rotation) using the manipulator tool.

To rotate around the model use the left mouse button.

To zoom in/out scroll the mouse wheel.

To move (pan) the camera use the right mouse button.

### **4.4 Information area**

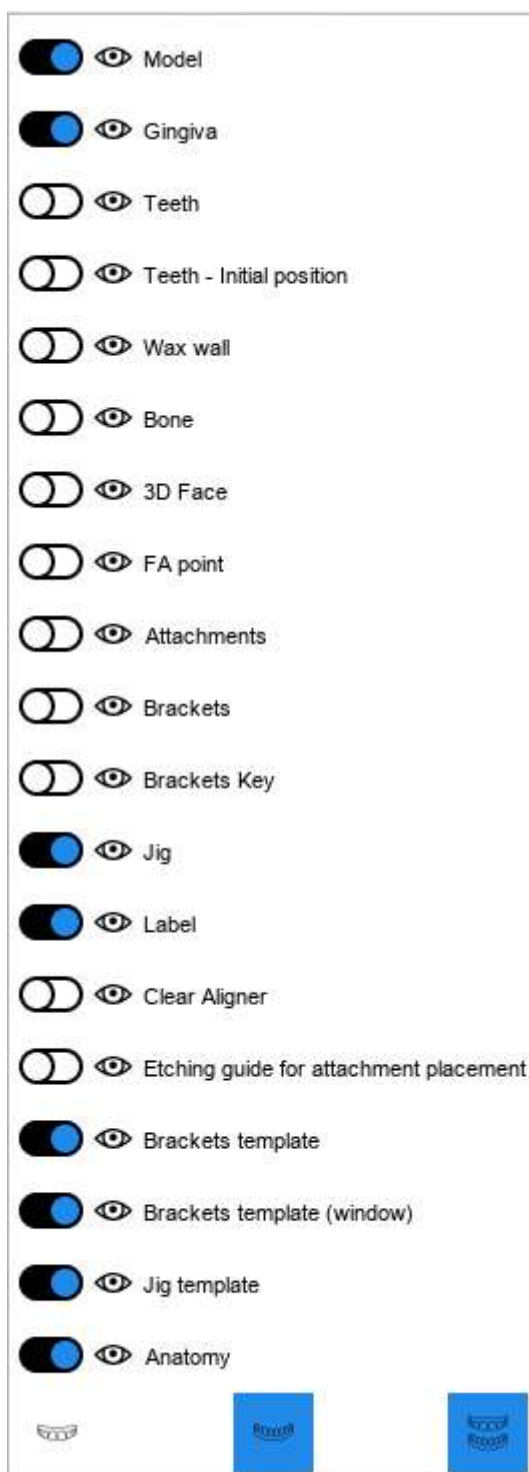
The information area of the screen shows the information related to the current case including clinic, doctor, patient, case ID and virtual model number.

### **4.5 Display toolbar**

The bottom toolbar contains tools for adjusting the visual settings of the viewing area.



Show/hide and change the transparency of the 3D scene components



**Touch screen rotation mode**

Enable the wheel or drag mode for the touch screen













**Touch screen pan mode**









**Zoom in**

Enlarge [PGDown key]

-  **Zoom out**  
Make the 3D scene smaller [PGUp key]
-  **Reset trackball**  
Reset the view
- 
  - **Perspective projection** [Key P]
  - **Orthographic projection** [Key O]Change the projection of the camera that frames the 3D scene
- 
  - **Flat** [Key F]
  - **Smooth** [Key S]Change the lighting properties of 3D models
-  **Photorealistic rendering**  
Enable photorealism
-  **Shadow**  
Enable shadows (only if photorealism is active)
-  **Texture colour superimposition**  
Show / hide the real colour of the 3D models, if the actual colour was acquired during the scan.
-  **Triangles**  
Show/hide triangles
-  **Edges**  
Show/hide triangle borders (Key E)
-  **Vertices**  
Show / hide points [Key V]

## 4.6 Sidebar

-  **Front view**
-  **Rear view**
-  **Left side view**
-  **Right side view**
-  **Top view**
-  **Bottom view**



**Open mouth view**



**Show maxillary**



**Show mandibular**

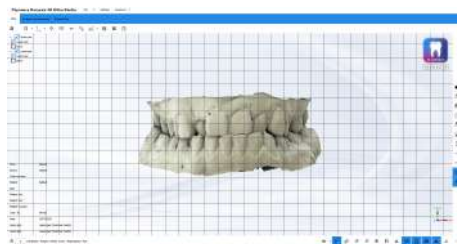


**Show all**



**Show grid**

Opens a grid on top of the model view. The grid resolution is 1 mm / 1 mm and can be changed from the lower left corner of the screen.



## 5 Starting new case from Planmeca Romexis

The following procedures describe how to scan, align and launch digital dental models to Planmeca Romexis 3D Ortho Studio.

### 5.1 Workflow 1: Launching models from CAD/CAM module

#### Steps

1. Double-click on Romexis icon on the desktop to start the program.



2. Select a patient

In the Patient module, select the patient from the patient list.

3. Launch models from CAD/CAM module  
(Click the *CAD/CAM* icon to scan)

**CAD/CAM**



4. Select the case from the case list.

**Patient Data**

A screenshot of the Patient Data window in Romexis. It shows a table with two columns: 'Case Name' and 'Image Date'. There are three rows of data, all with the case name 'NonRestorative 1-8' and the image date '31.1.2020 15:14'. The first row is highlighted in blue.

Case Name	Image Date
NonRestorative 1-8	31.1.2020 15:14
NonRestorative 1-8	31.1.2020 15:14
NonRestorative 1-8	31.1.2020 15:14

5. Click on the **Launch Romexis 3D Ortho Studio** icon.



### 5.2 Workflow 2: Launching models from Model Analyser module

#### Steps

1. Double-click on Romexis icon on the desktop to start the program.



2. Select a patient

In the Patient module, select the patient from the patient list.



3. Start scanning by clicking on the **Scan** button under *Models* tab.



4. Orient models  
See *Planmeca Romexis user's manual section "Model analyser module"*.
5. Click on the **Launch Romexis 3D Ortho Studio** icon.



## 5.3 Workflow 3: Aligning intraoral scans with CBCT for segmentation of roots and bone

The following section describes how to align CBCT image, segment root(s) and bone surface and launch the data to Romexis 3D Ortho Studio for treatment planning and analysis.

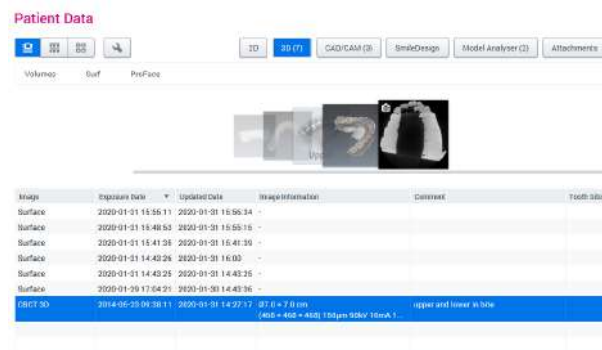
### 5.3.1 Model alignment

#### Steps

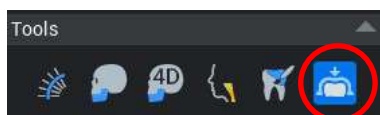
1. Open Romexis.  
Double-click on Romexis icon on the desktop.



2. Select a patient.  
In the Patient module, select the patient from the patient list.
3. Open 3D image.  
In the list of images under *Patient data*, double-click on the desired CBCT image to open it.



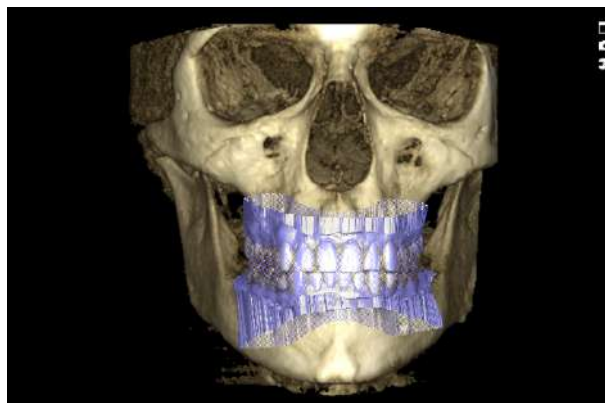
4. Fit dental model to 3D image.  
In the 3D Explorer sub-module, fit the digital models to the CBCT image using the *Fit model* tool in the *Tools* toolbar.



- 4.a. Select first the upper model using the **Select** button.
- 4.b. Indicate three common points one at a time from the digital model and the CBCT image.
- 4.c. Click **Done** when ready.
- 4.d. Repeat the process for the lower model.
  - Right-click to mark the corresponding points
  - Drag to rotate the images
  - Scroll the mouse wheel to zoom

## Results

After fitting, both models appear in the rendered view.



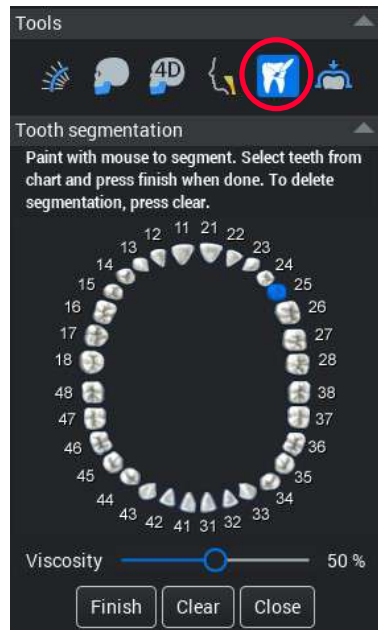
## 5.3.2 Root segmentation

### About this task

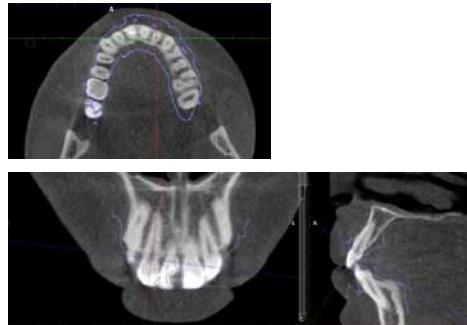
You can segment one or more roots to be used in 3D treatment planning. This is done by first aligning the views to the tooth to be segmented, and then painting the tooth and the root.

## Steps

1. Open the tooth segmentation dialog.



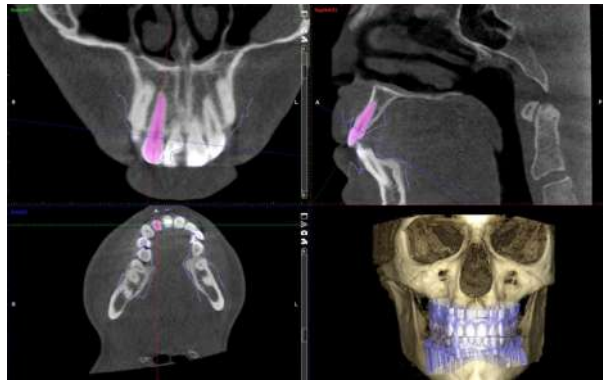
2. Align the 2D planes on the tooth to be segmented.
  - 2.a. Make sure **Zoom for mouse scroll** and **Move/rotate volume** buttons are disabled.
  - 2.b. Browse to the upper or lower arch using the axial view.
  - 2.c. Hold down the **Ctrl** key while clicking on the tooth to be segmented from the axial view.
  - 2.d. Rotate the planes in Coronal and Sagittal views by holding down **Ctrl** key while dragging with the right mouse button.



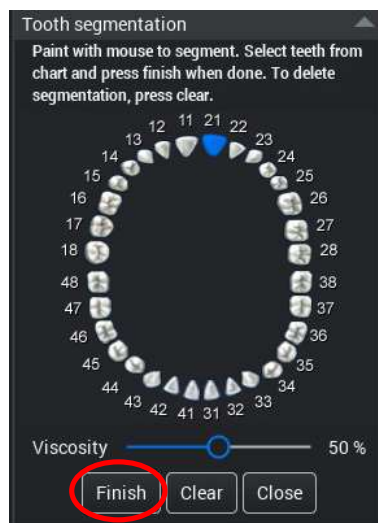
- Translate plane by holding down the **Ctrl** key while dragging.
  - Rotate planes by holding down the **Ctrl** key while dragging with the right mouse button.
3. Paint the tooth on the Sagittal view, then on coronal view and finally on Axial view.
 

To verify the painting scroll through the Axial view.

    - To change brush size hold down the **Alt** key while scrolling the mouse wheel.
    - To paint root click and drag, to erase painting right-click and drag.
    - To scroll frames using mouse wheel (disable zoom button).
    - To zoom hold down the **Ctrl** key while scrolling the mouse wheel (disable zoom button).

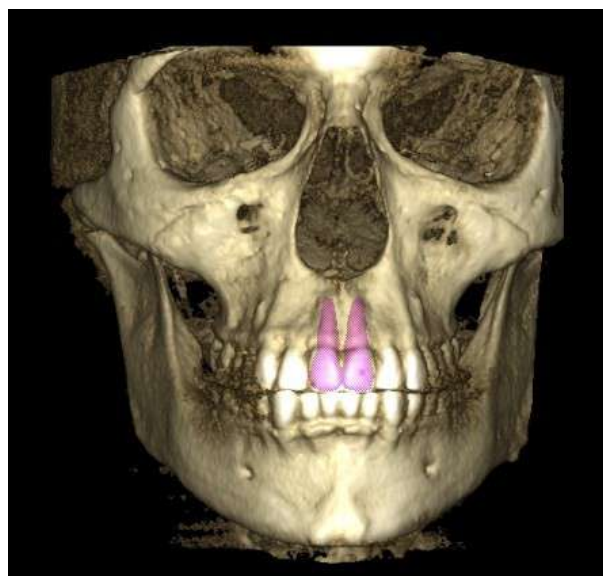


4. Choose tooth number and click **Finish**.



### Results

The segmented teeth appear in the 3D rendering and 2D views.



### What to do next

Repeat the process for all roots to be segmented.

### 5.3.3 Bone surface segmentation

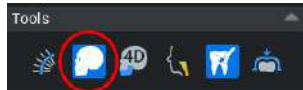
#### Before you begin

Optionally upper and lower bone surfaces can be segmented for planning. This is done by painting all the parts of the lower jaw that have contact with the upper jaw. These typically include left and right condyles, coronoid processes and the lower teeth.

#### Steps

1. Open the **Jaw Segmentation** tool.

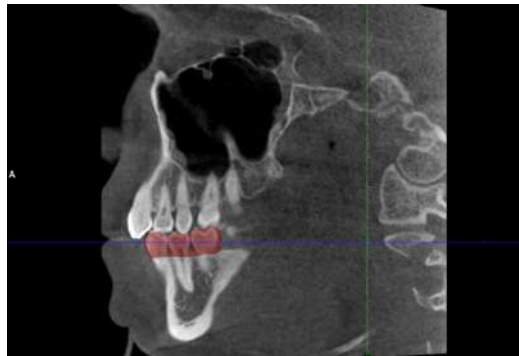
Click on the **Jaw Segmentation** icon in the *Tools* tool group to the right.



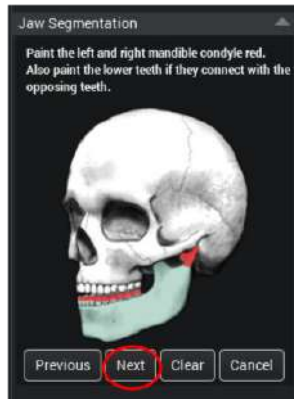
2. Paint the lower jaw condyles, coronoid processes and teeth.

Paint parts of the lower jaw which have contact with the upper jaw. Check the painting from all views.

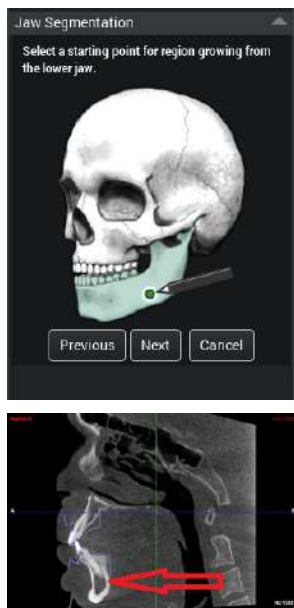
- Left-click to paint, right-click to erase painting.
- To change brush size hold down the **Alt** key while scrolling.
- To scroll frames use mouse wheel (when zoom button disabled).
- To zoom, scroll the mouse wheel while holding down the **Ctrl** key (when zoom button disabled).



3. Click **Next**.



4. Select seed point for the segmentation from the lower jaw.  
Click on the lower jaw to start the segmentation process.

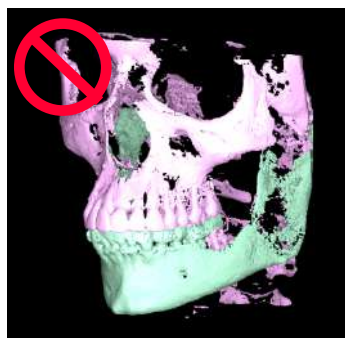


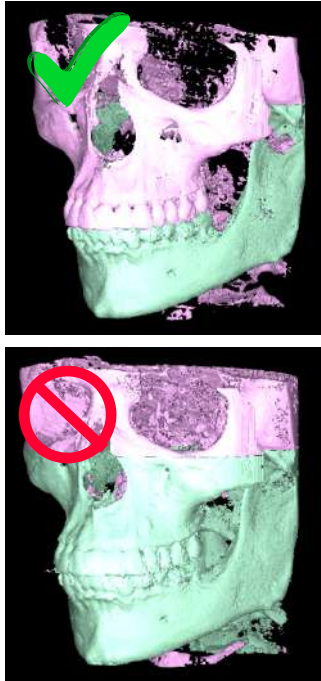
5. Click **Next**.

6. Adjust segmentation threshold.

Adjust segmentation threshold to left to include more data into the jaw segmentation.

If too much data is included (slider too far on the left) the lower jaw segmentation goes to upper jaw.





7. When ready click **Finish**.

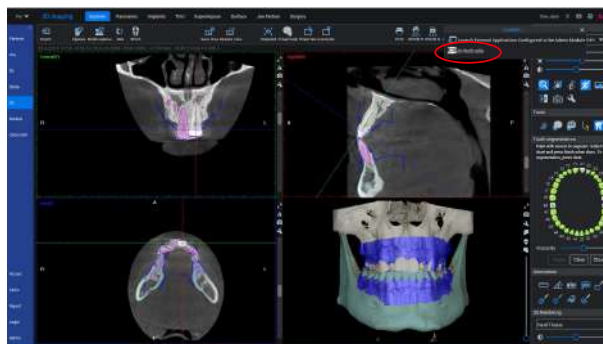
#### NOTE

If the segmentation of the lower jaw goes immediately to the upper jaw, go back (click Previous) and re-paint the contacting parts of the jaws.

### 5.3.4 Launch data to Ortho Studio from 3D Explorer

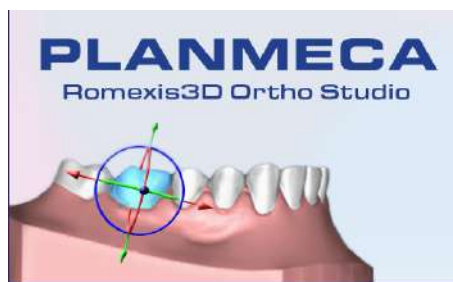
#### Steps

1. Click on the **Launch** icon in the top toolbar.
2. Select *OrthoStudio*.
3. Launch the upper and lower models, segmented teeth and bone surfaces to Ortho Studio.



### 5.4 Arrival of data in Ortho Studio

Romexis 3D Ortho Studio starts.





## 6 Continuing with existing case in Planmeca Romexis 3D Ortho Studio

### About this task

#### NOTE

If the models have already been aligned and transferred to Planmeca Romexis 3D Ortho Studio you can start from this section. If you need to align the models and the bite index see section "Starting new case from Planmeca Romexis" on page 12.

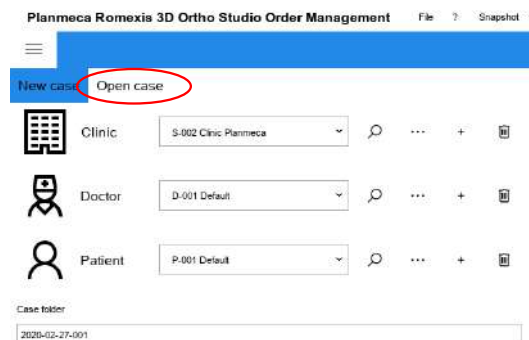
### Steps

1. Click the **Romexis 3D Ortho Studio** button on your desktop.

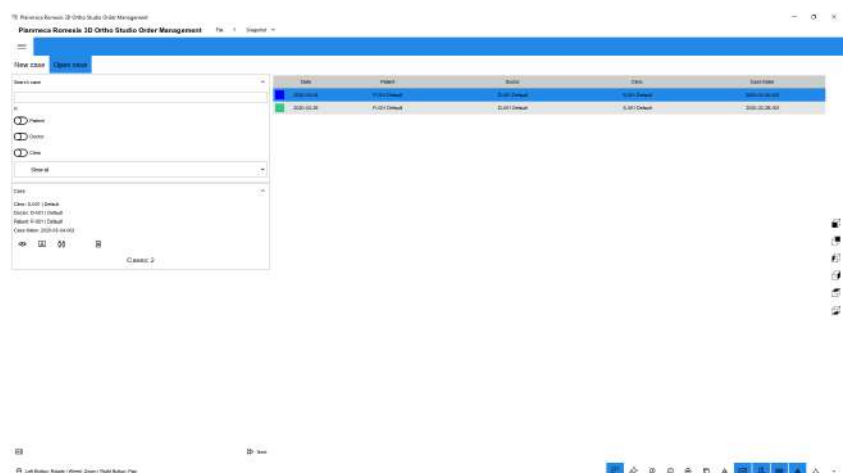


The application opens the *Planmeca Romexis 3D Ortho Studio Order Management* window.

2. Select the **Open case** tab.



3. Select the existing case from list of cases.



You can filter the list of cases by selecting a time reference from the drop-down menu on the left side of the screen.

You can also search by name by inserting it in the *Search case* field on the menu and selecting parameters.

A case can be deleted by selecting the bin icon at the bottom of the menu.

4. To select a case, click on it followed by **Next**.

A preview of the case opens.

5. If you want to proceed, click **Next**.

## **Results**

You are now ready to start your work case.

## 7 Adding and editing data entries

### 7.1 Adding new entries

#### About this task

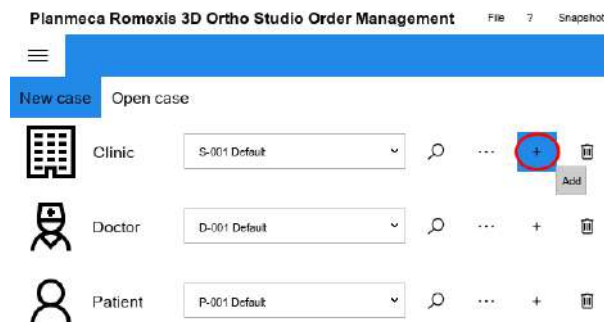
Follow the instructions below if you are creating a new case within **Planmeca Romexis 3D Ortho Studio** and have not used **Planmeca Romexis launch**.

#### Steps

1. Open the **Planmeca Romexis 3D Ortho Studio Order management** either from the icon on the desktop or from the **Order management** button under **Home** tab in the Planmeca Romexis 3D Ortho Studio software.
2. Select **New case**.



3. To add a clinic, select the Plus-icon on the **Clinic** row.



To add a new doctor click the Plus-icon on the **Doctor** row.

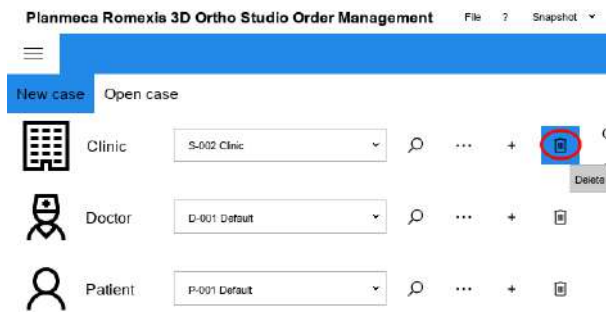
To add a new patient click the Plus-icon on the **Patient** row.

4. Fill in the necessary data.

5. Click **OK** to save the clinic/doctor/patient to the database.

6. Select the clinic/doctor/patient from the drop-down menu on the respective row.

To delete the clinic/doctor/patient currently selected click the **Delete** button.



## NOTE

Clicking the **Delete** button removes the selected clinic/doctor/patient from the Planmeca Romexis 3D OrthoStudio Database.

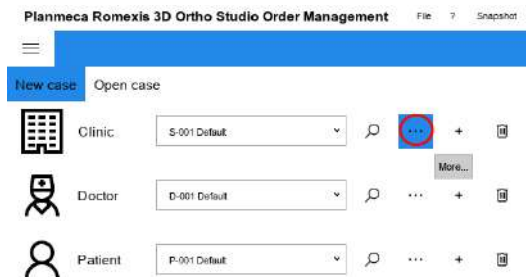
## 7.2 Editing clinic, doctor and patient data

### About this task

Follow these instructions to edit clinic, doctor and patient data.

### Steps

1. Click on the **More** button on the respective row.

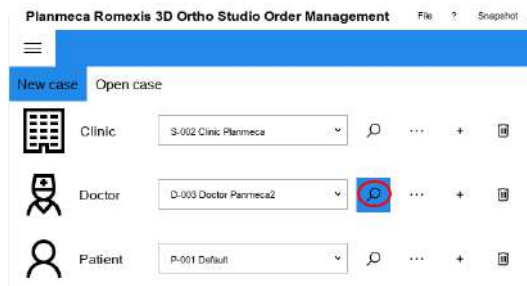


2. When finished click **OK**.
3. Click the **Next** button to proceed to dental model import for the current patient. See section "Importing cases" on page 26.

## 7.3 Searching clinic, doctor and patient data

### Steps

1. Choose the search criterion (clinic, doctor or patient) and click on the **Search** button on the respective row.



2. Enter the criterion in the search field and click **OK**.  
The **Search** button remains activated. Data is filtered according to the given search criteria until the button is deactivated.

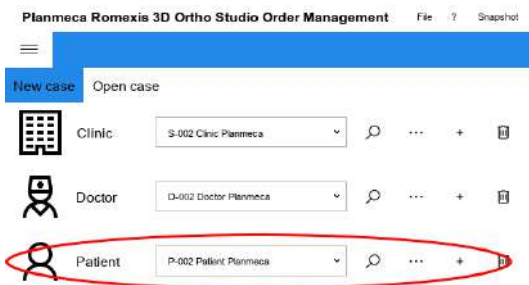
# 8 Importing cases

## Steps

1. Open the **Planmeca Romexis 3D Ortho Studio Order management** either from the icon on the desktop or from the **Order management** button under **Home** tab in the Planmeca Romexis 3D Ortho Studio software.
2. Select the **New case** tab.



- To import a case for an existing patient select the patient from the drop-down menu.

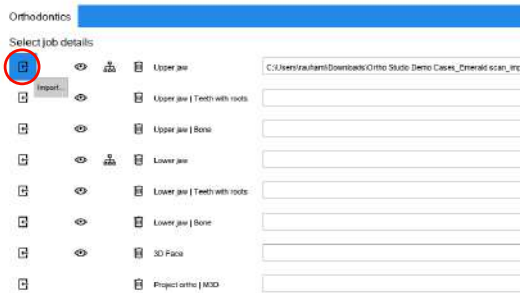


- To import a case for a new patient first add the necessary data entries. See section "Adding new entries" on page 23.

3. Click **Next**.



4. Import the models from an external folder either in *stl*, *ply*, *obj* or *ortho* file format by clicking the **import** button.



If you want to preview the file you are importing, click on the **Eye** icon. With the **Bin** icon, you can delete the file from the import row.



5. Import all necessary files.
6. Click **Next**.

### **Results**

The software will load the pictures and you can start your work case.

### **What to do next**

To start preparing models continue to section "Preparing and adjusting dental models" on page 30.

## 9 Brackets removal

### About this task

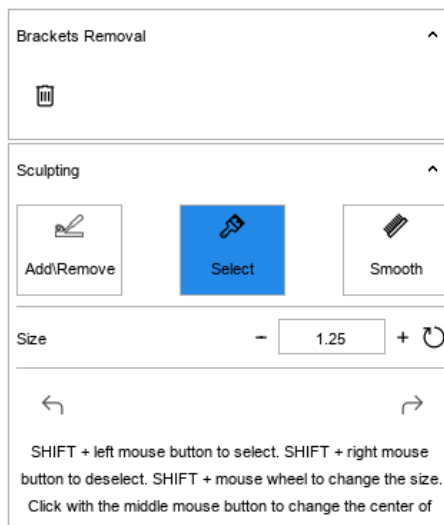
**Brackets removal** function is used when a patient has had brackets, which are to be removed and treatment continued with clear aligners or with a retainer.

A good quality scan is recommended for optimal result.

### Steps



1. Select the **Brackets removal** button from the main toolbar under **Home** tab.
2. Activate the **Select** button in the *Sculpting* tool group in the menu on the left side of the screen.



3. Select the wire and the brackets' support base as accurately as possible by holding down **Shift** key and dragging with the left mouse button pressed down.

Use **Shift** key + mouse wheel to adjust the size of the cursor.

Use **Shift** key + right mouse button to deselect areas.

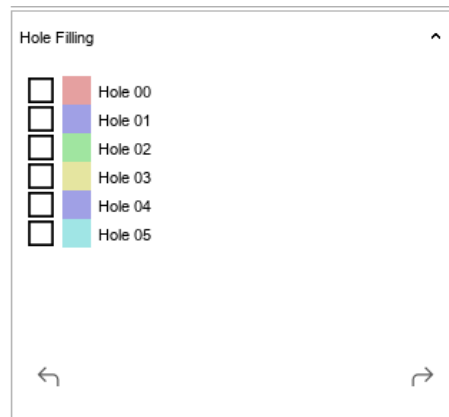


4. To remove the selected part, click on the **Bin** icon on the *Brackets removal*/tool group in the menu on the left side of the screen.

The selected areas are deleted and appear as holes.

All the holes created are listed in the menu on the left side of the screen.





5. Cover holes.
  - 5.a. Double-click on the hole you want to cover.

The hole is activated in the editing area and in the *Hole filling* menu.
  - 5.b. Select the **Hole filling** button on the *Hole filling* menu.

The software covers the hole.
  - 5.c. Repeat steps 5.a to 5.b to cover remaining holes.
6. Make adjustments if necessary.

You can, for example, use the **Smoothing** tool in the *Sculpting* tool group on the menu on the left side of the screen to reshape the surface.

## Results

When all brackets are removed and holes filled, the model is ready for a diagnostics setup.

# 10 Preparing and adjusting dental models

## 10.1 Adjusting orientation of models

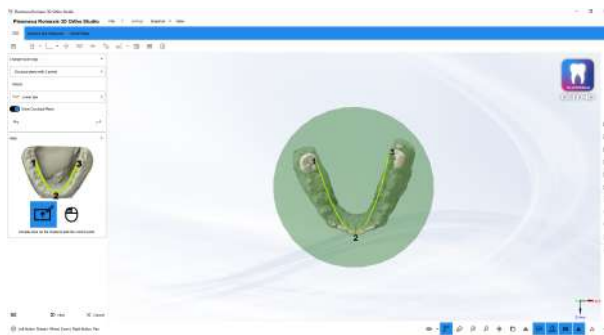
### About this task

The orientation of the models can be adjusted as explained below.

### Steps



1. Click the **Change local origo - Initial positioning** button.
2. Indicate three points on the model by double-clicking with the left mouse button as shown in the *Help* image on the left side of the screen.



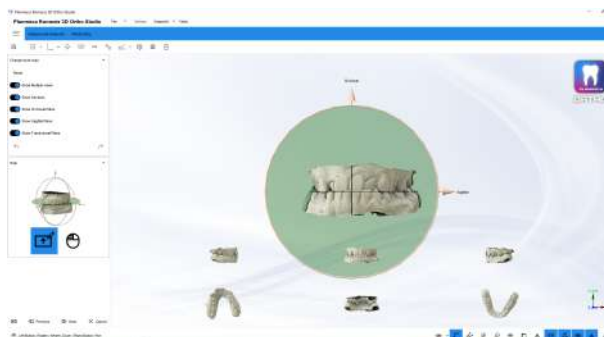
Click **Next**.



3. Translate and rotate the models by dragging the arrows or circle lines, until the models are correctly orientated.

The horizontal circle should be orientated at the occlusal plane and the vertical circle at the dental midline.

- The centre marks the origin of the coordinate system
- The sagittal arrow marks the X axis
- The occlusal arrow marks the Y axis
- The transversal arrow marks the Z axis



4. To update the orientation of the models and the center of rotation click **Next**.



5. Click on **Save case**.

## 10.2 Adjusting teeth occlusion

### About this task

If necessary you can adjust the contact relationship of the occlusal surfaces of the teeth. This can be done e.g. to create a target occlusion for orthognathic surgery module.

### Steps

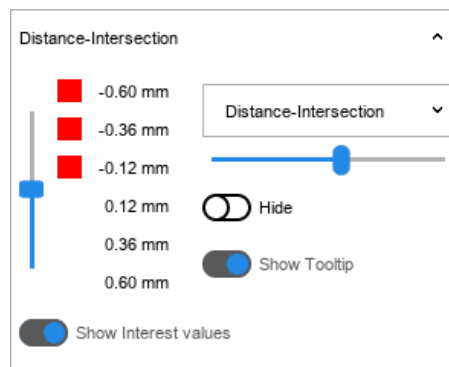


1. Click the **Change articulation** button.

2. Select lower or upper jaw from the *Movement overview* tool group on the left side of the screen.



3. You can visualize the occlusal distances of the upper and lower model using the tools in the *Distance - Intersection* tool group on the left side of the screen.



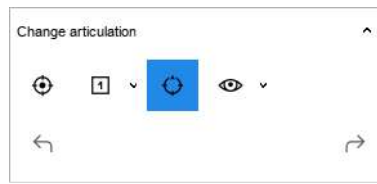
4. Adjust the occlusion by moving the manipulator's arrows or by using the tools in the *Movement* tool group on the left side of the screen.

The selected model can also be moved using the arrow keys.



- The centre marks the origin of the coordinate system
- The sagittal arrow marks the X axis
- The occlusal arrow marks the Y axis
- The transversal arrow marks the Z axis

If the arrows are not visible select the **Show/Hide manipulator** button from the *Change articulation* tool group on the left side of the screen.



5. To update the occlusion click **Next**.



6. Click on **Save case**.

### 10.3 Adding virtual base



To add virtual bases for models click the **Add virtual base** button in the **home** tab.

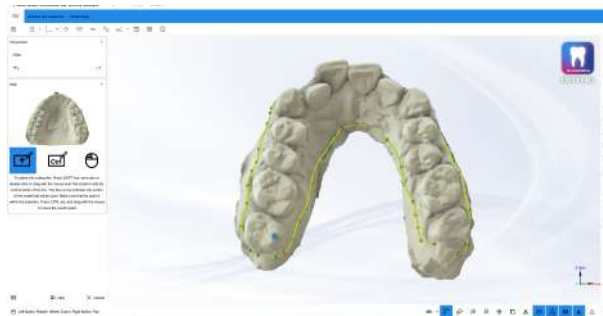
#### 10.3.1 Defining cutting line

##### About this task

A cutting line needs to be defined under which the virtual base is attached. Follow the steps below to add control points on the line.

##### Steps

1. Press and hold down the **Shift** key and click or double-click or drag with the left mouse button.
2. First define the maxillary model cutting line and click **Next**.



##### NOTE

Make sure to draw the cutting line through the surface of the models, not air.

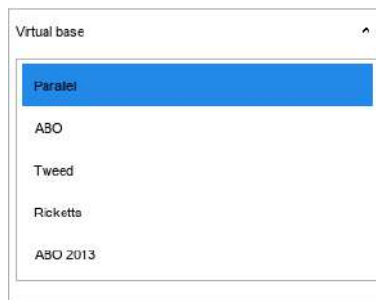
Drag the blue arrow within the selection as it indicates which part of the model is used.

3. Click **Next**.

- Define the mandibular model cutting line.



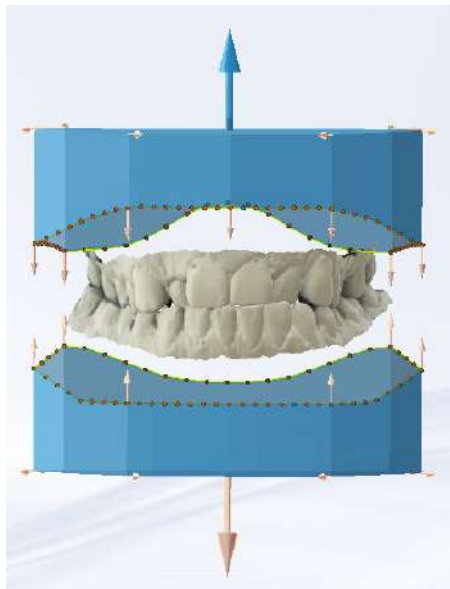
- Click **Next**.
- Select a type for the virtual base (Parallel, ABO, Tweed, Ricketts, ABO 2013) from the *Virtual base* drop-down menu on the left.



- Click **Next**.

## Results

The following view appears.



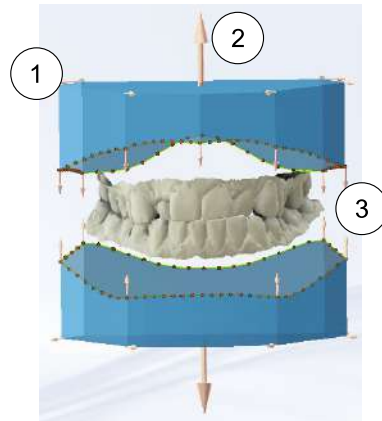
## What to do next

You can now customise and finalise the virtual base. Continue to section "Customising and finalising virtual base" on page 34.

### 10.3.2 Customising and finalising virtual base

#### About this task

Follow these steps to customise and finalise the virtual base. The shape and height can be customised by adjusting the arrows and points on the virtual base as shown below. To edit both bases simultaneously check the *Symmetrical changes* check box.



- 1 Editing base shape
- 2 Editing base height
- 3 Editing base border shape

#### Steps

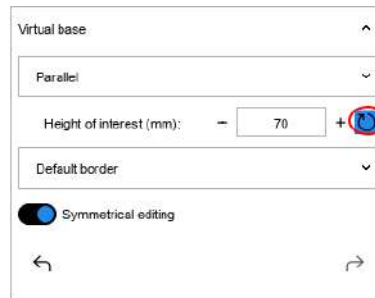
1. Make adjustments as necessary.
  - 1.a. Adjusting virtual base border shape:
    - To change the shape, hold down the **Shift** key and drag the points attached to the base.
    - To add/remove points, hold down the **Shift** key while double-clicking with the left mouse button.
    - To draw the base border, hold down the **Shift** key and click with the left mouse button dragging near to the base border.
    - To move the border up and down, hold down the **Shift** key and drag the arrows on the virtual base border.
  - 1.b. Adjusting base shape (width and length):
    - Hold down the **Shift** key and drag the points and arrows at base corners.

During editing constraints between angles/sides of base are preserved.
  - 1.c. Adjusting virtual base height

#### NOTE

This option is disabled for ABO bases.

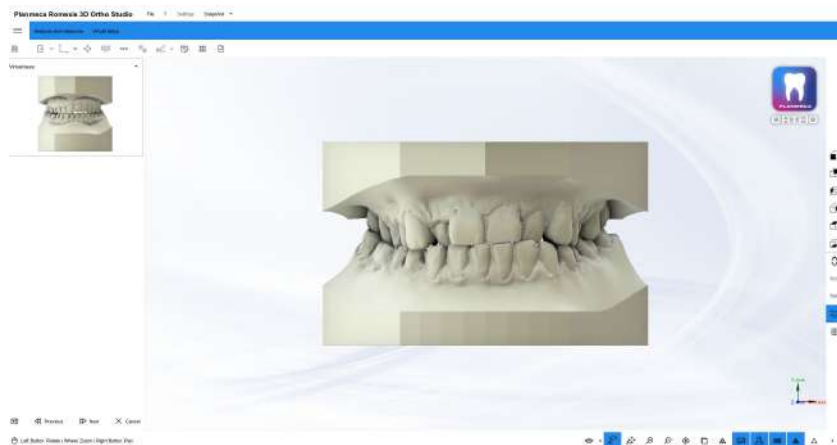
- Hold down the **Shift** key and drag the arrows on top and bottom of the models while pressing the left mouse button.
- To further adjust the height click the plus/minus icons in the *Virtual base* tool group on the left side of the screen.
- To reset to default height click the **Reset** button circled in the image below.



2. Click **Next**.

## Results

The defined bases will be merged with maxillary and mandibular models.



## What to do next

Click **Next** to approve the preview of the base or click **Previous** to make changes.

## 10.4 Smoothing and sculpting models

The sculpting and smoothing tools can be used to remove artefacts and excess material from the digital dental models and to smooth out the surface of the models.

### Smoothing



### Sculpting

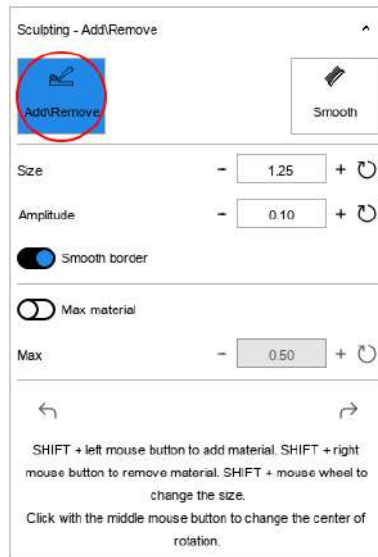
To modify the models, click the **Sculpting** button.

From the sculpting drop-down menu select the models for sculpting.



### Add/remove material

Click this button to add or remove material from the surface of the models. Adjust the size, amplitude of the brush and maximum amount of material to be removed.



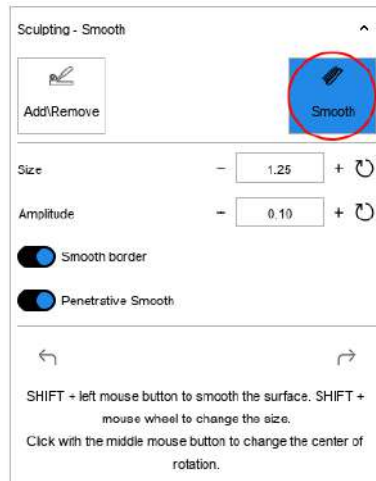
To add material on the model hold down the **Shift** key while clicking with the left mouse button.

To remove material hold down the **Shift** key while clicking with the right mouse button.

### Smooth surface

Click this button to smooth the surface of the models. Adjust size and amplitude of the brush.

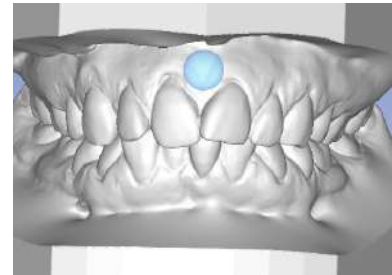




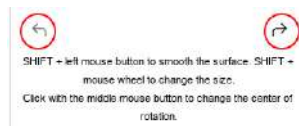
### Adjusting size of smoothing tool

Hold down the **Shift** key while left-clicking on the model to smooth out the surface.

To adjust the size of the brush scroll the mouse wheel.



### Undo/redo



Use the **Undo/Redo** buttons to undo and redo operations.

## 10.5 Adding labels to models

### About this task

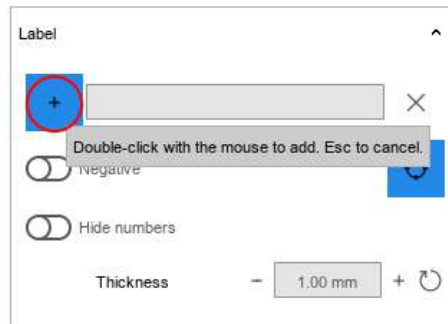
Follow these instructions on how to place labels on models.

### Steps

1. Click on the **Label** button under the **Home** tab.
2. Select the desired arch.

123

- Click the Plus-icon on the *Label* tool group on the left side of the screen to add a label.



- Double-click on the area where you would like to add the label. labels can be added on any part of the model.
- Write the information you want the label to show in the field next to the Plus-icon.
- Make necessary adjustments.

You can:

- Adjust the label's size and position with the help of the manipulator arrows
- Add multiple labels on the same model
- Choose if you want the label to be positive or negative (select from *Label* tool group)
- Customize the thickness (select from *Label* tool group)
- Delete a label by clicking on the X-icon in the *Label* tool group while the label is activated.

- Click **Next**.

## Results

The label is placed on the model.

## What to do next

If desired, the operation can be repeated for the second arch. The models can then be exported to a 3D printer.

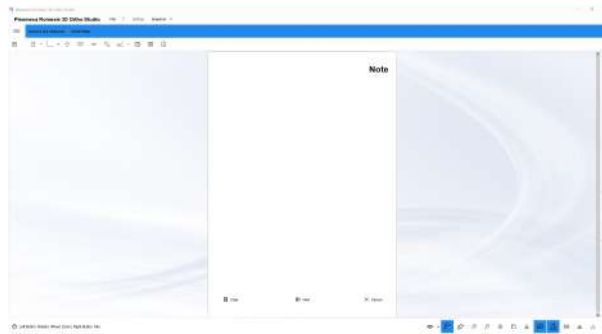
## 10.6 Adding notes to models

### Steps



- Click the **Note** button.

2. In the following window enter the notes.



If you want to clear the note sheet click the **Clear** button at the bottom of the sheet.

To save the note and close the note sheet, click on the **Next** button.

To close the note without saving, click on the **Cancel** button.

# 11 Dental model analysis

## 11.1 Occlusion inspection

### About this task

This tool can be used to view and analyse the occlusion distance and intersections (in millimetres) between maxillary and mandibular arches.

### Steps



1. Click the **Occlusion inspection** button in the *Analysis and measures* tab.

The colours on the arch represent the occlusion distance between the teeth on maxillary and mandibular arch.

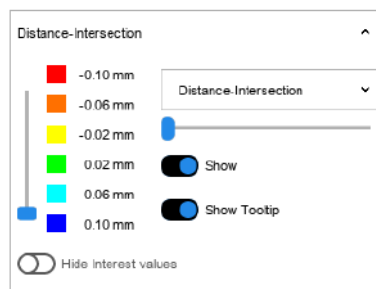
The following image shows the occlusion visualization on the maxillary and mandibular arches.



2. To view the occlusion distance at the exact point move the mouse over the tooth surface.

The colour scale is displayed at the right side of the screen.

You can set the scale by moving the slider on the *Distance-Intersection* tool group on the left side of the screen.



3. Select the appropriate option from the drop-down menu:
  - *Intersection*
    - Shows in colour the parts of the model which intersect each other.
  - *Distance*
    - Shows only positive distances between the models.
    - Red colour indicates a distance of 0 mm or negative.
  - *Distance-Intersection*
    - Shows intersections in negative values and distances in positive value

The distance can be shown only on the coloured areas. The occlusion distance is visualized on both models. Red colour indicates a distance of 0 mm or negative.



To show the occlusion distance on both arches with mouth open click the **Open mouth** button.



To show the occlusion distance only on the maxillary arch click the **Show Maxillary** button.



To show the occlusion distance only on the mandibular click the **Show Mandibular** button.

## 11.2 Planmeca 4D Jaw Motion

### About this task

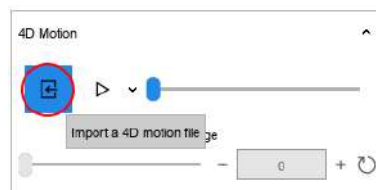
If patient jaw movement is tracked and recorded using Planmeca 4D Jaw Motion system the real jaw movement can be visualized using the digital dental models.

### Steps



1. Click on the **4D motion** button.

2. Click the **Import** button to import a new 4D motion file in \_RECS.xml format.



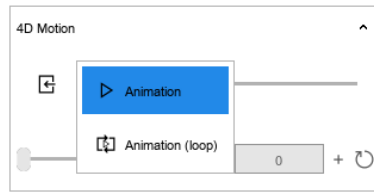
The recorded movement series can be animated.

The distances and intersections can be calculated with the original models or any models in the generated model series.



3. To play the recorded movements as animation select the recording from the list of recordings and click the **Animation** button.

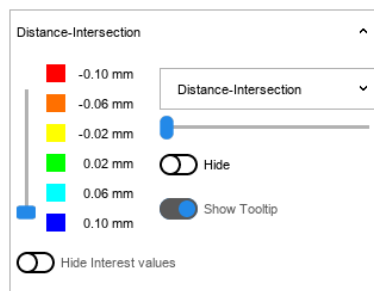
- To view the animation repeatedly click the *Animation* menu arrow and select **Animation (loop)**.



**NOTE**

In order to use the 4D Jaw Motion recordings the case has to be planned using the digital models aligned with CBCT in Planmeca Romexis and exported from Planmeca Romexis Jaw motion module together with recorded movement information.

Tools for the visualization of intersection/contacts.



- To scroll through the movement series manually step-by-step use the **Range** slider.



Switch between the model series' models using the drop-down menu in the main toolbar.

### 11.3 Cross section measurements

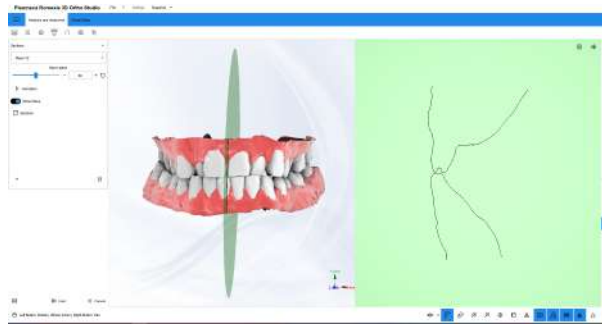
**About this task**

Cross sectional measurements can be done on cross sectional planes (frontal, axial, sagittal). The planes can be slid through the model.

**Steps**



- Click the **Sections** button.
- Make necessary adjustments.  
To slide the plane through the models use the **Move plane** slider.  
To adjust the transparency of the model use the **Dental model** slider.

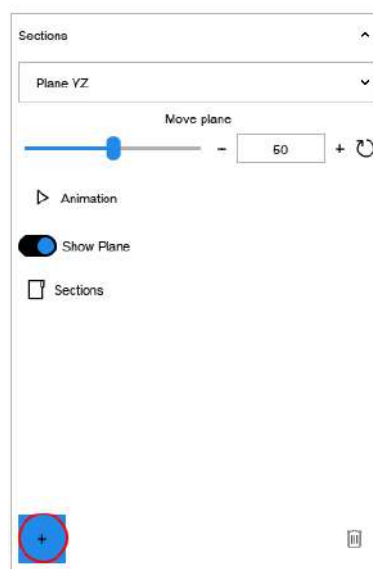


To add a point into a 2D grid, double-click it with the left mouse button.

To pan the cross sectional grid, right-click and drag it.

To zoom in and out, scroll the mouse wheel.

To save a measurement view, click the plus button on the left side of the screen.



After having completed and saved all the measurements click **Next**.

## 11.4 Teeth width measurements

### About this task

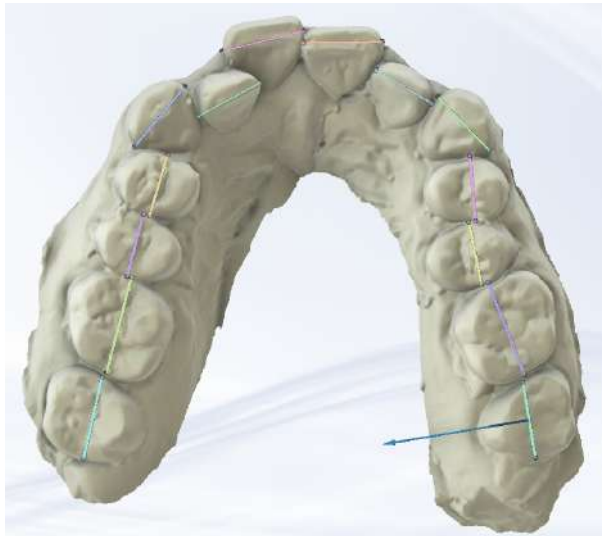
The software uses mesio-distal measurements to calculate the Bolton ratios. The mesio-distal measurements are also required in the tooth segmentation process for 3D planning in the virtual setup.

### Steps



1. Click the **Tooth width measurement** button.
2. Select the model to be measured by clicking on the **Maxillary** or **Mandibular** model.

3. Starting from the most posterior tooth on the right side of the dental arch double-click on the distal and mesial points of each tooth with the left mouse button.



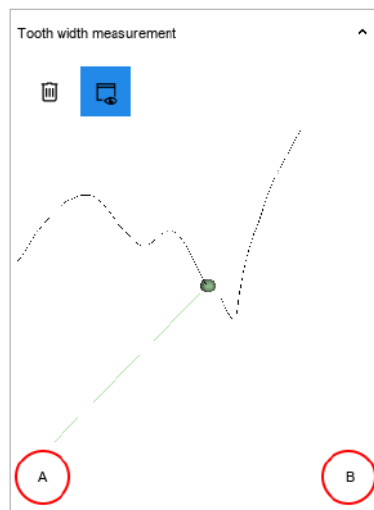
4. Make adjustments if necessary.  
If tooth number is incorrect, it can be corrected via the drop-down menu on the left side of the visualization/editing area.

The measurement can be deleted by opening the corresponding tooth's drop-down menu and selecting *cancel*.

For each tooth width measurement, the current length is shown.

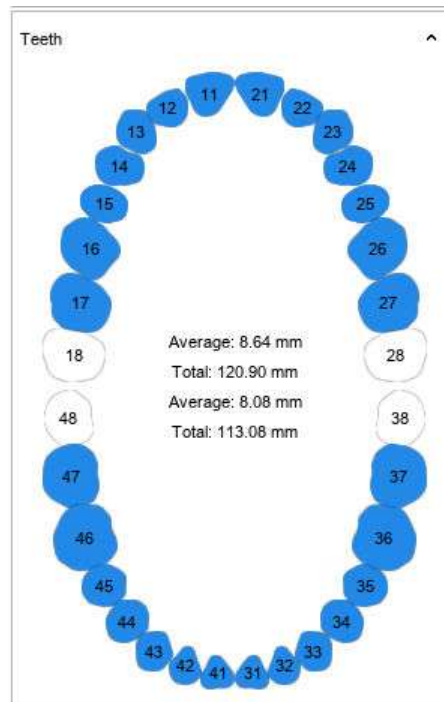
To adjust length, you can either:

- Drag either of the two points on the tooth with the left mouse button, or
- Click on the A or B buttons in the 2D cross section view in the left toolbar and drag the dot.



The total and average length of the segments are shown in the dental map on the left side of the screen.





When all tooth measurements of the upper and lower arches are done, Bolton overall and anterior ratio are shown.

To **show/hide** the mesio-distal measurement list for all teeth click this button.



To clear the measurements click the **Reset** button.



5. To save the measurements click **Next**.
6. After clicking **Next** you are prompted to proceed to tooth segmentation. Click **Next** to proceed to segmentation or **Cancel** to return to the main view.

## 11.5 Measuring arch length

### Steps



1. Click the **Arch length measurement** button.
2. Select the maxillary or the mandibular model.
3. Mark points on the arch starting from the posterior right side advancing through the arch and ending in the posterior left side of the arch.  
It is recommended to mark at least five points.  
Fine-tune the shape of the arch by dragging from the control points.



**NOTE**

If necessary more points can be added by double-clicking on the green line with the left mouse button.

The length of the drawn arch is shown in the *Arch length measurement* tool group on the left side of the screen.



4. Click **Next** when done.

## 11.6 Free measurements

### About this task

Follow these steps to freely measure lengths or angles on the models.

### Steps



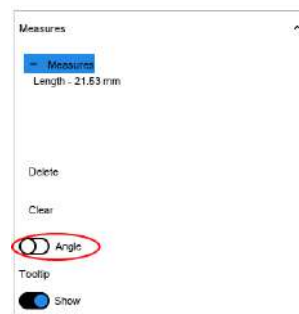
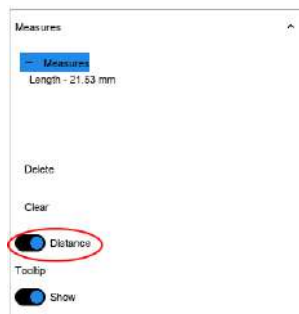
1. Click on the **Measures** button.



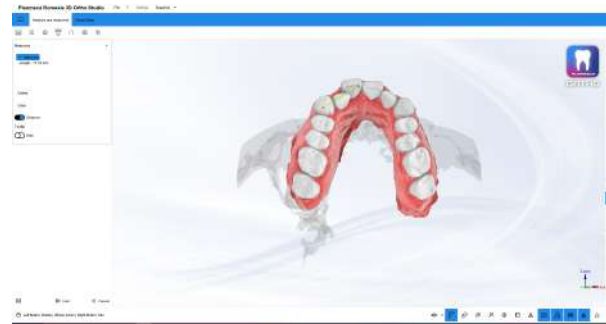
2. Select the arch to measure by clicking the **Show Maxillary** or **Show Mandibular** button.



3. Select **Distance** or **Angle** measurements.

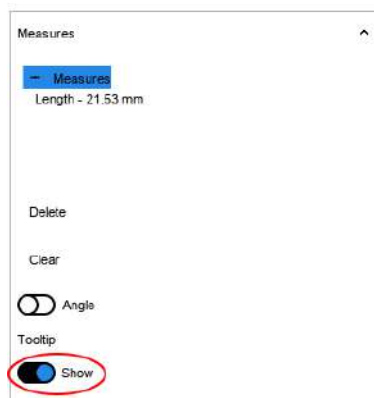


4. Mark the measurement end points by double-clicking with the left mouse button.



## Results

The measurements are automatically saved and listed in the menu on the left. The length of the measurement is shown if the tooltip button is in *show* position.



The measurements can be renamed by clicking on the text and entering a new name for the measurement.

## 11.7 3D comparison

### About this task

With 3D comparison tool you can compare two dental arches to verify the progress of treatment, or an impression taken in the course of treatment with the related virtual model.

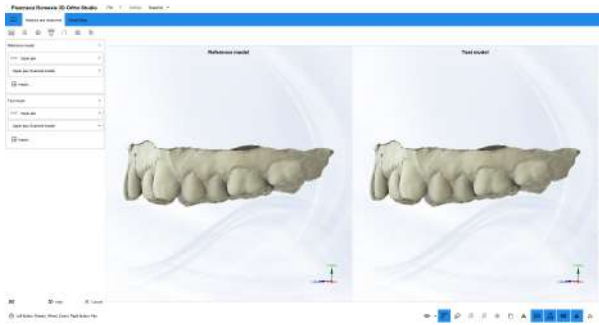
### Steps



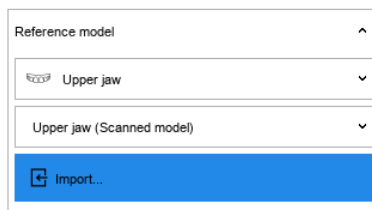
1. To start 3D comparison click on this button.

The screen is divided in two sections.

2. Select the 3D reference model into the section on the left.

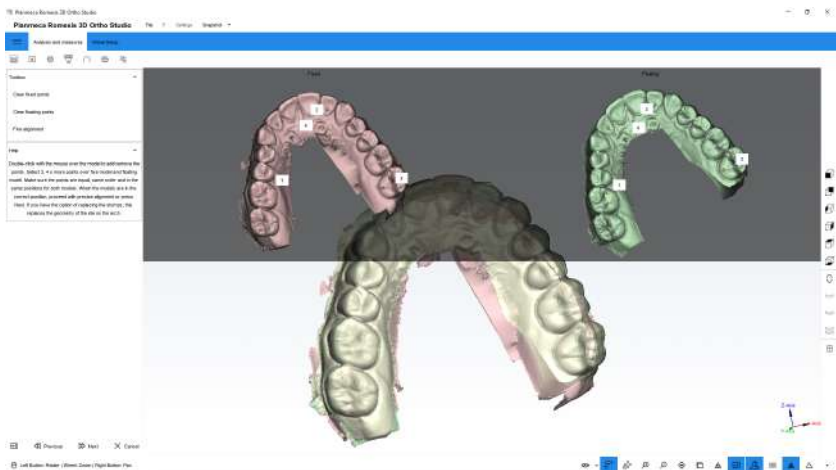


The transition models created previously with models builder are listed in the drop-down menus in the tool groups on the left side of the screen. To import model for comparison click the **Import** button and select the desired model for comparison.

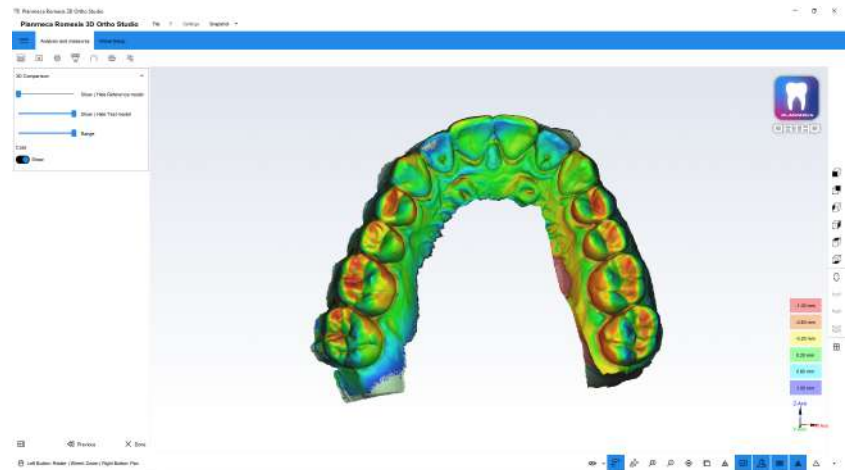


3. Select or import the 3D model to which you want to compare the reference model to into the section on the right.
4. Align the models by indicating a minimum of three common points from both models.
5. Click **Next**.

The software asks if the alignment should be fine-tuned using surrounding areas of the points.

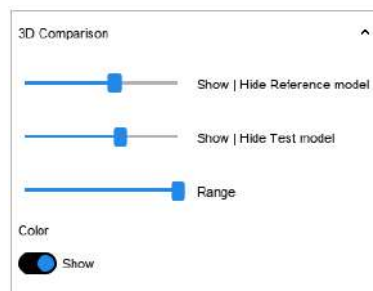


The colours indicate the distances between the selected reference model and imported model.



6. If needed, adjust the comparison by modifying:

- Transparency of the models
- Range of the comparison values
- Show/hide the colour map



## 12 Treatment planning in 3D virtual setup

The virtual setup can be used for making a staged treatment plan e.g. by displacing, rotating and extracting teeth.

The plan can then be utilized in the models builder for creating a series of STL models of the treatment plan.

### 12.1 Tooth segmentation

#### 12.1.1 Detecting margin

##### About this task

The tooth segmentation consist of defining outlines for single teeth, combining teeth outlines and defining local origin and rotation centres for all teeth.

##### Steps

1. When both arches are visible, the segmentation starts from the upper model.



Select the arch for segmentation by clicking the **Show maxillary** or **Show mandibular** button.



##### NOTE

The mesio-distal tooth measurements have to be done before segmentation.

##### NOTE

All teeth containing mesio-distal tooth measurement are segmented.

##### NOTE

It is recommended to segment at least one neighboring tooth per side of the teeth to be moved.

2. Click the **Tooth Segmentation** button.



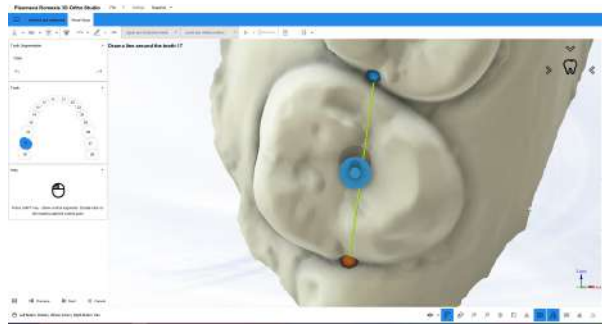
If teeth are not segmented, the software automatically goes to **tooth width measurement**.

The software automatically detects the margin lines for each tooth using the tooth width measurements.

3. Make adjustments as necessary.

Pressing the shift button shows the tooth width measurement points that can be dragged using the left mouse button.

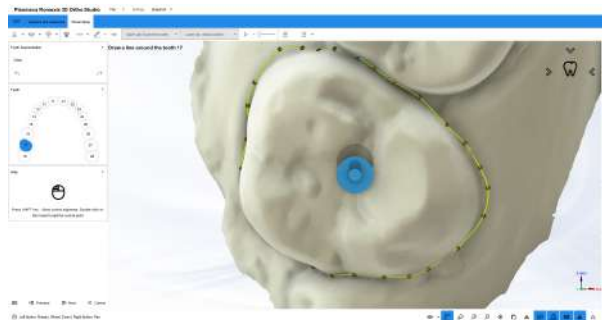
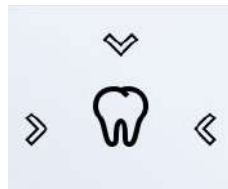
More control points can also be added around the tooth by double-clicking.



To fine-tune the tooth margin line, you can:

- Move a point on the outline by dragging it with the left mouse button pressed down
- Remove a point from the outline by double-clicking on it with the left mouse button
- Add a point between two points on the outline by double-clicking on the outline

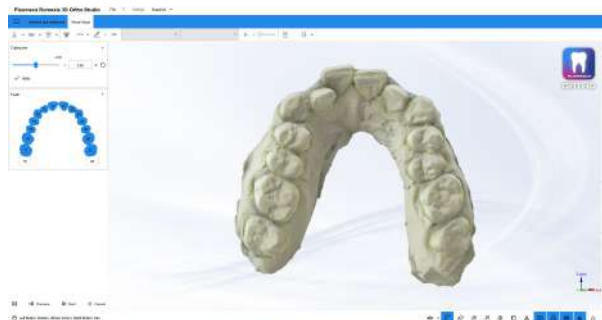
You can change your viewpoint from the occlusal to vestibular or lingual by using the control on the upper right corner of the visualization area.



## NOTE

The tooth for which the outline is defined can be selected by clicking on the odontogram on the left side of the screen.

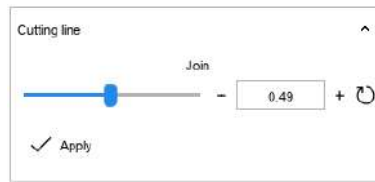
4. When you have defined the outlines for all teeth verify that the teeth are correctly outlined in the next step.



To readjust the outlines you can:

- Add a new point between two consecutive points by double-clicking near the edge of the two points

- Remove a point by double-clicking on it
- Move a point by clicking and dragging it using the left mouse button
- Define the maximum distance between the outlines of the adjacent tooth to be combined using the **Join** slider



If you need to re-define the outlines add a new point by clicking the **Default params** button and then clicking on another spot in the outline area. To define the outlines for all teeth repeat as necessary.

5. To continue to definition of local origin click **Next**.

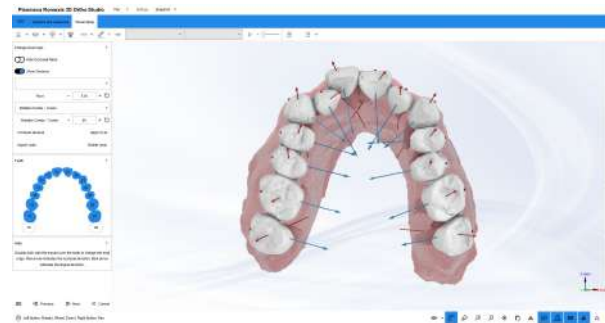
### 12.1.2 Defining local axes of teeth

**Before you begin**

#### NOTE

Complete the cutting line procedure before proceeding.

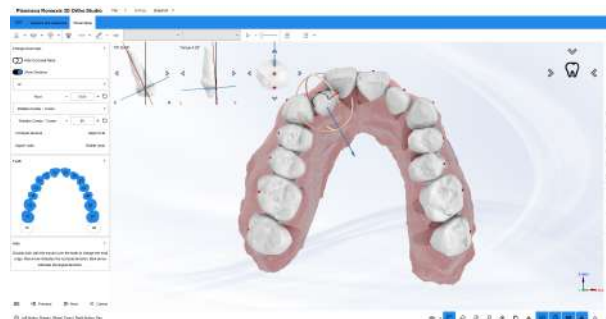
The following view opens.



**Steps**

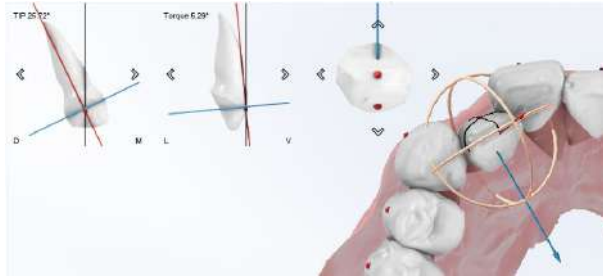
1. Double-click on the tooth you want to adjust.

The manipulator for changing the origin appears.



The red tooth axis should be based on the tooth root direction, the blue axis should point toward the lingual side of the tooth.

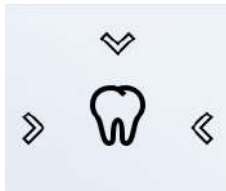




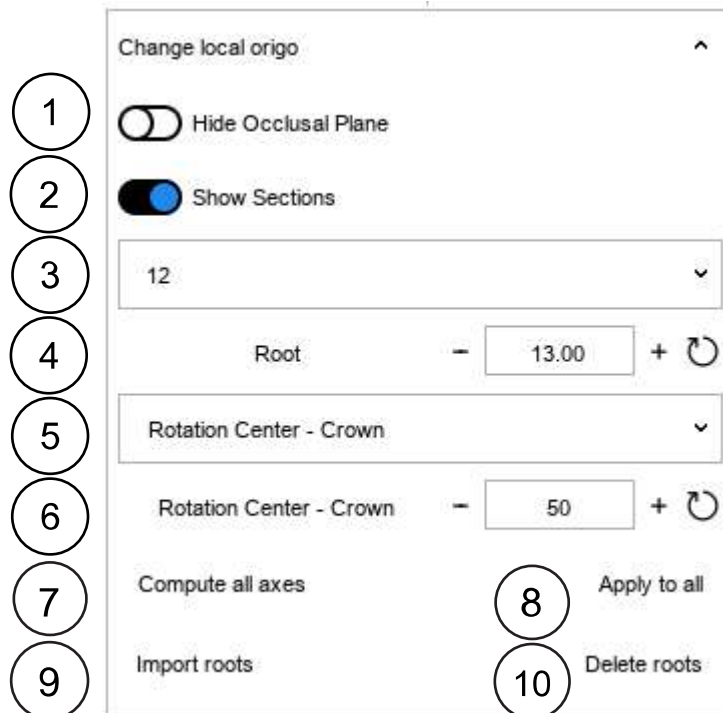
## NOTE

When changing the local origin, the virtual root of the tooth changes direction.

You can change your viewpoint from the occlusal to vestibular or lingual by using the control on the upper right corner of the visualization area.



- To adjust the root dimensions select the tooth and use the **Change local origo** for adjustments.



- Show/hide occlusal plane
- Show/hide sections on the selected tooth
- Tooth selection
- Root length
- Rotation centre (RC) of the tooth (crown or root)
- Centre of rotation of the tooth. Represented by percentage of the length of the crown or root circled in blue.
- Calculates axes and roots by default
- Apply parameters to all teeth
- Import segmented roots from CBCT image. When launched from Romexis 3D module in STL format after root segmentation the roots are included in the project.
- Delete roots

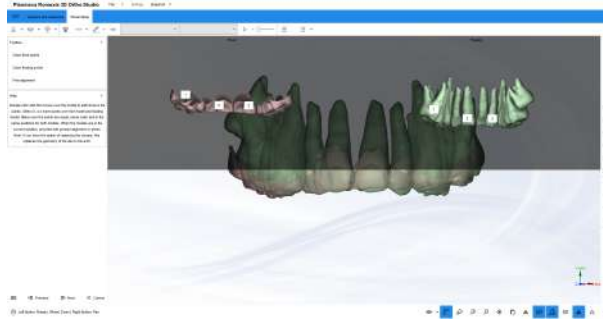
- To change the rotation centre of the manipulator click with the middle mouse button.
- Roots segmented in Planmeca Romexis 3D module can be imported into the project in STL format.

### What to do next

Roots segmented in Planmeca Romexis 3D module can be imported into the project in STL format.

The roots are combined with the segmented crowns to form unified 3D models of teeth. The launched roots are in correct coordinate positions so no fine alignment is required in Ortho Studio software.

If the roots are imported from outside Romexis, the roots and crowns can be aligned using the point registration algorithm



## 12.2 Virtual setup

### About this task

In virtual setup the teeth can be moved to the orthodontic treatment target position. It is possible to simulate the movement of the teeth from the original position to the target position.

### Steps

1. Go to the **Virtual Setup** tab.
2. Click on the **Virtual setup** icon.



### 12.2.1 Moving teeth

#### Steps

1. Select a tooth by clicking it with the left mouse button.

To select multiple teeth hold down the **Ctrl** key on your keyboard while clicking on the teeth.



If you want to select predefined groups of teeth quickly, select from these buttons:



With the **Divide the screen** button, you can divide the screen into several parts to have a multiple view of the case and to better see the movements made.



By pressing **Esc** key on the keyboard, you can deselect all selected teeth.

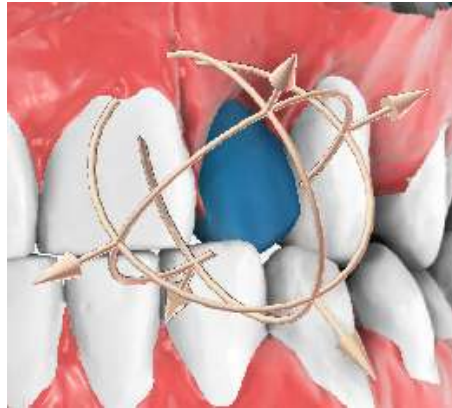
You can choose to work with only upper or lower jaw and adjust your viewpoint from the **Sidebar**.

2. Teeth can be moved by using one of the following techniques:

- **Tooth manipulator**



When a tooth is selected, the **Tooth manipulator** can be activated from the **Movement overview** tool group. The tooth can be moved using the manipulator to the occlusal and mesio-distal directions.

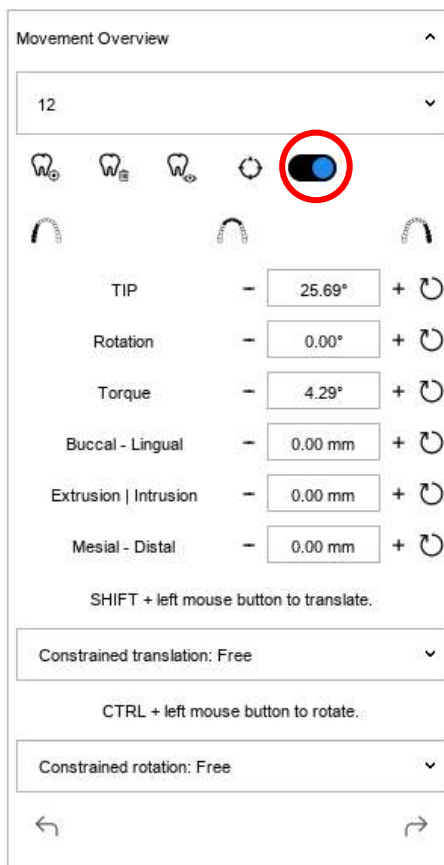


- **Numerical input**

When a tooth is selected, its position can be adjusted numerically in the **Movement overview** tool group.

TIP, rotation and torque can be adjusted in degrees and the buccal - lingual, extrusion - intrusion and mesial - distal translations in millimetres. The vestibular and lingual height and width are also shown.

When the button shown below is activated it is possible to show/hide the initial TIP and torque that was previously calculated.



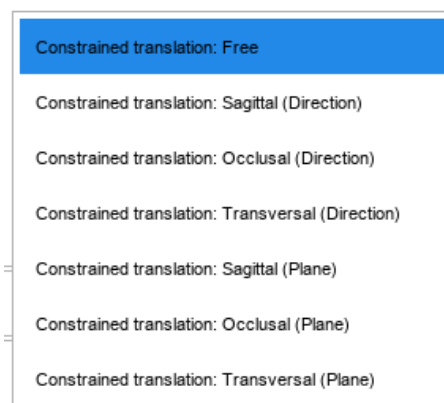
- **Shift + left mouse button**

A tooth can be moved by holding down **Shift** key on your keyboard and moving the tooth while pressing the left mouse button.

If you want to eliminate a movement, click on the tooth with the right mouse button and click **Reset**.

Movements can be constrained based on the parameters from the drop-down menus on the **Movement overview** tool group.

SHIFT + left mouse button to translate.



- **Keyboard keys**

Teeth can be moved with keyboard arrows **up**, **down**, **right** and **left** always in relation to the view.

3. You can click on this icon to show/hide a reference axis to get a better view on how the teeth are being moved.



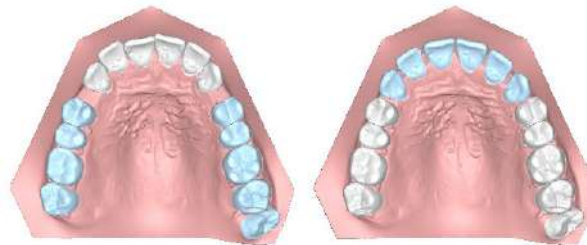
### 12.2.2 Layers

#### About this task

Layers can be created to simulate the different stages of the treatment.

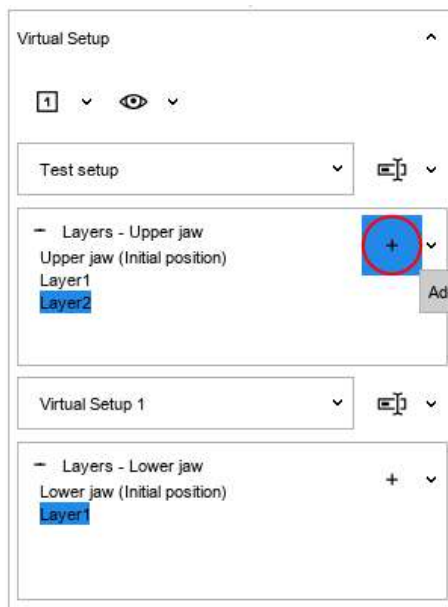
For example if the posterior teeth need to be moved before the anterior teeth:

First create *Layer 1* where you move the prosterior teeth. Then create *Layer 2* for moving the rest of the teeth (anterior).



#### Steps

1. Select the teeth you want to add to the layer.
2. To add a layer press the **Add** button in the **Layers** group.



You can rename the newly created layer by clicking on it in the **Virtual setup** group.

3. Make the necessary tooth adjustments in each layer.



4. When ready, you can watch an animation of the adjustments by selecting the **Animation** button from the main toolbar.

Animation will show adjustments in a sequence, one layer at a time.

You can choose if you want to play the animation once or in a loop.

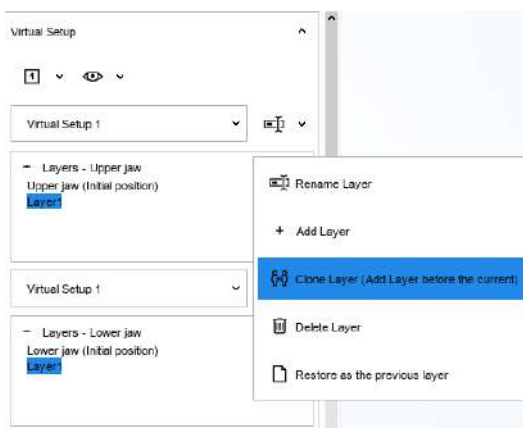
You can customize the speed of the animation by moving the slider next to the **Animation** button.

5. To delete a layer, select the **Delete** button from the drop-down menu next to the **Add** button.

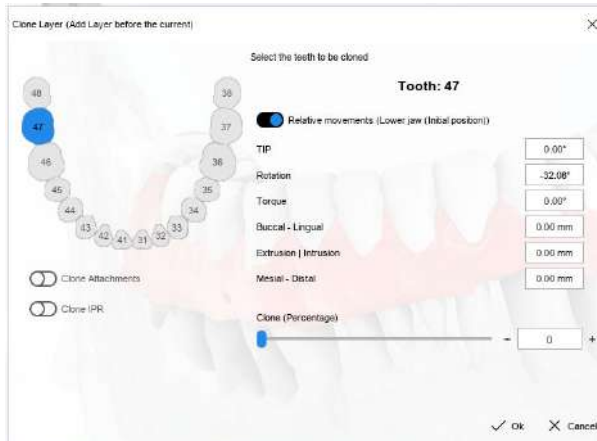
The starting point for a new layer is the last existing layer, which is the only layer that can be edited.

6. You can add a layer to a complete setup, if it becomes necessary at a later stage.

- 6.a. Select **Clone layer** from the drop-down menu in the **Virtual setup** group.



The **Clone layer** setup opens.



- 6.b. Select the teeth for the layer.

You can make multi-selection by keeping **Ctrl** key pressed down on your keyboard.

If you have attachments or IPR, you can clone them by activating the respective buttons.

- 6.c. Move the **Clone percentage** slider to 100.

6.d. Click **OK**.

New layer is created. You can review the movement sequence by selecting the **Animation** button.

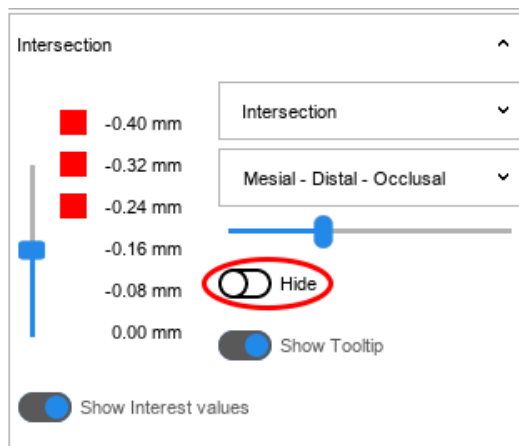
### 12.2.3 Intersection

#### About this task

Follow these instructions to evaluate intersections and contacts during tooth movement.

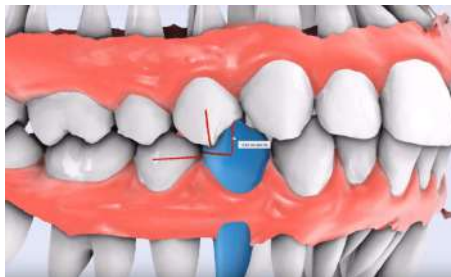
#### Steps

1. Scroll to the **Intersections** tool group on the menu on the left side of the screen.
2. To access the feature activate the **Show/hide intersections** button.



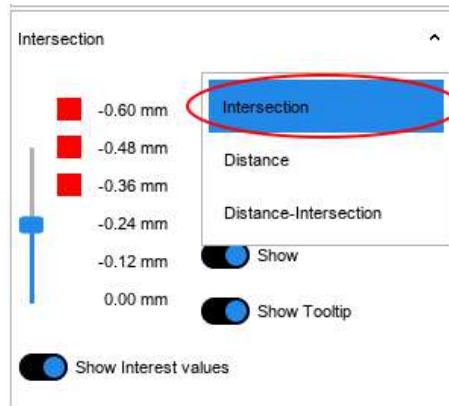
The intersections are calculated and shown.

Vertical lines indicate occlusal intersections. Horizontal lines indicate mesial-distal intersection. By moving the cursor to the intersection lines, you will see the distances and the teeth involved.

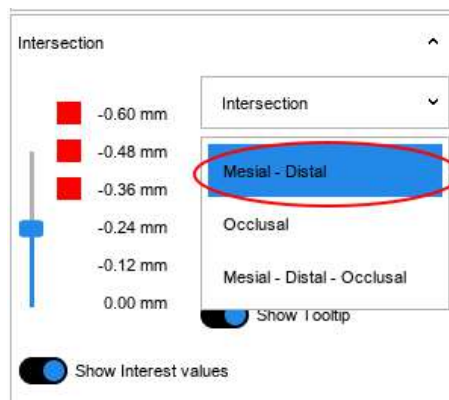


In the first drop-down menu you can select to inspect only intersections or distances.



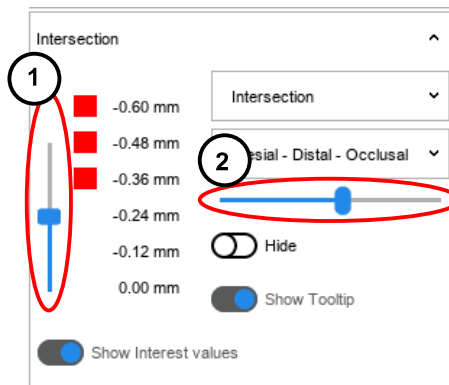


In the second drop-down menu you can select to inspect only occlusal intersections or mesial-distal intersections.

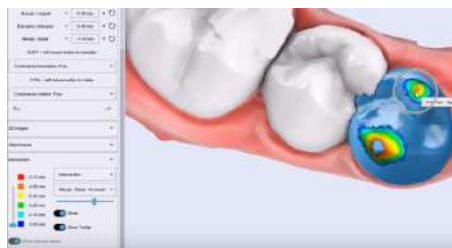


Use the bar on the left side of the tool group (1) to filter the intersections/distances you want to see, based on their measurement.

Use the second bar (2) to change the scale of the reference values.



If you prefer, you can move bar (1) to 0.00 mm which shows the intersections/distances as a colour map.



## 12.2.4 Inter-proximal reduction - IPR

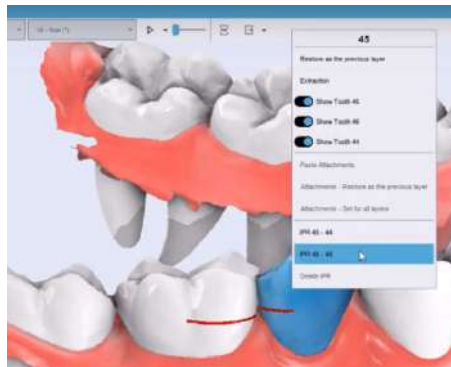
### About this task

IPR functionality simulates the mechanical removal of some of the outer tooth surface, enamel, between the adjacent teeth to create space for tooth movement.

### Steps

1. Select a tooth by clicking on it with the left mouse button.
2. Calculate the intersections as shown in "Intersection" on page 60.
3. Click on the right mouse button on one of the affected teeth.

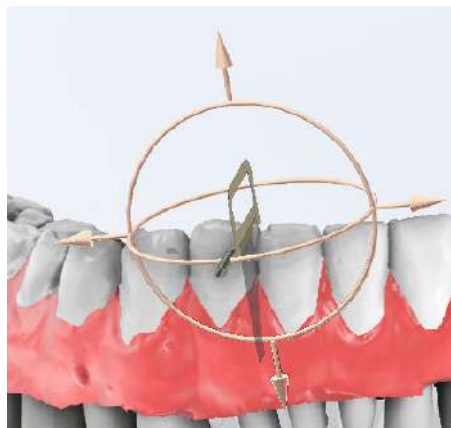
Select the teeth for treatment from the menu that appears.



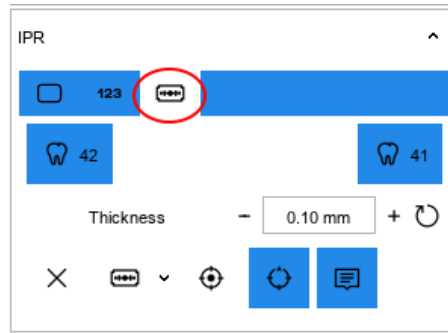
If you have moved a tooth from its original position the software tells you that it needs to reposition the teeth temporarily to the last known position i.e. that of the previous layer.

If you would like to perform IPR or extraction in the moved position, you need to create a new layer with that position before proceeding to IPR. See section "Layers" on page 58.

A blade appears in between the selected teeth.



4. Select **IPR** from the Attachments/Label/IPR tool group on the left side of the screen.

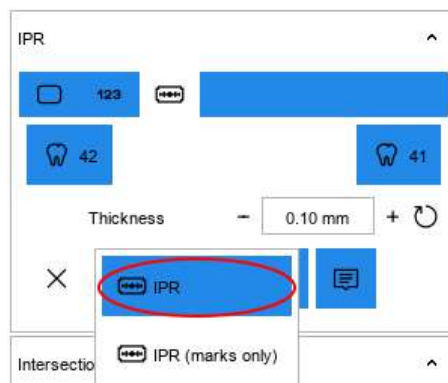


5. Make the necessary selections in the group.



- 1 Select if you want to perform IPR on both teeth or a single tooth, by activating these buttons accordingly.
- 2 The thickness of the IPR is adjusted here.
- 3 When the manipulator is activated, the position of the blade can be changed.
- 4 The optimal cutting position suggested by the software can be restored by clicking on this button.
- 5 Operation can be cancelled by clicking on this button or by pressing the **Esc** key on your keyboard.

6. Perform the IPR.



In the drop-down menu you have a choice between making the actual cut or to only mark the tooth. Select the marking option if you do not want to change the geometry of the tooth. A marking will be visible in the PDF report.



After IPR has been performed, a label on the model will display the respective work done. Labels can be hidden by clicking on this button in the IPR tool group.

If you want to cancel the IPR, click on the bin icon on the label.

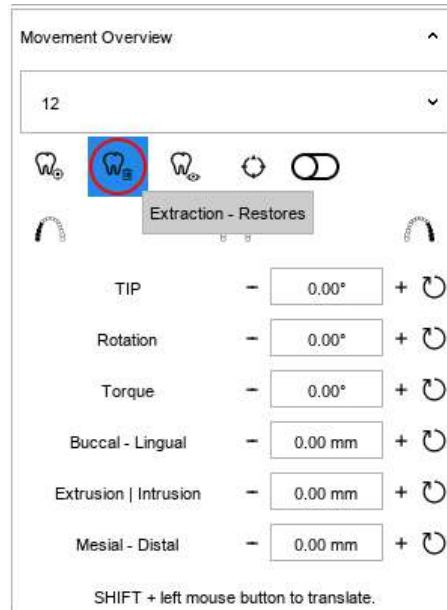
### 12.2.4.1 Tooth extraction

#### About this task

There are two options for simulating a tooth extraction.

#### Steps

1. Select the tooth by clicking on it with the left mouse button.
2. Perform one of the following options:
  - Select this button



- Right-click on the selected tooth and select **extraction** from the drop-down menu.

#### Results

The tooth is extracted. The gum will be reconstructed in the extraction point and the remaining teeth can be moved.

If you want to restore the extracted the tooth, select it from the drop-down menu on the *Movement overview* tool group and click again on the **Extraction - Restores** button.

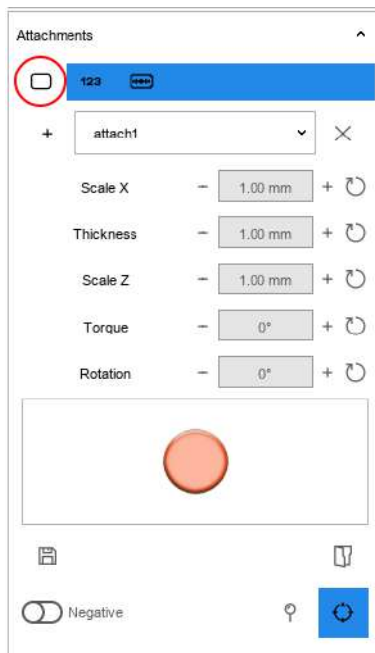
### 12.2.5 Adding attachments

#### About this task

Follow these instructions for adding attachments to teeth. You can change model's centre of rotation by clicking with the middle mouse button.

## Steps

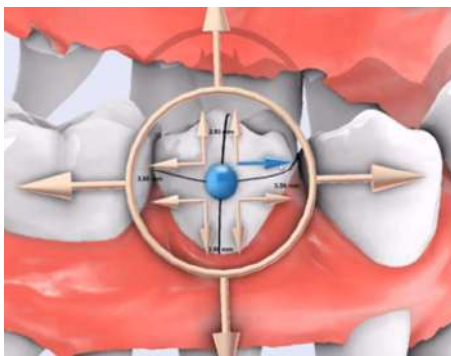
1. Select **Attachment** tab in the *Attachments/Label/IPR* tool group on the left side of the screen.



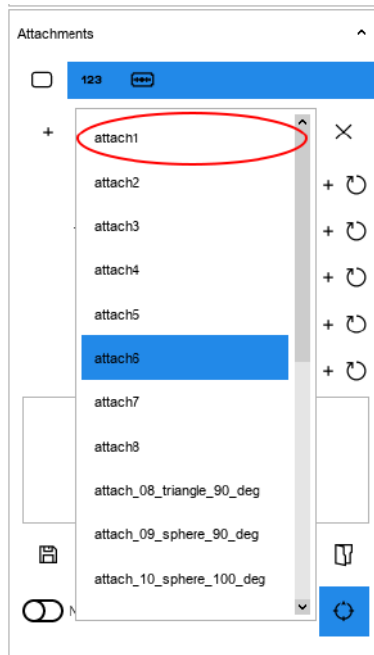
2. Click on the Plus-icon in the tool group or use key sequence **Ctrl + A** on your keyboard.

The software changes the look of the cursor to one that you can position an attachment with. You can cancel the operation by pressing the **Esc** key on your keyboard.

3. Double-click with the left mouse button to place an attachment.



To change the attachment type open the drop-down menu in the *Attachments* tool group and select.

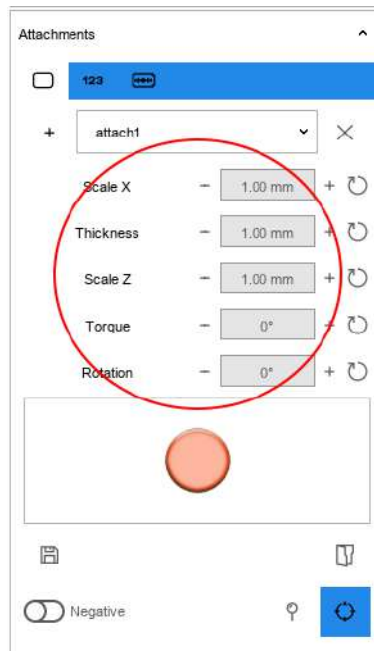


4. Make adjustments if necessary.

The attachment can be customized:

- By using the manipulator arrows.
- Torque can be adjusted by using the **Ctrl** key on the keyboard.
- The attachment can be moved with the arrow keys on the keyboard.

Modifications can also be made by adjusting the values in the *Attachments* group.



Attachments can be copied by clicking with the left mouse button and selecting **copy**. Paste by clicking on another tooth, left-click and select **paste**.



If the used attachment has default values, click on this button to restore them.



If you want to save your configuration for later use, click on the **Save** button.



Activate this button to create a negative attachment. The negative attachment will appear red. You can make the attachment positive again by deactivating the button.



With this button you can position the attachment in a facial axis (FA) point. By activating the button, the FA points become visible. Adjust the opacity of the attachments from the display toolbar so that you see the FA point of each tooth.

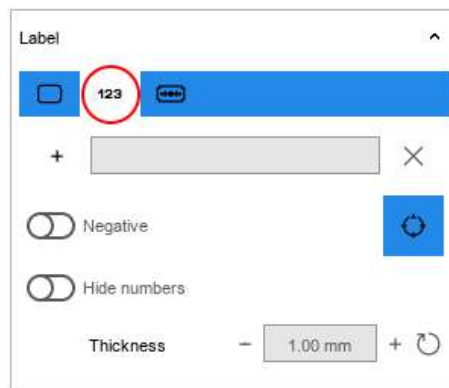
### 12.2.5.1 Adding labels

#### About this task

Follow these instructions if you want to add labels on the teeth or the gum.

#### Steps

1. Click on the **Label** tab in the *Attachments/Label/IPR* group on the left side of the screen.



2. Add a label by clicking on the Plus-icon in the tool group.
3. Make adjustments as necessary.

You can change the thickness in the tool group. Position and direction can be changed by moving the manipulator.

You can give the label an alphanumeric value by entering it in the field next the Plus-icon.

The software automatically gives the label a numeric value based on the model's number i.e. the labels on model 1 are numbered with 1 and labels on model 2 are numbered with 2. This automatic numeric value can be hidden from the tool group.

## 12.3 2D images

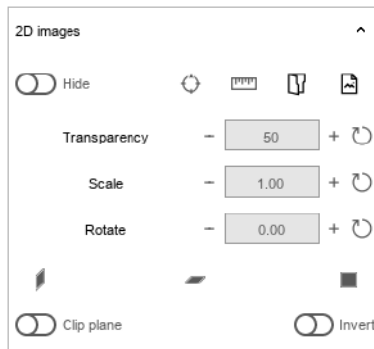
### 12.3.1 Importing a reference image

#### About this task

Follow these instructions to import reference images during the virtual setup phase to create an example for demonstration purposes.

**Steps**

1. Scroll to the **2D images** tool box on the left side of the screen.



2. Select either the **Upload file from disk** icon or **Import from library** icon.

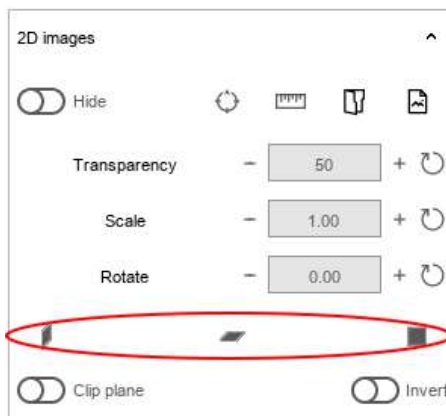


3. Choose an image.
4. Calculate a scale factor as prompted.
5. Click **Next**.

Image is imported.

6. Make adjustments as necessary.

Click on these icons to change the orientation of the image. The position can be further adjusted with the help of the manipulator.







You can use the **show/hide and change transparency** button in the display toolbar to change the look of the dental model by for example hiding the gum.

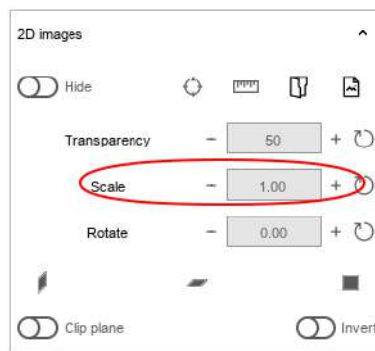
### 12.3.2 Importing a guide

#### About this task

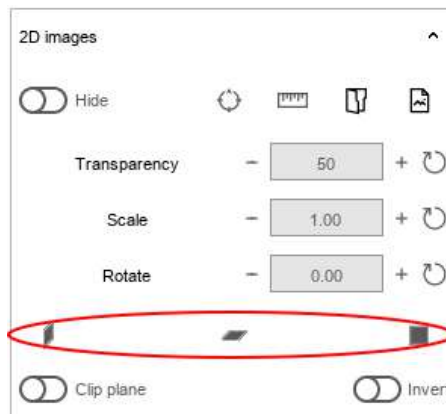
#### Steps



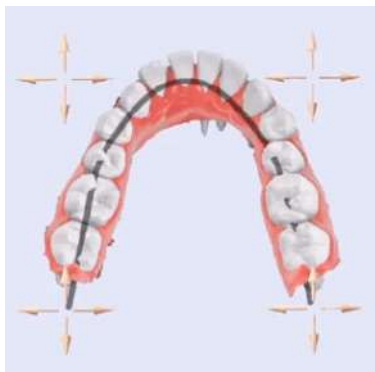
1. Select the **open file from the disk** button in the *2D images* tool box.
2. Import a guide image which must be in PNG format with transparency.
3. Enter a scale in the **Scale** field in the *2D images* tool box.



4. Use these buttons to select the correct direction for the guide image.



5. You can now move the teeth in the setup with the guide image as reference.



You can hide the imported image by clicking on the show/hide button in the *2D image* tool box.



With the **Clip plane** function, you can hide sections of teeth to help in visualization.



## 12.4 Models builder

### About this task

The models builder is intended to be used for creating a series of models which can be printed e.g. using a 3D printer. The 3D printed models can then be further utilized to create custom orthodontic appliances. The number of models and the maximum tooth translation and rotation between each model can be freely defined.

### Steps

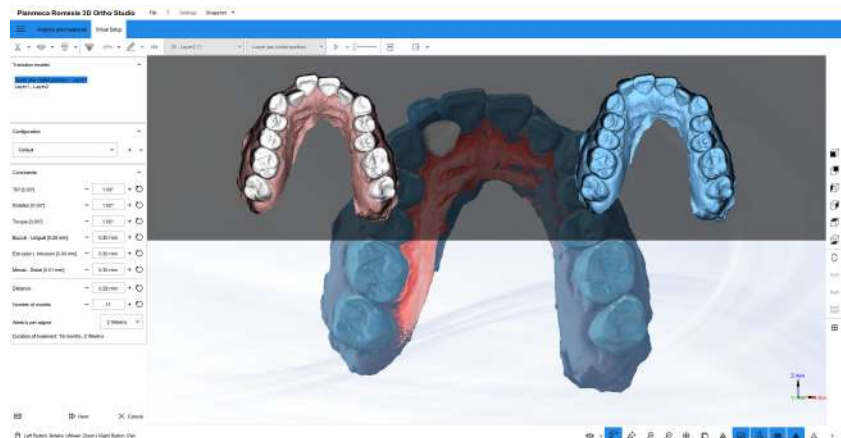
1. Select an arch by clicking the **Show Maxillary** button or **Show Mandibular** button.
2. Click the **Models builder** button.



### NOTE

Virtual setup needs to have been performed on the dental arch before proceeding to models builder.

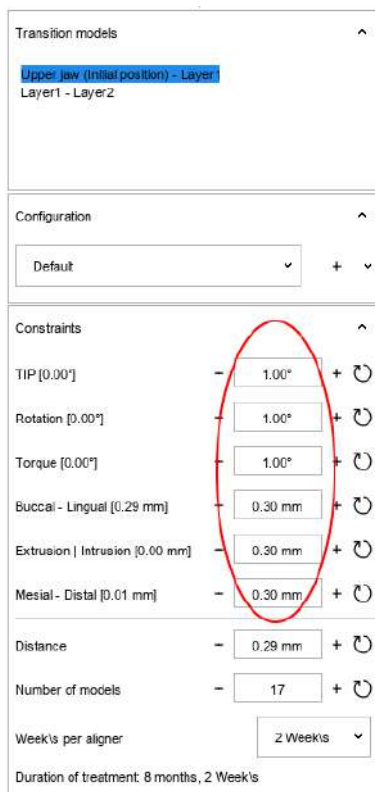
The following window opens.



In the centre, you see a combination of the initial and the final situation. Above are the two situations separately.

In the menu on the left side of the screen, you see a summary of the previously completed virtual setup.

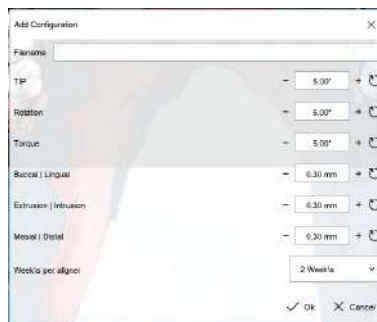
In the *Constraints* menu you can set the values you want the models to confirm to.



### 3. Create a model for each layer.

- 3.a. It is recommended to create your own parameters by clicking on the Plus-icon in the **Configuration** tool box.

In the next window, you can name the protocol, customize parameters' numerical values and enter the duration of the treatment.



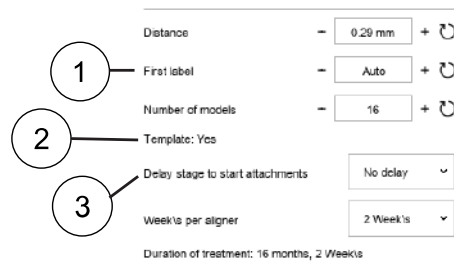
Predefined movement values can be loaded using the drop-down menu in the *Configuration* tool group.

- 3.b. Choose maximum movement of the teeth for each of the transition models by selecting the transition models and using the slider or the +/- buttons.

By modifying a value in this window the result values are calculated and modified accordingly.

You can also modify average distance or the desired number of models.

The software highlights parameter rows in red if there is a compatibility issue with given parameters. Modify the number of models or parameters until the highlighted row turns green.



- 1 The numbering of labels. You can modify the numbering to start from a later model.
- 2 This row indicates if a template aligner is used.
- 3 This parameter shows when to place an attachment. If you do not want to start placing attachments from the first model you can determine a delay here.

- 3.c. It is recommended to create your own parameters by clicking on the Plus-icon in the **Configuration** tool box.

In the next window, you can name the protocol, customize parameters' numerical values and enter the duration of the treatment.



Predefined movement values can be loaded using the drop-down menu in the *Configuration* tool group.

4. Once you are ready with adjustments, click **Next**.
5. Process the remaining layers using the previously given parameters.  
The software suggest the number of models. If this parameter is changed, the software will display the congruence warnings.
6. Click **Next**.

## Results

The software will create the sequence of models. You can watch an animation of the models by selecting **animation** button on the top menu. You can also use the **up** and **down** arrow keys on the keyboard to see all the created models.

You can select a single model from the drop-down menu next to the **animation** button.

## 12.5 Exporting transition models

### 12.5.1 Cut and close tool

#### About this task

The **Cut and close** tool is used to close the model and to remove all material that is not necessary when exporting and printing the models in 3D.

#### Steps

1. Select the desired arch by using the **Show Maxillary** or **Show Mandibular** buttons.
2. Click the **Cut and Close** button.



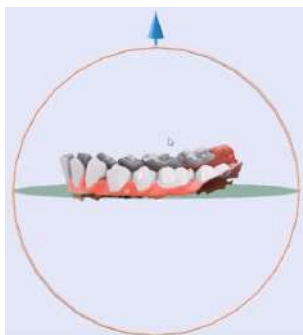
You can choose either **Cut and Close (Cutting line)** or **Cut and Close (Plane)** from the drop down menu.

If you select **Cut and Close (Cutting line)**:

- Press **Shift** key and click or double-click or drag with the mouse over the model to add the control points of the line.
- Blue arrow indicates the portion of the model that will be used. Make sure that it is within the selection.
- Press **Ctrl** key and drag with the mouse to move the control point.

If you select **Cut and Close (Plane)**:

- Position the cutting plan



3. Choose if you want to apply the cut to a selected model or if you want to cut all the transition models.

You can inspect each model separately by selecting it from drop-down menu on the main toolbar to see where the cut intersects.

4. To remove the extra material from models click **Next**.

### 12.5.2 Adding label to model before export

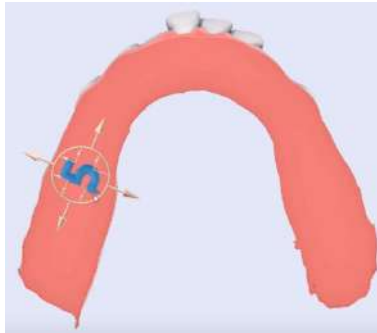
#### Before you begin

Follow these steps to place a label on the base of the model after using **cut and close** function before export.

## Steps

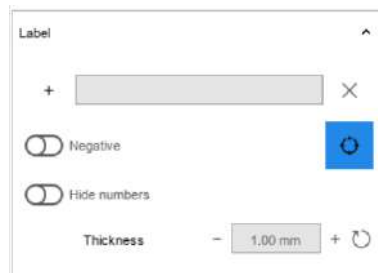


1. Click on the **Label** button on the main toolbar.
2. Rotate the model so that the base is visible.
3. Click on the Plus-icon on the *Label*/tool box on the left side of the screen.
4. Double-click the desired location on the model with the left mouse button to add the label.



The label's number automatically responds to the model's number.

You can adjust the appearance of the label in the *Label*/tool box on the left side of the screen.



You can also add more labels or remove them by making selections in the tool box.

Size can be adjusted by using the manipulator.

5. When ready, click **Next**.

## Results

The software will attach the labels on all of the models.

### 12.5.3 Export

#### Before you begin

Make sure that you have first followed the steps in sections "Cut and close tool" on page 73 and "Adding label to model before export" on page 73.

#### About this task

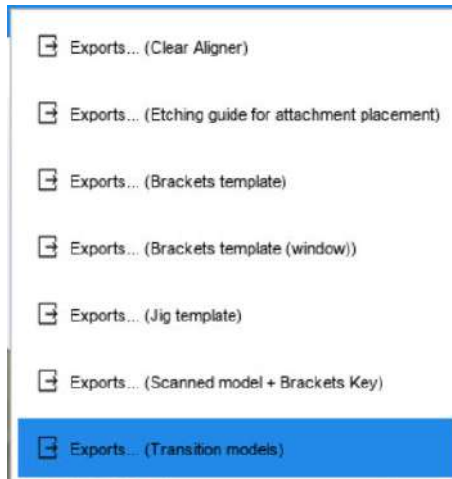
Follow these steps to perform export of transition models.

## Steps



1. Click on the **Exports (Transition models)** button on the main toolbar.

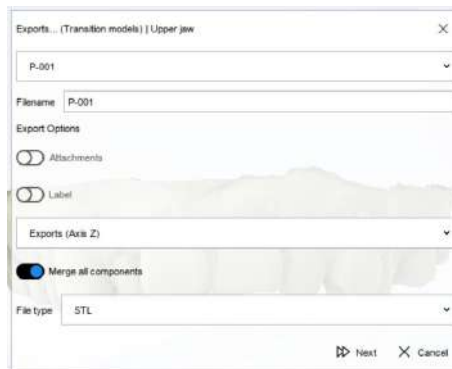
You can see all the export options by clicking on the drop-down menu arrow next to the **Exports (Transition models)** button.



2. Select the transition model export.
3. Select the desired arch.
4. In the opening window, choose a pre-built prefix for the models.

You can select if you want to export attachments and labels. You can also select the export axis.

In the final field, the file format is selected.



5. Click **Next**.
6. Select the folder where you want to save the model.

## Results

All the models are exported. The export time depends on the number of models.

## What to do next

Once the export is finished, the models are ready to be printed with any 3D printer.

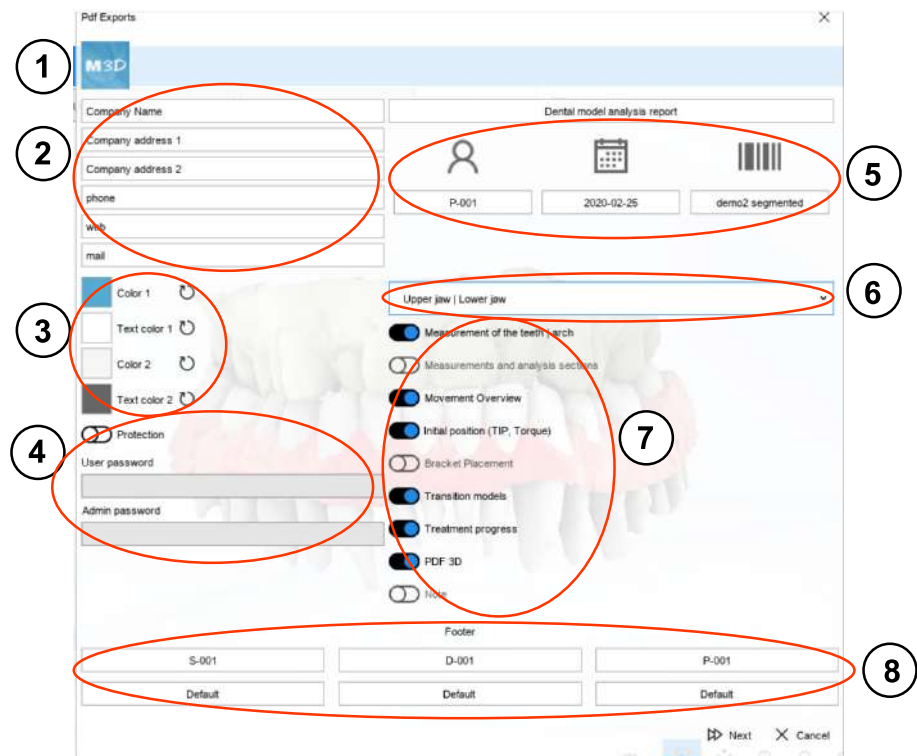
## 12.6 Creating analysis and treatment plan report in PDF format

### Steps



1. Click on **PDF Exports** button on the main toolbar.

2. Customize the parameters in the window that opens.



**1 Logo:** You can double-click on the logo and change it into any other image in preferably high-resolution PNG format.

**2 Contact information**

**3 Colour:** Report colour can be customized.

**4 Protection:** It is possible to activate a password to the user and the admin to protect the report.

**5 Customize file name, date, etc.**

**6 Choose arch:** a report can be created for one arch or both.

**7 Information shown:** select what information you wish to include in the report.

**8 Footer:** These parameters show a summary at the footer of the report.

3. Click **Next**.

4. Select location to save the report.

### Results

The software gives a notification when the report is ready and can be opened for reviewing.



## 12.7 Brackets placement

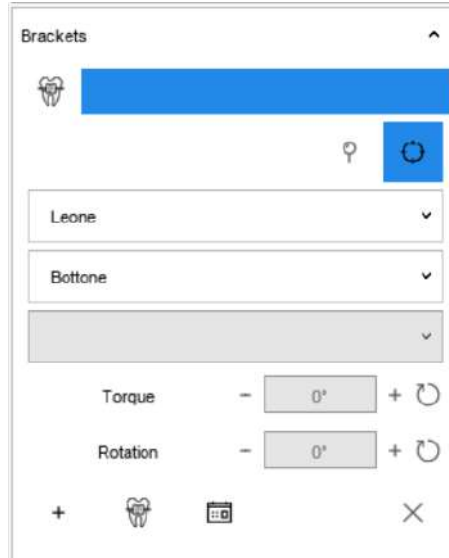
### Steps



1. Click on the **Bracket placement** button on the main toolbar.

You can now work on a virtual setup that was prepared earlier.

2. Scroll to *Brackets* tool box.



3. Select correct brand and model name for the brackets.
4. Position the brackets using one of the following ways.

- **Position brackets one by one**

Click on the Plus-icon on the Brackets tool box. Then double-click with the left mouse button to position the bracket in the desired location.

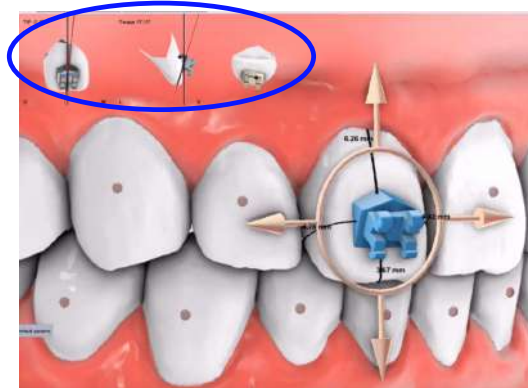


To make positioning easier, make FA points visible by clicking on the **Eye** icon in the display toolbar.

Use the manipulator to adjust the bracket's position on the tooth.

You can adjust the tip and the torque on the respective fields in the *Brackets* tool box.

On the top left of the visualization area, you see the tip and torque values.



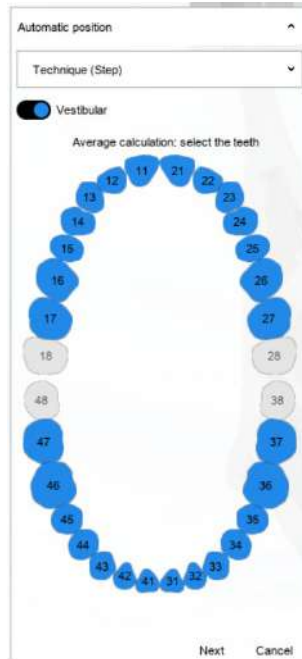
A bracket can be deleted by clicking on it with the right mouse button and selecting **delete** or by clicking on the X-icon on the *Brackets* tool box.

- **Position brackets with the help of the automatic mode**



Click on the **Automatic position** button on the *Brackets* tool box.

In the window that opens next, you can choose the positioning technique, whether the positioning should be vestibular or lingual and select or deselect the teeth.



When ready, click **Next** and the software will place the brackets.



By selecting this button you will see a table that shows the most suitable positioning based on the chosen technique and various calculations.

You can select a bracket and adjust it if necessary with the help of the manipulator. You can also double-click on the numbers and change the numerical values on the tooth.

### What to do next

If you want, you can import 2D images with the help of the 2D images toolbox. For more information see section "2D images" on page 67.

## 12.8 Brackets template

### 12.8.1 Classic brackets template

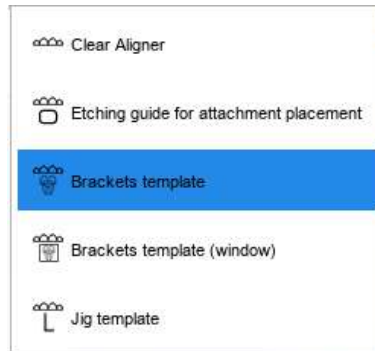
#### About this task

Follow these steps to create a classic brackets template.

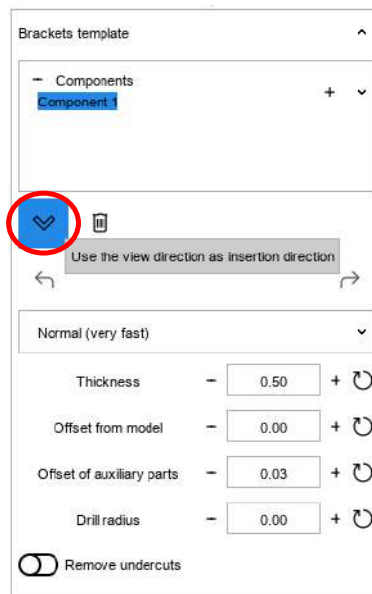
## Steps



1. Select **Brackets template** from the drop-down menu next to the **Clear aligner** button.



2. Select the arch and click **Next**.
3. Select the direction of insertion.
  - 3.a. Rotate the model to the occlusal view.
  - 3.b. Press the **Checkmark** button on the *Brackets template* menu on the left side of the screen to confirm that the view is used as insertion direction.

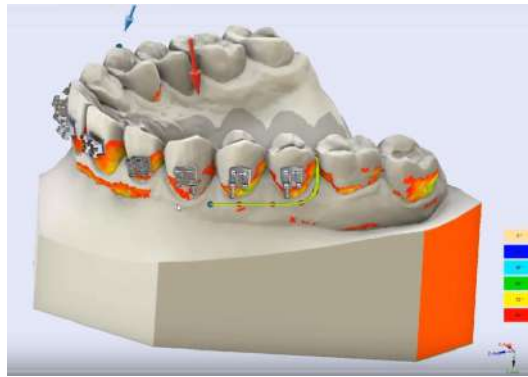


You can see how the undercuts change.

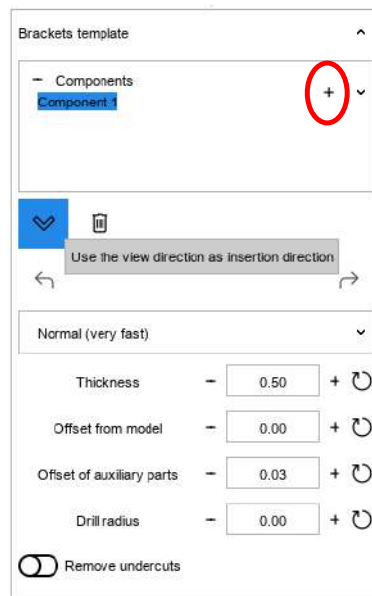
4. Define the template by making a cutting line.
 

To define a cutting line:

  - Hold down **Shift** key and left mouse button and trace the cutting line by dragging the mouse.
  - Trace the line by double-clicking with the left mouse button.



5. Move the blue dot within the selection to indicate which part of the model is used.  
Press **Ctrl** key and drag with the mouse to move the control point.
6. Check or customize the parameters on the *Brackets template* menu.  
In the menu you can also choose to remove undercuts.
7. If necessary, you can create more components and not attach all to a single template.
  - 7.a. Add a new component with the Plus-icon on the *Brackets template* menu on the left side of the screen.



- 7.b. Press the **Checkmark** button on the *Brackets template* menu on the left side of the screen to confirm that the view is used as insertion direction.
  - 7.c. Move the blue dot within the selection to indicate which part of the model is used.
  - 7.a. You can move between components to customize them, select the desired component from the *Components* field in the *Brackets template* menu.
8. Press **Next**.

## Results

Adjustment templates are loaded.



You can adjust transparency from the **Eye** icon in the bottom toolbar. You can, for example, remove the brackets from view, in which case only the shape of the bracket is visible in the template. You can also remove the model from view and inspect the templates.

### What to do next

The mask can now be prototyped or printed.

## 12.8.2 Brackets template (window)

### About this task

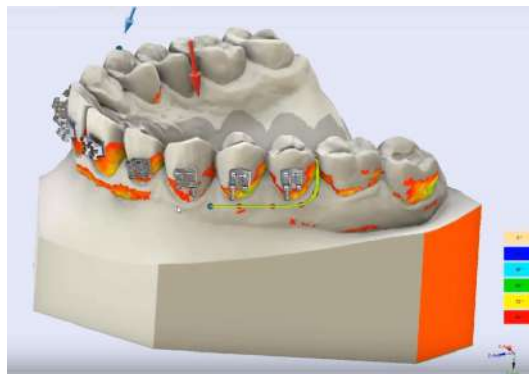
#### Steps



1. Open the drop-down menu next to the clear aligner icon in the main toolbar under **Virtual setup** tab.
2. Select the option **Brackets template (window)**.
3. Select the arch and click **Next**.
4. Define the template by making a cutting line.
 

To define a cutting line:

  - Hold down **Shift** key and left mouse button and trace the cutting line by dragging the mouse.
  - Trace the line by double-clicking with the left mouse button.

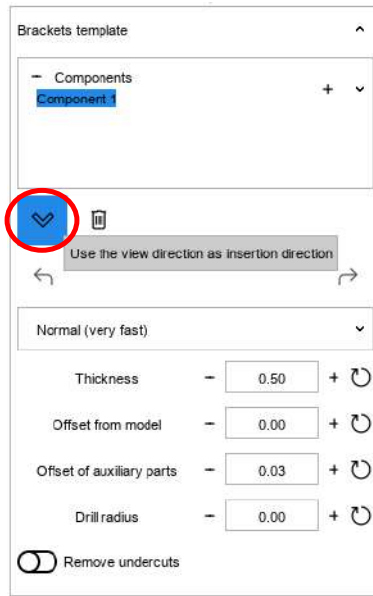


5. Move the blue dot within the selection to indicate which part of the model is used.
 

Press **Ctrl** key and drag with the mouse to move the control point.
6. Check or customize the parameters on the *Brackets template* menu.
 

In the menu you can also choose to remove undercuts.

7. Press the **Checkmark** button on the *Brackets template* menu on the left side of the screen to confirm that the view is used as insertion direction



8. Click **Next**.

### Results



The templates are created. You can remove brackets from view by clicking on the **Eye** icon in the bottom toolbar and selecting **brackets**. You will see that a window is created on the template which can be used for positioning the brackets.



### 12.8.3 Jig template

#### Before you begin

This function is only available if chosen brackets come with jig.

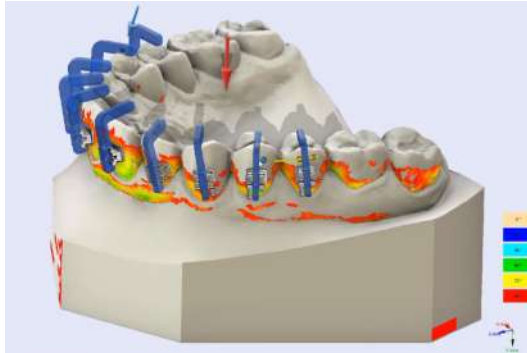
#### Steps



1. Open the drop-down menu next to the clear aligner icon in the main toolbar under **Virtual setup** tab.
2. Select the option **Jig template**.
3. Select the arch and click **Next**.
4. Define the template by making a cutting line.

To define a cutting line:

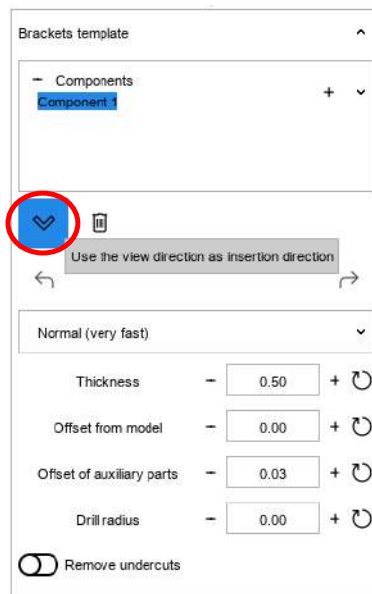
- Hold down **Shift** key and left mouse button and trace the cutting line by dragging the mouse.
- Trace the line by double-clicking with the left mouse button.



## NOTE

It is important the cutting line is above the housing part of the brackets as the mask will contain the jigs.

5. Move the blue dot within the selection to indicate which part of the model is used.  
Press **Ctrl** key and drag with the mouse to move the control point.
6. Move the blue dot within the selection to indicate which part of the model is used.  
Press **Ctrl** key and drag with the mouse to move the control point.
7. Check or customize the parameters on the *Brackets template* menu.  
In the menu you can also choose to remove undercuts.
8. Press the **Checkmark** button on the *Brackets template* menu on the left side of the screen to confirm that the view is used as insertion direction

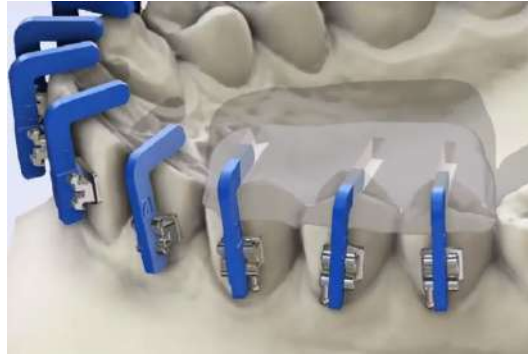


9. Click **Next**.

## Results



The templates are created. You can modify transparency by clicking on the **Eye** icon in the bottom toolbar and making selections.



### 12.8.4 Brackets template modification

#### About this task

Follow these instructions if you want to modify the external parts of a brackets template.

#### Steps



1. Select the **Home** tab from the main tool bar.
2. Open the drop-down menu next to the **Sculpting** button on the main toolbar.
3. Select option **Sculpting/Brackets template**, **Sculpting/Brackets template (window)** or **Sculpting/Jig template** depending on the type of bracket template.
4. Make desired modifications using the *Sculpting - Add/Remove* toolbox.
5. Click **Next**.

#### Results

Changes are made in the template and can be inspected on the model.

## 12.9 Clear aligner

### 12.9.1 Creating clear aligner

#### About this task

Follow these instructions to create a set of clear aligners.

#### Steps

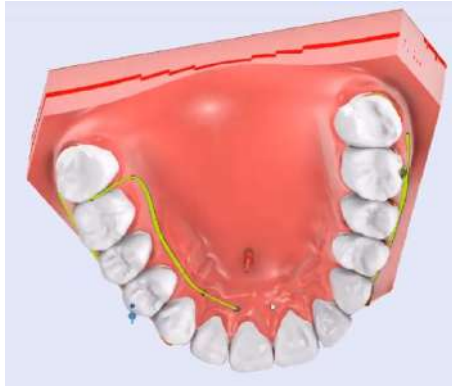


1. Open the drop-down menu next to the **Clear aligner** icon in the main toolbar under **Virtual setup** tab.
2. Select the first option **Clear aligner**.
3. Draw a cutting line.
 

To define a cutting line:

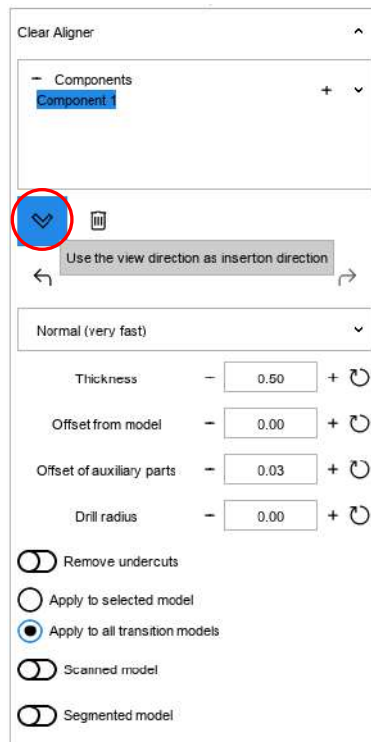
  - Hold down **Shift** key and left mouse button and trace the cutting line by dragging the mouse.
  - Trace the line by double-clicking with the left mouse button.





In the main toolbar you can see the model number and the layer you are working on. By selecting another model, you can see how the template fits on that model.

4. Press the **Checkmark** button on the *Clear aligner* menu on the left side of the screen to confirm that the view direction is used as insertion direction.



5. Move the blue dot within the selection to indicate which part of the model is used.

Press **Ctrl** key and drag with the mouse to move the control point.

6. Check or customize the parameters in the *Clear aligner* menu on the left side of the screen.

You can decide if you want make the template for the model you are working on only or for all of the transition models. You can also select if you want to make the model only for the scanned model or the segmented model.

7. Click **Next** when ready.

## Results

The virtual clear aligner, which allows you to see possible labels and attachments is created.



Click on the **Animation** button on the main toolbar to see an animation of the templates that have been adopted to the model from all transition steps.



Click on the **Eye** icon in the bottom toolbar and to remove items that are not of interest to you.

### 12.9.2 Etching guide for attachment placement

#### About this task

Follow these instructions for creating clear aligners to be used as etching guides. It is possible to create a single clear aligner for this purpose or to create multiple clear aligners.

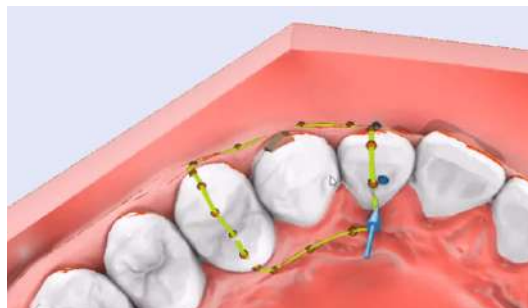
#### Steps



1. Open the drop-down menu next to the **Clear aligner** icon in the main toolbar under **Virtual setup** tab.
2. Select option **Etching guide for attachment placement** from the drop-down menu.
3. Draw a single cutting line or many pieces of you want many separate guides.

To define a cutting line:

- Hold down **Shift** key and left mouse button and trace the cutting line by dragging the mouse.
- Trace the line by double-clicking with the left mouse button.

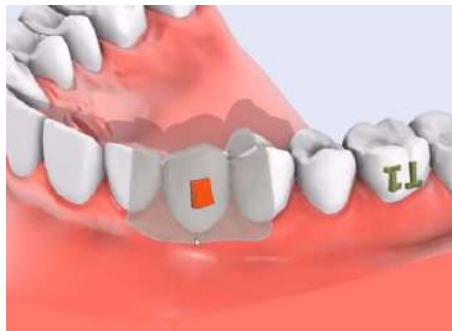


If you want to create more templates, add a component from the Plus-icon in the *Etching guide* tool box.

4. Move the blue dot within the selection to indicate which part of the model is used.  
Press **Ctrl** key and drag with the mouse to move the control point.
5. Press the **Checkmark** button on the *Etching guide* menu on the left side of the screen to confirm that the view direction is used as insertion direction.
6. Check or customize the parameters in the *Etching guide* menu.  
You can for example adjust the value in field **Offset of auxiliary parts** to create a larger hole for an attachment to allow for sculpting of tooth surface.
7. Click **Next** when ready.

### Results

The virtual etching guide is created.



Click on the **Eye** icon in the bottom toolbar and to remove items that are not of interest to you.

### 12.9.3 Exporting clear aligner

#### Steps



1. Click on the drop-down menu next to the **Exports** button on the main toolbar.
2. Select option **Exports (Clear aligner)** or **Exports (Etching guide for attachment placement)** based on the type work you have done.

#### Results

The STL files can be exported for 3D printing.

## 13 Video record

A video record is an efficient way of communicating between parties. Because the video can be viewed with any software player that support mp4 format, a separate Viewer software is no longer necessary.

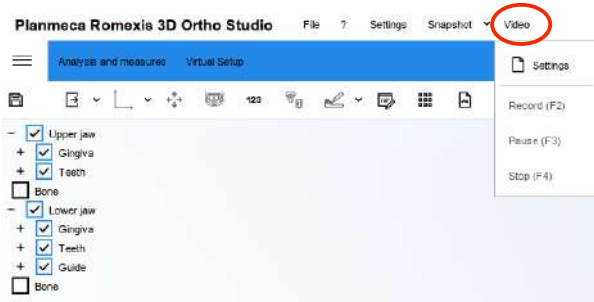
### 13.1 Making video record

#### About this task

Follow these instructions on how to make a video record of your workflow.

#### Steps

1. Go to the start page and select **Video** from the top toolbar.



2. Select **Settings** from the drop-down menu.
3. Select desired resolution, frame rate and quality.  
The chosen resolution will have an effect on file size. 10% quality is enough to have a good file size/quality ratio.
4. To start recording, click again on the **Video** button and select **Record**.  
The recording starts. You will see a timeline of the recording on the titlebar.



5. You can now select the workflow you wish to show and the software will keep recording.
6. To stop the video click again on the **Video** button and select **Stop**.  
The software asks to save the video.
7. Select path for saving the recording and click **Save**.

#### Results

You can open the video from its location and review it with any software player that supports mp4 format.

### 13.2 Automatic video record

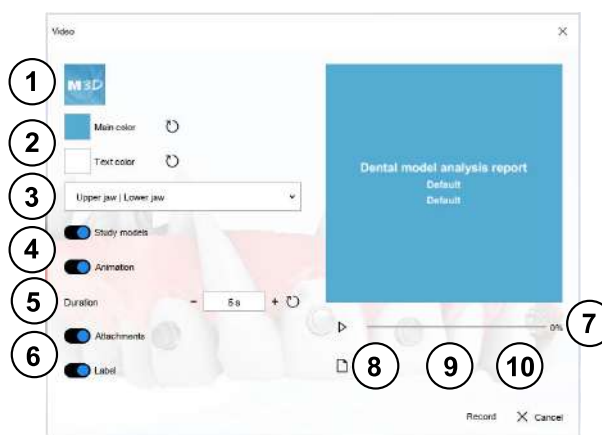
#### About this task

Follow these instructions to make an automatic video recording of study models and virtual setup.

## Steps

1. Select the **Virtual setup** tab from the main toolbar.
2. Click on the **Video** button on the main toolbar.

You can make certain selections in the window that opens.



- 1 **Logo:** double-click to add a new logo
  - 2 **Background/text colour:** double-click to modify
  - 3 Select upper jaw, lower jaw or both
  - 4 Select if study models and the animation are to be included
  - 5 **Duration:** indicates the length of time used to show the animation
  - 6 **Label:** Select if attachments and labels are to be displayed
  - 7 **Preview:** see a preview of the recording
  - 8 **Settings:** modify resolution, frame rate and quality
  - 9 **Title:** change the title of the main slide. The name of the doctor and the patient are automatically proposed.
  - 10 **Footer:** can be customized as wished.
3. To begin recording, click on the **Record** button in the bottom right corner of the *Video* window.

You can preview the video in the *Video* window.



4. Select path for saving the video and click **Save**.

## Results

You can open the video from its location and review it with any software player that supports mp4 format.

## Appendix A: Initial license activation

### Before you begin

Check that:

- you have an active Internet connection.
- you have added the **Dental.Studio.exe** software to your firewall and antivirus exceptions list.

### About this task

At first software execution, the software will show this window:



The screenshot shows a dialog box titled "Register the workstation [HW]". It has three text input fields labeled "Product Key", "Mail", and "Workstation name". At the bottom, there are two buttons: "X Exit" and "Next".

### Steps

1. Fill in the **Product Key** field with the code associated with your license.
2. Fill in the **Mail** field with a valid email address for receiving the confirmation of the activation.
3. Fill in the **Workstation name field** with the name you prefer for your workstation.
4. Press **Next** to activate the license.

#### NOTE

The activation procedure, described above, activates the license on the workstation. You need to repeat the activation procedure every time the workstation is changed.

#### NOTE

If you have a hardware license, the maximum number of activated workstations is three (3). However, the license cannot work simultaneously in more than one (1) workstation.

#### NOTE

The license works offline - the workstation does not need to be connected to the internet. Internet connection is essential only for the initial license activation.

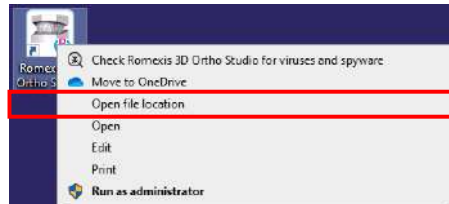
# Appendix B: Configuring Ortho Studio to start with administrator privileges

## About this task

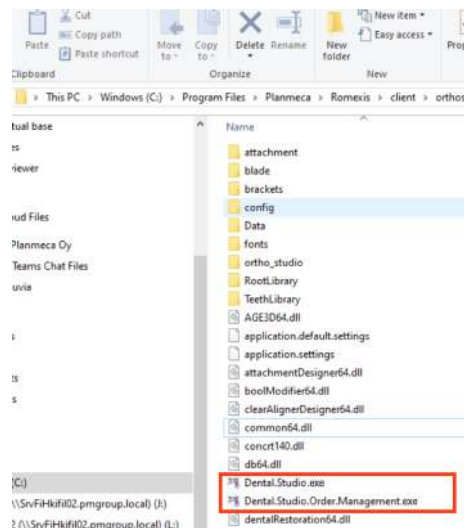
The Planmeca Romexis 3D Ortho Studio requires administrator privileges to run correctly.

## Steps

1. Right-click on the demo software icon on the desktop and select **Open file location**.

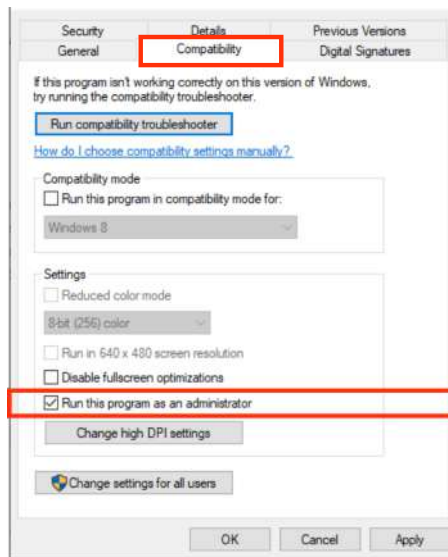


A window will then appear showing the contents of the installation folder, as shown in the image below.



2. Right-click on **Dental.Studio.exe**.
3. Select **Properties**.

4. As shown in the image below, press the **Compatibility** tab and check the item **Run this program as an administrator**.



5. Click **OK** to confirm.
6. Right-click on **Dental.Studio.Order.Management.exe** and repeat steps 3 to 5.
7. Right-click on the demo software icon on the desktop again and select **Properties**.
8. Click the **Compatibility** tab and check the **Run this program as an administrator** checkbox.



## Appendix C: Planmeca Romexis 3D Ortho Studio Viewer

The Planmeca Romexis 3D Ortho Studio Viewer can be distributed freely with ortho cases created in Planmeca Romexis 3D Ortho Studio.

The Viewer can be used to open .ortho and .m3d cases created with the full version of the software for making dental model analyses and visualization of the virtual setup treatment stages using the models builder. Storing of measurements or modifications performed in the virtual setup treatment plan is not possible.

The Viewer is located in the zip archive:

```
/ProgramFiles/Planmeca/Romexis/viewer/  
Planmeca_Romexis_3D_Ortho_Studio_Viewer.zip
```

## Appendix D: Important notes before updating to Version 5 (V5)

Before installing the V5 software, make a backup copy of c:\Program Files \Planmeca\Romexis\client\orthostudio\Data.

Work cases saved with V5 cannot be opened with V4. Similarly, new work cases created with V4 will not be visible in the new V5Order Management.

The V5 software **can** open the old V4 cases.

The V4 database will be converted into the new V5 one and all the previous cases will be visible.

New work cases exported with V5 for the Viewer cannot be opened with the V4 Viewer.

The new V5 Viewer can also open \*.ortho files exported with V4.



# PLANMECA

Planmeca Oy | Asentajankatu 6 | 00880 Helsinki | Finland

tel. +358 20 7795 500 | fax +358 20 7795 555 | sales@planmeca.com | www.planmeca.com

