Ortho Simulation

ver. 1.1
Revision 2 (03.2021)

CONTENTS

1 Introduction and Overview

1.1 Medit Ortho Simulation Overview

Medit Ortho Simulation is a software allowing to simulate the trajectory of teeth movement according to form information set by the user. It includes the function to create several possible outcome scenarios by adjusting position of each tooth. Explicit explanations and guide messages are accompanying each stage of the process.

Medit Ortho Simulation can be run from both Clinic and Lab Accounts in Medit Link.

1.2 Intended Use and Disclaimer

① The user is entirely responsible for the process and informing the patients that the simulation results generated by the application may not be precise or reliable; it should only be used for consultation or communication purposes. Medit does not take any responsibility or liability for any misunderstandings or miscommunications that might happen. The application is to be used solely for communication purposes.

② Medit Ortho Simulation is not developed for using in medical or clinical purposes.

③ The software may not be used for the following purposes:

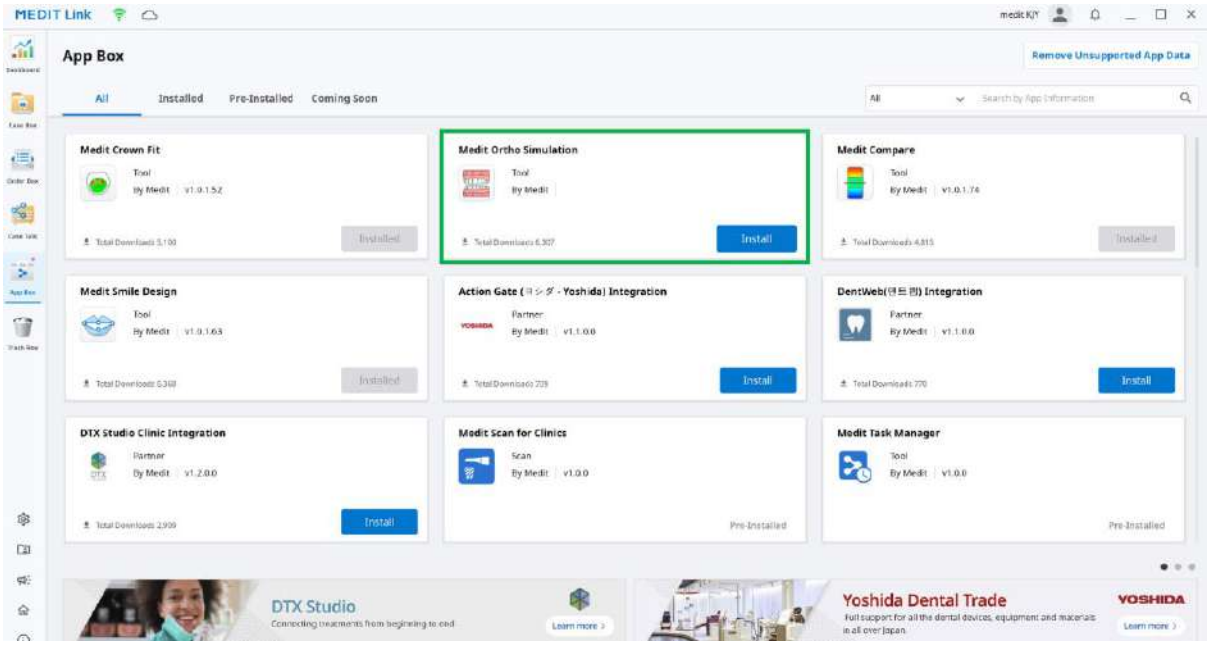
- For the purposes of diagnosing, treating, mitigating, or preventing diseases.
- For the purposes of diagnosing, treating, mitigating, or preventing injuries or disorders.
- For the purposes of inspecting, replacing, or transforming a structure or function.

1.3 System Requirements

	Laptop	Desktop
CPU	Intel Core i7-8750H/9750H AMD Ryzen 7 4800H	
RAM	16 GB or higher	
Graphics	NVIDIA GeForce GT 760 (2GB) or higher / or equivalent AMD video card	
OS	Windows 8 64 Bit (unavailable in 32 Bit) or higher	

1.4 Installation Guide

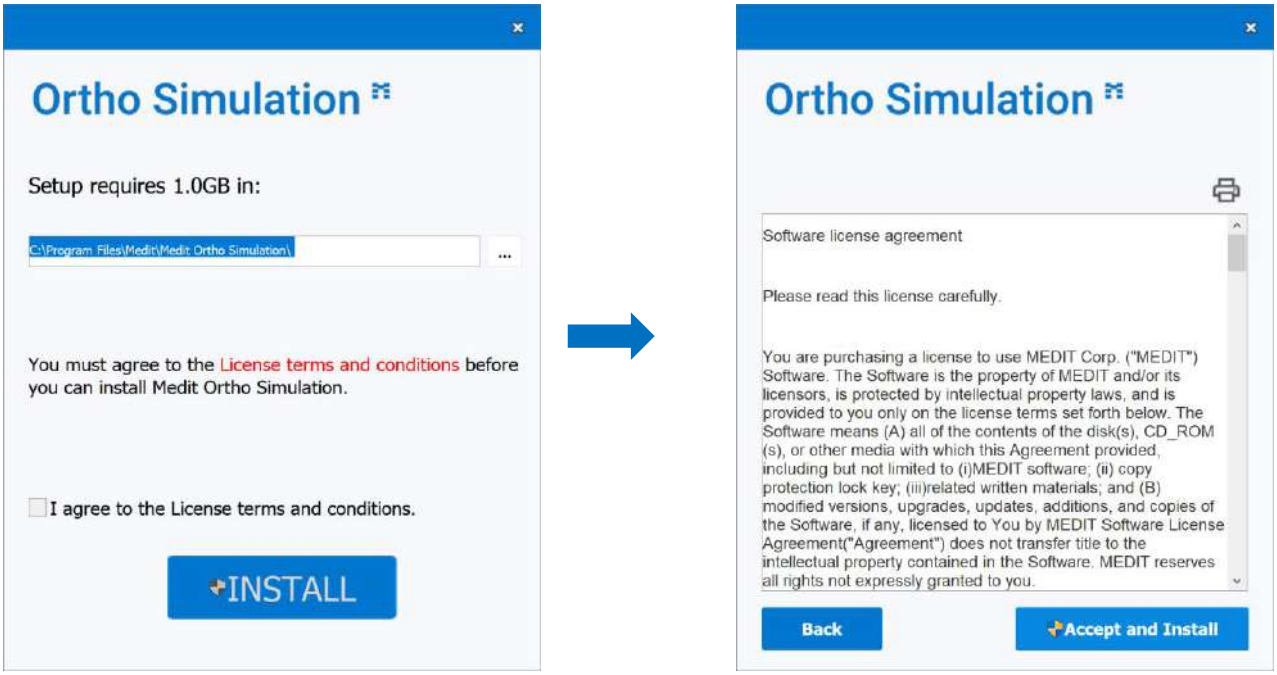
① Log in into your Medit Link Account and go to the **App Box**.



② Find **"Medit Ortho Simulation"** App and click on the **"Install"** button.

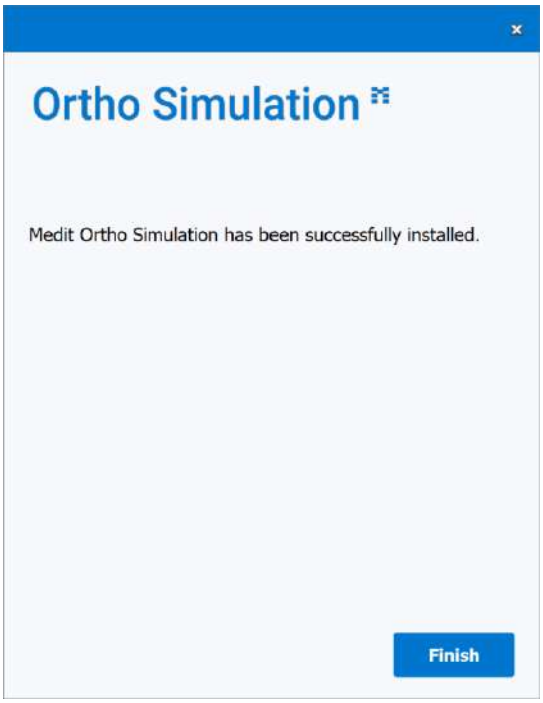
③ Once the download is complete, Medit Ortho Simulation installer will be run automatically.

④ Read and agree to the License Terms and Conditions.



⑤ It may take up to several minutes to finish the installation process. Please do not turn off the PC until the installation is complete.

⑥ Press **“Finish”** to complete the installation.



⑦ Restart Medit Link.

2 Data Management

2.1 Acquiring 3D Data

For *Clinic users*, scan data acquired through Medit Scan for Clinics will be automatically saved in Medit Link.

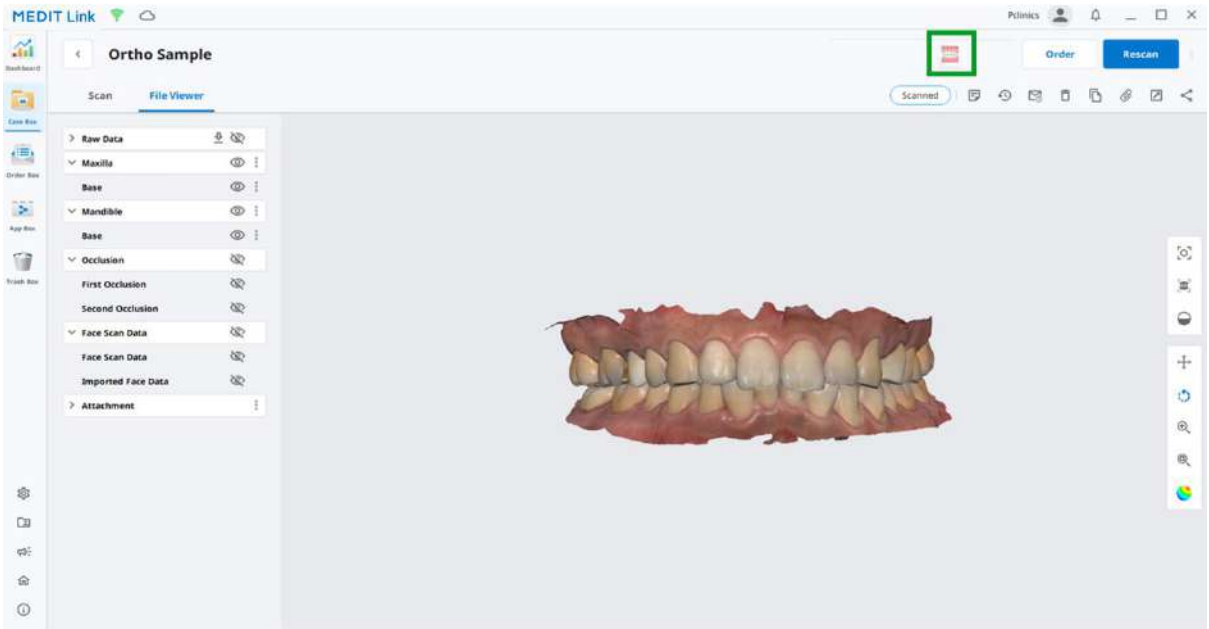
For *Lab users*, running Medit Ortho Simulation is possible from the cases received from Clinics.

Both Maxilla and Mandible scans, as well as both occlusions, are necessary to run Medit Ortho Simulation.

2.2 Running Medit Ortho Simulation from Medit Link

① Go to the **Case Box** (for Clinic Account) or **Work Box** (for Lab Account) and choose the case you would like to use in Ortho Simulation.

② Press the **"Ortho Simulation"**  icon in the right upper corner of the Case Detail window in Medit Link, which will automatically appear once you install the App and relaunch Medit Link.



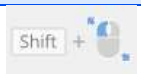
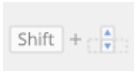
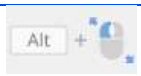
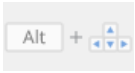
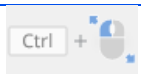
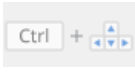
Medit Ortho Simulation Project file will be saved to Medit Link Case upon the completion alongside the captured images.

2.3 3D Data Control

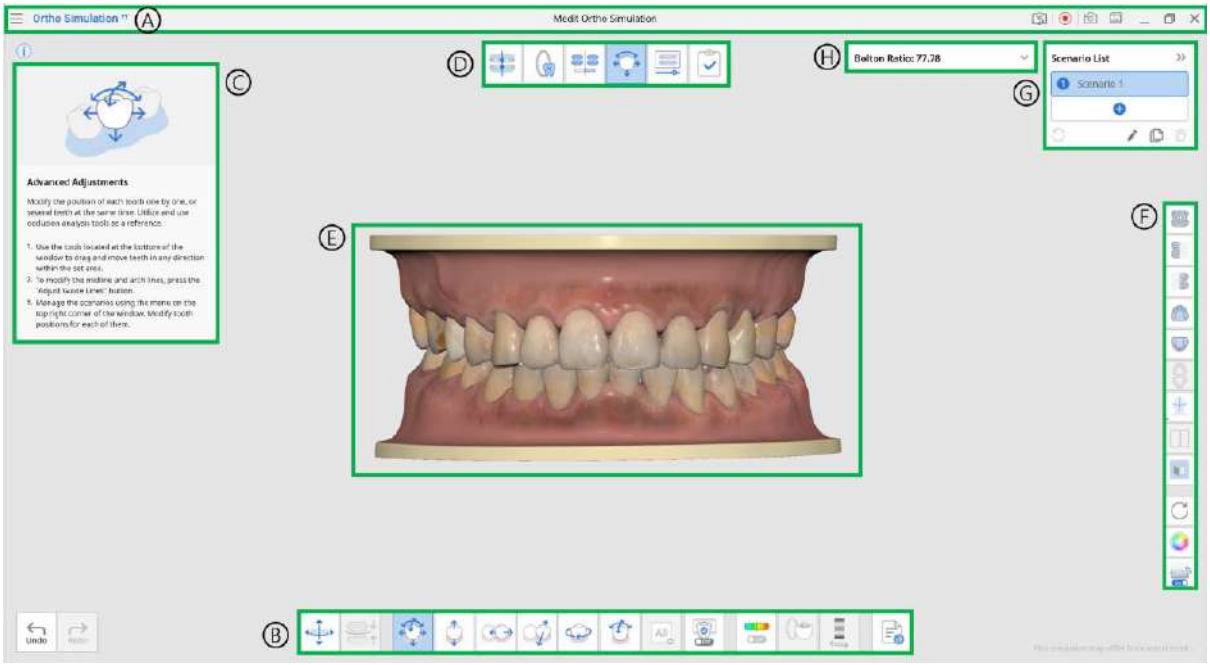
3D data control using mouse:

Button	Action	Use	Image
Wheel	Drag	Moves the data in view screen.	
	Scroll	Zooms in/out the data in view screen.	
Right	Drag	Rotates data in view screen.	

3D data control using mouse and keyboard buttons:

Button	Action	Use	Image
Shift	Left Click and Drag	Zoom in/out	
	Up and Down Keys		
Alt	Left Click and Drag	Rotate	
	Up, Down, Left and Right Keys	Rotate	
Ctrl	Left Click and Drag	Move	
	Up, Down, Left and Right Keys	Move	

3 User Interface



A. Title Bar
B. Toolbox
C. Guide Message
D. Stage
E. Model View
F. Side Toolbar
G. Scenario List
H. Bolton Ratio

3.1 Title Bar

The Title Bar consists of the following options:

Menu	The Menu includes tools to manage data display options and shows the details of application.
Start Video Recording	Starts the video capture.
Screenshot	Captures the screen.
Screen Capture Image Manager	Manages the captured screen images.
Minimize	Minimizes the application.
Maximize or Restore	Maximizes or restores the application.
Exit	Terminates the application.

3.2 Side Toolbar

Side Toolbar provides the tools to change data display and view options.

	Frontal View	Shows frontal view.
	Right Lateral View	Shows right lateral view.
	Left Lateral View	Shows left lateral view.
	Maxilla View	Shows maxilla occlusal surface.
	Mandible View	Shows mandible occlusal surface.
	Occlusal Surface View	Shows the occlusal surfaces of maxilla and mandible.
	Show/Hide Reference Data	Shows/hides such reference data as midline, arch line, face data.
	Show/Hide Face	Shows or hides the face data.
	Show/Hide Midline	Shows or hides the midline on the data.
	Show/Hide Arch Line	Shows or hides the arch line on the data.
	Scenario Comparison Mode	Shows the selected scenario or all scenarios in comparison to the original model.
	Grid Settings	Set grid display options. It shows or hides the grid and control its position in relation to the model (overlay on/off).
	Rotate	Allows to rotate the model in any direction with left mouse button.  Useful when you use touch screen.
	Model Display Modes	Changes the model display mode between **“Original Color Display Mode”** and **“Study Model Display Mode”**.

	Lower Jaw Movement On/Off	When on, shows lower jaw movement together with teeth.

3.3 Undo/Redo

The undo/redo buttons are located at the bottom left corner of the window.

	Undo	Undoes previous action.
	Redo	Redoes previous action.

4 Stages

Stages indicate the current step of the simulation you are working on. Stages are subjected to the specific sequence; however, after completing work at the **Advanced Adjustments stage** you can move back to the **Simulation Preview stage** to compare the scenarios you have created with the original model.

	Model Settings	Allows to set the model midline and clean the data. If you change the midline settings while working on the project, you will lose all current progress.
	Simulation Settings	Allows to adjust the settings for the simulation by defining missing teeth, planned extractions and prostheses.
	Simulation Preview	Shows the simulation preview in comparison with the original model.
	Advanced Adjustments	Provides tools for advanced adjustments for the position of each tooth.
	Animation View	Allows to view simulation in animation. Choose a scenario in the top right corner to see its teeth movement animation.
	Complete	Saves all information and creates capture images. The captured images will be saved to the case in Medit Link under Attachments.

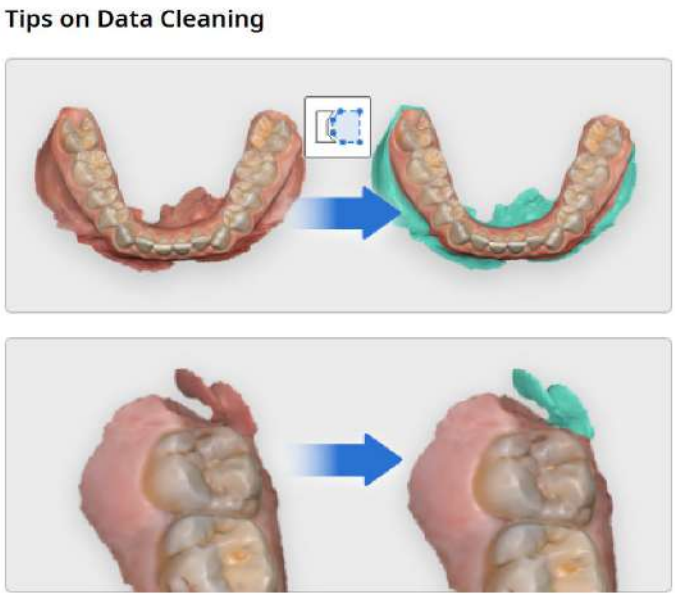
4.1 Model Settings

This stage helps to adjust the orientation of the arches by defining midline points on each of them. This is the necessary step for the program to perform the simulation.

① Adjust the midline points on each arch as shown on the picture below.

② Use trimming tool located on the right to edit the data. Trimming the gingiva part can help the model to look cleaner for the consultation.

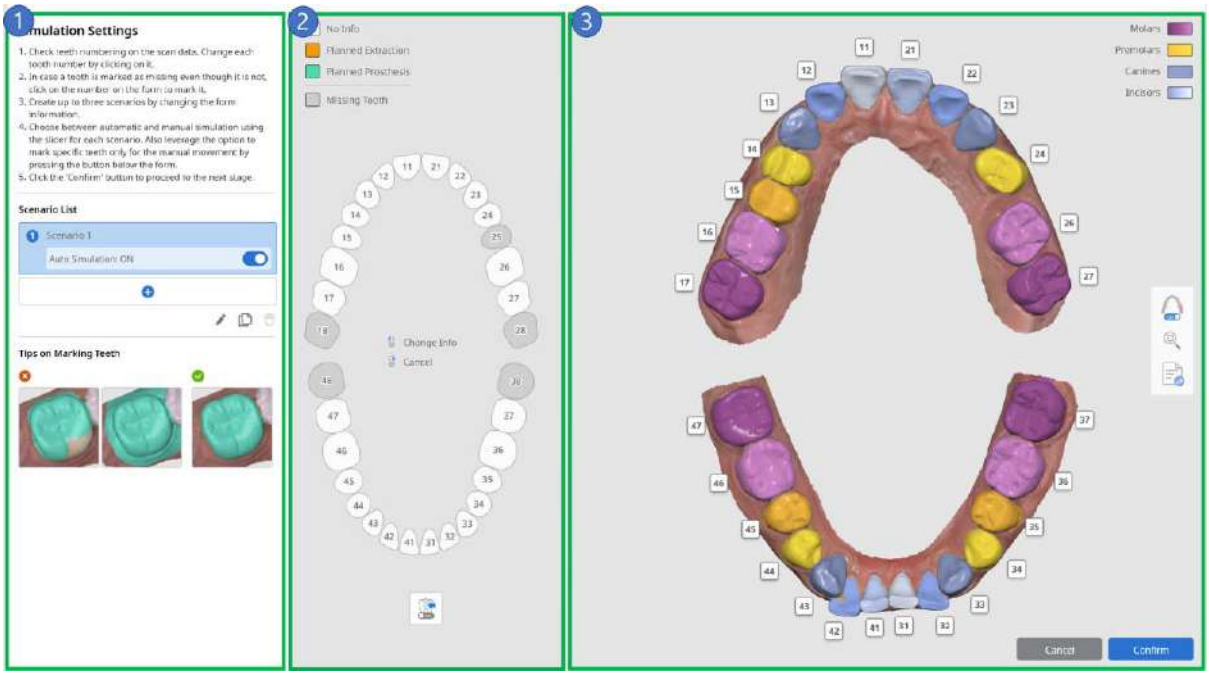
- Press the left mouse button and drag to select the area and click the right button to delete it.



③ Press the **“Confirm”** button to move to the next stage.

4.2 Simulation Settings

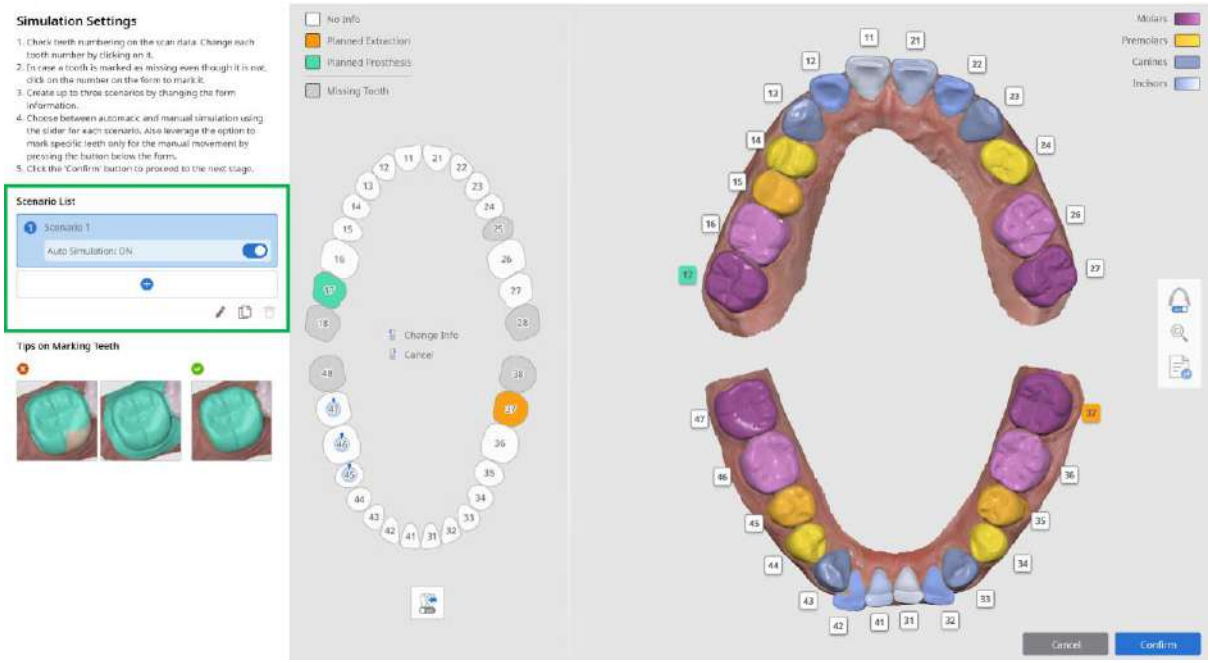
This stage contains the settings for the simulation that include defining form information, creating scenarios, and segmenting the teeth.



1	**Overview**	Overview section provides the space to create several scenarios of teeth movement. Adjust the form information for each of them to compare them at next stages. You can turn Auto Simulation on and off in each scenario. Additional tools for moving position of each tooth are provided at **Advanced** Adjustments stage.
2	**Form Information**	Utilize the form information section to mark teeth as missing, planned for prosthesis or extraction for the selected scenario. The teeth selected as “Manual Movement Only” are excluded from Auto Simulation.
3	**Scan Data**	Scan data section provides options to change tooth numbering in case the automatic segmentation is not made correctly by the program. You can export each of the segmented teeth as separate files to the Medit Link case.

4.2.1 Overview and creating scenarios

To visualize several possible simulations outcomes, you can create up to three scenarios of teeth movement based on the entered form information: create several variations of the form information by changing the teeth planned for extraction or prosthesis. You can turn Auto Simulation on and off in each scenario.



① Press the ⊕ button to add a scenario.

	Auto Simulation	Turns Auto Simulation on and off. When off, the original and simulation results are the same.
	Add	Adds a new scenario for each teeth movement scenario.
	Rename	Renames the selected scenario.
	Clone	Clones the selected scenario. You cannot clone a scenario if there are more than three of them already in existence.
	Delete	Deletes the selected scenario.

② Edit the form for each of the scenarios.

③ Once the simulation scenario is complete, click the **“Confirm”** button to proceed to the next stage.

4.2.2 Working on the form information

The form on the left side shows the results of the scan data in easy-to-understand format.

① Click a tooth to set as Planned Extraction and double-click to set as Planned Prosthesis.

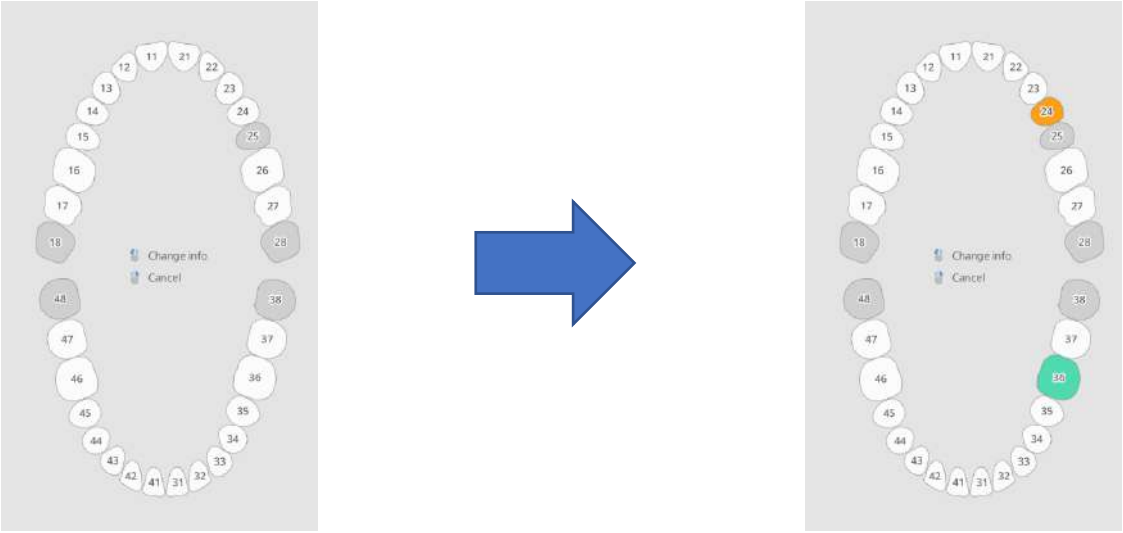
② You cannot move teeth set as Manual Movement Only in Auto Simulation. You can also move them manually at the Advanced Adjustments stage.

This function is helpful when you want to check the simulation of only some part of the teeth while fixing the rest. You can move the fixed teeth manually at the Advanced Adjustments stage.

③ Click a tooth in the form if extraction or prosthesis is planned.

④ Click once to mark a tooth as Planned Extraction.

⑤ Click again to mark it as Planned Prosthesis.



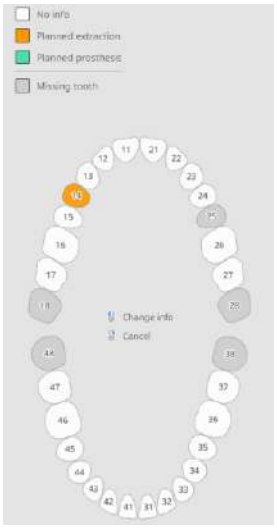
Simulation result cannot be created if the number of teeth is 10 or less.

⑥ If the tooth is still present but marked as a missing tooth, press “Add Tooth Area” button to add a tooth.

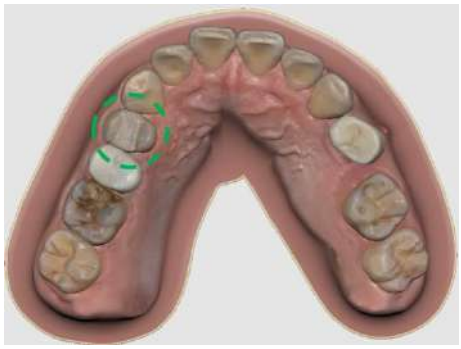
⑦ Press “Add Prosthesis Tooth” button to add Planned Prosthesis.

Differences between Planned Extraction and Planned Prosthesis:

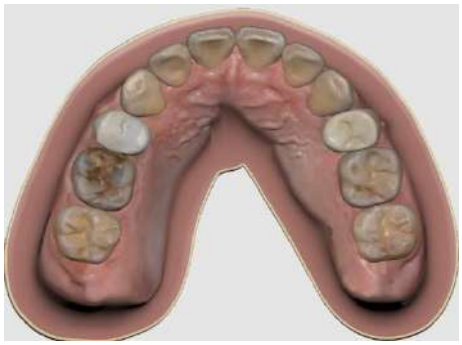
Planned Extraction



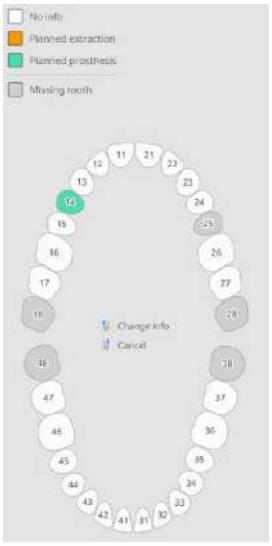
Original



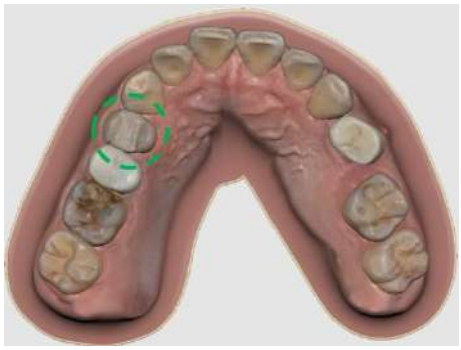
After Simulation



Planned Prosthesis



Original



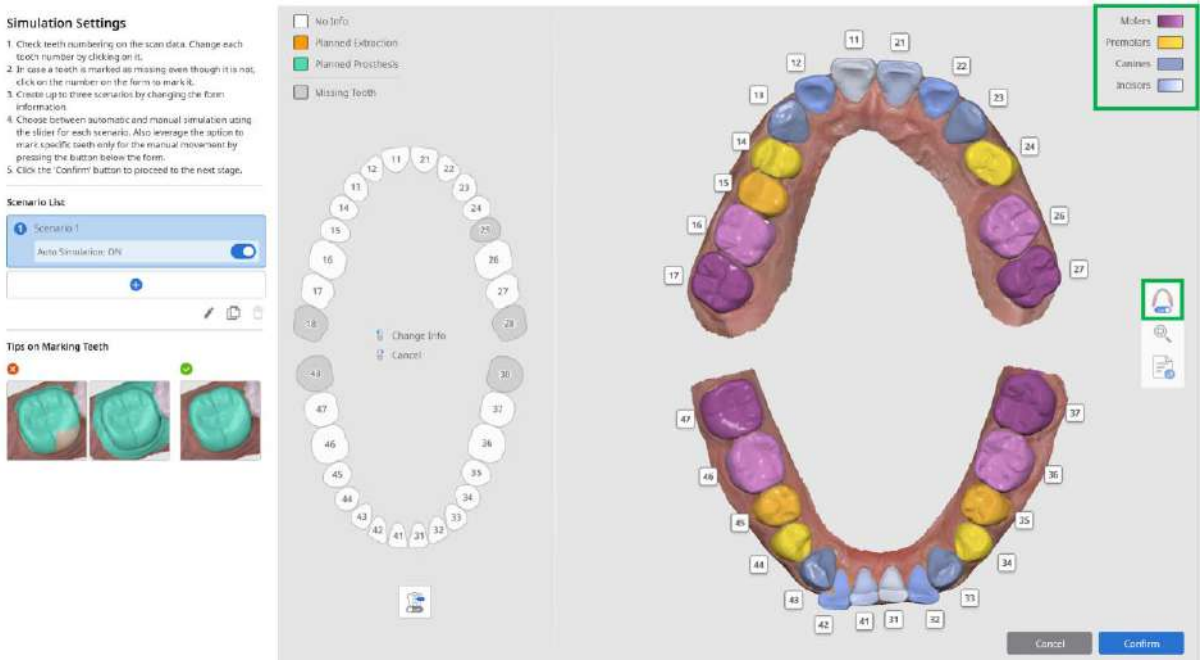
After Simulation

Check teeth numbering on the scan data. It can be changed by clicking on any tooth on the scan data.

In case a tooth is mis-numbered, click on it on the scan data. The program will suggest one or two options for the numbering.

4.2.3 Teeth Marking

The program will automatically segment and mark teeth based on their type. You can check the marking and edit if it is wrongly set. Also, you can export the segmented teeth.



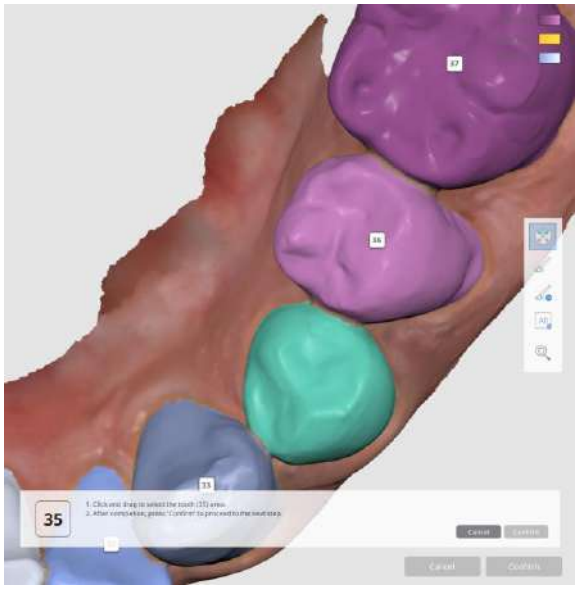
Use the teeth marking as a reference in case you will need to mark a tooth manually. Make sure that only tooth (and no soft tissues) is selected as shown on the image below.

① Check the tooth number in scan data. You can change the number by clicking the number.

② If wrong number is assigned, click the tooth number to see the possible numbers.

③ Utilize the tools located on the right to select the correct area for the tooth.

④ Use **“Smart Tooth Selection”** function to mark the area in one click or by pressing and dragging the mouse to automatically expand the area selection. You can also mark the tooth using the brush.



Toolbox

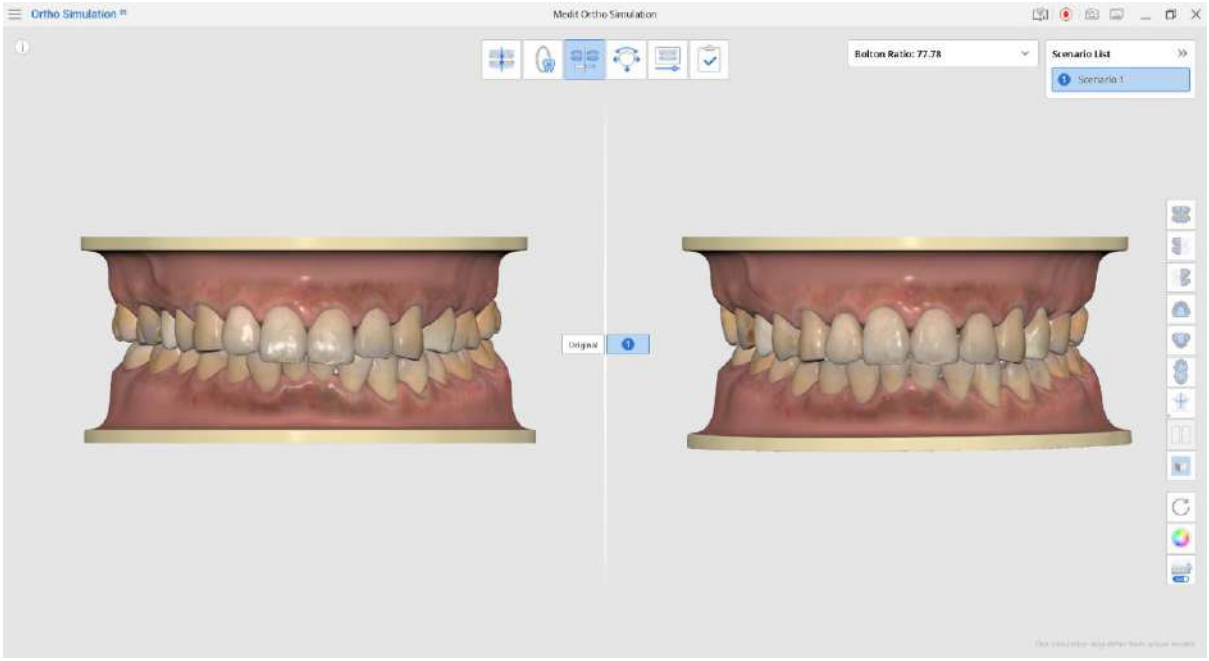
	Smart Tooth Selection	Automatically selects the area of the tooth. Click, press and drag the mouse on the tooth.
	Brush Selection	Allows to select the area using a brush.
	Brush Deselection	Allows to deselect the area using a brush.
	Clear All Selection	Clears all selection.
	Zoom Fit to Selection	Zooms to the selected area.

⑤ Click “Show/Hide Teeth Marking” button to see the data in the original colors.

⑥ Click “Segmented Export”  to export each of segmented teeth as separate files to the Medit Link.

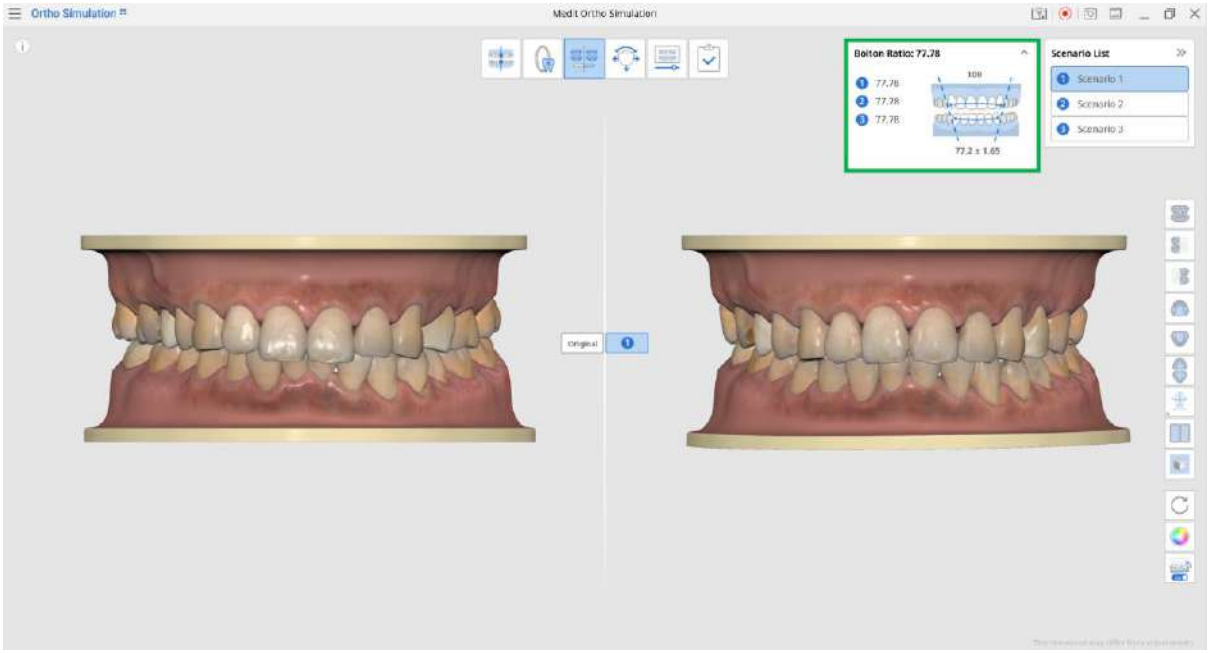
4.3 Simulation Preview

This stage generates and shows the expected simulation result in comparison with the original model.

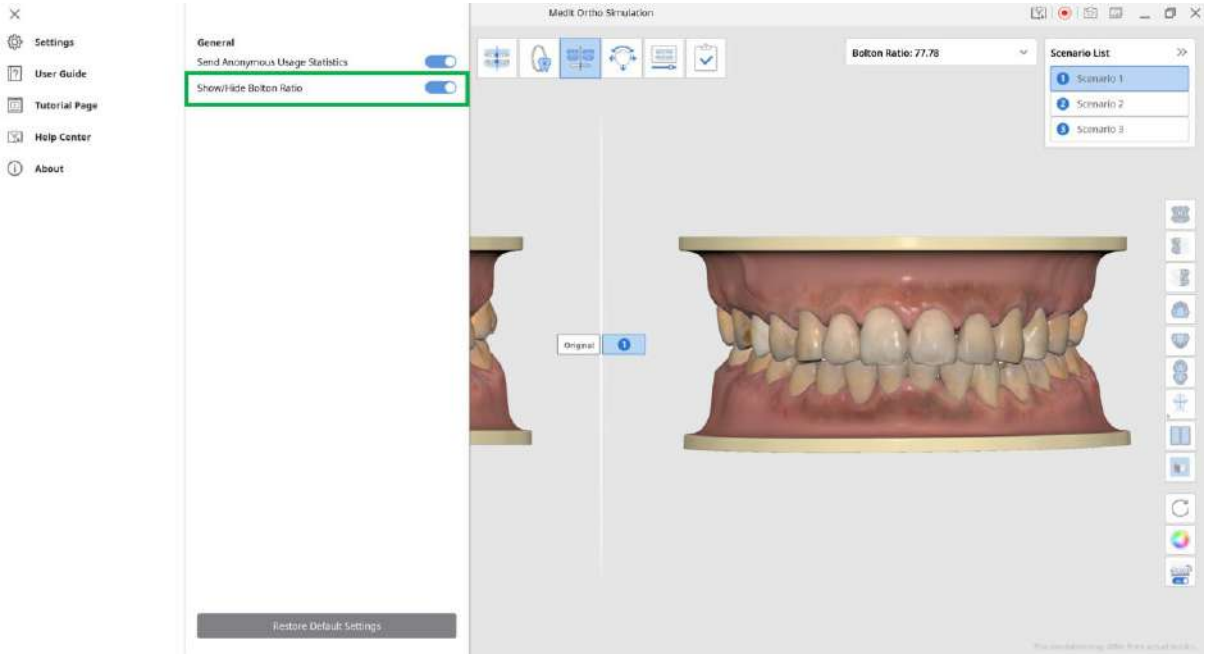


You can check the Bolton Ratio.

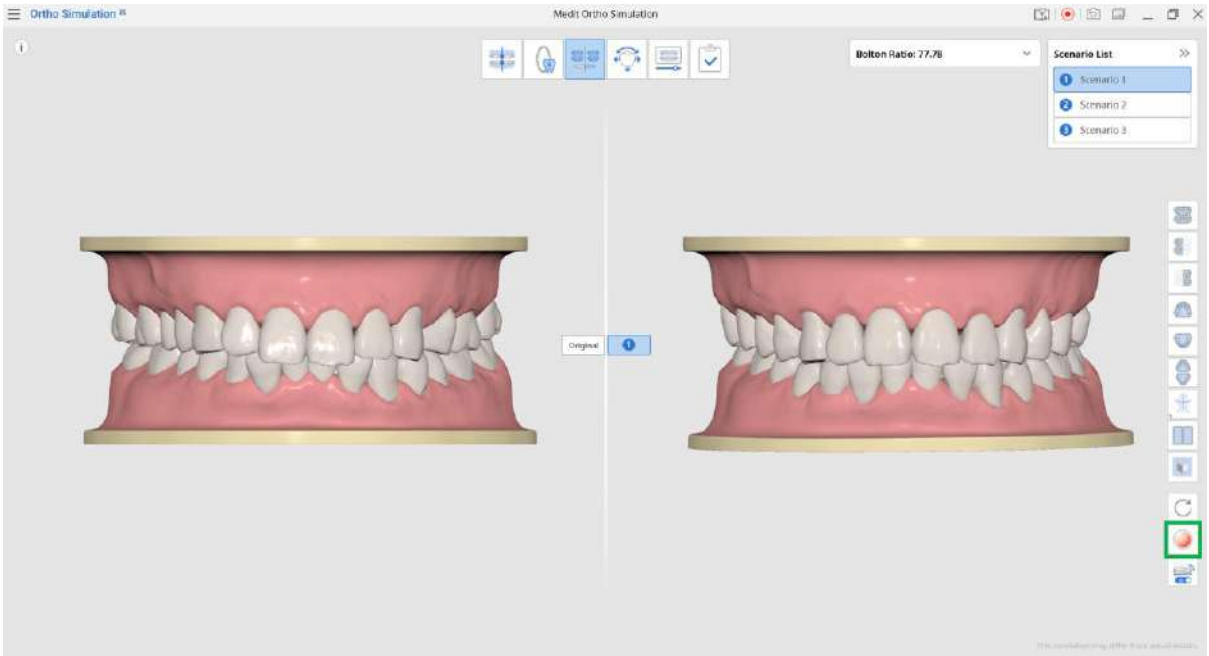
When there are more than two scenarios, Bolton ratio for each scenario will be displayed.



Turn “Show/Hide Bolton Ratio” off in Settings to hide it.

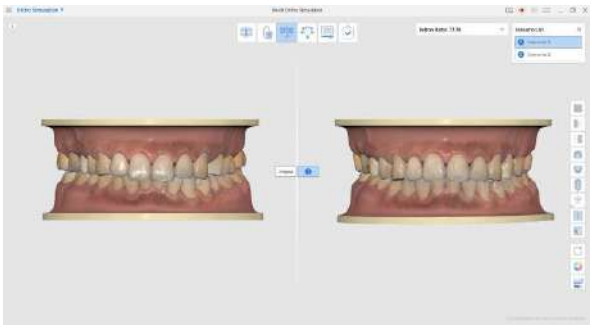
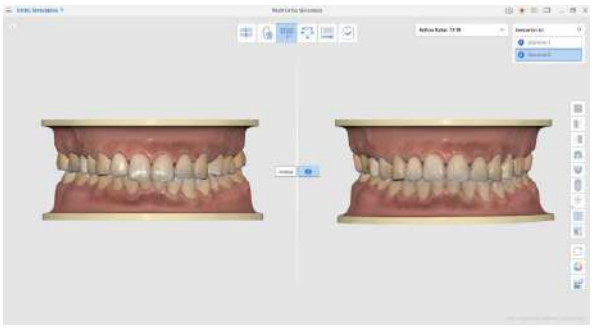


Try changing the model display style by pressing the button and changing to the Study Model Mode.

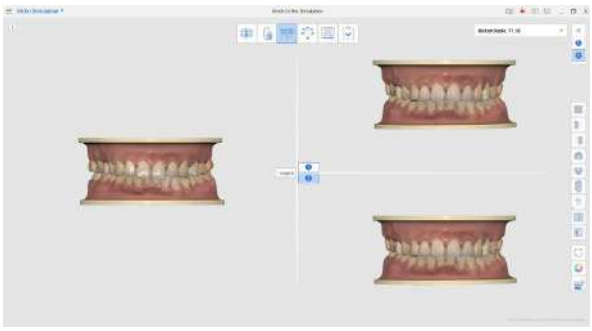
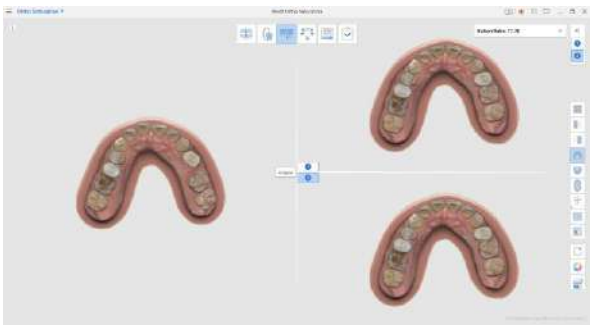


The **Advanced Adjustments stage** allows to use advanced tools to modify the position of each tooth along various directions.

① Once there is more than one scenario, you can compare all of them to the original model one by one by choosing the scenario at the top right corner.

② Compare all of them at a glance by pressing the **“Scenario Comparison Mode”** button on the Side Toolbar on the right.

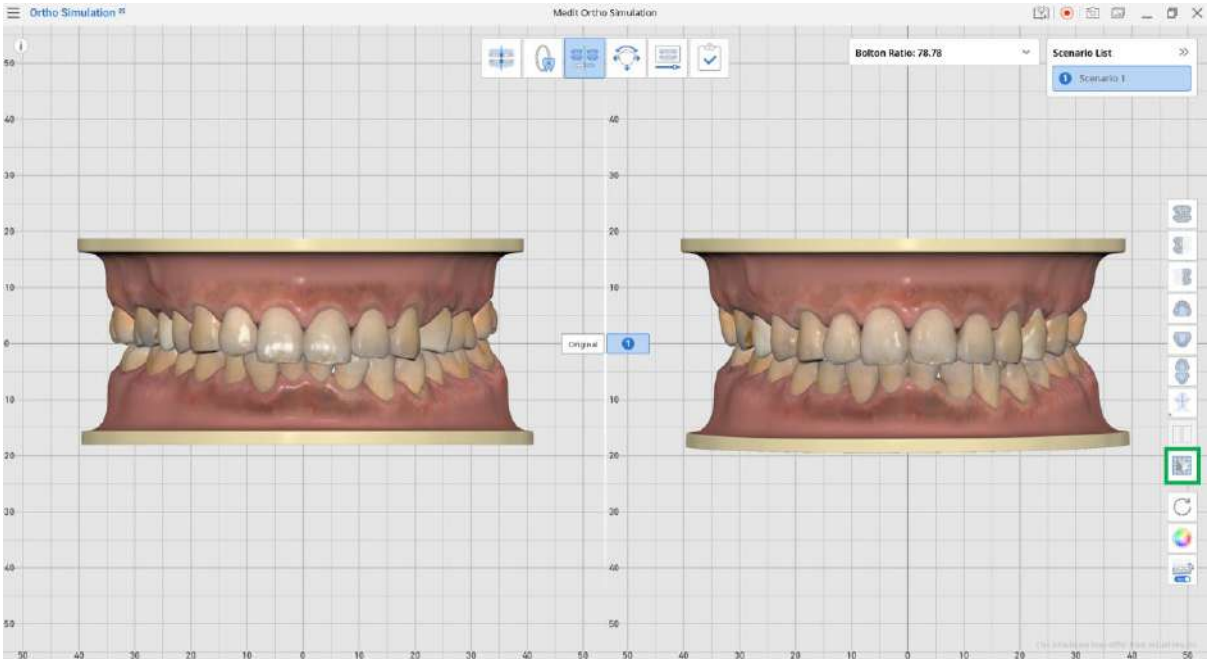
③ If there is face scan data in the Medit Link Case, it can also be seen at this Stage. Press the **“Show/Hide Reference Data → Show/Hide Face ”** button on the Side Toolbar.

④ Use the **“Show/Hide Midline”** and **“Show/Hide Arch Line”** options to check their location.

You can adjust the guide lines, such as midline and arch line, at the next stage (**Advanced Adjustments**).

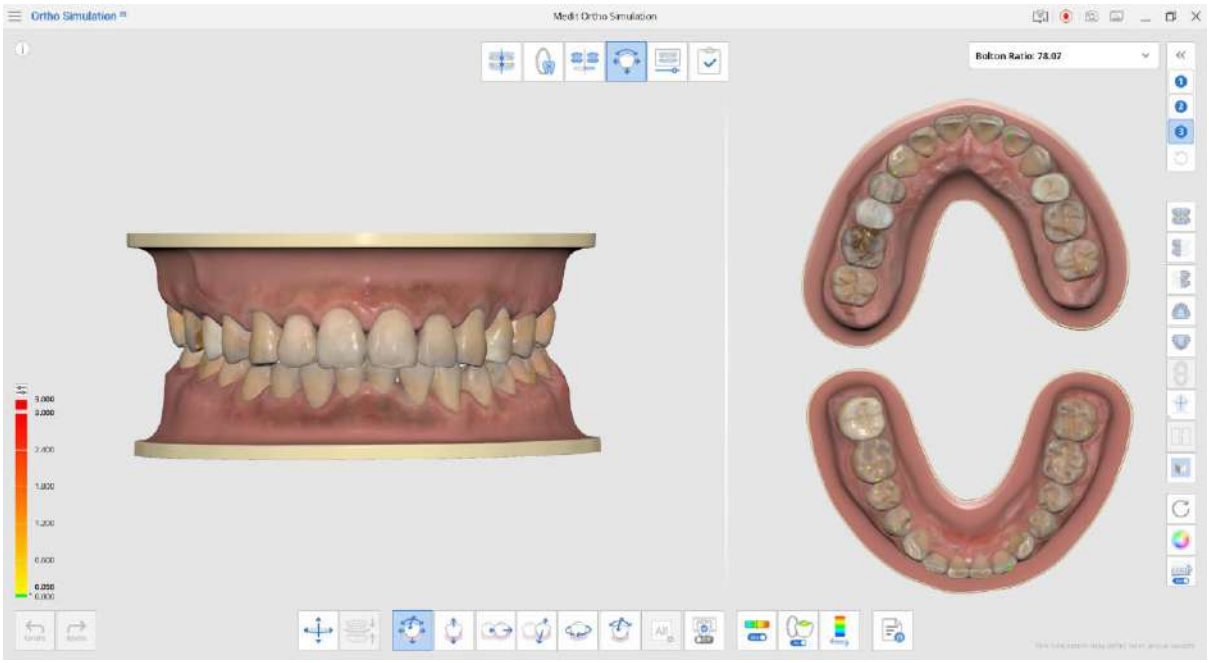
Simulation results for each scenario will be saved in the Medit Link Case upon completion as captured images.

⑤ Select “Grid Settings” to show or hide the grid, and control its position in relation to the model (overlay on/off).



4.4 Advanced Adjustments

This stage allows to modify the position of each tooth, and to edit (add or delete) teeth movement scenarios.



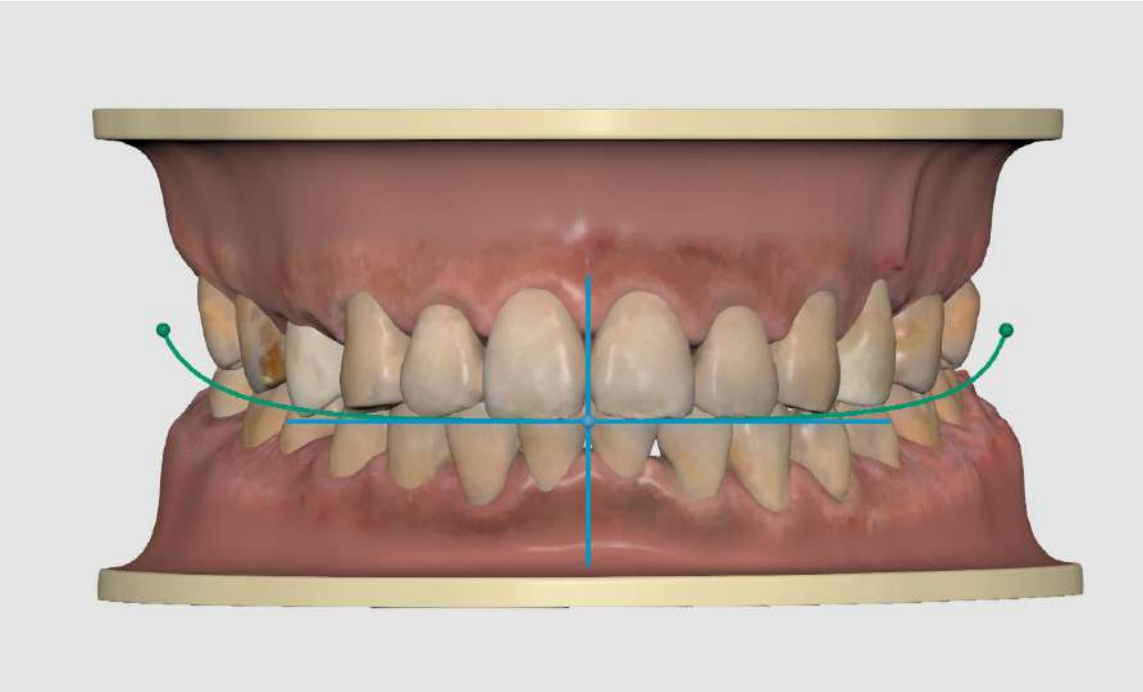
4.4.1 Working with the guide lines

You can work with the guide lines by adjusting them and then aligning the model to match them.

Toolbox

	Adjust Guide Lines	Adjusts the guide lines.
	Align to Guide Lines	Automatically adjusts the model so that it fits to the guide lines.

① Use the **“Adjust Guide Lines”** function to move the position of the guide lines.



② If needed, utilize the **“Align to Guide Lines”** tool that will automatically make the model fit to the new guide lines.

4.4.2 Adjusting teeth position

① Select the scenarios you would like to work more closely on and adjust position of each tooth, if needed.

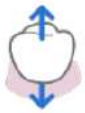
② Use the tools located at the bottom of the window to drag and move teeth in various directions within a set range.

If you move a tooth out of the set area, it will be extracted.

③ Click multiple teeth to select and move them as a group.

When multiple teeth are selected, they will not be extracted even if you move them out of the set area.

Toolbox

	Move Freely	Moves the tooth freely without any constraints. Press and hold Ctrl to rotate the tooth around lingual/buccal and mesial/distal directions.
	Move along Occlusal Direction	Moves the tooth along occlusal direction.
	Move along Mesial/Distal Direction	Moves the tooth along mesial/distal direction.
	Move along Lingual/Buccal Direction	Moves the tooth along lingual/buccal direction.
	Rotate around Occlusal Direction	Rotates the tooth around occlusal direction.
	Rotate around Lingual/Buccal or Mesial/Distal Direction	Rotates the tooth around lingual/buccal or mesial/distal direction.
	Deselect All	Cancels the selection of all teeth.
	Selected Simulation	Shows the simulation of selected teeth and allows you to move them.
	Export to Medit Link	Exports the current scenario at this stage of progress.

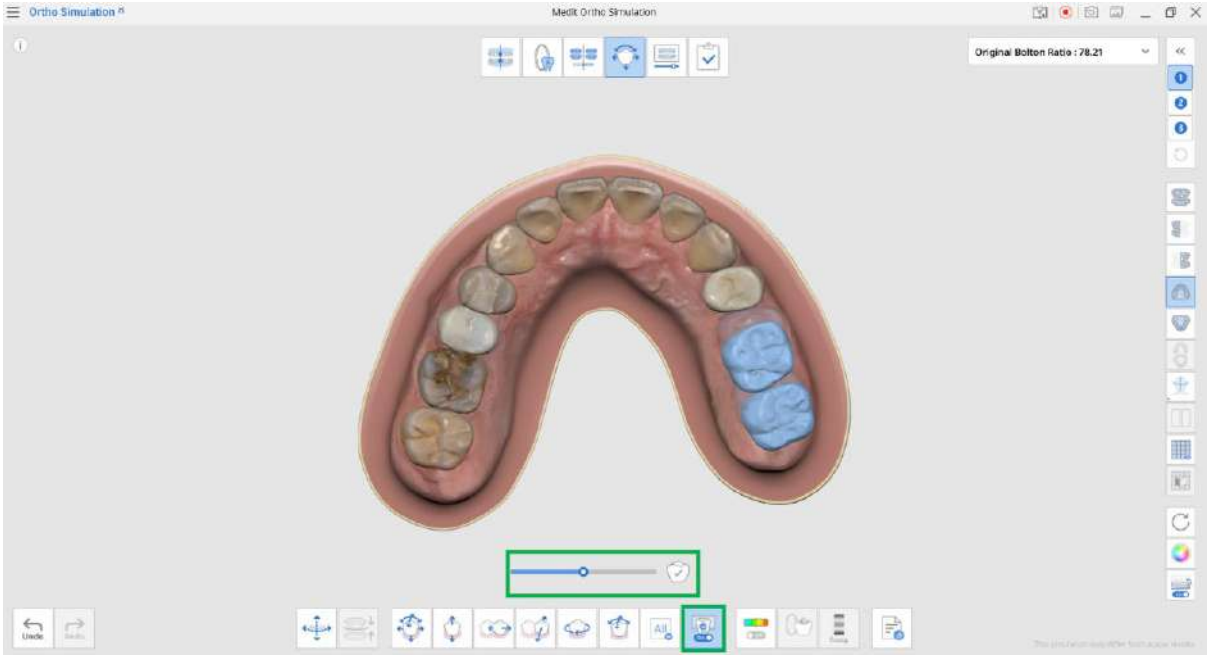
④ Press “Selected Simulation”  button to see the simulation of selected teeth and move them.

⑤ Select one or more teeth and press “Selected Simulation.” 

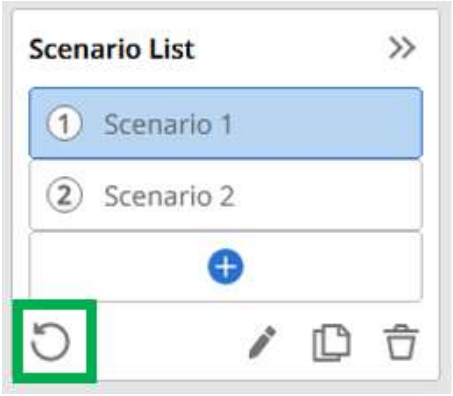
⑥ Check out how the position changes from the original to the current position by moving the slider.

⑦ Click “Apply” button to apply the current position of the teeth to the simulation.

This function is useful when you want to track the changes of each tooth or move tooth/teeth in the middle of the scenario.



⑧ You can reset the selected scenario by pressing the **“Reset”** button on the Scenario List.



You can move back and forth among the scenarios and adjust position of the teeth.

Go back to the previous stage to see the comparison among all scenarios and the original model.

4.4.3 Adjusting teeth position while referencing the occlusion

The program allows adjust the position of each tooth while referencing the occlusion deviation scale.

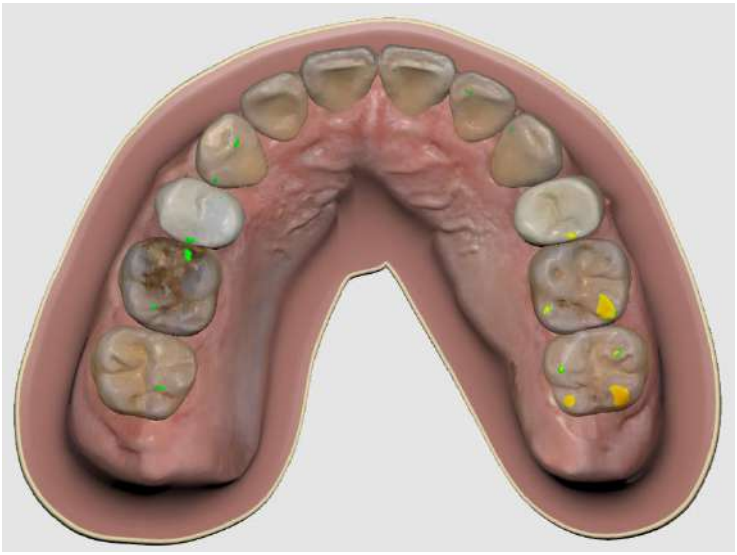
Toolbox

	Show/Hide Occlusal Intersection	When on, shows the occlusion intersection.
	Occlusion Multi-view	Allows to adjust the position of each tooth while observing the changes in occlusion deviation on the right.
	Switch Deviation Display Area	Switches the deviation display scale between all data and contact area only.

① Press the **"Show/Hide Occlusal Intersection"** button to reference the occlusion intersection.

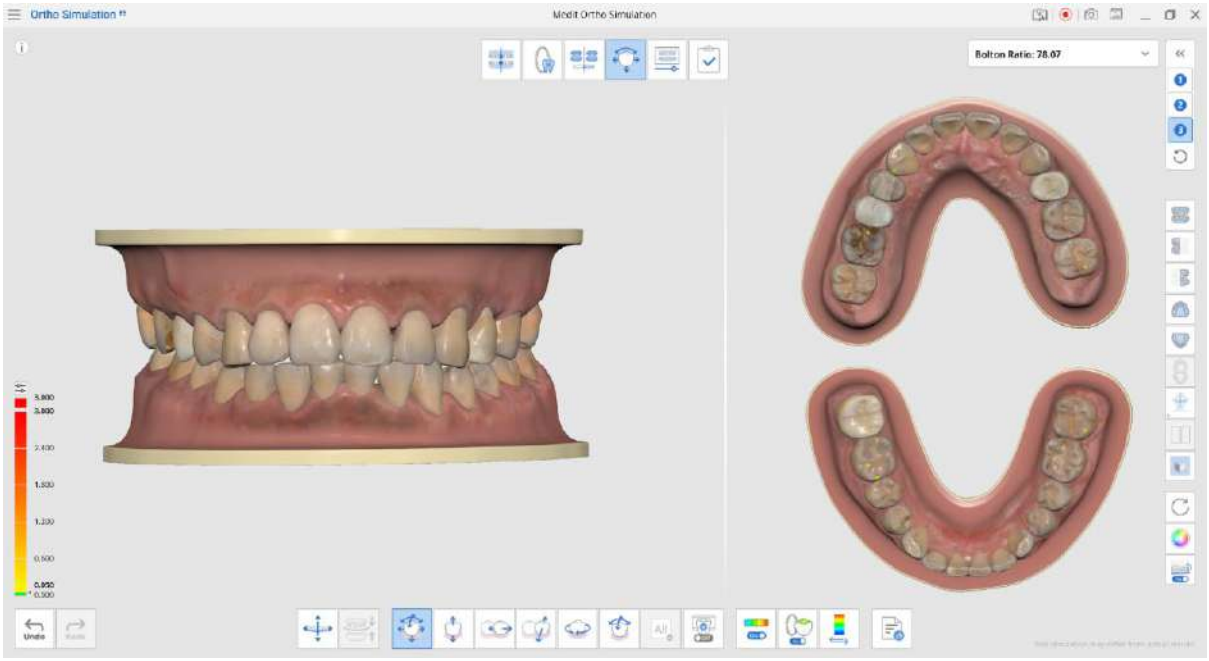
② Choose **"Maxilla View"** or **"Mandible View"** on the Side Bar on the right to view the deviation results.

③ Deviation occlusion data will be updated in real time as you move the position of the teeth.



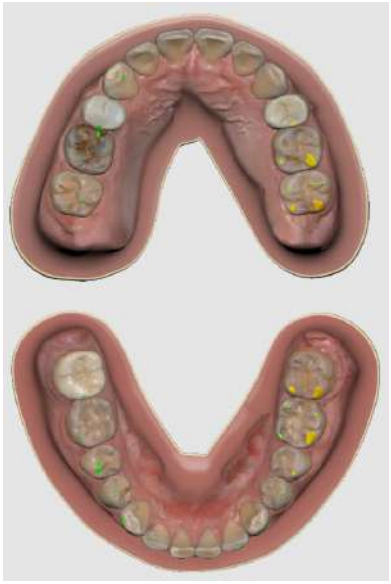
④ To see the model in frontal view and reference the occlusion deviation at the same time, press the **"Occlusion Multi-view"** button.

⑤ You will see deviation changed on the right side as you change the position of the teeth on the left.

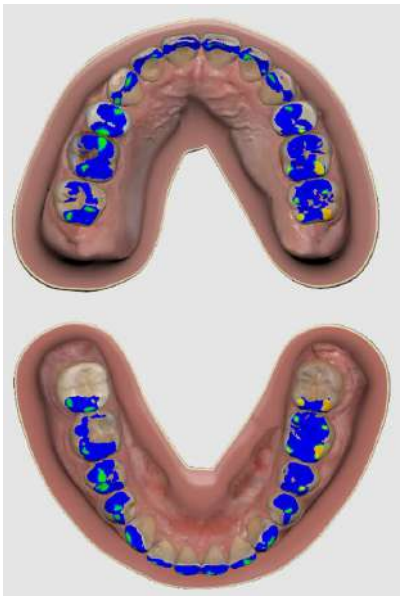


⑥ To change the deviation display scale from contact area only to all data, press the **"Switch Deviation Display Area"** button.

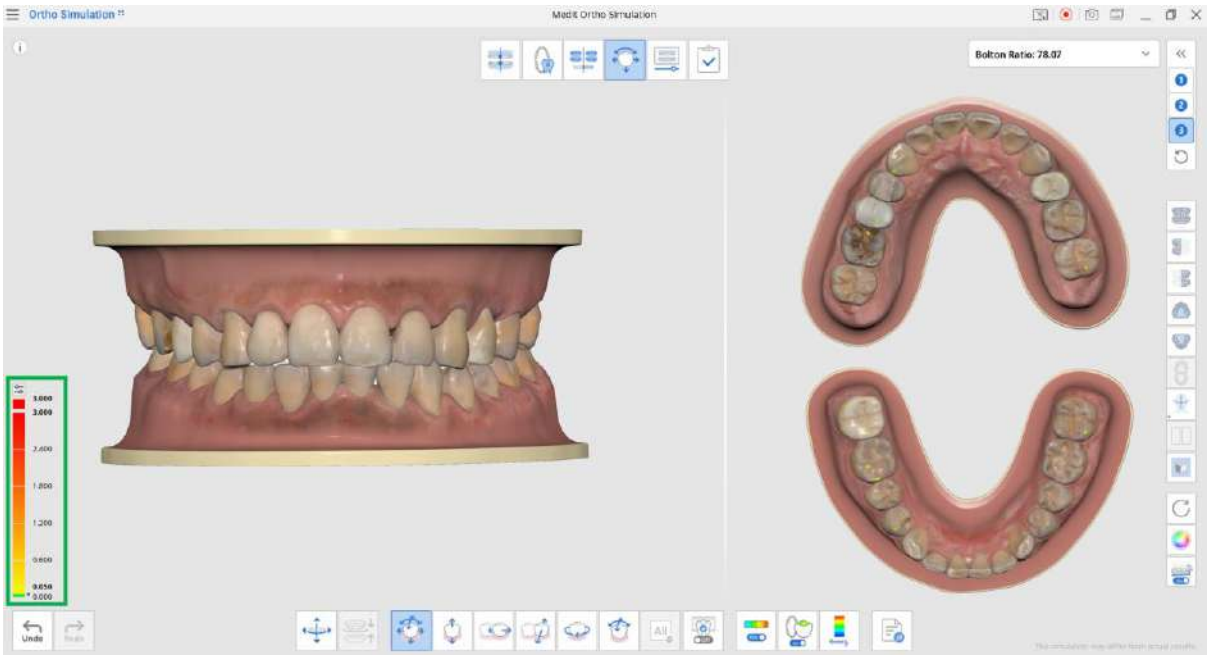
Contact Area Only



All Data



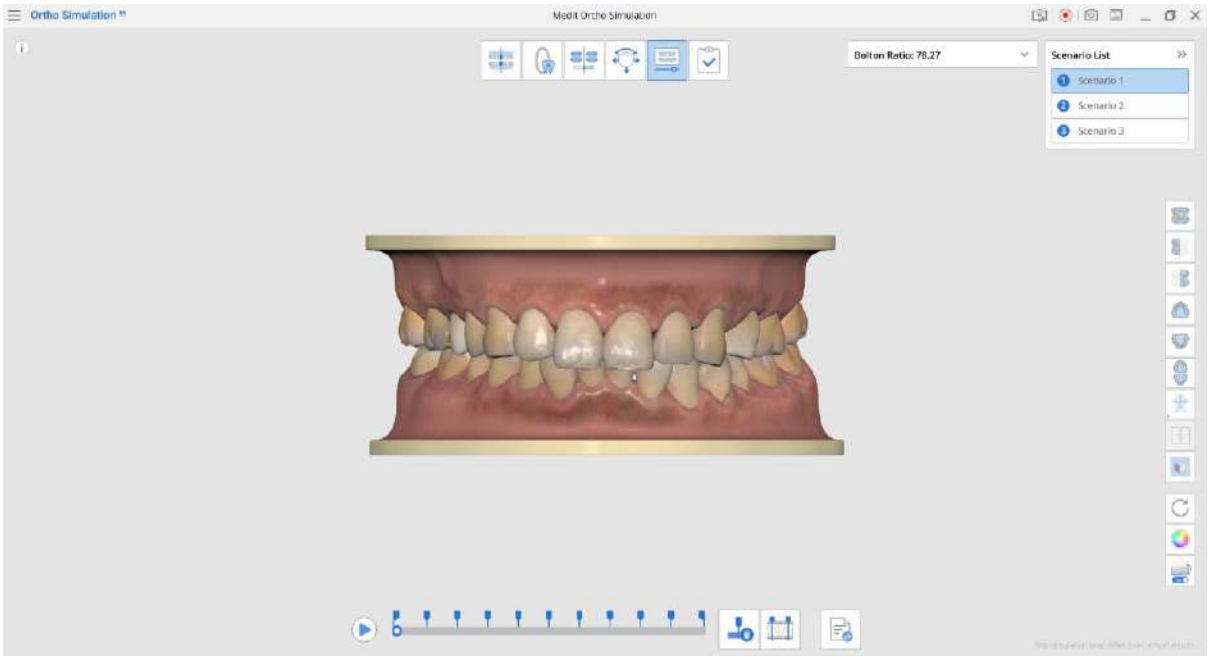
Keep in mind that you can adjust the deviation scale of the color bar on the right side of the window by clicking on the numbers in bold. You can adjust the resolution of the color bar by clicking on the  icon located above it.



4.5 Animation View

This stage shows the simulation in animation from before to after.

You can export the simulation data in various format to the Medit Link.



Toolbox

	Delete All Pins	Deletes all pins.
	Split Animation into Steps	Divides the animation into a number of steps.
	Export to Medit Link	Exports maxilla, mandible, or each of the segmented teeth as separate files to the Medit Link.

① Choose a scenario in the top right corner to see its teeth movement animation.

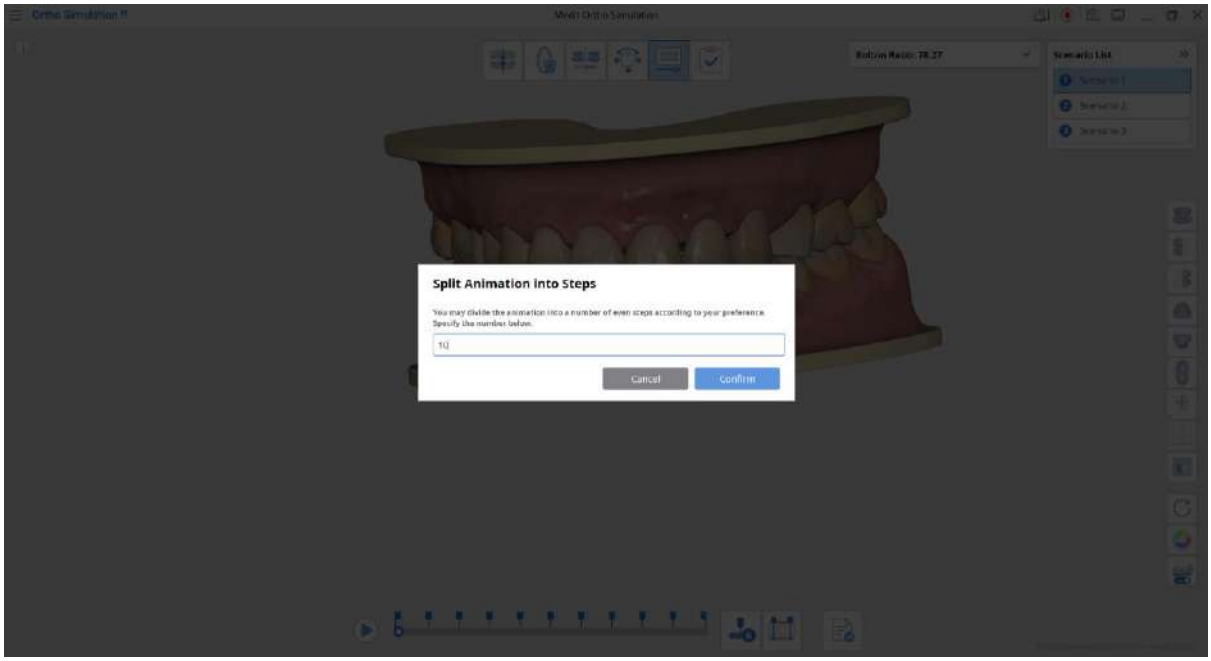
To see the original model during the animation play, click on the scan data with the left button on the mouse.

Use data display options on the Side Toolbar to watch the animation from different angles.

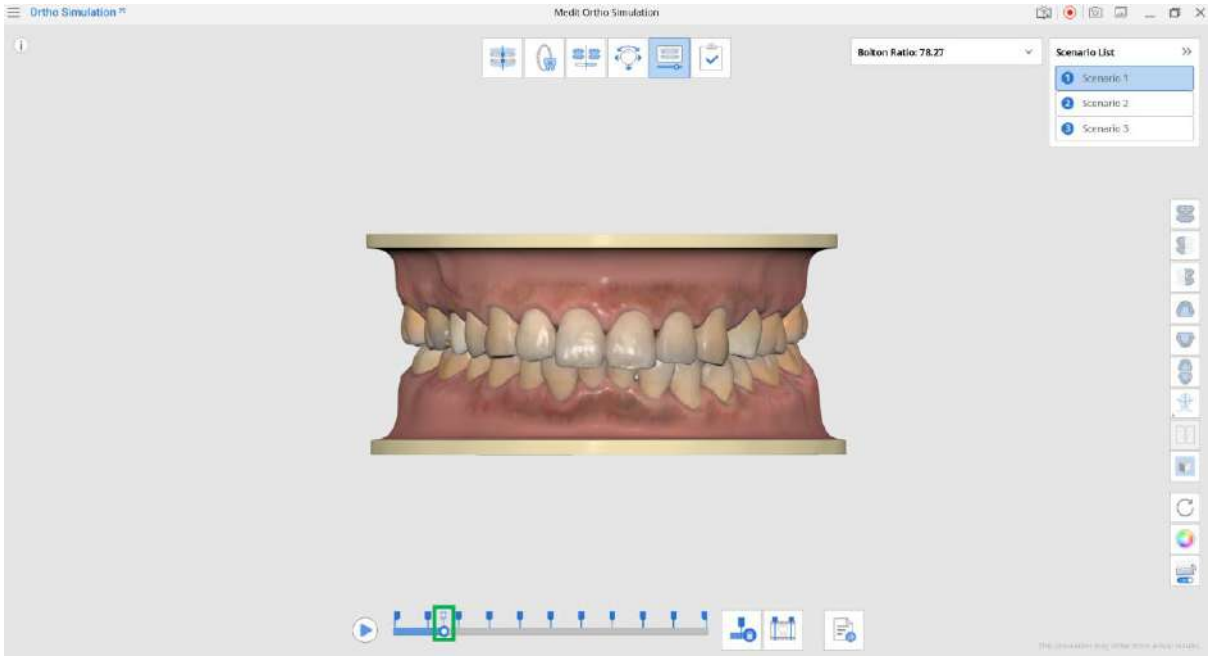
Make face data visible to see how it is being changed together with the intraoral data.

② Click “Split Animation into Steps” button to divide the animation into a number of steps according to your preference.

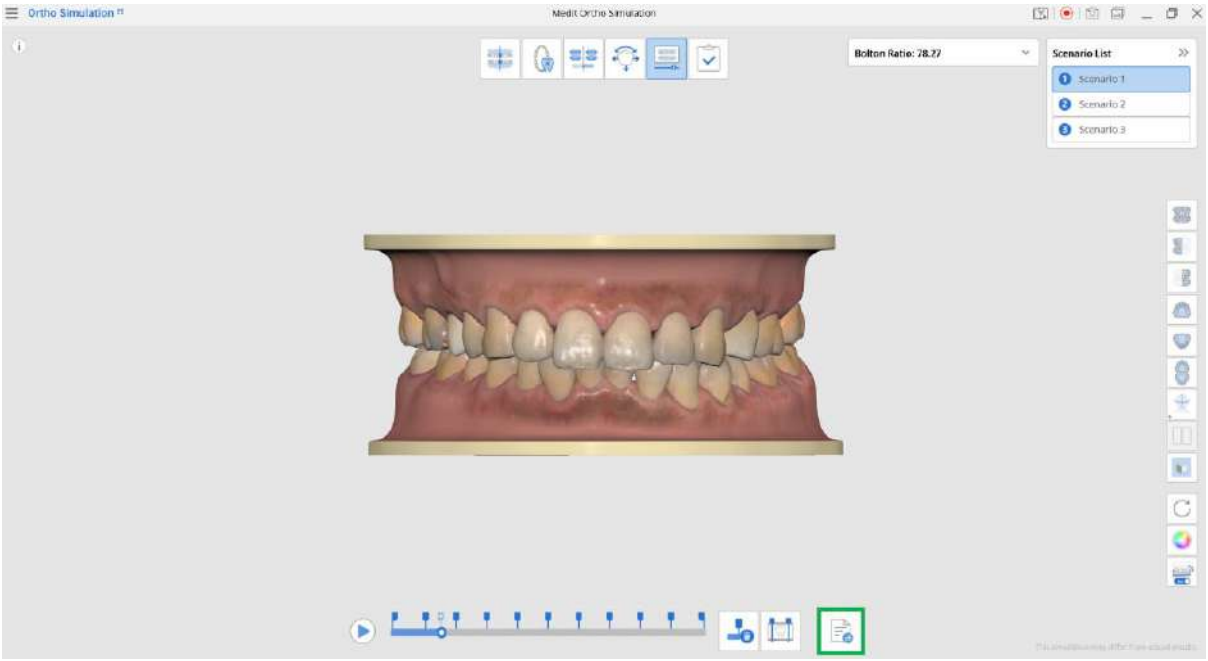
The animation can be divided up to 20 steps.



③ You can check each step. Click and add more pins to add more steps.



④ Click “Export to Medit Link”  button to export a model to the Medit Link.



You can export the current 3D data in animation by clicking “Export to Medit Link.”

⑤ Go to Export Settings and choose stages and model (base model and teeth) to export.

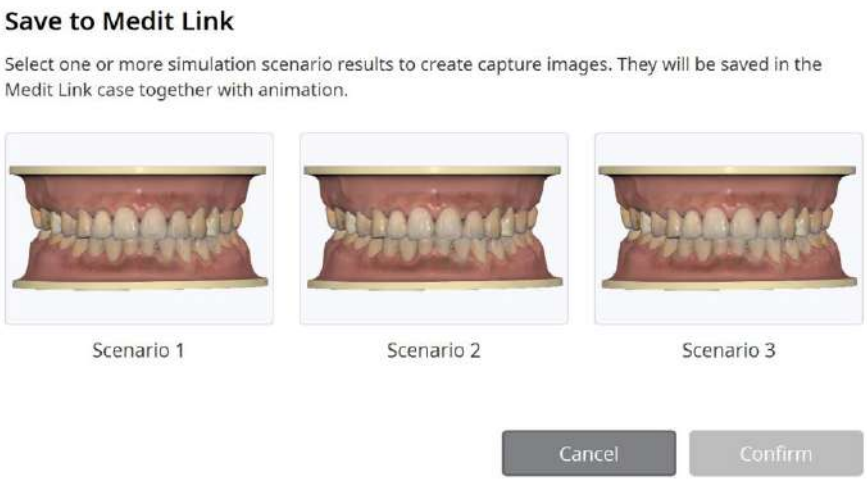
For a model, you can choose between “With Base” and “Without Base.”

For teeth, only segmented teeth are exported. You can choose between an open and closed teeth options.

4.6 Complete

This stage allows to save the project and make captured images for the simulation.

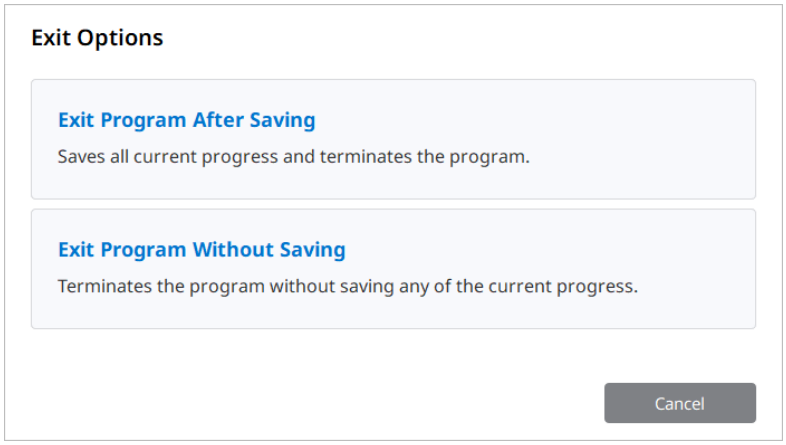
① Upon completion you will be asked to choose the scenarios for which you want image captures to be generated.



② Select one or more scenarios to create capture images. Press the **"Confirm"** button when the selection is done. This will terminate the application.

③ The captured images for the selected scenarios will be saved in the Medit Link case.

④ In case you exit the program while the project is still incomplete, you will have two options to select from: 1) Exit the program after saving; 2) Exit the program without saving.



⑤ If you choose the first option, you can open the project file by running the application from the same Medit Link case and continue working on it.