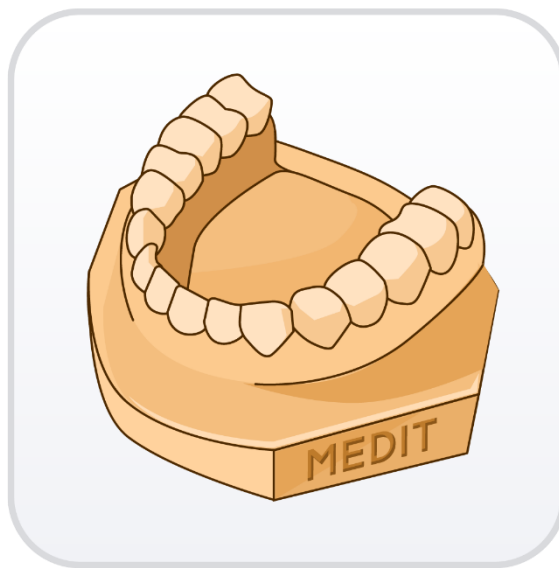


Model Builder



Revision 2 (11.2021)

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1 Introduction and Overview

1.1 Medit Model Builder Overview

Medit Model Builder is designed to create physical models of intraoral scan data. It offers both orthodontic and prosthetic workflows that equip users with various tools to create base and choose its type, fix occlusion through attaching articulators, label them, and create dies before 3D printing. The base comes in three different types: ABO, Plate, and Plateless. With various adjustable parameters for all the above and drain holes, users can utilize the software for the optimal 3D printing process.

Explicit explanations and guide messages accompany each step of the process.

1.2 Intended Use and Disclaimer

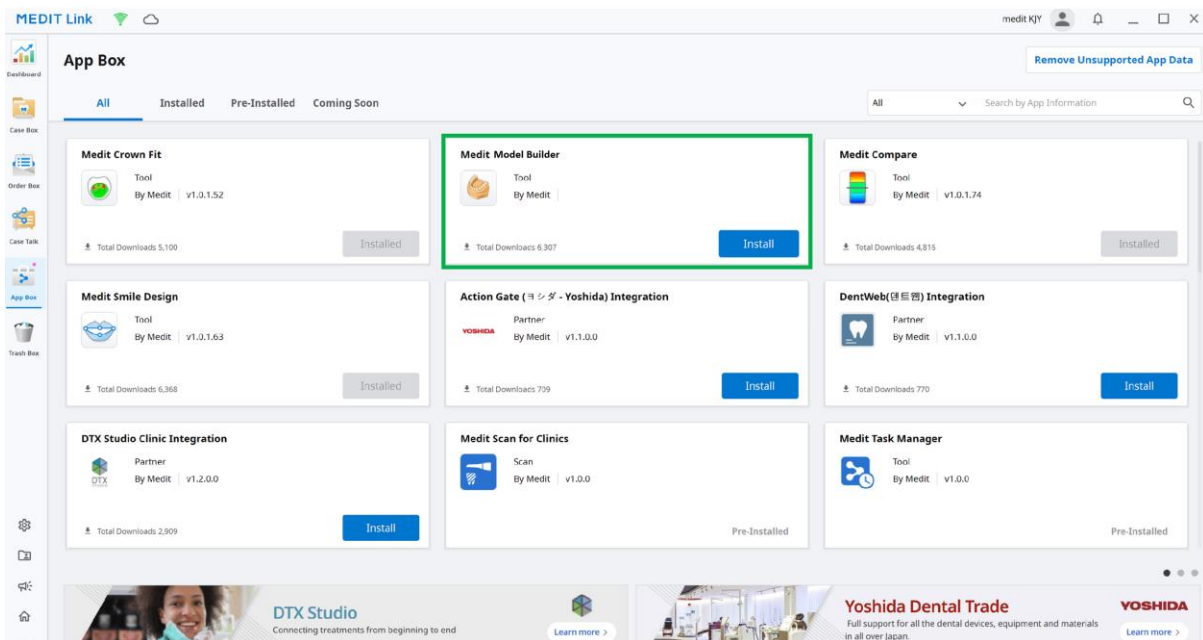
Medit Model Builder is a software application designed solely for the purpose of creating a model made of scan data and cannot be used for other purposes.

1.3 Recommended System Requirements

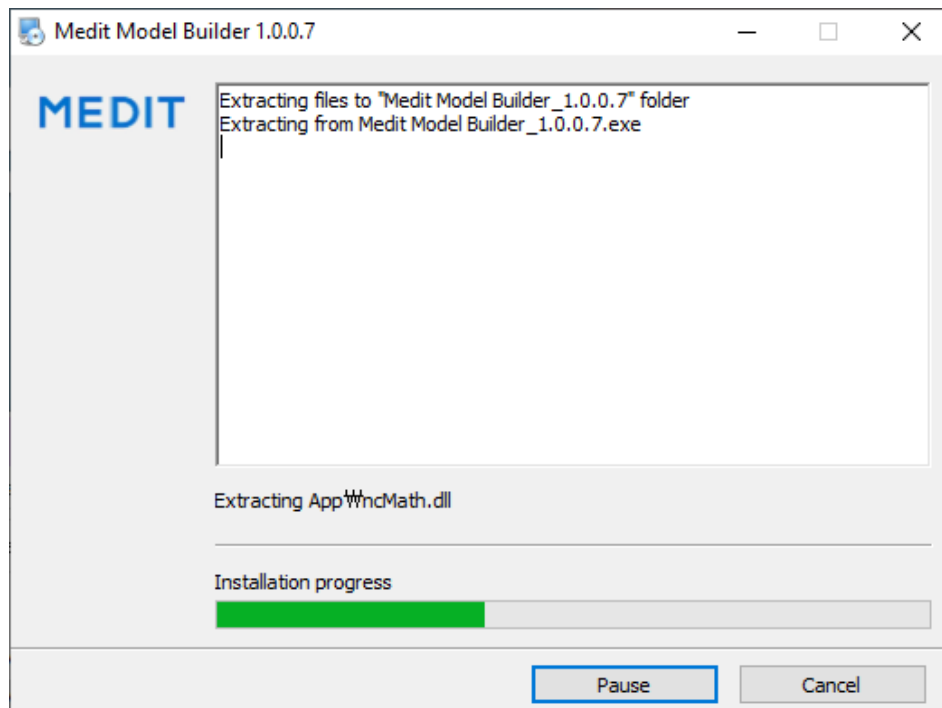
	Laptop	Desktop
CPU	Intel Core i5 2.6 GHz or higher	
RAM	16 GB or higher	
Graphics	NVIDIA GeForce GTX 1060 (2 GB) or higher	
OS	Windows 10 64-bit, Window 11 64-bit	

1.4 Installation Guide

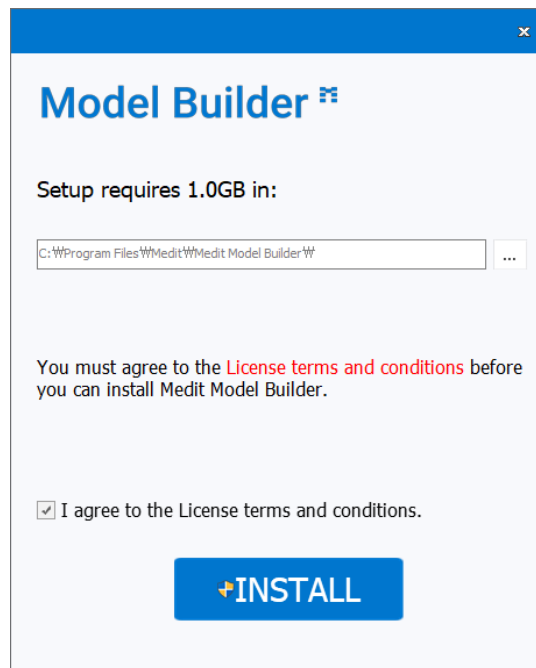
- ① Log in to your Medit Link account and go to App Box.



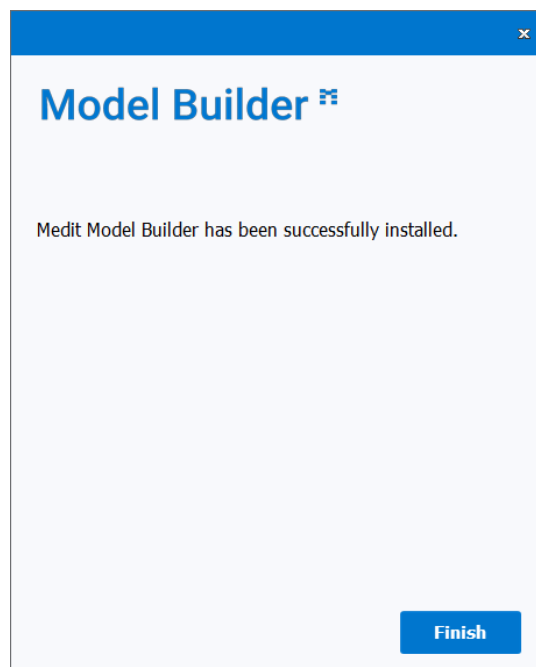
- ② Find the “Medit Model Builder” app and click on the “Install” button.
- ③ Once the download is complete, the Medit Model Builder installer will be run automatically.



- ④ Read and agree to the License Terms and Conditions.



- ⑤ It may take 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, scan data acquired through Medit Scan for Labs will be automatically saved in Medit Link.



Models can be created for single arches, as well for both.

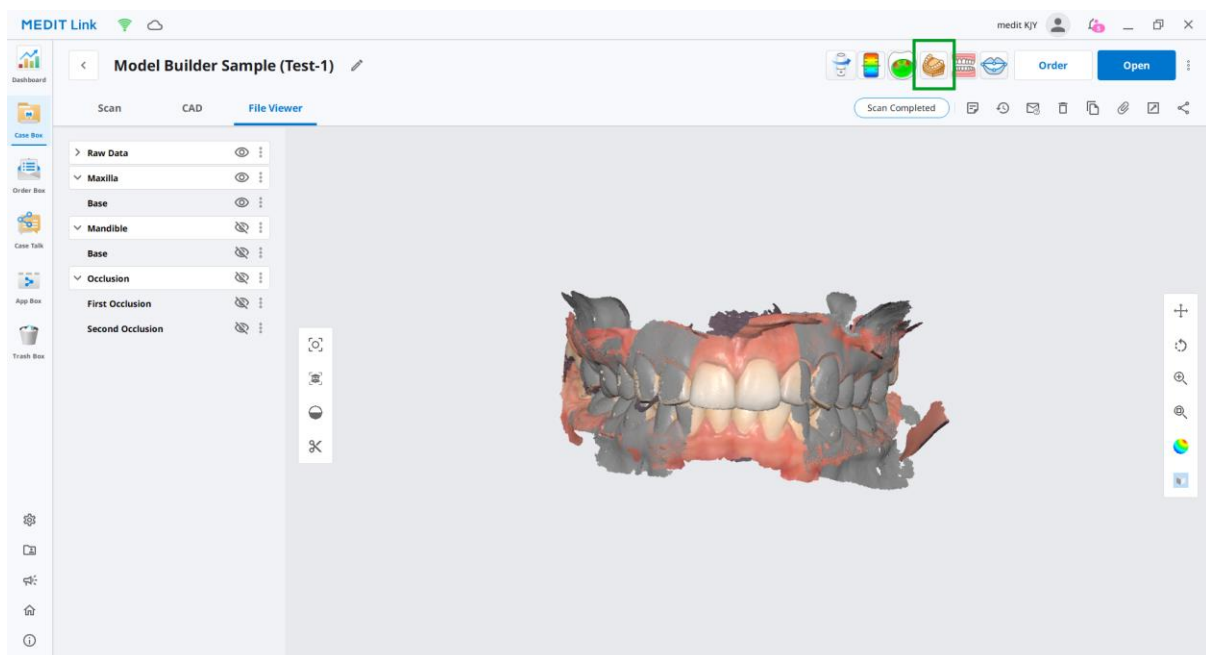
2.2 Running Medit Model Builder from Medit Link

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 Medit Model Builder.

② Press the “Medit Model Builder”  icon in the right upper corner of the Case Detail window in Medit Link, which will automatically appear once you install the app and restart Medit Link.






Check the scan data. Make sure that the data is clean and there is some gingiva scanned.



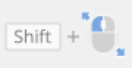
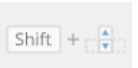

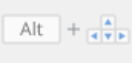


Medit Model Builder project file will be saved to Medit Link Case upon completion alongside the digital model files.

2.3 3D Data Control

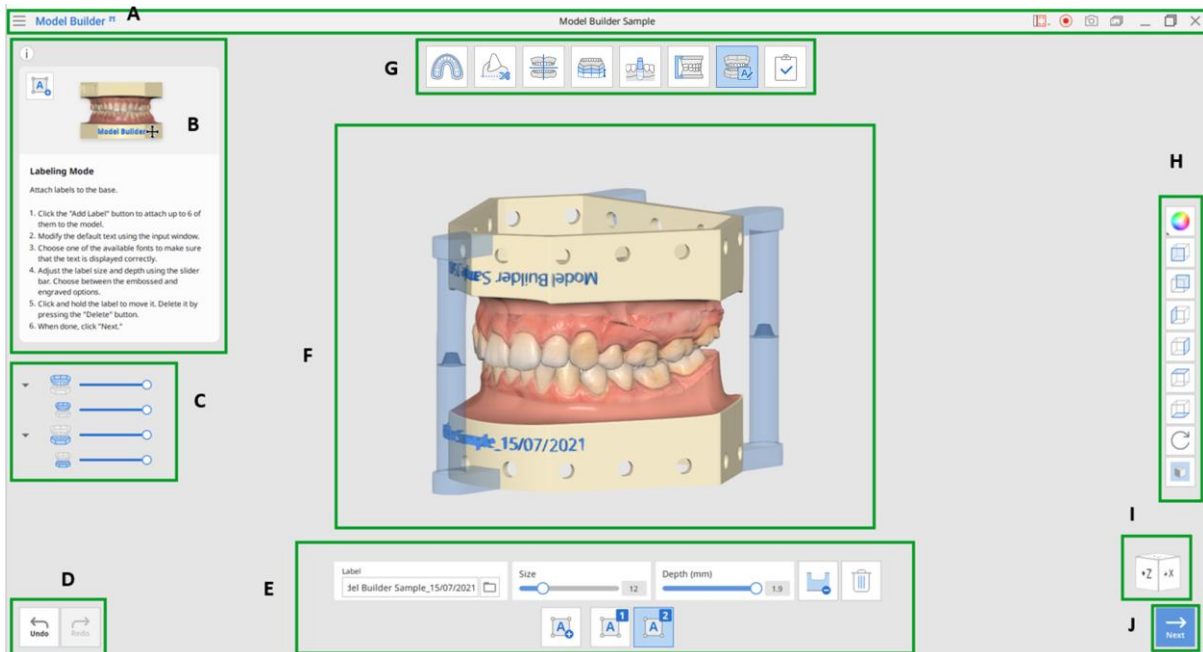
3D data control using the mouse:

Button	Action	Use	Image
Wheel	Drag	Move the data in view screen.	
	Scroll	Zoom in/out the data in view screen.	
Right	Drag	Rotate data in view screen.	

3D data control using the 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. Help Message | C. Data Tree |
| D. Undo/Redo | E. Tools | F. 3D Data |
| G. Modes | H. Side Toolbar | I. View Cube |
| J. Next | | |














3.1 Title Bar

The Title Bar consists of the following options:

Menu	Description
Menu	The Menu includes tools to manage data display options and shows the details of the application.
Help Center	Go to the Help Center page. It contains various information about using Medit Model Builder.
Start Video Recording	Start the video capture.
Screenshot	Capture the screen.
Screen Capture Image Manager	Manage the captured screen images.
Minimize	Minimize the application.
Maximize or Restore	Maximize or restore the application.
Exit	Terminate the application.

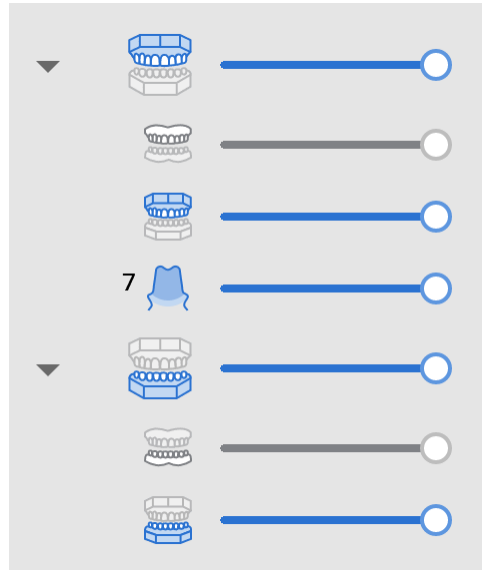
3.2 Side Toolbar

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

Icon	Tool	Description
Data Display Modes		
	Textured	See the data with color information.
	Textured with Edges	See the data with color information and edges.
	Monochrome	See the data in a single color.
	Monochrome with Edges	See the data in a single color with edges.
	Wire-Frame	See the data as edges only.
3D Data View Options		
	+Z Axis View	See the front view.
	-Z Axis View	See the back view.
	-X Axis View	See the left view.
	+X Axis View	See the right view.
	+Y Axis View	See the top view.
	-Y Axis View	See the bottom view.
	Rotate	Rotate data in any direction.
	Grid Settings	Set grid display options. It shows or hides the grid and controls its position in relation to the model (overlay on/off).

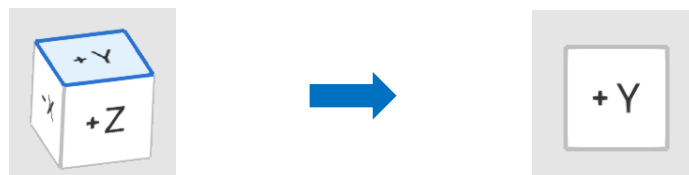
3.3 Data Tree

The data tree appears on the left side of the window and shows the list of data you are using in groups. Easily control data by hiding, showing, or changing its transparency one by one or as a group.






3.4 View Cube

View Cube displays the 3D view orientation, which is updated in real-time as the view is being rotated. Align the view to specific directions by clicking on a specific face of the cube.



3.5 Action Control

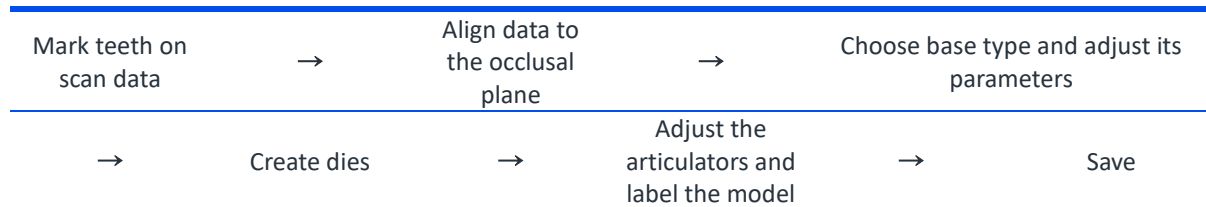
Find the Undo and Redo buttons at the bottom left corner of the window.

Icon	Tool	Description
Undo/Redo		
 Undo	Undo	Undo the previous action.
 Redo	Redo	Redo the previous action.
Next		
 Next	Next	Apply the changes and move to the next mode.




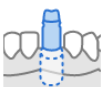



4 Modes

Modes indicate the current step of model creation. They are subjected to the specific sequence. However, you can move straight to the Complete stage after completing work at the Base Creation Mode to save the results to Medit Link. Adding articulators at the Articulator Mode or adding text to the model at the Labeling Mode is optional.

The overall workflow of the program is as following:



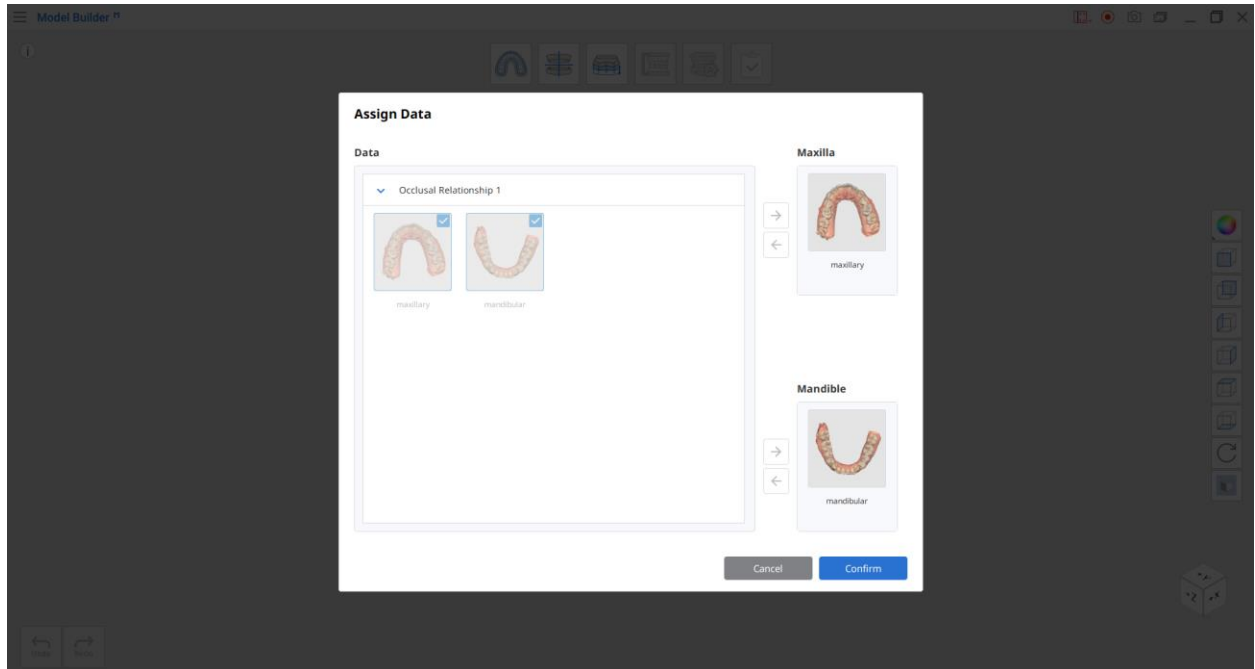
Modes

Icon	Mode	Description
	Overview Mode	Import scan data for base creation at this stage.
	Area Designation Mode	Designate the area for base creation.
	Alignment Mode	Move data to the occlusal plane of a virtual articulator.
	Base Creation Mode	Create the base for the model.
	Die Creation Mode	Create dies that will be used in the base model.
	Articulator Mode	Adjust or attach articulators to the model.
	Labeling Mode	Label the model, either engraving or embossing the text.
	Complete	Finish the model creation process and save the results to Medit Link.

4.1 Overview Mode

Overview Mode is the landing page of Medit Model Builder, where the imported data is shown.

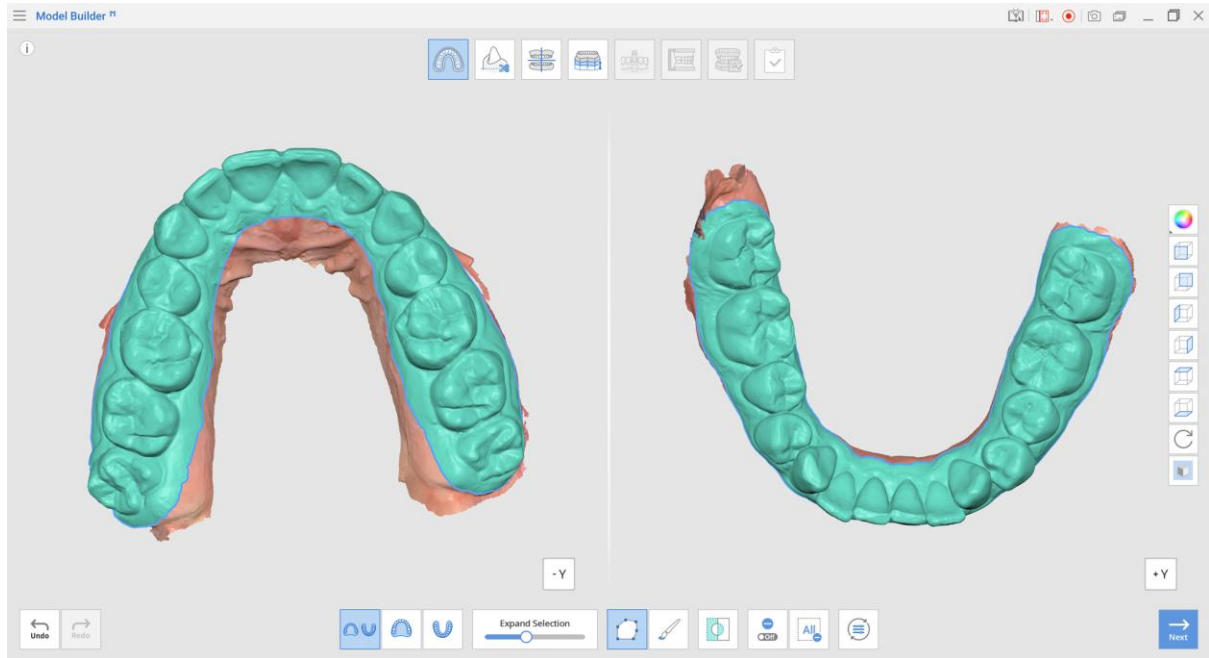
- ① Assign the data as maxilla and mandible. Both are not required to proceed.













- ② Click the Area Designation Mode  icon at the top to start creating the model.

4.2 Area Designation Mode

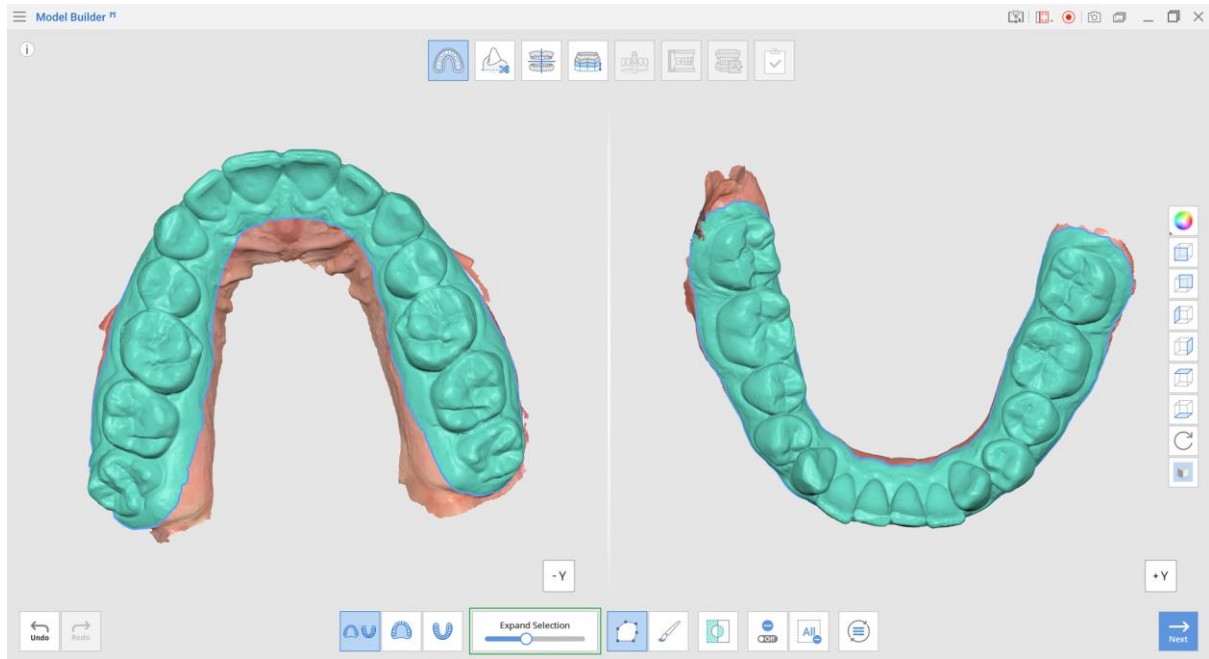
When entering the Area Designation Mode, the teeth on the scan data are selected automatically to mark the area that will be used for creating the model.



Toolbox

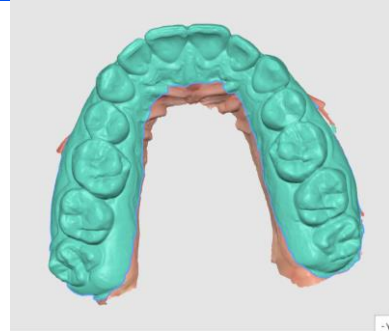
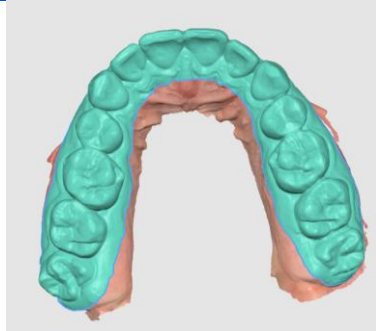
Icon	Tool	Description
	Split View	Show maxilla and mandible in Split View.
	Show Maxilla	Show only maxilla on the screen.
	Show Mandible	Show only mandible on the screen.
	Expand Selection	Expand the automatically selected area on the scan data.
	Polyline Selection	Select all entities within a polyline shape drawn on the screen.
	Brush Selection	Select all entities on a freehand drawn path on the screen. Only the front face will be selected. The brush comes in 3 different sizes.
	Invert Selected Area	Invert the selection.
	Deselection Mode	When on, this function deselects the area using various tools.
	Clear All Selection	Clear all selected areas.
	Reset	Undo all the actions done in this mode and restore all elements to their original position.

- ① If needed, adjust the area by moving the “Expand Selection” slider at the bottom of the screen.



Before expanding selection

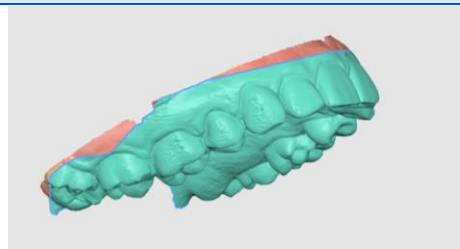
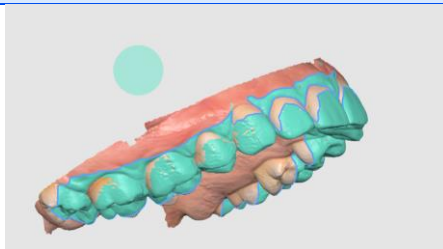
After expanding selection



If the data is not selected automatically, use other data selection tools. “Polyline Selection” is useful for selecting both the front face of the data and all the way inside it.

Selecting with the brush

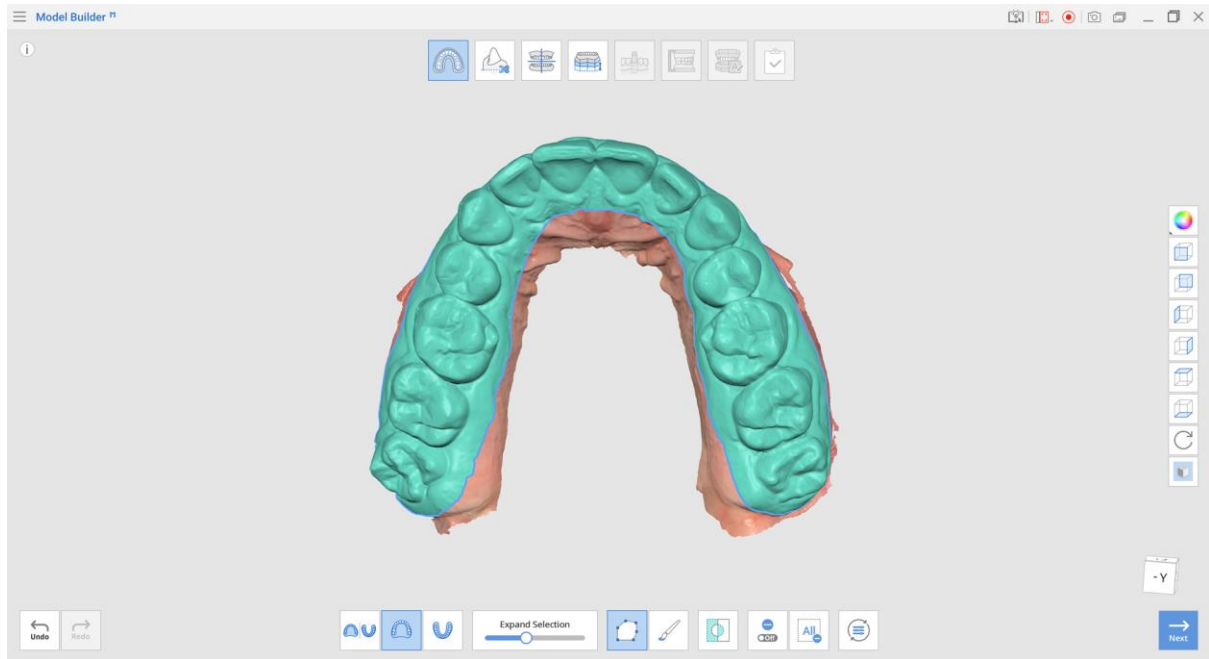
Selecting with the polyline tool



Make sure that as much data as possible is selected before moving to the next step.

If you are creating a model for both arches, adjust the selected area to each of them, leveraging the Split View.

- ① Click “Next” when finished.









4.3 Edit Mode

Edit 3D data to suit your needs in “Edit Mode.” Use the various trimming tools provided to edit your data. You can select the area and fill holes using “Fill Holes” or delete the entire area. You can also use “Sculpting” to smooth over data.



Toolbox

Icon	Tool	Description
	Polyline Selection	Select all entities within a polyline shape drawn on the screen.
	Brush Selection	Select all entities on a freehand-drawn path on the screen. Only the front face will be selected. The brush comes in three different sizes.
	Invert Selected Area	Invert the selection.
	Deselection Mode	When on, this function deselects the area using various tools.
	Clear All Selection	Clear all selected areas.
	Delete Selected Area	Delete the data from the selected area.



Fill Holes

Fill empty spaces in the 3D mesh data.

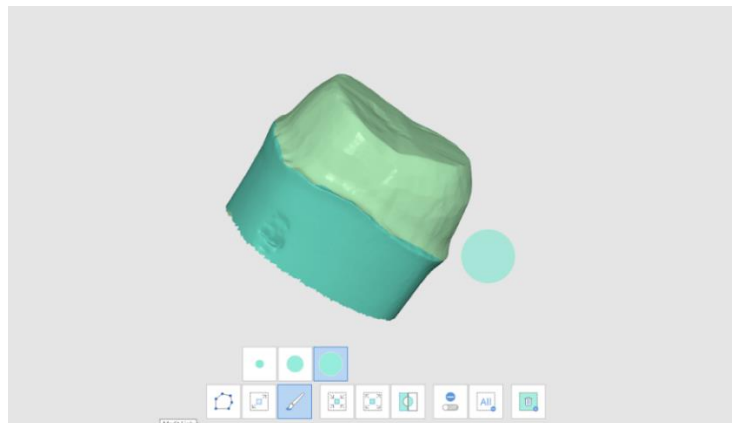


Sculpting

Sculpt data by adding, removing, smoothing, or morphing.

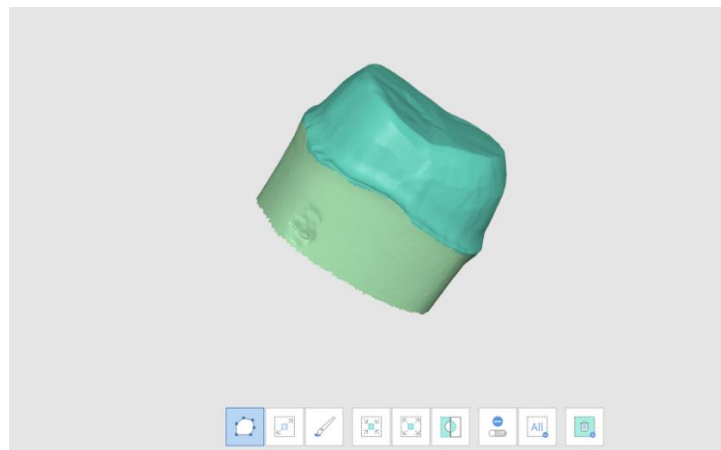
How to Edit Data

1. Use various tools to select the area you would like to edit.



“Polyline” removes all entities within a polyline shape drawn on the screen, while “Brush” removes only the front face data.

2. Revert the selection by clicking “Invert Selected Area.”



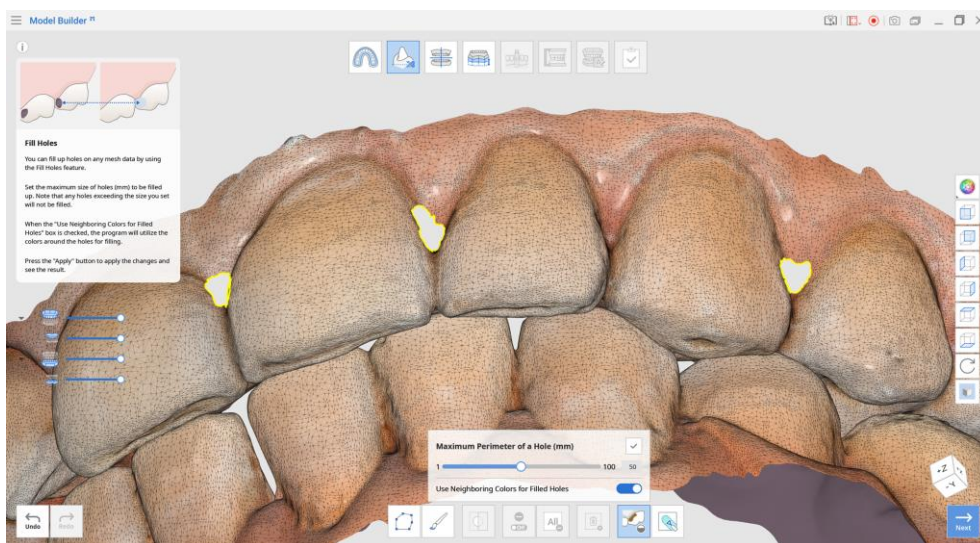
3. Reduce or expand the selected areas using the “Shrink Selected Area” or “Expand Selected Area” tools.



4. Click the “Delete Selected Area” button.

How to Fill Holes in Data

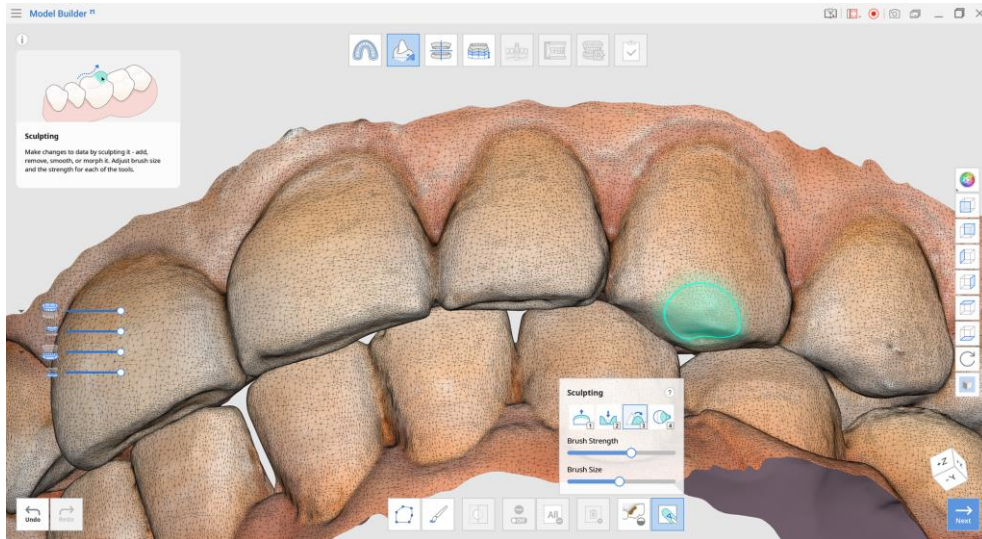
Using the “Fill Holes” function, you can fill in the holes left from scanning or fill in the areas deleted in the program.



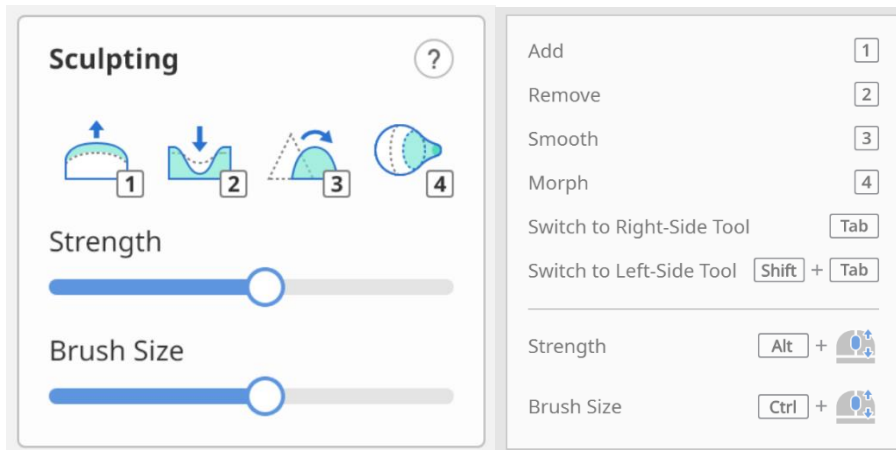
- Maximum Perimeter of a Hole (mm): Set the maximum size of holes (mm) to be filled up. Note that any holes exceeding the size you set will not be filled.
- Use Neighboring Colors for Filled Holes: When the “Use Neighboring Colors for Filled Holes” box is checked, the program will use the colors around the holes for filling. Otherwise, the filled areas will be grey.
- Press the “Apply” button to apply the results.

How to Sculpt Data

You can make changes to data by sculpting it using such tools as “Add,” “Remove,” “Smooth,” “Morph.”



Toolbox: Sculpting



	Add	Use the mouse to add on parts of the data. Hotkey: 1
	Remove	Use the mouse to remove parts of the data. Hotkey: 2
	Smooth	Use the mouse to smooth parts of the data. Hotkey: 3
	Morph	Use the mouse to morph parts of the data. Hotkey: 4

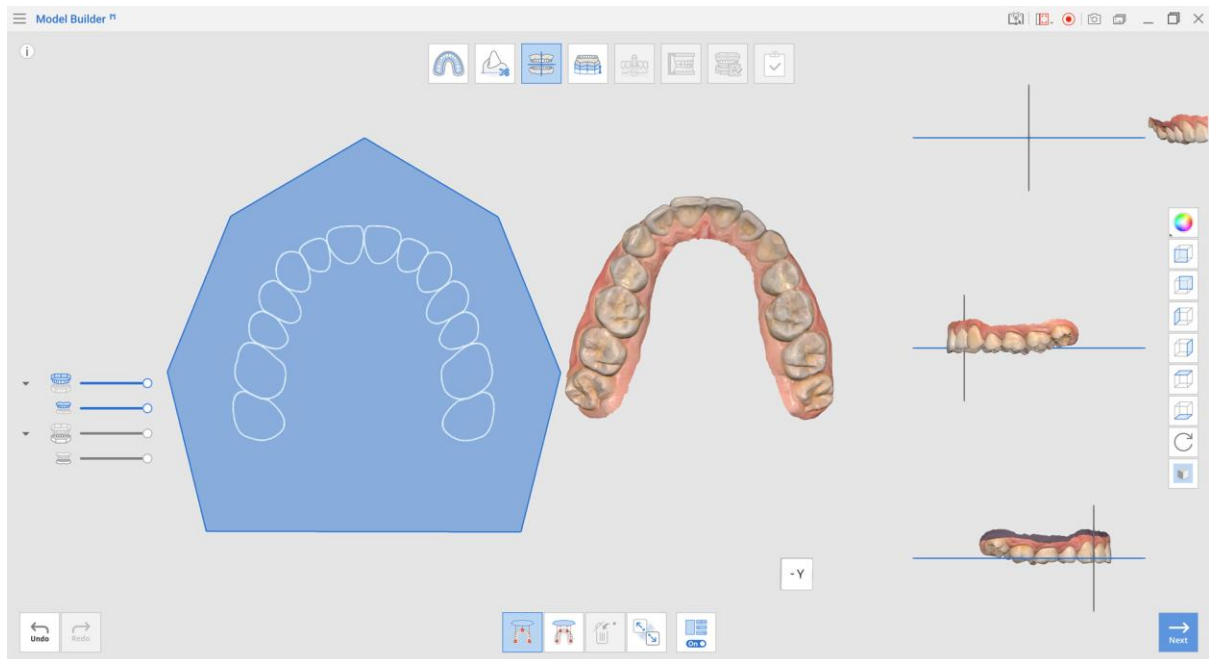
Press "Tab" to switch to the right-side tool.
Press "Shift + Tab" to switch to the left-side tool.

	Strength	Adjust the strength for each of the tools. Hotkey: Alt + Mouse Wheel
	Brush Size	Adjust the brush size for each of the tools. Hotkey: Ctrl + Mouse Wheel






4.4 Alignment Mode

Align the data with the virtual occlusal plane to properly place the data on the base.

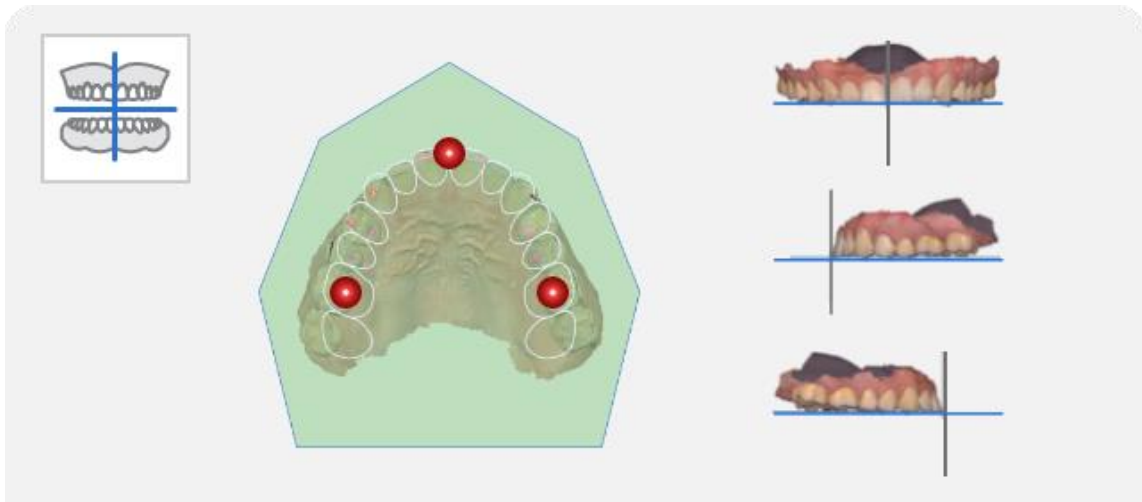
If the alignment has already been done in Medit Scan for Clinics or Medit Scan for Labs, you can skip this step. However, we recommend checking the alignment to ensure proper positioning of the data on the base.




Toolbox

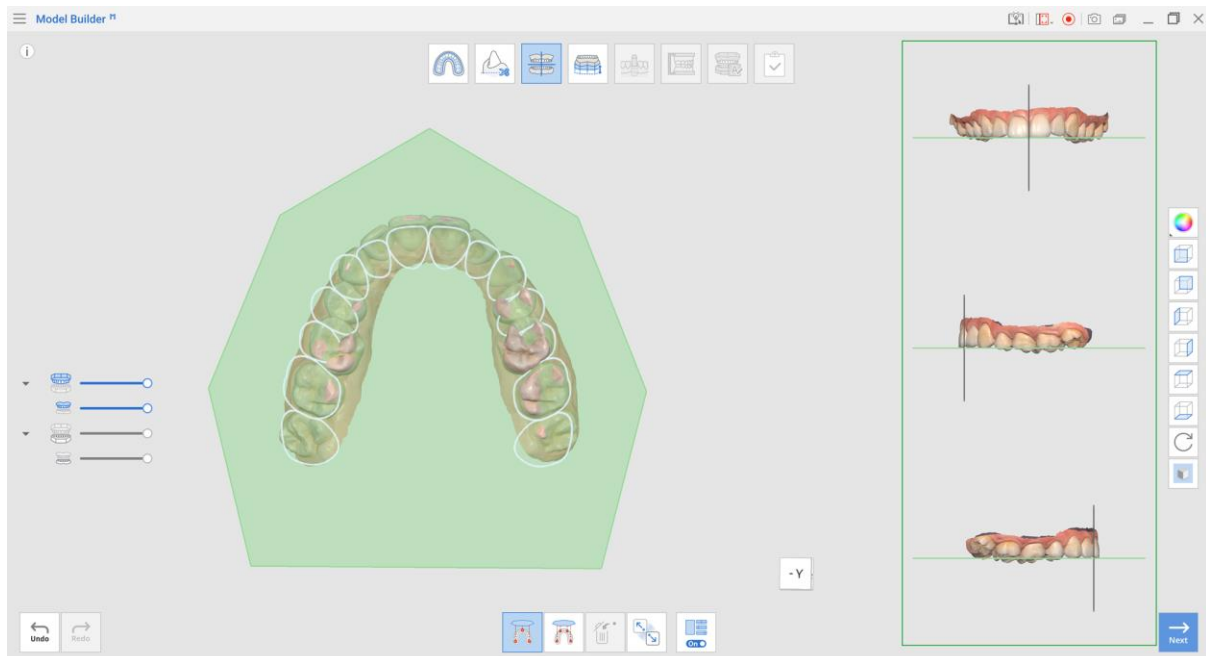
Icon	Tool	Description
	Align with Occlusal Plane by Three Points	Select three points on the maxilla or mandible to align with the occlusal plane.
	Align with Occlusal Plane by Four Points	Select four points on the maxilla or mandible to align with the occlusal plane. It is beneficial when there are no anterior teeth.
	Delete Marker Point	Remove the points selected for alignment.
	Detach Data	Separate the aligned data and move it to the original position.
	Multi-View	When on, this function shows data from four different angles.

- ① As shown in the image below, select three or four points on the data. Then it will be automatically aligned to the occlusal plane.



If there are no anterior teeth, select four points on the corresponding teeth on both sides after clicking the  button at the bottom of the screen.

- ② Adjust the data around in the Multi-View on the right to adjust its position on the occlusal plane.

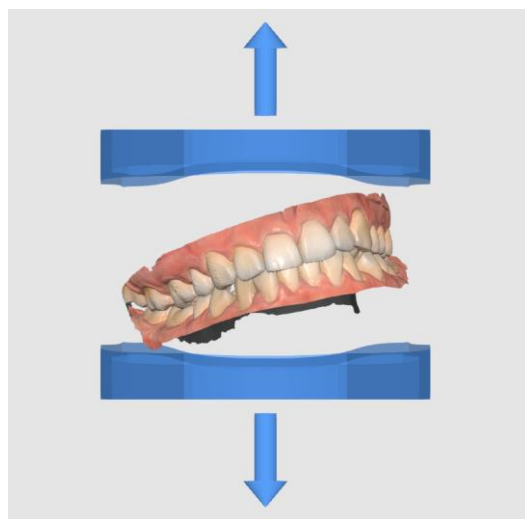


Use the View Cube at the bottom of each view for flexible 3D environment orientation.

- ③ Turn off the Multi-View to only show the occlusal plane part on the screen.



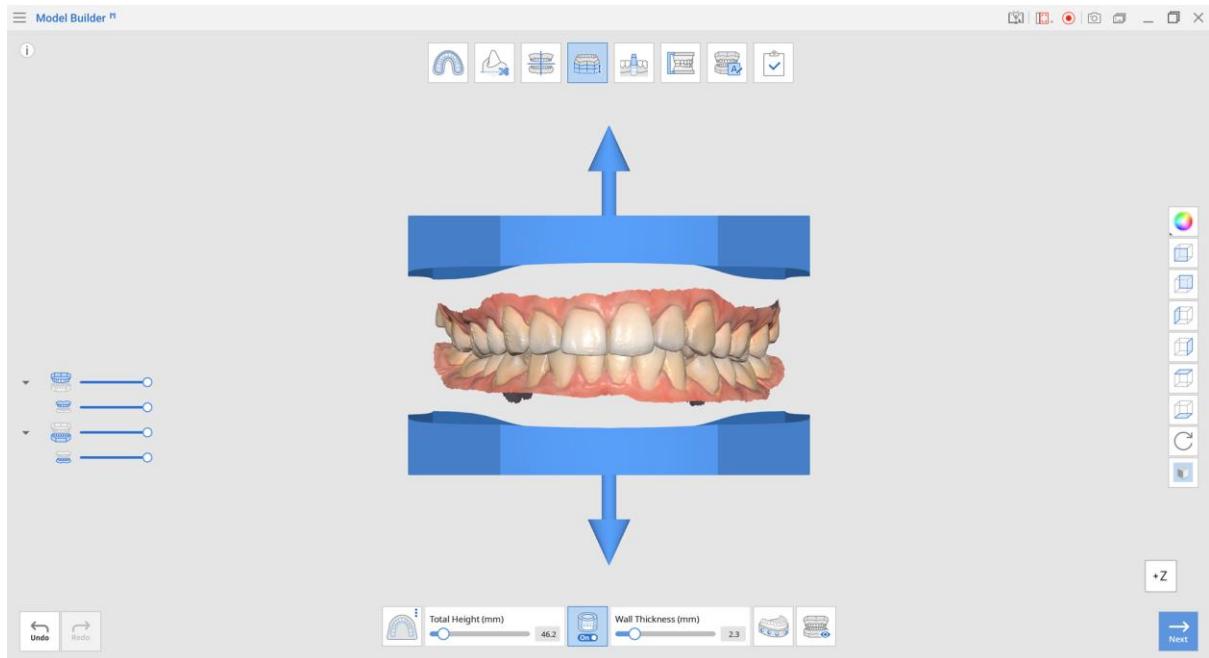
If the model is misaligned, the base might not be created correctly, as shown below.








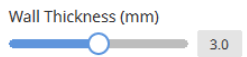









- ④ Click "Next" when finished.

4.5 Base Creation Mode

This mode is the key to model creation, as it allows to select the type of the base and adjust it across various parameters, such as base height, the wall thickness of hollow models, the number of drain holes, etc.

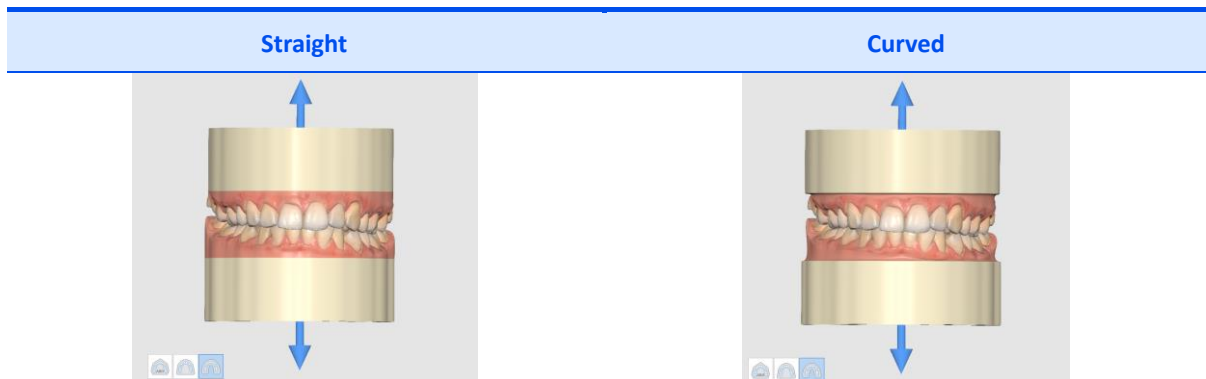


Toolbox

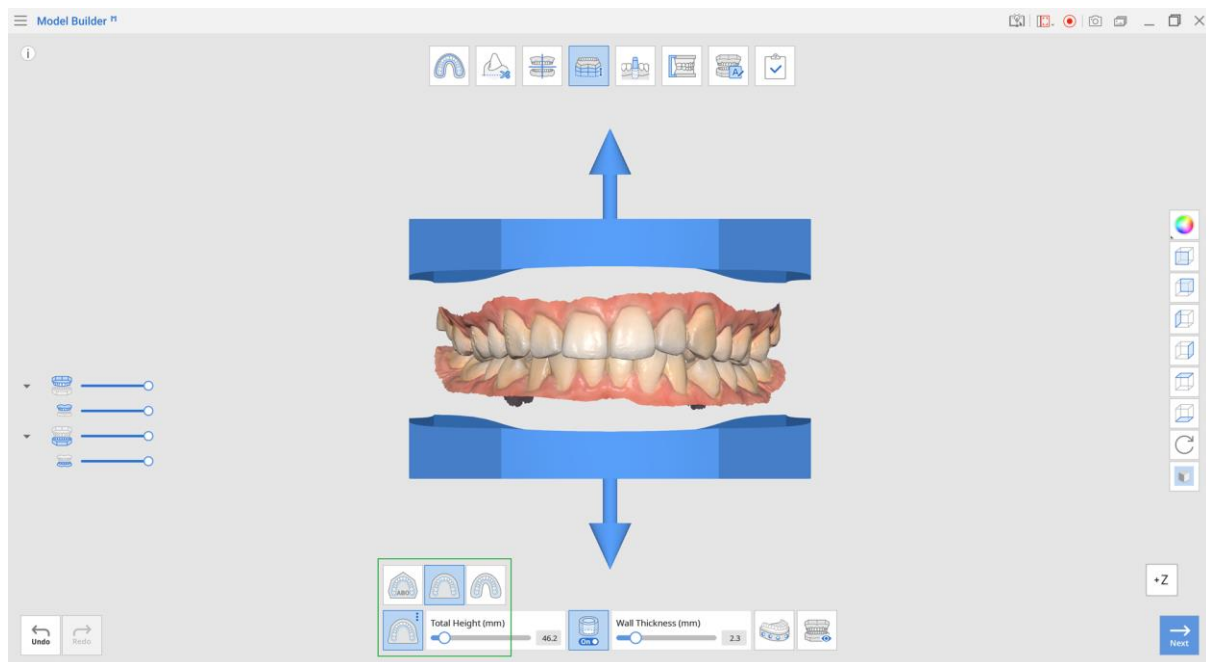
Icon	Tool	Description
	Base Type	Select one of the available base types: ABO, Plate, or Plateless Model.
	Total Height (mm)	Use this slider to adjust the total height of the model, including the base and scan data.  The total height of the model can be up to 99 mm. It might be useful to check the maximum height of the model available to print with your 3D printer to set a height limitation.
	Hollow Shape	Hollow out the base and adjust the wall thickness.  Hollowing out the shape is useful when printing the model using less material. Each type of base can be hollowed out.
	Wall Thickness (mm)	Use this slider to adjust the thickness of the walls once you choose to hollow out the model.  The range of wall thickness: 2 – 4 mm. It might be useful to check your 3D printer recommended settings to make a correct decision on the wall thickness.
	Straight/Curved (Straight)	Make the base at the edge of the scan data straight.  Only available for the Plateless Models.
	Straight/Curved (Curved)	Make the base at the edge of the scan data curved.  Only available for the Plateless Models.
	Create Drain Holes	Create drain holes to drain out uncured resin and set their quantity, diameter, and distance from the base.  Using drain holes is useful for resin printing since they help remove the excess resin and ensure that no material gets stuck inside the model.  Only works for hollow models.
	Preview	Preview the model before moving to the next step.



Below is the difference between the straight and curved bases.

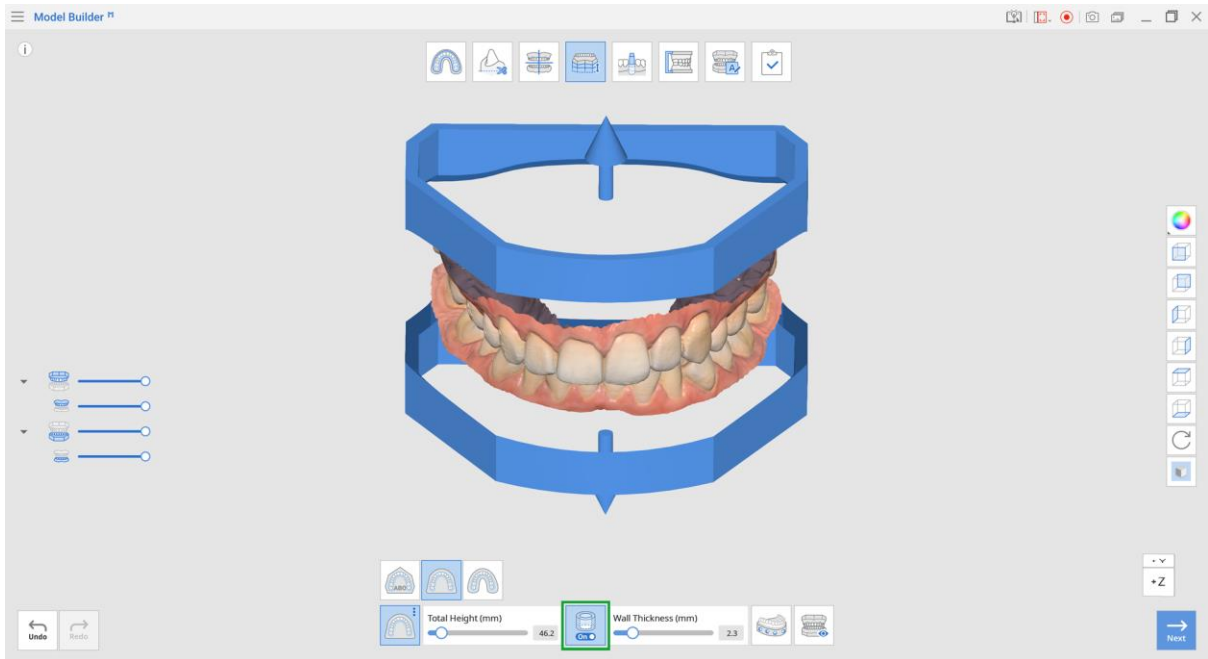


① Select a base type among the three available options.

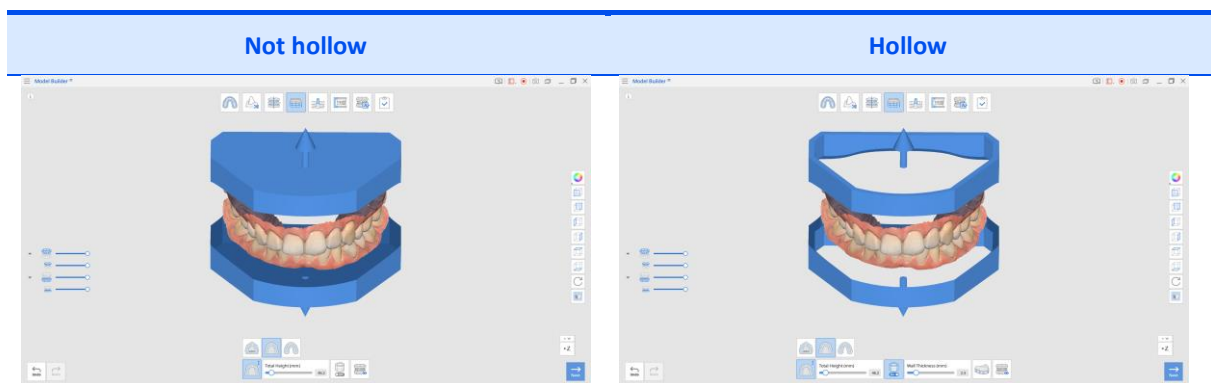


Icon	Base Type	Description
	ABO	Create an ABO Model. This orthodontic option creates a maxillary base with seven angles, while the mandibular base takes an elliptical form.
	Plate	Create a Plate Model. The plate will follow the shape of the scan data.
	Plateless	Create a Plateless Model. Usually made in a horseshoe shape, the base will recreate the shape of scan data.

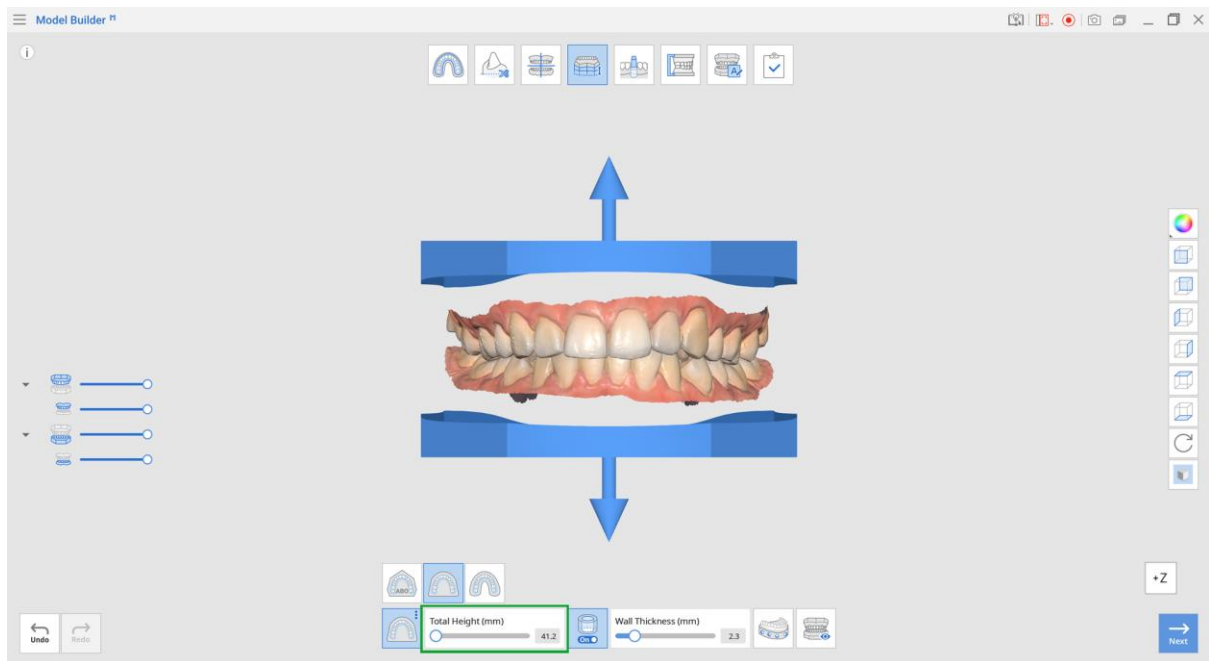
② Choose if you would like the base to be hollow.



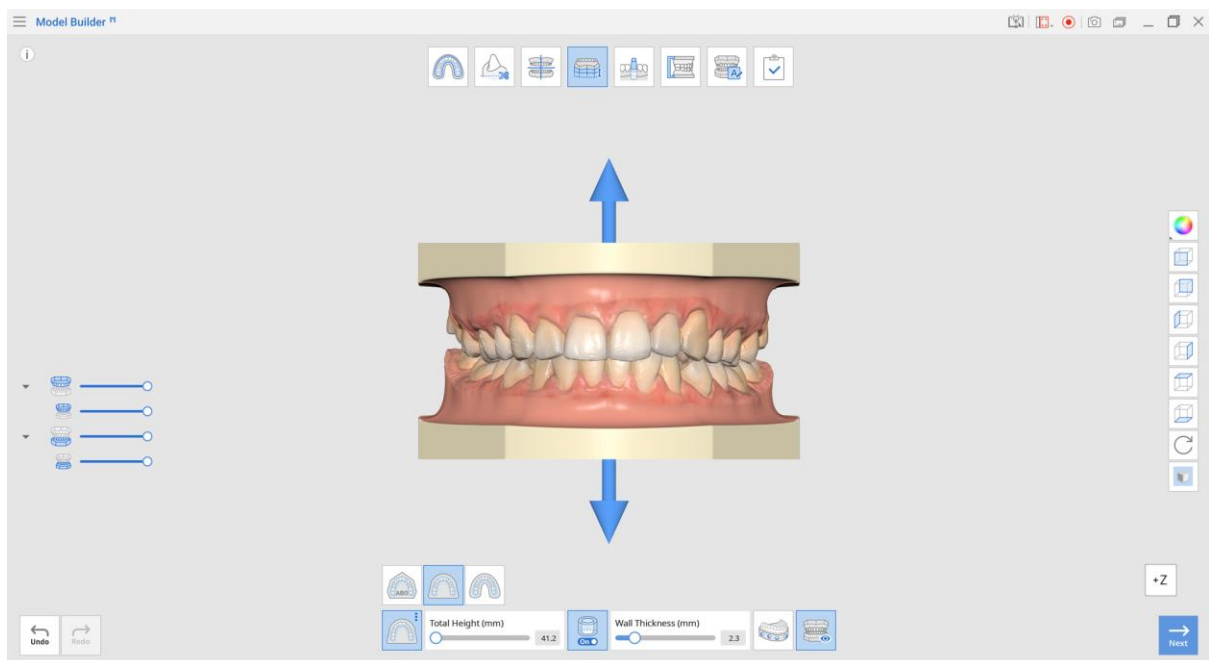
💡 Look at the difference it makes to hollow out a model.




- ③ Adjust the height of the base using up/down arrows located by the scan data. Use the slider on the bottom of the screen to get precise measurements.

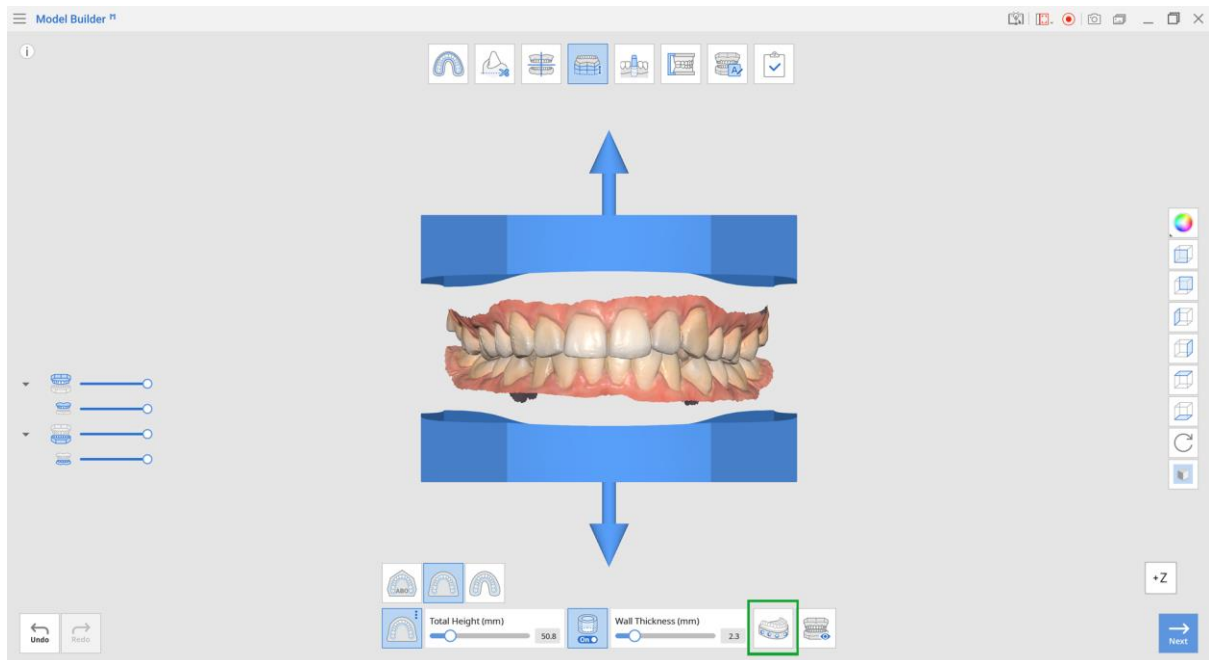


- ④ Click "Preview" to view the model before moving to the next step or finishing the process.

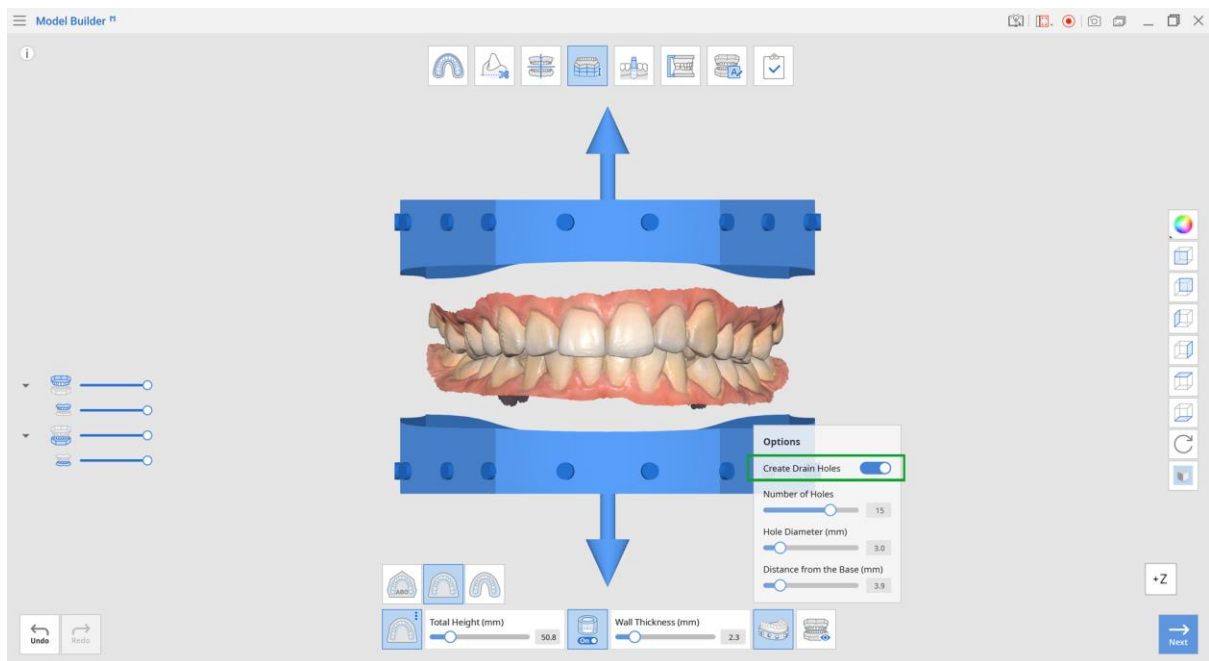


If you make any changes to the model, click "Preview" again to see them applied.

⑤ Create drain holes for the hollow models by clicking on  .

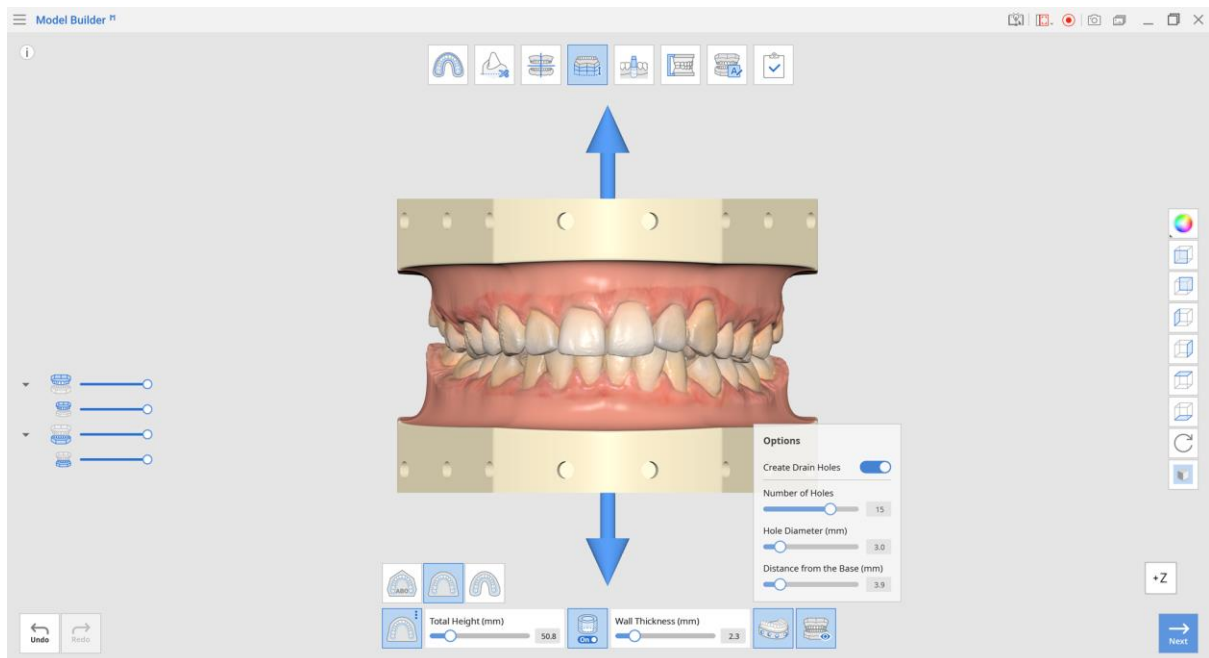


Look at the default parameters for the drain holes. After finishing the adjustment, turn on the “Create Drain Holes” toggle to see the holes on the model.



Parameter	Explanation
Number of Holes	Specify the desired number (from 1 to 15) of drain holes for each arch.
Hole Diameter (mm)	Specify the diameter of drain holes (applied to all of them).
Distance from the Base	Specify the desired position of drain holes as counted from the base of the model.

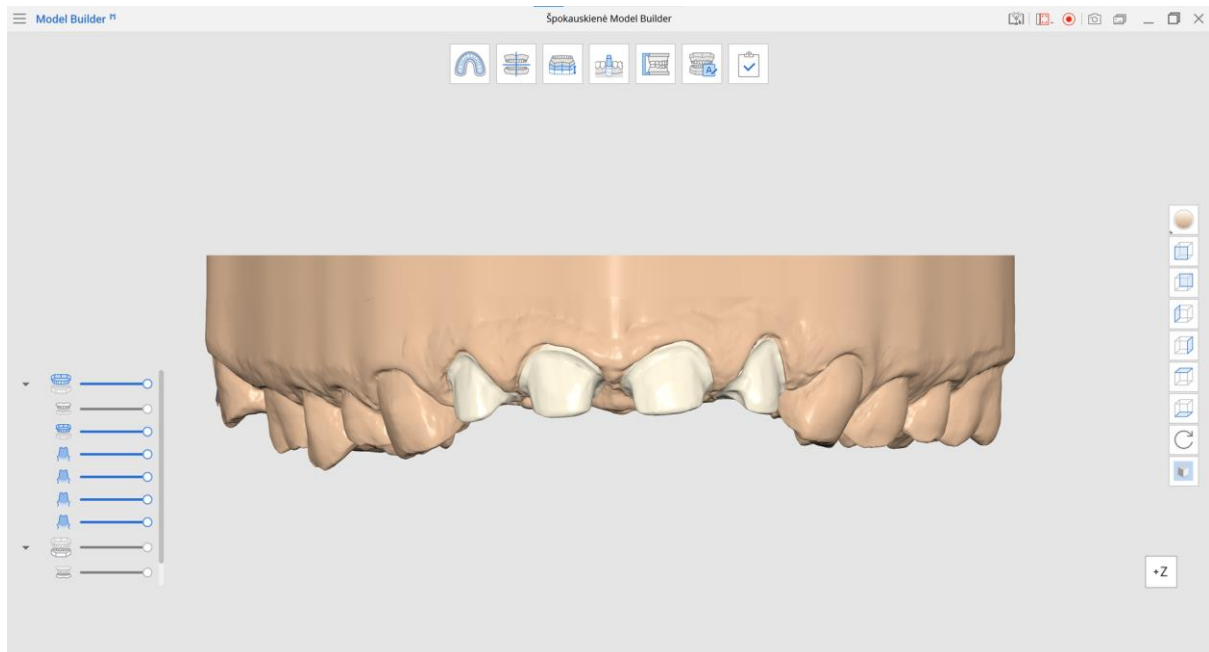
Once again, click “Preview” to see what they will look like.








② Click “Next” when finished.






4.6 Die Creation Mode

In Die Creation Mode, you can create individual dies that are detachable from the base model. Customize your dies easily using the numerous options provided, such as die gap, pin height, extra gap from margin, etc. There are also additional ways to create dies, such as “Cutout Dies” and “Extra Dies”.

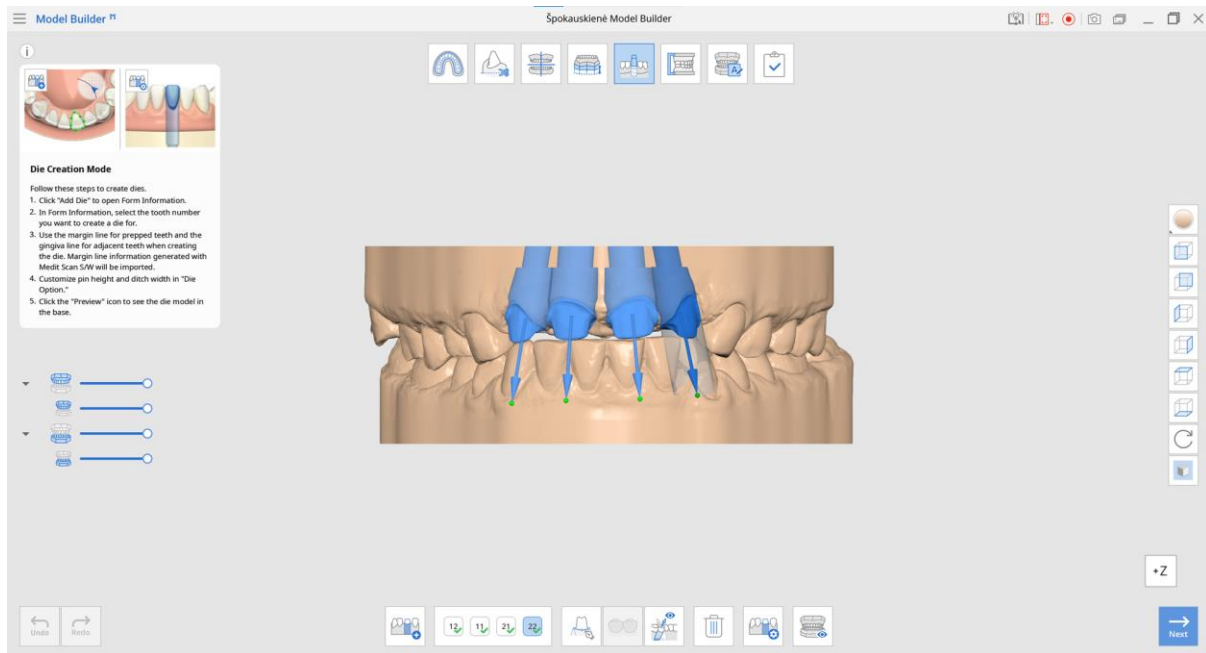


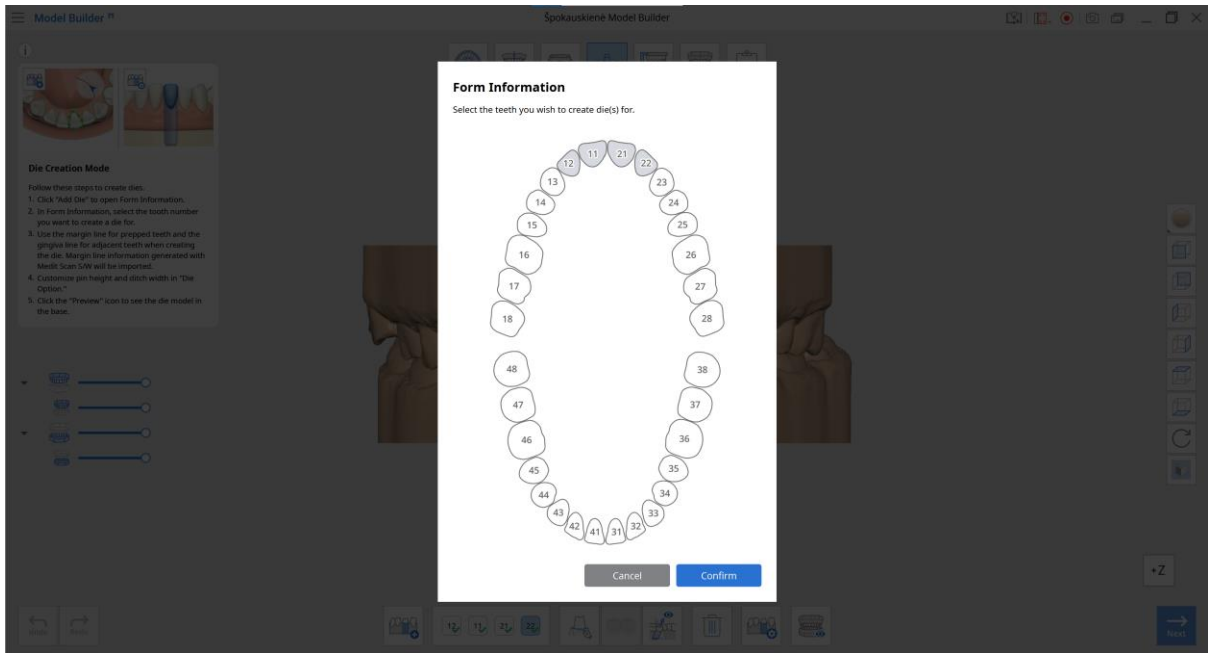
Toolbox

Icon	Tool	Description
	Add Die	Add die to the base.
	Margin Line	Draw the margin line on a prepped tooth.
	Adjacent Teeth Selection	Select the adjacent teeth instead of using margin lines to create the die.
	Set Die Insertion Path from Viewpoint	Adjust and set the die insertion path from your view direction.
	Delete	Delete current die.

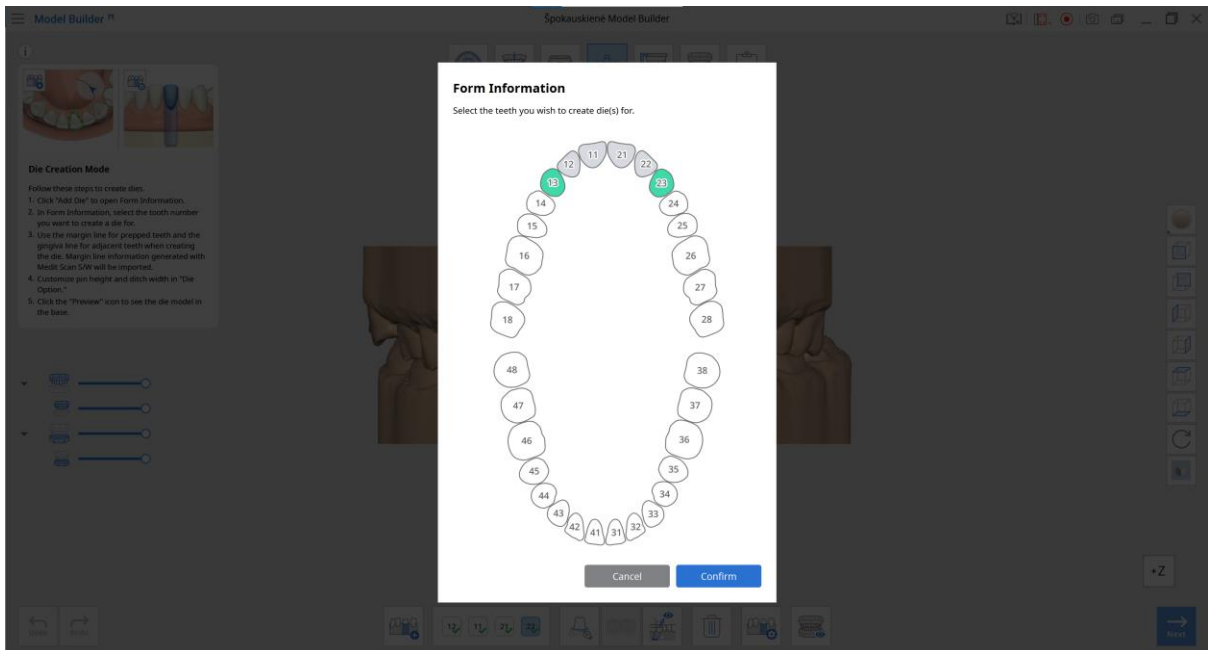
	Cutout Dies	Create dies that are detachable from the base.
	Extra Dies	Create additional dies along with a base with a trimmed margin.
	Die Option	<p>Customize the die.</p>  Save your adjustable options as custom Presets for quick access.
	Preview	Preview the die before moving to the next step.

- ① Form information will be available immediately if you have imported the case from Medit Link. If you want to create individual dies for adjacent teeth, click "Add Die" to open Form Information.

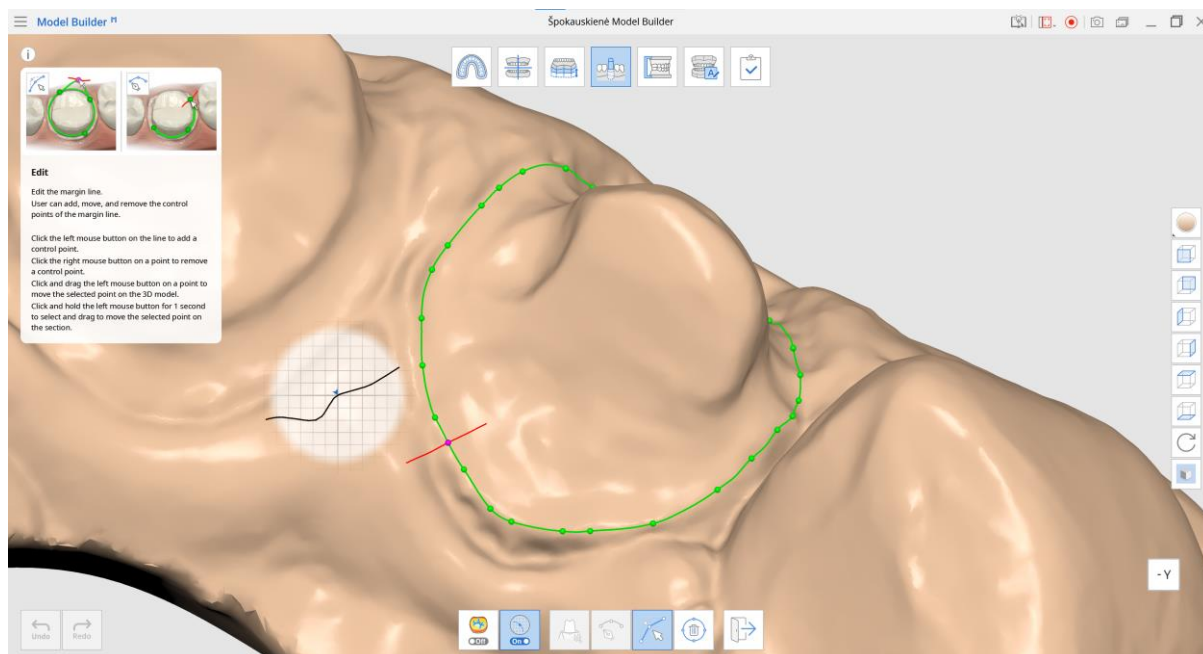











② In Form Information, select the tooth number you want to create a die for.

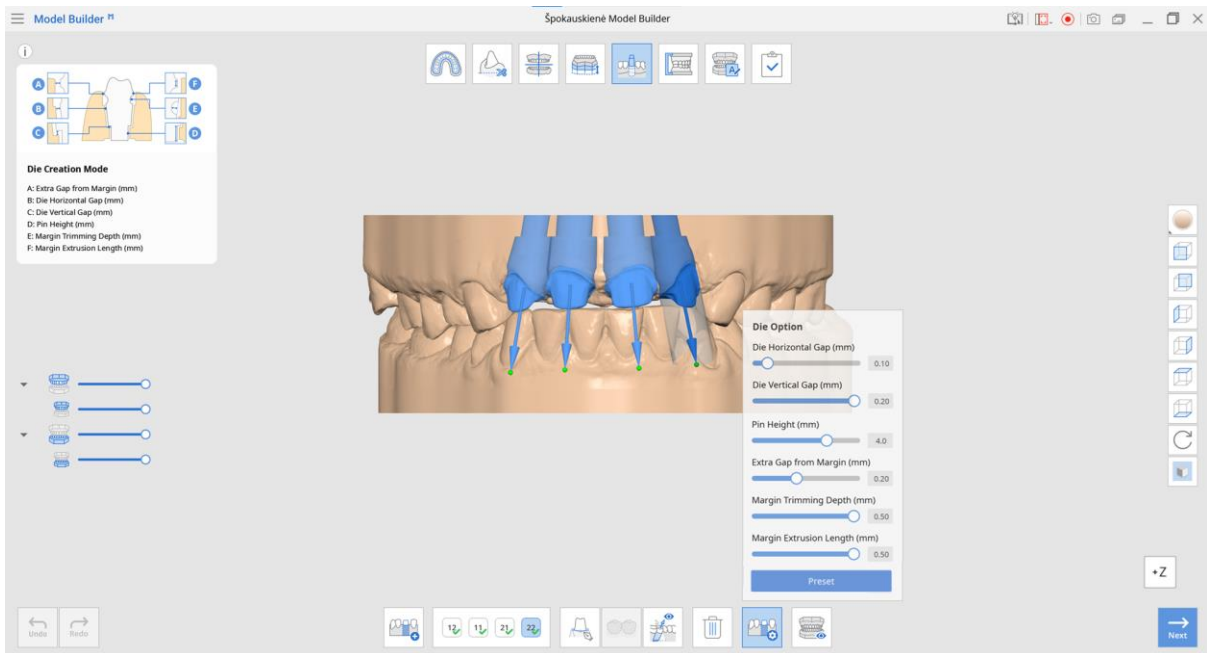


- ③ Use the margin line for prepped teeth and the gingiva line for adjacent teeth when creating the die. Margin line information generated with Medit Scan S/W will be imported.



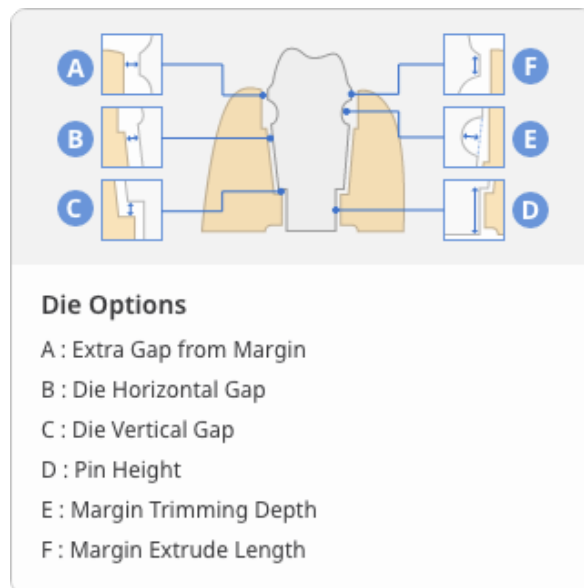
Icon	Tool	Description
	Curvature Display Mode	You can use the toggle to turn the Curvature Display Mode on and off based on your preferences.
	Selection View	You can use the toggle to turn the Selection View on and off based on your preferences.
	Auto Creation	Create a margin line automatically based on the multiple points selected.
	Manual Creation	Draw your own line using the left mouse button to drag and select the points.
	Edit	Edit the points on the margin line using your mouse. Left-click to add points, right-click to delete points.
	Delete	Delete the margin line.
	Exit	Exit and return to Die Creation Mode.

④ Customize the die in “Die Option” using the various parameters provided.



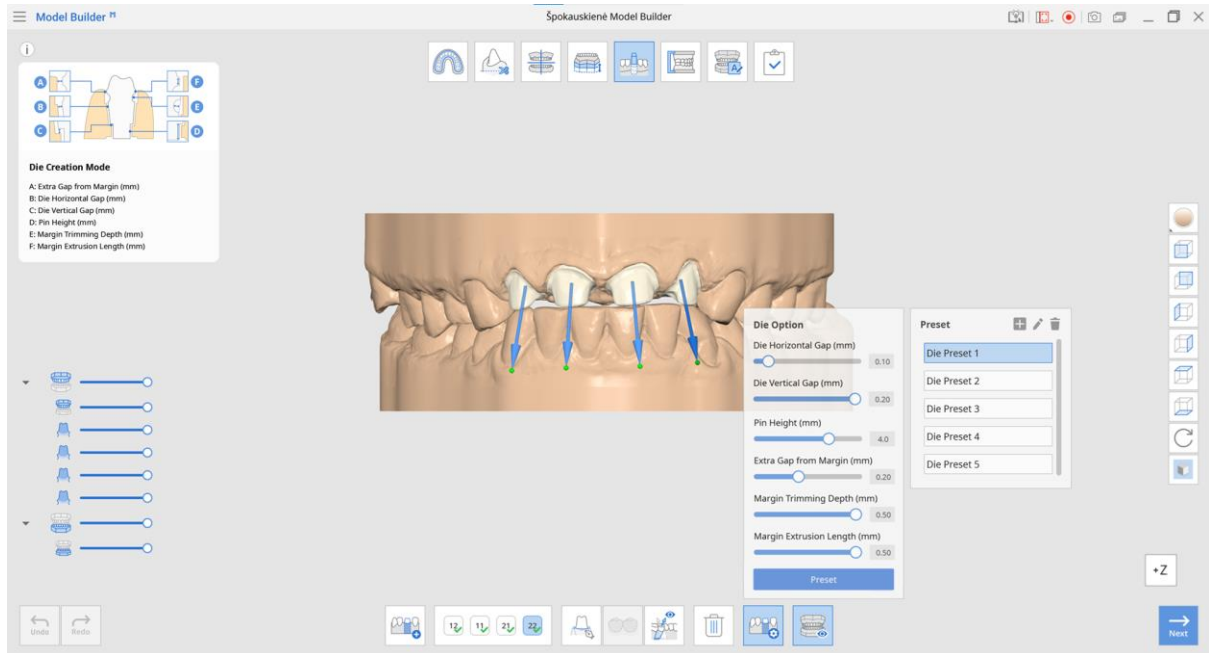
Die Option

Parameter	Explanation
Extra Gap from Margin	Adjust the extra gap space between the margin line and the base.
Die Horizontal Gap	Adjust the horizontal gap between the die and the base.
Die Vertical Gap	Adjust the vertical gap between the die and the base.
Pin Height	Adjust the height of the pin.
Margin Trimming Depth	Specify the additional depth that needs trimming from the margin line.
Margin Extrusion Length	Specify the length of the margin that is extruding.



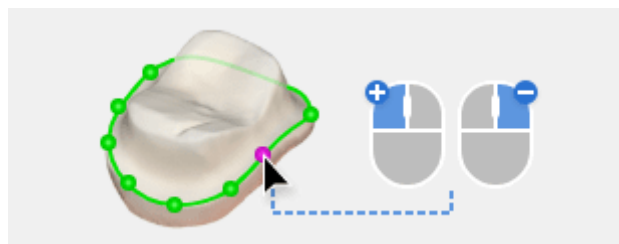
Each of the dies will be saved separately when saving the output files to Medit Link.

- Click the “Preview” icon to see the die model in the base.



4.6.1 Use the Margin Line Imported from Medit Scan for Clinics

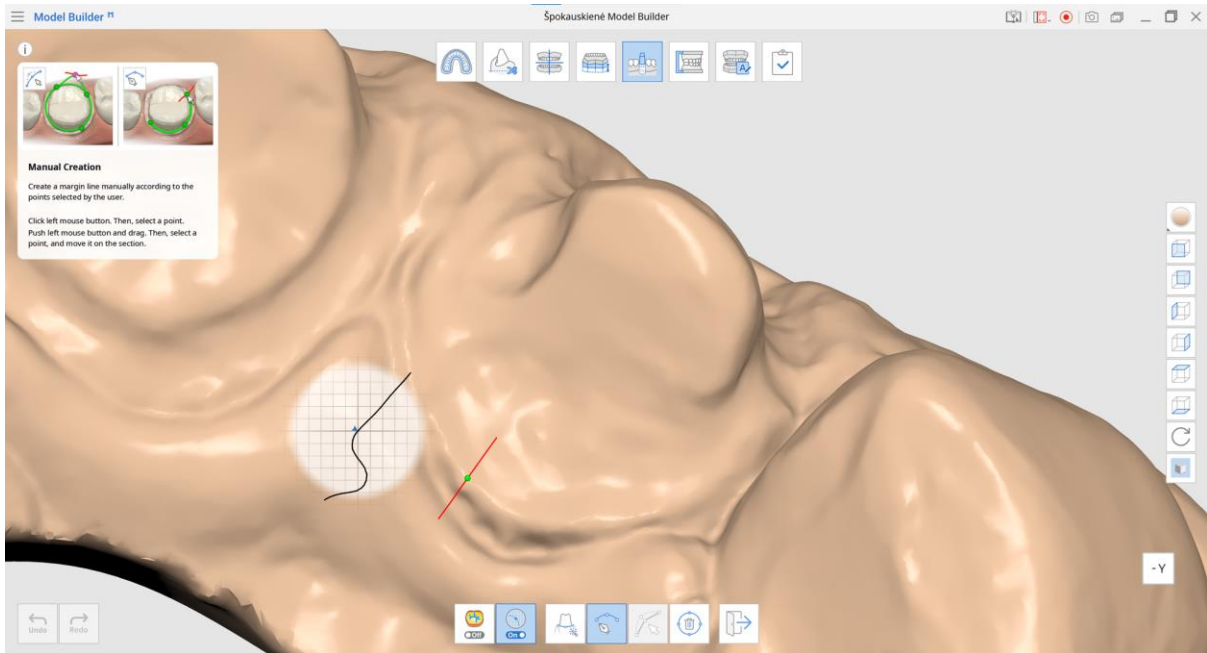
- Once you are in “Die Creation Mode,” dies will be created automatically if you already have a margin line for the prepared teeth in Medit Scan for Clinics. The margin line will be displayed on the scan data straightaway.
- Examine the margin line.
- Add or delete points using your mouse. Left-click to add points, right-click to delete points.



- When completed, click “Next.” You will see restoration ready.

4.6.2 Create a Margin Line in Medit Model Builder

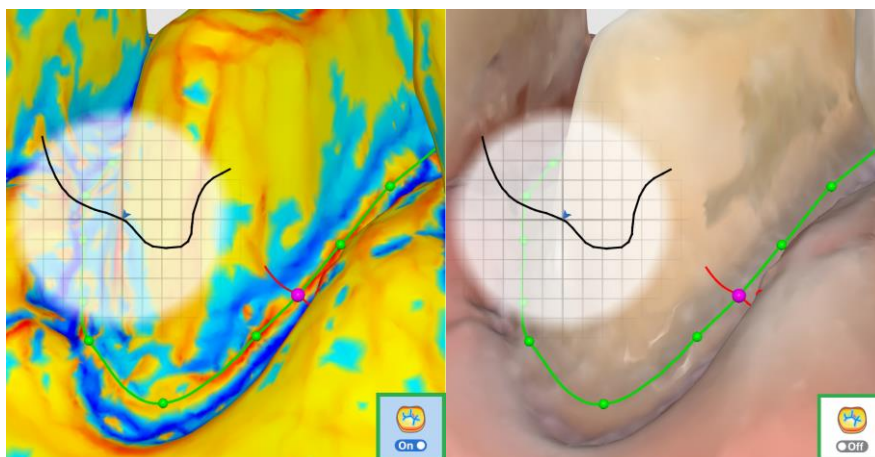
If you have not created a margin line for the prepared tooth in Medit Scan for Clinics, you can draw it manually in Medit Model Builder.



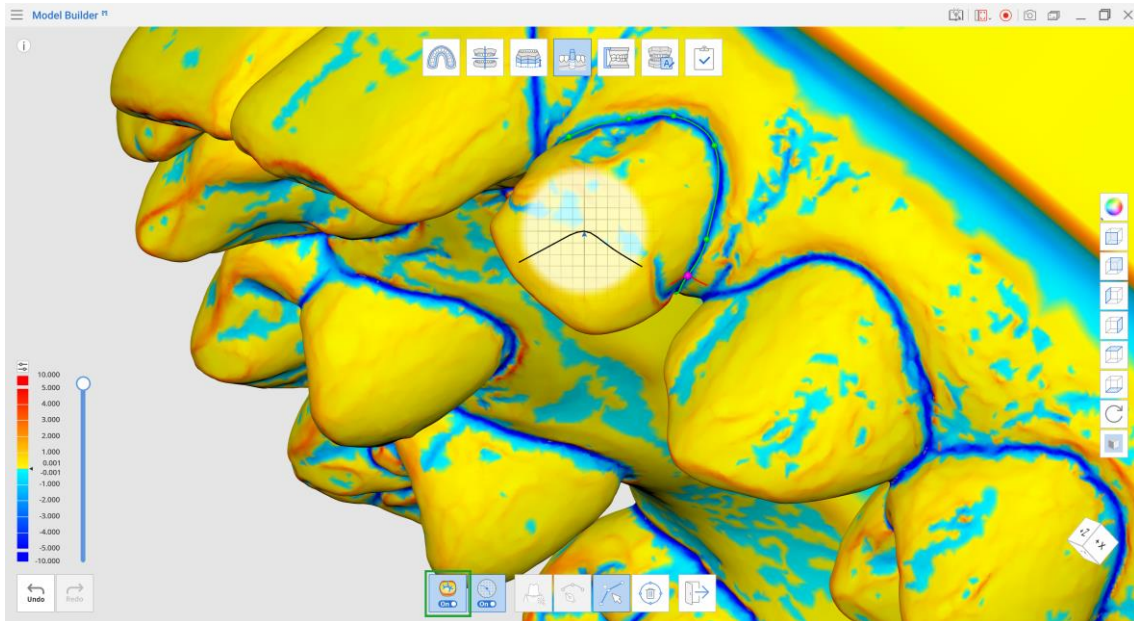
- ① In Die Creation Mode, click “Margin Line” at the bottom of the screen.
- ② You can then choose between “Auto Creation” or “Manual Creation.”
- ③ You can edit or delete the margin line.

View Curvature

Select the area to specify the margin line. Then check the curvature by turning on the function at the bottom of the screen. The surface curvature of the scan data is displayed in various colors.

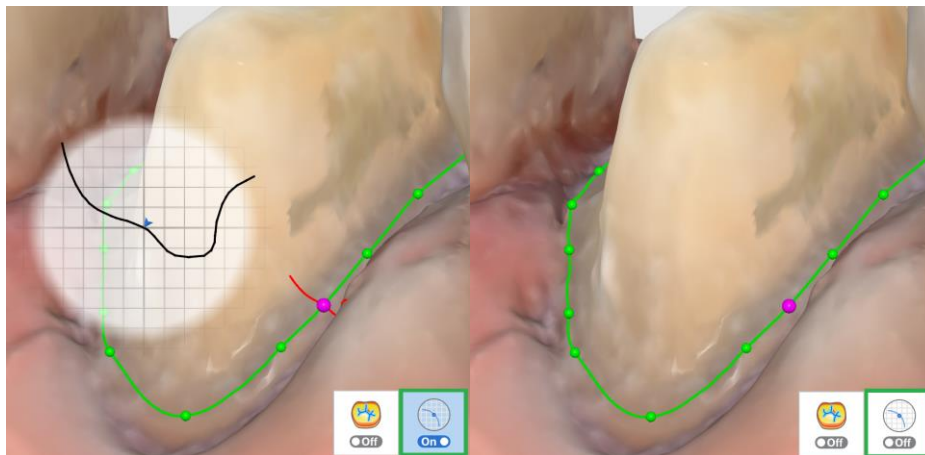


If the color is redder, it is more embossed and if the color is bluer, it is more engraved. You can use the color expression interval slider to adjust the color radius.



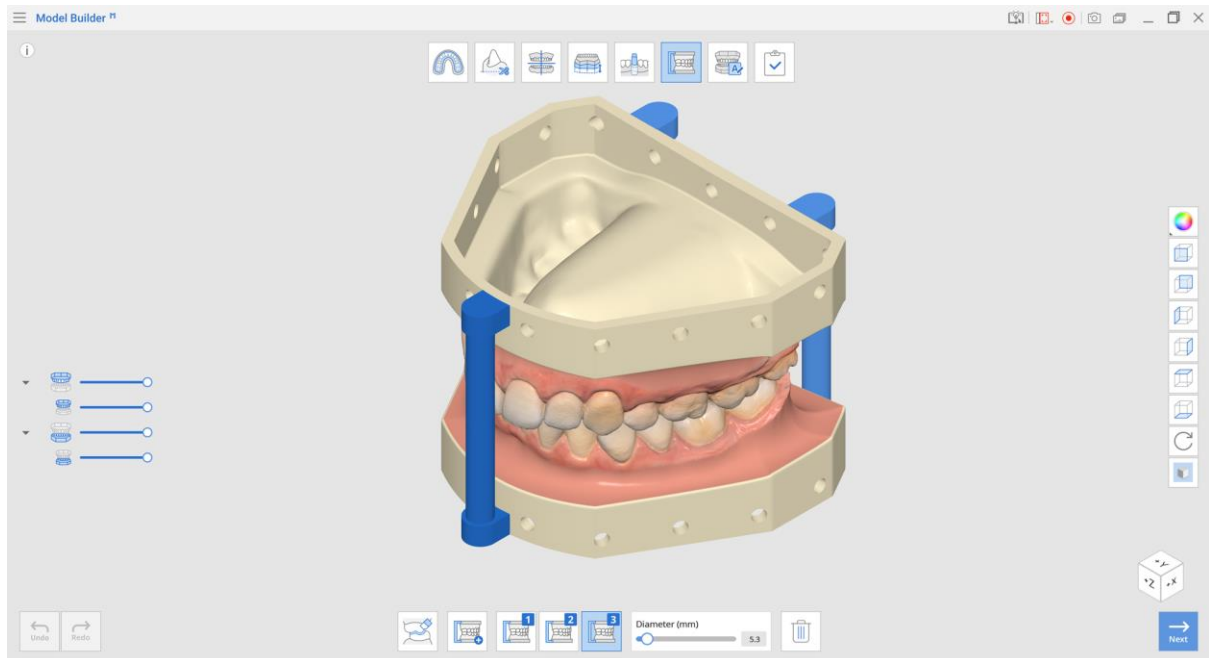
View Cross Section

When creating or editing the margin line, this feature shows you the cross-sectional display based on your mouse location; this feature can be turned on and off. It prevents any areas being hidden when zoomed in closely and allows you to check the magnified margin more carefully.



4.7 Articulator Mode

When entering the Articulator Mode, the program will automatically attach three of them to the model. Articulators are needed to fix the model in a static position. It is also a useful tool that allows you to check the occlusion of the model.











Notice that to use this function, you need to be working on a case with both arches.



You can attach up to 5 articulators to the model in total.

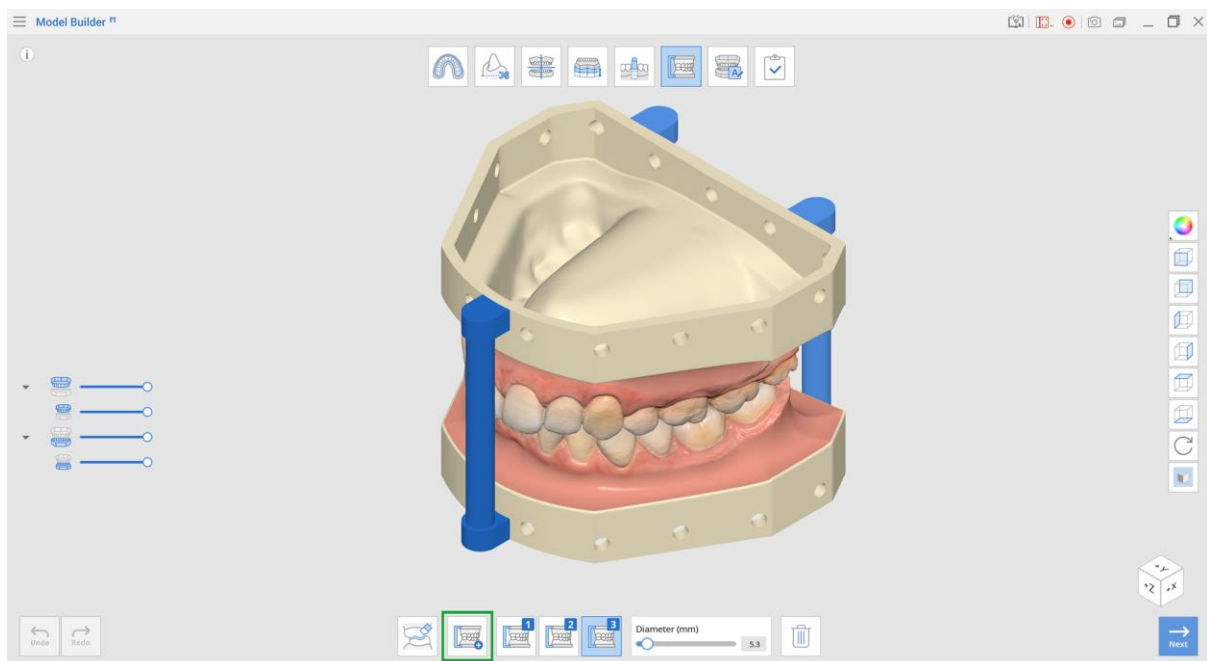
Toolbox

Icon	Tool	Description
	Removing Overlapping Areas	Select the overlapping data you wish to remove.
	Attach Articulator	Attach an articulator to the model. Click and hold the articulator to move it.
	Manage Articulator #1	Manage articulator #1.

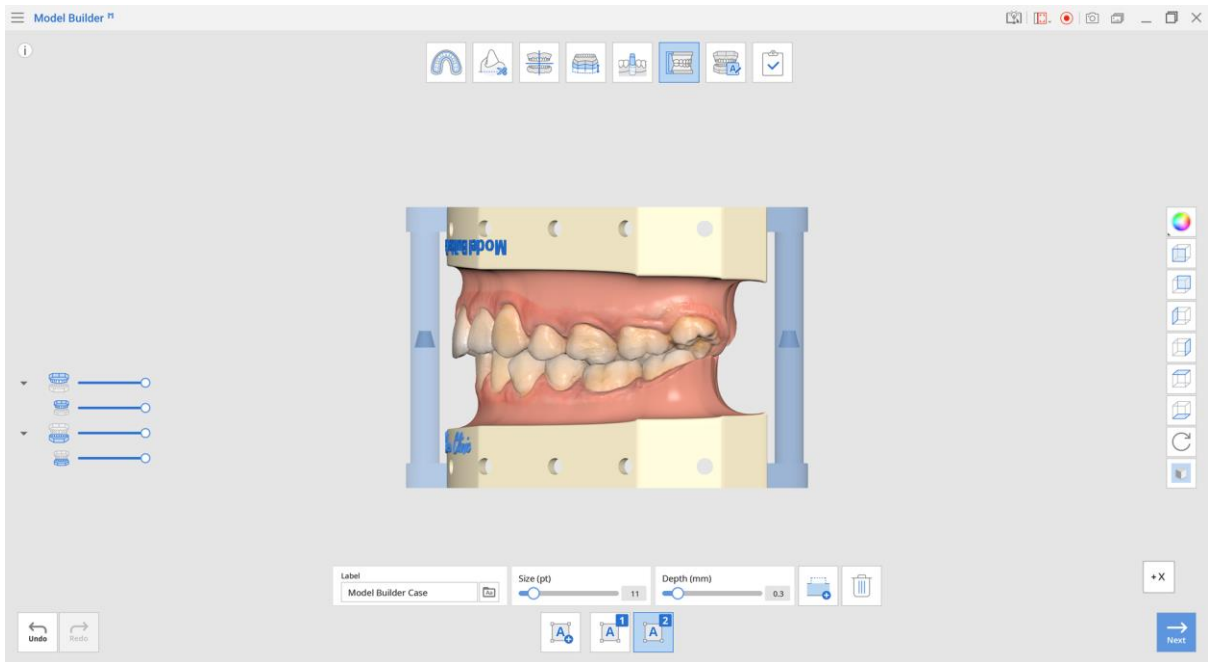
	Manage Articulator #2	Manage articulator #2.
	Manage Articulator #3	Manage articulator #3.
	Diameter (mm)	Adjust the diameter of the articulator.  The range of the diameter: 5 – 10 mm.
	Delete	Delete current articulator.


③ Check the placement of the automatically attached articulators.

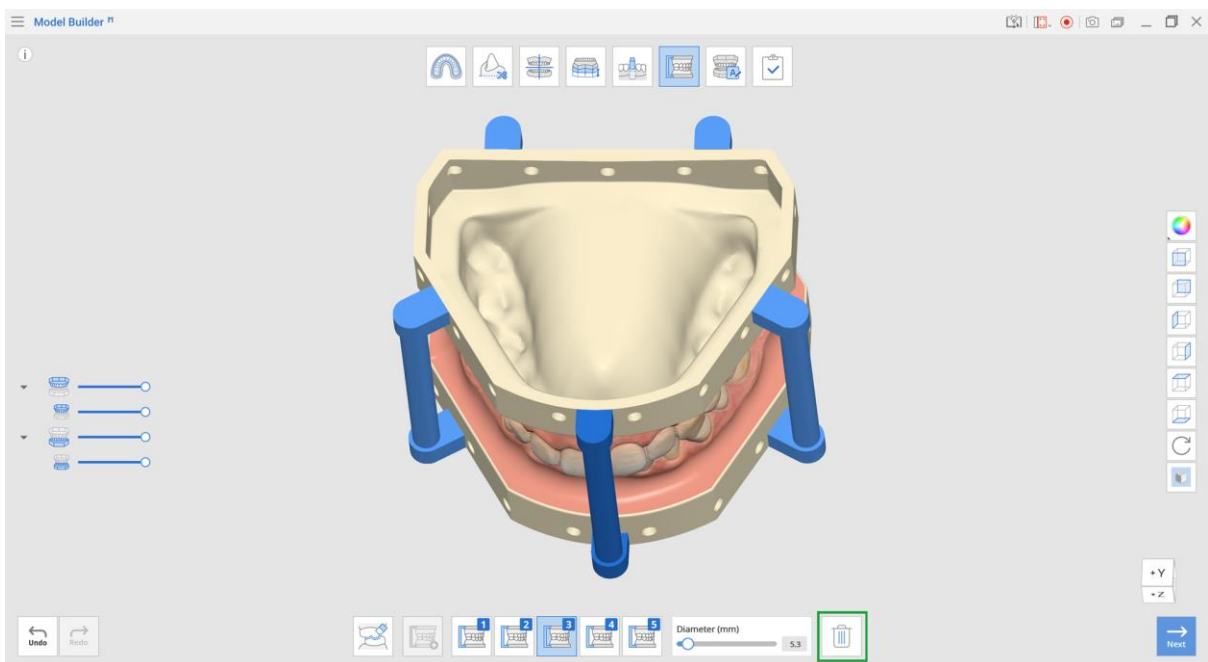
④ Add more, if needed, by clicking the “Attach Articulator”  button (up to 5 of them can be attached in total).




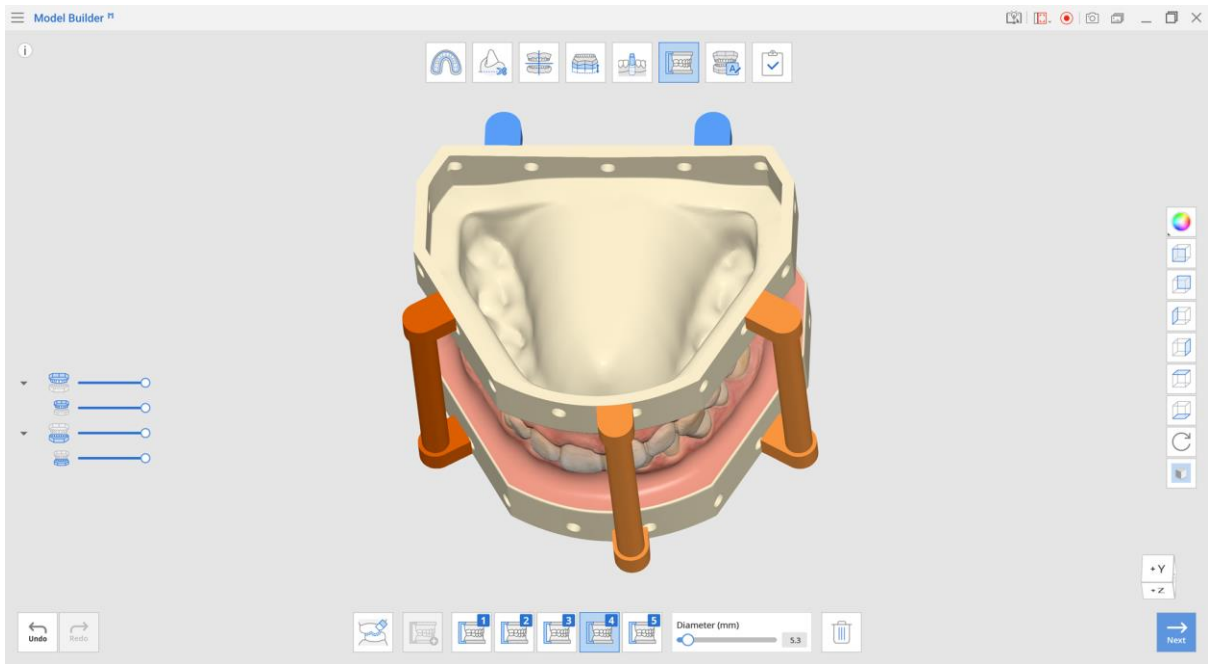
The inner structure of the articulator allows for easy 3D printing.



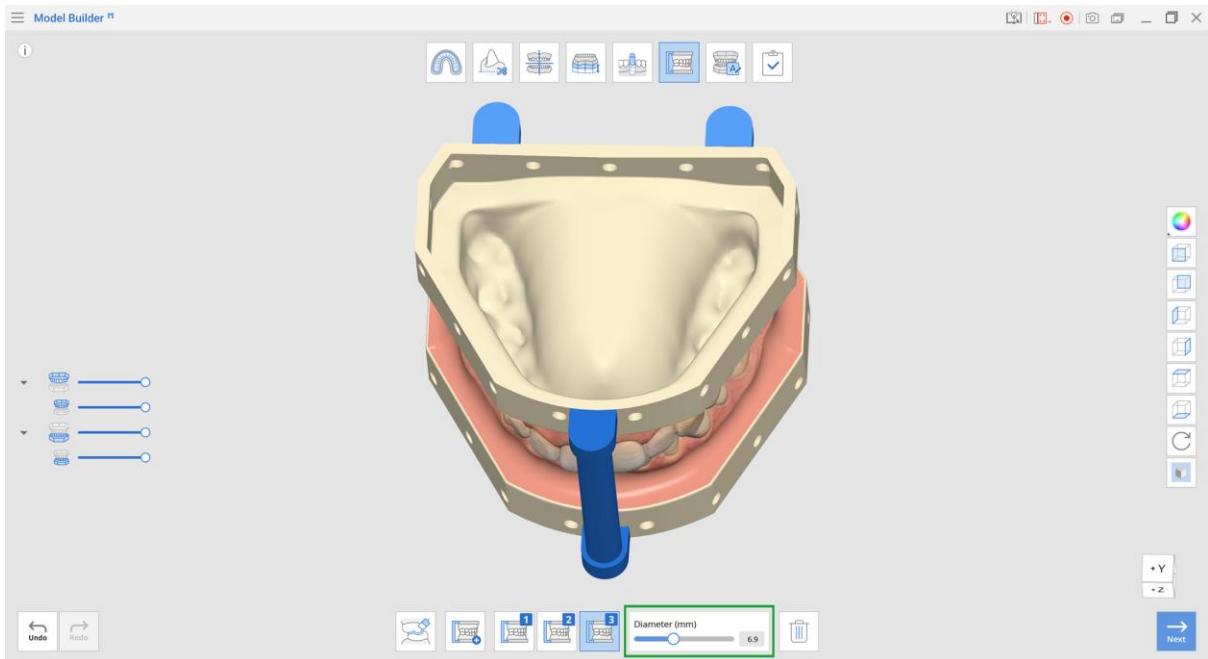
⑤ Click and hold the articulator to adjust its position. Delete it by clicking “Delete” .



 The positions in which articulator placement is not optimal will be displayed in orange: their position might be coinciding with the drain holes. Move it around until it becomes blue again.



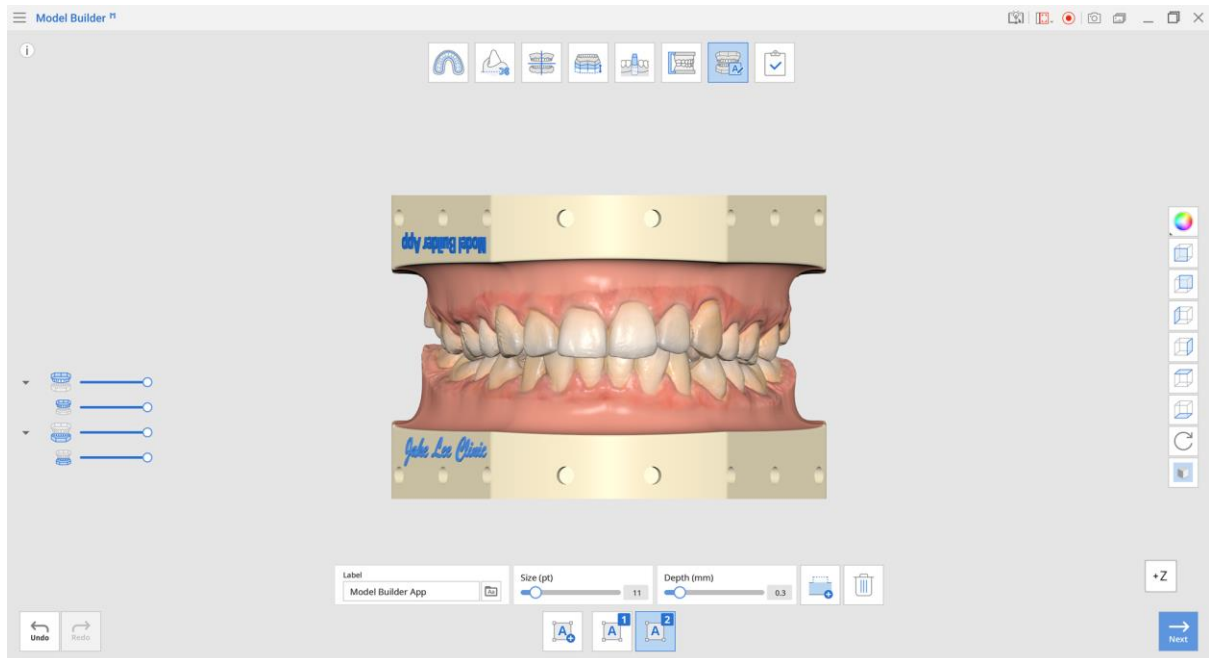
⑥ Use the “Diameter” slider to change their thickness.







⑦ Click “Next” when finished.

4.8 Labeling Mode

Labeling Mode presents a useful toolbox of functions to label the model. There will be labels automatically attached to each arch.



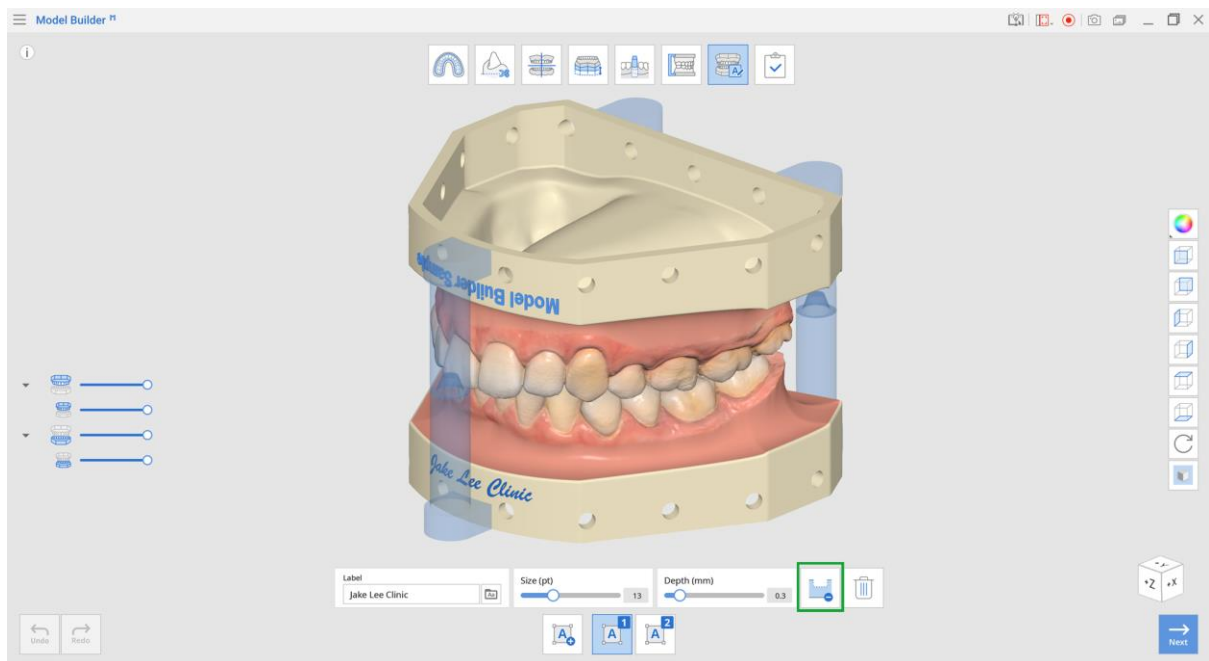
Toolbox

Icon	Tool	Description
Manage Labels		
	Add Label	Add a label to the base.
	Manage Label #1	Manage label #1.
	Manage Label #2	Manage label #2.
Tools		
<p>Label</p> <div style="border: 1px solid gray; padding: 2px; width: fit-content;">Model Builder Sample's Case</div>	Label	<p>Enter the text to appear on the label.</p>  <p>You can change the default label text in the program settings.</p>
	Font	Choose a font for the label from the list.
<p>Size</p> <div style="display: flex; align-items: center;"> <div style="flex-grow: 1; border: 1px solid gray; position: relative;"> <div style="position: absolute; left: 0; top: 50%; transform: translateY(-50%); border: 1px solid blue; border-radius: 50%; width: 15px; height: 15px; background-color: blue;"></div> <div style="position: absolute; right: 0; top: 50%; transform: translateY(-50%); border: 1px solid gray; padding: 2px;">12</div> </div> </div>	Size	Set the size for the labels.
	Embossing/Engraving (Engraving)	Label the model by engraving.
	Embossing/Engraving (Embossing)	Label the model by embossing.
	Delete	Delete current label.

- 1 Check the placement of the automatically attached labels. If any part of them is displayed in orange, adjust until it becomes blue again.



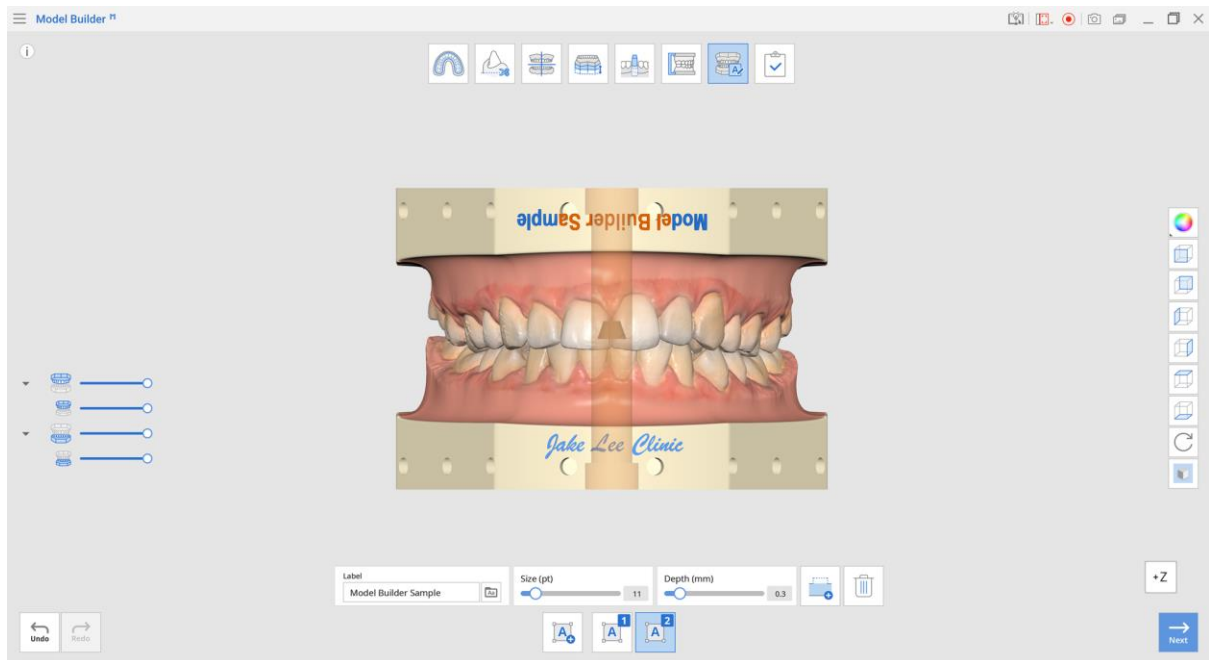
Add labels to the model by embossing or engraving.



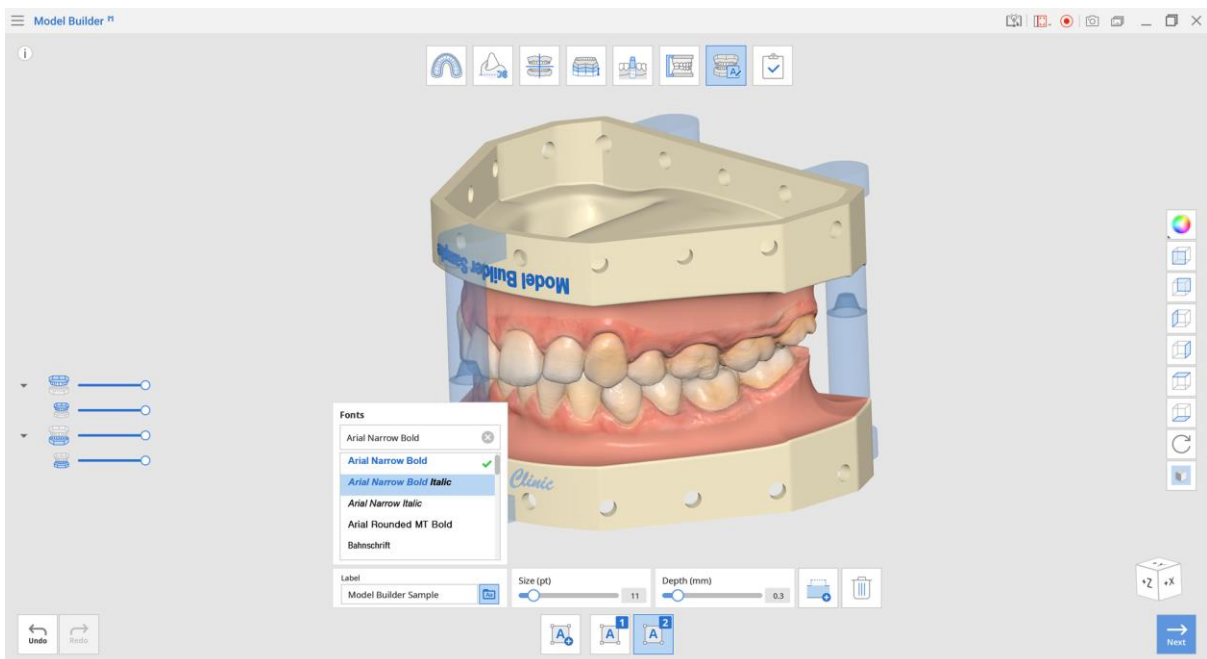
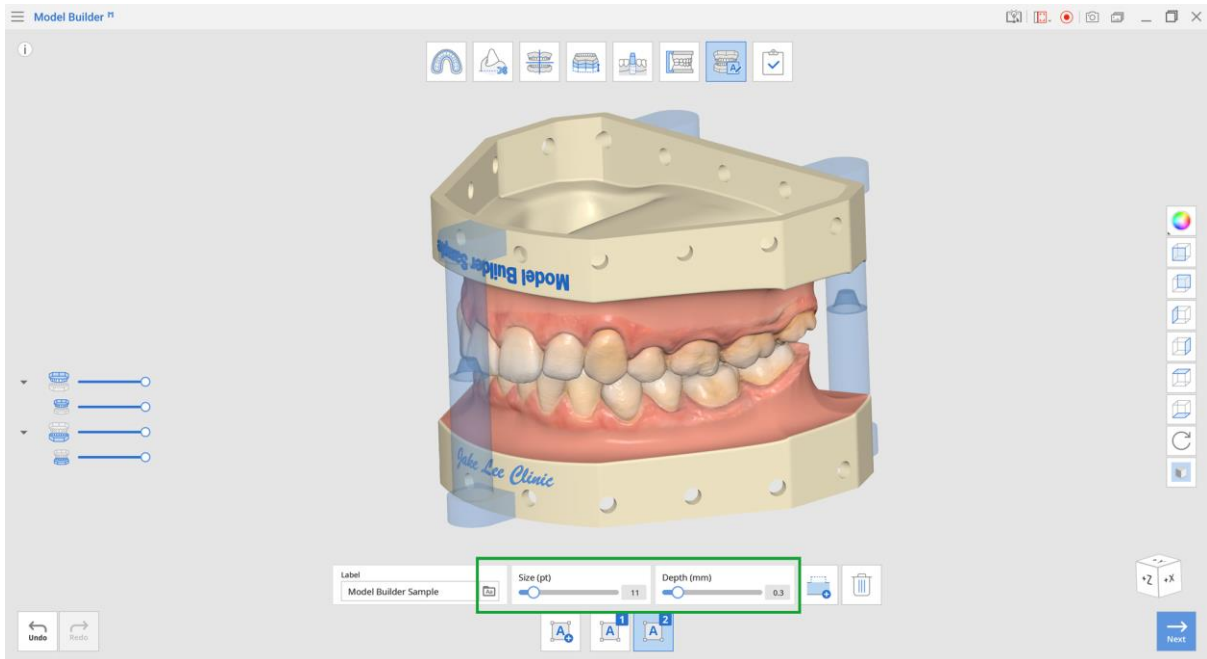
- ② Add more, if needed, by clicking the “Add Label” button (up to 6 of them can be attached in total).
- ③ Click and hold the label to adjust its position. Delete by clicking “Delete.”



In case the label and the articulator share the exact location on the model, they will be displayed in orange. Move the text around or go back to Articulator Mode to adjust the position of the articulators.



- ④ Click on each label to adjust its size and font.



- ⑧ Click "Next" when finished.

4.9 Complete

Once you finish the model creation process, click the last icon on top of the screen to save the results to your Medit Link case.

- ① Choose the file name and click the “Save” button.

Save As

Project File Name

Cancel Save

- ② Check the data in your Medit Link case.

