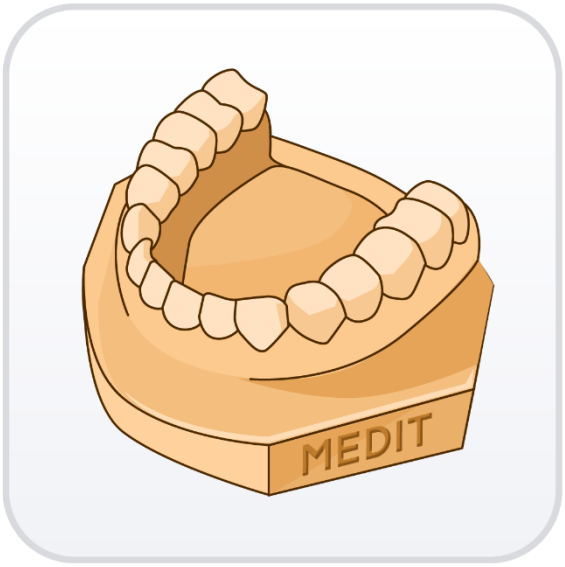
Model Builder



Revision 1 (07.2021)

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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. Its intuitive workflow equips users with various tools to create a base, attach articulators to check the occlusion, and label it before 3D printing. The base comes in three different types: ABO, Plate, and Plateless. With various adjustable parameters for all of 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

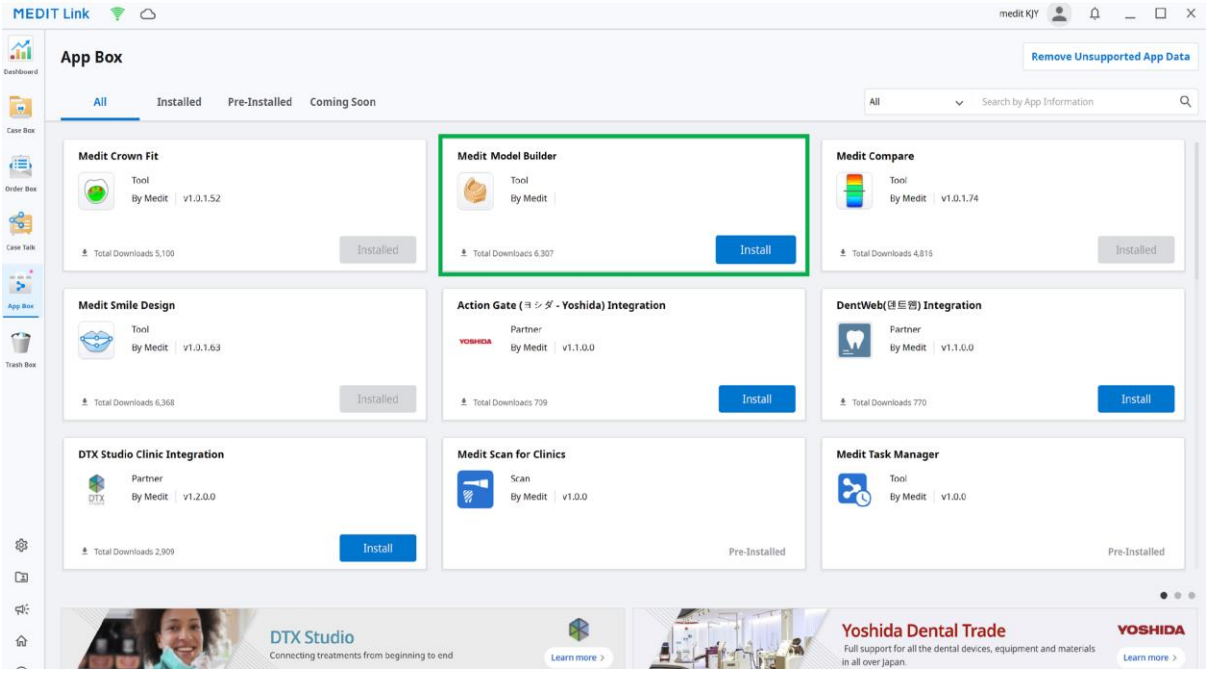
Medit Model Builder is a software application designed solely for the purpose of creating a model made of scan data and cannot be used for other purposes.

1.3 Recommended System Requirements

	Laptop	Desktop
CPU	Intel Core i7-8750H/9750H AMD Ryzen 7 4800H	Intel Core i7-8700K/9700K
RAM	16 GB	
Graphics	NVIDIA GeForce GTX 1060 6 GB	
OS	Windows 10 Pro 64-bit	

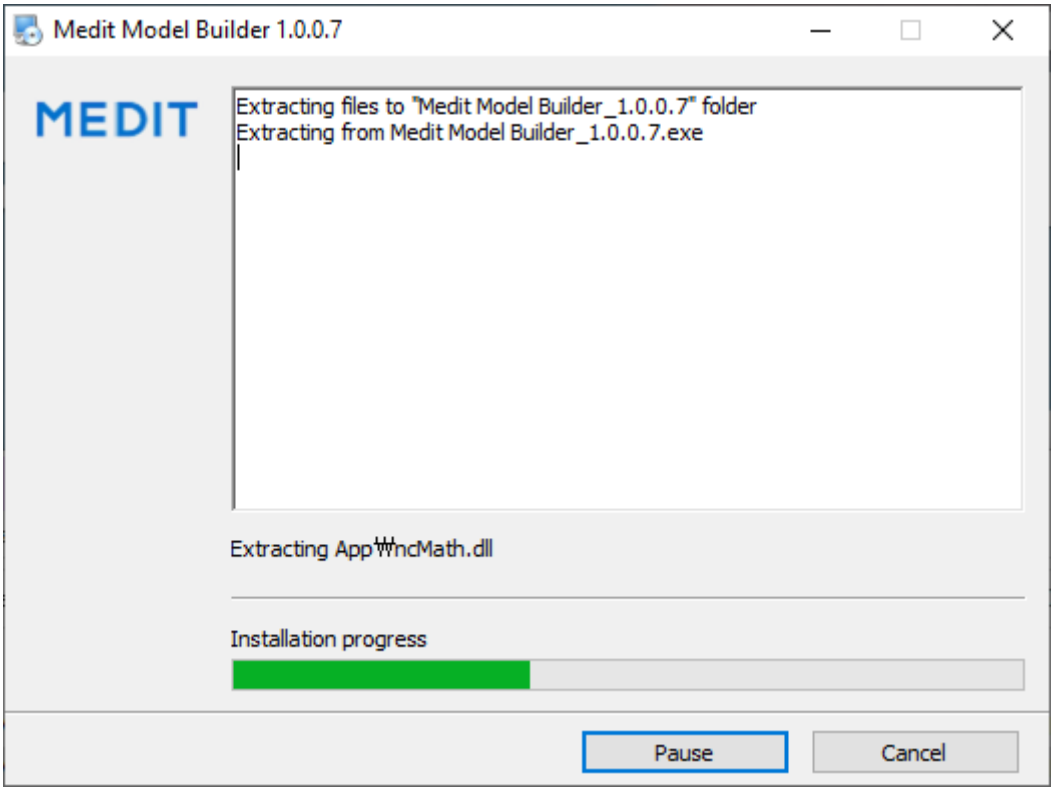
1.4 Installation Guide

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

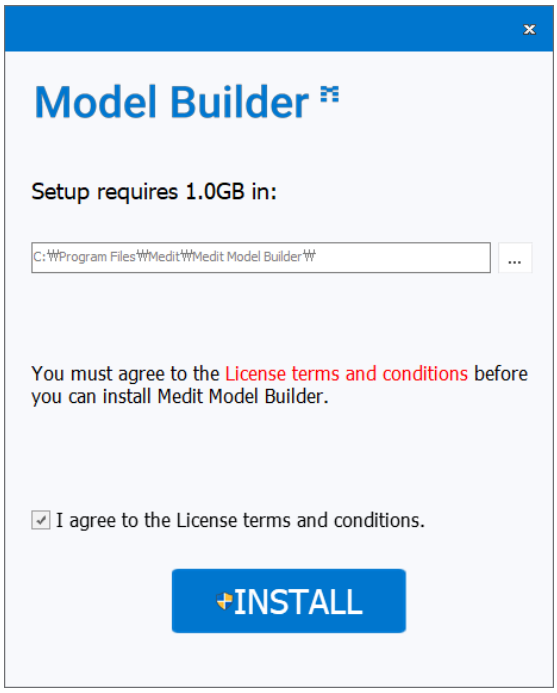


② Find the **“Medit Model Builder”** App and click on the **“Install”** button.

③ Once the download is complete, the Medit Model Builder installer will be run automatically.

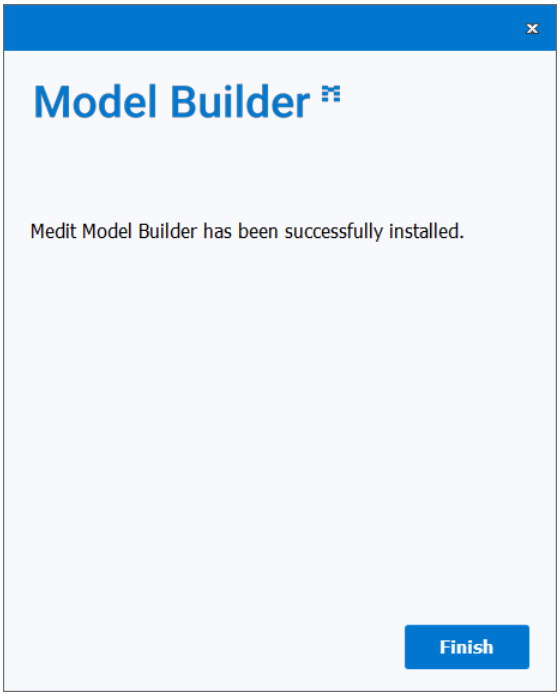


④ Read and agree to the License Terms and Conditions.



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

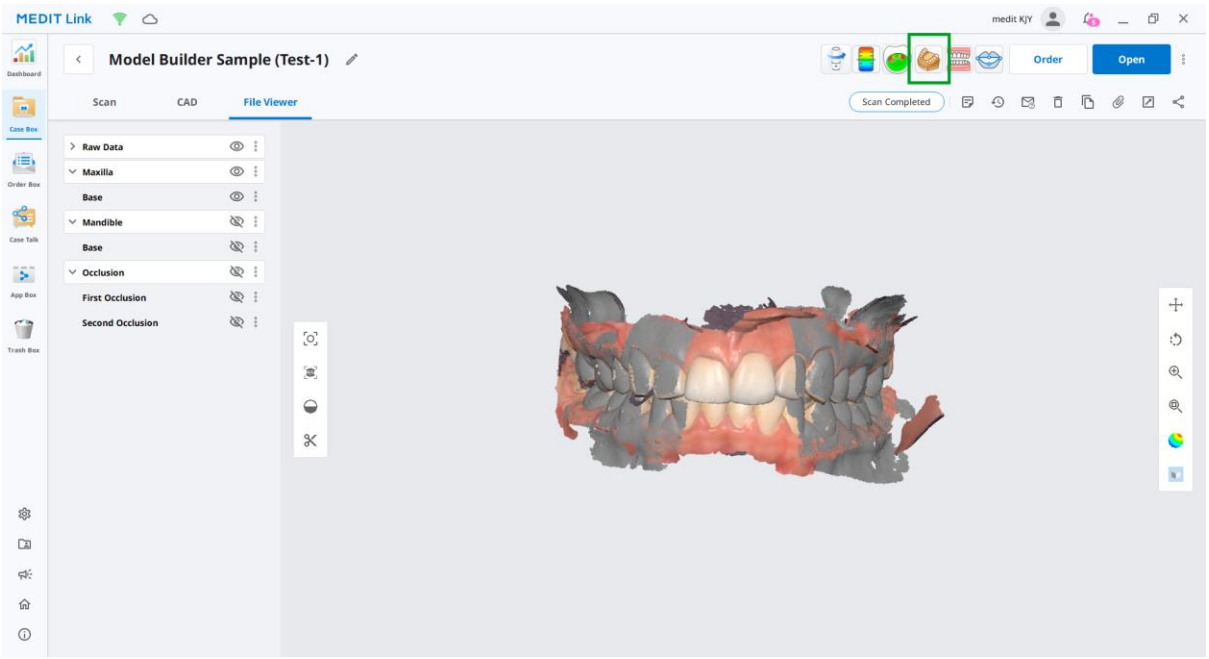
Models can be created for single arches, as well for both.

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 Model Builder.

② Press the **"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 relaunch Medit Link.

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



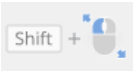
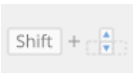
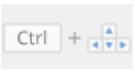
Medit Model Builder Project file will be saved to Medit Link Case upon completion alongside the digital model files.

2.3 3D Data Control

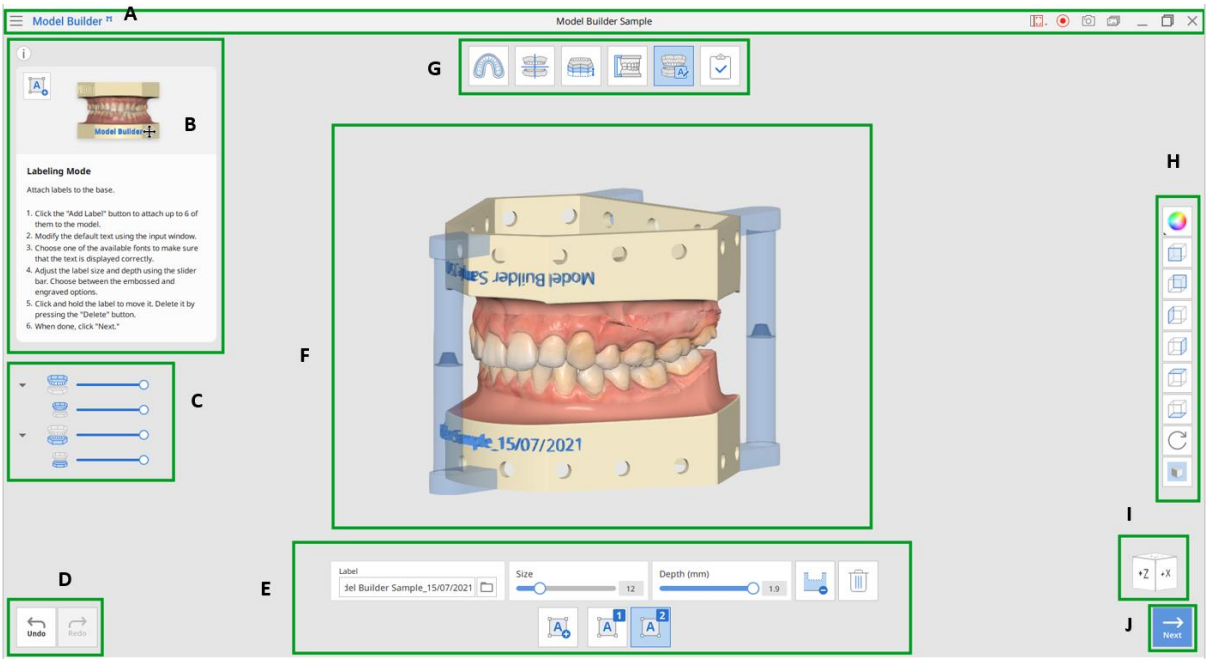
3D data control using the mouse:

Button	Action	Use	Image
Wheel	Drag	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 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 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.
	Show/Hide Arch Line	See the top view.

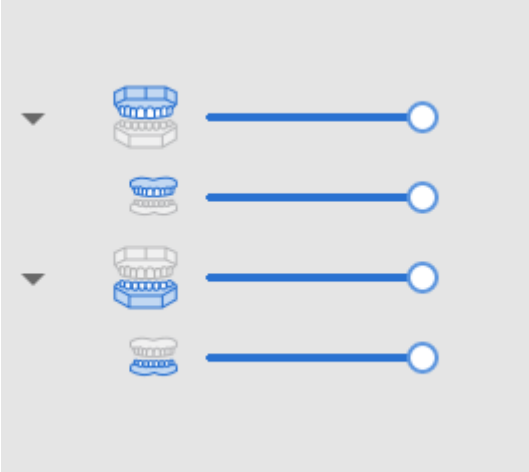
	Scenario Comparison Mode	See the bottom view.
	Rotate	Rotate data in any direction.
	Grid Settings	Set grid display options. It shows or hides the grid and control its position in relation to the model (overlay on/off).

➢

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

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

Icon	Tool	Description
		Undo/Redo
	Undo	Undo previous action.
	Redo	Redo previous action.
		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:

Mark teeth on scan data	→	Align data to occlusal plane	→	Choose base type and adjust its parameters	→	Adjust articulators	→	Label the model	→	Save

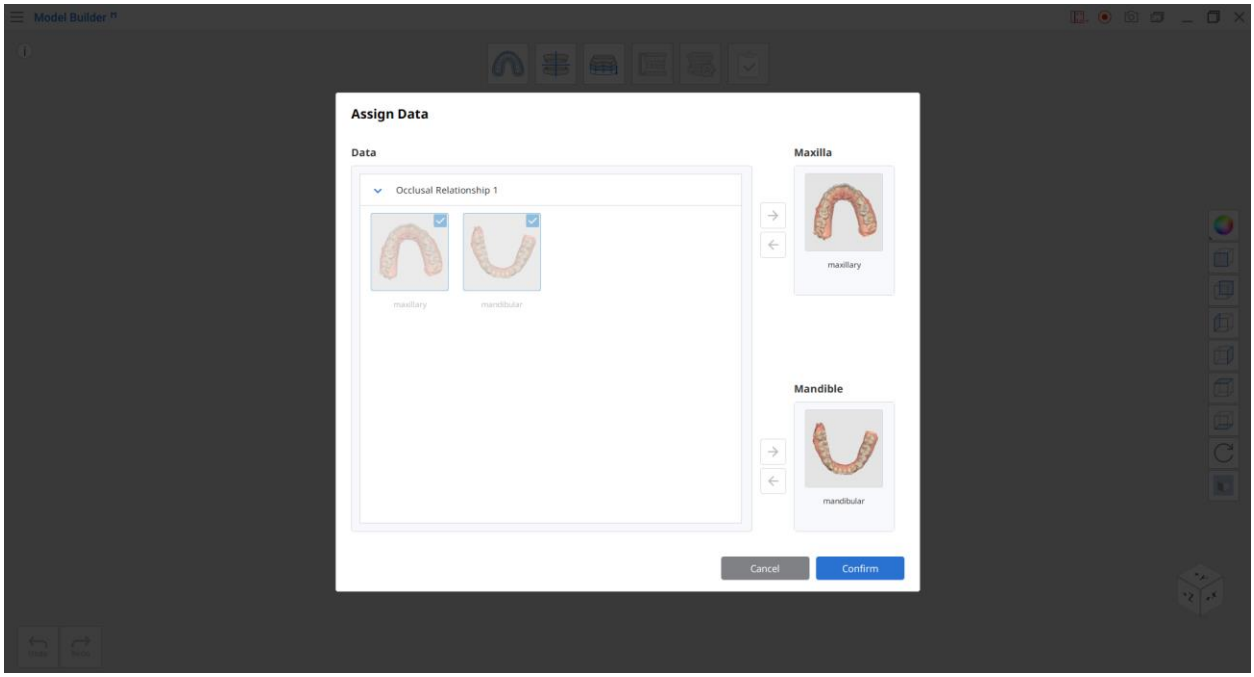
Modes

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.
	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.

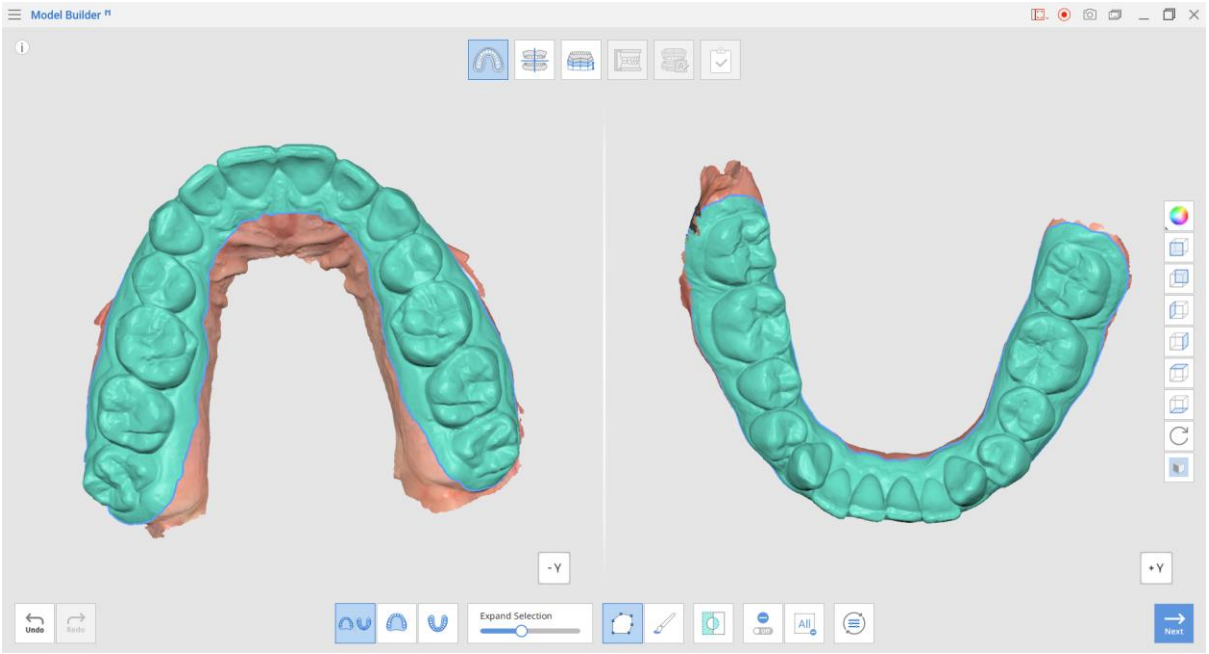
① Assign the data as maxilla and mandible.



② Click the first icon at the top  (**Area Designation mode**) to start creating the model.

4.2 Area Designation Mode

Upon entering the **Area Designation mode**, the teeth on the scan data are selected automatically to mark the area that will be utilized for creating the model.

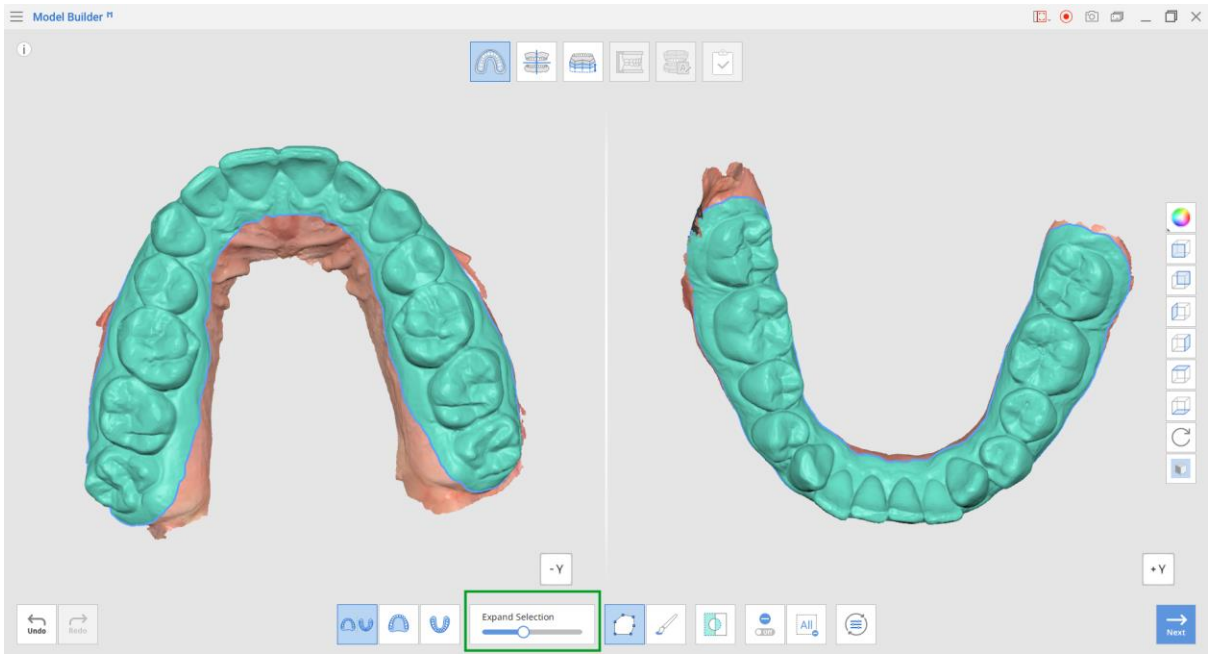


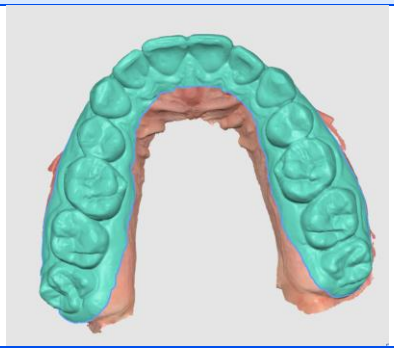
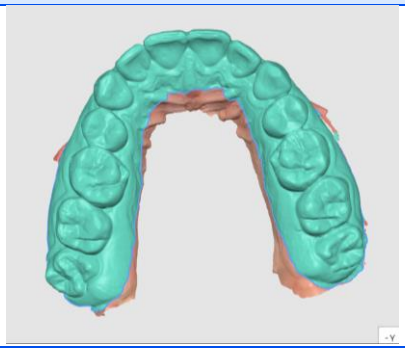
Toolbox

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.

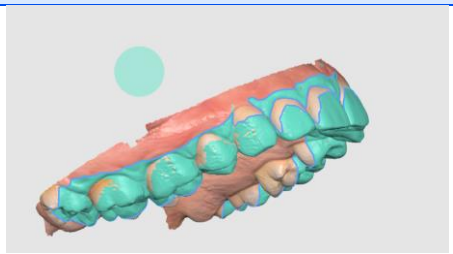
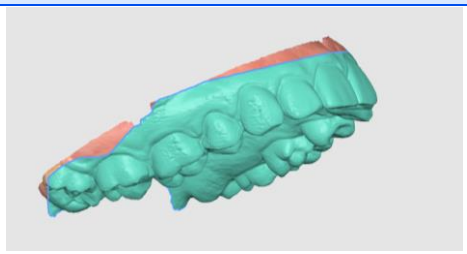
	Deselection Mode	When on, this function deselects the area using various tools.
	Clear All Selection	Clear all selected area.
	Reset	Undo all the actions done in this mode and restore all elements to their original position.

① If needed, adjust the area by moving the **"Expand Selection"** slider at the bottom of the screen.



Before expanding selection	After expanding selection
	

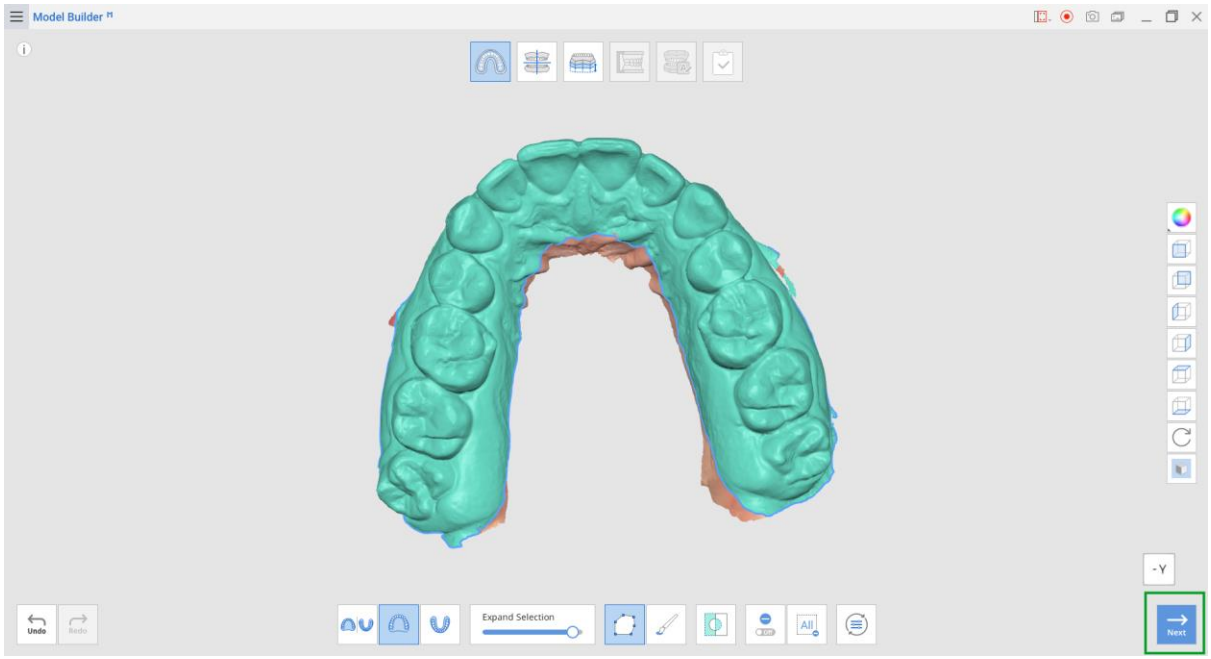
In case the automatic selection does not work, utilize other data selection tools. **“Polyline Selection”** is useful to select not just the front face of the data, but all the way through it.

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.

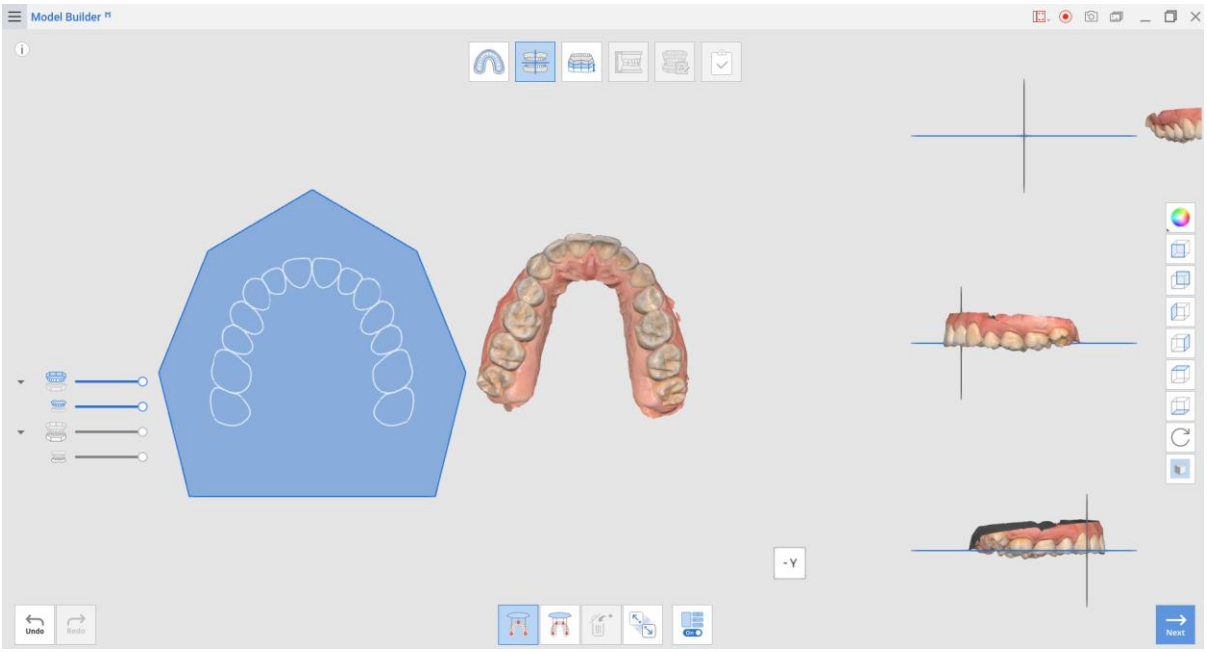
② If you are working on creating a model for both arches, adjust the selected area on each of them, leveraging the Split View.

③ When done, click **"Next."**

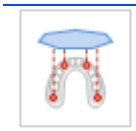


4.3 Alignment Mode

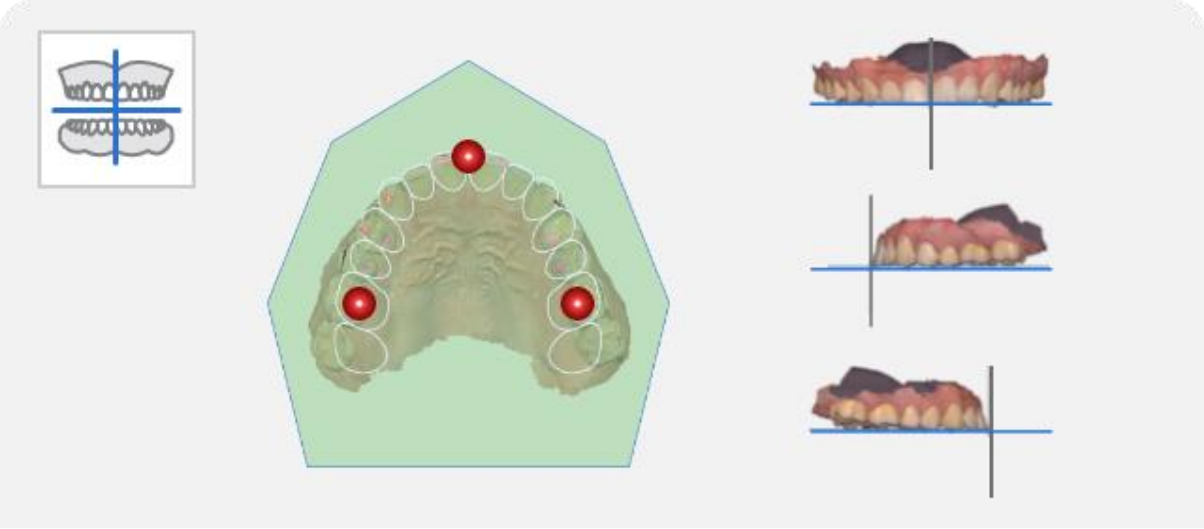
To properly place the data on the base, align it with the virtual occlusal plane.
If the alignment has already been done in Scan for Clinics or Scan for Labs, in general, you can skip this step. However, we recommend checking the alignment to ensure proper positioning of the data on the base.



Toolbox

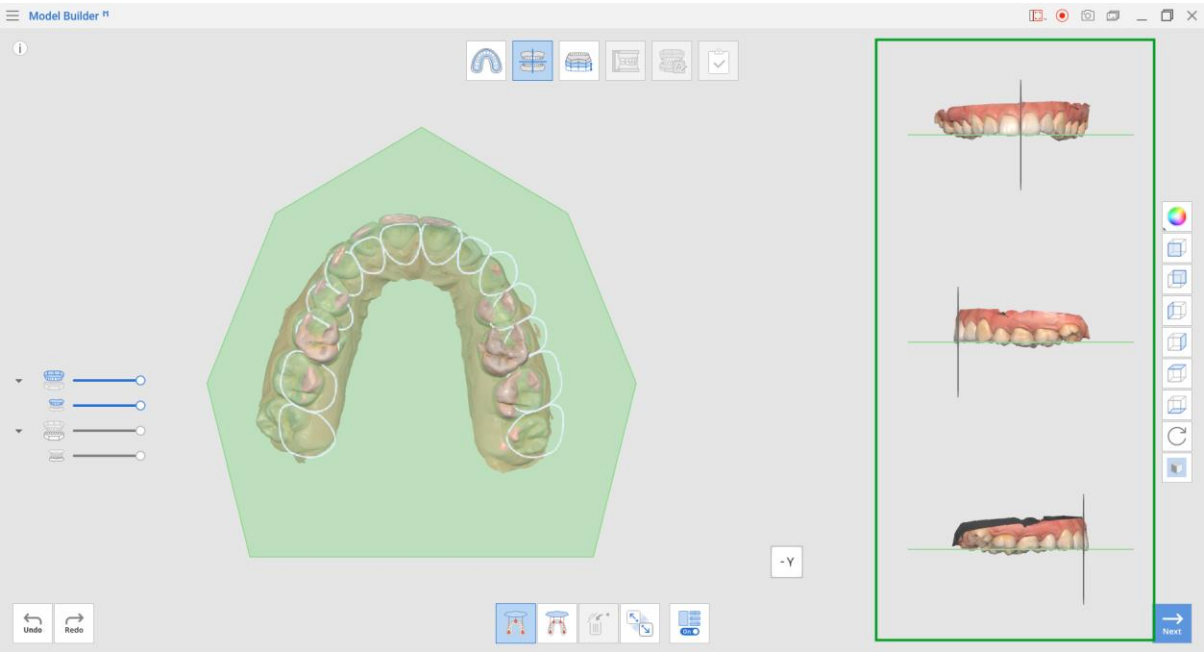
Icon	Tool	Description
	Align with Occlusal Plane by Three Points	Select three points on the maxilla or mandible to align with the occlusal plane.
	Align with Occlusal Plane by Four Points	Select four points on the maxilla or mandible to align with the occlusal plane. It is beneficial when there are no 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.



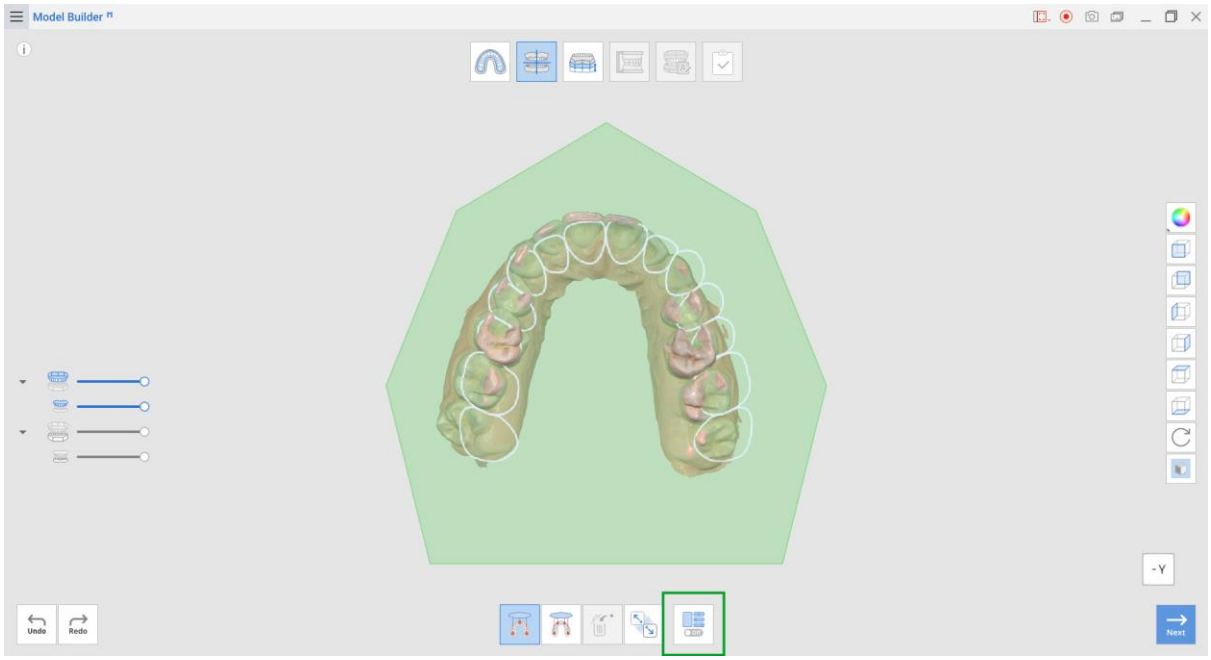
If there are no anterior teeth, select four points on the corresponding teeth on both sides after clicking the  button at the bottom of the screen.

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

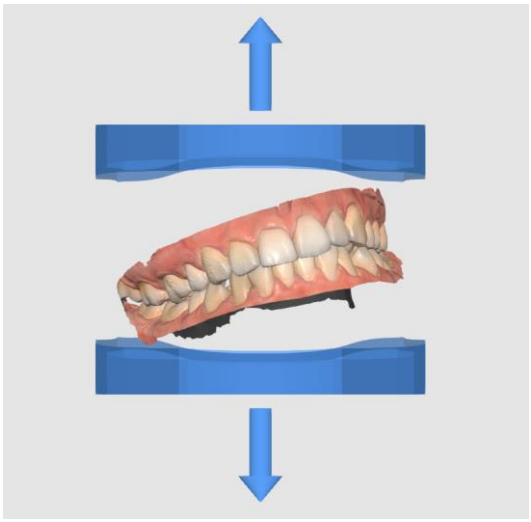


Utilize the Cube View at the bottom of each view to better orient in the 3D environment.

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



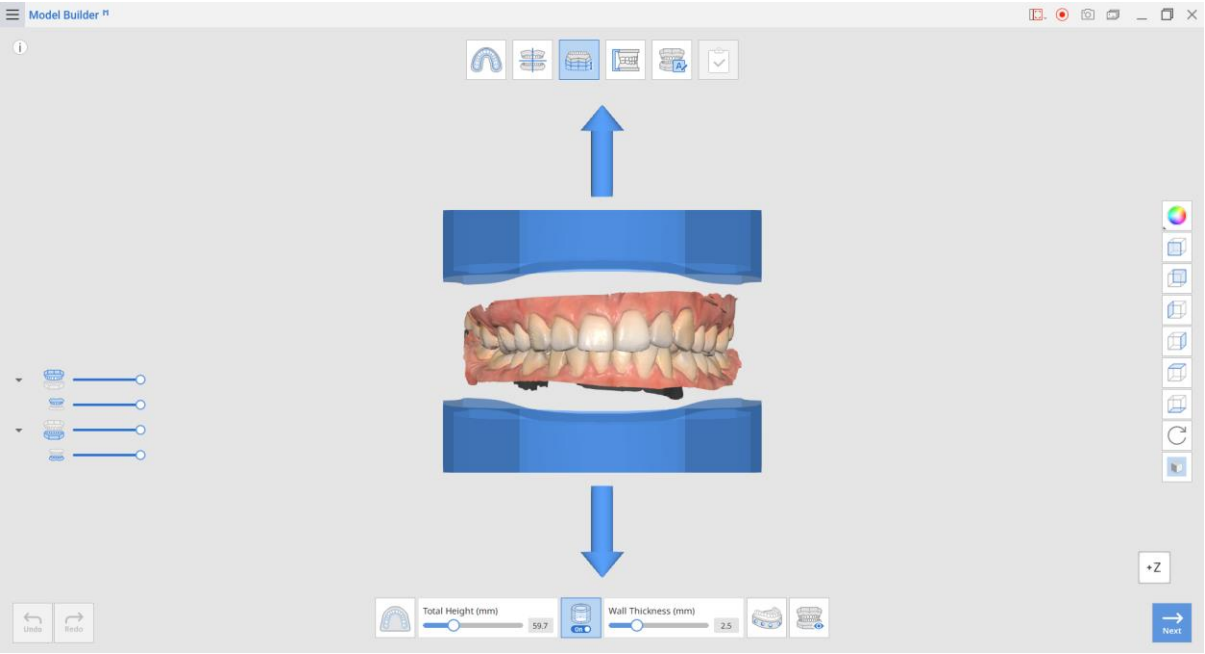
In case the model is misaligned, base might not be created correctly, as shown below.



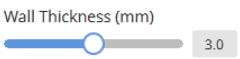
④ When done, click **"Next."**

4.4 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.

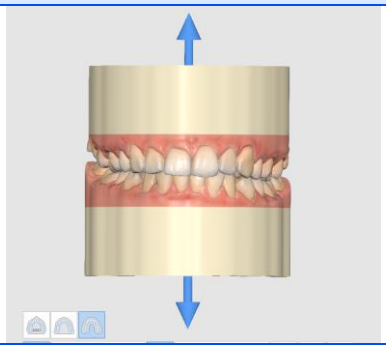
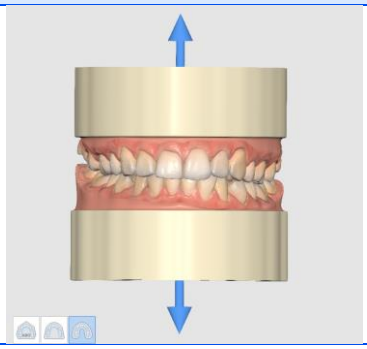


Toolbox

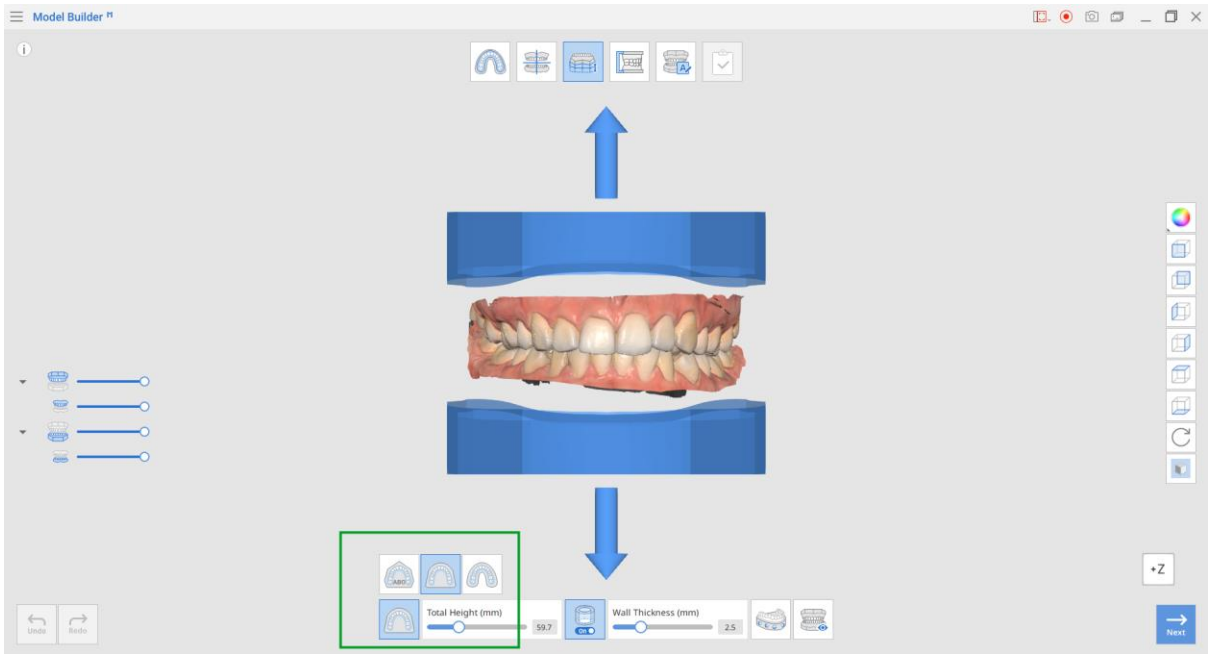
Icon	Tool	Description
	Base Type	Select one of the available base types: ABO, Plate, or Plateless Model.
	Total Height (mm)	Use this slider to adjust the total height of the model, including the base and scan data.  The total height of the model can be up to 99 mm. It might be useful to check the maximum 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 the 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 mm – 4mm. 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 for resin, and set their quantity, diameter, and distance from the base. Using drain holes is useful for resin prints, as 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.

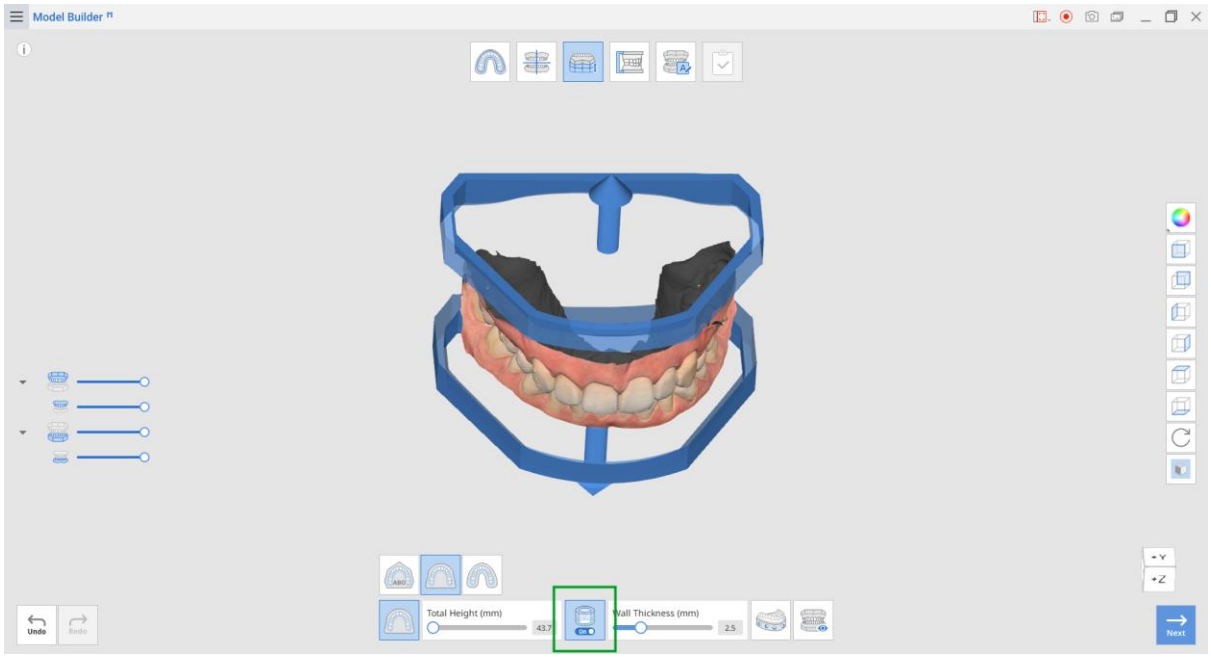
Straight	Curved
	

① Select a base type among the three available options.

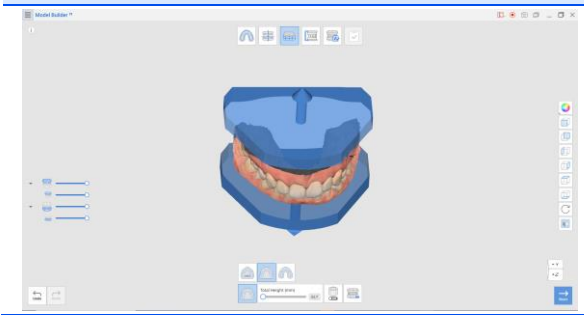


Icon	Base Type	Description
	ABO	Create an ABO model. This orthodontic option creates a maxillary base with seven angles, while the mandibular base takes an elliptical form.
	Plate	Create a plate model. The plate will follow the shape of scan data.
	Plateless	Create a plateless model. Usually made in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

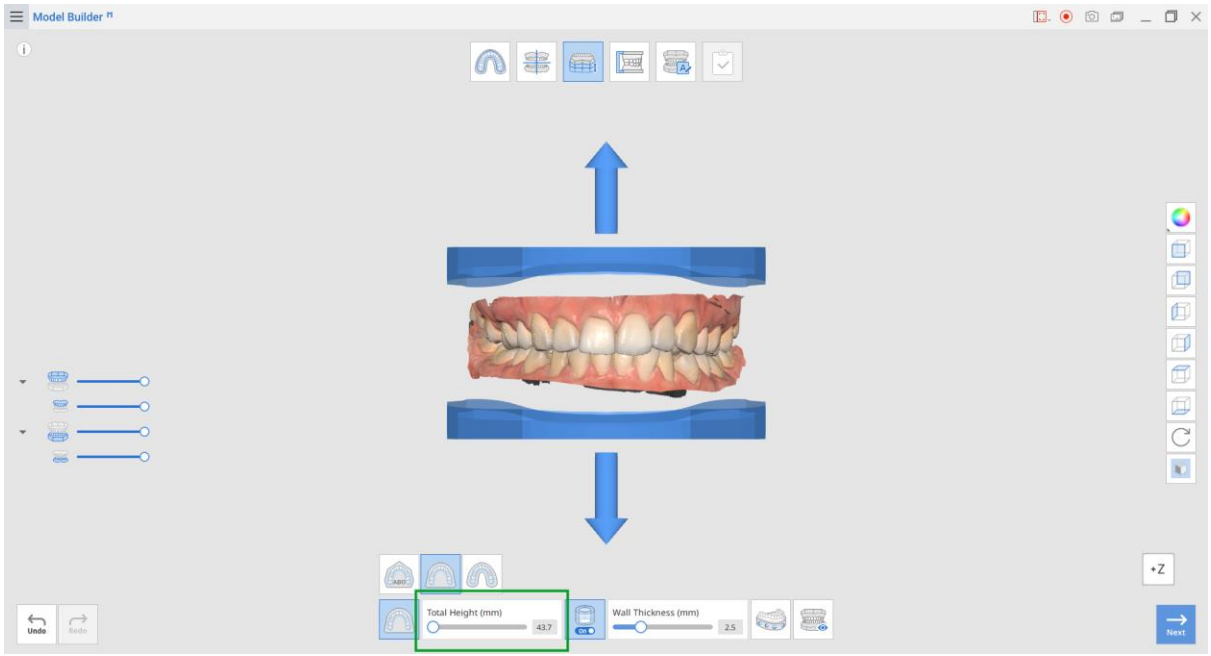
② Choose if you would like the base to be hollow.



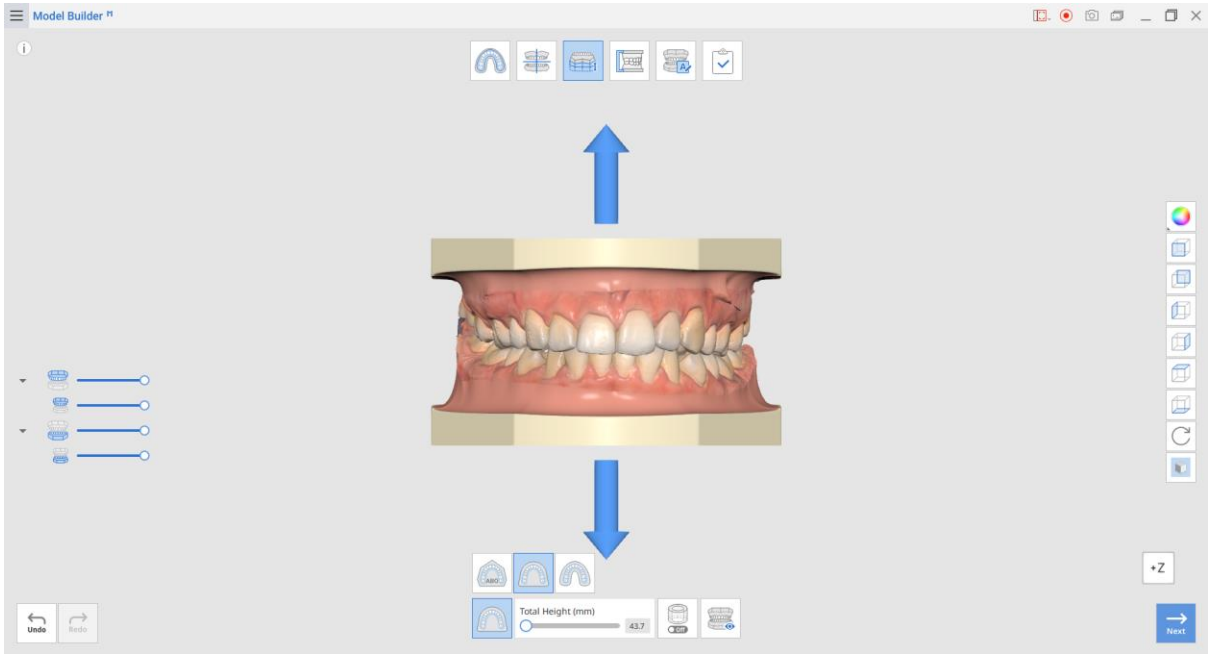
Take a look at what difference it makes to hollow out a model.

Not hollow	Hollow
	

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

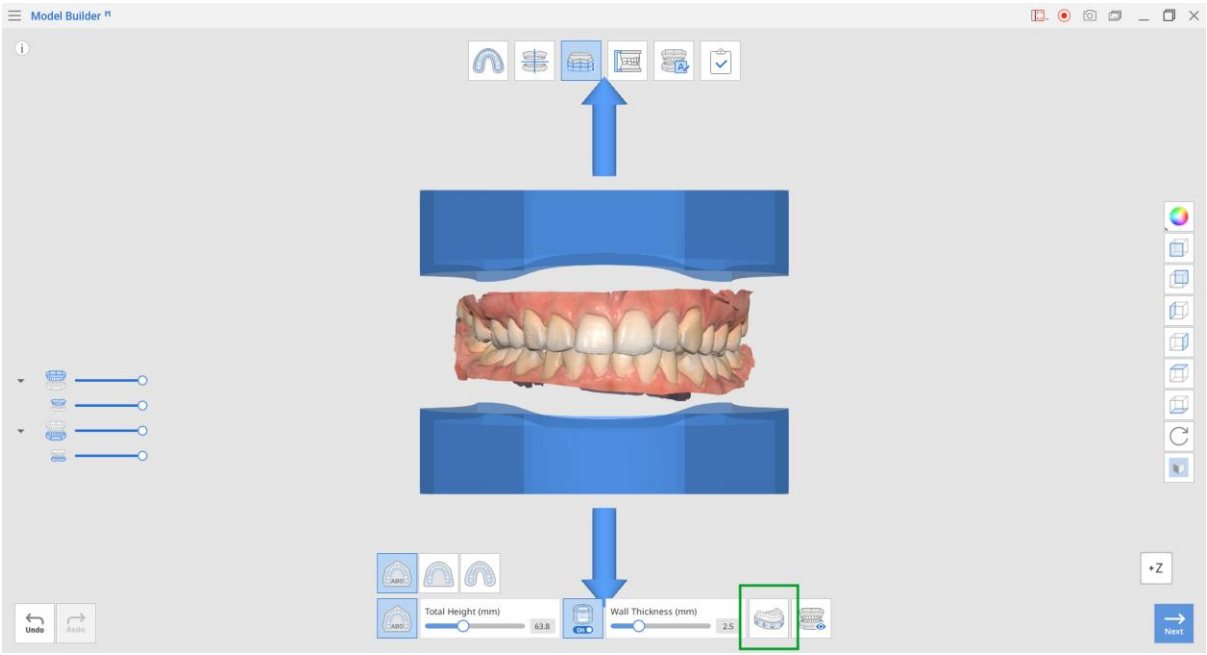


④ Click **"Preview"** to take a look at the model before moving to the next step or finishing the process altogether.

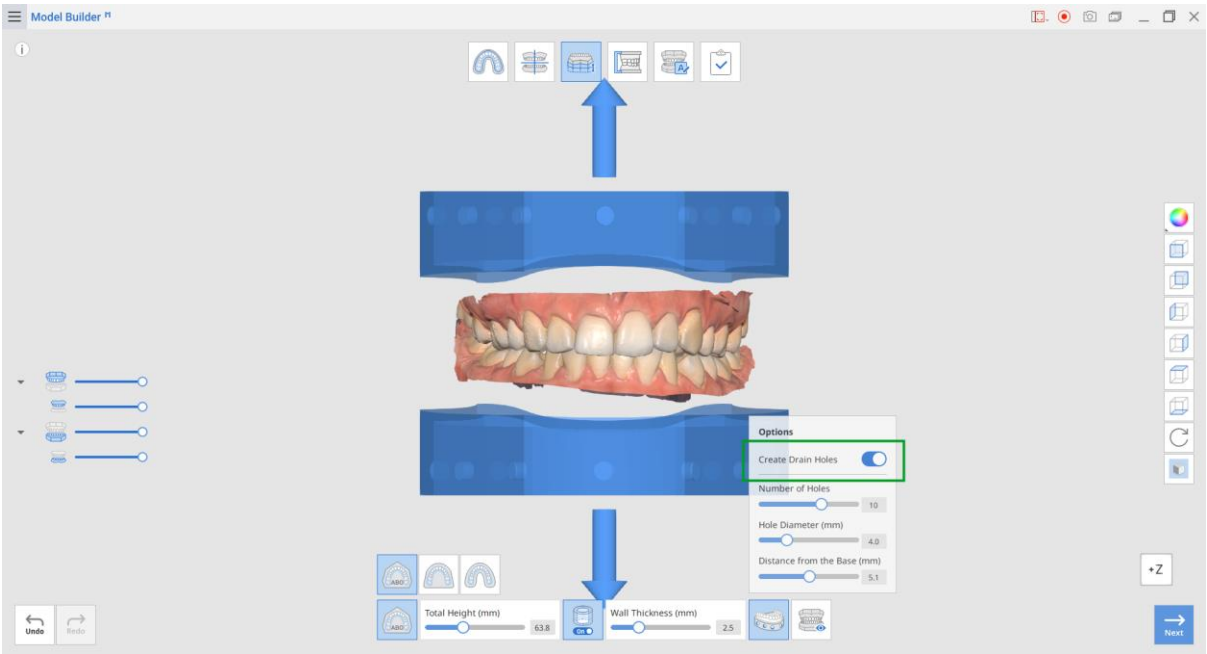


If you make any changes to the model, click **“Preview”** again to see them applied.

⑤ Create drain holes for the hollow models by pressing the button  .

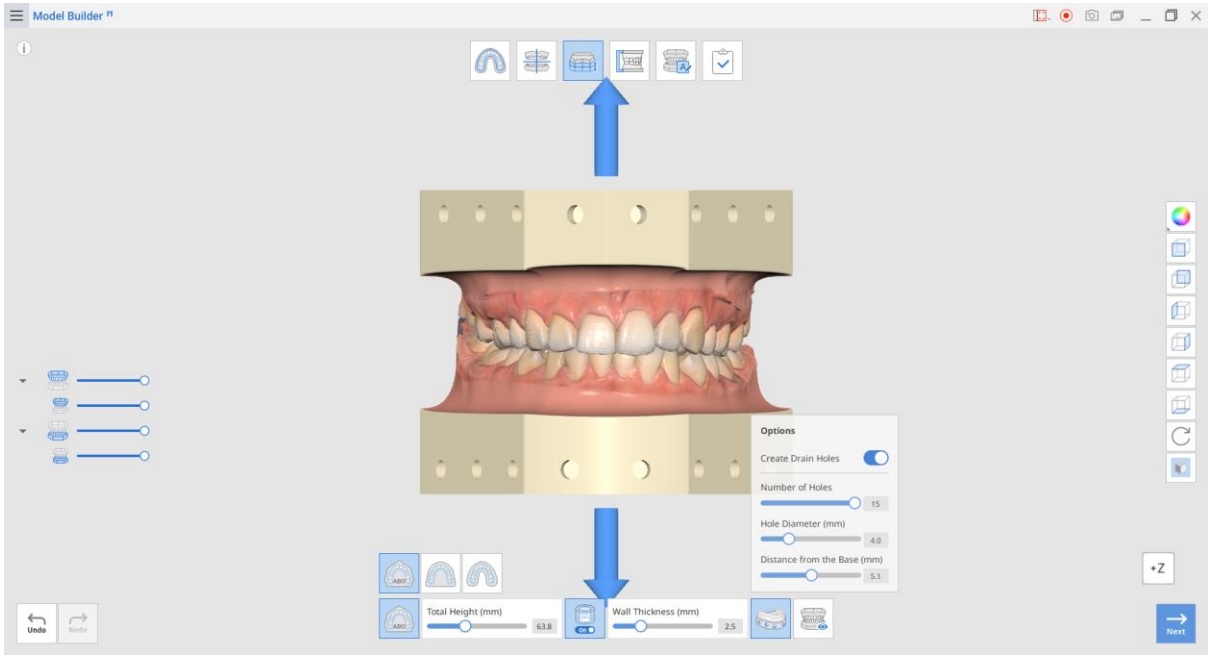


Take a look at default parameters for the drain holes. After finishing the adjustment, turn on the “Create Drain Holes” toggle to see the holes on the model.



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, press “Preview” to see what they will actually look like.

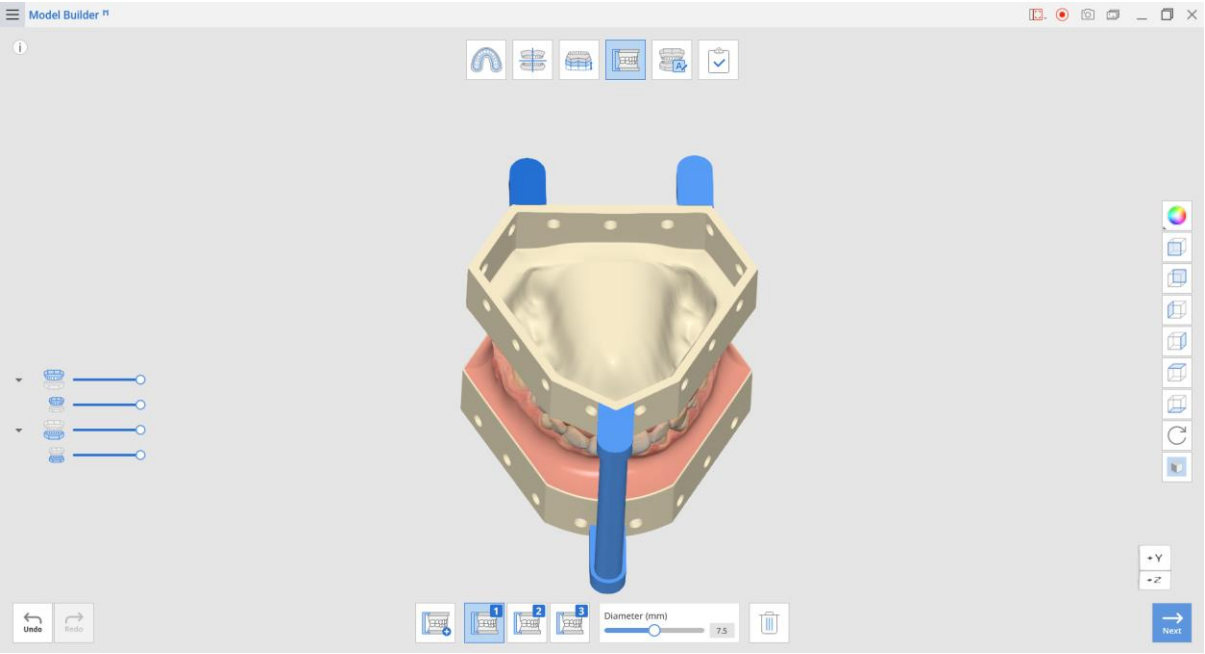


⑥ When done, click **"Next."**

4.5 Articulator Mode

Upon 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.

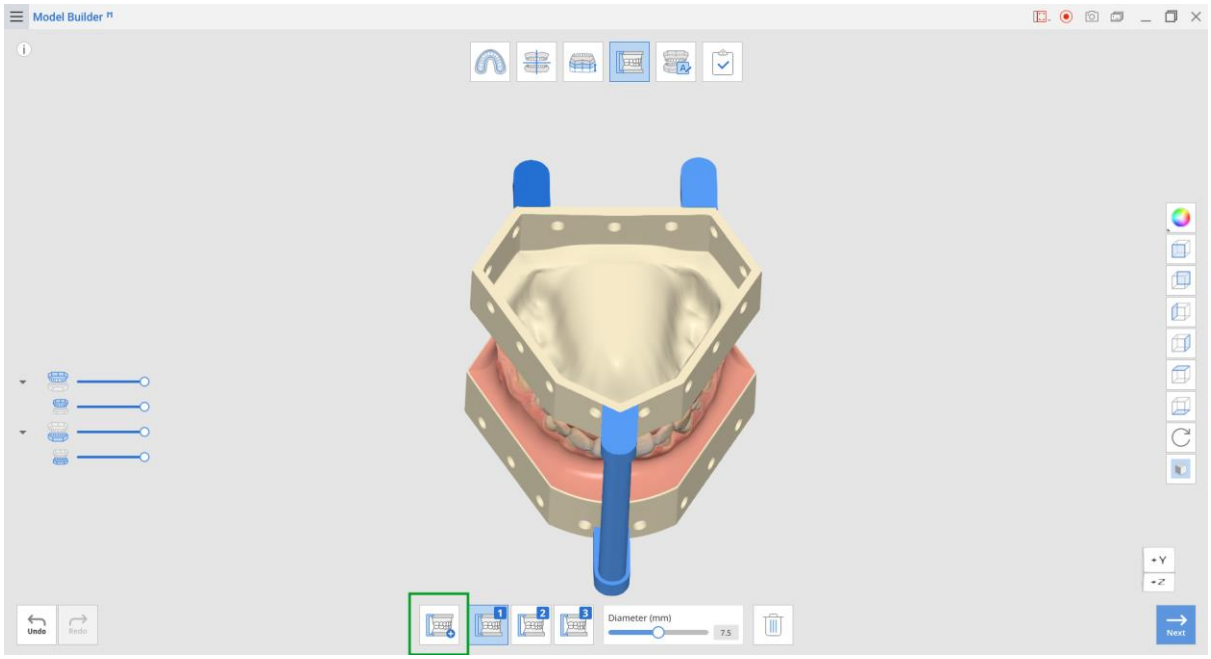
You can attach up to 5 articulators to the model in total.

Toolbox

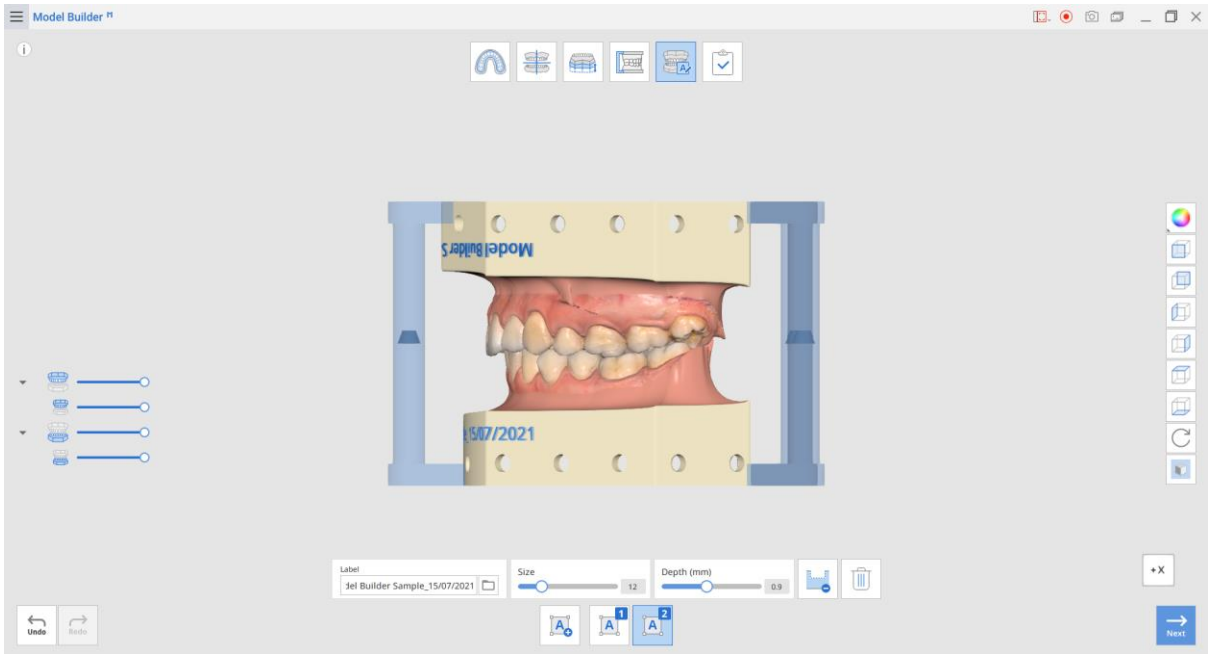
Icon	Tool	Description
	Attach Articulator	Attach an articulator to the model. Click and hold the articulator to move it.
	Manage Articulator #1	Manage articulator #1.
	Manage Articulator #2	Manage articulator #2.
	Manage Articulator #3	Manage articulator #3.
Diameter (mm) 8.2	Diameter (mm)	Adjust the diameter of the articulator. The range of the diameter: 5 mm – 10 mm.
	Delete	Delete current articulator.

① Check the placement of the automatically attached articulators.

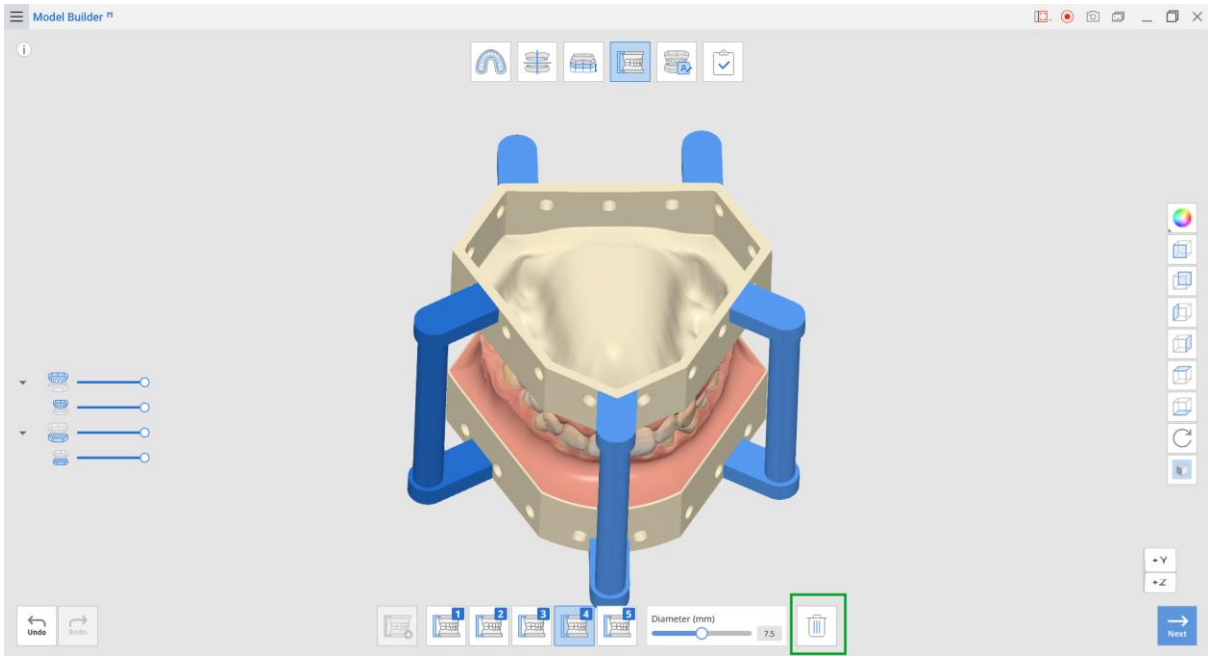
② Add more, if needed, by clicking the **"Attach Articulator"**  button (up to 5 of them can be attached in total).



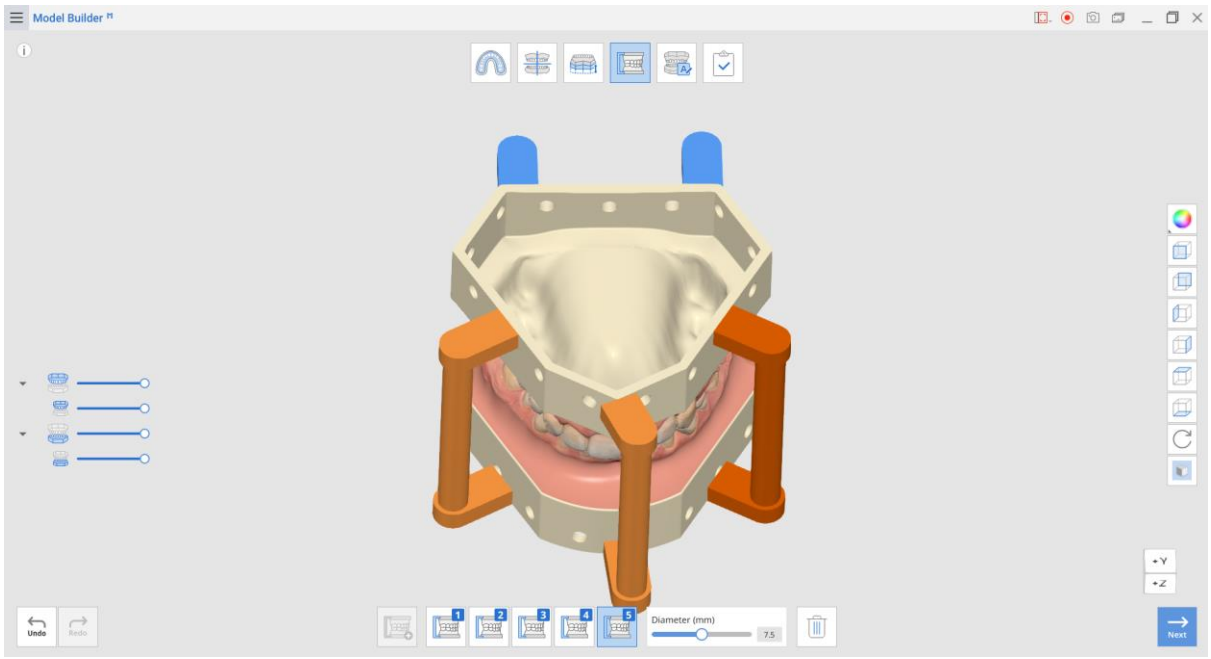
 The inner structure of the articulator allows for an easy 3D printing.



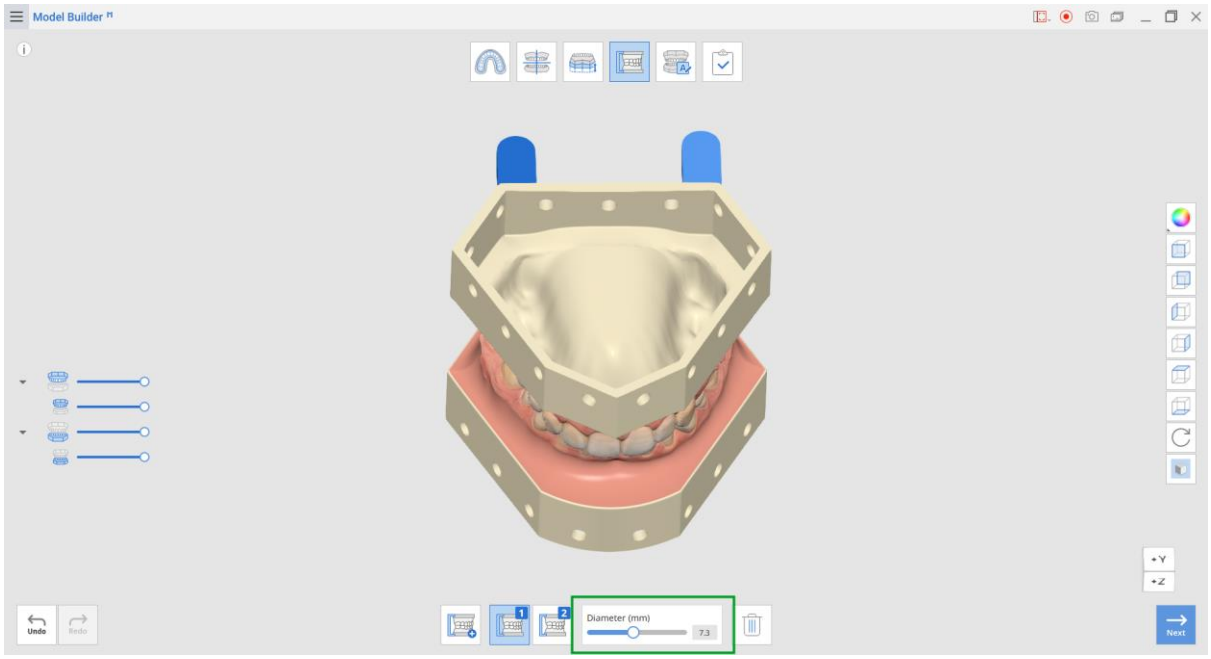
③ Click and hold the articulator to adjust its position. Delete it by pressing the **"Delete"**  button.



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.



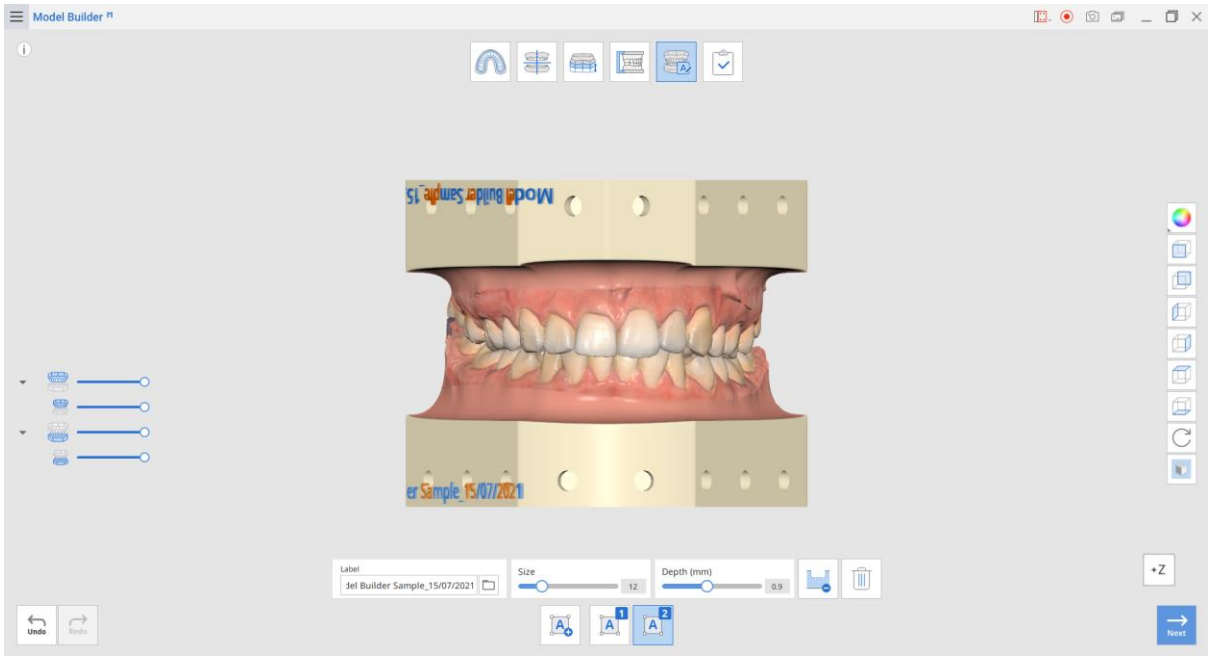
④ Utilize the **"Diameter"** slider to change their thickness.



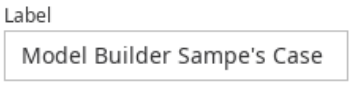
⑤ When done, click **"Next."**

4.6 Labeling Mode

Labeling mode presents a useful toolbox of functions to label the model. Upon entering the mode, there will be labels automatically attached to each arch.

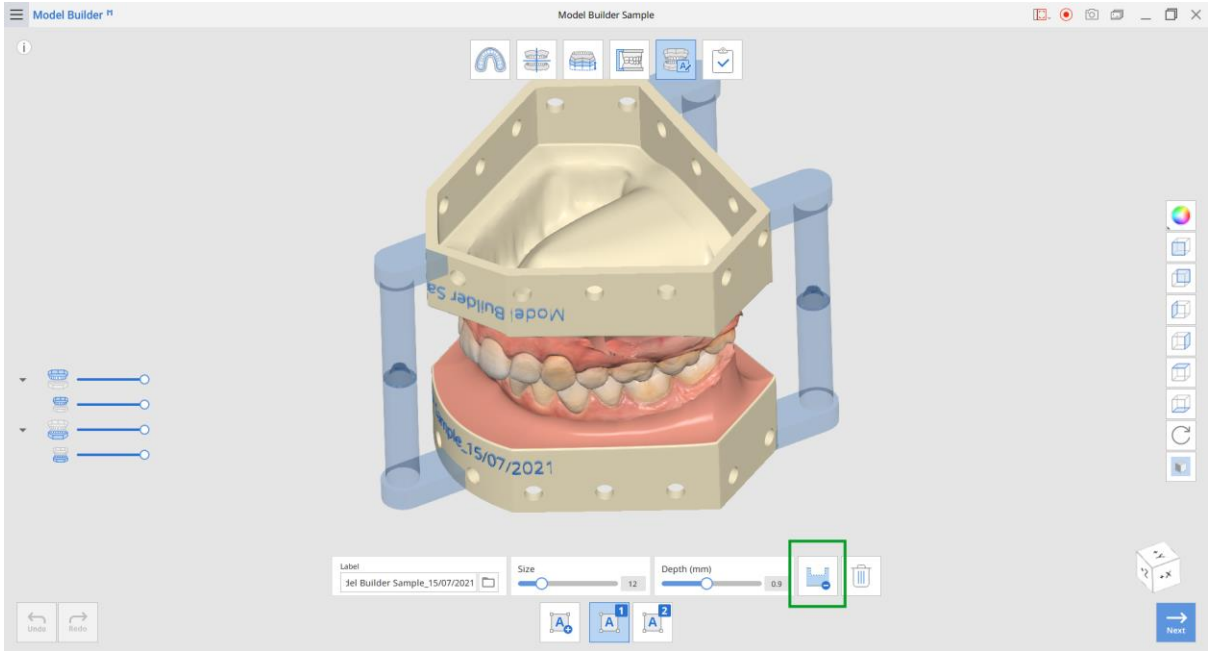


Toolbox

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	
	Label	Enter the text to appear on the label.  You can change the default label text in the program Settings.
	Font	Choose a font for the label from the list.
	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, move it around until it becomes blue again.

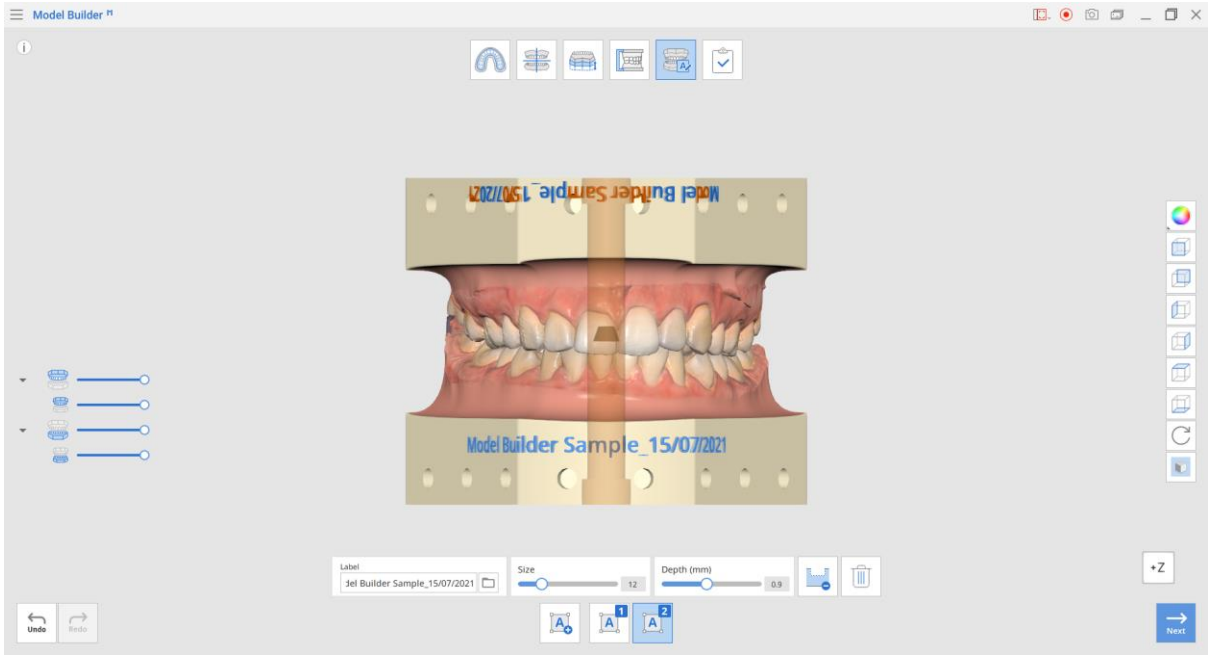
Add labels to the model by either embossing or engraving.



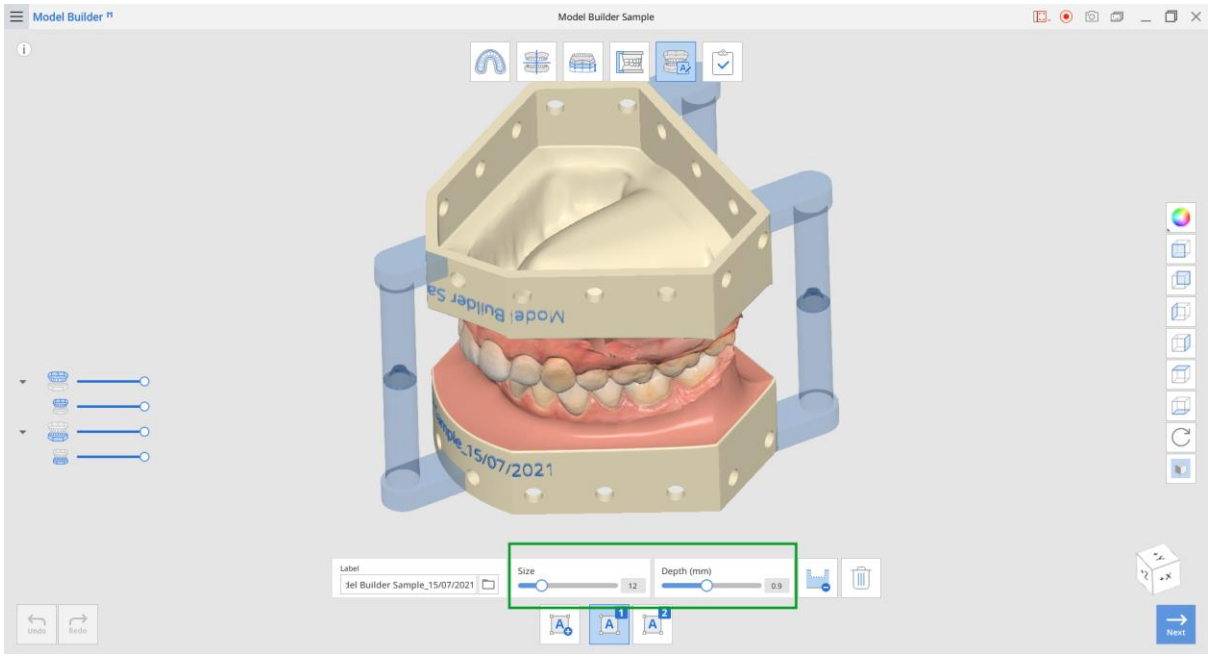
② Add more, if needed, by clicking the **"Add Label"** button (up to 6 of them can be attached in total).

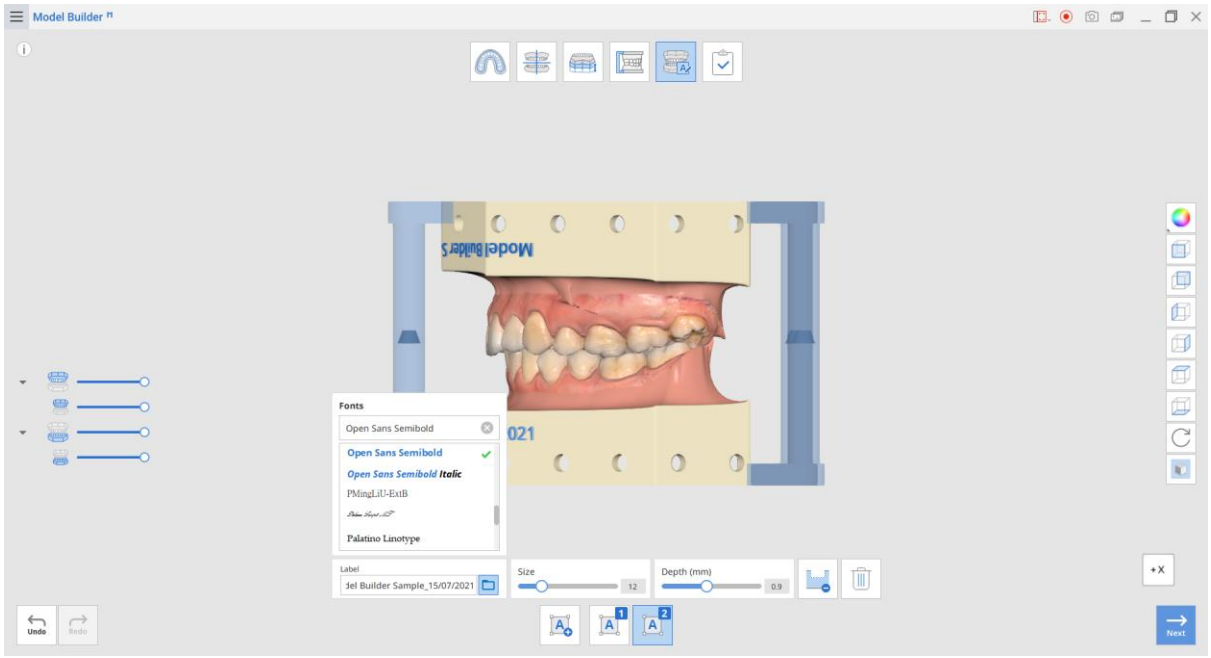
③ Click and hold the label to adjust its position. Delete it by pressing the **"Delete"** button.

In case the label and the articulator share the same 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.



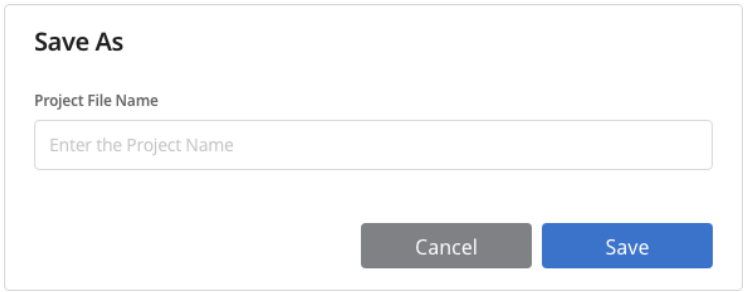


⑤ When done, click **"Next."**

4.7 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.



② Check the data in your Medit Link case.