Splints

Version 1.1.0

July 2023

Medit Splints

Version 1.1.0 (July 2023)

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Getting Started

Medit Splints Overview

Welcome to Medit Splints, a quick and easy way to create splints in just a few short steps.

Speed up your workflow by using the **Auto Creation** which harnesses AI power for fast splint creation. Then if required, you can use the suite of editing tools to make any fine adjustments.

There is also **Manual Creation** mode which will guide you step by step through the creation process.

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

Intended Use and Disclaimer

Medit Splints is a software application designed solely for the purpose of creating splints using scan data and cannot be used for other purposes.

System Requirements

Windows

CPU	Intel Core i5. 2.6 GHz or higher
RAM	16GB or higher
Graphic Card	NVIDIA GeForce GTX 1060 (2GB) or higher
OS	Windows 10 64-bit, Windows 11 64-bit

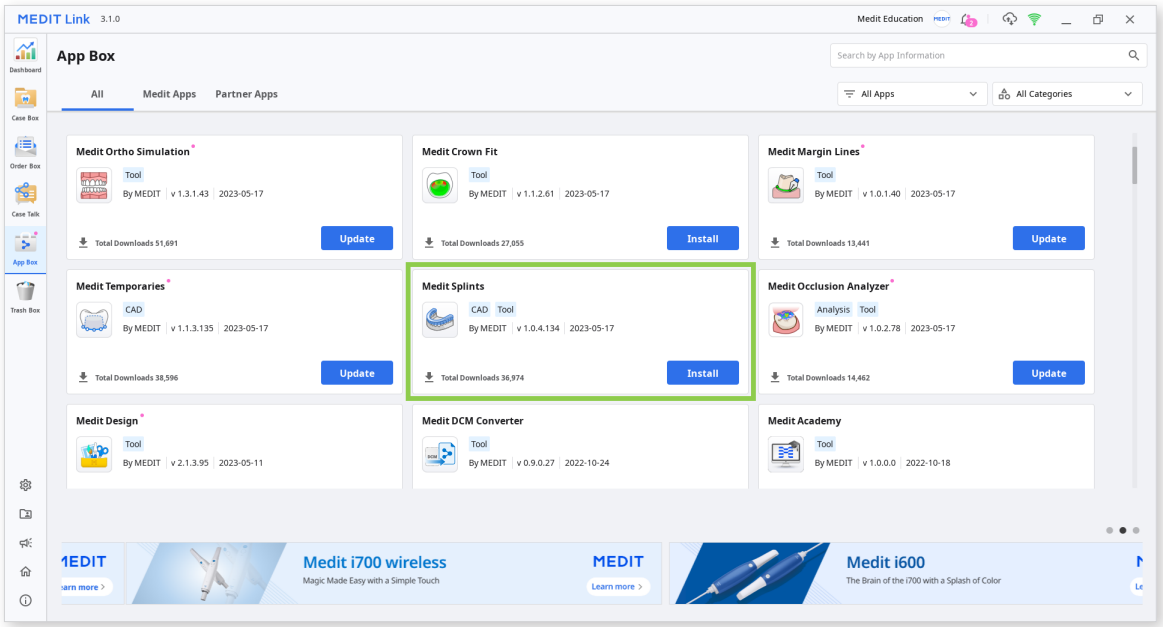
macOS

Chip	M1/M2 or higher
CPU	8-core or higher
RAM	16GB or higher
OS	Monterey 12

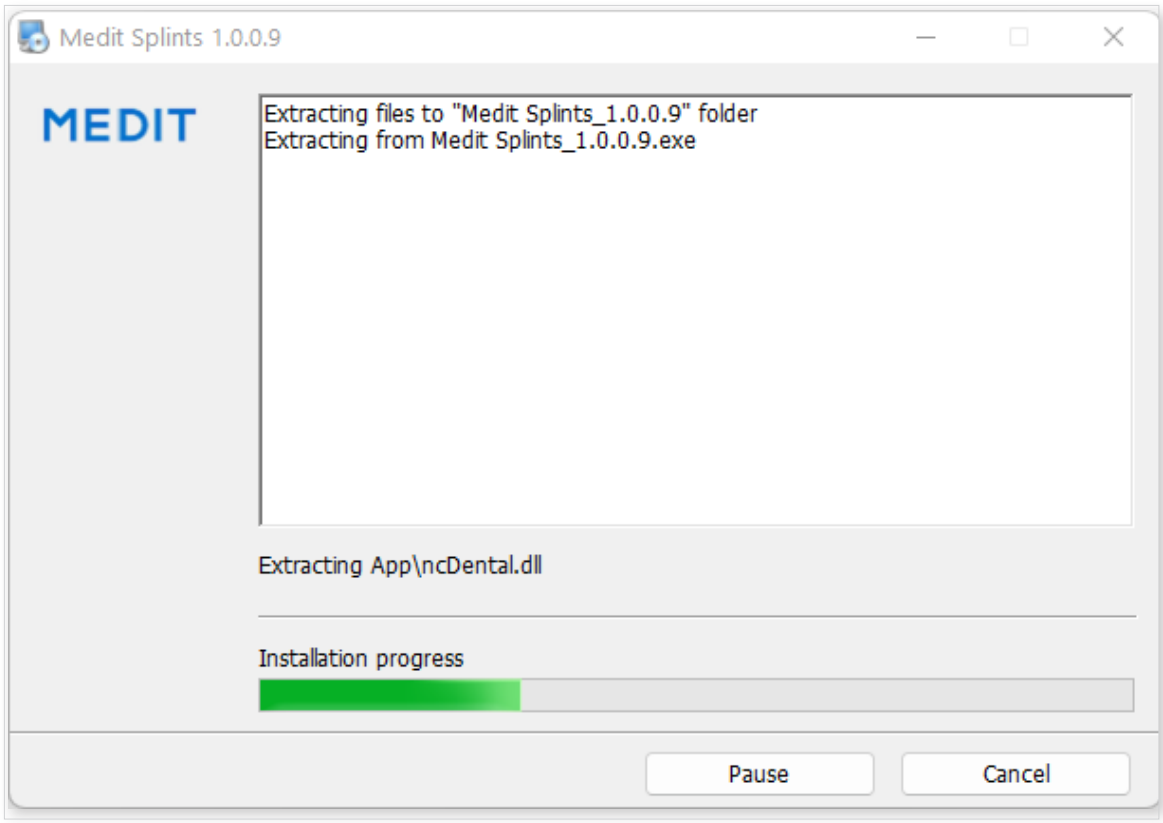
Installation Guide

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

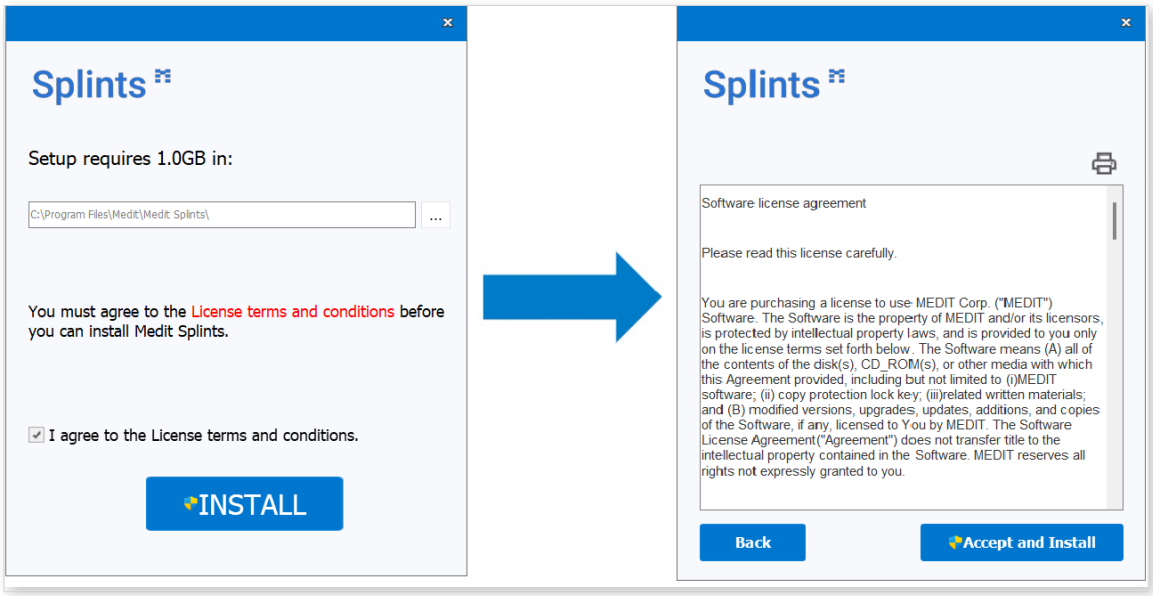
2. Find Medit Splints app and click “Install.”



3. When the download is complete, Medit Splints Installer will run automatically from your PC.



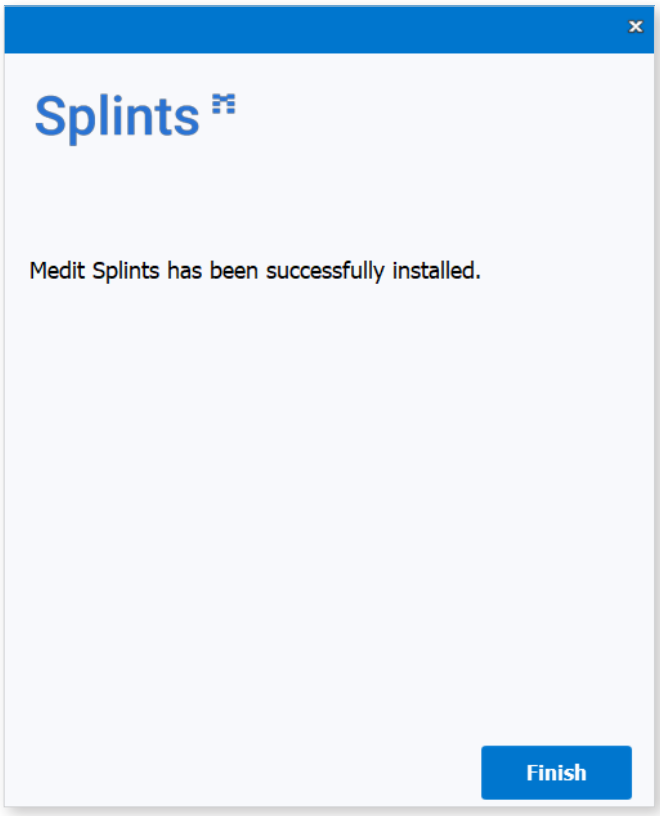
4. Read and agree to the License Terms and Conditions to continue.



5. It may take up to several minutes to finish the installation process.

> ⚠ Do not turn off the PC until the installation is complete.

6. Click “Finish” to complete the installation.



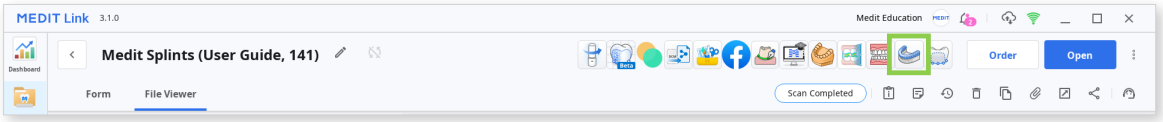
Running Medit Splints from Medit Link

Follow these steps to run Medit Splints from Medit Link.

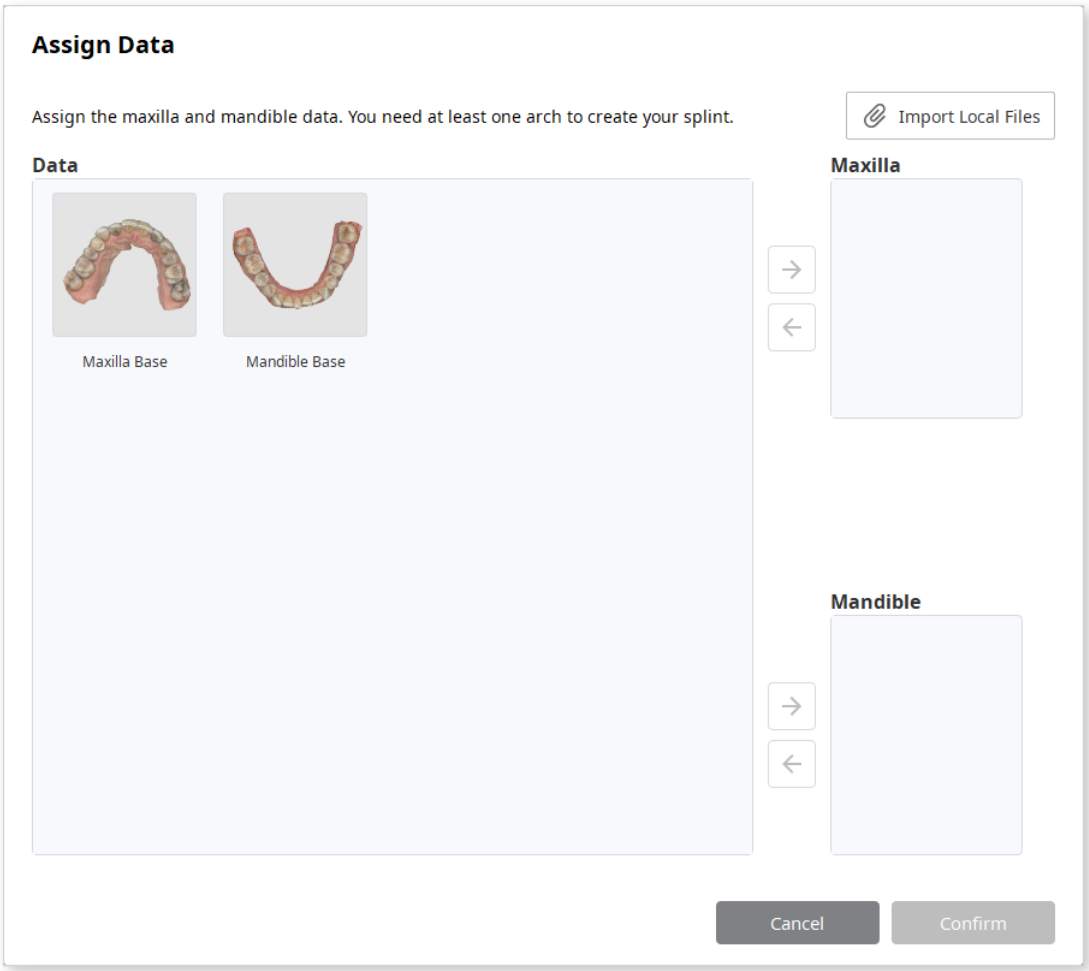
1. Go to Case Box (Clinic Account) or Work Box (Lab Account) and select the case you would like to open in Medit Splints.

> Check the scan data. Make sure it is clean and includes some given data.

2. Click the “Medit Splints” icon in the top right corner of the Case Detail window in Medit Link. The icon will automatically appear once you have installed the app.



3. Assign the data once the app has opened.



4. Then, you’ll need to determine specifics for your workflow. Read more about it in the **“On Splint Creation”** chapter.

Data Management

Acquiring 3D Data

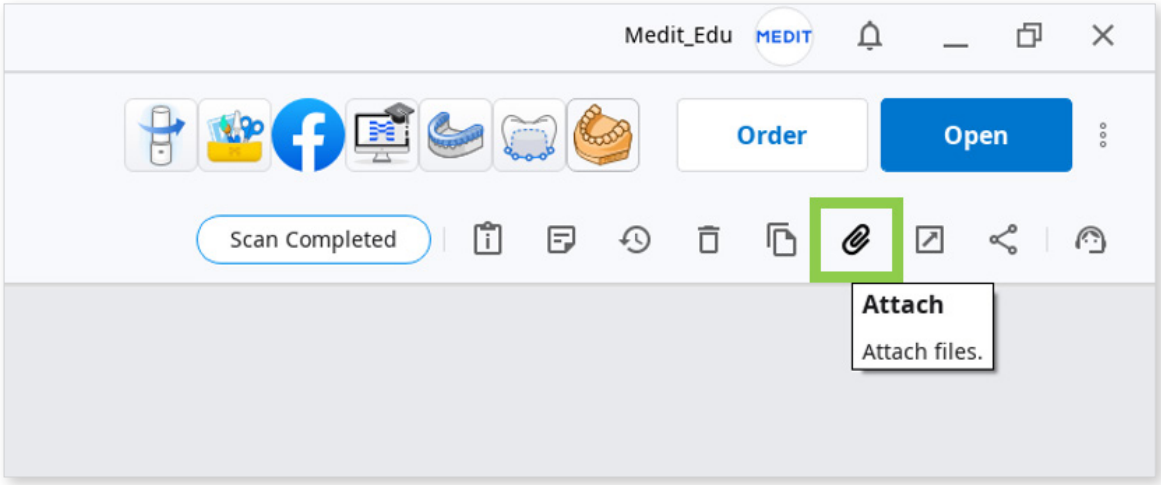
There are three ways to gather 3D data to use in Medit Splints:

1. Acquire scan data in Medit Scan for Clinics or Labs

   Create a new case and complete the necessary scans in Medit Scan for Clinics or Labs. Scan data will automatically be saved in the patient's case in Medit Link.

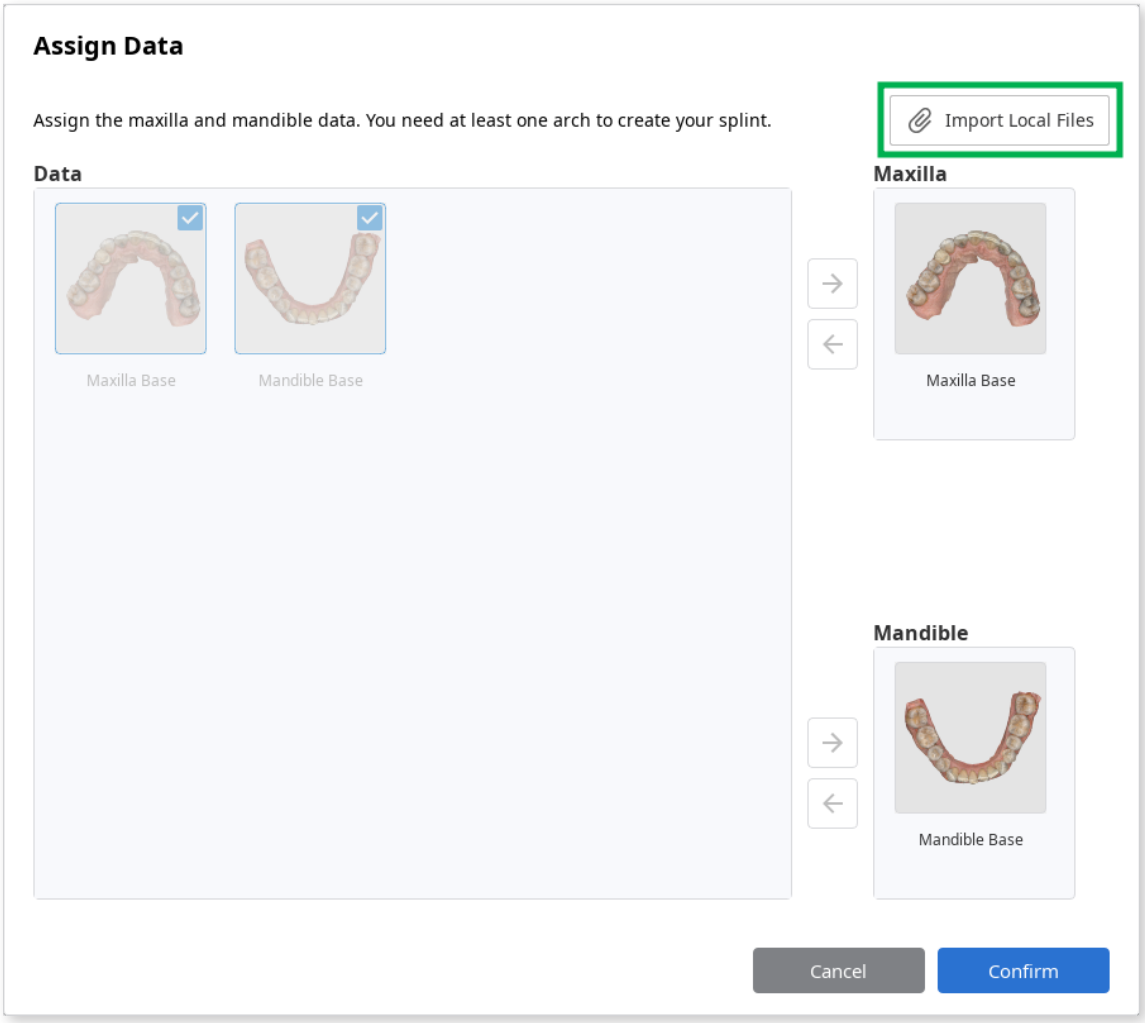
2. Import local files through Medit Link

   Before running the app, you can import data from local files and attach it to a Medit Link case in the Case Detail window



3. Import local files through Medit Splints

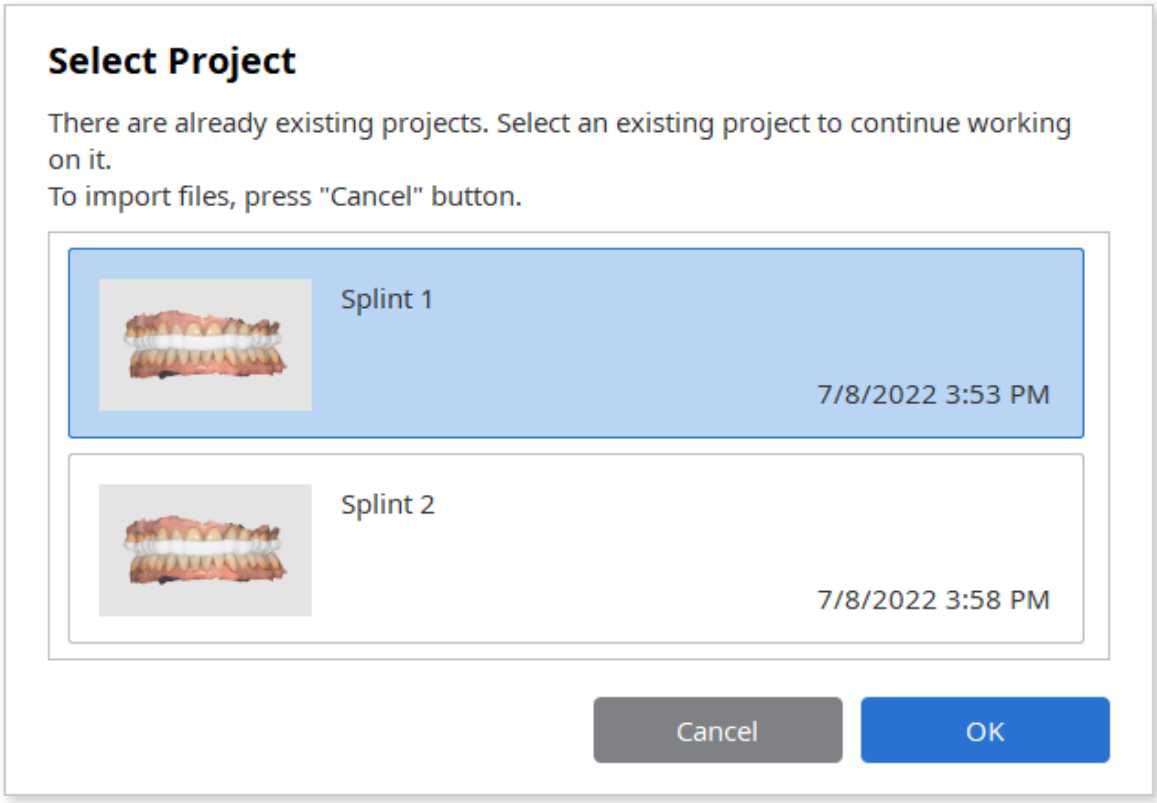
   After running the app, you can import 3D data from local files by clicking “Import Local Files” in the Assign Data dialog window.



Supported file formats for imported data are meditMesh, OBJ, PLY, and STL.

To create a splint, use a single arch data or both maxilla and mandible data.

You can continue working on an existing project if you run Medit Splints from the same case again.



3D Data Control

3D data control using a mouse:

Use	Description	Image
Zoom	Scroll the mouse wheel.	
Zoom Focus	Double-click on the data.	
Zoom Fit	Double-click on the background.	
Rotate	Right-click and drag.	
Pan	Hold both buttons (or wheel) and drag.	

3D data control using a mouse and keyboard:

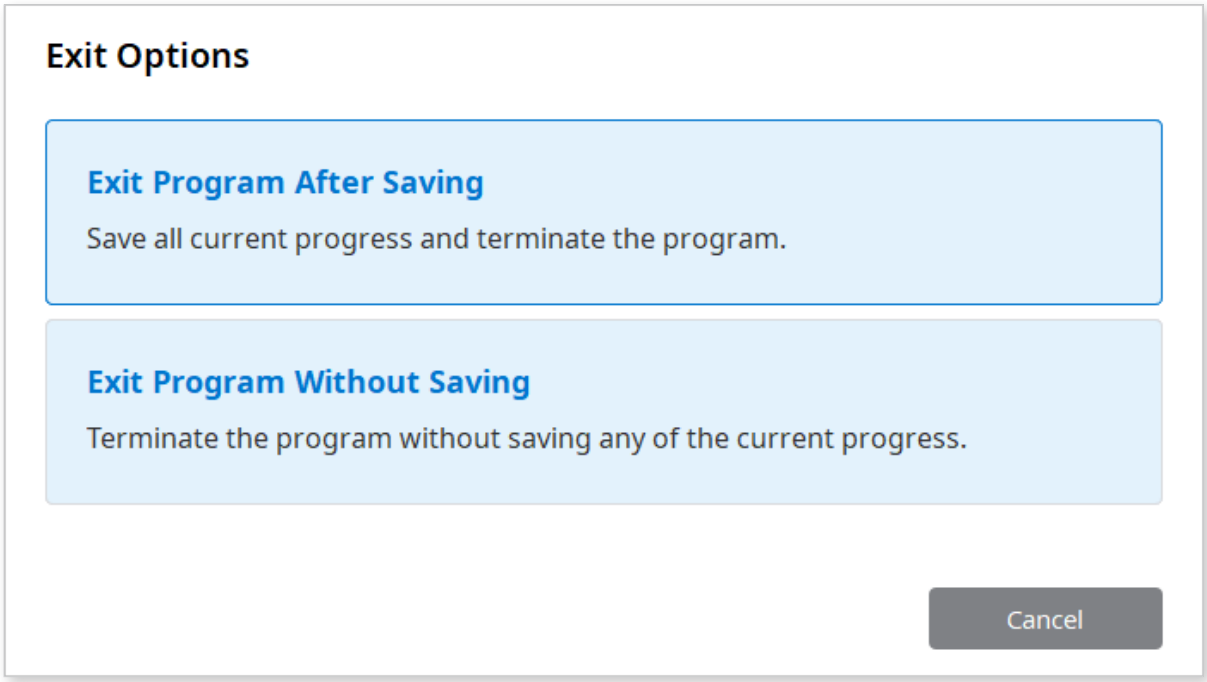
Use	Windows	macOS
Zoom		
		
Rotate		
		
Pan		
		

Saving 3D Data

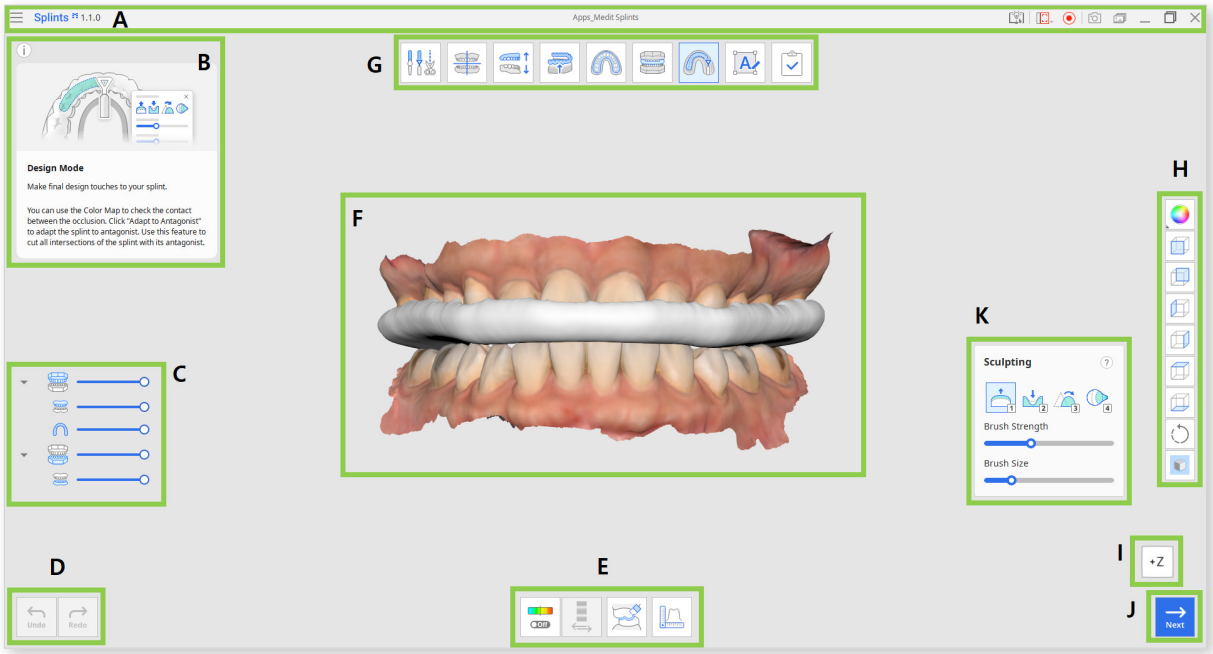
There are three ways to complete your projects.

1. Click “Complete” to finish the project and save it to the Medit Link case.
2. Click “Next” in Label Mode to finish the project and save it to the Medit Link case.
3. Click “Menu” in the Title Bar and select Save As.

You will still have save options if you close the program by clicking “Exit.”



User Interface



A. Title Bar
B. Guide Message
C. Data Tree
D. Undo / Redo
E. Tool Box
F. 3D Data View
G. Modes
H. Slide Toolbar
I. View Cube
J. Next
K. Sculpting Tools (* in Design Mode)

Title Bar

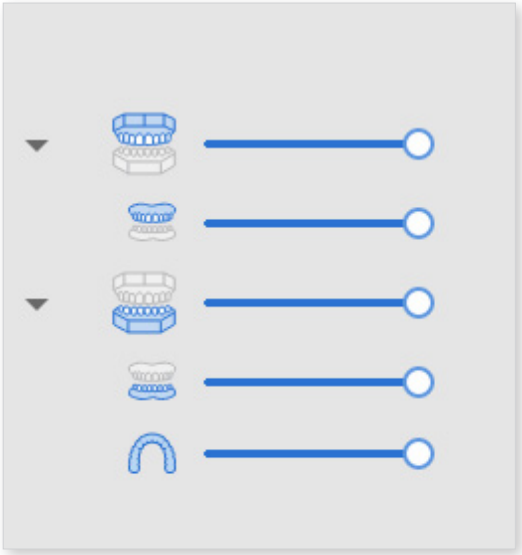
The Title Bar includes the following elements:

Menu	Adjust settings, access available assistance resources, and check application details.
Help Center	Go to the Medit Help Center page.
Select Video Record Area	Specify which area to be recorded for the video recording.
Start Video Recording	Start and stop video recording.
Screenshot	Take a screenshot. Capture the app with or without the title bar using automatic selection. Or click and drag to manually select the area for a screenshot.
Screenshot Manager	Manage screen capture images. All screenshots are automatically saved together with the project files to the Medit Link case.
Minimize	Minimize application window.
Restore	Restore application window.
Exit	Terminate application.

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.



Side Toolbar

The Side Toolbar provides two set of tools for controlling the 3D data display.

Data Display Modes

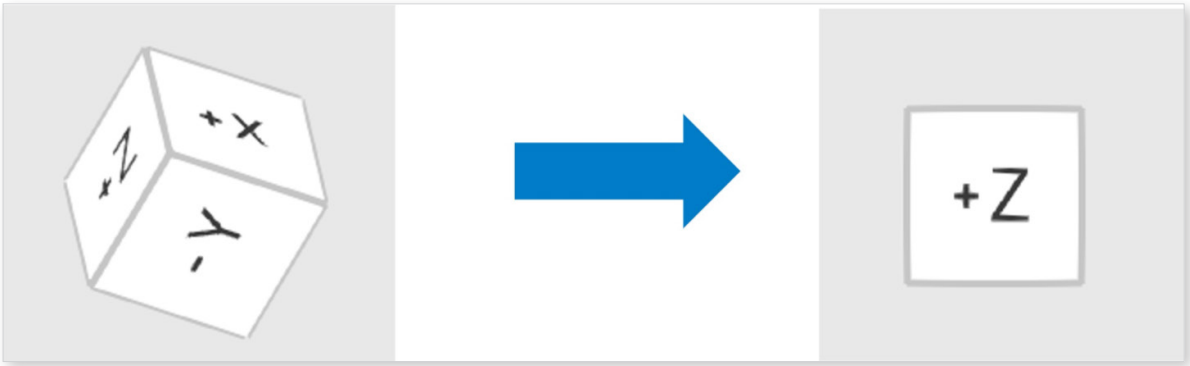
Icon	Tool	Description
	Textured	See the data with color information.
	Textured with Edges	See the data with color information and edges.
	Monochrome	See the data in a single color.
	Monochrome with Edges	See the data in a single color with edges.
	Wireframe	See the data as edges only.

3D Data View Options

Icon	Tool	Description
	+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 (mm)	Set grid display options. It shows or hides the grid and controls its position in relation to the model (overlay on/off).

View Cube

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



Action Control

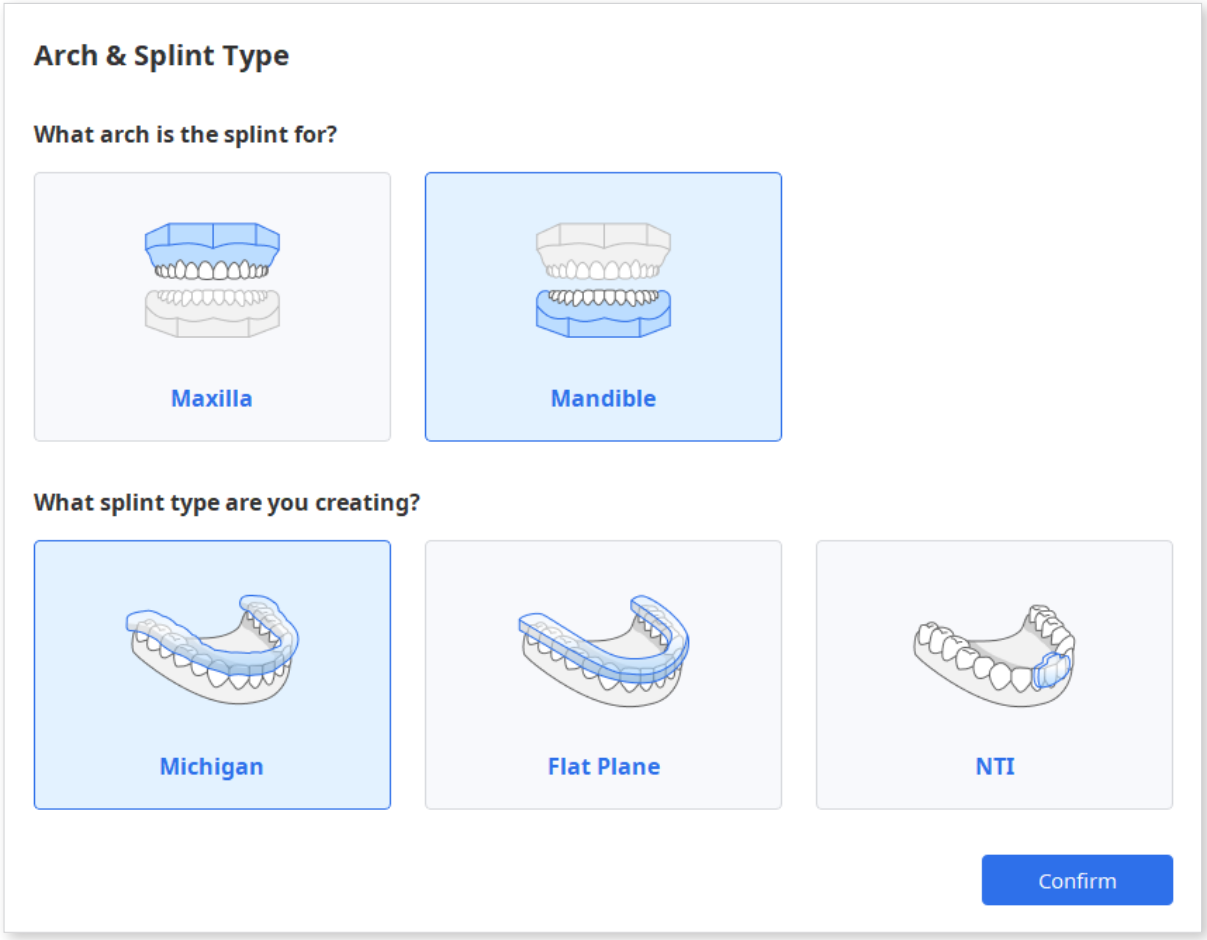
There are three buttons that provide action control within each mode. They can be found in bottom corners of the window.

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

On Splint Creation

After you assign scan data, the app will check in with you on two key aspects of creating a splint.

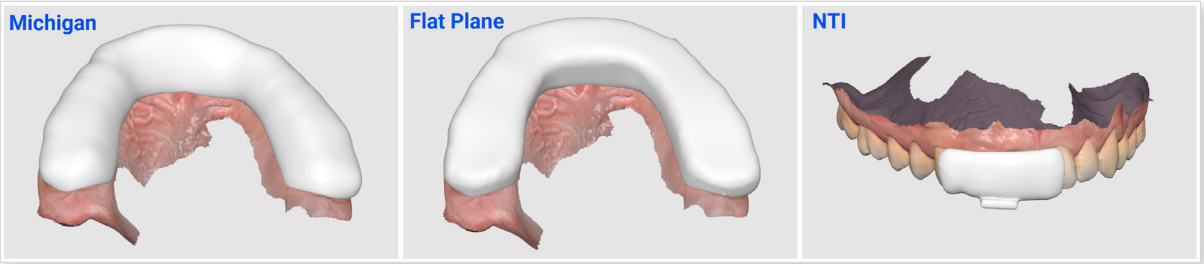
First, you'll need to determine what arch is the splint for and what splint type you're making.



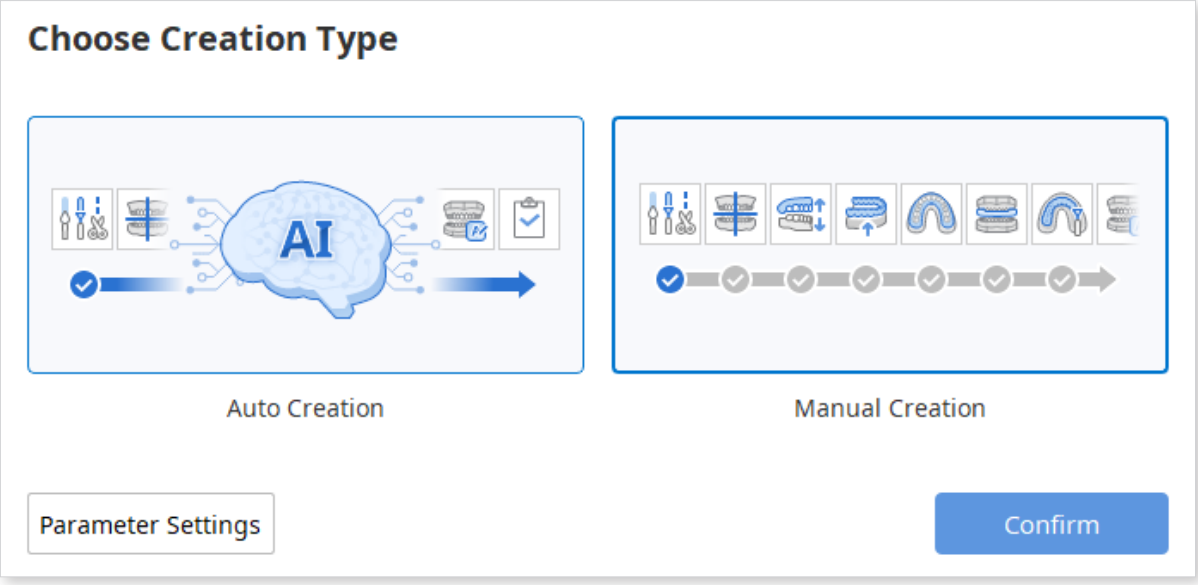
Splint Types

There are three splint types to choose from. Depending on your choice, specific changes will be made to the splint outline and outer surface.

Splint Type	Description
Michigan	A full-coverage splint for all general cases.
Flat Plane	A full-coverage splint with a flat, smooth outer surface that enables unhindered mandible movement.
NTI	A splint that covers only a portion of the front teeth and prevents contact between the back and canine teeth.



And the second aspect is whether you want to design automatically using A.I. or manually. Your workflow will be different depending on your choice.



Auto Creation

Auto Creation is an A.I.-powered automatic splint creation. The workflow for the Auto Creation is as follows:

Overview Mode → Design Mode → Labeling Mode

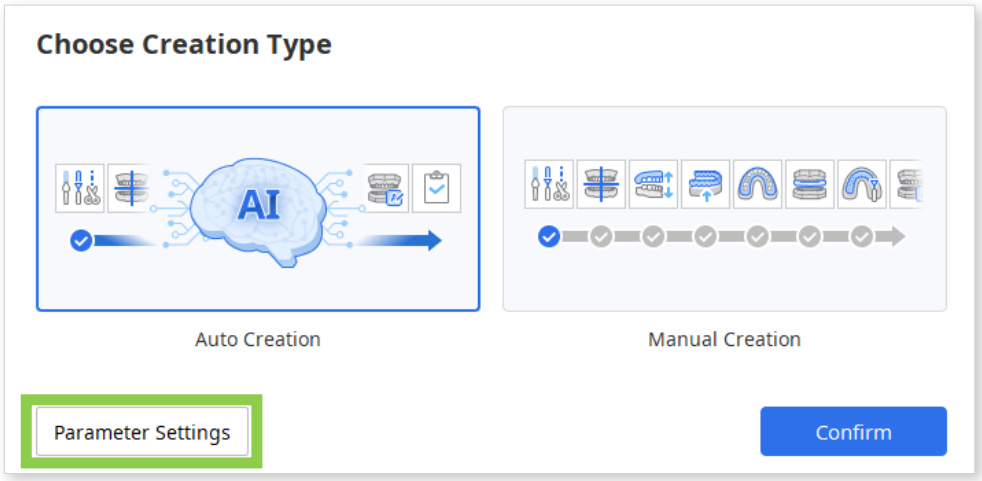
Design Mode and Labeling Mode are not mandatory. If you like the auto-created splint, skip these steps and save your project file.

Learn more about each mode in the **“Modes”** chapter.

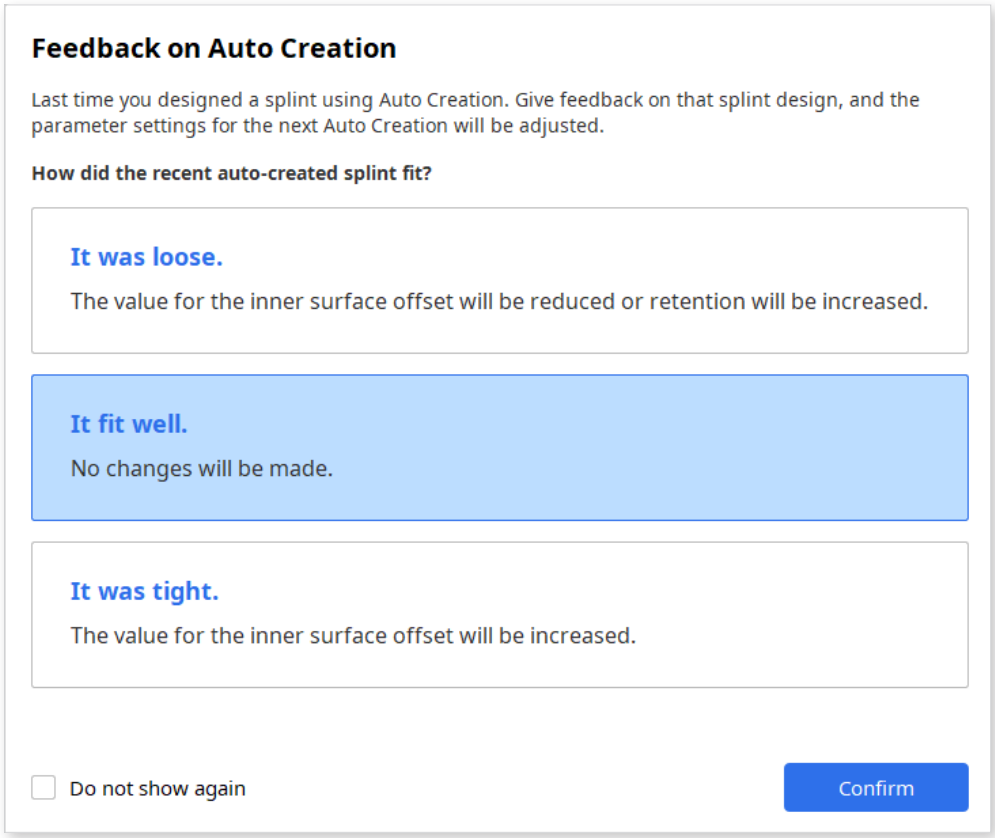
If you choose Auto Creation right after installing the app, the following default parameters for splint creation will be used:

Mode	Parameter	Default Value
Occlusal Adjustment Mode	Distance to Antagonist	1.50 mm
Inner Surface Creation Mode	Inner Surface Offset	0.10 mm
	Smooth Surface	4/5
	Angle	0.1°
	Retention	0 mm
Outline Designation Mode	Buccal Side	half the height
	Lingual Side	half the height
Outer Surface Creation Mode	Lingual & Buccal Thickness	1.50 mm
	Smooth Surface	5/5
	Dual Layer Splint	Off

After that, the app will remember and use your last applied parameters for the next Auto Creation. You can click “Parameter Settings” to check and change parameters before auto-creating the splint.



Next time you run Medit Splints after using Auto Creation, you will be asked for feedback on your latest auto-created splint. The app will learn from your reply and automatically adjust parameters to create a better fit splint design next time.

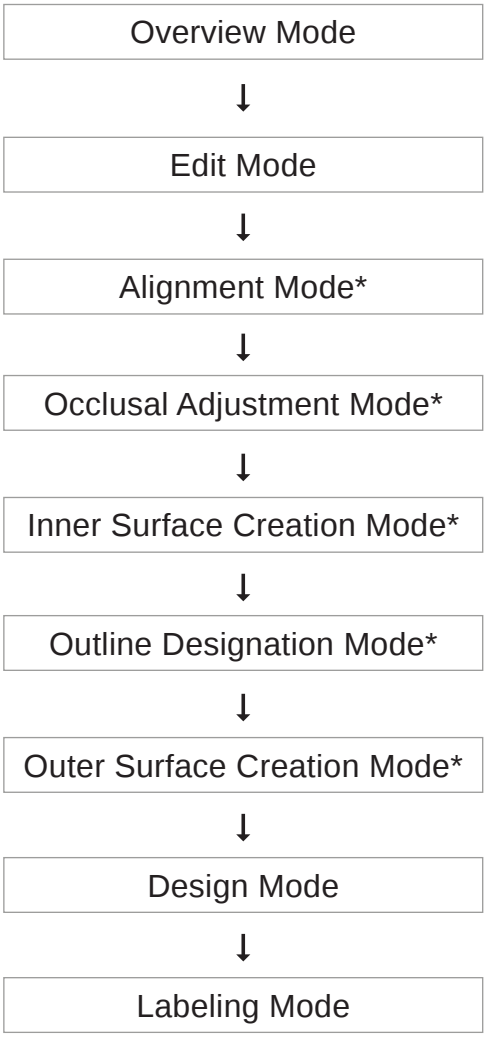


Feedback is optional and can be turned on or off in the settings.

Manual Creation

Manual Creation is a step-by-step splint creation process that allows you more flexibility if you want to make fine adjustments to the splint.

The workflow for the Manual Creation is as follows:



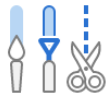
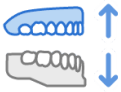
Modes marked with a star (*) automatically analyze the characteristics of anterior and posterior teeth. The analysis will be used to automatically suggest results in the current step once you enter it. Review the automatic suggestion, make adjustments if needed, and click “Next”.

Edit Mode, Design Mode, and Labeling Mode are not mandatory and can be skipped.

Learn more about each mode in the **“Modes”** chapter.

Modes

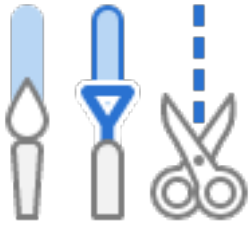
The modes indicate the current stage of the splint creation process and are completed in a specific sequence. If the occlusion was scanned in an opened state or there is only one existing arch, you can skip the “Occlusal Adjustment Mode.” After finishing in “Design Mode,” you can go straight to the “Complete” stage and save your results to Medit Link.

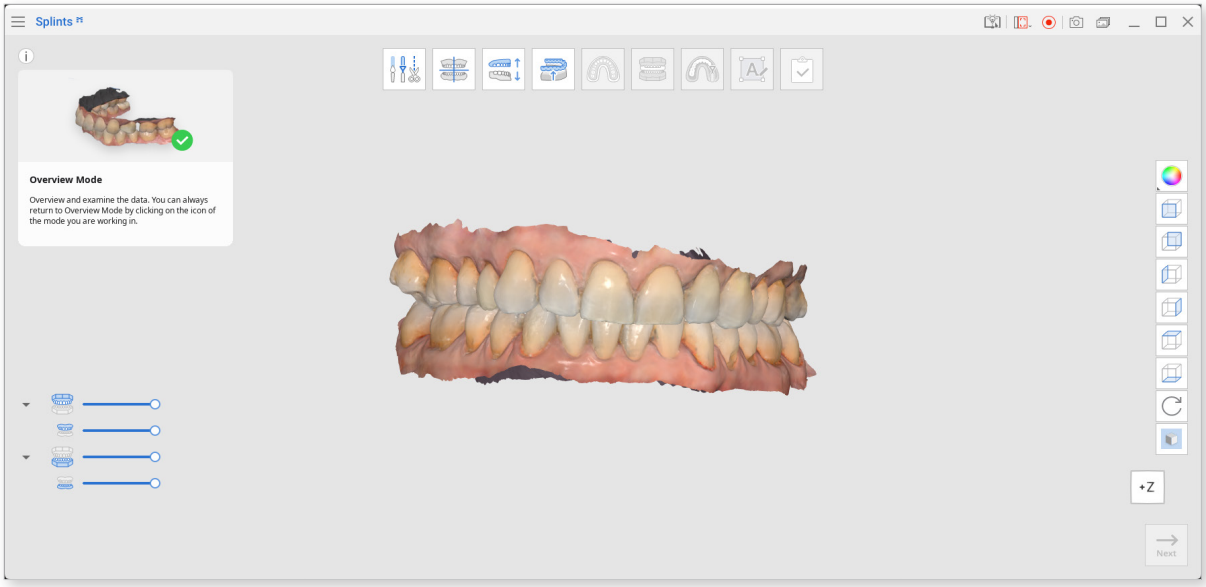
Icon	Tool	Description
	Overview Mode	Overview and examine the data
	Edit Mode	Edit and trim data using the wide array of functions provided.
	Alignment Mode	Align the data to the occlusal plane.
	Occlusal Adjustment Mode	Adjust the occlusal relationship.
	Inner Surface Creation Mode	Create the splint’s inner surface.
	Outline Designation Mode	Designate the splint area.
	Outer Surface Creation Mode	Create the splint’s outer surface.
	Design Mode	Design the splint using the tools provided.
	Labeling Mode	Label the splint by engraving or embossing the text.
	Complete	Finish creating the splint and save the results to Medit Link.

Overview Mode

Overview Mode is the landing page of Medit Splints, where the imported data is first displayed.

Examine your data and if it needs editing click the “Edit Mode” icon at the top of the screen.





If no editing is required, you can skip the “Edit Mode” and continue to “Alignment Mode.”

Edit Mode

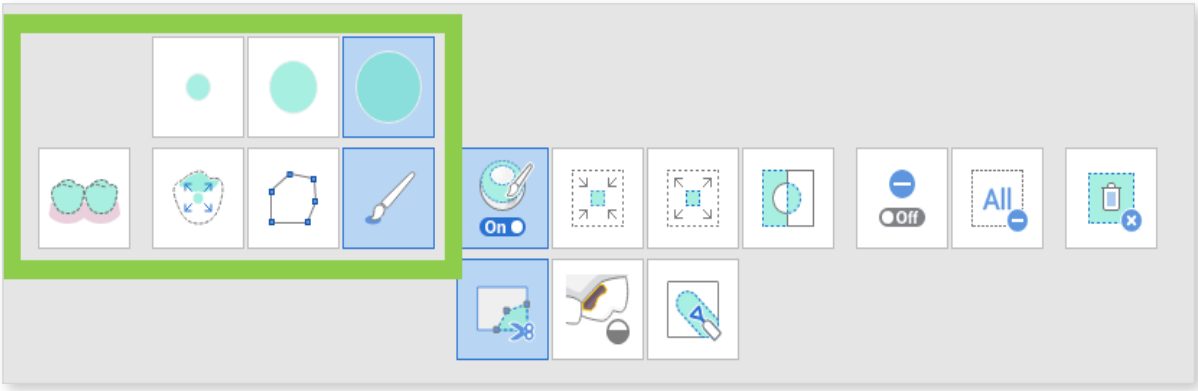
Edit Mode can be used to modify your data before creating the splint.

The toolbox in Edit Mode includes:

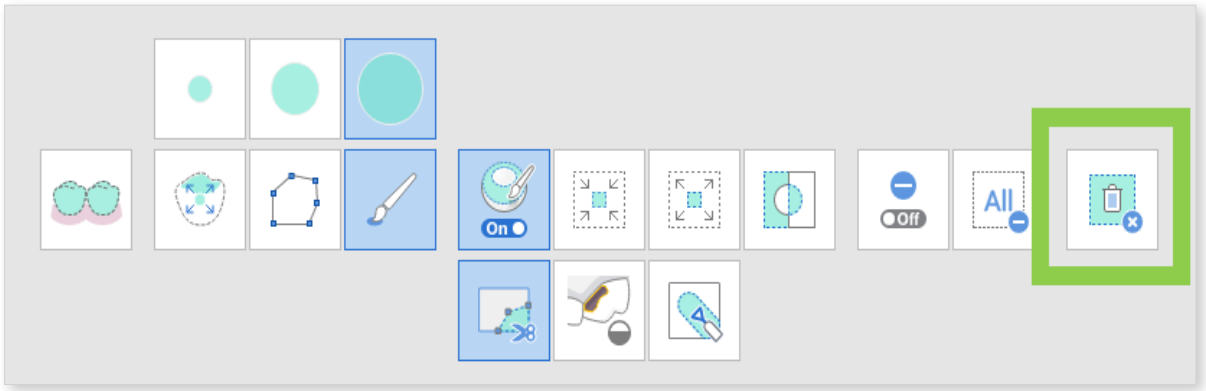
Icon	Tool	Description
	Trimming Tool	Use various selection tools to remove unnecessary data.
	Fill Holes	Fill empty spaces in the 3D mesh data.
	Sculpting	Sculpt data by adding, removing, smoothing, or morphing.

How to Trim Data

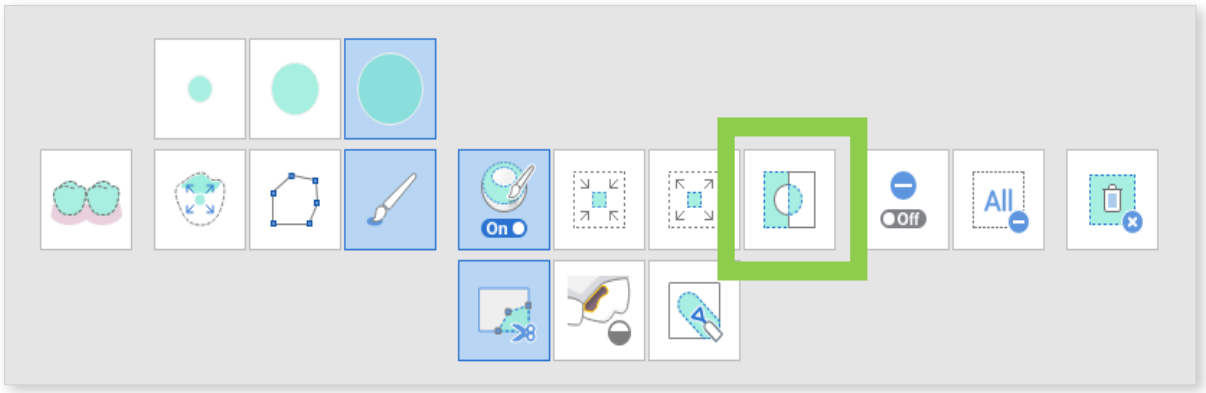
Use Smart Selection Tools for the program to automatically select the teeth data or choose between Polyline and Brush Selection to manually designate the trimming area.



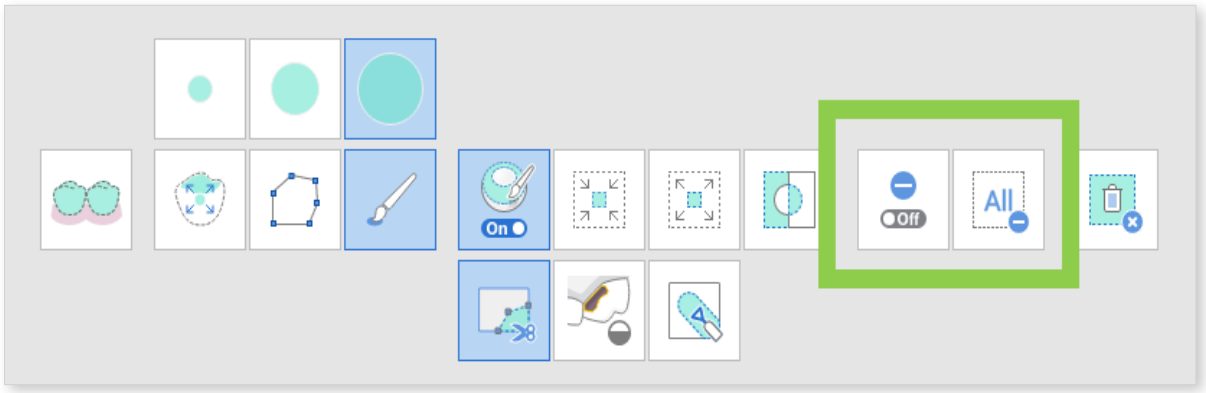
To delete the selected area click “Delete Selected Area.”



You can revert the selection by clicking “Invert Selected Area.”



You can revert the selection tools’ function to deselection by clicking “Deselection Mode”. Or use “Clear All Selection” to remove any selection.

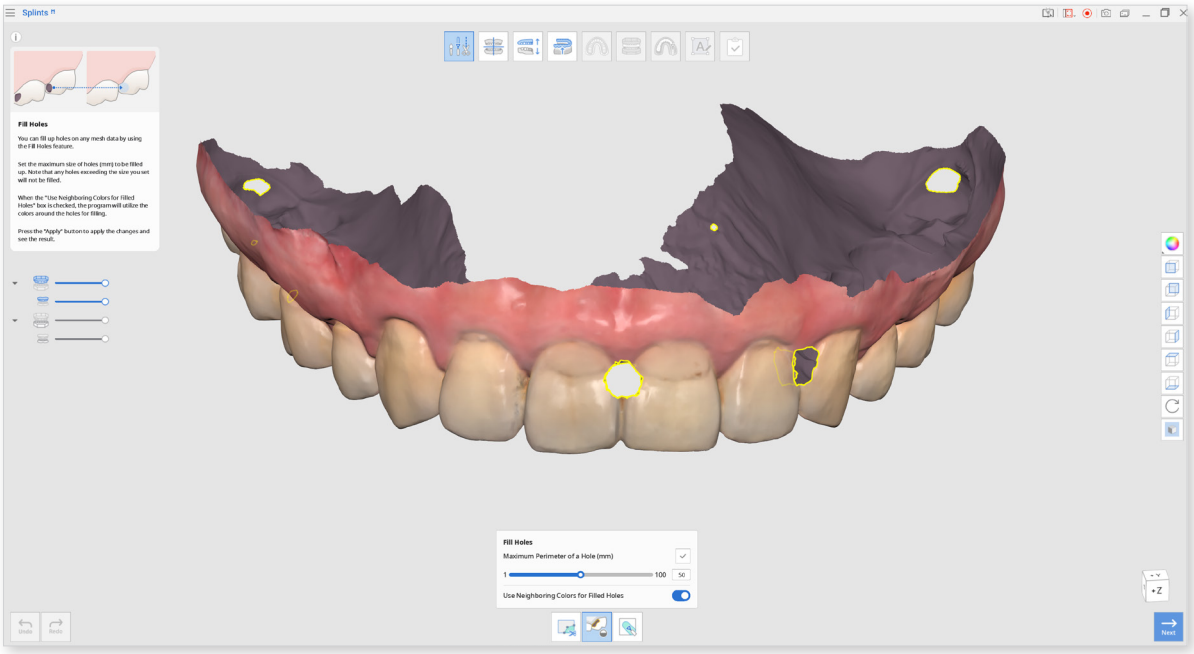


Toolbox: Trimming Tool

Icon	Tool	Description
	Smart Teeth Selection	Automatically select all teeth of the arch, leaving out gingiva parts.
	Smart Single Tooth Selection	Automatically select the area of a single tooth, leaving our gingiva parts. Click, press and drag the mouse on the tooth.
	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. The brush comes in three sizes.
	Autofill Selected Area.	Automatically fill in entities of the selected area.
	Shrink Selected Area	Reduce the selected area each time you press the button.
	Expand Selected Area	Expand the selected area each time you press the button.
	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.

How to Fill Holes in the Data

Use “Fill Holes” to fill in any holes left from scanning or fill in deleted areas.



1. 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.

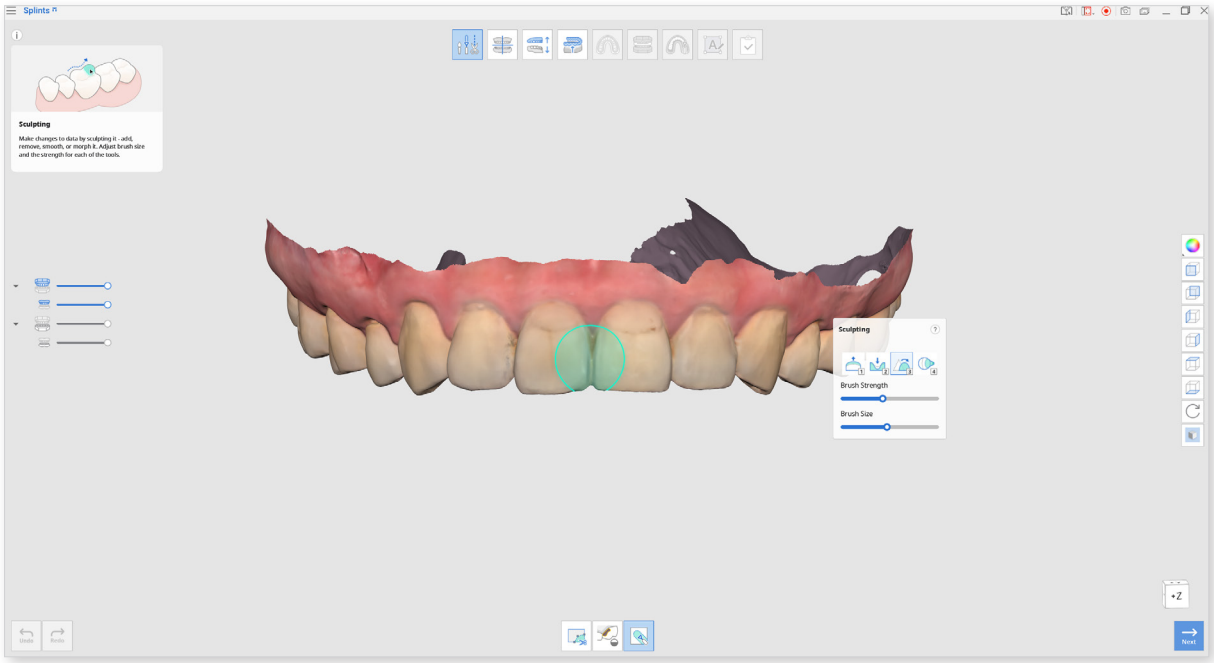
2. Use Neighboring Colors for Filled Holes
   When the “Use Neighboring Colors for Filled Holes” box is checked, the program will use the colors around the holes for filling, otherwise filled areas will be grey.

3. Press the “Apply” button to apply the results.

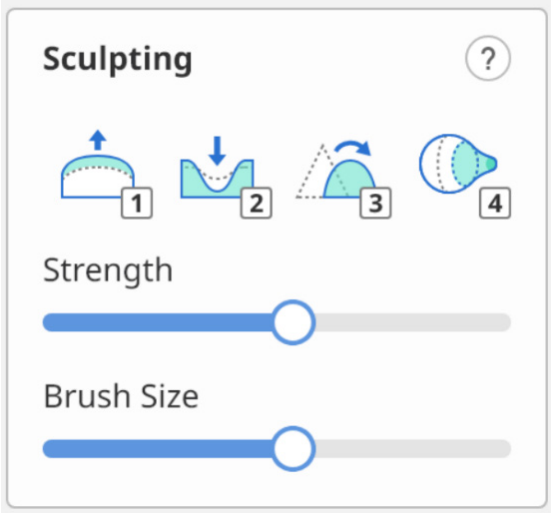
How to Sculpt Data

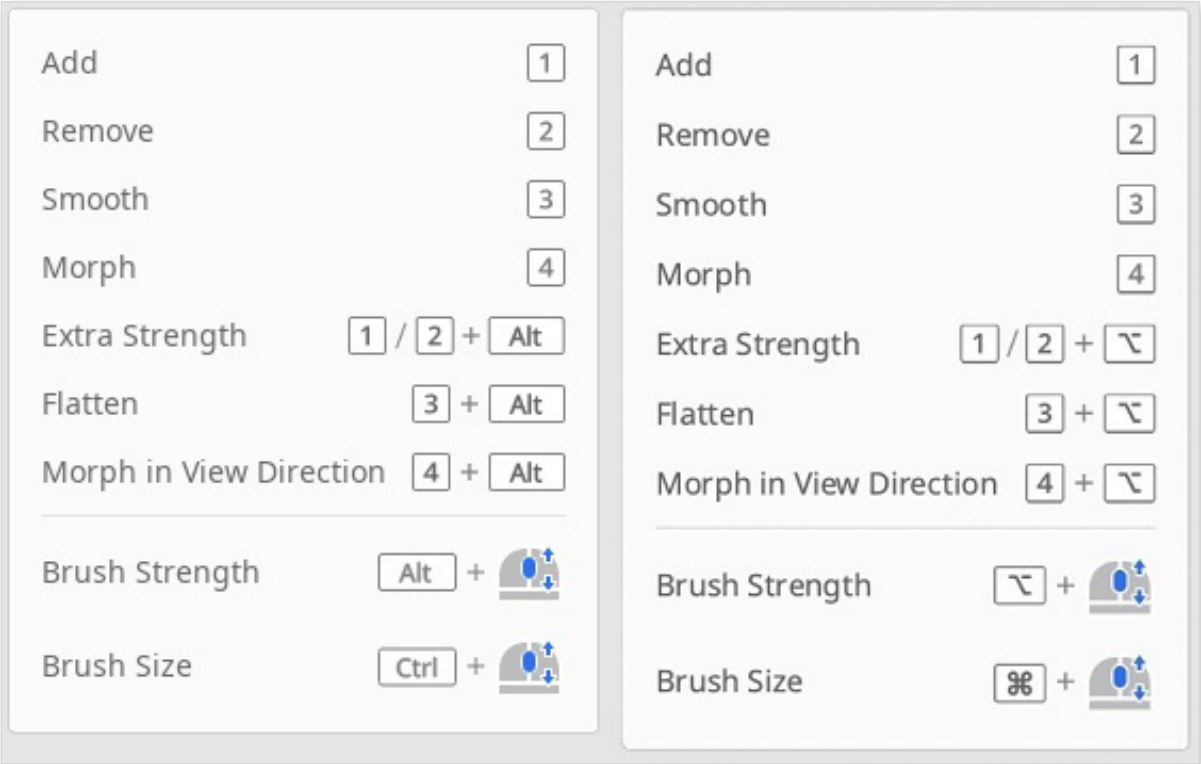
Selecting the “Sculpting” tool to make changes to the data.

The sculpting tools allow you to add, remove, smooth or morph parts of the data.

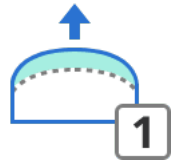
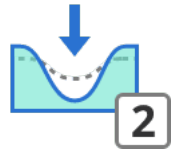
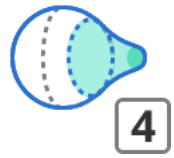


Toolbox: Sculpting





<Sculpting shortcuts for Windows and macOS>

Icon	Tool	Description
	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

Click “Next” when you are done editing.

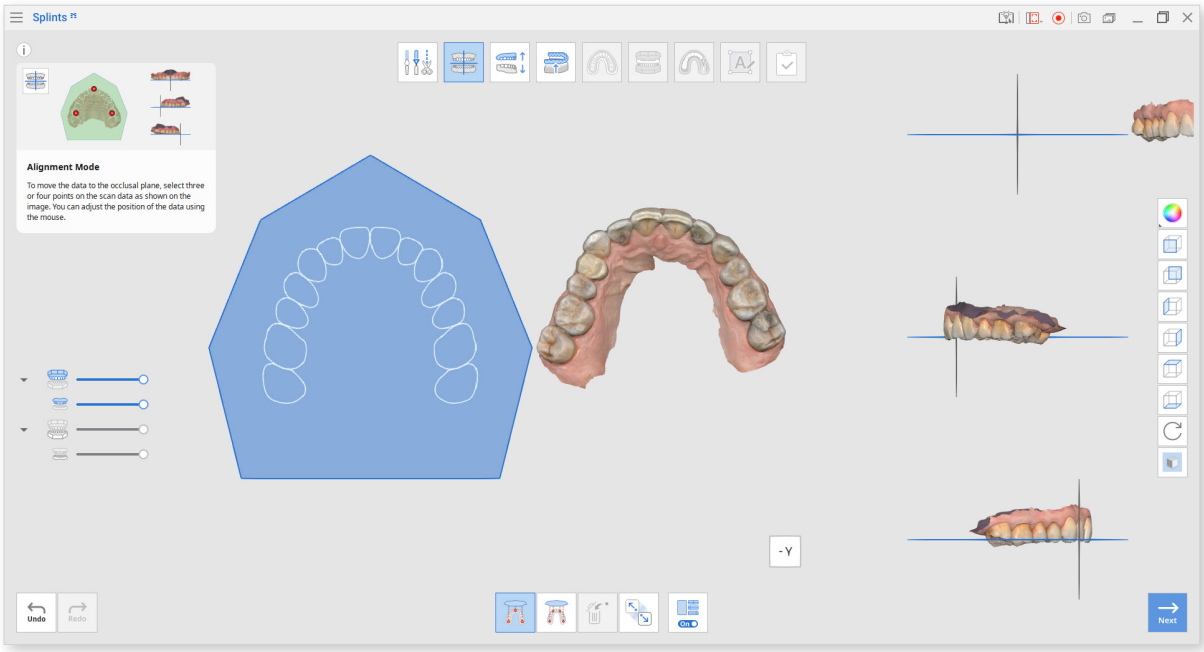
Alignment Mode

This stage will initially automatically align the data to the virtual occlusal plane.

Once complete you can make further manual adjustments if required.

If alignment has already been completed in Medit Scan for Clinics or Labs, you can skip this step.

> It is recommended that you always check alignment at this stage to ensure the proper positioning of the data.

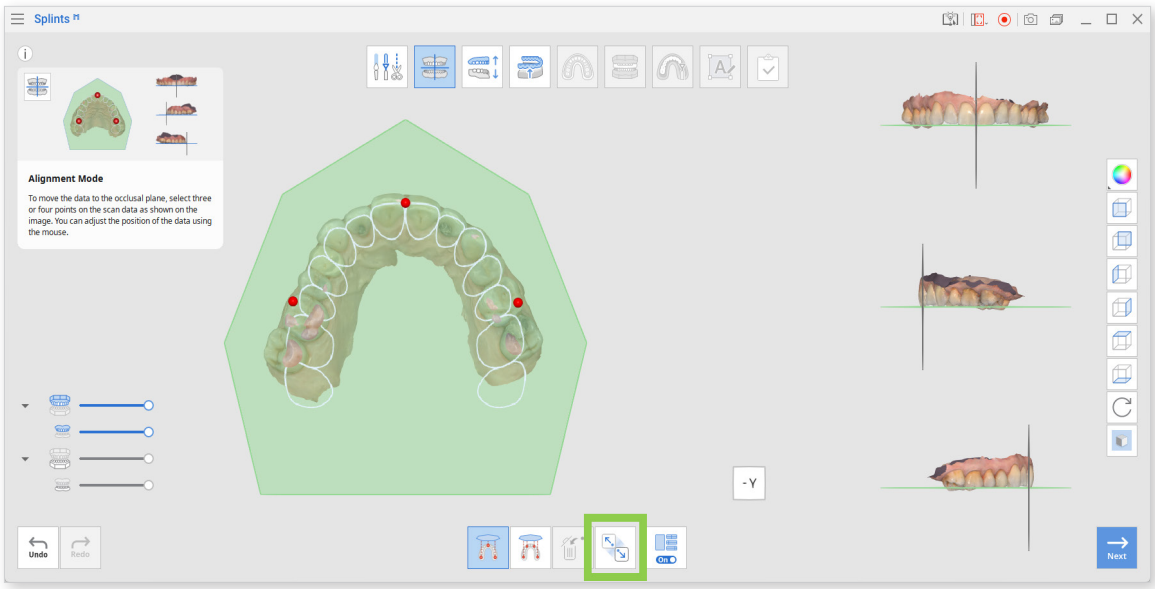


Toolbox

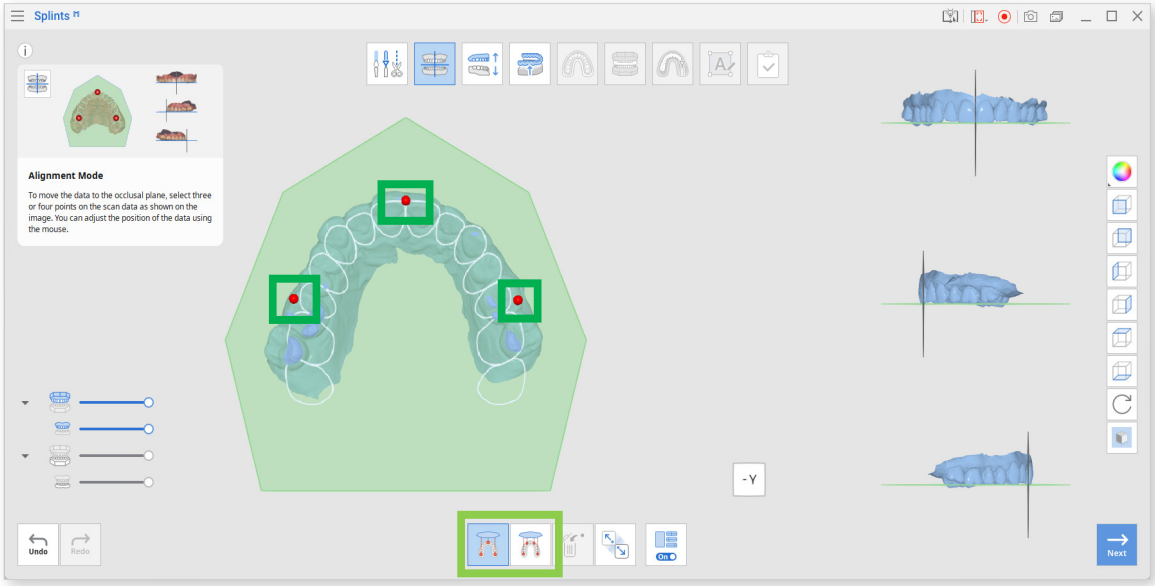
Icon	Tool	Description
	Align with Occlusal Plane by Three Points	Select three points on the maxilla and mandible to align with the occlusal plane.
	Align with Occlusal Plane by Four Point	Select four points on the maxilla or mandible to align with the occlusal plane. It is beneficial when there are no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

To manually realign the data to the occlusal plane, follow these steps:

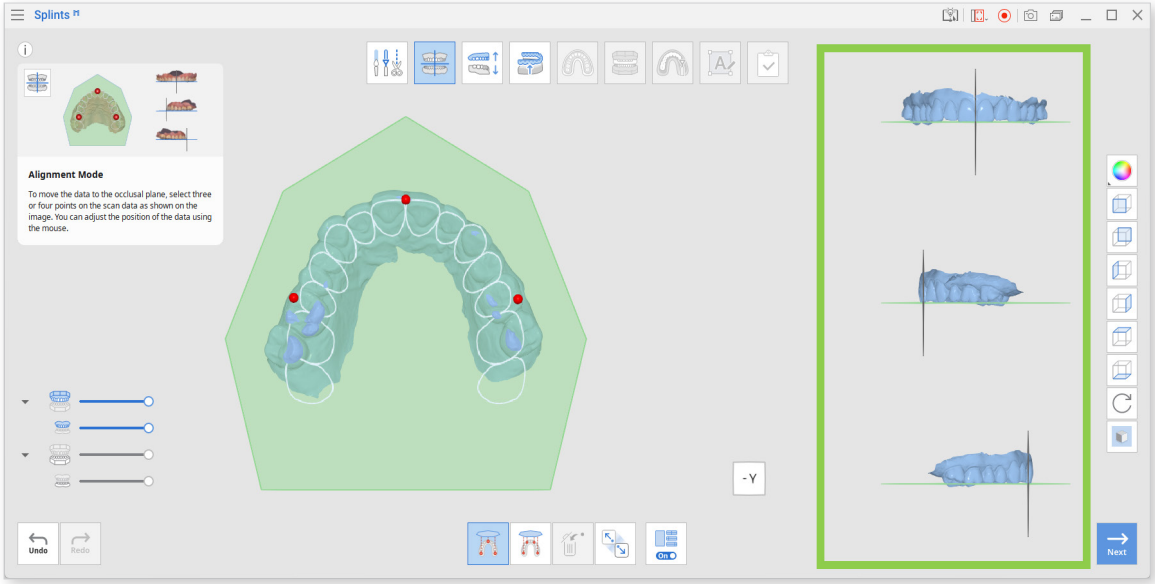
1. After the automatic alignment is complete, click “Detach Data”.



2. Then place three or four points on the data for the program to align the data to the occlusal plane.



3. Use the Multi-View on the right to move the data around and control the alignment process.



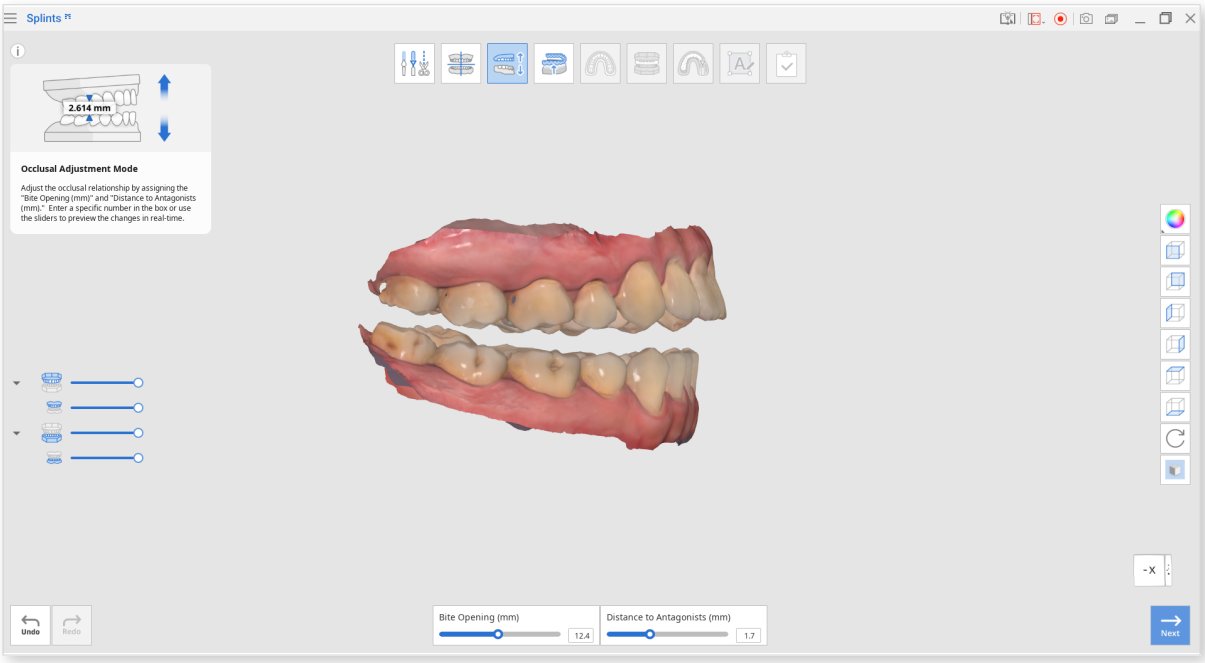
If you turn the Multi-View off, only the occlusal plane will be displayed.

4. Click “Next” when finished.

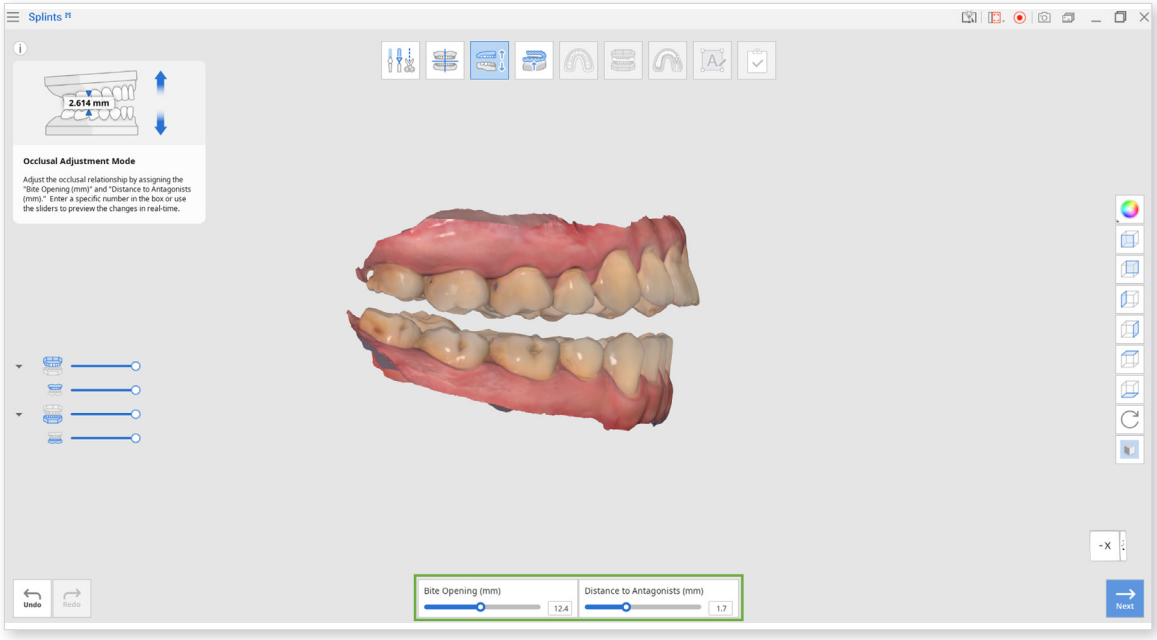
Occlusal Adjustment Mode

In this stage, you will be creating space for the splint by adjusting the occlusal relationship between the maxilla and mandible.

If the occlusion was scanned in an opened state or there is only one existing arch, you can skip the “Occlusal Adjustment Mode.”



1. To adjust, move the slider or enter a specific number in the boxes for the bite opening and distance to the antagonist to adjust the occlusal relationship.



Toolbox

Icon	Tool	Description
	Bite Opening(mm)	Set the degree of bite opening in the virtual articulator.
	Distance to Antagonist (mm)	Set the closest points between occlusal surfaces of maxilla and mandible.

The distance to the antagonist must be larger than 0.0.

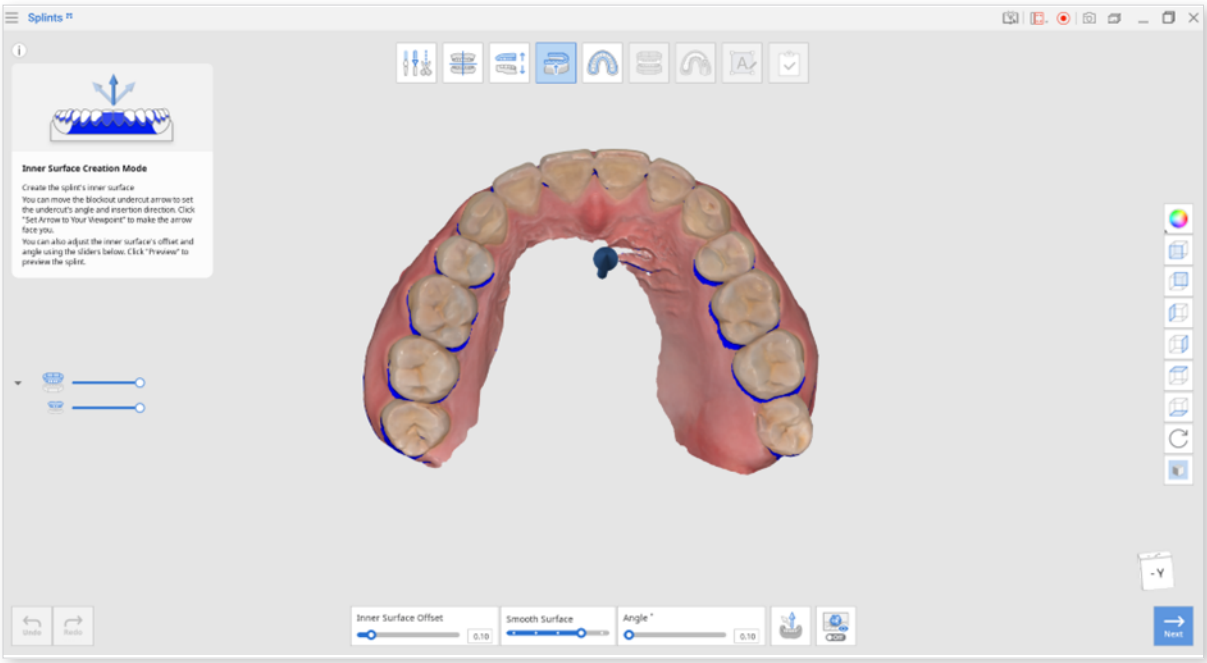
If it is set to 0.0, there is no space for the splint and you cannot move to the next stage.

Set this parameter to create a splint with sufficient occlusal thickness.

2. Click “Next” when finished.

Inner Surface Creation Mode

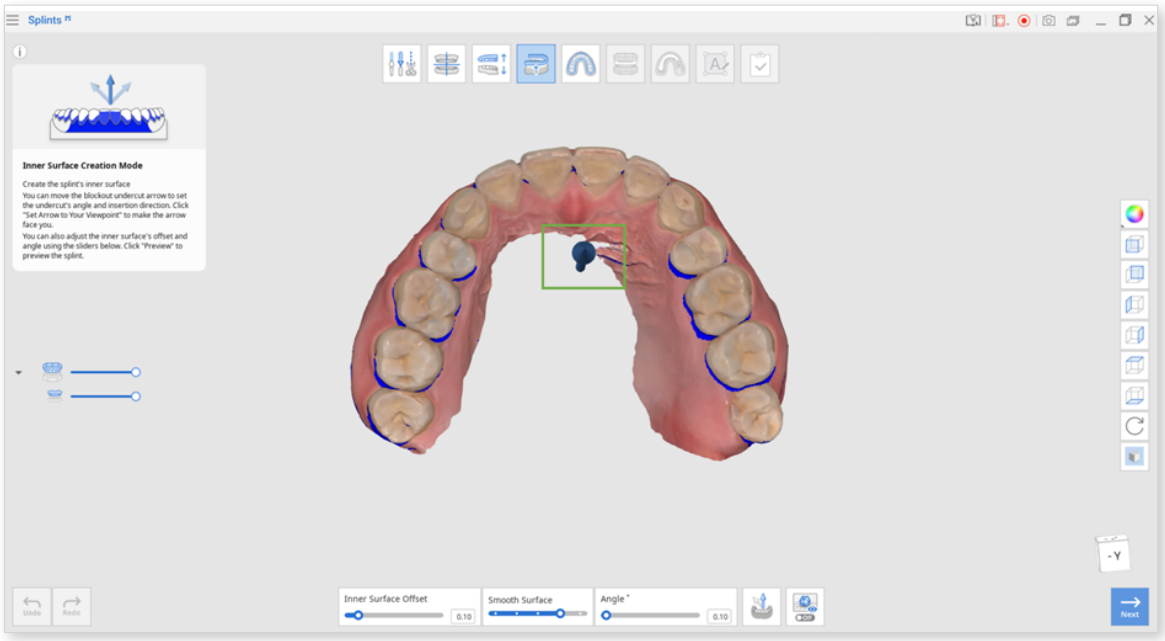
In this stage you will create the splint’s inner surface by making adjustments to the inner surface offset, blockout direction, and blockout amount.



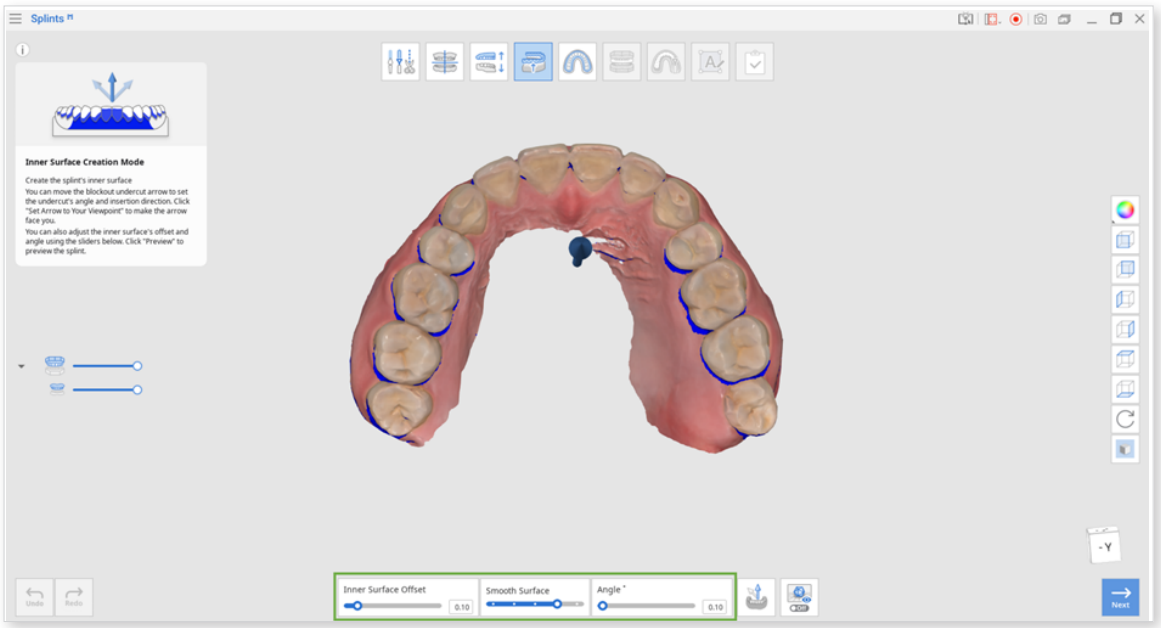
Toolbox

Icon	Tool	Description
	Inner Surface Offset	Set the offset distance from the data to create the splint's mesh.
	Smooth Surface	Smooth out the inner surface of the splint. Move slider to the right to add smoothness.
	Angle	Set the blockout angle.
	Set Arrow to your View Point	Change the direction of the blockout undercut arrow to face you.
	Preview	Preview the data with a blockout undercut.

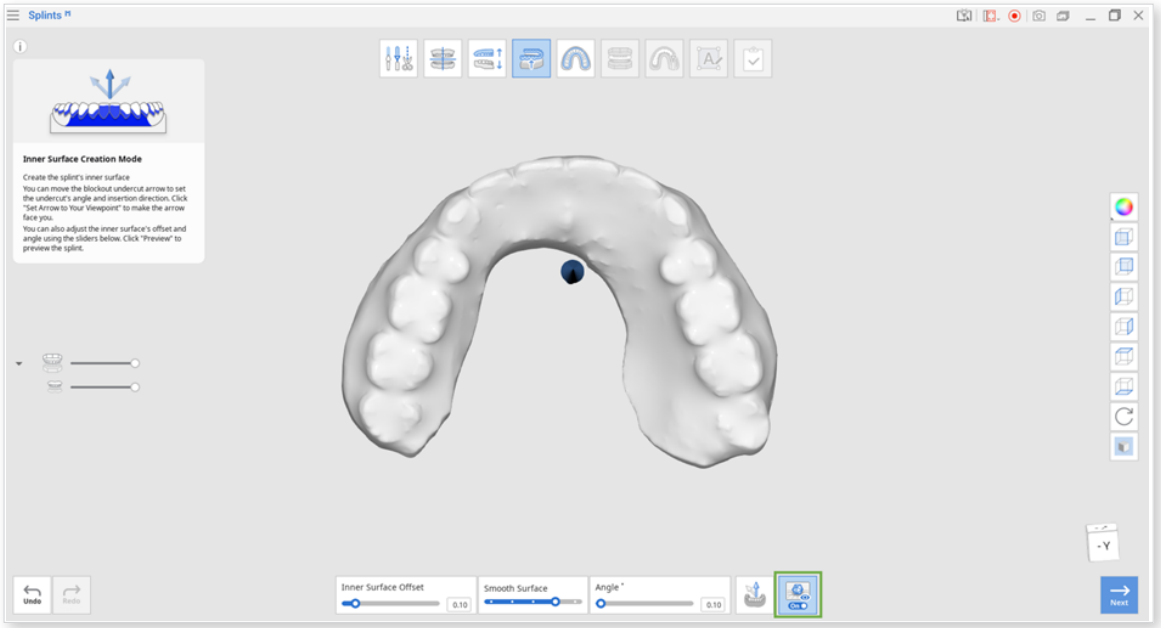
1. Click and hold the arrow to move it freely and set the blockout undercut's direction. The data that is part of the blockout area will be shown in blue.



2. Set the inner surface offset, surface smoothness, and the blockout angle to adjust the splint’s tightness.



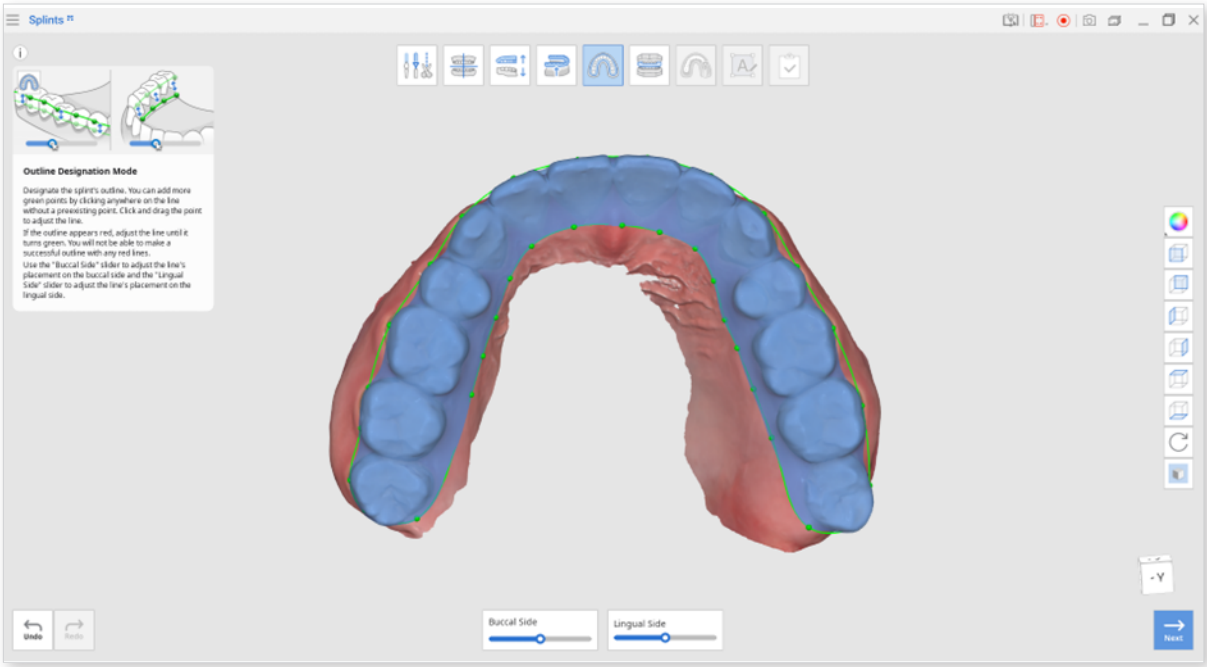
3. Click “Preview” to preview the data with the blockout undercut.



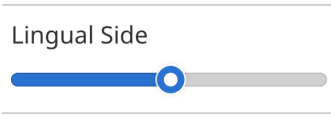
4. Click “Next” when finished.

Outline Designation Mode

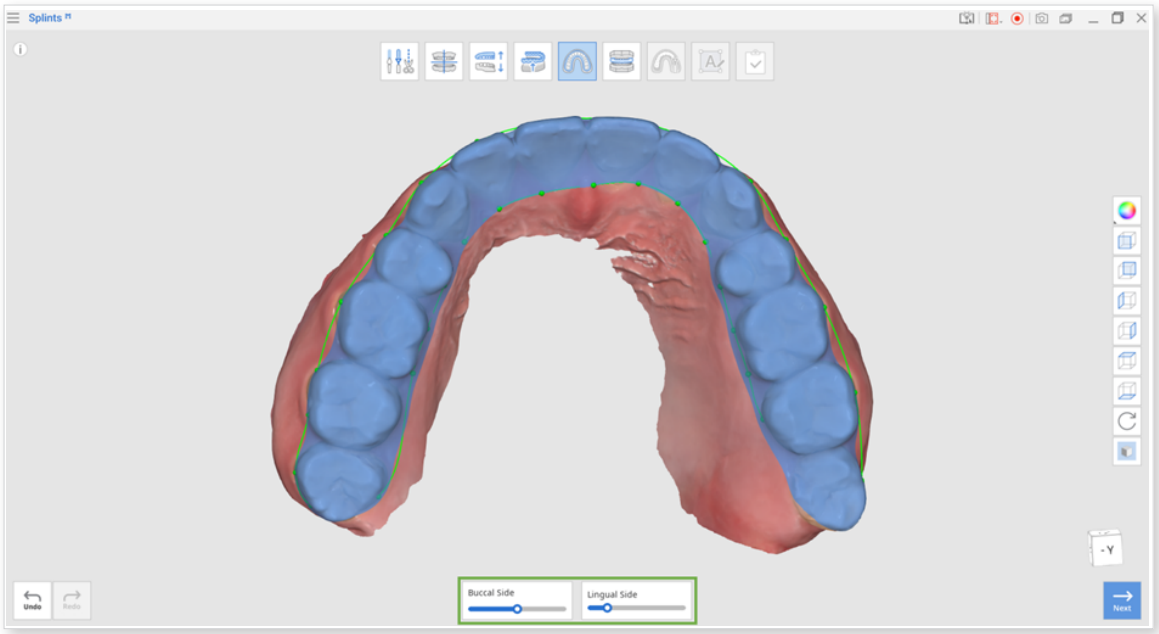
In this step, you will create the outline for the splint on the buccal and lingual sides.



Toolbox

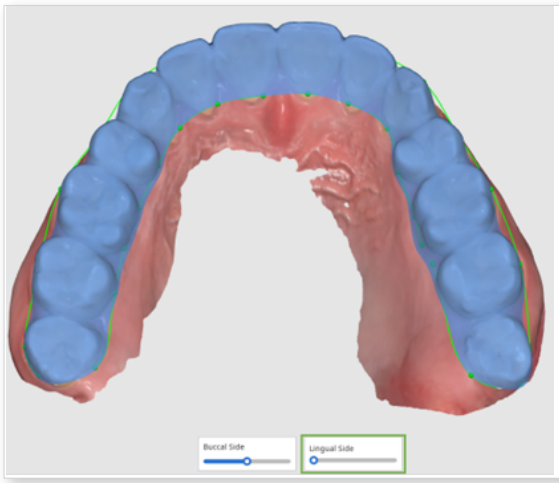
Icon	Tool	Description
	Buccal Side	Adjust the outline on the buccal side. Move the slider to the right to bring the outline closer to the gingiva.
	Lingual Side	Adjust the outline on the lingual side. Move the slider to the right to bring the outline closer to the gingiva.

1. In Outline Designation Mode, an outline will automatically be generated for you. If you need to modify the outline, move the green point of the outline using your mouse or use the “Buccal Side” and “Lingual Side” sliders at the bottom.

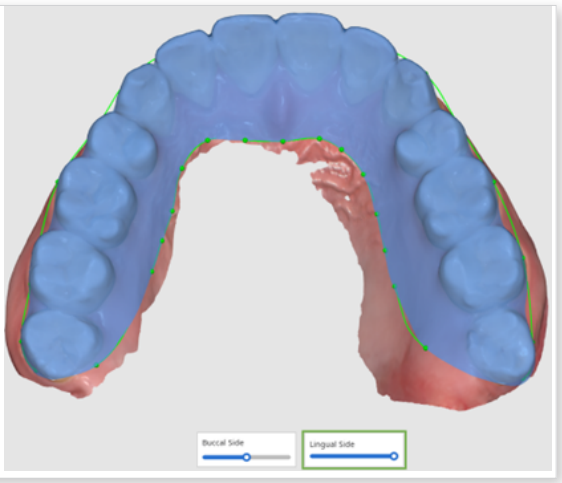


When you slide the Buccal Side’s slider to the left

When you slide the Buccal Side’s slider to the right

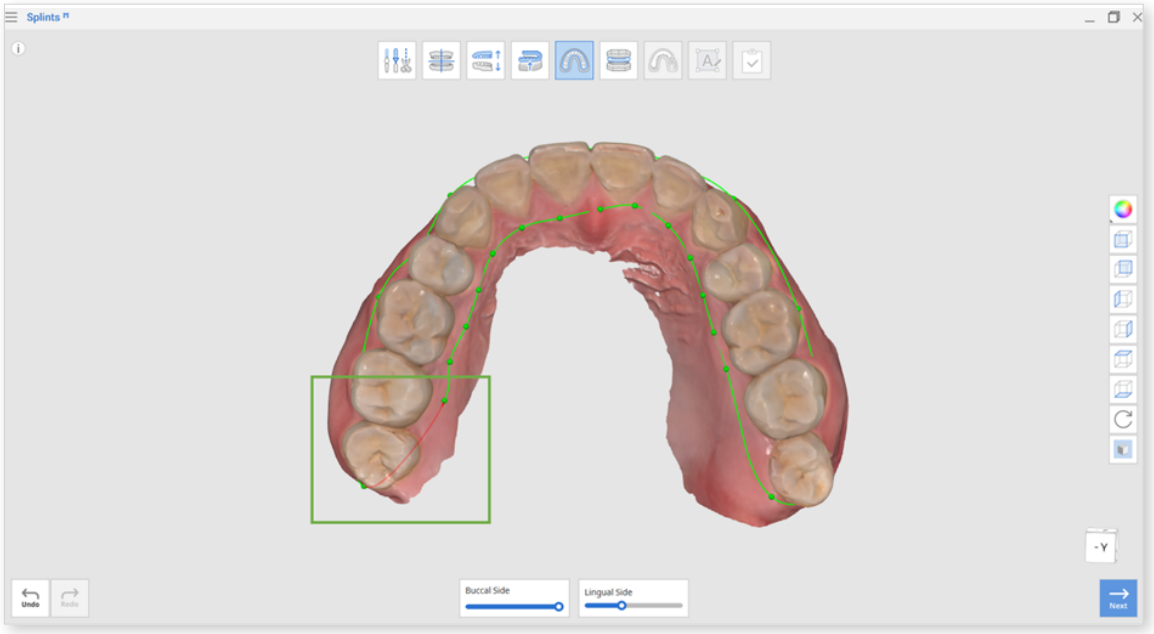


When you slide the Lingual Side’s slider to the left

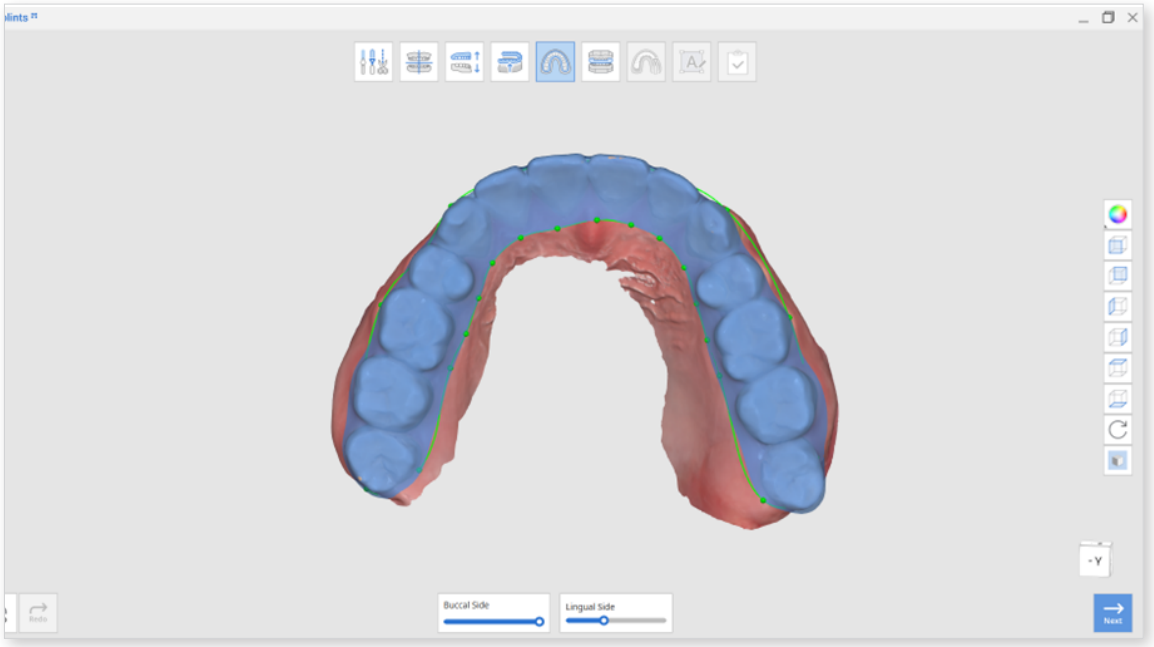


When you slide the Lingual Side’s slider to the right

2. If any section of the outline is red you will need to adjust the line until it is green. You will not be able to move to the next stage if there are any red sections.



3. When the data has been correctly outlined, the selected area is displayed in blue. Left-click on the outline to create additional green points and right-click to delete the green point.



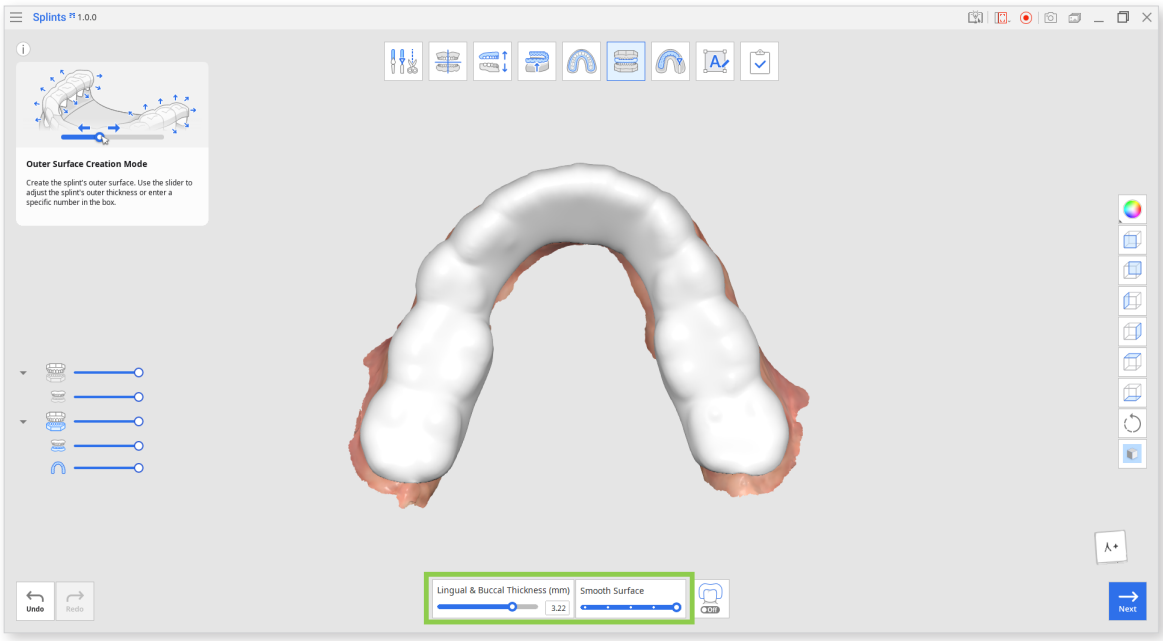
4. Click “Next” when finished.

Outer Surface Creation Mode

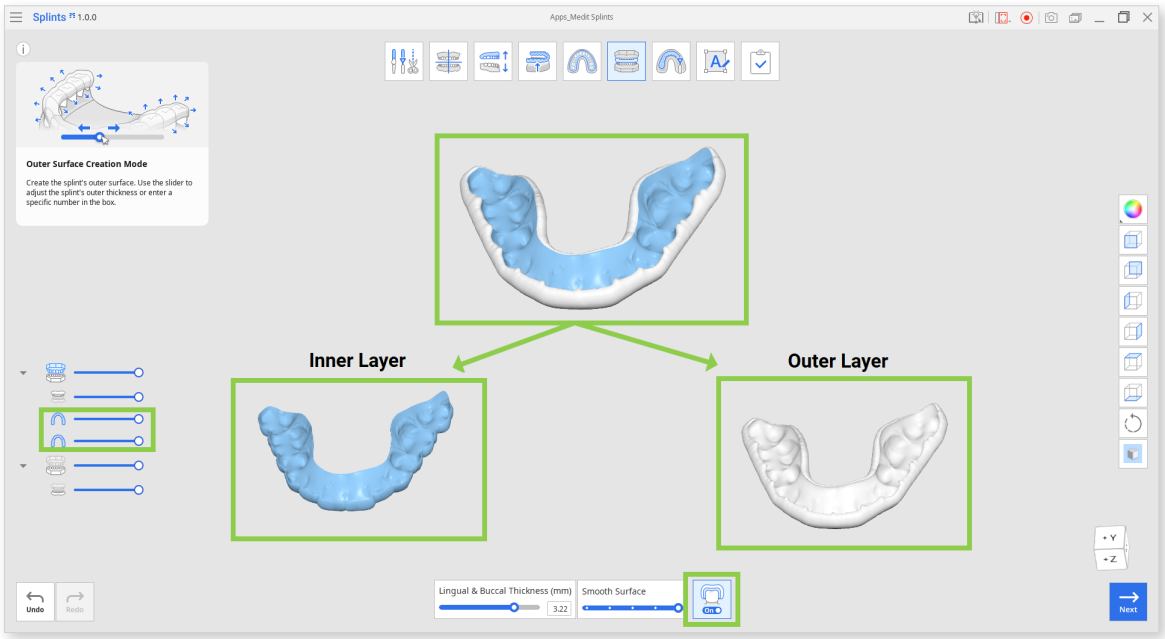
In this stage, you can edit the created outer surface using the provided tools.

1. Move the “Lingual & Buccal Thickness” slider to the right to add splint thickness on the lingual and buccal surfaces simultaneously. Thickness for the occlusal surface will be created automatically based on the distance to the antagonists.

2. Use the “Smooth Surface” slider to remove any roughness in the splint’s outer surface.



3. You can make a dual-material splint if your printer uses the MultiJet printing technology. For this, turn on "Dual Layer Splint" at the bottom, and your splint will be divided into outer and inner layers.



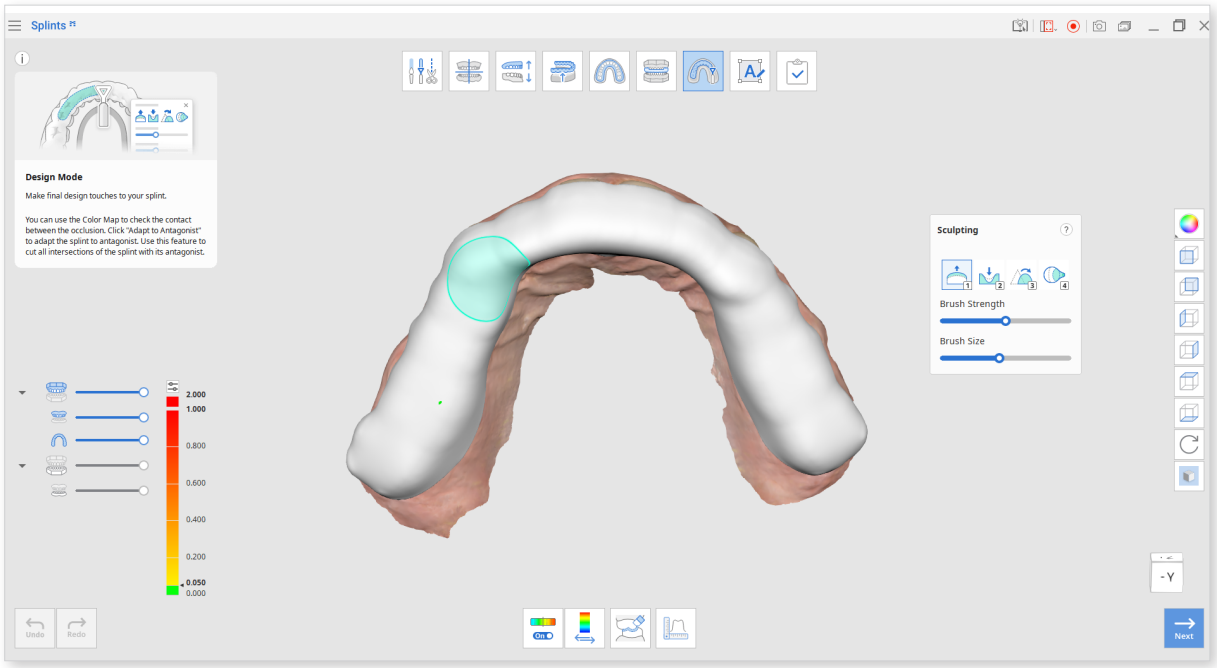
Toolbox

Icon	Tool	Description
	Lingual & Buccal Thickness	Adjust the splint thickness on lingual and buccal surfaces.
	Smooth Surface	Smooth out the outer surface of the splint.
	Dual Layer Splint	Split the splint mesh into the outer and inner layers for dual-material printing.

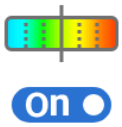
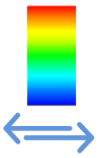
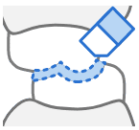
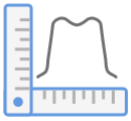
4. Click “Next” when finished.

Design Mode

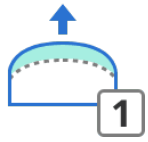
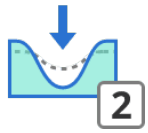
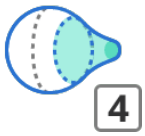
In this Mode, you can make the final design adjustments to your splint. Use the provided tools to analyze the occlusal contact points and cut out intersections of the splint with the antagonist. You can also check thickness of the splint after designing.



Toolbox

Icon	Tool	Description
	Color Map On/Off	Turn on/off the color map.
	Switch Deviation Display Area	Switch deviation display scale between all data and contact area only.
	Adapt to Antagonist	Adapt the splint to the antagonist.
	Measurement Tools	Create section lines and measure the distance between points.

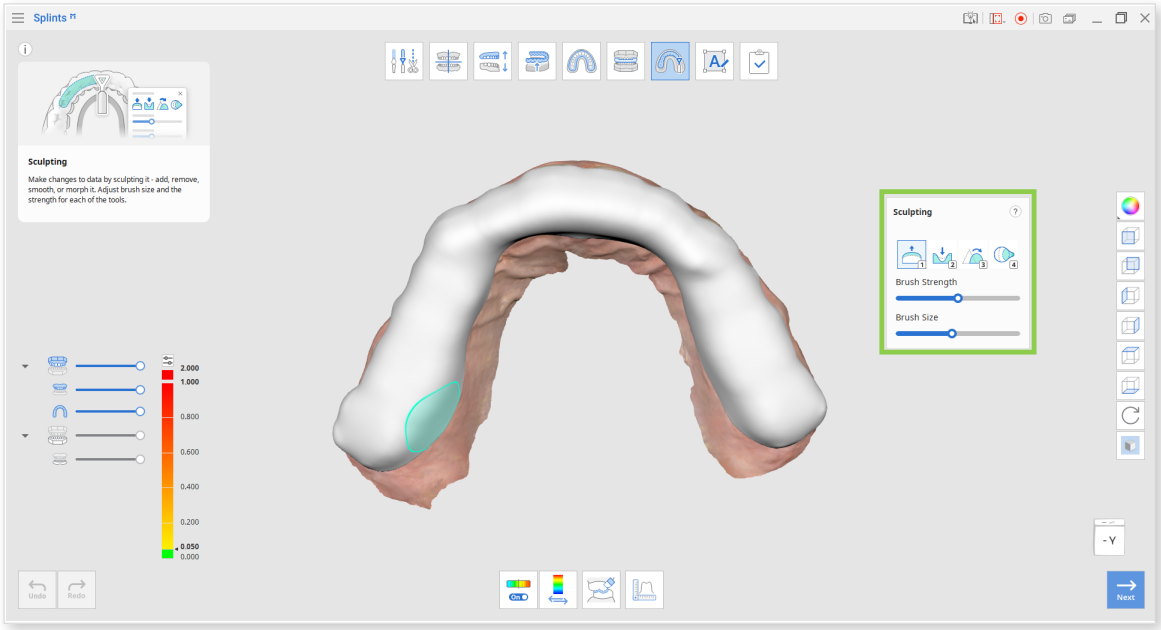
Toolbox: Sculpting

Icon	Tool	Description
	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

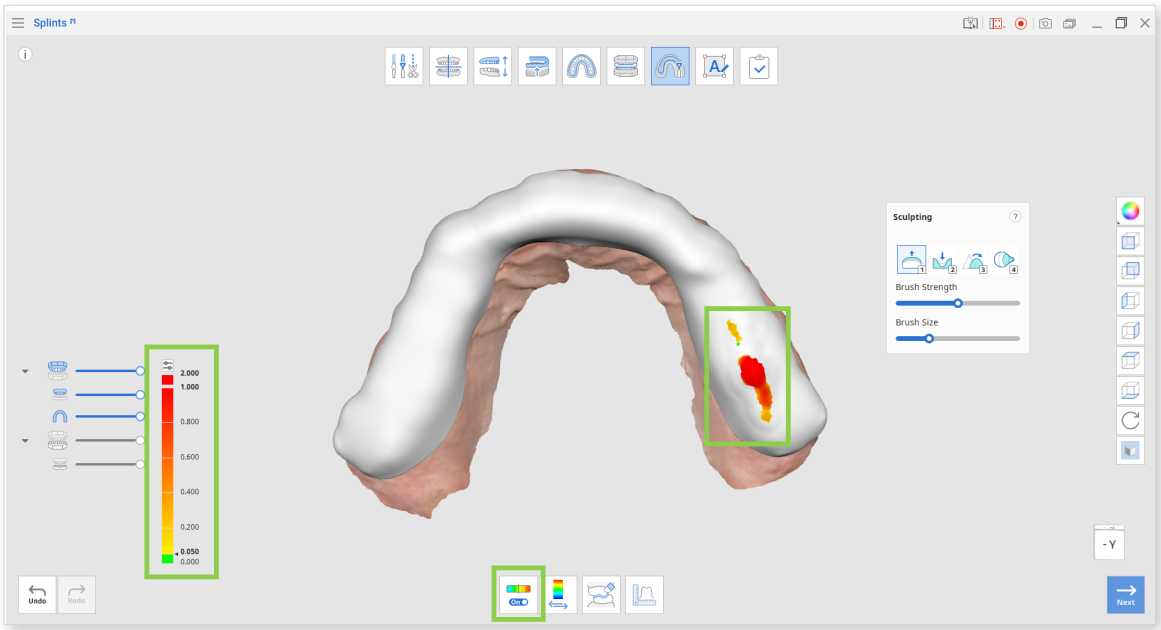
Toolbox: Measurement Tools

Icon	Tool	Description
	Create Sections	Create section lines.
	View Perpendicularly to Section Line	Orient the view perpendicularly to the section line.
	Measure Distance by Two Points	Measure the distance between two points.
	Measure Distance by Three Points	Measure distance between the point and the line defined by another two points.
	Delete Measurement Results	Delete measurement results and section lines by clicking on each of them.

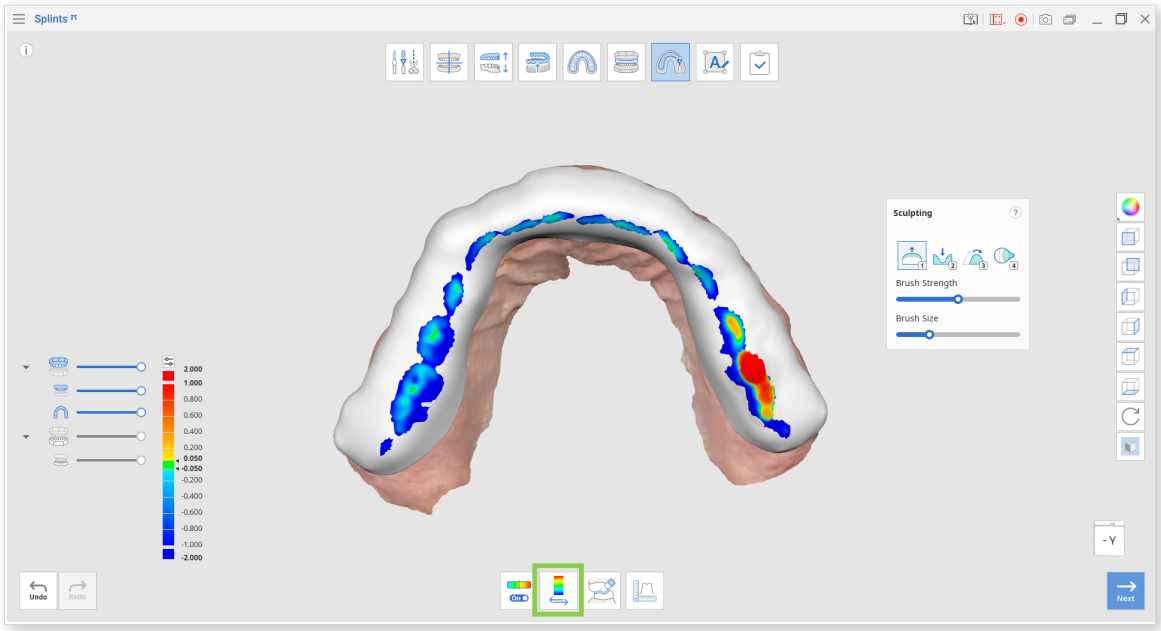
1. The Sculpting Tool will help you add, remove, smooth or morph the outer surface of the splint. Use it to make fine adjustments to the splint's surface.



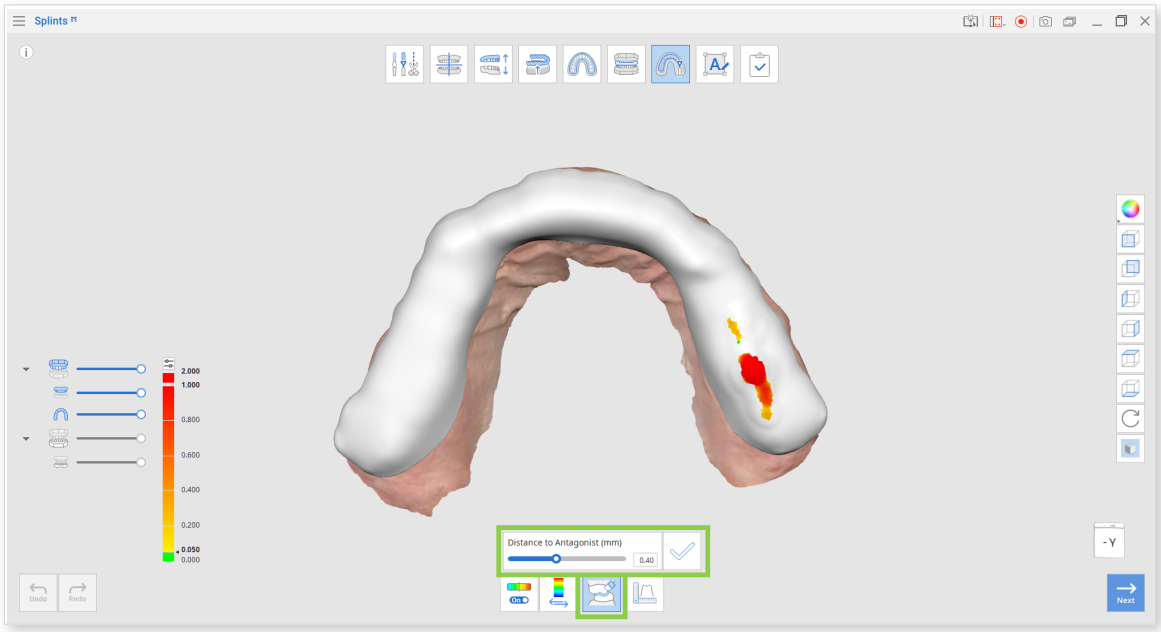
2. When the Color Map is on, the red areas will show you the intersections between the data.



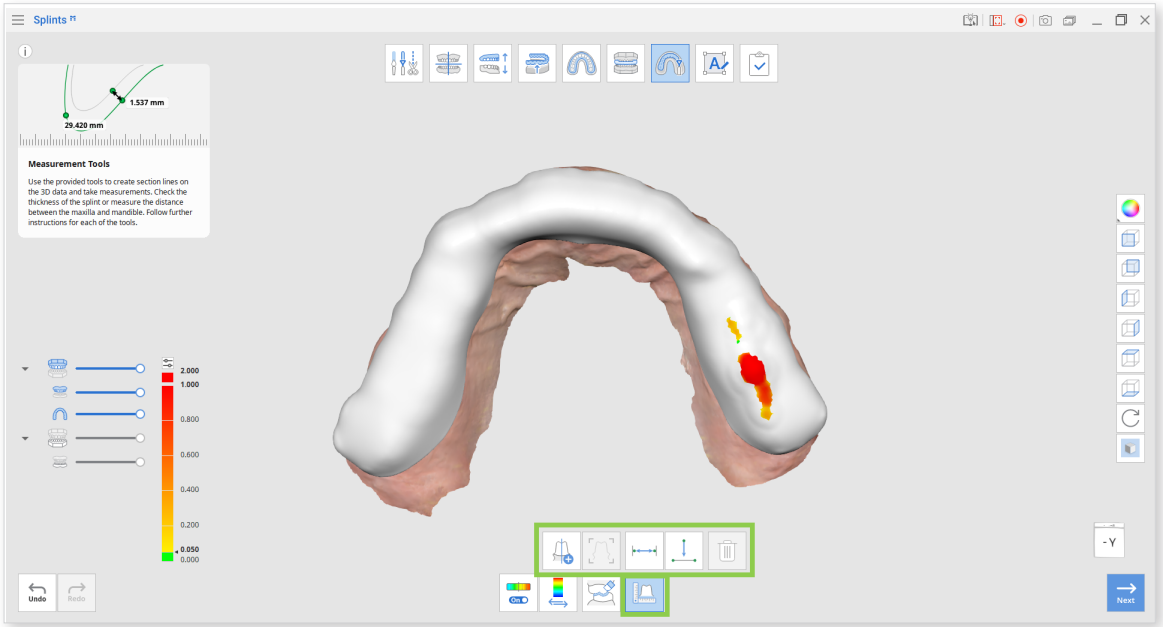
3. Click “Switch Deviation Display Area” to check the distance to antagonists.



4. To cut all intersections of the splint with antagonists, click “Adapt to Antagonist.”



5. Use “Measurement Tools” to review the thickness of your splint after sculpting and editing its design. Create section lines on the 3D data and then measure distances by selecting points on the lines.

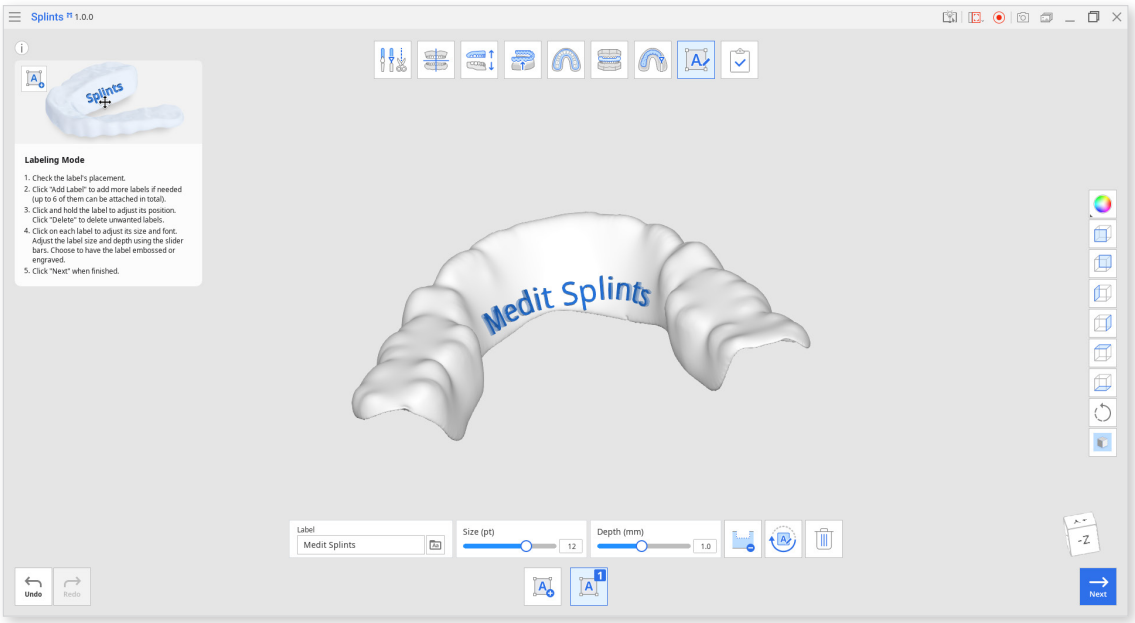


6. Click “Next” when you're finished designing the splint.

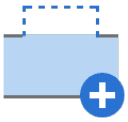
Labeling Mode

Labeling Mode provides features for creating and managing labels on the splint surface. The default label (Label #1) will be automatically created on the outer surface of the splint.

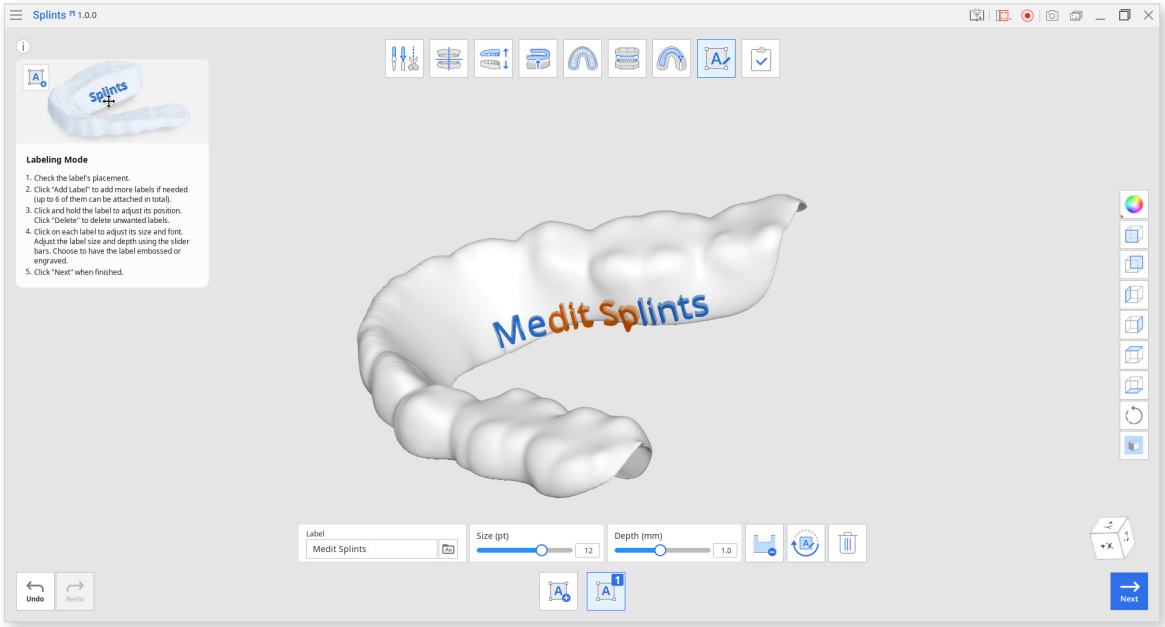
Working in this mode is optional.



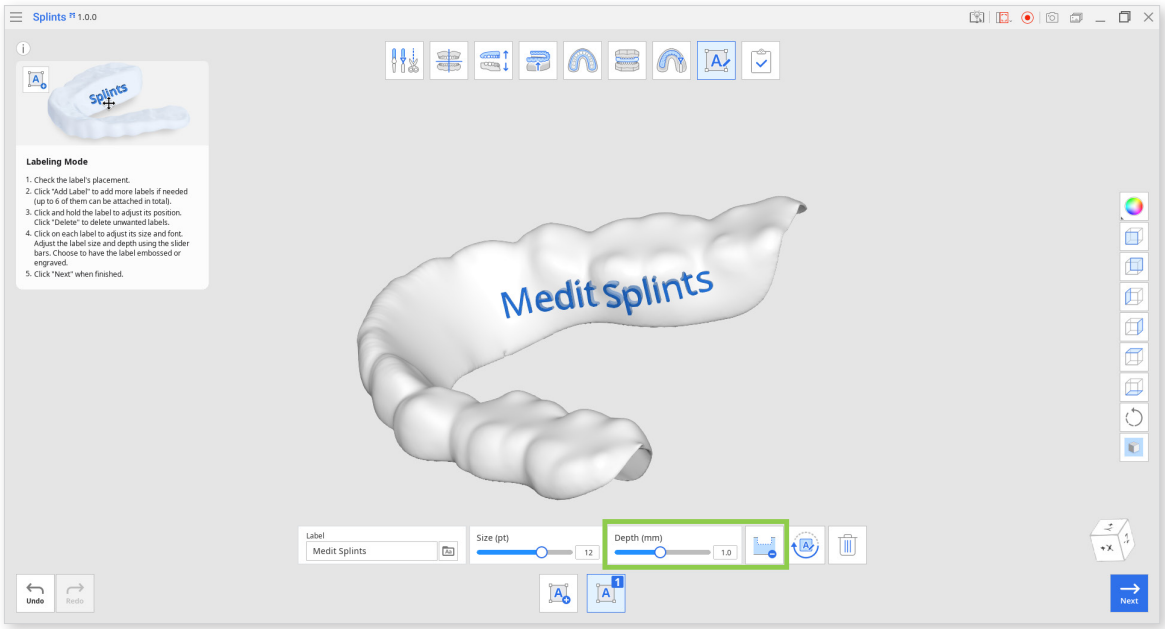
Toolbox

Icon	Tool	Description
	Add label	Add a label to the splint.
	Manage Label #1	Edit, emboss, or engrave label #1.
	Manage Label #2	Edit, emboss or engrave label #2.
	Label	Enter the text to appear as a label.
	Font	Choose a font for the label.
	Size	Set the label size.
	Engraving	Label the splint by engraving.
	Embossing	Label the splint by embossing.
	Rotate 180°	Turn the selected label by 180°.
	Delete	Delete the current label.

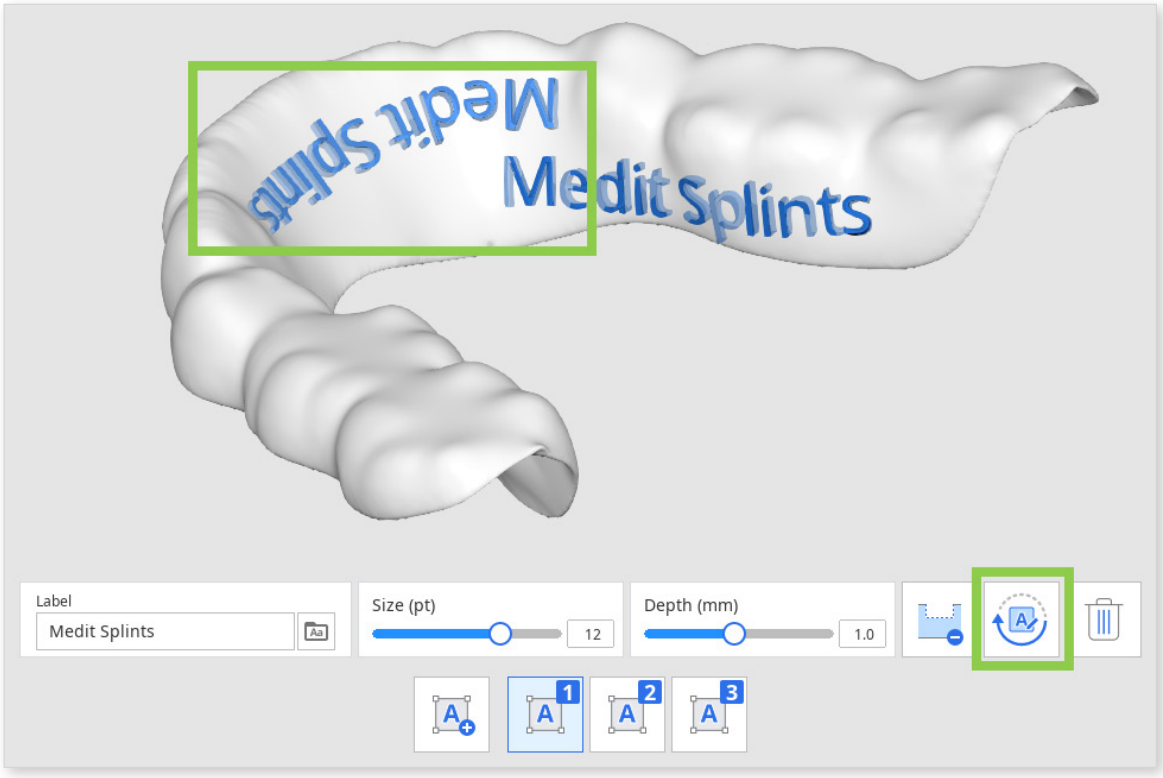
1. Check the placement of the automatically attached label. If any portion of the label is shown in orange, move it by dragging until it is entirely blue.



2. Click “Embossing/Engraving” to change the marking process. You can adjust the default labeling depth parameters.



3. You can rotate any of the created labels by clicking it and then using “Rotate 180°.”



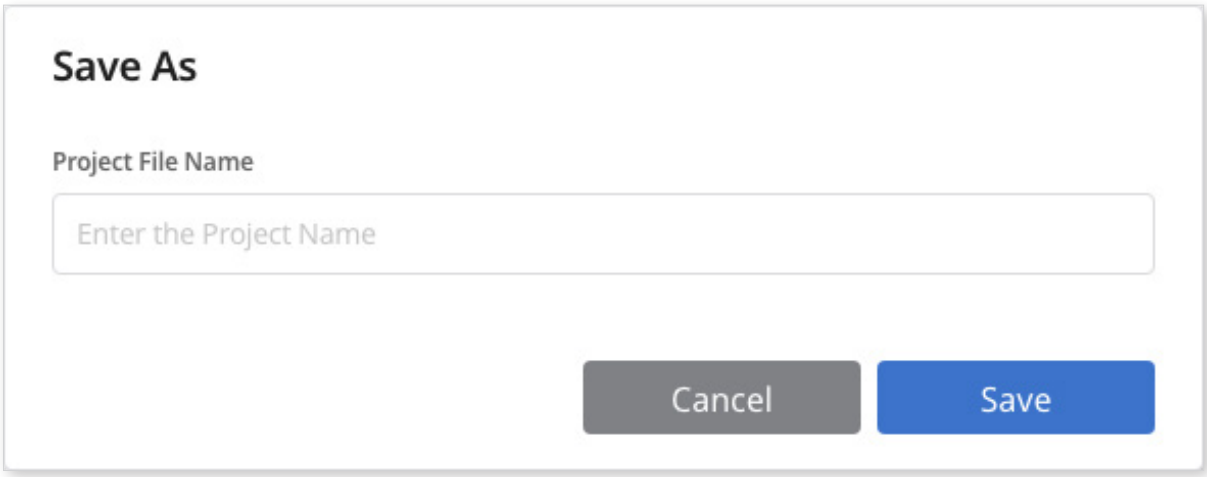
4. Select the label number at the bottom and click “Delete” to delete the label.

5. Select labels one by one to edit their font and size.

6. Click “Next” when finished.

Complete

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



Check the data in your Medit Link case.