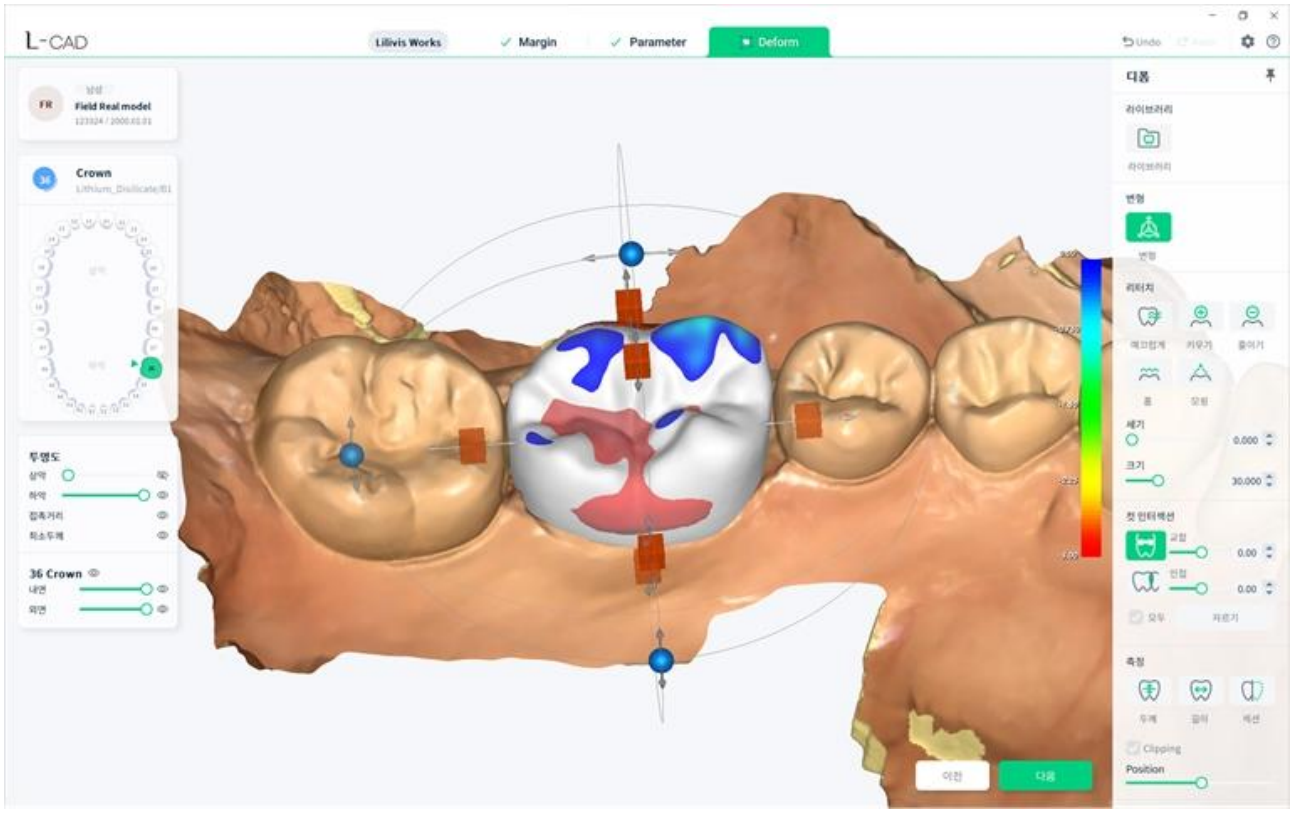
ENG

Lilivis CAD

L-CAD

USER MANUAL



IMPORTANT NOTICE

This user manual's contents were examined carefully in detail, and we believe that they are accurate in overall. However, the manufacturer does not assume any responsibility for any latent mistake or omission that results from the use of information included in this user manual. The manufacturer has the right to modify this product or product specifications any time, without special notification, and this modification may not be renewed in this document. The manufacturer does not guarantee any responsibilities for abnormal symptoms causing from the installation of S/W not related to the equipment.

■ Revision History

Revision	Date	Approval	Description
A	2023.01.19	정 광 영	First issued
B	2024.08.26	정 광 영	Added Provisional crown step Added Pontic step Added Pre-op Added Quick function Modified UI color

CE

9000ENG0129-B
(24.08.26)

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CONTENTS

SAFETY PRECAUTIONS **4**

1.1. Overview 4

Symbol Information **5**

2.1. Usage Precautions 6
2.2. Safety Precautions 6
2.3. Preface 8

INTRODUCTION **9**

3.1. System Outline 9
3.2. Intended Use 9
3.3. Contraindications 9
3.4. User Profile 9
3.5. Classification 9
3.6. Applied Standard List 9

Using the Software **10**

4.1. Lilivis Works User Interface 10
4.1.1 Create for patient and case 11
4.1.2 Run CAD 13
4.2. L-CAD User Interface 14
4.3. Mouse 14
4.4. Workflow Bar 14
4.5. Patient Information 15
4.6. Software Navigation 15

Design **16**

5.1. Work Steps 16
5.2. Import Data 16
5.2.1 Pre-op Edit 17
5.3. Margin 17
5.4. Parameter step 22
5.5. Deform step 24
5.5.1 Library 25
5.5.2 Retouch 25
5.5.3 Measurement 27
5.5.4 Pre-op 28
5.6. Retouch step 28
5.7. Quick function 29
5.7.1 Edit mesh 29
5.7.2 Section 29
5.8. Finish step 29

Tools and Setting **31**

6.1. Transparency tool 31
6.2. Setting 32

Shortcut Keys **33**

7.1. Shortcut Keys 33

System Requirement **34**

SERVICE INFORMATION **35**

1

SAFETY PRECAUTIONS

1.1. Overview

Safety is everyone’s responsibility. The safe use of this software is largely dependent upon the installers, users and managers. It is prerequisite to read and understand these specifications before installing, using, fixing or revising. Fully understanding the whole instructions must be the first priority. For this reason, the following safety notices have been placed appropriately within the text of this manual to highlight safety related information or information requiring special emphasis. All users, operators, and maintainers must be familiar with and pay particular attention to all signs of Warnings and Cautions.

⚠ WARNING

“Warning” indicates the presence of a hazard that could result in severe personal injury, death or substantial property damage if ignored.

“Warning” indique la présence d'un danger qui pourrait entraîner des blessures graves, la mort ou des dommages matériels importants si ignoré.

⚠ CAUTION

“Caution” indicates the presence of a hazard that could result in minor injury, or property damaged if ignored.

“Caution” indique la présence d'un danger pouvant entraîner des blessures légères ou des dommages matériels en cas d'ignorance.

⚠ NOTE

This is used to emphasize essential information.

Be sure to read this information to avoid operating the device incorrectly.

Ceci est utilisé pour souligner les informations essentielles.
Assurez-vous de lire ces informations pour éviter de mal utiliser l'appareil.

2

Symbol Information

The International Electrotechnical Commission (IEC) has established a set of symbols for medical electronic equipment which classify a connection or warn of any potential hazards. The classifications and symbols are shown below.

Symbol	Indication
	This symbol identifies a safety note. Ensure you understand the function of this control before using it. Control function is described in the appropriate User's or Service Manual. (Ce symbole identifie une note de sécurité. Assurez-vous de comprendre la fonction de ce contrôle avant de l'utiliser. La fonction de contrôle est décrite dans le manuel d'utilisation ou d'entretien approprié.)
	CE Mark (Marque CE)
	Authorized representative in the European Community – EU ONLY (Représentant autorisé dans la Communauté européenne- EU seulement)
	Manufacturer (Fabricant)
	Date of manufacture (Il indique l'année de fabrication et le fabricant.)
	Consult instructions for use (Consulter les instructions d'utilisation)
	To indicate this product is Medical device (Pour indiquer que ce produit est un dispositif medical)
	QR code (QR code)
	Unique Device Identifier (Identifiant unique de l'appareil)
	Caution: Federal U.S Law restricts this device to sale by or on the order of a trained dental professional.

2.1. Usage Precautions

This Software as Medical device has been developed and tested in conformity with domestic & international safety standards and regulations, which guarantees the high stability of this product. This guarantees a very high degree of safety for this SaMD. The legislator expects us to inform the user expressively about the safety aspects in dealing with the device. The correct handling of this equipment is imperative for its safe operation. Therefore, please read carefully all instructions before switching on this device. For more detailed information, please contact our Customer Service Department or one of our authorized representatives.

2.2. Safety Precautions

1. A dental restoration produced with a system using L-CAD software must be inspected by a certified dentist for correct fit, static and dynamic dental properties to ensure optimal patient dental health and comfort.

2. Some tools and features use colors to guide and assess the design. Therefore, users must have the ability to recognize colors to use them effectively.

3. Make sure the margin line is placed correctly on the sharp edge of the prepared tooth, it's very important in order to obtain a healthy functioning restoration.

4. If you adjust the protected areas, turn on the Show distance map slider to promptly assess the distance from the emergence profile to the gingiva and avoid going beyond the safe limits.

5. Perform a visual inspection of the imported scans to ensure their relevance to the patient's teeth and their sufficient quality for design of restorations.

6. Repair of this software must be conducted by HUVITZ's service technicians or other authorized persons.

7. Maintenance by users must observe the User's Manual and Service Manual. Any additional maintenance may only be performed by the service technicians or other authorized persons.

8. Install and use only approved programs to ensure proper functionality of the L-CAD software.

9. Manufacturers are responsible for the safety, reliability, and performance of this instrument only when the following requirements are fulfilled.
   (1) When the software has been installed in a proper system requirement(operational environment), following the manual.

(2) When the software has been operated and maintained according to the manual and service manual.

10. In the event of a serious incident involving the device, the user shall report it to the manufacturer and the competent authority of the Member State in which the user and/or patient are established.

11. Execution of the HEALTH SOFTWARE on an IT-NETWORK could result in previously unidentified RISKS to patients, USERS or third parties;

12. The RESPONSIBLE ORGANIZATION is advised to identify, analyze, evaluate and control these risks.

13. Subsequent changes to the IT-NETWORK could introduce new RISKS and require additional analysis; Changes to the IT-NETWORK include:
    (1) changes in IT-NETWORK configuration;
    (2) addition of items (hardware and/or software platforms or software applications) to the IT-NETWORK;
    (3) removal of items from the IT-NETWORK;
    (4) update of software applications on the IT-NETWORK;and
    (5) upgrade of software platforms or software applications on the IT-NETWORK.

14. Make sure that you always have an up to date virus scanner and firewall installed on your system.

15. When the network is connected with device other than the L-CAD software, virus infection or falsified data may occur. Ensure that it is proper operation condition under an administrator.

16. Even if back up is set to be performed, if the software is not operating or if the backup location cannot be found, backup is not performed

17. In the event of a cybersecurity incident, when the software L-CAD detecting cybersecurity treats, the user shall report it to the manufacturer and the competent authority of the Member State (Section 9. – Service information)

2.3. Preface

1. This manual is valid for the Lilivis CAD software version 1.0.0 or higher.

2. Electronic instruction for use is published in PDF format. A PDF reader can be downloaded at www.adobe.com.
   Authorized people can download the manual anytime, anywhere.

3. Electonic instruction for use can be downloaded by an authorized person on the ATHENA website at http://svc.ossvis.com

4. Instruction for use can be requested on paper if required.

3

INTRODUCTION

3.1. System Outline

Designing in Chairside L-CAD software is based on 3D scans of the patient's dental anatomy produced by a compatible(intraoral) scanner. Also, the software generates geometrical output of the design for manufacturing with compatible CAM systems.

3.2. Intended Use

Chairside L-CAD is a software device intended to support the design of dental restorations such as inlays, onlays, crowns, veneers based on 3D scans of the patient's dental anatomy produced by a compatible oral scanner.

3.3. Contraindications

No specific contradictions exist

3.4. User Profile

This software must be operated only by trained and qualified person/s such as dentist or dental hygienist.

- Age: adult (> 21 years of age)
- Occupation: Dentist, Dental hygienist
- Level of training: Recommend completing training how to use it is.
- Education: Basic training is required for the use of equipment. (Obtains a certificate of qualification such as dental, medical school, etc., after completing a certain amount of education.)

3.5. Classification

- Classification of product: Class I device according to Annex VIII (Rule 11) of the Medical Device Regulation 2017/745.
- Resistance against electric shock: Not applicable.
- Protection class against electric: Not applicable.
- This device is included in MDSW (SaMD : Software as Medical Device).

3.6. Applied Standard List

- IEC 82304-1: Health software – Part 1 : General requirements for product safety
- IEC 62304: Medical device software - Software life-cycle processes
- IEC 62366-1: Medical devices - Application of usability engineering to medical devices

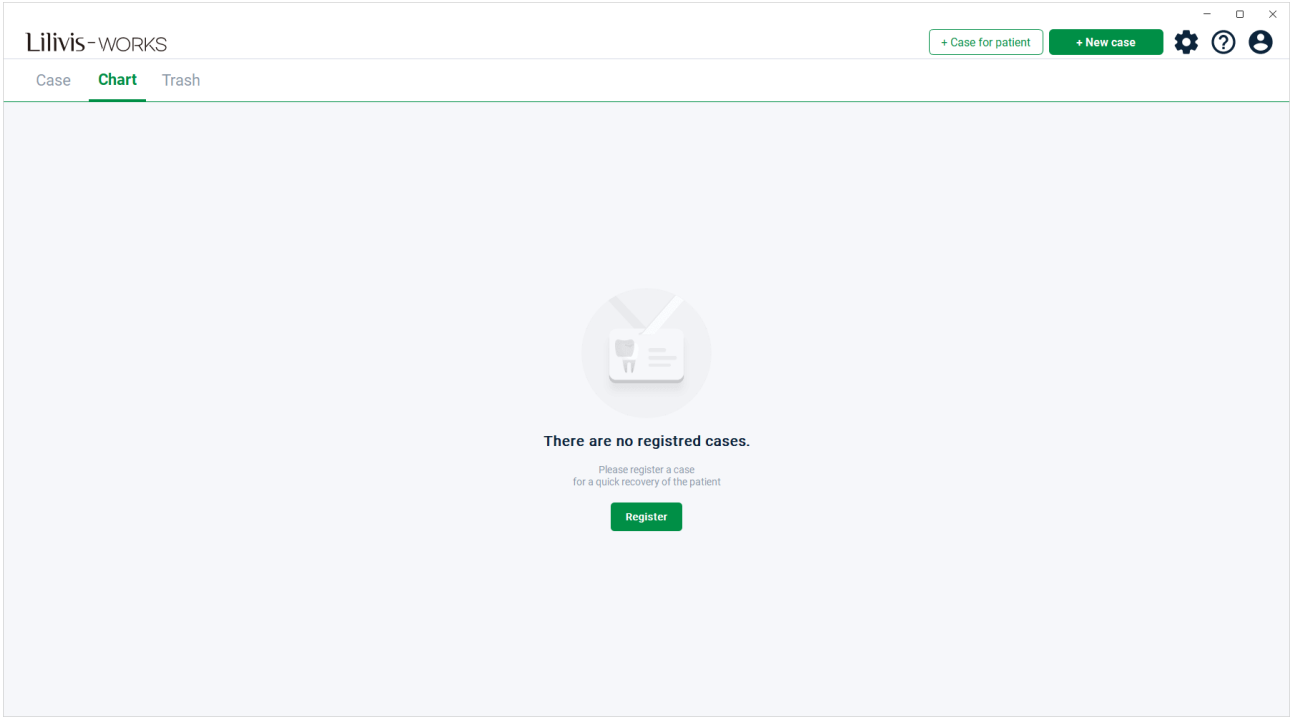
4

Using the Software

Overview

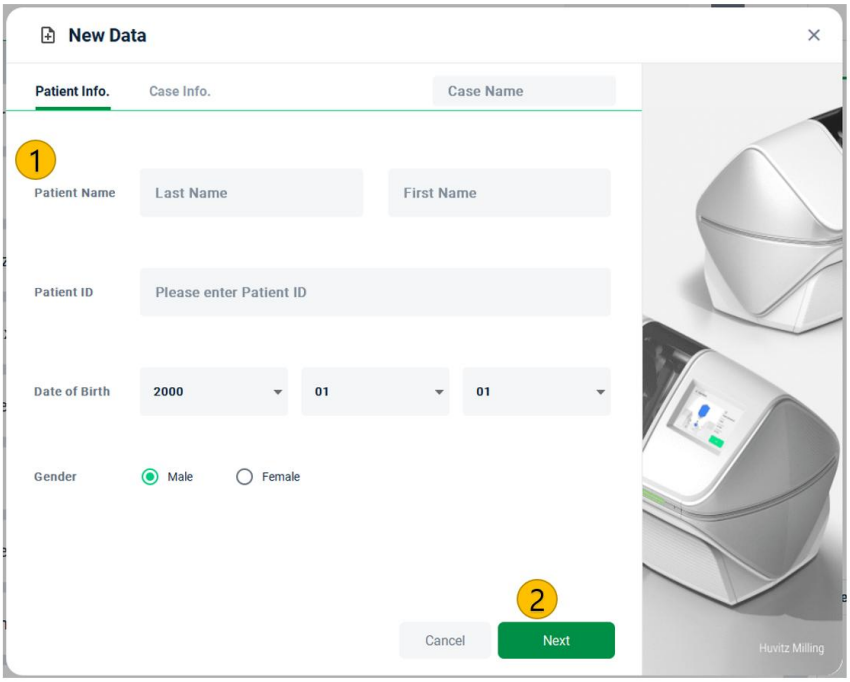
The Huvitz chairside CAD software is composed with L-CAD for designing dental restoration and Lilivis Works software. The functions for User/Admin account and data storage of patient information (including acquisition images) management can be conducted with Huvitz Lilivis Works software.

4.1. Lilivis Works User Interface

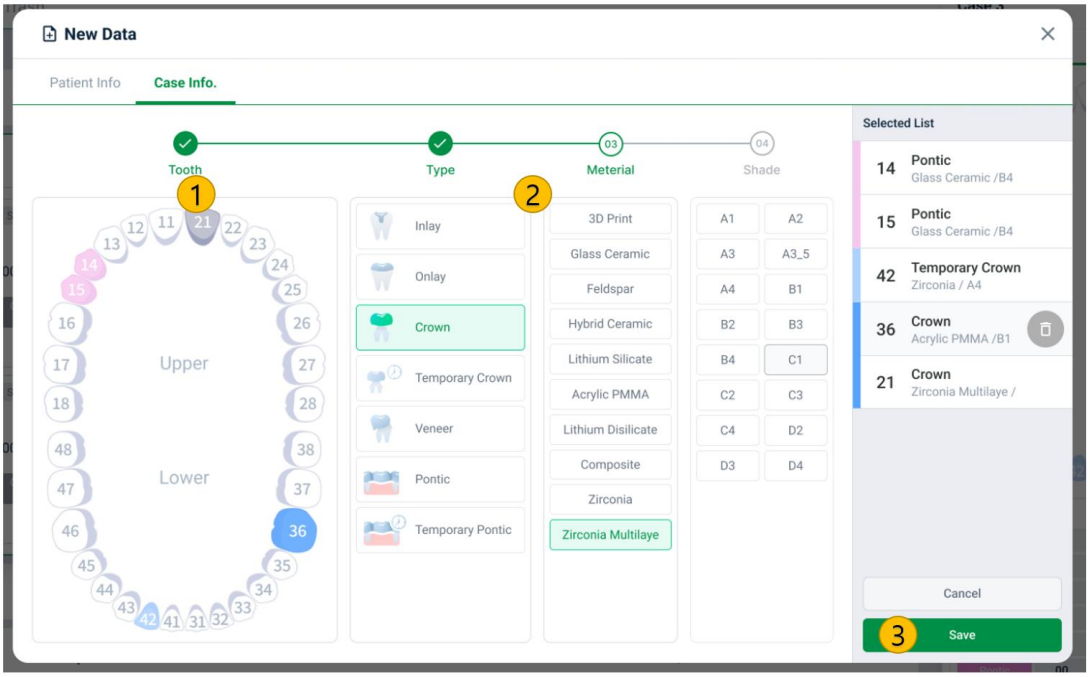


4.1.1 Create for patient and case

To set up a single pre-anatomical Crown or Inlay/Onlay, Veneer, Pontic case, click the “Case for patient” or “Register” button to create a new case for a patient. This process is only applicable using Lilivis Works(Manager) software.



1. Please fill in the patient's name and information.
2. Click “Next” button.
3. Please fill in the case information.



1. Select tooth to create item.
2. Select type, material, shade.
3. Click “Save” button.

*After selecting shade type, you can add multiple items in 1. or 2. iterations.

Edit item	1. Select item in the list. 2. Select type, material, shade.
Delete item	1. Select item in the list. 2. Hover over the item to be deleted and click the delete button.

1) Crown

Crowns - Contains the available crown red-negative types, each linked to a material. for each material you want to use.

2) Veneer

Veneers - Contains the available veneer red-negative types, each linked to a material. You need at least one item for each material you want to use. Added - Stock new veneer items.

3) Inlay/Onlay

Inlays/Onlays - Contains the types of available inlays/onlays, each associated with a material.
You need at least one item for each material you want to use.

4) Pontic

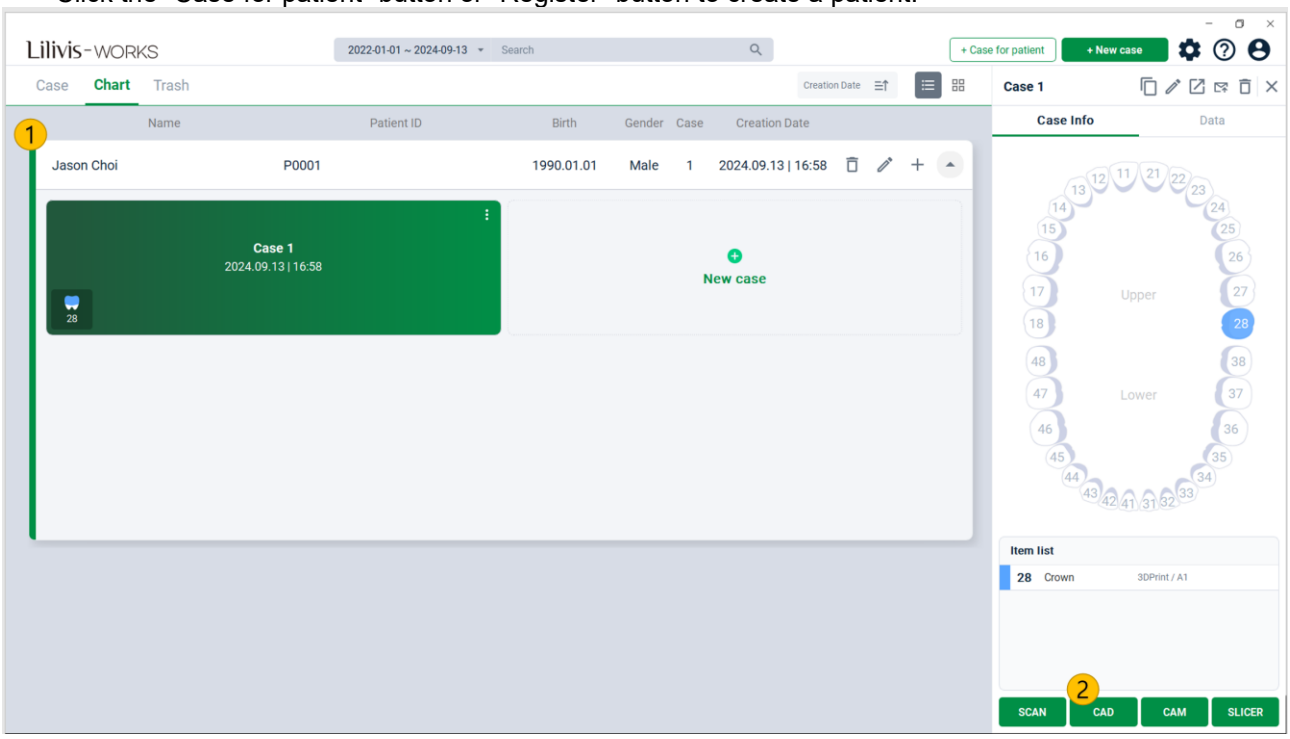
Pontic - Contains the types of available pontic, each associated with a material.
You need at least one item for each material you want to use.

NOTE

For efficiency, it is recommended to simultaneously select all teeth that require the same type of restoration and material.

4.1.2 Run CAD

Click the “Case for patient” button or “Register” button to create a patient.



1. Select patient, case to scan.
2. Click “CAD” button.

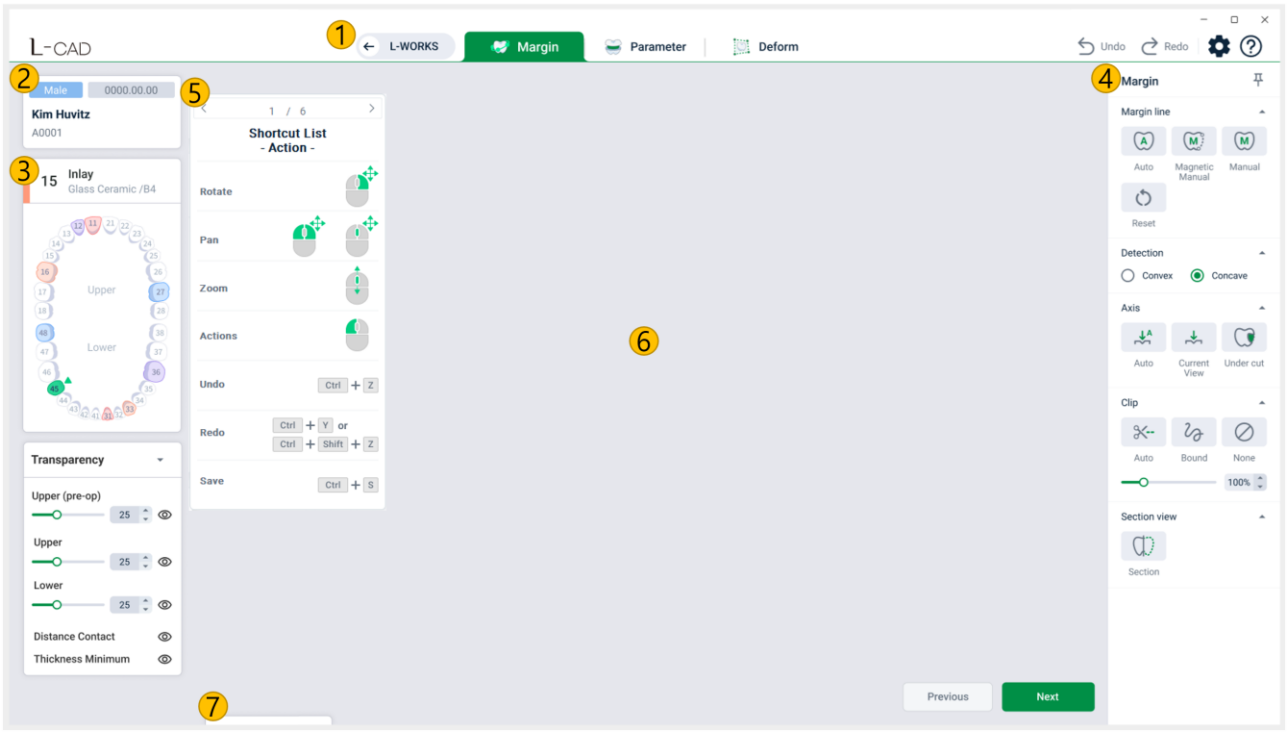
* Only L-CAD can be run at a time.
  Close and run the program to change the case.

4.2. L-CAD User Interface

Software Description

The following section describes how to navigate the software in the design flow.
L-CAD main window shows :

(1) Workflow Bar (Margin, Placement, Parameter, Deform, Retouch, Complete)
(2) Patient Information
(3) Navigation Button
(4) Functions for work step
(5) Shortcut information
(6) View Screen
(7) Quick function



4.3. Mouse

You can use the following mouse buttons to manipulate 3D models in the view screen.

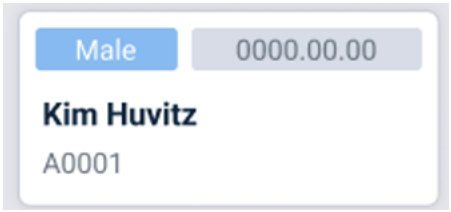
- Left mouse click: Select and apply a tool in the 3D view or select a tooth.
- Right-click: Use to rotate items up/down/left/right.
- Middle Wheel Click: Use to move items up/down/left/right.

4.4. Workflow Bar

The workflow bar guides you through the steps involved in prosthetic design such as Crown, Inlay, Onlay, Veneer, Pontic, Bridge. Each button on the workflow bar is organized sequentially from left to right and represents a step to be completed when designing a prosthesis.

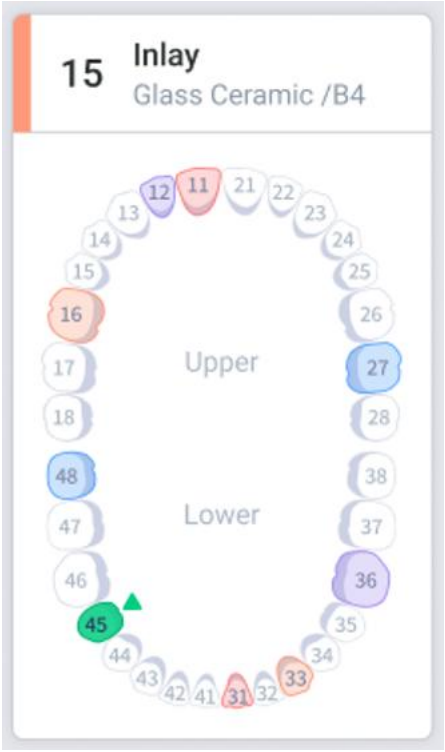


4.5. Patient Information



4.6. Software Navigation

A small arrow points to the selected tooth. When selected, the tooth is focused in the 3D field and you can work on the design. You can switch between teeth by clicking on a tooth in the tooth selector or by clicking on a tooth directly in the 3D view.



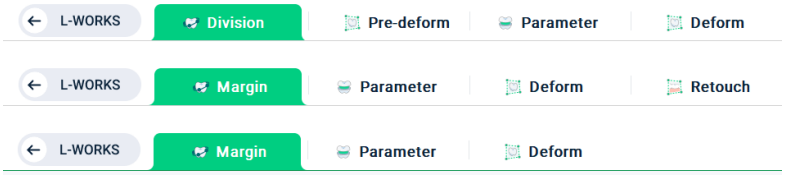
5

Design

5.1. Work Steps

There are two/three/four common workflow steps in L-CAD system: Division, Placement, Margin, Parameter, Deform(Pre), Retouch (Prosthetic Design).

1. In the Margin Step, you define the border between the tooth and restoration. The margin line can be either set automatically or may require manual refinement to achieve optimal results.
   Use the manual button to get your own Margin line.
   Start over by pressing the Clear button in case you do not like your margin line or the automatically generated margin line.



   You need to define the insertion direction of the restoration and ensure the absence of severe undercuts. You have two options for insertion direction.
   Use AUTO to automatically detect and determine the optimal insertion direction.
   Click the view button to set the insertion direction perpendicular to the model
   (The green arrow in the 3D window shows the current insertion direction.)

2. During Parameter Step, you can adjust the offset and margin line, cement gap using slider bar.

3. The Deform(Prosthetic design) step enables you to transform and modify the outer design of the tooth morphology with a set of tools. The tools include the functions of Retouch (Smooth, Add-on, Add off, Groove, Morphing), Cut Intersection and Measurement.

4. The Placement step is the mode for Pontic only, for tooth placement.

5. The Retouch step is a bridge-only mode, which is a step to modify the bridge.

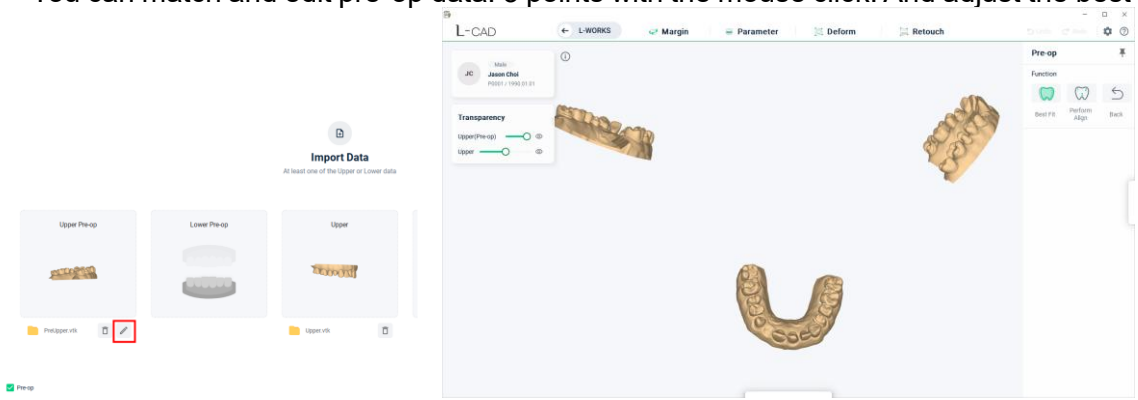
5.2. Import Data

User can import the designing model (Upper[Preop], Lower[Preop], Upper, Lower, Bite) data based on physical storage.



5.2.1 Pre-op Edit

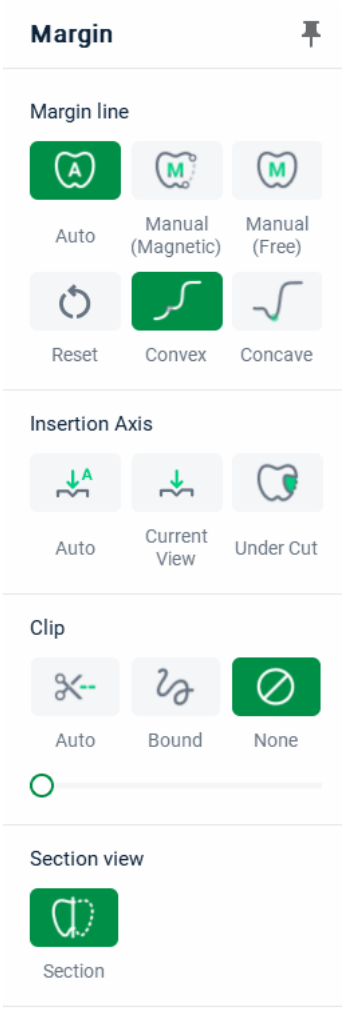
You can match and edit pre-op data. 3 points with the mouse click. And adjust the best fit position.



5.3. Margin

Design begins with a margin line step that defines the boundary between the tooth and the prosthesis. User define the border between the tooth and restoration.

The software flags the tooth as an annotation flag and instructs you to click on the margin line for that tooth.



1	Margin Line	Auto	Automatically create margin points and lines
2		Manual (Free)	Create a user-random margin points
3		Manual (Magnetic)	Creates a margin point for the user (within acceptable range). Creates a margin line based on specific criteria.
4		Reset	Delete margin points and lines
5	Detection	Convex	Supragingival.
		Concave	Subgingival.
6	Axis	Auto	Automatically set insertion axis orientation for generated data.
7		Current View	Set the insertion axis orientation to match the orientation of the screen you are viewing.
8		Under Cut	Check the UnderCut area in the current viewing direction.
9	Clip	Auto	Peripheral data clip around Extract area (adjust peripheral range with slider bar)
10		Bound	Set clip area by dragging left mouse
11		None	Check the data.

12	Section View	Section	Section view display settings based on mouse pointer.

5.3.1. Margin Line Setting

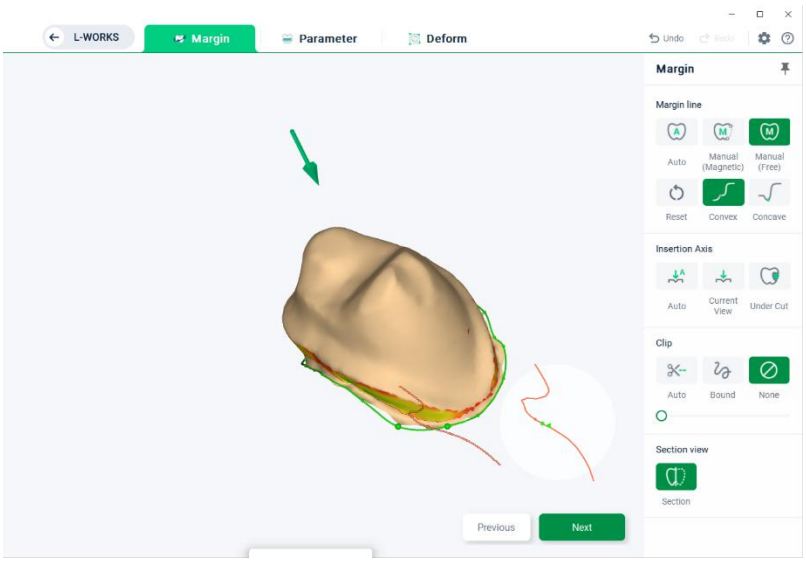
There are three ways to define margin lines:

5.3.1.1 Automatic detection

Click on the margin line of the automatically detected preparation to let the software automatically create the line according to the geometry of the preparation

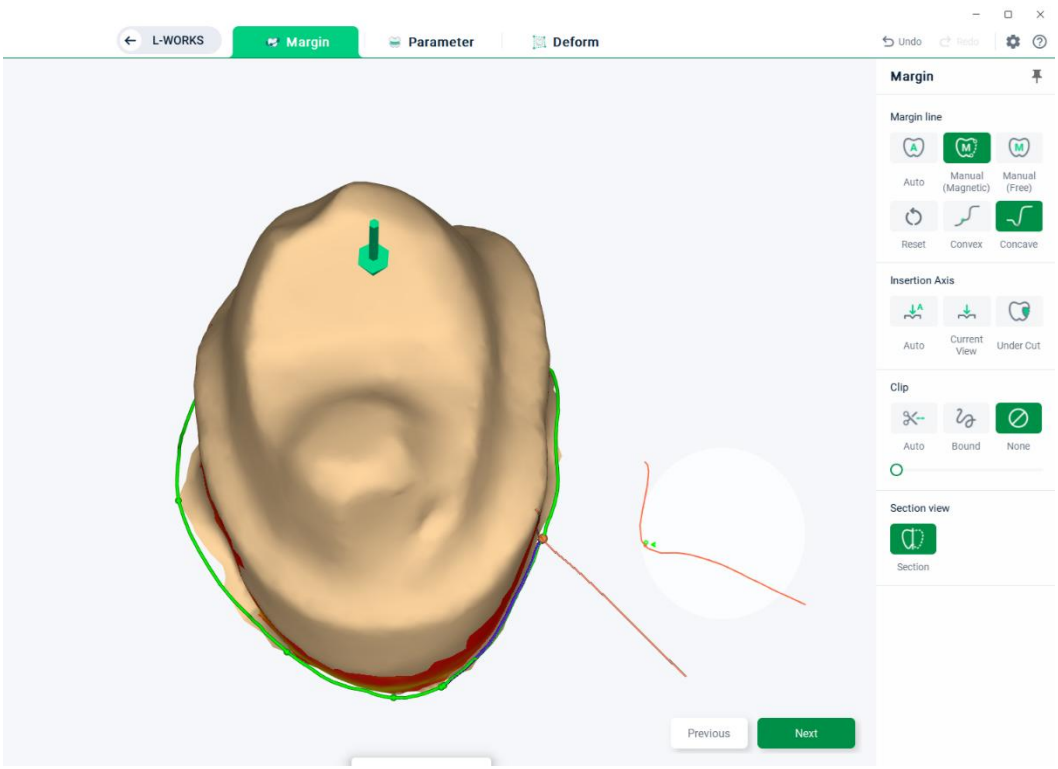
5.3.1.2 Manual (Free)

Manually draw margin lines by clicking points around the teeth along the click-and-move guides. To delete a segment from a line, hover over the segment until it turns red, then right click on the segment to delete it. Click on the first construction point to complete the line and close it. The software applies a virtual section around the active margin line when closed. The radius of the virtual section can be adjusted with the slider on the right side of the screen. This function is only available for closed margin lines with no repeats. If you have set up a margin line but this feature does not appear, check if the line is sharp or curved. You can edit or adjust the margin line by clicking near the line or by drawing a new segment. When editing, the smoothing parameter defines the amount of influence applied during line editing. Use the slider to adjust the degree of smoothness, or edit, refine.



5.3.1.3 Manual (Magnetic)

Manual(Free) and function are the same.
The preview line shows when the mouse hover is in the state.



NOTE

If there is a gap between the prosthesis and the preparation due to incorrect margin line setting, bacteria can be collected and it can affect other health conditions such as infection.

Also, if the new restoration does not cover the entire preparation area of the tooth, the dentin is exposed and becomes more sensitive to contact, air, biting force and acid exposure.

5.3.2. Insertion Direction Set-up (Axis)

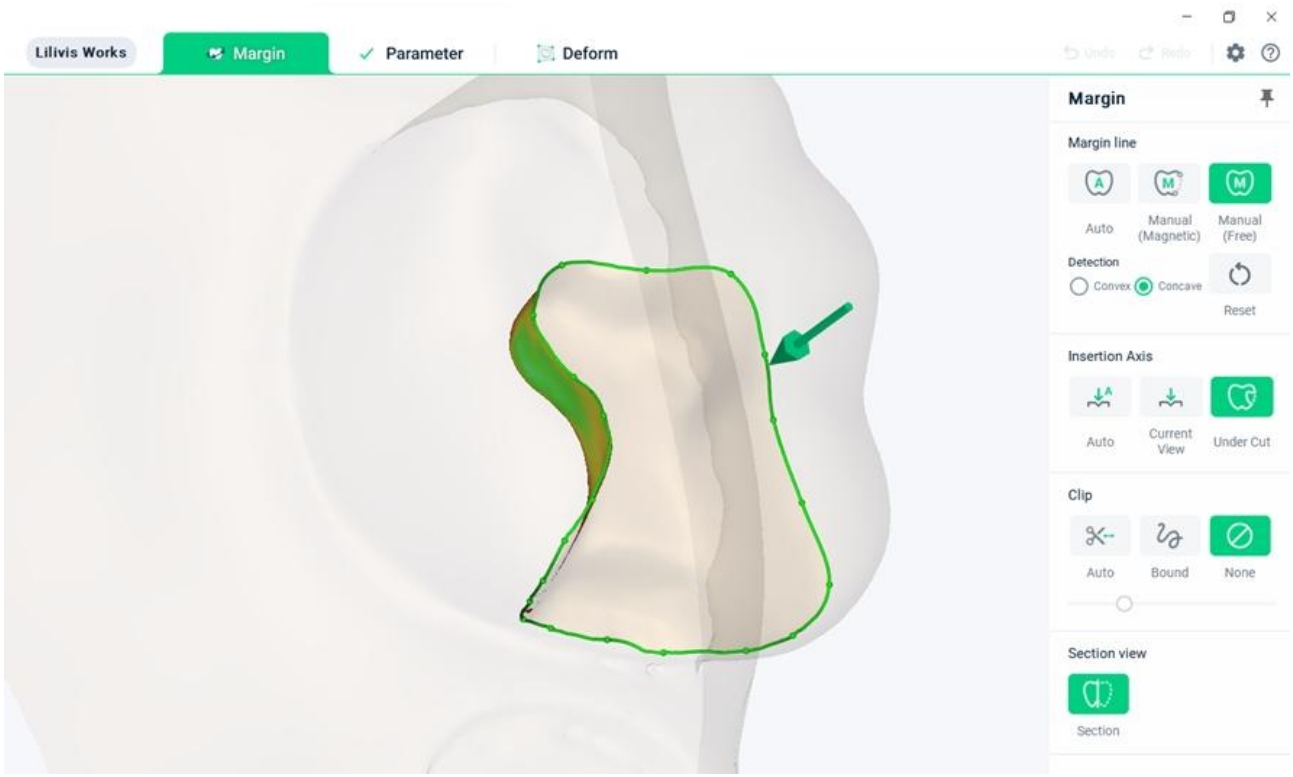
There are two ways to set the insertion direction:

5.3.2.1. Determine the optimal insertion direction.

Rotate the preparation to the required location and lock on the beam to set the insertion direction perpendicular to the screen.

5.3.2.2 AUTO to automatically detect and determine the optimal insertion direction.

Click the view button to set the insertion direction perpendicular to the model
(The green arrow in the 3D window shows the current insertion direction.)

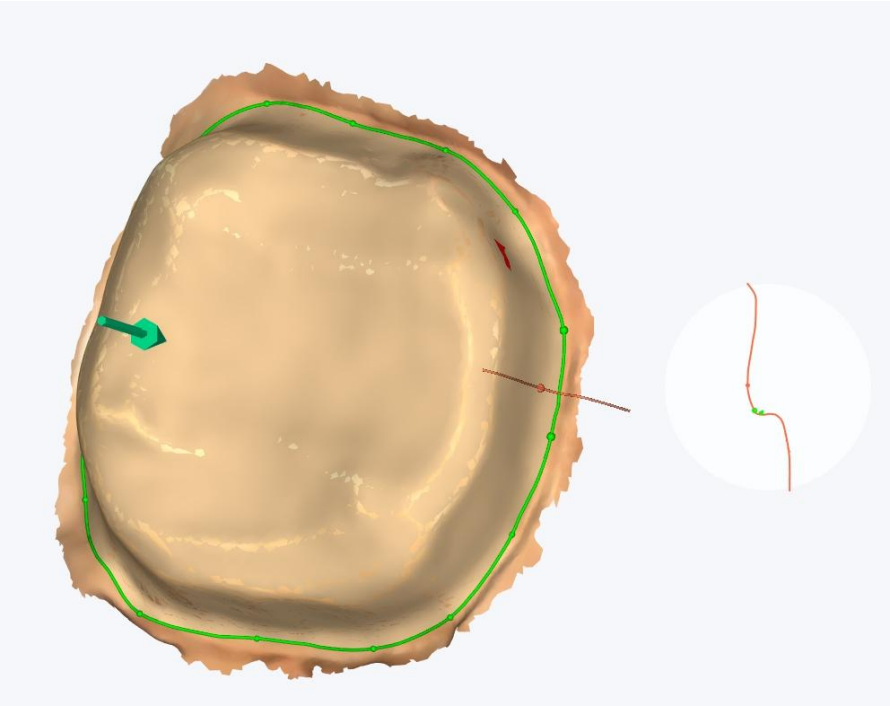


NOTE

It is important to avoid undercutting across the margin line to obtain a properly functioning prosthesis.

5.3.2.3 Section View

Show the model bend angle for the mouse position.



5.4. Parameter step

When user in parameter step, the software automatically draws the contact area of the adjacent teeth (shown in blue). Detects and sets the slider to the middle beam.

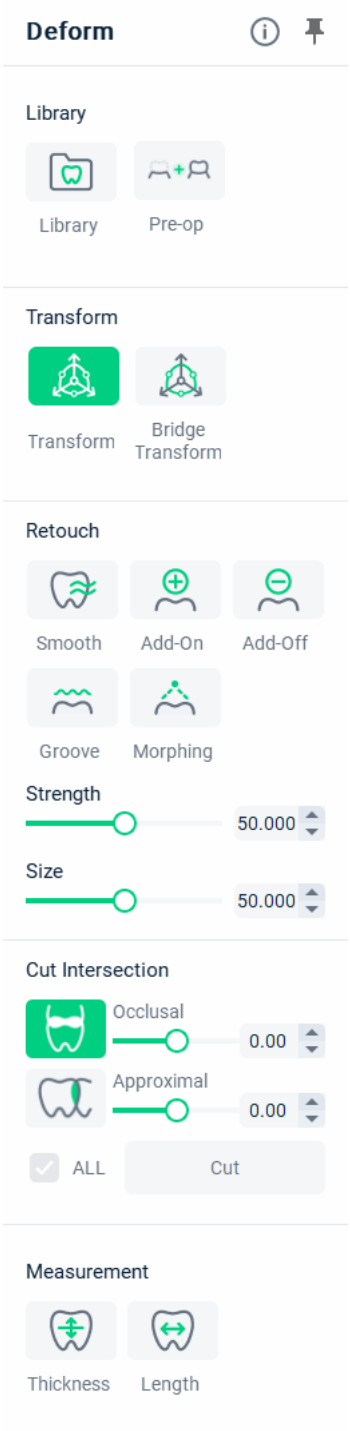
- The available parameter editing tools are:



1	Margin offset	Sets the margin offset. Setting the Margin offset parameter using the slider bar.
2	Dist. To margin line	Cement gap not applied interval setting. Setting the Distant to Margin line using the slider bar.
3	Cement gap	Set the Cement gap.

5.5. Deform step

At this stage, several tools can be used to transform and modify the external design of the tooth shape.



Library		User can replace an existing design with a new design from Library.
Pre-op		Imports and resets pre-op data.
Transform		Used to adjust tooth position, size, and angle.
Bridge Transform		Used to adjust tooth position, size, and angle. (Only Bridge)
Retouch	Smooth	Partial Area of Teeth, Smooth.
	Add-On	Partial Area of Teeth, Inflate/Deflate.
	Add-Off	Partial Area of Teeth, Inflate/Deflate.
	Groove	Partial Area of Teeth, Groove.
	Morphing	Partial Area of Teeth, Morphing.
Cut Intersection	Occlusal	Adjust the occlusal contact between the prosthetic and antagonist teeth to the specified contact distance to the antagonist.
	Approximal	Adjusts the interproximal contact between the prosthesis and the proximal deal to the specified contact distance to the adjacent tooth.
Measurement	Thickness	Measure the distance from the nearest Inner by the mouse pointer (when connected to Inner-Outer).
	Length	Measure the distance between two points through the left click of the mouse (blue : distance along the mesh, green : straight distance)

NOTE

If the auto-function is not enable for this step, virtual crowns are not automatically placed as in the prosthetic design workflow. Therefore, crown can be placed manually. To do this, click on the point on the scan that corresponds to the tooth position to set

the annotation.

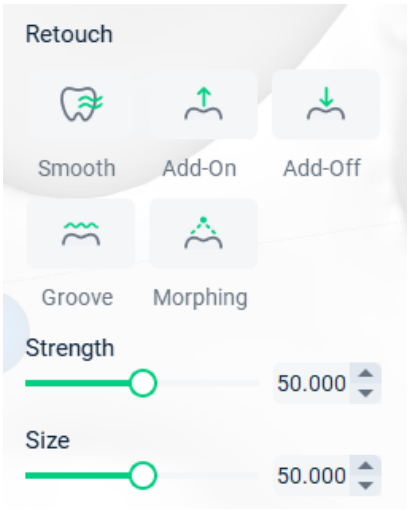
5.5.1 Library

The library allows you to use different tooth shapes. Click the Library button, then select the desired library or design to apply to your 3D chapter.

5.5.2 Retouch

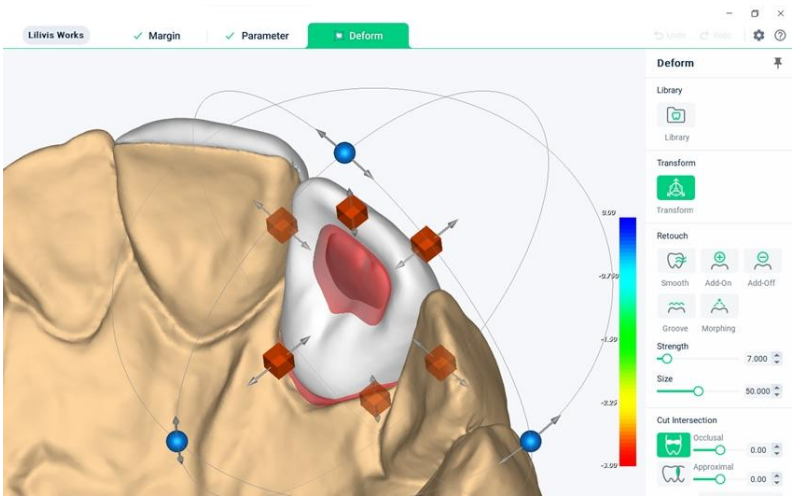
Use the Retouch module tool to add/remove material from the anatomy or to break its surface.

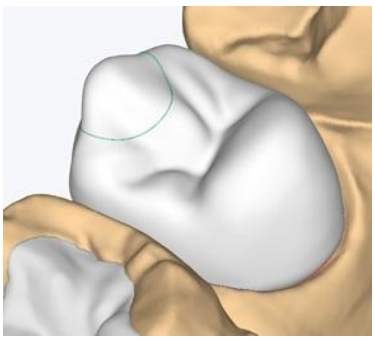
- Select one of the 5 options and click on the model to apply the action.
- Use the two slide bars or Shift+Mouse-wheel and Ctrl+Mouse-wheel respectively to select the size and strength of the Retouch module.
- Add materials with various default values for size and strength.
- Removes materials of various defaults for size and strength.
- Break it.



1) Adjustment with control points

You can change the tooth model using mouse clicks and drags.



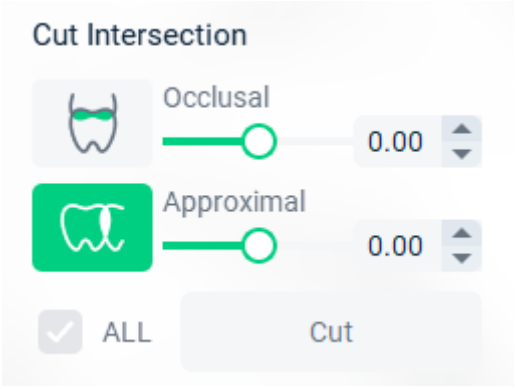


2) Morphing

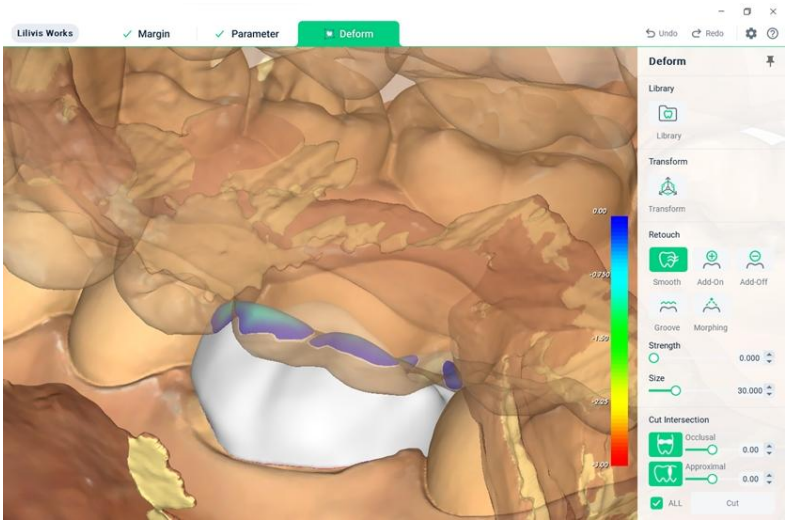
You can modify the tooth model by clicking and dragging the mouse.

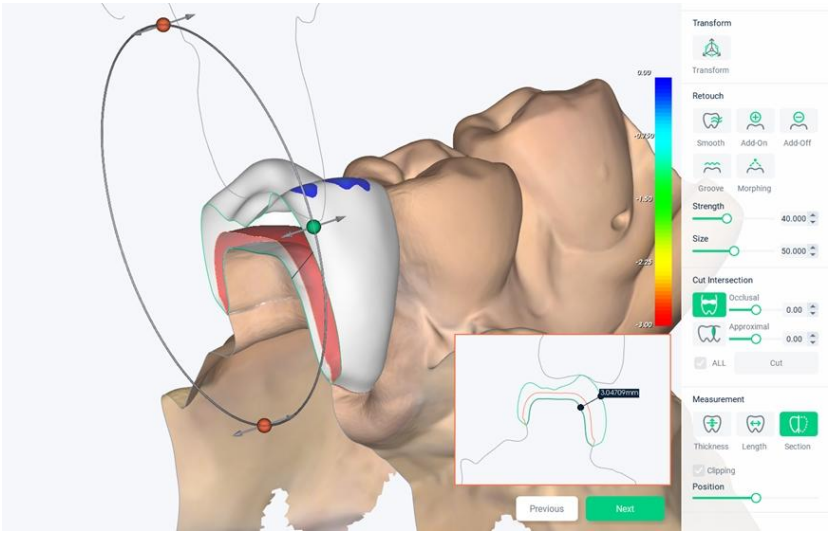
5.4.3. Cut Intersection

Adjust occlusal and proximal contacts using the Cut Intersection Tool.



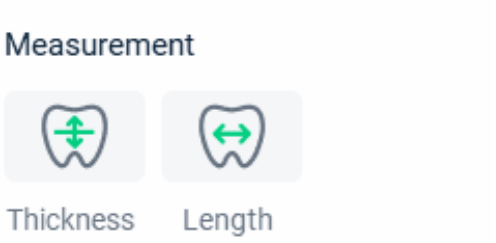
Create a 2D cutting plane on the model using the cut Intersection tool and using the measurement module for the distance in the 2D preview. Press the left mouse button and draw a section line along the model to create a 2D cutting plane. To rotate the 2D plane, click and drag the interpolation control point or border.





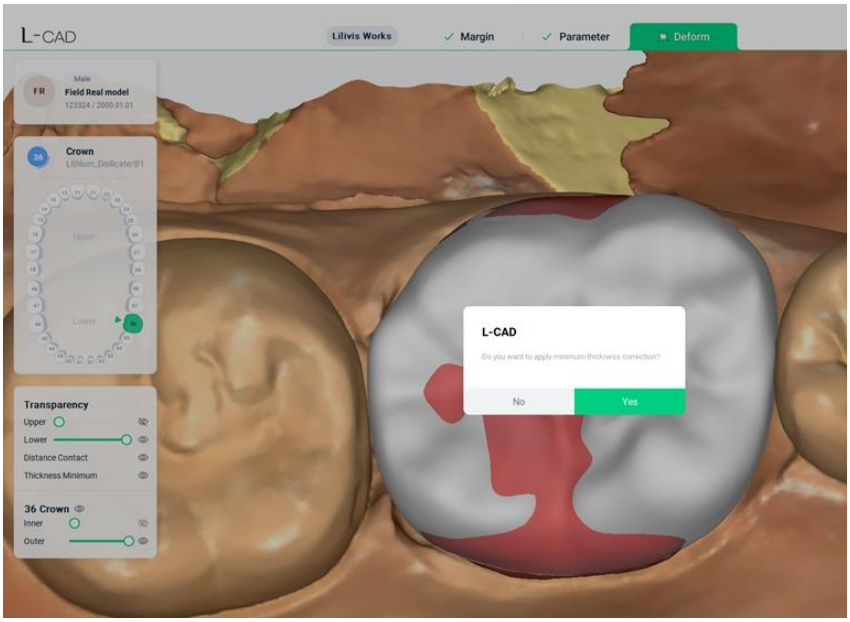
5.5.3 Measurement

Measure the thickness or length with the slider to visualize areas where the minimum point is less than the specified thickness.



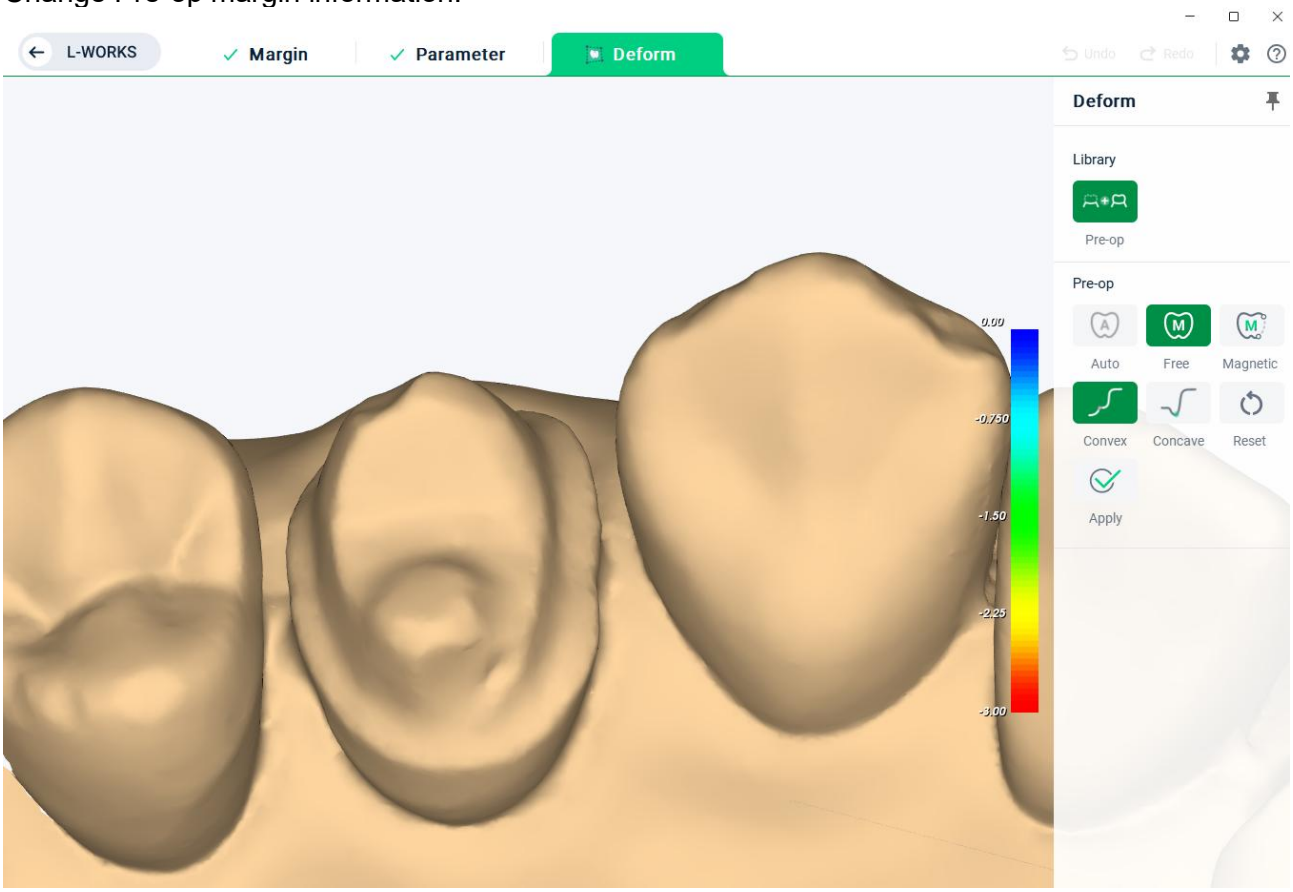
Select the desired function and click or drag the mouse.

When moving from Deform to the next step, check the use of the minimum thickness correction function.

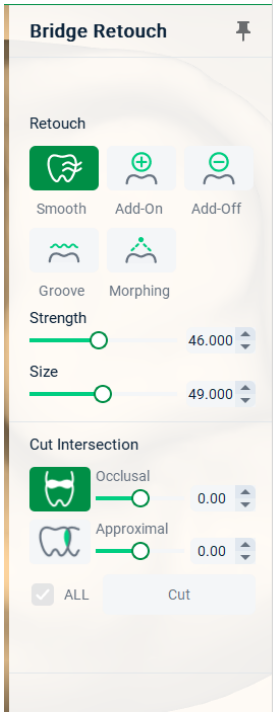


5.5.4 Pre-op

Change Pre-op margin information.



5.6. Retouch step

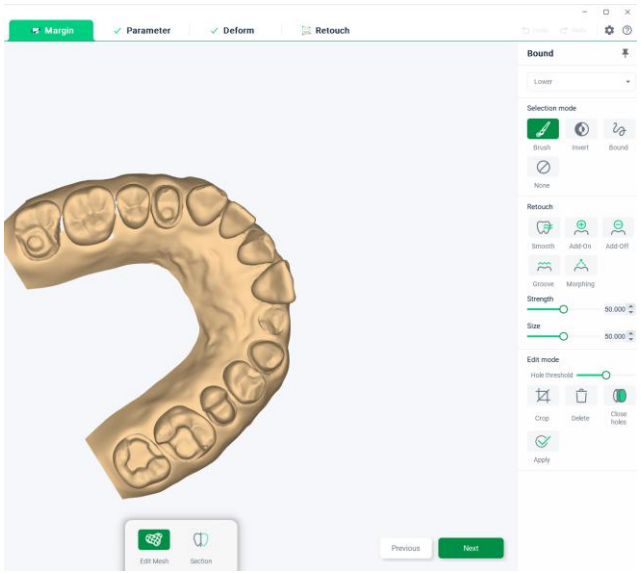


This is the step of retouching in the bridge state. (Only bridge)

5.7. Quick function

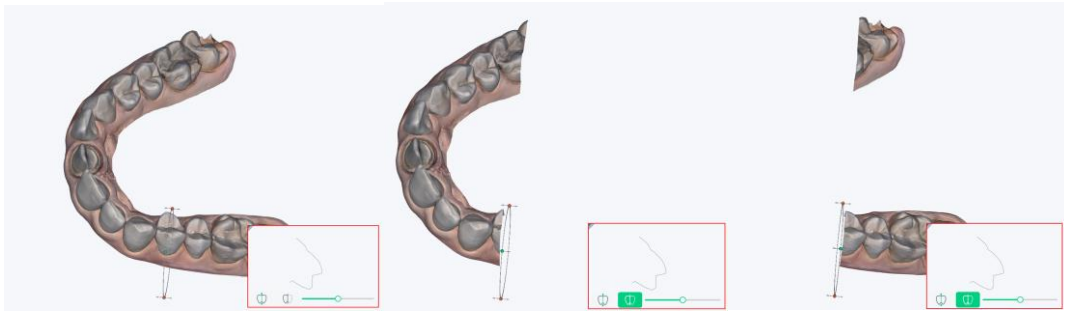
5.7.1 Edit mesh

Mods to modify the mesh. You can enter this mode regardless of the step.



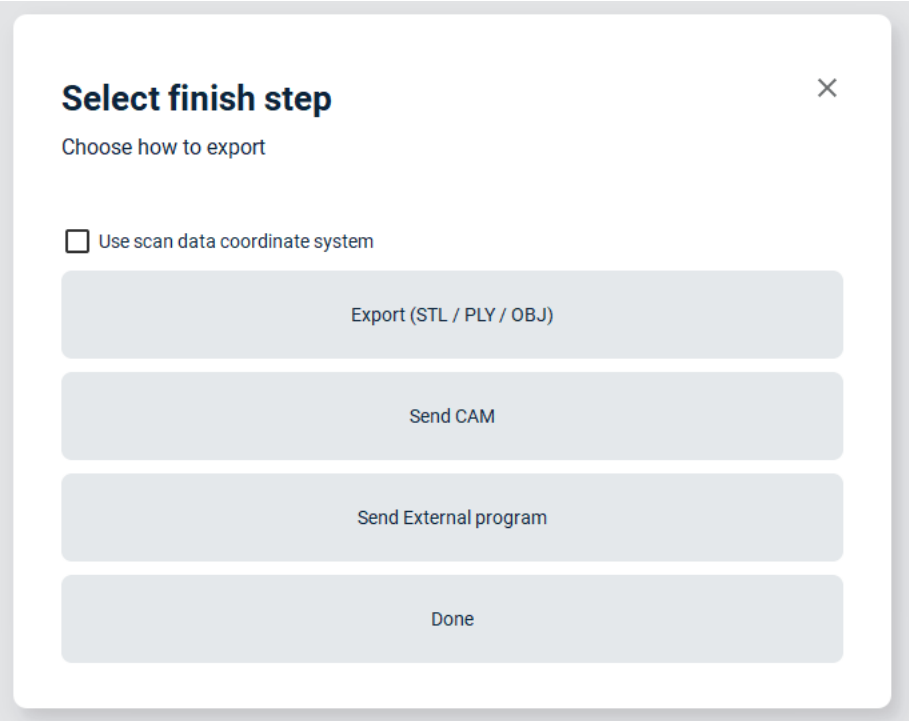
5.7.2 Section

You can cut and divide your teeth into sections.



5.8. Finish step

After finishing the design works, user select the export menu to change proper type of file or export to compatible CAM or 3D Printing software.


Select finish step
Choose how to export
Use scan data coordinate system
Export (STL / PLY / OBJ)
Send CAM
Send External program
Done

6

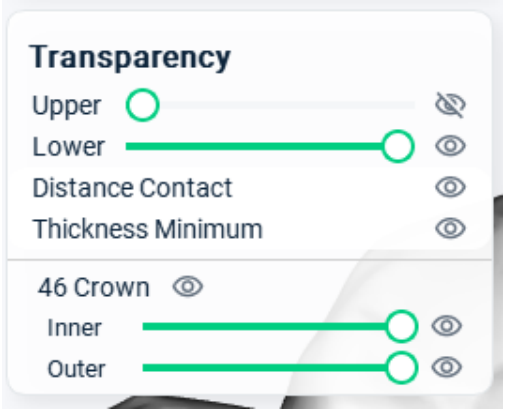
Tools and Setting

Prosthetic Design offers a variety of tools and settings.

- Transparency tool
- Setting (General, Reset, Program version)

6.1. Transparency tool

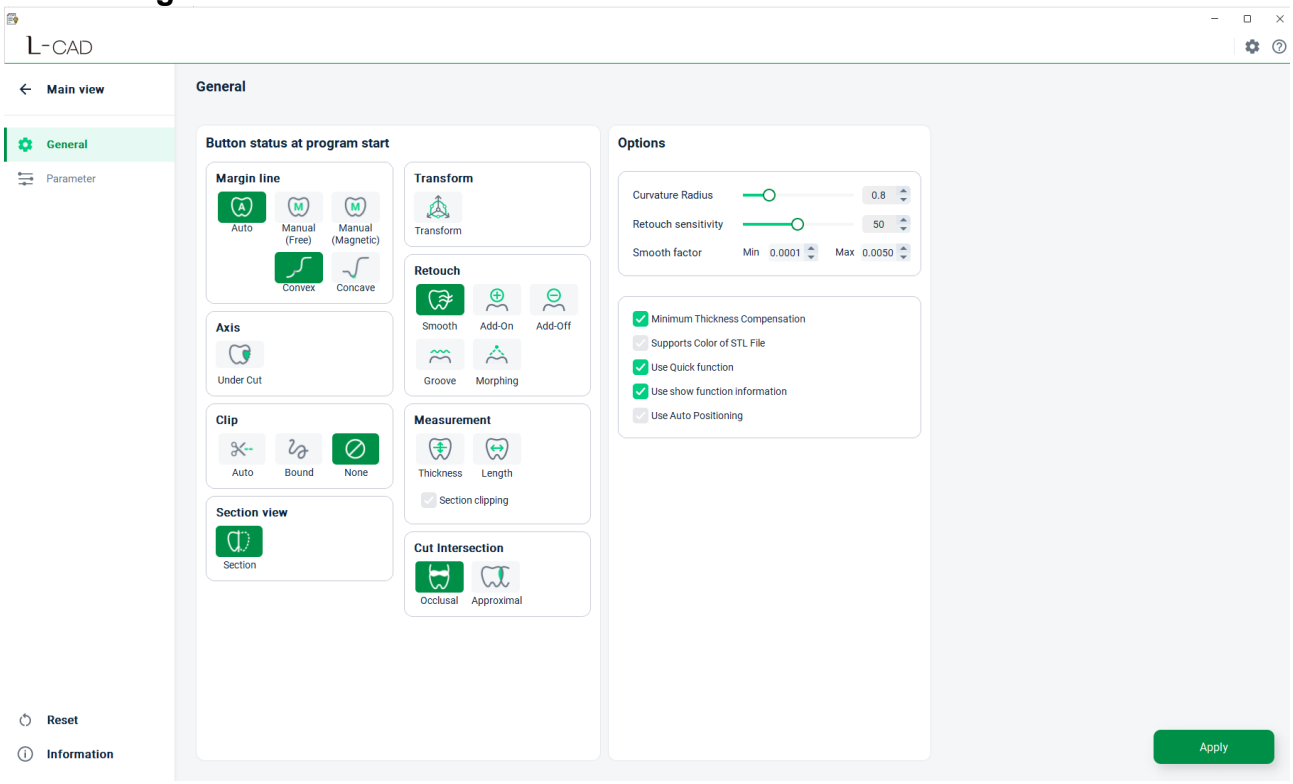
Transparency tools include the sliders and a transparency toolbar, which can be helpful during anatomical design. You can use the Transparency Slider to show or hide:



1	Upper	Tooth maxillary view.
2	Lower	Tooth mandible view.
3	Distance Contact	Show textures of distance contact.
4	Thickness Minimum	Allows transparency of areas where the minimum thickness is less than the required thickness
5	Inner	Adjust the crown's inner texture on/off by using slider bar.
6	Outer	Adjust the crown's outer texture on/off by using slider bar.

User can show or hide the Inner, Outer around the margin line, and adjust the spread by moving the slider sideways. This can be useful if the margin line is too close and ambiguous to the contiguous area.

6.2. Setting



1	General	Default values required for calculating tooth changes can be specified. Each of the buttons may be set as a default value at the start of the program.
2	Parameter	Setting parameters by tooth task type
3	Reset	Change setting information to initial settings.
4	Information	Shows program information.

NOTE

Dental prostheses made with systems using L-CAD design software must be inspected by a certified dentist for correct fit, static and dynamic tooth properties to provide optimal prostheses.

7

Shortcut Keys

A list of specific shortcuts used in the L-CAD Design module is provided below.

7.1. Shortcut Keys

Mouse	Description
Right-click and hold down	Mouse-move to rotate the model.
Left-click and hold down	Move the mouse to rotate the view up, down, left, or right.
Wheel scroll	Zoom the view.
Shortcut Keys	**Description**
Ctrl+Z	Undo.
Ctrl+Y, Shift+Ctrl+Z	Redo.
Ctrl+S	Save.
Ctrl+Space	Next Step
Ctrl+Back Space	Previous Step
A	Show/Hide the Antagonist Jaw.
X	Show/Hide the Upper Jaw.
N	Show/Hide the Lower Jaw.
S	Show/Hide the scanned jaw.
Shift+S	Change transparency of the scanned jaw.
L	Show/Hide the Outer of prosthetic tooth.
B	Show/Hide the Inner of prosthetic tooth.
Ctrl+D	Show/Hide the contact distance.
Ctrl+T	Show/Hide the minimum thickness.
Ctrl+Wheel click	Hide the objects under the mouse pointer.
Ctrl+Shift+Wheel click	Show the hidden object again.
Shift+Wheel click	Change transparency of the objects under the mouse pointer.
Alt	Temporarily Show the hidden objects.
T [Deform]	Transform
1 or * [Deform]	Smooth
2 or + [Deform]	Add On
3 or - [Deform]	Add Off
4 or G [Deform]	Groove
5 or M [Deform]	Morph
Shift+Wheel [Deform]	Retouch Size
Ctrl+Wheel [Deform]	Retouch Strength
Ctrl+X	Cut Intersection - All
Ctrl+A	Cut Intersection - Occlusal Only
Ctrl+N	Cut Intersection - Approximal Only
Y	Bridge Transform

8

System Requirement

Item	Specification
OS	Windows 10 or greater (Windows 11 recommended) 64bit
RAM	16GB or greater (16GB recommended)
Video Card Memory	NVIDIA GeForce (VRAM 6GB) or higher
HDD space available	512GB SSD (1TB SSD recommended)
CPU	Intel i5 or greater
USB Port	USB 3.1 Port (for compatible device or CAD/CAM system)
Mouse:	With the wheel button support

9

SERVICE INFORMATION

Information Needed for Service

If the problem is not solved, please contact to Huvitz or its agent with the information on the following items:

Year/month/day :

purchased:

Client name:

Client address:

Client contact number:

Model number:

Serial number:

L-CAD version:

Contact the Huvitz's service department directly by referring to the address and telephone numbers below if you cannot contact the distributor where you purchased the product.

■ How to Contact Huvitz Co., Ltd.

■ Huvitz Co., Ltd.

38, Burim-ro 170beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14055, Republic of Korea

Tel: +82-31-360-0082 Fax: +82-31-428-9194

E-mail : cs@ossvis.com website : www.huvitz.com