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**PROMADENT**  
Quality Dentalware

# 1 Contents

- 1 Contents ..... 2
- 2 MILLING..... 5
- 3 Installation ..... 6
  - 3.1 System Requirements..... 6
  - 3.2 Installation Notes..... 6
    - 3.2.1 BiSS with Network License ..... 6
  - 3.3 Control ..... 7
    - 3.3.1 Overview of General BiSS Short Cuts..... 8
    - 3.3.2 The Cube..... 8
    - 3.3.3 Repair-Tool ..... 9
    - 3.3.4 Editing Curve Points..... 9
  - 3.4 Launch the Program..... 10
- 4 The Workstation..... 10
  - 4.1 Overview..... 10
  - 4.2 Closing the Program..... 11
  - 4.3 Settings..... 12
    - Appearance..... 12
    - 4.3.1 Loading and Saving..... 14
    - 4.3.2 Control ..... 15
    - 4.3.3 Updates..... 16
    - 4.3.4 Advanced..... 17
- 5 From the Scan to a Printable Milling Model..... 18
  - 5.1 The Workflow ..... 18
  - 5.2 Open file..... 19
    - 5.2.1 Colored Representation of an Intraoral Scan ..... 21
    - 5.2.2 Unload Model ..... 22
    - 5.2.3 Assign a Project Name..... 22

- 5.2.4 Your Personal Workflow ..... 22
- 5.3 Align Object..... 23
  - 5.3.1 Align Occlusal Plane..... 23
  - 5.3.2 Adjusting the Implant Reference Scan ..... 25
  - 5.3.3 Single Align ..... 27
  - 5.3.4 Edit Components ..... 27
  - 5.3.5 Align – Overview of all Functions ..... 28
- 5.4 Repair ..... 31
  - 5.4.1 Repair ..... 31
  - 5.4.2 Application, Removal and Smoothing..... 32
  - 5.4.3 Fill Up..... 32
  - 5.4.4 Process Main Scans / Process Extra Components ..... 32
  - 5.4.5 Automatic Close and Repair ..... 32
- 5.5 Plugin “Implants”: Add Implants..... 33
  - 5.5.1 Adding a File to the Implant Library..... 33
  - 5.5.2 Load Implant Scan..... 34
  - 5.5.3 Align..... 34
  - 5.5.4 Creating New Implants ..... 34
  - 5.5.5 Note on the Reference Surface..... 38
- 5.6 Define Stumps ..... 38
  - 5.6.1 Automatic Import of Stumps ..... 38
  - 5.6.2 Select Stumps Manually..... 38
  - 5.6.3 Set Stump Margin ..... 39
- 5.7 Milling Models ..... 41
- 5.8 Labels ..... 42
- 5.9 Save the Job ..... 43
  - 5.9.1 Save BiSS-Project..... 43
  - 5.9.2 Send BiSS-Data to PUZZLE ..... 44
  - 5.9.3 Export 3D-Models..... 44

- 5.9.4 Export Aligned..... 44
- 5.9.5 New Project ..... 44
- 5.9.6 Choose Other Application..... 44
- 5.9.7 Short Excursion to the Coordinate System in BiSS..... 45
- 6 Software-Updates..... 45
  - 6.1.1 Update-Availability ..... 45
  - 6.1.2 Install Update..... 45
- 7 Dongle-Updates..... 46
  - 7.1 How to know that a dongle update is required?..... 46
    - 7.1.1 At Startup..... 46
    - 7.1.2 Via the Menu ..... 46
    - 7.1.3 Execute the UpdateClient.exe..... 46
  - 7.2 Execute Dongle-Update ..... 46
- 8 Warning and Notes - Disclaimer..... 47

## 2 MILLING

The BiSS Dental Software Suite is used for processing scan data in the field of dentistry and orthodontics, with the aim of enabling the scanned data to be mapped onto a workpiece (e.g., by 3D printing or CNC milling). BiSS uses the surface information of a common dental scan to create a 3D model for further processing by e.g., additive manufacturing processes (3D printing). BiSS also supports the processing of the generated model in a variety of ways. A "repair" of the scan data can be performed and is suitable for smoothing and trimming artifacts in the surface information.

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**Note:** *Using the repair function may distort the actual surface. This may result in inaccuracies of fit. Therefore, it is recommended to repeat scans with errors or scans with artifacts.*

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The scan data can be spatially aligned by automatically or manually setting the occlusal plane and is cleaned of unwanted boundary elements by setting a spline-based boundary curve. BiSS also allows the addition of removable dies and the creation of a milling model.

For resource-saving further processing, the model can be "hollowed out" to a user-defined wall thickness. In addition, escape holes can be defined.

The finished model can be saved as a project file .GBS, as well as exported as a printable file in .OBJ, .STL or .PLY format for further processing.

**Without plaster to a milling model**

FAST · EASY-TO-USE · INTUITIVE

MILLING can be optionally upgraded as a *network multi-user license*.

Face fun with MILLING! :)

## 3 Installation

### 3.1 System Requirements

The system requirements listed below must be fulfilled:

- ✓ Windows 64 Bit
- ✓ At least 500 MB free file system memory, recommended 2 GB
- ✓ Processor with at least 2 cores at 2 GHz, recommended 4 cores at 2,5 GHz
- ✓ Free working memory at least 8 GB, recommended 16 GB working memory
- ✓ Free USB-2.0 connection
- ✓ Minimum display resolution 1200 x 900 Pixel
- ✓ Graphic card: e.g., HD Graphics 3000 DX10.1 (we recommend not to use AMD/ATI RADEON graphics cards)

### 3.2 Installation Notes

The installation of the program BiSS is done with the provided installation file *BiSS-5.0.X-setup.exe*. Run the file and follow the installation instructions.

To start BiSS you need a *dongle license*. Make sure that your license dongle, with a valid BiSS license, is connected to your computer before you start the program.

If you have a *BiSS multi-user network license*, please refer to the following section:

#### 3.2.1 BiSS with Network License

In order for the network dongle to be recognized within your network, the following settings must be set before BiSS can be started the first time:

- ✓ Install BiSS
- ✓ Insert the network dongle into the device
- ✓ Open the installation directory of BiSS (on the same device)
- ✓ Run *DinkeyServer.exe* as Administrator
- ✓ Under *Startup Modes* on the left, select *Windows Service*
- ✓ Under *Network Configuration* on the right, select *Automatic*
- ✓ Click Start

Your firewall must recognize and allow Dinkey Server. Therefore, select *Automatically Configure Windows Firewall* when prompted to do so.

Dinkey Server now runs as a background service and doesn't need to be restarted manually after rebooting the device.

---

**Note:** *If you remove the dongle or add another dongle, a restart of Dinkey Server may be required.*

---

BiSS can now be started from all devices of your network, according to the number of purchased licenses.

### 3.3 Control

The software can be controlled with a commercially available mouse as a selection tool in the menu navigation and for rotating, moving, and zooming the model. Input via the keyboard is required for individual functions. The basic options for controlling the software are described in table 1. Below you will find a complete summary of the possibilities for navigation with an explanation of the function.











 	Selection Tool	Move the cursor to the desired position and click the left mouse button.
 	Rotate Model	Hold down the right mouse button and move the mouse.
 	Move Model	Hold down the mouse wheel and move the mouse.
 + Shift 	Move Model	Hold down the right mouse button and shift key and move the mouse.
	Zoom Model	Rotate the mouse wheel to zoom in or out of the model's representation on your working surface.
	Set Rotation Center	With a center click on any point you can set the center of rotation.

table 1: Short overview: Control of the program - overview mouse functions.

### 3.3.1 Overview of General BiSS Short Cuts

Shortcut	Description
Ctrl + F	Reset view to frontal view.
Ctrl + S	Save (Attention: The step "align" must first be exited, otherwise the position change will not be saved").
F10	Clean memory.
Drag mouse with right mouse button	Rotate view.
Drag mouse with middle mouse button	Move view.
Rotate mouse wheel in 3D area	Zoom in / zoom out view (direction can be selected in the settings).
Mouse wheel rotates over a spinner	Change value (a spinner is a field for setting numbers with two small buttons on the side).
Middle click on a part of the model	Focus view on the clicked point.
Right click on a part of the model	Open context menu.
Right-click in 3D area	Open context menu.
Right-click in a list of elements	Open context menu.
Restart User-Interface	Change the language in the settings (or select the selected language again).

table 2: General BiSS shortcuts.

### 3.3.2 The Cube

Left clicking on the cube rotates the view as indicated by the black arrow. Depending on where you click:

Left click on cube	Description
On the side that does not face forward	This side is rotated to the front.
One edge while one side faces forward	This edge is rotated upwards while the side continues to face forward.
The center of the side facing forward	The back side is rotated to the front. The direction of rotation depends on whether you click above, below, left, or right of center.



<i>A corner pointing upwards</i>	The corner is rotated forward.
<i>Edge that belongs to a corner that faces forward</i>	The edge is rotated forward.
<i>Corner that belongs to an edge that points forward</i>	The corner is rotated forward.
<i>Edge pointing forward</i>	The edge is rotated 90° to the left or right, depending on which half of the edge you click on.
<i>Double click on the cube, one side facing forward</i>	The side is rotated to the front and aligned that the label is right side up.
<i>Triple click on the cube</i>	Reset the view to frontal view.

table 3: The navigation cube.

### 3.3.3 Repair-Tool

Navigation	Description
<i>← during manual repair</i>	Reverse.
<i>→ during manual repair</i>	Restore.
<i>+ during manual repair</i>	Enlarge tool radius.
<i>- during manual repair</i>	Reduce tool radius.
<i>Spacebar during manual repair</i>	Initiate repair of the marked area.
<i>Ctrl + left mouse button during manual repair</i>	The previous selection is not deleted but extended.
<i>Shift + left mouse button in Repair mode</i>	A polygon can be drawn.

table 4: Navigation in the repair tool.

### 3.3.4 Editing Curve Points

Navigation	Description
<i>Del</i>	Delete selected curve point.
<i>Double click on curve point</i>	Delete clicked curve point.
<i>Space bar during editing curve points</i>	Focus view on the selected curve point.

table 5: Navigation for editing curve points.

### 3.4 Launch the Program

When you have started BiSS, the window shown in image 1 appears. Here you get an overview of the available modules for BiSS Dental Software Suite. These are PRINT, MILLING, TRAYS and LOCATE. In addition, there is a single application PUZZLE.

You can see from the green checkmarks, which modules are enabled according to your license. You can now select which application you want to launch. To start MILLING, click on the purple button *start software*.

Furthermore, you have the possibility to be forwarded directly to your retailer via the button *visit shop*, but also to purchase further BiSS modules. This button only appears if there is an existing internet connection.

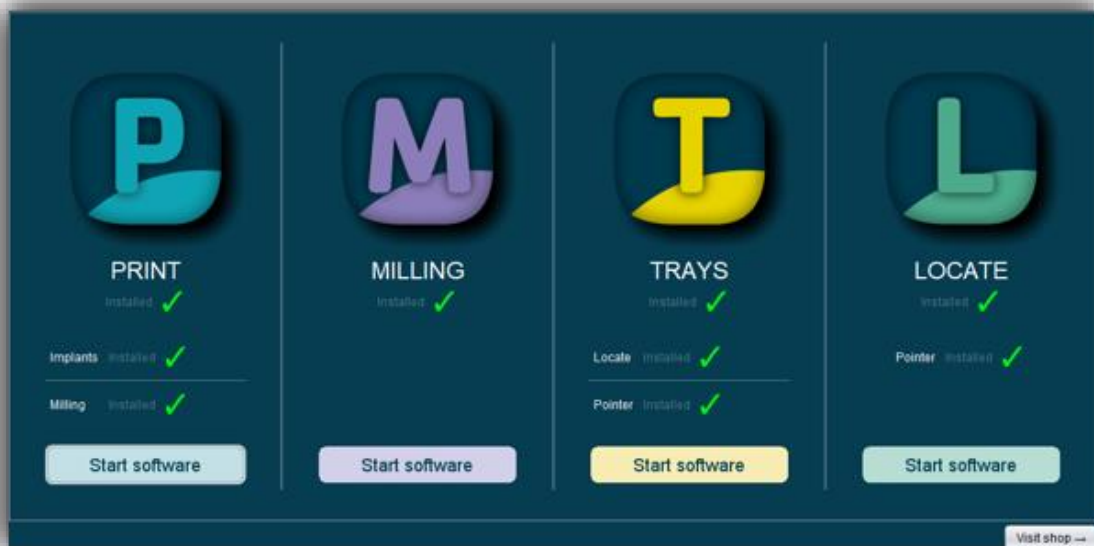


image 1: Welcome window after program launch.

## 4 The Workstation

### 4.1 Overview

Familiarize yourself with your BiSS workstation. The user interface is divided into the three main areas: navigation - action - model view

- ✓ You can access the *menu (burger)* via the navigation bar at the top. The < and > buttons navigate you step by step to the finished model. The individual processing steps of your workflow are displayed in the center. You can use the status bars to track the progress of

your work. You can also select the buttons individually and go directly to the desired design step. You can recognize the currently selected design step by the darker coloring.

- ✓ On the left you will find the action window. Here you adjust the settings specific to each design step.
- ✓ The 3D model you are working on is displayed on the right. Via the text window you will receive messages and notes that support you in your work.

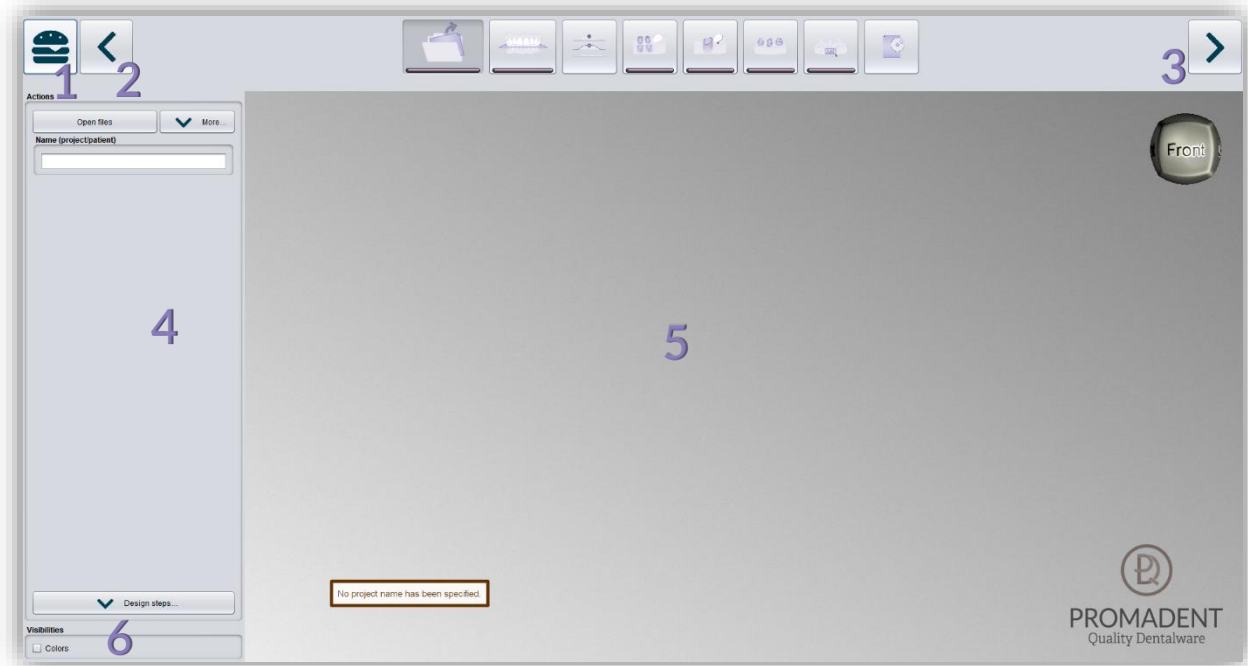


image 2: The BiSS program after launch 1) Menu: Contains settings, about us, other applications, new project. 2) Back: get back to the step before. 3) Next step: Complete the current processing step and proceed to the next step. 4) Action window: Individual for the respective work step. Here: Load file and define the work steps. 5) Work surface. 6) Visibility switch: Visible after loading the model.

## 4.2 Closing the Program

To close the program, select the **X icon** at the upper right corner of the program window and choose **close** under the **menu** button.

There is a query whether to close despite unsaved changes. Changes are both changes made by the user and calculation progress.

### 4.3 Settings

Under the *menu* button you will find the *settings tab*, see image 3. If you select settings, a new window opens with four tabs: appearance, load & save, control, updates and advanced.

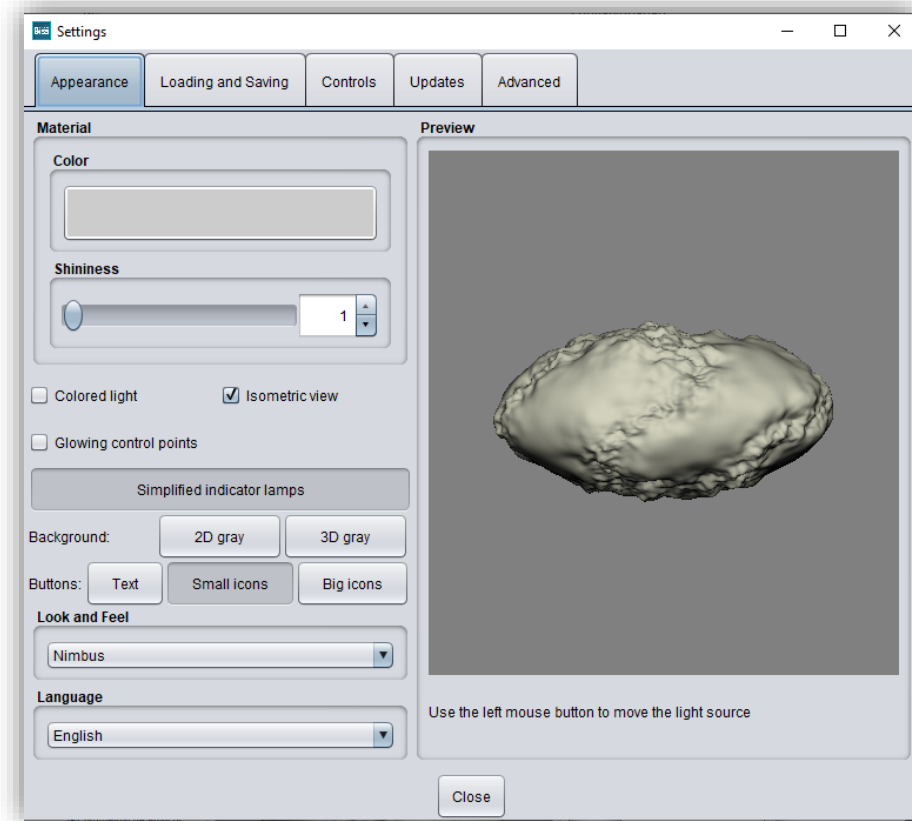


image 4: Changing the appearance of the model and the working environment.

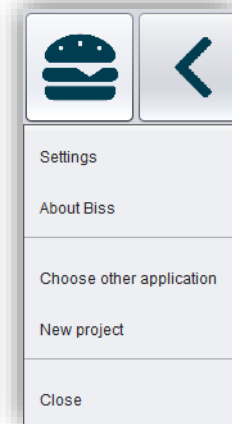


image 3: Menu.

The settings window can be closed by clicking the *close* button in the middle below of the window or the *X* in the top right corner. Your settings will be applied and saved.

#### Appearance

Under the *appearance tab*, shown in image 4, you can adjust the appearance of the loaded model to your needs by selecting a color and intensity of gloss. Further setting options are summarized in table 6.

FEATURE	DISCRIPTION	DEFAULT-VALUE
Colored light	Active: Multiple colored light sources from slightly different directions. Inactive: White light source.	inactive
Isometric view	Active: Isometric view. Inactive: Perspective view.	active
Glowing control points	In the "trim edge" step, the currently set curve points are displayed as a light source. Attention: Requires a lot of computing power.	inactive
Simplified indicator lights/ Detailed indicator lamps	Changes the appearance of the status bars that indicate progress within the workflow.	simplified indicator lights (active)
Background - 2D gray/ 2D colored	Selects the background of the windows - gray or colored.	2D colored
Background - 3D gray/ 3D colored	Selects the background of the 3D model - gray or colored.	3D grey
Look and feel	Selects the design of the windows.	Nimbus
Language	You can choose between German and English language.	English, with English system language

table 6: Appearance settings.

### 4.3.1 Loading and Saving

Behind the *loading & saving tab* (image 5) you can set in which format your model should be exported. The file formats .STL, .OBJ and .PLY are available for selection. You can also activate automatic saving of your project and set a time interval for automatic saving.

---

**Note:** *When you save automatically, your project file is saved in .GBS format. There is no file export.*

---

This function is used exclusively to restore the project after an irregular termination of the program. The folder for automatic saving should only be used for this purpose. In addition, if the PUZZLE application has been unlocked, you can decide here in which folder the data for PUZZLE should be exported. This folder must be the same as the monitoring folder of PUZZLE. If you check the box *Ask for additional location to save to*, you can select a new location each time. This must also be the same as the monitoring path of PUZZLE. If you want the data to be sent to PUZZLE automatically with every export, then you must check the box *Send to PUZZLE when exporting*.

Furthermore, you have the option to determine whether color data should be loaded and exported.

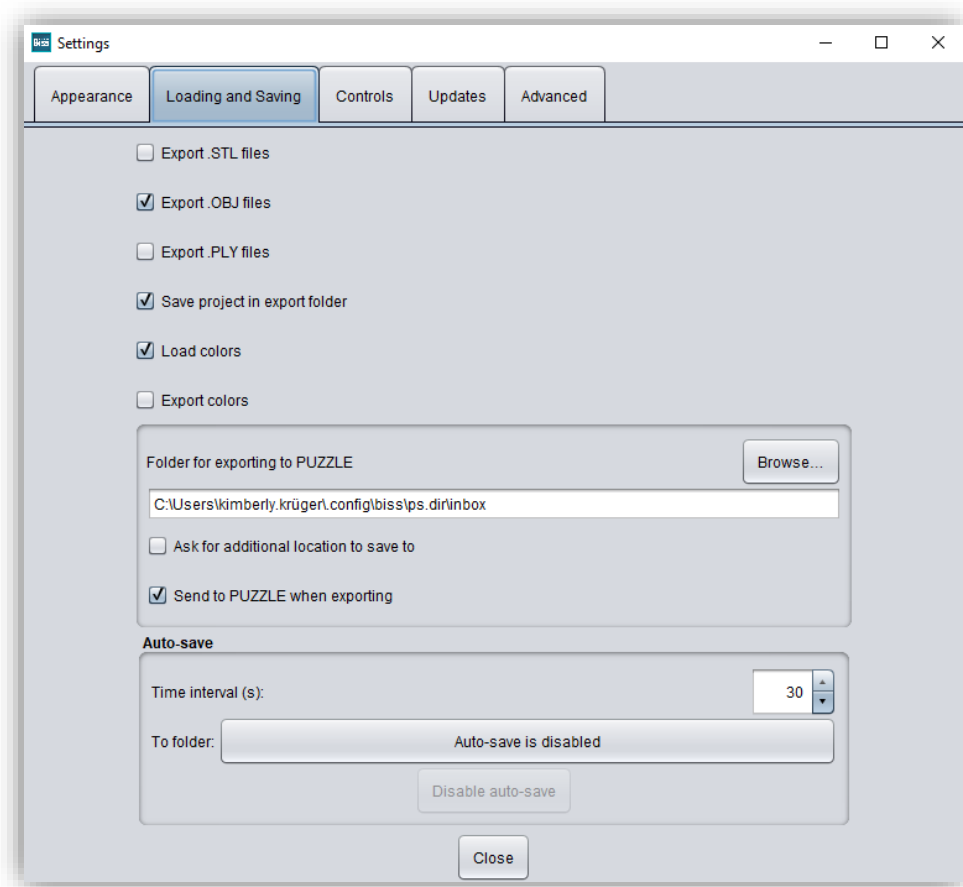


image 5: Loading and saving settings.

### 4.3.2 Control

In the *control tab*, see image 6, you can adjust the mouse behavior and the message size.

Mouse behavior                      Select whether your model is enlarged or reduced when scrolling up.

---

Message size                         Determine the size of the displayed messages on your workstation by entering a factor.

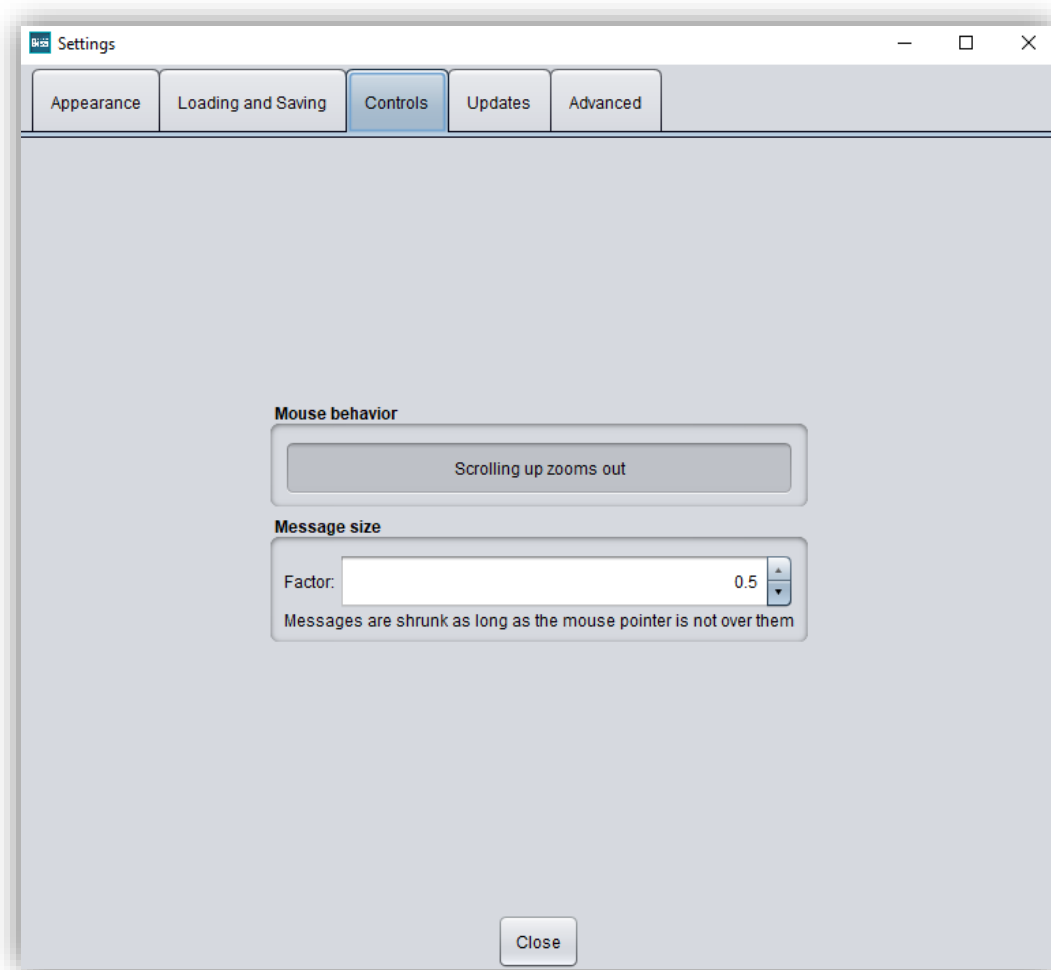
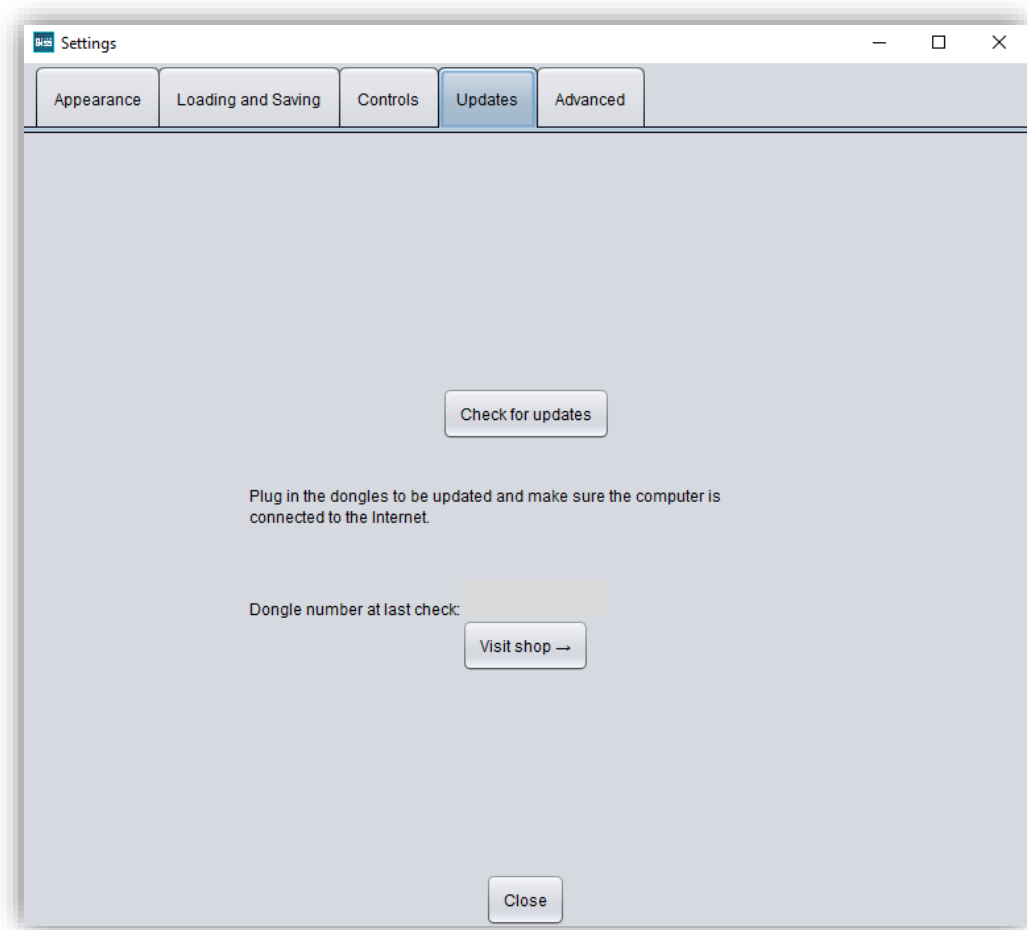


image 6: Custom setting of mouse behavior and message size.

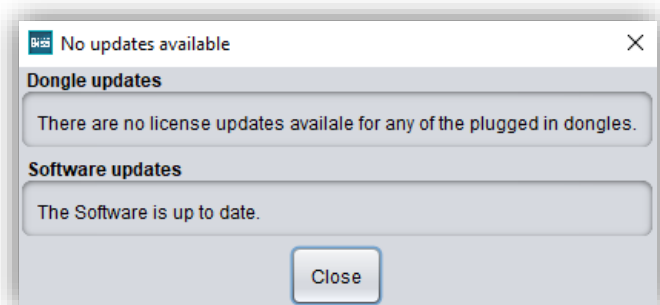
### 4.3.3 Updates

In the *updates tab* in image 7, you can check if new updates are available for BISS. To do this, click the button *check for updates*.



*image 7: Update-settings.*

Afterwards, a window like the one shown in image 8 opens and informs you about available updates. This can be for example a new software version that is ready for download or a license update for your dongle. You need this function e.g. when purchasing additional modules or extending a license.



*image 8: No updates available.*



#### 4.3.4 Advanced

Under the *advanced tab* you will find advanced settings.

Select *rotatable stumps in milling model*, if you want to allow rotation of the stumps on the milling model. By default, this setting is disabled.

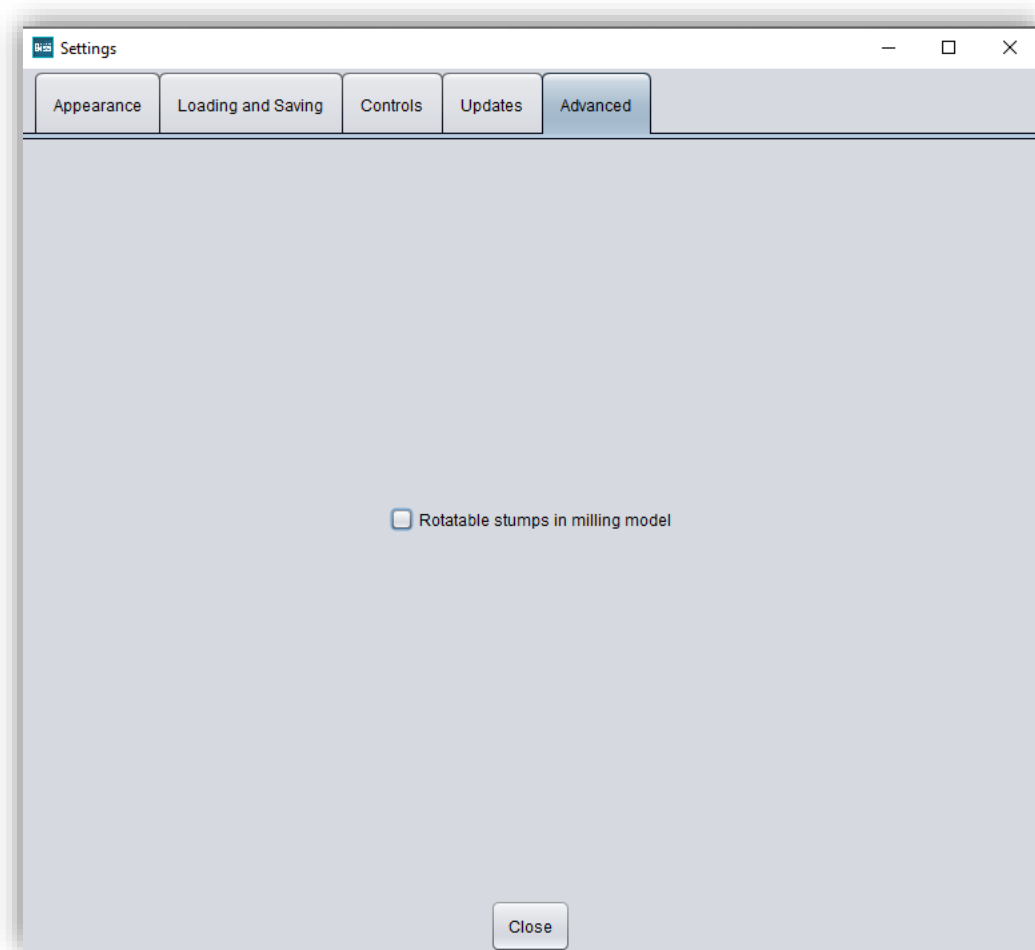
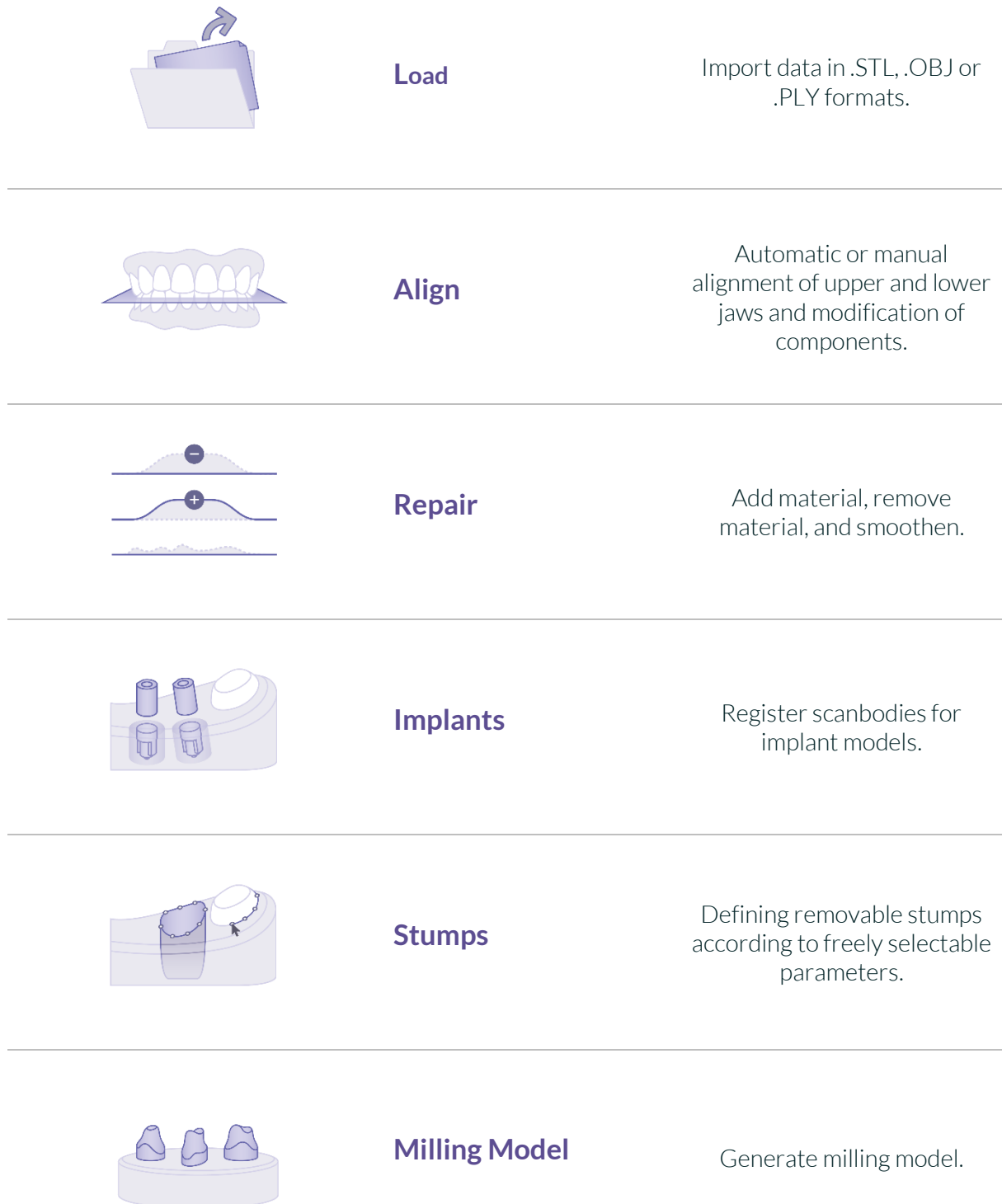
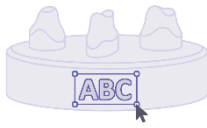


image 9: Advanced settings.

## 5 From the Scan to a Printable Milling Model

### 5.1 The Workflow





### Labels

Attachment of e.g., patient name or company logo.



### Save

Export all components to .STL, .OBJ or .PLY formats.

table 7: The Workflow.

## 5.2 Open file

On the left side of the program window, you will find the action menu. Using the *open file* button, you can load your scan data into the program or open an already existing .GBS project file (image 10). After selecting the button, a window will open where you can choose the desired file in the .OBJ, .STL or .GBS format.

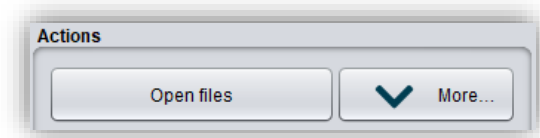


image 10: Open the scan data.

---

**Hint:** You can load multiple scans at once if you hold down Ctrl, select all the files you want, and then click open. If you click on "More...", you can load and unload individual scans.

---

If BiSS cannot recognize what type of scan it is from the file name, a „could not determine purpose of data“ windows open. Select which type of scan is displayed in the preview (image 11).

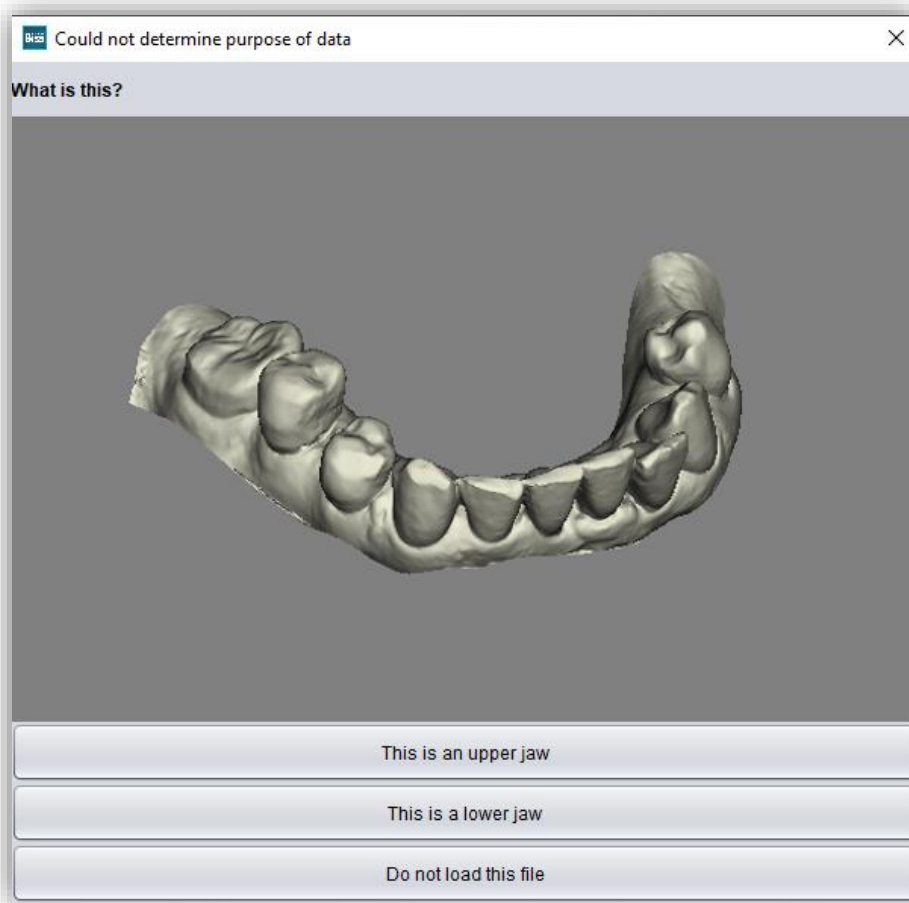


image 11: Assignment of the loaded jaw models.

**Hint:** BiSS can automatically detect which type of scan it is. BiSS distinguishes between upper jaw, lower jaw, implant reference scan and no implant reference scan. For this to work, there are certain requirements for the file names (see table 8).

File Type	Condition
File is upper jaw	<ul style="list-style-type: none"> <li>✓ contains <i>mandibel, mandubul, mandible</i> or</li> <li>✓ contains <i>lowerjaw, lower-jaw, lower.jaw, lower_jaw</i> or</li> <li>✓ ends with <i>occlusion_l</i> or</li> <li>✓ is <i>uk</i></li> </ul>

- File is lower jaw*
- ✓ contains *maxill* or
  - ✓ contains *upper-jaw, upper.jaw, upper\_jaw* or
  - ✓ ends with *occlusion\_u* or
  - ✓ is *ok*

- File is implant reference scan*
- ✓ contains *impla*

- File is no implant reference scan*
- ✓ contains *anatom*

*table 8: File name components for automatic detection of the scan type.*

After you load your scans, the model is automatically aligned. Note this later when exporting your work, see section *Save the Job*.

### 5.2.1 Colored Representation of an Intraoral Scan

It is possible to display intraoral scans in color in BiSS. To do this, simply load your color scan. BiSS recognizes .PLY files with textures as well as .OBJ or .PLY files with vertex colors. You can also disable the loading of colors under *menu / settings / load and save*.



*image 12: Color scan with textures.*

### 5.2.2 Unload Model

Of course, you can also unload the loaded models again. To do this, use the *unload upper jaw*, *unload lower jaw* or *unload implants scan* button shown on the action window on the left, see image 12.

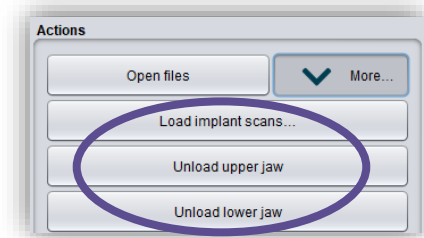


image 13: Unload models.

### 5.2.3 Assign a Project Name

After loading the scan data, it is possible to assign a user-defined name (e.g., project/patient) to the project (image 14). To do this, enter the desired project name in the *name (project/patient)* field. This name also appears in the top line of the BiSS window. If the project remains unnamed, you will see a corresponding message "No project name was entered". However, it is possible to continue without naming.

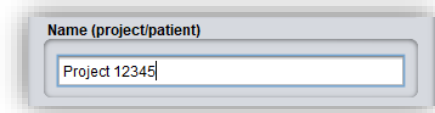


image 14: Enter project name.

---

**Hint:** *BiSS remembers the project name. If you add a label to your model (see chapter Labels) or if you want to save your project, BiSS uses the project name you specified by default - for a faster work.*

---

### 5.2.4 Your Personal Workflow

If you don't need one or more of the possible designing steps of BiSS in your machining process, you have the option to deselect individual functions. To do this, simply remove the check mark from the relevant function. These functions will then no longer be displayed in the navigation bar. You will find the function palette shown in image 15 on the left side of the action window when you are in the *load step*. BiSS remembers your setting until the next time you open it, so you don't have to make this selection every session.

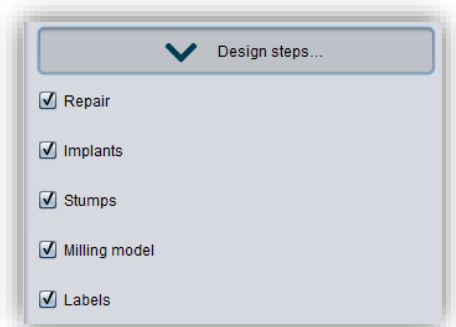


image 15: Module selection.

Once you have made all the necessary settings, click >, to set the occlusal plane for your model.

- ✓ Click on "Open file"
- ✓ Select the file to load
- ✓ Determine the upper and lower jaw or reference scans
- ✓ Give your project a meaningful name

### 5.3 Align Object

In this processing step, you can align all loaded components. On the one hand, these are the main scans for the upper and lower jaw, but also implant reference scans or free components, if applicable.

You will see the *adjust implant scan*, *adjust jaws individually*, *edit components*, and *join pinned components and main scan* (here you can pin single components, such as scan bodys, which were not connected to the scan, to the scan now). If none of these are selected, then the *align occlusal plane* function is active, see image 16.

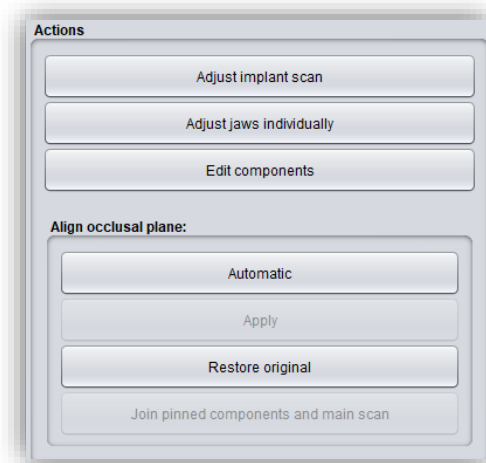


image 16: Action menu – align object.

#### 5.3.1 Align Occlusal Plane

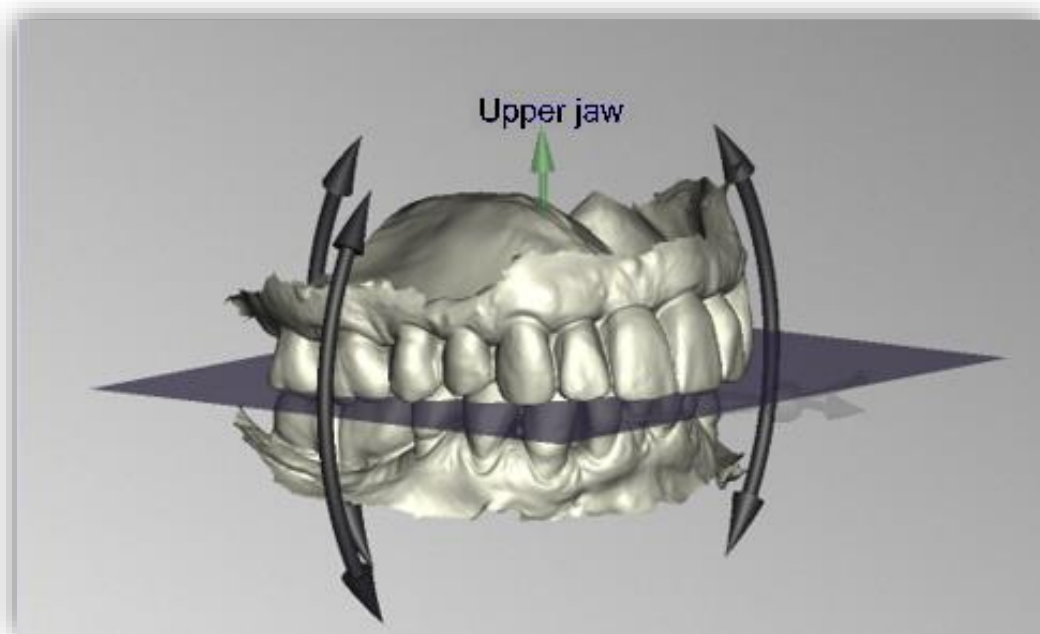


image 17: Automatically aligned occlusal plane. The position of the plane can be adjusted manually.

You can align the occlusal plane automatically or manually on the loaded model. The simplest method is to first align the model automatically. This is already done automatically in the background or by clicking the *automatic* button in the action window (image 16). The plane is now automatically aligned.

Now you can check the position on the model by moving, rotating, or zooming in/out with the mouse as described in the *In* order for the network dongle to be recognized within your network, the following settings must be set before BiSS can be started the first time:

- ✓ Install BiSS
- ✓ Insert the network dongle into the device
- ✓ Open the installation directory of BiSS (on the same device)
- ✓ Run *DinkeServer.exe* as Administrator
- ✓ Under *Startup Modes* on the left, select *Windows Service*
- ✓ Under *Network Configuration* on the right, select *Automatic*
- ✓ Click Start

Your firewall must recognize and allow Dinkey Server. Therefore, select *Automatically Configure Windows Firewall* when prompted to do so.

Dinke Server now runs as a background service and doesn't need to be restarted manually after rebooting the device.

---

**Note:** *If you remove the dongle or add another dongle, a restart of Dinkey Server may be required.*

---

BiSS can now be started from all devices of your network, according to the number of purchased licenses.

Control section.

If you would like to readjust the position of the occlusal plane, click on the appropriate direction arrow that shows you the possible change in position of the occlusal plane and thus move the plane while holding down the left mouse button. Double-clicking on the rotation arrows rotates the occlusal plane by 90°. Alternatively, click directly on the semitransparent plane. If you are content with your work, click *apply*. If necessary, you can automatically align your model again.

Clicking the *restore original* button will undo any alignment.



Click > to move to the next editing step.

---

**Hint:** If you've made changes to the alignment but have not yet clicked "apply", the button will not say ">" but "apply and continue".

---

- ✓ Click on "automatic"
  - ✓ Check the position of the plane on the model
  - ✓ Make a manual readjustment
  - ✓ Click on "apply"
- 

### 5.3.2 Adjusting the Implant Reference Scan

If you have loaded an implant reference scan, then you must also align it to the main scan if this hasn't already been done by the scanner. The alignment process follows a two-step procedure. First, a rough alignment to the main scan takes place, followed by the fine adjustment.

Click on *adjust implant scan*. Now a new menu opens. It is often necessary to roughly align the implant reference scan with the main scan in advance because it is in a different spatial position.

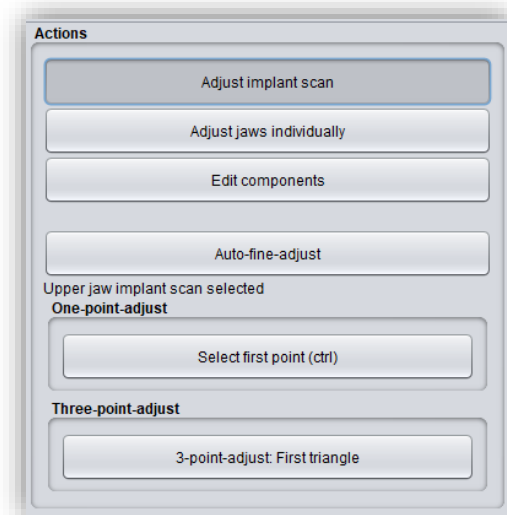


image 18: A new menu opens.

You have three options: You can "do it yourself" and "move" the implant scan to the main scan with the mouse. To *move* it, grab the arrow cross with the left mouse button pressed. And for *rotation* click on the model with the left mouse button and move the mouse while keeping the mouse button

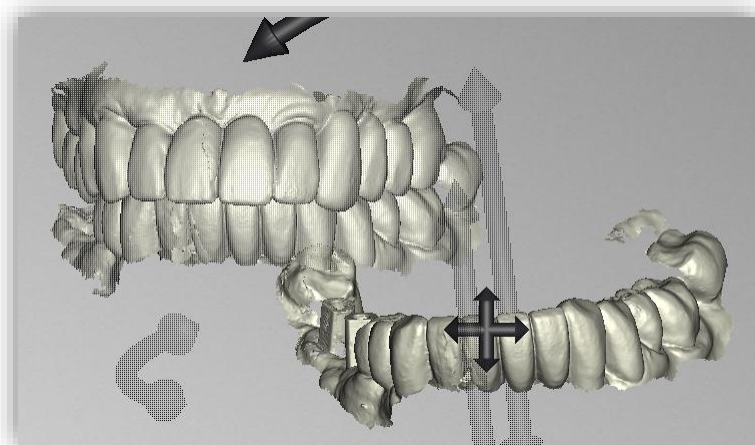


image 19: Implant reference scan has a different spatial position than the main scan.

pressed. The implant scan model now rotates around this point.

*Move implant scan*

Grab the arrow cross with the left mouse button pressed and move the scan.

*Rotate implant scan around point*

Click on the implant scan. Move the mouse while holding down the left mouse button so that the scan rotates around this point.

*Rotate implant scan around center*

Grab the curved arrows with the left mouse button pressed and rotate the scan.

Alternatively, you can perform the pre-alignment using *one-point alignment or three-point alignment*. Therefore, click the button *select first point (ctrl)*. Then select a point on the implant reference scan and the corresponding point on the main scan. On the left side of the action window, you will see a preview of your selection, see image 21. After selecting the second point, BISS roughly aligns the implant scan to the main scan. You can also hold down the *ctrl key* instead of clicking on the button and select the corresponding points for one-point alignment.

This is also where the third alternative comes in. What is described above also works with the *3-point alignment*. First select three points on the main scan and then the same three points on the implant reference scan. Here, too, you have the same preview, but on three images following each other.

**Note:** *If you set the first point, this component will not move during alignment. For example, if the upper jaw is to remain in its current position but the implant reference scan is to be aligned with it, you must set the first point on the upper jaw and the following point on the implant reference scan.*

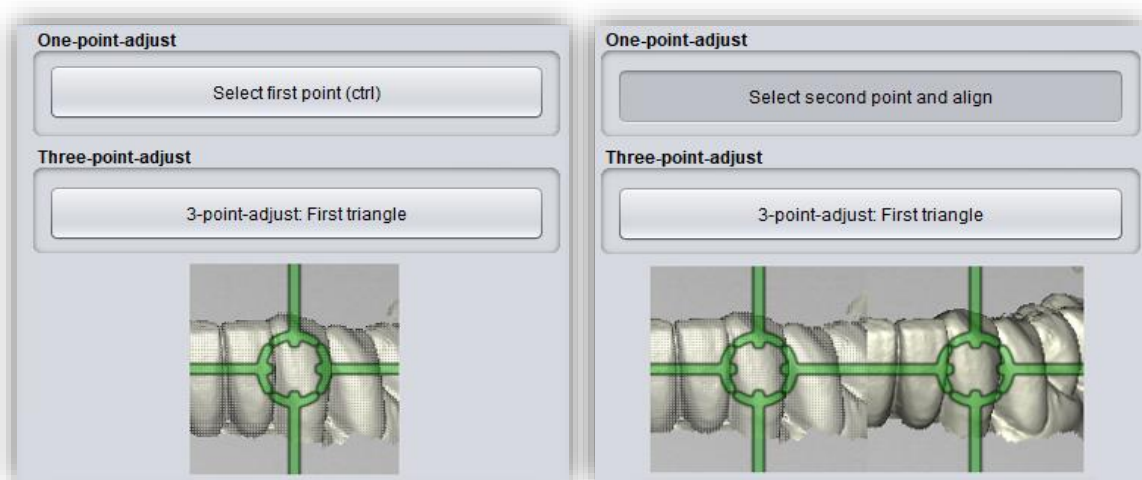


image 20: One-point alignment. LEFT - Select first point. RIGHT - Select second point.

After selecting the two points, the *automatic fine adjustment* is started automatically.

If you have aligned manually, you then need to perform the *automatic fine adjustment*. BiSS now aligns the two scans exactly, see image 22.

When you are done with the *align step*, click > *apply and continue*.

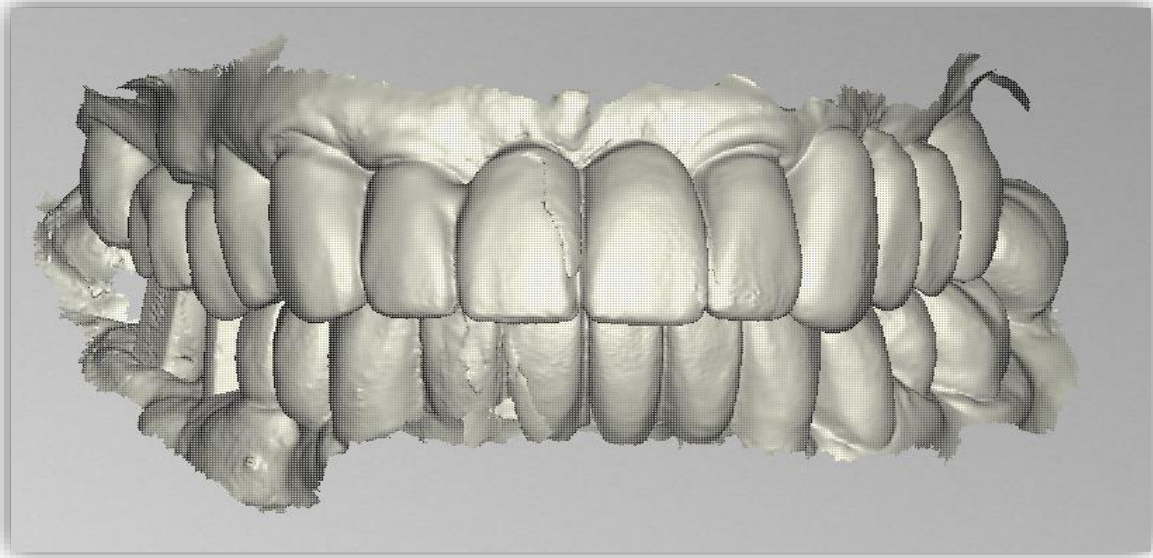


image 21: After the preliminary and fine adjustment. The implant reference scan is precisely aligned with the main scan.

- 
- ✓ Click on "adjust implant scan".
  - ✓ Hold down ctrl and make the one-point alignment or 3-point alignment
  - ✓ Press "automatic fine adjustment"
- 

### 5.3.3 Single Align

Click the *align individually* button, if you want to align the loaded jaw models to each other individually.

Select the respective individual component with a mouse click. You can now rotate and move these components as you wish.

#### 5.3.3.1 Load Bite Scan...

Via the *load bite scan...* button, you can self-explanatorily load an additional bite scan and align the jaws to the bite scan.

You can choose between automatic *one-point alignment*, *3-point alignment* or *manual alignment* and subsequent fine adjustment via the *automatic fine adjustment* button.






### 5.3.4 Edit Components

You can load additional components into BiSS as *free components* and edit them in a variety of ways:

- ✓ Delete small components below a selected value limit
- ✓ Load any number of free components
- ✓ Align manually, with one-point alignment or with 3-point-alignment
- ✓ Connect to the model in a variety of ways (affix, interspace, sew up, union, difference)
- ✓ Load bite scans to align the main scans to each other

### 5.3.5 Align - Overview of all Functions

ALIGN OCCLUSAL PLANE	
Automatic	The occlusal plane is automatically aligned. This is the initial state after loading the main scans.
Apply	Accepts the occlusal plane after it has been aligned manually.
Restore original	Restores the original orientation of the scan data in space.
ADJUST IMPLANT SCAN	
Automatic fine adjustment	Performs an automatic fine adjustment of the implant scan.
Select first point (ctrl)	One-point alignment as a method of pre-alignment.
3-point alignment: first triangle	3-point alignment as a method of pre-alignment.
SINGLE ALIGN	
Load bite scans...	Another scan can be loaded into the project.
Automatic fine adjustment	Performs an automatic fine adjustment of the loaded scan.
Select first point (ctrl)	One-point alignment for pre-adjustment of the loaded scan.
3-point alignment: first triangle	3-point alignment for pre-alignment of the loaded scan.
EDIT COMPONENTS	

Load free components		Free components can be loaded into the project, such as (...).
Anchor in upper jaw		The free component is firmly connected to the upper jaw.
Anchor in lower jaw		The free component is firmly connected to the lower jaw.
Delete		The selected component will be deleted.
Delete all free components		All free components are deleted.
Delete small free components		Free components that are smaller than a selected limit, are deleted.
Reset transformation		Transformation steps are reversed.
Select first point (ctrl)		Select first and second point for one-point alignment.
3-point alignment: first triangle		Select the first and second points for the 3-point alignment.
Don't align, just select		Activate the checkbox if the free component should not be aligned.
Connect: affix		Scan and component, which approximately touch each other, are glued, i.e. a gap between them is calculated away and they are joined together.
Connect: interspace		The scan and the component are superimposed in at least one place. All surfaces/volumes that are duplicated are now reduced to one surface/volume. All surfaces/volumes that are new are added.
Connect: sew up		The scan and the component touch and are connected.
Connect: union		The scan and the component are joined together. All internal overlaps are calculated away from the component.
Connect: intersection volume		By means of a Boolean operation, all parts of 2 data sets that do not overlap are calculated away.

Connect: difference



The penetrated volume of the free component is subtracted from the scan.

table 9: Align – overview of all functions.

Once you have loaded a component, you can right-click on it and make some settings:

- ✓ you can **delete** the free component
- ✓ you can **pin** the free component to the upper or lower jaw
- ✓ the free component can be **exported** individually
- ✓ with **resize** the file can be enlarged in the whole with + or reduced with -.
- ✓ make a free component **watertight**, i.e., you have a crown, e.g., where the preparation margin is not closed. You can therefore look inside. This can now be closed with a click.
- ✓ you can **reset the transformation or undo the last move**

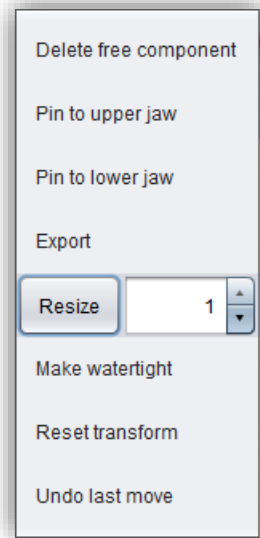


image 22: Extra settings for free components.

## 5.4 Repair

The repair of data is possible. This may be necessary if there are artifacts in the surface information. The repair trims and smoothes the artifacts and closes holes. In addition, material can be added or removed manually.

---

**Note:** *It should be noted that this distorts the surface and can lead to inaccuracies. Therefore, it is recommended to regenerate scans with artifacts and other irregularities.*

---

Furthermore, you can apply material to the surface, remove material or smooth the surface. To do this, select the corresponding option in the action window. You can also select the **tool radius** in millimeters (image 18).

### 5.4.1 Repair

Activate the **repair button** in case it's not activated yet. For repairing, select the areas of the model you want to edit, with the left mouse button. The repair will be executed when you confirm your selection by pressing the space bar afterwards. If you hold down the ctrl key, you can select several areas at once. Otherwise, the

previously selected area disappears when you release the mouse button and restart. If you hold down the shift key, you can draw a **polygon** that indicates the area to be repaired. We can distinguish two cases here. If the marker touches the boundary area of the model, the marked area will be removed. Here we can **smoothly close** the area through holes downright cut with a smooth edge. If the boundary area remains untouched, the data in the area will be removed and the hole will be closed again using extrapolated data.

---

**Hint:** *For example, you can remove entire scan bodies using this method if no corresponding scan is currently available to you.*

---

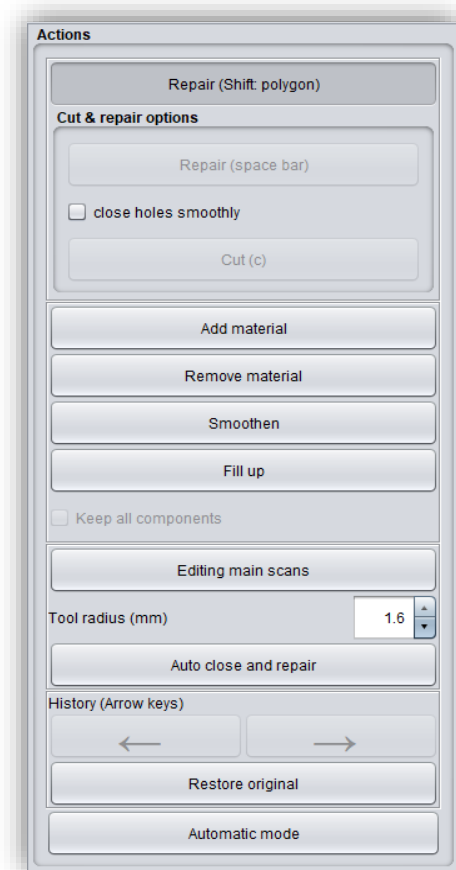


image 23: Action menu - repair.



#### 5.4.2 Application, Removal and Smoothing

The tools *remove*, *apply* and *smooth* are executed immediately, i.e., you do not have to confirm the input with the space bar. The intensity of this processing can be adjusted using the *intensity slider*. You can use the left arrow to undo individual editing steps and continue working on an earlier editing status or *restore original*.

#### 5.4.3 Fill Up

The *fill up* function is particularly suitable for filling holes. This tool works in the same way as *apply*, but is even more fun, see image 19.

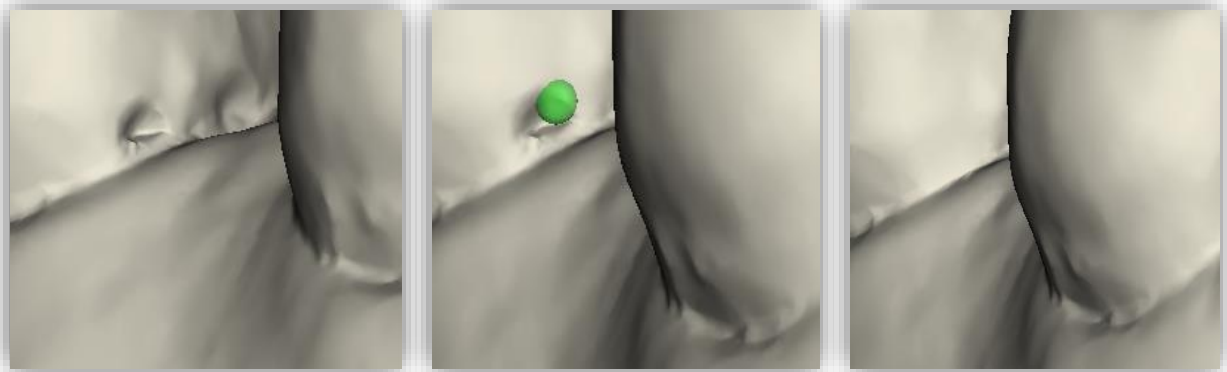


image 24: The fill up tool now makes it even easier to close holes and depressions.

#### 5.4.4 Process Main Scans / Process Extra Components

The *edit main scans/edit extra components* button allows you to choose which scan you want to edit.

#### 5.4.5 Automatic Close and Repair

This function automatically closes possible holes in the scan and repairs scan artifacts by deleting "defective" parts of the mesh (e.g., self-intersections) and then closes the holes.

Click > to move to the next editing step.

- 
- ✓ Select the repair tool
  - ✓ Select the radius of your tool and, if necessary, the intensity
  - ✓ Select the areas to be edited
-



## 5.5 Plugin “Implants”: Add Implants

### 5.5.1 Adding a File to the Implant Library

To work with the Implant module, you need to add the required models for scanbodies and analogs to your implant library.

#### Variant 1:

Go to the BiSS installation directory and open the *implants* folder. There you can create subfolders as you like, e.g., sorted by manufacturers and diameters, and thus create your personal implant library. Each implant geometry should have its own folder. Your personal implant library appears on the left side of the action window under the folder *"system-wide"*.

#### Variant 2:

Open the folder *.config* in your user directory and create a folder *implants*. Here you can also create your personal implant library, as in variant 1. It appears in the BiSS action window under *"user-specific"*.

Add your required files for analogs and scanbodies to the desired location within the *implants* folder. Please create a separate folder for each implant geometry. This folder contains the file for the *scanbody*, the file for the *model analog* and, if necessary, a *symmetry.txt* file that describes the rotational symmetry of the analog.

When creating their library, also note that the software works with the file names. Make sure that the file names contain the terms *(...)\_analog* and *(...)\_scanbody*. Then the files will be recognized correctly.

---

**Note:** Please note that these implant models in *.BOB* format can only be opened with BiSS. Any other use is not intended.

---

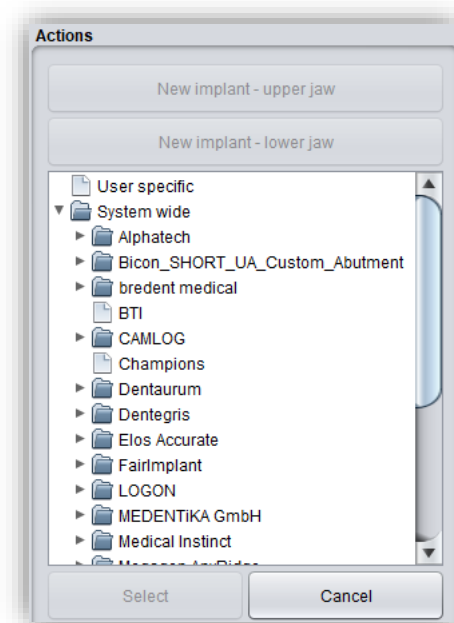


image 25: Implant library.

Once you have added the required files to your implant library, these implant models will be displayed in the implants editing step *after the next restart of BiSS*, see image 48.

### 5.5.2 Load Implant Scan

Load the implant reference scan at the same time as the two main scans at the very beginning of your project, see section Open file on page 19. BiSS automatically recognizes the implant scan by the file name as described in table 8.

If BiSS cannot retrieve this information in the file name, then the scan is loaded and assigned by a query.

---

**Tip:** *If you do not have a reference scan at hand, you can load the normal implant scan as a reference scan and use the repair function to cut out the scan bodies.*

---

### 5.5.3 Align

The implant reference scan is aligned directly after loading in the **align** processing step.

Often the loaded implant reference scans are located somewhere else in space than the corresponding main scan. A **pre-adjustment** is then required. You have three options for pre-adjustment:

With the mouse	Click the arrow cross to move, or the arrows to rotate. Click the model to rotate around the point.
One-Point-Alignment	Hold down CTRL and select two corresponding items on implant scan and main scan.
3-Point-Alignment	Hold down CTRL and select corresponding points on implant scan and main scan.

When you have made the rough pre-alignment with the mouse, you still must make the fine adjustment. To do this, click **automatic fine adjustment**.

The program automatically matches the scans to each other. When the scans are fine-adjusted, a control is automatically performed, i.e., the program controls itself (best-fit adjustment), for a perfect match. The loading bar shows you the progress.

### 5.5.4 Creating New Implants

When you arrive at the implants step, you will see a view with transparent main scans and the implant scan in the foreground, see image 49.

Now create new implants for the upper jaw or lower jaw, depending on the scans you have loaded.

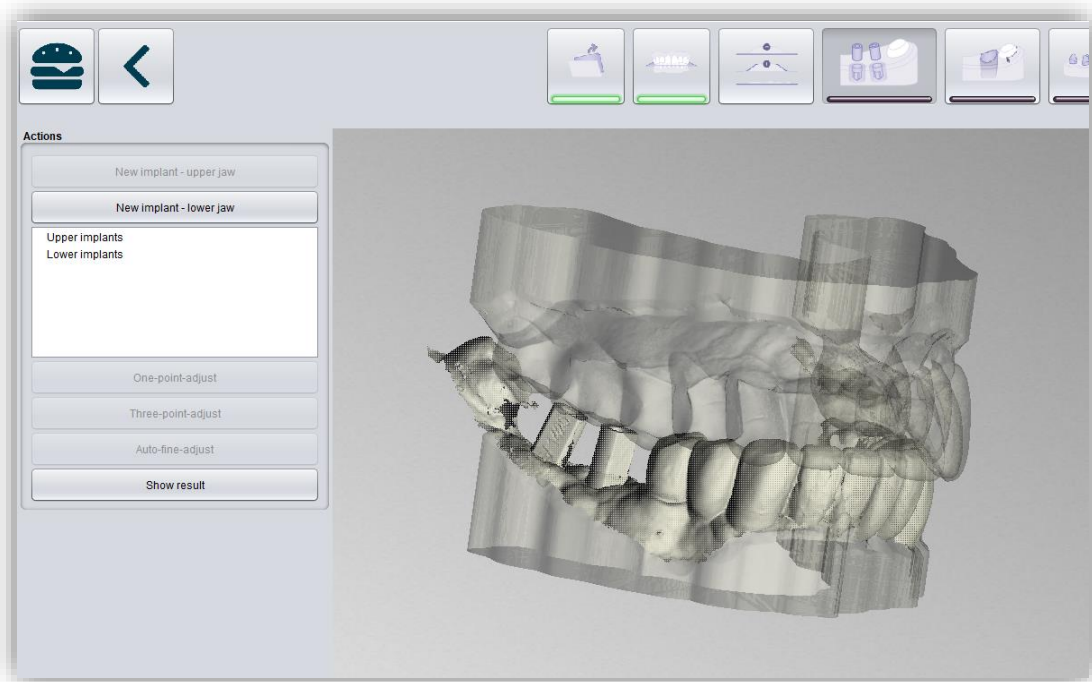


image 26: Insert implants machining step. The main scan is displayed transparently in the background. The implant reference scan appears in the foreground.

For example, click *new implant - lower jaw* if you have loaded a mandibular implant reference scan. Similarly, click *new implant - upper jaw* if you have loaded a maxillary implant scan. Alternatively, right-click the respective reference scan and select new implant from the context menu.

On the left-hand side in the action menu your previously loaded implant library will now open, see

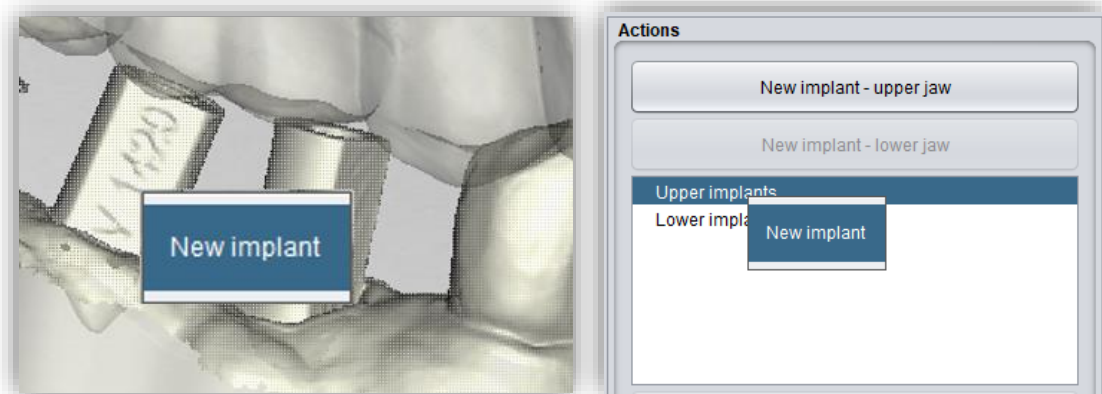


image 27: Add new implant from the context menu. LEFT - Right-click on the implant scan. RIGHT - Right-click on "implants below".

image 50. Select the desired implant model and confirm with *select*. The *cancel* button discards your selection.

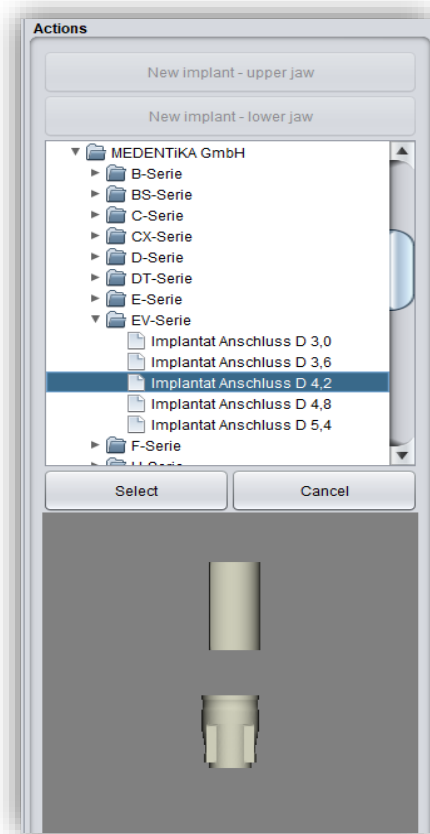


image 28: Select the appropriate implant from your implant library. A preview is displayed at the bottom.

If you have selected an implant model, then you will see a preview of the scanbody. You will be prompted to select a point for *one-point alignment* on the preview and correspondingly on the reference scan. Follow the instruction and select the points. The one-point alignment will now take place automatically. It starts at that moment you select the second point.

The one-point alignment is usually sufficient. If desired, you can also perform a 3-point-alignment. Select the *3-point-alignment* button for this. You will now be prompted to select three points on the preview and correspondingly on the model.

For another implant, repeat the steps again: select new implant, select the appropriate implant from your library and perform the one/three-point alignment.

image 52 shows the result after inserting and adjusting an implant.

You can still make implant adjustments after the adjustment by enlarging or wrapping the analog. You can also insert a hole towards the bottom. The selected settings are transferred to the milling base plate in the next step.

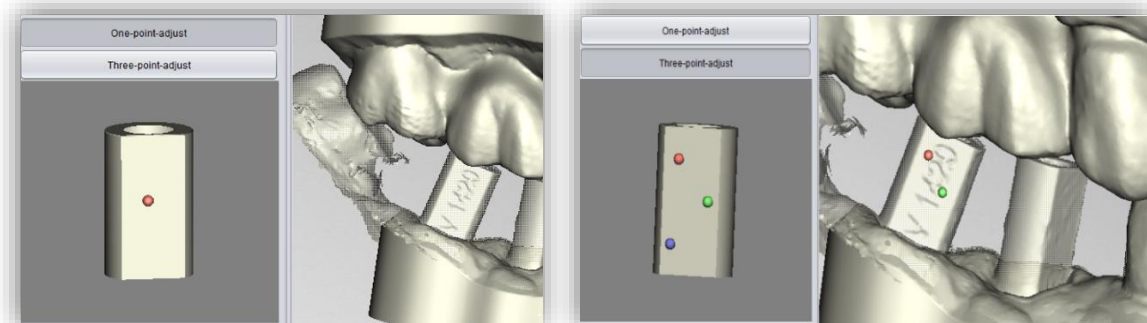


image 29: LEFT - One-point-alignment. RIGHT - Three-point-alignment.

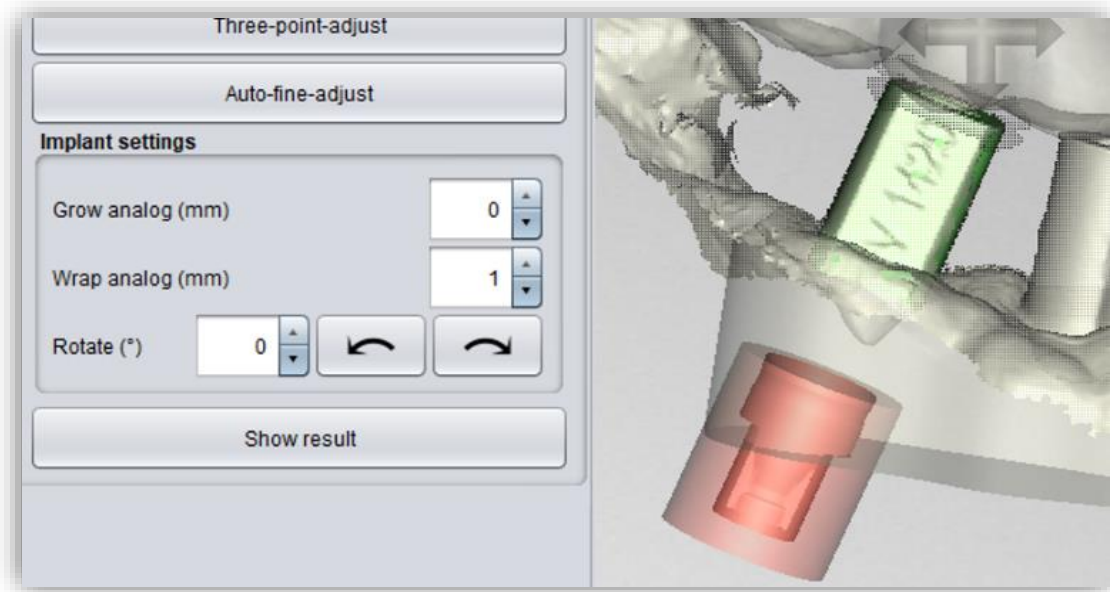


image 30: Display after one/three-point alignment and fine adjustment. The scanbody is shown in green. The analog is shown in red.

IMPLANT SETTING	DESCRIPTION
Grow analog (mm)	Increases the diameter of the analog. Values < 0 reduce the diameter. This value represents a correction value for 3D printing and must be tried out. (For the Anycubic Photon, this value is 0.05mm).
Wrap analog (mm)	Adjusts the distance of the wrap around the analog. By default, it is set to 1 mm. It represents a protective area that wraps around the analog. This means that no guides are cut off when adding gingival masks, for example.
Hole to bottom Ø (mm)	The hole down can be inserted to verify a properly analog seat and to allow air displacement during 3D printing.
Rotate (°)	This function rotates the analog. If we have an analog with a certain symmetry, then clicking on the arrows will rotate it according to the symmetry.

table 10: Description of the implant settings.

Clicking > transfers the settings to the base plate and the implants are "punched out" there. **Removable stumps** can then be defined.

Implant hole drillings and analog punch-outs are not yet immediately visible. They will be displayed when you are in the next step.

- 
- ✓ Load the implant reference scan
  - ✓ Match the implant reference scan with the main scan
  - ✓ Create a new implant
  - ✓ Perform the one-point alignment or the 3-point-alignment
  - ✓ Perform the automatic fine adjustment
- 

### 5.5.5 Note on the Reference Surface

Intraoral exposures are usually enlarged slightly. Although the implant models are aligned according to the reference surface, they are subsequently centered. This prevents inaccuracies due to scan expansion.

## 5.6 Define Stumps

In this machining step, you can define the stumps.

### 5.6.1 Automatic Import of Stumps

In BiSS there is the possibility to import stumps automatically if they have already been defined in a previous processing step, e.g., in the scan software.

BiSS checks whether there is a narrow, ring-shaped gap between two parts of a loaded scan and interprets this geometry as a stump. The gap will be closed and a stump with a matching edge curve will be created.

If the scan was dragged down the margins of the gap in a unified direction, creating a trench around the stump, then there will be an option later to use the exact shape of the trench as the stump boundary curve, rather than a control point-based spline as normal.

However, this only works if the mesh has not been changed too much in the trench after loading, which could happen, for example, by anatomical repair or addition of attachments.

### 5.6.2 Select Stumps Manually

First, individually select the stumps you want to create. Place your selection point approximately in the center of the corresponding stump (image 20), to define the center. When you are finished with your selection for the upper jaw, then click *proceed to lower jaw*. Make your selection here as well, if necessary. Even if you don't select any stumps for any of the jaws, you still can continue as normal. Now click on *edit stumps* (image 21).



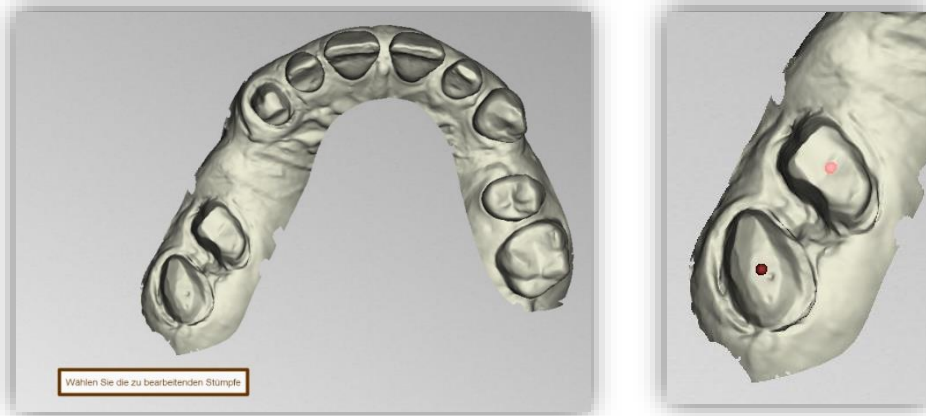


image 32: Selection of stumps.



image 32: 'Proceed to lower jaw' and 'Edit stumps' after selecting the stumps.

### 5.6.3 Set Stump Margin

Start defining the first of your previously selected stumps. The view is already automatically zoomed into the area in concern. Place a spline around the stump by selecting the individual spline points. Close the spline. If there are no self-intersections after closing the margin, the curve turns green (image 22).

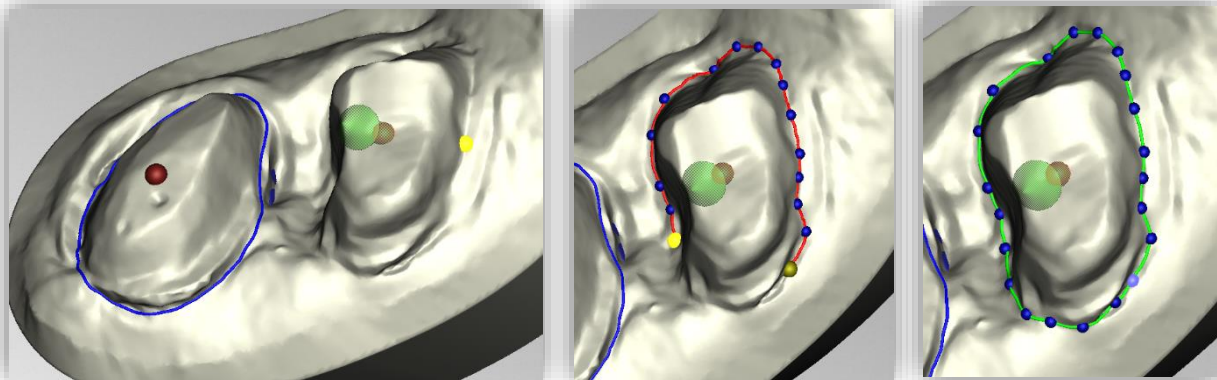


image 33: Definition of the spline around a removable stump. The line of the closed spline is displayed in green. The arrow visualizes the insertion direction. Click on "Next stump" to edit the next stump.

---

**Hint:** In some cases, it may be helpful to rotate the model and view the back side for a better view of the stump margin. The curve points can also be set from this perspective.

---

You can now continue with the other stumps by clicking > *next stump*. Proceed just as described until you have defined all the stumps.

If you are not currently editing the spline but are instead rotating or moving the view or changing stump settings, the jaw is displayed transparently allowing you to see a rough preview of the stumps in blue (image 24). If you move the direction of the arrow shown in green with your mouse, the orientation of the stump changes accordingly. For a vertical orientation, simply right click on the stump and select *reset insertion direction*.

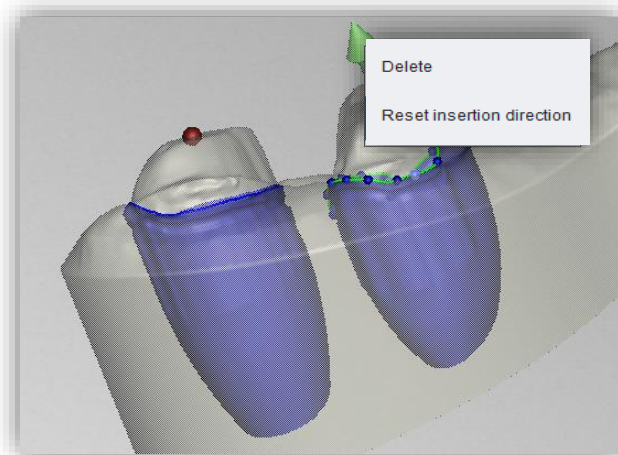


image 34: Reset the insertion direction of the stump or delete the stump. Preview of the removable stump.

The stump can also be *deleted* at this point (image 24).

When you are done defining all the stumps, click **> cut out all stumps** (image 25) at the top right of the program panel This process may take a short moment. If you receive an error message, correct the corresponding values or points in the respective spline and cut out the stumps again.

Now the finished stumps are displayed (image 23). The jaw matrices are hidden here by default. When you are ready, click **> cut out all stumps**. You can add more stumps at some later point.

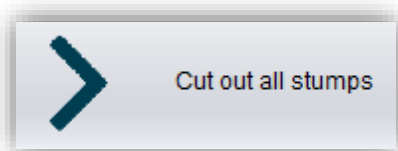


image 36: Cut out all stumps.

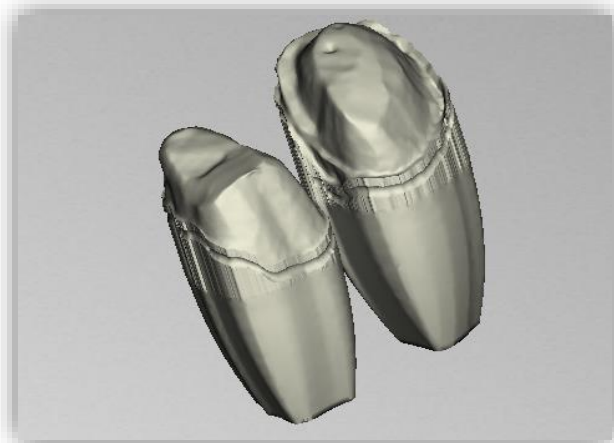


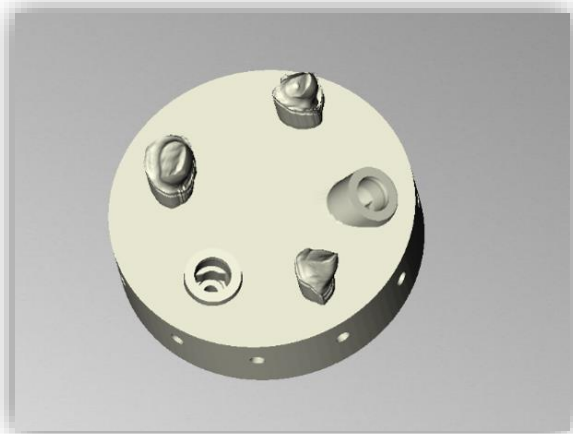
image 36: Stumps single.

- 
- ✓ Select stumps
  - ✓ Place the spline around each die individually
  - ✓ Correct the insertion direction if necessary
  - ✓ Click „> cut out all stumps”
-



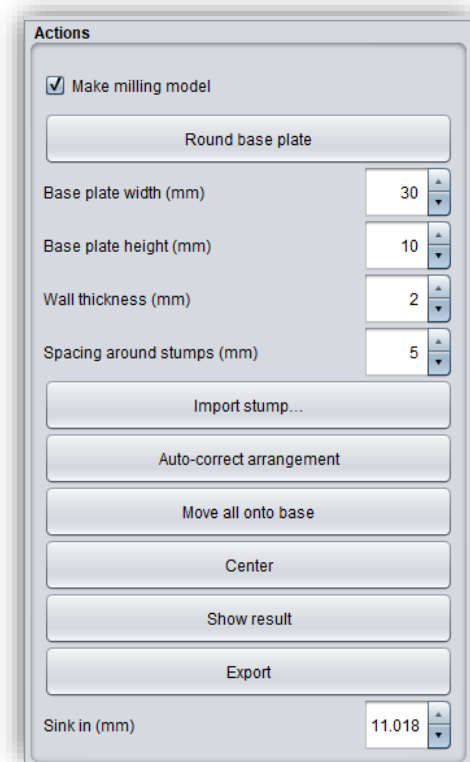
## 5.7 Milling Models

If you already have the stumps and implants defined in your model, then generating the milling model is a breeze. The base plate is automatically generated, and the previously defined stumps and implants are automatically placed, see image 27.



*image 37: The milling model is generated automatically. The geometry of the base plate and the position and alignment of the stumps and implants can be corrected.*

Various settings can be made in the action panel. You first must select whether a milling model should be generated. Now you are welcome to *import stumps*, which will be placed on the milling model with the orientation in which they were previously saved.



*image 38: Setting milling model.*

You can choose between a *round base plate and a square base plate*. The *width* (i.e., the diameter or edge length) and the *base plate height* can be set. The base plate is automatically hollowed out. Use *wall thickness (mm)* to set its thickness according to your preferences.

In addition, an initial presetting of the distance around the stumps is possible for the function *auto-correct arrangement*. Further automatic corrections are possible via the *move all onto base* and *center buttons*. You can also move the stumps manually, even all stumps together as a group by holding down the CTRL key. The rotatability of the stumps is disabled by default, but this function can be activated in the menu.

You use the parameter *sink in (mm)* to determine how deep the stumps are sunk into the base plate. The sinking can also be done comfortably with the mouse when the milling model is viewed from the side. This point only becomes visible when you have selected a stump.

Once you have designed the milling model according to your requirements and preferences, you can export it directly from this step. For this purpose, first click *show results*. The individual

components of the milling model are now combined into a single model. To export them for 3D printing, click the **export button**. You can now select a suitable storage location for your model.

When you are finished with the milling model, click **next step**.

- 
- ✓ Correct arrangement automatically or manually
  - ✓ Display results
  - ✓ Export milling model
- 

## 5.8 Labels

You can add a label to your model to clearly identify it after printing. This can be a simple text or an image file in .BMP, .JPG, .PNG or .GIF format.

Right-click on the part of your model where you want to add the label and select either **new text label** or **new image label** (image 28).

If you have selected new text label, then enter your text in the input line provided in the action window. If you have assigned a project name, this will be used by default. Of course, you can change the text. If you want to add an image label, then click on the image icon and select your image file (image 29).

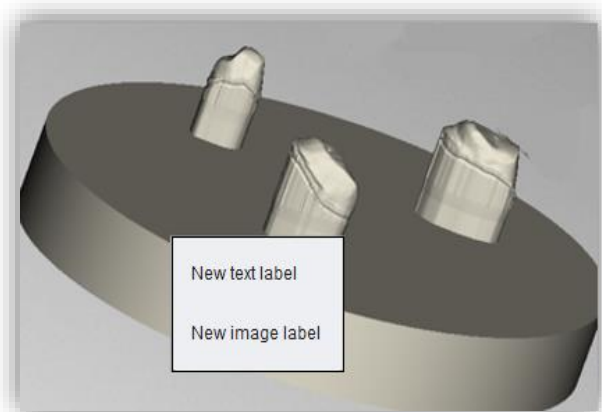


image 39: Selection label.

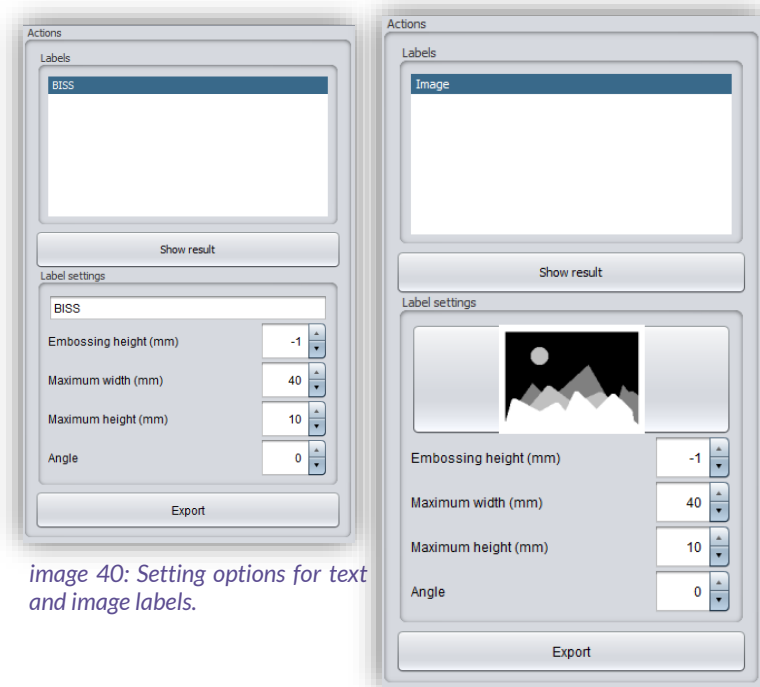


image 40: Setting options for text and image labels.

The selected labels are displayed on the model in design mode (image 30). You can change the *properties* of the labels, such as size, angle, and depth of the sweep in the action window. In the upper display field, there is a list of your added labels. You can select a label from this list and add it again by clicking on the other jaw of the model in the appropriate place or edit only its properties.

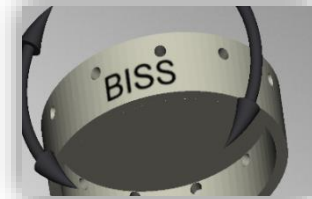


image 41: Preview text label.

Click *show results* if you want your labels to be added to the 3D model. You can edit the labels at any time afterwards. Reactivate the editing mode by clicking on your model. In addition, the imprints are added automatically when you exit the work step.



image 42: Label after imprinting.

If you have added one or more labels to your model and don't want to make any further changes, click >.

- 
- ✓ Make a right click on the model
  - ✓ Select e.g. new text label
  - ✓ Enter your text or select an image file
  - ✓ Change the geometry
  - ✓ Move the label to the right place
  - ✓ Set more labels
- 

## 5.9 Save the Job

Now you have the possibility to *save* the whole project in a project file .GBS or to *export 3D models* and all components as .STL, .OBJ or .PLY for further processing. In addition, you can also export individual intermediate states, *export the model aligned*, start directly with a *new project*, or return to the start screen and *choose another application* (image 32).

### 5.9.1 Save BiSS-Project

Select *save* to save the project file .GBS. If you have already saved the project or no project name is set, select *save as*.

### 5.9.2 Send BiSS-Data to PUZZLE

If you have purchased the PUZZLE application, then you can send the data directly to PUZZLE so that they are placed fully automatically. To do this, it is necessary to set the storage path beforehand (see chapter Loading and Saving).

### 5.9.3 Export 3D-Models

Use the *export 3D models button* to save your models in printable .STL, .OBJ or PLY format. Each component of the model is saved as a separate file. These are usually the lower jaw, upper jaw, gingival masks, and removable stumps.

### 5.9.4 Export Aligned

You can export the data in *original position*, or already aligned for 3D printing.

Therefore, activate the *export aligned button* and select the axis and orientation that points upwards for your printer.

If *export aligned* is not activated, the default is to export in the coordinate system used by BiSS, i.e., the set occlusal plane is the x-z plane.

Export in *original position* means that the data is exported in the same coordinate system in which the main scans were originally loaded.

### 5.9.5 New Project

Clicking on *new project* opens a new project. The old project is closed if it was saved before. If it has not been saved yet, then there is a hint about it.

### 5.9.6 Choose Other Application

Return to the start screen and select another BiSS application.

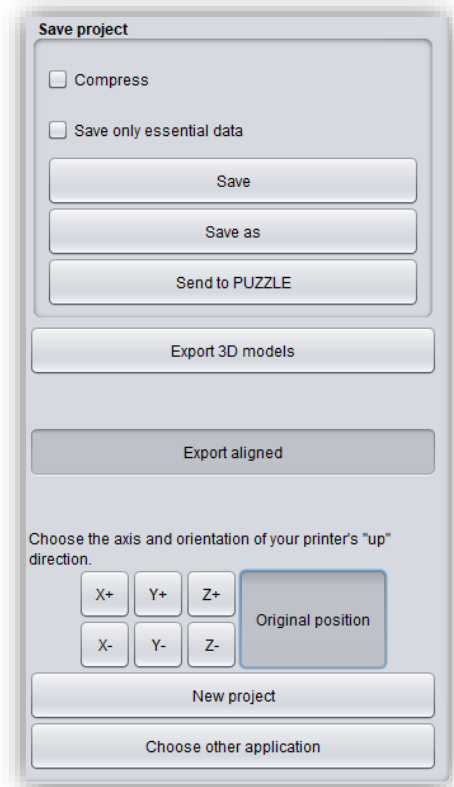


image 43: Selection for saving and exporting.

### 5.9.7 Short Excursion to the Coordinate System in BiSS

If you look at your denture from the front, the positive y-axis points upwards, the positive x-axis points to the right and the positive z-axis points to the front, see image 33.

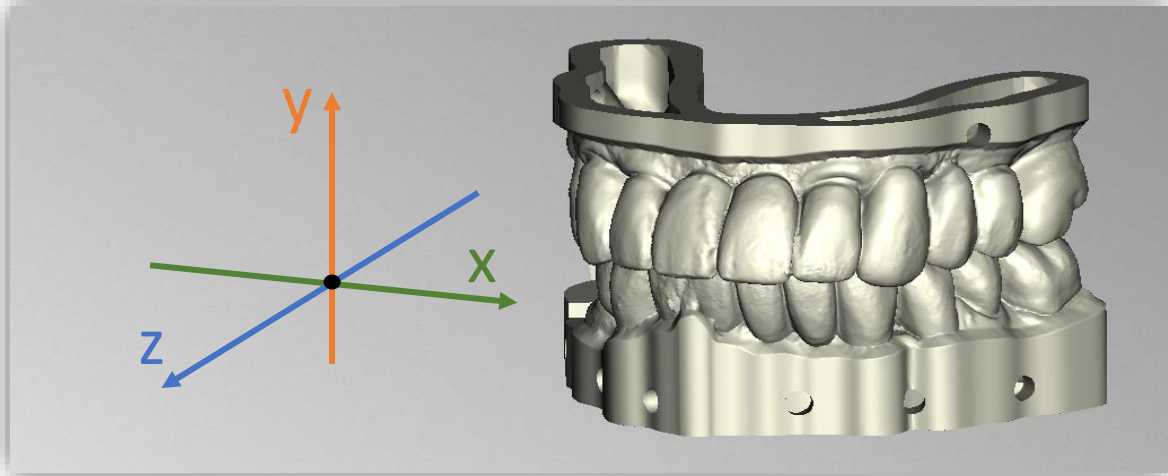


image 44: The orientation of the coordinate system used in BiSS.

## 6 Software-Updates

### 6.1.1 Update-Availability

You will automatically receive a message when a new update is available for your software.

Alternatively, you can click the Check for Updates button via Menu - Settings - Updates.

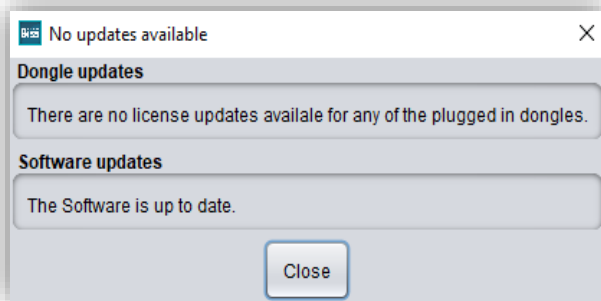


image 45: No software-update available.

If no update is available, the message shown in image 34 appears.

### 6.1.2 Install Update

Click on the provided link and download the new software version. Install the software in the desired directory. We recommend uninstalling the old version first. Manually added implant libraries should be preserved.

## 7 Dongle-Updates

In some cases, a dongle update is required:

- ✓ Your monthly license has expired, and you would like to extend it
- ✓ You have purchased another BiSS module, e.g., Premium Business
- ✓ You have purchased another workstation for your multi-user network license
- ✓ For more extensive updates, a dongle update may also be required so that you can benefit fully from the BiSS updates.

### 7.1 How to know that a dongle update is required?

You will be notified when a dongle update is ready for you:

#### 7.1.1 At Startup

You will automatically receive a message when you start BiSS if there is a new update available for your dongle. The prerequisite is that your dongle has not yet expired.

#### 7.1.2 Via the Menu

Go to the menu and then via settings to the updates tab. Click on the *check for updates button*. If there is an existing license update for your dongle, you will see it.

#### 7.1.3 Execute the UpdateClient.exe

In the installation directory of BiSS is the *UpdateClient.exe*. If BiSS does not start anymore, because your license has expired, you can start the update client this way, for updating your dongle or the software.

## 7.2 Execute Dongle-Update

Make sure that your BiSS dongle is plugged into the PC from which you will perform the dongle update.

Start the update client and follow the instructions.

## 8 Warning and Notes - Disclaimer

The software does not create dental prostheses and is only suitable for the further processing of digitally produced components in dentistry and orthodontics. Further use outside dentistry and orthodontics is not suitable.

The software leaves behind temporary files if it has not been terminated properly, e.g., in the event of a system crash. The user must then manually delete these files from his temporary files folder to free up disk space.