PROMADENT
Quality Dentalware

Version: 5.10.3

Stand: 01.05.2025

1 Contents

2 PUZZLE

PUZZLE is part of the BiSS Dental Software Suite and is a tool for placing STL, PLY or OBJ data on a virtual build platform. The application automates and links required steps to create a 3D printable model file from an IO scan file to place it. The feature is called *integrated Auto-Assistance Workflow (iAW)*. PUZZLE thus follows our claim: "Fast - Simple - Intuitive". Due to the complete automation of the digital workflow for the creation of 3D-printable model files with PUZZLE, manual steps that were still required in some cases are no longer necessary. Personnel resources, especially those of specialist staff, are conserved. If, for example, 15 IO scan data sets are prepared for printing per day in your practice or laboratory, this quickly adds up to more than 160 minutes of working time per day. That's 13 to 14 valuable hours of working time per week. BiSS PUZZLE independently accesses stored scan files of your intraoral scanner via *Auto-File-Collect* and imports them into the working environment. The scan files of the digital impression are then processed into a 3D printable model file using the *Integrated Auto-Design module (iAD)*, which is already successfully in use in PRINT. Base, hollow out, attach base supports, label - these work steps are completely automated.

The 3D printable model datasets are collected and placed by BiSS PUZZLE on the virtual 3D printing platform of your 3D printer (auto-nesting). You then only have to click on "Export". Once a platform is completely placed, the next one is automatically created. Depending on the printer type, e.g. die fits with different parameters and printer accuracies are reconstructed fully automatically so that the desired fits are achieved. Of course, the prepared model data sets (STLs) are available at any time for other advanced applications for BiSS users or can be sent to a partner milling center, for example.

From IO scans to finished 3D print file in full automation

FAST · EASY-TO-USE · INTUITIVE

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

Have fun with PUZZLE! :)

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.X.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 multi-user 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.

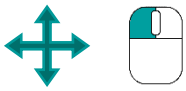
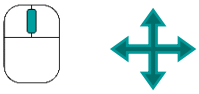
	Selection Tool	Move the cursor to the desired position and click the left mouse button.
	Rotate Model	Hold down the right mouse button and move the mouse.
	Move Model	Hold down the mouse wheel and move the mouse.
	Move Model	Hold down the right mouse button and shift key and move the mouse.
	Zoom Model	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
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.
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.
A corner pointing upwards	The corner is rotated forward.
Edge that belongs to a corner that faces forward	The edge is rotated forward.
Corner that belongs to an edge that points forward	The corner is rotated forward.
Edge pointing forward	The edge is rotated 90° to the left or right, depending on which half of the edge you click on.
Double click on the cube, one side facing forward	The side is rotated to the front and aligned that the label is right side up.
Triple click on the cube	Reset the view to frontal view.

table 3: The navigation cube.

3.4 Launch the Program

When you have started BiSS, the window shown in **Fehler! Verweisquelle konnte nicht gefunden werden.** appears. Here you get an overview of the available modules for BiSS Dental Software Suite. These are PRINT, MILLING, TRAYS, LOCATE, PUZZLE, FREEFORM and EDIT.

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 PUZZLE, click on the blue 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.

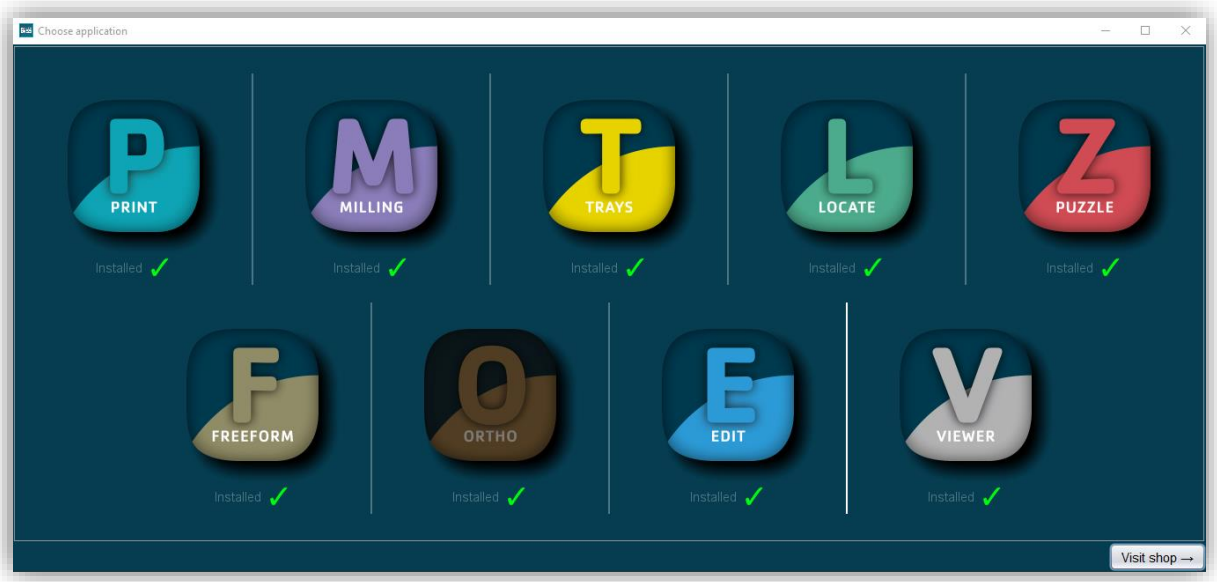


image 1: Welcome window after program launch.

3.5 The Workstation

3.6 Overview

Familiarize yourself with your BiSS workstation.

- ✓ The navigation bar at the top can be used to access the menu (burger). In addition, it is shown here whether PUZZLE is currently collecting data (the item is then colored purple), which can be paused with the button to the right of it. To the right of the pause, the plates can be exported.
- ✓ On the left you will find the action window. This is where you make the specific settings.

✓ On the right, you can see the 3D printing platform that is being worked on. Via the text window you can get messages and hints that support you in your work.

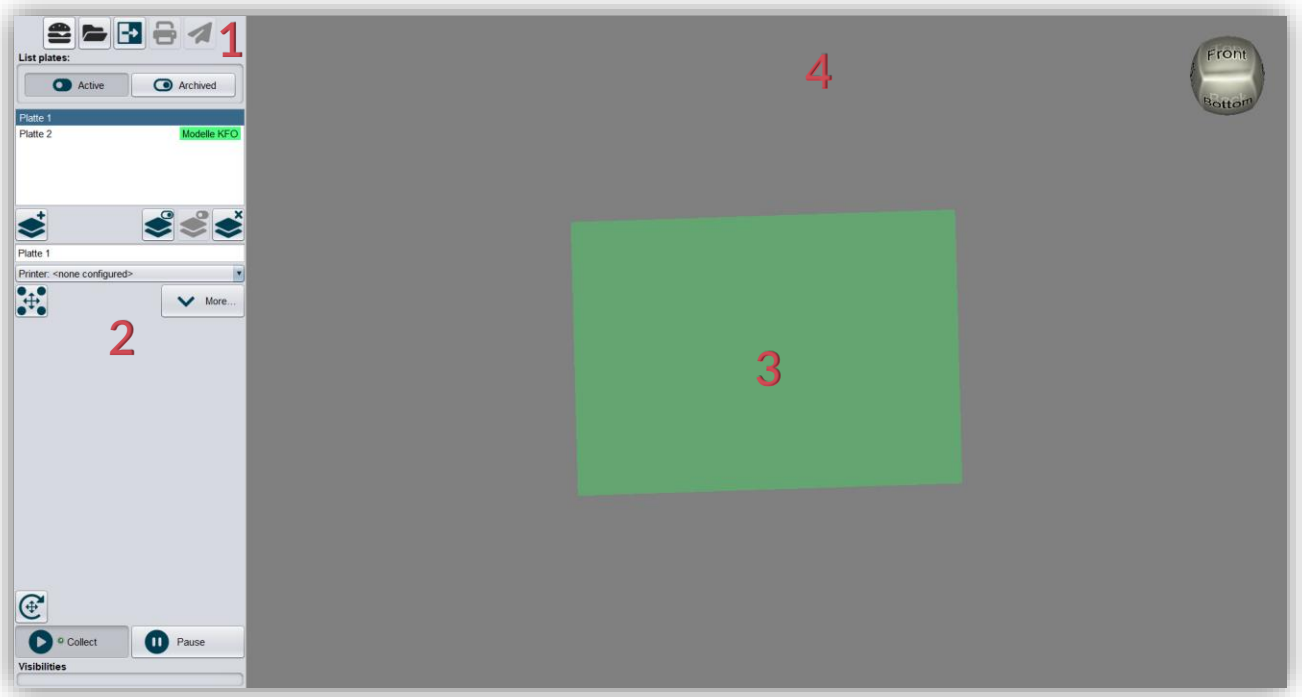


image 2: The BiSS program after the start. 1) Menu: Contains settings, printer configuration, about BiSS. 2) Action window: Individual for the respective work step. 3) Work area/printer plate. 4) Plate activities.

3.7 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.

3.8 Settings

Under the Menu Burgers button you will find the Settings tab, see image 4. Select Settings and a new window will open with the Appearance, Load & Save, Control, Updates, Advanced and PUZZLE tabs.

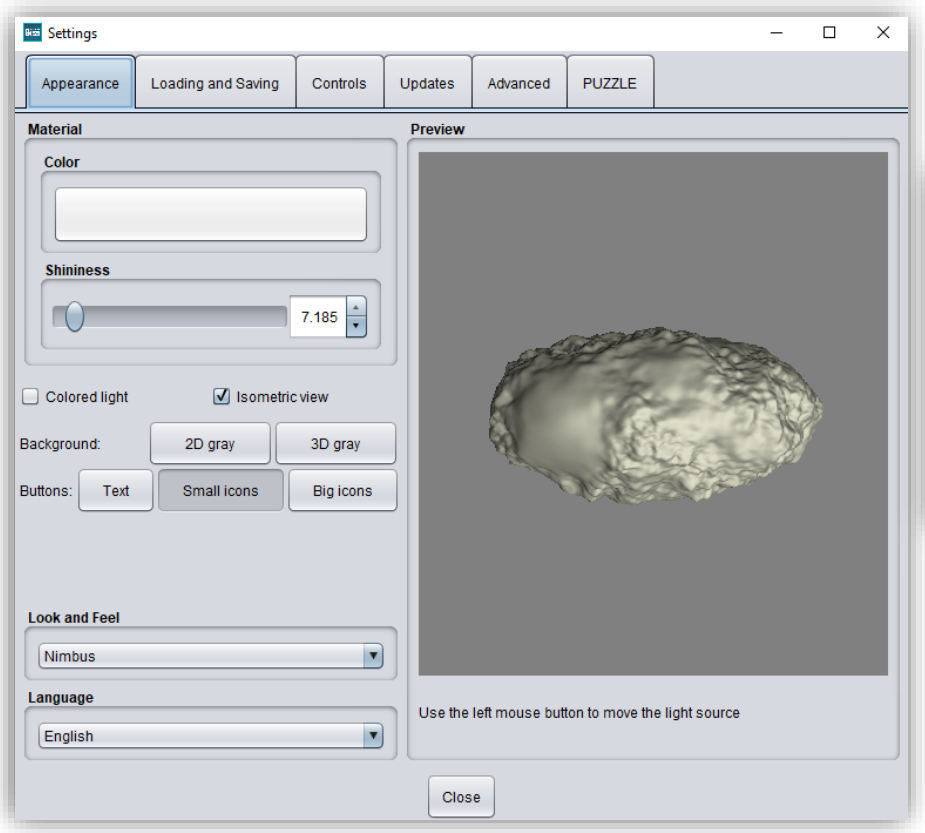


image 3: Changing the appearance of the model and the working environment.

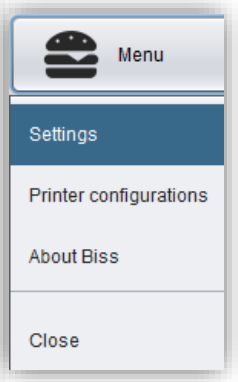


image 4: Menu.

The settings window can be closed by clicking the ***close*** button int 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 3, you can adjust the appearance of the loaded data to your needs by selecting a color and intensity of gloss. Further setting options are summarized in table 4.

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
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 4: Appearance settings.

3.8.1 Loading and Saving

Behind the Load & Save tab (image 5) you can set in which format your 3D printing plate should be exported. The file formats .STL, .OBJ. and .PLY are available for selection. Furthermore, you have the option to determine whether color data is loaded and exported. With each export, an image file of the plate is automatically output for a better allocation.

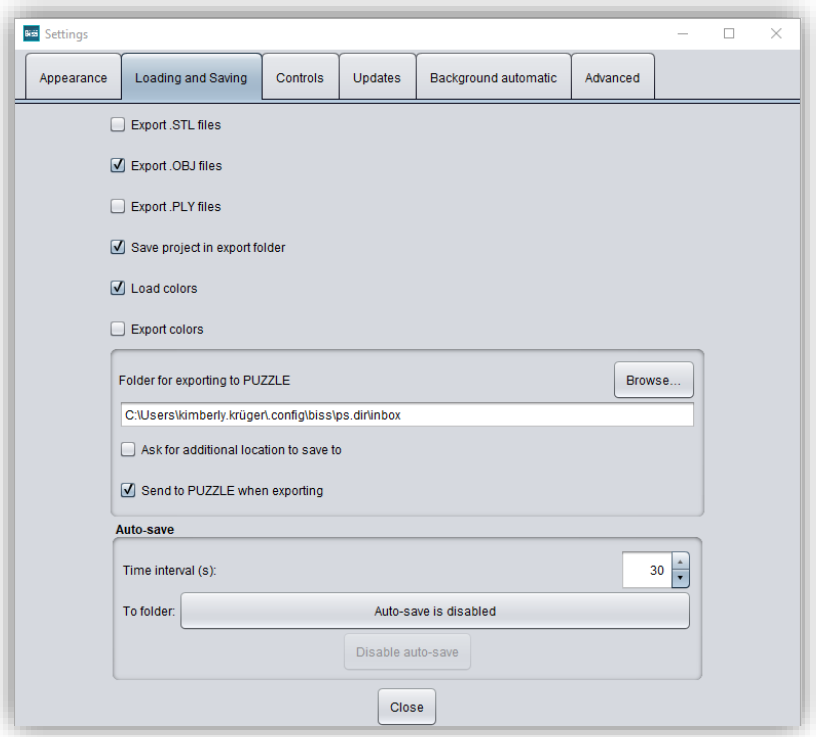


image 5: Loading and saving settings.

3.8.2 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.

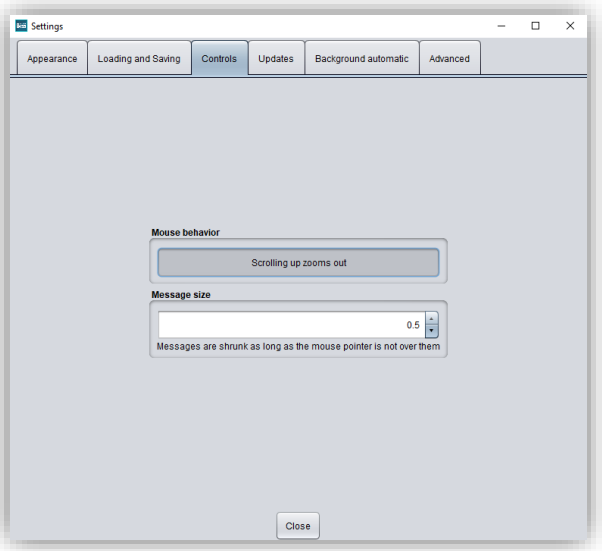


image 6: Custom setting of mouse behavior and message size.

3.8.3 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*.

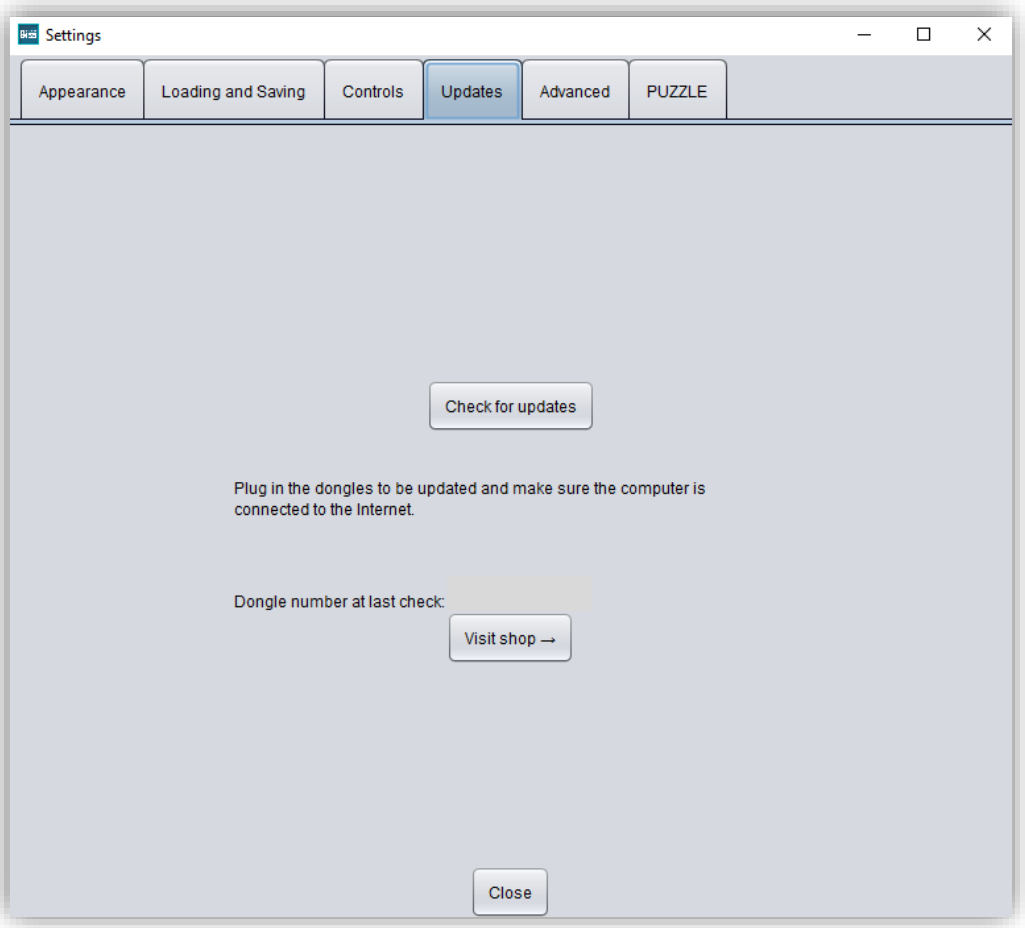


image 7: Update-settings.

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.

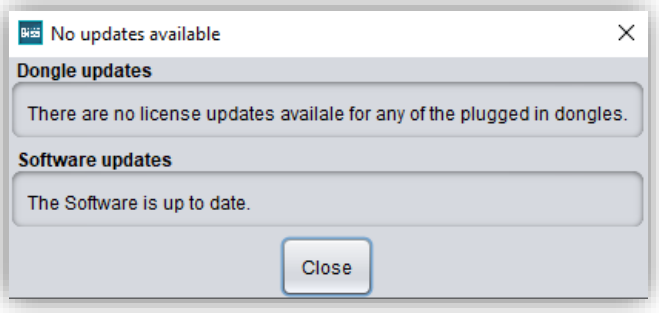


image 8: No updates available.

3.8.4 Advanced

You can check this box if you want to refine the data before calculating the wall thickness.

3.8.5 PUZZLE

You can individually set the *gap when placing party automatically (mm).* For the points *Importance of lying flat when importing single mesh files* and Importance of standing up when *importing single mesh files that seem to be stumps*, you can define with which intensity these points should be considered, so that the alignment on the plates is done according to your own wishes. If you let PUZZLE collect data, you can decide whether they may be distributed on several plates.

Under the section *These directories are being watched*, a folder must be created in which the data sets to be processed by PRINT or foreign data sets will be located. You can create several folders of your choice by *adding a path*. If you want to *edit* or *delete a path*, then the path must be marked first.

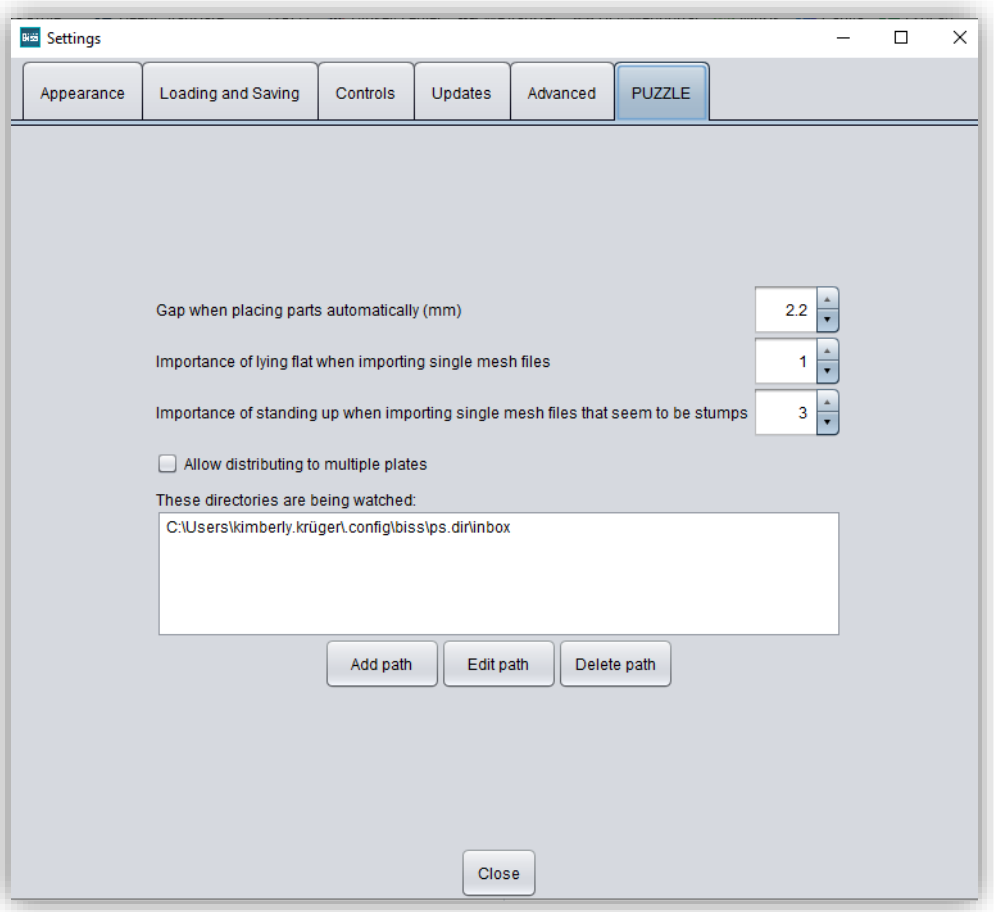


image 9: PUZZLE

3.9 Printer Configurations

Under the *Menu button (burger)* you will find the *Printer Configuration* tab, see image 11. Select Settings and a new window will open with the option to create a new printer (image 12).

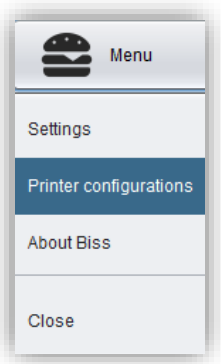


image 11: Menu

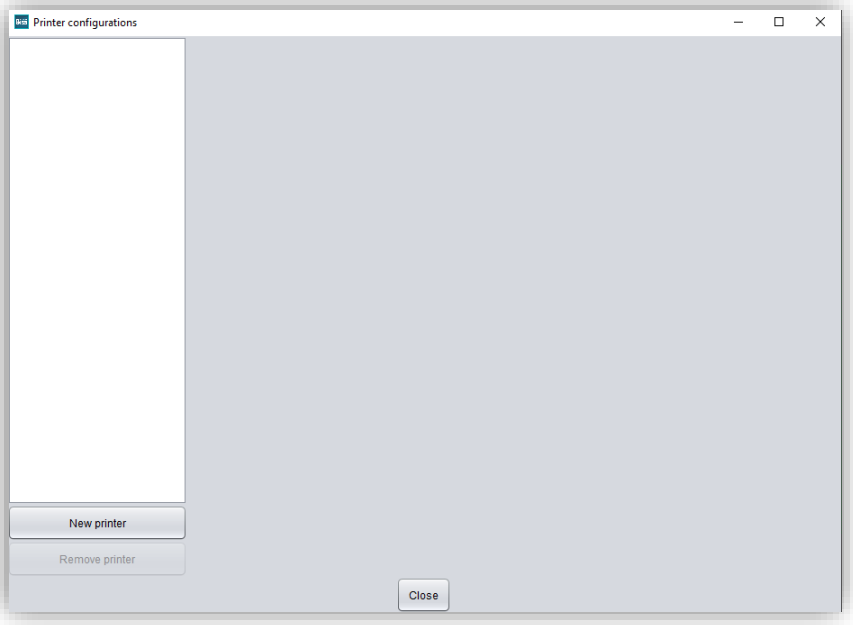


image 12: Printer configurations

Click *New Printer* and the settings with two tabs, *General*, and Stub *parameters*, appear (image 10).

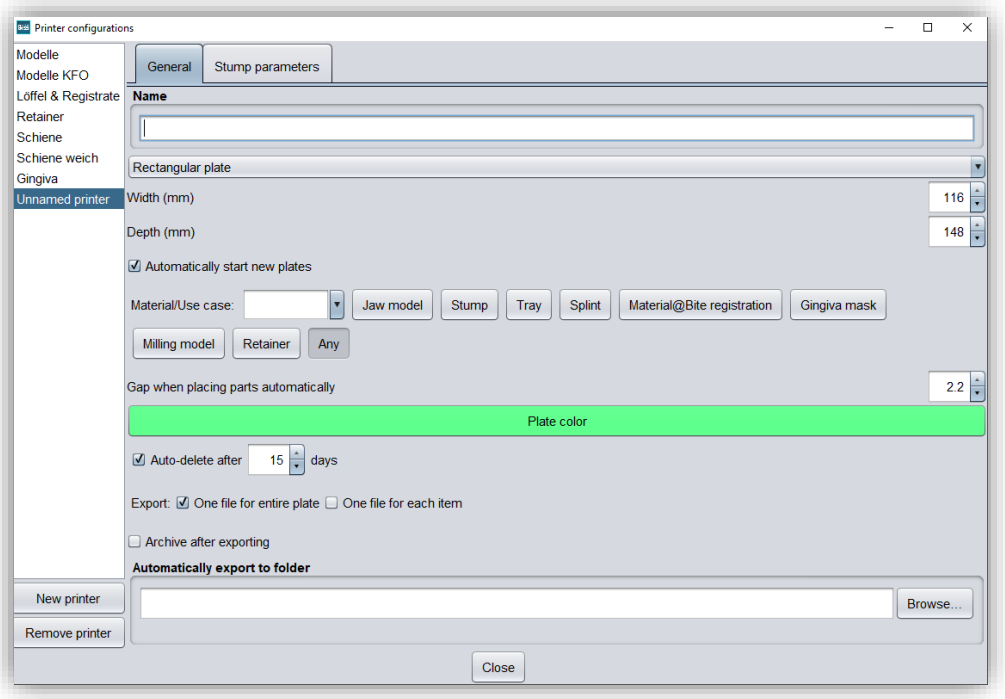


image 10: Settings for a printer

3.9.1 General Settings

You can name your printer as you like under *Name* and set whether you use a *rectangular plate*, a *ring-shaped plate* or an *ring-shaped plate with gap* (image 13). There are then different settings for the size, see table 5.

image 13: left: rectangular plate, middle: ring-shaped plate, right: ring-shaped plate with gap

Plate	PROPERTIES	DESCRIPTION
Rectangular	Width (mm)	Measure your plate and set the width of the plate here
Rectangular	Depth (mm)	Measure your plate and set the depth of the plate here
Ring-shaped/ring-shaped with gap	Inner radius (mm)	Measure your plate and set here the inner radius of the green area
Ring-shaped/ring-shaped with gap	Outer radius (mm)	Measure your plate and set here the outer radius of the green area
Ring-shaped with gap	Gap position (°)	Measure your plate and determine here from where the gap begins in the ring
Ring-shaped with gap	Gap size (°)	Measure your plate and find out here how big the gap on the ring is in °.

table 5: Plate size

If you check *Automatically start new plates*, PUZZLE will create new plates with the created printer as soon as a platform is full. Under *Material/Use Case* you can select if the plate should be assigned to a specific material, which can be named individually. The following use cases are available: Jaw model, die, tray, , splint, support post registration, gingiva masks, milling model, retainer and Egal.

Note: Considering material and use cases works only for project data from BiSS with a .GBS or .LFL file format.

You can decide how *large the gap should be for placing parts automatically*. For visual support, the *plate color* can be set individually. The plate can be exported in *one file for entire plate* or in *one file for each item*. Simultaneously with the export an *auto-deletion* after "X" days is possible.

3.9.2 Stump Parameters

The stump settings are the same as those in PRINT. If specific parameters are to be stored here, then the corresponding parameters are checked and set. In this way, it is possible to set individual stump parameters for each printer to ensure an exact stump fit. As soon as a printer has been assigned to a plate, the stump models are adapted to the parameters in the background.

Note: Considering stub parameters works only for project data from BiSS with a file format .GBS .

First, you can select whether the friction bars are located on *the stump* or *in the hole*. Under *gap (mm)* you define the gap between the stump and the hole. This is necessary to compensate for the effects of light scattering in the edge areas and to maintain the accuracy of fit. The *bar height*, *bar width*, *bar counts*, and *minimum bar distance* can be defined. The specified bar minimum distance must of course match the number of bars and the stump diameter. Furthermore, you can specify a *horizontal* and *vertical resolution* of the model. This allows you to determine the resolution of the stump/hole wall. Small values i.e., a high resolution, are usually not necessary and lead to an increased memory consumption with longer calculation time. The *bottom hole diameter* can be specified and adapted to the conditions of the model. In addition, you can specify the *minimum taper* of the stump. The bottom hole has at least the specified diameter, unless this would make it larger than specified by the taper. Consequently, the angle of the stump is defined by these values. We recommend choosing a rather small angle for a good hold. You can also extend the taper into the negative range, so that the lower part of the stump becomes significantly wider than the upper i.e., an inverted conical stump. This offers the possibility of inserting a stump into the model from below as well. For better visualization of the stump margin, the tooth stump has a *groove* whose diameter and distance from the edge can also be defined at this point. The *bottom steps* compensate the technically induced widening of the first pressure layers. Set the height and width as your system requires. You can also define a *side hole* to check position and fit accuracy.

4 Editing

4.1 Area of Action

On the left side there is the action area to edit the individual plates (image 14). You can display all *active* plates or/and all *archived* plates. The blue marked plate is your currently displayed plate. Each plate can be named, here "Plate 1". PUZZLE will automatically title the next plate in chronological order "Plate 2". The other symbols are described in table 6. Under the plate name you can select your printers. All printers that have been created under *Printer Configurations* appear here. As soon as a printer has been selected, the created plate size values and the *hover distance* of the individual files to the platform appear under *plate shape*. These are also mirrored 1:1 from the *Printer Configurations*. As soon as you have defined a new distance, this is triggered by ✓. As soon as you click on a model on the plate, additional icons appear for editing, which are described in more detail in table 6. Each mesh has a project name and additionally a *item name* that indicates whether it is an upper jaw or lower jaw file. When entering a new project name, only the naming is changed. As soon as you click on *pen-symbol* afterwards, the entered name will be engraved on the models.

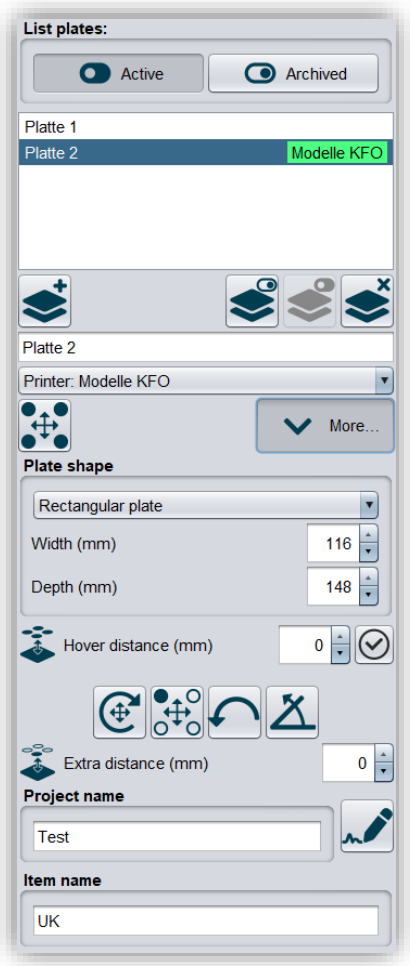


image 14: area of action

Note: Relabeling of models works only for project data from BiSS with a file format .GBS.

ICON	FEATURES	DESCRIPTION
	Import mesh...	Individual data can be loaded manually
	Export	The marked plate will be exported
	Active	Only active plates are displayed here
	Archived	All archived plates are displayed here
	Start new plate	A new free plate can be created
	Archive plates	The marked patch will be archived and deleted after "X" days if this was set
	Delete plates	The marked patch will be deleted
	Re-place all	All already loaded data on the marked platform will be automatically repositioned
	Re-place selected	The selected file will be repositioned
	Hover distance	All objects on the platform are lifted at a set distance from the platform
	Extra distance	A selected object on the platform is lifted at a set distance from the platform
	Complex movement options	This can be switched on or off. If the function is activated, you can rotate and move the single mesh over all axes.
	Flip	The file is turned 180° upside down
	Rotate backwards 45°	The file is tilted by 45°
	Apply label	The completed project name is engraved on the models
	Collect	Incoming data is always collected and placed in the background
	Pause	Automatic collection is paused

table 6: Function icons for editing the plate and the individual meshes.

Note: All exported data must now be loaded into the respective slicer software for printing, in order to slice the data and set supports if necessary.

4.1.1 Short excursion to the coordinate system in BISS

When you export your data, all individual meshes, or the entire plate are exported aligned so that the Z axis points upwards. This is also the upward pointing axis for almost every printer, so that the data does not have to be rotated or realigned when imported into the slicer software, see image 15.

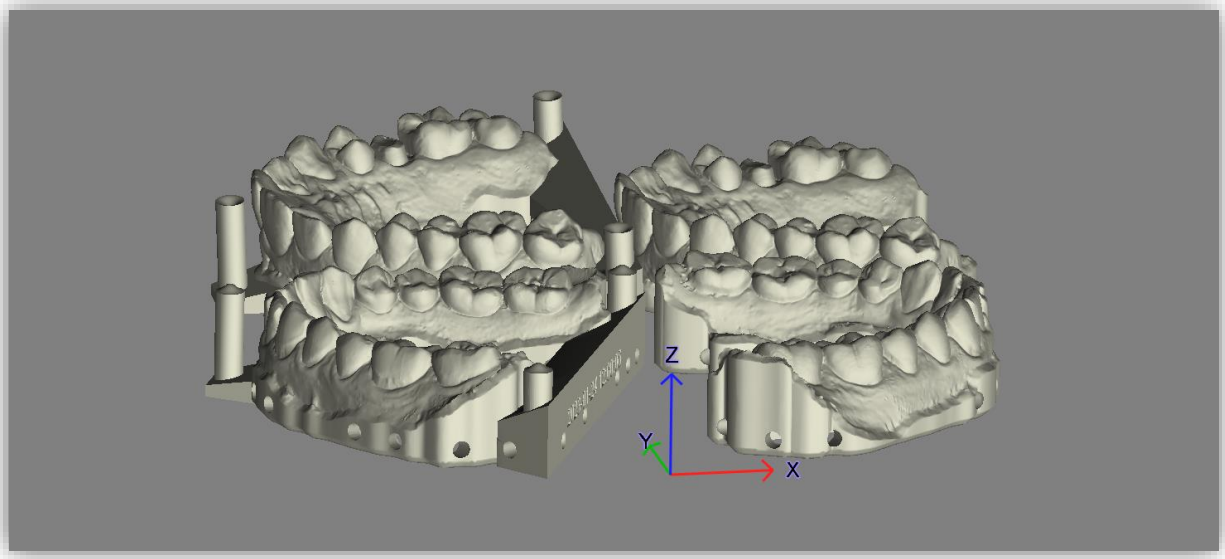


image 15: Aligned exported plate

4.2 Working Surface/Printer Plate

On the printer plate, all meshes belonging to a project file are displayed in the same color. All foreign data are displayed in another color. The data is not displayed in detail for pure viewing, for better computing power. As soon as you click on a file, the actual view appears, see image 16.

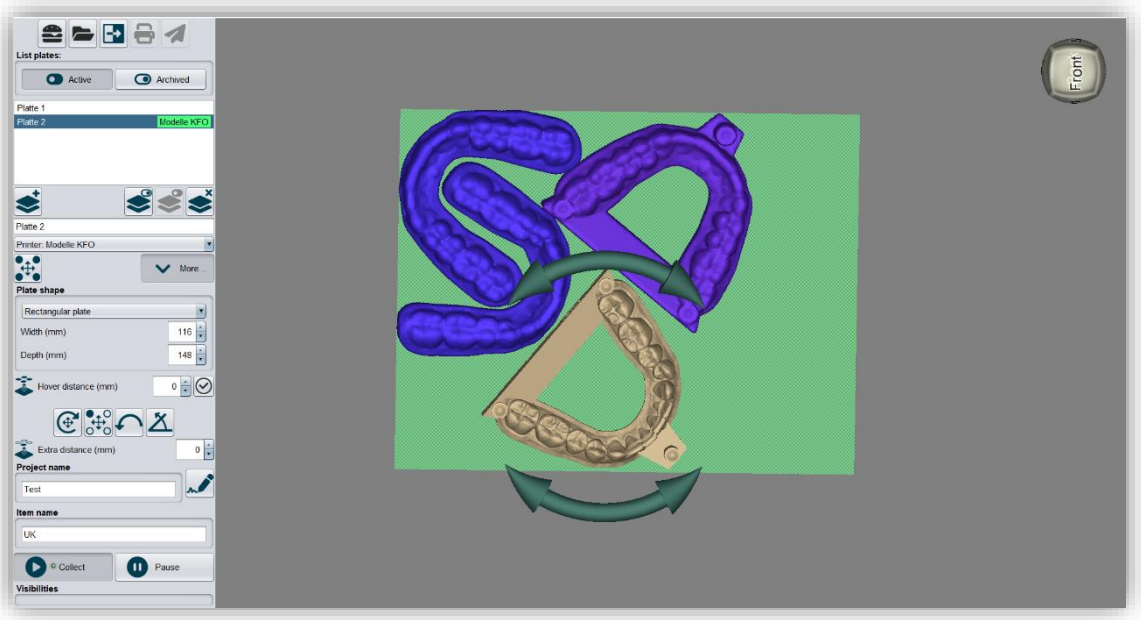


image 16: View of the loaded meshes on the printer platform.

You can move and rotate the file as you wish. Right-click on a mesh to open a new control menu (image 17):

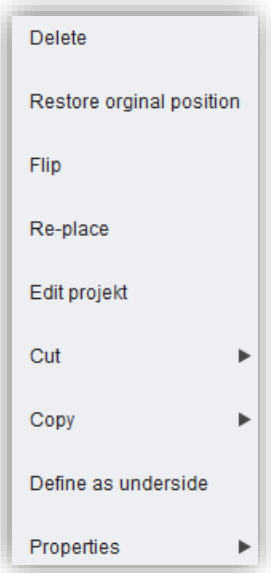


image 17: Control menu

With *Delete* you can delete the selected file individually. This will not delete the whole project file. *Restore original position* will align the mesh to the last saved position that was stored in PUZZLE before the import. *Flip* will turn the file 180° upside down. With *Re-place,* the file will be repositioned on the plate in the orientation it is in now. Via *Edit project* you can enter the PRINT application to make manual changes in the file. This is more commonly used if you have used the integrated Auto-Assistance Workflow to automatically construct and place your models, see chapter *integrated Auto-Assistance Workflow (iAW)*

After installing the software, there are two additional icons (image 18) on the desktop which only work in combination with PUZZLE - PRINT and FREEFORM Butler. When you open these, a miniature of the actual PRINT or FREEFORM application appears, see image 19. The settings here are the same as in the full PRINT or FREEFORM version.

. After making a change in PRINT, you can simply close the application and the data will be recalculated and exchanged with the old data on disk. *Cut* and *Copy* allows you to move or copy the mesh to another plate that has already been created. If you want to define which side rests on the

platform, then this can be changed by right-clicking on said side with *define as underside*. About the *project type* you can see if it is a .GBS, .LFL, .STL, .PLY or .OBJ.

5 integrated Auto-Assistance Workflow (iAW)

After installing the software, there are two additional icons (image 18) on the desktop which only work in combination with PUZZLE - PRINT and FREEFORM Butler. When you open these, a miniature of the actual PRINT or FREEFORM application appears, see image 19. The settings here are the same as in the full PRINT or FREEFORM version.

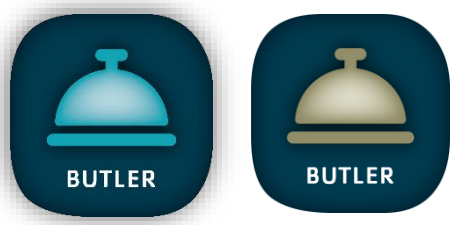


image 19: left – PRINT Butler. right – FREEFORM Butler

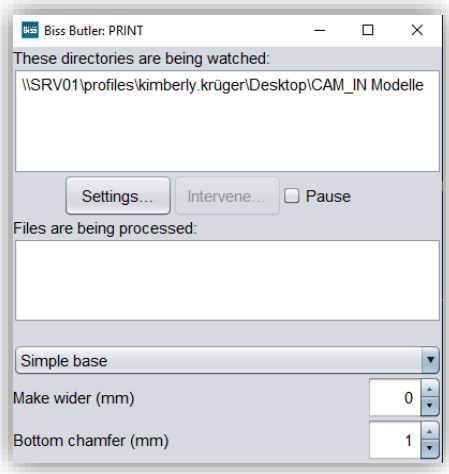
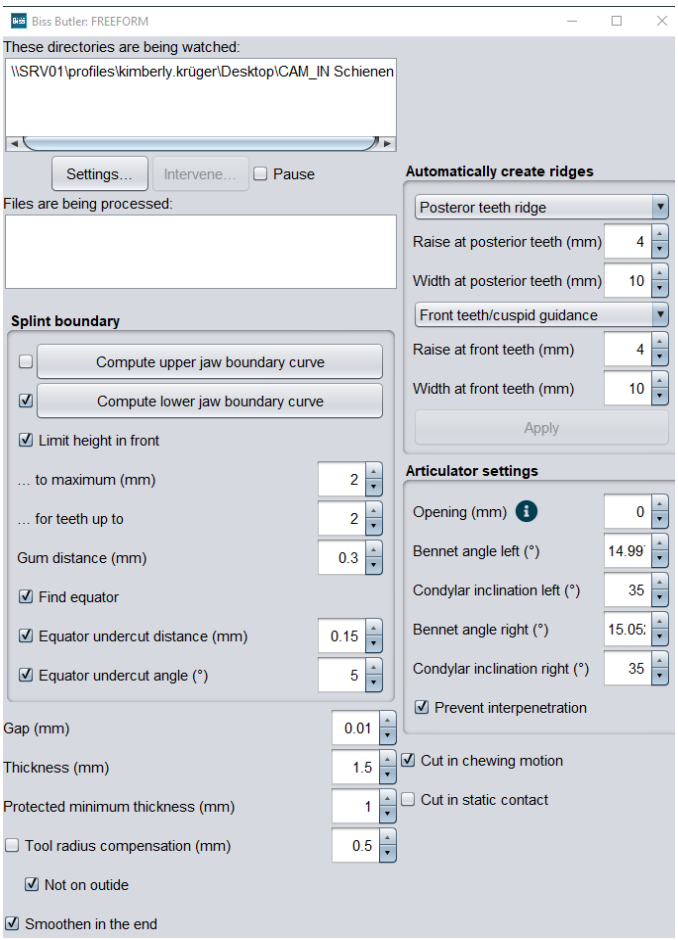


image 18: Left - Miniature of the PRINT application. Right - miniature of the FREEFORM application.



5.1 Import Data

If you have now defined your import folder, then you can directly save or store your IO scans there. For the automation to work properly and for the Butler to be able to assign an upper and lower jaw to a project, the file name before the file type (upper or lower jaw) must be identical. Examples:

- *Test*_maxilla und *Test*_mandibular
- *14586251253645638*_LowerJaw und *14586251253645638*_UpperJaw
- *Max-smith*_maxillary und *Max-smith*_mandible

Note: There must be no other label behind the file type, i.e. data with the name "Test_Implantmaxilarry" or "Test_normal Bite", etc. will not be recognized.

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 28).

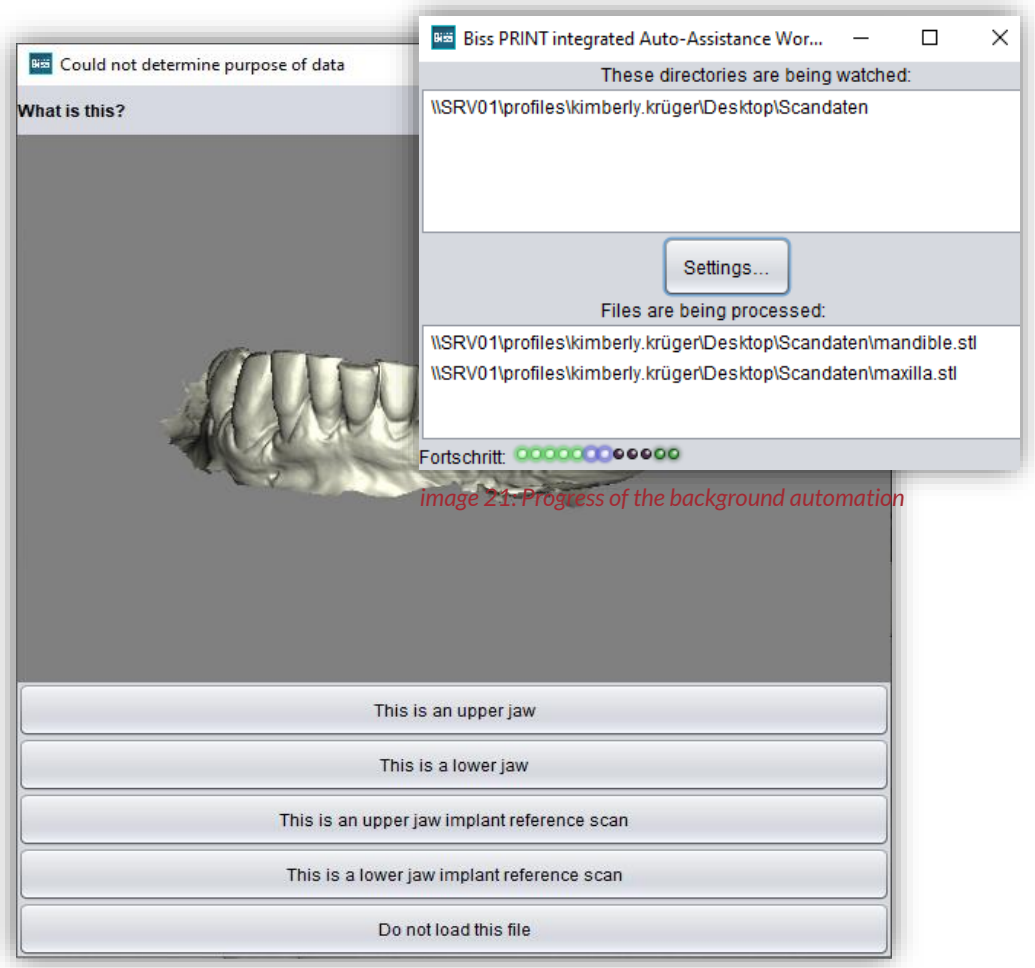


image 21: Progress of the background automation

image 20: Assignment of the loaded jaw models.

5.2 Data Processing

Once your scans are saved in the correct folder, the Butler will process the data in models and splints. You can also monitor the progress (image 29). Then the data will be placed in PUZZLE's watch folder so that PUZZLE can place the data.

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.

If no update is available, the message shown in image 30 appears.

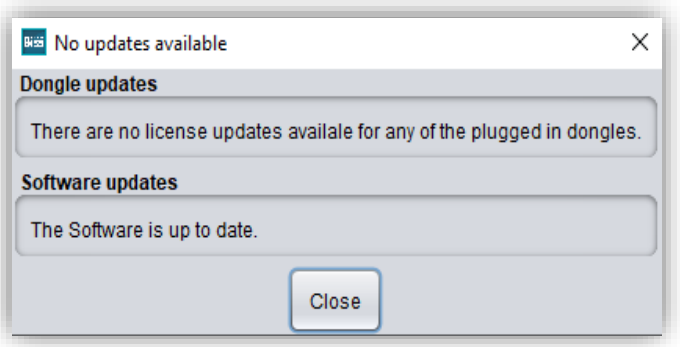


image 22: No software-update available.

6.1.2 Install Update

Click on the provided link and download the new software version. Install the software in the desired directory. 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 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.