



# Zfx<sup>®</sup> EvolutionNext Manual



## Safety / Important information

- × The manual is part of the product
- × Take good care of the manual
- × Read and follow the instructions in the manual
- × Give the manual and all documents associated with the product to all users of the product
- × Read and follow all safety instructions and → Chapter 2 “Commissioning”
- × Failure to follow these instructions will invalidate the warranty
- × Service and maintenance of the system must be carried out exclusively by technicians/staff who have been trained or authorized by Zfx GmbH
- × In the event of any damage in transit, read and follow → Chapter 1.4

## Symbols / description of the hazard levels / information used

In order to prevent injury to personnel and material damage, safety information in this document is categorized into different information and hazard levels.



### NOTE

Gives the user important additional information.



### CAUTION

Designates a hazardous situation which could give rise to material damage or slight to moderately serious injury.



### WARNING

Designates a hazardous situation which could give rise to major material damage or serious to fatal injury.

## Support Service

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For any enquiries or queries, please quote the version or serial number of the product in all cases. For the program, this can be found at the top left, and for the unit, on the rear of the housing.

In order to maintain the value of the equipment and guarantee a long life, the maintenance recommendations in → Chapter 7 must be followed.

# Safety instructions

Please be sure to follow the safety instructions and keep them somewhere that is accessible to the user. Make all users aware of the safety instructions.



## CAUTION

Additional software can restrict the operation of the system.



## CAUTION

Zfx GmbH will not provide support for problems resulting from the use of non-approved computer specifications.



## CAUTION

Only use power supplies which comply with the technical specifications in → [Chapter 9.1.3.](#)



## CAUTION

Use only the cables and mains leads provided.



## CAUTION

The removal and connection of cables while the system is operating is strictly forbidden.



## CAUTION

Ensure adequate ventilation for the equipment and do not cover the fan openings



## CAUTION

Do not expose equipment components to rain, moisture or heat.



## CAUTION

Never replace parts of the scanner with third-party components.



## CAUTION

Do not use solvents such as nitro, sanitary, alcohol or grease cleaners.



## CAUTION

Do not place objects on the scanner.



## CAUTION

Never reach into the area around the positioning unit when the scan is taking place.



## CAUTION

Do not look into the projector while it is operating.



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# 1 General information

## 1.1 Product description

A data sheet and further technical data are included in this manual in → [Chapter 9 "Product description"](#).

## 1.2 Warranty conditions

Please refer to the Zfx GmbH General Terms and Conditions of Business. These can be found on the Zfx website under the following link:

[https://dentaltec.zfx-dental.com/sites/default/files/content/4023\\_202105\\_AGBs\\_de.pdf](https://dentaltec.zfx-dental.com/sites/default/files/content/4023_202105_AGBs_de.pdf)

## 1.3 Packaging



## 1.4 Damage in transit

If the packaging is externally damaged on delivery, please proceed as follows:

- ✘ The recipient must record the loss or damage in the confirmation of receipt. The recipient and the shipping company's representative must sign this confirmation of receipt. The recipient may only make a claim for compensation (worldwide) against the shipping company by recording these facts.
- ✘ Do not make changes to the product or packaging.
- ✘ Do not use the product.
- ✘ Report the damage to the shipping company.
- ✘ Report the damage to Zfx GmbH.
- ✘ Under no circumstances, return the product to Zfx GmbH without prior agreement.

- ✗ Send the signed confirmation of receipt to Zfx GmbH.

If the product is damaged when there was no detectable damage to the packaging on delivery, proceed as follows:

- ✗ Report the damage without delay (by no later than the 7th day) to the shipping company.
- ✗ Report the damage to Zfx GmbH.
- ✗ Do not make changes to the product or packaging.
- ✗ Do not use damaged components.
- ✗ Under no circumstances, return the product to Zfx GmbH without prior agreement.
- ✗ Send the signed confirmation of receipt to Zfx GmbH.



#### NOTE

If the recipient fails to comply with one of the above conditions, then the damage shall be deemed to have occurred after delivery (in accordance with ADSp. Art. 28 / CMR law, Chapter 5, Art. 30).

## 1.5 Transportation and storage in the packaging

### 1.5.1 During transportation and storage up to commissioning

The following symbols for transportation and storage must be observed:



Keep upright;  
arrows point upwards!



Do not stack!



Keep dry!



Protect against  
shock!

### 1.5.2 Storage before commissioning

Before commissioning: After shipping, the system must be left in the packaging for sufficient time for acclimatization so that all components reach the specified operating conditions (15°C to 30°C). If there is a risk of dew formation, the period must be extended accordingly to give the moisture opportunity to escape.

It is recommended to wait for a least 8 hours before opening the packaging.







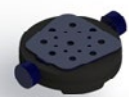







#### CAUTION



As result of large temperature changes or high humidity, condensation may form and lead to a short circuit. The sensor unit can also go out of adjustment.

## 1.6 Scope of supply

### 1.6.1 Standard

Item	Image	Part number	Name/Description	Quantity
1		ZFX03NEXT	Zfx® EvolutionNEXT	1 pcs
2		GST120A24-R7B	Desktop power supply	1 pcs
3			Mains cable	1 pcs
4			USB 3.0 connecting cable	1 pcs
5		ZFX02001224	Calibration pedestal for Zfx Evolution	1 pcs
6		ZFX02001225	Spacer plates for Zfx Evolution	1 pcs
7		ZFX02001247	Model base for Zfx Evolution	1 pcs
8		ZFX02001226	Fixator for Zfx Evolution	1 pcs
9		ZFX02002063	Blu Tack adhesive compound 120g	1 pcs
10		ZFX03001034	DELL P3640 Workstation	1 pcs
11			DELL 22" Monitor	1 pcs
12		ZFX03001038	Manual (online)	1 pcs

## 1.6.2 Optional

Item	Image	Part number	Name/Description	Quantity
1		ZFX02001228	Arti-Synchronizer - ARTEX 126 mm height	
		ZFX02001230	Arti-Synchronizer - SAM	
		ZFX02001231	Arti-Synchronizer - STRATOS	
		ZFX02001232	Arti-Synchronizer - KAVO	
		ZFX02001233	Arti-Synchronizer - ARTEX 116 mm height	
		ZFX02001234	Arti-Synchronizer - Panadent	
2		ZFX02001227	Multi Die Table for Zfx Evolution	



### WARNING

The operation of active implanted systems (e.g. heart pacemakers, defibrillators) can be affected by electromagnetic fields. Persons with implanted systems must maintain a safety distance of 30 cm from the surface of the unit!

The product complies with the applicable requirements relating to electromagnetic fields in accordance with RL-2014-30-EC ("EMC Directive") and RL-2014-35-EC ("Low Voltage Directive, Provision of Electrical Equipment").

## 1.7 Purpose /Intended use

### 1.7.1 General

Intended use also includes observation of all information in this manual and compliance with the inspection and maintenance instructions. The national statutory safety at work conditions and applicable measures for the prevention of accidents must be taken into account when using the product. It is the user's responsibility to employ working equipment that is free from faults.



#### **WARNING**

**The equipment components may only be set up and used indoors.**

### 1.7.2 Product-specific information

The main area of use for the Zfx® EvolutionNEXT scanner and the Zfx components is in the dental laboratory. The scanner is intended for the three-dimensional measurement of objects in digital form with high quality resolution and precision. The Zfx software generates three-dimensional data which are exported as polygon-mesh-formatted data (STL, OBJ, PLY) and can be used as input data for various software packages such as CAD software or 3D printers. Any use other than that described is considered to be improper use.

If the Zfx components are integrated into an existing network, the responsibility for safety and functionality lies with the network operator.



#### **CAUTION**

**Never dismantle the sensor unit's cameras or projectors. The mechanical positioning of the camera and projector in the sensor unit must be carried out exclusively by Zfx GmbH. The image quality can be adversely affected by adjusting the aperture rings of the camera or projector. Never adjust or turn the aperture rings of the camera and projector.**

### 1.7.3 Decommissioning and disposal

The appropriate country-specific regulations must be observed when finally decommissioning the Zfx components. If you have any questions relating to the proper disposal of the Zfx components, please contact Zfx GmbH or a disposal company certified in accordance with ISO 14001:2004. The equipment components and accessories must not be disposed of in unsorted household waste.



#### **CAUTION**

**Generated waste for man and the environment must be taken safely for recycling or disposal in accordance with the applicable national regulations. See also Directive 2012/19/EU (WEEE).**



## 2 Commissioning

### 2.1 Location

Arrange the scanner, computer, monitor, keyboard and mouse to enable a comfortable working attitude. The scanner should be easily accessible for inserting and removing objects.



#### NOTE

- ✗ The scanner is an optical measuring instrument which can be damaged by a lack of care.
- ✗ Do not expose the system to moisture (e.g. rain) or heat (due to direct sunlight).
- ✗ Do not cover fan openings so as to ensure that adequate air circulation and cooling are maintained.
- ✗ Avoid movement, collisions, jolts, shaking and vibration in the vicinity of the sensor while taking a measurement.
- ✗ Do not use scan sprays inside the system.
- ✗ Ensure a constant room temperature between 15°C and 30°C.
- ✗ Keep the exposure to dust as low as possible.



#### CAUTION

Place the unit on a stable, flat and horizontal subsurface in order to avoid damage or injury to the equipment and to the user.



#### CAUTION

A safety distance of at least 0.25 m between the scanner, wall and other objects and the user must be maintained to ensure there is no damage to the user and the equipment during the scanning process.

### 2.2 Connecting the system

Connect all the cables before commissioning the components. Connect the computer to the monitor, keyboard and mouse. Connect the scanner to the computer by means of the USB cable using the designated USB port.



#### CAUTION

Connecting or disconnecting cables while the system is operating can cause damage to the system.

### 2.3 Electrical connection

Connect the low-voltage desktop power supply cable to the scanner, and the desktop power supply to the designated mains supply socket using the included mains cable. It is recommended that the scanner, computer and monitor be powered from a switched socket strip with surge protection.



#### CAUTION

Using a non-approved power supply, mains cable or USB cable can adversely affect the operation and electronic safety of the unit. Use only the mains cables, power supply and USB cable supplied for connecting the equipment.

## 2.4 Internet connection

Connect the computer using a network cable. If the computer is integrated into an existing network, the responsibility for safety and functionality lies with the network operator.

## 2.5 Computer

Change the date, time, time zone and country settings on the computer if necessary. The system settings must not be changed. No additional third-party software may be installed on the computer (loss of warranty).



### CAUTION

**Only data processing devices (PCs etc.) which comply with the norms DIN / EN / IEC 60950, UL 60950 and CAN / CSA-C22. 2 NO. 60950-00 may be connected to the scanner.**

## 2.6 Installing the user software

Installation of the user software assumes that Zfx Manager 2.0 is installed on the computer. From there, the scan software can be downloaded, installed and activated by means of the product key.



### NOTE

**Administrator rights are required if an update or new installation are necessary.**

## 2.7 Switching the unit on/off

Only start the scanner once it has reached room temperature.

### Switching on the unit

- × Switch on the socket strip
- × Switch on the PC/monitor/scanner using the On/Off switch (rear of the scanner)
- × Log in to the PC

### Switching off the unit

- × Shut down the PC as usual
- × Switch off the PC/monitor/scanner using the On/Off switch (rear of the scanner)
- × Switch off the socket strip

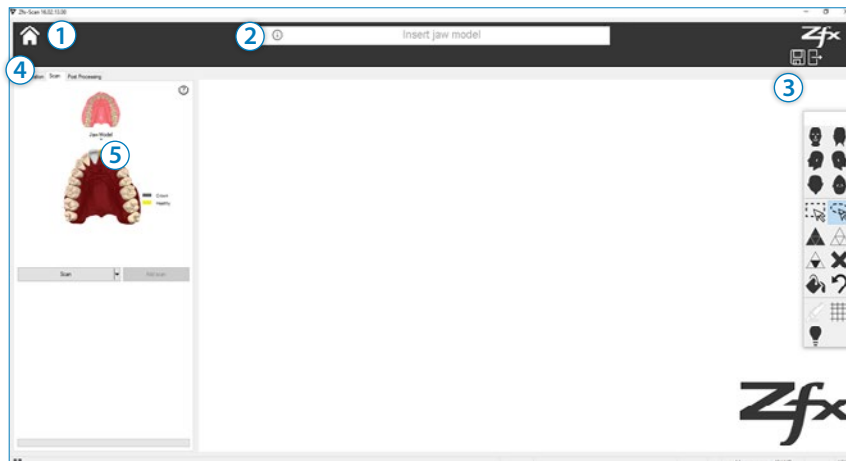
## 2.8 Language setting

The language is set using Zfx Manager 2.0 and is transferred to the scan program.

If the language required for the scan program is not available, this is indicated by the program.

## 3 User interface in standard mode

When an order is registered and stored in Zfx Manager 2.0 or in the configurator, the scan button for the scan software is enabled and the user can immediately start scanning. After starting by means of the “Scan” button, the user gains access to the Scan operating mode level (→ [4.5 “Operating mode – Scan”](#))



- ① **Menu selection**  
→ see [Chapter 3.1](#)
- ① **Information display**  
→ see [Chapter 3.3](#)
- ② **Menu selection**  
→ see [Chapter 3.2](#)
- ③ **Toolbar**  
→ see [Chapter 3.4](#)
- ④ **Operating modes**  
→ see [Chapter 3.5](#)
- ⑤ **Scan Assistant**  
→ see [Chapter 4.5.2](#)

### 3.1 Glossary



**RMB** Right mouse button



**MWB** Mouse wheel button



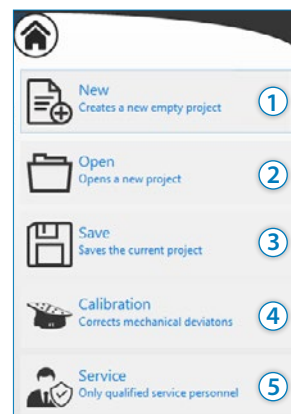
**LMB** Left mouse button

## 3.2 Menu selection



The following applications can be opened using the „Home“ button

- ① New
- ② Open
- ③ Save
- ④ Calibration
- ⑤ Service



### 3.2.1 New

Enables a new file to be created without Zfx Manager 2.0. The restoration and scan method are created using the configurator described in → [Chapter 4.4 “Operating mode – Configuration”](#). It is recommended that restorations always be described using Zfx Manager 2.0.



### 3.2.2 Open

Open the restorations created in Zfx Manager 2.0 or upload data sets that have already been saved.



### 3.2.3 Save

Saves newly created or modified data sets.



### 3.2.4 Calibration

The system can be recalibrated. The calibration procedure is described in → [4.3 “Calibration”](#).



### 3.2.5 Service

Service mode provides important tools for maintaining and checking the system.

Service mode is for qualified service personnel only and requires a password. How to use the service area is explained in the installation manual which is available separately.

## 3.3 Information display



In the information display, the user is prompted to carry out certain working steps, e.g. to position the jaw impression in the scanner.



### Info button

If the description in the information display is not sufficient for understanding the procedure, the user can obtain detailed instructions on the next action step by clicking the left mouse button (LMB).

## 3.4 Toolbar

### ① Orientation of 3D data (views)

→ see Chapter 3.4.1

### ② Selection of 3D data

→ see Chapter 3.4.2

### ③ Delete

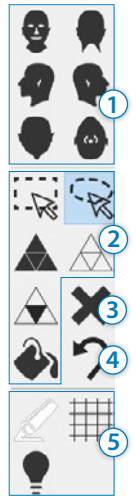
→ see Chapter 3.4.3

### ④ Undo

→ see Chapter 3.4.4

### ⑤ Display of 3D data

→ see Chapter 3.4.5



#### 3.4.1 Orientation of 3D data (views)



View of the scan object from the front



View of the scan object from the back



View of the scan object from the side (left-hand side)



View of the scan object from the side (right-hand side)



View of the scan object in a bird's-eye view (from above)



View of the scan object in a worm's-eye view (from below)

#### 3.4.2 Selection of 3D data



##### Rectangle

Hold down the Shift key + LMB to drag out a rectangle



##### Lasso

Hold down the Shift key + LMB to define a free-form area



##### Select all

All 3D data are selected



##### Clear selection

All 3D data are deselected



##### Invert selection

View of the scan object in a bird's-eye view (from above)



##### Coherent selection

All scan areas associated with the selection are marked

#### 3.4.3 Delete



##### Delete selection

Deletes all selected areas

### 3.4.4 Undo



#### Undo

The most recent commands can be undone.  
In an automated procedure, such as the re-scan mode, this button is inactive.

### 3.4.5 Display of 3D data



#### Display mode

Single color or textured display  
Recommended setting: deactivated



#### Light sources

Setting in the "Properties" display



#### Grid

A 2D background grid can be displayed



#### Axis of rotation coordinate system

The pivot point can be moved from the central position (corresponding to the center point of the scan object capture) to an outer pivot point (position of the mouse determines the axis of rotation)

## 3.5 Operating modes

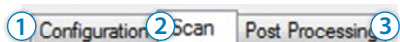
The user can access the different operating modes by clicking on the appropriate tab.

The three different operating modes are described in more detail in the following chapter.

### ① Configuration

→ see [Chapter 4.4](#)

### ② Scan



→ see [Chapter 4.5](#)

### ③ Post processing

→ see [Chapter 4.6](#)

## 4 Operating basics

### 4.1 General advice for achieving good operating results

- × Handle and transport the unit with the greatest care; it is a high-precision, optical tool.
- × Do not make any changes to the apertures of the camera or projector lens.
- × Maintain a constant room temperature ( $\pm 3^{\circ}\text{C}$ ).
- × Do not dismantle any parts
- × Avoid movement, collisions, jolts, shaking and vibration in the vicinity of the sensor while taking a measurement (vibration, shadows, ...).

### 4.2 Mouse and keyboard commands

Mouse button combinations make it easier for the user to process and position the 3D model.



#### RMB

Rotation in all directions



#### Hold down LMB + RMB

Move



#### MMB (scroll or keep pressed + move mouse)

Enlarge/Reduce



#### LMB

Zoom window



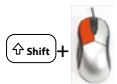
#### Alt + RMB

Move clockwise or anticlockwise while displaying the axis of rotation in the direction of view



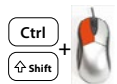
#### Double-click with LMB

Positions the scan centrally on the screen



#### Shift + LMB

Mark



#### Ctrl + Shift + LMB

Undo mark

### 4.3 Calibration

The calibration process ensures that the system provides accurate and reproducible 3D results within the measuring volume.

### 4.3.1 Calibration accessories



#### CAUTION

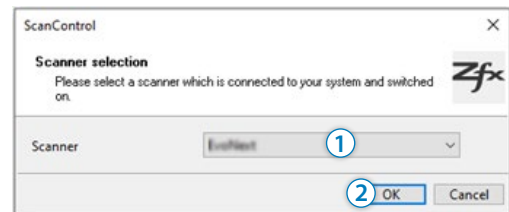
- × The calibration plate is a certified measuring tool; hold by the base when fitting and removing.
- × Never touch the ceramic plate (test marks on the calibration plate could be damaged).
- × Do not drop the calibration plate (risk of breakage)
- × Never wipe the ceramic plate or clean it with an abrasive substance (scratches on the plate may significantly impair the measurement result)

### 4.3.2 Preparation

- × Lay out the calibration plate, mounting plate and 4 spacer plates.



- × Start by clicking the “Calibration” button
- × Select the connected scanner ①
- × Confirm the selection by clicking “OK” ②



#### NOTE

The calibration procedure repeats itself 5 times at different heights.

### 4.3.3 Steps 1 to 5

#### 1<sup>st</sup> step



- × Insert the calibration plate with the base plate (#1) in the scanner.
- × Confirm selection by clicking “OK” ①

#### 2<sup>nd</sup> step



- × Insert first spacer plate (#2)
- × Confirm selection by clicking “OK” ①

#### 3<sup>rd</sup> step



- × Insert first spacer plate (#3)
- × Confirm selection by clicking “OK” ①

#### 4<sup>th</sup> step



- × Insert first spacer plate (#4)
- × Confirm selection by clicking “OK” ①

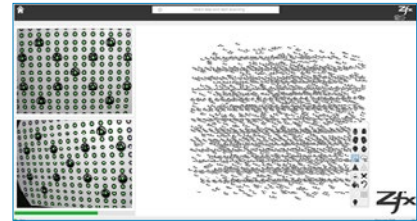
#### 5<sup>th</sup> step



- × Insert first spacer plate (#5)
- × Confirm selection by clicking “OK” ①

The calibration plate is moved automatically to the appropriate height at different positions and measured.

When all heights and positions have been recorded, the control points are automatically detected and aligned and the deviation compared with a reference data set.



## NOTE

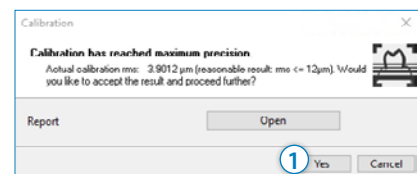
The process may take a few minutes; please follow the progress status at the bottom of the screen.

Complete the calibration process by clicking "Yes" ①

Following calibration, the program automatically starts an adjustment process, i.e. the projector setting is checked with reference to the coordinate system.

Position the calibration plate with a spacer plate and the mounting plate on the rotary swivel unit.

Confirm by clicking "OK" ②

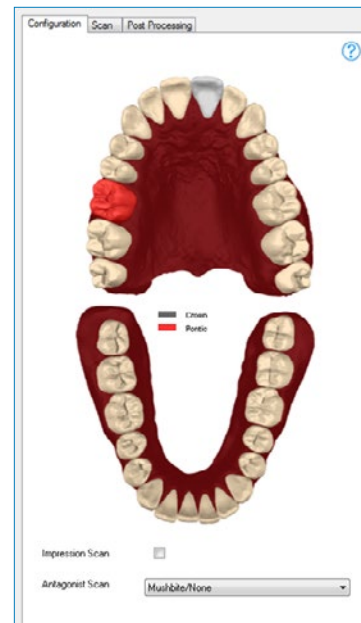


## 4.4 Operating mode – Configuration

The configurator displays the scan order created in Zfx Manager 2.0 in the tooth diagram.

The order can still be modified or augmented if necessary.

The Scan Assistant later leads the user through the necessary scanning steps according to the information defined here.

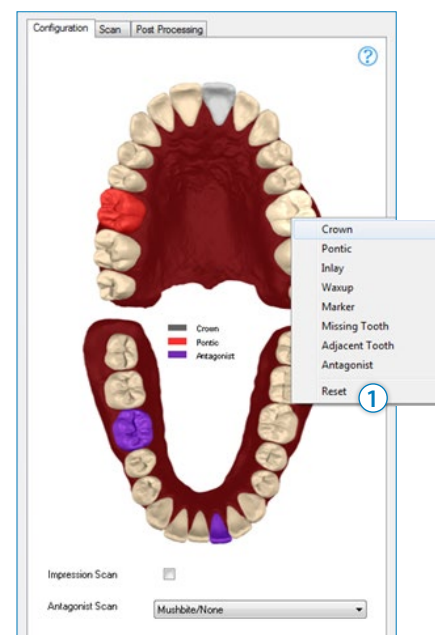


### 4.4.1 Selection of additional restorations



Select the tooth, the status of which is to be changed, with the mouse pointer. Clicking the **left mouse button** opens the menu to enable the newly required status to be selected.

“Reset” ① resets the tooth status.



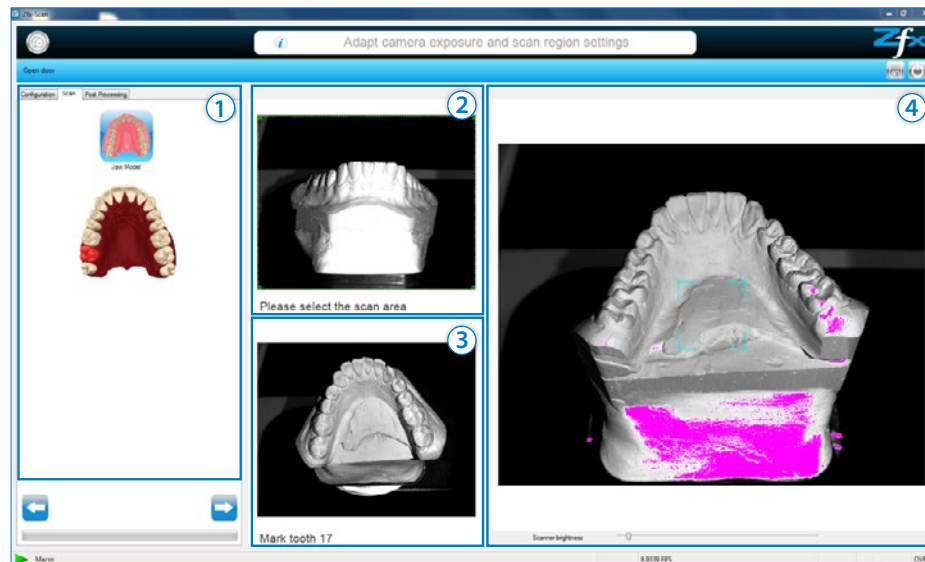
### NOTE

If the tooth status is changed in the configurator, a check should be made to ensure that the change has been incorporated in Zfx Manager 2.0.

## 4.5 Operating mode – Scan

When the order is registered and stored in Zfx Manager 2.0 or in the configurator, the scan button for the scan software is enabled and the user can immediately start scanning.

### 4.5.1 User interface Scan mode



- ① **Scan Assistant / Help**  
→ see Chapter 4.5.2
- ② **Define scan area**  
→ see Chapter 4.5.3
- ③ **Tooth selection Chapter**  
→ see Chapter 4.5.4
- ④ **Brightness setting**  
→ see Chapter 4.5.5

### 4.5.2 Scan Assistant / Help

The Scan Assistant guides the user through the various steps required for the current order. The individual scanning steps are shown graphically and explained in the information display.

#### Information display

Information display – the user can obtain detailed instructions on how the scanning step is to be carried out by left-clicking on the Info icon.

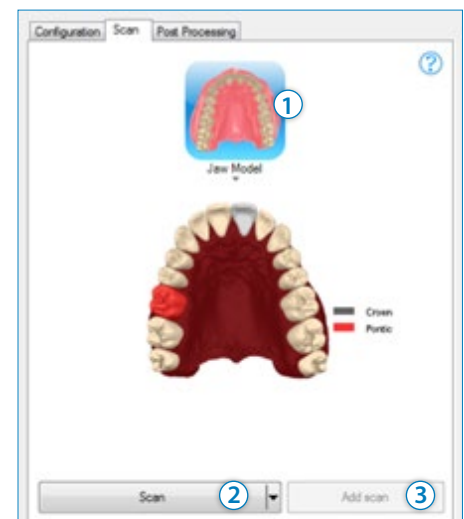


#### Website

The Zfx GmbH website ([www.zfx-dental.com](http://www.zfx-dental.com)) will be opened.

#### Scan

- ① Clicking on the **jaw model** shows the scanning steps necessary for an order. (see illustration below)
- ② Clicking the **“Scan”** button starts a new scan and gathers 3D data or overwrites existing scan data.
- ③ Additional scan data for a step which has already been scanned can be generated by clicking the **“Add Scan”** button. This application is not active for all scan variants but only for variants such as single tooth scan or marker scan, as data may be required retrospectively in these cases.

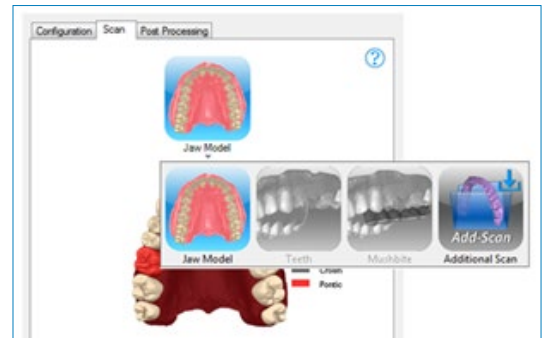


### Scanning steps

The number of images describes the number of scanning steps necessary and depends on the scope of the restoration.

The sequence of the scanning steps can be freely selected after capturing the basic data (e.g. jaw model).

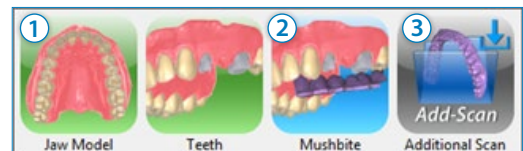
The next scanning step to be carried out is selected by clicking with the mouse.



### Scan status

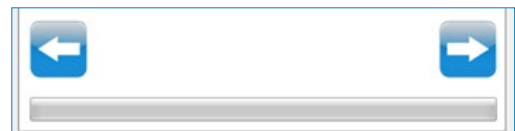
The background color of the display indicates the scan status of the various scanning steps:

- ① Background **GREEN**  
3D data have already been gathered
- ② Background **BLUE**  
3D data have not yet been gathered
- ③ Background **GRAY**  
Scanning step requires a preliminary step which has not yet been carried out or the data can be gathered as an option, see Add Scan.



### Arrow buttons

The arrow buttons allow the user to move forwards or backwards through the scanning steps in order to process the scan order.



#### Back

The last scan step is discarded



#### Next

Complete the scan and go to the next scan step

### 4.5.3 Define scan area

The area that is relevant to the order can be selected in order to narrow down the scope of the scan area (top left). This helps to save time, as areas which are not required for the calculation of the 3D data are no longer considered.

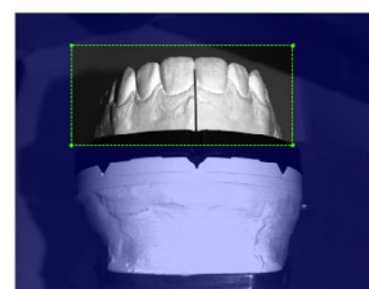
The green selection frame defines the area that will be scanned. Initially, the entire possible scan area is preselected. This can be adjusted manually.

Reduce the scan area to the section necessary for the order.

It is recommended that the scan area be chosen such that part of the mounting plate is scanned at the same time. Superfluous data can be selected and deleted later. (→ [4.5.8 "Selecting and deleting a data set"](#))



Please select the scan area



**Adjust size of selection frame – Option 1**

Position the mouse pointer on one of the corners and, keeping the **left mouse button** pressed, drag the frame to the required size

**Adjust size of selection frame – Option 2**

Position the mouse pointer on one of the four sides and, keeping the **left mouse button** pressed, drag the frame to the required size

**Move the selection frame**

Position the mouse pointer inside the selection frame and, keeping the **left mouse button** pressed, drag the frame to the required position.

**Reset the selection frame**

**Double-clicking** inside or outside the selection frame resets the frame to the overall possible scan area.

**4.5.4 Tooth selection**

The teeth to be scanned for the order are selected in the tooth selection image (bottom left).

It is not absolutely necessary to define the tooth areas; the scan can also be carried out without this input. However, this helps to save time, as tooth areas which are not required for calculating the 3D data are no longer considered.

Under the image, the user will find an indication of which of the teeth is to be marked next.

**Marking**

The tooth is marked by clicking on it. The position and scan area can still be corrected manually.

**Position**

Position the mouse pointer inside the green center frame and, keeping the left mouse button pressed, drag the circle to the required position.

**Scan area**

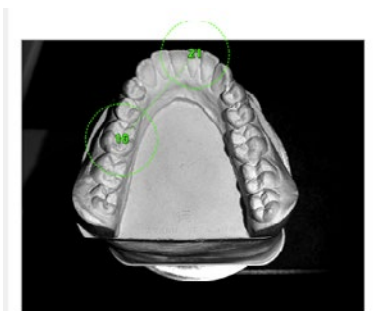
Increase or decrease the circle diameter by dragging the circle in or out at any point (**left mouse button** pressed).

**Delete**

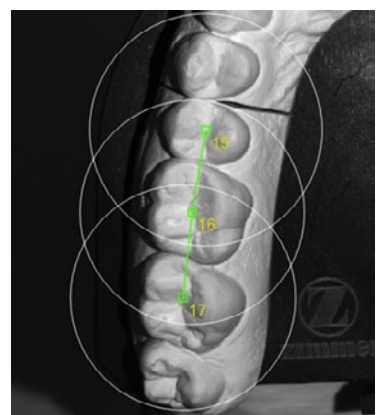
Position the mouse pointer inside the circle and remove the selection by clicking the **right mouse button**.



Mark tooth 16



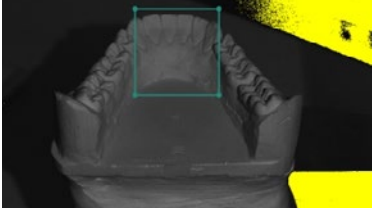
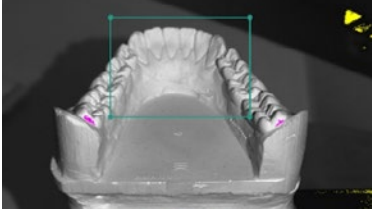
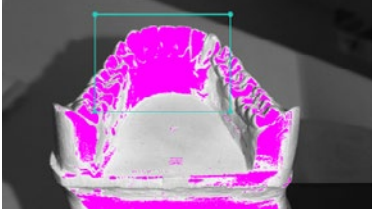
Mark additional areas



### 4.5.5 Brightness setting

The optimum brightness for the scan area can be defined in the automatic brightness setting display. Where necessary, this can be adjusted automatically (→ Chapter 4.5.5.1), or manually, (→ Chapter 4.5.6).

The user is **not** explicitly advised of the need for the setting. However, it should be ensured that the scan object is optimally illuminated, as the quality of the scan data is directly dependent on this.

Example	Evaluation
	<p><b>Poor</b></p> <p>Image underexposed. The brightness has been set too low.</p>
	<p><b>Good</b></p> <p>Brightness controller setting: normal illumination</p>
	<p><b>Poor</b></p> <p>Image overexposed. The brightness has been set too high.</p>

#### 4.5.5.1 Automatic brightness setting

The green selection frame allows the user to adjust, position and select the area on which the automatic brightness setting is to work.

The position should be selected such that the area to be scanned is optimally illuminated.

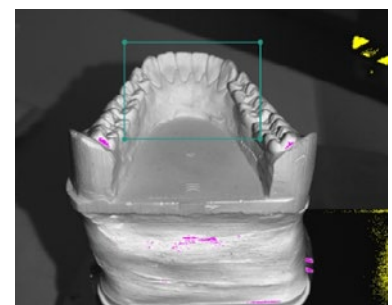
The optimum brightness for this area is set by double-clicking inside the selection frame.

##### Reposition the selection frame – Option 1



Position the mouse pointer inside the selection frame and, keeping the **left mouse button** pressed, drag the frame to the required position.

##### Reposition the selection frame – Option 2



Move the mouse pointer to the required position and confirm the position by double-clicking with the **left mouse button**. The frame will jump to the selected position.

### Adjust size of selection frame – Option 1



Position the mouse pointer on one of the corners and, keeping the **left mouse button** pressed, drag the frame to the required size.

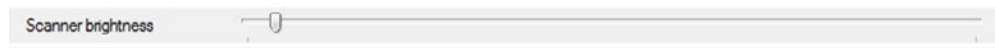
### Adjust size of selection frame – Option 2



Position the mouse pointer on one of the four sides and, keeping the **left mouse button** pressed, drag the frame to the required size.

#### 4.5.5.2 Manual correction option for the brightness setting

The brightness setting can still be changed individually by means of the **“Scanner brightness”** correction slider (below the live image) in order to achieve optimum illumination for the object.

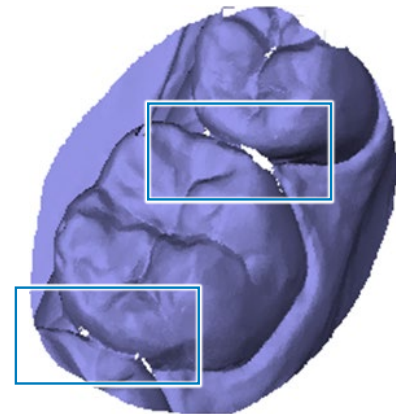


#### 4.5.6 Additional scan in scan step

The Additional Scan function enables the user to interactively influence the result of a scan step (e.g. jaw model).

The **“Additional Scan”** dialog box is displayed after each scan step for this purpose. An **“Additional Scan”** scan enables missing data to be supplemented by means of one or more additional scans in order to improve the scan result.

The additional scan area is selected interactively by the user. Whether an additional scan is necessary depends on the shape of the object as well as the individual user requirements.

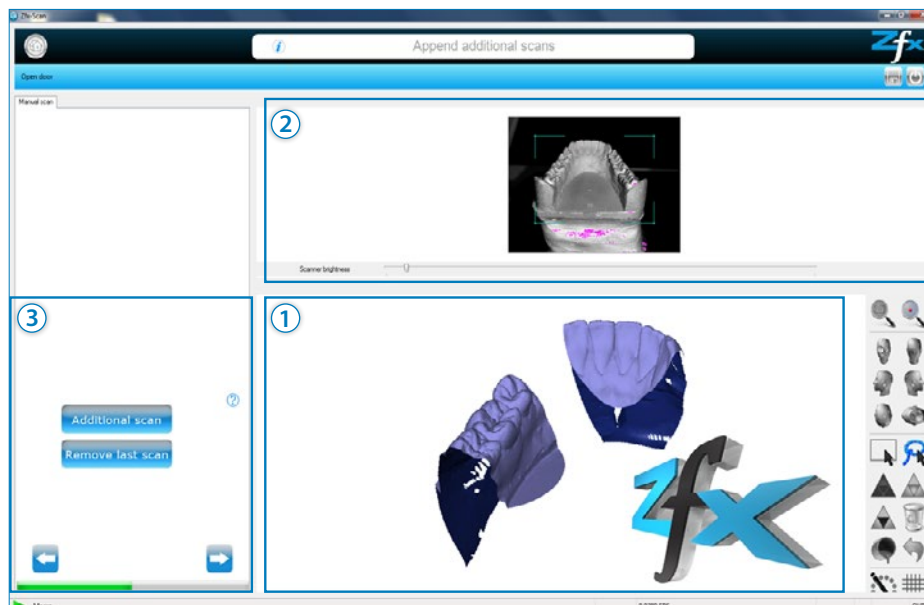


Defective areas in the data model

Additional scan

The additional scan is started by clicking the **Additional Scan** button.

##### 4.5.6.1 User interface and settings (Additional Scan mode)



- ① Data view
- ② Camera live image/ Brightness
- ③ Scan button

### 4.5.6.2 Start additional scan

Please note: The numbering ①–③ corresponds to the processing sequence

#### ① Data view (3D)

The model can be positioned in the viewing window using mouse functions (→ Chapter 4.2 “Mouse buttons and keyboard commands”). When doing so, it must be ensured that the defective areas (holes in the 3D image) are easily visible.

The user settings are immediately carried out by the rotary swivel unit and the model is repositioned in the unit, which can be detected by slight sounds of movement.

The toolbar is not available in this application.

The image in the display window is shown in preview mode, i.e. the areas are only shown thinned out.



#### NOTE

**The desired position for the model can only be set within the maximum possible tilting range of the positioning unit. This means, for example, that a model cannot be scanned from the supporting surface (from below). If the user should try to make such a setting, the rotary swivel unit will automatically set itself to its maximum possible tilting position and indicate this in the 3D display window and the live camera image.**

#### ② Camera live image

The camera live image shows the position of the model in the unit and can be zoomed by clicking in the window and using the MMB. (→ Chapter 4.2 “Mouse buttons and keyboard commands”).



#### NOTE

**The positions of the object in the camera window are immediately transferred to the positioning unit and indicate to the user which setting will be or has been scanned.**

#### Brightness

The brightness can be readjusted for each additional scan within the camera live image as in → Chapter 4.5.5 “Brightness setting”.

#### ③ Scan button

#### Additional scan

Additional scan is started and data gathered

#### Remove last scan

Data from the last additional scan are discarded



#### Back

All additional scan data are discarded



#### Complete additional scan

The whole model including all additional scan data is calculated and the system switches to the next scan step.

#### 4.5.6.3 Possible problems with the additional scan

If some of the defective areas are not closed in spite of the additional scan, it may be necessary to treat the scan object with an anti-reflection spray. This is, however, only recommended for strongly reflective (shiny) or partly transparent (impression materials) surfaces.



#### CAUTION

**Do not spray anti-reflection spray into the scanning chamber. Always spray the scan object outside the scanning chamber as otherwise there is a risk of the system optics becoming contaminated.**

#### 4.5.6.4 Starting an additional scan for already completed models

An additional scan is only possible while in Operating Mode. If it is necessary to gather data for already completed models, the appropriate scan must be restarted from the required point.



#### NOTE

**Only complete the scanning process after carefully checking whether sufficient scan data have been gathered.**

#### 4.5.7 Additional Scan – Add-Scan

A scan order with, for example, three specified scan steps (jaw model/teeth/mush bite) can be extended by one or more scanning steps using the “Add-Scan” function.

This function is necessary when further information relating to a restoration is required or the scanned data do not cover the desired area.



##### 4.5.7.1 Start Add-Scan



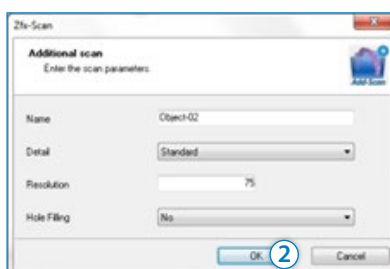
- ✗ Click the “Add-Scan” button
- ✗ Position the scan object in the scanner



#### NOTE

**As the scanning step is not defined in the Dental Manager or via the configurator, no preview is available using the Scan Assistant. The additional scanning step is also displayed as an Add-Scan image after the scan.**

- ✗ Start Add-Scan by clicking the “Scan” ① button.
- ✗ Enter the name and setting and confirm by clicking “OK” ②



**NOTE**

The scanning procedure is identical to scan data gathering → [Chapter 4.5 “Operating mode – Scan”](#) /  
→ [Chapter 6 “Scanning process”](#)

× Align additionally gathered data with the basic data set using the post processing “Align mesh” function (→ [Chapter 4.5.9](#)).

**PLEASE NOTE**

Additional scan objects cannot be renamed or deleted; it is only possible to delete the content of the scan (3D data) and not the scanning step.

**4.5.8 Selecting and deleting a data set**

When a scan step has been completed, the user can select and delete unnecessary data. This function is available in all operating modes (Configuration/Scan/Post Processing).

**NOTE**

Selecting and deleting 3D data affects the amount of data to be stored. The less there is, the smaller the space required on the storage medium.

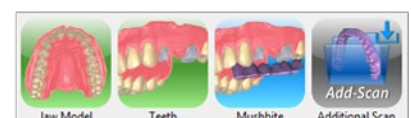
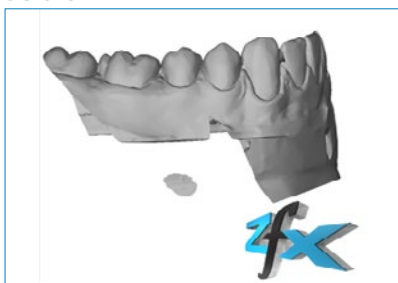
**Selection and deletion procedure**

The area to be scanned is already limited by the scan area setting (→ [Chapter 4.5.3](#)) and the tooth selection (→ [Chapter 4.5.4](#)). In order to select and delete redundant data, the previously scanned step must be selected in the Scan Assistant.

**NOTE**

It is recommended that the 3D data view be positioned using the options described in → [Chapter 3.4.2](#).

The background color (green blue) in the Scan Assistant shows whether scan data have already been gathered (→ [Chapter 4.5.2](#)).

**Before**

Uncut 3D data set

Residual data are shown as gray areas.

**Choice of selection**

e.g. drag out a rectangular frame using **SHIFT + LMB** in order to select unwanted data

The different selection options are described in → [Chapter 3.4.3 “Selection of 3D data”](#).

**After**

Redundant data are deleted.



### Delete

Deletes the areas marked in red

### Tailoring for crowns

At least two adjacent teeth on each side must be selected

### Tailoring for inlays

Also select the appropriate adjacent tooth

### Tailoring for bridges

The completed 3D model may not be smaller than the corresponding squash bite, since the protruding teeth (to the left and to the right of the squash bite) are needed as orientation points for aligning the opposite jaw.



### Undo

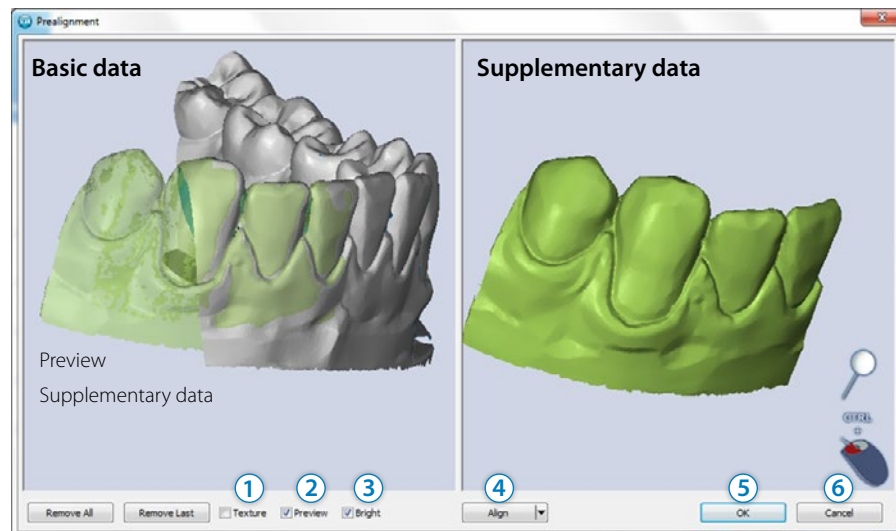
The most recent commands can be undone.

## 4.5.9 Alignment of data sets

As a rule, alignment takes place automatically. The user is only required to align data sets manually in cases where automatic alignment is not possible, e.g. in an Add-Scan.

Manual alignment can be carried out using the "Align mesh" function in the Post Processing operating mode (→ Chapter 4.6 "Operating mode – Post Processing").

### 4.5.9.1 Alignment interaction window



#### ① Texture

Activate or deactivate the texture of the 3D data model. It is recommended that the texture be deactivated.

#### ② Preview

Application preview:

- ✗ Three-point marking
- ✗ Automatic precision alignment "Align"

It is recommended that preview be used as it simplifies the alignment and penetration of the automatic precision alignment function.

③ **Bright** (Brightness)

The background color can be set to black or light gray. The “light” setting is recommended and is used for further processing once it has been selected.

④ **Align**

The Align function is an automatic precision alignment and provides the user with an even more accurate alignment option.

The default setting is normally sufficient. For setting options, see (→ [Chapter 4.5.9.3 “Application of the Align function”](#))

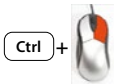
⑤ **OK**

The alignment as shown is accepted and saved.

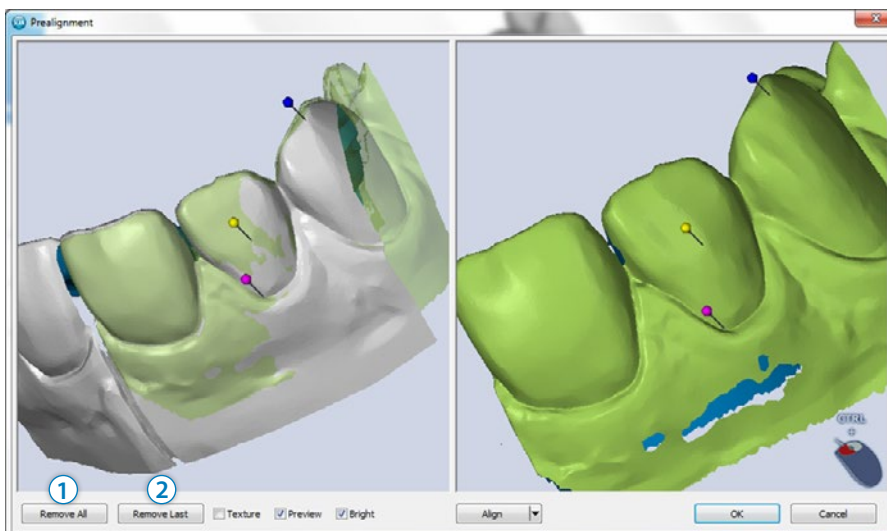
⑥ **Cancel**

The alignment is closed without being accepted and is not saved.

#### 4.5.9.2 Manual three-point alignment



When carrying out manual alignment, at least three identical points in the two data sets are marked using the **Ctrl+LMB** combination.



In order to identify three identical points for marking in the two data sets, it is expedient to select a similar view for the two data sets.

As described in → [Chapter 4.2 “Mouse and keyboard commands”](#), the views of the two data sets can be rotated, zoomed and moved by means of the mouse to bring them into an identical position.

#### Correct markers

① **Remove last**

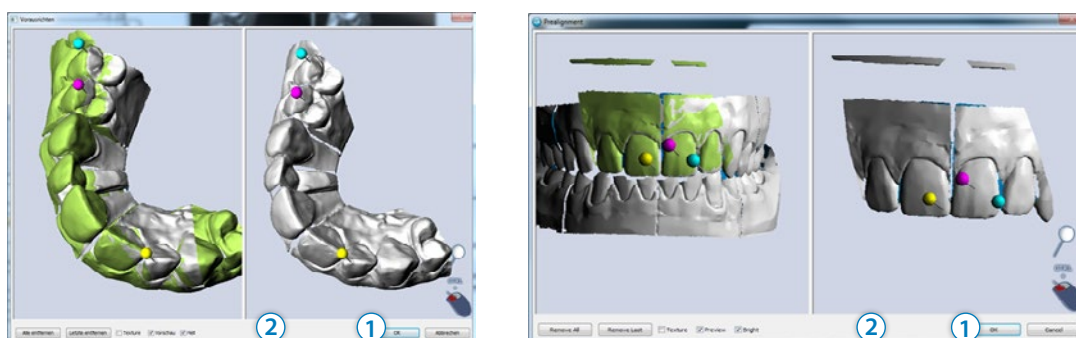
If a marker has not been set satisfactorily, it can be undone using the “**Remove last**” button.

② **Remove all**

If all the markers are to be discarded, delete all markers using the “**Remove all**” button.

**NOTE**

It is recommended that the "Preview" button be activated; the user can decide whether the alignment has been successful using the preview.

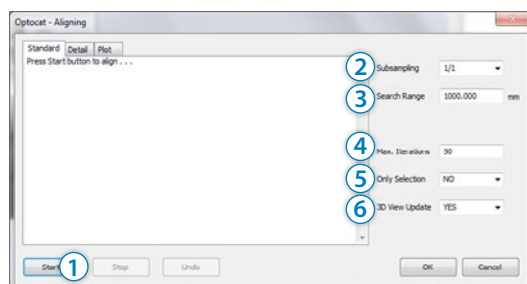
**Examples**

The areas shown in green in the left-hand image (with Preview active) show the correspondence of the alignment. The user can decide whether the alignment is satisfactory or whether new or further alignment points need to be defined.

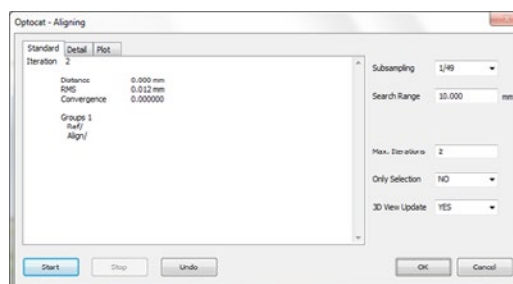
The result of the alignment can be accepted by clicking "OK" ① or a more accurate automatic precision alignment can be carried out using the "Align" ② button.

**4.5.9.3 Application of the Align function**

In order to be able to use the automatic precision alignment, it is first necessary to mark three identical points → Chapter 4.5.9.2 "Manual three-point alignment". The precision alignment of the two data sets is carried out with reference to their object geometry based on this preliminary alignment (best-fit alignment).

**Align function settings**

Align function dialog box



Information relating to the result of the precision alignment process

**① Start**

The alignment of the data sets is optimized based on the set parameters.

**② Subsampling**

Sampling rate. This rate determines how many data points are to be used for optimizing the precision alignment – each data point (1/1) or fewer data points.

**③ Search Range**

The search range defines the radius of the overlapping area within which corresponding data points are sought.

**④ Max. iterations**

Determines the maximum number of iterative optimization loops.

**⑤ Only Selection**

**NO:** the complete data set is used for precision alignment

**YES:** only pre-selected data areas are used for precision alignment.

**⑥ 3D View Update**

**NO:** 3D image is not updated (less memory usage)

**YES:** Every change in an optimization loop is updated in the 3D image

**NOTE**

Once changed, all parameter settings (Subsampling, Search Range etc.) are used as the default value for other projects.

**4.5.10 Match holders (markers) / Scan bodies**

The coded match holders are a special feature, as these enable the position of the implants to be determined unambiguously.

Using the coded match holders, a file is created for each tooth; angle and coordinate data are accurately measured and transferred to Zfx Manager 2.0 for further processing.

The uncoded match holders are used as scan bodies and are only measured as such.

**CAUTION**

Do not modify or contaminate the codes on match holders or render them unrecognizable, as this can prevent the markers from being recognized correctly.

The match holders must be properly recorded by the scan. If this is not possible due to their close arrangement, a marker scan should be carried out with the Add-Scan function (in the working step).

Coded markers can be used several times per restoration.

**4.5.10.1 Match holder (marker) coding**

The match holders are coded by Zfx GmbH and supplied as an optional accessory.

**NOTE**

It is recommended that only coded match holders be used, as this is the only way to avoid extensive rework in the Zfx Design CAD software.

### 4.5.10.2 Match holder (marker) selection

Marker status	Description	Comment
Coded match holder	Transfers the exact position of the match holder to Zfx Manager 2.0 in the form of coordinates per scanned match holder in a separate file.	<b>ADVANTAGE</b> No separate import is necessary
Uncoded match holder	The position of the match holder is only measured as a body in the overall scan data packet; separate Zfx position data are not available.	<b>DISADVANTAGE</b> Data have to be read from the data set.

It is not absolutely necessary to use a coded match holder, as an uncoded match holder is detected as a scan body and displayed as such.

### 4.5.10.3 Scanning match holders (markers)

#### Markers separate

The match holder is recorded using the “Marker Scan” button.

It can be seen from the green frame whether the marker scan was successful. The next scan step is not enabled until the marker has been successfully detected.



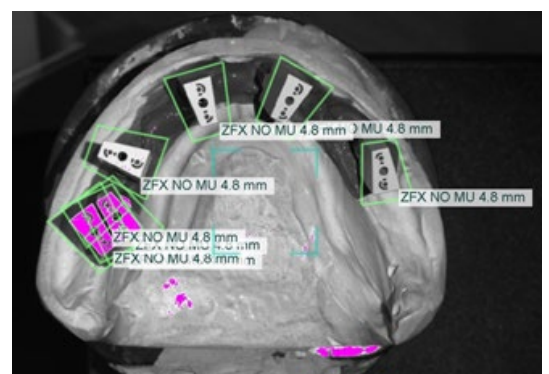
#### NOTE

All match holders that have been set must be marked with a green frame. If this is not the case, repeat Marker Scan or capture the markers as described below with an additional “Add-Scan” within the working step.

#### Markers interfere with one another

Two markers close together cannot be scanned at the same time as the sides are obscured by the other marker and can therefore not be detected unambiguously.

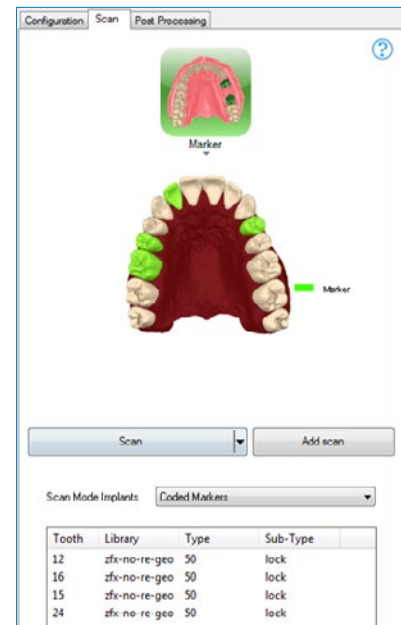
The “Marker” scanning step is divided into two or three sub-steps for gathering the data. This can be done using the “Add-Scan” function.



**“Add-Scan” procedure in the working step:**

Example: Markers required for teeth 12/15/16/24

- ✗ Set markers on tooth positions 12/16
- ✗ Start “Scan” (left button)
- ✗ Select teeth 12/16 for example
- ✗ Scan with two markers set on teeth 12/16
- ✗ Note list in the Scan Assistant; teeth 12/16 are entered.
- ✗ Remove marker from teeth 12/16 and change to 15/24 without changing the position of the scan object.
- ✗ Start “Add scan” (right button)
- ✗ Select teeth 15/24 for example and scan
- ✗ Marker 15/24 is added to the marker list

**NOTE**

The last view scanned is always displayed for scans within a working step; all data are recorded in the 3D data set. The volume of data within a working step is increased by the “Add-Scan” function.

**4.5.10.4 Defining the match holder (marker) type**

With coded match holders, information relating to the match holder, such as tooth, marker manufacturer and marker size, is shown in the table in the Scan Assistant. The system can read this data using the code.

The exact **sub-type** must be added by the user.

The exact **sub-type** must be entered separately by the user.

**Sub-type selection**

A drop-down menu is activated when the user clicks the **right mouse button** on the cell in the “Sub-Type” ① column.

Possible examples of sub-types are:

**Lock**

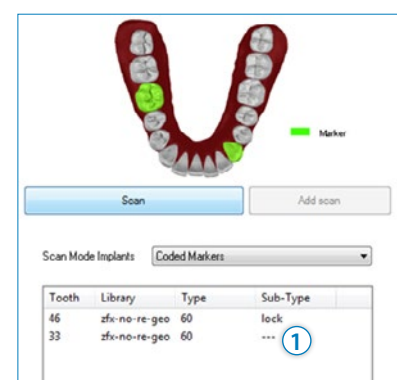
Anti-turn = prevents rotation

**No lock**

Turns freely = does not prevent rotation

**Ti-Base**

Hybrid abutment consisting of a titanium base with an attached body section

**NOTE**

It is absolutely essential that the exact sub-type description is chosen for the selected match holder.

### 4.5.11 Multi Die

The “Multi-Die” scan function enables the user to scan up to 12 single stumps from different patients simultaneously.

#### Essential accessories

- ✗ Multi Die Table for ZFX Evolution – ZFX02001227  
see Scope of Supply → [Chapter 1.6 “Scope of Supply”](#)

The “Multi-Die” scan function is launched from the Dental Manager program. The “Multi-Die” mode selected in Dental Manager automatically transfers all the necessary information to the scanning program and displays the Multi-Die grid instead of the tooth diagram.



#### NOTE

The following procedure is recommended:

##### Dental-Manager:

- ✗ Assign the patient’s name and tooth number to the respective tooth position on the Multi-Die plate.
- ✗ Group similar restorations together.

##### Scan program:

The scan procedure is the same as in the chapters already described.  
Scan settings can be made as usual.




#### NOTE

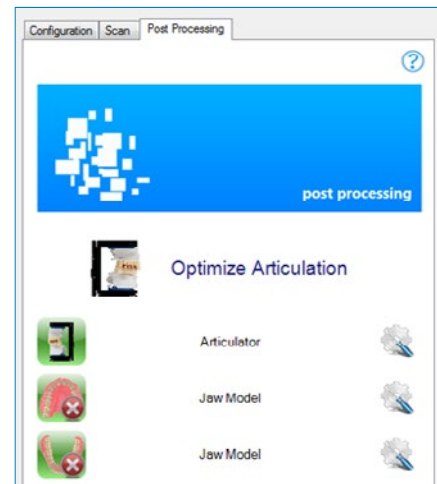
The “Tooth selection” setting is not required. The display image at the bottom left is therefore inactive (black), as the exact tooth position is already defined by means of the Multi-Die plate grid.

## 4.6 Operating mode – Post Processing

The Post Processing operating mode assists the user in the subsequent processing and preparation of the scan data.

The scanning step can be displayed or hidden by clicking the images.

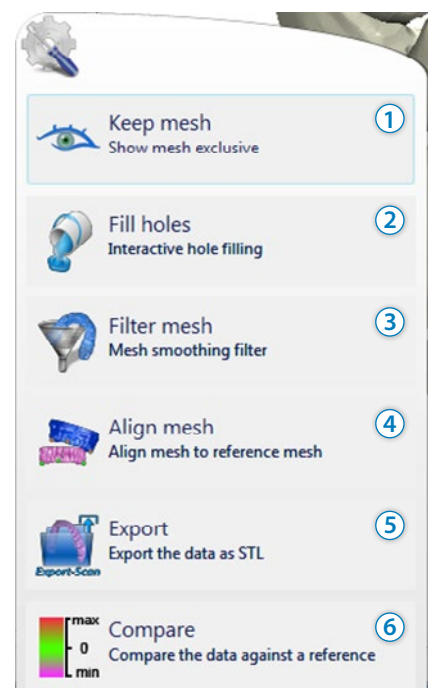
If an image is marked with a , this means that the view is hidden.



Processing functions are launched by clicking the left mouse button on the [Processing icon](#) or the descriptive text.

Possible functions are:

- ① **Keep mesh**  
→ see [Chapter 4.7.1](#)
- ② **Fill holes**  
→ see [Chapter 4.7.2](#)
- ③ **Filter mesh**  
→ see [Chapter 4.7.3](#)
- ④ **Align mesh**  
→ see [Chapter 4.7.4](#)
- ⑤ **Export**  
→ see [Chapter 4.7.5](#)
- ⑥ **Compare**  
→ see [Chapter 4.7.6](#)



### 4.7.1 Keep mesh

By selecting the “Keep mesh” function with the left mouse button, only the individual view of the selected scan situation is shown and all other scan situations are hidden.



#### NOTE

Refer back for full information on the toolbar functions (→ [Chapter 3.4](#)) and the mouse button and keyboard commands (→ [Chapter 4.2](#))

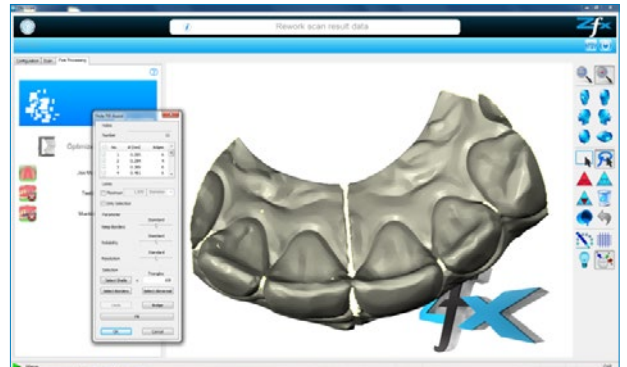
## 4.7.2 Fill holes

The “Fill holes” function (Fill Holes Assistant) is an interactive tool with which the user can complete missing 3D data (holes) in the data set by calculation. The user has the option of filling all holes automatically or only selected holes.

Before filling, the hole borders are cleaned using the preset default parameters, which results in a hole-free data set in just a few iterations.

The borders of all surfaces are marked in yellow.

It is recommended that only the scan situation to be processed be shown when filling holes (Keep mesh).



### NOTE

Hole filling **CANNOT** be undone (function inactive).

All other toolbar functions (→ [Chapter 3.4](#)) as well as the mouse and keyboard commands (→ [Chapter 4.2](#)) remain active.

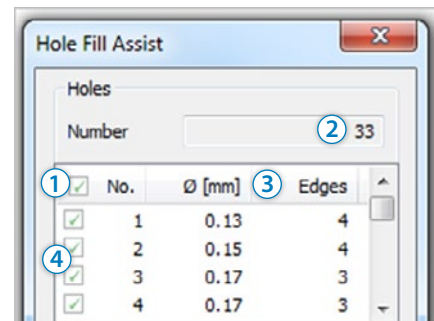
The control window in the Fill Hole Assistant is divided into 5 areas

### 4.7.2.1 Holes

In this dialog box, the number of holes is listed according to size and number of edges; the user can select individual holes.

- ① Activate or deactivate all holes
- ② Number of holes found taking into account size and selection status in the “Limits” dialog box
- ③ Sort by diameter or number of edges
- ④ Activate or deactivate one hole

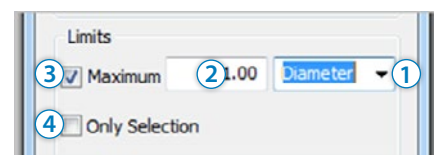
All holes are marked in yellow initially.



### 4.7.2.2 Limits

“Limits”: Here, the holes to be filled can be limited according to their size and selection status.

- ① The units for the “Hole size” information can optionally be Diameter or Number of edges
- ② Hole size
- ③ Activate size limitation
- ④ Activate limitation to selected areas

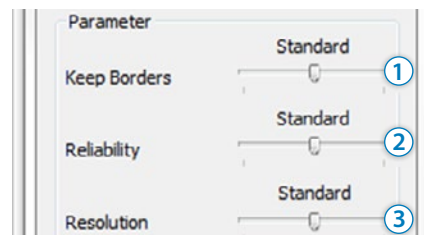


### 4.7.2.3 Parameters

“Parameters”: The way in which a hole is to be filled can be set here.

①–③ Sliders, each with 5 steps for setting the filling mode

#### ① Keep borders



Step	Description
No	The Assistant automatically cleans the hole borders in order to achieve better filling.
Fewer	
Standard	The border retention is progressively weighted.
More	
Exact	The border of the hole is not changed. This can lead to a hole not being filled as, without filling, its border geometry is too complex.

#### ② Reliability

Step	Description
Lowest	With the lowest reliability, the Assistant takes virtually no account of the shape of the fill. Filling the holes takes priority. Depending on the border geometry, this can sometimes result in larger artefacts or holes being only partially filled.
Low	
Standard	The Assistant pays increasing attention to homogenous transitions at the borders of the hole. Partially filled holes are not allowed, which means that a hole may possibly not be filled if the hole geometry is too complex.
High	
Highest	Additional calculation effort is invested in order to achieve the most homogenous filling possible.

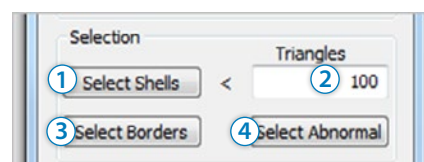
#### ③ Resolution

Step	Description
Lowest	Reduces the resolution relative to the “Standard” step by approx. $\frac{1}{3}$
Low	Reduces the resolution relative to the “Standard” step by approx. $\frac{1}{6}$
Standard	The Standard fill resolution is oriented towards the average resolution of the hole border
High	Increases the resolution relative to the “Standard” step by approx. 1.5 times.
Highest	Increases the resolution relative to the “Standard” step by 3 times.

### 4.7.2.4 Selection

The selection of triangles can be defined here. These are deleted in the next step, thereby removing troublesome structures.

- ① Selection of contiguous surface elements having no more than the number of triangles specified in the box on the right
- ② Maximum number of triangles for the selection of contiguous surface sections
- ③ Selection of triangles which are not correctly bonded to the surfaces
- ④ Selection of all border triangles

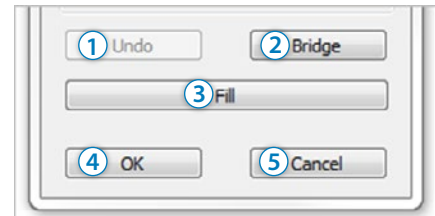


If the limit is active on selected areas, then all actions under “Selection” are only carried out on the marked area.

#### 4.7.2.5 Action

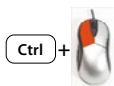
“Action”: Initiation of filling, the building of bridges, and closing the Assistant

- ① Undo the last action
- ② Insert bridges, e.g. to connect borders or islands
- ③ Start the filling process with the above boundary conditions
- ④ Close the Assistant without saving the parameters
- ⑤ Close the Assistant and save the set parameters. The same parameters will be preset the next time the system is started.

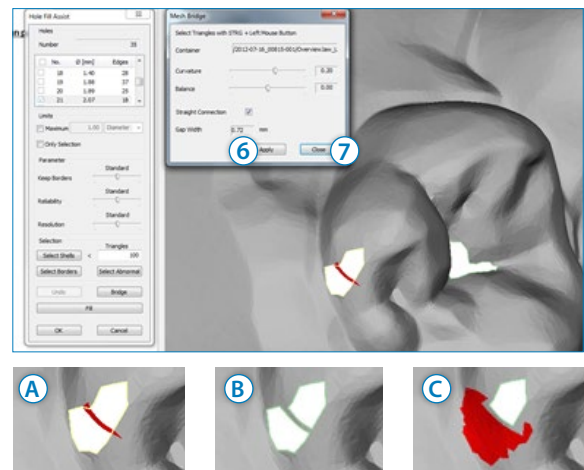


#### 4.7.2.6 Creating a bridge:

Click the “Bridge” button ② and accept or modify the settings.



- A Keeping the **Ctrl** key pressed, select the two triangles between which a bridge is to be created.
- B Click “Apply” ⑥ to accept the bridge and update the hole borders.
- ✗ Close the “Mesh Bridge” dialog box by clicking the “Close” ⑦ button.
- C The split hole can then be filled by selecting the hole number (→ Chapter 4.7.2.1 “Holes”) and confirming by clicking the “Fill” button (→ Chapter 4.7.2.5 “Action”).



#### 4.7.3 Filter mesh

The “Filter mesh” function smooths the indicated surface of a scan object (polygonal mesh).



#### NOTE

It is sensible to use the “Fill holes” function to smooth the surface after editing the 3D data set.

#### 4.7.4 Align mesh

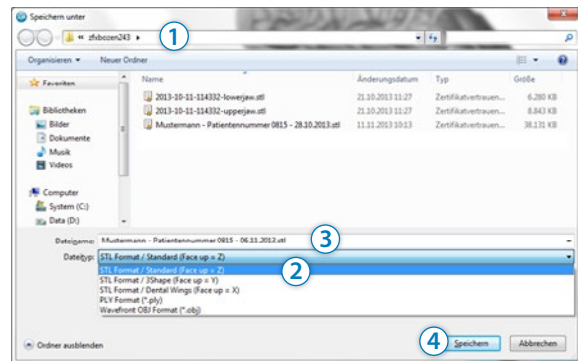
The Align mesh function is described in → Chapter 4.5.9 “Alignment of data sets”.

## 4.7.5 Export

3D data sets can be exported and saved in different file formats using the “Export” function (see file format selection). This enables data to be transferred to different 3D Dental CAD processing programs, to be sent as e-mail, or, if required, reloaded into the scan program as a comparison data set.

### “Export” procedure

- ✗ Click the “Export” button
- ✗ The Explorer window will open
- ✗ Select the file path ① (if not already shown)
- ✗ Select the appropriate file format ②
- ✗ Assign a file name ③
- ✗ Save by clicking the “Save” button ④.



## 4.7.6 Compare

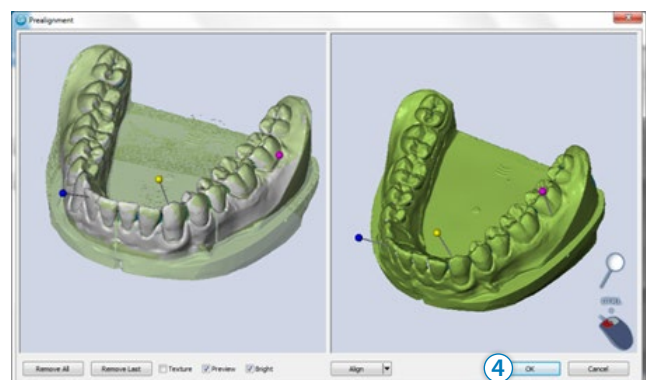
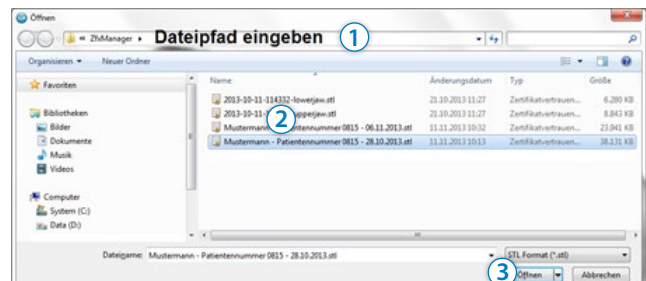
The Compare function enables the user to read data sets from earlier recordings and to compare them with the active data set.

The function is suitable, for example, for enabling already machined tooth models to be compared with the source data set.

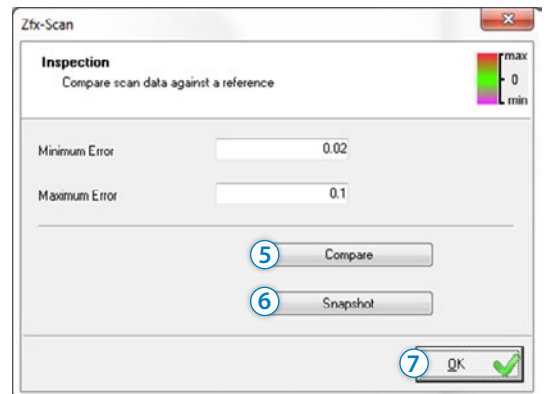
### “Compare” procedure:



- ✗ Click the “Compare” button
- ✗ The Explorer window will open
- ✗ Select the file path ① (if not already shown)
- ✗ Select the comparison data set ②
- ✗ Click the “Open” button ③ to open the file
- ✗ The user will be prompted to align the data sets  
→ Chapter 4.5.9 “Alignment of data sets”.
- ✗ Click “OK” ④ to accept the alignment

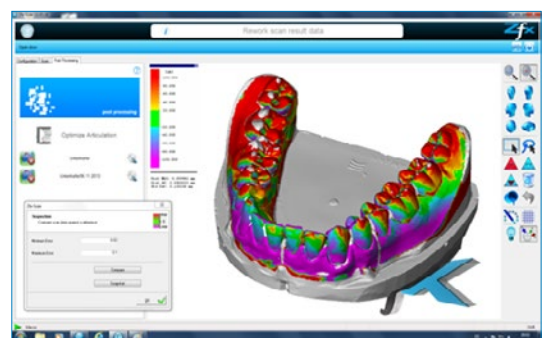


- ✗ The “Inspection” window will open
- ✗ The range of error in which the two data sets are compared with one another can be changed with the Minimum Error and Maximum Error settings.
- ✗ We recommend that the suggested parameters be adopted in order to achieve a meaningful comparison.
- ✗ Click the “Compare” ⑤ button



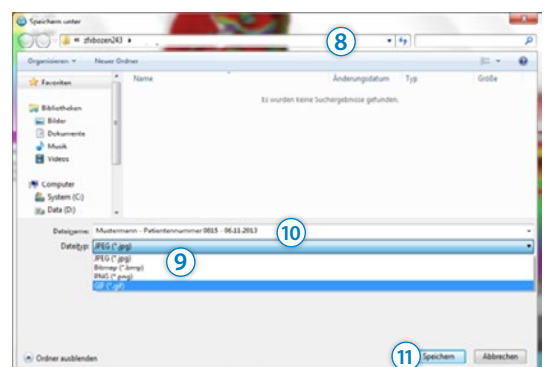
- ✗ The deviations between the current data set and the additionally loaded data set are calculated and shown in color.  
A color is assigned to the value of the deviation according to the color chart shown.

Surface color	Meaning
GREEN	Match in the Minimum Error value range (no deviation between data sets)
RED	Deviation between data sets which is greater than the positive value of the Maximum Error
MAGENTA	Deviation between data sets which is greater than the negative value of the Maximum Error



- ✗ The “Snapshot” ⑥ button can be used to save the comparison for documenting in the form of an image file.

- ✗ The Explorer window will open
- ✗ Select the file path ⑧
- ✗ Select the appropriate file format ⑨
- ✗ Assign a file name ⑩
- ✗ Save by clicking the “Save” button ⑪.
- ✗ When the comparison is complete, the “Inspection” window can be closed again by clicking “OK” ⑦.





## 5 Placing the object to be scanned in the scanner

The scanning position depends on the scanning strategy and the holders to be used.

### 5.1 Model Base

The user should use Blu Tack to place the object to be scanned on the "Model Base". (Item No.: ZFX02002063)



#### CAUTION

Before using Blu Tack, read the manufacturer's safety data sheet and the accompanying slip.

The user should ensure that the object to be scanned is positioned securely so that the position of the object does not change when individual model segments are removed.



The object to be scanned must not protrude at the front beyond the blue perforated sheet.



Right position



Wrong position

The object to be scanned is positioned too far to the rear



Wrong position

The object to be scanned is positioned too near to the front

The object to be scanned must be positioned centrally with respect to the axis of rotation.



**Right position**



**Wrong position**

The object to be scanned is positioned too high



**Wrong position**

The object to be scanned is positioned too low

Spacer plates are provided for setting the correct height. These can be combined with one another as required, wherein the adapter #1 must always be used for fixing to the rotary swivel unit.



## 5.2 Multi Die

Fill the pre-allocated mounting holes with dental putty and smooth it. Press the individual teeth into the putty in such a way that they can be still be easily registered by the scanner.

## 5.3 Zfx Synchronizer

Please refer to the operating instructions for the Zfx Synchronizer for carrying out alignment in the synchronizer. Lock the whole Zfx Synchronizer into place on the rotary swivel unit.

## 6 Scanning process

### 6.1 Overview of possible scanning processes

- × Standard plaster models
- × Fully anatomical crowns/bridges
- × Single veneered copings/wax-ups
- × Anatomically reduced veneered copings and frameworks
- × Bridge frameworks / wax-ups
- × Inlays/Onlays/Inlay bridges
- × Gum models
- × Situation scanning
- × Implant/ scan body (where available in Zfx Manager 2.0)
- × Squash bite or aligned jaw model
- × Marker setting



#### NOTE

The scan order is defined in Zfx Manager 2.0 or in the configurator.  
From this, the scanning software determines the different scanning steps.



#### NOTE

The use of Zfx Arti-Synchronizer for Zfx Evolution is recommended as this has been designed for the system.  
(→ [Chapter 1.6.2](#))

### 6.2 Scanning procedure

Step	Description	→ see Chapter		
1	Open the scan order	Enter the order in Zfx Manager 2.0 specifying the required restorations, patient data, material information etc.	4.4	<a href="#">Operating mode – Configuration</a>
2	Start the scan order	Start the scan order via Zfx Manager 2.0 or directly from the scanning program	4.5	<a href="#">Starting the scan</a>
3	Scan object	Place the object to be scanned in the scanner	5	<a href="#">Placing the object to be scanned in the scanner</a>
4	Adjust the brightness	Determine the optimal illumination for the scanning area	4.5.5	<a href="#">"Brightness setting"</a>
5	Define the scanning area	Select the scanning area by adjusting the frame	4.5.3	<a href="#">"Defining the scan area"</a>
6	Tooth selection	Select the scanning area with the position circle	4.5.4	<a href="#">"Tooth selection"2]</a>
7	Start the scan	Start the scanning process by clicking the right arrow button	4.5.2	<a href="#">"Scan Assistant/Help"</a>
<b>The scanner scans the object and gathers the data (this process can take a few minutes).</b>				
8	Additional scan	The user has the option of adding further scans to the data set	4.5.6	<a href="#">"Additional scan in scan step"</a>
9	Select the data set	Delete superfluous data	4.5.8	<a href="#">"Selecting and deleting a data set"</a>
10	Complete scan*			

\*or repeat the whole scan step → go back to Point 4.

Depending on the number of process steps displayed in the Scan Assistant, the scan procedure will be repeated with the points 1 to 10 for process step two and for all following process steps of a scan order. It can only be extended by means of the "Alignment of data sets" function (→ [Chapter 4.5.9](#)).

## 6.3 Practical examples

Two practical examples on the following subjects can be found in → [Chapter 10 – “Practical examples”](#).

### Match holders

Scan implant with coded match holders

### Articulator

Scan a complete jaw/antagonist alignment

## 6.4 Abort scan

A scan can be aborted between every step of a scan order by clicking the “Close Window” exit button with the exception of a scan which has already been started. In this case, the user must go back by clicking the left arrow button and then stop the scanning process.

A step cannot be aborted, regardless of whether a scan has already been performed or not.

All data already gathered at the time the scan is aborted is automatically saved in the patient file created with Zfx Manager 2.0.

## 6.5 Restarting an aborted scan order

An already existing scan order can be restarted at a later stage.

The data stored in the patient file is reloaded automatically into the scan program from Zfx Manager 2.0.

- ① Start Zfx Manager 2.0
- ② Open the patient file
- ③ Start the scan program using the Scan button

or enter the scan program directly by opening the patient file from Explorer.

The Scan Assistant shows whether data have already been gathered by means of the image background:



Jaw Model

### Green background

Data relating to the scanning step  
already exist



Jaw Model

### Blue background

Data relating to the scanning step  
still missing

Scanning steps can be repeated, skipped or missing scan steps added as required.

# 7 Maintenance

Premature wear, a shortened product life cycle and malfunctions are caused by improper handling.

Carry out proper maintenance regularly.

## 7.1 Cleaning and care

The components must be treated with care, and suitable cleaning materials must be used.



### CAUTION

- × Do not use solvents such as nitro, sanitary, per, alcohol or grease cleaners.
- × Never adjust or turn the aperture rings of the camera and projector.
- × Do not clean the projector and camera lenses as this may damage the objective lenses.

## 7.2 Regular measures

- × Wipe away contamination with a damp cloth without detergent.
- × Wipe the outer housing with a fine duster.



### CAUTION

Do not use compressed air and do not touch the objective lenses.

## 8 Operating faults

Please notify

Zfx Support of any malfunctions which cannot be rectified with the help of the information contained in the table below  
Contact information can be found in the → [Chapter entitled "Support Service"](#).

### 8.1 Fault finding

Problem	Description/Cause	Remedy
Program does not start	Error message: "OPCAT Message 6171: OPCAT licensing: wrong coded informations ( Error ) !"	Switch on the scanner Check the mains connection Restart Zfx Manager 2.0
Calibration unsuccessful	Error message: Several marks could not be read.	Check calibration plate for damage.
	RMS value > 12 µm	Contact service engineer
Surface not detected or holes in the scan image.	A surface could not be scanned in spite of optimal alignment and illumination	Use Zfx anti-reflection spray. Change the position of the model.
Malfunctioning of the scanner due to incorrect location	Unit becomes very hot	Check that minimum distance from wall is 0.25 m. If appropriate, avoid direct sunlight.
Fuse blown	Condensation Short circuit	When replacing the fuse, follow the instructions in → <a href="#">Chapter 9.2</a> .
Sensor unit out of adjustment	The sensor unit can go out of adjustment if the working temperature differs significantly from 15°C to 30°C. Calibration shows a strong deviation in accuracy.	Always wait until the device has reached room temperature (15°C to 30°C) and is absolutely dry. Contact service engineer.
Software message: "Code mark on Zfx Synchronizer"	The code marks cannot be read by the program.	Check code marks for damage or contamination. Repeat the detection process. If the code marks are still not recognized, contact your service engineer.
Scan process aborted	Scanner stops suddenly during the scanning process	Check the power supply Restart the program



#### CAUTION

Do not spray Zfx anti-reflection spray inside the system. Always remove the scan object from the scanner before spraying as otherwise there is a risk of the optical components being contaminated.

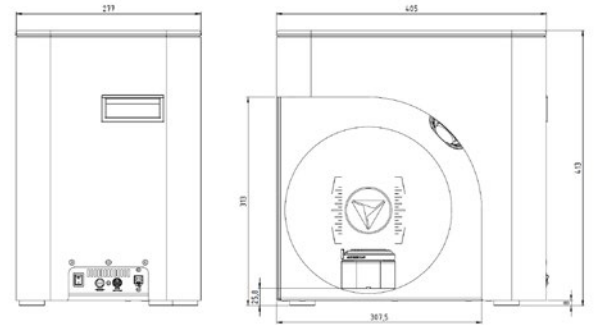
## 9 Product description

### 9.1 Datasheet

Technical specifications – Zfx® EvolutionNEXT and component set

#### 9.1.1 General

Height	413 mm
Width	405 mm
Depth	277 mm
Weight without load	12 kg



#### 9.1.2 Electrical connections

Input voltage	24 V
Input connector	R7B
Power consumption	Max. 90 W
USB port	USB-3.0 Type B

#### 9.1.3 Desktop power supply

Input voltage	100–240 VAC 50/60 Hz
Output voltage	24 VDC
Output current	Min. 3.75 A
Output power	Min. 90 W



#### WARNING

If the cable for the desktop power supply becomes damaged, replace it immediately.  
To do this, contact Zfx Support.

#### 9.1.4 Sensors

Camera sensor technology	Color, CCD, USB 3.1
Camera resolution	2 × 2,048 × 1,536 pixels
Protection unit	DLP, display size 1,200 × 800 mm <sup>2</sup>
Light source	LED (RGB), max. 48 W
Number of projected line pairs	128
Minimum measuring time [ms]	980
Triangulation angle [°]	20
Base length [mm]	85
Operating distance [mm]	210
Field of measurement [mm] <sup>1</sup>	134
Size of measurement field [mm] <sup>2</sup>	160 × 90
Depth of measurement [mm] <sup>3</sup>	66
x,y resolution [μm] <sup>4</sup>	3.4
Resolution limit [μm] (z) <sup>5</sup>	4
Noise (z) [μm] <sup>6</sup>	±6
Characteristic accuracy [μm] <sup>7</sup>	±6

### 9.1.5 Positioning unit

Positioning unit	2-axis
Angle of rotation [°]	± 360
Swivel angle [°]	± 360
Dynamics	Synchronous rotating and swiveling movement
Positioning accuracy [°]	0.01
Relative encoder resolution [pulses/revolution]	64,000
Positioning speed [°/s]	> 375
Maximum load limit	1.5
Usable volume	160×90×90

### 9.1.6 Calibration plate

Material	Precision glass ceramic
Dimensions	120×80×80 (with rounding R = 60 mm)
Color	White, opaque, matt
Structuring	Dark chrome raster with calibration marks
Structure accuracy	± 3
Working temperature range [°C]	18 to 22

### 9.1.7 Computer requirements

Operating system	Windows 10 Pro 64 bit (Version 1809, 1909, 2004)
CPU	Intel® Xeon® W-1270P or Intel Core-i9 11900k / AMD Ryzen 9 5900X
RAM	16 GB DDR4 without ECC Nvidia Quadro P2200
Graphics cards	or Nvidia RTX 2060 (6 GB GDDR6) or RTX 3070 / AMD Radeon RX 5600 XT or 6700XT (6 GB GDDR6)

#### Please note

The above data apply to a single capture.

The specified measuring specifications are average values for the central area of the measuring field which are achieved under defined measuring conditions and following precision calibration of the sensor. They apply exclusively in combination with a system configuration supplied by Zfx. All accuracy figures may be dependent on the surface of the object and environmental conditions.

<sup>1</sup> All values listed in this datasheet are average values within defined tolerances. They give an idea of the order of magnitude. For example, the image diagonal of the field of measurement '134' varies by ±10%.

<sup>2</sup> Size of the measurement field referred to the zero plane.

<sup>3</sup> Maximum extension in the z-direction.

<sup>4</sup> The values for the lateral resolution have been calculated theoretically (ratio of size of the measuring field and the number of pixels of the camera chip).

<sup>5</sup> The resolution limit is defined as the theoretically achievable accuracy (ratio of the size of the measuring field to the number of pixels of the camera chip).

<sup>6</sup> The noise is determined from the deviation of the measured points against a best-fit curve.  
The noise of the measured 3D data depends significantly on the camera chip used.

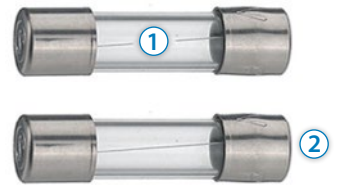
<sup>7</sup> Typical characteristic accuracy of the range. The typical characteristic accuracy is determined in accordance with VDI Directive 2634.

## 9.2 Device protection

The approved fuses are:

Manufacturer	Type
Schurter	0034.1521
Littelfuse	02173.15MXP
OMEGA	ST520231

The fuses are protective devices for electrical circuits which blow in the event of a fault or short circuit. A fuse may be blown if the device is connected to the supply network and is switched on, but the operating lamp on the connecting panel is not lit. If this is the case, the fuse must be checked. The fuse wire ① in the picture below must not be broken. Otherwise, the blown fuse must be replaced by one of the specified fuse types. An undamaged fuse is shown by ② in the picture. The fuse is located on the connecting panel at the rear and is identified by the fuse symbol. See → [Chapter 9.6 "Connecting panel"](#). Use a flat screwdriver to open the fuse holder.



## 9.3 Operating conditions



### WARNING

Only qualified personnel who have first read and understood the above instructions are allowed to change electronic fuses.



### WARNING

Use only the specified fuse types. Using other types of fuse or fuses from other manufacturers will invalidate the product liability and warranty.



### WARNING

If the fuse should blow again, please contact Zfx Support.



### WARNING

A blown fuse must never be replaced by metal wires or other materials.



### WARNING

The fuse must never be replaced by one with a higher current value; **FIRE HAZARD!**



### WARNING

Before replacing a fuse, check that the unit is switched off and has been disconnected from the power supply.

Permissible ambient temperature range	15 °C to 30 °C
Permissible up to max. relative humidity	80 %
Permissible up to max. ASL	2,000 m
For indoor use only	

## 9.4 Ambient conditions, transportation and storage

Temperature range	Min. -20°C to max. 55°C
Humidity	5% to max. 95%
Pressure	Min. 700 hPa to max. 1,060 hPa



### WARNING

As result of large temperature changes or high humidity, condensation may form in the unit and lead to a short circuit. The sensor may also go out of adjustment. Refer to → [Chapter 2](#) for commissioning.

## 9.5 Rating plate

The rating plate can be found on the rear of the unit.

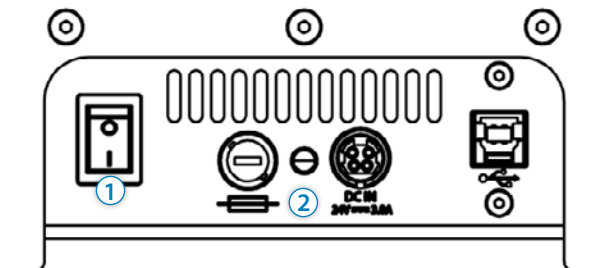
Symbol	Meaning
	Unit type Zfx® EvolutionNEXT
<b>REF</b>	Item number
<b>LOT</b>	Serial number
VOLTAGE	Supply voltage
POWER	Power
	Caution: Read the instruction manual.
<b>CE</b>	CE mark
	Disposal information, see "Intended use"
	Manufacturer



## 9.6 Connecting panel

The connecting panel can be found on the rear of the unit.

Symbol	Meaning
①	On/Off switch
	Fuse
②	Operating lamp
	DC
	USB port



## 9.7 Operating lamp

The operating lamp shows the operating state of the scanner. When lit, the scanner is switched on. If the scanner has been properly commissioned and is switched on but the operating lamp does not illuminate, please check the fuse. For more information, read and follow → [Chapter 9.2](#).

# 10 Practical examples

## 10.1 Marker Scan

### Settings in Zfx Manager 2.0

#### Scanning example:

Entry in Zfx Manager 2.0:

- × Open new order
- × Enter order data

#### Order data:

- × Anatomical crown: Tooth 24
- × Implant type: threaded
- × Gingiva scan : on

Save order

The order is created right in Zfx Manager 2.0, from which the scan is usually started.

The scan program is started by means of the scan button. The user interface as described in → [Chapter 4.5](#) appears.

#### Scanning procedure

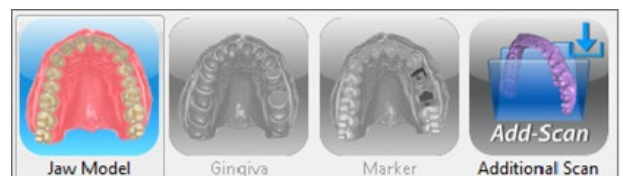
The user can again check the scan order created in Zfx Manager 2.0, or, if necessary, add a restoration, in the configurator.



#### NOTE

Not all Dental Manager programs are compatible with the additional configuration; please always check that the Dental Manager has accepted the restoration created using the configurator.

Three steps are necessary for the chosen example,  
→ [Chapter 4.5.2 "Scan Assistant / Help"](#)



#### NOTE

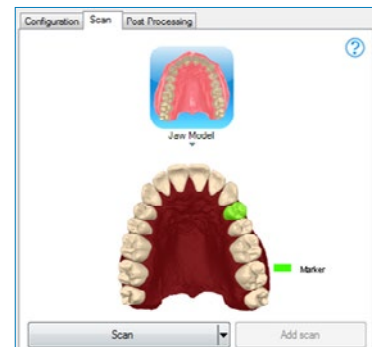
The image in the Scan Assistant turns green as soon as 3D data have been gathered in a working step,  
→ [Chapter 4.5.2 "Scan Assistant / Help"](#).

### Step 1/3 – Upper jaw scan

- ✗ Insert the upper jaw model
- ✗ Position the model on the mounting plate → [Chapter 5](#)  
“Placing the object to be scanned in the scanner”



Start the scan by clicking the “Scan” button



- ✗ Adjust the brightness (→ [Chapter 4.5.5](#))
- ✗ Define the scan area (→ [Chapter 4.5.3](#))
- ✗ Select the tooth (→ [Chapter 4.5.4](#))



Start the scan by clicking the right “arrow button”



The user can now decide whether to gather further data.

Confirm by clicking the “Additional Scan” dialog button –  
the additional scan will be started,

→ [Chapter 4.5.6](#) “Additional scan in scan step –  
Additional Scan”

If an additional scan is unnecessary as all relevant data have  
been gathered,



complete the process by clicking the right “arrow button”

The program automatically jumps to the next step.

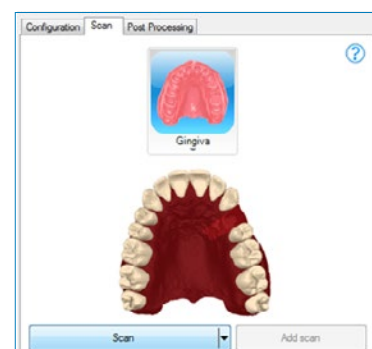


### Step 2/3 – Gingiva Scan

- ✗ Remove the adjacent teeth from the impression.
- ✗ Insert the gingiva

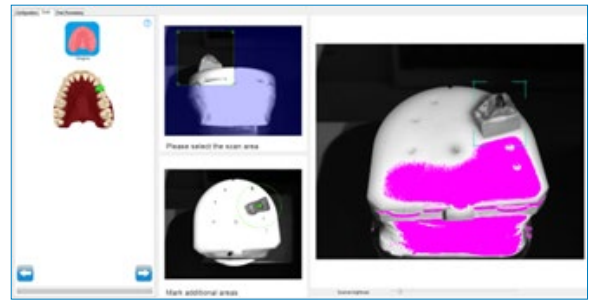


Start the scan by clicking the “Scan” button



- ✗ Adjust the brightness (→ Chapter 4.5.5)
- ✗ Define the scan area (→ Chapter 4.5.3)
- ✗ Select the tooth (→ Chapter 4.5.4)


Start the scan by clicking the right **“arrow button”**



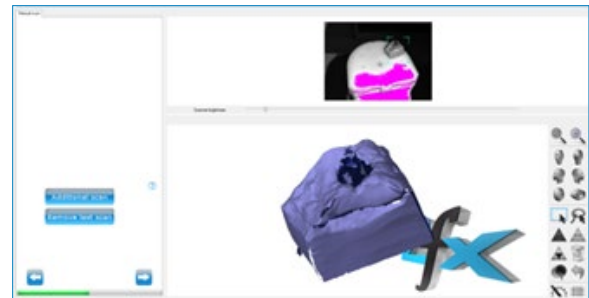
The user can now decide whether to gather further data.

Confirm by clicking the **“Additional Scan”** dialog button – the additional scan will be started,  
 → Chapter 4.5.6 **“Additional scan in scan step – Additional Scan”**

If an additional scan is unnecessary as all relevant data have been gathered,

 complete the process by clicking the right **“arrow button”**

The program automatically jumps to the next step.



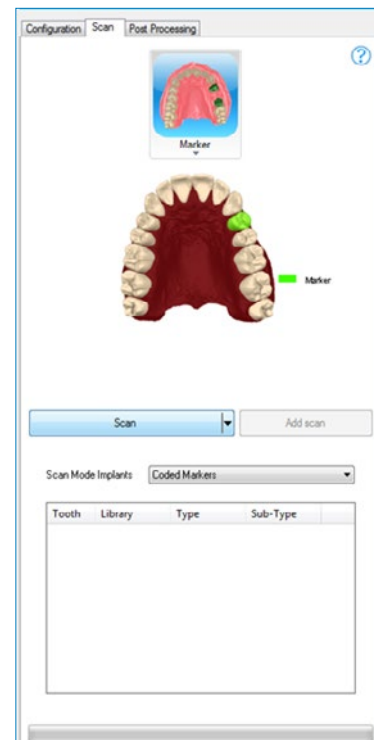
**NOTE**

**If the data from step 1 and step 2 cannot be correlated automatically (e.g. due to the model moving on the mounting plate), then the user will be prompted to align the data sets. → Chapter 4.5.9 **“Alignment of data sets”****

**Step 3/3 – Marker Scan**

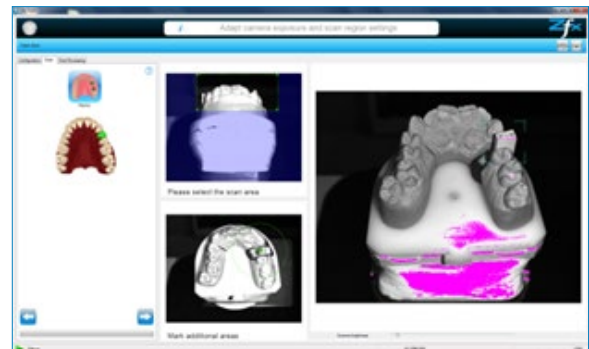
- ✗ Insert marker in the impression
- ✗ Position the adjacent teeth
- ✗ Selection: Coded marker or uncoded marker

 Start the scan by clicking the **“Scan”** button

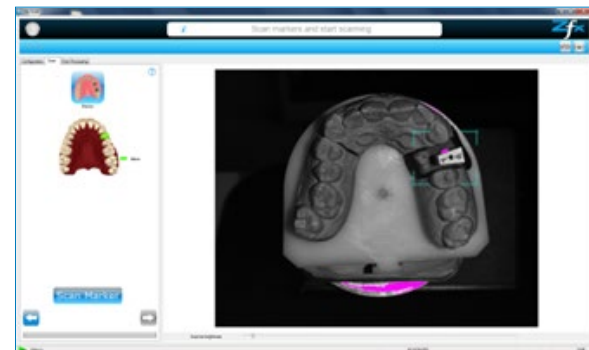


- × Adjust the brightness (→ Chapter 4.5.5)
- × Define the scan area (→ Chapter 4.5.3)
- × Select the tooth (→ Chapter 4.5.4)

➔ Start the scan by clicking the right “arrow button”



- × Readjust the brightness (→ Chapter 4.5.5)



### **i** NOTE

When setting the brightness for detecting match holders, overexposure is better than underexposure.

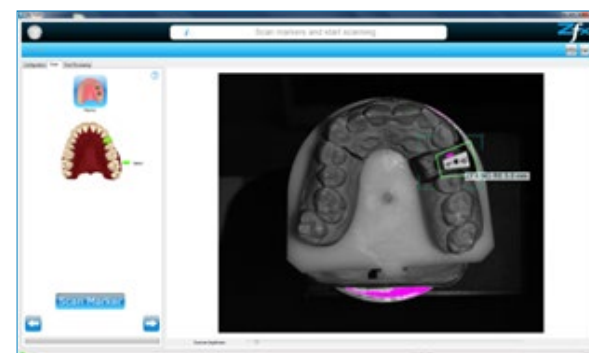
#### Scan Marker

Start match holder detection by clicking the “Scan marker” button.

The user can see whether the marker recognition was successful by the green frame around the marker and the display of the marker type.

If both conditions are met, the right arrow button will be enabled and the user can start the scan.

➔ Start the scan by clicking the right “arrow button”



The user can now decide whether to gather further data.

Confirm by clicking the “Additional Scan” dialog button – the additional scan will be started,  
→ Chapter 4.5.6 “Additional scan in scan step – Additional Scan”

If an additional scan is unnecessary as all relevant data have been gathered,

➔ complete the process by clicking the right “arrow button”





Clicking with the **RMB** on the **Sub-Type** ① column header opens a drop-down menu to enable a selection to be made.



**NOTE**

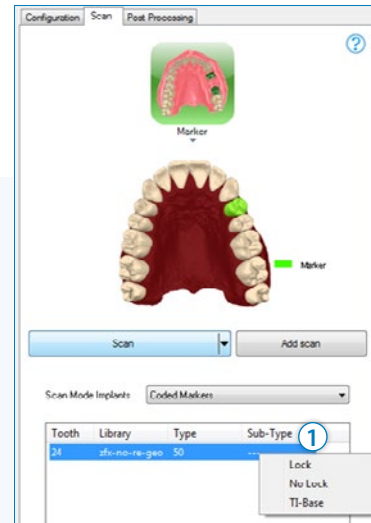
It is essential to enter the exact type of match holders (markers) used.

**Examples of possible Sub-Types**

Lock – anti-turn (= prevents rotation)

No lock – turns freely (= does not prevent rotation)

TI-Base – hybrid abutment consisting of a titanium base with an attached body section



Scanning process complete – all necessary data have been gathered.



The user can select and delete superfluous data  
 → [Chapter 4.5.8 "Selecting and deleting a data set"](#)



**NOTE**

All images in the Scan Assistant are green, i.e. 3D data have been gathered in each scanning step

→ [Chapter 4.5.2 "Scan Assistant/Help"](#).



**End of scan order**

## 10.2 Coded Zfx Synchronizer

With the help of a coded Zfx Synchronizer, no further alignment actions are required and thus the error rate can be reduced.

The determination of what is to be scanned and how takes place in Zfx Manager 2.0, from which the scan is usually started.

### Settings in Zfx Manager 2.0

#### Scanning example:

Entry in Zfx Manager 2.0:

- × Open new order
- × Enter order data

#### The order may appear as follows:

- × Reduced coping: Tooth 11
- × Anatomical crown: Tooth 16
- × Antagonist: Teeth 41/46
- × Adjacent teeth: Teeth 12/21 and 15/17

Select antagonist type: Virtual articulator

Save order

Start scan by clicking the Scan button

The scan program is started by clicking the scan button in Zfx Manager 2.0. The user interface for scanning mode as described in → [Chapter 4.5 "Operating mode – Scan"](#) appears.

### Step 1/3 – Whole jaw model scan

- × Insert the Zfx Synchronizer with the full jaw model fitted
- × See the description of the Zfx Synchronizer for how to fit the jaw model in the synchronizer



Start the scan by clicking the "Scan" button

- × Adjust the brightness (→ [Chapter 4.5.5](#))
- × Define the scan area (→ [Chapter 4.5.3](#))
- × Select the setting plane  
(Frankfurt horizontal or Camper plane)

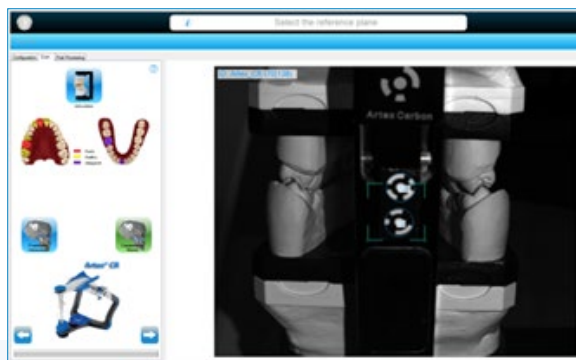


Start the scan by clicking the right "arrow button"



The coding marks of the Zfx Synchronizer are detected automatically. If a code cannot be read, please refer to the information in → Chapter 8 “Operating faults”.

➔ Continue scanning by clicking the right “arrow button”



**NOTE**

The program will only recognize coded Zfx Synchronizers.

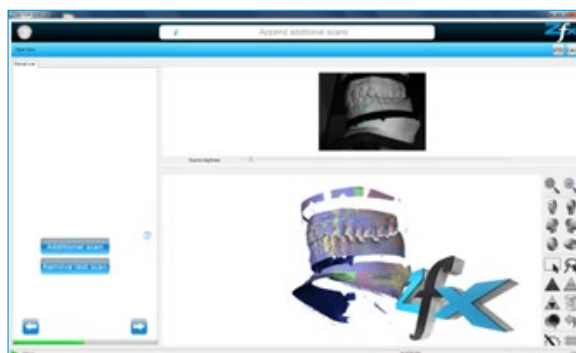
The user can now decide whether to gather further data.

Confirm by clicking the “Additional Scan” dialog button – the additional scan will be started,

→ Chapter 4.5.6 “Additional scan in scan step – Additional Scan”

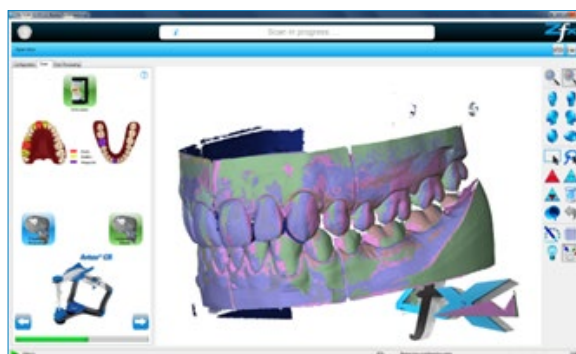
If an additional scan is unnecessary as all relevant data have been gathered,

➔ confirm by clicking the right “arrow button”



The data are recalculated and summarized in a 3D data set. This process takes a few seconds; please check the progress bar.

When the data have been gathered, the program automatically advances to the next step.

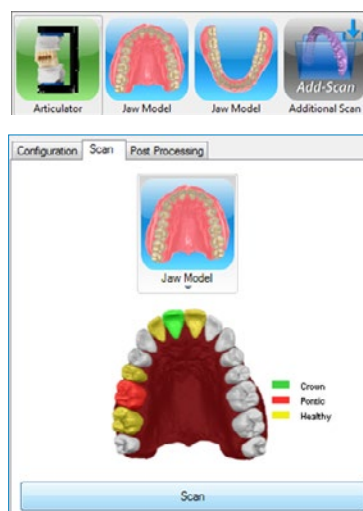


**Step 2/3 – Upper jaw scan**

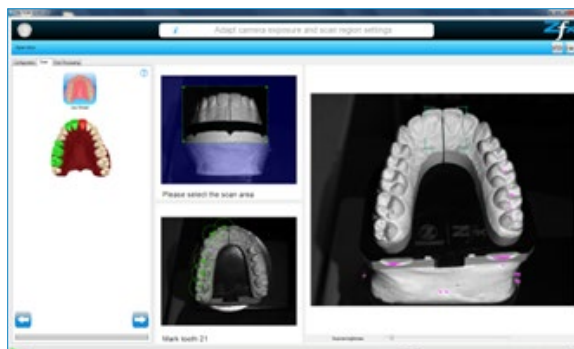
It is not necessary to switch to the next step manually (optional) → Chapter 4.5.2 “Scan Assistant / Help”

- ✗ Remove the synchronizer from the scanner.
- ✗ Remove the denture from the Zfx Synchronizer – see description of Zfx Synchronizer
- ✗ Fix the upper jaw model on the model base and place in the scanner

➔ Confirm by clicking the right “arrow button”



- ✗ Adjust the brightness (→ Chapter 4.5.5)
- ✗ Define the scan area (→ Chapter 4.5.3)
- ✗ Select the tooth (→ Chapter 4.5.4)



The user can now decide whether to gather further data.

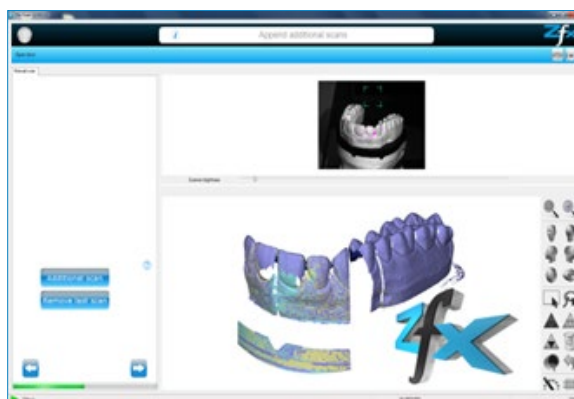
Confirm by clicking the "Additional Scan" dialog button – the additional scan will be started,  
 → Chapter 4.5.6 "Additional scan in scan step – Additional Scan"

It is recommended that the brightness be readjusted by double-clicking in order to be able to detect the position of faults more easily. (→ Chapter 4.5.5)

If an additional scan is unnecessary as all relevant data have been gathered,



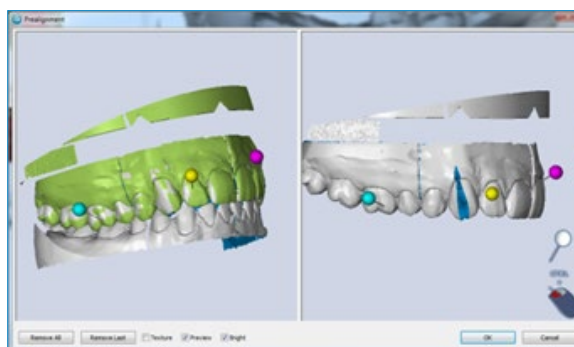
confirm by clicking the right "arrow button"



The user will be prompted to align the data sets  
 → Chapter 4.5.9 "Alignment of data sets"

Confirm the alignment by clicking "OK"

The program calculates the necessary data and goes automatically to the next step.



### Step 3/3 – Lower jaw scan

It is not necessary to switch to the next step manually (optional) → Chapter 4.5.2 "Scan Assistant/Help".

- ✗ Remove the upper jaw model from the scanner.
- ✗ Fix the lower jaw model on the model base and place in the scanner



Confirm by clicking the right "arrow button"



- ✗ Adjust the brightness (→ Chapter 4.5.5)
- ✗ Define the scan area (→ Chapter 4.5.3)
- ✗ Select the tooth (→ Chapter 4.5.4)



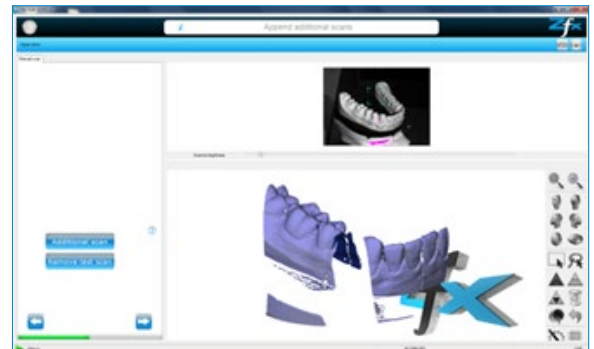
The user can now decide whether to gather further data.

Confirm by clicking the "Additional Scan" dialog button – the additional scan will be started,  
 → Chapter 4.5.6 "Additional scan in scan step – Additional Scan"

If an additional scan is unnecessary as all relevant data have been gathered,



confirm by clicking the right "arrow button"

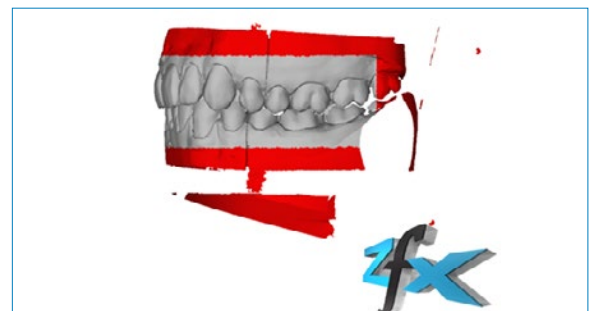


The program calculates the necessary data and all steps are marked as complete in the Scan Assistant.

If superfluous data are to be removed, the user can select the data at the end or after each step.



Data set "selection and deletion" can be started (→ Chapter 4.5.8 "Selecting and deleting a data set")



**NOTE**

All recorded data sets can be displayed and edited at the same time by clicking the Post Processing button. This program feature will save the user time, and all the superfluous data fragments in all views can be removed simultaneously.

**End of scan order**





FOR MORE INFORMATION VISIT  
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