



User manual

Software v3.0



dental Scan

A product from smart optics Sensortechnik GmbH



Legal Notice

Dear Customer,

Thank you for choosing a product from smart optics!

With the aid of the dental Scan software you will be able to control the scanning processes of your smart optics 3D scanner quickly and conveniently. No matter whether you scan using the stand-alone mode or integrated with a CAD software, the dental Scan software offers the perfect scanning strategy for every situation.

In the dental field, our trained specialist dealers are responsible for providing first level support. If you require additional information or if you have any questions about the software, therefore please contact your smart optics specialist dealer.

We hope you enjoy working with dental Scan!

Your smart optics team

CHANGES AND SERVICE

We reserve the right to implement product changes as part of continuous improvement and technical progress and to make changes to this documentation. You can find the current version of this documentation in the download-center on our homepage: www.smartoptics.de.

Please note that the current version of this documentation may contain information which does not apply to older versions.

On request we are also glad to send you a printed paper version of the documentation. If you require a copy, please send an e-mail to communications@smartoptics.de.

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1. About this manual

Please read through this User manual carefully. Keep the User manual in a safe place. If you pass on the device to somebody else, please make sure that you hand them this User manual as well.

smart optics accepts no liability for damages due to failure to comply with the User manual.

Which operating manuals are there?

Generally there are several manuals for the smart optics scanners:



Operating manual

This manual contains the description of the device components, the general notes on safety and the technical data. They will tell you how to operate the scanner and how to handle the accessories.



Installation manual

Here you will find out how to install the dental Scan for the first time and how to receive and install updates at a later date.



User manual dental Scan

All scanning methods and the use of optional modules are described in this manual.

Graphic symbols and highlighting of important information

In this manual, graphic symbols and text highlights are used to present the information more clearly. In this way you may understand the instructions better.

- ▶ A triangle on the left indicates a step involving an action.
- ✓ A tick on the left tells you what the outcome should be if you have followed one or more steps correctly.
- 1. An element in a sorted list
- An element in an unsorted list

Important statements are highlighted in bold type.

Important **KEYWORDS** are highlighted with capital letters in bold type.

 Section NN

 Page NN

Cross-references within a manual are highlighted with a book icon. Cross-references act as hyperlinks in the electronic version. Click on the number to follow the link.



Cross-references to other manuals are highlighted with a symbol for the type of manual: a scanner for the operating manual, a software package for the installation manual and a user on the PC for the dental Scan user manual.



The signpost shows a selection of topics related to your current issue.



This icon points towards functions or modules that are not included in the standard scope of delivery and that can be purchased separately.



Variants in operation and functionality which do not apply to every scanner type are marked with this symbol.



Variants in operation and functionality which apply to the joint use of dental Scan with exocad® DentalCAD are marked with the exocad® DentalDB application.



Standard settings specified by the manufacturer are indicated with a steering wheel.



TIP

The word "Tip" and the information icon are used to highlight tips on operation and information that require your special attention.



The manufacturer of the product is indicated by the factory symbol.

Figures

Figures showing equipment and screenshots from the software are used for illustration purposes.

The images shown in this manual may differ from the appearance of your actual device or from the software supplied with your device. The screenshots show realistic examples but they do not contain actual data.



Software controls

The software controls are highlighted as follows:

- OK** Names of buttons in the software are shown with a colored background.
- Name** Names of fields in the software are highlighted in bold type.
- File | New** Names of menus and menu options are separated by a vertical line.
- Name .txt File and path names are shown in Courier font.

Units of measurement and numbers

In this manual the numbers are given according to the decimal system with decimal places.

Units of measurement comply with the legal units in Germany as well as the international system of units (SI).

Further information as well as measurement converters can be found on the Internet.

Measurement	Unit	Abbreviation
Measurements/weight	Kilogram	kg
	Gram	g
Length	Meter	m
	Centimeter	cm
	Millimeter	mm
	Micrometer	μ
Angle	Degree	°
Time	Hour	h
	Minute	m
	Second	s
Electrical power	Watt	W
Electrical voltage	Volt	V
	Alternating current	AC
Electrical frequency	Hertz	Hz
	Gigahertz	Ghz



Measurement	Unit	Abbreviation
Electrical current	Ampere	A
Protection class	International Protection	IP 1. digit: solids protection, 2. digit: fluids protection
Temperature	Degree Celsius	°
Memory (PC)	Random Access Memory	RAM
Data volume	Megabyte Gigabyte	MB GB
CAD data format	Polygon file format Standard Triangulation Language American Standard Code for Information Interchange Mesh PixelCloudMeasurement	PLY STL ASCII MSH PCM
Picture element	Pixel Megapixel	px (monitor), dpi (print) Mpx

Warnings

Warnings provide information on how damage to objects and injury to persons can occur and give instructions on how to avoid risks. Warnings are categorized into four levels depending on the severity of the possible consequences.



NOTE

This combination of signal word and symbol warns you about possible *material damage* that might occur if the instructions are not followed correctly.



CAUTION

This combination of signal word and symbol warns you about possible *minor injuries* that might occur if the instructions are not followed correctly.



WARNING

This combination of signal word and symbol warns you about *severe to lethal injuries* that might occur if the instructions are not followed correctly.



DANGER

This combination of signal word and symbol warns you of dangerous situations which could lead directly to death or severe injuries.



2. About dental Scan

dental Scan is a software with which you control the scanning processes for digitization of jaw models. You will receive the software exclusively together with a 3D dental scanner from smart optics.

If you already operate a 3D dental scanner from smart optics, it is possible to install a new version as update for the following scanners:

Vinyl, Activity 885 Mark 2, Activity 885, Activity 855 or scanBox.

dental Scan cannot be combined with 3D scanners from other manufacturers.

System requirements

RECOMMENDED

Operating system	Windows 10 64-BIT
Processor (CPU)	Quad-Core i7 16 GB RAM
Free hard drive space	approx. 80 – 150 GB
Graphics card	2,056 MB RAM
USB connections (Ports)	USB 2.0/3.0 P

Compatibility with exocad® Dental CAD

System requirements exocad®
Dental CAD
wiki.exocad.com

dental Scan can be installed and used together with exocad® Dental CAD. In this case also ensure that the system requirements for exocad® Dental CAD are complied with.



Installation
exocad® Dental CAD
Installation dental Scan

exocad® Dental CAD must be adapted for use with dental Scan. Information is given in the installation instructions of smart optics.



TIP

smart optics is a distribution partner of exocad GmbH. If you are interested in exocad® please contact your smart optics specialist dealer or smart optics directly.



Load calibration data

Calibration data

Each software package includes calibration data which is filed in a special folder. These calibration data are unique for every device. Without the correct calibration data the software will not be able to work optimally with your scanner.

Should you install dental Scan for several scanners at different workstations it is therefore important that you use the installation data carrier with the correct calibration data for each scanner.

Modules

The following modules are integrated in dental Scan:

- secondDie
- Texture scan monochrome

The following optional modules are available:

- Articulator scan
- Fixator scan
- multiDie
- multiCase
- Texture scan color
- Triple-Tray® impression scan



Section 8.3

It depends on the type of scanner connected as to whether a module is available on the hardware side. Depending on the type of scanner, the available modules are part of the standard scope of delivery or can be purchased in addition. Optional chargeable modules must be authorized in the software.



Scope of delivery

Object holders, fixators and articulators

To use the modules Fixator-Scan, multiCase, multiDie and Triple-Tray® impression scan you require a special object holder in addition. Depending on the type of scanner, the object holders are part of the standard scope of delivery or can be purchased in addition.

The articulator scan module is available for the articulators of various manufacturers. For individual jaw scans of articulated models you require an adapter plate from the scanner accessories. However, the matching articulator is not part of the scanner accessories.

Data format

The standard format for data output is PLY (Polygon File Format). Output in STL format (stereolithography) is also possible in addition.

3. Principles of operation

This section describes the fundamental design of dental Scan and the functional principles of the software.



Topics in this section

- User interface
- Workflows
- Project definition patient
- Project definition multiCase
- Messages
- Replace tab
- Matching and project completion
- Vestibular scan
- exocad® projects

Detailed information on the individual functions of the software are given in the following sections.



Software functions

- Modify mesh
- View
- Service position
- Projects
- Miscellaneous
- Settings

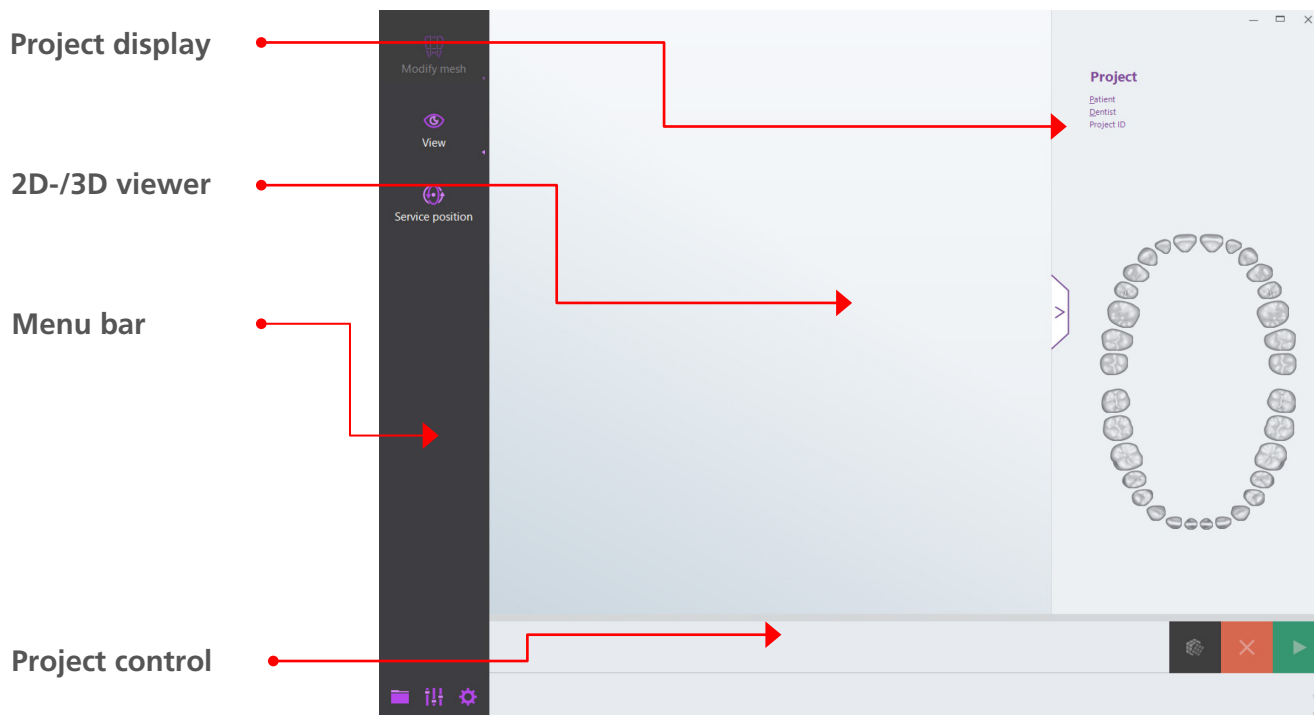


Assistance for your specific workflows are given at the end of this manual in the “Roadmaps” section.



3.1. User interface

The user interface of dental Scan is divided into four areas:



Project display



Section 7.1

The project display presents the information of the data given for the definition of the project. The data cannot be edited here.

Patient

First name and surname of patient.

Dentist

Name of the dentist in a dental Scan project, name of the customer in an exocad® project.

Project ID

The ID is assigned automatically during creation. It begins with the date in the form: [YYYY]-[MM]-[DD]. For dental Scan projects, the time is added in the form -[hhmmss]. For exocad® projects the exocad®-ID is added, e.g. 00002-001.

Odontogram

Colorations in the odontogram show the defined reconstruction for every position. The color codes vary, depending on whether the project was created in dental Scan or in exocad®.

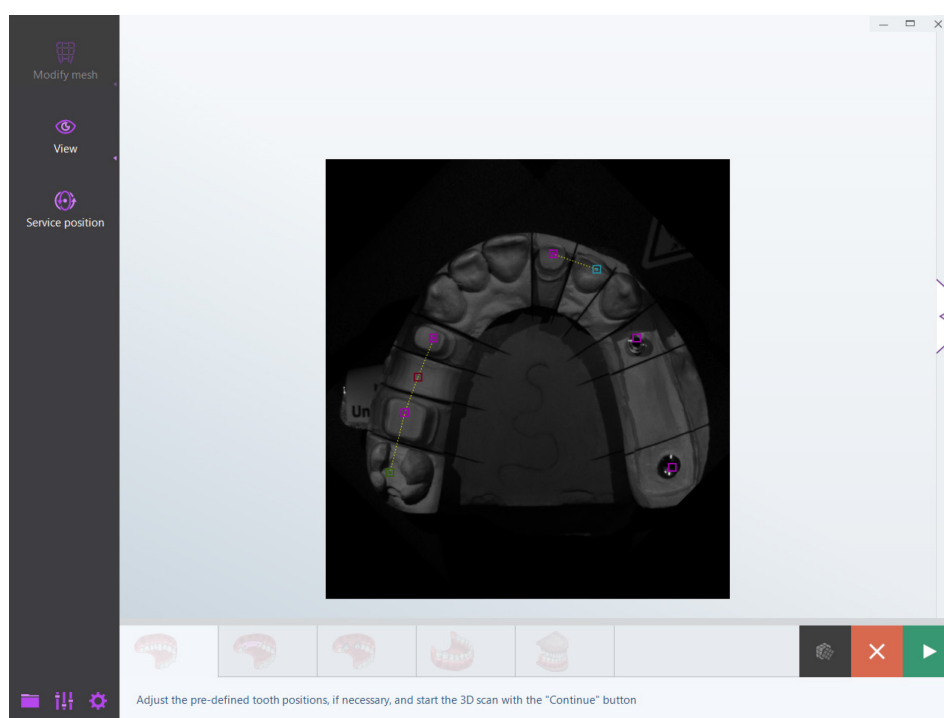
Showing and hiding

You can hide the project display to increase the working area in the 3D viewer.

- ▶ Click on the grabber >].
- ▶ The project area is hidden.
- ▶ To show the project area again, click on the grabber again <].

The 2D viewer

The 2D viewer shows a black/white photo of the jaw model from the top.

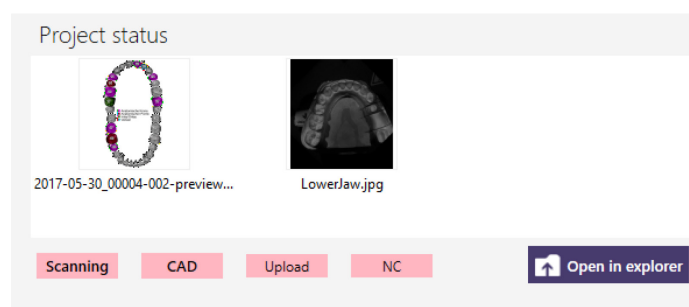


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In this view you can determine the exact tooth positions from the project definition. This step is necessary as every dentition has different dimensions, so that the exact position of every tooth cannot be known.

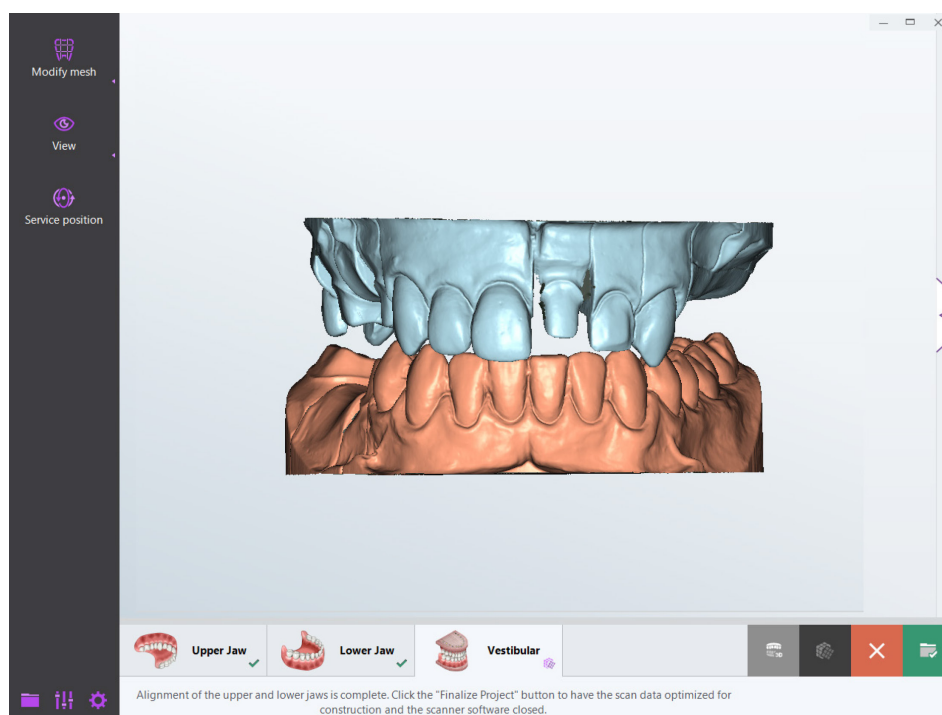
**TIP**

The 2D images are also shown in exocad® DentalDB as preview images in the project status.

**The 3D viewer**

Section 3.8, 3.9, 5

The scan is presented three-dimensionally in the 3D viewer. You can view the scan from all sides.



You can also carry out corrections in the 3D viewer, for example, rescanning missed areas, adding a correction scan or cutting out the base of the model. To align the scan of the upper and lower jaw with the vestibular scan, the 3D viewer is divided horizontally.

The menu bar

The menu bar is the gray area on the left side of the application.

Important menus

The upper menus, **Modify mesh**, **View** and **Service position** contain frequently used functions.

Modify mesh bundles functions for cutting as well as correction functions (**Rescan**, **Correction scan**, **Fill holes**).

Under **View** you can find functions which allow you to view the scan from different perspectives or in different presentation modes. This is also where you determine the rotation axis for movements with the mouse.

The **Service position** function does not have any subpoints. With this you return the axes of the scanner into the starting position.

Further menus

The menus at the bottom are seldom required or offered context-related.

Projects

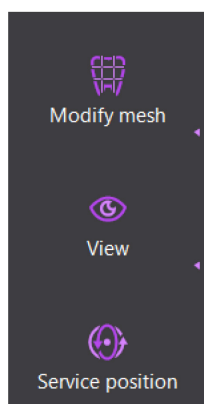
In this menu you can create a new project, save as ZIP file or close.

Miscellaneous

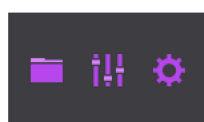
Numerous different functions can be found in this menu: calibration, reset jaw registration, add activation code, delete void scan data (PCM), information.

Settings

This dialog includes all setting options. These are offered every time when creating a project and prior to scanning jaw models.



 Section 3.9, 5, 6



 Section 7

 Section 8

 Section 9

Project control

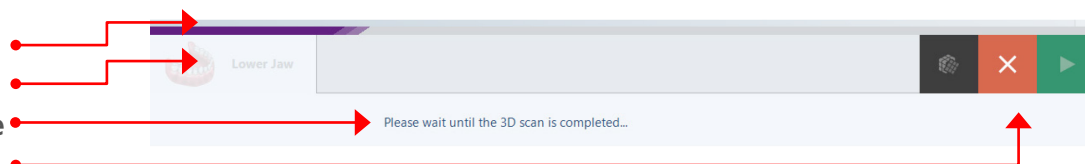
The horizontal bar under the 3D viewer includes all control functions.

Status bar

Tabs

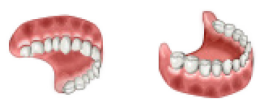
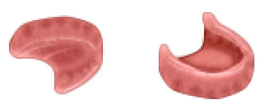
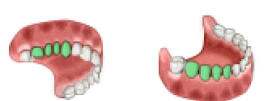
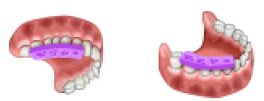
Information line

Actions



In the **status bar**, dental Scan indicates how long data processing will still continue so that you can estimate waiting times better.

One **Tab** contains one scan. The symbol indicates which type. Depending on the type and scope of a project, the corresponding number of tabs is displayed.

	Upper jaw, lower jaw
	Upper jaw, lower jaw – without tooth
	Vestibular with and without tooth
	Wax-up upper jaw and lower jaw
	Situ upper jaw and lower jaw
	Scanbody upper jaw and lower jaw
	Gingiva upper jaw and lower jaw
	Squeeze bite upper jaw and lower jaw
	Triple Tray® impression
	Correction scan



multiCase



Calibration model

The **Information line** is an orientation aid for the right procedure. This displays messages or instructions for the next work step.

You complete the current processing step with an **Action** (matching, cancel or continue).

Minimizing or maximizing program windows

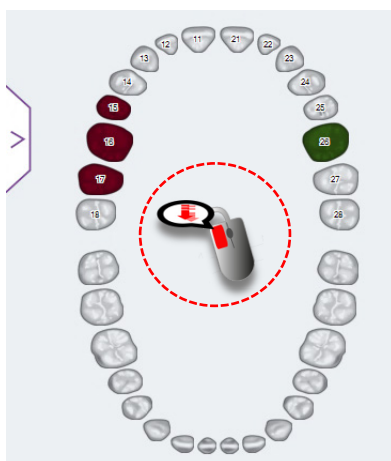
 Page 17

Using the menu bar, you can set the program window to medium size or full size screen. You can also shift the program window on the screen.

The program window fills the entire screen and is to be reduced:

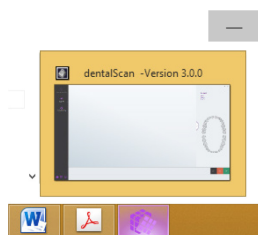


- Double click the gray zone of the menu bar anywhere (not on an icon). Alternatively, you can click on the center icon in the right upper corner of the window or the middle of the odontogram in the project area.



- ✓ The program window is reduced to medium size.

In the same way, you can increase the program window to full screen. Please note that dragging on the window border does not allow individual size adaptation.



However, you can minimize the program window in the task bar:

- ▶ Click on the "Minimize" icon.
- ✓ The program window is reduced in the task bar.

Shifting the program window

Using the menu bar, you can shift dental Scan on the screen. For example, this is useful if you are working with several screens.

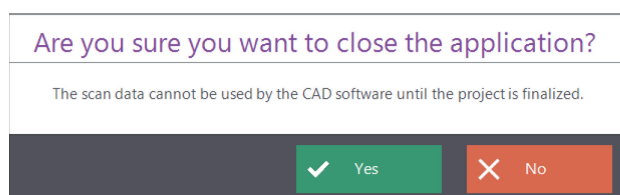


- ▶ Close all dialogs if applicable.
- ▶ Bring the program window to medium size.
- ▶ Click on the gray area with the left mouse key.
- ▶ Keep the left mouse key pressed.
- ▶ Move the mouse.
- ✓ The program window follows the movement of the mouse.
- ▶ Once you have reached the desired screen position release the mouse key.
- ✓ The program window is shifted.

Closing the program window

You can close dental Scan at any time, even when you are interrupting work on a project.

- ▶ If applicable, end the current work step in the workflow.
- ▶ Click on **X** in the upper right corner of the program window.
- ✓ The **X** is highlighted in red.
- ✓ If a project is open which contains at least one unmatched tab, the following message is displayed:



- ▶ Click on **Yes**.
- ✓ The project is closed. Incomplete scans remain in this condition.

- ✓ dental Scan is closed. You can restart the software by double-clicking the desktop icon or from the app menu.

3.2. Workflows

What is a workflow?

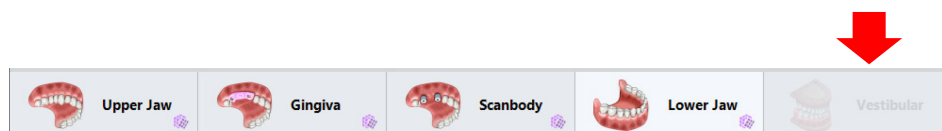
A workflow is a sequence of scans and actions which lead you through dental Scan.

Section 7.1

You prepare a project definition for every new project. From this, dental Scan deduces which scans are required for this project.

A tab is generated for every scan in the project control. An additional tab is added behind the jaw scan for the options, e.g. gingiva, situ, implant/scanbody or wax-up.

Tabs which do not yet contain a 3D measurement, are displayed as deactivated.



First you process the tabs automatically from left to right. You start the next scan in the workflow with the "Continue" icon in the project control.

If you wish to view, replace or correct an existing scan, you can interrupt the workflow by clicking the desired active tab. After the interruption, you can continue the workflow via the "Continue" icon.

However, you cannot skip tabs which are not yet filled, e.g. to scan the lower jaw before the upper jaw. The sequence required by the workflow needs to be complied, with a few exceptions.

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For wax-up scans and esthetic templates (for full dentures) you can save settings that these are scanned first and then the jaw model.

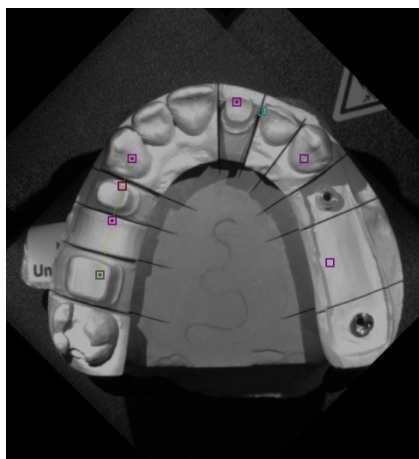
**Examples**

Project definition	Tabs in the project
Complete jaw + situ	Upper jaw, situ, lower jaw, situ, vestibular,
Upper jaw with anatomical crowns and anatomical pontic, veneer, Lower jaw with inlay/onlay	Upper jaw, lower jaw, vestibular

Correcting tooth positions in the 2D viewer

A 2D scan, in other words a black/white photo, is always started from the top before the 3D scan of the upper and lower jaw, if you have marked certain tooth positions in a project definition with the secondDie presentation mode.

Colored boxes are placed on the photo which may be connected by dotted lines. The colors of the boxes correspond to the project definition. The lines show connected preparations.



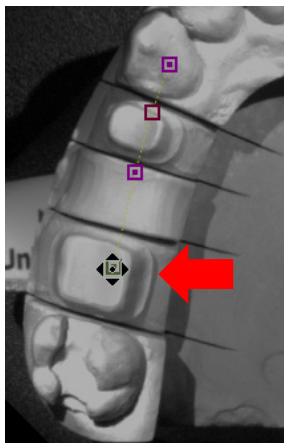
In the starting condition the position of the box on the photo of the jaw model may be inaccurate. Therefore correct the position of the box prior to the following 3D scan. You can shift the boxes individually or together.

Correcting individual positions

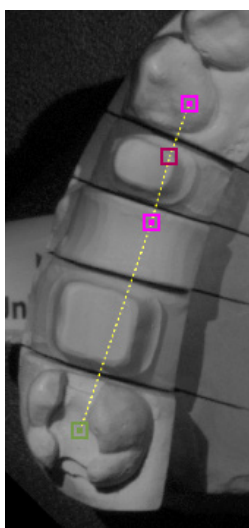
If the position of the boxes is already very precise in parts (such as the anterior teeth in the figure) and still partly very inaccurate (such as the molars in the figure), it is best to position the boxes individually.

- Point the mouse precisely at a box.

- ✓ The mouse cursor changes.



- ▶ To shift the box, click on it with the left mouse key. Keep the mouse key pressed.
- ▶ Drag the box to the center of the correct tooth stump model.
- ▶ Release the mouse key.
- ✓ The individual tooth position is corrected.



Correcting all positions

If the boxes are aligned correctly but the row is displaced versus the jaw model, then you can shift the row as a whole.



- ▶ To shift the row, keep the CTRL key pressed. Click on any box with the left mouse key. Keep the mouse key pressed.
- ▶ Drag the row onto the photo so that the boxes are as accurate as possible over the correct tooth.
- ▶ Release the keyboard and the mouse key.
- ✓ The tooth positions are corrected.



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TIP

In addition to the boxes, you can also have the number of the tooth position displayed.

3.3. Project definition patient

The **Project definition patient** is always suggested first. A definition consists of preparations for the upper and lower jaw, the presentation mode, the scan mode and the texture scan option.

Project definition

Patient

Multicase

Project ID

2017-07-17-161748

Dentist

Dr. Dent

Patient

Mary Smith

Notes

Presentation upper jaw

secondDie

Presentation lower jaw

Complete jaw

Scan Mode

One stone model

Texture scan

Disabled

13

12

11

21

22

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Tooth 26

Preparation

☐ Stump
 ☐ Pontic
 ☐ Inlay/Onlay
 ☐ Veneer
 ☐ Implant
 ☐ Neighbor
 ☐ Antagonist

Options

☐ Situ
 ☒ Gingiva
 ☐ WaxUp



OK

Cancel

Document version: 3.0 08-17

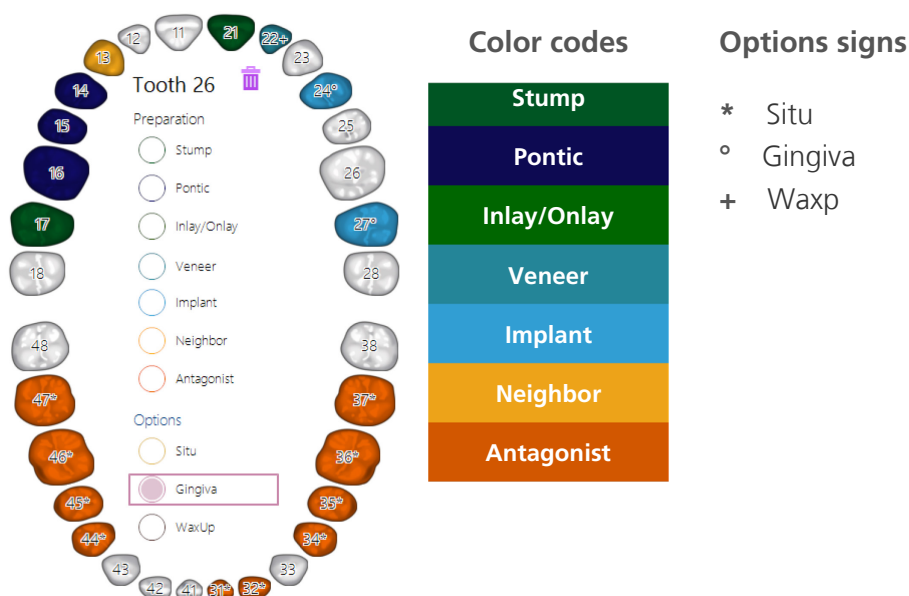
Principles of operation

Page 24

Preparations for the upper and lower jaw

The desired preparations are represented by colored markings in the odontogram. Possible preparations include: stump, pontic, inlay/onlay, veneer, implant, neighbor, antagonist. These seven preparations are not as differentiated as with CAD software. But they are fully adequate for controlling the scanning process.

Key of the color codes for dental Scan projects



The color codes are also given in the circles and markings of the preparations and options.

The key in the odontogram is hidden again as soon as you click on another position within or outside the dental Scan.



If you start a project from exocad® DentalDB, the color codes of exocad® are displayed. In addition to the color codes, dental Scan places the + sign as sign for the wax-up for the pre-models.

Color guide from exocad®

Crowns/Copings		
 Anatomic crown	 Coping	 Pressed crown
 Offset coping	 Provisional crown	 Preform crown
Pontics		
 Anatomic pontic	 Reduced pontic	 Pressed pontic
 Provisional pontic		
Inlays, onlays and veneers		
 Inlay/Onlay	 Offset inlay	 Veneer
Digital copy milling		
 Anatomic waxup	 Reduced waxup	 Pontic waxup
Primary units		
 Bar pillar	 Bar segment	 Attachment
 Telescopic crown		
Bite splint		
 Bite splint	 Bite splint (missing tooth)	
Residual Dentition		
 Antagonist	 Adjacent tooth	 Missing tooth

Presentation



The presentation mode is set separately for the upper jaw and lower jaw, secondDie is recommended as standard setting. You can change your preferred presentation mode in the settings.

Complete jaw/complete jaw fast

The effect of these presentation modes is that only the jaw model is scanned without presenting individual tooth stump models. These options are suitable for scanning jaw models for archiving or similar purposes. "Complete jaw fast" also reduces the scanning quality in favor of speed.

You do not need to select a preparation for a scan with the presentation mode "Complete jaw/complete jaw fast".

multiDie

In order to use this presentation mode you require a multiDie adapter from the scanning accessories.



Scope of delivery

 Section 8.3 Page 33 Page 32

Depending on the scanner, this presentation mode can only be selected after the multiDie module has been authorized with an activation code.

With this mode you can crop up to twelve tooth stump models from the upper and lower jaw together with or independently of the model base.

secondDie

This presentation mode is the standard. Every second tooth stump model is scanned in its position of the jaw model so that a maximum of two scanning procedures are necessary for presenting a jaw model.

Single tooth

With the single tooth presentation mode, every individual tooth stump model is scanned at its position in the jaw model, so that several scanning procedures are necessary.

Scan mode

You can scan single models or occlusion models. The scan mode is suggested to correspond with the project definition.

Occlusion models can be fixated with a rubber band or an occlusion clamp with every scanner without regard to the condyles.

Depending on the scanner, you can fixate articulated occlusion models condyle-related with a fixator or articulator.

Two stone models in occlusion

This scan mode is suggested as standard if the product definition requires a vestibular scan. You can scan non-articulated occlusion models with this mode.

Two stone models in ...

For a vestibular scan of articulated occlusion models, select the scan mode corresponding to your fixator or articulator. Possible systems include Artex®, Artist/Arto®, Denar®, Reference® and SAM®.



Scope of delivery,
positioning of occlusion model





NOTE

Inaccurate measurements due to incorrect scan mode

If you select a scan mode which does not fit the actual fixator or articulator used, you will receive inaccurate measurement results.

- ▶ Check the scan mode carefully every time, before confirming the project definition.



Scope of delivery



Section 8.3



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Triple Tray®

To use this scan mode, you require a Triple Tray® impression holder from the scanner accessories.

Depending on the scanner, this module can only be selected after it has been authorized with an activation code.

Using this scan mode, you can scan Triple Tray® impressions like occlusion models.

exo

The corresponding scan mode in exocad® is termed "Digital impression scan".

Texture scan

The effect of a texture scan, is that markings on the surface of a jaw model can be scanned, e.g. pencil markings. Texture scans are included in the 3D scans of a project. Colored texture scans also reproduce the color of the scanned model or impression. No additional scans are generated.



NOTE

Inaccurate measurements due to drawings on preparation lines

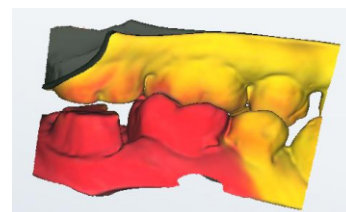
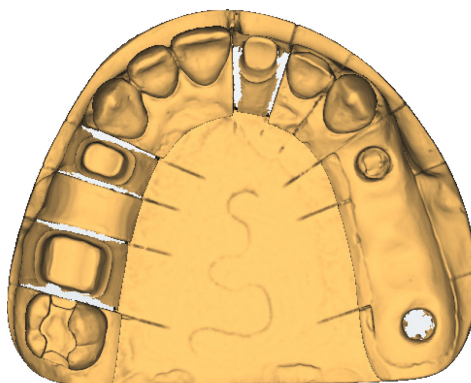
If you draw a preparation line, the measurement and thus the accuracy will be distorted.

- ▶ Only draw in areas of the jaw model which are not relevant for measurement.



Examples

Textures monochrome/color



Scope of delivery



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Texture scans are monochrome (single colored) as a matter of principle. Colored texture scans are only possible if the connected scanner supports this function.

The texture scan is switched off as standard, so that 3D scans do not contain any markings. If you wish to scan with a texture scan in general, then you need to change the settings.

3.4. Project definition multiCase



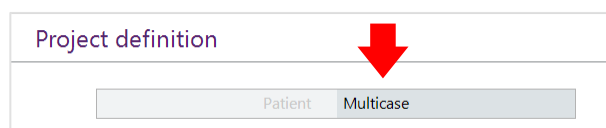
Scope of delivery



Section 8.3

In order to use the multiCase project definition you require a multiDie adapter from the scanning accessories.

Depending on the scanner, this project definition can only be created after the multiCase module has been authorized with an activation code. Only then is the **MultiCase** selection available in the **Project definition** dialog.



You can scan up to 12 individual tooth stump models in one multiCase project. These can stem from different jaw models and even be from different patients.

- ▶ Point the mouse at the line.
- ✓ The line is colored orange.
- ▶ Click on any place to change the project type.

Patient Multicase

- ✓ The **MultiCase** project type is activated.
- ✓ In addition to the patient information, 12 numbered circles are displayed. The circles correspond to the slots of the multiDie adapter.

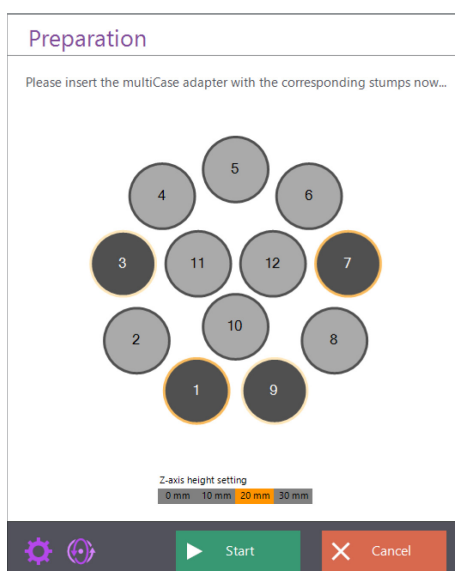
Procedure

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✓ OK

- ▶ If applicable, enter the patient data of the project definition.
- ▶ Click on the slots (circles) in which you wish to place the tooth stump models.
- ▶ Click **OK**.
- ✓ You will be asked to position the tooth stump models.

Example



Positioning of tooth stump models



Mounting spacer plates

✓ Start

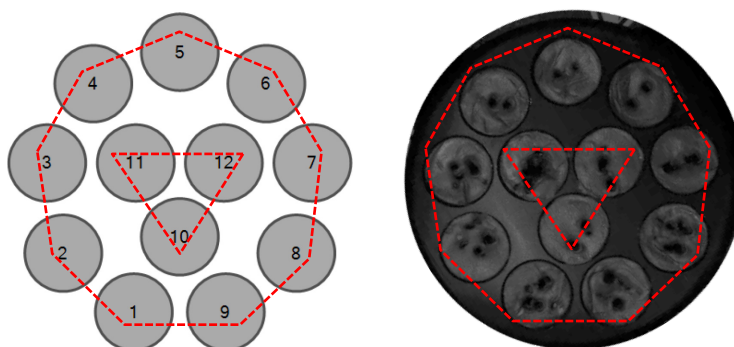
- ▶ Position the tooth stump models in arbitrary sequence into the slots marked dark gray. Information on handling is given in the operating manual of your scanner.
- ▶ If you are using a scanner with spacer plate system, click on the number of spacer plates currently being used in the scanner under **Number of spacer plates**.
- ▶ If you are using a scanner with automatic z-axis, click on the desired height in millimeters.
- ▶ Click on **Start**.
- ✓ The tooth stump models on the dark gray marked positions are scanned and the result is displayed on the 3D viewer.

 Section 3.7, 3.9

- ✓ The other positions are not scanned.
- ▶ If applicable, you can correct the scan by rescans and cutting.
- ▶ Close the project.
- ✓ The multiCase project is completed.

Tips for correct execution**Finding positions**

The positions of the slots on the multiDie adapter can be recognized by their typical pattern.

**Assign slots correctly**

If you have marked too many slots by accident, you can leave some vacant. However, light gray marked slots must remain vacant. That is because these positions are not scanned.

3.5. Messages

In every workflow you will be instructed by messages as to which jaw model you need to place in the scanner next.



The following additional functions are available in the messages:



Service position



Settings

Please note that the changes of some settings only become effective after a restart of the software.

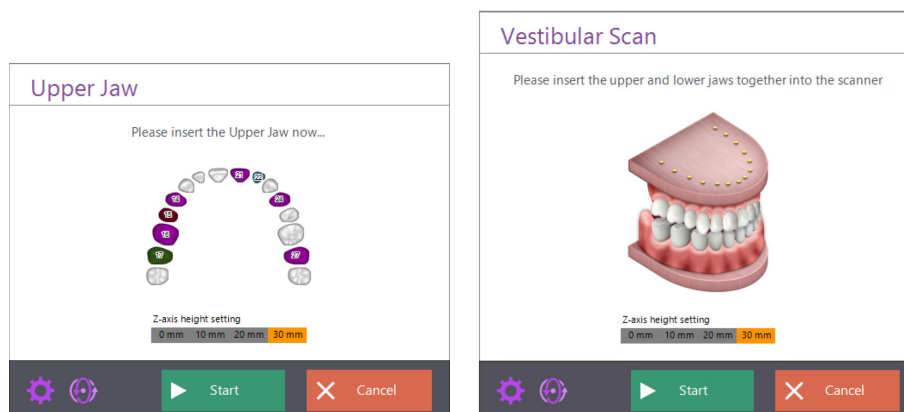
Inserting a jaw/occlusion model

After the start of a scan you will be asked to insert the jaw model which is due according to the workflow. The message shows the odontogram. The tooth stump models are colored the same as in the project definition.

 Section 7.1, 3.9

The graphic display is only for information purposes. You cannot change anything in the project definition here. If you discover an error, you need to interrupt the process, change the definition in the source system and restart the scan new.

Example



 Positioning of jaw model

 Mounting spacer plates

 **Start**

- ▶ Position the requested jaw model in the scanner. Information on handling is given in the operating manual of your scanner.
- ▶ If you are using a scanner with spacer plate system, click on the number of spacer plates currently being used in the scanner under **Number of spacer plates**.
- ▶ If you are using a scanner with automatic z-axis, click on the desired height in millimeters.
- ▶ Click on **Start**.
- ✓ The jaw model is scanned and the result displayed in the 3D viewer.

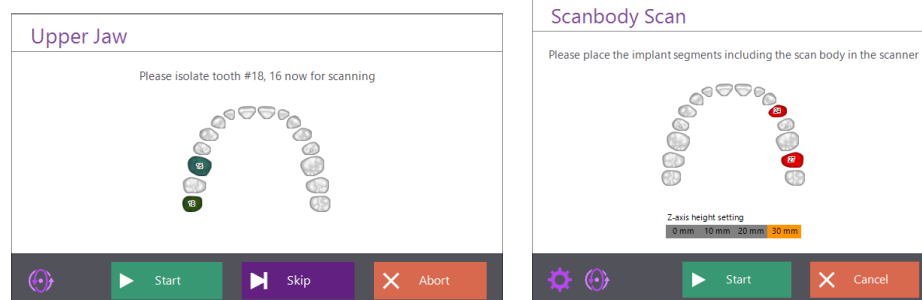
Presentation (individual tooth or secondDie)

After completing a scan, you will be asked to crop individual segments (tooth stump models or scanbodies) in as far as the project definition

requires presentation. Due to presentation, the scanner can measure all interdental areas exactly.

The graphic display of the odontogram shows the tooth stump models which are to be scanned individually in color.

Example



- ▶ Only leave the marked segments (tooth stump models or scanbodies) remaining. Remove all other tooth stump models from the jaw model.
- ▶ Click on **Start**.
- ✓ The cropped tooth stump models are scanned and added to the scan of the jaw model.
- ✓ If further tooth stump models need to be cropped, then a message for the next tooth stump models is displayed. Proceed exactly as described.
- ✓ If you are working with the "secondDie" mode, you will be asked twice at most. With the "Individual tooth" mode you will be asked separately for each tooth.



You can skip every presentation. Please note that data will then be missing in the 3D scan.

Presentation (multiDie)

After completing a scan, you will be asked to crop individual segments (tooth stump models or scanbodies) in as far as the project definition requires presentation. Due to presentation, the scanner can measure all interdental areas exactly.

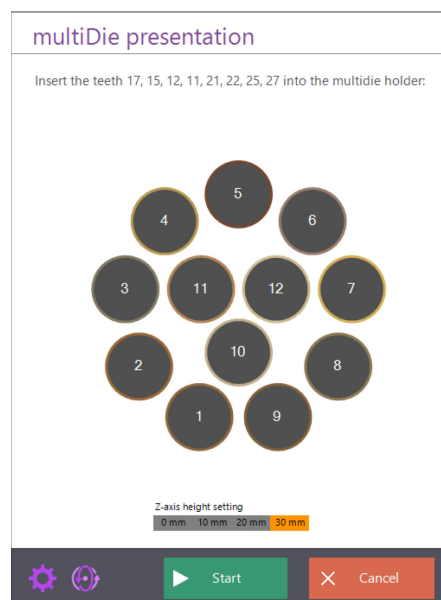


In order to use the multiDie presentation mode you require a multiDie adapter from the scanning accessories.



Depending on the scanner, the multiDie presentation mode can only be selected after the multiDie module has been authorized with an activation code.

Example



Color codes for slots

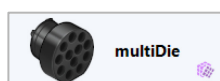
1	7
2	8
3	9
4	10
5	11
6	12



Positioning of tooth stump models



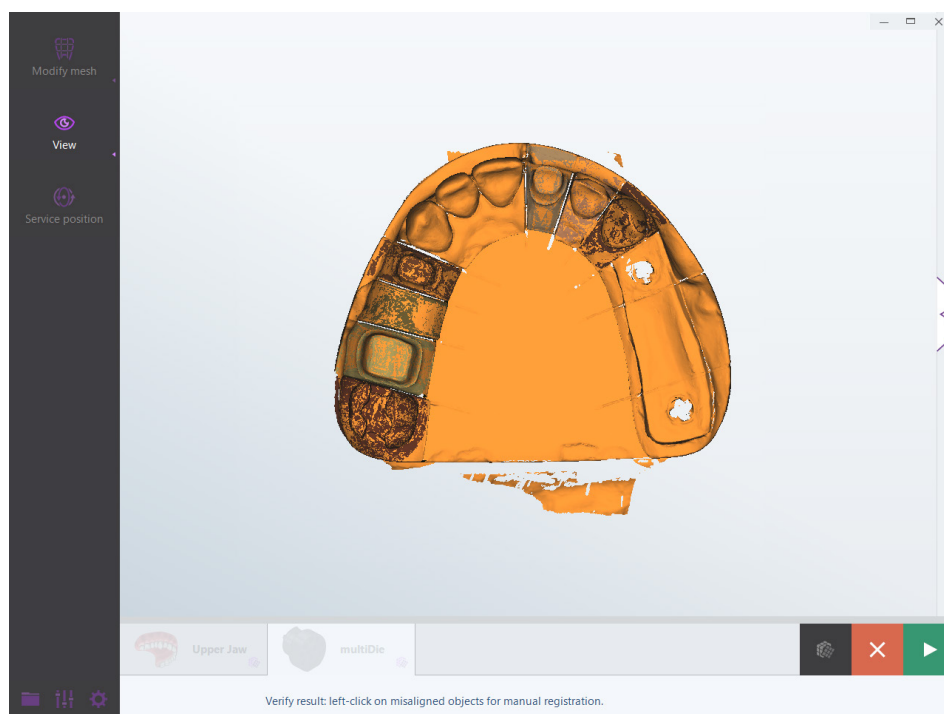
Mounting spacer plates



- ▶ Position the requested tooth stump models in the slots. Information on handling is given in the operating manual of your scanner.
- ▶ In case of 1, 2 or 3 tooth stump models, the slots 2, 5 and 8 must be assigned. For all other tooth stump models you can choose the slots freely.
- ▶ If you are using a scanner with spacer plate system, click on the number of spacer plates currently being used in the scanner under **Number of spacer plates**.
- ▶ If you are using a scanner with automatic z-axis, click on the desired height in millimeters.
- ▶ Click on **Start**.
- ✓ The tooth stump models are scanned and the result is displayed on a separate tab in the 3D viewer. Each position has its individual brown tone.



- ▶ Check whether the 3D scan is correct.
- ▶ If yes, click on the "Continue" icon.
- ✓ The 3D scan of the tooth stump models is aligned automatically according to the jaw model scan. This calculation may take a little time.
- ✓ The various scans are displayed in different colors on the 3D viewer. First the jaw scan is projected in orange, then the scans of the tooth stump models are projected in their brown tones.



- ✓ The color areas in the preview let you see whether automatic alignment has been successful.

Section 5.2

- ▶ Rotate the scan to check all sides.

- ▶ If required, you can correct the alignment manually.
- ▶ If you are satisfied with the result, click the "Continue" icon.
- ✓ The alignment is calculated. The multiDie presentation mode is completed.

Manual alignment

You can use manual alignment to make the automatic alignment of the multiDie presentation more precise.



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TIP

If you have changed the assignment of the mouse keys in the settings, then a double click with the left mouse key is necessary instead of a single click.



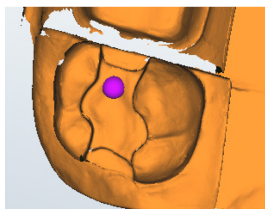
- ▶ In the orange-brown scan, click on the tooth stump scan you wish to align manually with the left mouse key.
- ✓ The 3D viewer is divided horizontally. The orange-colored jaw scan is displayed on the top, the brown-toned tooth stump scan on the bottom.



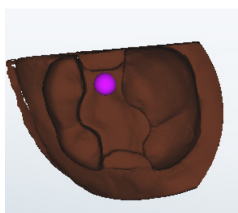


Section 5, 5.2

- ▶ Click on a prominent point on the jaw scan. Rotate or zoom the scan such, that you can see this point clearly.
- ✓ This point is marked with a pink-colored sphere. Rotate the scan to check the spatial placement.



- ▶ If you are not satisfied, you can repeat this process as often as you wish.
- ▶ Zoom and rotate the jaw scan in the lower viewer the same as the jaw scan, so that you have identical perspectives. This is important to obtain precise alignment.
- ▶ Click on the same point of the brown tooth stump scan in the lower viewer.



- ✓ If the pink-colored spheres have corresponding positions, then manual alignment of the tooth stump scan is prepared.



- ▶ Click on the "Continue" icon.

- ✓ The manual alignment is calculated. The 3D viewer displays an orange-brown preview.

- ▶ If required, align other tooth stump models manually in the same manner.



- ▶ To complete alignment, click on the "Continue" icon.

- ✓ The 3D viewer will now only display the jaw scan. The **multiDie** tab is now no longer required and therefore closed.

Section 4

- ✓ You can now correct the jaw scan or continue with the workflow.



TIP

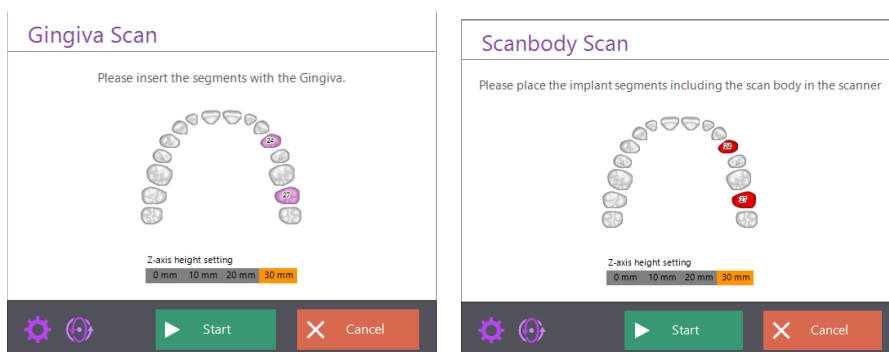
If you then wish a rescan of the jaw model, please do not forget to change the multiDie adapter in the scanner to the model holder and insert the individual tooth stump models into the jaw model again.

Adding small prosthetic components

After completing a scan, you will be asked to add small components, e.g. gingival plastics or scanbodies, in as far as required by the project definition.

The graphic display of the odontogram highlights the affected tooth stump models in color. In this case the colors do not correspond to the project definition, they are purely for illustration reasons.

Example



- ▶ Attach the requested component to one or more tooth stump models. If applicable, follow the instructions of the manufacturer.
- ▶ Leave all tooth stump models in the jaw model.
- ▶ The height data and the number of spacer plates resp. is performed by the jaw scan. Correct the values if required.



- ▶ Click on **Start**.

- ✓ The additional scan of the jaw model is created and the result displayed on the 3D viewer.



- ✓ In a scanbody scan you will be asked to crop the segments of the scanbody. Follow the instructions.

Insertion of a Triple Tray® impression

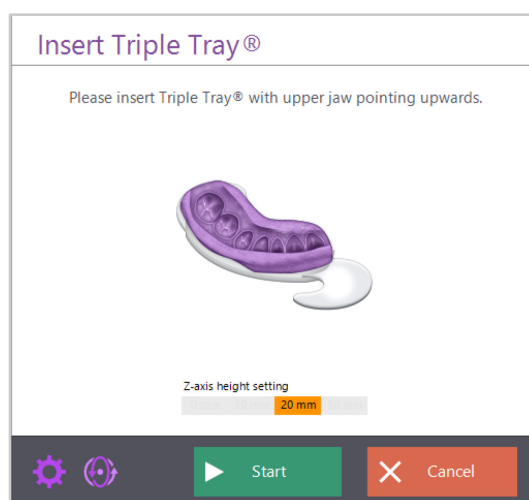
After starting a project with the Triple Tray® scan mode you will be asked to insert a Triple Tray® impression. Triple Tray® projects have a special workflow.



Section 8.3

To use the “Triple Tray®” scan mode, you require a Triple Tray® impression holder from the scanner accessories.

Depending on the scanner, the Triple Tray® scan mode can only be selected after the module has been authorized with an activation code.

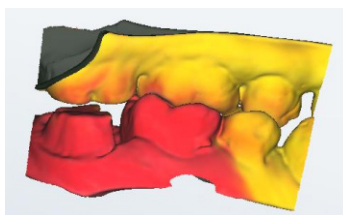


- ▶ Position the Triple Tray® impression in the scanner. Observe the note in the message as to which side is to face upwards.
- ▶ Information on handling is given in the operating manual of your scanner.
- ▶ If you are using a scanner with spacer plate system, the required **number of spacer plates** is displayed. Mount the number of indicated spacer plates.
- ▶ If you are using a scanner with automatic z-axis, the height will be shown in millimeters.
- ▶ Click on **Start**.
- ✓ The Triple Tray® impression is scanned and the result displayed in the 3D viewer.
- ✓ In the next step, the other side of the impression will be requested. Then the occlusion is calculated automatically.



**Example**

Impression scan in occlusion



3.6. Replace tab

If a scan is completely wrong, you can replace the scan on the tab without having to repeat the entire workflow.



Section 3.9

Use this option if, for example, you have inadvertently scanned the lower jaw model in place of the upper jaw model. If the scan is basically correct, but contains slight errors, you are better off correcting with rescans, the automatic "Fill holes" function or correction scans.

- ▶ Click on the tab you wish to replace.
- ▶ Click on the "Cancel" icon in project control.
- ✓ You will be asked whether you wish to prepare the scan new.



Start Over	
Do you really want to start over again with the work on the Lower Jaw?	
✓ Yes	✗ No



- ▶ Click on **Yes**.
- ✓ The existing scan is deleted.
- You cannot reverse this process. To retain the old scan, click on **No** in the message.
- ✓ You will be asked to insert the corresponding jaw model.
- ▶ Follow the request.
- ✓ The jaw model is scanned.
- ▶ If applicable, correct the new scan.
- ▶ When the new scan is finished, click on the "Continue" icon.
- ✓ The interrupted workflow will be continued.



3.7. Matching and project completion

“Matching” describes a calculation which generates a data set in PLY or STL format from the individual images and measured values (scanning data). Matching is already performed automatically during scanning for each individual scan and at the end of a workflow for all scans in the project as standard.

You can identify matched scans by the green tick on the tab. Unmatched scans are identified by the matching symbol, the twisted cube.



Manual matching

For certain purposes, e.g. adding a correction scan, it is necessary to match a jaw scan manually.



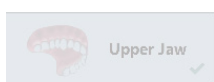
- ▶ If applicable, click on the tab you wish to match.
- ▶ Click on the “Matching” icon.
- ✓ The software performs matching of the images and shows the result in the 3D viewer. The tab is identified with a green tick.
- ✓ You can now create a correction scan for example.

Checking matching

At the end of a workflow you can view all matching results together on the 3D viewer.



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- ▶ Click on “Check matching” in the project control. The button is only displayed when all tabs have been matched.
- ✓ The 3D viewer loads all results temporarily and displays these in contrasting colors.
- ✓ The tabs are temporarily deactivated (faded).



Section 5

- ▶ View the results of matching from all sides. You cannot edit the results in the check view.
- ▶ To end the check view, click on the "Check matching" button again.

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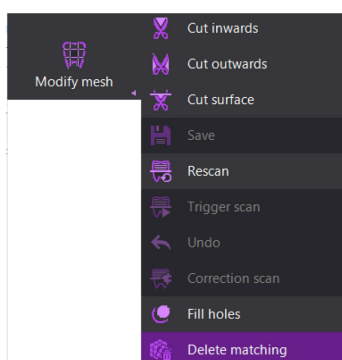
Section 3.9

- ▶ If all results are OK, you can complete the project.
- ▶ If the results are not OK, then click the affected tabs one after another. Correct or replace the scan.

Delete matching

If the result of the matching appears unusual, you can delete the matching and thus set the scan back to the individual measurements. Then you can correct or replace the scan.

- ▶ Open the tab concerned.
- ▶ Click on the **Modify mesh** menu and then on **Delete matching**.
- ✓ The matching for this tab is deleted. The matching of the other tabs is retained.
- ✓ The 3D viewer will again display the individual measurement (PCM). The color tone of the scan becomes somewhat darker. Instead of the green tick the tab contains the twisted cube.



Finish project



The button "Finish project" appears at the end of a workflow in the project control. Completion is only possible if the entire workflow has been run through. However, the tabs need not be matched.

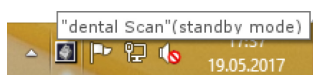
 Page 99

Finishing the project completes the project so that the data can then be used in a CAD program for construction, for example exocad®. The data are saved at the scanning quality as saved in the software settings for the individual case. If applicable, the data volume is also reduced.



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- ▶ Click on the button "Finish project".
- ✓ Unmatched tabs are matched. All results are saved in a PLY file.
- ✓ If the STL format is also activated in the settings, a STL file will also be generated.
- ✓ The project is closed. The scanner changes to the standby mode and the software is minimized in the task bar.



If you close the software without finishing the current project, you will receive a message stating that the scan data cannot be used for construction in their present form.

 Section 7.1

You can reopen projects, including completed projects, at any time and edit them further.



3.8. Vestibular scan



Scope of delivery
Positioning occlusion model

Based on the vestibular scan, dental Scan automatically calculates how the upper and lower jaw scan are to be aligned to each other to correspond with the patient's bite. Based on these data, an anatomically adapted reconstruction can then be constructed later on in the CAD software.

Depending on the scanner, various accessory components for occlusion models are included as standard or available as options.

A vestibular scan can be prepared without accessories by fixating the occlusion model with a rubber band. However, this method does not deliver condyle-related results.

Registering a fixator or articulator for vestibular scans



If you are using a fixator or articulator by Artex®, Artist/Arto®, Denar®, Reference® and SAM® for vestibular scans, then you must assign the upper and lower jaw manually once off. The software saves the values of jaw registration so that these values are available for further scans.



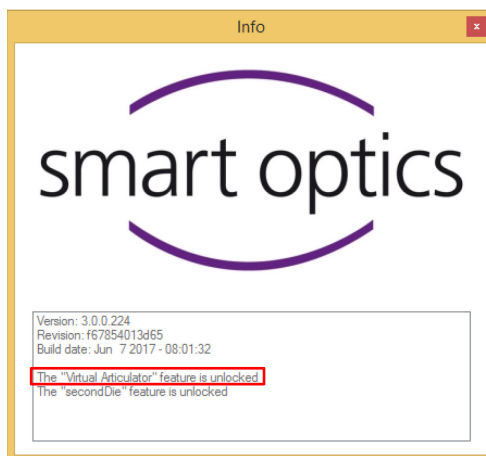
TIP

To obtain a good result, only use well processed jaw models with complete dentition for jaw registration. Damaged models or models with many missing teeth are not suitable for this process.



Section 8.5

- The “Virtual articulator” module is already authorized as standard in dental Scan. You can check this in the **Info** dialog.



 Section 7.1

- ▶ Prepare a new project with a simple definition for a vestibular scan. Do not add any options which trigger an additional scan (e.g. gingiva).
- ▶ Select the desired articulator as scan mode in dental Scan **Two models in ...**, in exocad® **Two plaster models in articulator ...**
- ▶ Start the scan.

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- ▶ Follow the instructions for the individual jaw scans and the vestibular scan. You must confirm or correct the tooth positions in the 2D view before scanning the upper and lower jaw.

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- ▶ Align the upper and lower jaw scan according to the vestibular scan. Use the manual method to do this. The automatic method alone is not sufficient for jaw registration.
- ▶ Close the project.
- ✓ Jaw registration for the fixator/articulator is completed.

If you are using fixators/articulators from different manufacturers, repeat the process for all types.

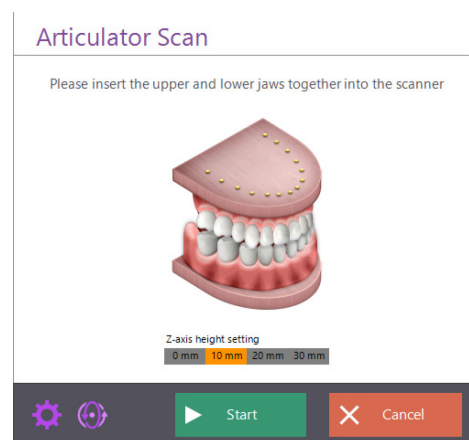
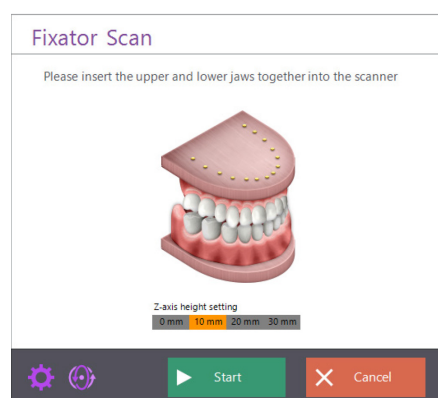
 Section 8.2

If you are not satisfied with the scan results later on, you can delete the saved jaw registration and re-register the jaw again.

Procedure

The vestibular scan is positioned last in the workflow as standard. You will be asked to insert an occlusion model into the scanner. The fixation method for occlusion (rubber band, occlusion clamp, fixator or articulator) is displayed according to the project definition.

Example

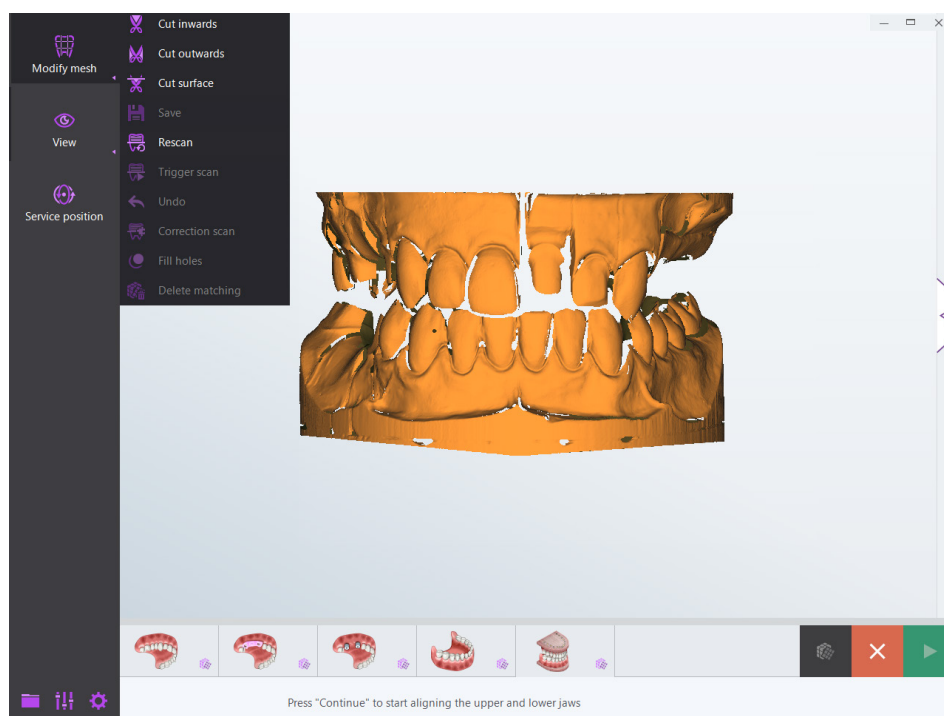


Positioning of occlusion model

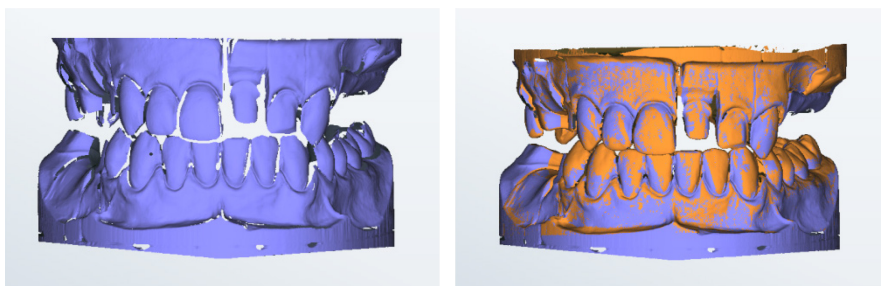
- ▶ Position the occlusion model in the scanner. Information on handling is given in the operating manual of your scanner.



- ▶ The height data and the number of spacer plates resp. is performed by the jaw scan. Correct the values if required.
- ▶ Click on **Start**.
- ✓ The occlusion model is scanned. First, only the vestibular scan is displayed.



- ▶ Check whether the 3D scan is correct.
- ▶ If yes, click on the "Continue" icon.
- ✓ The 3D scans of the upper jaw and the lower jaw are automatically aligned according to the vestibular scan. This calculation may take a little time.
- ✓ The various scans are displayed in different colors on the 3D viewer. First the vestibular scan is projected in purple, then the scans of the upper and lower jaw are projected in orange.



 Section 5.2
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- ✓ The color areas in the preview let you see whether automatic alignment has been successful.
- ▶ Rotate the scan to check all sides.
- ▶ If required, you can correct the alignment manually.
- ▶ If you are satisfied with the result, click the “Continue” icon.
- ✓ The alignment is calculated. The vestibular scan is completed.

Procedure in case of errors

If errors occur, for example through calculation or mixing up jaw models, you can interrupt the process following scanning or after alignment.

Repeating alignment



- ▶ To discard the alignment completely, click on the “Cancel” icon.
- ✓ The purple-orange colored 3D scan returns to orange.



- ▶ Click on the “Continue” icon.
- ✓ Alignment is repeated.

Repeating the vestibular scan

- ▶ To repeat the vestibular scan, click the “Cancel” icon repeatedly until you are asked whether you really want to start the vestibular scan new.

Start Over

Do you really want to start over again with the work on the Vestibular Scan?

✓ Yes
✗ No

✓ Yes

- ▶ Click on **Yes**.
- ✓ The vestibular scan restarts.

Manual alignment

You can use manual alignment to make the automatic alignment of a vestibular scan more precise.

Using manual alignment, you also register the upper and lower jaw once off in the fixator or articulator before using the devices for vestibular scans.



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TIP

If you have changed the assignment of the mouse keys in the settings, then a double click with the left mouse key is necessary instead of a single click.



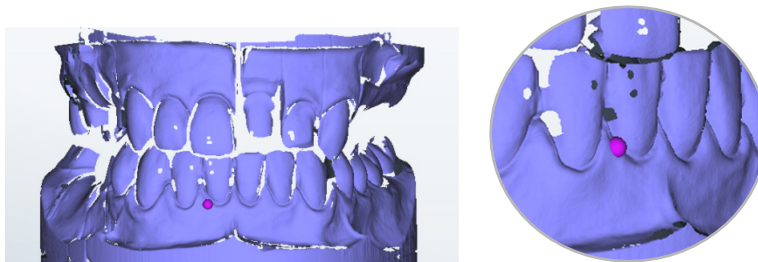
- ▶ In the purple-orange-colored scan, click on the jaw scan you wish to align manually with the left mouse key.
- ✓ The 3D viewer is divided horizontally. The purple-colored vestibular scan is displayed on the top, the orange-colored jaw scan on the bottom.



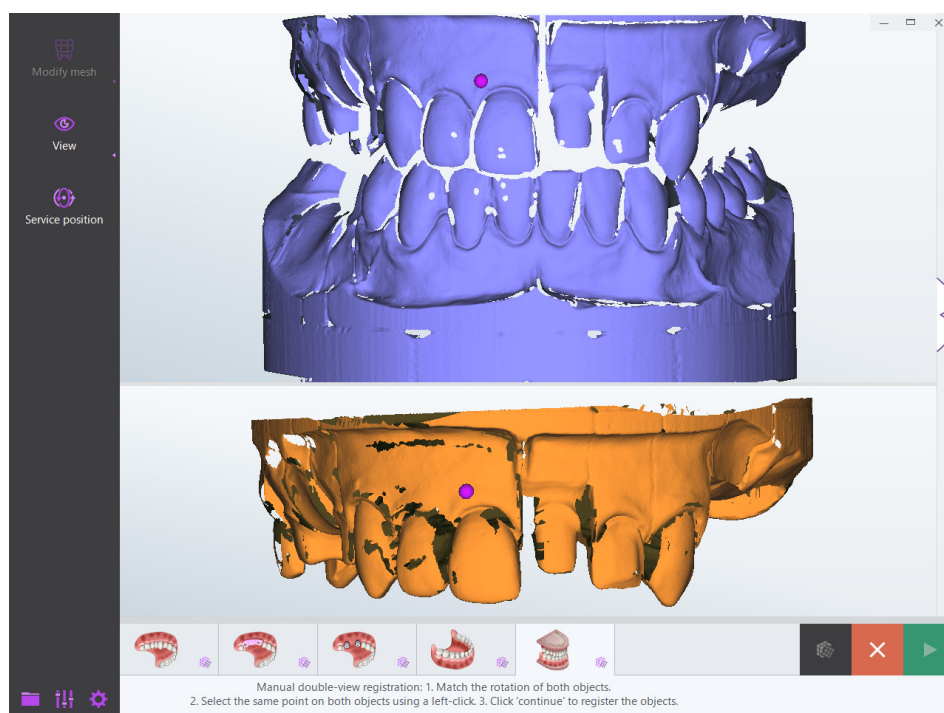
 Section 5, 5.2

- ▶ Click on a prominent point on the vestibular scan. Rotate or zoom the scan such, that you can see this point clearly.
- ✓ This point is marked with a pink-colored sphere.

- ▶ Rotate the scan to check the spatial placement.



- ▶ If you are not satisfied, you can repeat this process as often as you wish.
- ▶ Zoom and rotate the jaw scan in the lower viewer the same as the vestibular scan, so that you have identical perspectives. This is important to obtain precise alignment.
- ▶ Click on the same point of the orange-colored jaw scan in the lower viewer.

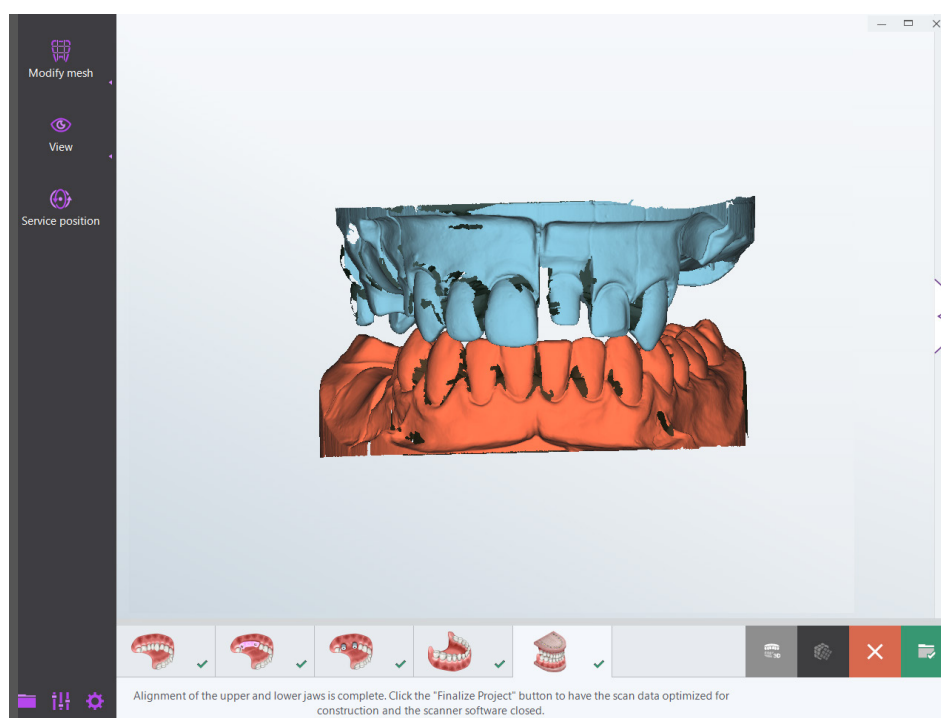


- ✓ If the pink-colored spheres have corresponding positions, then alignment of the jaw scan is prepared.
- ▶ Click on the "Continue" icon.
- ✓ The manual alignment is calculated. The 3D viewer displays a purple-orange preview.
- ▶ If required, align the other jaw scan manually in the same manner.





- ▶ To complete alignment, click on the "Continue" icon.
- ✓ All 3D scans in the project are matched. This calculation may take some time.
- ✓ The aligned jaw scans are displayed on the 3D viewer. The upper jaw scan is turquoise, the lower jaw scan is red.



Page 41, 43

- ✓ You can now check the matched scans or finish the project.

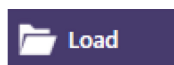
3.9. exocad® projects

The work directory for exocad® projects is standard or C:\Program Files (x86)\exocadFramework\CAD-Data\.

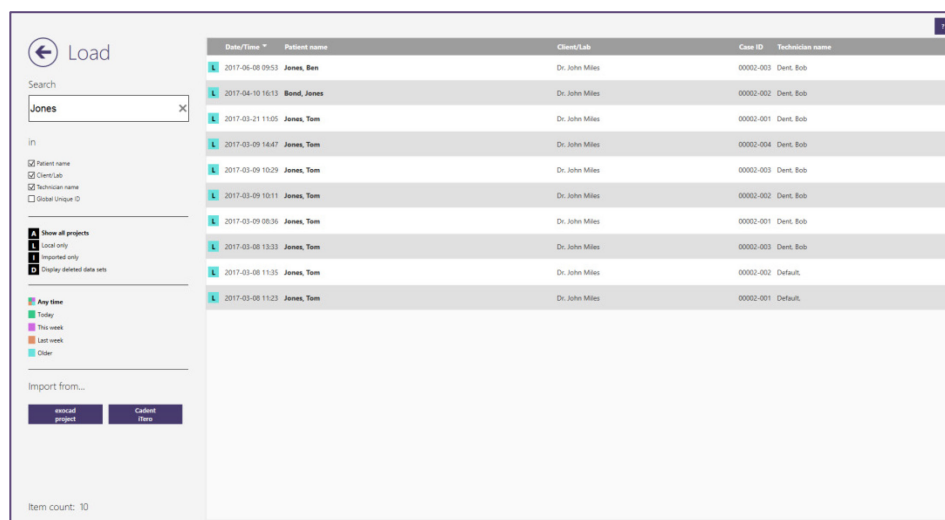
In the case of exocad® projects you need not fill in the project definition in dental Scan. This is extracted from exocad® DentalDB and can only be changed there.

Loading an exocad® project via DentalDB

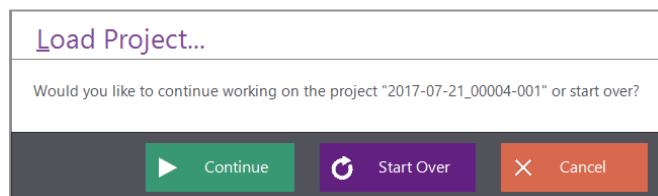
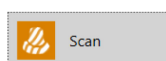
You can add scans or make corrections to an exocad® project.



- ▶ Start the exocad® application DentalDB (**exo**).
- ✓ The exocad starting page opens.
- ▶ Click on the “Load” icon.
- ✓ The exocad® dialog **Loading** opens.



- ▶ Search for and select the desired project.
- ▶ Accept the project by double-clicking in the project window.
- ▶ If you need assistance for these steps, please click on the “Help” icon.
- ✓ The exocad-Wiki opens.
- ▶ Select your language and follow the instructions.
- ▶ Click on the “Scan” action icon.
- ✓ dental Scan starts. You will be asked whether you want to continue the project or start again new.

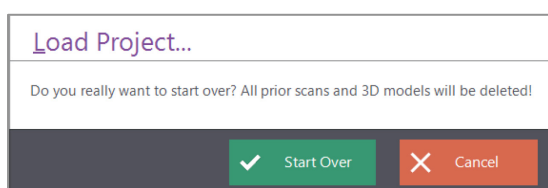


- ▶ Click **Continue**.
- ✓ The project is loaded in dental Scan. You can continue the workflow.

Correcting preparations in exocad® projects

Should you discover that the preparations of individual teeth are not given correctly in exocad®, then proceed as follows:

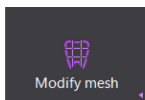
- ▶ Correct the definition of the exocad® project in the DentalDB application and save the project.
- ▶ Restart the scan.
- ✓ Click on **Start Over** in the first message **Load project**.
- ✓ You will be informed that all previous measurements and constructions will be deleted.



- ▶ Click again on **Start Over**.
- ✓ The workflow starts from the beginning.



4. Modify mesh



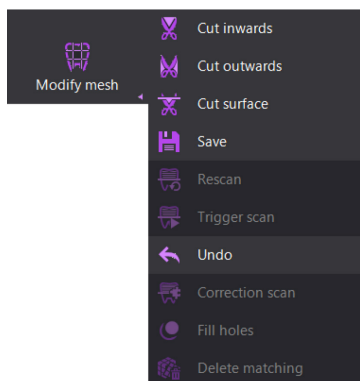
You will find the correction and cutting functions in the **Modify mesh** menu. To indicate the correct points in time, the functions open automatically as part of a workflow. Depending on the context, some functions are active and others not.

4.1. Cutting

You can remove superfluous components in a scan using the cutting functions. Cutting of data accelerates processing time.



- ▶ The **Modify mesh** menu opens automatically within a workflow. If applicable, click on the icon.
- ✓ The cutting functions include **Cut inwards**, **Cut outwards**, **Cut surface**, **Save** and **Undo**.

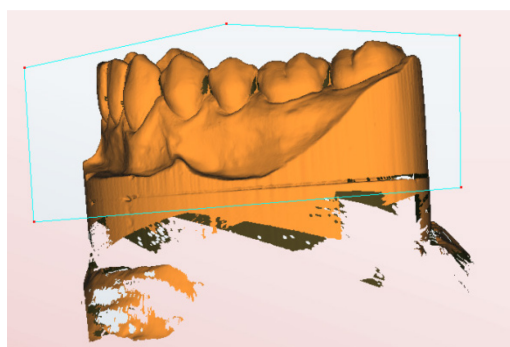


Cutting methods



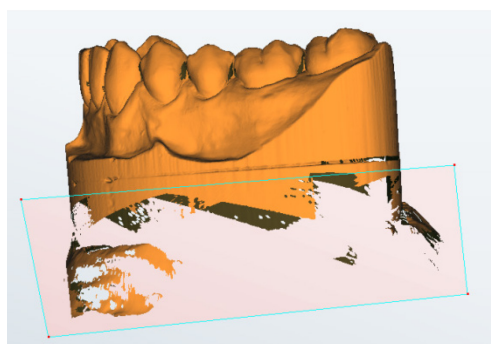
Cut outwards

This cuts the data outside the cutting line. The cut runs through all levels of the 3D object. The data within the cutting line remain.



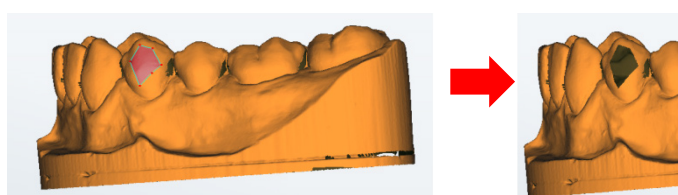
Cut inwards

This cuts the data inside the selection. The cut runs through all levels of the 3D object. The data outside the cutting line remain.



Cut surface

This cuts the surface data inside the selection. The data outside the cutting line as well as all data at the lower levels of the 3D object remain.

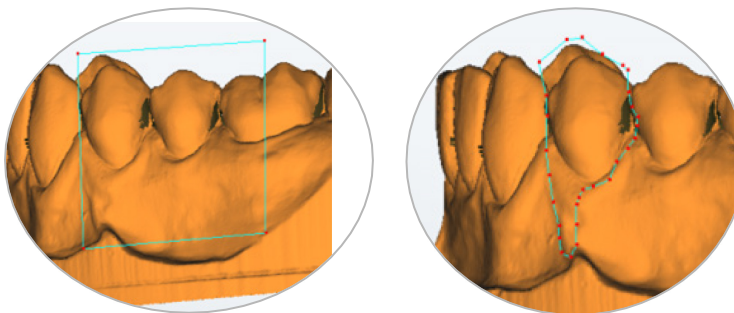




Procedure



- ▶ Click on an icon to activate the required cutting function.
- ▶ Left-click with the mouse around the required area to produce a marker line. The more often you click, the finer the marker line:



- ▶ If you have inadvertently clicked the wrong position, press the ESC key.

✓ The selection is cancelled.



- ▶ Click the right mouse key at the end of the marking line.

✓ The 3D image is cut.



- ▶ If you are not satisfied with the result, click on the "Undo" icon.

✓ The previous condition is restored. Only one action can be reversed.



- ▶ When you have finished, click the "Save" icon.

✓ The data are saved. The last action can no longer be reversed.

Tips for correct execution

The cutting functions are offered automatically within a workflow as soon as this is possible. The **Modify mesh** menu opens automatically.

After the rescan



Section 4.2

You can cut on every tab directly after the main measurement. However, if the main measurement needs to be supplemented with additional measurements, then use the rescan function first. Otherwise the rescan function will add the cut off parts again.

Prior to matching



Section 3.7

Cut the base of the model before matching. These lets you accelerate the subsequent processes. Only cut the construction areas after matching.

Construction areas

Make sure that you do not cut any components which are required for the construction. Also retain the directly adjacent areas. This ensures that the preparation border can be detected correctly, for example in exocad® DentalCAD.

4.2. Rescan

If the 3D sensor was not able to measure areas of the model, then data will be missing on the scan. For example, this is the case in so-called “undercut areas” (retentions, narrow passages). Light reflections on the surface may also be a reason. Such areas are displayed as “holes” on the 3D viewer.

A rescan specifically remeasures the uncaptured areas and thus achieves extremely accurate results. You should use this function to fill holes for further processing in a CAD system, in other words, for constructions.



Section 4.3

For other purposes, for example, the archiving of complete jaw models, you can use the automated “Fill holes” process.

Procedure

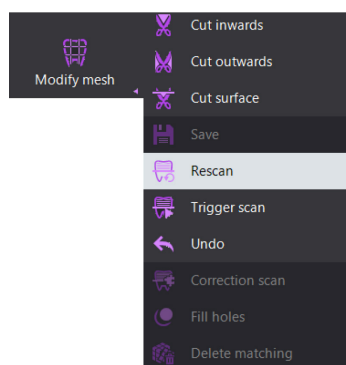


- ▶ The “Modify mesh” menu opens automatically within a workflow. If applicable, click on the “Modify mesh” icon.

- ✓ The rescan includes **Rescan [activate]**, **Trigger scan** and **Undo**.



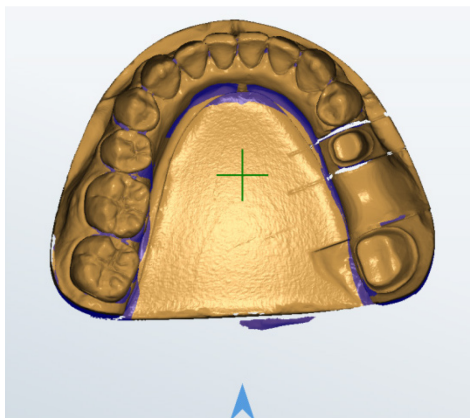
- ▶ Click on the “Rescan” icon.
- ✓ The rescan mode is activated. The “Trigger scan” icon becomes active.



- ✓ A green cross hairs appears on the scan. Make sure that the cross hairs are placed on the object and not outside.

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- ✓ Areas which cannot be captured due to the current position of the model in the scanner, are displayed shaded blue as standard. You can switch off this shadow illustration in the settings.



 Section 5

- ▶ Position the scan using the **View** menu.
- ▶ Alternatively you can rotate, shift and zoom the scan with the mouse.



Rotating:

Left mouse key



Shifting:

Right mouse key



Zooming:

Scroll wheel

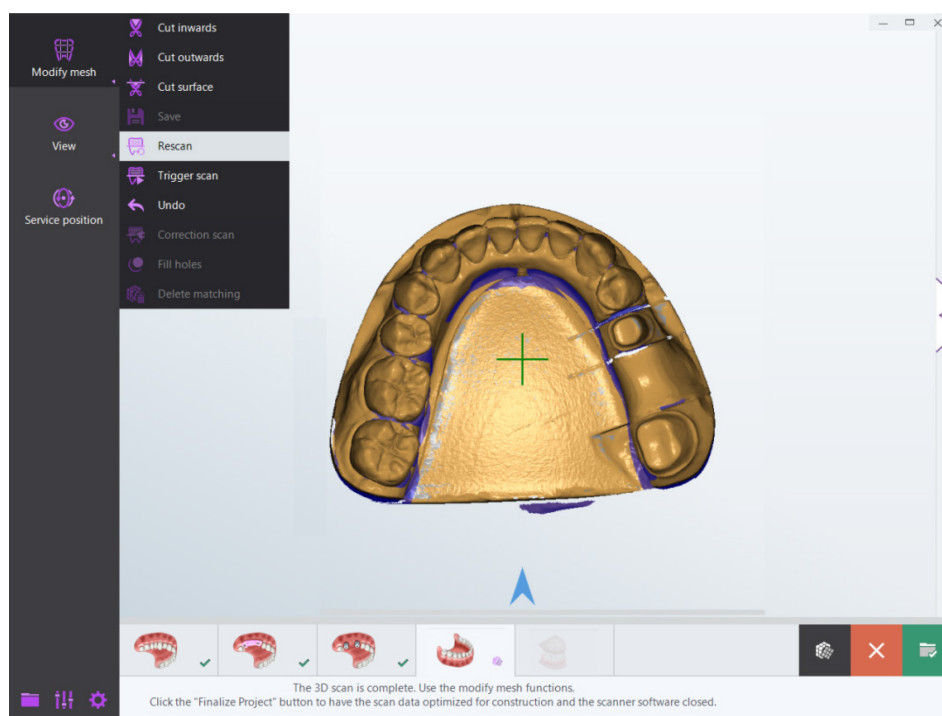
- ✓ The position is correct when no blue shadows cover the desired areas. If this has not been fully successful, you can repeat the procedure.



- ▶ Click on the "Trigger scan" icon.
- ✓ The scanner positions the jaw model such, that 3D measurement can be executed from the set perspective.

 Page 101

- ✓ All non-blue areas are remeasured. Blue areas are not captured and, if applicable, remain with holes. The remeasured areas are displayed in a contrast color, light gray as standard. You can change this color in the settings.



- ✓ The rescan mode remains activated. Rotate the scan if required and repeat the process from a different position.
- ▶ If you are still not satisfied with the rescan, check the position of the jaw model in the scanner as well as the position of the blue shadows on the existing data.
- ▶ You can reverse the last rescan. To do this, click on the "Undo" icon.

Tips for correct execution

The rescan function is offered automatically within a workflow as soon as this is possible. The **Modify mesh** menu opens automatically.

Before cutting



Section 4.2

You can add rescans on every tab directly after the main measurement. If you want to cut the main measurement, add the rescans before cutting. Otherwise the rescan function will add the cut off areas again.

Prior to matching



Section 4.2

Always add the rescans prior to matching as this accelerates the calculations.



Section 4.4

Prior to a correction scan

If you wish to replace part of a scan with a correction scan, always add the rescans before the correction scan. The reason being, that you need to exchange the jaw model in the scanner for the correction scan.

Presentation of interdental spaces

Areas in interdental spaces are difficult to capture with the sensors. To achieve this, you can take the adjacent teeth from the jaw model. If you now trigger a rescan you will achieve a better result.

This measure can prove useful if you are in a workflow with the presentation modes "Complete jaw" or "Complete jaw fast". Otherwise, presentation is part of the workflow anyway.

Reasons for poor representation

Poor representation quality can have numerous reasons other than 3D measurement.

Quality of the models

Models made of reflecting or very dark material are not suitable. Treat such models with 3D scan spray prior to scanning.

Monitor settings

Section 9.2

For example, make sure that unfavorable screen settings do not cause too strong light reflections or too strong transparency of the scan.

Scanning with cutting filters

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Non-captured areas in the upper or lower section of the scan may also be due to incorrectly set cutting filters. Check the settings for cutting filters and the cutting radius.

4.3. Filling holes

If the 3D sensor was not able to measure areas of the model, then data will be missing on the scan. For example, this is the case in so-called "undercut areas" (retentions, narrow passages). Light reflections on the surface may also be a reason. Such areas are displayed as "holes" on the 3D viewer.

The "Fill holes" function automatically fills small, non-captured areas. This process is, for example, suited for archiving complete jaw models.

 Section 4.2

You should use the rescans to close holes for further processing of the data in a CAD system.

Procedure

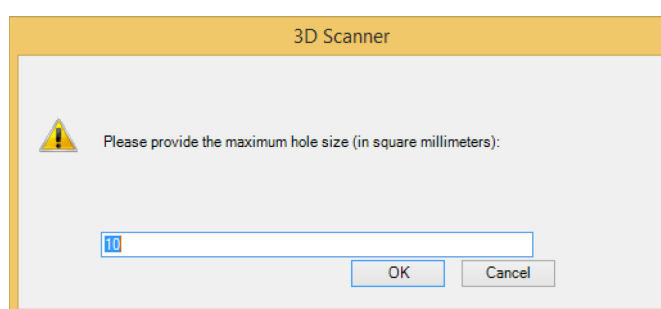


- ▶ The “Modify mesh” menu opens automatically within a workflow. If applicable, click on the “Modify mesh” icon.



- ▶ Click on the “Fill holes” icon.

- ✓ You will be asked to define the maximum size of holes to be filled.



- ▶ Enter the desired number of square millimeters. Recommended are 10 mm².
- ▶ Click **OK**.
- ✓ All holes up to the defined size will be filled. Larger holes remain open.
- ▶ If you are not satisfied with the result, you can execute the function again and, if applicable, change the hole size.



- ✓ You can reverse the last work step. To do this, click on the “Undo” icon.

4.4. Correction scan

In a scan which is largely successful, there may still be parts which are not perfect, for example, because the preparation was changed afterwards or because the impression features bubbles, warps etc.

In this situation, a correction scan helps. To do this, scan a second jaw model and replace the part not properly represented in the dental scan.

The correction scan is ideal for replacing a tooth stump model with a second tooth stump model.

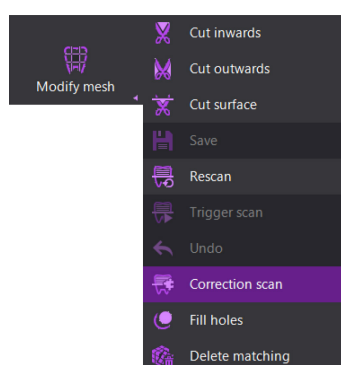


Procedure

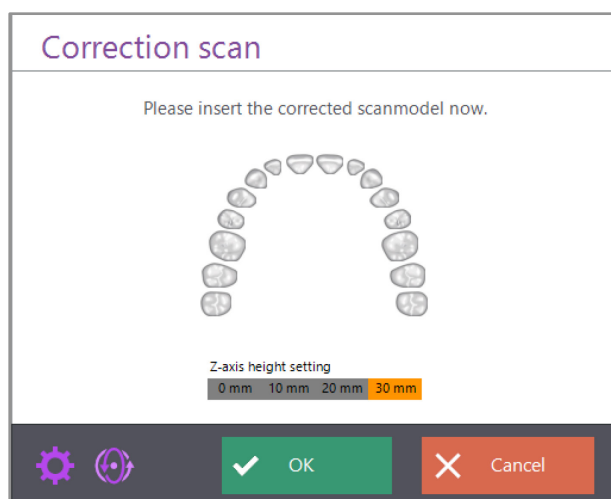
Section 4.1

Section 3.7

- ▶ Create a project.
- ▶ Cut the scan to be corrected. In particular, remove the areas to be corrected.
- ▶ Match the tab. Depending on the project definition this may not be possible until the end of the entire workflow.
- ▶ Click on the **Modify mesh** menu and then on **Correction scan**. Please note that this icon only becomes active once the dental scan has been matched.



- ✓ You will be asked to insert the jaw model for the correction scan.



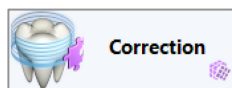
Positioning of jaw model



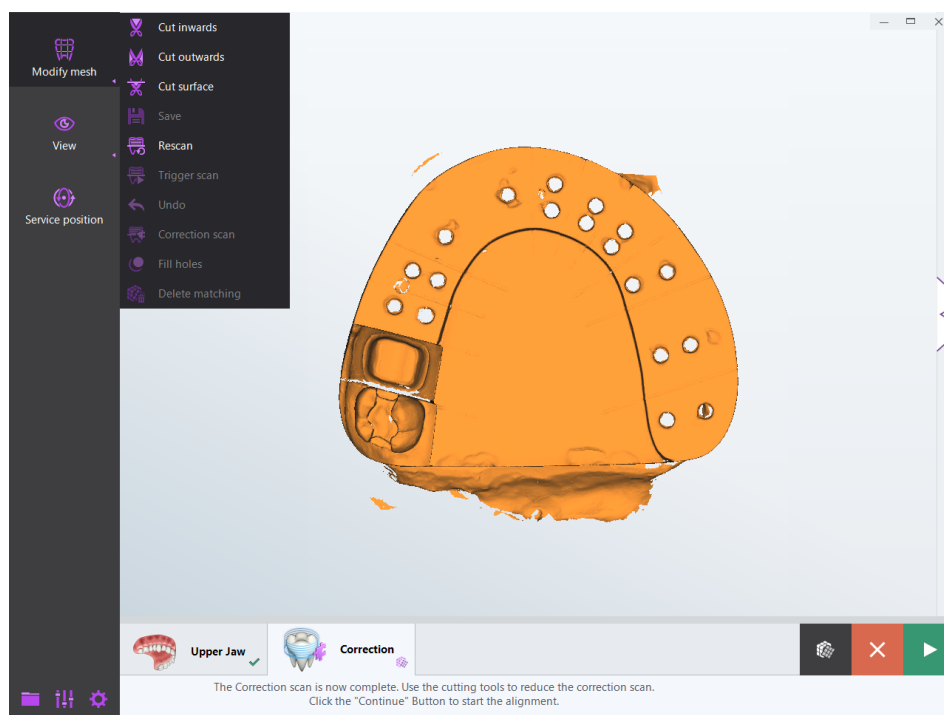
Mounting spacer plates

- ▶ Remove all teeth from the jaw model which are not required for the correction.
- ▶ Position the correction model in the scanner. Information on handling is given in the operating manual of your scanner.
- ▶ If you are using a scanner with spacer plate system, click on the number of spacer plates currently being used in the scanner under **Number of spacer plates**.

- ▶ If you are using a scanner with automatic z-axis, click on the desired height in millimeters.
- ▶ Click **OK**.
- ✓ The correction model is scanned and indicated on a correction tab.
- ▶ If required, supplement the correction scan with rescans.

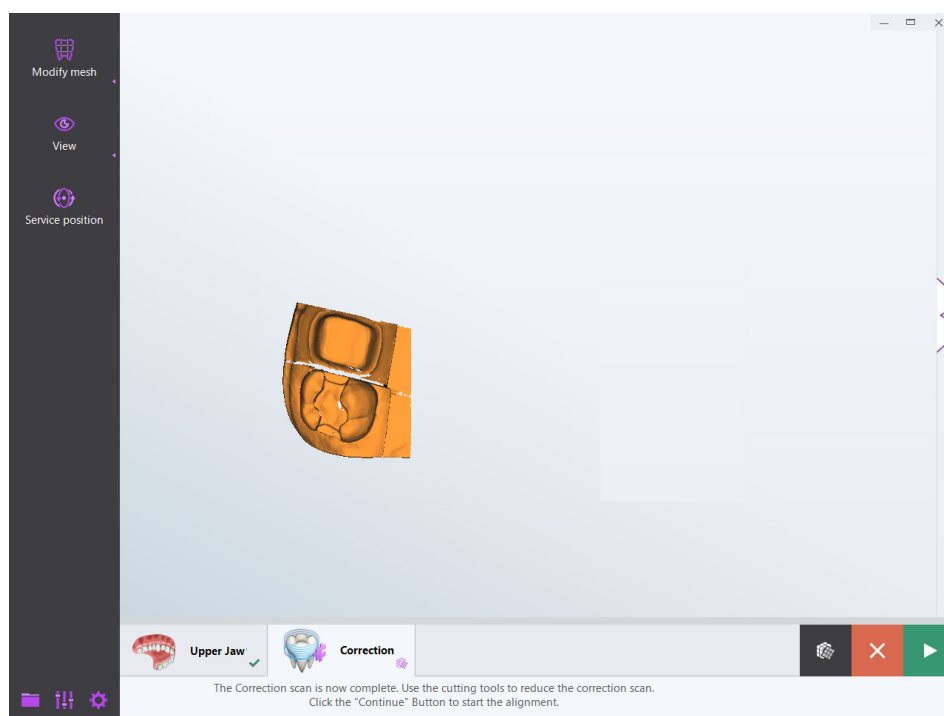


Section 4.2

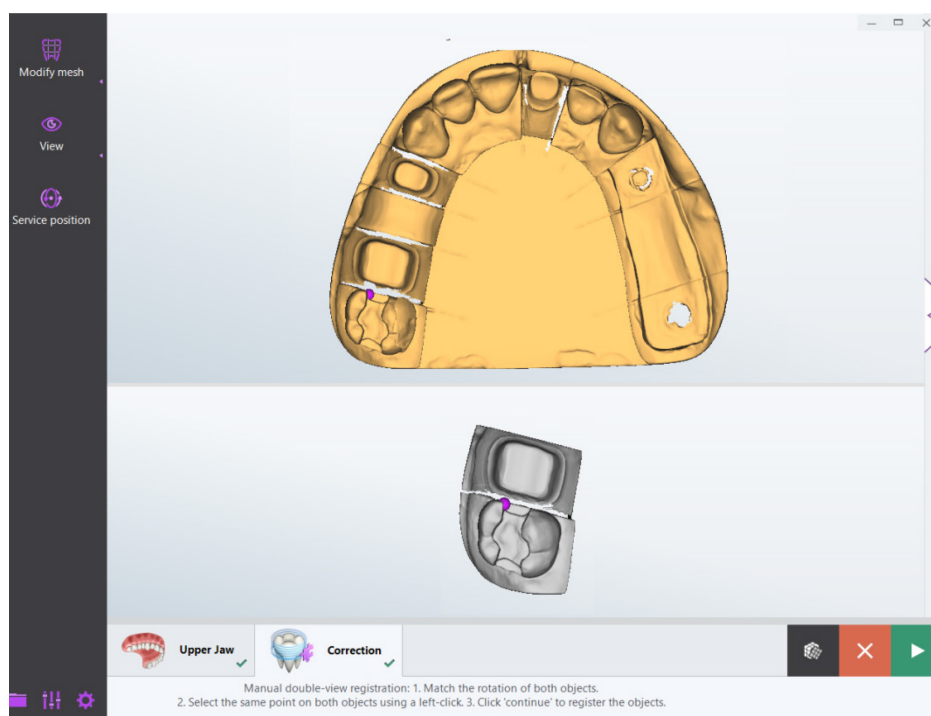


Section 4.1

- ▶ Now cut the correction scan.
- ✓ The correction scan is cut correctly if it covers the areas required for correction and, if applicable, adjacent areas.



- ▶ To continue with alignment, click on the “Continue” icon. The alignment determines at which position of the dental scan the correction scan is to be inserted.
- ✓ The correction scan is matched and indicated under the dental scan.

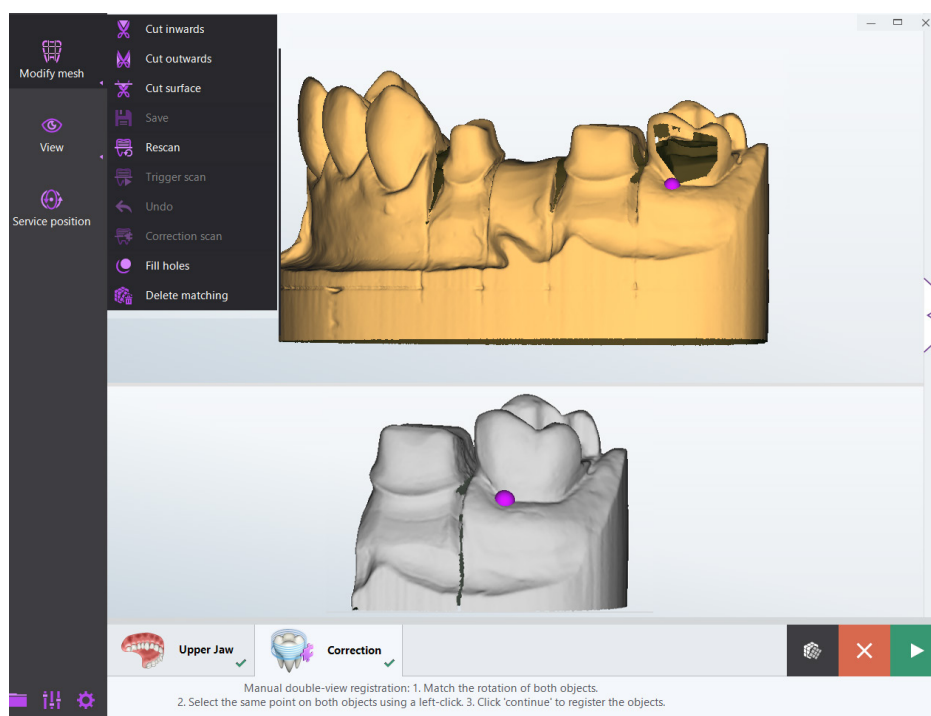


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- ✓ Both scans are displayed above each other from a bird's-eye view. The correction scan is colored gray, the dental scan is sand-colored. You can change the standard colors individually in the settings.

 Section 5

- ▶ If another perspective is of more advantage for the alignment, you can rotate the scans. You can rotate both scans identically with the icons under **View**, and using the mouse you can rotate and zoom each scan individually.
- ✓ The perspective is suitable when the correction area can be viewed and when both scans are displayed from the same perspective and with similar magnification.
- ▶ Click on the same point, first on the lower scan, then on the upper scan.
- ✓ The clicked point is marked with a pink-colored sphere. If you missed the desired point, you can repeat this process as often as you wish.



- ▶ Once the desired point on the top and bottom has been marked, click on the "Continue" icon.
- ✓ A preview of the composed scan is displayed. You can see which areas stem from the correction scan and which from the original by their colors (sand-colored = original, gray = correction scan).

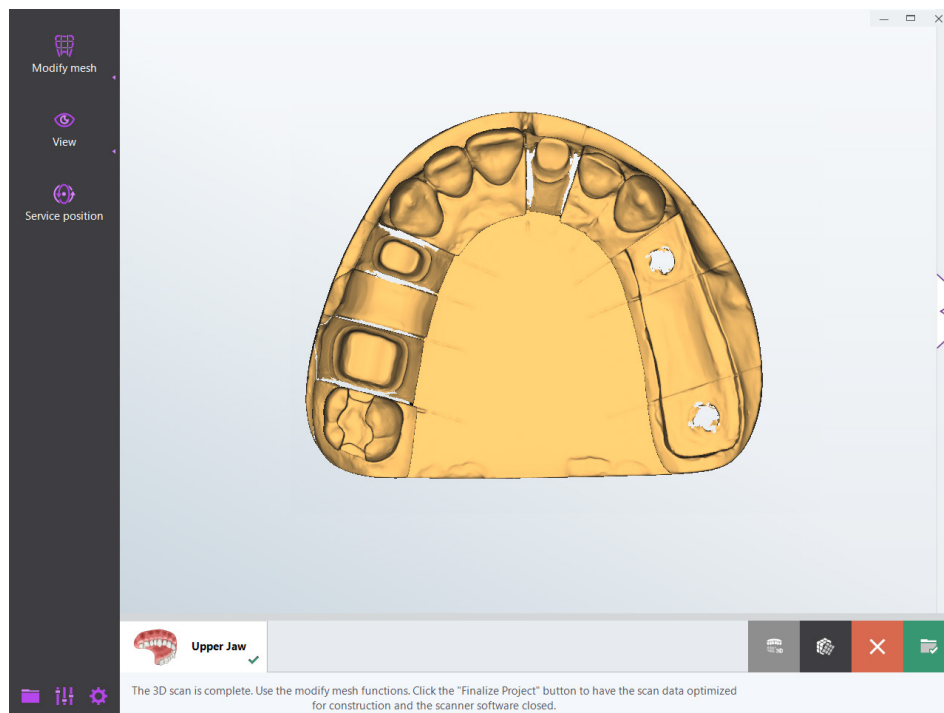


- ▶ Check the result.
- ▶ If you would like to repeat the alignment, double-click any position on the correction scan (gray).



- ✓ The viewer is divided again and you can repeat the alignment.
- ▶ If you are satisfied with the result, click the "Continue" icon.
- ✓ The result is calculated.

- ✓ The **Correction scan** tab is now no longer required and therefore closed.
- ✓ The corrected and matched dental scan is displayed.



- ✓ The correction scan is completed. You can now continue with your workflow.

Tips for correct execution

Removing stumps from the correction model

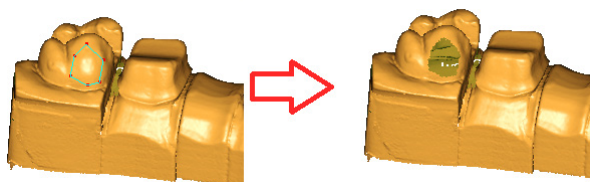
Ensure that the jaw model of the correction scan is smaller than the jaw model to be corrected.

You can remove all tooth stump models that are not required. But leave at least one adjacent tooth in place. If, for example, you wish to replace a part of tooth 17, then teeth 17 and 16 should be present in the correction model.

 Section 4.1

Cutting the correction area in the dental scan

Remove the part to be corrected from the dental scan, for example, a piece from the surface of a tooth stump.



Keep sufficient data when cutting the dental scan

Ensure that sufficient data remains in the dental scan which can then be recovered in the correction scan. Otherwise alignment cannot be calculated correctly. For example, if you want to replace a tooth stump model completely, the correction scan must contain both adjacent teeth.

Cutting the correction scan to required areas

You will achieve a perfect result if you only retain those areas in the correction scan which you require for the correction, as well as all adjacent areas which are important for construction in CAD, in particular stumps and adjacent teeth.



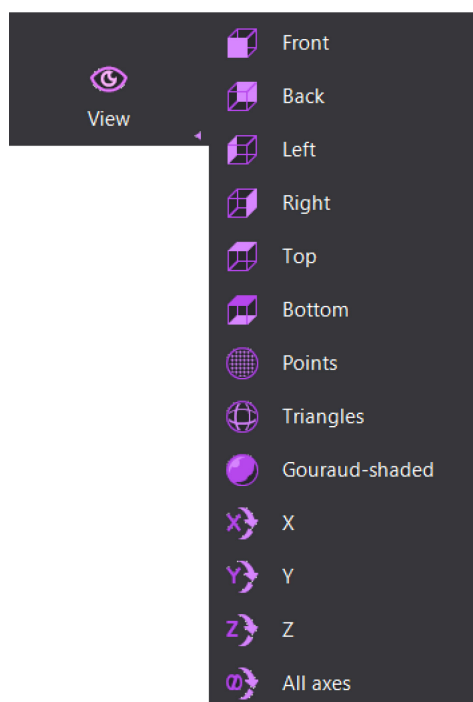
5. View

You can find the functions for controlling the view in the 3D viewer under **View**. You need these functions to check and edit a scan.

5.1. Icons



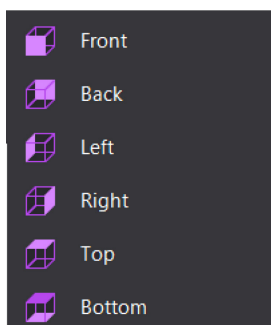
- Click on the **View** icon and then the desired symbol.



Section 5.2

- ✓ The view in the 3D viewer is changed accordingly (except for icons **X**, **Y**, **Z** and **All axes**).

Perspective



With the icons in this group you can select the perspective with which a scan is displayed.

The perspective from the top (bird's-eye view) is activated as standard. The other perspectives are only accommodated temporarily and are not saved. For example, if you view a scan from the left and then open another tab, the second scan will be displayed from the bird's-eye view and not the left. When you then view the first scan again, this will also be shown from the bird's-eye view again.



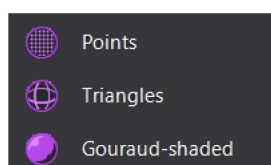
TIP

A change in perspective is useful, for example for cutting model bases.



The complete base can be viewed well from the front or back. However, from the side you can only view part of the base and therefore these perspectives are not to be recommended for cutting.

Representation



With the icons in this group you can select the method with which the 3D data model is to be displayed.

The active representation is saved and retained, even when changing between different tabs or when loading saved projects. Following a restart of the software, the representation is always **Gouraud shaded**.

Points or triangles indicate the geometrical structures from which the 3D representation is composed. You will need these representations occasionally to analyze a 3D measurement.

Please note that the points and triangles can only be applied correctly to matched scans as the software only calculates the 3D data model at this point in time. Unmatched scans are indicated with a makeshift honeycomb structure, but not as correct 3D data models.

The geometric structures are extremely delicate and can therefore only be detected at strong magnification.



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TIP

Please note that zooming is only possible with the mouse.

Representation with points

In representations with points, the object color automatically reverts to white.



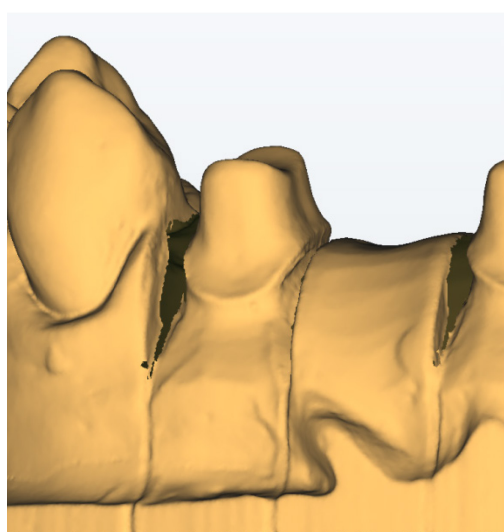
Representation with triangles

In the representation with triangles, you can detect nets on all surfaces at large magnification. The structure on the forefront can be seen in the normal object color, the structures in the background are dark.



Representation Gouraud shaded

The Gouraud representation looks three-dimensional and true to life. This is activated as standard and is suitable best for scanning and editing.





5.2. Rotating, shifting, zooming

You can move, rotate and zoom scans with the mouse. You need these functions to check and edit a scan.



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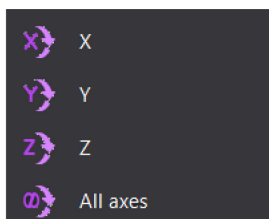
Movements are executed slightly quicker if the 3D objects are only represented by image points during movement. You can activate this option in the settings.

Axes

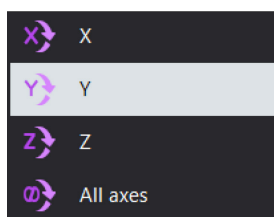
The icons for the axes do not have a direct effect on the view, but on the rotating axis of a movement with the mouse.



- ▶ Click on **View**.
- ✓ The menu opens.
- ▶ Click on the desired rotation axis.



- X-axis (horizontal, abscissa): movements are executed upwards and downwards.
- Y-axis (vertical, ordinate): movements are executed to the right and left.
- Z-axis (vertical to X and Y-axis, 3rd dimension, applications): movements are executed three-dimensionally.
- All axes: movements are executed in all directions.
- ✓ The rotation axis for movement is activated.



- ✓ The menu closes.
- ✓ Scans are rotated over the activated axis. If no axis is activated under **View**, then all axes are valid.

Mouse functions

 Page 103

The mouse keys can be assigned in different ways. This manual describes the standard setting.



Both mouse keys Shifting the object



Right mouse key Rotating the object



Scroll wheel Zooming

Procedures

Rotating scan

- ▶ To rotate the scan, click to the zero point of the planned movement with the right mouse key.
- ▶ Keep the mouse key pressed.
- ▶ Move the mouse.
- ✓ The scan rotates around the activated axis – depending on the selected zero point.
- ▶ Once you have reached the desired position release the mouse key.

Shifting the scan

- ▶ To shift the scan, click on the starting point of the planned movement with both mouse keys.
- ▶ Keep both mouse keys pressed.
- ▶ Move the mouse.
- ✓ The scan follows the movement of the mouse, namely at a distance to the selected starting point.
- ▶ Once you have reached the desired position release the mouse keys again.

Zooming the scan ▶ Point the mouse at an arbitrary area of the program window.

Enlarging the view



- ▶ Rotate the scroll wheel forward (in direction of your hand).

Reducing the view



- ▶ Rotate the scroll wheel backward (away from your hand).
- ✓ The scan appears larger or smaller. You can enlarge or reduce infinitely variable until the maximum enlargement or reduction is reached. Release the scroll wheel when the scan has reached the desired representation size.



6. Service position

When you insert or remove the object holder or the adapter or articulator from the scanner, it can happen that the axes of the scanner move. It can also happen that the position of the model is inadvertently shifted when removing or inserting individual tooth stump models.

Due to such movements, the actual position of the axes no longer corresponds with the position last registered by the software.

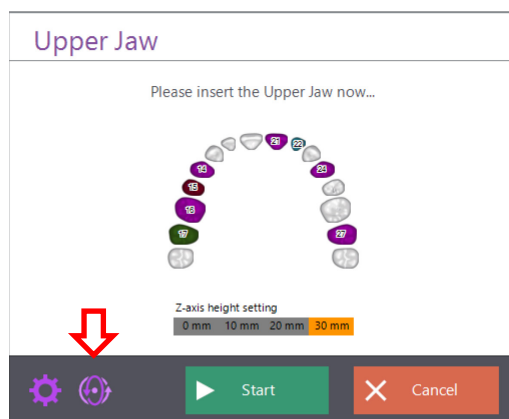
If something like this happens, please proceed as follows:



- Click on the "Service position" icon. You can find this icon at all relevant positions of the program, for example, in the menu bar or the entry request when starting a scan.

Example

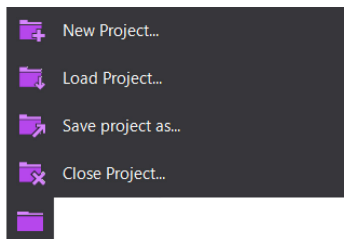
"Entry request upper jaw"



- ✓ The axes are returned to their starting position.
- ✓ You can now continue with your workflow.



7. Projects



Every scan consists of a multitude of files. This is why scans are organized in projects. All functions for managing projects are bundled under **Projects**.

- ▶ Click on the “Projects” icon to open the selection.
- ✓ The functions are displayed.
 - New project
 - Load project
 - Save project under
 - Close project
- ▶ Click on the desired function.

7.1. New project



Section 7.4

After every start of the software, you will automatically be asked to create a new project. If the software is already opened or is opened from a standby mode, you can create a new project manually.



NOTE

Loss of data from an open project due to creating a new project

If you create a new project although another project is still open, the open project is overwritten. Scanning data and scan results can be lost.

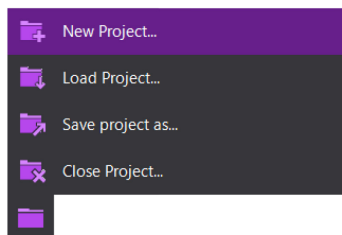
- ▶ Close the opened project first before creating a new project.



Section 3.9

TIP

A few special characteristics apply to exocad® projects.



Procedure

- ▶ If applicable, click on the "Projects" icon and then on **New project**.
- ✓ The project definition opens.

Project definition

Patient Multicase

Project ID: 2017-07-24-135227

Dentist: Dr. Max Dent

Patient: Doe, John

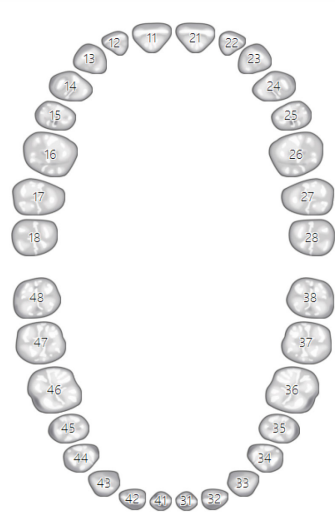
Notes: asap

Presentation upper jaw: Complete jaw

Presentation lower jaw:

Scan Mode: One stone model

Texture scan: Disabled



OK Cancel

- ▶ If applicable, select a project type by clicking on the **Patient** title or **MultiCase**.

- ✓ The project definition is displayed.

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- ▶ Enter the patient data (optional).
- ▶ Select a project type.

 Section 3.3, 3.4

- Project definition **Patient** (standard)
- Project definition **multiCase** (optional module)

 Page 80

- ▶ Check the presentation mode and the scan mode for the "Patient" project type.
- ▶ If applicable, select the mode for a texture scan.



- ▶ Click **OK**.

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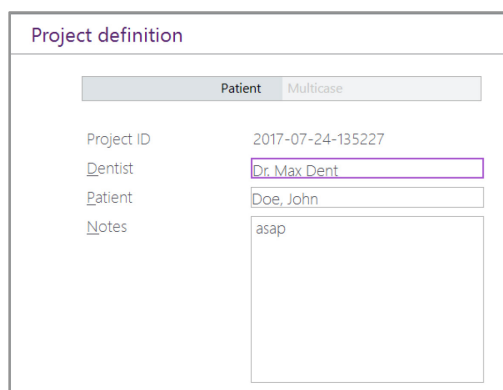
- ✓ The project is saved in the works directory as standard C:\Users\[Username]\Documents\3D-Scanner\Work\[year]. You can store a different work directory in the settings.
- ✓ The workflow starts.
- ✓ The project definition can no longer be changed in dental Scan.

Entering patient data

The patient data are the same for both project types. The patient data are optional, but may be important later on to avoid mix-ups.



All data can also stem from an exocad® project. These data should be accepted unchanged in dental Scan.



A **Project ID** is assigned automatically and indicated immediately. It begins with the creation date in the form: **[YYYY]-[MM]-[DD]**. For dental Scan projects, the time is added in the form **-[hhmmss]**. For exocad® projects the exocad®-ID is added, e.g. **00002-001**.

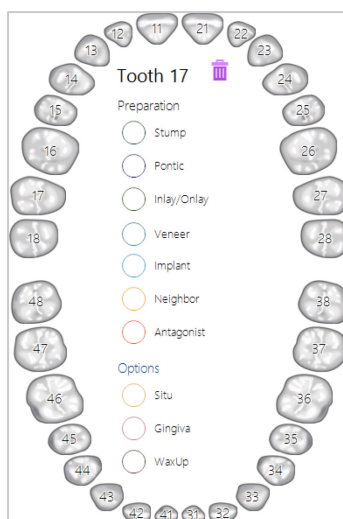
- ▶ Enter the patient data.
 - **Dentist:** Name of the dentist in a dental Scan project and name of the customer in an exocad® project
 - **Patient:** name of the patient, not relevant in multiCase projects
 - **Comments:** optional note on processing
- ▶ The fields are not subdivided, so that you can enter the names according to your own standards ([Title] [First name] + [Surname] or [Surname], [First name]).
- ✓ The patient data are stored in the project file (.SOP).
- ✓ These data (with the exception of the Comments), can later be seen in the project display next to the 3D viewer in dental Scan.
- ✓ After the start, you can no longer change the patient data and the ID.

Entering preparations

Assigning a preparation to a tooth position

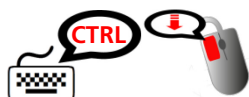
- ▶ Click on the tooth position in the project definition to which you wish to assign the preparation.

- ✓ A key appears in the middle of the odontogram.



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- ▶ Click on the desired preparation.
- ✓ The tooth position is colored according to the color code.
- ▶ To arrange for additional scans, click on one or more options.
- ✓ The option signs appear next to the position numbers.



Copying preparations individually

- ▶ To transfer the same preparation to another tooth position, press the CTRL key and keep the key pressed.
- ▶ Click on the next tooth position.
- ✓ The tooth position will be colored and the option signs appear.



Copying preparations to several positions

- ▶ To transfer the same preparation to a series of tooth positions, press the SHIFT key and keep the key pressed.
- ▶ Click on the last tooth position of the series.
- ✓ All tooth positions of the series are colored identically and the option signs appear.

Deleting preparation and options

- ▶ Click on the colored/marked tooth position.
- ✓ The key appears in the odontogram.



- ▶ Click on the “recycle bin” icon. In order to delete the preparation only but not the option, click on the preparation still assigned.
- ✓ The preparation and, if applicable, the options are deleted from the tooth position.
- ▶ Using the key combination CTRL or SHIFT and the left mouse key, you can copy deletion to individual tooth positions or a series.

Changing preparations

- ▶ Click on the colored/marked tooth position.
- ✓ The key appears in the odontogram.
- ▶ Click on the new preparation.
- ✓ The color of the tooth position changes accordingly.

Select presentation

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Der standard mode is “secondDie”. If you prefer another presentation mode as a matter of principle, change this in settings. Regardless of this, the standard mode for the “Opposite jaw” is always “Complete jaw”.

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Presentation mode with jaw model with preparation

- ▶ Select at least one preparation for the upper jaw or lower jaw.
- ✓ The standard mode is automatically set under **Presentation upper jaw** or **Presentation lower jaw**.
- ▶ Change the suggested value for **Presentation upper jaw** or **Presentation lower jaw** if you prefer another presentation mode for the current project.

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- ✓ Following the jaw scan, you will be asked to execute presentation.

Presentation mode for jaw model without preparation

To scan a complete jaw, do not select a preparation.

- ▶ Select “Complete jaw” or “Complete jaw fast” under **Presentation upper jaw** or **Presentation lower jaw**.
- ✓ The “Complete jaw” presentation mode results in a scan with high quality. “Complete jaw fast” results in a scan with lower quality.



- ✓ A jaw model without a presentation mode is not scanned. An individual jaw model with a presentation mode is scanned as a single model.
- ✓ Both jaw modules with a presentation mode are scanned individually and as occlusion models.

Selecting the scan mode

The scan mode indicates with which aids the occlusion of the jaw models is to be fabricated. If only a single jaw model is to be scanned, the selection of a scan mode is dispensed with. In this case, **Single model** is automatically set.



Scope of delivery



Section 8.3



Section 3.8

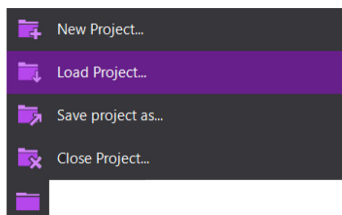
In order to use modes for fixators or articulators or the Triple Tray® mode, you require the corresponding model holders from the scanner accessories.

Depending on the scanner, the **Triple Tray®** scan mode can only be selected after the module has been authorized with an activation code.

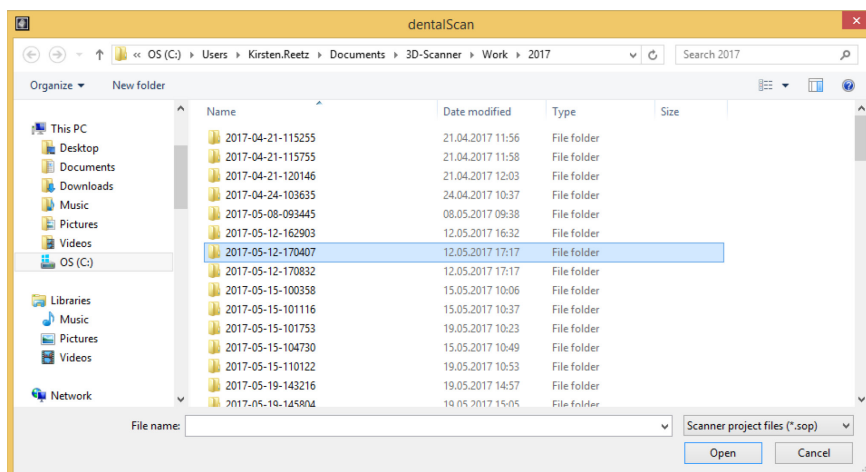
- ▶ Select the fixator or articulator which you are using to fixate the occlusion model from the list.
- ▶ Ensure that the fixator or the articulator are registered.
- ✓ dental Scan calculates the vestibular scan in the subsequent workflow based on the values of the selected fixator or articulator.
- ✓ If you have selected the **Triple Tray®** scan mode, a special workflow starts.

7.2. Load project

You can load a project and continue to edit a project at any time, regardless of whether it has already been completed or not.



- ▶ Click on the "Projects" icon and then on **Load project**.
- ✓ The Windows dialog for opening a file opens.



- ✓ The content of the dental Scan work directory is displayed. Every project is saved in a separate folder. The folder names correspond to the project ID, in other words, are composed of the year, month, day and a 6-digit time code, e.g. 2017-04-21-115255.
- ▶ Open the desired project folder.
- ✓ The project file in the folder is recognized automatically. This file has the following format as standard Scanner project file (*.sop). Files in other formats, for example, scanning data in PCM format, are not displayed in this dialog.
- ▶ Click on the project file and then on **Open**.
- ✓ The project definition opens.
- ▶ Check the data. However, corrections to the project definition are not possible.

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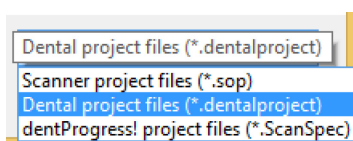


Section 3.9

TIP

exocad® projects are also saved in individual folders and named according to the exocad® project ID.

You can open exocad® projects the same as with dental Scan. To do this, change to the folder C:\Program Files (x86)\exocadFramework\CAD-Data\. Alternatively to the scan project (*.sop) you can also open the dental project (*.dentalproject).

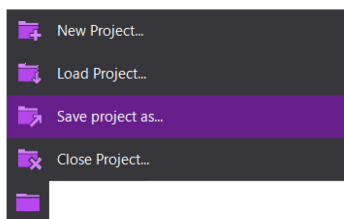


In order to correct texts such as the spelling of patient names or the project definition, it is however recommended to open the project in exocad® DentalDB and to restart the scanning process from there.

7.3. Save project under

You can archive every project as a ZIP file to save memory on your hard drive.

Section 7.1, 3.7



- ▶ Open the project you wish to archive.
- ▶ Ensure that all tabs are matched.
- ✓ The project folder contains usable results in PLY or STL format.
- ▶ Click on the "Projects" icon and then on **Save project as**.
- ✓ The Windows dialog **Save** opens. The project folder is suggested as location and the project name as file name, for example, 2017-05-15-110122.zip.
- ▶ Click on **Save**.
- ✓ The project is saved in the project folder as ZIP file.

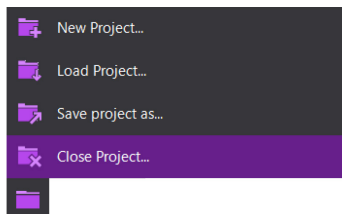
**TIP**

Save selected projects as ZIP files before deleting void PCMs.



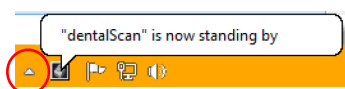
7.4. Close project

You can close an opened project at any time. The project is saved in the current state of processing. You should always use this function when you interrupt work on a project and wish to continue processing later on.



- ▶ Click on the "Projects" icon and then on **Close project**.
- ✓ The project is closed without questioning. Incomplete scans remain in this condition.
- ✓ dental Scan is not closed, but switched to the standby mode.
- ✓ The axes of the scanner are moved to the service position.

You can open the software quickly from the task bar. The dental Scan symbol is in the group of hidden system symbols as standard.

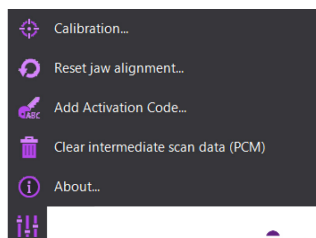


TIP

Starting from the standby mode is even quicker if you assign the symbol with the feature display **Show icon and notifications**. Thus, the dental Scan symbol is always displayed in the task bar. Alternatively you can open dental Scan by double-clicking the desktop icon from the standby mode.



8. Miscellaneous



 Section 8.1, 8.2, 8.3, 8.4



Various functions which are rarely required are bundled under **Miscellaneous**.

- ▶ Click on the “Miscellaneous” icon to open the selection.
- ✓ The functions are displayed.

You now have the following options:

- Calibration
 - Resetting jaw registration
 - Add activation code
 - Delete void scanning data (PCM)
 - Information...
- ▶ Click on the desired function.
 - ▶ Edit the corresponding dialog.

8.1. Calibration

Calibration is necessary for the software to measure all the positions in the measuring field correctly and to exactly determine the position of the axes.



NOTE

Inaccurate measurements due to neglected calibration

If you do not calibrate the scanner as prescribed, you will receive inaccurate measurement results.

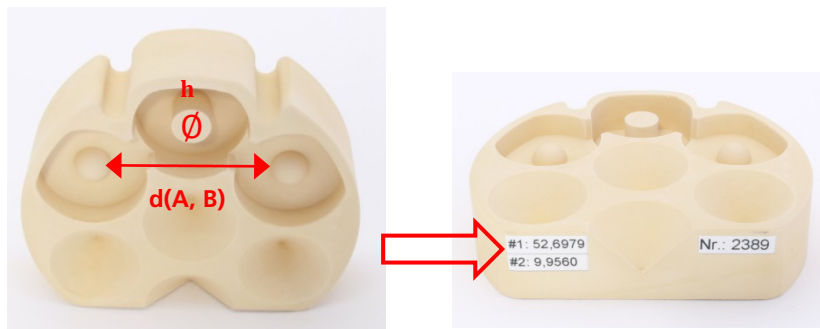
- ▶ Calibrate the scanner following the initial installation of dental Scan, after connecting a new scanner and every time when requested to do so by the software.

The principle of calibration

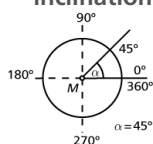
Calibration comprises two processes:

1. Determining correction values

In a first step, the scanner measures the calibration model and compares its measured values with the documented values of the factory-measured calibration model. From this comparison, the software calculates the correction values to be considered by the scanner for every 3D measurement to achieve accurate results.



2. Determining axis inclination

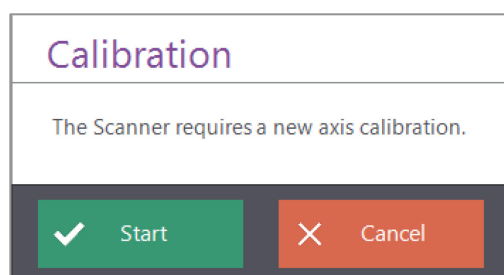


The scanner's sensor knows the zero point of axis alignment from the manufacturer's calibration. In the second step of calibration, the axes measurement, the other inclination angles, e.g. 90°, are measured so that the scanner can accurately travel to each position of the axes.

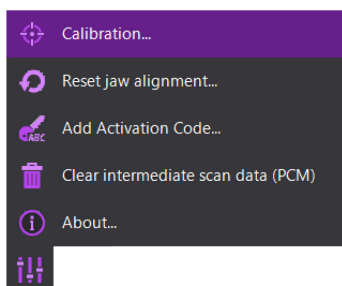
For physical reasons, there will always be minor deviations, for example due to material movement at temperature fluctuations, so that the scanner requires new calibration.

Procedure

As soon as the software detects that calibration of the scanner is required, you will be asked to calibrate as soon as you start the software.



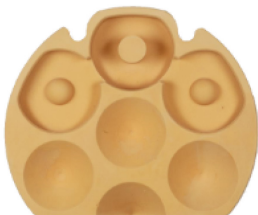
► Click on **Start**.



- ✓ The **Calibration** dialog indicates the last entered values. You can also see when the scanner was last calibrated.
- ▶ To start calibration, you can click on the “Miscellaneous” icon and then on **Calibration** at any time.

Calibration

Please place the calibration model...



#1:
#2:

Last calibrated on 14.06.2017 11:21:18

✓ Start

✗ Cancel



Position calibration model
Mount spacer plates

- ▶ Fixate the calibration model on the object holder.
- ▶ Position the calibration model in the scanner.
- ▶ If a scanner with spacer plate system is connected, then the dialog will state how many spacer plates are required. Follow the instructions.
- ▶ Check whether the values in the fields **#1** and **#2** correlate with the values on the back of the calibration model. If applicable, adopt the values of the calibration model.



NOTE

Inaccurate measurements due to calibration with incorrect values

If you perform calibration with values which do not correspond with the values given on the back of the calibration model, you will receive inaccurate measurement results.

- ▶ Fully transfer the values from the calibration model. Do not omit any post-decimal places.
- ▶ Use a comma or period as separating character. Do not insert any blanks.

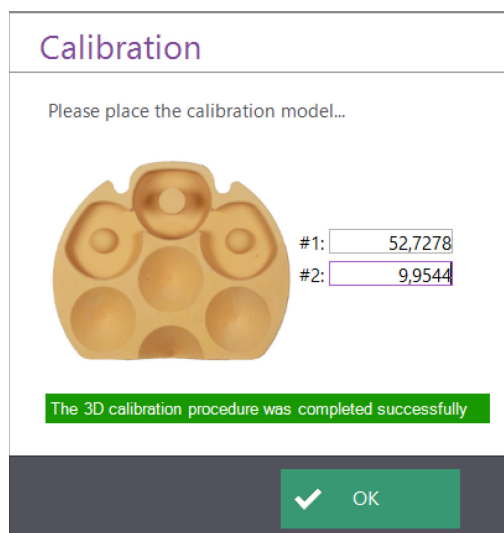


- ▶ Click on **Start**. For some scanners you will be asked to close the lid for this process.

- ✓ After the start, you can no longer interrupt the process. The scanner is calibrated. A message will inform you about this process:



- ✓ After successful completion of calibration, the message **3D calibration has been executed successfully** will be displayed:



- ▶ Click **OK**.
- ✓ The dialog closes. You can now start scanning.



Procedure after faulty calibration



NOTE

Inaccurate measurements due to faulty calibration

If you scan despite faulty calibration, you will receive inaccurate measurement results.

- ▶ Only prepare scans for test purposes as long as calibration was faulty.

Should an error message appear after calibration, please attempt the following:

- ▶ Check whether the values in the fields **#1** and **#2** really correlate with the values on the back of the calibration model.
- ▶ Close the software and switch off the scanner.
- ▶ Wait for a short period.
- ▶ Switch the scanner back on and start the software.
- ▶ Repeat calibration.
- ✓ In most cases, calibration will now be executed.
- ✓ If an error message still appears despite these measures a technical defect may be the reason.
- ▶ Please contact your specialist dealer for checking the scanner.

8.2. Resetting jaw registration

If you are using an articulator by Artex®, Artist/Arto®, Denar®, Reference® and SAM® or an appropriate fixator for vestibular scans of articulated jaw models, then the measured values for jaw registration are required.

When using articulator systems from other manufacturers, mean values are always calculated for articulation.



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Scope of delivery

You should reset jaw registration if the first registration was not executed correctly or when you change the articulator system.

You require suitable adapter plates for your articulator system and, depending on the scanner, a fixator from the scanner accessories.

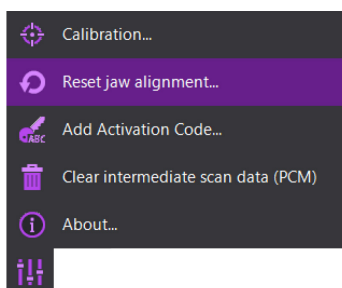


NOTE

Incorrectly calculated occlusion through scanning with incorrect jaw registration

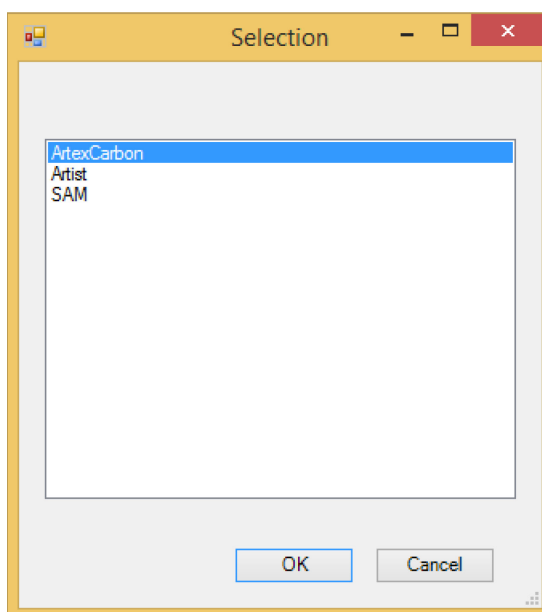
The correct values are absolutely essential for the condyle-related precise calculation of articulation.

- ▶ Only scan with a jaw registration which fits your articulator system.



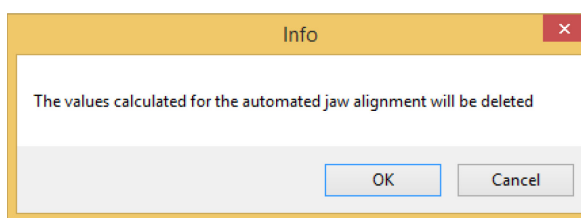
Procedure

- ▶ Click on the "Miscellaneous" icon and then on **Reset jaw alignment**.
- ✓ The **Selection** list is displayed.



Section 8.3

- ✓ The list contains the fixators and articulators which are authorized in dental Scan. Which of these have already been registered and which have not, is not indicated on the list.
- ▶ Mark the jaw registration you wish to reset.
- ▶ Click **OK**.
- ✓ You will be asked to confirm deletion of the values.



- ▶ Click **OK**.
- ✓ The values are deleted. The entries in the list will still be retained.
- ✓ You can now perform a new jaw registration.

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8.3. Add activation code

dental Scan includes the Virtual Articulator module as well as the optional multiCase, multiDie, texture scan^{color} and Triple Tray[®] impression scan modules as standard functions.



Scope of delivery

It depends on the connected scanner as to which modules are supported and which modules you need to authorize.



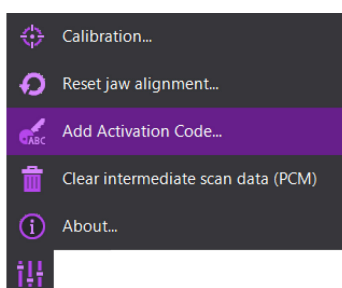
Section 8.5

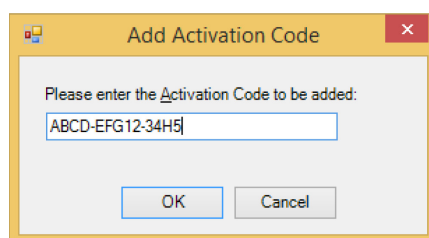
Using the information dialog, you can find out which modules are currently authorized in your version.

Procedure

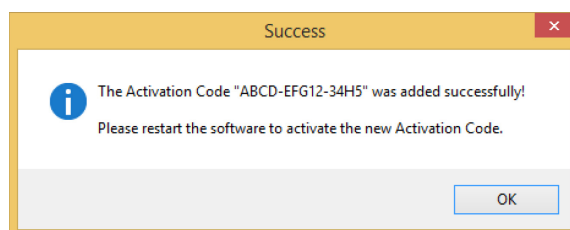
To have a module authorized which is not part of the scope of delivery of your software package, the following work steps need to be executed once-off.

- ▶ Ask your specialist dealer to send you an activation code for the desired module. An activation code consists of numbers and capital letters as well as hyphens, for example, ABCD-EFG12-34H5.
- ▶ Click on the “Miscellaneous” icon and the on **Add activation code**.
- ✓ A window for entering the code opens.





- ▶ Enter the activation code.
- ▶ Click **OK**.
- ✓ The code is adopted into the scanner configuration. As every code is generated individually, it is not possible to check the validity of the code on adoption.



- ▶ Exit dental Scan and restart the software.
- ✓ The module is authorized. You can now work with the module.

Procedure for failed authorization

Should the module not be available after entering the activation code and a restart, attempt the following:

Exclude typing errors

- ▶ Repeat the work steps.
- ▶ Enter the code completely and correctly.
- ▶ Or copy the code from the message of your specialist dealer and enter it.

Check activation code

- ▶ It is possible that an error occurred when generating the code. Ask your specialist dealer to check the entered activation code.



8.4. Delete void scanning data (PCM)

Projects include a large number of work files in PCM file format. These files can be used for reprocessing a scanned result. However, after completion of a project it is generally sufficient to only keep the results in PLY or STL format.

To save memory, you can delete all PCM files older than 30 days from the work directory.



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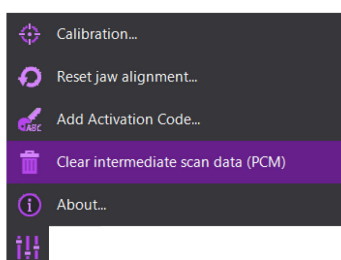
TIP

As standard, the work directory for dental Scanprojects is
`C:\Users\[Username]\Documents\3D-Scanner\Work\[year]`.
 You can save a different directory in the settings.

exocad® projects are filed as standard in the folder
`C:\Program Files (x86)\exocadFramework\CAD-Data`,
 regardless of the setting in the work directory in dental Scan.

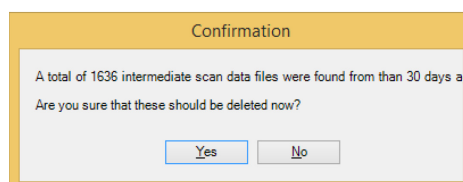
You cannot clean exocad® projects through dental Scan.

Section 7.3



Procedure

- ▶ If required, create a ZIP archive of old projects which you wish to save including the PCM files using the **Save project** function.
- ▶ Click on the “Miscellaneous” icon and then on the **Clear intermediate scan (PCM)** function.
- ✓ The software reports the number of files to be deleted. If no files are found, you will also receive a report. You will be asked to confirm the procedure.

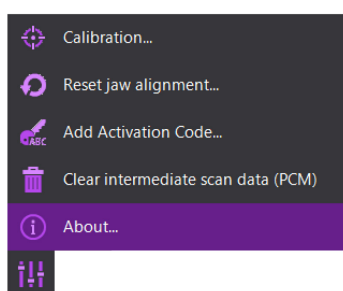


- ▶ Click on **Yes**.
- ✓ All PCM files saved more than 30 days ago will be deleted.

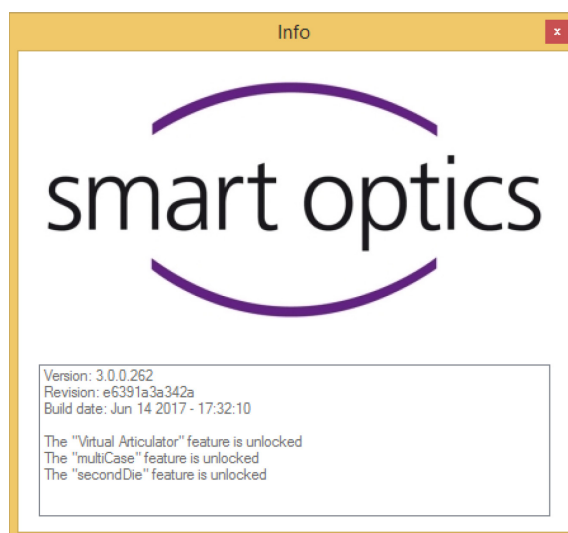
You can allow the software to execute this function without a safety query. In this case, all older PCM files are deleted automatically from the work directory after 30 days.

8.5. Information

You can find information on your software version in the information dialog. This information could, for example, be of interest to Support.



- ▶ Click on the "Miscellaneous" icon and the on **About**.
- ✓ The information dialog opens.



- ✓ The following information is displayed:
 - Manufacturer's logo
 - Detailed version number
 - Revision characteristics
 - Date and time of version construction
 - Titles of authorized modules.

- ▶ If a module is missing on the list, please add the corresponding activation code.
- ▶ To close the dialog, click on the red X.



TIP

Modules which are part of the standard scope of delivery, for example, the "Virtual articulator" module, are also listed as authorized modules.

If modules are missing on the list for which you do not know the activation code, please contact your specialist dealer. In order to help you, your specialist dealer requires the detailed version number as well as the sensor number and version number of your scanner.



9. Settings

dental Scan operates with ex-factory settings after initial installation. These have been chosen to deliver satisfactory results in most cases. However, you can change the settings if required.

Procedure



- ▶ To open the settings, click on the “Settings” icon. You can find this icon at all relevant positions of the program, for example, in the navigation bar on the side, in the project definition, or when starting a scan.
- ✓ The **Settings** window opens.
- ▶ Click on the title of the required tab.
- ✓ The tab opens.
- ▶ You can now edit the desired settings on the **Matching**, **General** or **Installation** tabs.
- ▶ If applicable, click on a further tab to edit additional settings.
- ▶ Click **OK**.
- ✓ Your changes are saved and will be valid instantly in most cases, certainly no later than the next start of the program.

 Section 9.1, 9.2, 9.3



TIP

Your personal settings are retained even when you update or uninstall the software, so that you can continue to work with your personal settings after an update or new installation.



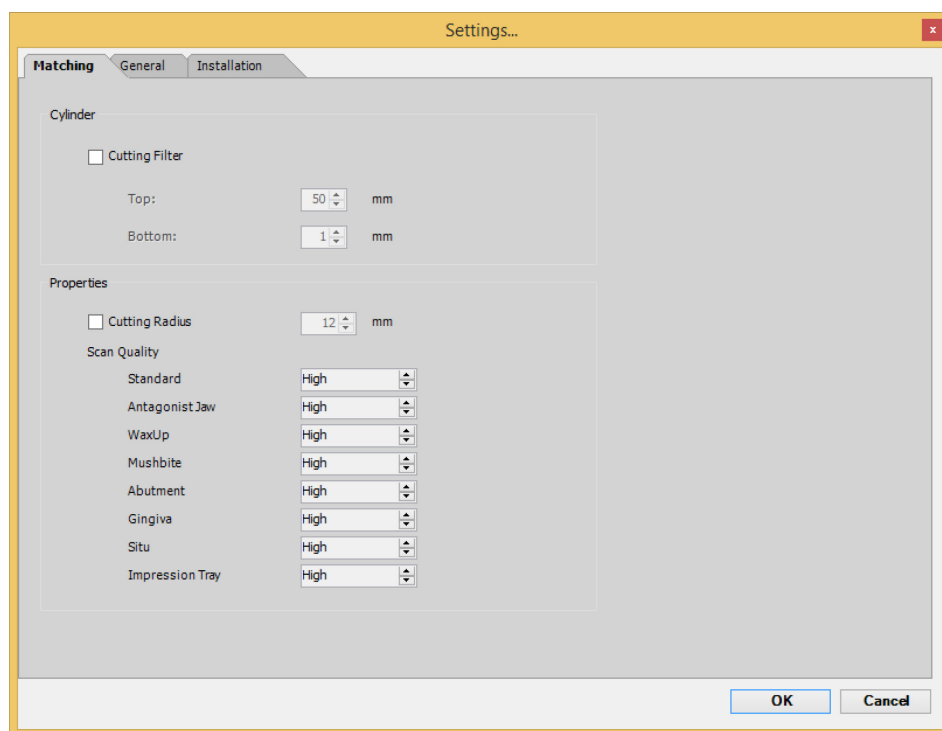
Section 9.4

If you do not wish to do this, you can restore the standard settings.



9.1. Settings for matching

The settings for matching govern the quality and size of the 3D model data set.



Cylinder

Activating cutting filter

Cutting filter If the checkbox is activated, the cutting filters cause the upper and lower area of the scan to be cut automatically. If the bases of the jaw models are always of the same height, you can cut these automatically with a cutting filter. This dispenses with manual cutting of the scans in the workflow.

Top cutting filter | Bottom cutting filter

Enter the required measurement in mm for the top and bottom cutting filters. Test the setting with typical scans before scanning real cases. If the cutting filter is too large, this can lead to essential parts of the scan being cut off.

	Highest value	Lowest value	Standard
Top	85 mm	5 mm	50 mm
Bottom	80 mm	0 mm	1 mm

These values cannot be changed arbitrarily. The lower value must remain at least 5 mm smaller than the upper value.



No cutting filters are activated by default.

Properties

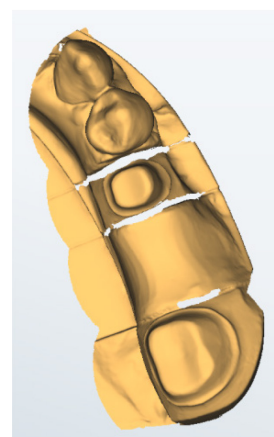
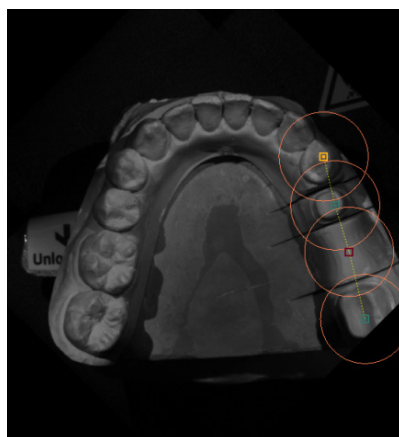
Cutting radius

Cutting radius

If the checkbox is activated, only the data in the defined radius around every marked tooth stump model are scanned. All further removed areas are cut automatically, so that only the cut tooth stump models remain in the 3D scan. In the 2D viewer, the cutting radius is represented as a circle around the marked tooth stump models. The size of the circles corresponds to the set cutting radius.

Without a cutting radius, the entire jaw model is scanned and can be cut manually.

Example 2D and 3D



If you are using the optional multiDie presentation mode or the multiCase module, it makes sense to enter a cutting radius to isolate the tooth stump models in the scan.



A cutting radius is not activated by default. 12 mm are recommended for activation. The lowest value is 0, the highest is 200.

Scan quality

Scan quality

Determines the precision and the size of the 3D model data set in four quality stages. The higher the quality, the greater the data set.

Very high: in the 3D model data set, the maximum resolution of the sensor is reproduced (with maximum data volume).

High: good resolution of the 3D model data set at somewhat smaller data size.

Normal: medium resolution, medium data size.

Coarse: moderate quality, minimum data size.

You can select different quality stages for different scan modes. A lower quality stage may, for example, be sufficient for archiving purposes. For complex constructions, “high” is recommended as minimum.

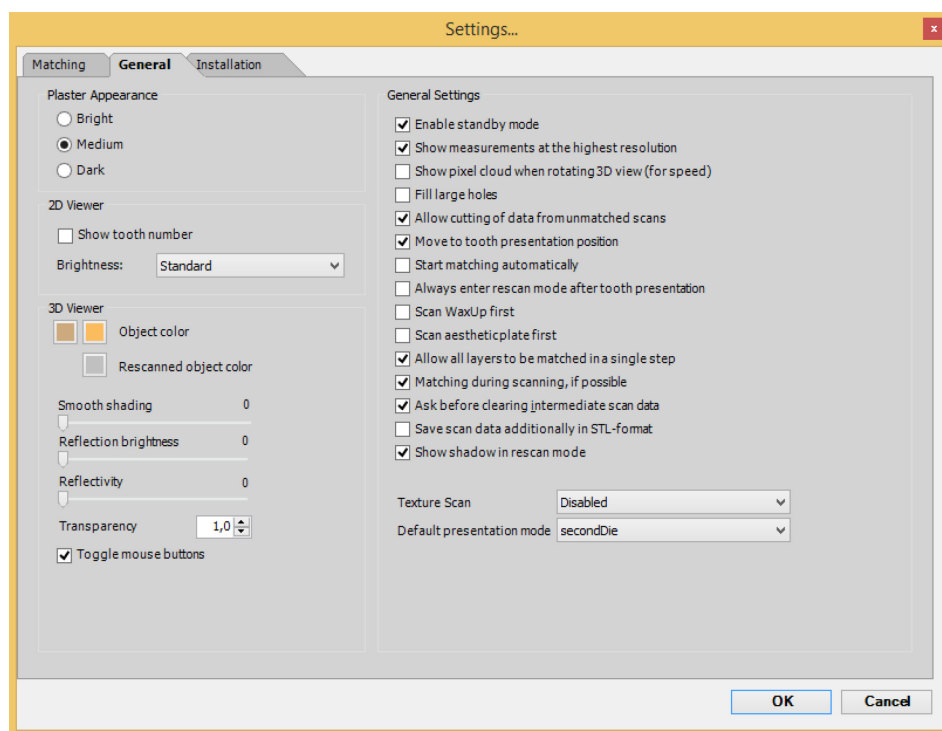


All scan modes are set to the **High** quality stage by default.



9.2. General settings

The general settings govern the 3D and 2D representation and the behavior of the software for certain actions.



Plaster appearance

Light | medium | dark

Plaster appearance

The color of the jaw model influences the light intensity of the sensor during a 3D measurement. If required you can adjust this setting to match the color of the material being scanned.



The **Medium** option is set by default.

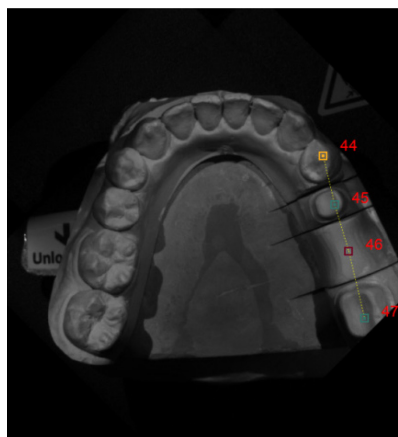
2D viewer

Show tooth number

Show tooth number

The "2D viewer" is a photo of the jaw model from a bird's-eye view. For preparations of individual tooth stump models, mark the exact positions on the photo with colored boxes. Hereby the color corresponds to the respective type of preparation. If the checkbox is activated, each tooth stump model is also marked with its tooth description.

Example



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If a cutting radius is set at the same time, the 2D viewer displays circular cutting lines in the size of the cutting radius.



The checkbox is deactivated by default, i.e. the positions of the tooth stump models are only marked with colored boxes on the 2D viewer.

Brightness

Brightness

The brightness determines the representation on the 2D viewer. You can choose between **bright**, **dark** and **standard**.



Standard is set by default.

3D viewer

Object color
Rescanned object color

Object color | Rescanned object color

The 3D viewer uses colors which allow easy identification of the scan. The second color is used for matched 3D scans. Unmatched 3D scans are displayed in a somewhat darker color tone.

The rescanning color is used for the following purposes:

- for marking the rescanning areas after triggering
- for aligning the correction scans and vestibular models in the lower viewer
- for checking all matched scans.

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Therefore, this color should be distinctly different from the object color.

- ▶ To change a color click the color field.
- ▶ Choose the required color from the Windows color scheme.
- ✓ The color field is shown in the new color.

The color tone of the object varies through shadows and light reflections in the 3D viewer. Dark colors are not suitable as a matter of principle. Very light color tones are not distinguished that well from a background, but can be recognized through shadows and reflections.



The following color definitions are set by default:



Object color 1 (sand-colored)

RGB 205, 170, 125 | color tone 22, saturation 107, brightness 155



Object color 2 (golden)

RGB 251, 188, 94 | color tone 24, saturation 228, brightness 162



Rescanned object color (light gray)

RGB 192, 192, 192 | color tone 160, saturation 0, brightness 181

Smooth shading

Smooth shading

Determines the surface smoothing of the object in the 3D viewer on a scale of 0-100. This setting has no influence on the 3D measurement.



The slider is set to **0** by default.

Reflection brightness

Reflection brightness

Determines the brightness of the light reflection on the object in the 3D viewer on a scale of 0-100. This setting has no influence on the 3D measurement.



The slider is set to **0** by default.

Reflectivity

Reflectivity

Determines the intensity of the light reflection on the object in the 3D viewer on a scale of 0-100. This setting has no influence on the 3D measurement.



The slider is set to **0** by default.

Transparency

Transparency

Determines how transparent the 3D representation will appear. This setting has no influence on the 3D measurement. Values between 0.1 and 1.0 are possible.



The value is set to **1.0** by default.

Toggle mouse function

Toggle mouse function

If the checkbox is deactivated, the assignment of the mouse keys for shifting and rotating the object in the 3D viewer is as follows:

Rotating the object		Hold left mouse key and move mouse
Shifting the object		Hold right mouse key and move mouse
Place point for 1-click assignment		Double-click with left mouse key

The function of the scroll wheel does not change.



The checkbox is activated by default. The mouse keys are assigned as follows:

Rotating the object		Hold right mouse key and move mouse
Shifting the object		Hold both mouse keys and move the mouse
Place point for 1-click assignment		Click with left mouse key
Zooming		Rotate scroll wheel forward for enlarging, backward for reducing

General settings

Enable standby mode

Enable standby mode

Determines whether the software changes to the standby mode after completion or closing a project. Alternatively, the software is closed. The standby mode dispenses with starting processes so that you can start on a new project quicker.



The checkbox is activated by default.

Show Measurements at the highest resolution

This defines whether the object is displayed with very high resolution in the 3D viewer.

Please note that this setting demands significantly more performance from the graphics card. Actions such as calculations, moving objects and adding new images take longer to perform.



The checkbox is deactivated by default.

Show pixel cloud when rotating 3D view (for speed)

This defines whether the object is displayed as pixels in the 3D viewer when the mouse is moved. This optimizes the display speed during the movement.



The checkbox is deactivated by default.

Fill large holes



Determines whether the "Filling holes" correction function is performed automatically during matching. Any remaining "data holes" in a scan (e.g. holes on a straight surface) can be automatically filled with this function.

Please note that this function does not return accurate results.



The checkbox is deactivated by default.

Allow cutting of data from unmatched scans (PCM)



Determines whether the individual images in PCM format can already be cut instead of the results in PLY format.

If you already cut the model bases in the individual images in PCM format, you will accelerate the subsequent processes. To achieve exact measurement results, the individual images should not be cut any further.



The checkbox is activated by default.

Move to tooth presentation position

Determines whether the axes automatically travel to their starting position when starting a scan.



The checkbox is activated by default.

**Start matching automatically**

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Start matching automatically

Determines whether or not individual images generated via a scan are automatically joined together into a 3D model data set. This setting has no influence on the normal workflow.



The checkbox is deactivated by default.

Always enter rescan mode after tooth presentation**Always enter rescan mode after tooth presentation**

Determines whether the rescan mode is automatically activated when presenting individual teeth.



The checkbox is deactivated by default.

Scan WaxUp first**Scan WaxUp first**

Determines whether a wax-up scan can be performed before the 3D dental scan.



The checkbox is activated by default.

Scan aestheticplate first**Scan aestheticplate first**

This setting is only relevant if you are working with exocad® and are using the Full Denture module. If the checkbox is activated, the esthetic template is scanned first in the construction of full dentures.



The checkbox is deactivated by default.

Allow all layers to be matched in a single step**Allow all layers to be matched in a single step**

This setting allows matching all tabs at the completion of a project. If you do not wish to do this, you can alternatively match every tab manually.



The checkbox is activated by default.

Matching during scanning, if possible**Matching during scanning, if possible**

Determines whether the software already matches all individual images during the running process and composes these to a 3D model data set. This setting accelerates subsequent data processing.



The checkbox is activated by default.

Ask before clearing intermediate scan data

Ask before clearing intermediate scan data

This setting relates to the **Clear intermediate scan data (PCM)** function under "Miscellaneous". This function deletes PCM files older than 30 days from the work directory. If the checkbox is activated, a safety query must be confirmed to execute deletion. If the checkbox is deactivated, the PCM files are deleted without a query.



The checkbox is activated by default.

Save scan data additionally in STL format

Save scan data additionally in STL format

Scanning data, in other words individual images in PCM format, are composed through matching to a single file which can be processed by a CAD program. The standard format of dental Scan is PLY, the Polygon File Format. This format has superseded STL, the Standard Triangulation Language, as standard format. However, you can create STL files additionally as an option.



The checkbox is deactivated by default. In other words, only PLY files are created.

Show shadows in rescan mode

Show shadows in rescan mode

A rescan supplements a 3D measurement with an additional image. By aligning the view in the 3D viewer, you determine from which angle this image is to be created. Blue shadows tell you which areas of the model cannot be recorded by the camera using the selected angle.



The checkbox is activated by default.

Texture scan

Texture scan

Using a texture scan, markings are scanned which are located on the surface of a jaw model, for example, pencil markings. In principle, the option exists of scanning such markings in color or black/white or to disregard them. Select a setting here which is to be specified for the start of a new project.



Scope of delivery

The texture scan **monochrome** is possible for all scanners. Texture scan **color** is only available for specific scanners.

You can choose whether you wish to change the specified setting for every project definition.



The texture scan **monochrome** is set by default.

Default presentation mode

Default presentation mode

The individual tooth stumps of a jaw model can be presented with different modes: successive presentation of individual teeth, presentation with the integrated secondDie module or presentation with the optional multiDie module. Alternatively you can dispense with presentation ("skip presentation").

Select a setting here which is to be specified for the start of a new project.

You can choose whether you wish to change the specified setting for every project definition.

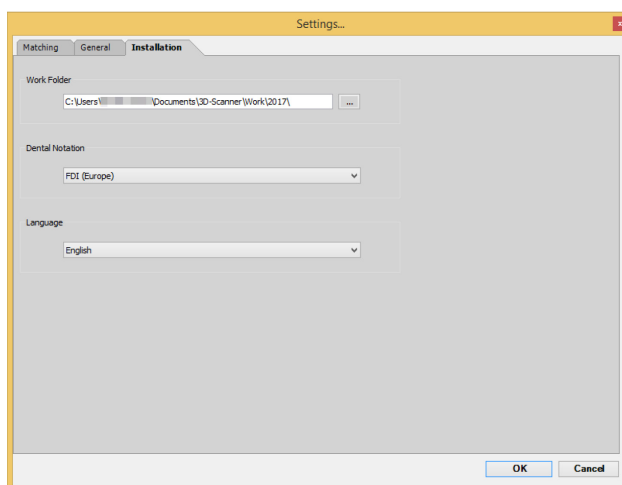


The integrated secondDie module is set by default.



9.3. Installation settings

During installation the work directory, i.e. the save location for scan data and 3D model files is automatically defined, as is the language in which the software is displayed. You can change these settings later on.



Work Folder

Work Folder You can select the folder in which the software saves its scan files.

- ▶ Enter the required path in the field. OR:
 - ▶ Click the **...** button to choose a folder from the folder structure.
 - ▶ Click **OK**.
- ✓ The software now saves new scan data in the selected folder.



By default, the path for the work directory is set as
`C:\Users\[Username]\Documents\3D-Scanner\Work\[YYYY]`
(alternative representation in Windows-Explorer:
This PC ▶ OS (C:) ▶ User ▶ [Username] ▶
3D-Scanner ▶ Work ▶ [YYYY].

Please note that the sub-directory [YYYY] is not adapted automatically at the turn of a year. For example, if you are working in sub-directory 2016 and install an update in 2017, a new sub-directory 2017 is created, but the work directory will continue to be `C:\Users\My Name\Documents\3D-Scanner\Work\2016`.

In order to update the sub-directory after an update, change the path here.

Dental Notation

Dental Notation You can choose which tooth description system is to be displayed in the project definition: FDI (Europe) or UNS (US). The tooth descriptions will be labeled accordingly.



The European FDI system is set by default.

Language

Language From the dropdown list, select the language in which the software controls are to be displayed. The following are available: English, German, French, Italian, Romanian, Spanish, Portuguese, Greek, Turkish, Russian, Czech, Chinese (traditional and simplified), Korean and Japanese. Using the **System language** selection you will ensure that the software language always adapts to the Windows language.



The current Windows language is set after installation.



9.4. Restore standard settings



NOTE

Loss of program functions due to deletion of files

In order to reset the settings of dental Scan to original delivery state, it is necessary to delete a file from a protected directory. If several or other files were deleted by accident, it is possible that dental Scan no longer works.

- ▶ Only execute the following work steps if you have completely understood them.
- ▶ If you are not sure, please ask an experienced Window user or your specialist dealer for support.
- ▶ Should an error occur nonetheless or if dental Scan no longer starts, re-install the software.

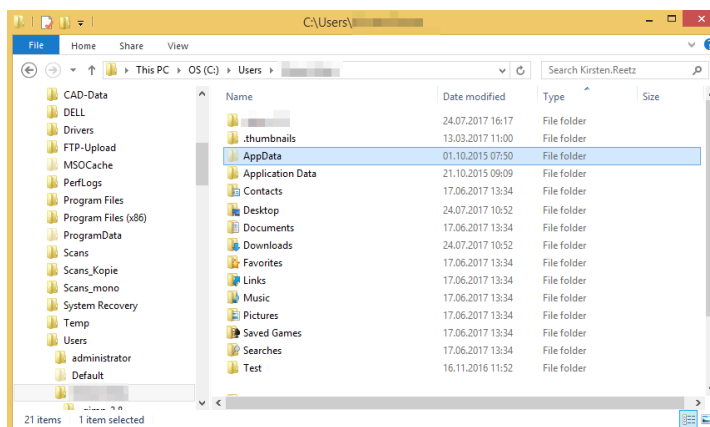
During installation, the standard settings are saved in the installation directory. A copy is created in the local user directory when the program is first started as follows: `C:\Users\[Username]\AppData\Local\3D-Scanner\UserSettings.xml`

All changes you make within the software are saved in the file `UserSettings.xml`. dental Scan will from now on always access your personal settings and no longer access the original settings in the installation directory.

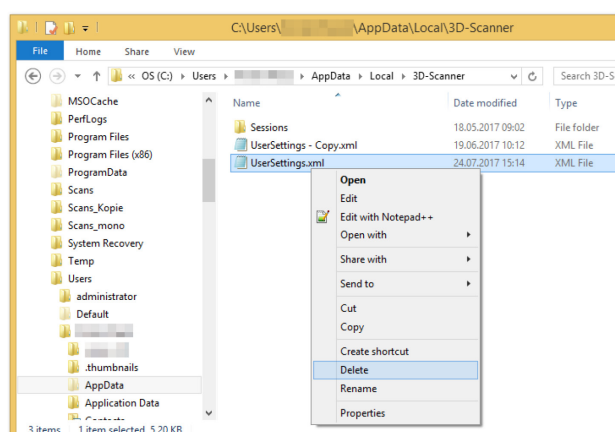
Procedure

To reset your personal settings to the original state of delivery, please proceed as follows:

- ▶ Open the directory `C:\Users\[Username]` in Windows Explorer.
- ▶ Check the checkbox **Hidden Elements** under **View**.
- ✓ The `AppData` folder will be displayed.



- ▶ Open the folder `..\AppData\Local\3D-Scanner\`.
- ▶ For safety reasons, create a copy of the file `UserSettings.xml` under a different name.
- ▶ Delete the file `UserSettings.xml`.



- ✓ The personal settings are deleted.
- ▶ Start dental Scan.
- ✓ The file `UserSettings.xml` is created new in the directory `C:\Users\[Username]\AppData\Local\3D-Scanner\`.
- ✓ dental Scan now works again with the standard settings. These settings will as of now be saved and maintained as personal settings.



TIP

If applicable, you can rename your back-up copy in order to recreate your old personal settings.



10. Roadmaps



This section is presently being prepared.

Not inclined to read the entire instruction manual? Looking for a topic, but not able to find?

The quick and easy way to an overview:

In future you will find overviews ("Roadmaps") here with the stations necessary to achieve a specific goal.



11. Glossary

3D model data set 3D data generated from the scan data. Basis for the CAD software. The format of the data set (e.g. PLY and optionally STL) is open for many applications.

Activation code

A) Code which starts a countdown of 12 months. Updates can be installed free of charge during this period. After this period, a new activation code must be entered following the installation of an update.

B) Code, with which a chargeable module is authorized for use.

Work directory Directory in which the scan results are saved, subdivided by years and projects.

Calibration

A metrological term, here:

A) alignment of the scanner to the values of an industrially calibrated model.

B) alignment of the motion axes with regard to the individual calibration data.

Scan

Representation of a scanned jaw or tooth stump model on the 3D viewer. Scans are based on measured values of individual images (PCMs) as intermediate results. Scans are converted into a 3D model data set by matching.

Calibration data

Individual data which only apply to the calibration of a single scanner. Each set of calibration data is assigned an explicit sensor number, i.e. SO-20242.01-13-062. The first digits SO-202 are always the same, the subsequent numbers differ.

You can find the number in the following places:

- Label or type plate with the appendix "Sensor"



— as name of the folder in which the calibration data are saved.

Important file paths

Windows directories are sometimes indicated differently in Explorer than in conventional spelling. For example, the designation

► This PC ► OS (C:) ► Users corresponds to the directory C:\Users.

Some Windows directories are protected so that these are only displayed by entering the path name in Explorer. The placeholder sign % can replace parts of the path, i.e. %appdata%.

File paths in the current software version

Program files	C:\Program Files\3D-Scanner\dentalScan
Work directory (stand-alone)	C:\Users\[Username]\Documents\3D-Scanner\Work\[YYYY]
Work directory (with exocad®)	C:\Program Files (x86)\exocadFramework\CAD-Data\[Versionnumber]
Folder for calibration data	C:\ProgramData\3D-Scanner\DeviceCharacteristics\Sensors
Protected file for the user settings of the software	C:\Users\[Username]\AppData\Local\3D-Scanner\UserSettings.xml

File paths in older software versions

Program files	C:\Program Files\3D-Scanner\Activity
Work directory (stand-alone)	C:\Users\Public\Documents\3D-Scanner
Work directory (with exocad®)	C:\Program Files (x86)\exocadFramework\CAD-Data\[Versionnumber]
Folder for calibration data	C:\Programs (x86)\3Dscanner\Activity\Data
Folder for reports	"C:\Users\[Username]\AppData\Roaming\3D-Scanner\Sessions"

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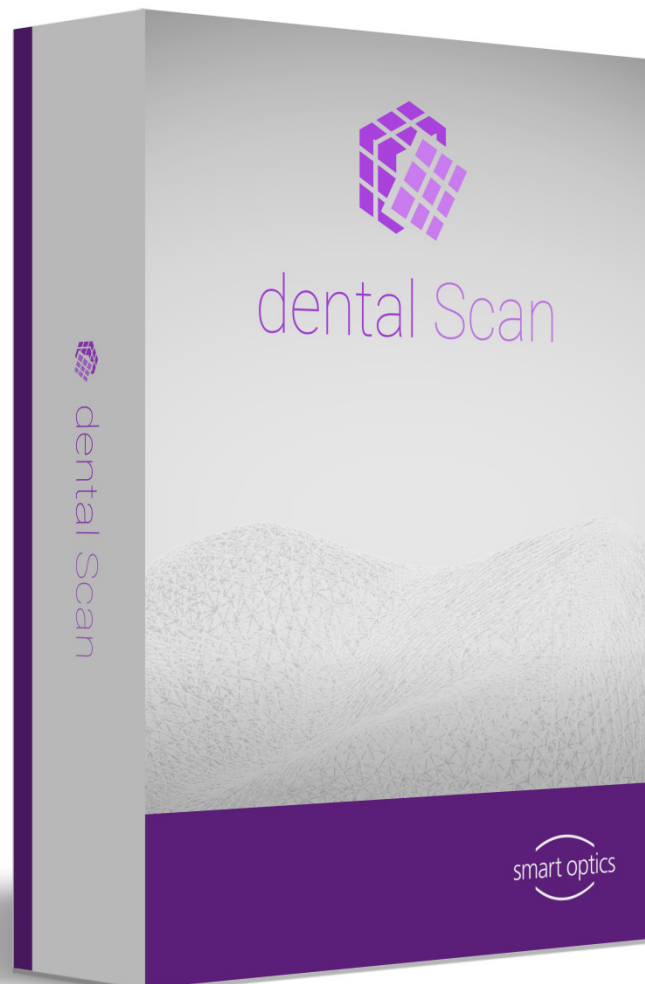
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