Dentsply Sirona

OraCheck

Software Version 5.0.x

Operator's Manual

English

Table of Contents

1 Introduction

1.1 Welcome

Dear OraCheck User,

Thank you for purchasing your OraCheck software from Dentsply Sirona.

OraCheck enables you to overlay various three-dimensional models produced with the CEREC acquisition unit and to measure differences between individual models and display them color-scaled.

Improper handling and usage can result in incorrect interpretations or wrong results. Therefore, please read and carefully follow this manual and the relevant operating instructions.

Prerequisite for the successful application of OraCheck is basic working knowledge of the acquisition units from Dentsply Sirona and the corresponding software. For questions regarding use of the acquisition unit or software, consult the corresponding manual.

To prevent damage to third parties and property, adhere to both the safety instructions provided in this document regarding the devices as well as the instructions provided in the software.

We trust that you will find using our software a positive experience.

Your
OraCheck team,

1.2 Contact information

Customer Service Center

In the event of technical queries, please use our online contact form at the following address:
http://srvcontact.sirona.com

Manufacturer's address

Sirona Dental Systems GmbH
Fabrikstrasse 31
64625 Bensheim
Germany

Tel.: +49 (0) 6251/16-0
Fax: +49 (0) 6251/16-2591
e-Mail: contact@dentsplysirona.com
www.dentsplysirona.com

1.3 Copyright and trademark

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Trademarks

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Windows™ is a trademark of Microsoft Corporation.

All other trademarks are the property of their respective holders.

2 General data

Please read this document completely and follow the instructions exactly. You should always keep it within reach.

Original language of the present document: German

2.1 Certification

CE mark

This product bears the CE mark in accordance with the provisions of the Council Directive 93/42/EEC of June 14, 1993 concerning medical devices (MDD).

2.2 General safety information

Only use genuine software

Only use genuine software or software released by Dentsply Sirona.

Software and software components must not be installed using false information.

Check whether an approval for your country exists for OraCheck. Do not use this product if such an approval does not exist.

Checking the installed software version

You can check which version is installed during operation.

1. On the phase bar, tap on or click "OraCheck".

2. Tap on or click the double arrow (A) of the open window.
3. The expanded window contains all relevant information of the OraCheck software.
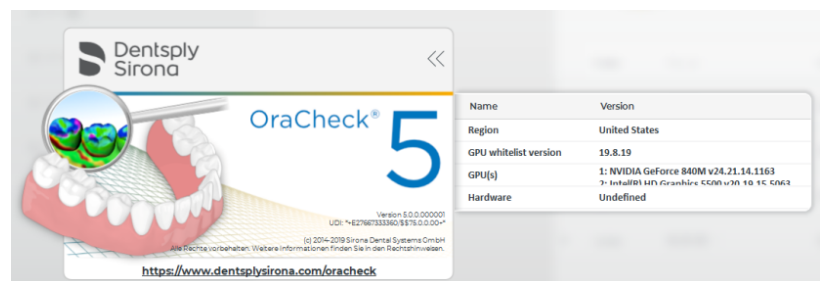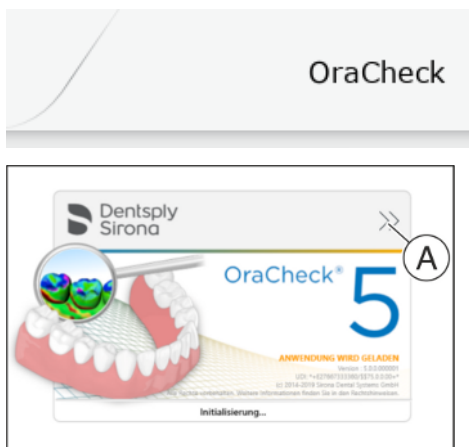
OraCheck does not replace the conventional working method

Measurements taken with OraCheck must not be used on their own but only for verifying the conventional diagnostics methods. Also observe section "Application and limitations [→ 11]" regarding the application of the software.

2.3 Structure of the manual

2.3.1 Identification of the danger levels

To prevent personal injury and material damage, please observe the warning and safety information provided in these instructions for use. Such information is highlighted as follows:

⚠ DANGER
An imminent danger that could result in serious bodily injury or death.

⚠ WARNING
A possibly dangerous situation that could result in serious bodily injury or death.

⚠ CAUTION
A possibly dangerous situation that could result in slight bodily injury.

NOTE
A possibly harmful situation which could lead to damage of the product or an object in its environment.

IMPORTANT
Application instructions and other important information.

Tip: Information for simplifying work.

2.3.2 Formats and symbols used

The formats and symbols used in this document have the following meaning:

✔ Prerequisite **1.** First action step **2.** Second action step or ➢ Alternative action ⇨ Result ➢ Individual action step	Requests you to do something.
See "Formats and symbols used [→ 8]"	Identifies a reference to another text passage and specifies its page number.
● List	Designates a list.
"Command / menu item"	Indicates commands / menu items or quotations.

2.3.3 Conventions

Example	Meaning
Click	Pressing once and releasing the left mouse button or the left trackball button on the acquisition unit (or foot switch).
Double-click	Pressing and releasing the left mouse button or the left trackball button on the acquisition unit (or foot switch) twice quickly in succession.
Move the mouse in one direction	On the acquisition unit: Moving in the corresponding direction with the trackball or via the touchpad.
Grab a point	Pressing the left mouse button (left trackball button on the acquisition unit) and keeping it pressed.
For acquisitions with the CEREC AC: Actuate the foot switch	The same function as: Pressing the left trackball button on the acquisition unit or the left mouse button.
"Ctrl+N"	On the keyboard: Press the **Ctrl** and **N** keys simultaneously.
Drag & drop	Dragging and dropping. Clicking on an element (e.g. icon), holding down the mouse button and releasing it on a possible destination.

2.3.4 Manual formats (assistance)

A PDF version of the user manual can be found online at (http://www.dentsplysirona.com/manuals).

This format is page-oriented and is well suited for printing out the desired pages.

2.4 File formats

You can assign one or more cases to each patient in the software. Depending on the processing status, a case comprises digital impressions and the overlays implemented with them.

The software uses its own file format (*.oc) when exporting a case into a file. This format contains all of the case data including patient information. OC files can be opened with other OraCheck software installations. Under certain circumstances, older software versions cannot open data exports from a more recent version.

2.5 Supported Dentsply Sirona products

OraCheck 5.x (or newer) supports the following Dentsply Sirona products:

- **CEREC SW 5.x (or newer)**
- **CEREC Ortho SW 2.1 (or newer)**
- **Connect SW 5.x (or newer)**

OraCheck 5.x requires Windows 10 and cannot be started from older versions.

3 Application and limitations

3.1 Application

In connection with a digital, optical impression system, OraCheck is designed to visualize differences between virtual optical scans on the computer. These differences may include movements, rotations as well as geometric surface changes.

Depending on the given, clinical situation evaluated by the dentist, these changes can indicate abrasion, swelling, recession, plaque and a changed tooth position.

3.1.1 Intended patient group

No restrictions.

3.1.2 Intended user profile

- Qualified (licensed) dentist
- Dentist/student in training (university)
- Assistant dentist (university or practice)

3.2 Limitations

> ⚠ WARNING
>
> Measurements taken with OraCheck must not be used on their own but only together with conventional diagnostics methods for the creation of a diagnosis.

4 Getting started

4.1 Installing the software

IMPORTANT
Prerequisite for the proper installation is that one of the products mentioned in section "Supported Dentsply Sirona products [→ 10]" is installed on your system.

✓ The PC is booted and all programs are closed.

✓ You have received an installation file for the installation.

1. Transfer the installation file, for example, with a USB stick, to the acquisition unit or Windows 10 PC.

2. Double-click this file to start the setup program.
   ↳ The installation wizard opens.

3. Click the *"Next"* button.

4. Read the license agreement carefully. If you accept the license agreement, select the *"I accept the terms in the license agreement"* check box and then click the *"Next"* button.

5. In the next step, you can choose the installation folder. You can also select whether a desktop shortcut is to be created. Click *"Next"*.
   ↳ All compatible host applications are now listed. As a default, OraCheck is installed for all existing host applications (CAD/CAM products). Here individual host applications can be excluded.

6. Click the *"Next"* button.

7. Click the *"Install"* button.
   ↳ The installation starts. This may take several minutes.

8. Following the successful installation, click the *"Finish"* button to finish the installation.
   ↳ The installation program closes.

4.2 Uninstalling the software

✓ The program is closed.

➢ Uninstall the OraCheck software via the Uninstall function of Windows.

4.3 Copy protection

The software can be started only if you have installed a valid OraCheck license. The USB license stick is included in the scope of delivery of the Dentsply Sirona acquisition units.

The OraCheck license token with the 25-digit license key is available from your Dentsply Sirona distribution partner.

You can install the OraCheck license via the license manager on the USB license stick included in the scope of delivery, if you have purchased a Dentsply Sirona hardware product.

Optionally the installation of the license can also take place directly on a Windows 10 PC without a license stick.

When installing the OraCheck software, a virtual Codemeter license container is copied onto the computer for this purpose. The OraCheck license is inextricably merged together with this virtual license container and the PC hardware. If the PC is no longer working, the license will no longer work. If the user is not happy with this, a USB license stick can still be purchased from the Dentsply Sirona distribution partner.

IMPORTANT
If you have no valid license for OraCheck, you cannot export any cases from the Dentsply Sirona CAD/CAM software to OraCheck. In addition, you cannot start OraCheck from the CAD/CAM software but only via the desktop icon. In this case only loadable demonstration examples and no acquisitions from the Dentsply Sirona CAD/CAM software are available.

Following a software update, you may require a new license that is not available on your USB license stick. For further information, refer to section "License manager [→ 16]".

4.4 Service packs and upgrades

Information about future service packs and upgrades of OraCheck can be found here:

https://my.cerec.com and

www.dentsplysirona.com

4.5 Updates and upgrades of the Dentsply Sirona CAD/CAM software

When you install an update or upgrade of the Dentsply Sirona CAD/CAM software, parts of OraCheck are also removed by the installation program. Therefore a reinstallation of OraCheck may be required after a version upgrade as described in section"Installing the software [→ 12]".

5 User interface
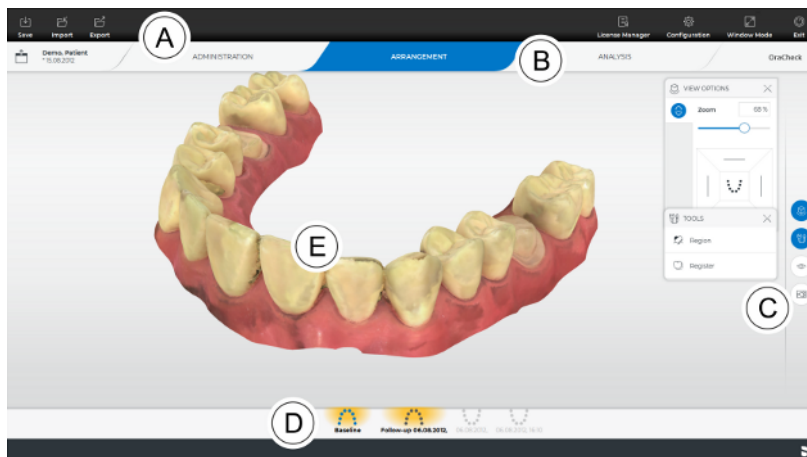
A	System menu	B	Phase bar
C	Page palette	D	Object bar
E	Main window		

5.1 System menu
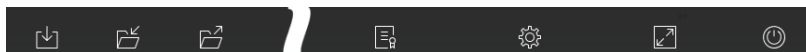
In the system menu you can perform the following actions:

- Save a case
- Export a case
- Import a case
- Open the license manager
- Configure the software
- Change the window mode
- Close the software

Opening the system menu

➢ Move the cursor to the upper left corner of the application window and click the "System menu" symbol.
   ↳ The system menu is displayed.

Closing the system menu

1. Click the "System menu" symbol.

or

➢ Exit the system menu with the cursor.
   ↳ The system menu is closed.

5.1.1 Saving a case

In this dialog, you can save the current case.

➢ Select the *"Save case"* in the system menu.
   ↳ The current processing status of the case is saved.

5.1.2 Exporting a case

You can store a case in any location in the OraCheck format *.oc.

✓   You have opened a case in the software.
1. Click the *"Export"* button in the system menu.
    ⮡   The Export case dialog window opens.
2. Select the target folder to which you want to export the case.
3. Assign any name to the case.
4. Click the *"Save"* button.
    ⮡   The case is exported as an OC file.

If you would like to transfer the case to another PC, you can use a USB stick or a network drive for this purpose.

5.1.3 Importing a case

✓   The OC or STL file of a case is stored on the acquisition unit or on a storage medium connected to it.
1. Click the *"Import case"* button in the system menu.
    ⮡   The *"Import case"* dialog box opens.
2. Select the folder where the case is located.
3. Select one or more files.
4. Click the *"Open"* button.
    ⮡   The optical impression is imported and opened.

Currently you can import both STL files as well as OC files. When STL files are imported, you must manually add the patient information and whether it is an upper jaw or lower jaw.

NOTE
Importing STL files
STL is an open data format with different data quality. Dentsply Sirona cannot guarantee the functionality when STL files are imported.

5.1.4 License manager

The license manager is used for the installation of new software licenses on the USB license stick. To do this, start the license manager via the system menu and follow the instructions on the screen. Keep the 25-digit code which you received with the purchase of OraCheck at hand.

Tip: You can also start the license manager via "Start / All Programs / Sirona Dental Systems / OraCheck / Tools / License Manager".

**You must have an Internet connection to activate the license.
For installation on a USB license stick, it must be inserted.**

If the acquisition unit does not have Internet access itself, you can run the license manager on another PC with Internet access.

The license stick must be removed from the acquisition unit and plugged in to the PC with Internet access. The license stick is located behind the lower cover on the rear of the acquisition unit.

Install the license manager on the PC with Internet access and run the license update.

Licenses and code libraries

For information on licenses and code libraries from other providers, see licenses.pdf. The file is located in the installation directory under "C:\Program Files\Dentsply Sirona\CADCAM\Apps\OraCheck".

5.1.5 Configuration

The *"Configuration"* menu opens the *"Settings"* submenu, in which two settings can be made.
- Warnings
- Language

5.1.5.1 Resetting warnings

All warnings can be reset here. The warnings that you individually hid manually are all shown again.

5.1.5.2 Selecting a language

Here you can set the language of the software. Once the software is rebooted, the language is set to your choice.

Possible options are:
- English
- German
- French
- Italian

5.1.6 Window mode

The *"Window Mode"* function can be used to activate or deactivate the full-screen mode.

5.1.7 Current program version

If you click on the lettering *"OraCheck"* in the phase tab, you obtain information on the current program version.

5.1.8 Exiting the program

The *"Exit"* function can be used to close the software.

5.2 Page palette

Different functions are offered in the page palette, depending on the current phase. The page palette is available in the ANALYSIS and ARRANGEMENT phases.
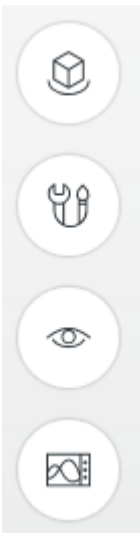
5.2.1 View options
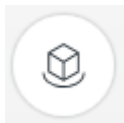
You can use the *"View Options"* button to display 5 predefined views. The views correspond to the view of the dentist and not that of the patient.

- Occlusal
- Right/left
- Front/rear

5.2.1.1 Changing the view
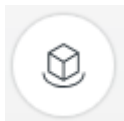
1. Click the *"View Options"* button.
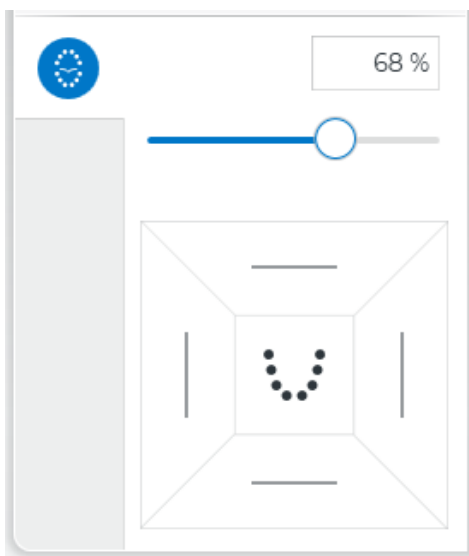
2. Click on one of the offered views.
   - ⮎ The virtual model rotates to the corresponding view.

5.2.1.2 Enlarging or reducing the view
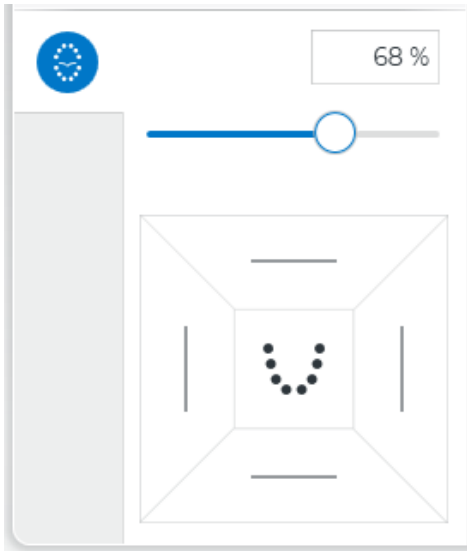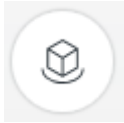
1. Click the *"View Options"* button.

2. Use the slider on the button or enter the scaling value directly in the input field.

or

➢ Alternatively, you also can use the mouse scroll wheel or the middle button to enlarge or reduce the view.

5.2.2 Tools
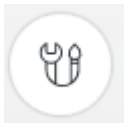
Various tools are available depending on the phase.

- Arrangement tools, see "ARRANGEMENT phase [→ 30]".
- Analysis tools, see "ANALYSIS phase [→ 36]".

These tools are offered in the page palette.

5.2.3 Displaying objects

5.2.3.1 Displaying the selected jaw
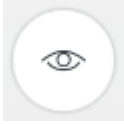
The *"Display objects"* button enables you to display and hide the selected model as well as adjust the transparency of this model.
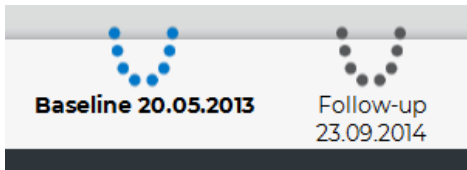
You recognize the selected model by the fact that it is displayed in blue and in bold letters in the object bar (in the example on the left, the baseline model).

Proceed as follows, to show or hide the selected model:

1. Click the *"Display objects"* button.

2. Click the *"Selected"* button.
   ↳ The selected model box is displayed or hidden (blue or white background of the symbol).
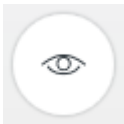
5.2.3.2 Display non-selected jaw

The *"Not selected"* button enables you to display and hide the non-selected model as well as adjust the transparency of this model.

The non-selected model is displayed in gray and in black letters in the object bar.

Proceed as follows, to show or hide this model:

1. Click the *"Display objects"* button.

2. Click the *"Not selected"* button.
   ↳ The non-selected model is shown or hidden.
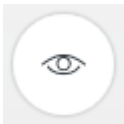
5.2.3.3 Displaying selected/non-selected transparently

You can continuously adjust the transparency of the models.
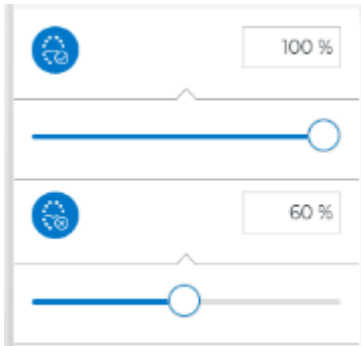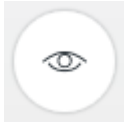
1. Click the *"Display objects"* button.
2. Activate the selected (or non-selected) model whose transparency you want to change.
   - ✎ A slider appears.
3. Move the corresponding button of the slider with a pressed left mouse button from left to right.
   - ✎ The transparency of the selected model is changed.

Alternatively, you can also set the transparency (opacity) as a percentage in the displayed text field. It is not possible to completely hide the corresponding model with the transparency setting.

Tip: You can switch between the selected and non-selected model by double-clicking in the 3D window as well as by pressing the space bar.

5.2.3.4 Region

The *"Region"* button allows the transparency of the marked regions to be switched on and off as well as adjusted. This is helpful if the regions are to be defined based on the color model, for example. Depending on the active phase, the visibility of the region for the overlay (ARRANGEMENT phase) or the area of the analysis (ANALYSIS phase) is changed.

1. Click the *"Display objects"* button.
2. Click the *"Region"* button.
   - ✎ A slider appears.
3. Move the corresponding button of the slider with a pressed left mouse button from left to right.
   - ✎ The transparency of the region is changed.

Alternatively, in the displayed text field, you can also set the transparency as a percentage. It is not possible to completely hide the corresponding region with the transparency setting.

Tip: You can switch the visualization of the region on and off completely by clicking the button (single-click).

The *"Region"* button refers to the visibility of the regions on all displayed models.

5.2.3.5 Color model

The *"Color model"* button can be used to show or hide the color (texture) of the model display.

If no color information is available, for example because the model was read in via STL import, this button is displayed grayed out.

> **NOTE**
>
> If the color model is activated, *"Follow-Up"* and *"Baseline"* can no longer be differentiated from each other via the surface color. In this case, use the transparency setting for the non-selected model. Which model was selected can be determined via the object bar.

5.2.4 Measurement tools
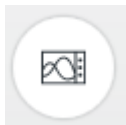
You have the option of performing the following measuring functions by clicking the *"Analysis tools"* button.

- *"Cursor details"*
- *"Span distance"*

Tip: The measurement tools are not available during the drawing in of regions.

5.2.4.1 Cursor details

The *"Cursor details"* button activates a tool that allows pointwise measurement of the surface distance between *"Follow-Up"* and *"Baseline"*.
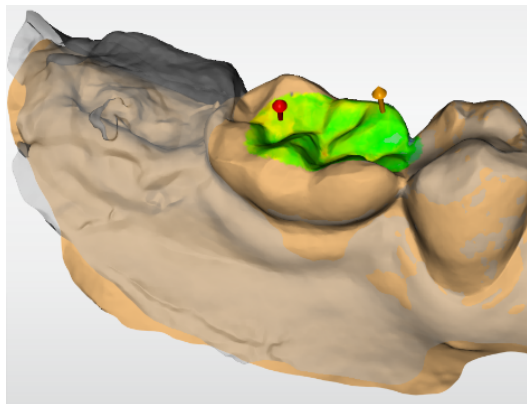
The corresponding measured values are shown in the display window on the bottom left. The surface of the region over which the cursor is located is also displayed.

1. Click the *"Analysis tools"* button.
2. Select the *"Cursor details"* check box.
   - ↳ The distance between the follow-up and baseline model is displayed at the mouse cursor and additionally visualized in real-time with an orange arrow.
   - ↳ If the cursor is located over a region, the area of the region in mm^2 is also displayed.
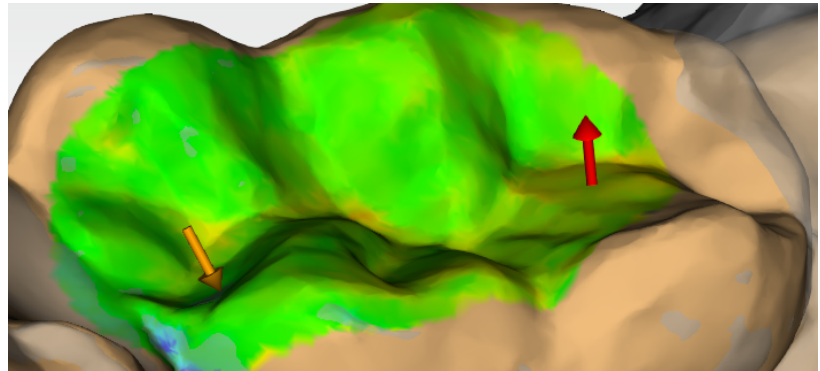
Tip: A single click with the left mouse button places a red arrow in addition to the orange arrow. You can remove the red arrow again by clicking it with the right mouse button.

The sign of the distance display indicates whether it is a material increase or a material decrease. If the surface of the follow-up model is above the surface of the baseline acquisition, the distance is positive. Otherwise, the distance is negative. The direction of the material increase or decrease is displayed additionally through the direction of the displayed arrow.

5.2.4.2 Span distance

You can also use the *"Span distance"* button to manually measure distances on the surfaces.

1. Click the *"Analysis tools"* button.
2. Click the *"Span distance"* button.
3. Click the models to define the starting point and end point of the measurement.
   ⮡ The span distance is displayed in the display window at the bottom left.

5.3 Phase bar

| ADMINISTRATION | ARRANGEMENT | ANALYSIS |

The workflow of the software is organized in 3 phases:
- ADMINISTRATION
- ARRANGEMENT
- ANALYSIS

The current phase is displayed in the phase bar with a blue background.

Tip: By clicking in the phase bar, you can jump back to an already completed phase at any time.

5.4 Object bar
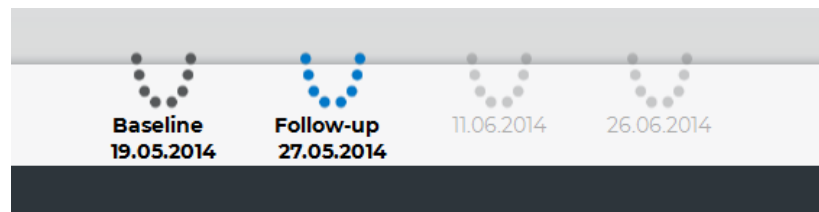
The buttons for model selection are located in the object bar. The object bar is available in the ARRANGEMENT and ANALYSIS phases. Based on the time of acquisition, the oldest model is designated with *"Baseline"*, the other with *"Follow-Up"*.

The object bar is used in the ARRANGEMENT phase to select the acquisition from all the acquisitions contained in the current case for use in the analysis.

In the ANALYSIS phase, you can activate one of the models selected for the analysis by clicking the corresponding model in the toolbar.

Tip: Alternatively, you can also switch between the baseline and follow-up model by double-clicking in the main window.

If you want to use a follow-up model as a baseline, you can switch to the *"ADMINISTRATION"* phase and edit the case. Assign the model intended as the new baseline with the oldest date of the case. After saving the change this model is used as the baseline in the future.

NOTE
This procedure is only recommended in exceptional cases because there is the danger of losing track of when the individual models were scanned.

6 ADMINISTRATION phase

In the ADMINISTRATION phase, you can perform the following:

- Edit information of the patient
- Open the saved cases of a patient
- Recombine cases
- Edit cases
- Delete cases

Available cases are displayed in this phase. The available models for each saved case are displayed with date and time. Patient data can be edited and cases and acquisitions that are no longer needed can be deleted.

6.1 Editing a patient

As soon as you export a case from the Dentsply Sirona CAD/CAM software to OraCheck, patient data such as name and date of birth is transferred from the Dentsply Sirona CAD/CAM software in addition to the acquisition data. This enables you to find a patient and the cases for that patient in OraCheck during the course of treatment and to differentiate patients from one other.

Typically it should only be necessary to change patient information in OraCheck in exceptional cases, for example if a patient name was entered incorrectly in the Dentsply Sirona CAD/CAM software or if acquisitions were imported from STL files.

Clicking the *"Edit patient"* button opens an input form in which you can edit patient information:

- Last name
- First name
- Date of birth
- Patient ID

In case of input errors, for example an invalid date of birth or a duplicate patient ID, an exclamation mark indicating the error appears to the right of the input field.

IMPORTANT
Observing data protection
For data privacy reasons, a patient ID should be used instead of the full name. Make sure that the free text fields are completed in terms of the applicable data privacy law.

As soon as the patient information has been entered in such a way that all patients in the database can be clearly distinguished from each other, you can exit editing mode by clicking the check mark to the right of the patient line.

If you want to cancel the editing, click on the cross.

6.2 Combine cases for analysis

This button is available to you in different versions.

1. *"Add as a new case"*: Saving a case imported from the Dentsply Sirona CAD/CAM software as a separate case without combining it with another case existing in OraCheck.
2. *"Combine cases"*: Combining a case imported from the Dentsply Sirona CAD/CAM software with an existing case in OraCheck.
3. *"Recombine"*: Combining of two cases existing in OraCheck.

6.2.1 Add As New Case

The *"Add as a new case"* button is available when:

- A case was exported from the Dentsply Sirona CAD/CAM software to OraCheck,
- An STL file was imported, or
- An existing case was selected using *"Recombine"*.

The case to be newly combined is displayed with an orange background, and no other case may be selected (blue background) at the same time. See the following figure.
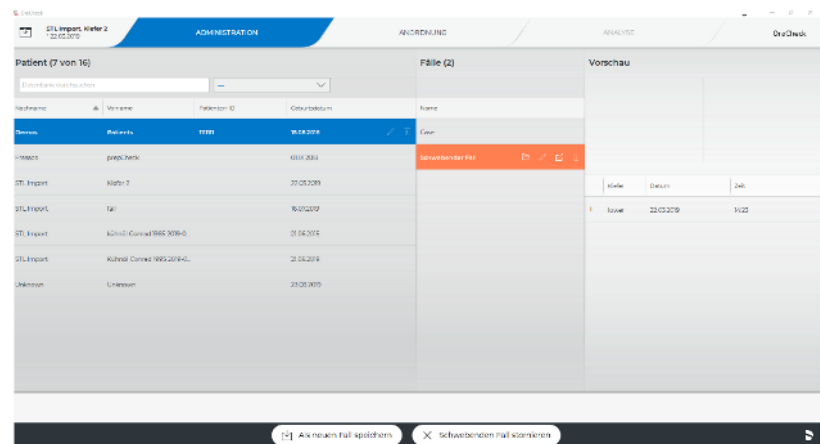
6.2.2 Combine Case

This button is available to you as soon as you have exported a case from the Dentsply Sirona CAD/CAM software to OraCheck or have selected an existing case in OraCheck using *"Recombine"*. This is indicated by a case having an orange background. **At the same time, a further case must be selected (blue background).**
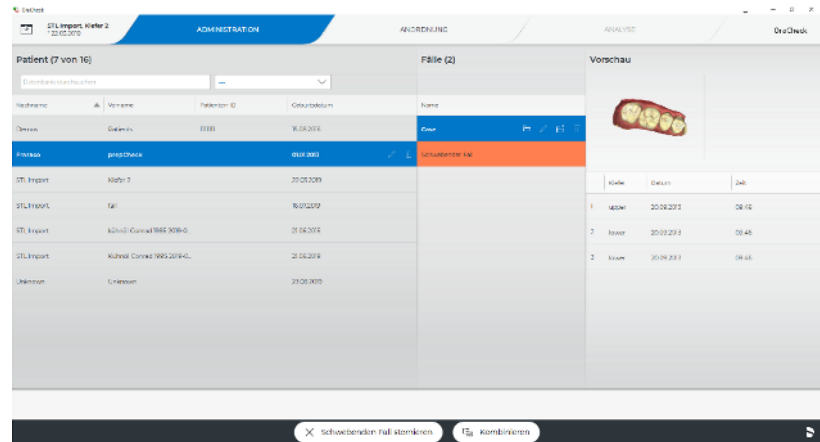
When the *"Combine"* button is pressed, the case with orange background is combined with the selected case (blue background) and still displayed as a floating case. This new floating case contains all the models of the previously imported orange case and the selected blue case.

6.2.3 Recombine Case

This button allows you to combine cases that were previously exported to OraCheck. It is visible if no floating case is available, meaning that no case has an orange background.

As soon as you press the button, the currently selected case is copied in the memory, opened and displayed as a floating case with an orange background. You can then treat the case as if it had just been imported from the Dentsply Sirona CAD/CAM software to OraCheck.

6.3 Open Case

The *"Open case"* button opens the selected case for the current patient and switches to the phase ARRANGEMENT. If this case has already been analyzed, an automatic switch is made to the ANALYSIS phase.

You can achieve the same effect by clicking on the desired case or on an acquisition of the desired case.

6.4 Edit Case

The pencil symbol allows a title and comments for the selected case to be entered or changed.

The entry must then be confirmed by clicking the check mark or cancelled by clicking the cross.

6.5 Editing acquisitions

Analogous to the editing of cases, the pencil symbol in the column of the acquisitions allows the date and time of each acquisition to be changed. In addition, it can be specified whether this acquisition is of the upper or lower jaw.

NOTE
Wrong order
If the acquisition date is changed, the baseline acquisition and follow-up acquisition may be compared in the wrong order. This can in turn result in distances being specified with the wrong sign (this means that material increases are interpreted as decreases and vice versa).
➢ Only change the acquisition date if you are sure!

6.6 Exporting a case

This symbol allows the direct export of a case in the ADMINISTRATION without having to previously load the case. When this button is clicked, a file dialog for the selection of the storage location opens.

6.7 Deleting a case

A case including all contained acquisitions is irreversibly deleted from the OraCheck database and from the hard disk by clicking this button, followed by confirmation.

The case is not deleted from the database of the Dentsply Sirona CAD/CAM software and can, if necessary, be exported again to OraCheck via the Dentsply Sirona CAD/CAM software.

7 ARRANGEMENT phase

In this phase you can complete the following tasks:

- Select models for the analysis,
- Set the arrangement region (optional).

Both tasks are described in more detail below:

7.1 Selecting models for the analysis

In this work step, two acquisitions that are to be overlaid and analyzed are selected by means of the object bar.

The models available for analysis are represented by stylized dental arches. The acquisition date and time is displayed below the dental arches.

In order to specify two acquisitions as the baseline and follow-up model, they can be added or removed with a single mouse click. Note that no more than two models are ever analyzed. Therefore no more than two models can be selected at any time. If two models have already been selected, it is therefore necessary to first deselect one of the two models in order to add another model.

The sequence in which the models are represented in the object bar always corresponds to the chronological sequence of the acquisition. The model acquired earlier is always located on the left.
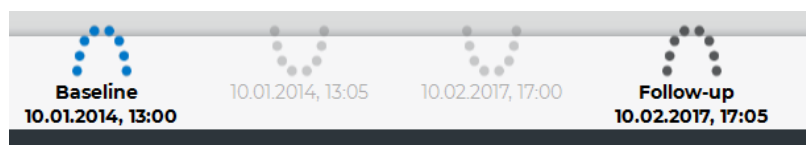
Exactly two models can be selected in OraCheck for the analysis. Of these two models, the one furthest on the left is therefore always the baseline model that was acquired chronologically before the follow-up model.

The currently selected model is symbolized by a blue dental arch while the non-selected model is symbolized by a dark gray dental arch. The dental arches displayed in light gray are not selected for the analysis.

Models of both the upper jaw and lower jaw are located in the object bar. To access the subsequent ANALYSIS phase, two upper jaws and two lower jaws each must be selected.

If two models have selected for the analysis, you can switch between the two models by double-clicking in the 3D scene or via the space bar. As already mentioned the selected dental arch is shown in blue.

IMPORTANT
To activate the non-active model, you do not necessarily have to double-click the desired model. This, for example, could have unwanted side effects for an activated region tool because the region of the active model would be changed as well in this case. Instead you can also switch the active model by double-clicking in the background.

After selecting the baseline and follow-up models in the ARRANGEMENT phase, you can switch to the ANALYSIS phase by clicking the Analysis button (in the phase bar).

IMPORTANT
If you are unable to switch to the ANALYSIS phase, make certain that two models are selected in the object bar and that both represent either upper jaws or lower jaws.

If special regions were selected in the ARRANGEMENT phase, as described below, the regions selected there are used as reference for the overlay. Otherwise the models are overlaid on the basis of the complete surfaces.

The following chapter describes how you can define the arrangement regions for the overlay.

7.2 Specifying an Arrangement region

> **NOTE**
>
> Even though an overlay can often be calculated without specification of an overlay region, the specification of overlay regions is necessary, depending on the patient case, to obtain results that are usable at all. Before the overlay, the user must first assess which regions of the acquired models have remained constant between the acquisitions. These areas should be marked on at least one of the models to be compared. Subsequently the quality of the overlay should be checked visually. This can be done, for example, using the distance analysis on the overlay regions.

7.2.1 Introduction

The purpose of defining the arrangement region is to define areas on the model that are to be used for calculating the overlay. This step serves only to support the calculation and should be used when the overlay of acquisitions leads to undesired results without a definition of the region. You can find background information on overlaying in section "What is the procedure for overlaying models? [→ 49]".

One or more regions on the selected model can be selected with the region tool. The region can be expanded, reduced or reset. If the mouse cursor is exactly on the line, the line can be edited with a double-click.
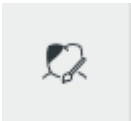
7.2.2 Purpose

If the *"Region"* tool is selected in the ARRANGEMENT phase, once the baseline model is selected, specific areas/regions on this model to be used as reference for the overlay can be marked. The corresponding areas/regions can then also be marked on the follow-up model with the same tool.

The marking of individual areas in the ARRANGEMENT phase is especially useful in situations in which the two models to be overlaid show large deviations but also have some identical areas.

Example

An adjustment of the upper front teeth with anchoring on the premolars and molars. Here it is useful to mark the anchor teeth on both models as a region since these areas should be nearly unchanged on both models. At an automatic overlay of both models problems in correct overlay could arise if regions are not defined.

Normally a selection of areas in the ARRANGEMENT phase is rarely necessary since the OraCheck software models are automatically and precisely overlaid.

You can enlarge or reduce the diameter of the selection area if you move the cursor with pressed right mouse button on the model to be marked towards the top (enlarge) or bottom (reduce).
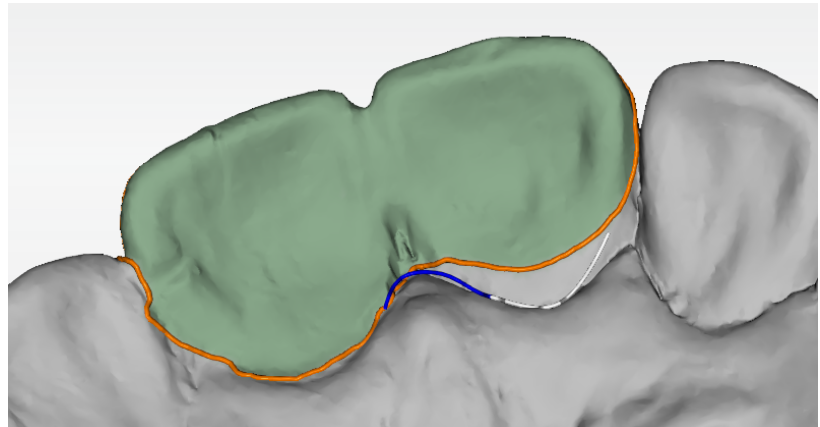
By double-clicking on the line at the edge of the selection area (cursor becomes a cross), the line of the selection area can be edited analogous to the preparation edge in the Dentsply Sirona CAD/CAM software.

7.2.3 Defining region(s)

✓ You are in the ARRANGEMENT phase and two models to be compared are already specified in the object bar.

1. In the page palette, click the *"Tools"* button.
   ↳ The tool menu opens.
2. Click the *"Region"* button.
   ↳ The *"Region"* tool opens.
3. Click the *"Expand"* button to create a region for the overlay or to enlarge it. Then, while holding down the mouse button, move the mouse cursor over the model to define the region. To change the size of the overlay region, move the mouse upward or downward while holding down the right mouse button.
4. Click the *"Reduce"* button to reduce the region analogous to above.

or

➢ Click the *"Reset"* button to delete the region on the active model.

5. If the overlay with the specified region leads to an undesired result, in order to assist the overlaying process a region can also be defined on the second of the two models that is to be overlaid with the region on the first model. Double-click in the background to switch to the other of the two models and perform the steps listed above again.
   ↳ The drawn overlay region of one or both models is marked in color.
6. Switch the transparency of the regions on or off or change the transparency value. This step is helpful if you want to use information from the color model to define the regions.
7. Click the *"Region"* button again.
   ↳ The *"Region"* tool is closed.
8. You can now switch to the ANALYSIS phase. The recently selected regions are used as reference for the overlay or you can perform the overlay using the the overlay tool described below.
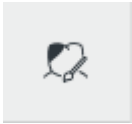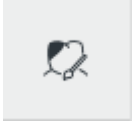
7.3 Overlay

The overlay of the two models is automatically performed at the transition to the ANALYSIS phase. During definition of an overlay region it may be desirable to test the overlay and to check the effect of the overlay regions on the overlay. The *"Overlay"* tool is used to this purpose.

1. Click the *"Overlay"* tool to perform an overlay.
   ⮫ The result of the overlay is then displayed.

   ⮫ If the overlay shows a large error, this is indicated by an exclamation mark in the dialog.
2. In this case check whether the overlay can be improved by adjusting the overlay regions.
3. Click the *"Reset"* button to restore the situation before the overlay.

8 ANALYSIS phase

Change to the ANALYSIS phase by clicking in the phase bar. In the ANALYSIS phase, the baseline and follow-up models are available in overlaid form and the chronological sequence of changes to the surfaces can be analyzed with the available tools.

The quality of the overlay is temporarily displayed in detail in an information or warning window (see also section "Overlay [→ 35]") and is then visible as the average distance of the two models in the lower right corner of the screen.

After clicking the *"Tools"* symbol in the page palette, the available tools can be opened.
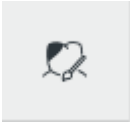
The following tools are available in the tool menu.

● Region
● Volume analysis
● Distance analysis
● Section view
● Tilt analysis

A comprehensive description of these tools can be found in the subsections below.

8.1 Specifying a region

The *"Region"* tool is handled the same in the ANALYSIS phase as in the ARRANGEMENT phase. Regions on the model can be selected and deselected here by expanding, reducing or resetting.

In the ARRANGEMENT phase, the *"Region"* tool is used to define regions that will be used for calculating the overlay. Corresponding regions can be defined on both the baseline model and follow-up model for this. By contrast, in the ANALYSIS phase, regions are only specified on the follow-up model.

In the ANALYSIS phase, the region area is used to specify the color range for the false colors visualization and to specify the region for the calculation of: *"Volume analysis"* or *"Tilt analysis"*.

The procedure for defining a region in the ANALYSIS phase is almost identical to that in the ARRANGEMENT phase:

✓ You are in the ANALYSIS phase.

1. In the page palette, click the *"Tools"* button.
   ↳ The tool menu opens.

2. Click the *"Region"* button.
   ↳ The *"Region"* tool opens.

3. Click the *"Expand"* button to create a region for the volume analysis or to enlarge the region.

or

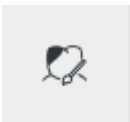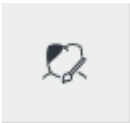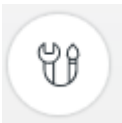➤ Click the *"Reduce"* button to reduce the region.

or

➤ Click the *"Reset"* button to delete the active region.

4. Switch the transparency of the regions on or off or change the transparency value. This step is helpful if you want to use information from the color model to define the regions.

5. Click the *"Region"* button again.
   ↳ The *"Region"* tool is closed.

8.2 Volume analysis

With the *"Volume analysis"* tool, the volume difference between the baseline model and follow-up model in the area of the analysis region can be calculated and displayed.

If you have not defined any area for the volume analysis with the *"Region"* tool, an error message appears.

IMPORTANT
Whether a material increase or a material decrease is involved is disregarded in the volume calculation. If parts of the follow-up surface are above the baseline and other parts are below the baseline, the sum of both volume parts is therefore displayed.

The measured value of the volume calculation is output in the lower right corner of the 3D main window.

8.2.1 Performing a volume analysis
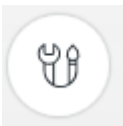
✓ You are in the ANALYSIS phase.
1. Click the *"Tools"* button in the page palette.
   ↳ The tool menu opens.
2. Click the *"Region"* button.
   ↳ The *"Region"* tool opens.
3. Click the *"Expand"* button to select a region for the volume analysis, *"Reduce"* to reduce an area or *"Reset"* to delete the active region.
   ↳ The analysis region is marked in color.
4. Click the *"Region"* button again.
   ↳ The *"Region"* tool is closed.
5. In the page palette, click the *"Tools"* button.
   ↳ The tool menu opens.
6. Click the *"Volume analysis"* button.
   ↳ The volume analysis is performed for the region defined in step 3. The result is displayed on the screen.

NOTE
Avoid calculating the volume on marginal regions of the acquisitions. Both models must be positioned exactly on top of one another and must not exhibit any holes. Check the solid, for example, by hiding both the baseline model and follow-up model with the Display objects tool.

8.2.2 Exiting the volume analysis

➢ Click the *"Volume analysis"* button again.
   ✍ The *"Volume analysis"* tool is closed.

8.3 Distance analysis

With the *"Distance analysis"* tool, the distances between the follow-up model and baseline model in the area of the analysis region can be calculated and displayed using a color scale. If no analysis region is specified, the distance is visualized for the entire surface.

The sensitivity can be set separately for positive (*"Increase"*) and negative (*"Decrease"*) areas.

To control the sensitivity, move the *"Decrease"* slider while holding down the left mouse button. This sensitivity of the scale is increased or decreased accordingly. Alternatively you can enter the sensitivity as a numerical value.

0,11 mm

If a specific region is not selected, distances are displayed for the entire model surface. However, by selecting specific areas or regions (with the *"Region"* tool) you can calculate and display only the distances for the areas or regions that are interesting for you.

This allows specific surfaces to be analyzed on the basis of clinical issues, in which the entire available color spectrum can be used.

0,79 mm

Limiting the region for the distance visualization allows the use of the entire color range from red to blue for visualizing the region of interest.

Alternatively, the specification of a region may dispensed with completely and,= instead the color range can be adjusted as described above via the *"Increase"* or *"Decrease"* buttons in such a way that the color range is, for example, limited to distances between -1 mm and +1 mm.
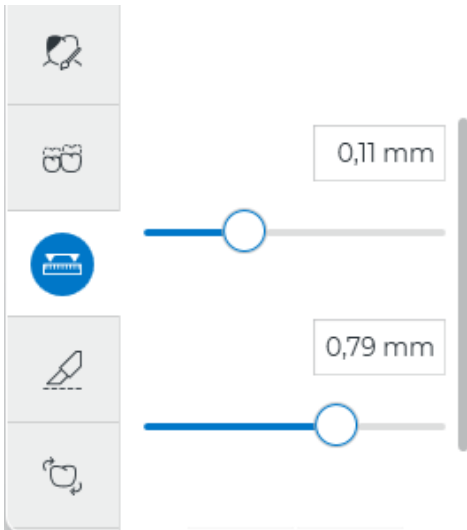
The distance analysis is performed in the following way:

✓ You are in the ANALYSIS phase.

1. Click the *"Tools"* button in the page palette.
   - ↳ The tool menu opens.

2. Click the *"Region"* button.
   - ↳ The *"Region"* tool opens.

3. Click the *"Expand"* button to select a region for the volume analysis, *"Reduce"* to reduce an area or *"Reset"* to delete the active region. Draw the region on the 3D model.
   - ↳ The analysis region is marked in color.

4. Click the *"Region"* button again.
   - ↳ The *"Region"* tool is closed.

5. In the page palette, click the *"Tools"* button.
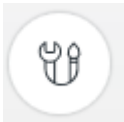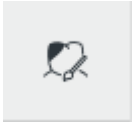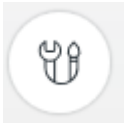   - ↳ The tool menu opens.

6. Click the *"Distance analysis"* button.
   - ↳ The distance analysis is performed for region(s) defined in step 3. The result is displayed on the screen. If no region(s) were specified in step 3, the distance analysis is performed over the entire model surface.

To end the distance analysis:

➢ Click on the *"Distance analysis"* button again.
   - ↳ The tool is closed.

8.4 Section view

The section view provides the option of analyzing differences between the baseline model and follow-up model in a 2D section view.

In the 2D view, it is possible to perform metric measurements between the overlaid models.

8.4.1 Creating a section view

✓ You are in the ANALYSIS phase.

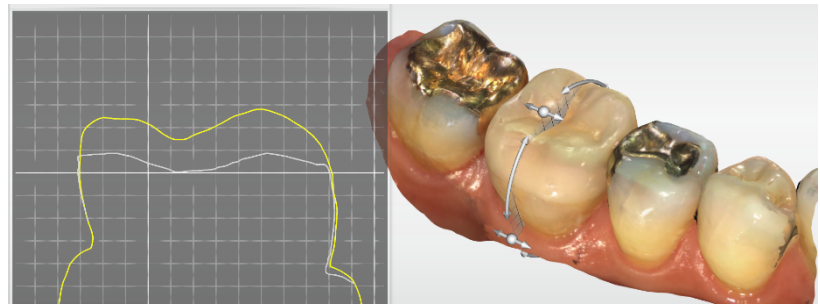1. In the page palette, click the *"Tools"* button.
   ⮡ The tool menu opens.

2. Click the *"Section view"* button.
   ⮡ The *"Section view"* tool opens.

3. Click on a point where you want to begin the section and hold down the left mouse button.

4. Create the section while holding down the left mouse button.
   ⮡ The section is created and the section window is shown subsequently in the left screen area.

8.4.2 Measurements in the section window

You can perform metric measurements in the section window.

✓ You are located in the section view.

1. In the section window, click on the start point of the measurement and hold down the left mouse button.

2. While holding down the left mouse button, move to the end point of the measurement and release the left mouse button.

   ↳ The length of the distance is displayed to you on the right below the mouse cursor.
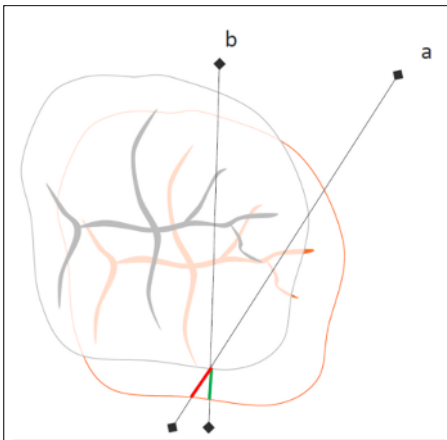
NOTE
Note that measurements in the section view do not necessarily represent the shortest distance between two models. Example: Due to their differing orientation, the two section planes a and b provide section segments having different lengths (red and green line) in the section view.

8.4.3 Exiting the section view

➢ Click the *"Section view"* button again.

   ↳ The *"Section view"* tool is closed.

8.4.4 Setting the section planes

You can use the control elements of the section tool to adjust the section planes.

1. While holding down the left mouse button, move the direction arrows of the control wheel. The section plane can be moved horizontally, rotated or tilted.

2. Grab the horizontal arrow at the end, to move the section plane horizontally.

3. To rotate the section view, grab the vertical arrow ends on the control wheel while holding down the left mouse button and drag the section to the desired position.

4. To tilt the section plane, grab the ball on the horizontal arrow and drag it to the desired section plane position while holding down the left mouse button.

8.5   Tilt analysis

Movements of specific regions can be analyzed using the tilt analysis. These movements, for example tooth movements, are calculated by OraCheck by overlaying the specified region (see "Specifying a region [→ 37]") of the follow-up model with the baseline model a second time.

The tilt and rotation are specified in degrees while the movement of the central point is specified in millimeters. The rotation and tilt are calculated relative to the center point of the analysis region.

In addition the movement is visualized with arrows that go through the center point of the analysis region.

IMPORTANT
All the calculated angles and distances are displayed with positive signs. Therefore the displayed values may be interpreted on the geometry only in connection with the arrows.
The tilt analysis supplies three numerical values that describe the tooth movement. The overlay quality (confidence) is also specified.

8.5.1   Calculated values of the tilt analysis.

8.5.1.1   Tilt

The tilt represents the rotation of an axis orthogonal to the occlusal plane.

The tilt is visualized by the two large arrows in the 3D view.

8.5.1.2   Rotation

This value corresponds to a rotation in the occlusal plane, meaning around an axis orthogonal to the occlusal level.

The rotation is visualized using two small arrows that extend from the tip of the tilt arrows.
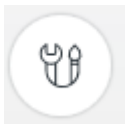
8.5.1.3   Movement

The movement is displayed based on the start point of the two arrows that visualize the tilt.

8.5.1.4   Confidence

The value of the confidence describes the percentage of the follow-up region that could be overlaid with the baseline model.

8.5.2 Analyzing the tilt
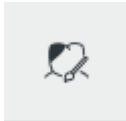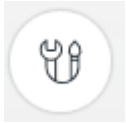
✓ You are in the ANALYSIS phase.
1. Click the *"Tools"* button in the page palette.
   ↳ The tool menu opens.

2. Click the *"Region"* button.
   ↳ The *"Region"* tool opens.
3. Select the *"Expand"* tool.
4. Mark the region to be analyzed.
5. In the page palette, click the *"Tools"* button again.
   ↳ The tool menu opens.

6. Click *"Tilt analysis"*.
   ↳ The tilt for the region that was just defined is analyzed and the result is displayed at the lower right edge of the screen.

9 OraCheck and CAD/CAM software from Dentsply Sirona

The following subsections describe the interaction of the CAD/CAM software of Dentsply Sirona with OraCheck. For simplification purposes, the term CAD/CAM software is used, where "CAD/CAM" can be replaced by the supported product in each case.

## 9.1 Starting OraCheck from the CAD/CAM software

After installation of OraCheck, the app can be started directly from the CAD/CAM software.

Prerequisite for this is that a case with one or more existing models is open in the CAD/CAM software.

To do so proceed as follows:

1. In the system menu of the CAD/CAM software, click *"Run Application"*.

2. Click the OraCheck icon.
   ⮩ OraCheck is started and the case existing in the CAD/CAM software is exported to OraCheck. All image catalogs available in the CAD/CAM software for this case are transferred to OraCheck.
3. You can now decide how you want to proceed with the model data of the CAD/CAM software.
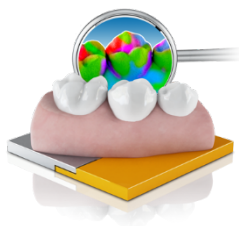
You have the following options:

- You can save the imported data as a new independent case.
- You can add the imported data to an existing case for this patient name.
- You can add the imported data to any other patient.
- You can delete the imported data or a specific portion of it.

If no case is loaded in the CAD/CAM software or if the model axis was not specified in a loaded case, instead of the OraCheck symbol in the CAD/CAM system menu *"Run Application"*, the OraCheck symbol is displayed grayed out with an exclamation point. OraCheck cannot be started. To start OraCheck, open a case in the CAD/CAM software and specify the model axis.

IMPORTANT
Reinstallation of OraCheck may be required.
If the OraCheck app cannot be started after an update of the Dentsply Sirona CAD/CAM software, a reinstallation of OraCheck is required.

9.1.1 Combining models with earlier acquisitions

9.1.1.1 OraCheck started during import and case opened

If OraCheck is already started and a patient case is open during the import of acquisitions, a message is displayed asking if the imported case is to be added to the open case. If you confirm this with *"Yes"*, both cases are combined and the imported acquisitions receive the patient information of the existing case. OraCheck then automatically switches to the ARRANGEMENT phase.

If you answer the question with *"No"*, the open case is discarded in OraCheck. The patient data of the new case is then compared with the patient data of earlier cases in OraCheck. If an earlier case with matching patient data is available, the corresponding patient is selected automatically and all cases of this patient are displayed below each other in the right-hand area of the ADMINISTRATION tab. The newly imported case is displayed as a so-called "floating case" below the other acquisitions of the same patient. OraCheck remains in the ADMINISTRATION phase. By double clicking an existing case, you can combine it with the new case. By double-clicking the so-called "floating case", it is opened directly.

If no matching case was found, the patient is newly created and you can save this case. Alternatively you can combine this patient with data of another patient.

This is especially helpful if patient data is entered inconsistently or incompletely. For example, the date of birth of the patient is available for an earlier acquisition but was not specified for the the current acquisition. The newly imported floating case is shown in the ADMINISTRATION phase with an orange background. If the name of the patient does not exist either, this also has an orange background.

When cases are combined, a copy of the existing cases is created to counteract accidental data loss.

If you select *"Cancel"* in response to the above-indicated question, the data transfer is stopped and you are given the option of saving the open case in OraCheck.

9.1.1.2 OraCheck not started or no case opened yet

If OraCheck has not yet been started, it is now started by the CAD/CAM software and the acquisitions are transferred. OraCheck is then in the ADMINISTRATION phase. If available, the matching patient is already preselected. Otherwise a new patient is created.

10 FAQ

10.1 Overlay

10.1.1 Why are my models not overlaid correctly?

Proceed as follows if the models are not correctly overlaid:

Check in the ARRANGEMENT phase whether areas were possibly selected that prevent an appropriate overlay (for example, tooth 21 on baseline model and tooth 11 on follow-up model).

To reset regions, use, for example, the *"Reset"* option of the *"Region"* tool. This deletes an already specified region **for the baseline model or the follow-up model, depending on the selected acquisition**. Then mark one area on one model or identical areas on both models, or let OraCheck perform the overlay fully automatically – without selection of regions.

10.1.2 Do models have to be trimmed in the CAD/CAM software before the transfer to OraCheck?

A trimming of the model geometry performed in the CAD/CAM software has no effect on the model exported from the CAD/CAM software to OraCheck.

10.1.3 Why do models have to be pre-aligned in the CAD/CAM software?

If the models were not correctly oriented in the CAD/CAM software, this lack of pre-alignment only affects the view options. If the model was rotated during the pre-alignment of the model, the *"Top"* view option shows it accordingly from below instead of from the top.

The pre-alignment of the models in the *"Set Model Axis"* section of the CAD/CAM software before the transfer to OraCheck does not affect the overlay of the two models.

10.1.4   What is the procedure for overlaying models?

The models ae overlaid in a step-by step procedure that overlays both models: From each point of the virtual follow-up model, the nearest point of the baseline model is found and the distances are calculated. The follow-up model is then moved and rotated in such a way that the distances are minimized. This combination of finding the next points and minimizing the distance is repeated until no further improvement is possible. From the mathematical point of view, a cost function is defined as a measure for approximation of the two models. As a general rule, this function consists of the sum of the individual quadratic distances, comparable to the variance or standard deviation. Through minimization of this measure, the models are approximated optimally.

When calculating the distances, however, errors can result in the case of real measurement data, caused, for one thing, by false detection of the adjacent neighbor. These differences occur in particular in regions in which both models differ. Furthermore, such situations frequently occur at the edges of model surfaces of different sizes or in areas where two surfaces are in close proximity (for example, proximal surfaces). For another thing, the model may also already contain acquisition errors or errors due to data handling that also generate false distance values. To prevent these errors from producing an inferior overlay, a certain portion of the highest deviations is disregarded for the overlay.

The following rules can be derived from this:

- **Rule 1**: If a large portion of the overlay surfaces has remained unchanged between the baseline model and follow-up model, the acquisitions can be clearly assigned, even if individual areas have have changed significantly (for example, orthodontic procedures).

- **Rule 2**: If the overlay is to be performed based on a smaller region and this region is specified on only one of the two models, the overlay may fail. The reason is that this small region of the one model may be assigned several matching overlay points on the other model. Even if only one of the points matches the small region exactly, the step-by-step procedure may cause the overlay to calculate a local optimum at an incorrect point of the model. You can avoid this problem by using large regions or by specifying regions on both models.

- **Rule 3**: The most reliable way to achieve a good overlay is to define overlay areas on both models that are as large as possible.

We reserve the right to make any alterations which may be required due to technical improvements.