Cercon® art 3.1.5

Instructions for Use

Cercon® art 3.1.5 in connection with Cercon® smart ceramics and Compartis® integrated systems
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1 Purpose

1.1 Indications for use:
- Cercon art is a hardware and software system developed for the virtual design of dental crowns and bridges in the dental laboratory.
- Cercon art must be used only for those indications for which it has been approved in the most recent Cercon base Instructions for Use.
- Cercon art is the CAD module for the Cercon smart ceramics zirconia all-ceramic system and the Compartis network manufacturing. With the current software version, Cercon art can be used to produce frameworks for crowns and bridges in those materials which are released by DeguDent.

1.2 Contraindications:
- Cercon art is not suitable for any applications other than those described in the Cercon art, Cercon base/ Cercon base disk and Cercon brain/Cercon brain expert Instructions for Use.

1.3 Warnings:
- Applicable local laws and regulations related to work with display screen equipment must be followed when using with Cercon art.
- Cercon art units are electrical devices with electrical connectors essential to their function. These electrical connectors must conform to all applicable local laws and regulations. They must not be modified by the operator.
- Repairs and interventions must be performed by DeguDent-authorized service technicians only. Interventions by non-authorized personnel will invalidate the warranty.
- Improper repairs or interventions may compromise the integrated safety and protective functions (including electromagnetic protection) of Cercon art and may cause personal injury or damage the system.
- Hardware components must be repaired using original replacement parts only. This is the only way to ensure the stated performance and required operating safety. We recommend entering into a maintenance agreement that includes inspections to the Cercon art units.
- Keep all original packaging materials. The person or entity responsible for the operation of the unit is also responsible for the appropriate return of the Cercon art, should this become necessary. Return the system only in the original packaging materials, which should be retained for the purpose. DeguDent will not be responsible for any injury or damage caused by improper packaging (i.e., not the original packaging materials).
- Modifications of system components may constitute a direct safety hazard and are therefore prohibited. In addition to the direct safety hazard, indirect hazards may occur, including errors in the dental restorations produced with Cercon art.
- Frameworks produced with Cercon art and Cercon brain/Cercon brain expert or by the Compartis network production service must be checked for correct fit on the master cast before delivery to the patient.
- Avoid strong magnetic fields in the vicinity of the system, which might interfere with the proper communication between the various components of the unit.
- Before connecting the components, please compare the listed voltages, frequencies and fuse ratings on the rating plates with those of the existing power supply.
- Do not operate the system in a moist environment.
- Do not operate the system outdoors for any protracted period.
• Do not operate the system in an explosive atmosphere.

• When installing the unit, ensure adequate cooling by providing sufficient clearance.

• The system will be electrically safe only when connected to a properly difficult installation including protective earth.

• If you require a longer power cord to connect the system to mains, make sure that the ratings of the cables used and the electrical outlets are compatible with those of the system. In case of doubt please contact a licensed electrician.

• Disconnect the system from mains if not in use for a protracted period. To do so, unplug the mains cables.

• Hazardous fumes or gases may be generated in case of fire.

• Do not attempt to extinguish the fire with water. Use a non-residue carbon dioxide extinguisher.

1.4 Safety precautions:
• The safety instructions preceding the Instructions for Use include cautions and warnings for safe operation of the system components.

• Make sure to observe the safety instructions in the Instructions for Use of the various Cercon art units and the pertinent supplementary documentation.

• Before operating Cercon art for the first time, please read these Instructions for Use carefully. They contain important information concerning system safety, use and maintenance. This will protect you can prevent damage to the system.

• Retain these Instructions for Use and make them available to all users of the system.

• In addition to this chapter, make sure to read to separate Instructions for Use for the PC and monitor components.

• This chapter contains all information required for the safe operation of Cercon art.

• Permanent operation of the units is permissible in well-ventilated dry rooms only.

• Follow the EU Directive on the Minimum Health and Safety Requirements for Work with Display Screen Equipment (90/270/EEC)

• Downloading software updates or transmitting data for processing outside the laboratory requires access to the public telephone network or to a local area network (LAN) with Internet access.

1.5 Manufacturer
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Cercon art is the CAD module for the Cercon smart ceramics zirconia all-ceramic system. This module adds another method for fabricating frameworks to our proven zirconia all-ceramic system.

Crown and bridge frameworks can be designed using the scanner integrated in Cercon brain and Cercon art. Cercon art, in combination with the Cercon eye scanner (available separately) additionally allows a virtual wax-up of bridge frameworks.

For this purpose, individual die data are acquired using the Cercon brain laser or the separate Cercon eye scanner. Data from saw-cut models with bridge preparations can only be acquired using Cercon eye. The Cercon art software designs the crown or bridge framework and controls the Cercon brain/Cercon brain expert unit that takes care of the milling. Alternatively, the CAD data can be transmitted to the Compartis network production service for off-site fabrication.

Cercon art can be connected to both system component, i.e. the Cercon brain scanning and milling unit and the separate Cercon eye scanner. Alternatively, each of these units can be operated separately on its own Cercon art PC. The objects themselves continue to be fabricated using the Cercon brain milling unit or, again, utilizing the DeguDent network production service.

The Cercon art components comply with the requirements of EC Directive 73/23/EEC (Low-Voltage Directive). The Cercon art components comply with the requirements of EC Directive 89/336/EEC (EMC Directive). A voltage selector is located on the back panel of the Cercon art PC where the correct voltage range (100–127 V or 200–240 V) must be selected prior to installing the unit. In case of doubt please consult a licensed electrician.

Before connecting and using Cercon art, please read these Instructions for Use carefully. The Instructions for Use and its complements (see below) are applicable to all product components of the Cercon art CAD module. The Instructions for Use and other documentation pertaining to the PC, monitor, USB storage device and PC switch complement the present Instructions for Use and are to be considered an integral part of these Instructions.

Target group

Cercon eye/Cercon art must only be used for the fabrication of dental components of medical products (dental crown or bridge restorations) when operated and supervised by qualified dental laboratory personnel.

This documentation is intended to be read and followed by the person responsible for the operation and any other operators or users of the Cercon brain, Cercon brain expert, Cercon eye and Cercon art.
3 Working with Cercon art

3.1 Scope of delivery
Depend on ordered devices

3.2 Individually available components
Cercon art PC (no keyboard, no mouse, no USB storage device) 1 ea. REF 53 5530 0001
Cercon art key 1 ea. REF 53 5530 0145
Cercon brain expert PC (no keyboard, no mouse, no USB storage device) 1 ea. REF 53 5538 0003
Keyboard (According to country)
Flat-screen monitor 1 ea. REF 53 5530 0123
Navigator 1 ea. REF 53 5530 0153
Cercon® move, PC switch 1 ea. REF 53 5530 0140
Cercon eye blockout wax 1 jar REF 53 2371 0101
Wireless Bridge 1ea. REF 53 5530 0184

3.3 CAD accessories for Cercon brain
Retrofitting kit for Cercon® brain 1 kit REF 53 5530 0160
Scan holder set complete with scanning template, fixating compound and varnish 1 ea. REF 53 5530 0183
Scanning template, single pack 1 ea. REF 53 5530 0101
Fixating compound, single pack 1 pack REF 53 5530 0170
Cercon brain expert milling cutter, Cercon 1,0 mm 1 pc REF 53 5558 0101
Cercon brain expert milling cutter, Cercon 2,0 mm 1pc REF 53 5558 0102
Cercon brain expert milling cutter, Cercon 3,0 mm 1pc REF 53 5558 0103
Cercon brain expert milling cutter, PMMA, Cast 1,0 mm 1pc REF 53 5558 0111
Cercon brain expert milling cutter, PMMA, Cast 2,0 mm 1pc REF 53 5558 0112
Cercon brain expert milling cutter, PMMA,Cast 3,0 mm 1pc REF 53 5558 0113

3.4 Technical specifications

PC
Protection class I
Rated voltage (selectable) 100–127 V/200–240 V
Rated frequency 50 Hz/60 Hz
Maximum rated current
with monitor socket 100–127 V/6 A
200–240 V/3 A
Monitor socket (output) 100–127 V/3 A
200–240 V/1.5 A
Dimensions (W × D × H) 200 × 370 × 370 mm
Weight Approx. 11 kg

Monitor
Rated voltage range
(automatic selection) 100–240 V
Rated frequency 50 Hz/60 Hz
Rated current 1.4 A
Dimensions (W × D × H) 369 × 495 × 268 mm
Weight 6.5 kg

Cercon move navigator
Dimensions (W × D × H) 141 × 203 × 40 mm
Weight 0.7 kg
4 Description of system components

4.1 PC without keyboard or mouse
Cercon art includes a PC with an Intel i7-2600 processor and an CAD-graphics card NVIDIA Quatro 600. Both an analogue modem and an ISDN adapter are integrated to facilitate a connection to the Internet. A comprehensive set of connecting cables and adapters is provided (see packaging) to connect the hardware to a variety of different telephone jacks. Alternatively, the PC can be connected to the Internet via the built-in network adapter and a local area network (LAN).

4.2 Monitor
A high-quality flat-screen monitor is included with the Cercon art system to provide brilliant graphic images.

4.3 Cercon move
The Cercon move navigator is designed to allow simple manipulation of the three-dimensional objects displayed on the screen. It scroll wheels are used to rotate, swivel and move virtual dies, crown or bridge frameworks or to zoom in or out. The Cercon move navigator makes interaction with the program simple thanks to its intuitive 3D approach.

It is not possible to use the navigator as a standard PC mouse. Conversely, however, navigation using the standard mouse is facilitated. Otherwise, the mouse is mainly employed to press the software buttons on the screen or to manipulate the virtual wax-up. Any Cercon art object can be moved using the Cercon move navigator.
4 Description of system components

4.4 PC switch
When two Cercon art PCs are used in close vicinity to each other, a PC switch saves space and money, allowing one monitor, keyboard and mouse to be shared by both PCs.

The larger wheel (1) will rotate the object around its vertical axis, while the larger top wheel (3) will tilt it around the hypothetical dental arch.

The smaller top wheel on the left (4) resumes in and out on the object, and the small wheel on the right (2) moves the object along the dental arch.

4.5 Software
The Cercon art CAD/CAM software comes preinstalled on the PC and is ready to go. It may be necessary to perform a software update to the most recent software version of Cercon art.

The Cercon art software is protected by intellectual property rights and may be used only for the purposes for which it is provided. Misuse is prohibited and subject to legal recourse on the part of the rights holder.

The software consists of three components: The Cercon art application itself, the Cercon tools configuration and backup tool and the service and analytical tool used by service technicians.

In addition to this chapter, make sure to read to separate Instructions for Use for the PC and monitor, the USB storage device and (if applicable) the PC switch.
5 Setup

5.1 Installing Cercon art
The PC and monitor must be installed in a location suitable for work with display screen equipment.

Sufficient circulation must be provided. All units must be protected from excessive heat, moisture, dust or strong electromagnetic fields.

The Cercon art key (dongle) needs to be always inserted in an USB-Slot of the PC. Without the inserted Cercon art key the Cercon art software cannot be used.

Contrary to the Cercon brain, Cercon brain expert is connected by way of an Ethernet cable, eliminating the length restriction of 5 m for the cable.

The separate Cercon eye scanner is connected to the PC via the USB connection cable included in the PC cardboard box. The scanner should be positioned close to the PC because the positioning of the cast within the scanner is controlled via an image shown on the PC screen.

To separate the scanning tasks using Cercon eye and virtual wax-ups on one hand and the Cercon brain/Cercon brain expert milling unit control tests on the other, it is recommended to provide a separate Cercon art PC for each of the two units. Data can be exchanged between the two PCs using a USB mass storage device.

When two Cercon art PCs are used in the same room, a PC switch is available to allow the monitor, keyboard and mouse to be shared by both PCs, saving space and money.

Cercon brain and the PC are connected via a null-modem (“Laplink”) cable. This connection allows a reliable exchange of the scanning and milling data between the two devices.

The null-modem cable length is 5 metres, which defines the maximum distance of the two units. Extension cables must not be used because this may result in data transfer errors. It is recommended to position the two units at the maximum possible distance, i.e. not placing the PC and monitor in the direct vicinity of the Cercon brain unit, in order to prevent any dust stains. Persistent exposure to dust may damage the keyboard or other components.
5.2 Ports and connections

When setting up the system, first connect all the components with the appropriate cables. The illustration shows the location of the various connectors for a PC to be connected to both the Cercon eye and the Cercon brain unit. Specifically, the following cables must be connected on the back of the PC:

1. Keyboard cable (PS2)
2. Mouse cable (PS2)
3. Cercon move navigator cable (USB)
4. Cercon eye connecting cable (USB)
5. Cercon brain connecting cable (null modem)
6. Digital monitor cable (DVI); connect to PC and monitor
7. PC mains cable (connect to mains socket)

In addition, connect the monitor to mains using the mains cable provided.

The system requires one of the following Internet connections:

8. By analogue modem (to be connected to an analogue phone jack/POTS)
9. Via an ISDN adapter (to ISDN jack)
10. Via a LAN card (to DHCP server)

To connect the analogue modem or ISDN adapters, use the connecting cables enclosed and, where necessary, the appropriate adapters.

In principle, an Internet connection via LAN or ISDN should be preferred to an analogue modem connection because the latter is much slower. However, both preferred variants require prior configuration (dialing method, IP addresses etc.), the details of which would exceed the scope of the present Instructions for Use. When setting up the connection, consult a phone expert (ISDN) or your network administrator (LAN).

The null-modem cable is connected to the back of the Cercon brain unit as illustrated.

The Cercon brain expert comes with a dedicated Cercon art PC that includes an additional network adapter. Connect the Cercon art PC to the Cercon brain expert via this additional network adapter. The network connectors (10) can be used to connect the PC to your LAN and/or to the Internet.
5 Setup

5.3 Turning the system on or off

Once the Cercon art components have been connected properly, they are ready to use. Turn on Cercon brain/Cercon brain expert, Cercon eye, the PC and the monitor. Once the PC has booted, Cercon art will be started automatically and display the program selection screen (see 6.2.1 on page 20). When you are done working with Cercon art, turn off the Cercon brain/Cercon brain expert on Cercon eye units. The PC will turn itself off automatically once powered down. The monitor will enter standby mode; however, it is possible to manually turn it off completely.

The Internet connection is required for downloading software updates and for transmitting order data to a Compartis network production centre or other Cercon laboratories.
6.1 Laboratory steps

Cercon art allows you to produce crown and bridge frameworks using one of two different methods: the familiar, “classical” method or the virtual design method using the CAD module.

When selecting the method you want to use, always make sure that the ceramic veneer of the future restoration is given a consistent thickness. This will avoid tension within the ceramic material that may result in damage to the restoration.

6.1.1 Minimum requirements of the dental cast

All dies must be prepared as per our Clinical Manual, which describes the generally recognized preparation method for all all-ceramic restorations.

We recommend pouring the dental arch in a light-coloured dental stone, e.g. white, pastel yellow, light brown or light grey, since these are the best colours for the Cercon brain/Cercon brain expert scanner or Cercon eye to recognize and process.

6.1.2 Preparing the dies

For blocking out the dies, we recommend our Cercon eye blockout wax (REF 53 2371 0101) or another scanning wax containing a high percentage of titanium oxide.

Do not use resin, since resin may reflect the laser beam of the Cercon brain/Cercon brain expert scanner or Cercon eye, resulting in scanning errors. If you still wish to use resin, cover the resin casts with our scanning spray.

The surface of the die should remain untreated. Do not use die hardener or die spacer.

6.1.3 Preparing for automated preparation margin detection

The use of the geometry filter method requires a circumferential chamfer to be prepared all the way around the preparation margin. To be detected correctly by either scanner (Cercon brain and Cercon eye), the surface immediately below the preparation margin should form a 10° to 20° angle with the insertion path. Chamfers that are more pronounced (deeper) may not be correctly recognized by Cercon eye.
6 Preparatory steps

6.1.4 Cercon eye scanning platform

The scanning platform shown here is part of Cercon eye. It accommodates all standard pin casts and positions them for the scanning process. Its suitability for Systems featuring lateral brackets is limited.

The scanning platform has been designed to be extremely flexible, allowing even difficult clinical situations to be aligned for successful scanning.

6.1.5 Positioning stent

Use the positioning stent to check the height of the bridge situation on the scanning platform and the correct position of the occlusal rim, assigning the height of the planned restoration to a specific size of Cercon base blank based on the rectangular circumference. The centre frame corresponds to the size of the video image. To check the aligned situation (looking vertically down onto the stent), place the abutment crowns below the centre marks of the template; all three reference marks must be located completely within the frame. The scanning platform must also be located completely within this frame.

6.1.6 Clamping the model

Clamp the cast in place on the cast holder table. It does not matter whether the locking screw is located on the radio on the lingual side of the dental arch. Make sure that no part of the cast or the scanning platform protrudes beyond the circle on the template once it has been aligned to the centre mark to prevent the scan holder from touching the rear wall during the scanning process and being dislocated.
6 Preparatory steps

6.1.7 Preparing for the actual scan

Remove all parts of the cast that are not needed for the scanning process. Visually determine a preliminary path of insertion and tighten the locking screw of the ball joint so it stays in place, but can still be finely aligned.

6.1.8 Reference marks

Align the pivoting arm with the three reference marks with a bridge situation and lock it in place. Make sure that the joint piece is as close as possible to the relevant parts of the cast without casting a shadow. Also make sure that all segments of the cast can be removed without the arm getting in the way.

6.1.9 Aligning the cast

Align the height of the scan holder according to the height of the dies and the exact path of insertion. The highest die should almost touch the template, i.e. the scanning platform including the cast and dies should be movable freely below the template. Once the cast has been aligned as described, once again check the position of the joint piece that cast a shadow over the cast. The cameras must be able to capture all relevant parts of the cast at an angle of approximately 45°. Then tighten the locking screw firmly.
6 Preparatory steps

6.1.10 Selecting the right blank size

Based on the blank sizes indicated on the template, you can check which Cercon base blank is needed for the object on hand. The windows are slightly larger than the templates for the wax-up, since the milling strategy utilizes the blanks optimally in CAD mode. The subsequent scanning steps are described in Chapter 7.

6.1.11 Additional applications

Posterior bridge with vestibular repositioned pivoting arm with reference marks. Insert: Position of the arm without the cast in place.

If an occlusal rim is to be scanned, allowance must be made for this when aligning the cast and the reference mark arm. The pivoting arm with the reference marks must permit the occlusal rim to be placed. The antagonist cusps should be positioned approximately at the level of the stent.

6.1.11a Example (1): Vestibular view

Note: The pivoting arm with the reference marks should be as close as possible to the relevant portions of the cast, but without casting a shadow.
Anterior bridge with vestibular pivoting arm with reference marks. Insert: Position of the arm without the cast in place. This arrangement is suitable for significantly tilted anteriors.

**Note:** The thumbwheel of the locking screw must not be position so low that it might lift the base plate, as this might result in referencing errors.
6 Preparatory steps
6.2 Cercon art preparations

6.2.1 User mode selection

Once the PC has turned on and completed the booting sequence, you will see three symbols.
To start the program, click once on the icon labelled Cercon art.
To configure your Internet access, to copy or delete files or to perform a software update, click once on the icon labelled Cercon tools. The third icon labelled Service is a password-protected access for our service technicians.

6.2.2 Startup screen

After clicking the Cercon art icon, you will briefly be shown the start-up screen while the program is being loaded. The screen also indicates the main software version.

6.2.3 New or existing file

In the first step, you must decide whether to create the new case (left icon) or to continue working on an existing case (right icon). You can make your selection in one of two different ways:
1. By clicking once on the selection icon and then clicking on the forward arrow in the lower right corner
2. By double-clicking on the selection icon
6 Preparatory steps

6.2.4 File selection (existing file)

The list contains all cases stored on the PC, complete with file number, restoration type, dentists and patient names, date and time the file was last saved and the status of the file. The status indicates which program phase was attained the last time the file was worked on. To copy a highlighted existing case, check Open as new case below the table.

In the case of a revision of network production results (see Chapter 14.5 on page 84), check Open for revision.

6.2.5 Search function

The Search field provides a filtering option for the list of cases. Only cases whose names contain the search string entered will be shown.

6.2.6 Detail view

If the case is selected in list mode, the detail data for this case will be shown in the detail view window (left).
6 Preparatory steps

6.2.7a Creating a new case

When Cercon art is restarted, the last auto-saved case is displayed if the program had previously been closed without saving or if it had been irregularly terminated.

6.2.7b Text entry

If the original case had already been saved, you will see a comparison of the auto-saved case (left) and the user-saved case (right).

It is up to you to decide whether to open the auto-saved copy as a new case or whether to let the auto-saved copy overwrite (replace) the user-saved case.

6.2.8 Creating a new case

To create a new case, i.e. a new file, click the corresponding icon.
6 Preparatory steps

During the first step of the preparatory phase, the program requires you to enter the name of the patient, dentists and operator to uniquely identify the case and to meet the quality assurance requirements. Additional information about the case may be entered in the text field at the bottom.

The next step determines the restoration type to be created. Starting with Version 3.1 available options include CAD coping, CAD bridge, telescopic and conical crowns and individual abutments.

Activating Cap, Bridge or Custom Abutment opens material selection. Here you select the material to be used for your job.
Material selection for conical/telescoping crowns is done directly in the tooth scheme.
6 Preparatory steps

6.2.12 Material selection screen primary crowns

6.2.12a Changing a material selection

If you made a mistake when selecting your framework material or if you wish to re-design an already designed object in a different material, backtrack through the menus until you get to the material selection screen. Simply check the selected material.

6.2.12b Changing a material selection

You will see a message window informing you that the design data will be lost. The scanning data, however, will be retained, allowing you to re-design the object in the new material selected.

Click Modify to display the newly selected material on the selection screen. You can now design your object based on the existing scanning data. Exception: When changing between the different materials, the design data will be retained, and you will not see the message.
In the second step, the tooth or jaw region to be restored is selected. In addition, you may also select the adjacent teeth and the counterbite. Use the Delete key if you need to start over. Example: To identify a bridge, click once on each tooth designated as a terminal abutment; abutment teeth are shown in light red. All teeth between the terminal abutments are automatically designated as pontics (light blue). Clicking on a pontic converts it to an abutment. This completes the preparatory entry phase.

To select conical / telescoping crowns, single-click on the tooth. To select an adjacent element, double-click on the tooth. The adjacent elements are shown in dark blue. To create a gingival element, triple-click to show the element in light blue.
7 Scanning

7.1 Selecting the scanner

Two scanners are available in CAD mode, the integrated scanner of the Cercon brain unit (for single guys) and the Cercon eye scanner (for CAD coping, CAD bridge and Registration). Starting with version 3.1.5, scanning with Cercon brain is no longer supported. Select the Cercon eye scanner instead.

Starting with version 3.1.5, scanning with Cercon brain is no longer supported. Select the Cercon eye scanner instead.

7.2 Preparing for the scan (Cercon eye)

If the scan selected is the Cercon eye, on-screen instructions will explain the steps to be performed on the scanner:

Turn on the scanner. Clamp the cast in place on the scanning platform. Align it roughly according to its path of insertion and also according to its height, using the plastic scanning template. Follow the instructions under Preparatory steps (specifically, Chapters 6.1.6/6.1.4) of these Instructions for Use.

Please note that for primary crowns, the cast on the scanning platform must not be modified after this point.

7.3 Aligning the first element

Position the scanning platform on the scanning plate so the crosshairs are positioned in the middle of the die in the case of posterior teeth or at the centre of the incisals edge in the case of anterior teeth.

All three reference marks must be completely visible within the video image frame.
Close the lid to start the scanning process. The lower bar shows the scanning progress for the current element. The lower bar shows the total scanning progress for all elements.

Once the scan is completed, remove the first die (13) from the base of the cast and insert the next die listed in the top info bar (in this example, gingival element 14).
7 Scanning

7.7 Larger gingival elements

Individual gingival elements (element 14 in our example) are processed in the same way as die elements. For larger, coherent gingival elements, perform a separate scan for each tooth to be restored. Move the scanning platform so the area of the first pontic is located below the crosshairs. A prompt will be shown following the scan inquiring whether the element has been completely acquired. In this case, another partial scan is needed, so click Add. Next, move the scanning platform so the area of the next pontic is located below the crosshairs. If the gingival element has been acquired completely, click Complete when prompted about any additional scans.

7.8 Scanning the adjacent tooth

Dies 15 and 16 are scanned similarly to the first die. Once the entire bridge situation has been scanned, you will be prompted to scan the adjacent teeth. Proceed in the same manner as for the dies: centre the crosshairs and start the scanning process.

7.9 Tilt detection

If the unit detects that the reference marks have moved during scanning, e.g. because the scanning platform was tilted, a warning message to that effect will appear on the screen.

You will be prompted to reposition the element. Once this is done, the scan will be repeated.
To acquire the antagonists (counterbite), insert all dies into the base and place the silicone occlusal rim on top. Most of the contest must be sprayed with scanning spray before positioning to improve the acquisition result.

The scanning process is similar to that for larger gingival elements.

When scanning a counterbite, one scan should be performed for each tooth to be replaced (for an example). First, move the scanning platform such that the area of the counterbite above the first pontic is located below the crosshairs. A prompt will be shown following the scan inquiring whether the element has been completely acquired. In this case, another three partial scans partial scan is needed, so click Add. Next, move the scanning platform such that the area of the counterbite above the next pontic is located below the crosshairs.

Once the counterbite with all antagonists has been completely acquired, the scanning phase is completed, and the calculation phase begins.
7 Scanning

7.13 Referencing

Next, the scanning data for the four elements, for the adjacent teeth and for the counterbite are referenced, i.e. the ten point clouds will be perfectly aligned. Messages in the top info bar keep you informed about the progress of the calculation.

7.14 Presenting the scanned data/Multi-scan (1)

When the calculations have been completed, Cercon art will display the resulting point cloud. The points should be distributed fairly evenly up to just below the preparation margin. More extensive discrepancies would indicate that an inappropriate material was used for the cast or that a mistake was made when preparing the cast or when aligning the impression.

In the event of discrepancies in the point cloud – such as holes – you can repeat the scan for a single die only. This presupposes that the cast has not been moved or in any way modified on the scanning platform.

7.15 Multi-scan (2)

Simply go back one step using the arrow buttons.

A menu will open where you select the objects to be rescanned by clicking on them. The selected object will be removed from the point cloud, and the selected die will be marked with an N (for New scan) on the tooth status graph.
7 Scanning

7.16 Multi-scan (3)

To reduce the amount of data to be processed and to obtain a well-defined margin, the scanning data must be cropped, starting at the basal aspect.

To do so, use the slide control to determine the height of the base. Allow the circumferential chamfer to remain fully visible below the lowest point of the preparation margin. Then click on the forward arrow in the lower right corner to leave the SCAN software section.

7.17 Multi-scan (4)

The re-scanned object will be automatically inserted into the bridge.
The multi-scan option will be available for as long as the case has not been closed. If the case has been saved and closed, the multi-scan option will no longer be available.
The multi-scan option also facilitates subsequent scanning of neighbouring or antagonist teeth.

7.18 Cropping the scanned data

Realign the object below the crosshead and re-scan.

This presupposes that the cast has not been moved or in any way modified on the scanning platform.
8 CAD/Designing single copings with Cercon art

8.1 Displaying the scanned die

When moving from the SCAN section to the CAD section of the software, the scan points of the coping scanned with Cercon brain that are located above the preparation margins are used as the basis for calculating and displaying the die surface. Below the display, a virtual base is shown for subsequent representation of the coping and to indicate the position of the preparation margin. If a scanning error becomes evident as you look at the display, please consult In case of problems see Chapter 14 in these Instructions for Use.

8.2 Framework design parameters

In the following step, the parameter values required for designing the CAD framework (wall thickness, cementing gap, spacer area) can be selected. Wall thickness may range from 0.4 to 1.0 mm in increments of 0.1 mm. The width of the cementing gap may vary between 10 and 60 µm. Narrower gaps are recommended for shorter crowns or for crowns with a pronounced conical shape. Wider gaps are recommended for longer crowns or for crowns with a less pronounced conical shape. The cementing gap is represented on the display by a dark coating, a virtual spacer. The spacer area parameter (in %) determines the width of the cervical margin area intended to be spacer-free. A value of 100 % corresponds to complete spacer coverage. Clicking the default button restores the pre-programmed default values for the material used.
After a few seconds of internal calculations, the framework geometry as determined based on the parameter selected will be shown on the die. For more detailed information on the various virtual wax-up steps, please consult Preparatory steps (Chapter 6).

For single copings only, a section view of the framework can be displayed in the Surface modification section of the software by clicking on one of the five view-selection buttons on the right. By rotating the framework through the intersecting plane, you will have full control of the framework margin and walls.

⚠️ Clicking the Section button one more time will return you to the regular view. This feature is not available for bridges.
9 CAD/Designing bridge frameworks with Cercon art

9.1 Wax-up display

In the example shown here, the counterbite cutback checkbox was activated (see Scan data, Chapter). This will cause the counterbite to be displayed in reduced form, as in our illustration. If you leave the checkbox unchecked, the full counterbite will be shown exactly as it was scanned.

9.2 Correcting the preparation margins

If you disagree with the path of insertion or preparation margin has automatically determined by the system, click the Back button to correct the preparation margin manually.
Here you have the option to modify the preparation margin manually. To move a single point, selected by clicking it with the left mouse button and dragging it to the desired location. Alternatively, you may move the point using the Position slide control.

To move a large a second rather than a single point, increase the number of points by moving the corresponding slide control.

To move all points, check the corresponding checkbox.

Click the Back button to go back and undo each of the modifications you made, one by one. Click the Continue button to restore a modification previously undone. A single click on the button “New search” restarts automatic preparation line recognition starting from the present location.

When correcting the preparation margin manually, you may display/hide the graphic representation of undercuts as needed.
9.4 Correcting the path of insertion

Next step, you can modify the path of insertion manually, based on the path automatically determined by the system, or to deactivate the automatic path of insertion.

To modify the path of insertion manually, check the corresponding checkbox and change the positions of the two slide controls labelled.

- Orovestibular axis
- Mesiodistal axis

as required. The software supports you in doing so by showing any undercuts in red. To avoid undercuts that have not been removed, you should pay particular attention to any red areas extending beyond the preparation line. The individual insert is aligned in relation to the stage plane (blue) and the object plane (orange). The marked stump is not moved by the alignment procedure.

9.5 Correcting the path of insertion (2)/Plan view

In addition, you can click the Plan view button to check whether all preparation margins are visible when looking at the preparation along the path of insertion.
The next step defines the abutment crown/coping parameters: The second correspond to those for single copings.

- All thickness
- Cementing gap
- Spacer area

If you want the selected settings to apply to all copings, check the appropriate checkbox in the lower left corner.

If the checkbox in the lower left corner is unchecked, any settings defined will apply only to the selected die. To select a die, simply click on it. The selected die is recognized by the brown colour of the spacer area.

Wall thickness may range from 0.5 to 1.0 mm in increments of 0.1 mm.

The width of the cementing gap may vary between 10 and 60 µm.

Narrower gaps are recommended for shorter crowns or for crowns with a pronounced conical shape. Wider gaps are recommended for longer crowns or for crowns with a less pronounced conical shape.

The cementing gap is represented on the display by a dark coating, a virtual spacer. The spacer area parameter (in %) determines the width of the cervical margin area intended to be spacer-free. A value of 100 % corresponds to complete spacer coverage.

Clicking the default button restores the pre-programmed default values for the material used.
The software automatically designs the copings, pontics and interdental connectors and presents a design suggestion.

This design can be milled as is or after individual optimization. The following tools are available in the construction window for this purpose.

- Library tooth selection
- Library tooth modification
- Pontic base modification
- Surface modification
- Connector modification

In the example shown here, the counterbite cutback checkbox was activated (see Scan data, Chapter). This will cause the counterbite to be displayed in reduced form, as in our illustration. If you leave the checkbox unchecked, the full counterbite will be shown, just as it was scanned.
To rapidly design the reduced anatomical shape of the framework, select the Surface modification software section, which offers three surface tools:

Application/Smoothing/Removal/Morphing

Build-up height
Degree of smoothing
Radius

For more detailed instruction please see page 43.

Once a coping has been selected, click on its surface one more time to define the centre of the build-up area. Characteristics such as the amount of bulk to be built up and the build-up radius can be determined using the slide controls.

Keep the left mouse button pressed to add material to the crowns or pontics, or to reduce material anatomically or smooth the affected surfaces.

Click the Undo button to go back and cancel each of the modifications you made, one by one. Click the Redo button to restore a modification that you have previously undone.
9 CAD/Designing bridge frameworks with Cercon art

9.9b Optimizing the framework

Once the framework has been optimized, you can proceed to milling.

9.10 Selecting library teeth

If you want to give the surfaces of copings and pontics their individual anatomic shape, select the Library tooth selection software section.

Select the object to be designed and check the Fully anatomic library tooth checkbox.

9.11 Selecting library teeth (2)/Settings for all teeth

If you want a fully anatomic design for all elements, additionally check the Setting applies to all elements checkbox.
In the next step you can determine the vestibular alignment of the fully anatomic element (tooth axis) relative to the dental arch. To do so, move the Vestibular alignment slide control to the desired position. While you do this, the library tooth you are working on is shown as transparent. A correct alignment is a necessary prerequisite for the subsequent reduction step (veneering).

Once the vestibular alignment of all library teeth has been determined, the next step is the modification of the library teeth. Here, the active (selected) element is shown in light orange together with three reference axes. All manipulations applied to the active (selected) axis, which will be highlighted and can be selected by clicking on it directly or by clicking the corresponding button.

The following elements will be shown:

- Button for selecting the reference axis
- Translation; select by moving the slide control to the right of this button
- Rotation; select by moving the slide control to the right of this button
- Size; select by moving the slide control to the right of this button
9 CAD/Designing bridge frameworks with Cercon art

9.14 Modifying library teeth (2)

By adjusting the individual slide controls (translation/rotation/size), you can adapt the occlusal surfaces of the library teeth to the counterbite. The surface modification tool offers a distance control.

9.15 Modifying the pontic base

In the next step, you can manipulate and modify the lower (base) aspect of the pontics. The manipulation window again contains the button for selecting the reference axis and the following slide controls:

- Position of the basal pole
- Wall thickness of the veneer [mm]
- Shape of the base

The basal contours will not be corrected to reflect the (selectable) distance from the gingiva until this step has been completed.
The surface modification tools serve to correct the shape and to add material to the abutment copings and pontics. This allows anatomic shapes to be adapted to the Contras of the counterbite.

The counterbite can be displayed and hidden by clicking the button “Display / hide counterbite” - either the selected element only (segmentation), or completely with a further click.

To do so, select the coping (shown in light orange) and click on its surface to define the centre of the reduction, whose characteristics such as reduction depth radius can be determined using the slide controls: Keep the left mouse button pressed to subtract material from the crowns or pontics or to add material or smooth the affected surfaces. Click the Back button to go back and cancels each of the modifications you made, one by one. Click the Continue button to restore a modification that you have previously undone.

The manipulation window contains the following tools and controls:

- Application/Smoothing/Removal/Reduction/Morphing
- Build-up height
- Reduction depth
- Degree of smoothing
- Radius
9 CAD/Designing bridge frameworks with Cercon art

9.17 Complete reduction

The veneer reduction tool of the Surface modification software section allows you to reduce library object to create some space to accommodate the veneer.

To reduce the complete element, the Complete reduction checkbox must be activated. To reduce only part of the element, this checkbox must be deactivated.

To achieve a complete reduction, select an element (shown in light orange) and use the slide controls to define the desired amount of reduction per tooth axis. Press the Apply button to apply the parameters to the selected element.

If you would like to define the reduction depth in terms of direction rather than in terms of taxes, you can do so after clicking the Advanced reduction features button.

Reduction by axis (standard reduction features)

- Mesial/distal reduction [mm]
- Mesial/distal reduction [mm]
- Mesial/distal reduction [mm]
- Advanced reduction features button

Reduction by direction (advanced reduction features)

- Mesial reduction [mm]
- Distal reduction [mm]
- Occlusal reduction [mm]
- Vestibular reduction [mm]
- Oral reduction [mm]
- Basal reduction [mm]
- Standard reduction features button
When the selected parameters have been applied to the object, the element will be displayed in its fully reduced form.

For more control, an outline of the original contour can be displayed by clicking the Show/Hide Anatomic Features button.

To reduce only part of the element for the new veneer, the Complete reduction checkbox must be deactivated.

Select an element (shown in light orange) and use the slide controls to define the desired amount of reduction across the occlusal/basal and the mesial/distal area. A preview of the selected area will be shown in bright orange.

The amount of reduction is determined by the vestibular reduction slide control.

Press the Apply button to apply the parameters to the selected element.

Partial reduction features

- Vestibular reduction [mm]
- Occlusal/basal area
- Mesial/distal area
9.20 Partial reduction (2)

Once the selected parameters have been applied to the object, the element will be displayed in its partially reduced form.

All fully anatomic elements of a given situation can be fully or partially reduced in this manner. However, it is not possible to reduce the same element more than once.

The Adding/Smoothing/Reducing surface modification tools can be reapplied to any reduced element, independently of how it was reduced.

9.21 Showing the maximum production height

Clicking the maximum production height button, a plane can be added to the display for zirconia, titanium or resin frameworks indicating the maximum production height for the object.

For zirconia, acrylic or PMMA, you must select this level from the Blank type selection window depending on the desired blank or fabrication process.

Click on Set as default to define the last selected blank type as the default blank type for future restorations.

As there is no maximum production height for CoCr frameworks, the button will be greyed out in this case. The maximum production height applies only to frameworks to be fabricated by our Compartis network production centre.
If the framework transgresses this plane, both the plane itself and the maximum production height button would change to red. The top info bar will show a message informing you that the design exceeds the maximum production height. In this case, correct the height of the object to facilitate its production.

Click the highlighted arrows to modify the threshold limits.

If you activate the colour alerts for wall thicknesses or distances by checking the corresponding checkbox, any values that are less than the minimum will be indicated by the corresponding colour gradient for the object.
9 CAD/Designing bridge frameworks with Cercon art

9.24 Wall thickness diagnostics

In the example shown here, the minimum wall thickness was not reached for element 13. When the corresponding diagnostic tool is activated (wall thickness checkbox), this is indicated by a red display.

The numerical values shown for wall thickness of distance in the diagnostic window refer to that point on the active element that the mouse pointer indicates.

9.25 Insufficient wall thickness

If the minimum wall thickness is not reach for one or more objects, you will receive a warning message to that effect after pressing the Continue button, the corresponding objects will be shown in dark orange. The deficiency can corrected either automatically (by the software) or manually (by the user).

9.26 Diagnostic function, distance from counterbite

Distance from bite rim
Displaying the available space for veneering.

In the following example, the distance between the bite rim and the pontic should be approximately 1.0 – 2.0 mm. Change the upper threshold limit to 2.0 and the lower threshold limit to 1.0 to visualize this on the screen. Blue areas indicate that some material must be cut back. Green areas indicate that the distance from the adjacent tooth is approximately 1.5 mm, leaving the choice of whether to reduce to the dental technician. Gum-shaped areas can be left unchanged.
Distance from the original anatomic shape after reduction
Displaying the available space for veneering.
In the following example, the distance between the original anatomical shape and the fully reduced coping should be approximately 0.8–1.5 mm. Change the upper threshold limit to 1.5 and the lower threshold limit to 0.8 to visualize this on the screen. Blue areas indicate that some material should be cut back. However, it is not always possible to do this and respect the minimum wall thickness at the same time. Green areas indicate that the difference from the original shape is approximately 1.1 mm, leaving the choice of whether to reduce to the dental technician. In the example shown here, there is not enough space anywhere to apply a 1.5 mm veneer.

Conical/telescope crowns
Displays the available space when milling conical crowns.
In the following example, the conical crown is designed for a minimum wall thickness of 0.5 mm. Modify the upper threshold limit (giving a lower threshold limit of 0.5 and an upper threshold limit of 0.6) to highlight all areas where a reduction of up to 0.1 mm is possible.

The final step is to design the interdental connectors using three slide controls.

Three types of modifications are available:
- Movement oral/vestibular
- Movement basal/occlusal
- Adjusting the cross-sectional area

When designing the connectors, make sure that these do not touch the gingiva and that the minimum requirements for the cross-sectional area (which depends on the material used) are met.
9 CAD/Designing bridge frameworks with Cercon art

9.27a Modification of the connector marginal curves
When a connector is selected, its two connector marginal curves are displayed. The displayed control points can be selected with the mouse and shifted. (picture 9.27)

9.27b Modification of the connector marginal curves
When a connector is selected, its two connector marginal curves are displayed (image left). The displayed control points can be selected and shifted with the mouse. Pressing the delete key while clicking on a control point will delete the point. Clicking on the existing curve inserts a point.

9.27c Modification of the connector marginal curves (2)
Pressing the key A while clicking on a control point adds a curve segment.
9.27d Modification of the connector marginal curves (3)

That cuts the existing curve to size at the cutting points.

9.27e Modification of the connector marginal curves (4)

This button lets you hide adjacent structures (lateral elements) that may obstruct your view of specific objects. Confirm activation of this feature to hide all obstructing elements in a vertical view of the connector curve.

9.28 Checking the connectors

The software automatically checks whether the connectors have the recommended minimum cross-sectional area. If this is not the case, the connector will be shown in red, and the corresponding message will appear in the top info bar.
9 CAD/Designing bridge frameworks with Cercon art

9.29 Checking the connectors (2)

In addition, a final plausibility check of the framework is performed before the milling step. If any connectors do not have the recommended minimum cross-sectional area, a warning message will appear. If you decide not to correct this, the framework in question can only be produced at your own risk.

9.30 Undercuts

The standard casting technique allows bridges with slight undercuts to be created in the presence of slightly divergent abutments. These can be inserted successfully thanks to the fact that the teeth have a certain level of physiological mobility by making use of the rocking method, which alternates between slightly different paths of insertion. The Cercon art software version till 3.0.1 allows the design and production of SLM frameworks with undercuts.

If one or several dies of undercuts, a corresponding message will appear in the top info bar.

9.31a Undercuts (ZrO$_2$)

Trying to fabricate ZrO$_2$ frameworks with undercuts is inappropriate due to material constraints. The surface will be calculated without undercuts, i.e. the software will block out any undercuts encountered. In cases where the preparation margins would be affected by blocking out the undercuts, these margins will be moved to the equator.
This will result in undercuts, but the crown margins will not all be located at the preparation margins.

Once the surface has been calculated, the scan situation will appear as shown in these illustrations, and the preparation margins are shown as they are on the model, highlighting the discrepancies (diverging areas).

This will result in undercuts, but the crown margins will all be located at the preparation margins.
10 CAD/conical crowns

10.1 Model imaging

After the scanning data are cut and calculated comes the chapter Cap parameters, Settings.

10.2 Preparation margin correction

If you are not satisfied with the automated determination of the preparation margin, go to the chapter „Change preparation margin manually“ in the action window on the icon bar.

10.3 Preparation margin correction (2)

Here you can change the preparation margin manually. To shift a single point, click on it with the left mouse key and either pull it to the desired location with the mouse or move the slider “Position” accordingly.

To shift an area larger than a single point, raise the number of points with the appropriate slider.
If you wish to shift all points, activate the appropriate checkbox.

The button “Backwards” deletes the last changes step by step. The deleted changes can be restored with the “Forwards” button. A single click on the button “New search” restarts automatic preparation line recognition starting from the present location.

The individual insert is determined in this step. In addition to automatic alignment of the direction of insertion you can also align it manually or deactivate the alignment.

For manual alignment, activate the corresponding checkbox and change the two sliders:

- "Orovestibular axis"
- "Mesial-distal axis"

as desired. The software provides support by colouring (red) the areas that slide under one another. To avoid undercuts that have not been removed, you should pay particular attention to any red areas extending beyond the preparation line. The individual insert is aligned in relation to the stage plane (blue) and the object plane (orange). The marked stump is not moved by the alignment procedure.
10 CAD/conical crowns

10.5 Correction – top view

You can also press the button “Top view” to check whether all preparation lines are recognizable with the insert as selected. The stump elements that are not activated are hidden. The gingiva and adjacent teeth remain visible.

10.6 Parameters for caps

The parameters for the primary crowns are determined in the next step:

- Setting the framework wall thickness
- Setting the cement gap
- Setting the spacer area

[For all] If the selected settings are to apply to all primary crowns, the checkbox at the lower left must be activated. The option “For all” is not available if different materials were selected in the “Material selection” chapter.

10.7 Individual cap setting

If the checkbox “For all” is not activated, the set parameters apply only to the selected stump indicated by the brown colour of the spacer area.

The wall thickness can be set between 0.4 mm and 1.0 mm in 0.1 mm increments.

The values used for calculation of the cement gap are between 10 and 60 µm.
A lower gap value should be used for short or highly conical stumps and higher gap values for long or less conical stumps.

The spacer lacquer, shown as a brown area (in %) determines the width of the gapless cervical margin. 100% correspond to a continuous spacer.

In this chapter, the parameters are determined for the primary parts and the entire insert. The software calculates an initial proposal with an insert optimized for aesthetics.

Critical areas, i.e. if the conical surfaces would damage the wall thickness due to pronounced slanting of the overall insert, are shown in red by the software. In the next chapter "Modelling conical crowns" the cervical shoulder is automatically widened and can be changed individually.

For all conical crowns

You determine the angle and cervical shoulder width in the upper part of the action window. The checkbox “For all conical crowns” must be activated if the selected settings apply to all primary crowns.

You can select and angle from 0° to 6°. The angle 0° is the setting for telescoping crowns.

The cervical shoulder includes an area from 0 mm to 2 mm and can be set in 0.10 mm increments. No shoulder is generated at the setting 0 mm.
10 CAD/conical crowns

10.8 Conical crown parameters

- **Aesth. insert**: The entire insert is defined in the lower part of the action window. If you decide to accept the initial proposal made by the software, the checkbox “Aesth. insert” must be activated. The software determines the aesthetic insert by minimizing the vestibular wall thickness of the most mesial cone in the

- **Manual insert**: If you decide not to use the initial proposal made by the software, the checkbox “Manual insert” must be activated. Now the

  - “Main axis”
  - “Transverse axis”

are activated and the entire insert can be changed as you wish by moving the two sliders, or you can grab the manipulation cross by clicking on it and holding it with the left mouse key, then moving it along the main and transverse axes.

10.9 Modelling conical crowns

Based on the inputs in the step “Conical crown parameters” the primary parts are now calculated. The action window displays information on the cone surface and the average cone height of the marked cone.

The user can change either the occlusal or incisal surface of the primary part using the slider “Smoothing”.

Determine the cone height using the slider “Position of the cone margin curve”, which parameter can also be individually varied on the object.

If the modelling results in a structure that does not meet the minimum wall thickness requirement, the software will indicate the corresponding areas in red. Press the Correction button to perform an automatic correction of which the conical area on the shoulder is moved outward. In addition, this function will correct overlapping cervical shoulders while respecting the minimum wall thickness requirement.
In addition, the Analysis button in the lower icon bar lets you visualize the wall thickness of the conical surface to the selected wall thickness (see 9.23, Diagnostic tool).

You can now choose between 2 display forms:

- **Preview**
  - If the checkbox “Preview” is activated, all modelling steps will be done in real time in the preview display mode.

- If the checkbox “Preview” is inactive, the marked object appears in a transparent construction view that can now be individually modelled. The occlusal / incisal surfaces are displayed as tracking lines.

At the lower left of the screen, the coordinate axes are located indicating the current working plane resulting from the current view.

You can add or delete points on the borderlines as desired. A point is placed at exactly the point where the mouse cursor points to the line by clicking the left mouse key. Move the mouse cursor to a point and press the “Del” shortcut key to delete the selected point.
To model the primary part individually, you can work on the shoulder in the top view. By grabbing a point at the outer margin of the shoulder with the pressed mouse key it can be modelled narrower or wider within the preview shoulder radius,

or you can grab a point on the upper borderline of the cone surface and drag it to the shoulder level.

At the same time, you are provided with the information on the current individually changed shoulder width.

In the lateral/front view, you can pull the shoulder height or cone surface upwards or downwards. A measurement of the cone height is also provided here simultaneously.

If the checkbox “Combined” is activated, the preset values for shoulder width and cone height are generated when shoulder height or the position of the cone surface are changed.
The function “Combined” can be temporarily inverted with the shortcut key “q”. 
10 CAD/conical crowns

10.10 Surface processing

Three surface tools are available to you in this chapter:

The incisal / occlusal surfaces of the primary parts can be worked on using application / smoothing / removal. The shoulder and cone surface remain unchanged.

10.10.1 Shipping to the network production centre

If a case with conical crowns is to be shipped to the network production centre, each conical crown of the selected case will receive its own case number in the list of cases prepared.

This gives you the option to select and ship the conical crowns to be produced by Compartis. In the example shown here, conical crowns 1, 3 and 5 have been selected for shipping.
When moving on from the CAD section to the CAM section of the software, you will be given three choices for the production mode, i.e. for determining how to produce your design:
Cercon brain 1 for milling with your own Cercon brain unit
Other device for sending the data to another Cercon laboratory
Network for sending the data to the Compartis network production center by DeguDent.

If you select the Cercon brain production mode, you will be prompted to connect the USB memory stick enclosed with the blanks to the PC.
When nesting conical crowns, these will be initially aligned within the blank such that the milling tool can machine all aspects of the object. In other words, the axis of rotation allows undercuts to be processed. In doing so, the software ensures that there is enough space between adjacent objects.

There are two optimized positions in which the object can be placed. You can alternate between these two positions by performing a 180° rotation.

Objects with optimized positions are indicated by a checkmark.

By rotating the object out of its optimized position, the object can be milled and three axis. Undercuts will be blocked out and must be manually finished later. This reduces the nesting distance from the adjacent object.

Objects rotated out of their optimized position are indicated by an orange-coloured label.
You will see one or several blanks on the screen, depending on the size of the package.
Each blank will be marked with the ID of the corresponding USB stick and continuously numbered from 1 to 5.
After several milling procedures, the screen may look as shown. Blank 1 has been completely used for milling, while Blank 2 has been partly used. Blanks 2 and 3 can be used to mill additional objects.

Blank 2 is currently being selected for another milling task. A pop-up window indicates the type, material and batch number of the blank.

Click on a blank to select it and proceed to the next menu item.
Here you will place your objects to be fabricated within the blank, as usual. It is possible to rotate (using the mouse wheel) and to position (pressing the left mouse button) the desired object freely within the blank.

For the next milling step, the objects already milled during a previous milling session will be shown in grey. Objects nested during the current session will be shown in light grey with a white margin, as usual.

See also 10.12.2a/Nesting conical crowns
To assign your blank to the corresponding USB stick, the ID of the stick will be shown near the upper margin of the blank display. In this example, -2 indicates the second blank from a pack of three.

297600-2

All blanks carry a label at their end indicating the USB stick ID and the number of the blank.
In the example shown here the blank has been assigned the stick carrying an ID of 298551, which is the third blank of the package.
In order to be able to place the partially milled blanks in their correct position within the milling frame, it is recommended to position the blanks with this label pointing upward and forward within the Cercon brain.
10 CAD

10.18 Preparing for milling, Cercon brain

Similar to the procedure when scanning, you will be prompted on the screen to perform the following steps:

- Inserting the blank holder
- Closing the cover
- Starting the milling process on the Cercon brain

To pause the milling process, press the Stop key once. To cancel the milling process, press the Stop key a second time.

10.19 Preparing for milling, Cercon brain (2)

The Cercon brain display will prompt you to start the milling process.

10.20 Milling process

All steps of the milling process are documented on the screen by appropriate progress bars. The object calculated will change color to dark grey. The progress bars for coarse and fine milling refer to the milling objects currently being processed, while the Total bar refers to the entire milling task.
At the end of the milling process, you can either start a new case or terminate the program.

Once the milling process has been completed, open the cover, take out the blank holder and remove the blank from its milling frame.
Carefully sandblast the membrane wings with a precision stylus and alumina (50 µm, max. 3 bar) until the object is detached. It is best to wait with finishing the framework margin until after sintering to protect the delicate marginal structures.

Select the Other device production mode to have your framework milled on a Cercon brain milling unit at another dental laboratory. Click Continue. An e-mail window will open where you need to fill in the e-mail address and subject. You may optionally enter any remarks you have in the text field. If you check Send design data only in the lower left corner, the volume of the data transmitted will be reduced by up to 90%, significantly reducing transmission time. The data for your case will be automatically added to the e-mail message as an attachment. Click Continue and confirm to send your order.
10.24 Network production mode

Select the Network production mode to have your framework milled by Compartis.

The first time you send your data to Compartis from Cercon art, you will be prompted to fill in the following fields: Laboratory name, street, postal code, city, country, contact, phone number and e-mail address.

10.25 Multi-transmission

After clicking on the Continue button, you will see the list shown here. Use the two buttons below the list to filter the list.
Show CAM cases only hides all cases marked milled or sent to.
Check all network-eligible cases checks all cases within the list that are eligible for network production.

10.26 Multi-transmission (2)

Check the cases to be sent for network production. Then click the arrow button to open the following menu.
This menu lets you check the selected cases one more time and potentially request an extended warranty (available only within Germany for ZrO₂ and CoCr) but checking the corresponding checkbox.

Once you have assured yourself that your selection is correct, click the Send button. The system will dial into the Compartis network and transmit the selected cases one by one.

Different info screens will keep you informed about the transmission progress.

Once the transmission has been completed, you will see a status report for all cases transmitted.
10.30 Multi-transmission (6)

Use the Save button to save all data transmitted to Compartis to a CSV file on the USB stick. This file may be displayed in e.g. Excel.

10.31 Transmission confirmation/Program end

If the data were transmitted successfully, a window will appear where you can opt to terminate the program or to continue with a new case.
The Cercon tools utility is started via the corresponding button on the startup screen. It offers miscellaneous options such as language selection, Internet and e-mail settings, file handling and software updates. The corresponding menus are activated by the toolbar at the bottom of the screen.

The icons indicate the following functions (left to right):

- Language
- Internet dialup
- Email settings
- Writing into USB memory
- Reading from USB memory
- Delete files
- Saving case data
- Global settings
- Report problems
- Software update via internet
- Software update/CD/USB
- Scanner
- Terms of Sale

The lower right corner of the window shows two important details related to your Cercon system: The PC ID, which is a number that uniquely identifies your Cercon art PC, e.g. when ordering from our network production service. Below the PC ID will find the version number of the Cercon art software installed on your PC. These ID codes can be important for us when servicing or troubleshooting your system or answering questions. Click on the version number to open the window with version details.
11.3 Language

Click on the flag icon to select the software language. This will cause all texts and prompts in Cercon art and Cercon tools to be displayed in the selected language. In addition, the computer will be configured for the appropriate keyboard layout. For example, if Italiano is selected, a keyboard with an Italian layout should be connected for all keys to be assigned properly.

11.4 Internet access

Your PC has an analog modem, an ISDN adapter and the network adapter. If you want to dial up to the network via the telephone network, enter your access mode, the telephone number of your provider and, if required, your username and password. Additionally, you may configure your Internet access to use your local area network (LAN). A connection test is available for each of these three access modes.

11.5 E-mail settings

E-mail is used to send Cercon art cases to another Cercon laboratory. You can configure your e-mail settings and the corresponding menu (envelope icon). When sending data for larger or more complex objects, such as bridge cases, make sure your Internet provider supports large e-mail attachments.
Select Write to USB stick to write some or all files (lines) saved on the PC to a USB memory stick for copying or safekeeping. The lines you selected will be highlighted in blue. Make sure a USB memory stick is inserted in a USB port on the PC, then press the Save button to copy the selected files.

Select multiple cases as usual in a Windows environment:
1. Holding the Ctrl key and clicking on the line will select/deselect that line, while retaining the selected/deselect status of the remaining lines.

2. Pressing and holding the left mouse button anywhere within the free space in the File No. column and moving the mouse selects all lines in that area.

3. If a line is selected, holding the Shift key pressed and clicking on a different line will select the initially selected line, the line on which you clicked next and all lines between them.
11 Cercon tools

11.7 Reading from USB

Case details can be saved by clicking the tab on a USB stick

A file was created on the USB stick containing all details of the cases

If you opt to copy cases, the original case number – indicating the provenience of the data – is maintained as information. An example of a copied case is shown in the illustration in Detail view, Chapter 6.2.6.

Cases you import will be stored with consecutive case numbers starting with the lowest unused case number.

Additionally, a Delete function is available to delete cases stored on a USB memory stick.

11.8 Delete files

This option serves to delete files (cases) from the PC hard disk. Select the cases to be deleted as described under Write to USB stick (above).

Note that any cases deleted from your hard disk will be irretrievably lost unless they have been saved to a USB stick first. To alert you to this possibility, the table shown will have a red frame.
Saving and restoring saved case data.

It is possible to save all cases created before a settable date. Using the function delete, all cases on the USB stick are compared with your PC version and, if they correspond to your PC version, they are deleted.

“Restore saved case data”

Using this function, all saved cases can be copied back to your PC, or you can delimit the volume by entering a limit date.

Keyboard layout – individual shortcut key programming possible
11.8d Global settings

Quality settings in mushbite quality

The display speed is raised by selecting a lower quality. This is particularly advantageous with older PC models.

11.8e Global settings

The starting thickness of caps can be changed with this setting to prevent objects from falling out of the blank during the fraising process.

The fraising speeds can be varied, for example in order to increase the level of reliability when fraising Cercon base cast blanks.

11.8f Report problems

This feature allows you to submit problem case data for analysis when prompted to do so by DeguDent. You may select to submit case data, log files or registry settings. Do not use this feature unless specifically instructed to do so! (CM)
11.11 Software update from CD or USB

Whether you update via Internet or from a CD or USB stick, you will receive detailed information about the content of the available updates. Start the installation process by clicking Continue.

In addition, this program area lets you activate future additional Cercon art features by way of a USB stick.

11.9 Software Update via Internet

This button will let you perform a software update via the Internet. A working Internet connection is a prerequisite. For information on how to configure your Internet access, see Internet access (Chapter 11.4).

11.10 Software Update via Internet (2)

You will first have to retrieve any information on available updates from the update host. To do so, press the Update Info button and wait until the appropriate information is shown on the screen.

11.11 Software update from CD or USB
11 Cercon tools

11.12 Automatic installation

The installation process may take several minutes.

A progress bar will indicate how much of the installation process has been completed.

Never turn off your PC while an update is in progress.

Should you experience problems during the installation process or at any later point, you can always retrieve the previous version by clicking the Recovery button.

11.13 Scanner

Click the Scanner button. A window will open, prompting you to perform the calibration process. Enter the diameter of the calibration ball (included with Cercon eye) in the appropriate field and adjust the slide control to obtain the appropriate value. Centre the calibration ball below the crosshairs to scan it. When the scan is completed, click the Close button. This will close the Scanner menu and return you to the Cercon tools screen.

11.14 Terms and conditions, license

The rightmost button will open a window displaying the special Terms and Conditions for Cercon art and licensing information for third-party software.
Regular check all units from mechanical damage to prevent accidents and technical failure. Regularly clean the screen with an antistatic cloth or an appropriate cleaning agent. Immediately remove any stains from the keyboard to ensure proper function.

Help save our environment!
Defunct devices will often contain valuable raw materials that may be recycled. Return any defunct devices to the nearest DeguDent service point or an authorized collection site for electrical and electronic equipment.
Do not dispose of defunct devices with general household or laboratory waste!
14 In case of problems

14.1 Technical consultants, technical hotline

Both the Cercon art program and Cercon brain will alert the user to any operator or device errors and potential remedies. If you have any questions on the application or suspect problems with one of the hardware components, please contact one of our technical consultants.

14.2 Troubleshooting

<table>
<thead>
<tr>
<th>Topic</th>
<th>Problem</th>
<th>Possible cause</th>
<th>Potential remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compounds</td>
<td>The representation of the die contains occlusal voids (notches).</td>
<td>The dental stone is too dark. Too many scan points are being filtered out.</td>
<td>• Use lighter types of stone (white, yellow, light brown, light grey).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Coat the affected region with Cercon scan spray.</td>
</tr>
<tr>
<td>Die preparation</td>
<td>Too few scan points are left after filtering.</td>
<td>Die spacer has been used; reflexions interfere with the scanning result.</td>
<td>• Avoid the use of die spacer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Coat the affected dies with Cercon scan spray.</td>
</tr>
<tr>
<td>Blocking out</td>
<td>Too few scan points are left after filtering in blockout areas.</td>
<td>The wax or resin reflects light.</td>
<td>• Use Cercon eye lockout wax.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Coat resin with Cercon scan spray.</td>
</tr>
<tr>
<td>Scanning result (Cercon brain)</td>
<td>The region of the clinical crown contains scan points that are clearly located below the surface of the die.</td>
<td>These points were filtered out by the software because of their low intensity. Calculations do not take these points into account.</td>
<td>• Check the Cercon brain laser.</td>
</tr>
<tr>
<td>Clamping</td>
<td>Occlusal aspects of the dies are missing.</td>
<td>The position of the dies during scanning was too high.</td>
<td>• Clamp the dies in place as per the recommendations in Chapter 6 and rescan.</td>
</tr>
<tr>
<td>Clamping</td>
<td>Cervical aspects of the dies are missing.</td>
<td>The position of the dies during scanning was too low or out of range.</td>
<td>• Clamp the dies in place as per the recommendations in Chapter 6 and rescan.</td>
</tr>
<tr>
<td>Die orientation</td>
<td>The CAD die exhibits vertical folds on steeper slopes.</td>
<td>Only few coins are scanned on steeper slopes.</td>
<td>• No remedies required if the folds are smaller, as they will not become manifest in the milling result.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• If the folder larger, realign die and try to arrange the affected slope so it is not so steep.</td>
</tr>
<tr>
<td>Milling process</td>
<td>The coping drops out of the blank during milling.</td>
<td>• A new cutter was inserted incorrectly.</td>
<td>• Take out the cutter, clean the chuck with compressed air, clean the cutter shaft, insert the cutter into the chuck as far as it will go and clamp down.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The zero calibration point of the machine may be out of adjustment.</td>
<td>• If the problem still exists, contact the DeguDent service technician.</td>
</tr>
</tbody>
</table>
## 14.2 Troubleshooting

<table>
<thead>
<tr>
<th>Topic</th>
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<th>Possible cause</th>
<th>Potential remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast preparation</td>
<td>Preparation margin is not properly detected.</td>
<td>Preparation margin has been drawn on the cast with a pen.</td>
<td>Try not to manipulate the dies in any way.</td>
</tr>
<tr>
<td>Preparing the cast (Cercon eye)</td>
<td>Preparation margin is not properly detected.</td>
<td>Preparation margin exhibits an excessive chamfer.</td>
<td>Manually modify the preparation margin as described under Preparatory steps (Chapter 6).</td>
</tr>
<tr>
<td>Preparing the cast (Cercon eye)</td>
<td>Preparation margin is not properly detected.</td>
<td>Preparation margin exhibits an insufficient chamfer in some areas.</td>
<td>Manually modify the preparation margin as described under Preparatory steps (Chapter 6).</td>
</tr>
<tr>
<td>Preparing the cast (Cercon eye)</td>
<td>Preparation margin is not properly detected.</td>
<td>Die axes diverge.</td>
<td>Block out slight divergences in the milling unit.</td>
</tr>
<tr>
<td>Preparing the cast (Cercon eye)</td>
<td>Preparation margin is not properly detected.</td>
<td>Die exhibits two or more edges.</td>
<td>Block out extra edges in the area of the clinical crown.</td>
</tr>
<tr>
<td>Preparing the cast (Cercon eye)</td>
<td>Incorrect preparation margin or insufficient fit.</td>
<td>Die exhibits bubbles or voids.</td>
<td>Block out any bubbles or avoids.</td>
</tr>
</tbody>
</table>
| Preparing the cast (bridge) | Occlusal rim exhibits large voids. | • The bite in the bite rim is very deep.  
• The position of the bridge wax up/occlusal rim is too high. | • Cut back the bite rim.  
• Check the cast against the scanning template. |
| Cast adjustment        | Preparation margin is not properly detected.          | Cast is not properly aligned for the appropriate path of insertion.          | Manually modify the preparation margin as described under Preparatory steps (Chapter 6). |
| Scanning process (bridge) | Scanning data for a specific element appear dislocated or duplicated. | Scan holder touched the wall during scanning. | Align the cast so no part of the scan holder protrudes from the template. |
| Scanning process (bridge) | Die appears in the wrong position. | Scans are performed in the right sequence. | Follow the instructions in the top info bar. |
| Scanning process (bridge) | Gingiva exhibits of voids in relevant areas. | Too few individual scans were performed for the gingival element. | As a rule, provide one scan per tooth to be restored. |
| Scanning process (bridge) | Bite rim exhibits large voids. | Too few individual scans were performed for the bite rim. | As a rule: provide one scan per antagonist. |
| Scanning process (bridge) | Insufficient fit, rocking. | Dies were not completely inserted into the base during scanning. | Make sure the dies are inserted completely. |
| Scanning process (bridge) | Insufficient fit. | Scanning platform changed position between scans. | Clamp the scanning platforms firmly in place and be careful while swapping elements. |
| Scanning process (bridge) | Voids in the scan data | The pivoting arm with a reference marks cast a shadow on the scanning region. | Observe the correct camera angle of approximately 45°. |
| Scanning process (bridge) | Scan data are incomplete. | Neighbouring elements cast a shadow. | Leave only the actual element to be scanned within the cast. |
14 In case of problems

14.3 Cercon brain error messages

The text display is limited to 32 characters and will only display short messages in case of a problem. As with the classic Cercon unit, these messages refer only to errors that are related to Cercon brain.

![Cercon brain error message](image1)

14.4 PC error messages

If unexpected or incorrect entries are made on the PC, the top info bar will show an explanatory message in white letters on a dark orange background. In case of connection problems between the PC and Cercon brain, a gray window will appear containing suggestions for correcting the problem. If the software no longer accept any input at all, the PC must be restarted. To do so, press the main switch on the PC and keep it pressed for approximately four seconds.

![PC error message](image2)

14.5 Revisions of network production results

If the results of your DeguDent network production order are unsatisfactory, you can send in a revision order for free processing within two weeks from submitting the original order. To do so, open the existing case for revision (by checking the corresponding checkbox) and indicate the reason for your complaint in the window shown. If the fit was unacceptable, check the New scan checkbox. You will be guided through the subsequent steps.

![Revision window](image3)
Button
Interactive onscreen button.

CAD
Computer-aided design.

CAM
Computer-aided manufacturing.

Cercon art
The brand-name for all components connected to the Cercon Module, as well as the software that controls them.

Cercon move
A navigator device to three-dimensionally move Object on the PC screen. Cercon move facilitates the control of the various movements and reduces the time it takes to complete the design.

Compartis
Brand name for DeguDent network fabrication.

Icon
A pictograph or symbol, usually placed on a software button.

Interface
Connection between two (PC) components.

Nesting
Arranging milling objects within the blank so it is utilized in the most economical way. Nesting also allows the use of partial blanks left over from a previous procedure.

PC-ID
Six-digit number that identifies the Cercon art PC. Can be checked in Cercon tools.

Progress bar
A graphic indicator elements that visualizes how far process has come in its execution.

Recovery
Restoring the software version prior to the most recent update.

Referencing
Precise relative alignment of the scan point clouds of digital elements.

Reference marks
Pattern of geometric circles to assist in referencing.

Revision
Simplified complaints procedure for Compartis products.

Update
Installation of the more current software version to replace the previous one.

USB (memory) stick
Storage medium for backing up and transferring data. Connects to a USB port (connector) on the PC.

Wizard
A name for a software concept where the user is guided sequentially through a program, step by step. Cercon art has been designed according to this concept.