DentalCAD User Manual
Version 2.0

egs

Moving **Innovation**

Table of Contents

1 Overview

DentalCAD is an 64bit native application designed for skilled and less skilled dental technicians. Based on a proprietary and open technology, it can be easily customized and it leads the market for functionalities and performance. It is the main part of the complete **DentalSuite** solution that include also the **Dscan** software

DentalCAD provides to technicians the below capabilities:

- Laboratory management
    - Doctors, patients and preparations can be created an edited
- Model acquisition by Importer or Scanner (if **Dscan** application is installed)
    - Data are acquired by Importer in STL, PLY and OBJ formats
- Modeling Prosthesis
    - Anatomic, reduced, coping, inlay/onlay , veneers, pressed or telescopic singles crown or multiple bridge are fully supported. Maryland and Bite Bridge too.
    - Attachement
    - Screwed or Cemented Implant. Single crown or Bridge
    - Bars with intermediate elements
    - Multiple preparations can be done on the same dental jaw. Powerful editing tools allow modifications of the profile of any single tooth, veneer or reduced to perfectly fit in the patient's mouth in short time and high precision. STL export file are produced properly oriented for milling machine

All the application is driven by a **Wizard Interface**. It is an user-friendly and easy to use approach to the dental solution. It guides the user in the whole process with full control of each step of the job and preparation. A modern and compact command layout provides the user with a wide and tidy viewport, without any dialog window hindering the process.

2 What's New

Rev 2.0

DentalCAD Application

1. Attachement
2. Pressed crown
3. Telescopic Crown
4. Screwed or Cemented Implant. Single crown or Bridge
5. Bars with intermediate elements
6. Tooth mirroring
7. A New command, Detect Margin Line, to create margin lines selecting more than one points
8. Only one command for Add, Remove, Smooth and Freeform tools
9. New command, Correct Tooth, to remove automatically intersection between crowns and opposite teeth or neighbors
10. A new management of the contact between gum and the tooth bottom in a pontic element
11. 360 deg collar
12. Arc Jaw creation step is removed. Now it is not any more required
13. Options for light reflections/brightness
14. Neighbors, Gum and Antagonist visibility don't depend anymore from the Step
15. Order manager is able to order jobs by Patient name or Date or Status
16. New Registration command available also in the Importer module

DScan Application

1. New Add Acquisition command
2. New Registration command
    1. Apply is available to register more teeth without closing the registration tool
    2. If two meshes are close each other is possiblet to register them directly without using the three points strategy
    3. The three registration points can be resetted only for float or fixed window using context menu
3. Neighbors and pontic gengiva are automatically defined
4. Antagonist and gum segmentation is no more required
5. Workarea is now defined during total model acquisition

6. Now it is possible to change the hight of the acquisition area before the scan. A parameter is added in the scan dialog box
7. ESC close the active selection command
8. New Revert Selection command
9. Bottom teeth or arc jaw big holes are no more selectable by fill hole command. The max lenght of the holes boundaries can be setted by a parameter
10. Now it is possible to visualize the tessellation also in Dscan
11. User_scan_setting.xml contains customer scan cycles, it is used to overwrite default cycle during a dental job or in Basic Mode.
12. Exocad Integration: Double arc jaw job definition is fully supported

Rev 1.1

DentalCAD Application

1. Native 64 bit version application
2. Full multijob on the same arc support
3. Veneers
4. Maryland Bridge
5. Bite Bridge
6. Improved Tool compensation algorithm
7. Multiple insertion directions in the same bridge
8. Advance mode during connector construction
9. Restore on single tooth
10. New Color maps available for Modeling Tools
11. New option to show teeth tessellation
12. Export file inherits the name from the job name
13. General UI tuning:
    1. Apply available in commands when required
    2. New Look for job definition phase
    3. Additional visible entities in same phase

DScan Application

1. New option to skip wrong scanned teeth during multidie acquisition

3 Installation

Installation section is organized in three parts:

System Requirements

Getting Started

Troubleshooting

3.1 System Requirements

The following configuration is RECOMMENDED for best results:

- **Processor:** Intel Core i7 or higher
- **Memory:** 8 GB or higher
- **Video card:** Nvidia 5xx series or higher / ATI 5xxx series or higher, with 1gb or more video ram
- **Operating system:** Windows 7 64bit*
- **Network interface card:** 2 x RJ45 Ethernet adapters or 1 x RJ45 Ethernet adapter + 1 x Wireless adapter

*** 64bit OS is a mandatory requirement for the DentalSuite**

3.2 Getting Started

Uninstalling previous versions of DentalCAD

It is highly suggested to uninstall any previous versions of **DentalCAD** to avoid conflicts.

To do so use the Add/Remove Programs command in the Windows Control Panel.

Installing DentalCAD

Double-click the setup file (usually in the form **DentalCAD**.x.y.z.exe, where xyz are build codes) and follow the on-screen guidelines.

Licensing

Upon launching **DentalCAD**, you will be prompted to insert one of the following two items depending from the version installed:

1. the dongle
    1. insert the dongle in a free USB 2.0.
    2. Restart the software
2. the license code
    1. In the emerging window copy down the "hardware fingerprint" code that will appear in two 4 digits/letters tokens separated by a hyphen (eg. xyzw-wzxy).
    2. Send an email to egs-info@egsolutions.com with this code, and we will forward you your registration data to copy in the empty fields of the REGISTRATION window.

A network card must be active in the system in order to correctly register the software with a keycode license, if not hardware fingerprint may suddenly change thus invalidating the license.

For any problem concerning the registration procedure check the Troubleshooting chapter.

3.3 Troubleshooting

Registration key not accepted

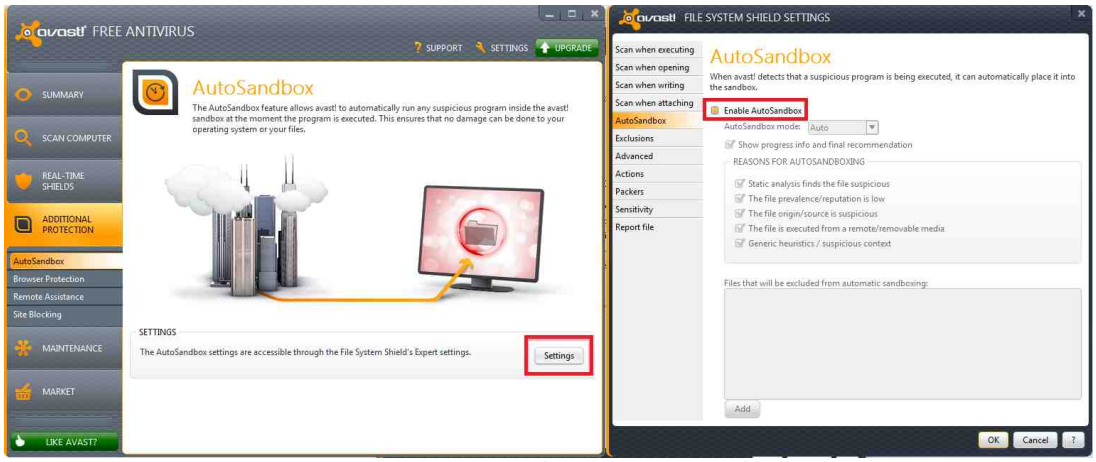
In some cases the registration procedure may lead to an error

Dongle Version

DentalCAD setup system automatically installs certificate to license software components to manage dongle. This is done via a batch script, which can be identified by some protection software as malicious, or unsafe.

At the time of writing, known issues include the following anti-virus software:

- **Avast v.7** and above: make sure to disable "auto sandbox" function to correctly install the license.



auto-sandbox must be DISABLED for correct licensing of DentalCAD

Fingerprint keycode version: UAC and Administrator rights

With the introduction of UAC (User Access Control) in Vista and 7 systems problems may appear when registering **DentalCAD**, and the correct key not being accepted as valid.

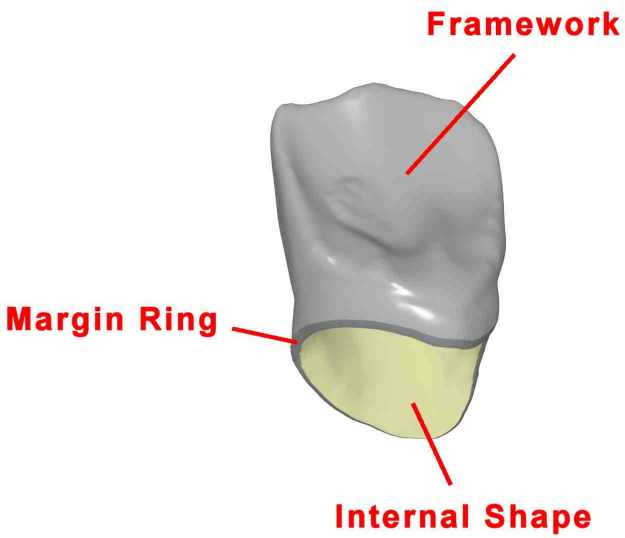
To solve the problem please proceed as follows:

1. Launch **DentalCAD** with administrator rights by right-clicking on the **DentalCAD** shortcut and subsequently clicking on the Run as administrator command
2. Enter the username and key supplied in the registration window
3. Restart **DentalCAD**. If license is prompted again...
4. **Disable** UAC by navigating to the Control Panel > User Accounts > Turn Account Control on or off (Vista) or to Control Panel > User Accounts and Family Safety > User Accounts > Change User Account Control Settings (7)
5. Restart the system
6. Repeat steps 1 > 3

4 Basic Concepts

Single Prosthesis (Crown)

From **DentalCAD** point of view a single prosthesis (called also job or preparation) is defined by three surfaces closing a volume in the 3D space



Framework: a dental job inherit the name from the strategy adopted to create this shape. There are three main strategies available:

1. Anatomic: the Framework shape coincides with the anatomic tooth
    - Coming from a digital library
    - Imported or Scanned directly (Waxup)
2. Offset coping: the framework shape is an outer offset of the original stump
3. Reduction: the framework shape is an offset reduction (inner offset) of the anatomic tooth

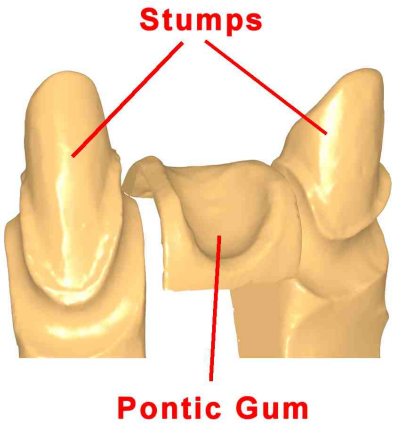
Internal Shape: it is created making an offset surface of the stump starting from the Margin Line. The differences are:

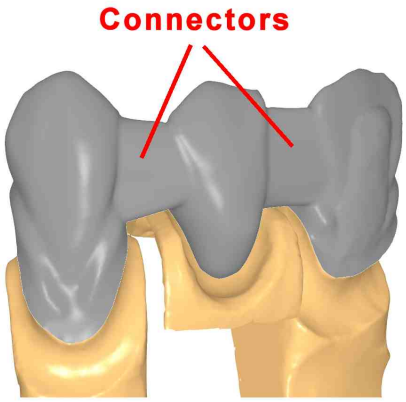
1. Cement gap correction
2. Friction area gap correction
3. Milling tool compensation
4. Undercut corrections

Margin Ring: this shape is the connection between the previous two, From one side it starts from the Margin Line and it is the starting point for the framework

Multiple Prosthesis (Bridges)

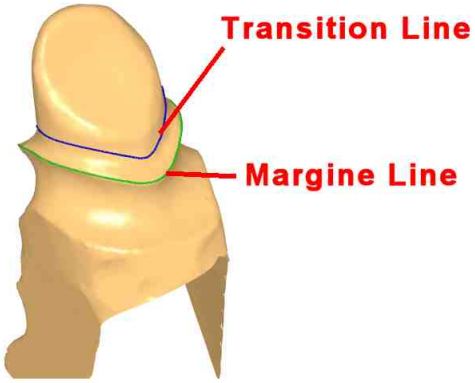
Multiple Prosthesis (called also bridges) are single prosthesis joined by special surfaces called Connectors





Constructions sequence

Regardless to the type of Prosthesis the first step to create a preparation is to design a closed curve on the stump called **Margin Line**. Then all the others surfaces are created



Generally speaking the creation sequence can be defined as below:

1. Margin line
2. Internal Shape and Margin Ring
3. Framework
4. Connectors

DentalCAD will add more Step to this basic sequence, some of them depend to prosthesis type, other are required to define data used later. A Wizard Interface drives the user trough all the Steps. A **Step Bar** appears in the bottom of the application to show the full workflow and to highlight the current working step

Skipping between the various steps is always done via the arrow buttons NEXT and PREVIOUS.

5 Application Workflow

Phases and Steps

DentalCAD application is structured in three main **Phases**:

1. Patient & Job definition
2. Acquisition by Importer or Scanner (if **Dscan** is installed)
3. Modeling Prosthesis

To create a prosthesis the user has to go across all the three Phases. For each Phase one or more **Steps** are provided. The general rule is that it is not possible to move to the next step until all the modeling or scanning operations required are finished. It is always allowed to move back in a previous completed step.

In the following sections each Phase and related Steps are presented in detail.

5.1 Phase 1: Patient & Job Definition

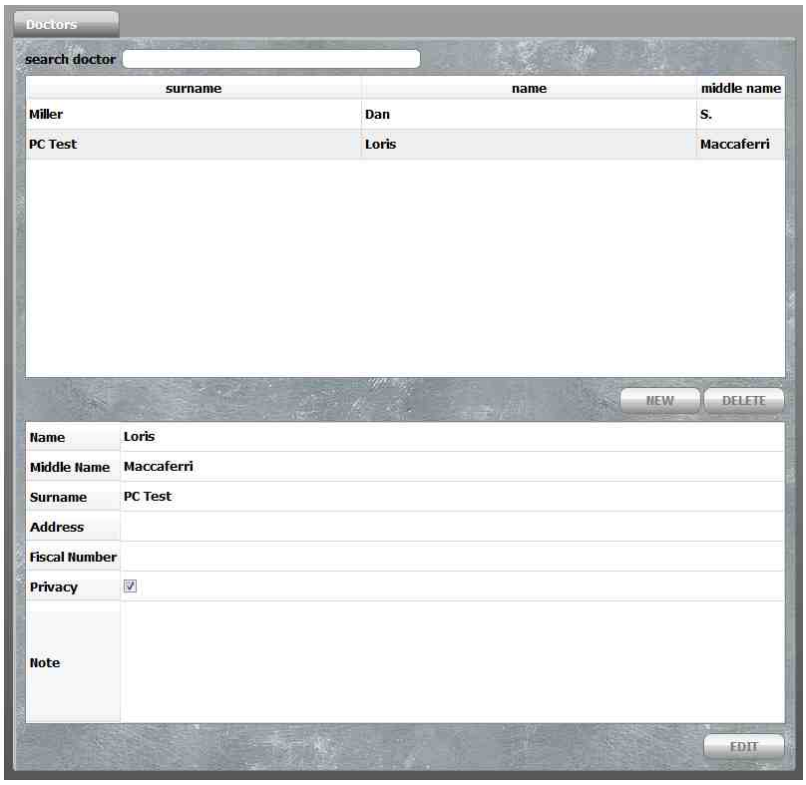
Patient & Job Definition Phase has two main steps:

- Managing Patients

- Managing Jobs

5.1.1 Managing Patients

Before creating a Job, the user must choose an existing Doctor or create a new one by using the NEW button in the Doctor panel



A Doctor and all related jobs can be removed by using the DELETE button

See also Patient UI layout for more details

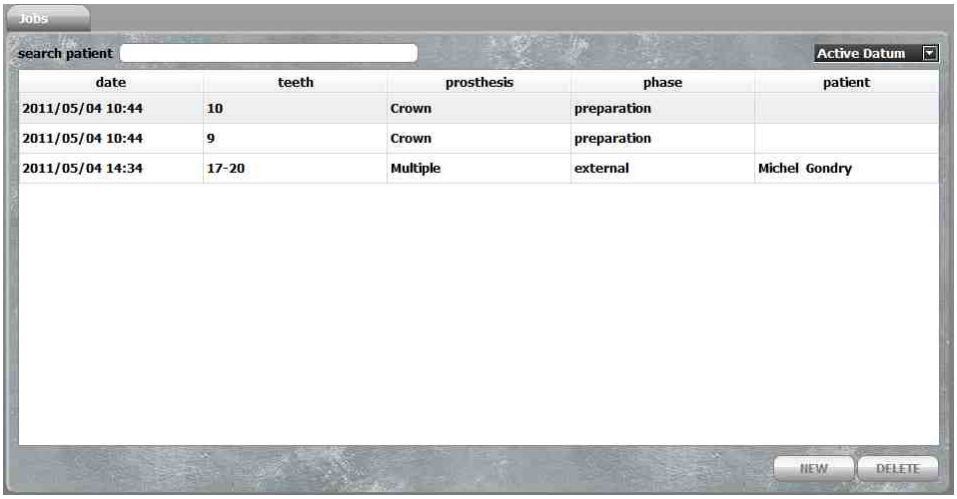
5.1.2 Managing Jobs

In this Step the user can:

- Create or edit an existing job
- Define prosthesis type and elements

5.1.2.1 Creating a new Job or choosing an existing one

Create a New Job



Clicking on NEW job button for creating a new job

A jobs can be removed by using the DELETE button.

When a new job is created the user is prompted to insert basic patient data. This information is then linked to the job and shown in the list of existing jobs.

By selecting ACTIVE DATUM or FINISHED DATUM it is possible to view both the unfinished works and the finished ones for which the results have already been exported

Note that when a job is finished it is moved automatically into the FINISHED DATUM section.

Choosing an existing Job

There are two ways to choose an existing job:

1. Double Click on an existing one: In the ACTIVE DATUM or FINISHED DATUM section, by double clicking on a job **DentalCAD** loads the latest phase in which the result was saved
2. Import Button: be careful not to have existing jobs in the same location as the imported files, **DentalCAD** will NOT replace existing files. If, on the other hand, you wish to import a preparation to replace an existing one, please remove any existing file before importing.

5.1.2.2 Definition of the prosthesis

Job supported

DentalCAD supports the below type of jobs:

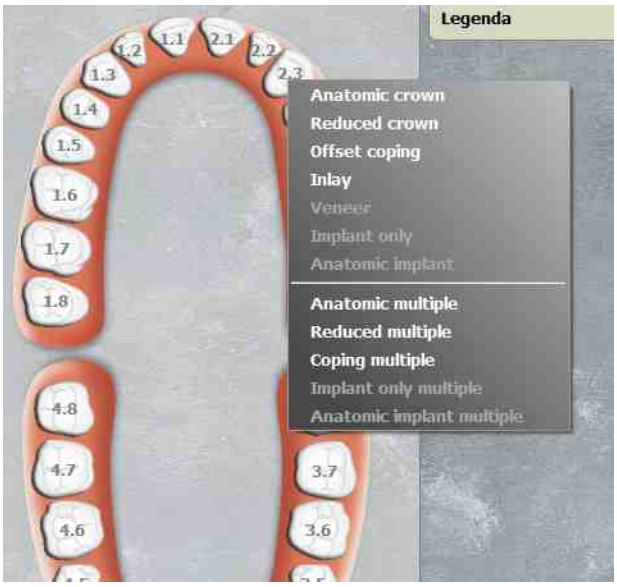
1. Anatomic
2. Offset coping
3. Reduction
4. Inlay/Onlay

All of them can be Single o Multiple prosthesis. Additionally can also be defined:

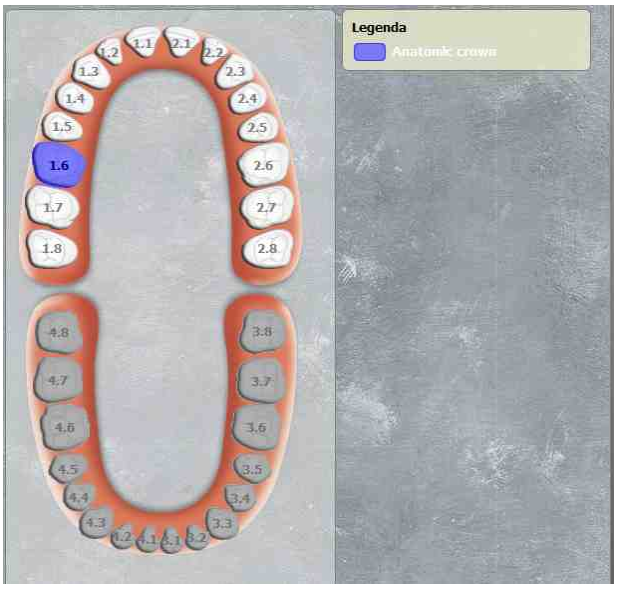
5. Veneers
6. Maryland Bridge
7. Bite Bridge

Define a single Prosthesis

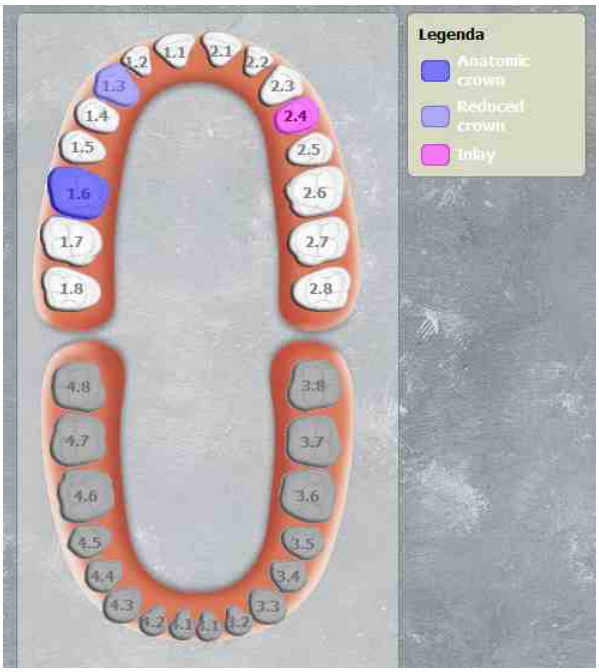
Upon clicking on a tooth on the arc jaw inside the Job Definition panel a contextual menu containing all the possible prosthesis type appears.The upper part of the menu contains the single prosthesis types, while the multiple prosthesis types are located in the lower part.



Upon selection of a tooth, selection on the opposite arc jaw is disabled.

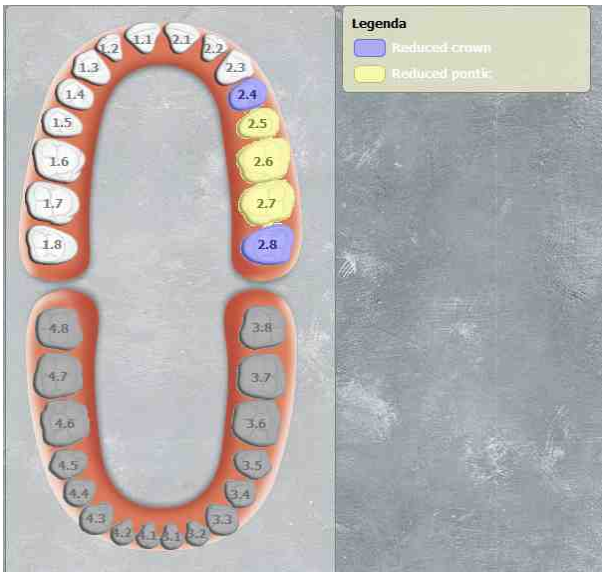


It's also possible to specify more than one job per arc jaw: the acquisition of the necessary dataset will be completed in a single scan, or import. the list of the job is displayed also in the job list panel

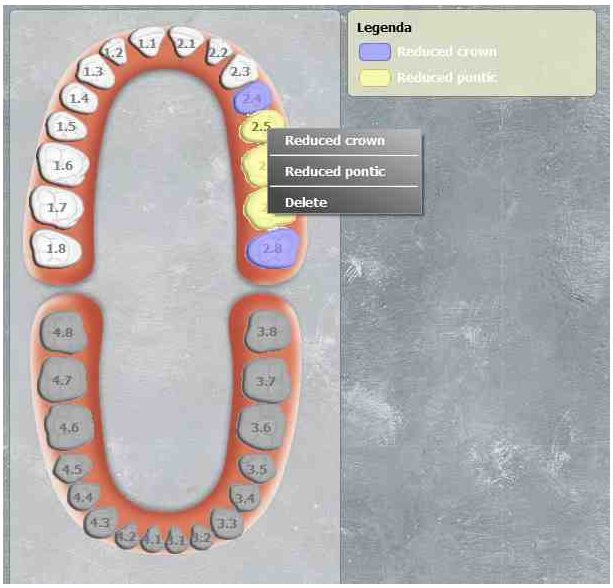


Define a multiple prosthesis

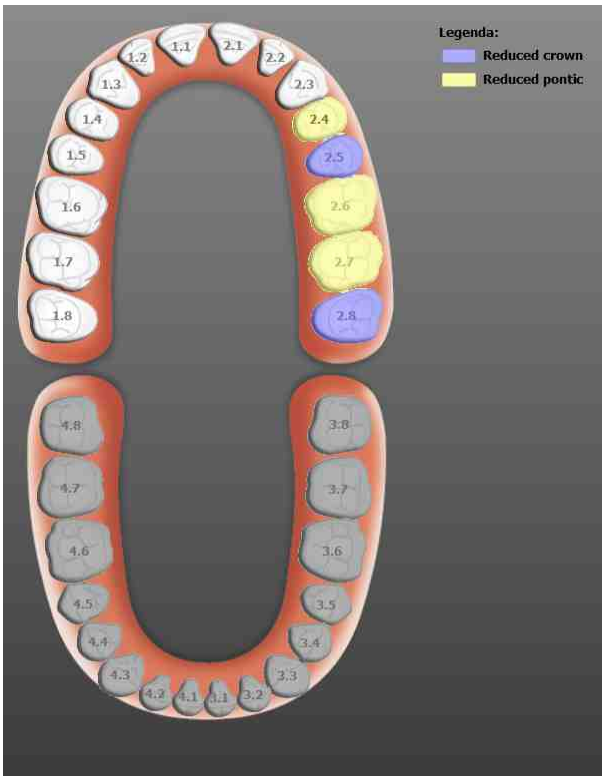
If a multiple prosthesis type has been selected, **DentalCAD** will automatically select all the elements upon picking the external teeth interested by the preparation.



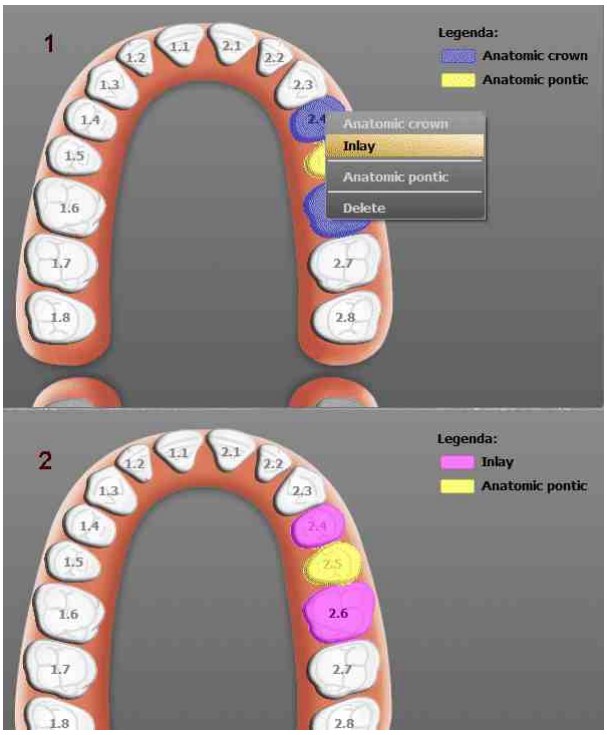
It is possible to rearrange the single tooth functionality simply clicking on it. A context menu displays the possible options



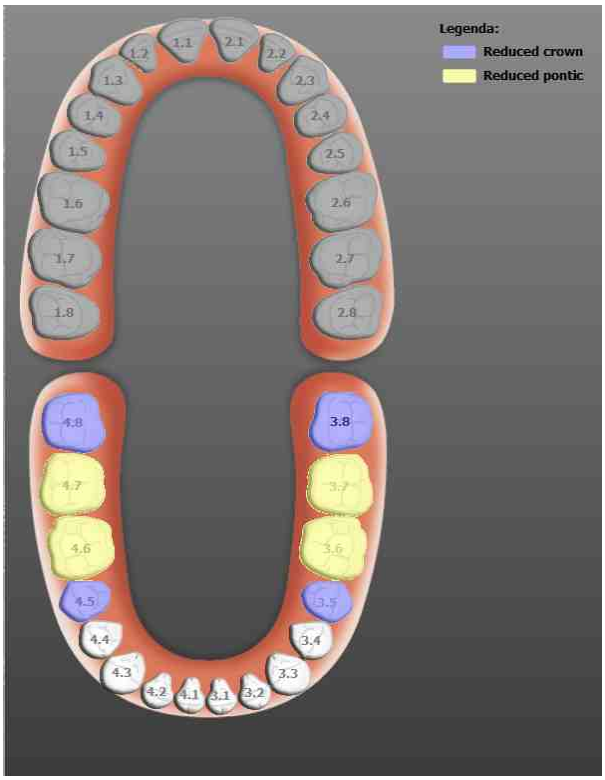
For example the previous 5 teeth bridges is changed in a cantilever one



DentalCAD support also Inlay Bridge. To define this type of job first create an Anatomic Bridge then change the Anatomic Crown in Inlay preparation

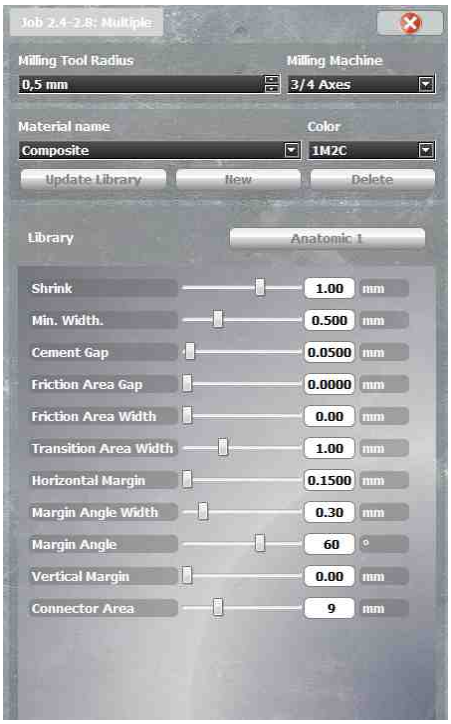


It's also possible to specify more than one job per arc jaw: the acquisition of the necessary dataset will be completed in a single scan, or import



Job Properties

Job Properties can be edited in the right part of the main window



You can select:

- Milling Tool: defines the radius of the curvature correction for Internal Shape
- Milling Machine: enables 3/4 axes or 5 axes correction
- Material Name and Color:
    1. Set the material of the preparation
    2. Create a new material from scratch
    3. Delete a custom created materials
- Library: define the anatomic tooth shape used by the job

5.2 Phase 2: Acquisition by Importer or Scanner

Acquisition by Importer or Scanner

In this phase **DentalCAD** will activate the interface leading the user through the steps

needed to acquire all the data required by the prosthesis. As previously mentioned, when a scanner is not available, the acquisition is done through the Importer module.

To start the acquisition by Scanner or Importer click the corresponding button from the upper toolbar.

- Importer Module
- Scanner Module

5.2.1 Importer Module

Importer Module sections describe:

- Workflow
- UI Elements
- Preferences

5.2.1.1 Workflow

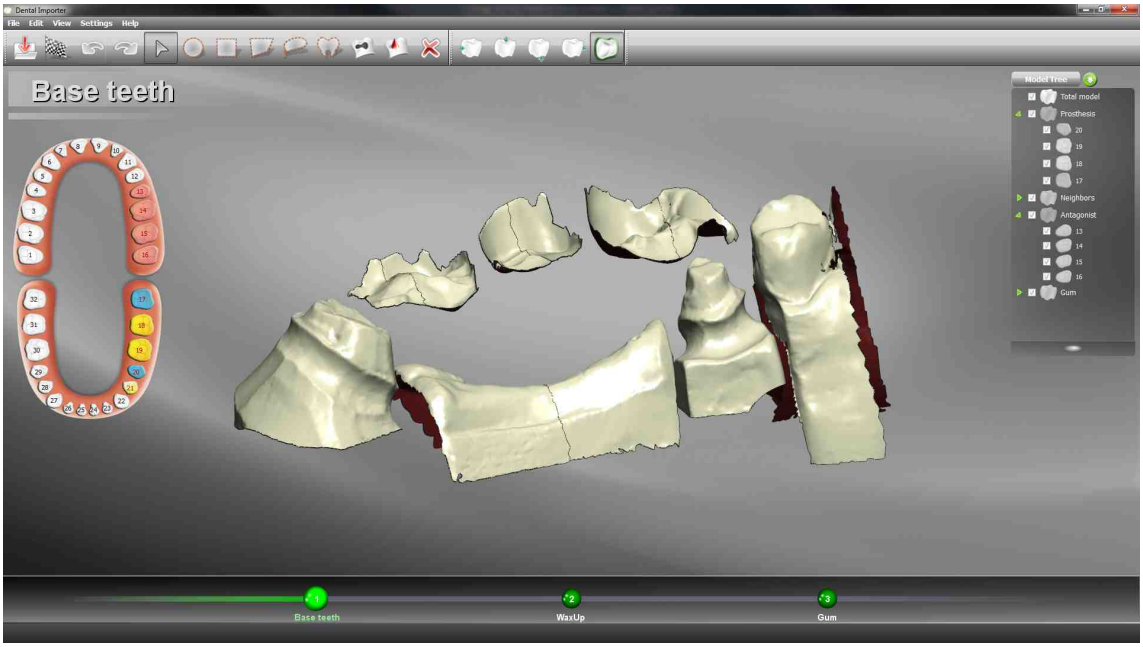
Import Workflow

When loading existing scans from a file, the Importer module provides a wizard like environment. Regardless of the prosthesis type the Importer workflow steps are as follows:

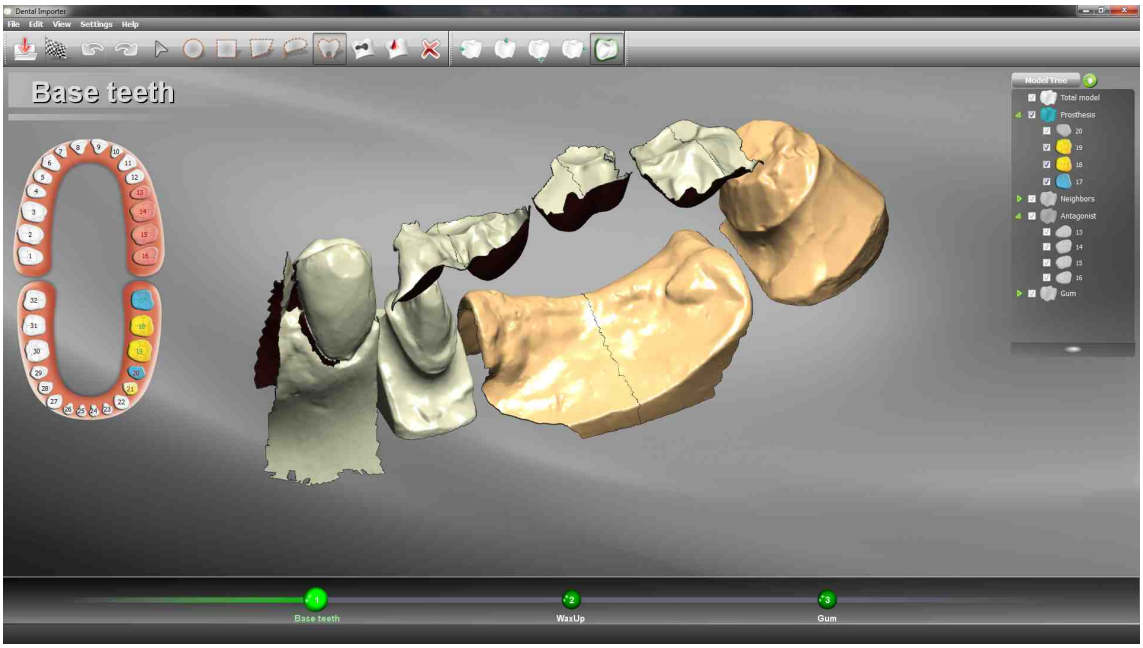
1. Importing existing STL files
    - Base Teeth (prosthesis/neighbours/antagonists)
    - WaxUp (optional)
    - Gum (optional)
    - Implant Scanabutment
2. Segment and Assign each mesh to the proper tooth via the tooth selector tool
3. Finish

A typical example follows.

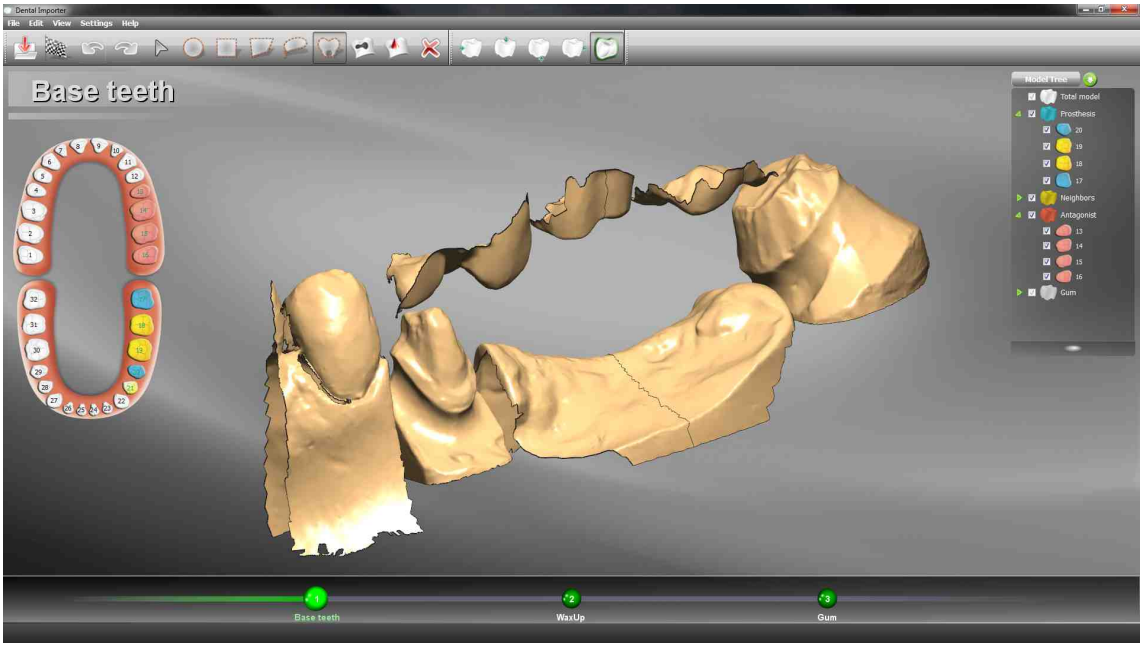
1. Import a STL files: In this case the file contains all the required meshes. Additionally they are already corrected segmented



2. Assign tooth: Select a mesh using selection tools and click on the corresponded tooth icon on the arc jaw. Linked teeth change color in the model tree and graphic area



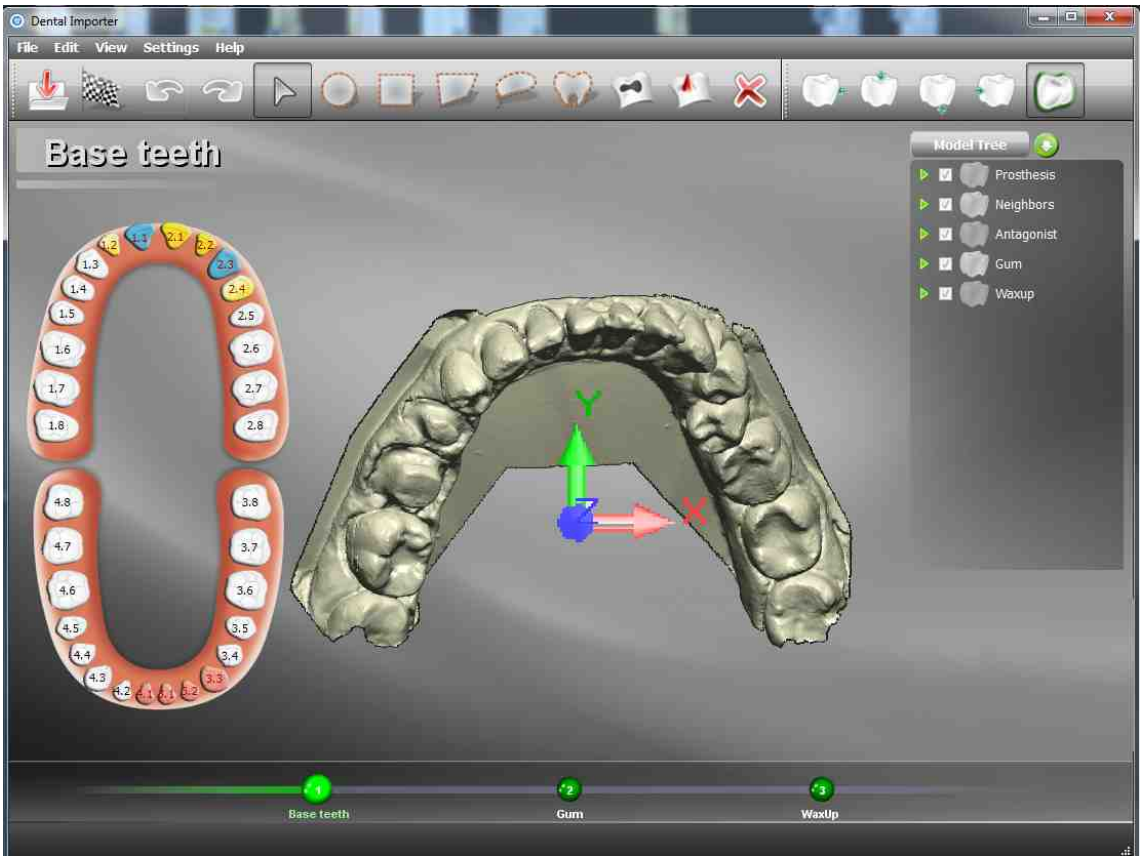
3. Repeat this step for all the items required by the job



4. To close the Importer module click on Finish Flag icon

Model orientation

The imported mesh have to be oriented like the image below:

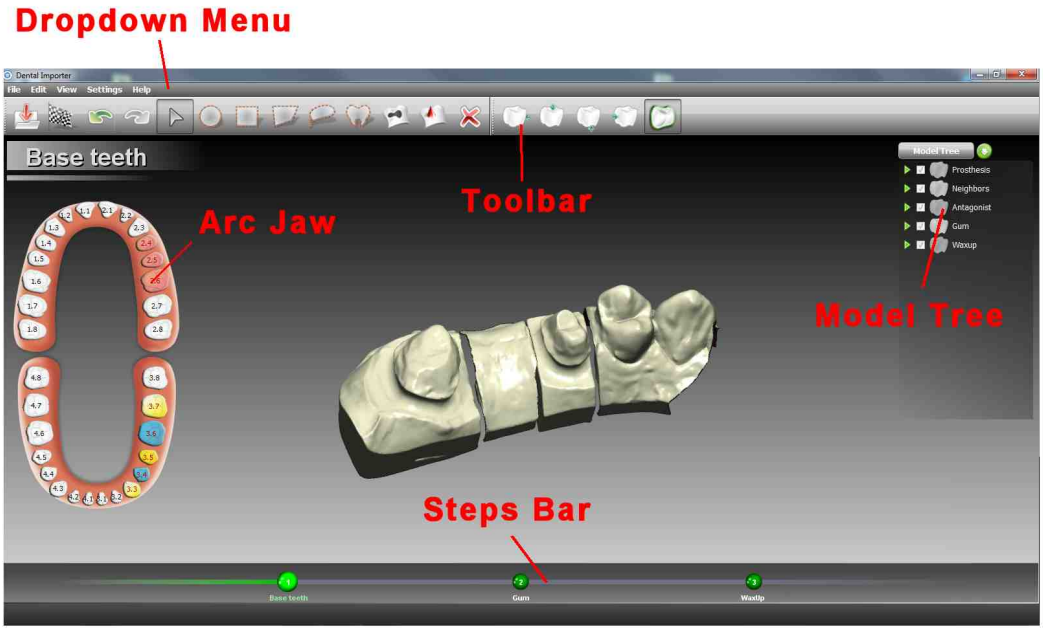


Occlusal direction has to coincide with Z axis. Incisor versus the top of the screen

If a file fails to Import disable the Graphics card memory visualization via Settings > Preferences submenu

5.2.1.2 UI Elements

Importer general UI layout is showed below:

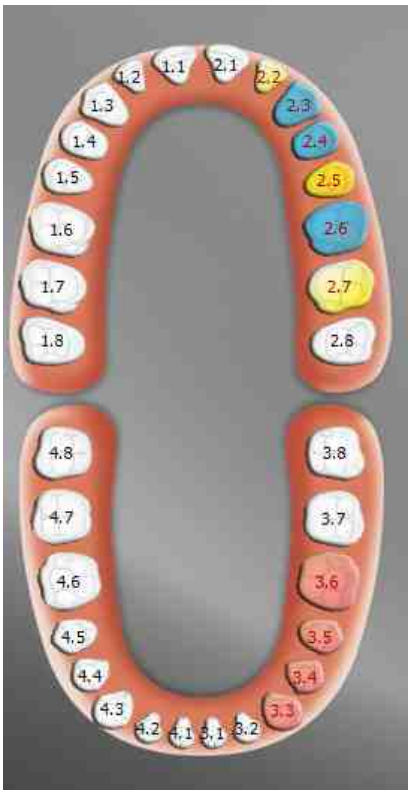


UI Elements include:

- Arc Jaw
- Model Tree
- Steps Bar
- Toolbar Commands

5.2.1.2.1 Arc Jaw

The left panel indicates which tooth are needed by Importer; the user is expected to load the elements.



5.2.1.2.2 Model Tree

The right panel is the Model Tree that shows all the teeth loaded for each job defined.

Flag/Unflag the tooth drives its visibility. Mouse wheels drives the transparency

5.2.1.2.3 Steps Bar

In the bottom of the screen a phase bar shows the current input status:

It is possible to jump from one input status to another one simply clicking on the green button

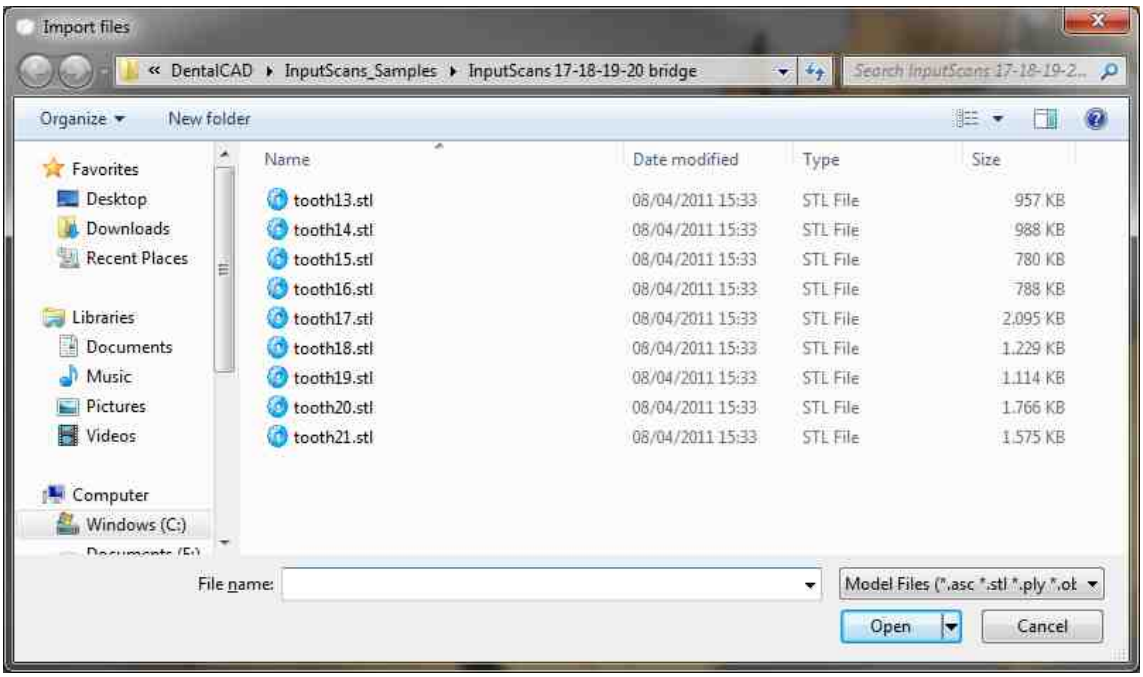
5.2.1.2.4 Toolbar Commands

In the following, for each command of the toolbar image, from left to right, a brief description is provided.

- Import Files
- Finish Import
- Undo
- Redo
- Mesh Selectors
- Fill holes
- Spike Removal
- Delete Selected triangles
- Standard Views
- Show/Hide Mesh Borders

5.2.1.2.4.1 Import Files

An Open file dialog pop up allowing the user to load multiple STL files in the Importer



5.2.1.2.4.2 Finish Import

Terminates the import phase- Click this button when you have finished with the importing and all required meshes have been assigned

5.2.1.2.4.3 Undo

Undoes last operation

5.2.1.2.4.4 Redo

Redoes last undo operation

5.2.1.2.4.5 Mesh Selectors

- Disabled selection: Switch to this tool when you want to simply navigate on model without any active selector
- Rectangle selection: allows to select all triangles inside a rectangular region
- Polygon selection: allows to select all triangles inside a polygonal region
- Lazo selection: allows to select all triangles inside a free-hand closed region
- Cluster selection: selects all triangles in the picked cluster
- Tooth selection: select a tooth by picking: this step is mandatory to link each imported mesh to the proper element in the arc jaw

5.2.1.2.4.6 Fill holes

Fills the holes in the mesh

5.2.1.2.4.7 Spike Removal

Flatten the triangles in a small area defined by polygon selection

5.2.1.2.4.8 Delete Selected triangles

Removes all the selected triangles

5.2.1.2.4.9 Standard Views

Sets the viewport to a standard direction

5.2.1.2.4.10 Show /Hide Mesh Borders

Graphical display option for showing or not the borders of the mesh in highlight

5.2.1.3 Preferences

It is possible to configure application parameters from drop down menu:

Setting -> Preferences

Visualization

- ArcJaw Size: size of the arcjaw picture on the left side of the viewport
- Antialiasing: enables the antialias filter
- Steps bar animation: enables/disables the progress bar animation
- Steps title: enables/disables the step title above the arc jaw
- Translucency widgets: enables/disables alpha blending on the viewport widgets
- Only active teeth in the model tree: hide/show non active teeth in the model tree
- Background image: show/hide background image
- Graphics card memory: which must be disabled to bypass visualization errors when running **DentalCAD** in a low-end workstation

5.2.2 Scanner Module

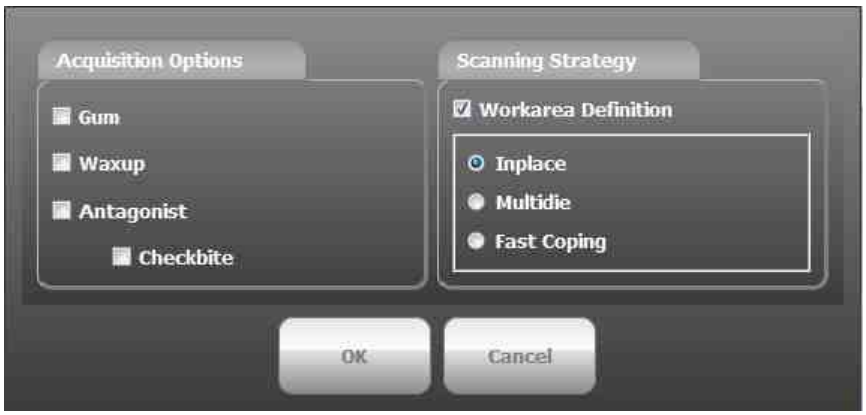
Scanner Module section describes:

- Acquisition Workflow
- UI Elements
- Preferences

5.2.2.1 Acquisition Workflow

Strategy & Options

Upon starting the Scanner prompts the user to choose the acquisition Options and the scanning Strategy to use.



Three Strategies are available:

- Inplace: Standard strategy. The job stumps stay in the original position during scanning. No realign is required
- Multidie: Alternate strategy. The job stumps are positioned on a special device. They need to be realigned manually later
- Fast Coping: it is particularly useful when a single Stump has to be scanned

The below Options allows the user to add elements to scan:

- Gum
- Waxup
- Antagonist

Workarea definition flag force the scanner to focus on a specific arc jaw area avoiding to acquire the entire model saving computational time

Acquisition Workflow

Depending from the strategy and option selected, the **Dscan** sets several Steps in order to acquire the arc jaw model and related stump in the best possible way. This sets of Steps are called **Acquisition Workflow**. To help the user to navigate in the workflow a wizard like UI is provided. There are three type of Steps used by scanner to make an Acquisition Workflow:

1. **Scan Step**: The model is scanned using several positions depending from the specific Step. After a Finalize meshes are created. Obviously an arc jaw, a tooth or other models have to be inserted in the scanner by the user
2. **Registration Step**: Meshes are aligned each other. The alignment requires to select three points on a fixed mesh and the homologous ones on a movable mesh. The application compute the transformation in order to minimize the distances. In order to align to mesh they have to have overlapping areas. It is not possible to align meshes without overlapping
3. **Assignement Step**: Meshes are segmented and assigned to the appropriate teeth

For example below are listed the Steps to acquire a simple job using Inplace strategy and Workarea flag on. No additional options selected

1. Workarea Definition
2. Total Model Acquisition
3. Neighbors
4. Inplace
5. Registration
6. Finish

The same Workflow adding Gum Option:

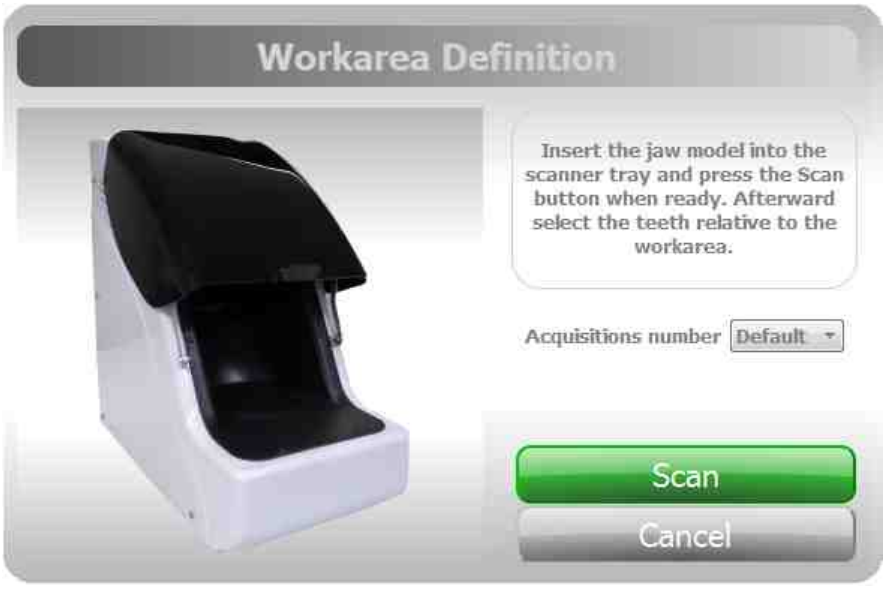
1. Workarea Definition

2. Total Gum Acquisition
3. Total Model Acquisition
4. Gum Registration
5. Gum
6. Neighbors
7. Inplace
8. Registration
9. Finish

In the following sections Steps are described in details

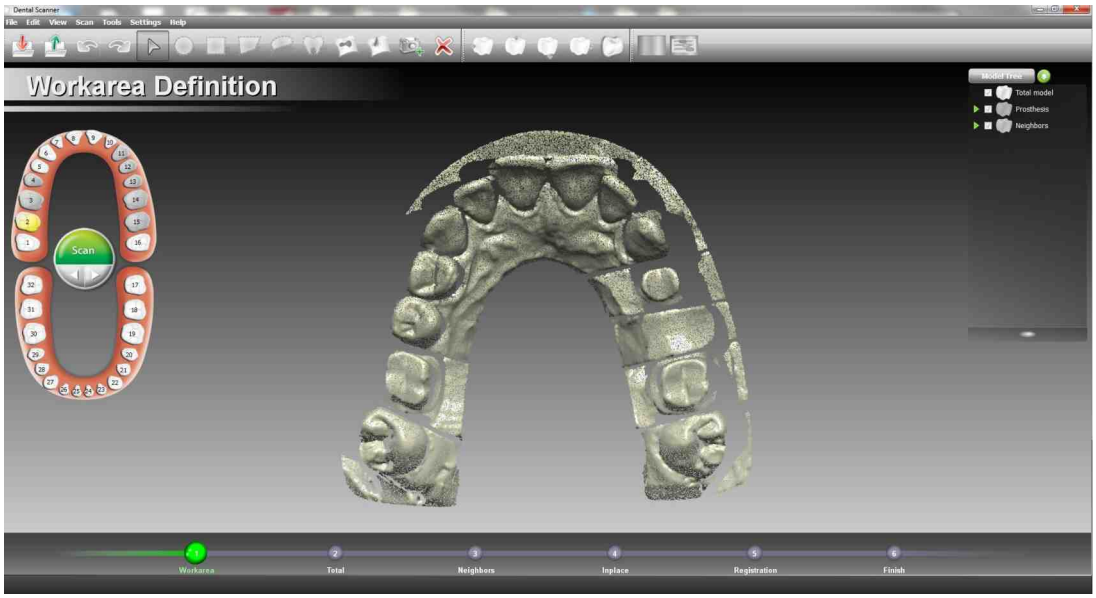
5.2.2.1.1 Workarea Definition

The Workarea Definition is a Scan Step. Ii has the goal to focus all the scanning and computation effort to a specific arc jaw area avoiding to acquire the entire model saving time

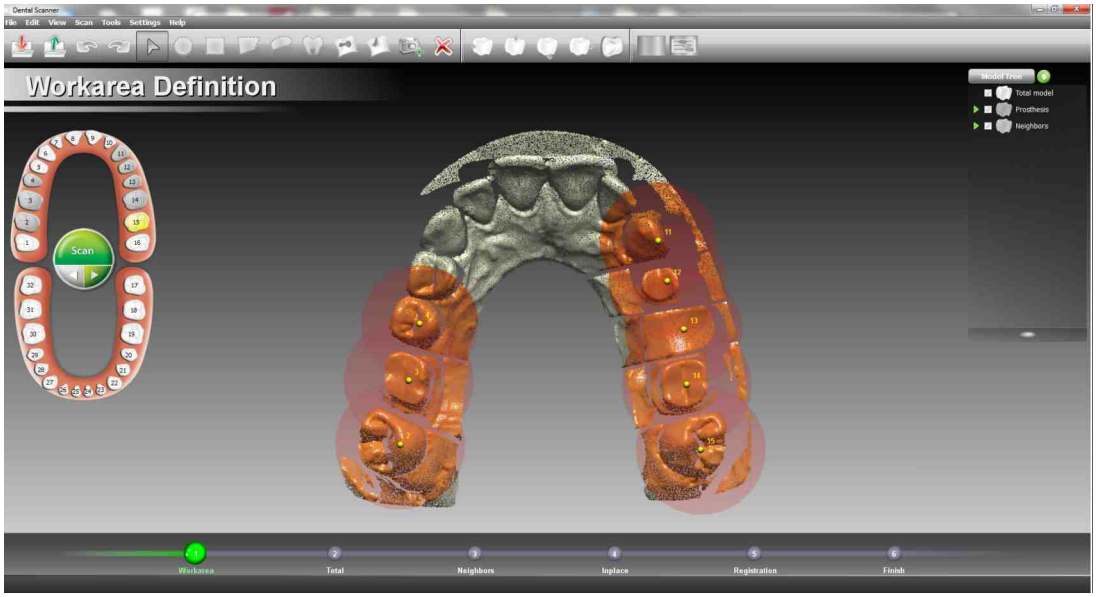


Workarea Definition

1. Quick acquisition, only 2 positions by default, of the total model is done. No Finalize is required



2. Teeth segmentation and linking. When all the teeth are linked to a workarea, the step is completed. In this step the top view is blocked, and only panning is allowed.



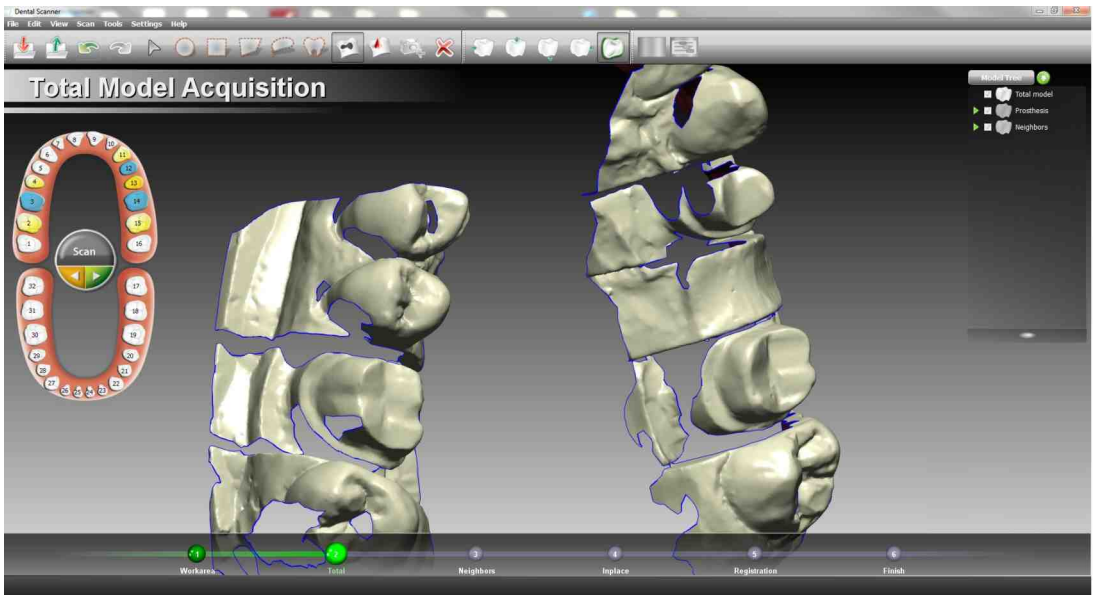
5.2.2.1.2 Total Model Acquisition

The Total Model acquisition is a Scan Step. It is used for two purpose:

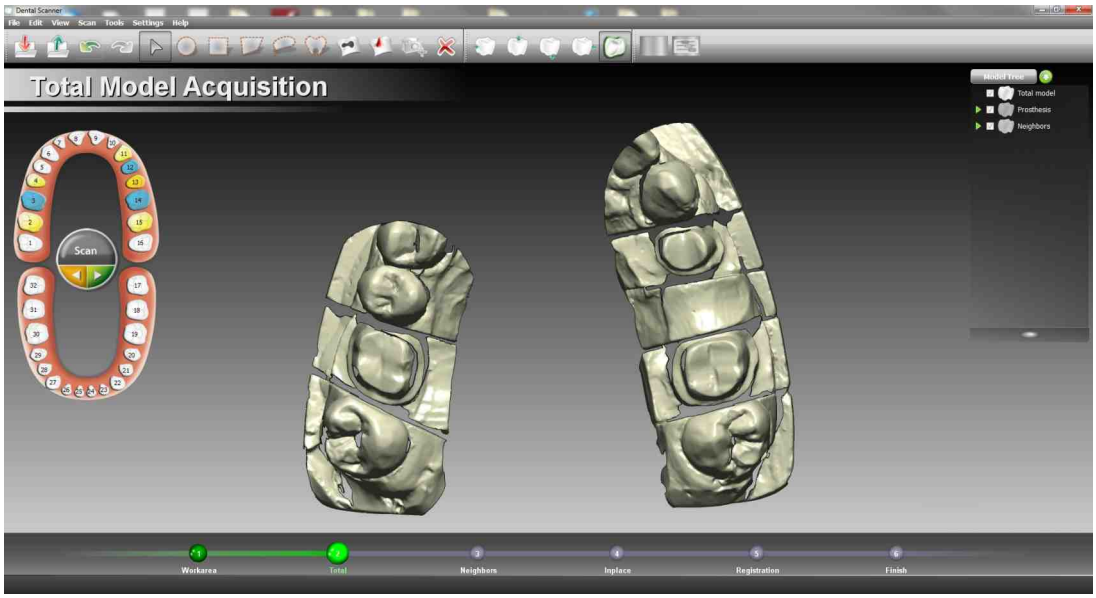
1. Neighbors and Pontic element definition
2. Reference for other acquisition Steps

Total Model Acquisition

1. Detailed acquisition, 8 positions by default, of the previously defined workarea. To finish the acquisition a Finalize is required



2. Upon completion of the acquisition it's possible to use the Fill Holes or Spike removal tool to heal the mesh. When no further editing is needed, the step is completed



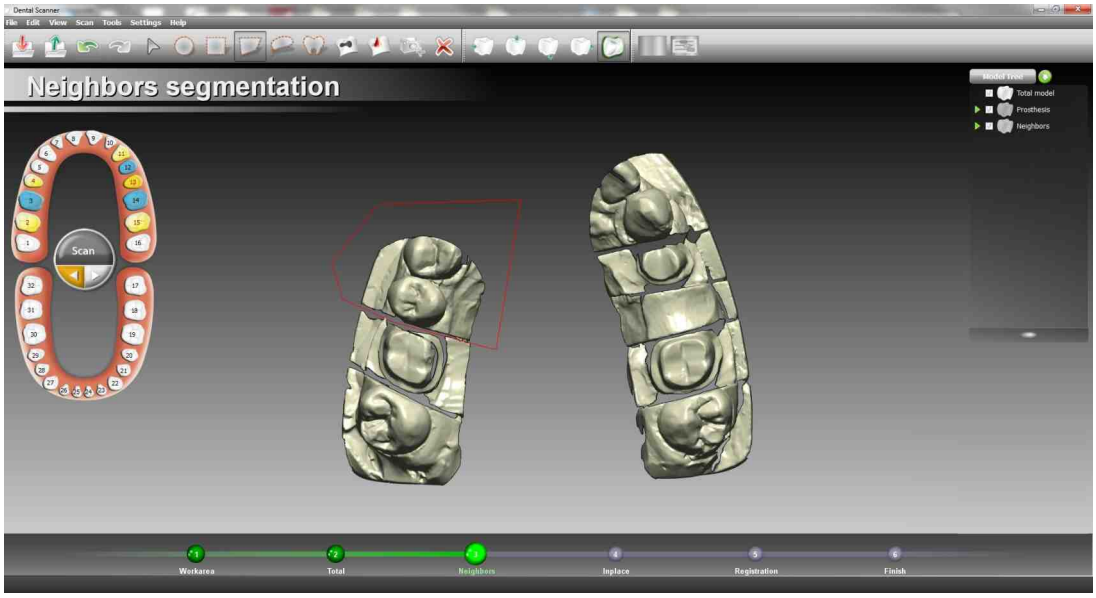
5.2.2.1.3 Neighbors

Neighbors is an Assignment Step. A manual segmentation is needed to identify all the neighbors and pontic elements in the Total Model acquisition.

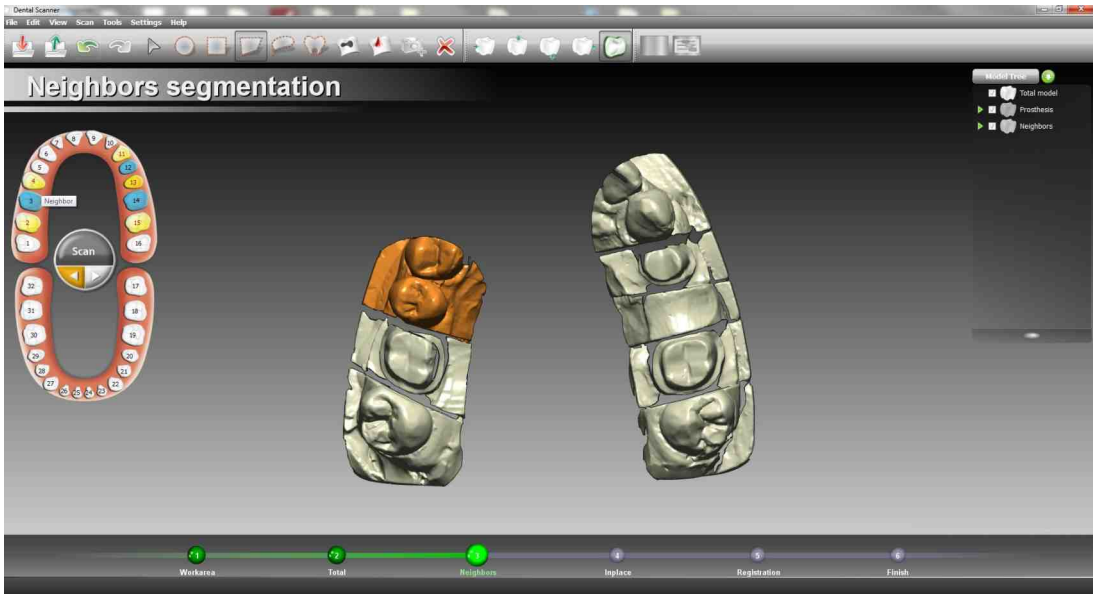
This step is usually performed using the polygon and the lasso selection tools.

Neighbors segmentation

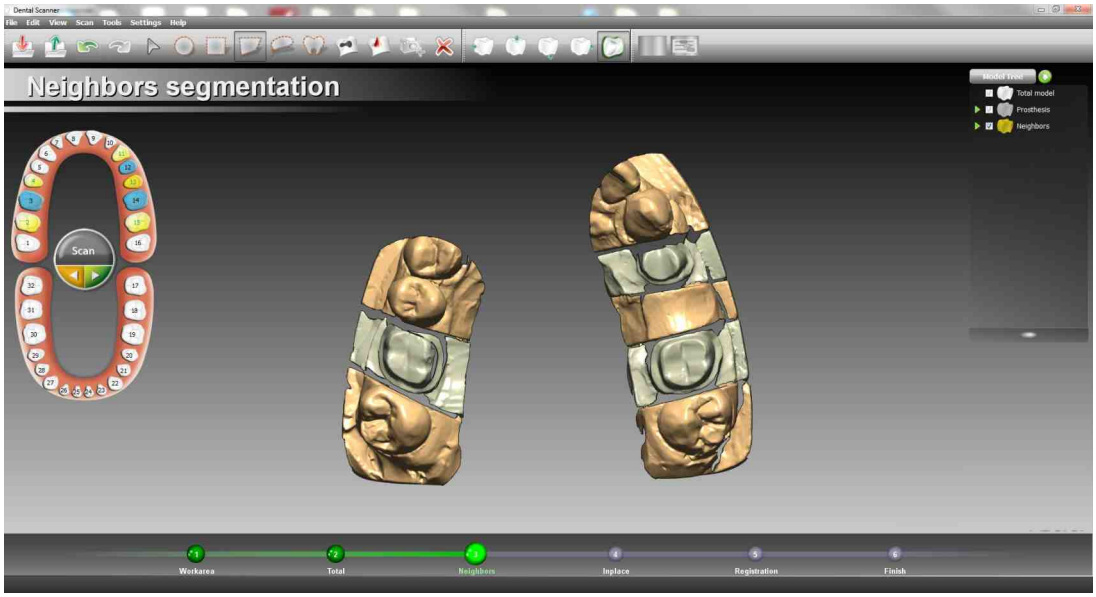
1. Correct manual segmentation of the single meshes:



2. Linking of the segmented meshes to the preparation elements; pick the segment and the arcjaw teeth by single click to link;



3. Correctly linked elements are shown in pale orange; unlinked elements are shown in bright orange. Once all elements have been correctly linked the step is complete.



5.2.2.1.4 Inplace

Inplace

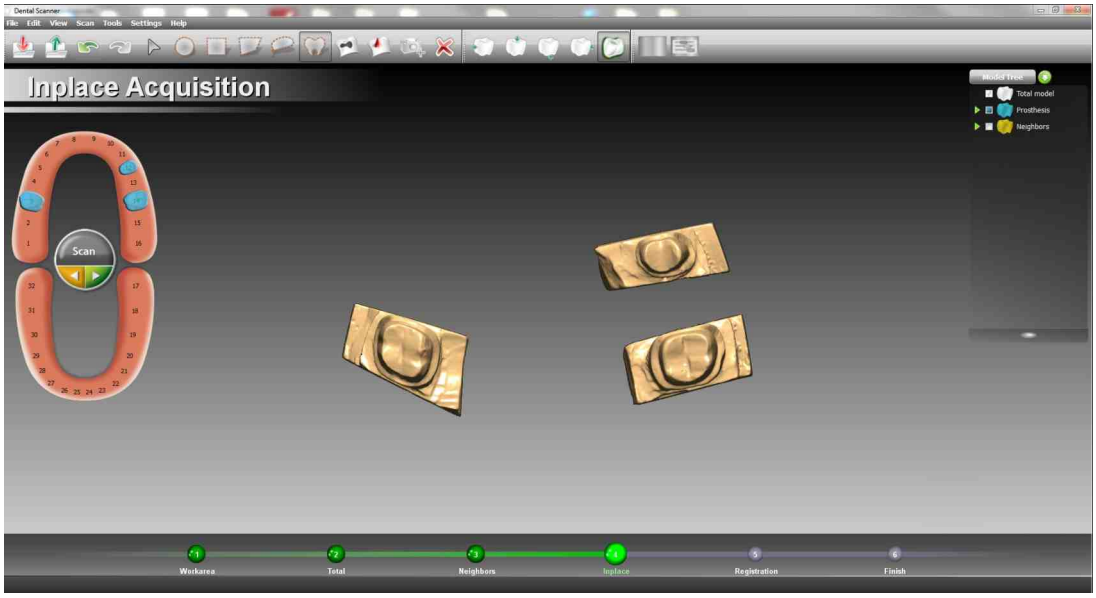
The Inplace is a Scan Step. This strategy implies keeping the stumps on the base, while removing all the other elements. Stumps scanned this way are already in the right position, no additional step are required

If the preparation involves several stumps the scanner automatically could split the acquisition in two or more separate Steps

Inplace workflow

1. Acquire the stumps, 16 positions by default. A Finalize is required. Elements scanned this way are already registered with the total acquisition:

2. Link the elements; pick the segment and the arcjaw teeth by single click to link



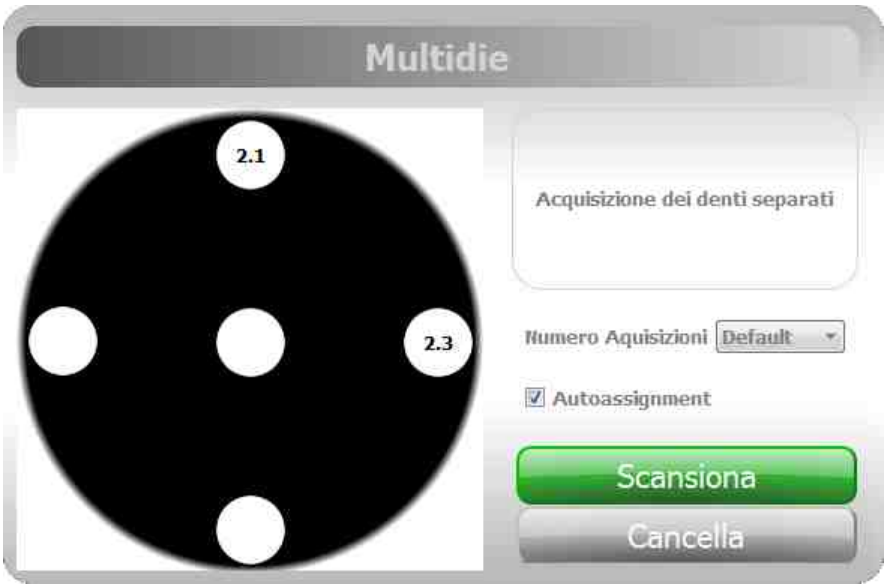
If one tooth is not well acquired don't assign it. Remove from the base the right ones and repeat the scan running it from pulldown menu. (The Scan button is inactive)

Dscan deletes automatically the not assigned mesh and repeat the acquisition cycle.

5.2.2.1.5 Multidie

Multidie

Multidie is a Scan Step. This strategy implies removing the stumps from the base and inserting them into a special tablet, according to a specific pattern. The stumps are scanned in a different position respect the arc jaw, an additional registration step is required and mandatory to move them in the right position. As reference the Total Model is used

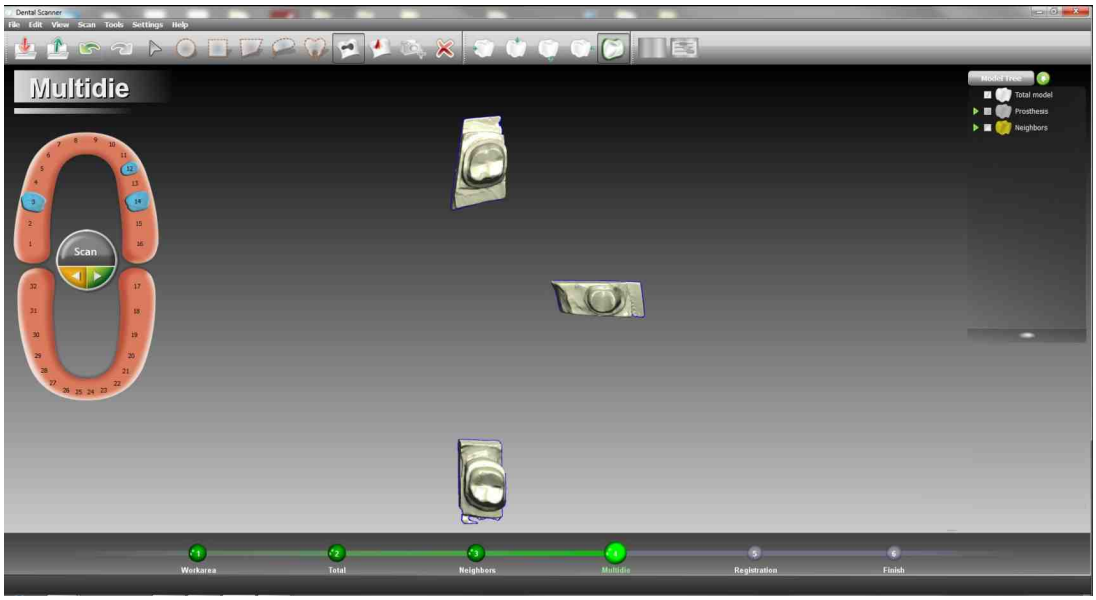


.

If the preparation involves more than five stumps the scanner automatically split the acquisition in two or more separate Steps

Multidie workflow

1. Acquire the multidie support, 16 positions by default. A Finalize is required to finish. The meshes are assigned automatically by **DScan** if the flag Autoassignment is on

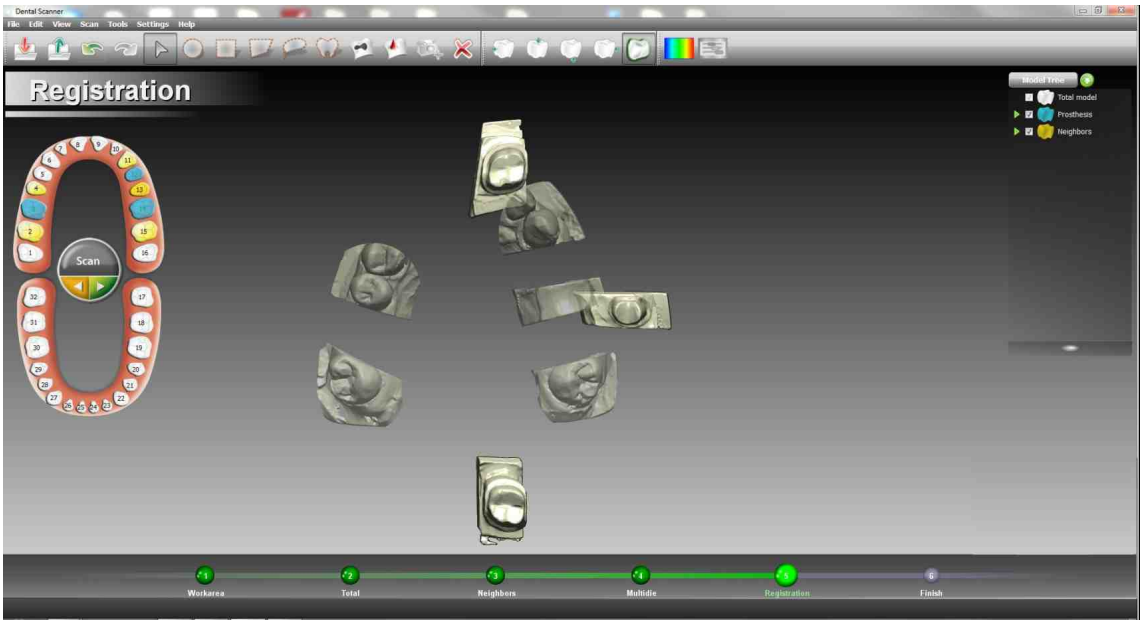


If one tooth is not well acquired deassign it clicking on the related arc jaw icon. Remove from the rotating tablet of the scanner the right ones, move just a little the wrong stump and repeat the scan running it from pulldown menu. (The Scan button is inactive). When the multidie scan dialog box appears unflag the Autoassignment. **Dscan** deletes automatically the not assigned mesh and repeat the acquisition cycle

---

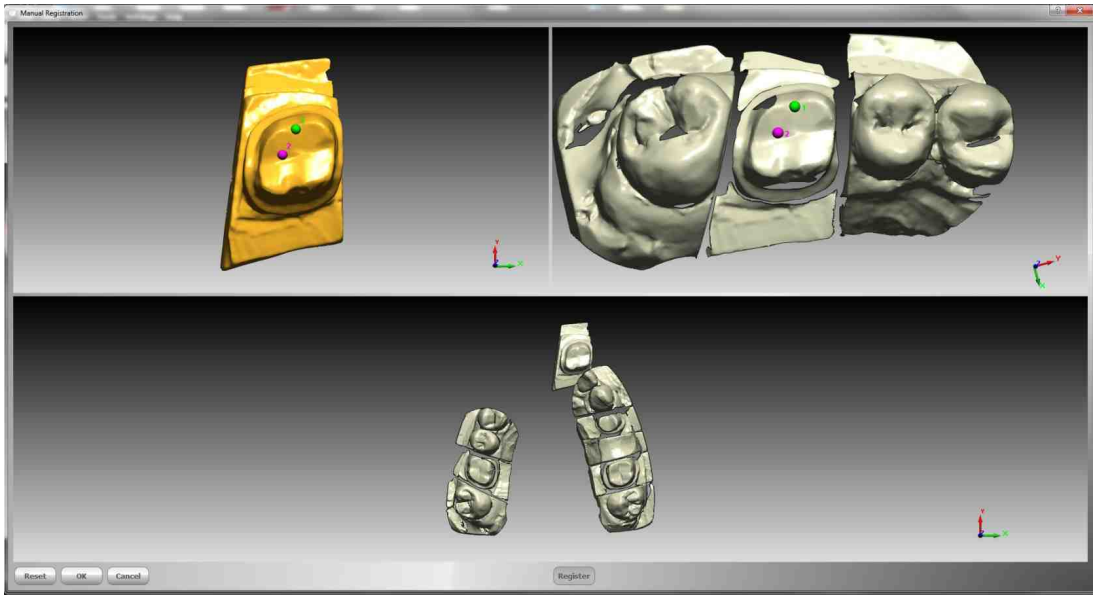
5.2.2.1.6 Registration

Registration has the goal to align meshes to other one. Usually stumps or waxup are aligned using Total Model. Registration Step is mandatory for stumps acquired using the Multidie approach, and optional for Inplace acquisition.

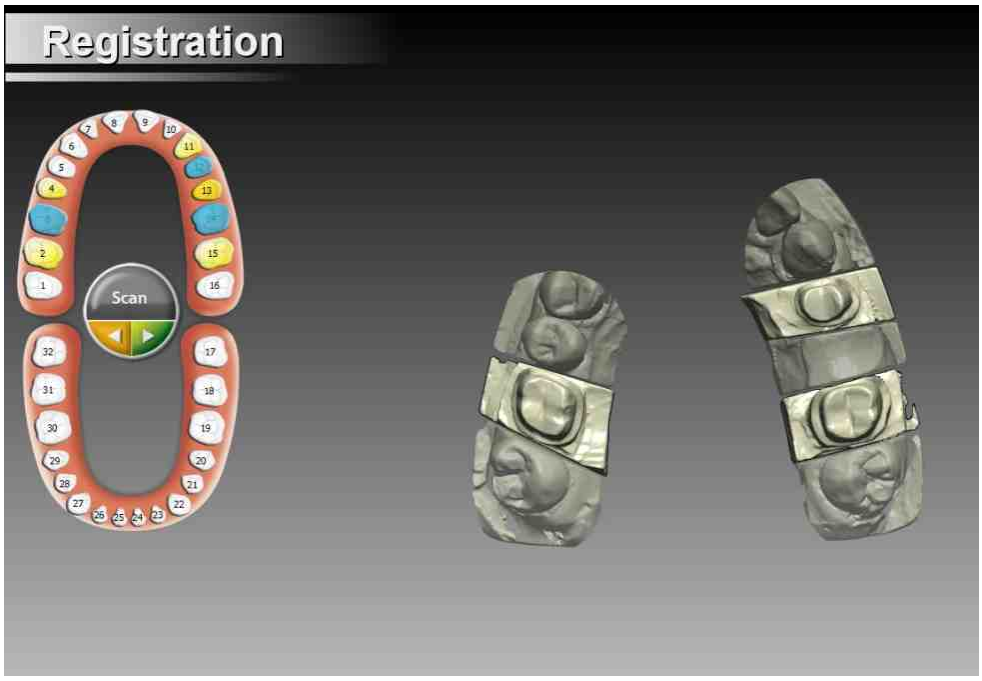


Registration

1. Click in the arc jaw on the tooth to register: A dialog box appears
2. Select three or more homologous points on both the single teeth and the total model. At any time is possible to RESET the selection or ABORT the operation. Once done click the REGISTER button



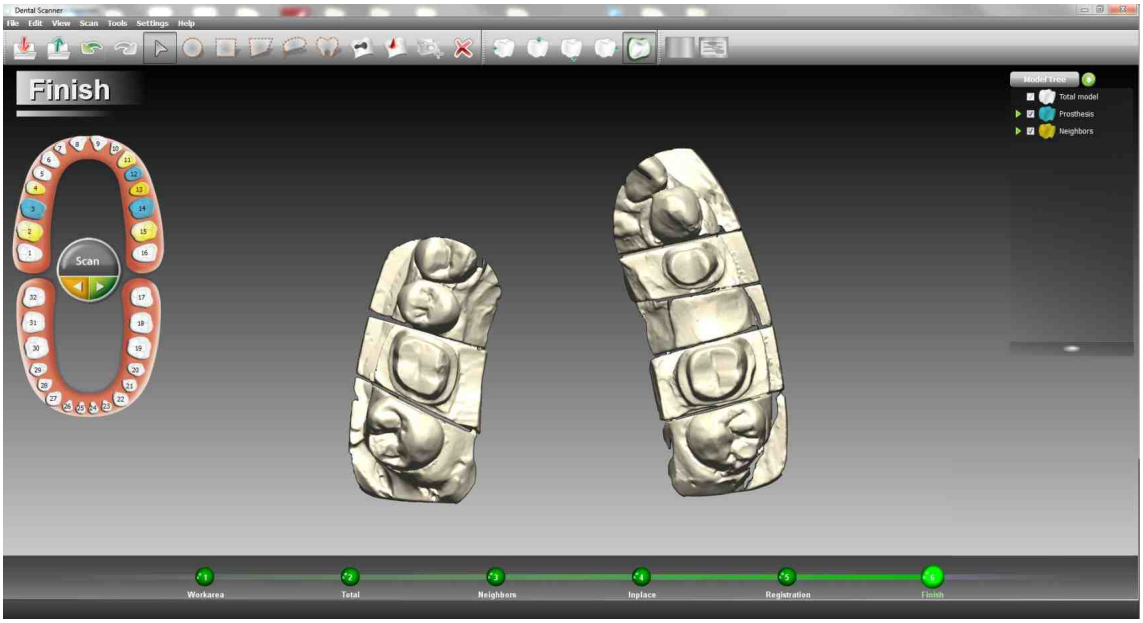
3. By clicking the OK button the operation is completed. A successfully registered element is shown with a green label in the jaw view:



4. Repeat the step for each element to align

5.2.2.1.7 Finish

When all the Steps in the Acquisition Workflow are done, the scanning process is complete. The Scanner application is ready to move all the data acquired to the Modeling Prosthesis phase. This is automatically done clicking on the NEXT button



5.2.2.1.8 Gum

When Gum option is checked the Scanner add three Steps to the Acquisition Workflow:

1. Total Gum Model Acquisition
2. Gum Registration
3. Gum Assignment

Total Gum Model Acquisition

Total Model with gum is acquired, 8 positions by default. A Finalize is required

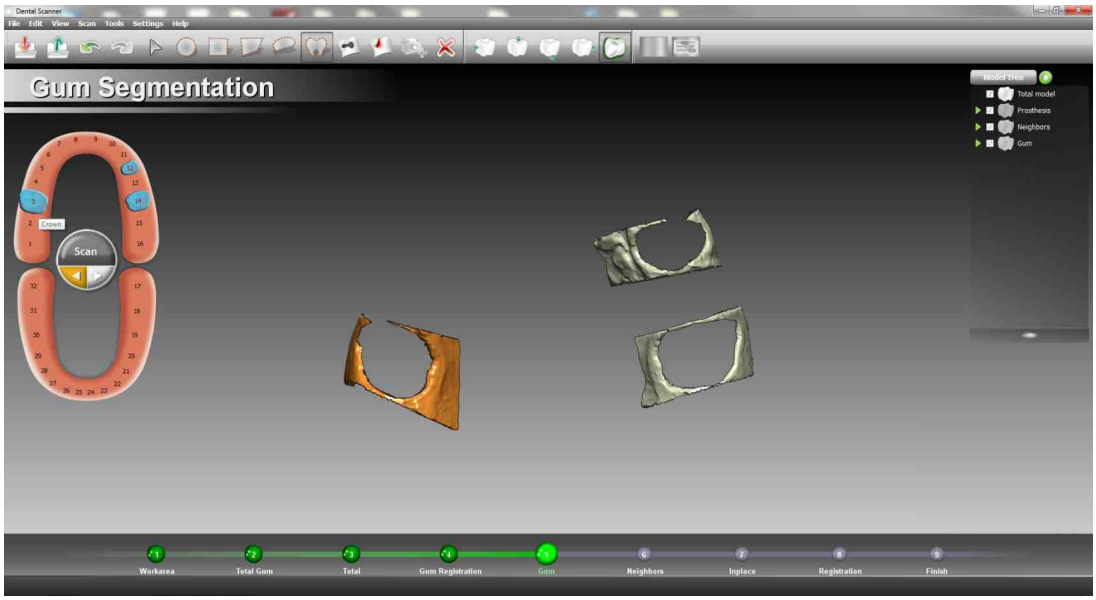
Gum Registration

This Step is composed by two parts:

1. A not mandatory Registration of the two total model acquisitions
2. An semiautomatic segmentation. A specific tool for gum identification, accessible via the button  , is available. Using this tool and proper scanned total models, it's possible to isolate gum without the need of manual segmentation

Gum Assignment

Segmented gums must be linked to the proper tooth



5.2.2.1.9 Waxup

When Waxup option is checked the Scanner add four Steps to the Acquisition Workflow:

1. Total Waxup Model Acquisition

2. Total Waxup Model Registration
3. Waxup Acquisition
4. Waxup Registration

The purpose of these Steps is to acquire shape to be used instead of the default ones available from internal DentalCAD libraries. It means that some modeling job has to be performed to make the shape acquired compatible. This job is done in the Waxup Acquisition Step mainly using Delete and Fill hole commands

Total Waxup Model Acquisition

Total Model with Waxup is acquired, 8 positions by default. A Finalize is required

Total Waxup Model Registration

A not mandatory Registration of the two total model acquisitions is available if required

Waxup Acquisition

This Step is composed by two parts:

1. The Waxup model is acquired, 5 positions by default. A Finalize is required.

2. Segmentation and element linking is then required. Waxup has to be prepared in order to substitute library elements. It means the Waxup bottom has to have a regular hole in order to be able to connect to the Margin Ring. To achieve this result some modeling jobs is required using Delete and Fill hole commands:

    1. Delete the Waxup support

2. Split the total shape in single shapes cutting connectors if present

3. Recreate lateral faces using fill hole command

4. Delete the bottom of the waxup in order to create the base hole

Waxup Registration

A not mandatory Registration of Waxup shapes is available if required. The reference model will be the Total Waxup Model

5.2.2.1.10 Antagonist

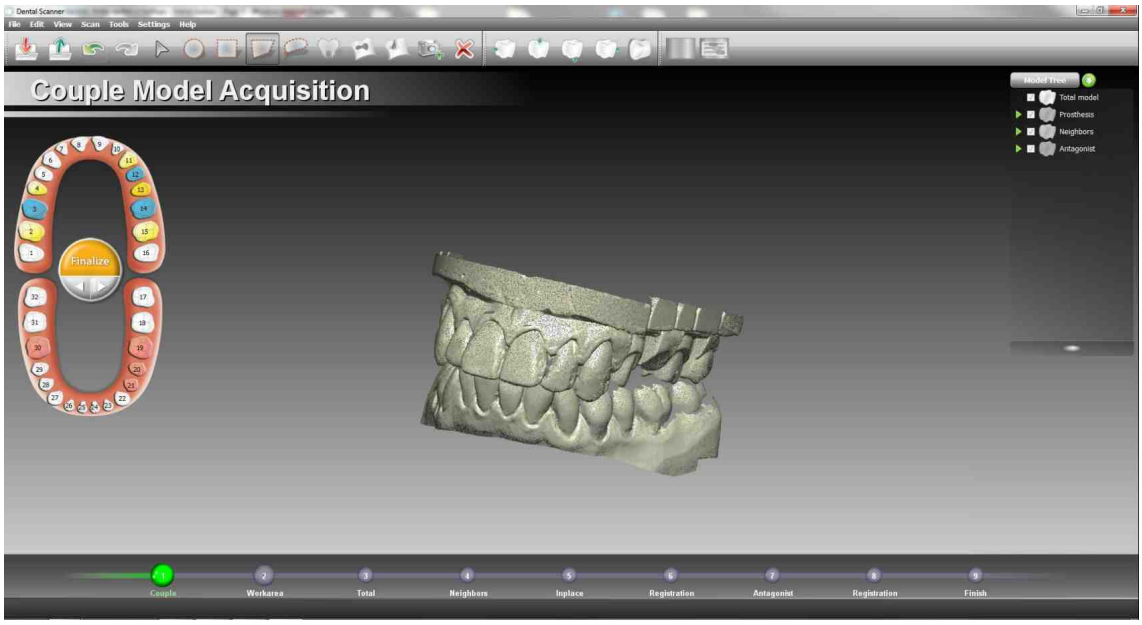
Antagonist

When Antagonists Option only is checked (no checkbite), the Scanner add three Steps to the Acquisition Workflow:

1. Couple Model Acquisition
2. Antagonists Acquisition
3. Antagonists Registration

Couple Model Acquisition

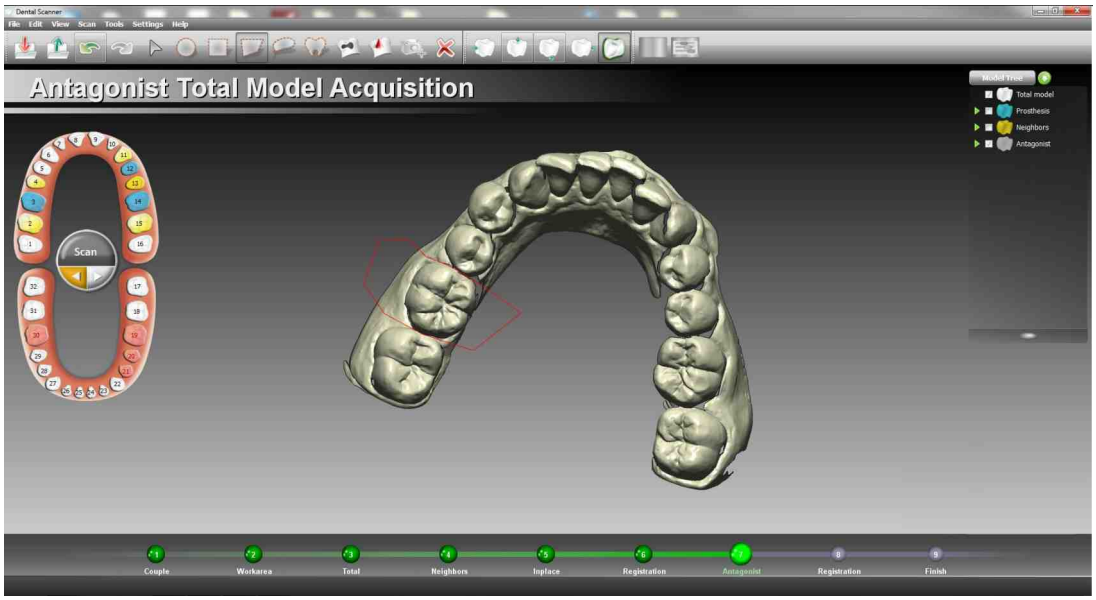
Acquire the Couple Model. A quick acquisition, 6 positions by default, of both arc jaws, superior and inferior, is performed.



Antagonist Acquisition

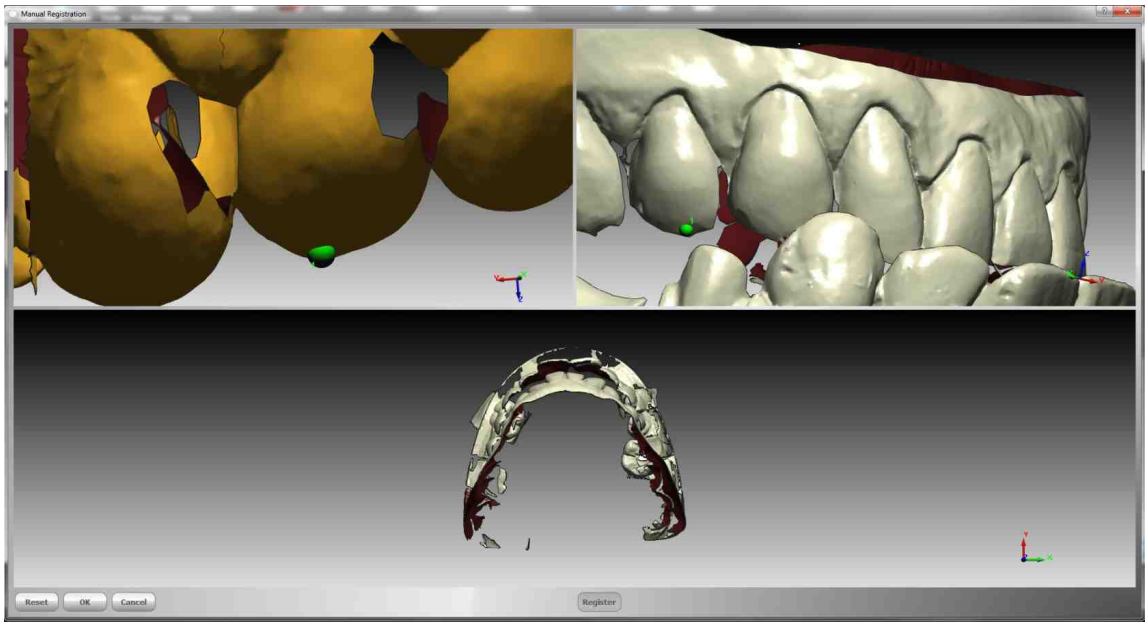
This Step is composed by two parts:

1. The user is required to scan the full antagonists arc jaw, 8 positions by default. A Finalize is required
2. Segmentation and element linking is then required



Antagonist Registration

Perform the registration between the antagonist jaw and the Model Couple by picking the contact points. Once all elements have been correctly registered the step is complete.



Checkbite

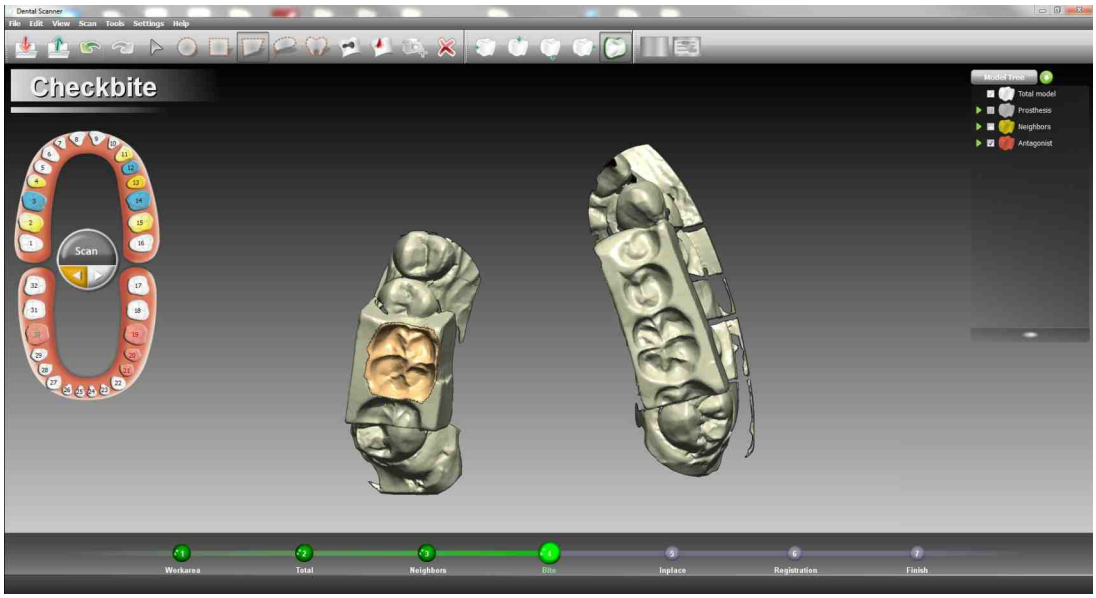
When Antagonist with Checkbite option is checked, the Scanner add one Steps to the Acquisition Workflow:

1. Checkbite acquisition

Checkbite acquisition

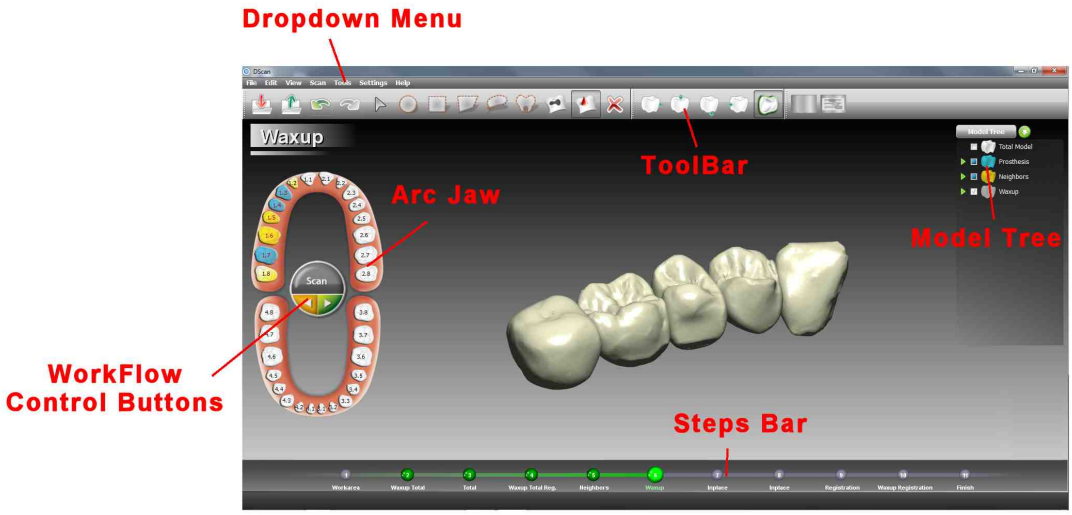
This Step is composed by two parts:

1. Total Model Acquisition with checkbite, 5 positions by default. A Finalize is required
2. At this point segmentation of the checkbite is needed to link each element to the proper tooth. After proper segmentation and linking the workflow proceeds in the standard way



5.2.2.2 UI Elements

Scanner general UI layout is showed below:

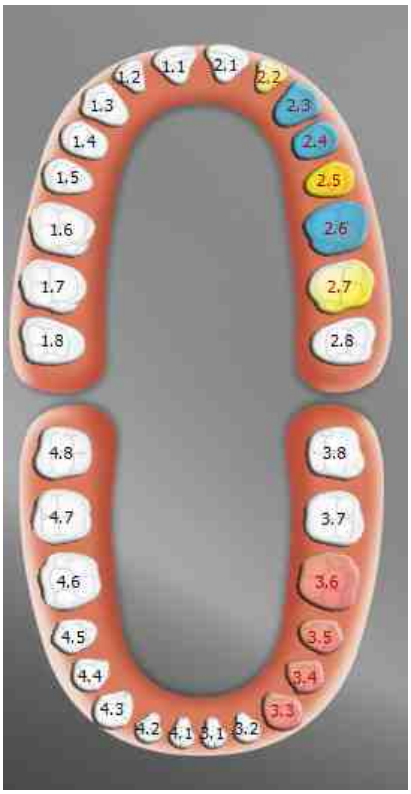


UI Elements include:

- Arc Jaw
- Workflow Control Buttons
- Model Tree
- Step Bar
- Toolbar Commands

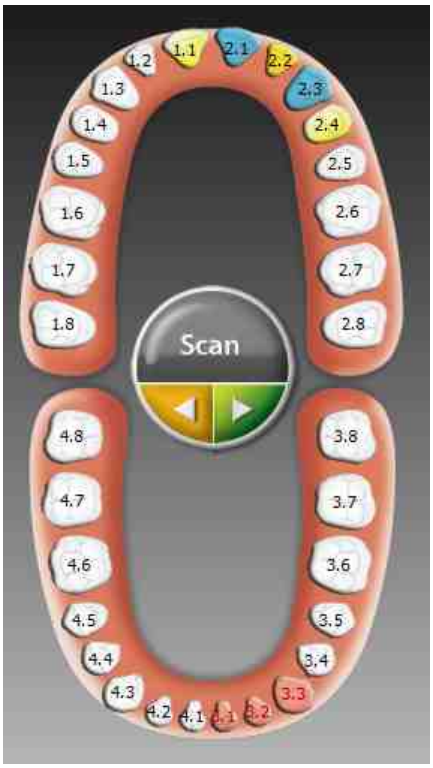
5.2.2.2.1 Arc Jaw

The left panel indicates which tooth are needed by the Dental Scanner; the user is expected to load the elements.



5.2.2.2.2 Workflow Control Buttons

In the middle of the arc jaw on the left three buttons drive the Acquisition Workflow. More than one button can be active in the same time



Next/Previous Buttons

When active (Green) it is possible to move to the next Step of Acquisition Workflow

When active (Yellow) it is possible to move to the previous Step of Acquisition Workflow

Actions Buttons

When active (Green) a Scan Step will be executed

When active (Red) a Scan Step is running. Using this button is possible to stop the Scanner. It immediately stops to acquire data and returns in zero axis position

When active (Yellow) a Finalize computation is performed. Data acquired by the scanner become meshes

When active (blue) a Registration Step is performed

5.2.2.2.3 Model Tree

The right panel is the Model Tree that shows all the teeth loaded for each job defined.

Flag/Unflag the tooth drives its visibility. Mouse wheels drives the transparency

5.2.2.2.4 Step Bar

In the bottom of the screen the Step Bar shows all Acquisition Workflow Steps and highlight the current on

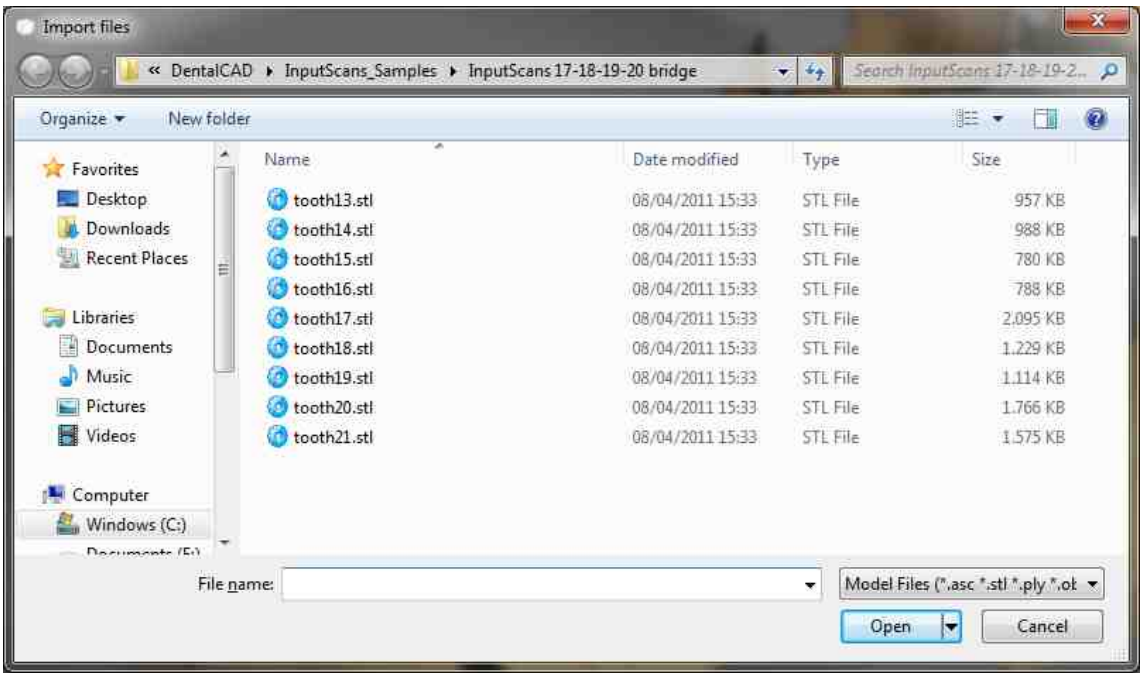
It is possible to jump from one Step to another one simply clicking on the green button.

5.2.2.2.5 Toolbar Commands

In the following, for each command of the toolbar image, from left to right, a brief description is provided.

5.2.2.2.5.1 Import Files

An Open file dialog pop up allowing the user to load multiple STL files in the scanner



5.2.2.2.5.2 Export Files

An Export Files dialog pop up allowing the user to export multiple STL files from the scanner

5.2.2.2.5.3 Undo

Undoes last operation

5.2.2.2.5.4 Redo

Redoes last undo operation

5.2.2.2.5.5 Mesh Selectors

- Disabled selection: Switch to this tool when you want to simply navigate on model without any active selector
- Rectangle selection: allows to select all triangles inside a rectangular region
- Polygon selection: allows to select all triangles inside a polygonal region
- Lazo selection: allows to select all triangles inside a free-hand closed region
- Cluster selection: selects all triangles in the picked cluster

- Tooth selection: select a tooth by picking: this step is mandatory to link each scanned mesh to the proper element in the arc jaw

5.2.2.2.5.6 Fill holes

Fills the holes in the mesh

5.2.2.2.5.7 Spike Removal

Flatten the triangles in a small area defined by polygon selection

5.2.2.2.5.8 Delete Selected triangles

Removes all the selected triangles

5.2.2.2.5.9 Standard Views

Sets the viewport to a standard direction

5.2.2.2.5.10 Show/Hide Mesh Borders

Graphical display option for showing or not the borders of the mesh in highlight

5.2.2.2.5.11 Show colormap

Enable/Disable the colormap while registering the elements

5.2.2.2.5.12 Gum registration slider

The slider is active only when acquiring the gum, refer to Gum for details on its usage

5.2.2.3 Preferences

It is possible to configure application parameters from drop down menu:

Setting -> Preferences

the dialog box has several tabs. See below for details

General

- UI Language: changes the user interface language
- Output format: changes the type of teeth nomenclature

Visualization

- ArcJaw Size: size of the arcjaw picture on the left side of the viewport;
- Antialiasing: enables the antialias filter;
- Steps bar animation: enables/disables the progress bar animation;
- Steps title: enables/disables the step title above the workjaw;

- Translucency widgets: enables/disables alpha blending on the viewport widgets;
- Only active teeth in the model tree: hide/show non active teeth in the model tree;
- Background image: show/hide background image;
- Graphic card memory: which must be disabled to bypass visualization errors when running DentalCAD in a low-end workstation.

Registration

- Set minimum and maximum tolerance of the color filter, while the registration algorithm is running

Chronology

- Enable/Disable chronology; press the CANCEL CHRONOLOGY button to clear the process list.

Acquisition

- Adjust the height of the scanning area.

5.3 Phase 3: Modeling Prosthesis

Depending from the job selected in Phase 1 **DentalCAD** sets several Steps. This sets of Steps are called **Modeling Workflow**.

Below a table that contains the list of all possible modeling Steps

Job		Step									
		Margin Line	Insertion Direction Setup	Tooth Preparations	Internal Refinement	Arc Definition	External Refinement	Framework Refinement	Setup Connectors	Prosthesis Refinement	Export
Single	Anatomic Crown	x	x	x**	x	x	x			x	x
	Reduced Crown	x	x	x**	x	x	x	x		x	x
	Offset Coping	x	x	x**	x	x		x		x	x
	Inlay	x	x	x**	x	x	x			x	x
	Veneer	x	x	x**	x	x	x			x	x
										x	
Multiple	Anatomic	x	x	x**	x	x	x		x	x	x
	Reduced	x	x	x**	x	x	x	x	x	x	x
	Coping	x	x	x**	x	x	x	x	x	x	x
	Bite Brigde	x	x	x**	x	x	x	x	x	x	x
	Maryland Bridge	x	x	x**	x	x	x	x	x	x	x
	**Optional										

For example if a Single Reduce Crow is selected the list of Steps required will be:

1. Margin Line
2. Insert direction Setup
3. Internal Refinement
4. Arc Definition
5. External Refinement
6. Framework Refinement
7. Prosthesis Refinement
8. Export

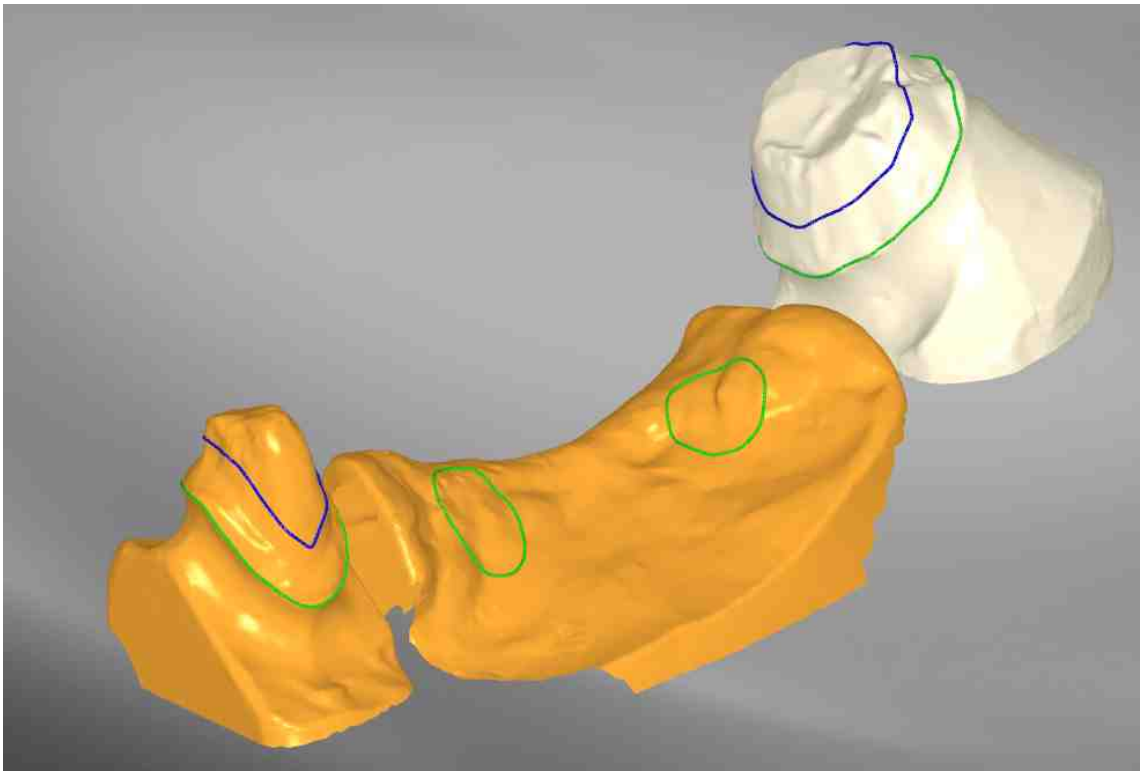
In this Phase the user is driven by the wizard during the creation of all the surfaces required by the prosthesis. A **Step Bar** appears in the bottom of the application to show the full workflow and to highlight the current working step

Skipping between the various steps is always done via the arrow buttons NEXT and PREVIOUS.

In the following sections the Steps are described in details

5.3.1 Margin Line Setup

In this Step the system will show the Margin Line calculated on the Stump in green, and the boundary of the variable offset transition area, Transition line, in blue.

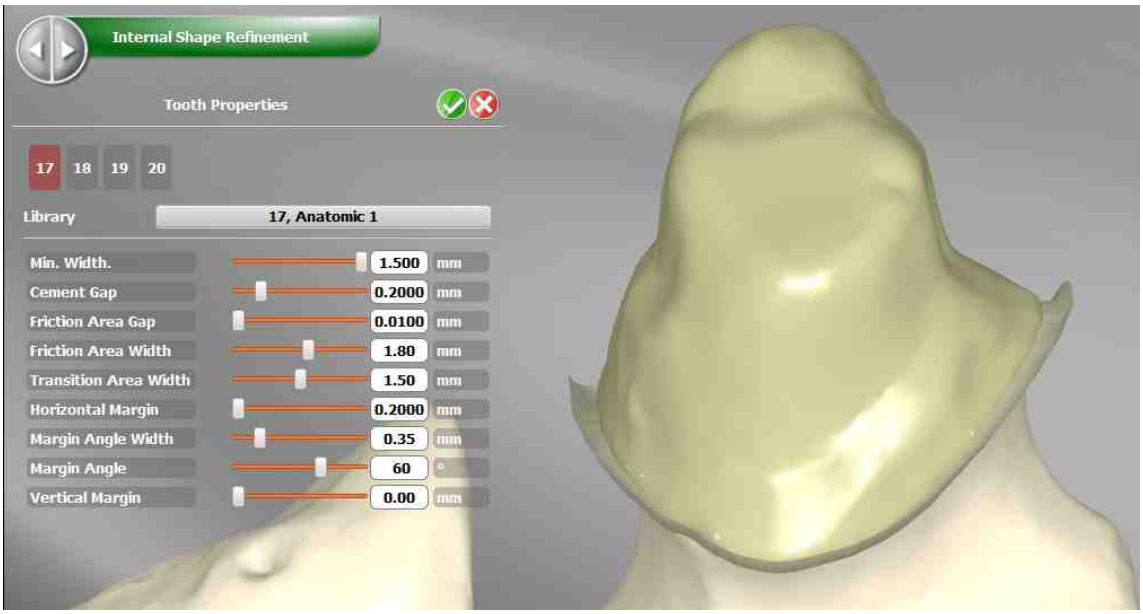


Several Tools are available to work with the Margin or Transition Lines:

- Tooth Properties
- View Cross Section
- Autodetect Margin Line
- Draw Margin Line
- Edit Margin Line
- Replace Line Portion
- Pontic Gum Offset

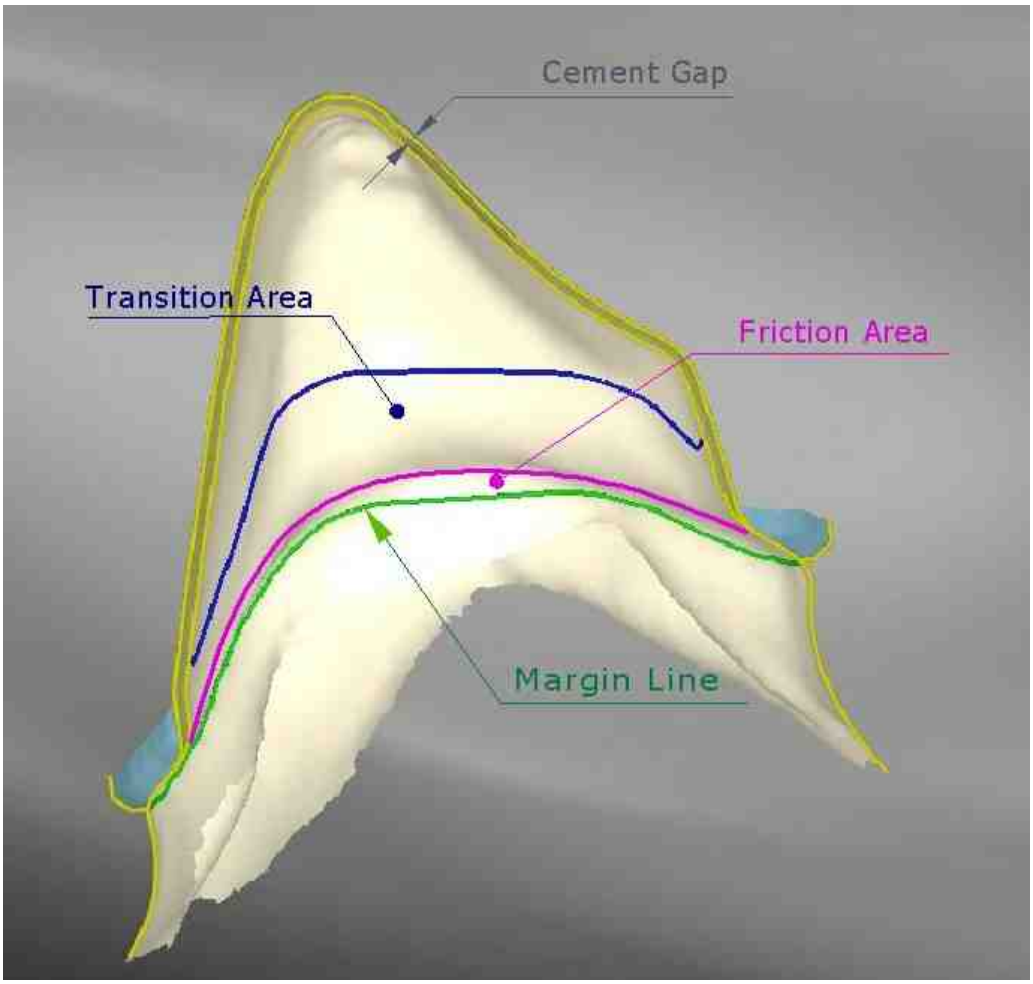
5.3.1.1 Tooth Properties

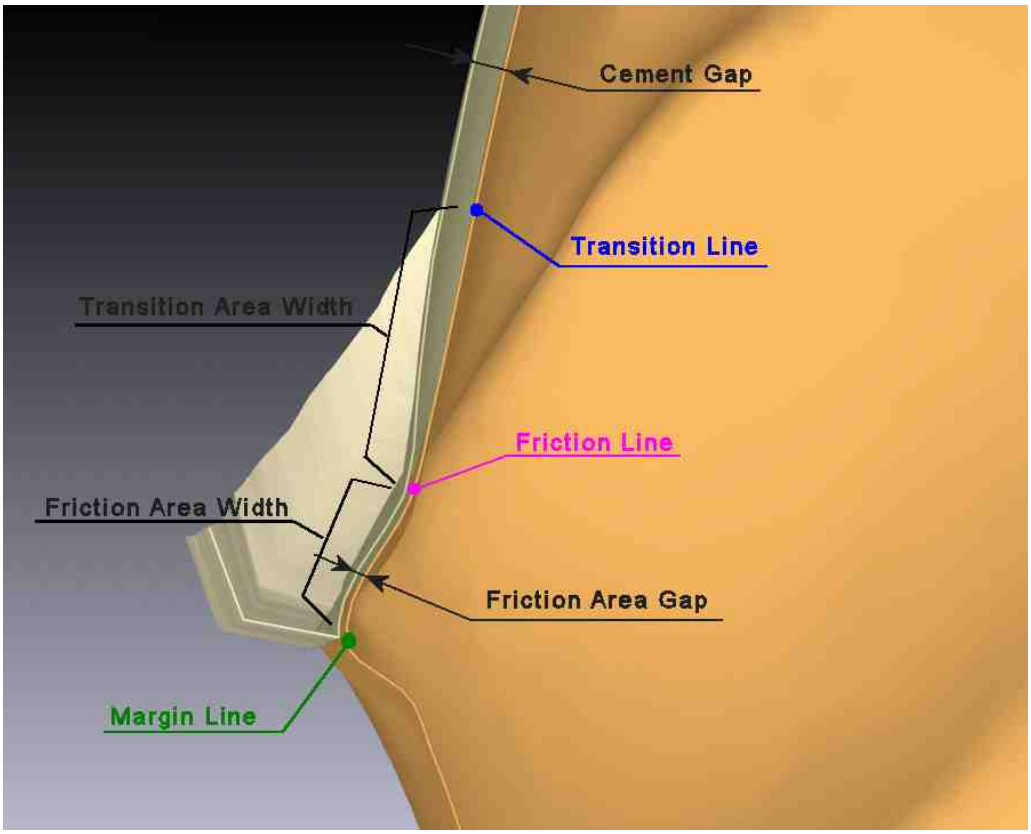
The Tooth Properties Tool provides several sliders to control the shape of the prosthesis:



The below listed Tooth Properties affecting directly Margin Line construction:

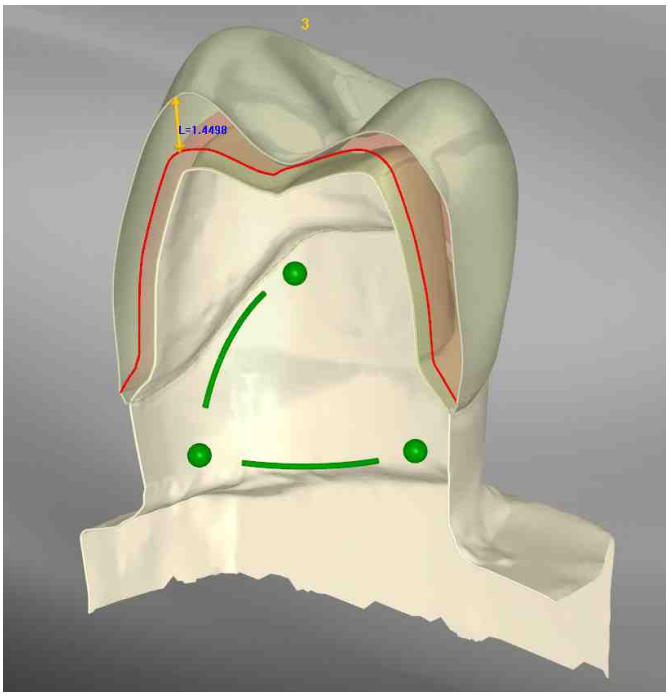
- Transition Area Width





5.3.1.2 View Cross Section

The View Cross Section tool is useful to evaluate the internal shape of the prosthesis by sectioning the teeth. It's tweakable by a handy manipulator and allows measurements



This tool is available in several phases

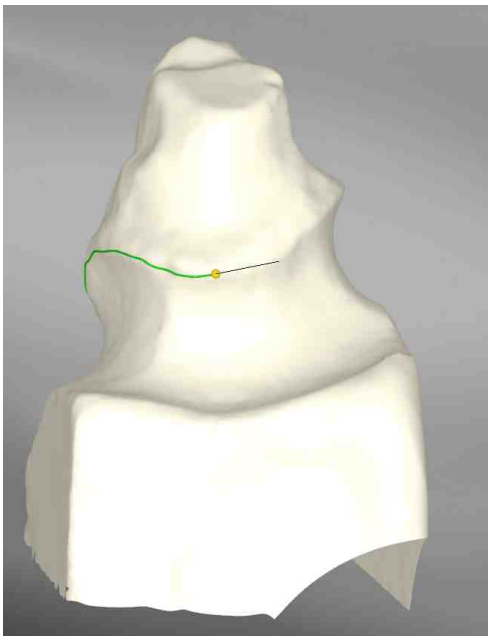
5.3.1.3 Autodetect Margin Line

Autodetect Margin Line can be invoked to calculate the Margin Line

5.3.1.4 Draw Margin Line

In some cases the preparation is such that the system is not able to automatically define a unique Margin Line. The function lets the user define a manually draw Margin Line, created by clicking several points on the mesh.

At any point it's possible to use the Close Line tool to automatically complete the partial curve created.

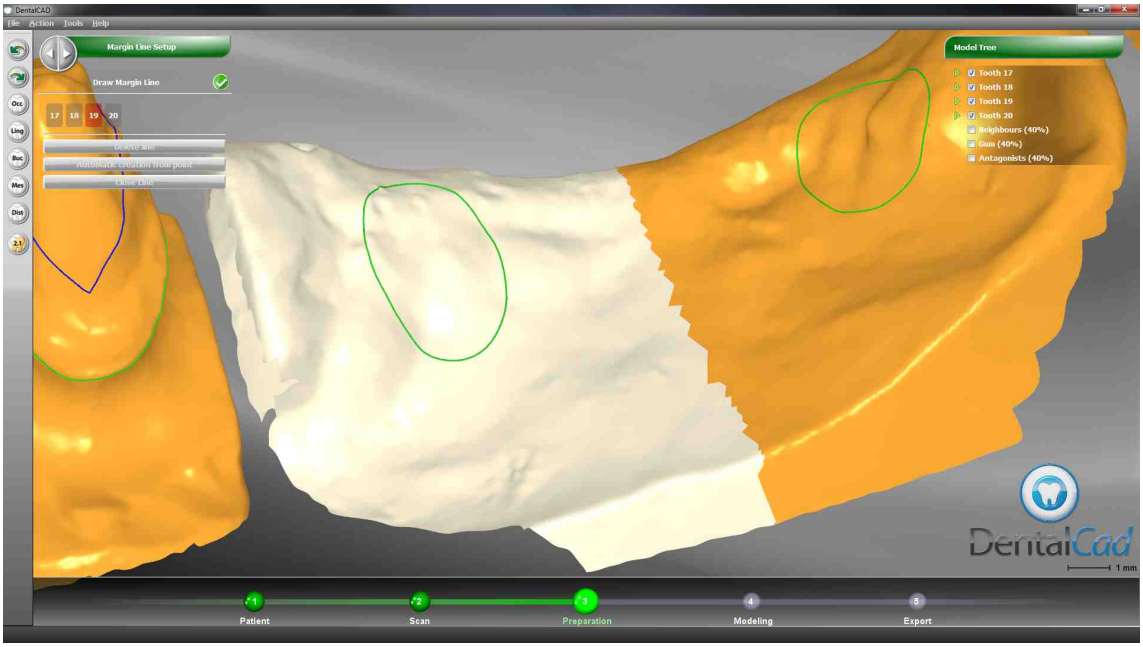


It is both possible to click a single point on the mesh and try to automatically resolve the Margin Line with the Automatic Creation from Point tool; or click subsequent points on the mesh to create the curve manually.

In case of bridges (prosthesis with one or more missing teeth) it's mandatory to define the contact area for each of the Pontics of the prosthesis.

This can be done in the very same way but using the command *Draw Margin Line*.

If used on a missing tooth in fact it will create the contact area margin line.



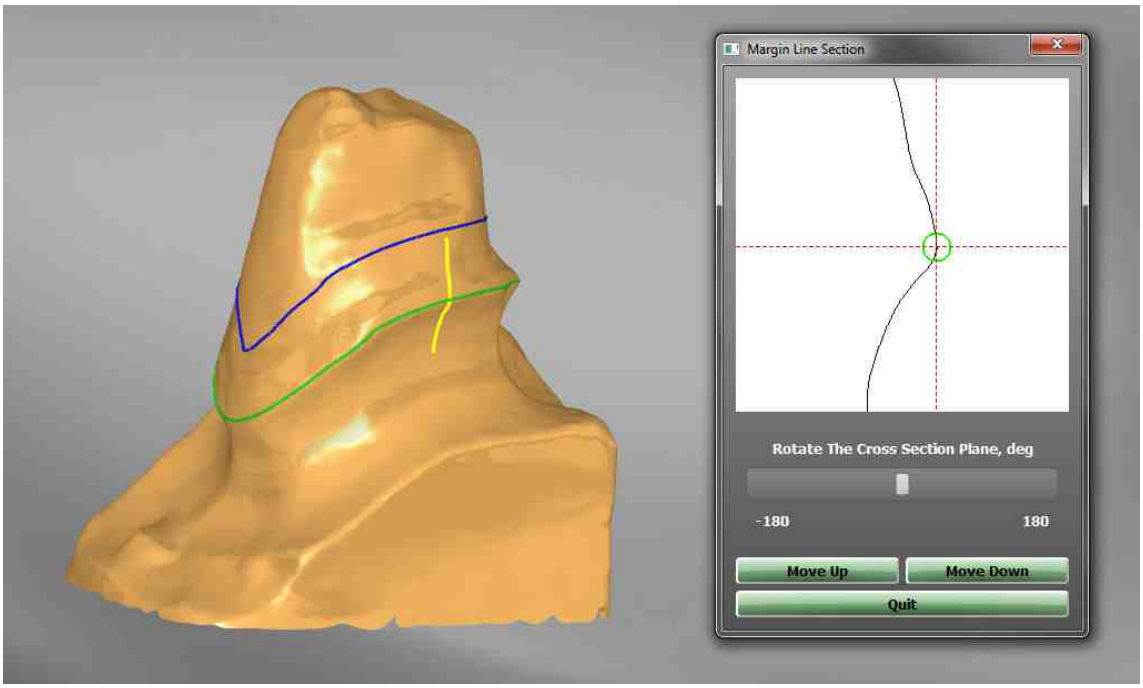
5.3.1.5 Edit Margin Line

Both the Margin Line and the Transition Line can be manually edited via the Edit Margin Line command. They can be edited locally or globally by selecting the proper option:

- Global Editing: the entire curves are moved dragging any curve point by keeping the left mouse button pressed and moving the mouse
- Local Editing: Only a portion of the curves is moved. The Edit Scale option is used to control the area affected by the curve editing

Each single movement can be aborted via the dropdown menu Action/Undo or by pressing the CTRL-Z shortcut on the keyboard.

Inside the command Edit Margin Line it is possible to use a 2D mode with the Use section control.



Within this mode a new window will be shown, and, upon clicking any point on the margin line, a section of the tooth will appear.

At this point the curve can be modified by dragging or by clicking on the MOVE UP and/ or MOVE DOWN buttons.

The position of the section plane can be modified by clicking on the margin line inside the 3D viewport, or by using the proper pointer in the “section” view.

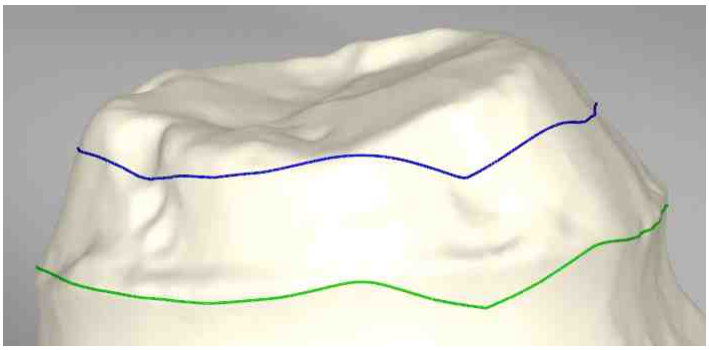
Press the QUIT button to confirm the operation.

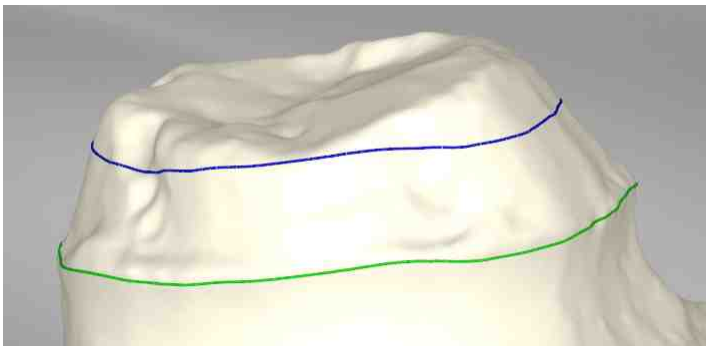
Press the UPDATE TRANSITION BOUNDARY button to update the transition boundary (blue curve) before exiting the step.

5.3.1.6 Replace Line Portion

The Replace Line Portion lets to replace a part of the existing Margin Line (or Transition Line) with a straight line or a new curve drawn directly on the tooth.

With this regime activated double click on the first point defining the curve part to modify; further clicks on the tooth surface define additional points that the new curve must pass through, until another double click is performed to define the second, and last, boundary of the segment to modify.

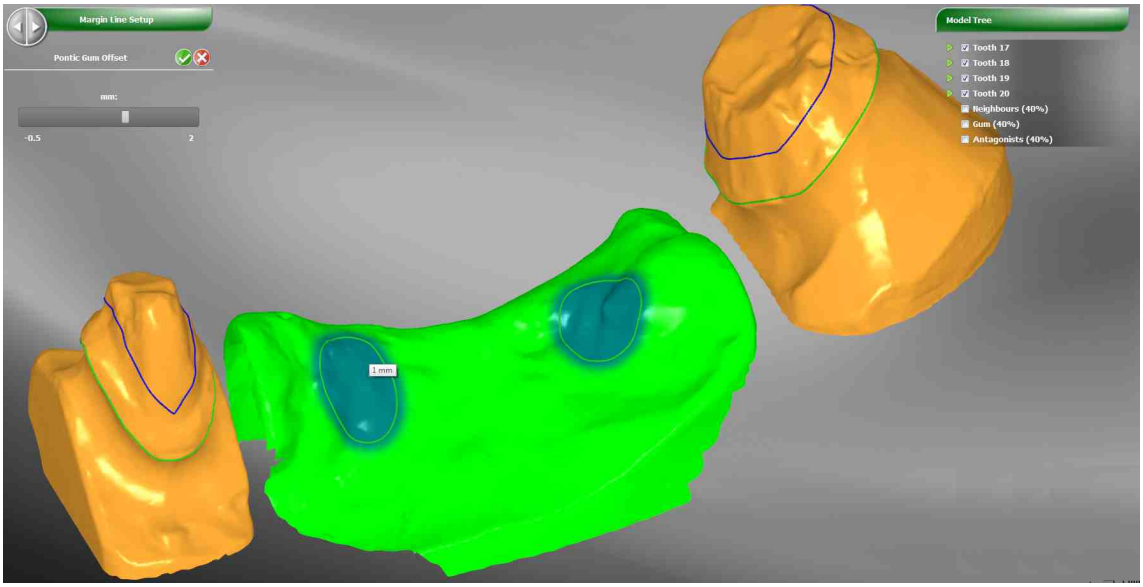




5.3.1.7 Pontic Gum Offset

When working with multiple prosthesis it's also possible to edit the pressure of the pontics on the gum via the Pontic Gum Offset command, which lets the user edit the displacement of the contact area against the gum surface via a slider.

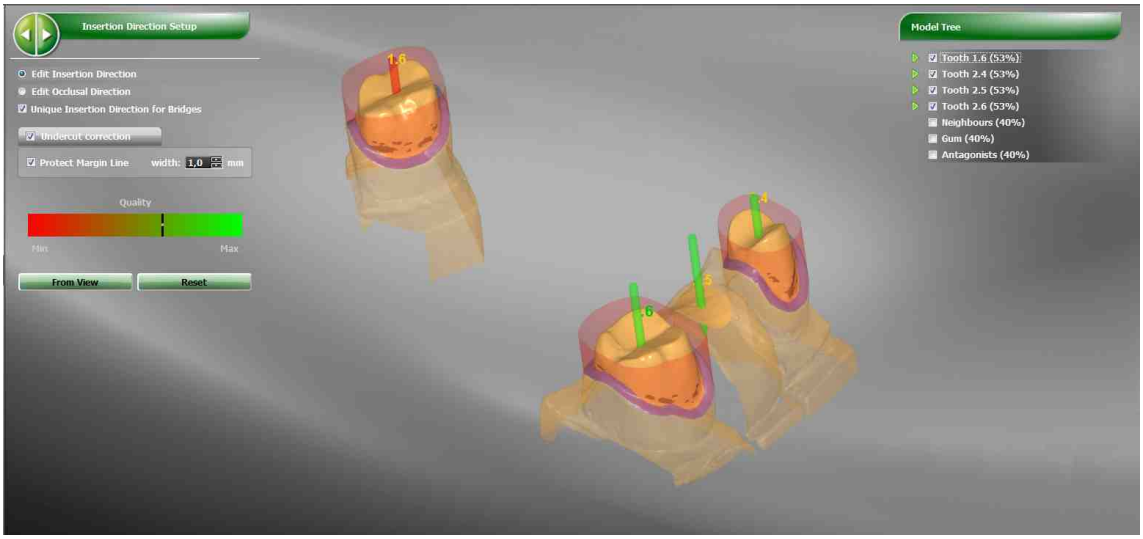
A real time color map will show how this value will affect the prosthesis:



5.3.2 Insertion Direction Setup

Stumps Colors Code

In this Step **DentalCAD** shows for each Stump the Insert Direction. A green arrows are used for the active Stumps or Bridges, red one for all the others



All the Stumps laying in the same bridge share the same Insert direction by default.

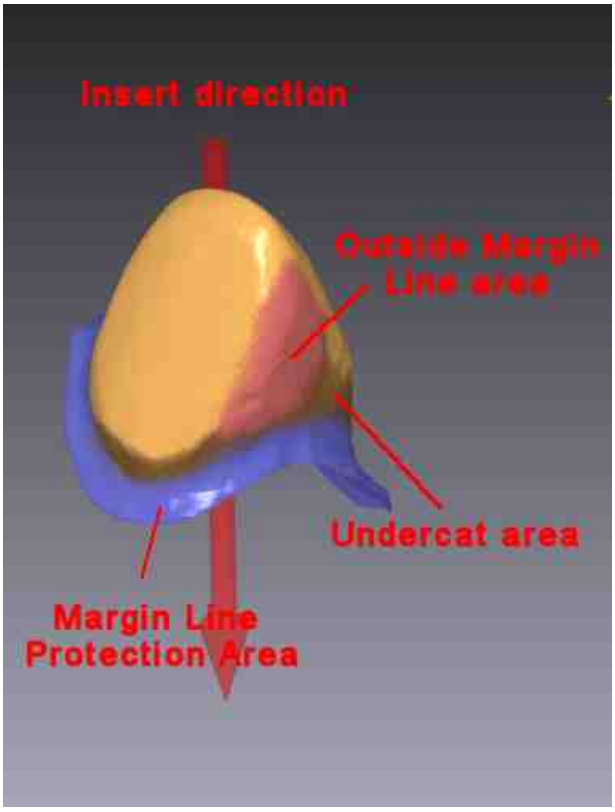
It is possible to assign different Insert Direction inside a bridge disabling the Unique Insertion Direction for Bridges flag

The stump surfaces are also colored and follow the below color code:

Brown -> Undercuts area

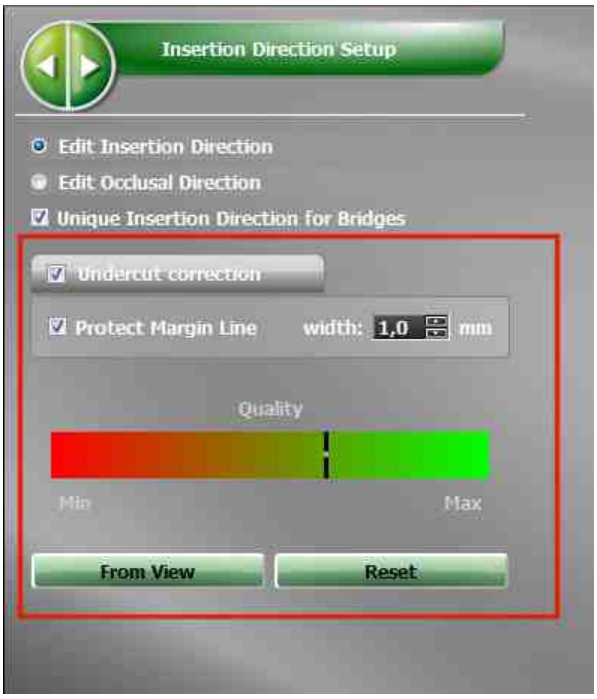
Blue -> Margin Line Protection area

Red -> Outside Margin Line area



Undercuts

Undercuts are identified against an Insertion Direction which minimizes them. A Quality indicator will be shown, as a visual meter of the surface percentage resulting as undercut against the selected direction



The user can, if needed, verify the system choice and, eventually, modify it. In order to edit Inserting Direction there are two ways:

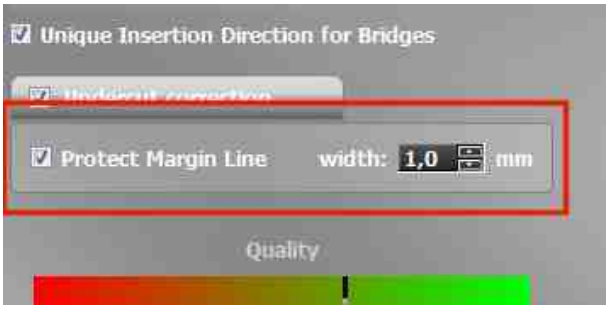
1. Rotate the view using Right Click button and click From View button, which uses the direction perpendicular to the actual view
2. Click Left mouse button and move it

For each modification of the Insertion Direction all the information on screen will be automatically update. In any moment it's possible to reset the automatic choice by clicking on the Reset button

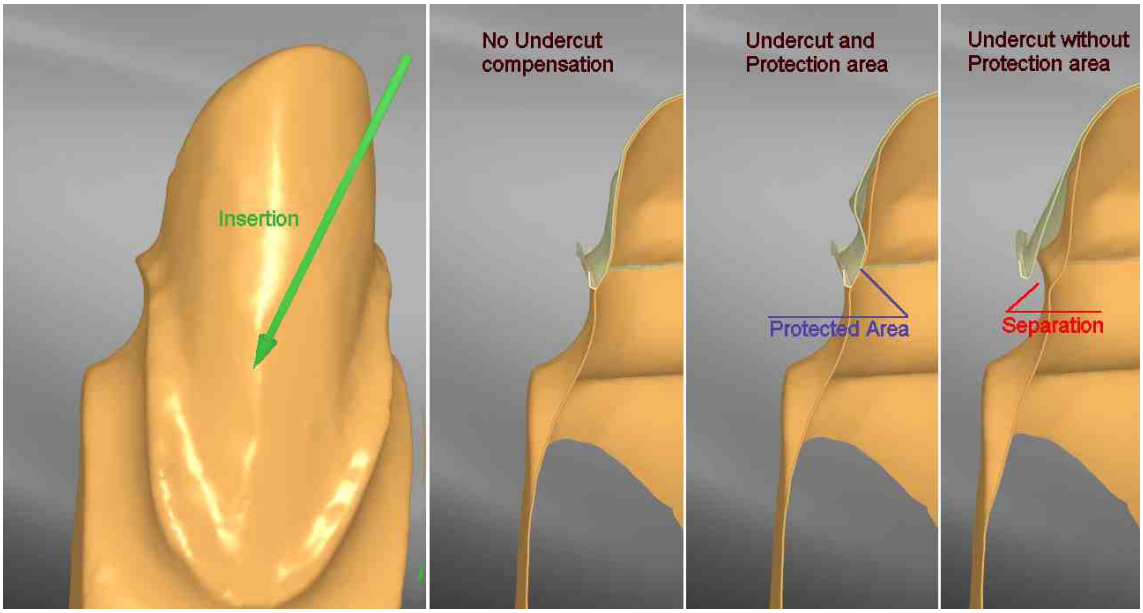
Undercut correction can be disable simply unflagging the Undercut Correction check box

Margin line Protection

If Undercut Correction check box is enable the system will not compensate the area defined by the protection width parameter (blue area in the Stump). It is possible to force **DentalCAD** to compensate also this area disabling the Protect Margin Line flag.

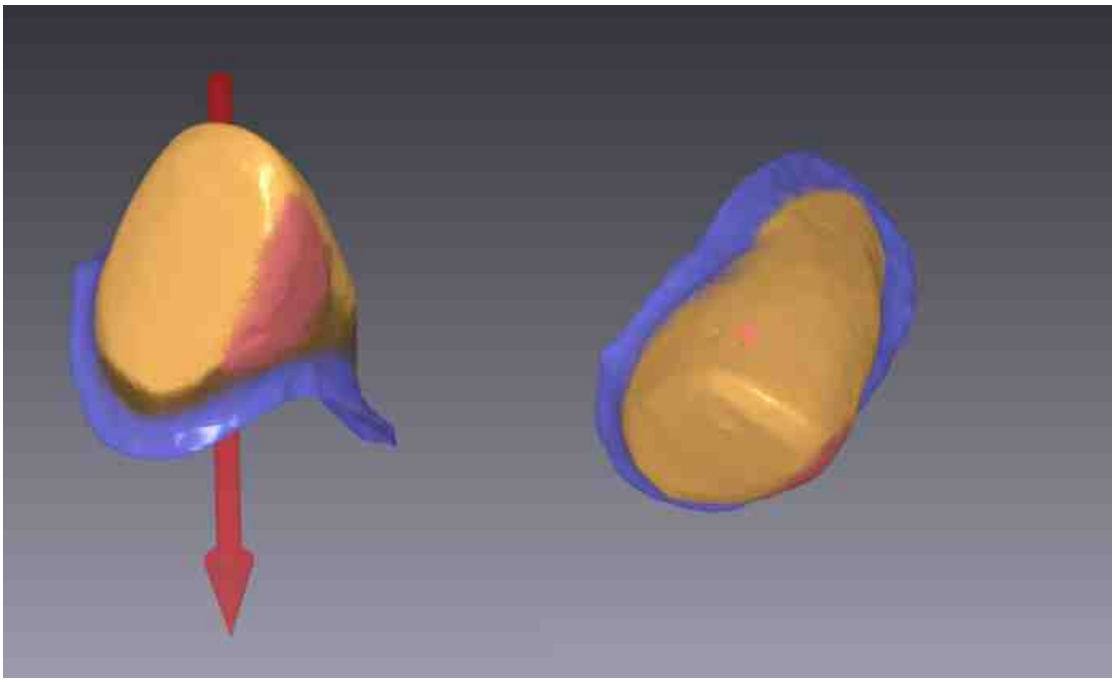


In some situation the compensation can separate the Internal Shape surface and the Margin ring from the Stump. In the below images an example where it is shown, in an exaggerated way, the phenomenon



Outside Margin Line

This is the area of the Stump where the projection falls outside the Margin Line



The only way to fix this problem is to correct the Stump shape using the tools available if the Correct Stump tool option is enable

5.3.2.1 Tooth Preparation

This Step is optional. It has to be enable from Options -> Modeling ->Enable Correct Stump tool drop down menu

From here it's possible to fix the shape of the stump by editing, using some of the tools available also in the next steps and whose details can be found in the following chapters:

- Add
- Remove
- Smooth
- Restore

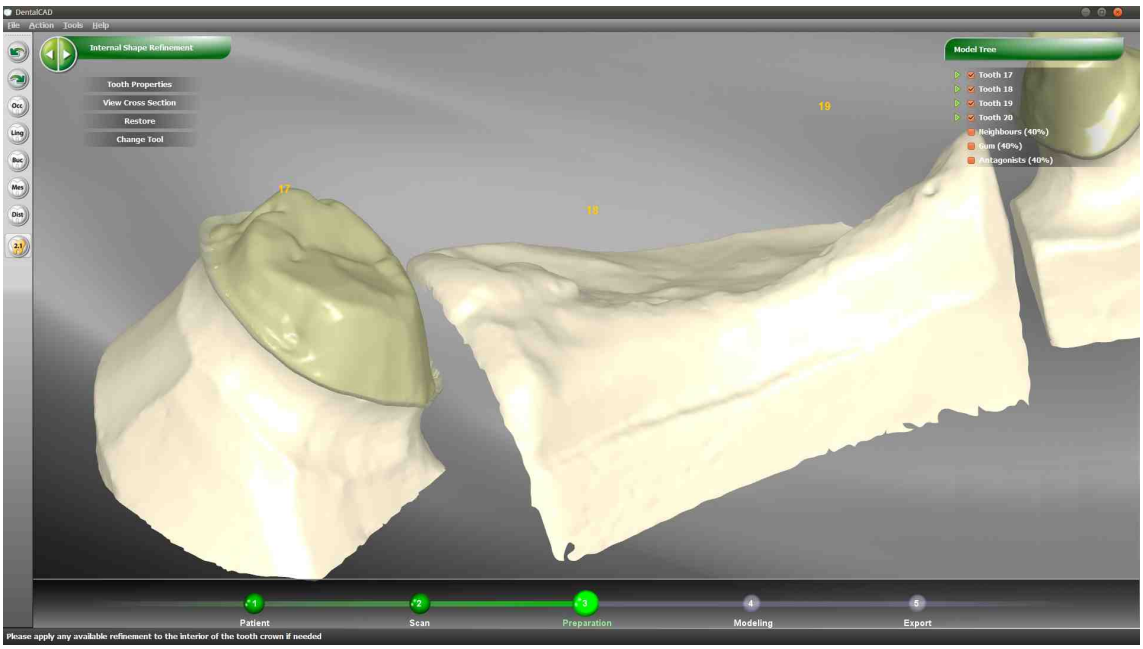
The editing can be aborted using the RESTORE button which replaces the modified geometry with the original previously acquired.

On the other hand, upon confirmation of the editing done, the new geometry of the stump is used in any further step.

5.3.3 Internal Shape Refinement

This step shows the surface resulting from the application of the offset with the parameters described in the previous section. Margin Ring and Internal shape are created at the same time.

If the prosthesis is a Bridge no intersection between Margin Ring and Internal Shape of different teeth is tolerate. The problem has to be fixed before next Step

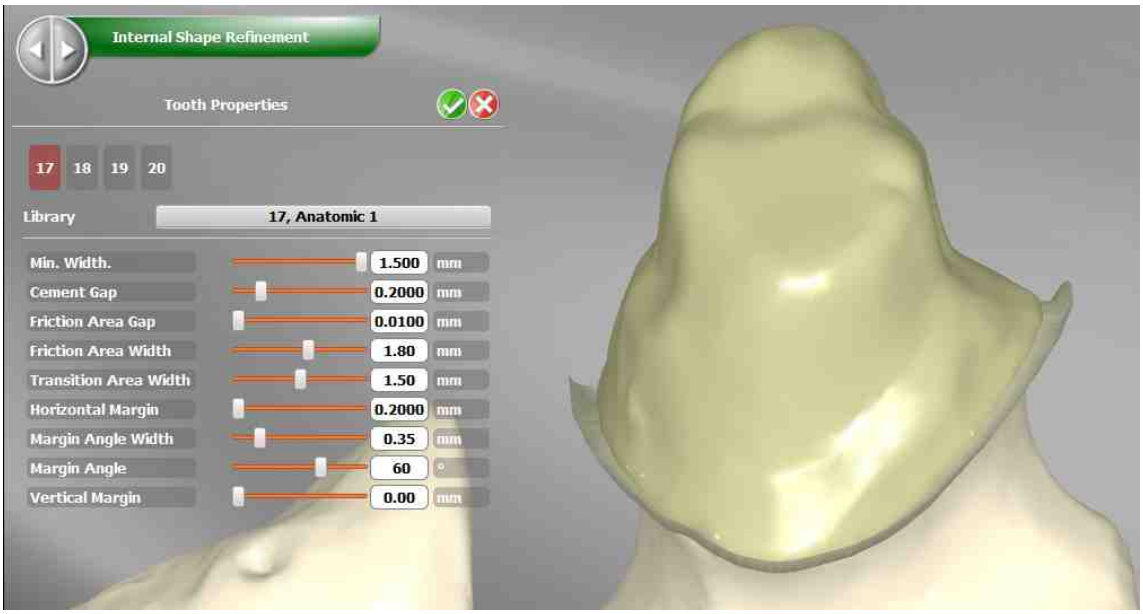


The user is able to manually modify the internal shape of the prosthesis via the following tools:

- Tooth Properties
- View Cross Section
- Restore
- Change Tool

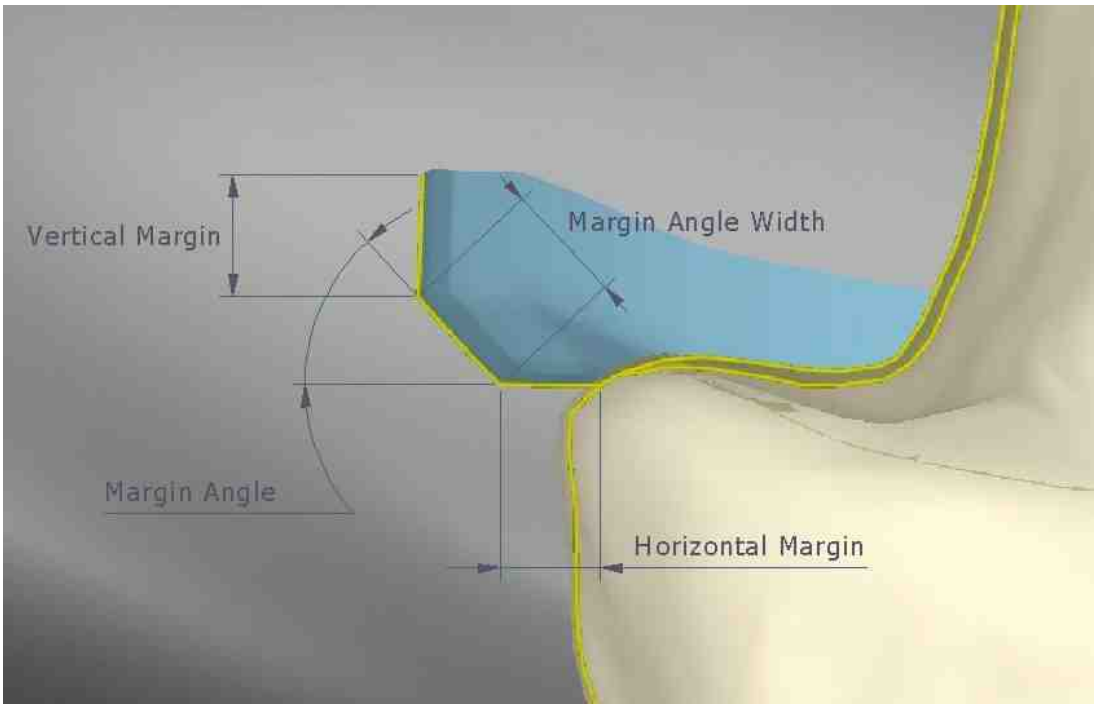
5.3.3.1 Tooth Properties

The Tooth Properties Tool provides several sliders to control the Margin Ring and the Internal Shape of the prosthesis:



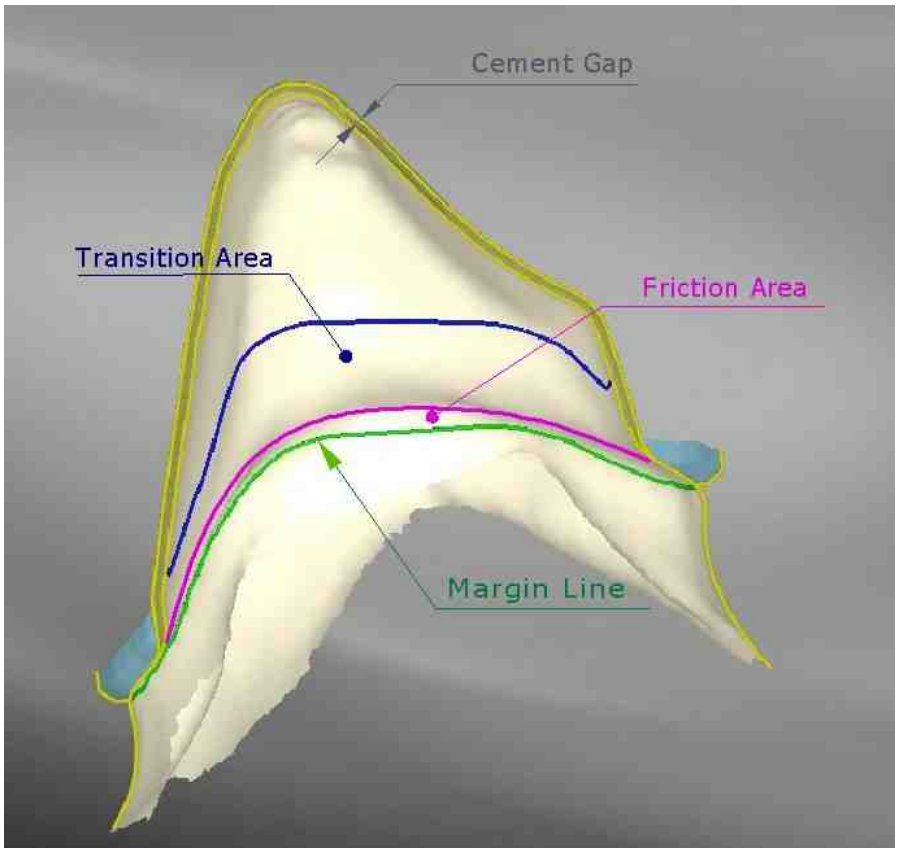
Below are listed Tooth Properties affecting directly Margin Ring setup

- Horizontal Margin
- Margin Angle Width
- Margin Angle
- Vertical Margin



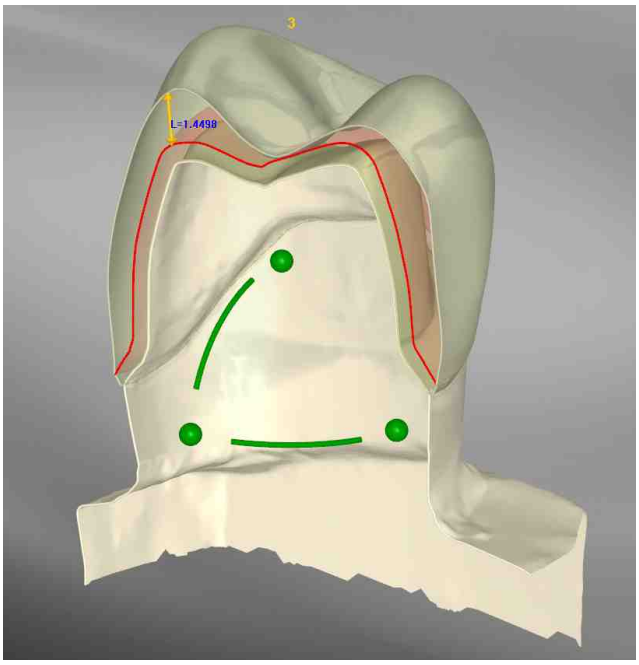
Below are listed Tooth Properties affecting directly Internal Shape:

- Cement Gap
- Friction Area Gap
- Friction Area Width
- Transition Area Width



5.3.3.2 View Cross Section

The View Cross Section tool is useful to evaluate the internal shape of the prosthesis by sectioning the teeth. It's tweakable by a handy manipulator and allows measurements.



This tool is available in several phases.

5.3.3.3 Restore

The Restore button undoes all the latest changes of the current tooth and reset the shape to the initial status, upon confirmation.

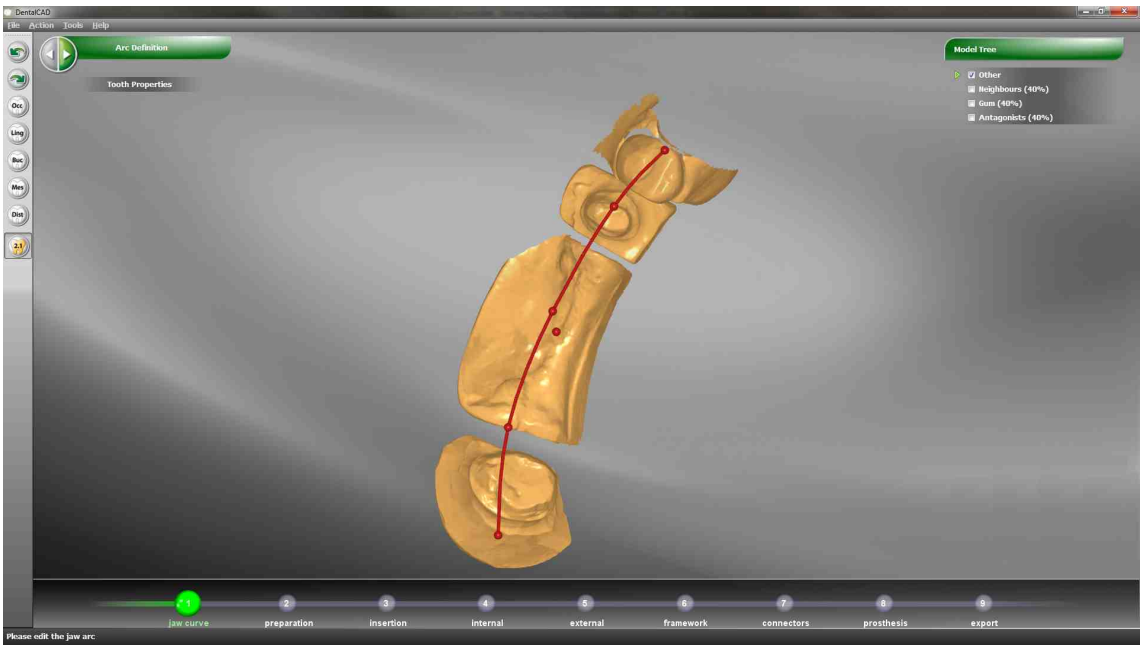
5.3.3.4 Change Tool

During this step the Change Tool command is available to change the Milling Tool radius, the Tool range radius is between 0.3 -1 mm. Changing it the Internal Shape will be updated

5.3.4 Arc Jaw Definition

This information is mandatory to optimize the positioning of the single teeth anatomic shapes. The curve has to pass on the ridges of incisor and valleys of the molar teeth. The user can enhance the curve by dragging the spherical handles.

In this phase the top view is blocked, and only panning is allowed



5.3.5 External Shape Refinement

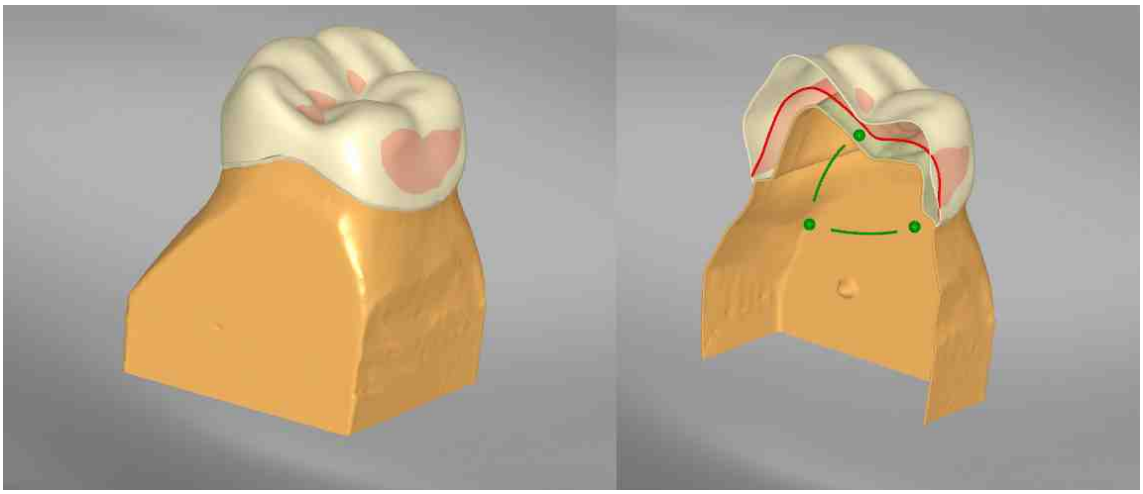
In this step **DentalCAD** gets anatomic shape from library and places them on arc jaw. If Waxup is available it will be used instead of library elements.

In order to verify the right anatomic position **DentalCAD** shows the **Reference Coping**, red colored. The reference coping is a shape represents the minimum thickness of the

prosthesis. No intersection between External Shape and Reference Coping should be tolerate.

The suggest sequence to refine an External Shape is the follow:

1. Move/Rotate and Scale
2. Adjust Thickness if required
3. Add/Remove/Smooth and FreeForm

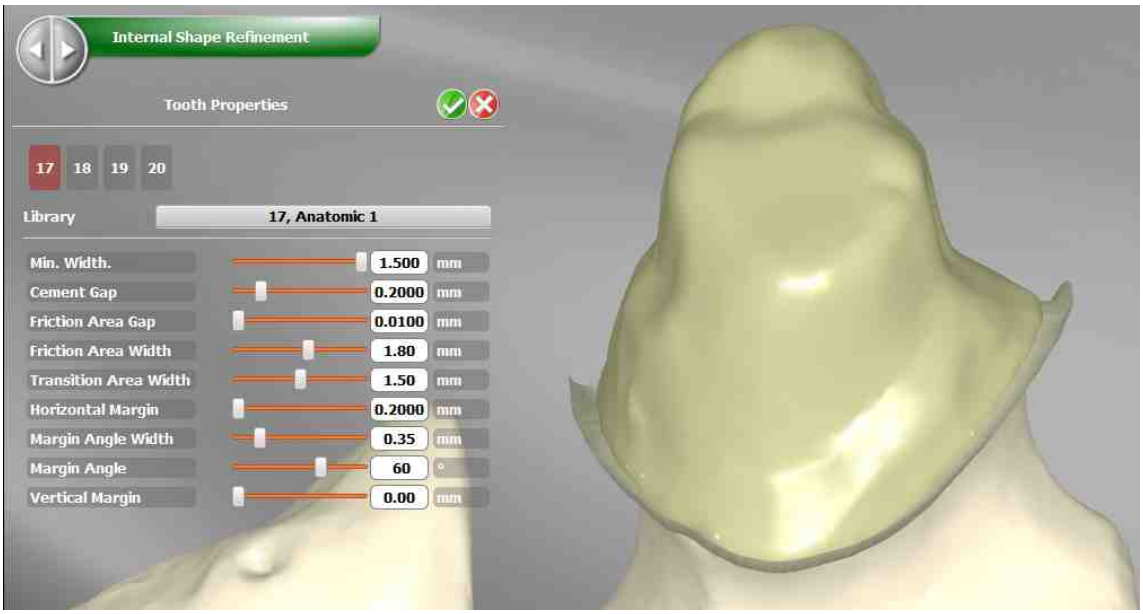


The user is able to manually modify the External Shape of the prosthesis via the following tools:

- Tooth Properties
- View Cross Section
- Restore
- Add, Remove, Smooth
- Free Form Deformation
- Move/Rotate/Scale
- Contact Analysis
- Adjust Thickness

5.3.5.1 Tooth Properties

As usual the Tooth Properties Tool provides control to the External shape of the prosthesis:

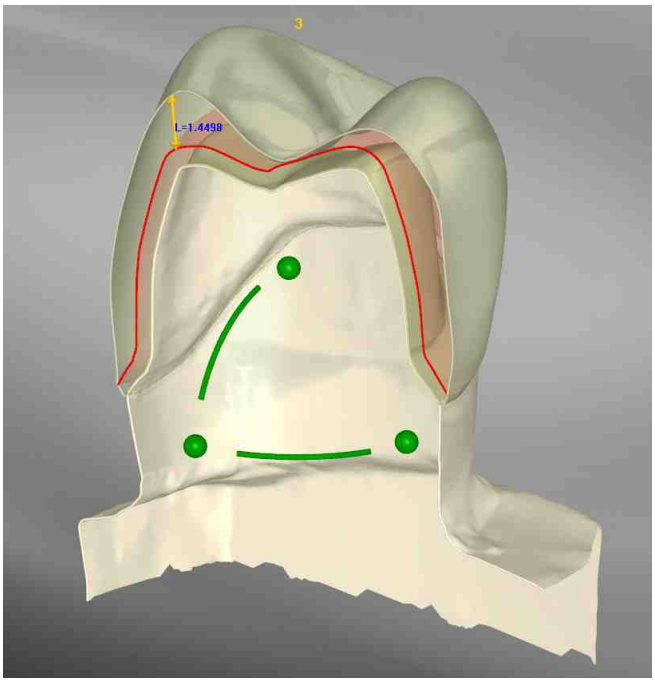


The below listed Tooth Properties affecting this Step:

- Anatomic Library

5.3.5.2 View Cross Section

The View Cross Section tool is useful to evaluate the internal shape of the prosthesis by sectioning the teeth. It's tweakable by a handy manipulator and allows measurements



This tool is available in several phases

5.3.5.3 Restore

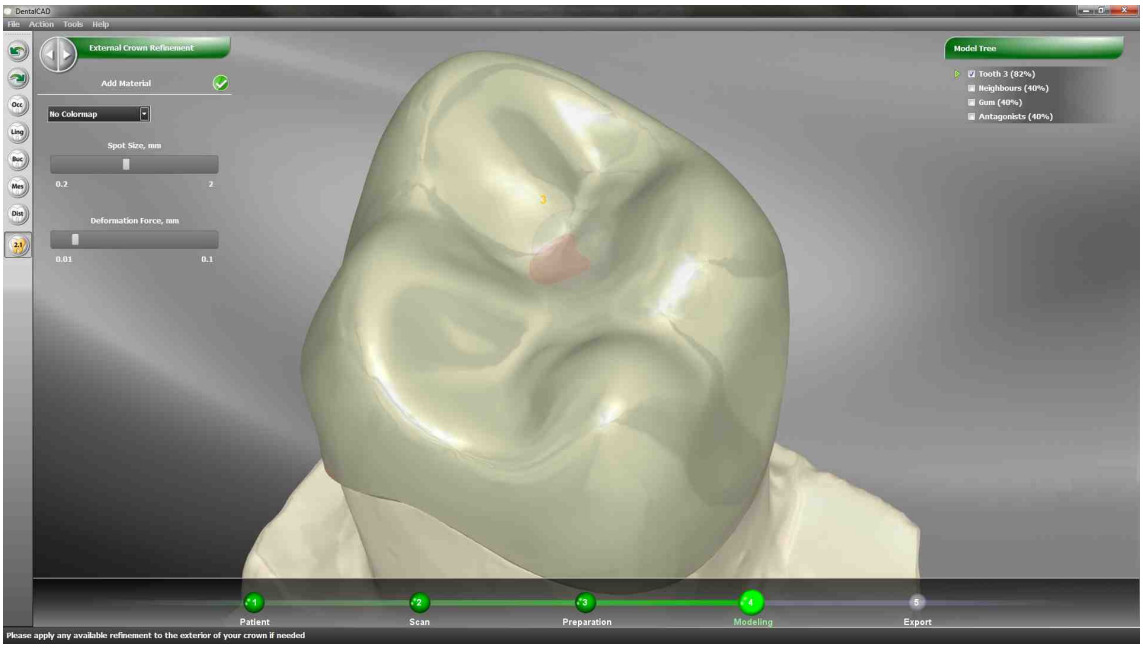
The Restore button undoes all the latest changes of the current tooth and reset the shape to the initial status, upon confirmation.

5.3.5.4 Add, Remove, Smooth

Clicking on Add (Remove or Smooth) each click on the left mouse button on the stump will “add” (remove, or smooth) material on an area.

The area dimension is defined by the Spot Size slider, while the deformation force slider controls the weight of the deformation.

The Smooth tool features an additional slider which controls the number of iterations.



Inside this and other commands it's possible to activate an analysis mode, which visually show how the modification will affect the overall shape with a color map.

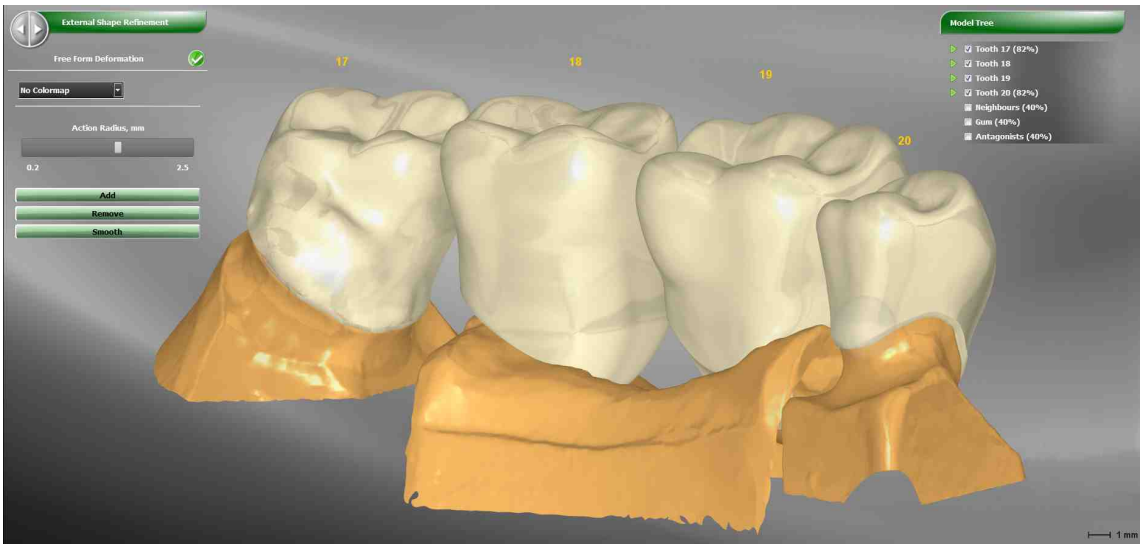
Three color maps are available:

1. Antagonist - External Shape
2. Neighbors - External Shape
3. Internal Shape - External Shape

5.3.5.5 Free Form Deformation

An advanced way of modifying the prosthesis is by using the Free Form Deformation tool, which lets the user modify the morphologic shape of the element dynamically.

The action can be controlled via an Action Radius slider, affecting the area involved in the morphing.



Inside this command it's possible to activate an analysis mode, which visually show how the modification will affect the overall shape with a color map.

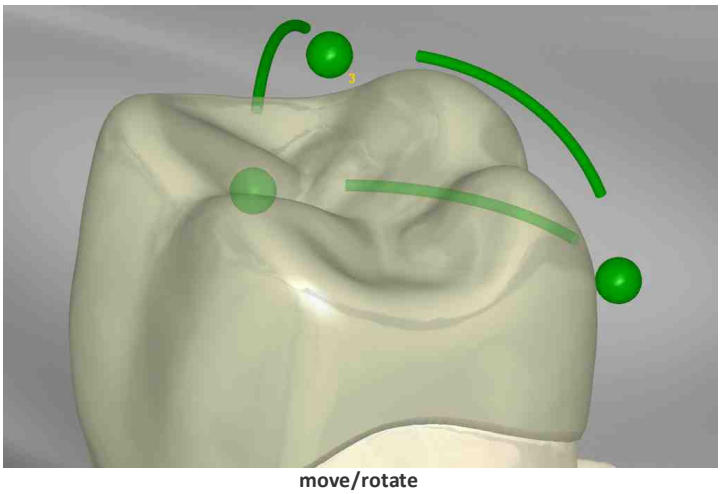
Three color maps are available:

1. Antagonist - External Shape
2. Neighbors - External Shape
3. Internal Shape - External Shape

5.3.5.6 Move/Rotate/Scale

Accordingly to the quality of the available information, in some cases it may be needed to fix the position and dimension of the External Shape on the tooth, via the Move/ Rotate and Scale commands.

By activating one of these commands, **DentalCAD** freezes the connection between the External shape and the Margin Ring, by showing a manipulator that can be used to tweak position and dimension of the External Shape.

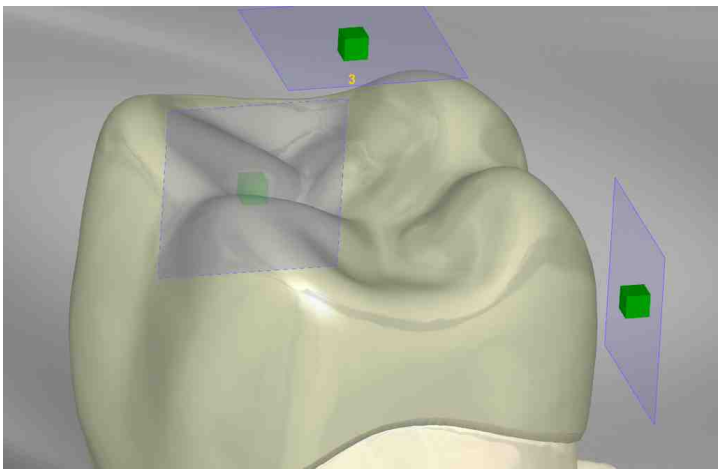


move/rotate

Selecting Points: External Shape is moved in x,y or z direction

Selecting Arc: External Shape is rotated around x,y,z axis

Selecting the External Shape: it is moved freely in the space



scale

Selecting square: External Shape is scaled along x,y, or z axis

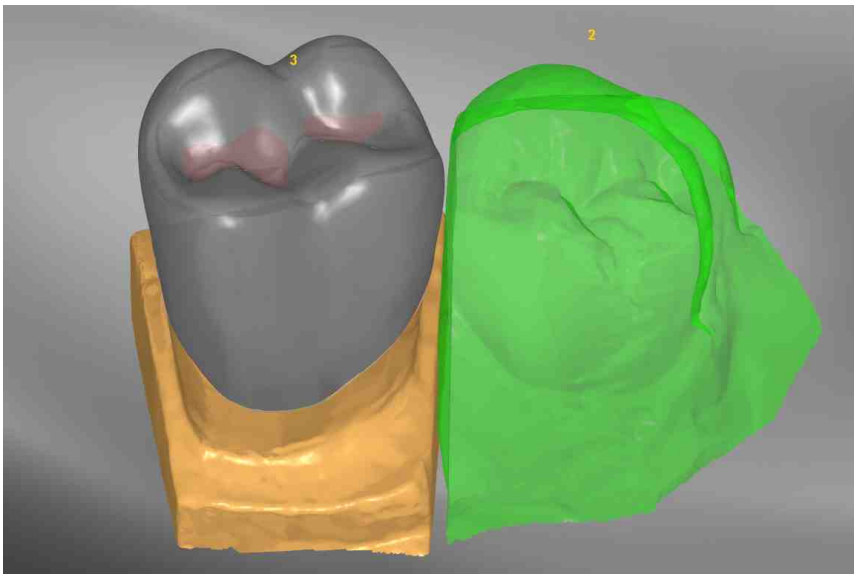
Selecting the diagonal square: External Shape is homothetic scaled

5.3.5.7 Contact Analysis

The system provides several tools to evaluate the quality of the positioning and dimensioning obtained.

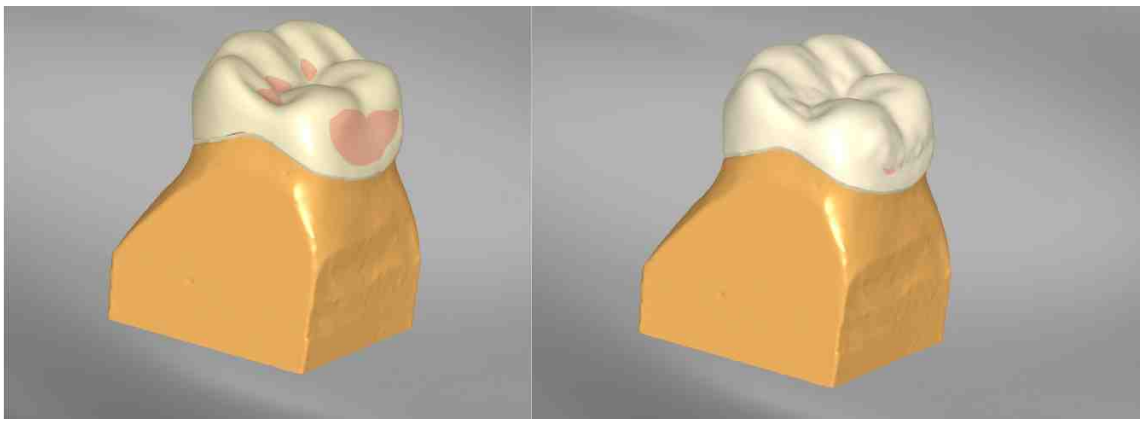
Contact Analysis is available only when the active surface is the External Shape: it shows a map in faux colors representing the areas where the prosthesis may collide with neighbors and antagonists.

The list selector shown in the next picture allows choosing the teeth couple to analyze.



5.3.5.8 Adjust Thickness

The Adjust Thickness command is used to change the thickness of the External Shape in order to make it bigger than the Minimum thickness allowed for the current material



5.3.6 Framework Shape Refinement

DentalCAD creates the Framework depending from the job selected:

1. Anatomic: the Framework shape coincides with the anatomic tooth
    - Coming from a digital library
    - Imported or Scanned directly (Waxup)
2. Offset coping: the framework is an outer offset of the original stump

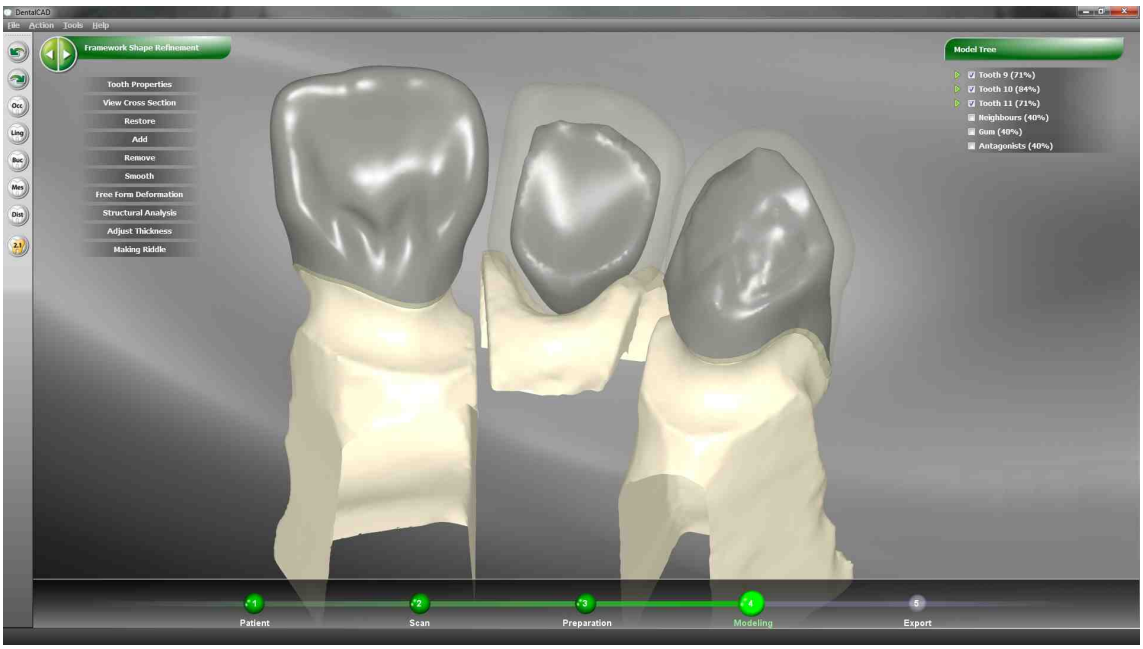
3. Reduction: the framework is an offset reduction (inner offset) of the anatomic tooth

The red **Reference Coping** helps the user to evaluate quickly the minimum thickness of the prosthesis. A more refined thickness analysis can be performed using Structural Analysis command

No intersection between different teeth Framework is allowed

The suggest sequence to refine a Framework is the follow:

1. Adjust Thickness if required
2. Add Riddle if required
3. Add/Remove/Smooth and Free Form



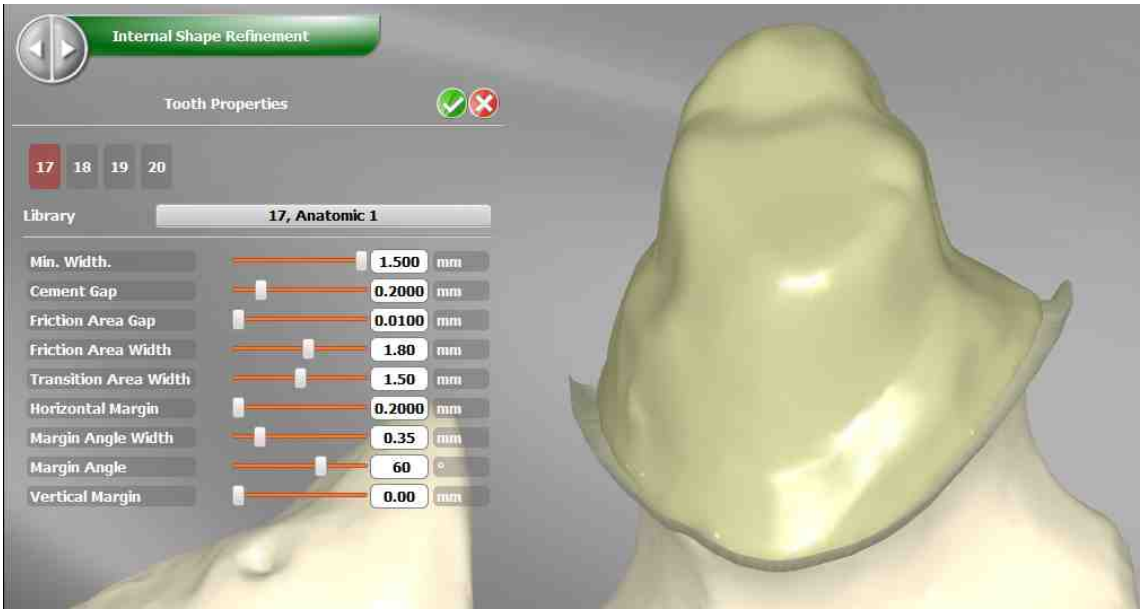
The user is able to manually modify the Framework via the following tools:

- Tooth Properties
- View Cross Section
- Restore
- Add, Remove, Smooth
- Free Form Deformation
- Structural Analysis

- Adjust Thickness
- Create Riddle
- Edit Riddle
- Replace Riddle
- Delete Riddle

5.3.6.1 Tooth Properties

The Tooth Properties Tool provides several sliders to control the Framework:

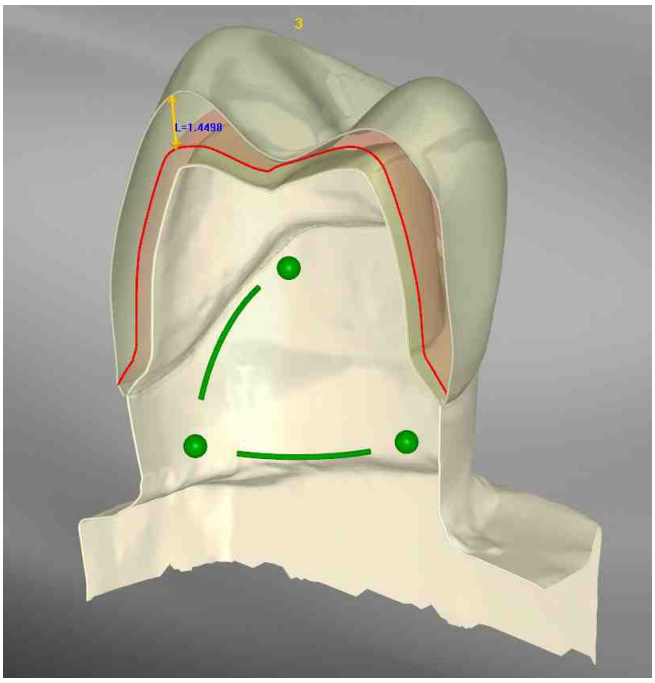


Below are listed the ones affecting directly Framework

- Shrink
- Minimim Width

5.3.6.2 View Cross Section

The View Cross Section tool is useful to evaluate the internal shape of the prosthesis by sectioning the teeth. It's tweakable by a handy manipulator and allows measurements



This tool is available in several phases

5.3.6.3 Restore

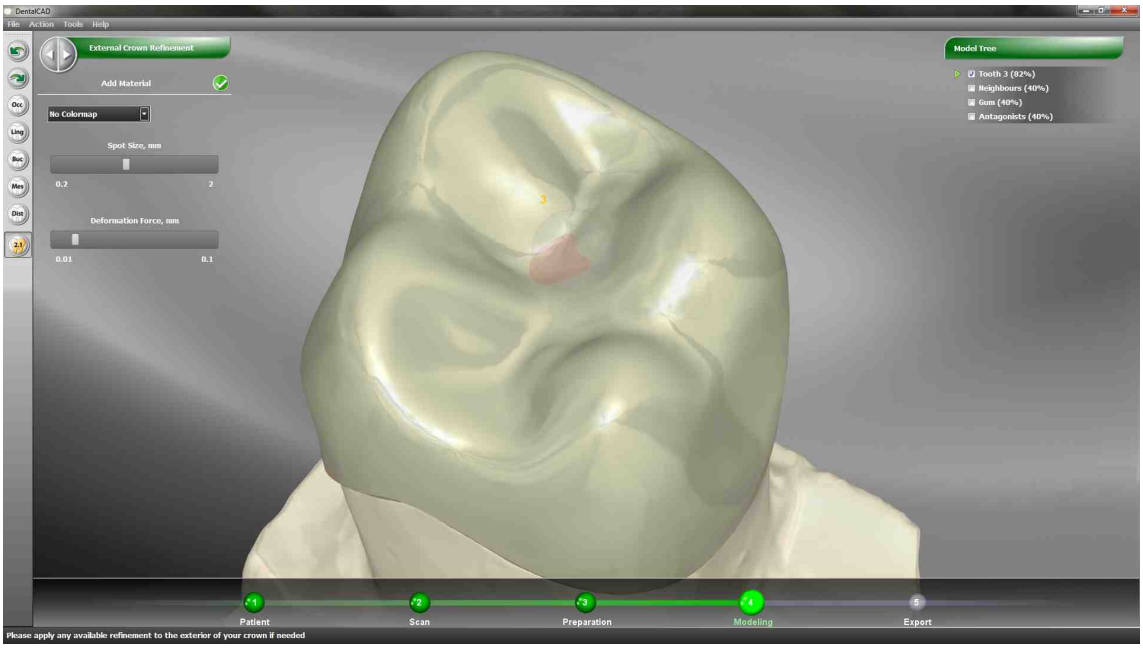
The Restore button undoes all the latest changes of the current tooth and reset the shape to the initial status, upon confirmation.

5.3.6.4 Add, Remove, Smooth

Clicking on Add (Remove or Smooth) each click on the left mouse button on the stump will “add” (remove, or smooth) material on an area.

The area dimension is defined by the Spot Size slider, while the deformation force slider controls the weight of the deformation.

The Smooth tool features an additional slider which controls the number of iterations.



Inside this and other commands it's possible to activate an analysis mode, which visually show how the modification will affect the overall shape with a color map.

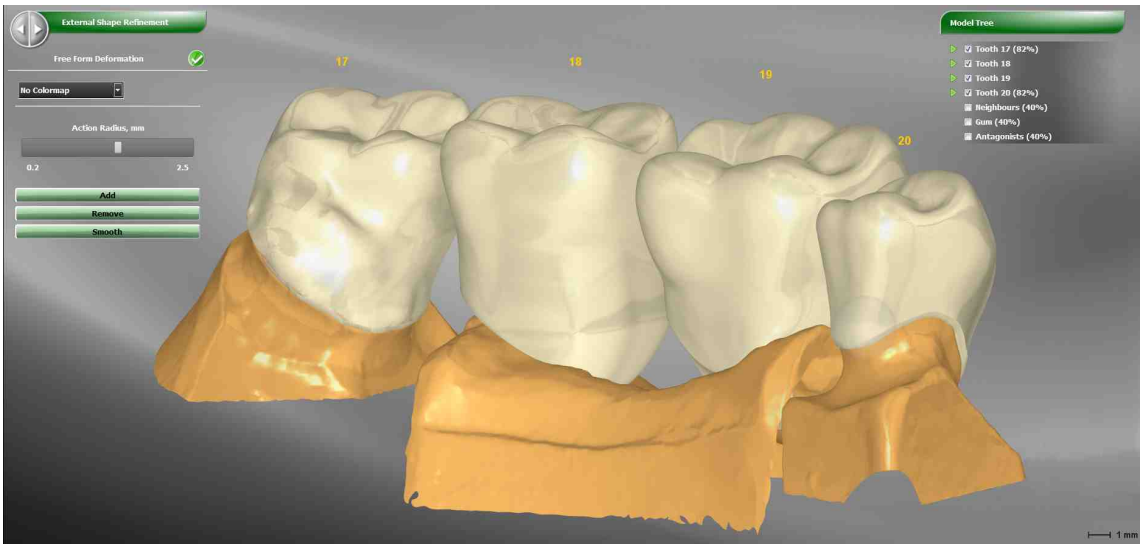
Three color maps are available:

1. Internal Shape - Framework
2. External Shape - Framework

5.3.6.5 Free Form Deformation

An advanced way of modifying the prosthesis is by using the Free Form Deformation tool, which lets the user modify the morphologic shape of the element dynamically.

The action can be controlled via an Action Radius slider, affecting the area involved in the morphing.



Inside this and other commands it's possible to activate an analysis mode, which visually show how the modification will affect the overall shape with a color map.

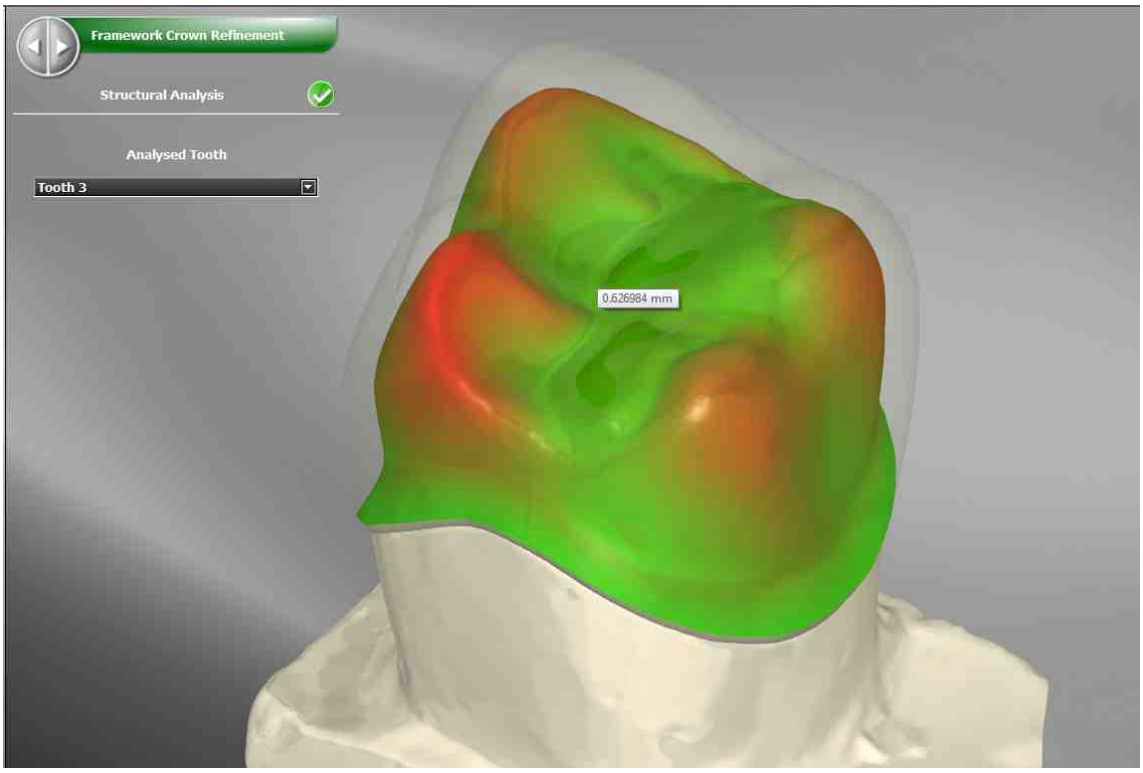
Three color maps are available:

1. Internal Shape - Framework
2. External Shape - Framework

5.3.6.6 Structural Analysis

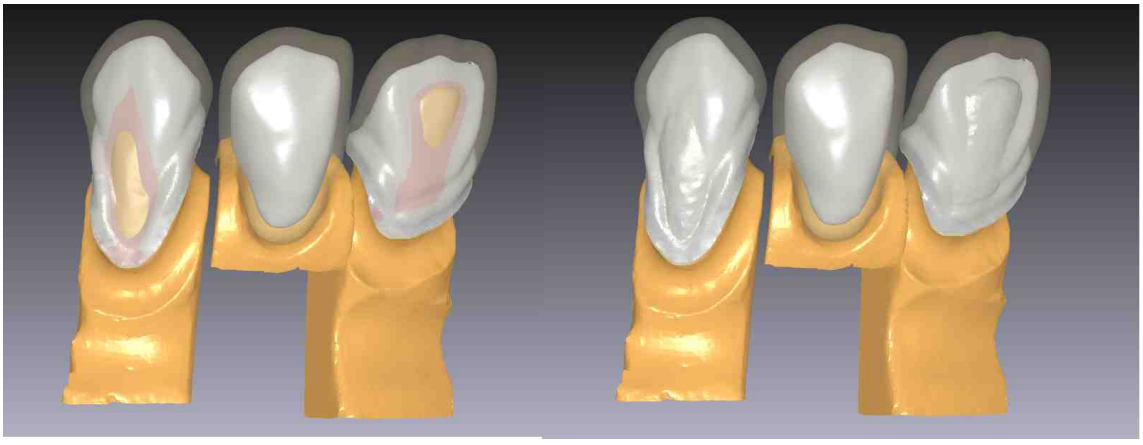
The Structural Analysis command allows the user to analyze with high precision the distance between the Internal Shape and the Framework.

Hovering on the tooth will show deviation in real time.



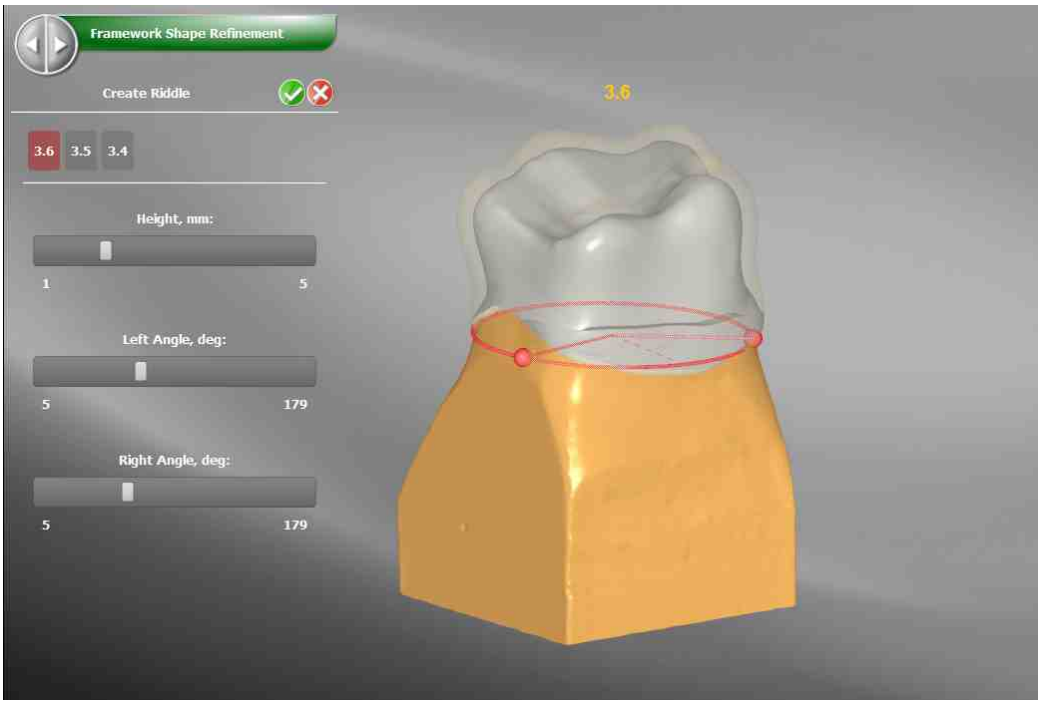
5.3.6.7 Adjust Thickness

The Adjust Thickness command is used to change thickness of the Framework in order to make it bigger than the Minimum thickness allowed for the current material



5.3.6.8 Create Riddle

The Create Riddle command allows defining a lingual collar for the Framework part in order to make it more robust

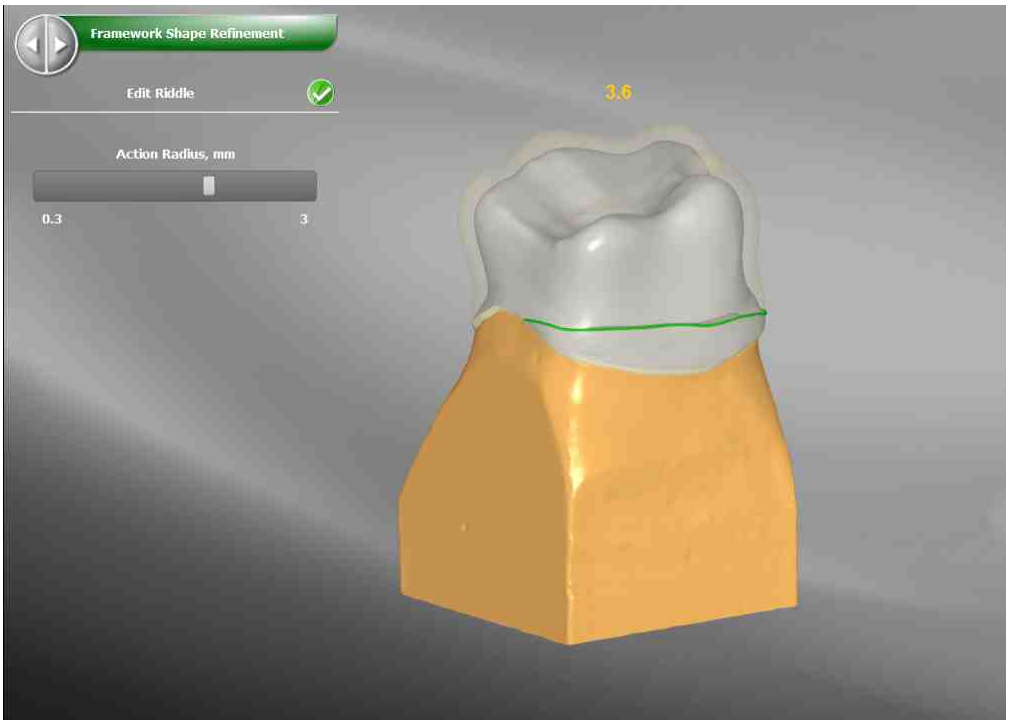


The user has direct control over several parameters:

1. Height: it represents the Collar height against the Margin Line
2. Left Angle e Right Angle: they define the span of the boundary in the occlusal plane. It's possible to change them by dragging the handles in the graphic area

5.3.6.9 Edit Riddle

The Edit Riddle command allows the user to change the default Collar shape like in the edit of the Margin Line

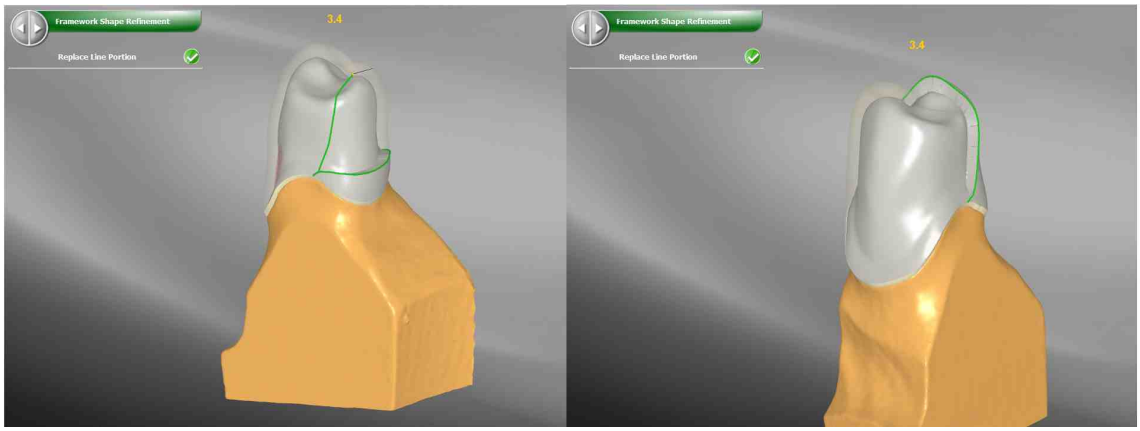


Edit Riddle command lets the user “warp” the curves simply dragging any curve point by keeping the left mouse button pressed and moving the mouse. The Action Radius option is used to control the area affected by the curve editing.

5.3.6.10 Replace Riddle

The Replace Line Portion lets the user replace a part of the existing riddle line with a straight line or a new curve drawn directly on the tooth.

With this regime activated double click on the first point defining the curve part to modify; further clicks on the tooth surface define additional points that the new curve must pass through, until another double click is performed to define the second, and last, boundary of the segment to modify.



This is a useful way to create Partial Reduction

5.3.6.11 Delete Riddle

Delete Riddle remove the Riddle from the selected Framework

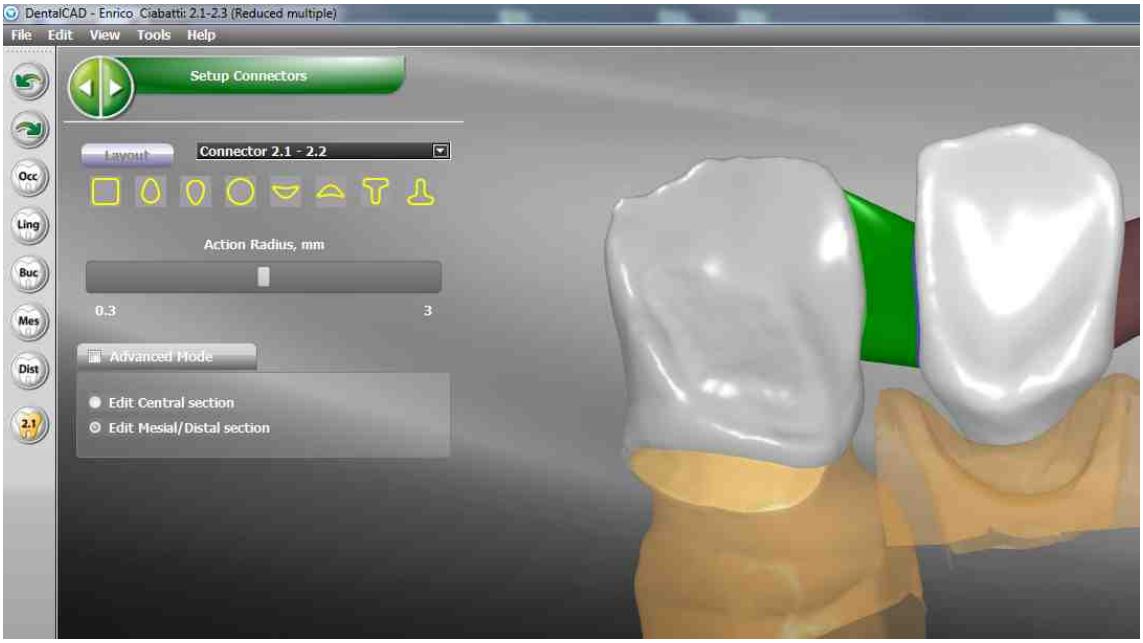
5.3.7 Setup Connectors

Connectors

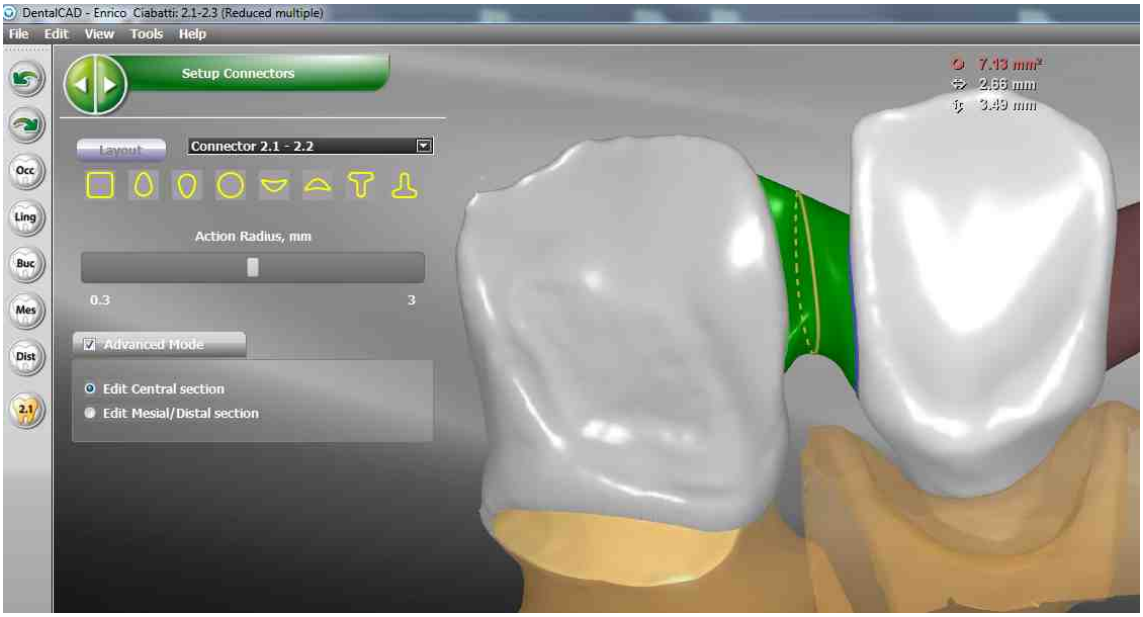
The **Connector** surface is always created between two adjacent Framework teeth.

DentalCAD supports two modes:

1. Basic: the surface is created using two sections. mesial and distal, projected on the Framework involved. The projections cannot be bigger than the Framework silhouette



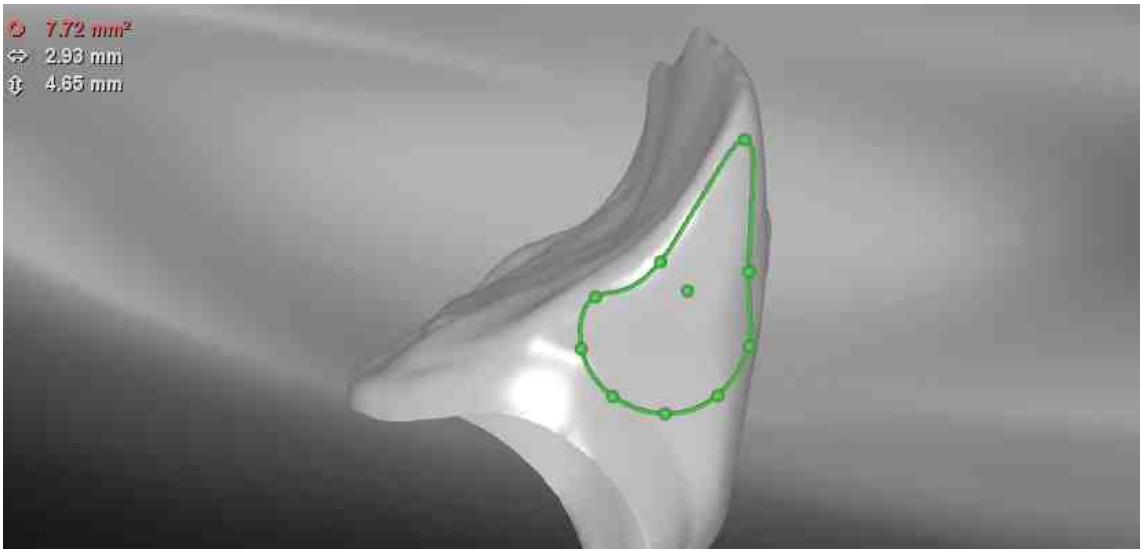
2. Advanced: an intermediate section (yellow) is added: Only the central section can be bigger than the Framework silhouette involved. This option is useful when there is a big distance between the two adjacent Framework teeth to connect



In the control window it's possible to switch between the Basic and Advanced mode

and select the type of section used for the construction between Raindrop, Banana, Circle, Square and more. If you Select Layout the main viewport will expand for better analysis of the connector

DentalCAD computes real time the area of the sections. If the area of one of the connectors sections is below the threshold defined in the parameters related to the material used a warning is shown. The user can subsequently modify each connector using the proper tool



Connector surface editing

Connectors to edit can be chosen by clicking on them directly in the main viewport or using combo box. The Connector surface can be modified only editing their sections:

1. Editing sections control points
2. Dragging in 3D view mesial and distal sections projected curves

Section Control points

Sections control points can be selected:

- **Individually**, by clicking on them with the left mouse button;
- **Sequentially**, by clicking the start and the ending point with the left mouse button while pressing the SHIFT key;
- **Additionally**, by clicking the individual points with the left mouse button while pressing the CTRL key.

When moving a single control point, if the ALT key is pressed, all the points will be scaled or morphed accordingly; if, on the other hand, the ALT key is pressed while multiple control points are selected the scaling and morphing will affect only the selected points.

The shape will be scaled when mouse is moved in the up/down direction, while the right/left axis controls the morphing direction of the connector or the connector part.

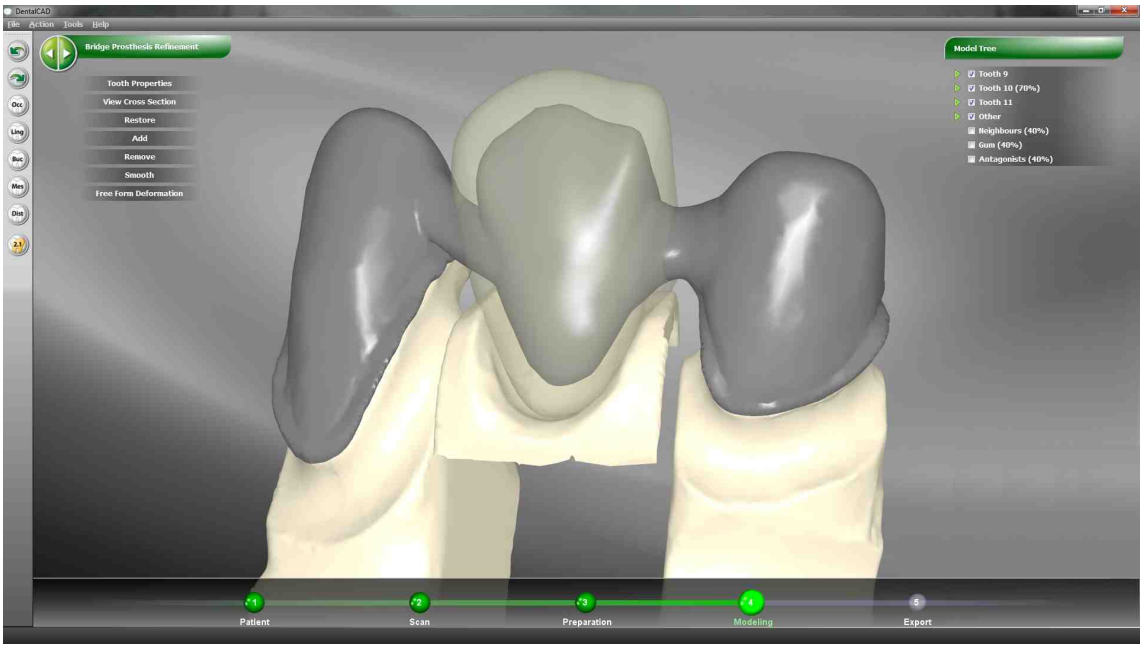
Any modification done will update the connector main view accordingly

3D sections projected curves

Both mesial and distal sections projected curves can be manually edited in 3D view simply dragging any curve point by keeping the left mouse button pressed and moving the mouse. The Action Radius option is used to control the area affected by the curve editing

5.3.8 Prosthesis Refinement

In this Step the connectors surface are created and attached to the teeth Framework.

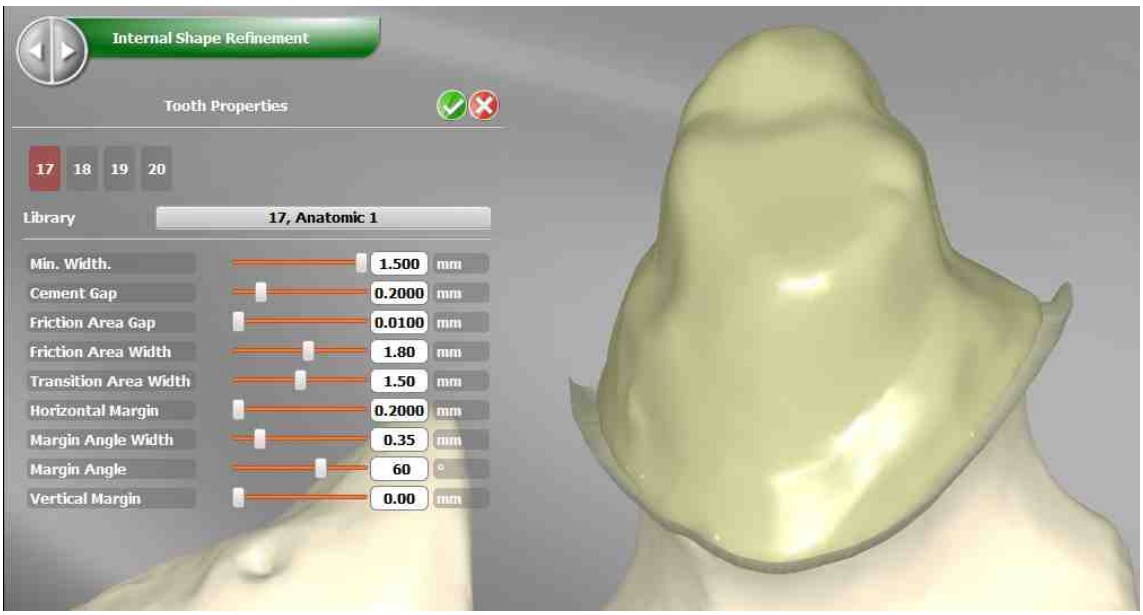


The complete Prosthesis and the Connectors surfaces can be edited using the usual Tools:

- Tooth Properties
- View Cross Section
- Restore
- Add, Remove, Smooth
- Free Form Deformation

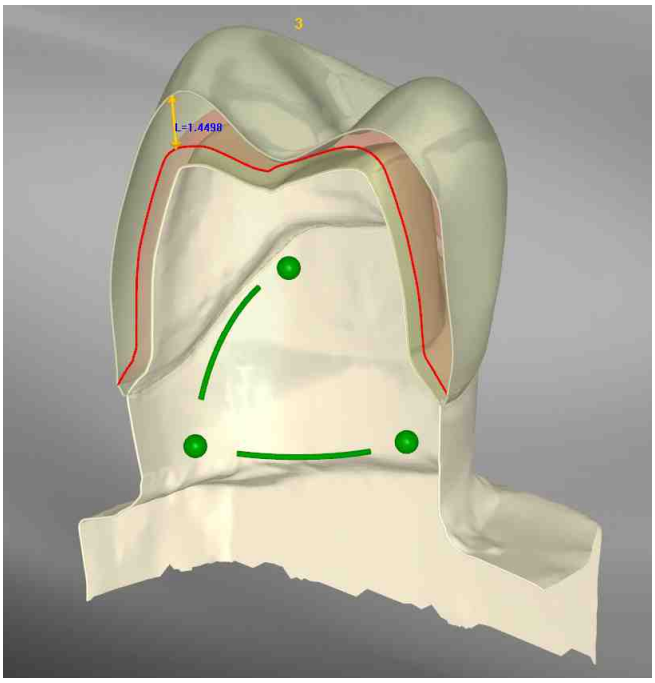
5.3.8.1 Tooth Properties

In this Step Tooth Properties are used only to visualize the prosthesis parameters



5.3.8.2 View Cross Section

The View Cross Section tool is useful to evaluate the internal shape of the prosthesis by sectioning the teeth. It's tweakable by a handy manipulator and allows measurements



This tool is available in several phases

5.3.8.3 Restore

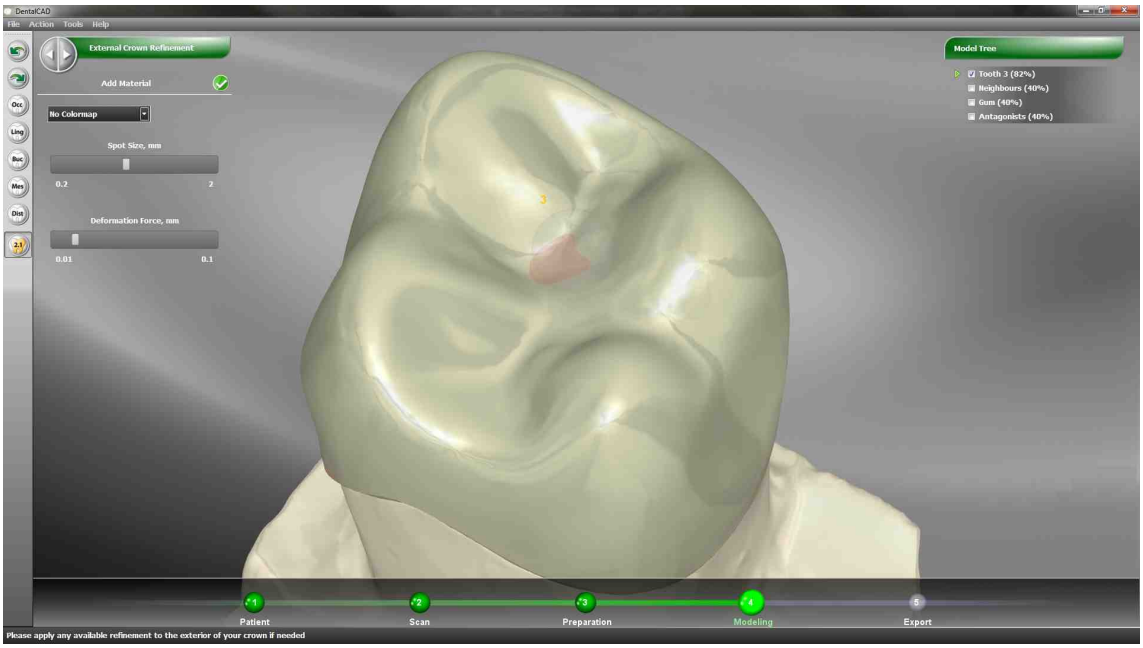
The Restore button undoes all the latest changes and reset the shape to the initial status, upon confirmation.

5.3.8.4 Add, Remove, Smooth

Clicking on Add (Remove or Smooth) each click on the left mouse button on the stump will “add” (remove, or smooth) material on an area.

The are dimension is defined by the Spot Size slider, while the deformation force slider controls the weight of the deformation.

The Smooth tool features an additional slider which controls the number of iterations.

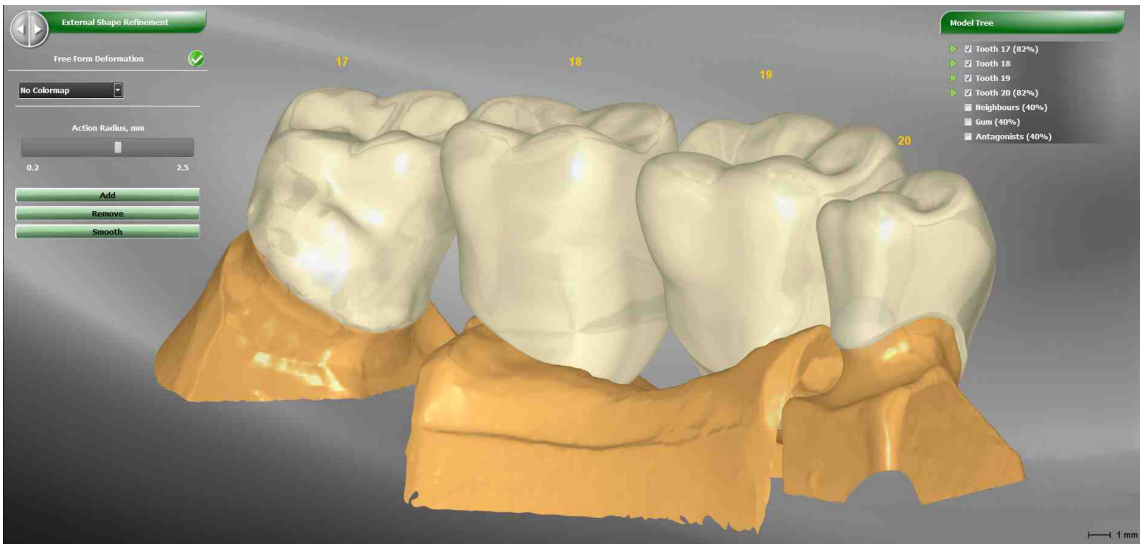


No color maps are available when the command is used in this Step

5.3.8.5 Free Form Deformation

An advanced way of modifying the prosthesis is by using the Free Form Deformation tool, which lets the user modify the morphologic shape of the element dynamically.

The action can be controlled via an Action Radius slider, affecting the area involved in the morphing.

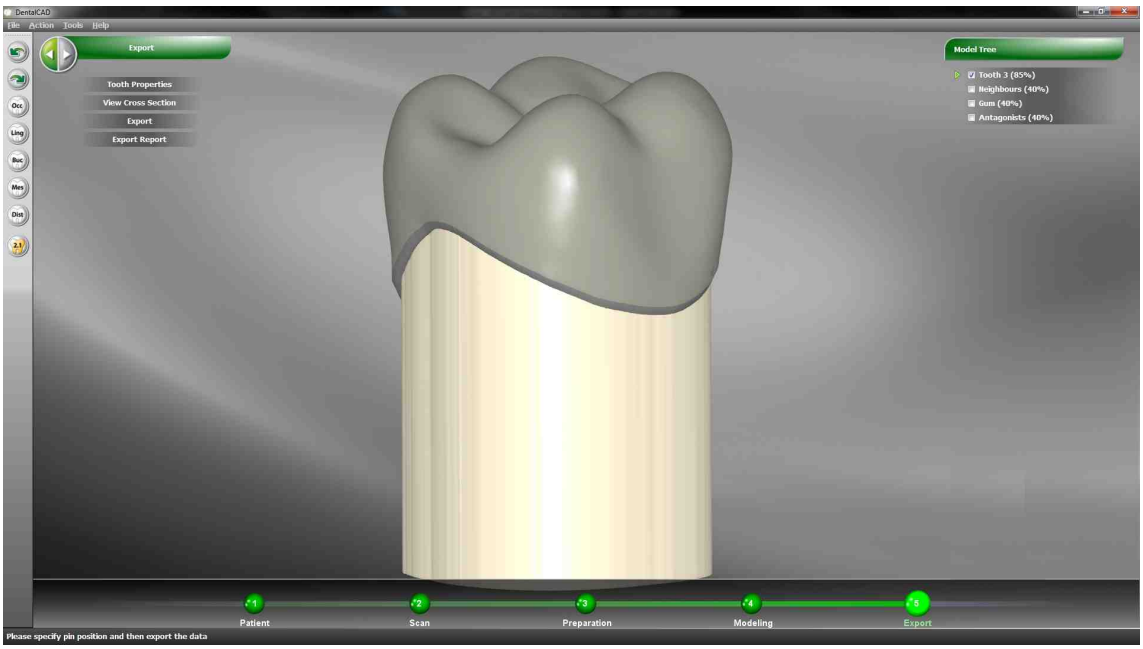


No color maps are available when the command is used in this Step

5.3.9 Export

When all the previous phases have completed the Export phase is shown. Here **DentalCAD** merges all the prosthesis mesh surfaces.

In case of covered prosthesis **DentalCAD** shows in semi-transparency the external "finished" surface as modeled by the user, and in matte color the internal structure to mill to eventually cover with an aesthetic layer

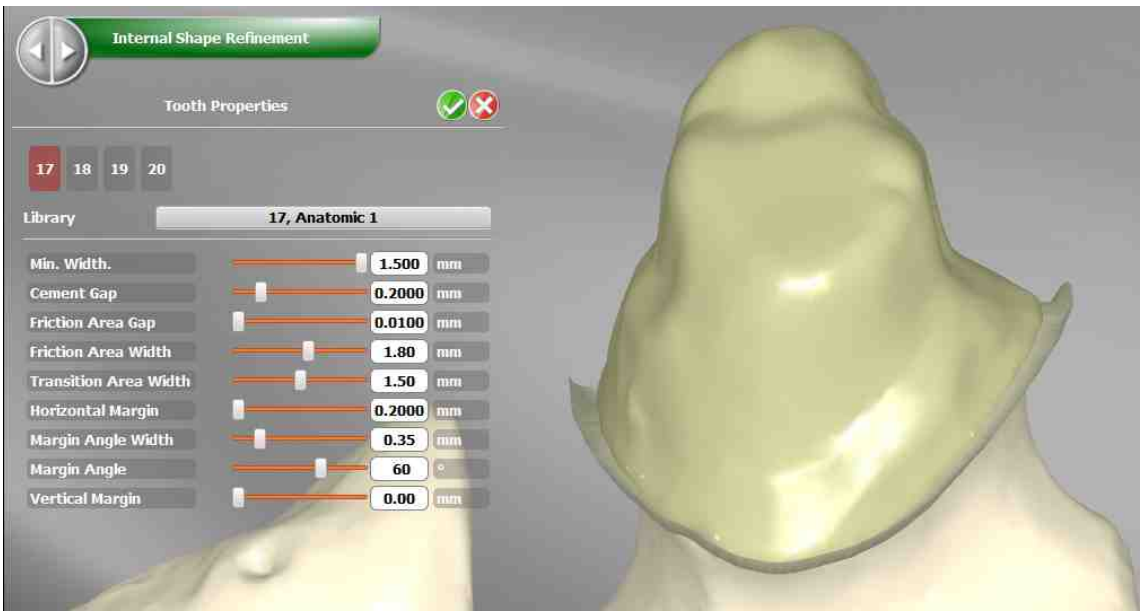


Before exporting the prosthesis can be checked using the Tools:

- Tooth Properties
- View Cross Section

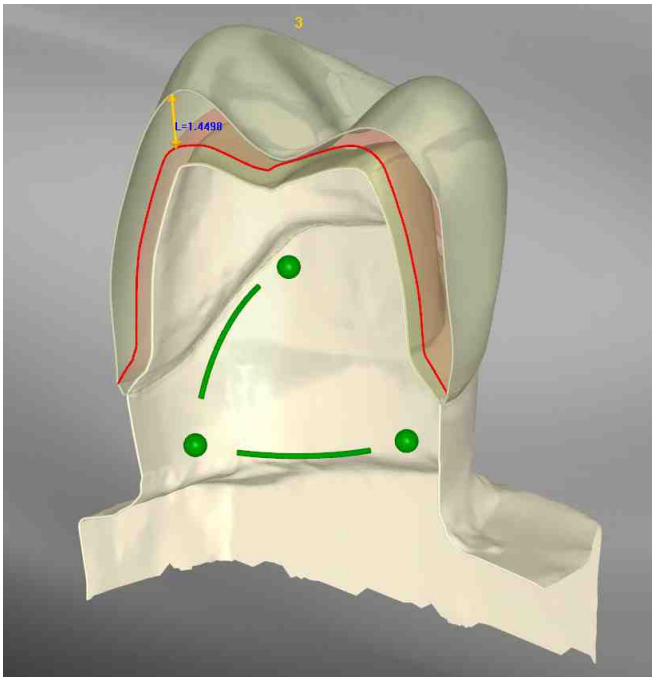
5.3.9.1 Tooth Properties

In this Step Tooth Properties are used only to visualize the prosthesis parameters



5.3.9.2 View Cross Section

The View Cross Section tool is useful to evaluate the internal shape of the prosthesis by sectioning the teeth. It's tweakable by a handy manipulator and allows measurements



This tool is available in several phases

5.3.9.3 Export

To export the data into STL file use the *Export* tool. Directory. Prosthesis file name is inherit by default from the job definition, it can be changed if required

6 UI Elements

UI Elements are different depending the current phase.

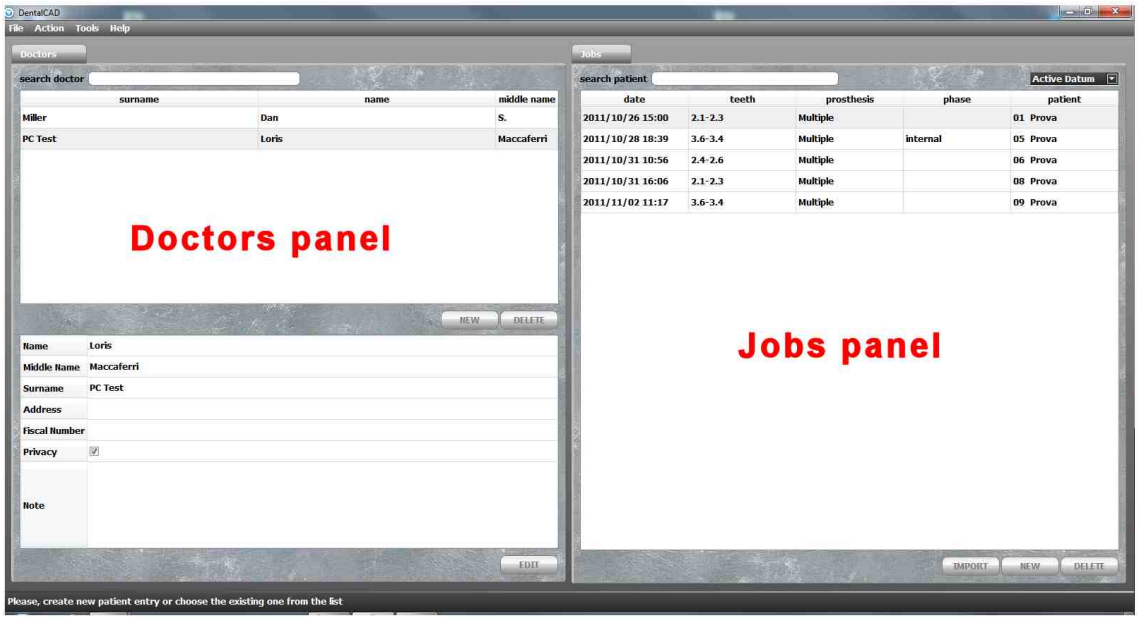
6.1 Phase 1: Patient & Job Definition

Patient & Job Definition Phase has two main UI Layout:

- Patients UI layout
- Job UI layout

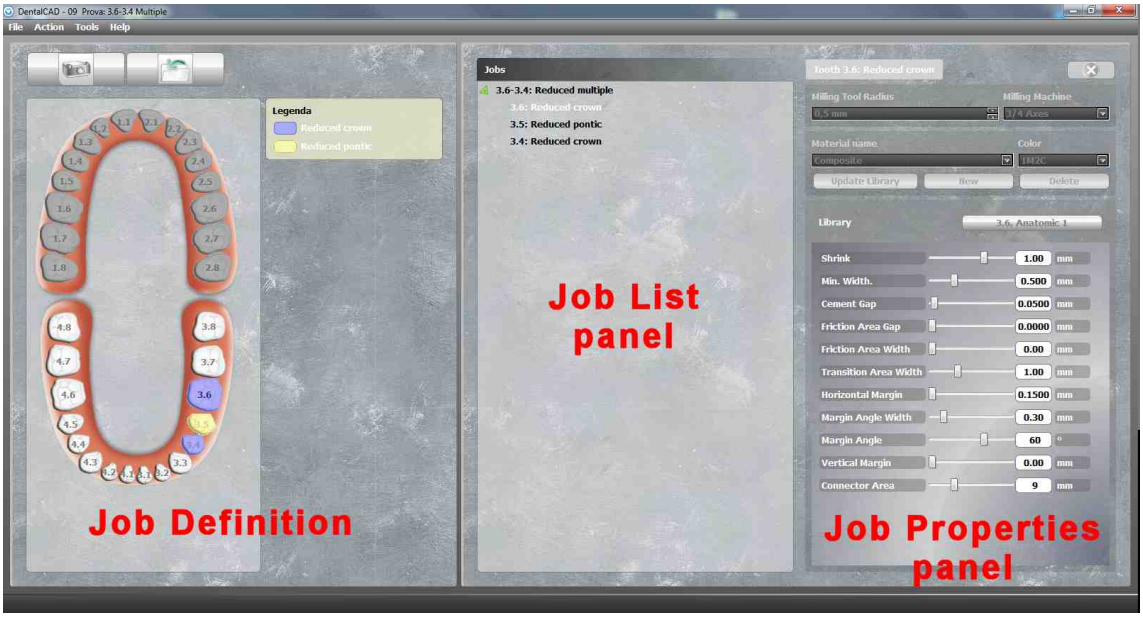
6.1.1 Patient UI Layout

Patients general UI layout is showed below:



6.1.2 Job Definition UI Layout

Job general UI layout is showed below:



6.2 Phase 2: Acquisition by Importer or Scanner

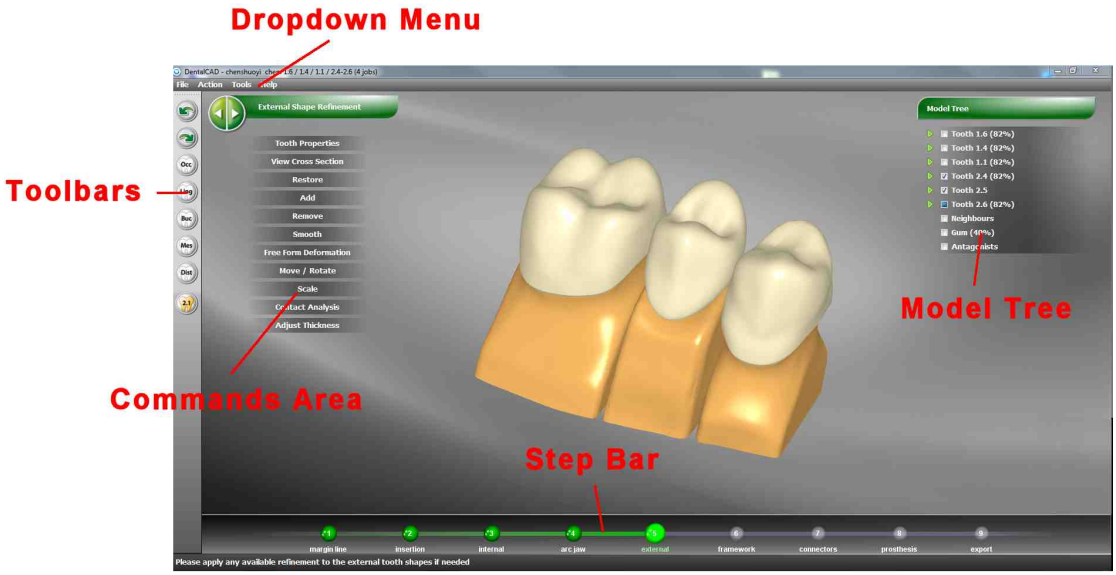
Importer o Scanner UI Layout is showed following the below links:

- Importer UI Layout

- Scanner UI Layout

6.3 Phase 3: Modeling Prosthesis

Modeling Prosthesis general UI layout is showed below:



UI Elements include:

- Commands Area
- Model Tree
- Step Bar
- Toolbars

6.3.1 Commands Area

Depending from the current Step the list of commands available for modeling the shapes is available in this area:

Each command has its own specific layout but some common elements can identified:

Command Title: The name of the active command

Tooth Selector: Red is the current tooth. Clicking on the grey buttons it is possible to set current another tooth.

Apply: Execute the command without exit ((useful when the command has to be repeated several times on different teeth)

OK: Execute the command and exit

Cancel: Exit from the command without executing it

6.3.2 Model Tree

For each phase with 3D graphical view enabled, on the right side of the screen, the **Model Tree** subview is always available.

The Model Tree allows the user to show/hide each element part available for the current phase and also define its opacity (transparency) level. Note that the entities are grouped by the belonging teeth.

Use the checkbox to control the show/hide status. Switching on/off the visibility checkbox of a Tooth group will hide/unhide all the items belonging to such a group.

The opacity level is shown as a % value after the name of the element part. In a similar way, moving the mouse wheel on the tooth item group will change the opacity of all subitems in the tree.

6.3.3 Step Bar

Enter topic text here.The Step bar in the bottom of the application highlight to the user the current Step and gives a full overview of all the Steps

6.3.4 Toolbars

The UI infrastructure is able to display a set of toolbars for exposing auxiliary commands. These toolbars could be placed on the left/right/top/bottom of the view, as the user prefers.

By now there is only one toolbar available, containing the undo/redo commands, the standard view commands and the switch for number labeling.

7 General Options

It is possible to configure application parameters from drop down menu:

Tools -> Options

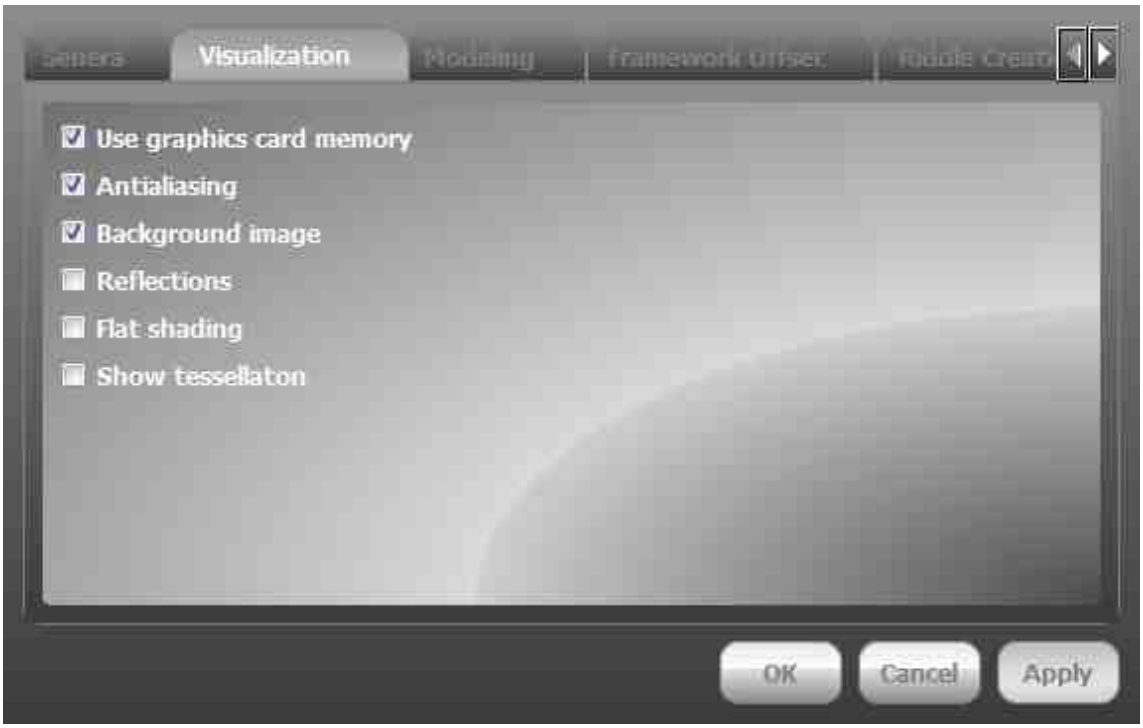
The dialog box has several tabs. Tabs group parameters allowing the users to change easily the software algorithms, such as the space to leave for the cement between the prosthesis and the stump/s

General

- Use Middle Name: allows editing the patient middle name

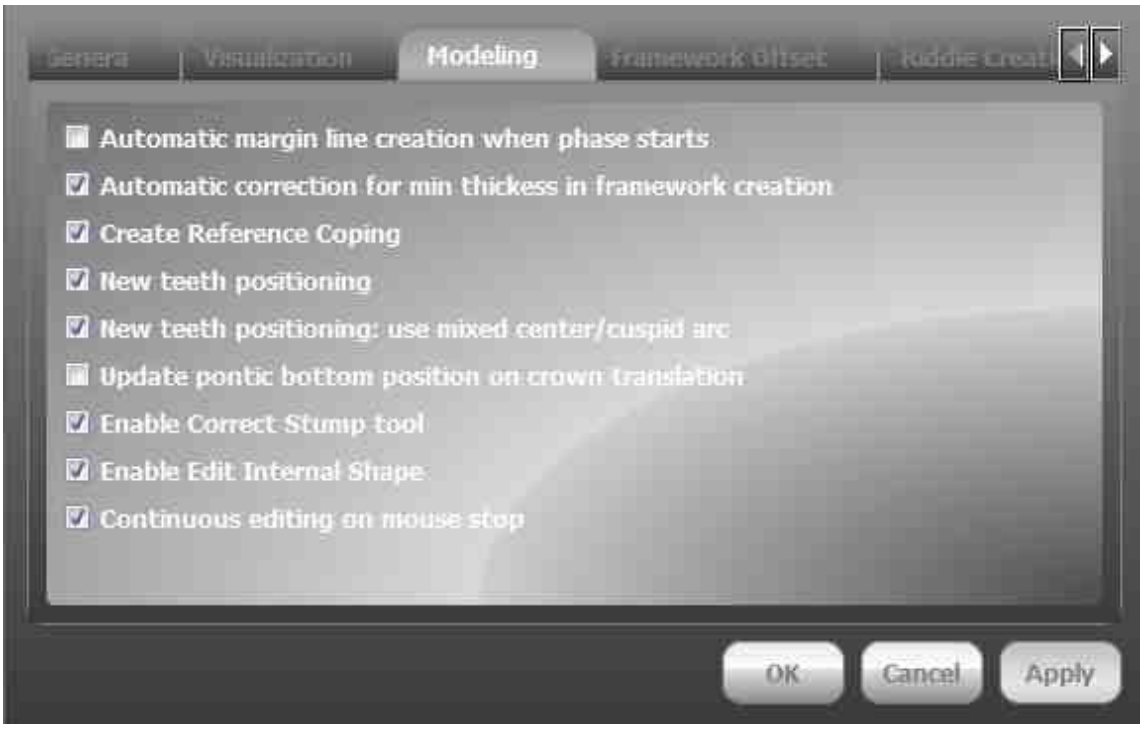
- Show Birth Date and Notes: shows birth date and notes of the patient
- Desktop Scanner Available: allows the user of a desktop scanner
- Automatic saving: check the box to save the model automatically upon phase changing
- UI Language: changes the user interface language
- Output format: changes the type of teeth nomenclature

Visualization



- Antialiasing: enables the antialias filter
- Background image: enables the background image
- Reflections: enables advanced mipmap reflections
- Flat shading: enables flat shading visualization
- Flat shading: enables flat shading visualization
- Show tessellation: enable the meshes edges visibility

Modeling



- Automatic margin line creation when phase starts: enables the autodetection of the tooth margin line upon entering the phase
- Automatic correction for min. thickness in framework creation: automatic thickness adjustment of the anatomic shape reduction
- Create Reference Coping: enables creation of reference coping surface
- New teeth positioning: better alignment of library teeth by reference points
- New teeth positioning: use mixed center/cuspid arc: use the new approach to arc jaw definition
- Update point bottom position on crown translation
- Enable Correct Stump tool: it adds a special Step during Insert Direction. It becomes possible to change the Stump shape using standard modeling tools
- Enable Edit Internal Shape: it makes available the standard modeling tools during this Step
- Continuous editing on mouse Stop: If enable the Add, Remove e Smooth standard modeling tools work also if the mouse is not moving

Framework

- Coping and Adjust Thickness: you can adjust and set the Boundary Transition Area Width, in millimeters
- Anatomical Reduction: you can set the No Reduction Area Width in millimeters, and the Transition Area Width, also in millimeters

Riddle Creation

- Riddle Height, mm: sets the default height of the riddle
- Draft Angle, deg: sets the default draft angle of the riddle
- Left-Side Angle, deg: sets the default left-side angle of the riddle
- Riddle Thickness for Coping, mm. the default used for riddle in coping job

Directory

- User Data Directory: sets the path of the work directory, where to store preparations and temp files

Library

- Default Library: choose the default library to be used as teeth anatomic shape