Maestro 3D Ortho Studio
User's Manual

Introduction to the use of Maestro 3D Ortho Studio software.

AGE SOLUTIONS S.r.l.

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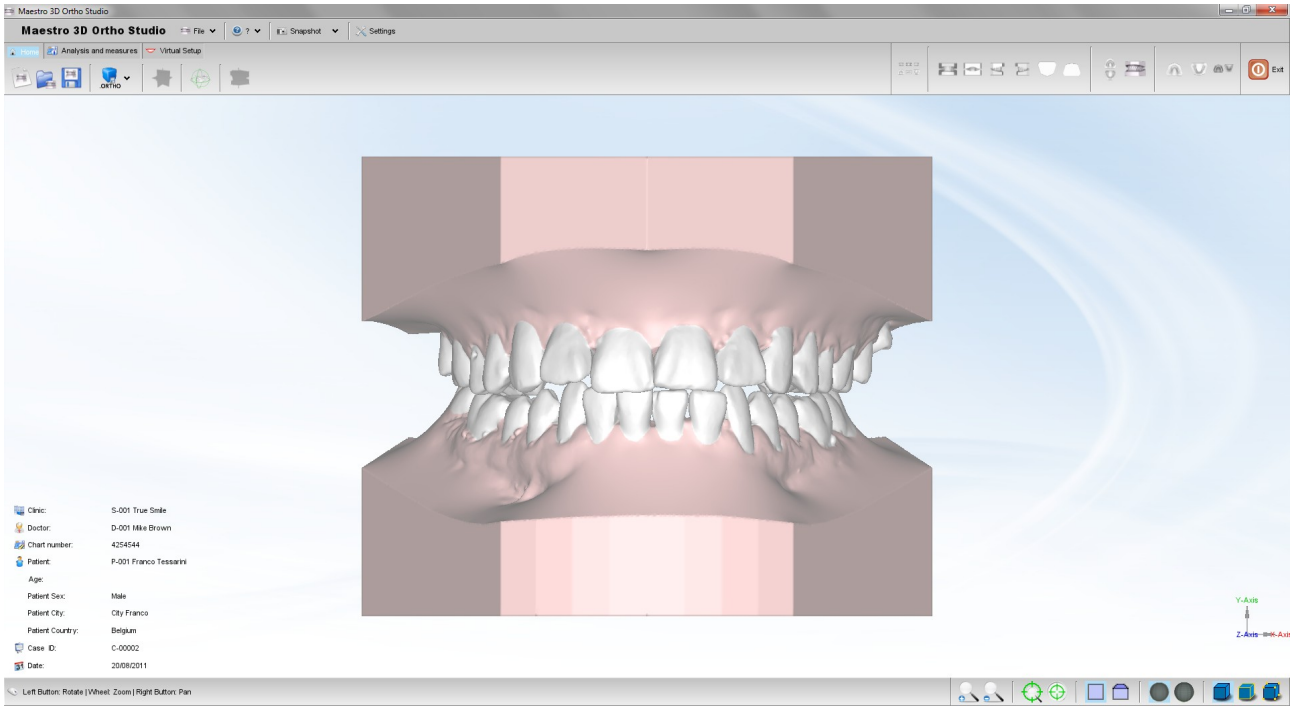

Introduction to the use of 3D Ortho Studio software.

AGE SOLUTIONS S.r.l.
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General Informations

Purpose of the document

This document is intended to introduce the user, in a simple and quick way, to the use of the Ortho Studio software. Please read this manual carefully before making use of the Ortho Studio software.

Index

1. Introduction

Maestro 3D Ortho Studio is a very powerful and easy to use software for orthodontics.

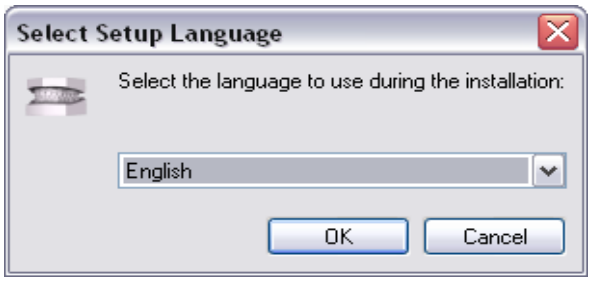
The principal features available are:

- Patient, Surgery And Doctor info handling using AGE DB.
- Choice of local origo of mandibular and maxillary arcs.
- Virtual base creation / modification and stitching to mandibular and maxillary arcs.
- Virtual Setup.
- Occlusion inspection between mandibular and maxillary models.
- Analysis of distance, measures and sections.

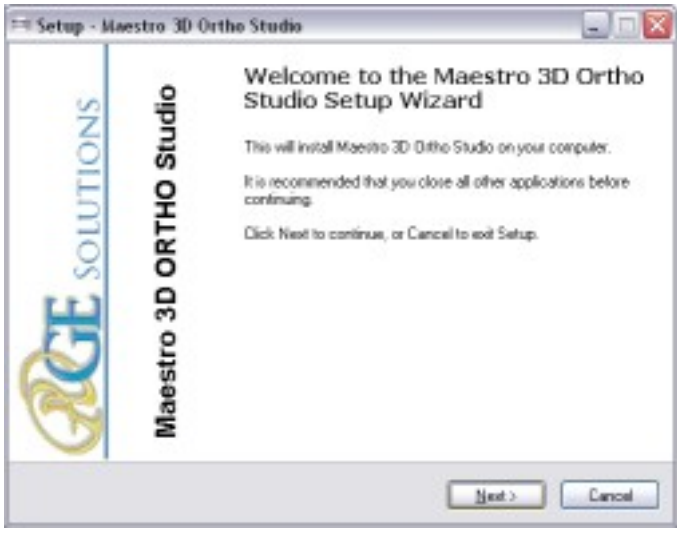
2. Software Installation

To install the Maestro 3D Ortho Studio software, double click with left mouse button on the file: *Maestro.3D.Ortho.Studio.vx.xx.xxx.Setup.exe* which is in the CD\DVD.

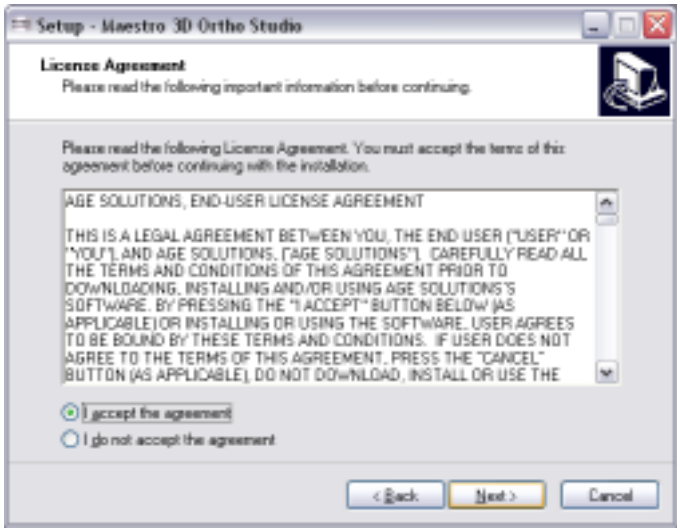
Step 1: Select the installation language.



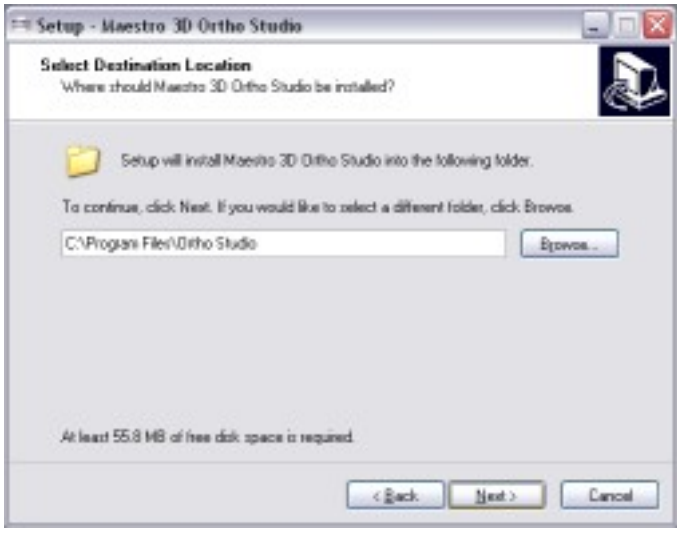
Step 2: A welcome installation window of Maestro 3D Ortho Studio appears. Press *Next* to continue.



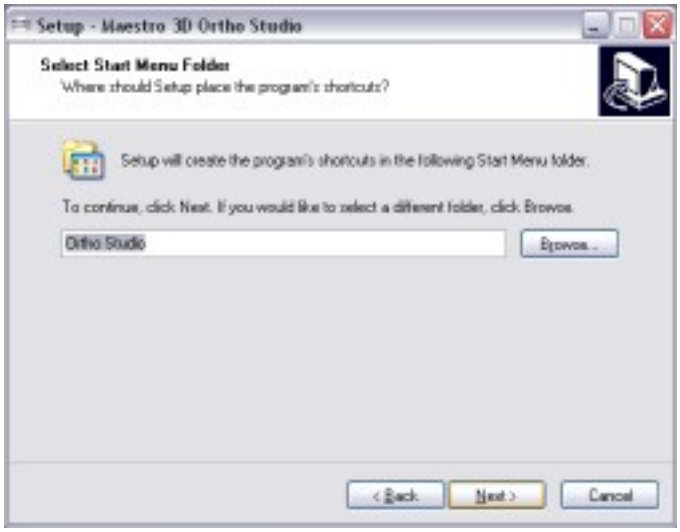
Step 3: Please read the license agreement carefully, accept it as shown in the red circle and press Next to continue.



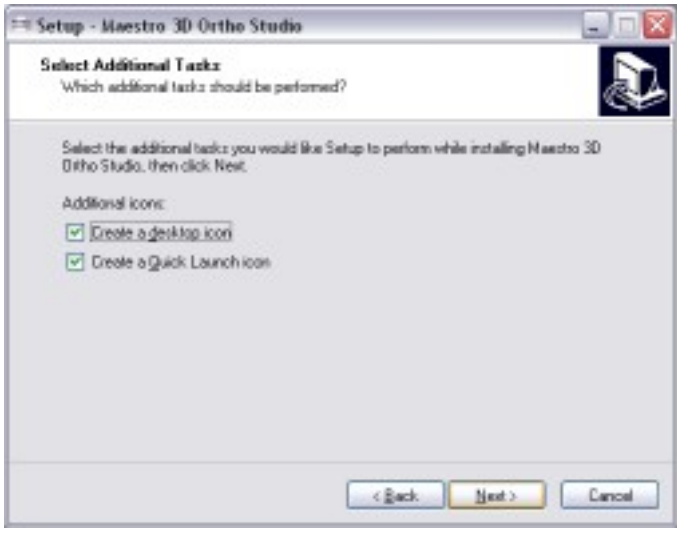
Step 4: Select the destination folder. (We recommend to use the default folder). Press *Next* to continue.



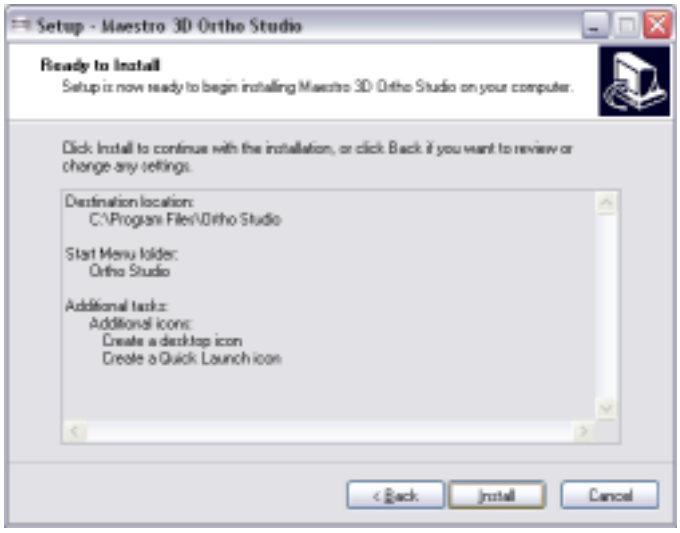
Step 5: Select the menu start folder. (We recommend to use the default folder). Press *Next* to continue.



Step 6: Select, if desidered, a program icon on the desktop and into the quick launch bar. Press *Next* to continue.

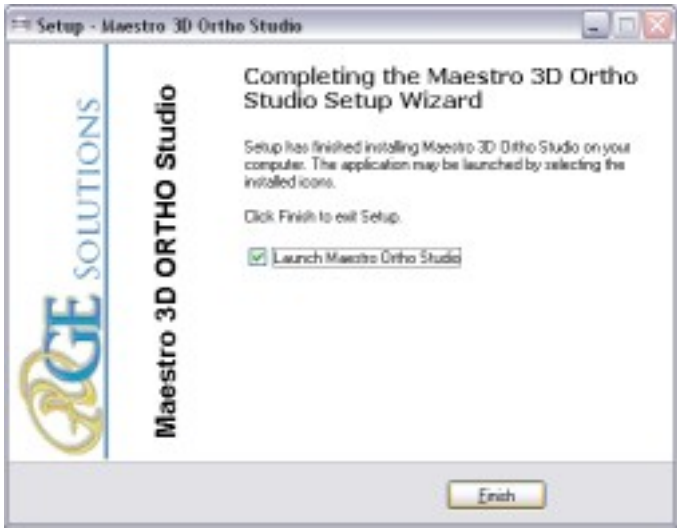


Step 7: At this point a summary of installation information appears. Press *Install* to install the software.



A progress bar shows the progress of the installation process.

Step 8: Installation complete. Press *Finish* to complete the installation.



WARNINGS:

Use Windows 7 - 64 bit
Install all Windows update available
Install the last graphics card available from NVIDIA web site www.nvidia.com

Right mouse click over software icon and **Properties -> Advanced -> (check) Run As Administrator.**

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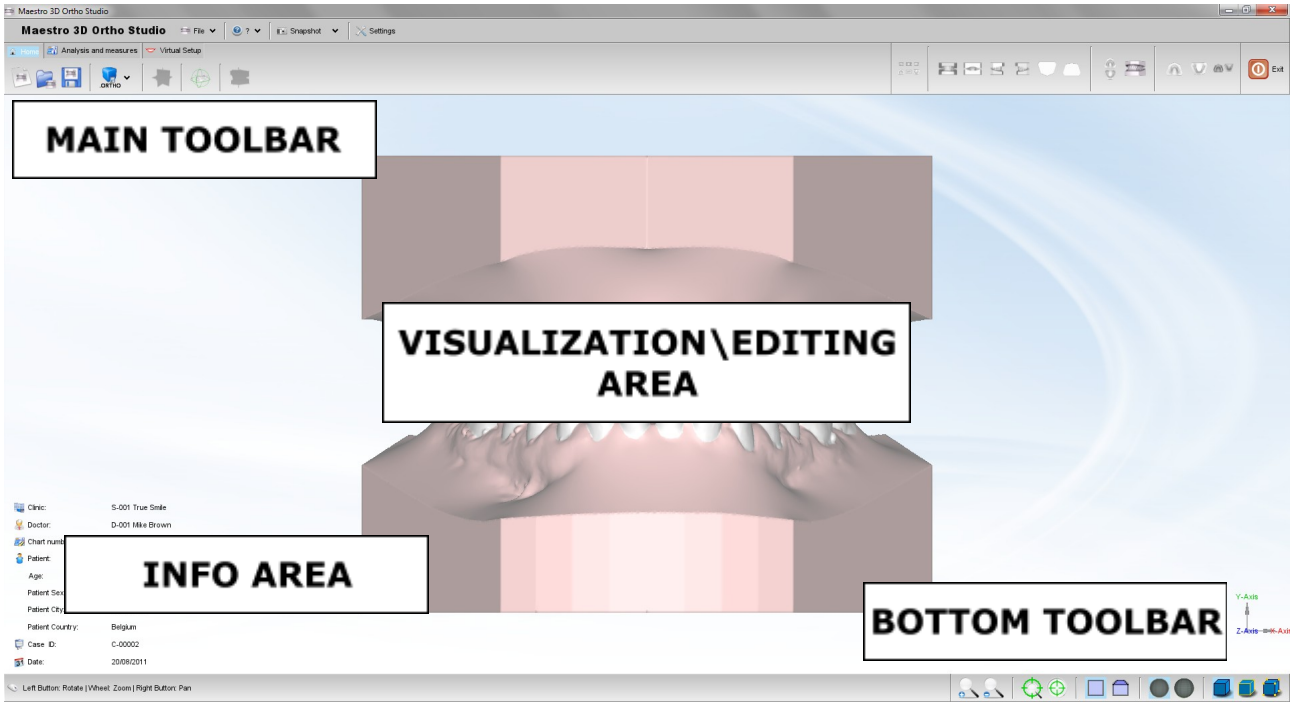
3. User Interface

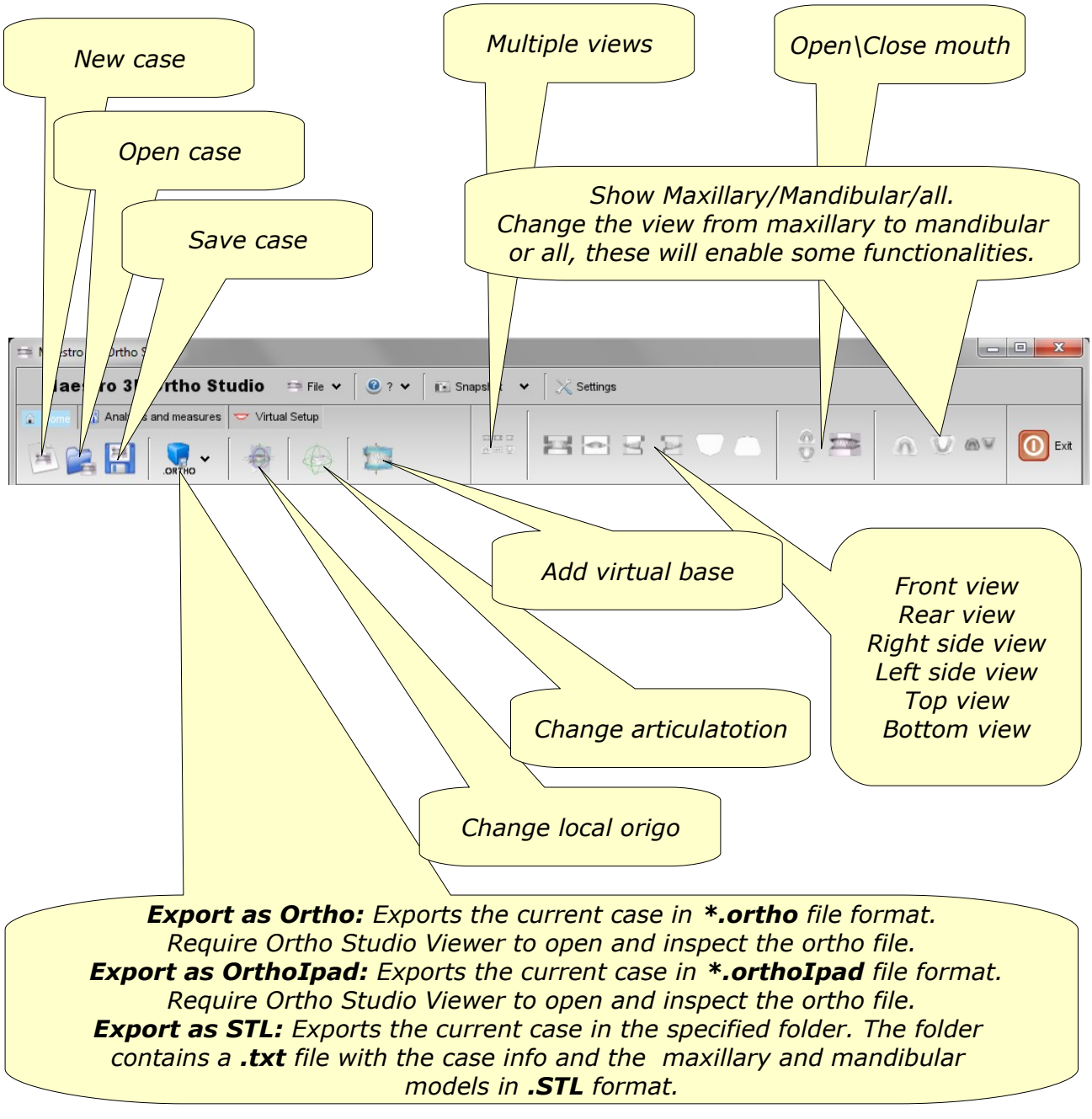
The figure below shows the composition of the user interface.

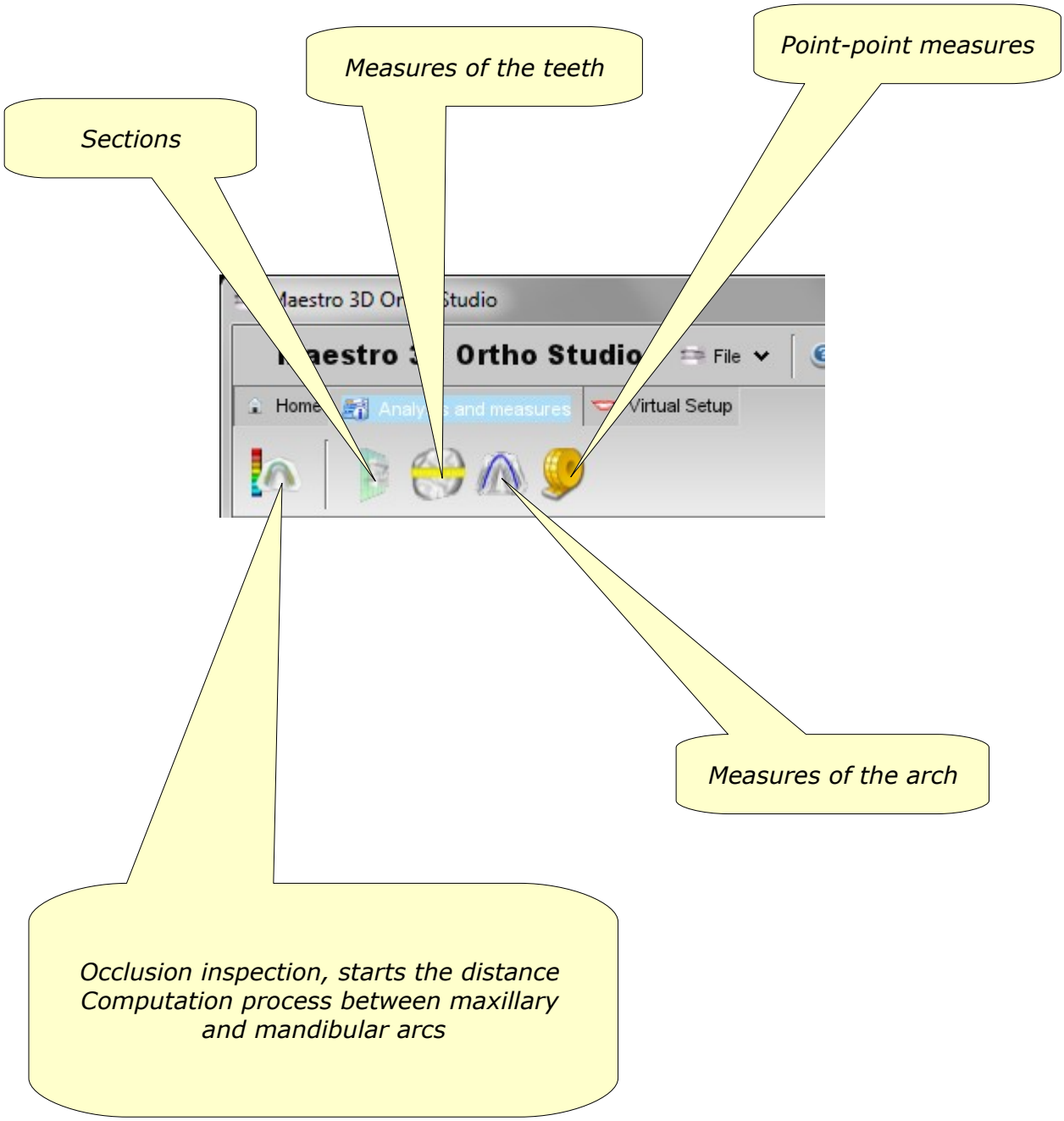


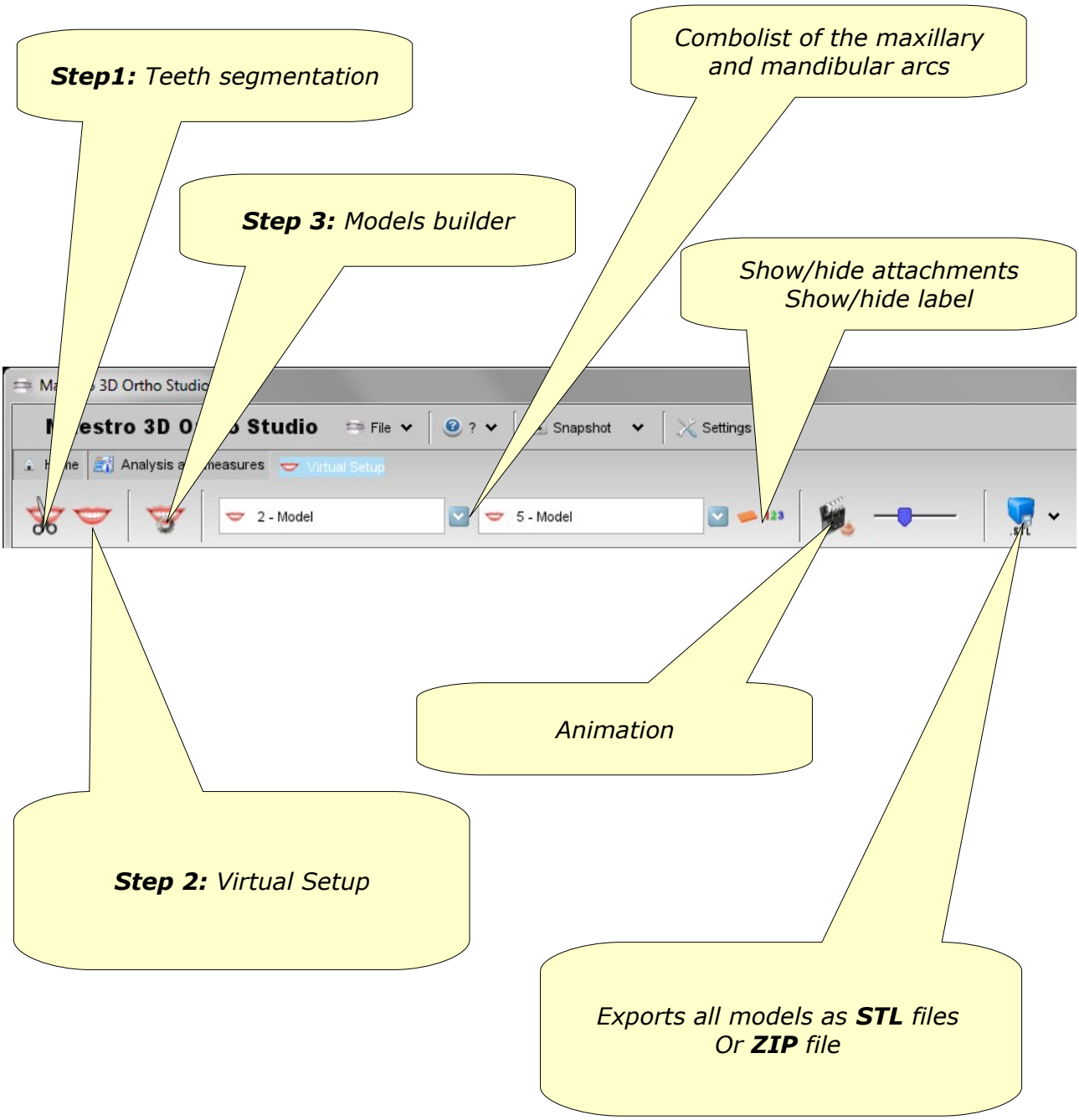
In the following sections of this chapter the various areas of the user interface will be examined.

3.1. Main Toolbar

The main toolbar allows to access to all the functionalities of the Ortho Studio Software.

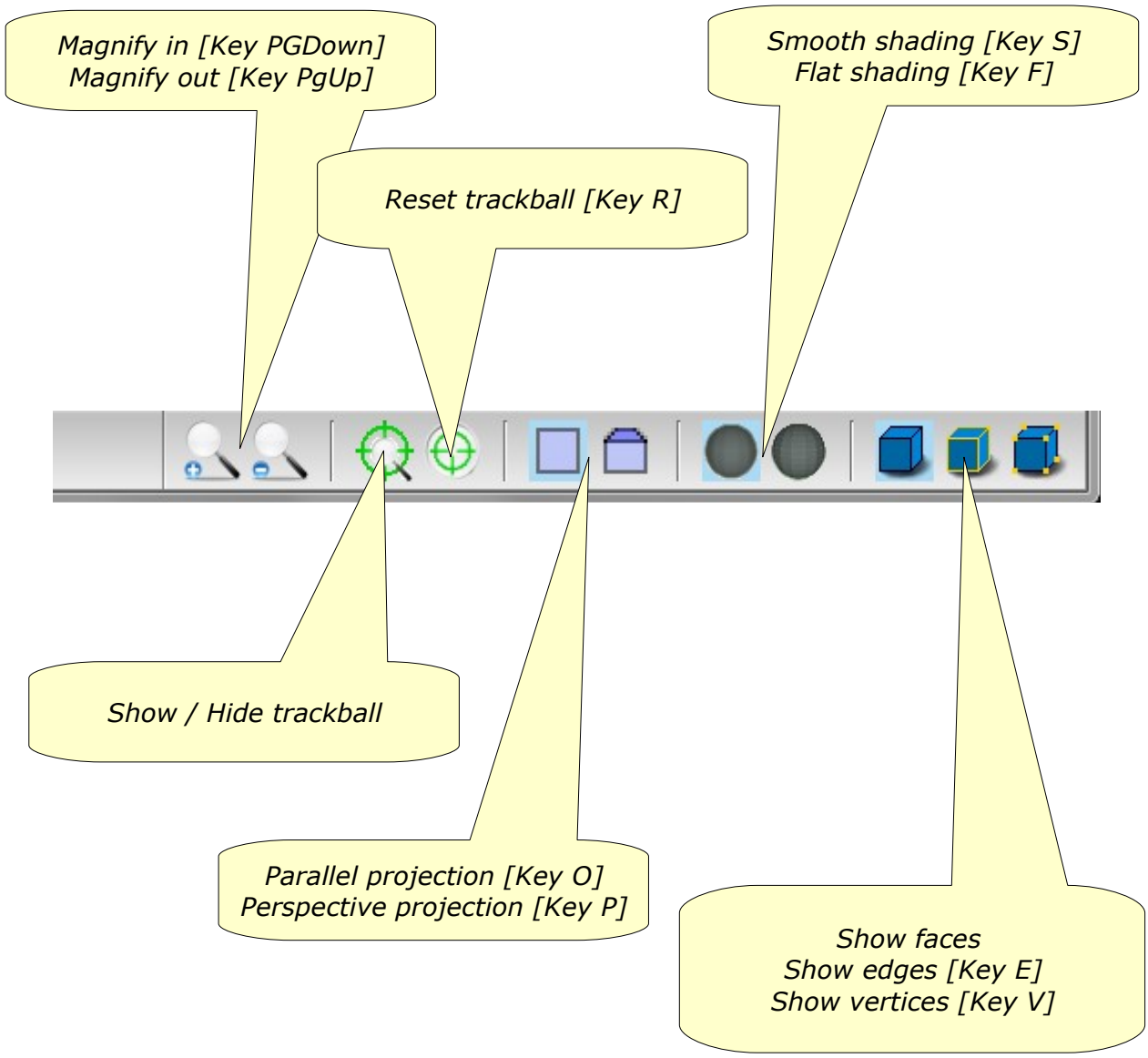






3.2. Bottom Toolbar

The bottom toolbar is the area of the screen containing a progress bar that is displayed and updated during each computation of the program and the controls for changing the visual settings of the visualization / editing area.



3.3. Visualization / Editing Area and Info Area

The visualization / editing area is the area of the window in which the models are visualized and all the editing operations are performed.

In the visualization area it is possible to create virtual bases, show the occlusion inspection between maxillary and mandibular arcs, measure distance between teeth and to perform virtual setup.

In order to examine the models displayed in the visualization / editing area camera parameters (position, scale and rotation) can be setted using an instrument called trackball.

The trackball is very simple to use. Just use the Left mouse button dragging to rotate around the model, the mouse wheel to Zoom in / Zoom out and the Right mouse dragging to move (pan) the camera.

The info area of the screen shows the info related to the current Case. In particular the info about Surgery, Doctor and Patient are displayed, also with the Case ID.

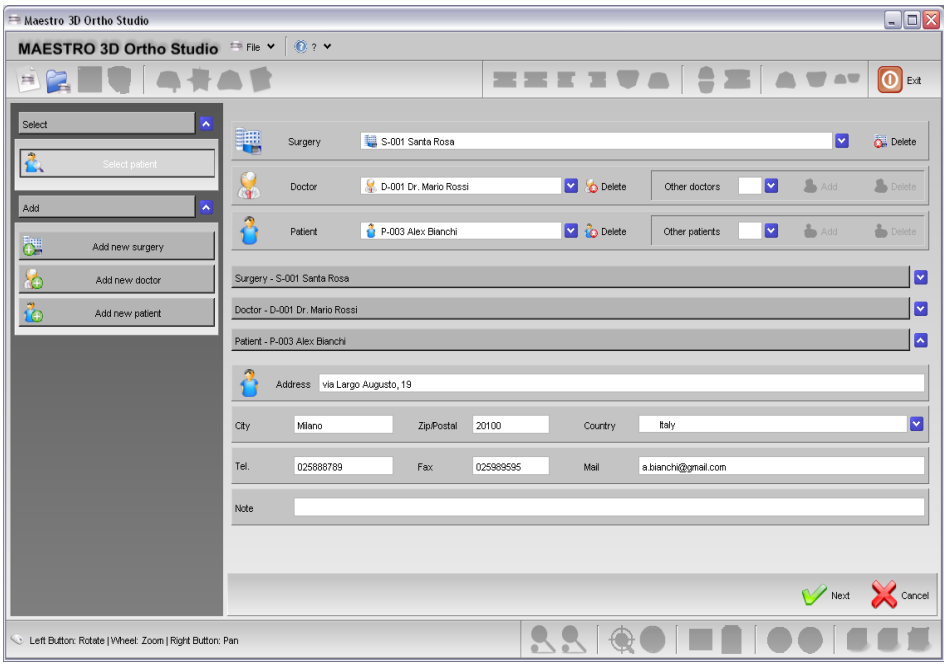
4. Create a new Case and open and existing Case

4.1. Create a new case

To create a new case press the  *New Case* button located in the main toolbar.
The process of creating a new case consists in the following steps:

- specify the Surgery data (optional)
- specify the Doctor data (optional)
- specify the Patient data (optional)
- specify the relationship between Surgery, Doctor and Patient (optional)
- choose maxillary and mandibular models (required)

To create a new Surgery press the  *Add new surgery* button, located in the left side of the screen.
After filling the fields of the form that appears in the main side of the screen specifying the data of the Surgery, press the  *Insert* button *to* add the new Surgery to the database or the  *Clear* button to clear the fields of the form.

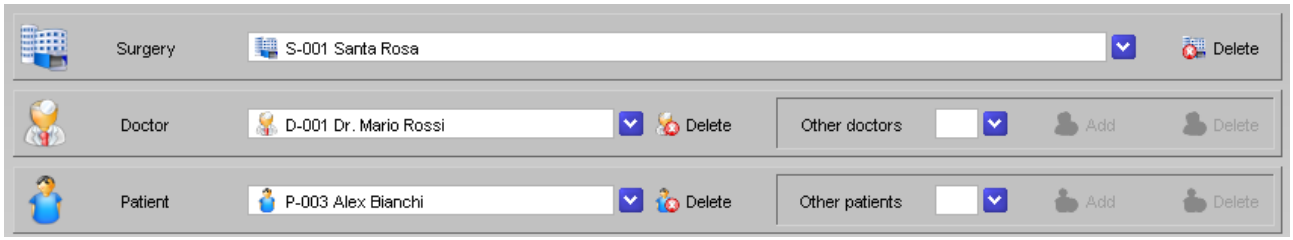


In the same way it is possible to create a new doctor pressing the  *Add new doctor*

button and to create a new patient pressing the *Add new patient* button.

In order to define a Case it is necessary to press the *Select patient* button located in the left side of the screen.
In the main side of the screen now it is possible to make the relationship between Surgery, Doctor and Patient.

The first half of the main screen area allows to make the relationships between Surgery, Doctor and Patient (see picture below).



Pressing the button of the Surgery combobox allows to select one of the Surgeries previously defined. The *Delete* button allows to delete the Surgery currently selected. Please note that when pressing the *Delete* button the Surgery definition is phisically removed from the Database of the Surgeries.

When the list of the Doctors associated to a given Surgery is empty and in general when it is necessary to add a new Doctor to the Surgery previously selected, it is possible to select a Doctor in *Other doctors* combobox *p*ressing the button *and then* pressing the *Add* button. The *Delete* button located nearby to the *Other doctors combobox* allows to remove the definition of a Doctor from the Database of Doctors.

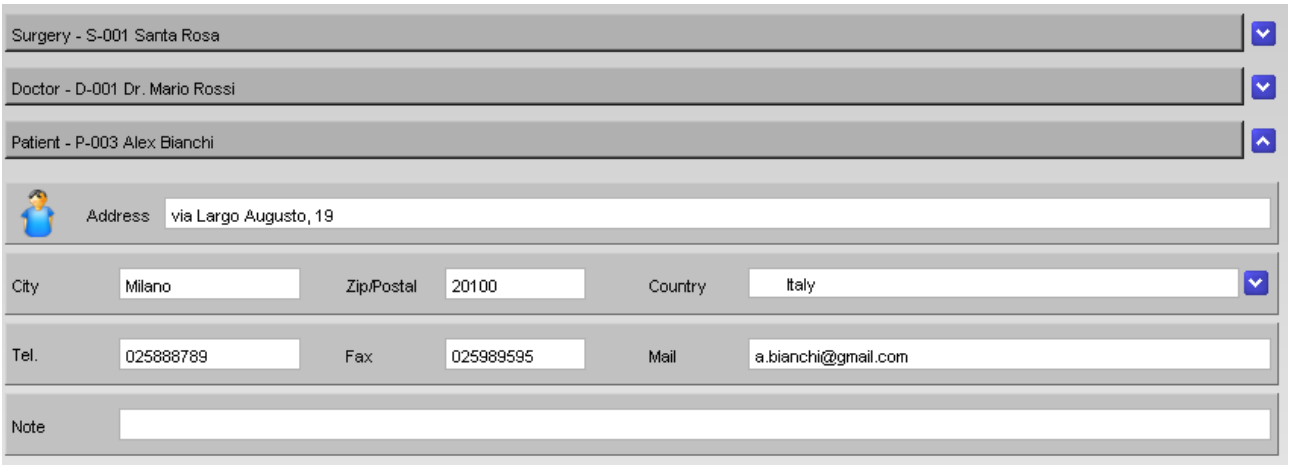
Pressing the button in the *Doctor* combobox allows to select one of the Doctors associated to the Surgery. The *Delete* button located nearby to the *Doctor* section allows to remove a Doctor from the Doctors of a Surgery without deleting the doctor from the Database of Doctors.

When the list of the Patients associated to a given Doctor is empty and in general when it

is necessary to add a new Patient to the Doctor, it is possible to select a Patient in *Other patients* combobox *p*ressing the button *and then* press the *Add* button. The *Delete* button located nearby to the *Other patients* combobox allows to remove the definition of a Patient from the Database of Patients.

Pressing the button in the *Patient* section allows to select one of the Patients associated to the Doctor. The *Delete* button located nearby to the Patient section allows to remove a Patient from the Patients of a Doctor without deleting the patient by the Database of Patients.

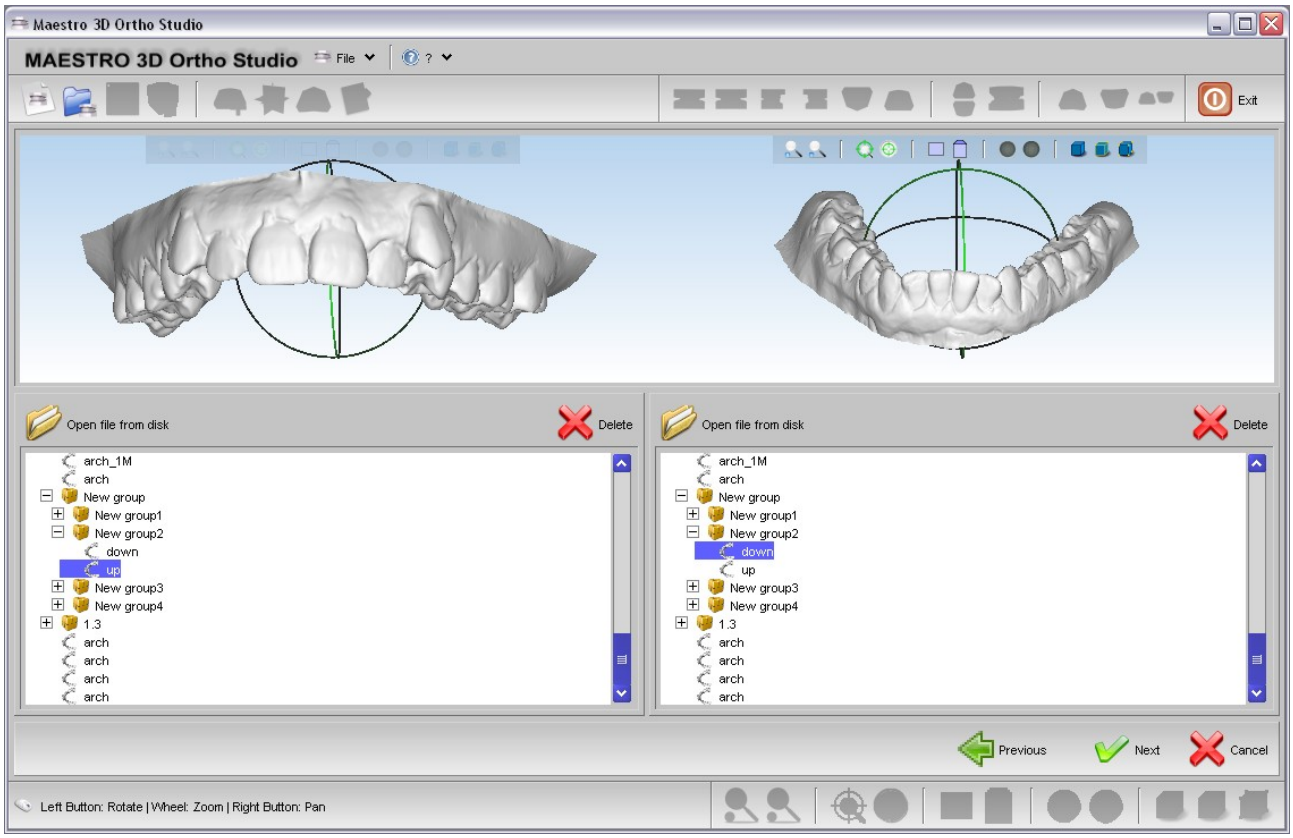
Please note that in the second half of the screen main area it is possible to modify the fields of the Surgery, Doctor and Patient previously added.



Pressing the *Next* button located in the lower right corner of the window allows to proceed in the definition of the case.

The task of choosing maxillary and mandibular models can be accomplished in two distinct way:

- choosing a model by the tree of the Maestro Data (this is the folder in which the models acquired by Maestro 3D Dental Scanner are placed by default)
- importing a model by an external folder using the *Open files from disk* button (the allowed format for the models to import is the ***STL*** *file format*).



Pressing the ✔ *Next* button located in the lower right corner of the window allows to complete the process of defining a case.
In order to save the created case, please remember to press the *Save case* button located in the main toolbar.
Pressing the *Previous* button allows to go back to the previous step of the Case definition.
Pressing the ✘ *Cancel* button exits from the process of defining a new Case.

4.2. Open an existing case

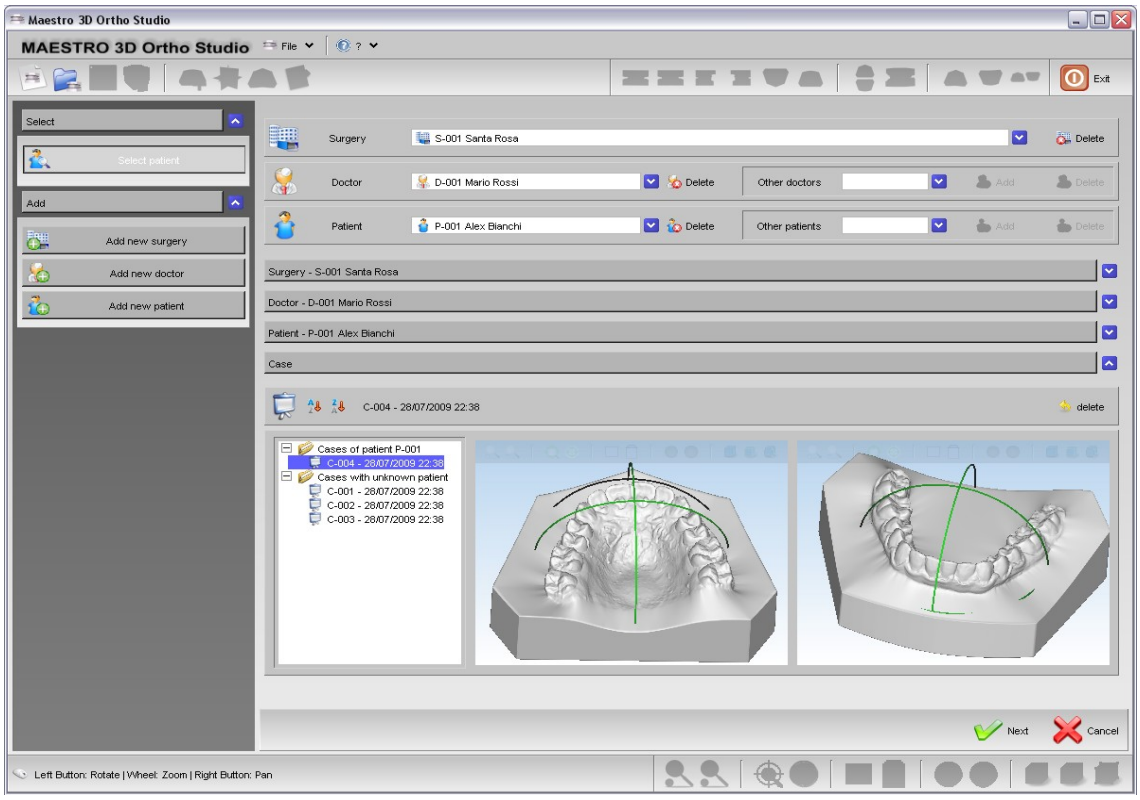
To open an existing case click on the  *Open case* button located in the main toolbar.

In the treeview it is now possible to select an existing case. To see all the cases of a given patient press the  *Select patient* button located in the left side of the screen.

In this phase it is possible to change the properties of a case, changing the Surgery, Doctor and Patient info and adding a new Surgery, Doctor and Patient.
Also note that it is possible to move an unknown case or a case of a given Patient in a case of another Patient simply locating the case in tree and dragging it from the starting folder to the destination folder.

Pressing the ✔ *Next* button located in the lower right corner of the window it is possible to proceed with the next operation.
Pressing the ✘ *Cancel* button break the process of opening an existing case.

The image below shows the process of opening an existing case.

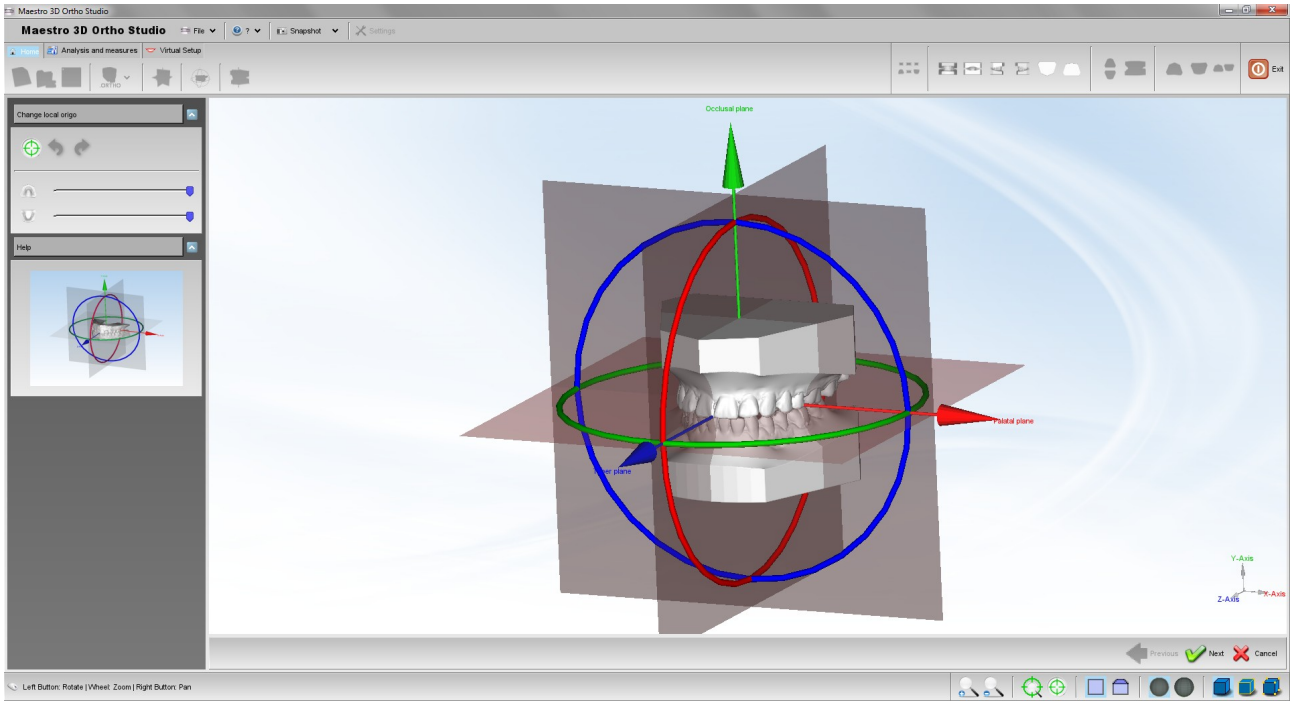


5. Changing the Local Origo

In order to change the Local Origo for the maxillary and mandibular models, first visualize both the maxillary and mandibular models pressing the *Show all* button, then press the *Change Local Origo* button.

In the editing area appears a Manipulator (see image below).
The center of the manipulator represents the origin of the coordinate system, the red arrow represents the X axis, the green arrow represents the Y axis and blue arrow represents the Z axis of the coordinate system.
Using the Left mouse button + Shift key it is possible to translate the Manipulator (dragging the arrows) or rotate the manipulator (dragging the circles). These operations allows to change the coordinate system of the models.

Pressing the *Next* button located in the lower right corner of the editing area allows to move the maxillary and mandibular models in the new reference coordinate system.
In order to apply the changes to the models, please remember to press the *Save case* button located in the main toolbar.

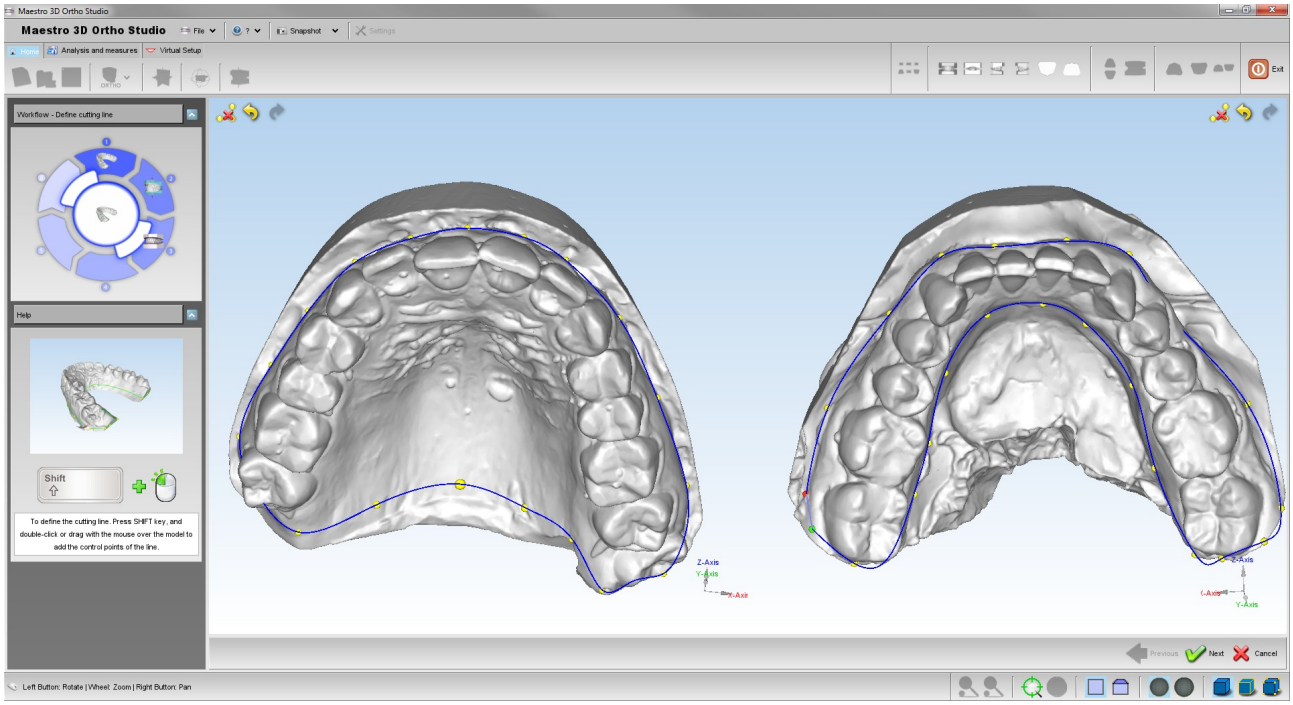


6. Virtual Base Creation

In order to add the virtual base for the maxillary and mandibular models, first visualize both the maxillary and mandibular models pressing the *Show all* button, then press the *Add virtual base* button.

First step to perform when doing virtual base editing, it's to define a trimming line in order to remove the unimportant areas of model.

It's possible to define trimming line simultaneusly for both models. After defining trimming line, software automatically detect area to remove.



TIPS:

SHIFT + double-click with left mouse button to add a point of the spline.

The second step is the editing operations on virtual bases.

It's possible to choose several base types, in particular it's possible to choose between ABO, Parallel, Tweed and Ricketts models.

It's also possible to perform simultaneusly several several editing operations for virtual base:

A: changing base border shape:

- dragging points located at base border it's possible to change the shape of the border itself. It's also possible to add/remove points using shift + left mouse double click. It's also possible to draw the base border just using the shift + left mouse button dragging near to the base border. Dragging the arrows located at base border it's possible to move the border up and down.

B: changing base shape:

- dragging points and arrows located at corners of virtual base it's possible to change the shape of the virtual base (for example it's possible to change the width and the length of bases). During all the editing operations, constraints that exists between angles/sides of base are preserved.

C: changing base height:

- dragging the arrow positioned at base bottom it's possible to change the height of bases (this option it's disabled for ABO bases).

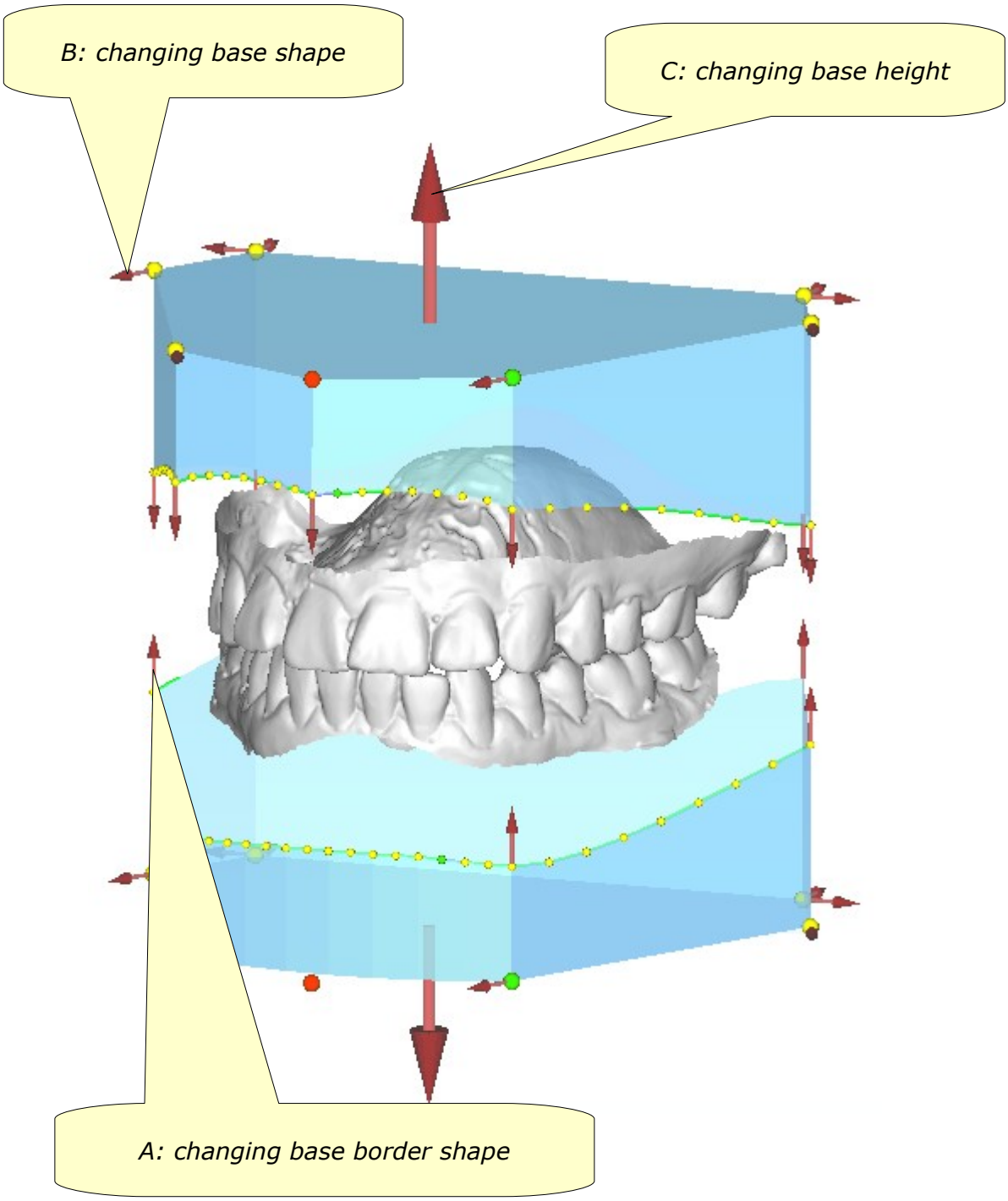
All operations concerning virtual base editing process are performed with Shift + left mouse button dragging (Shift + left mouse double click to add remove points to base border).

Using the “Symmetrical changes” checkbox, editing will be performed simultaneusly on both bases.

After finishing editing process just press Next button in order to finalize the editing procedure and merge the defined bases with maxillary and mandibular models.

TIPS:

SHIFT + double-click / drag with left mouse button to add/remove points to base border.



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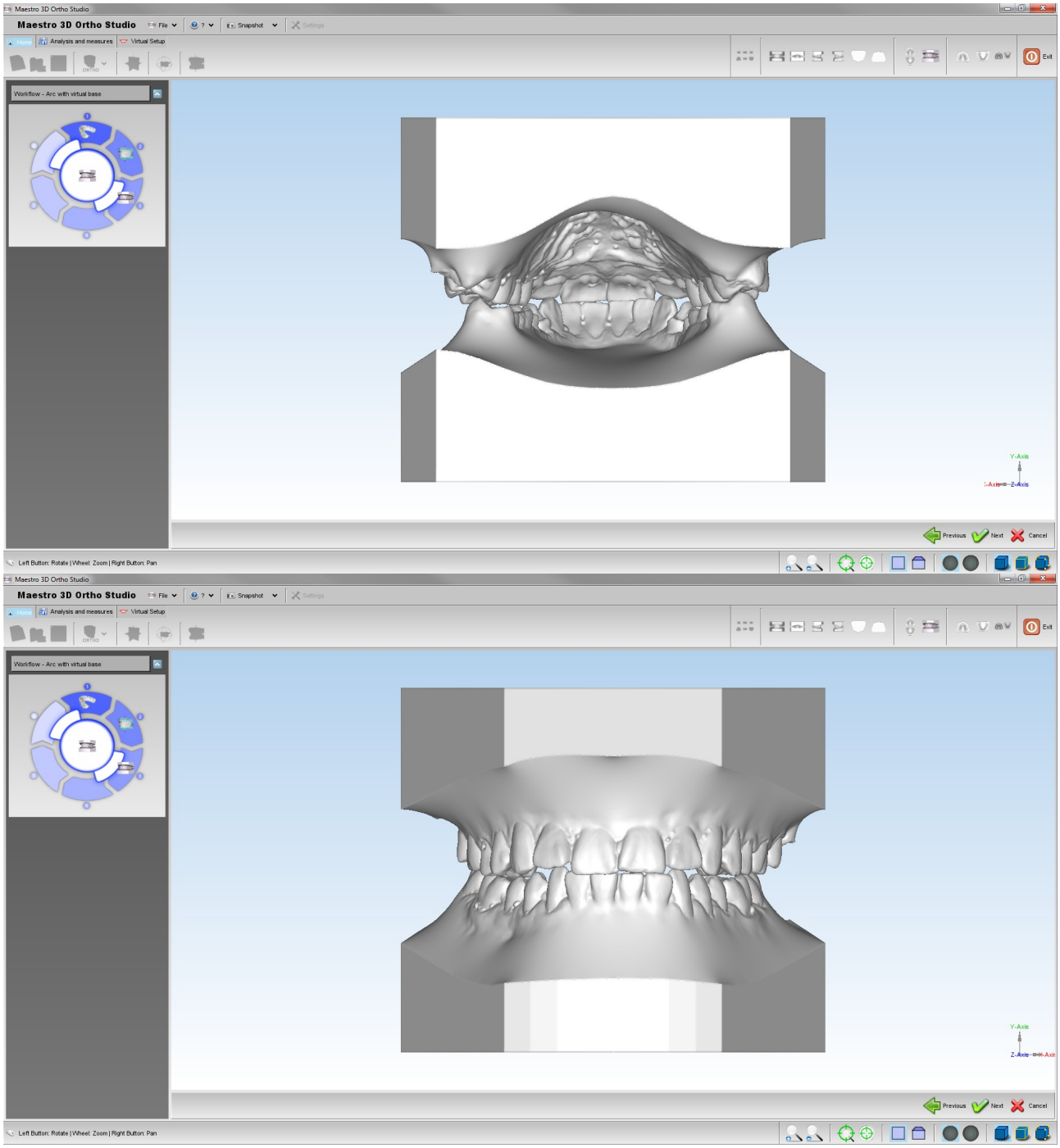
Stitching between base and model it's more smooth and the transition between arch and base it's smoother.



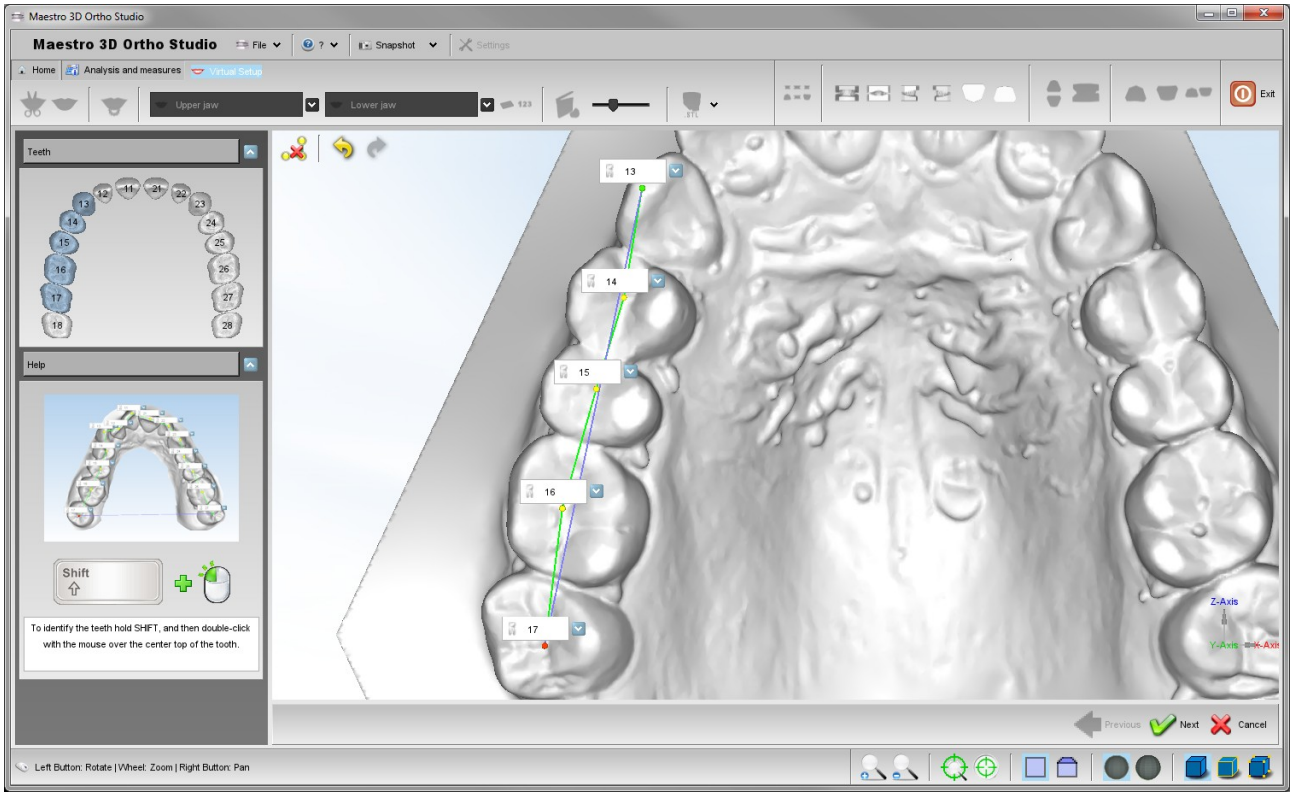
7. Virtual Setup

With this feature, you can make a setup of both jaws and create all the models needed to complete the treatment. It's possible to add the custom attachments and the label 3D.

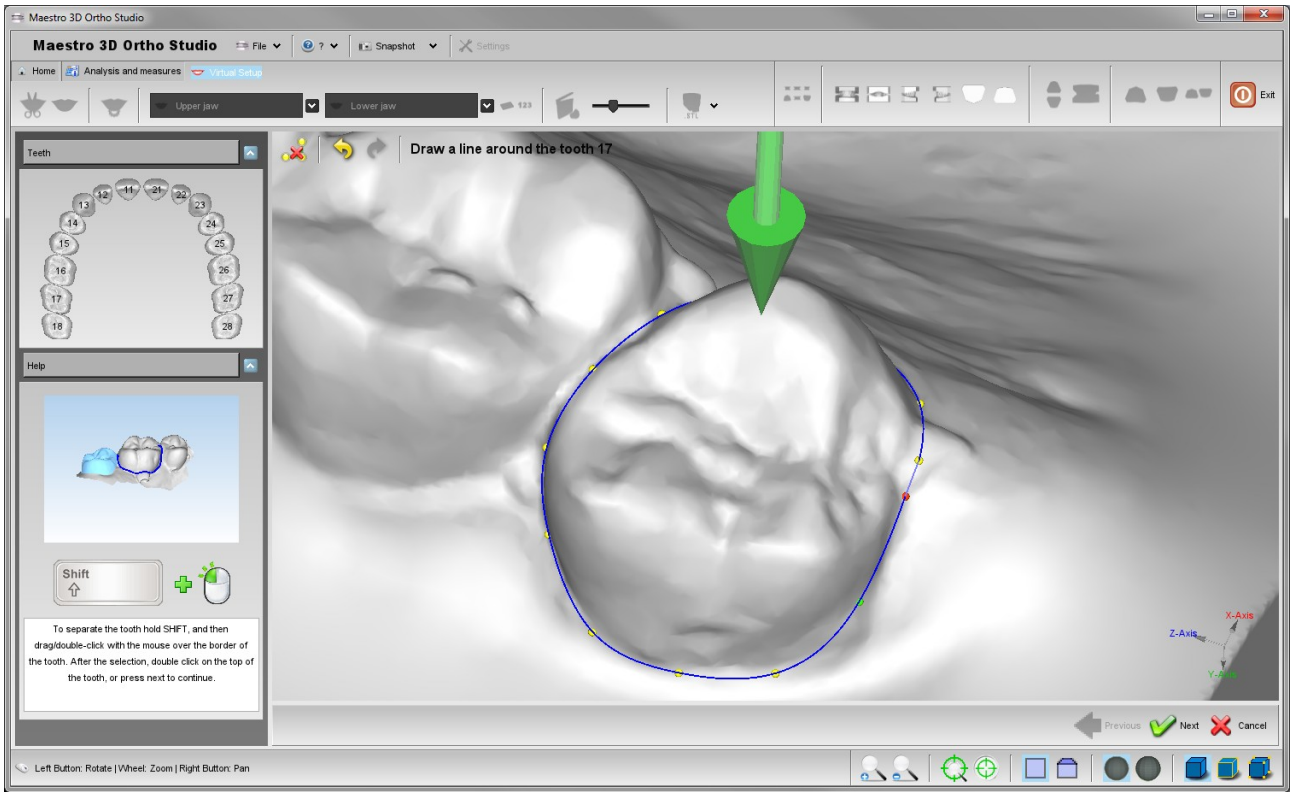
7.1. Tooth Segmentation

In order to perform the tooth segmentation, select the arch to segment using the  *Show Maxillary* button or the  *Show Mandibular* button and then press the  *Tooth Segmentation* button.

The first step is identify the teeth. To identify the teeth, hold SHIFT and then double-click with the mouse over the center top of the tooth. Choose with the combo list the correct tooth number, as shown below:



The second step is to draw a line around the tooth in order to separate the tooth. To do this, hold SHIFT and then drag or double-click with the mouse over the border of the tooth. After this, double-click on the top of the tooth or press next to continue.



TIPS:

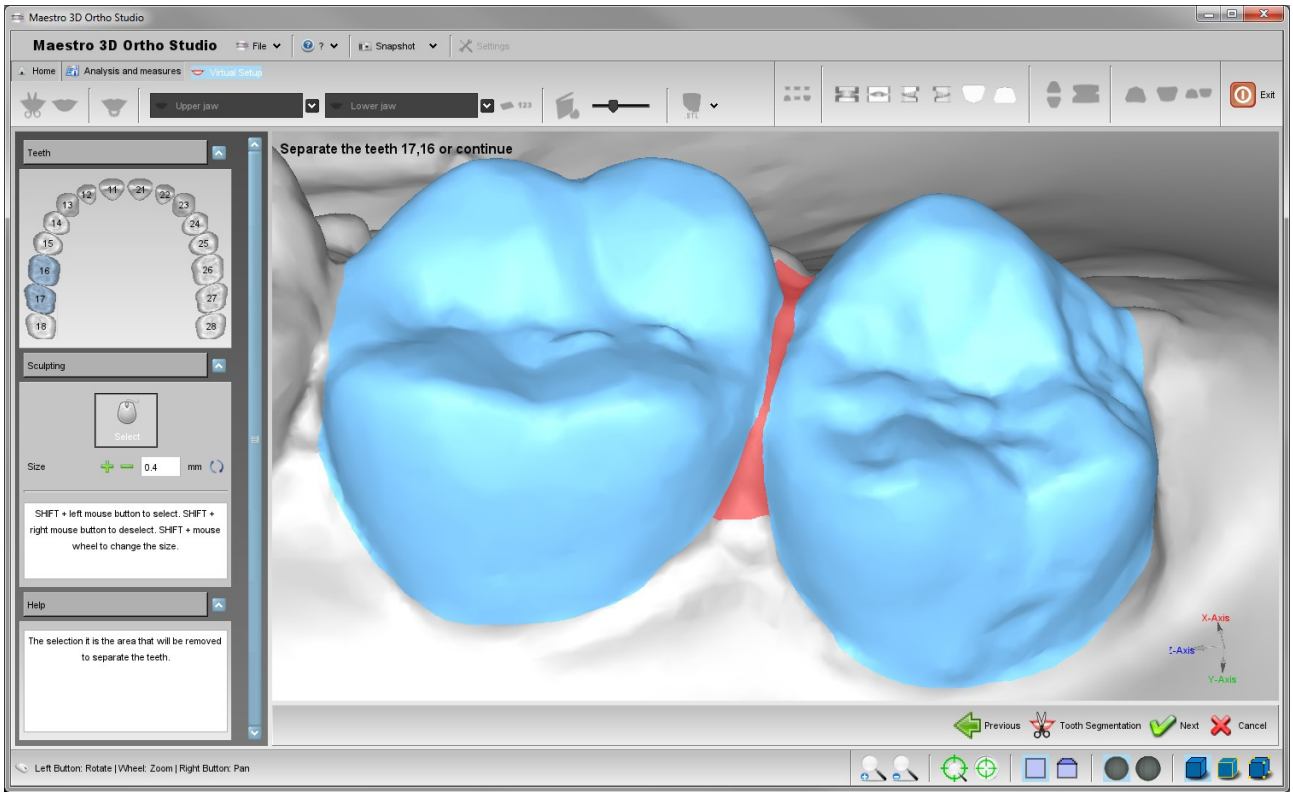
to add a point between two consecutive points, hold SHIFT double-click on the edge of the two points.

To remove a point, double-click over it.

To move a point, hold SHIFT and drag over it.

The third step is to separate the two adjacent teeth. To do this, hold SHIFT and then drag with left mouse button to paint a red selection or drag with right mouse button to remove the red selection.

The red selection it's the area that will be removed to separate the teeth. After press the  *Tooth Segmentation* button or press next and choose **YES** to the message box.



TIPS:

Do not paint a too wide selection that goes to cover the gum.

Try to draw a continuous selection and not a jagged selection.

It's possible also not separate the teeth, just press next and choose **NO** to the message box.

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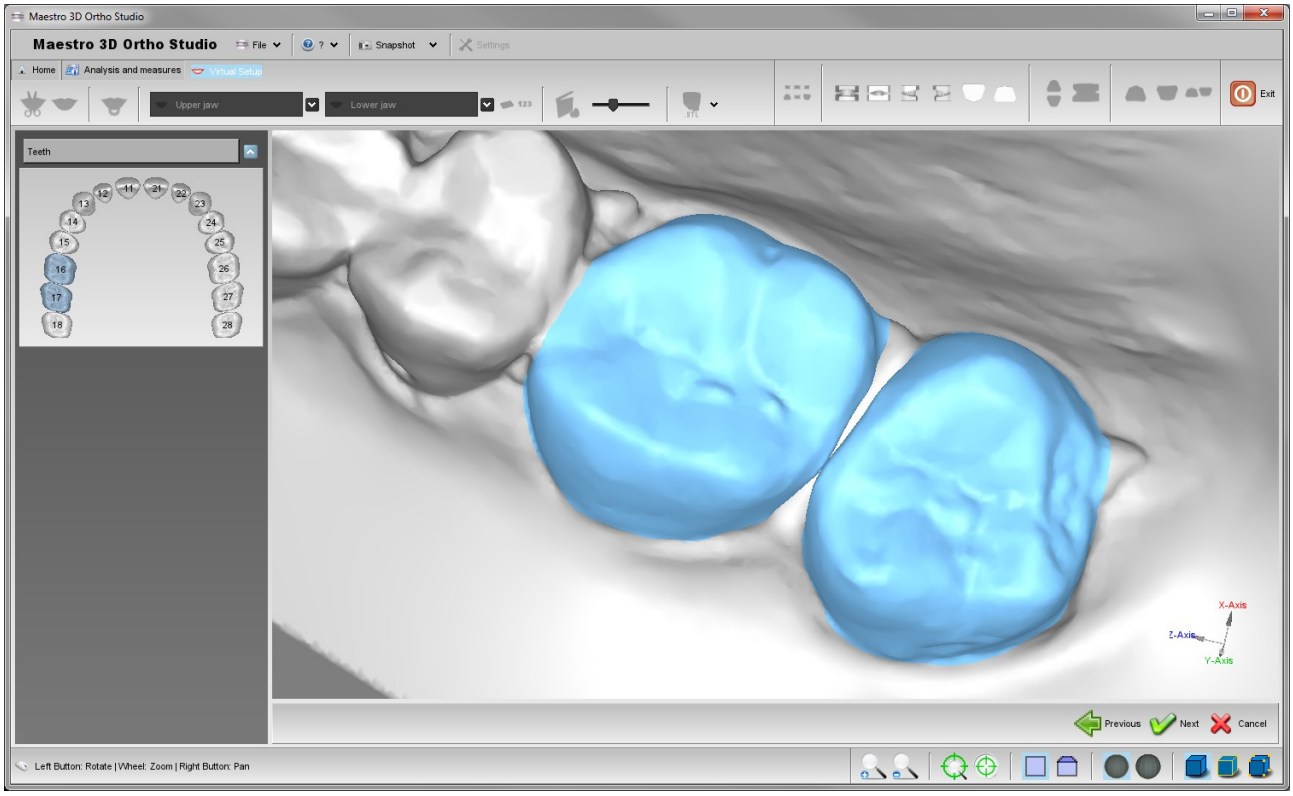
This is the result after the separation. See below.

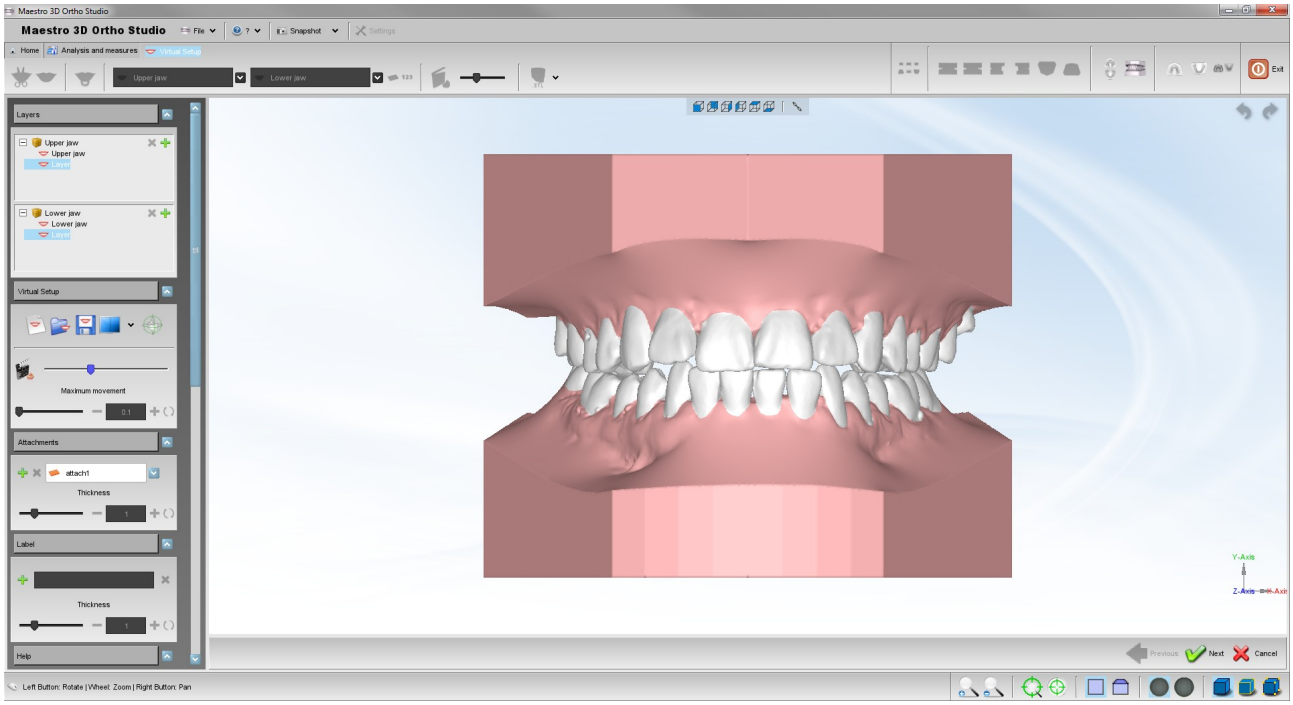
This is useful to move the teeth independently.



Repeat all steps for all teeth of both the jaws.

7.2. Virtual Setup

In order to perform the virtual setup, press the *Virtual Setup* button.



In this step you can translate and rotate the teeth in order to obtain the desired final position. To select a tooth, click with left mouse button over a tooth.

TIPS:

SHIFT + left mouse button to translate the teeth selected.

CTRL + left mouse button to rotate.

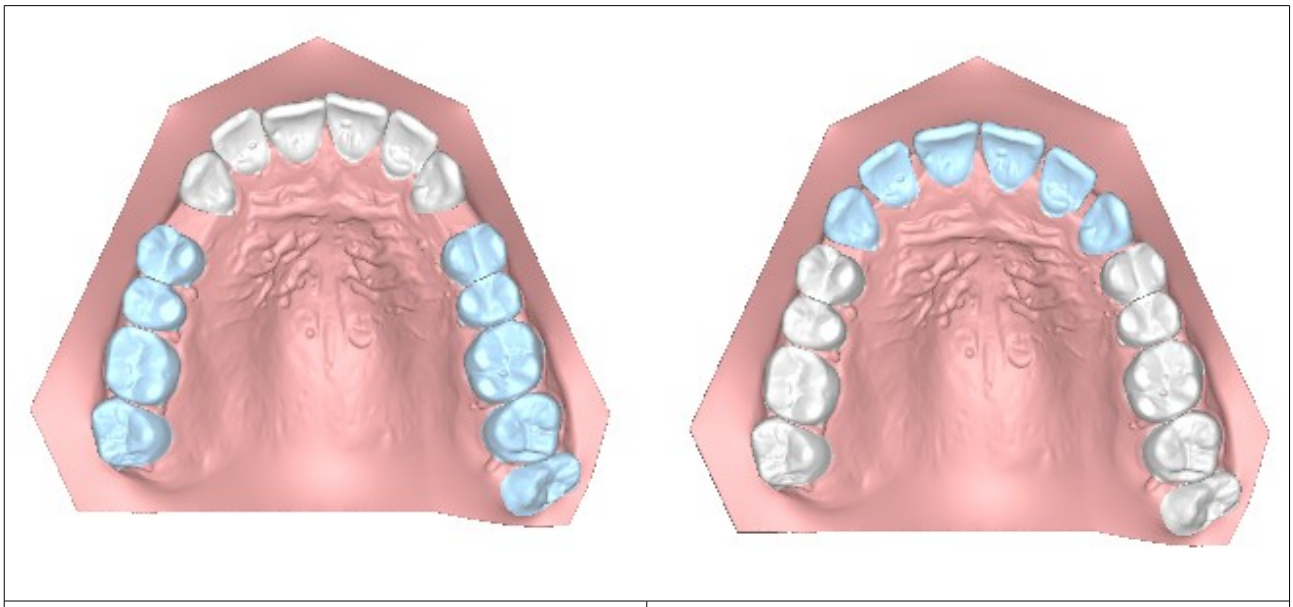
Click with the middle mouse button to change the center of rotation of the trackball.

CTRL + left mouse button to make a multiselection.

We take a look to the GUI on the left of the screen that allows to access to all the functionalities of the Virtual Setup.

7.2.1. Layers

The layers are the steps that are useful to work with some groups of teeth in different period, **i.e.:**
you can move the posterior teeth and build a **layer1.**
than you can move the anterior teeth and build a **layer2.**

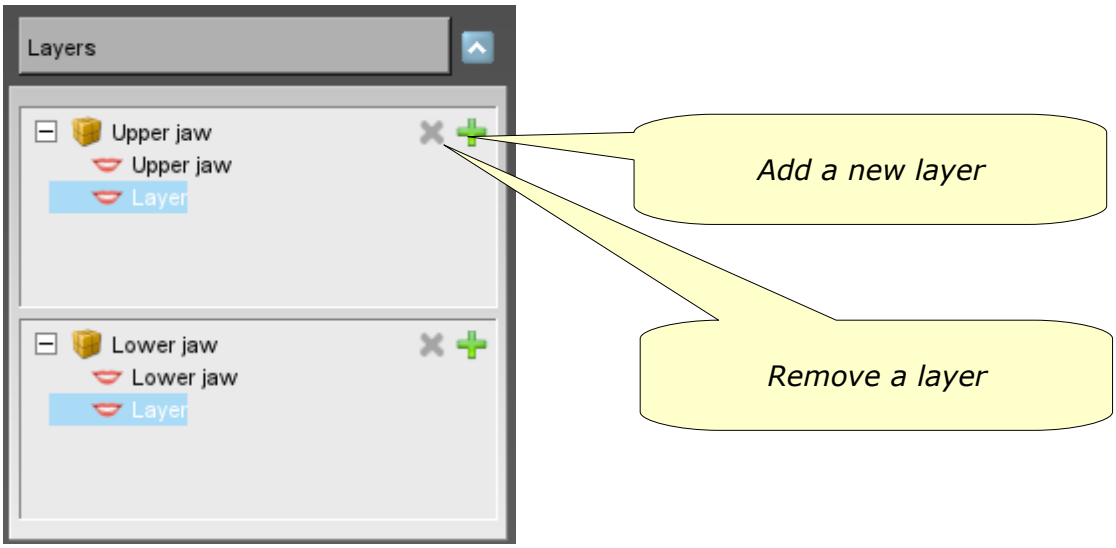
	
Layer1	Layer2

In this way when the software builds a set of virtual models, it is obtained:

Original model	
virtual model(1)	→ Clear aligner 1
virtual model(2)	→ Clear aligner 2
...	...
Layer1	→ Clear aligner L1
virtual model(k)	→ Clear aligner k
virtual model(k+1)	→ Clear aligner k+1
...	...
Layer2	→ Clear aligner L2

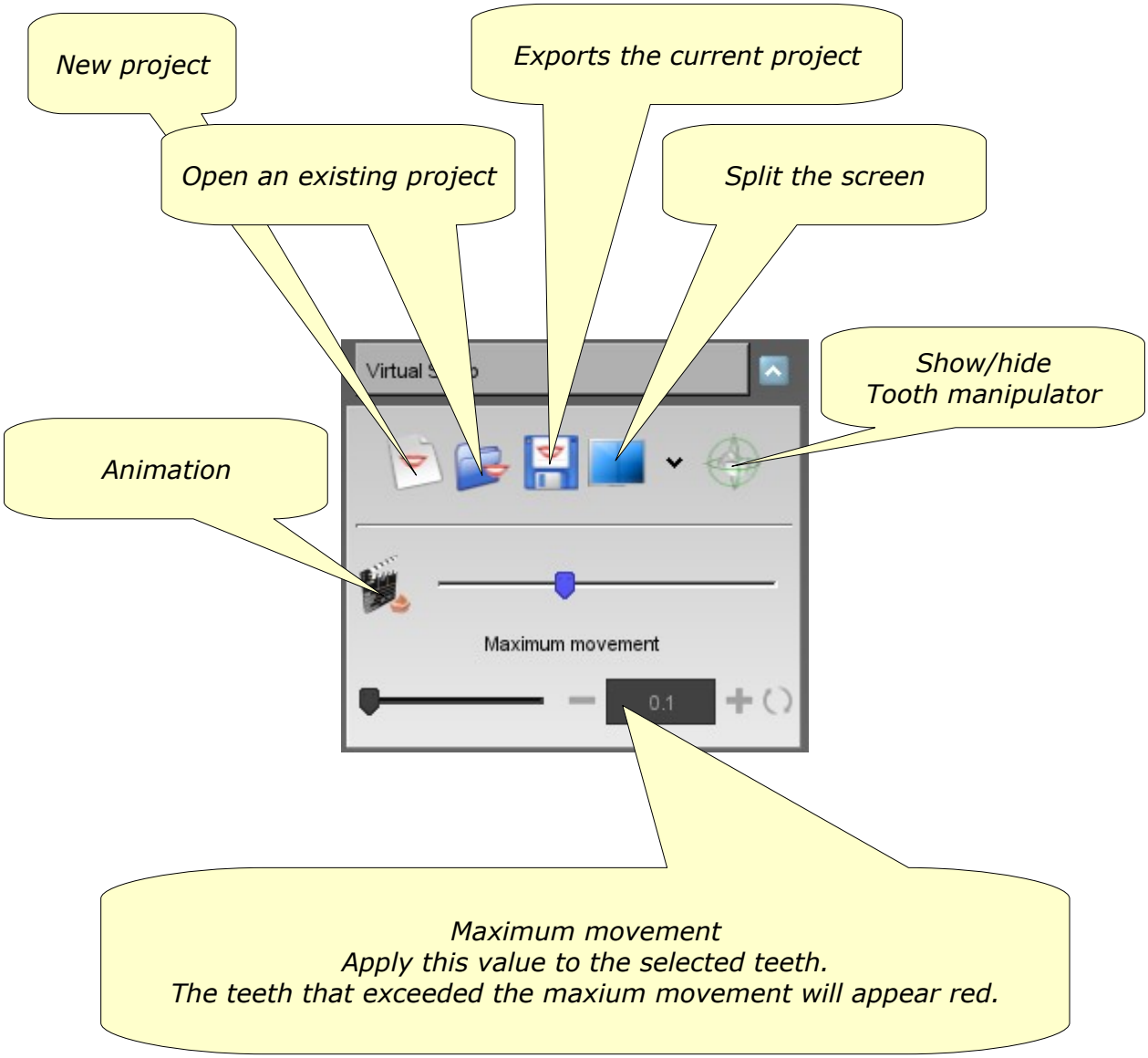
So the first set of aligners don't move all teeth but only the posterior teeth.

Only after some weeks, when you start to the layer1 you are ready to move the the anterior teeth.

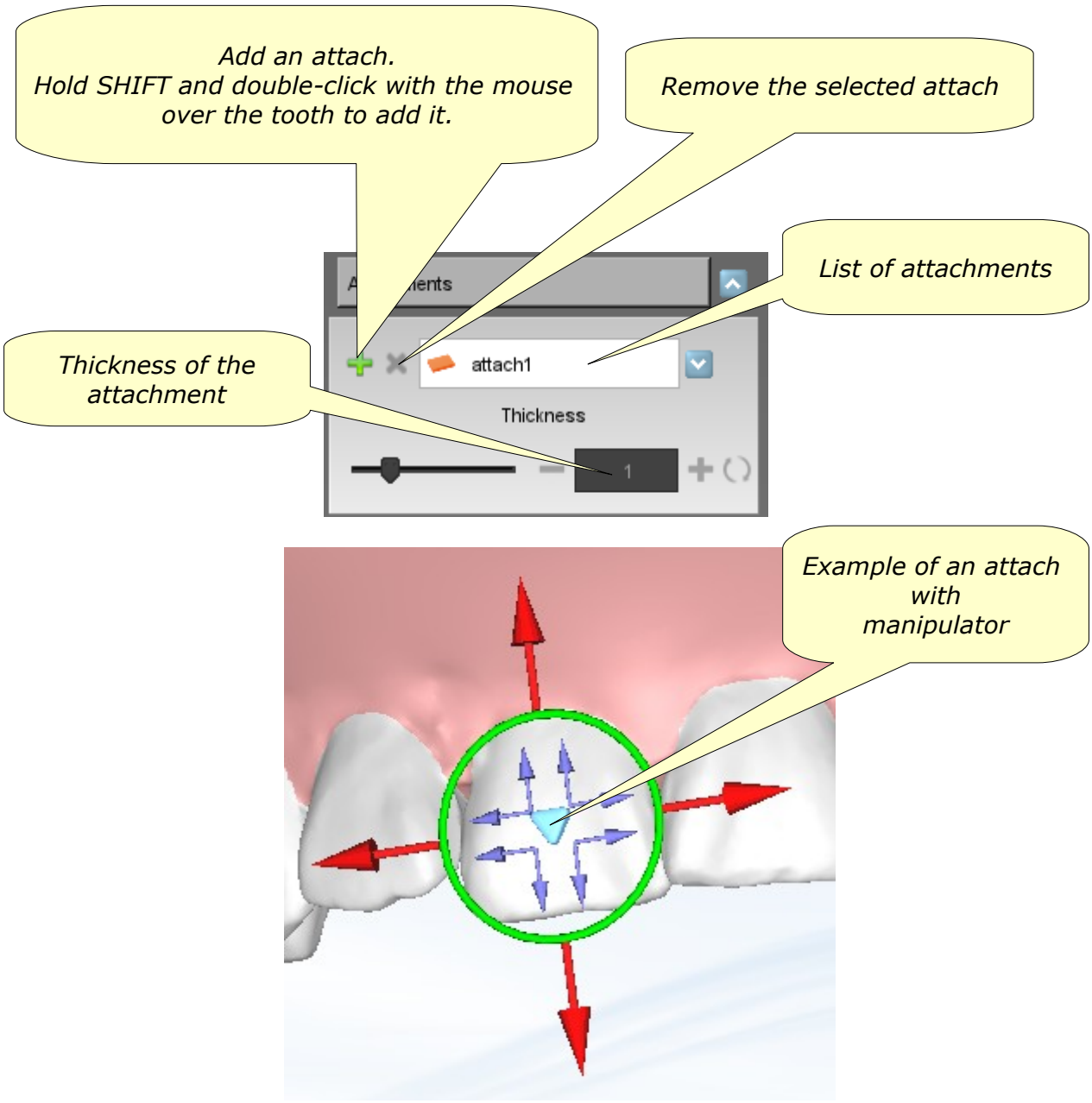


It's possible to work only with the last layer. If you select a different layer, all functionalities will be disabled.

7.2.2. Main toolbox

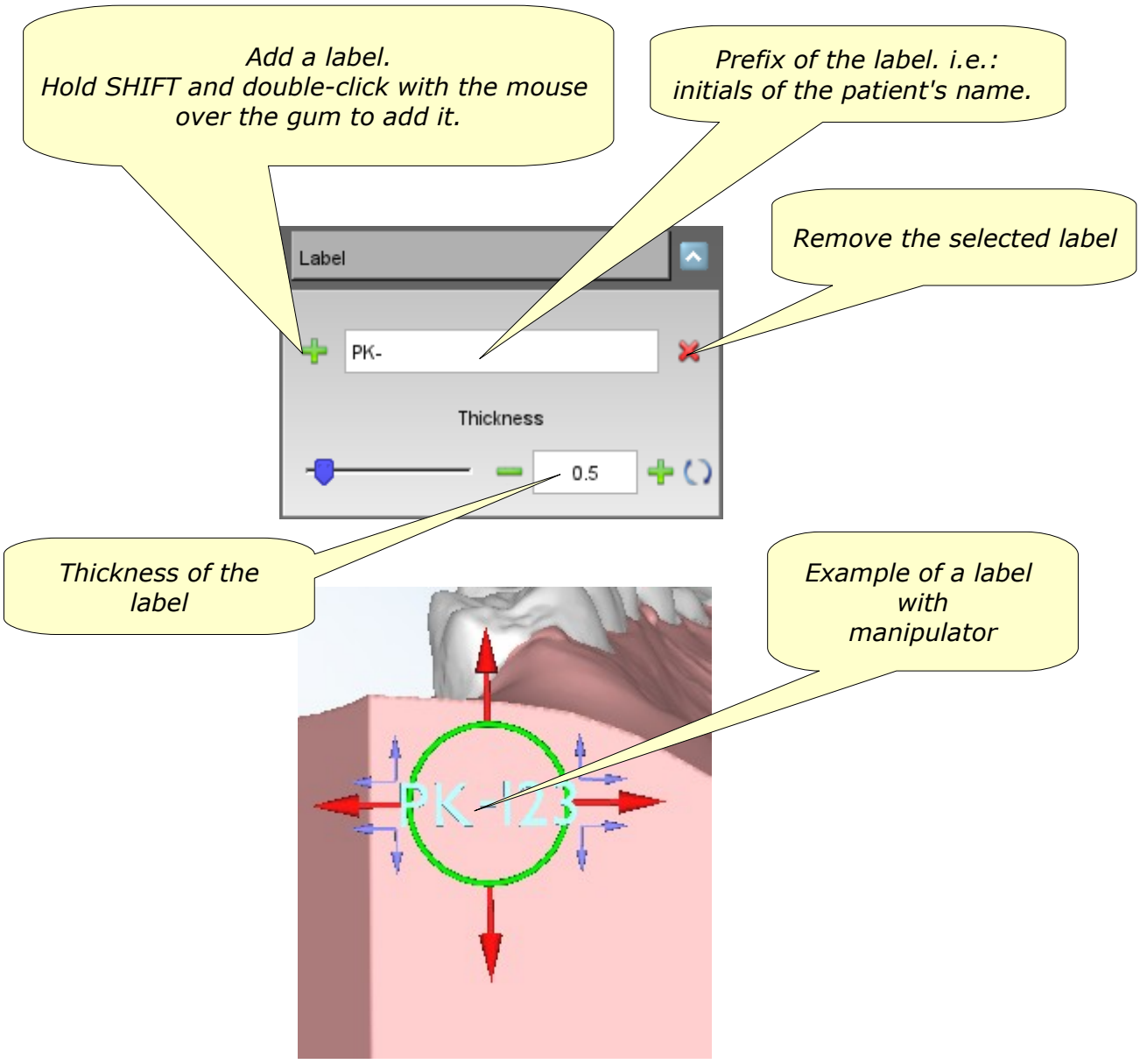


7.2.3. Attachments

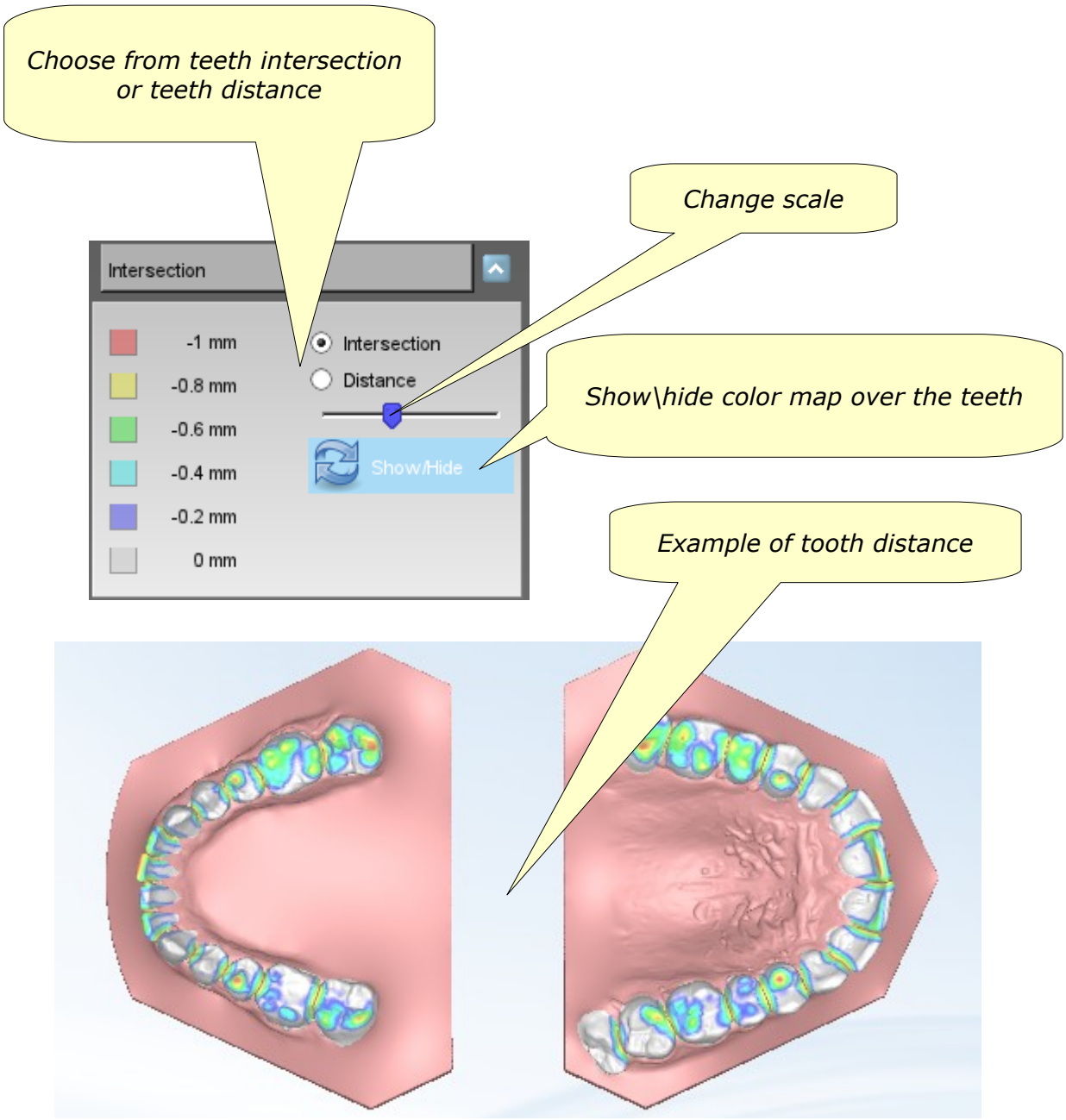


7.2.4. Label

It's possible to put a 3D text over the gum. It's useful to identify the models after printed.

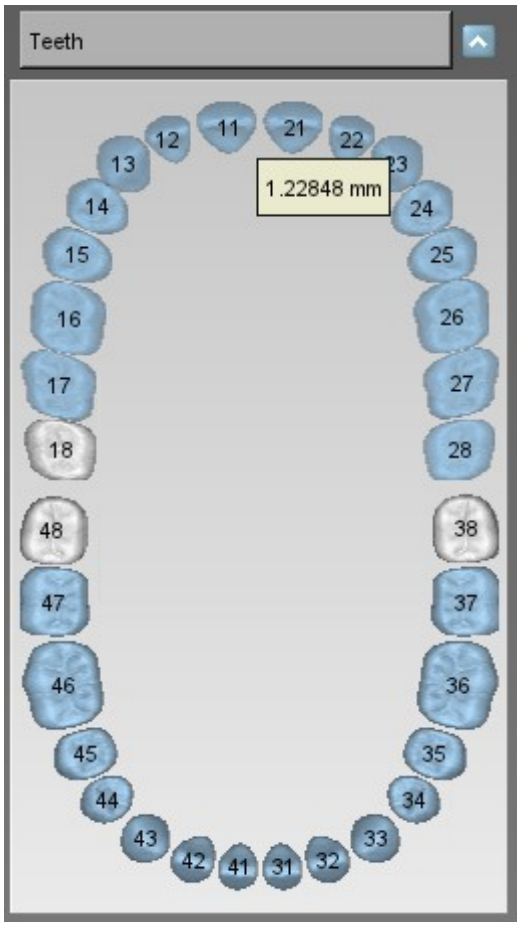


7.2.5. Show Intersection/distance



7.2.6. Teeth informations

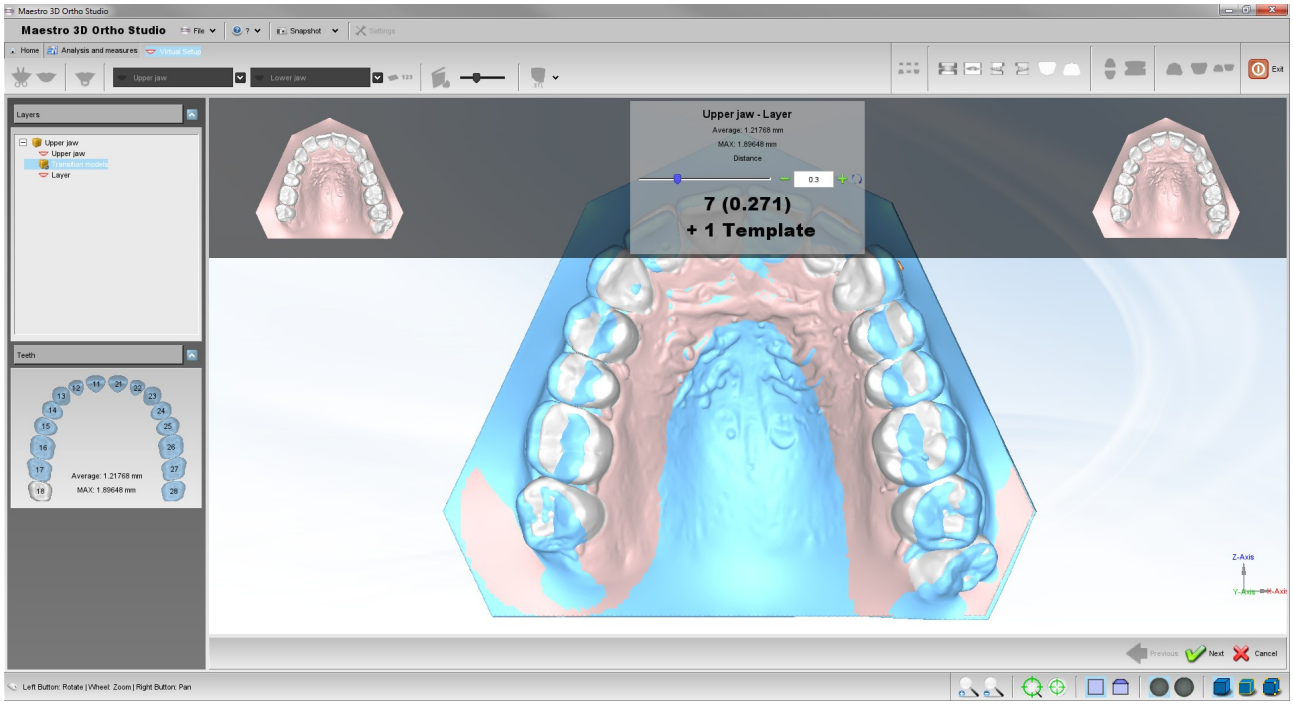
If you move the mouse over a tooth, it shows an informative label about the tooth's movement.



7.3. Models Builder

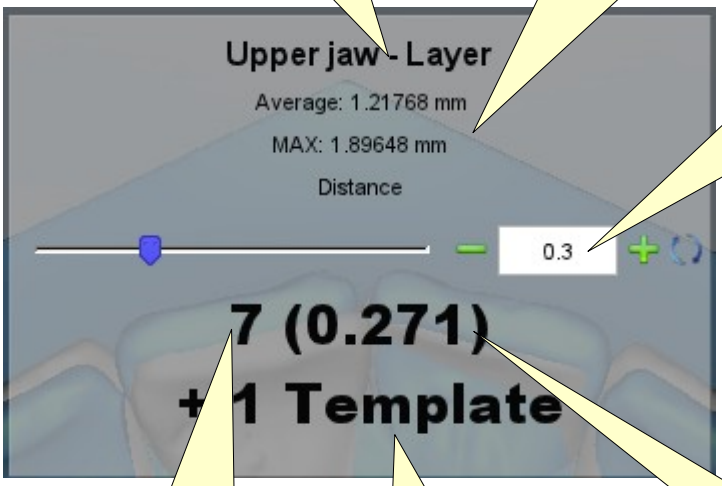
In order to perform the models builder, select the arch using the  *Show Maxillary* button or the  *Show Mandibular* button and then press the  *Models builder* button.

In the left of the screen there is a treeview with all layers. Between two layers there is a transition models item. Select it to choose the movement of the teeth for each virtual model



Distance Option
From layer(n) To layer(n+1)
In this example:
From "Upper Jaw" (original arch)
To Layer

***Average:** is the average value of the movement of all teeth.*
***MAX:** is the value of the max movement between all teeth*



desired value
of the movement
of the teeth
for each virtual model

Real value
of the movement
of the teeth
for each virtual model

Number of virtual models

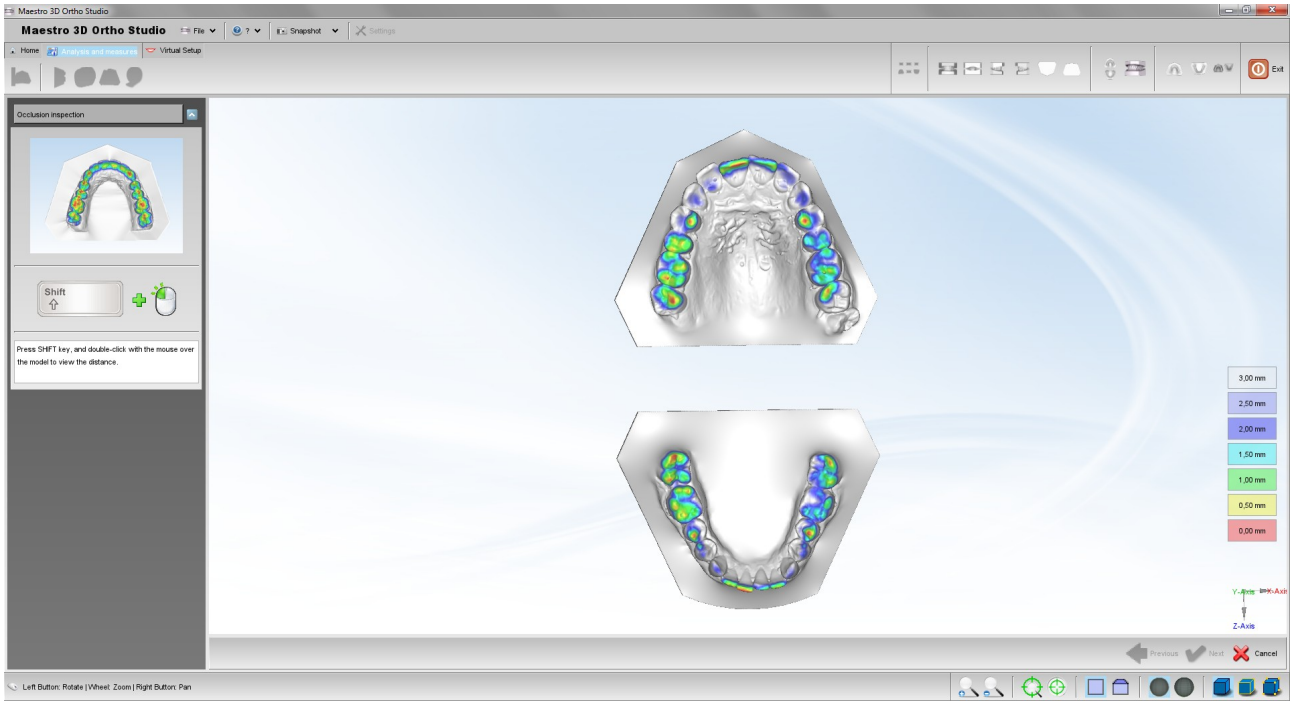
This label indicates that there will a template model to stick the attachments

8. Occlusion Inspection

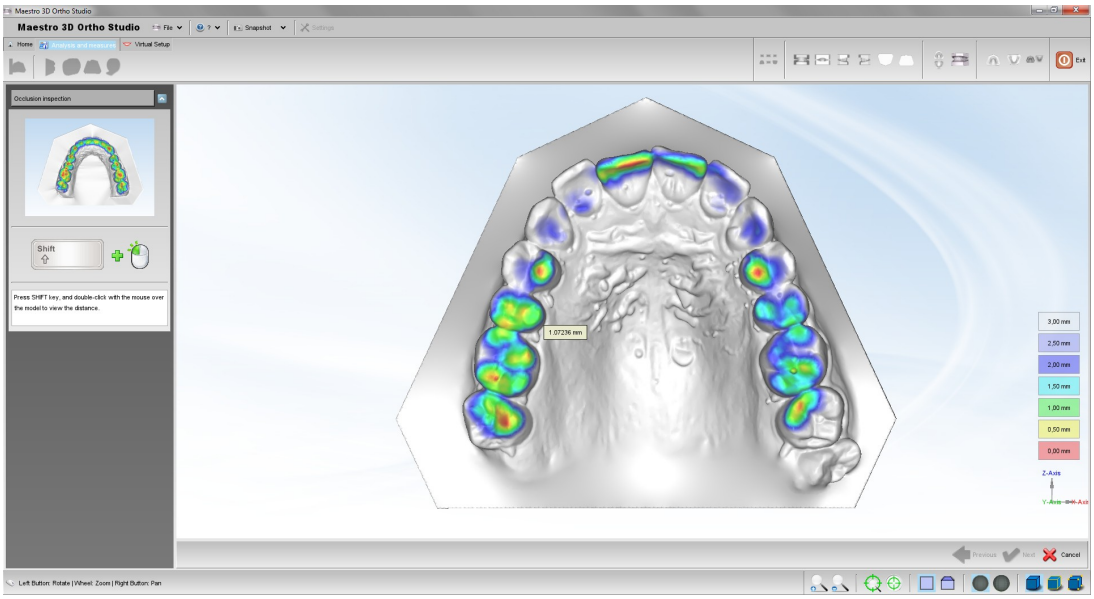
To see and analyze the occlusion inspection between maxillary and mandibular arcs just press the  *Occlusion inspection* button. After the computation each point ot the surface of an arch is painted with a color representing the distance by the opposite arch surface. In the right side of the editing area is located a legend that explain the meaning of the colors.

It is also possible double clicking on the model to know the exact distance value for this point (Shift + Left mouse button). Please note that it is possible query for the value only for an area of the model with a color assigned.

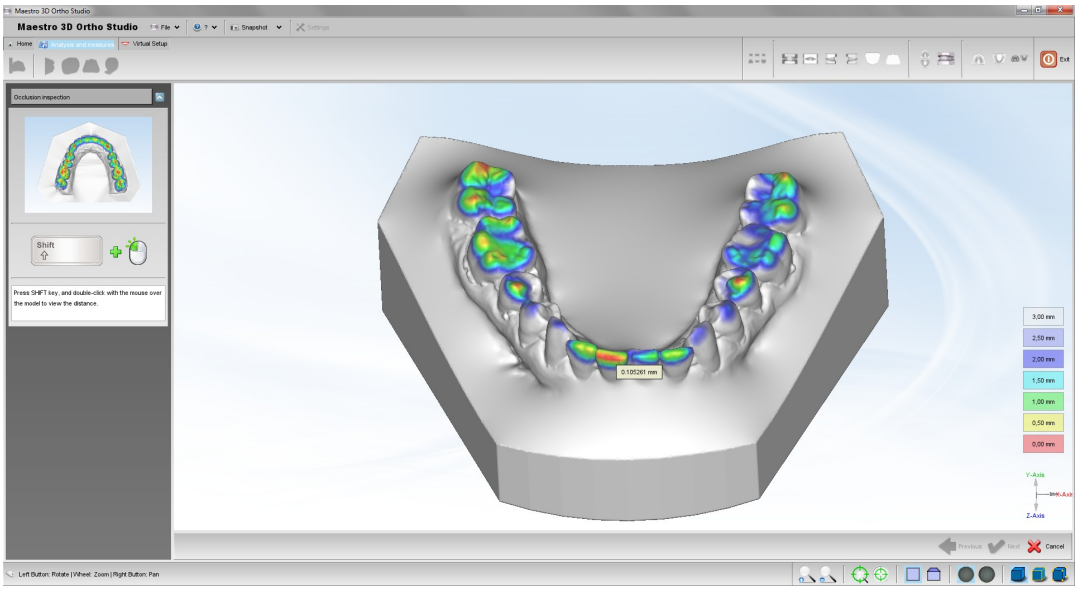
The following images shows the occlusion inspection visualized on both the arcs. To activate this visualization press the  *Show all* button.



The following image shows the occlusion inspection visualized on the maxillary arch. To activate this visualization press the  *Show Maxillary* button.



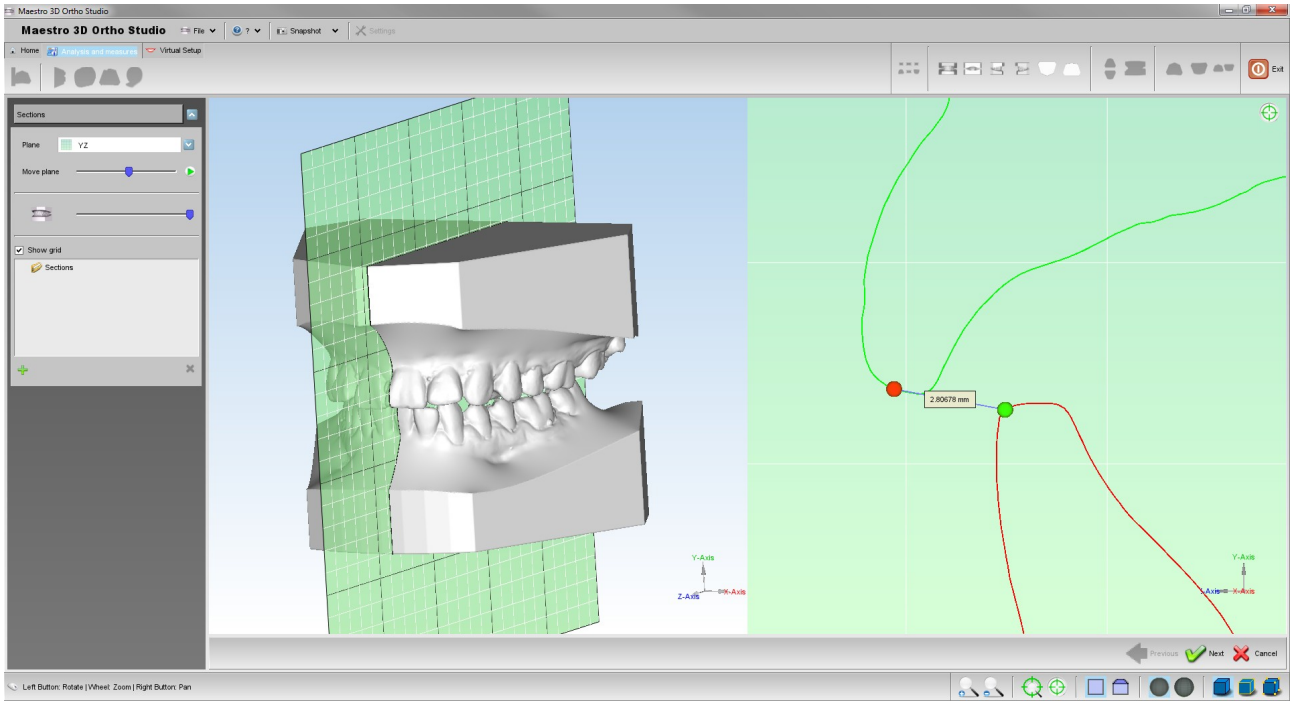
The following image shows the occlusion inspection visualize on the maxillary arch. To activate this visualization press the  *Show Mandibular* button.



9. Cross sections

In order to perform the analisys of a cross sections, press the  Sections button.

2D Measurements over cross sections aligned to main axes. It's possible to slide the sections and measure distances on 2D cross sections.



TIPS:

SHIFT + double-click with left mouse button to add a point into 2D grid.

10. Measuring Distances

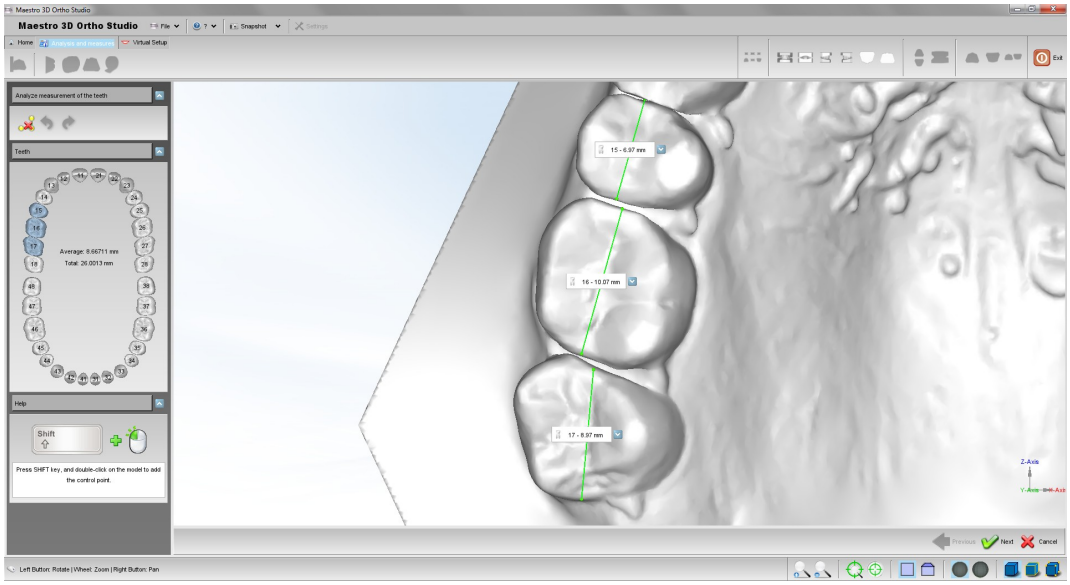
In order to perform the analisys of the distances between theeth, select the arch to inspect using the  *Show Maxillary* button button or the  *Show Mandibular* button and then press the  *Analyze the measure of the teeth* button.

The following image shows the process of measuring distances between theeth in the maxillary model. As for the process of the cutting line definition, it is possible to add, remove or modify the position of the points.
For each line segment defined by two consecutive points the current length of the segment is showed.

On the left side of the screen the total length and the average length of the segments are showed too.

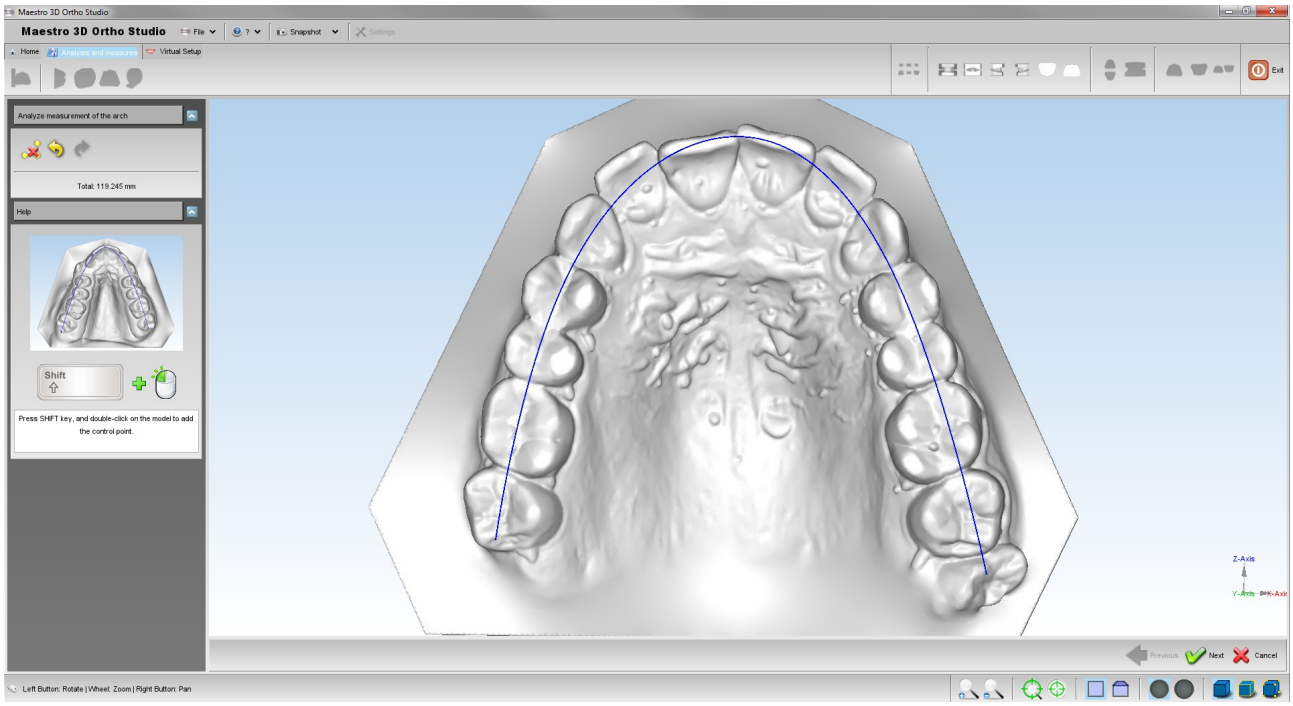
Using the  *Undo* button and the  *Redo* button it is possible Undo / Redo all the operations performed.
It is also possible to clear the measure using the  *Reset* button.

In order to save the measures, after pressing the ✔ *Next* button, please remember to press the  *Save case* button located in the main toolbar.



11. Arch length

In order to perform the analisys of the arch length, select the arch to inspect using the  *Show Maxillary* button button or the  *Show Mandibular* button and then press the  *measures* button.

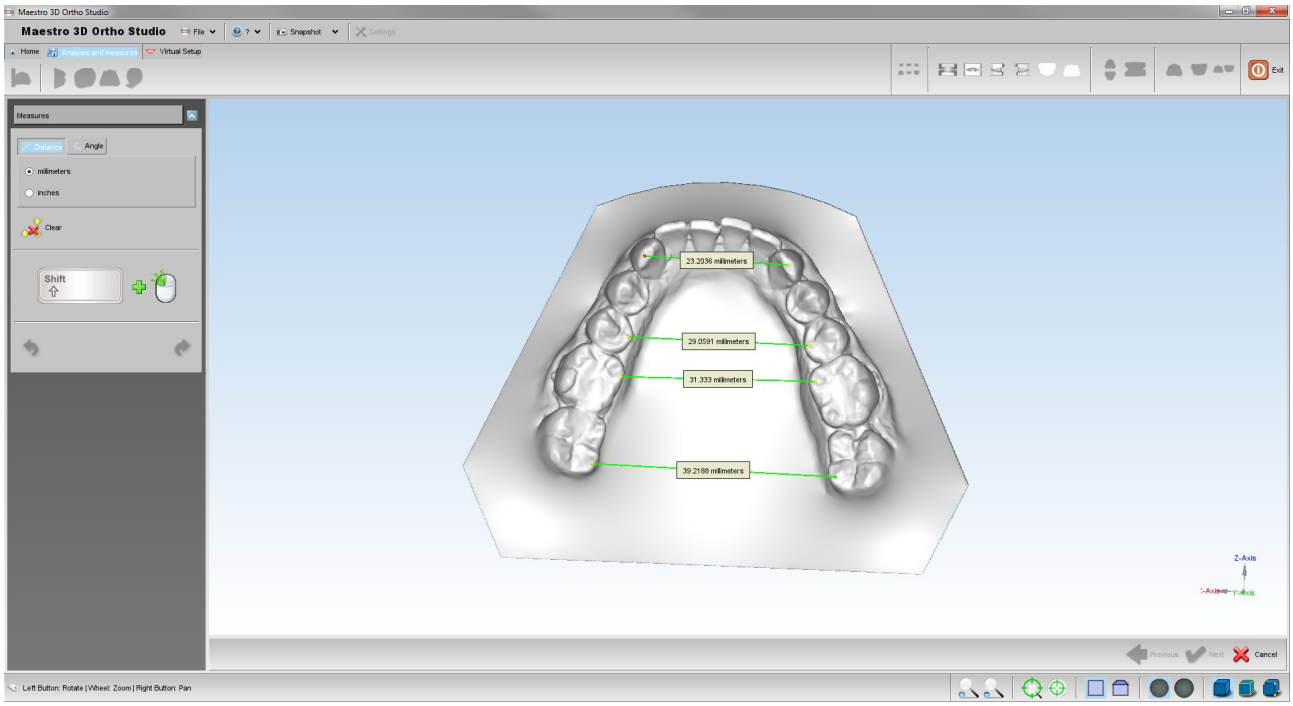


TIPS:

SHIFT + double-click with left mouse button to add a point of the spline to compute the arch length.

12. Free Measures

In order to do the measures of length or angles, select the arch to inspect using the  *Show Maxillary* button button or the  *Show Mandibular* button or togheter and then press the  *measures* button.



TIPS:

SHIFT + double-click with left mouse button to add a point.

13. Recommended PC hardware configuration

Processor:

the clock rate of CPU is very important, at least 3.0 Ghz, our software fully exploiting the parallel calculation offered by the multicore and multithreading technologies, for this reason, you can also use a quad core. We will recommend the following product line:

- Intel® Core™ i5 - 3,00 GHz (or highest)
- Intel® Core™ i7 - 3,00 GHz (or highest)

Ram: 4GB or 8GB DDR2/DDR3

Graphic card: Pci-Express Technology

GeForce 210 / GT520 / GT220 / GT430 / GTX550 / GTX560 / GTX580 with 1 GB DDR3 (or highest)

USB 2.0

OS: Microsoft Windows 7 64 Bit

14. Contacting AGE SOLUTIONS

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