



Wieland Dental – Digital Support
Milling models with the Zenotec mini

Table of contents

1. Requirements	1
2. Model Builder	1
2.1 Setting the model parameters in the Control Panel	1
2.2.1 Trimming the scan	3
2.2.2 Setting the occlusal plane	4
2.2.4 Adjusting the occlusion	5
2.2.5 Preparing and defining the insert direction	5
2.2.6 Model	7
2.2.7 Saving the model	8
3. Handling in the CAM system	9
3.1 Defining closing surfaces	9
3.1.1 Middle closing surfaces	9
3.1.2 Upper closing surfaces and lower closing surfaces	9
3.2 Defining the insert directions	10
3.3 Nesting	12
3.4 Calculation and simulation	14

Milling models with the Zenotec mini

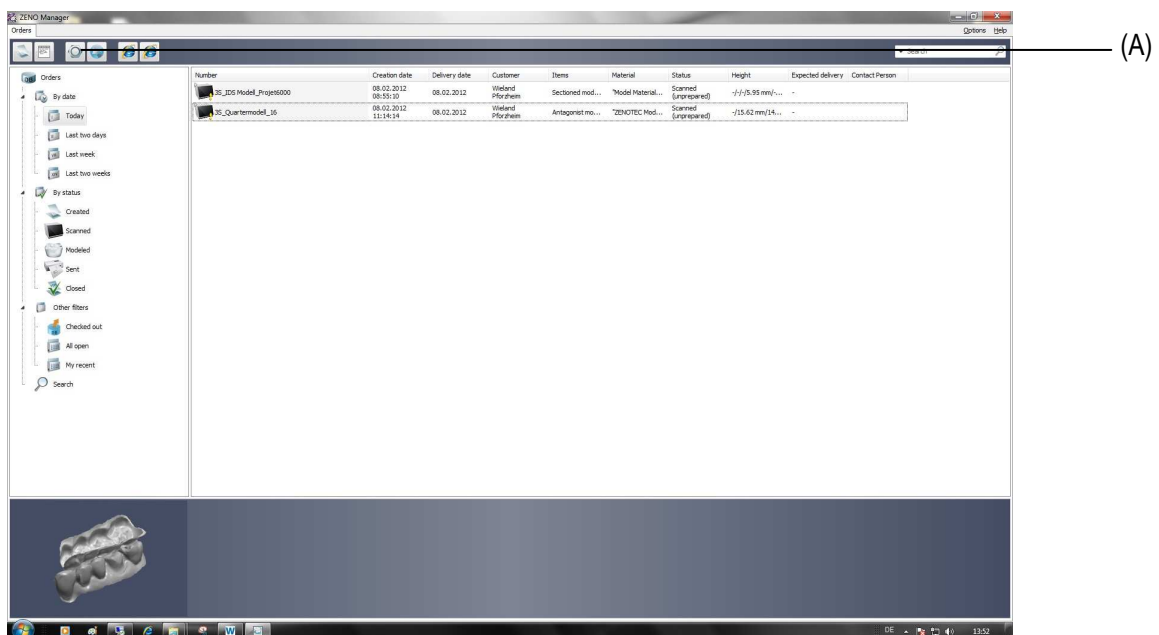
1. Requirements

- 3Shape CAD software including Model Builder
- 3Shape Articulator
- CAM Advanced software

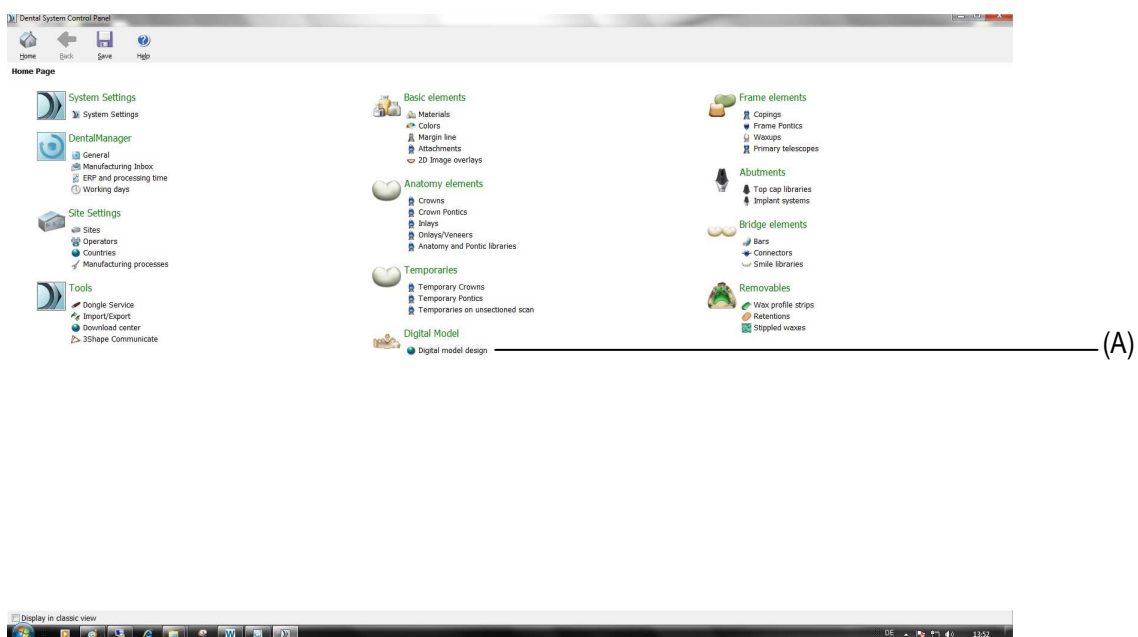
2. Model Builder

2.1 Setting the model parameters in the Control Panel

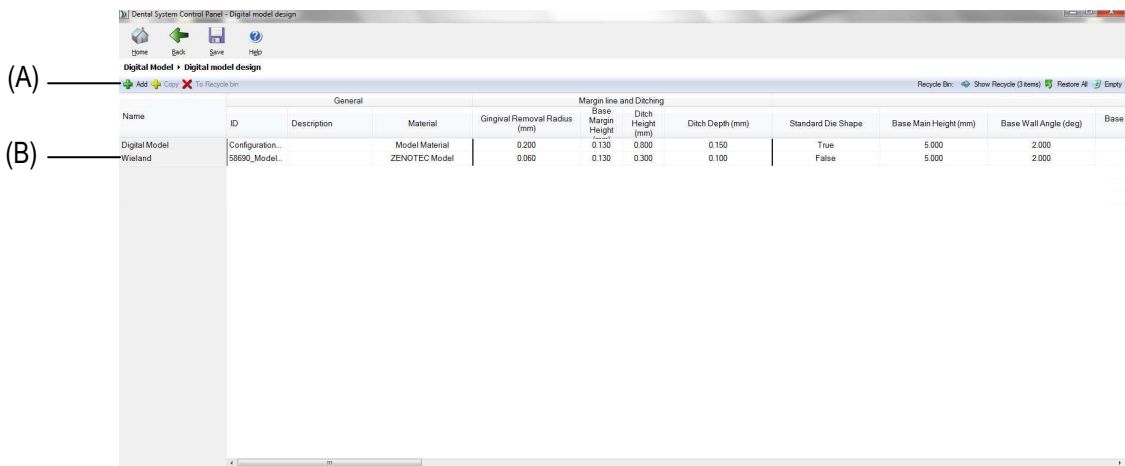
- Go to <<Control Panel>> (A)



- Go to the menu <<Digital model design>> (A)



- Click on <<Add>> (A). In the column "Name", rename the parameters <<Wieland>> (B) and set the Wieland parameters as shown in the table (C).

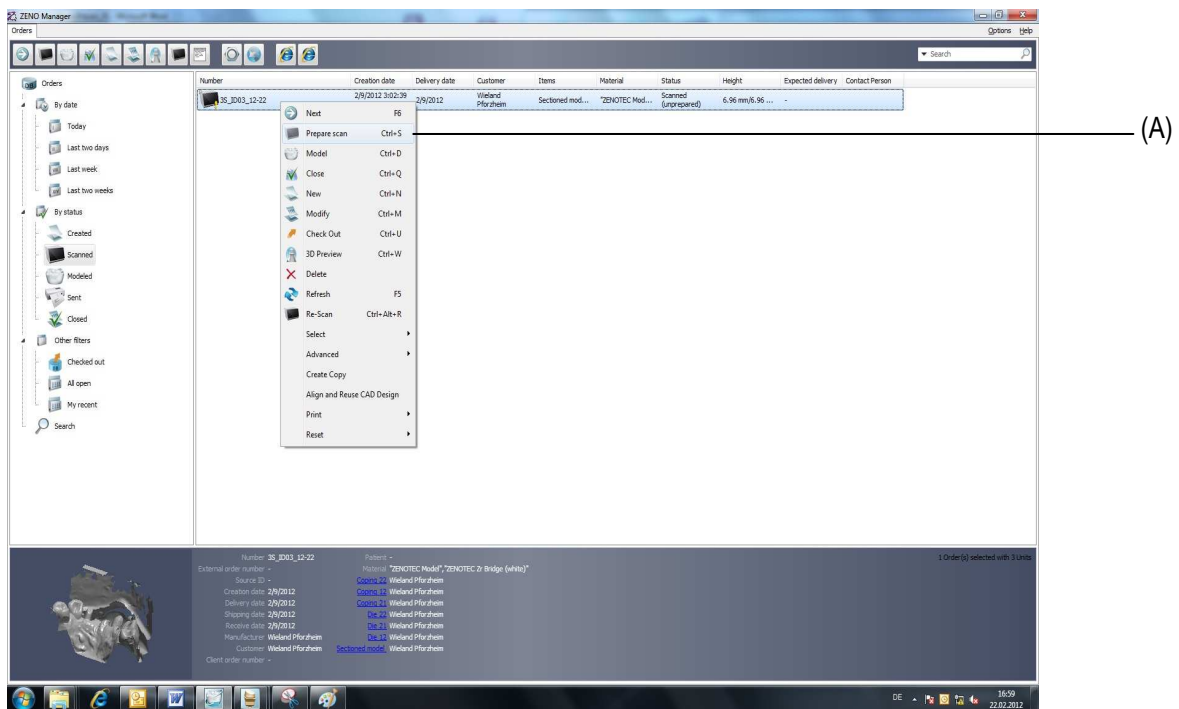


3Shape export parameters (English)	3Shape export parameters (German)	Wieland parameters
Material	Material	Zenotec Model
Gingival removal radius	No translation in software	0,2
Base margin height	No translation in software	0,13
Ditch height	Extraktionshöhe	0,3
Ditch depth	Extraktionstiefe	0,1
Standard Die Shape	Standardstumpform	FALSE
Base main height	Haupthöhe der Basis	5
Base wall angle (degrees)	Basiswandwinkel	2
Base stop surface width	Flächenbreite des Basisstopps	0,001
Base stop surface angle	No translation in software	0
Die to model spacing	Abstand Stumpf zum Model	0,01
Friction Bar width	Friktionsstegbreite	0
Friction bar overlap	Friktionsstegüberlappung	0
Number of friction bars	Anzahl Friktionsstege	0
Vertical Insert Direction	Vertikale Einschubrichtung	FALSE
Pin type	Pintyp	PinCylindric
Snap off Pin	No translation in software	FALSE
Pin height	Pinhöhe	2
Pin wall angle	No translation in software	0
Pinless hole type	Typ ohne Pin	CADCylindricalBottomHole
Side hole type	No translation in software	none
Pushing indent type	Eingedrückter Einschubtyp	PinShapedPushingIndent (German: Pin-förmige Einrückung)
Pushing height	Schiebhöhe	1
Use drill compensation	Fräserkompensation verwenden	FALSE
Drill Radius	Fräserradius	0,5
Minimum Model height	No translation in software	4
Hollow model	No translation in software	FALSE
Surface thickness	Oberflächendicke	1,5
Use variable thickness	Variable Stärke verwenden	FALSE
Hollow dies	Hohlstümpfe	FALSE
Drain hole size	Größe der Ablauföffnung	0
Use ID tag	ID-Tag verwenden	FALSE
Font height	No translation in software	2,5
Text depth	Texttiefe	(-0.500)
Use connectors	Verbinder verwenden	WAHR
Print layer thickness	No translation in software	0.050mm
Platforms Distance	No translation in software	0
Friction adjustment for angle	Anpassung für Stumpfwinkel	0
Friction adjustment for size	Anpassung für Stumpfgröße	0
Ditch unsectioned model	No translation in software	FALSE

2.2 Preparing the scan

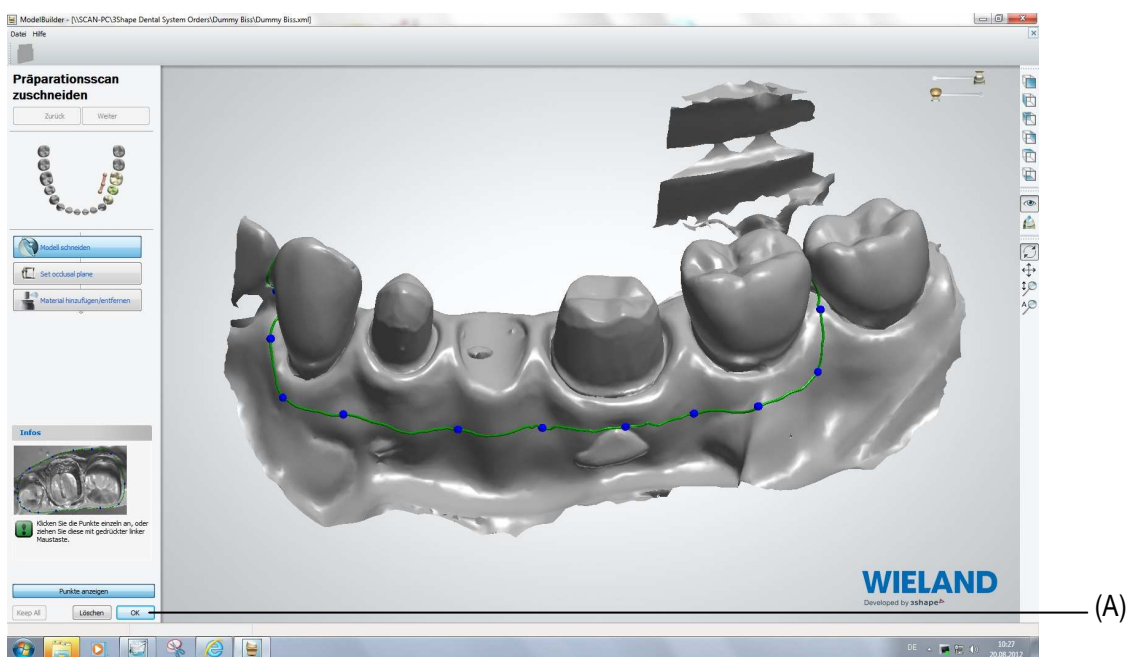
Whether using an intra-oral scan or an impression scan, the raw scan data must be prepared in the 3Shape Model Builder.

- Right click on the order and select <<Prepare scan>> (A). This launches the Model Builder.



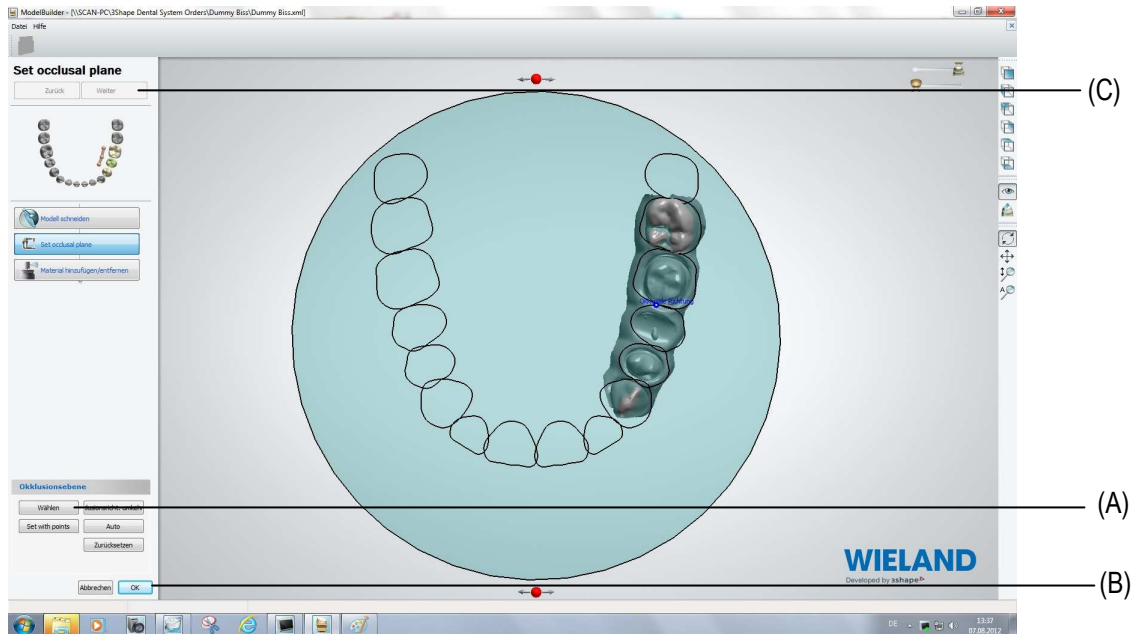
2.2.1 Trimming the scan

- Click to set spline points and mark out the required area. When finished, join the points to define the spline
- Click on <<OK>> to confirm (A)



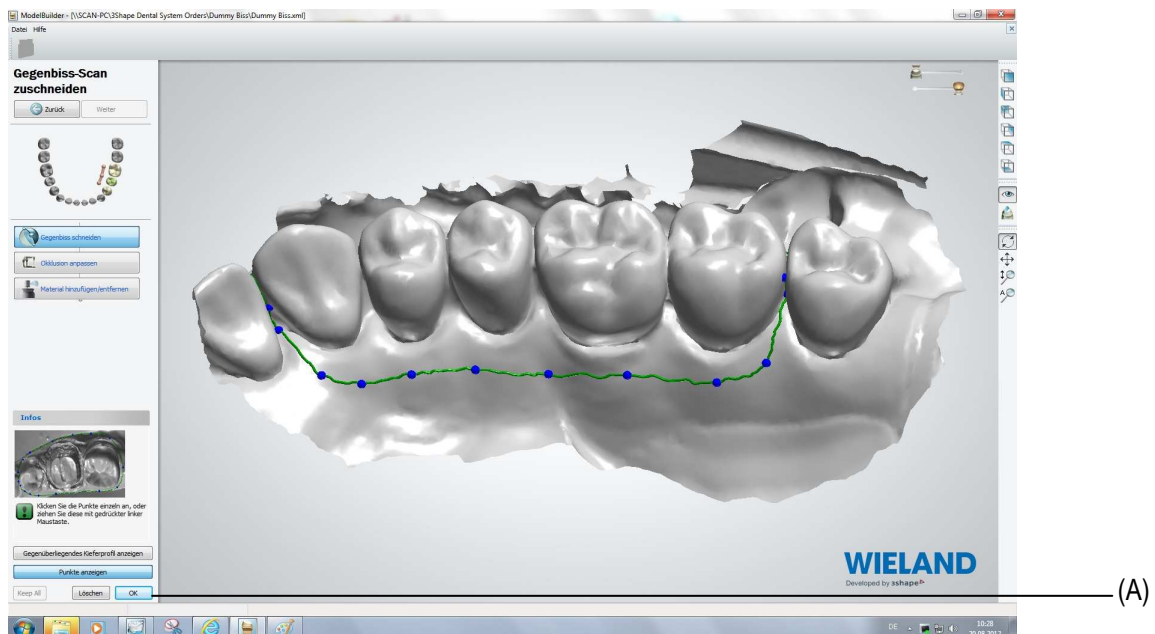
2.2.2 Setting the occlusal plane

- Ideally, view the scan and occlusal plane from above when defining the settings. This is important since the model base will be generated according to the occlusal plane and this in turn defines the insert direction for the stump pin shape.
- Click on << **Select** >> (A) to define the insert direction and click on << **OK** >> to confirm (B)
- Confirm by clicking on << **OK** >> (B) and then click on << **Next** >> (C)



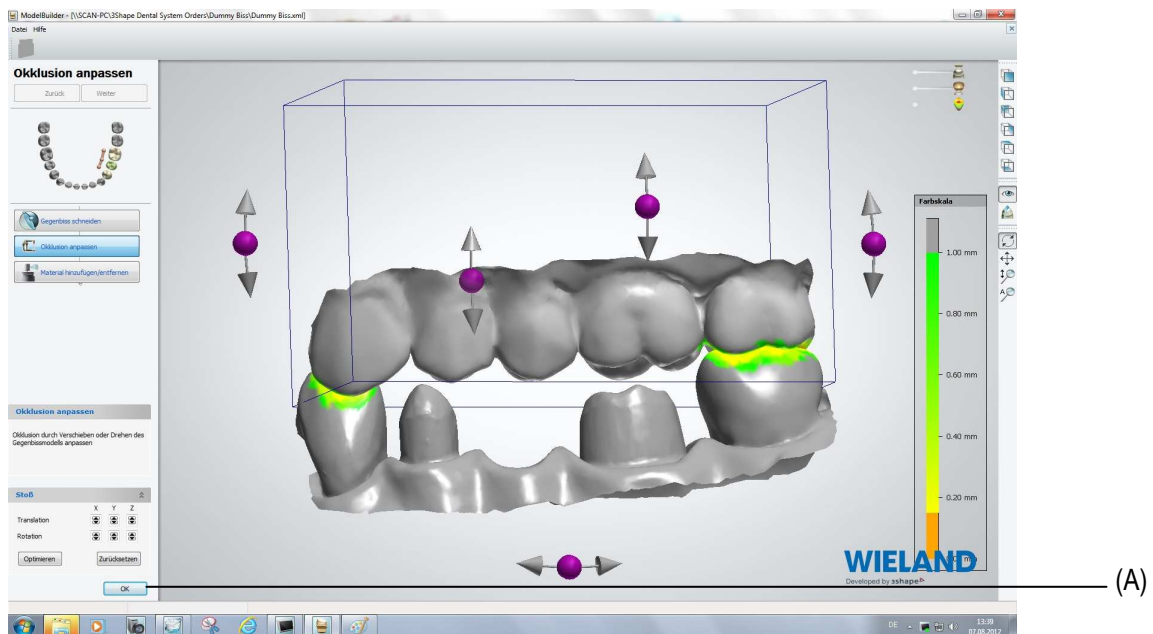
2.2.3 Trimming the model of the opposing teeth

- Define the spline and click on << **OK** >> to confirm (A)



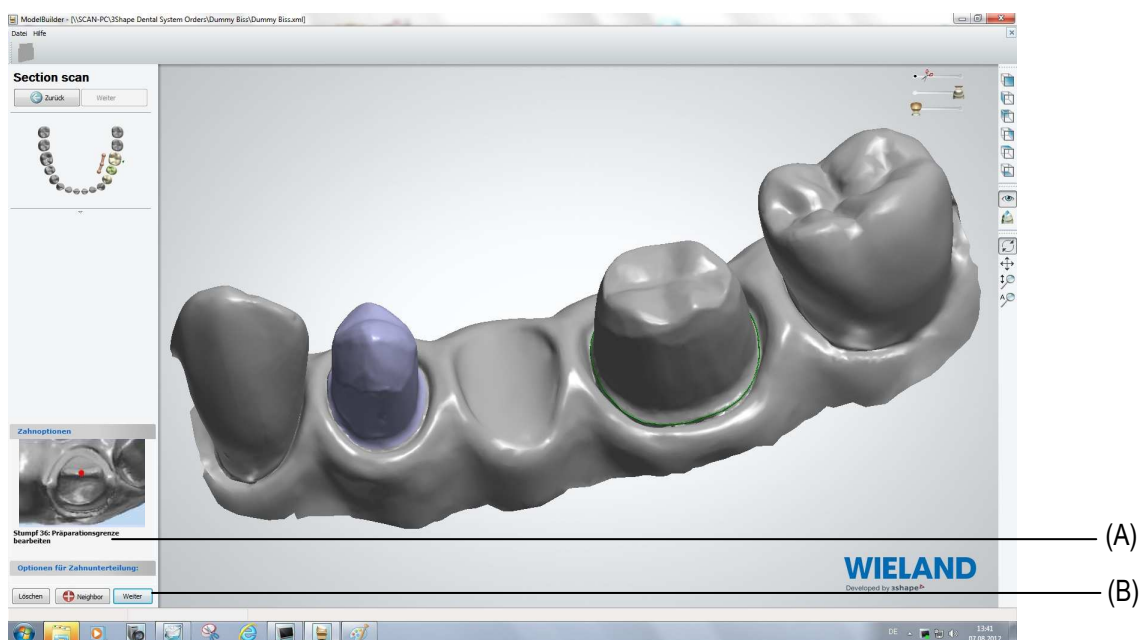
2.2.4 Adjusting the occlusion

- If the occlusion from the intra-oral scan or impression scan is not correct, this can be adjusted manually.
- For the main part, this is not necessary, in which case, all that needs to be done for this step is to confirm by clicking on <<OK>> (A).

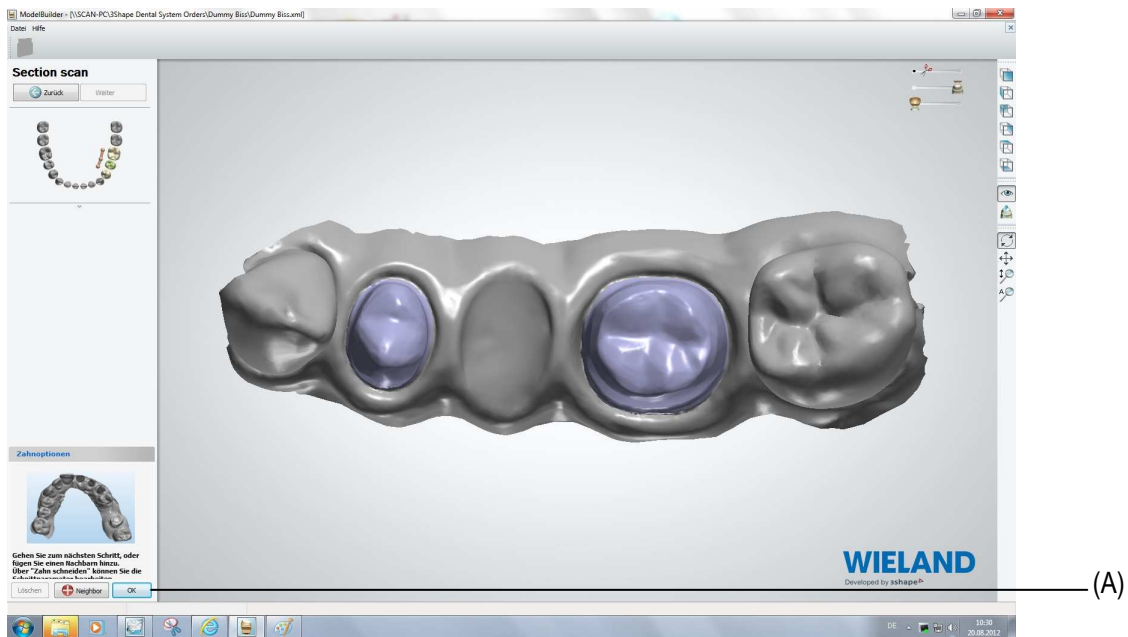


2.2.5 Preparing and defining the insert direction

- Follow the prompts. Click on the required tooth (A). A prep margin is defined automatically. Hold the left mouse key down and drag the mouse over the image to adjust the preparation.
- Click on <<Next>> to confirm and then proceed in the same manner for the subsequent stumps (B).

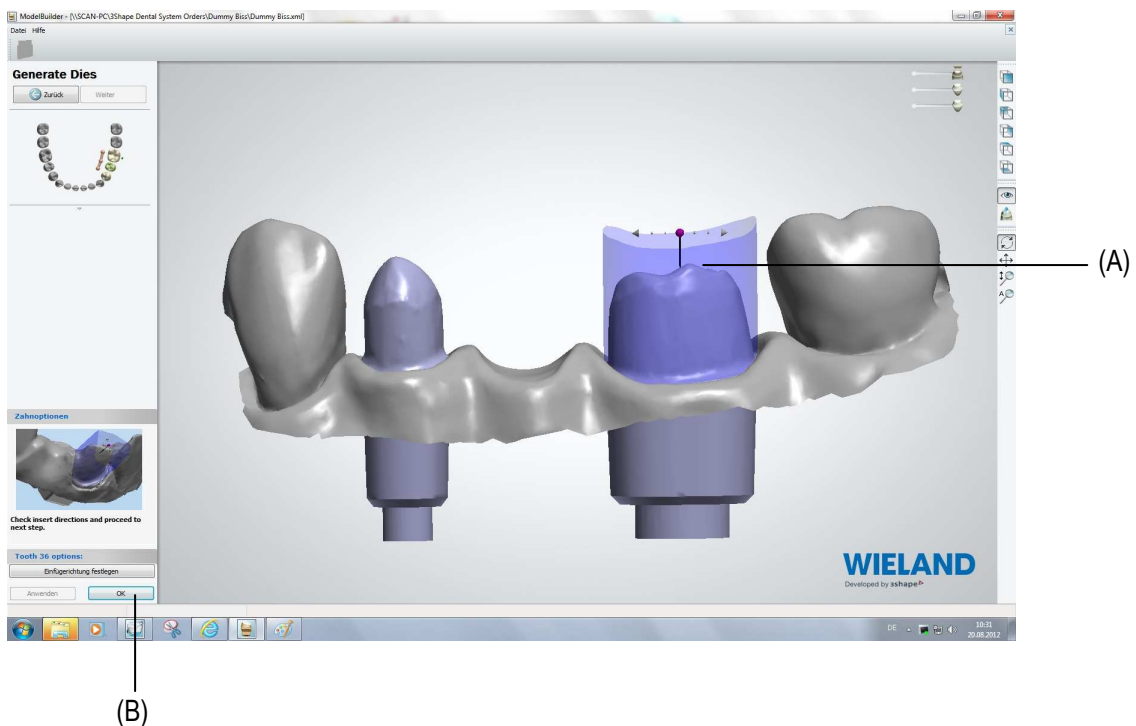


- Once the preparations have been defined, confirm by clicking on <<OK>> (A) and then click on <<Next>> to define the insert directions.



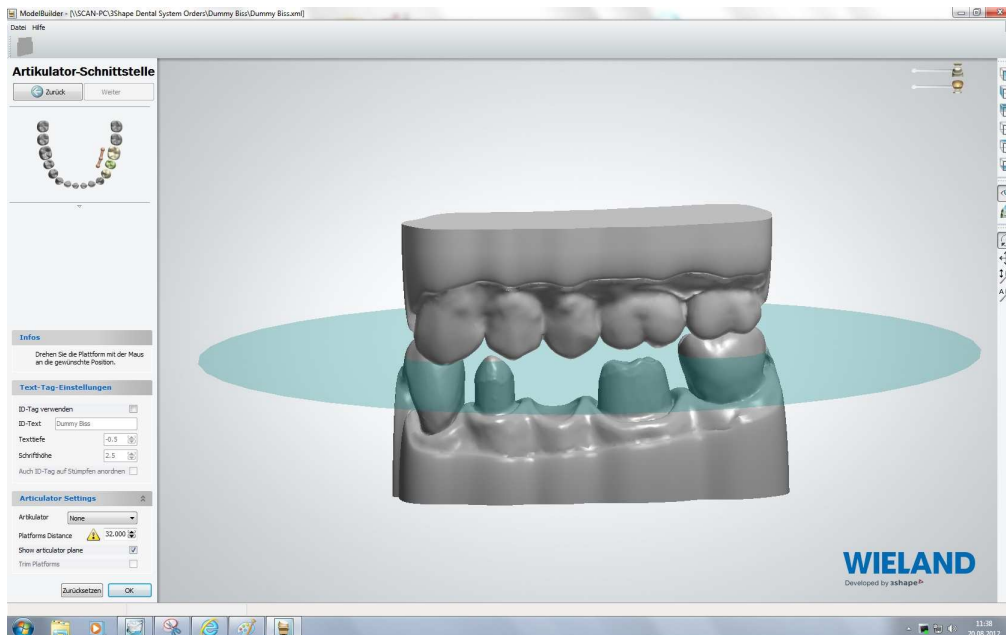
If the occlusal plane was accurately defined at the outset, then all insert directions for the extracted dies are already ideally defined for the Zenotec mini as a single insert direction. This insert direction should be retained.

- If the teeth are divergent, then just one die can be adjusted for the Zenotec mini by clicking on a single tooth (A) and adjusting the angle from above.
- N.B.** When changing the insert direction for a tooth, it should be borne in mind that with the Zenotec mini it is only possible to tilt the axes by up to 10°. Larger angles can not be milled.
- If necessary, you can go one step back in the Model Builder and modify the occlusal plane again in order to find a single, ideal insert direction for all dies.
- Once the insert directions have been defined, confirm by clicking on <<OK>> (B)

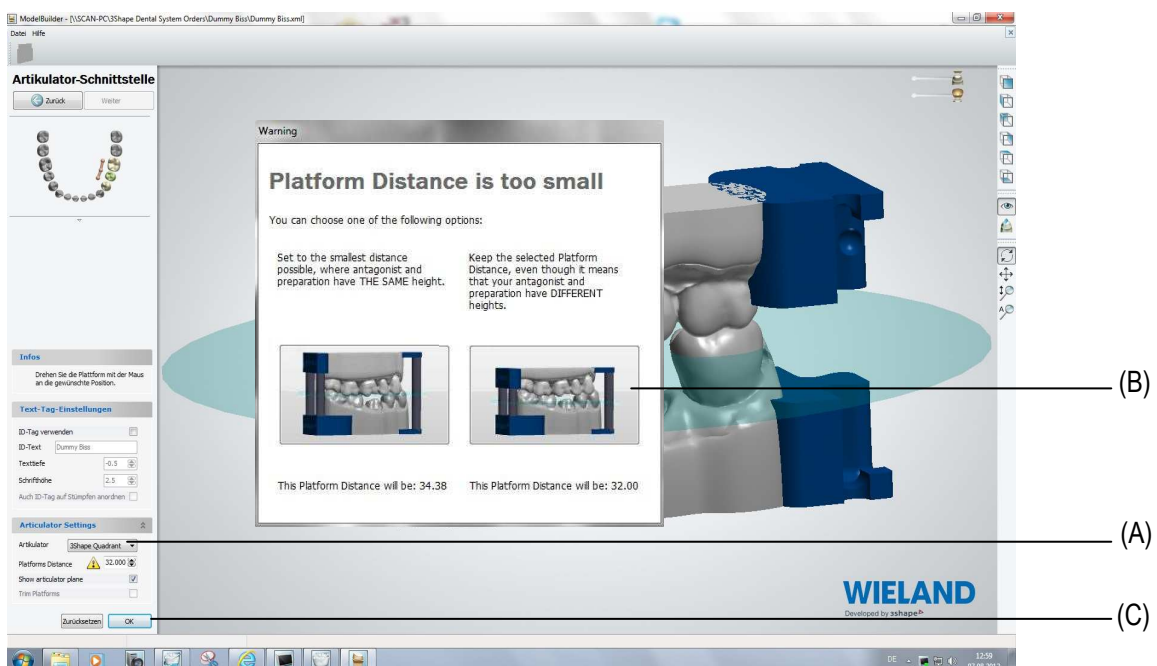


2.2.6 Model

- When all preparations and insert directions have been defined, click on **<<Next>>**.
- The model will now be generated automatically.



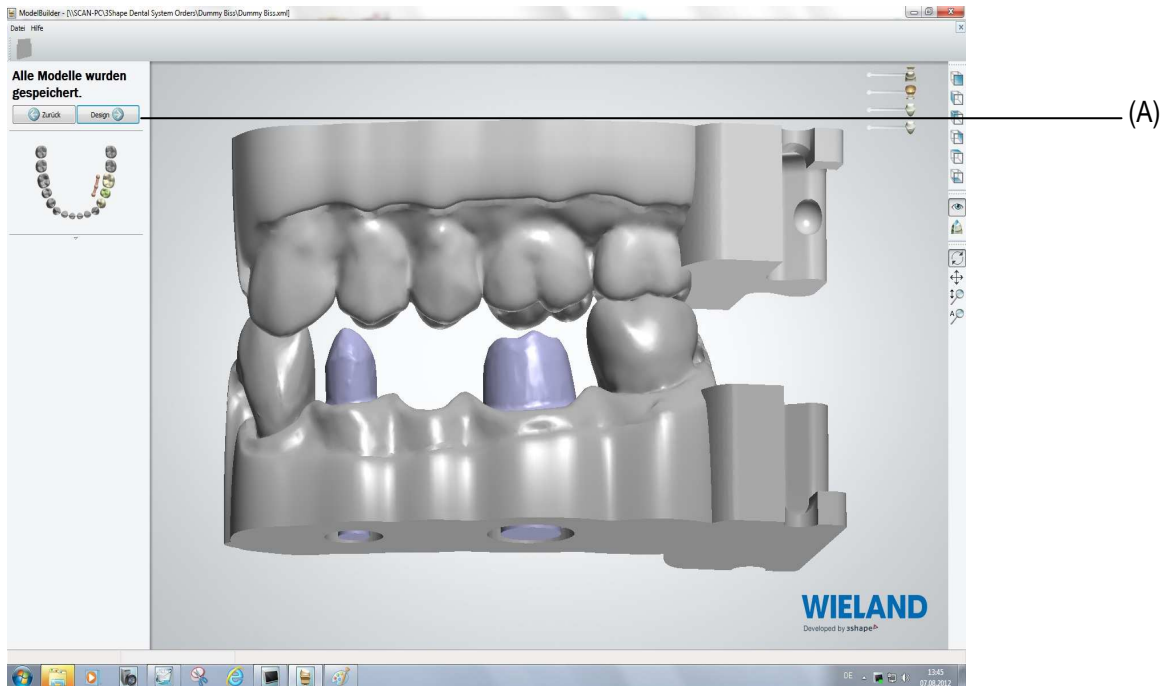
- Select **<<3Shape Quadrant>>** (A) as the articulator interface, or for anteriors and in the case of full-arch models, select **<<3Shape Fullarch>>**. The articulator will now be added automatically. Click on the articulator and move along the edge of the model to adjust the position of the articulator.
- Once the articulator interface has been selected, an automatic warning appears prompting the user to confirm the **<<Platform Distance>>**
- Always select the 32mm option (B). This height corresponds to the height of the articulator and the model base will be adjusted to this height. This is necessary to ensure that the models fit in the articulator.
- Confirm by clicking on **<<OK>>** (C)



2.2.7 Saving the model

- When the model is complete, click on the <<Design>> button (A)

This will take you automatically to the Dental Designer so that you can proceed to design the restoration.



3. Handling in the CAM system

3.1 Defining closing surfaces

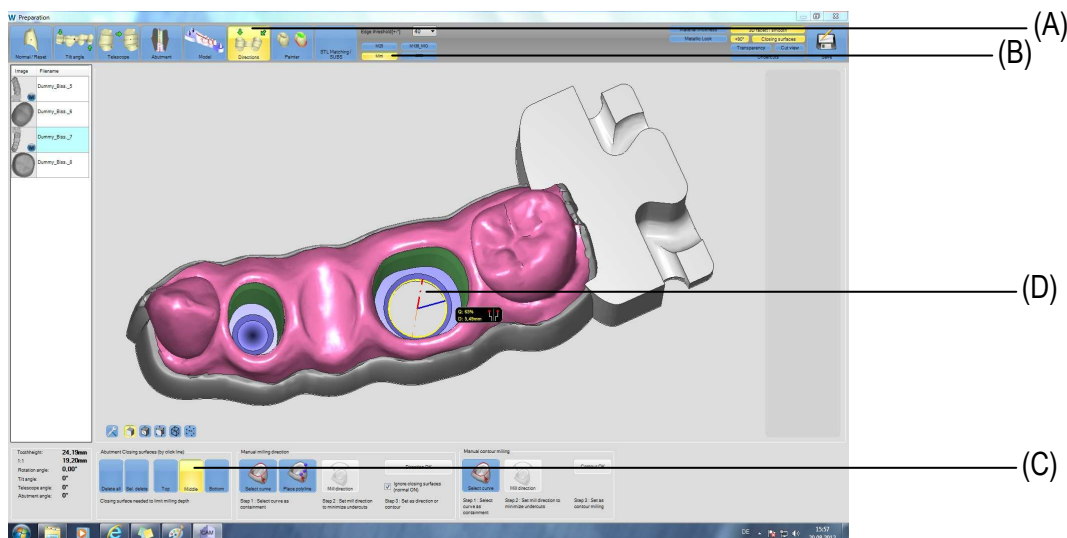
When using **STL files**, the closing surfaces and insert directions must first be defined on the model and the occlusal surfaces of the remaining natural dentition must be painted with fissure marking.

When using the **Wieland CAM 4.0 export format**, the closing surfaces and the insert directions are already defined. It is sufficient to paint the occlusal surfaces of the remaining natural dentition.

3.1.1 Middle closing surfaces

The middle closing surfaces are set in order to define the maximum milling depth which can be reached by the tool from above and below during fine milling. Otherwise the tool may break if it tries to penetrate too far into the material.

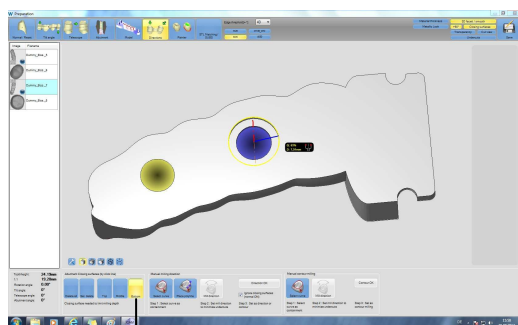
- Select **<<Insert directions>>** from the **<<Preparation>>** toolbar (A); if you have not yet selected a machine, you will be prompted to do so (B). This is important because the maximum tilt angle depends on the machine type. When using the T1, a tilt angle of up to 25° can be defined.
- Next, click on **<<Middle>>** at the bottom of the screen (C) and move the cursor to the edge where the closing surface is to be set. The edge must be highlighted in yellow (D).



3.1.2 Upper closing surfaces and lower closing surfaces

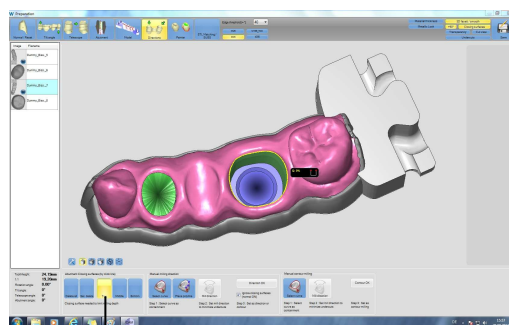
The upper and lower closing surfaces should be set in order to prevent the fine milling tool from traveling at full speed in the insert directions during the first fine milling stage, which could result in tool breakage.

→ Click on **<<Lower>>** (A) and select edge in order to set the lower closing surfaces
The yellow closing surface is set.



(A)

→ Click on **<<Upper>>** (B) and select edge in order to set the upper closing surfaces
The green closing surface is set.



(B)

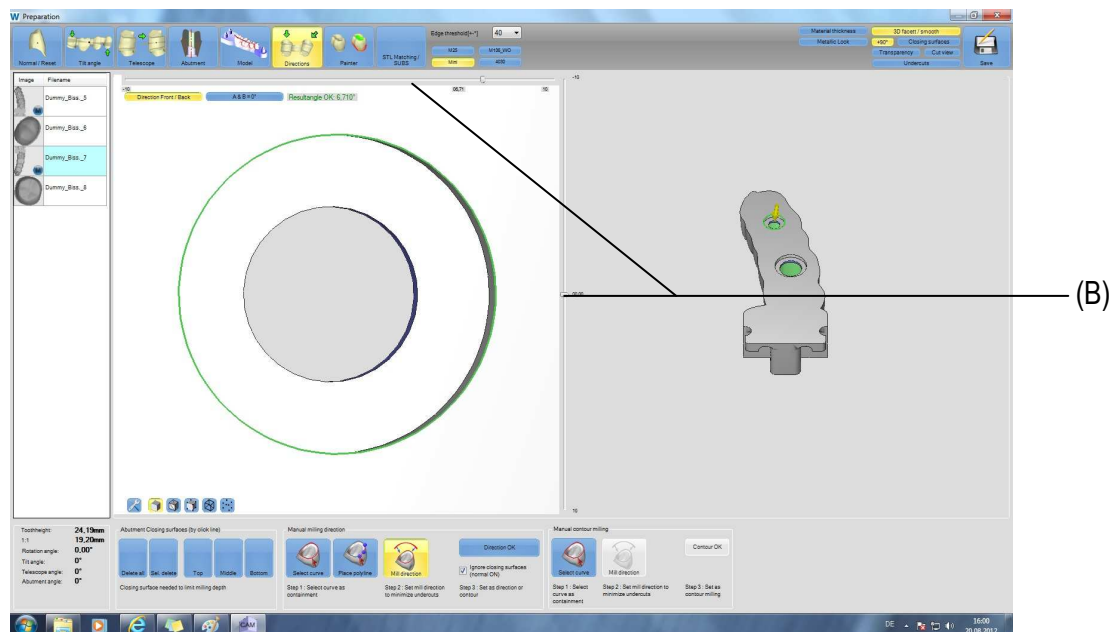
3.2 Defining the insert directions

The insert directions are defined in order to facilitate a separate fine milling phase with a low feed rate. This ensures that the restoration will be an accurate fit.

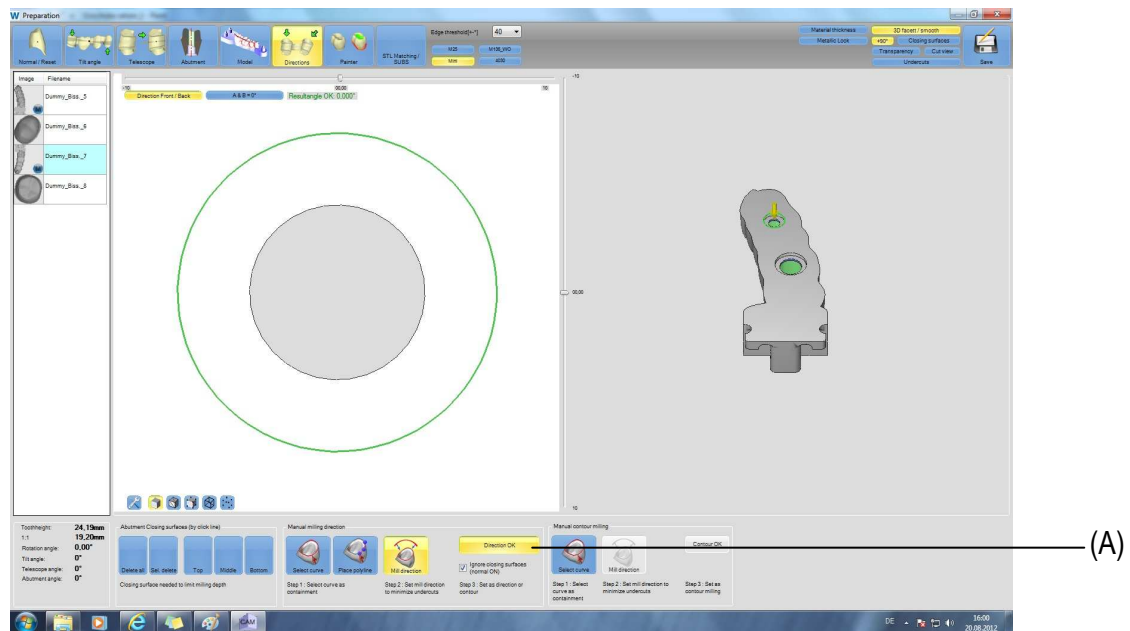
- Select <<Directions>> from the <<Preparation>> toolbar (A), then click on <<Select curve>> under manual milling directions at the bottom of the screen (B). Then place the cursor on the edge of the position where the insert direction is to be set. The edge must be highlighted in yellow.



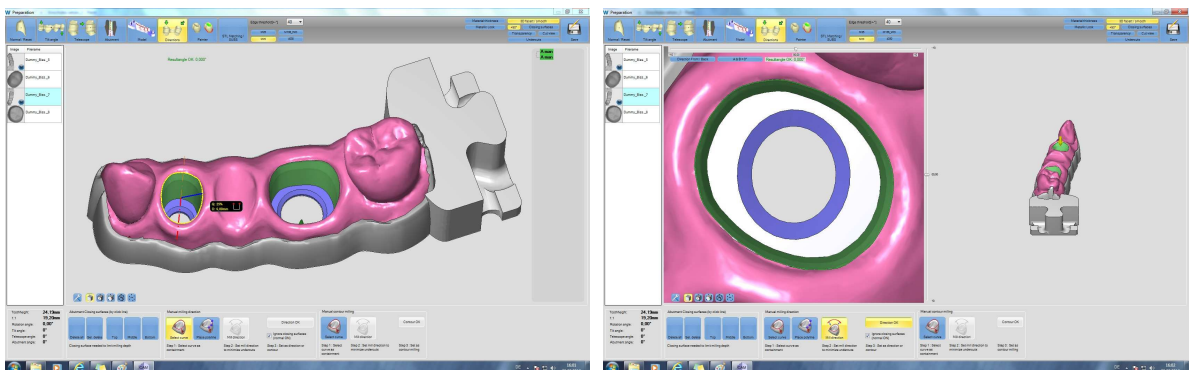
- If the insert direction is not set correctly, it must be adjusted with the <<Slider>> (A). The insert direction should be adjusted so that no misalignment can be seen from above. Otherwise, the resulting restoration may not be a good fit.



- When the insert direction is correctly aligned, click on <<Direction OK>> (A) to define the insert direction.

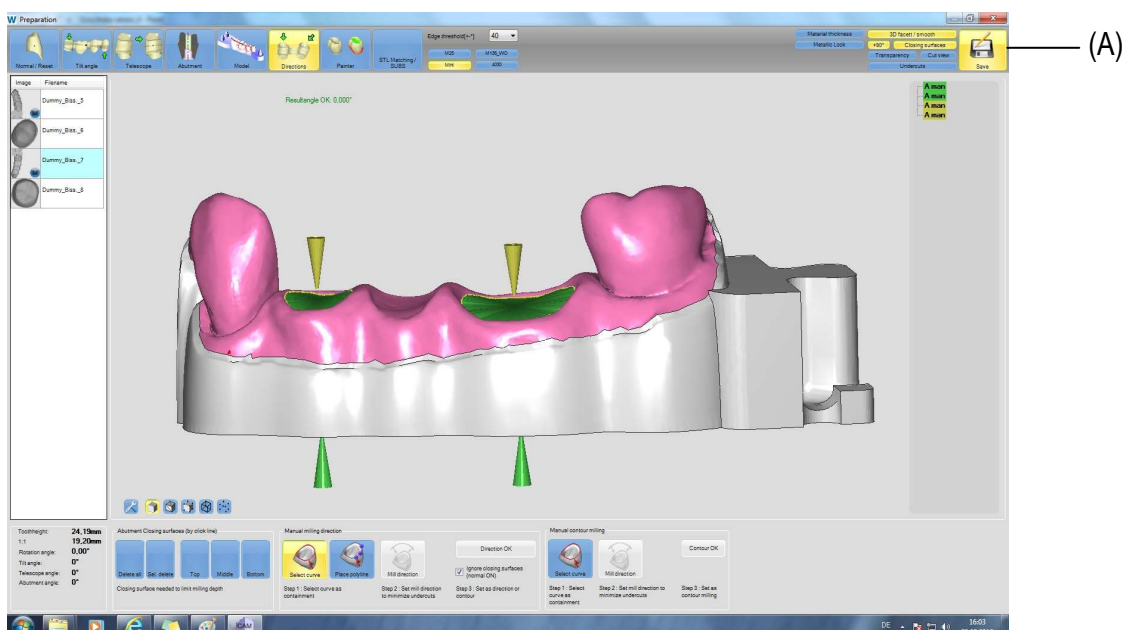


- Proceed as above for all the other insert directions.



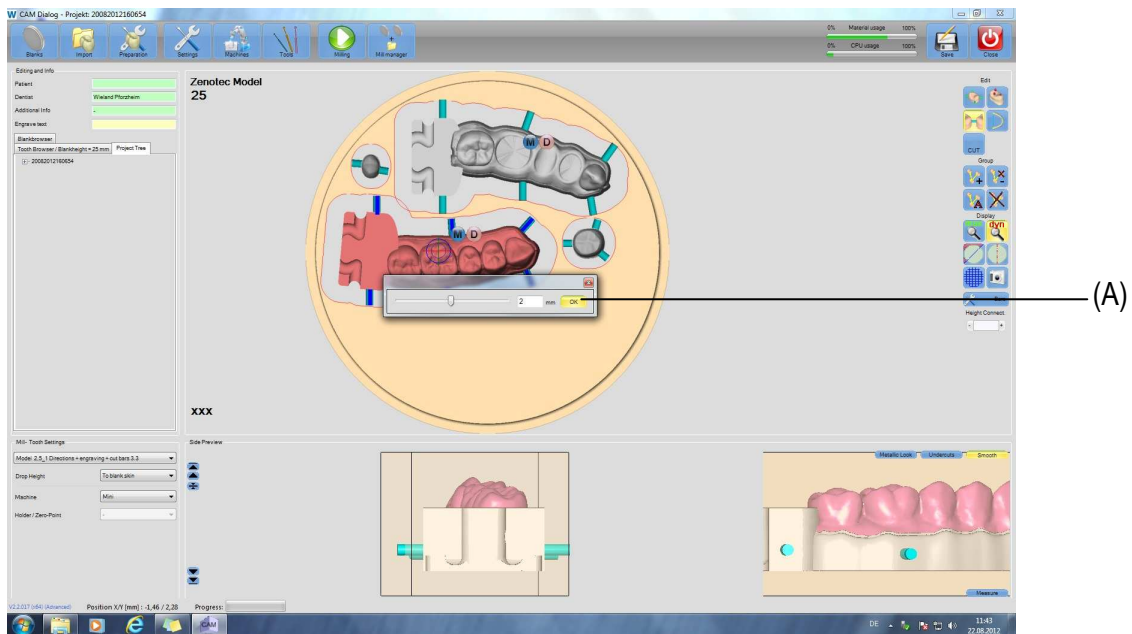
The model is finished when all closing surfaces and insert directions have been defined.

- Click on the icon on right of the top toolbar (A) to <<Save>> the model.

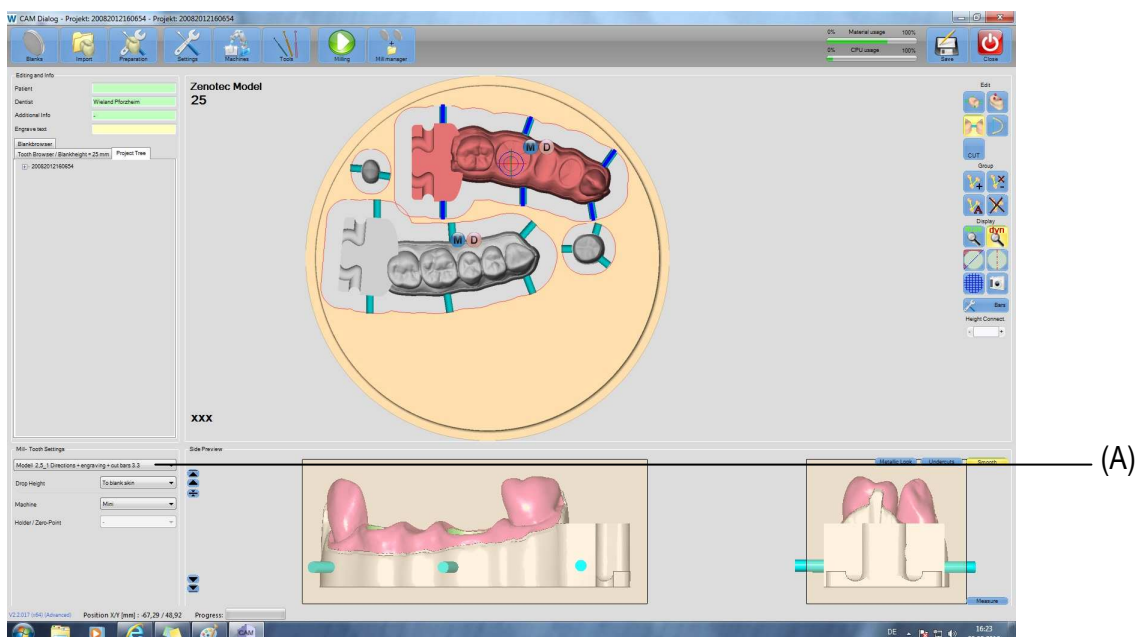


3.3 Nesting

- Next, position the model and the relevant dies on a blank.
- Extend the milling area of the model (excluding stumps) to 2mm when milling models on the Zenotec mini. Because of the length of the tool, the shank of the tool often extends below the surface of the blank. When the job is calculated, this will always result in a message warning the user of a problem with the milling depth because the shank of the tool could collide with the surface of the blank. Extending the milling area to 2mm prevents the shank of the tool from colliding with the edge of the extended area.
- In order to extend the milling area, right click on the work, then click on **<<Change milling area>>** and use the slider to adjust the value to 2mm, then confirm by clicking on **<<OK>>** (A)



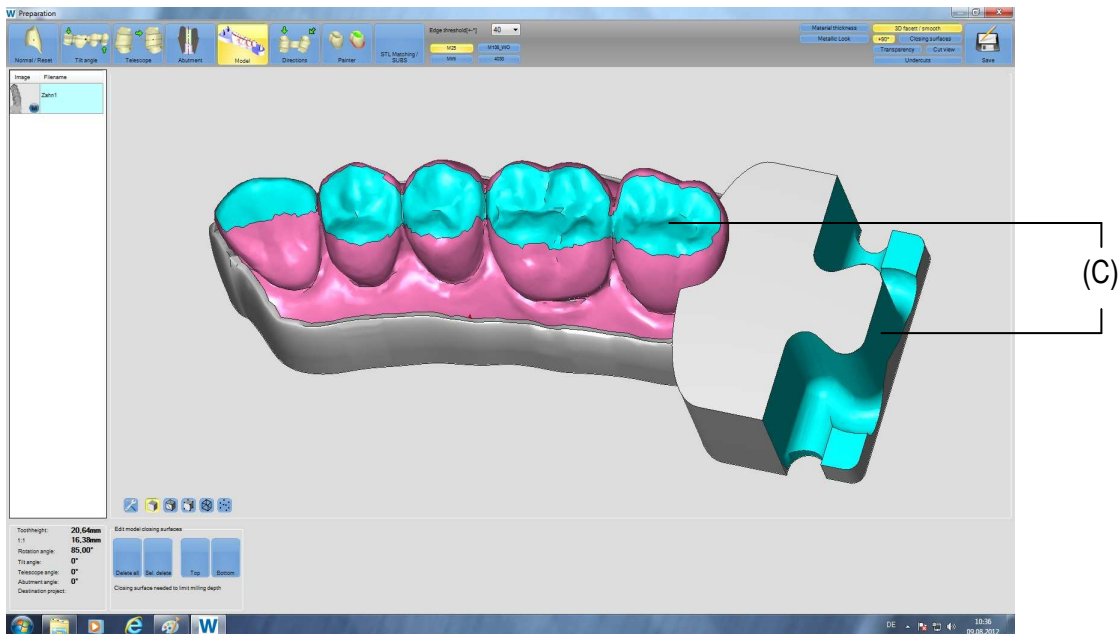
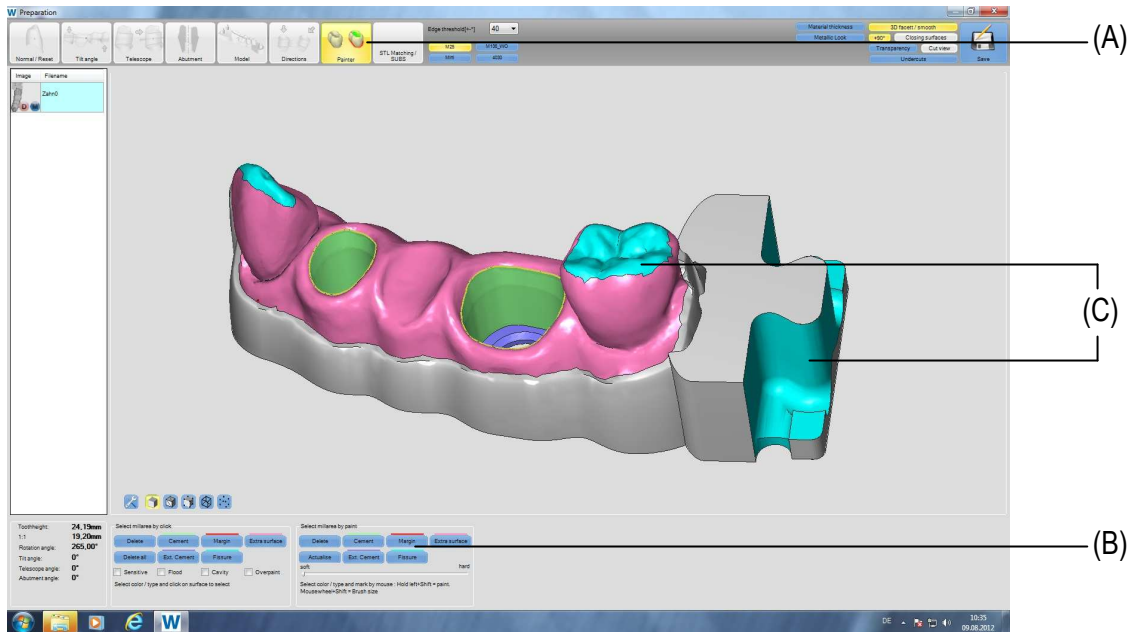
- Select a **<<Strategy>>** (A); the following strategies available as standard:
 - Stump model **<<Model 2,5_1 Directions + engraving + cut bars 3.3>>**
 - Antagonist model without insert directions **<<Model 2,5_1 Antagonist + engraving + cut bars 3.3>>**
 - Stumps **<<Model 2,5_1 Stump + engraving + cut bars 3.3>>**



- For faster milling results, the following strategies can be used:
 - Stump model → <<Model 2,5_1 Directions FAST MILLING 3.3>>
 - Antagonist model → <<Model_Antagonist FAST MILLING 3.3>>

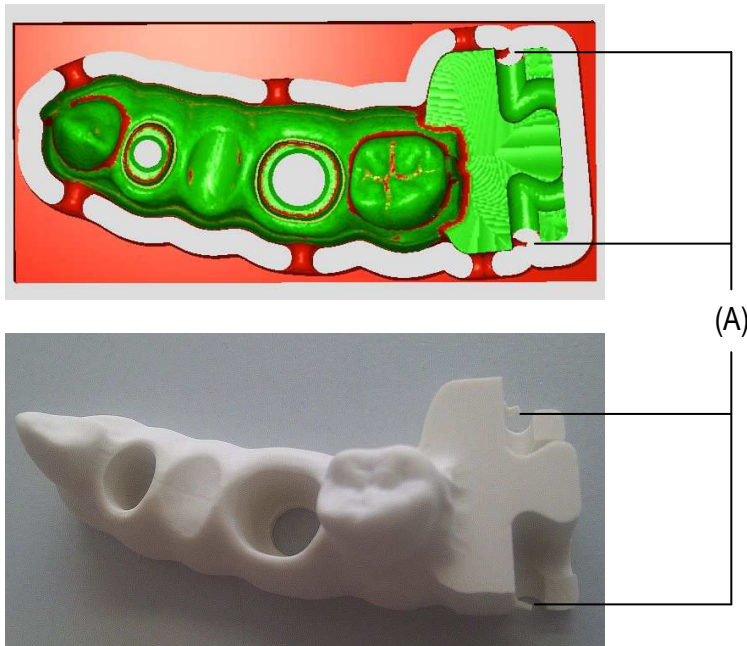
In order to use the fast strategies, certain areas of the model must be painted.

- Select <<Painter>> from the <<Preparation>> toolbar (A) → then click on <<Fissure>> at the bottom of the screen (B), hold the SHIFT key down and left click on the occlusal surface and on a part of the articulator connector (C)



NOTE:

When using the fast milling strategy, some residual material remains on the models in the area of the articulator (A); this must be removed manually when the work is separated from the blank.

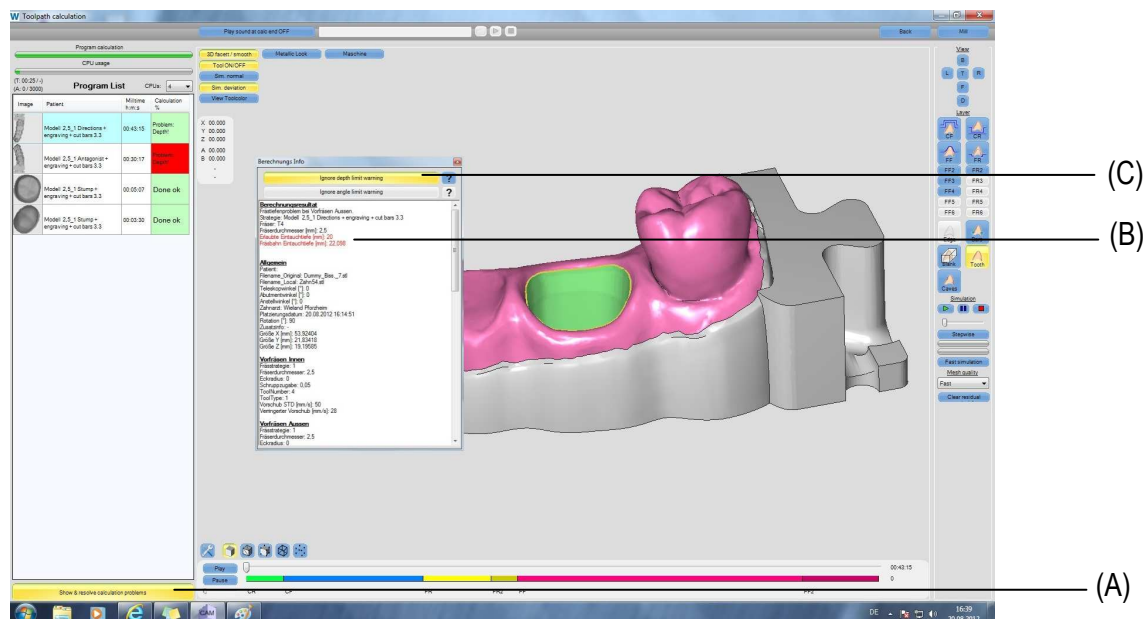


3.4 Calculation and simulation

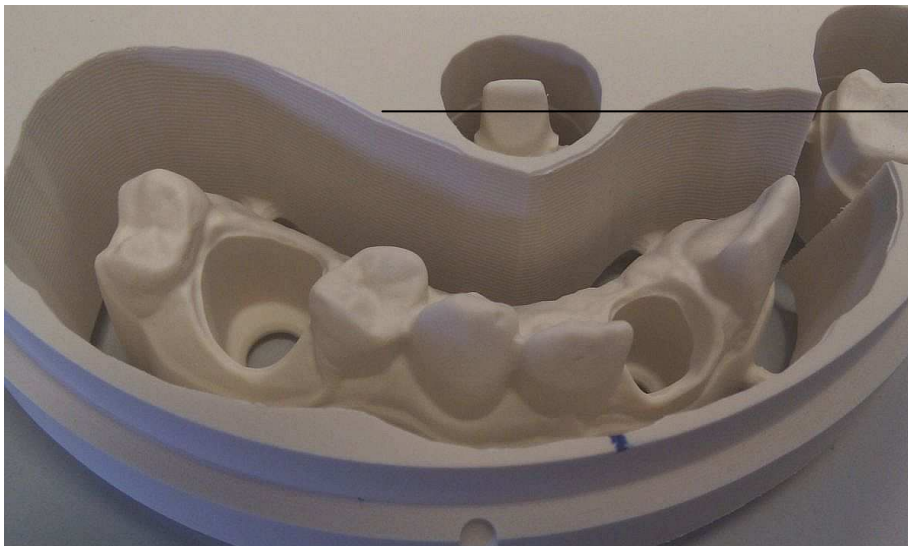
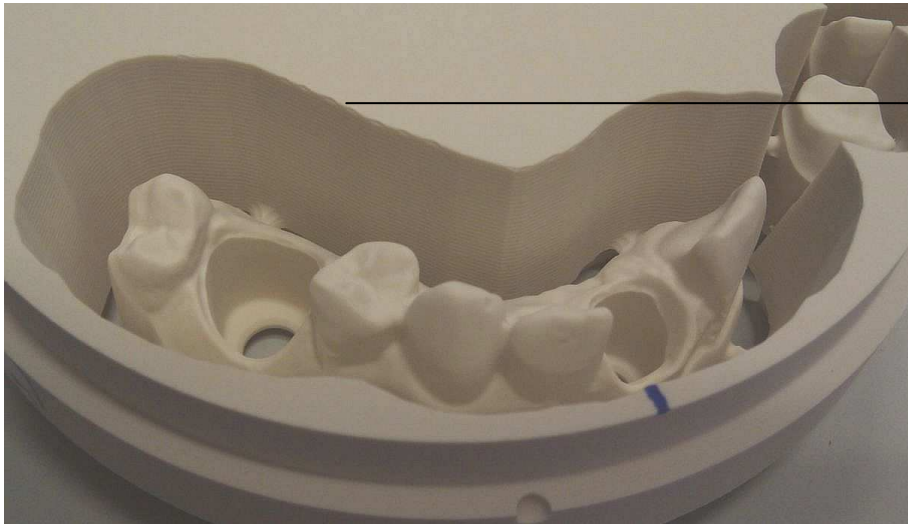
When the models are being calculated, the length of the tool almost always causes the message, **<<Depth limit warning>>** to be displayed. Collisions with the edge of the blank can be avoided if the milling area is extended as described in section 2.4.

However, extending the milling area only works up to a milling depth of 23.55 mm. The actual depth can and should be checked every time the milling depth problem occurs.

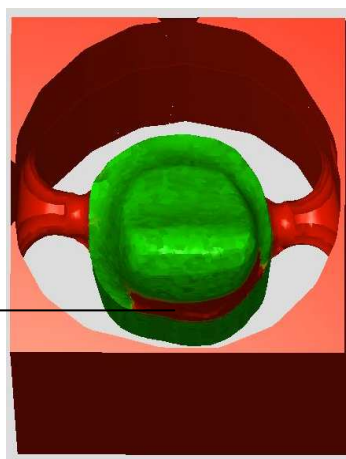
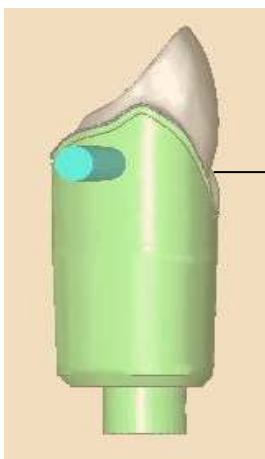
- By selecting **<<Show and resolve calculation problems>>** (A), the actual **<<depth limit>>** can be seen (B). If the actual depth limit is less than 23.55mm, the message **<<Depth limit warning >>** (C) can be ignored. There will be no collision. The model can not be milled until you have ignored depth limit warning.



- If the <<milling depth>> is greater than 23.55mm, collisions will occur with the holder chuck at the edge of the blank.
- A <<milling depth>> of 24.07mm will cause minor milling marks at the edge of the blank (A).
- A <<milling depth>> of 24.65mm will cause severe and uniform collision marks at the edge of the blank (B).



- Because the Zenotec mini is a four-axis machine, undercuts, for example those on tooth stumps (A), can not be milled. This will also be shown in the simulation. If necessary, these areas must be finished manually.

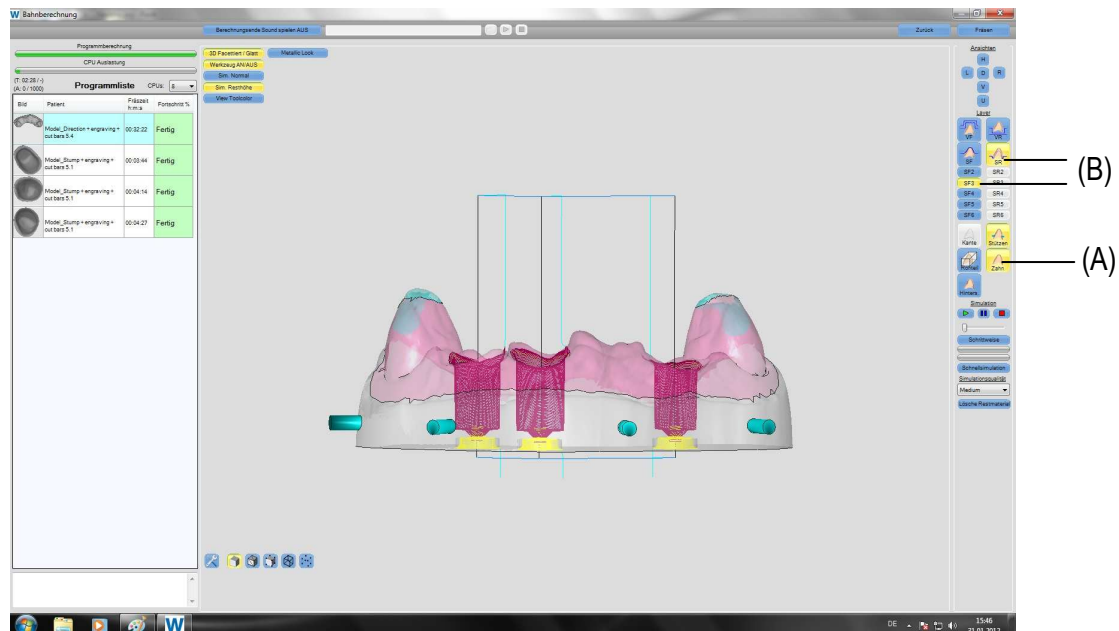


Once calculation is complete, you should always check the path and watch the simulation since this enables errors to be detected immediately, which can prevent an unsuccessful milling operation.

The paths will indicate whether all closing surfaces have been set correctly.

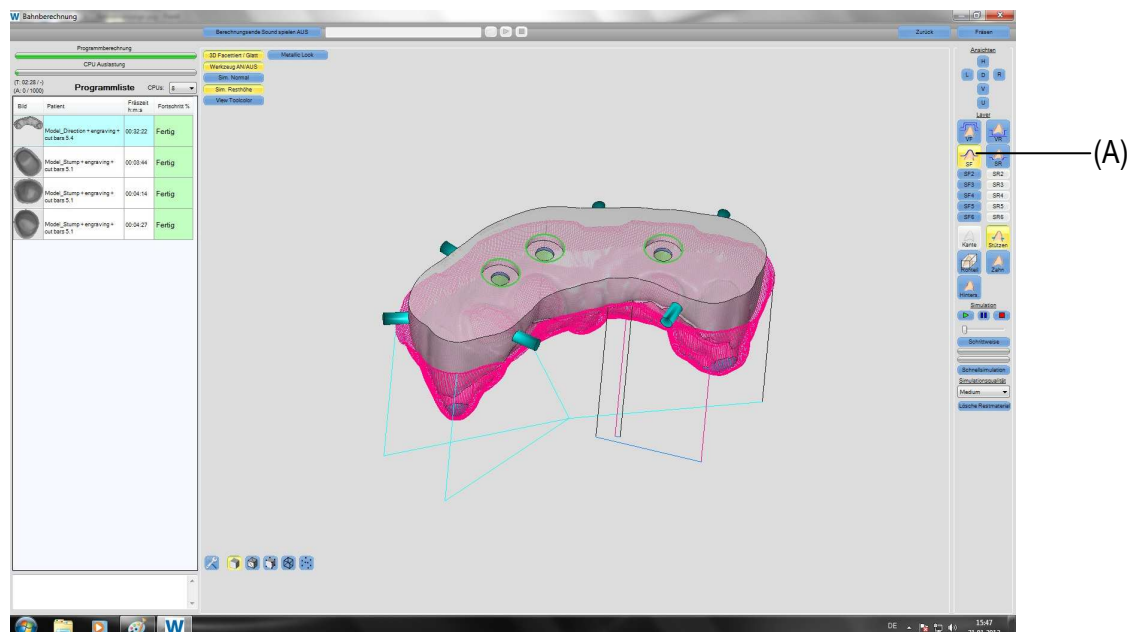
Middle closing surfaces:

- Right click several times on the <<Tooth>> button (A) until the work is transparent
- Then click on the paths for the insert directions (B). The paths for the insert directions must not extend beyond the middle closing surface



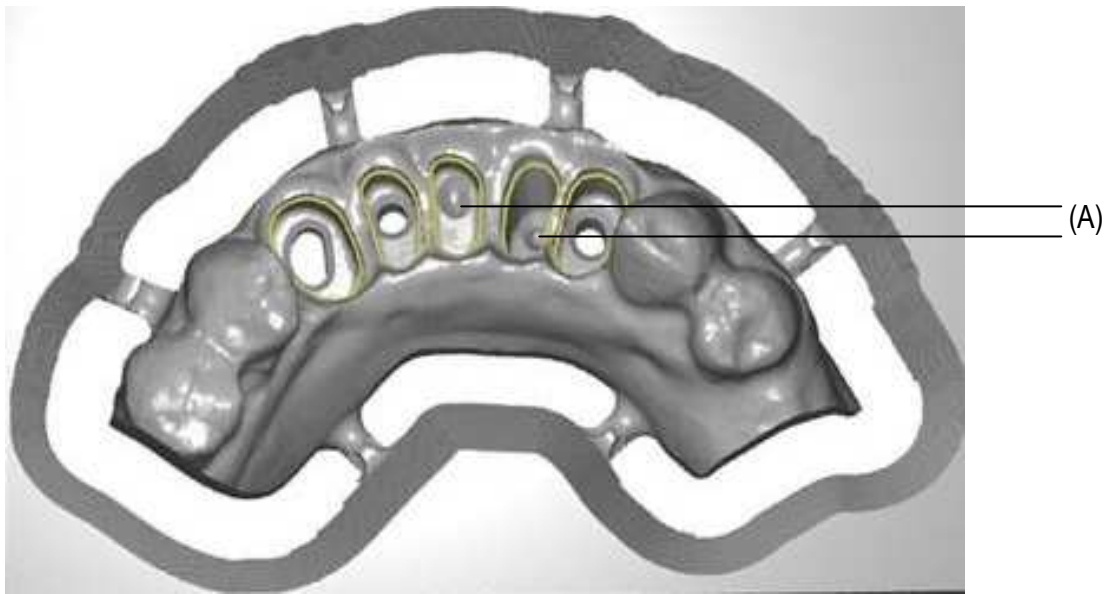
Upper and lower closing surfaces

- Click on the paths for the first fine milling stage (A). The paths may not extend into the areas of the insert directions from above or from below.

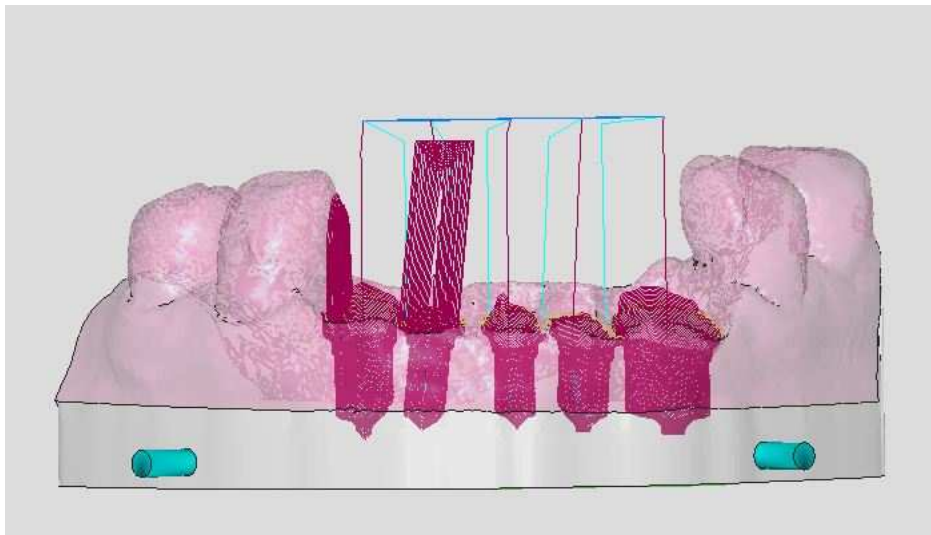


Milling errors

If some stump holes are not fully milled (A), there can be two reasons for this:



- 1) The paths for the insert directions extend beyond the insert direction.



This is a sign that the tool must penetrate so deep into the material that the shank collides with the edge of the blank. This can be remedied by extending the milling area.

- 2) If the insert directions are correct but the simulation nevertheless shows enclosed pin holes, it may be that the pin diameter was defined as too small in the CAD system or that too small a pin has been automatically generated on the basis of stumps that are too small. In this case, the diameter of the tool in use will not allow the insert direction to be fully milled.

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Wieland offers a wide range of products and services from CAD/CAM technologies and dental alloys to veneering ceramics and electroforming. Thanks to our worldwide presence and international network, Wieland is never far away, and your contact person can always be located via the Internet.

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