

Protocol for SAM Articulator/Surgical Simulation Planning



SAM[®] 3 Articulator

http://www.sam-dental.de/pages/engl_catal.html

SAM[®] RMI 500 Reference Measure Instrument 3D

Measures and compares x, y, and z selected points on articulator mounted casts when placed on the instrument.



1. Digitize the lateral headfilm and save the file. In order to obtain a valid surgical simulation it is important that the certain points are identified correctly. The transfer from the articulator is based on the precise location of the following tooth landmarks:
 - isi** (Horizontal and Vertikal),
 - iii** (Horizontal and Vertikal),
 - csM** (Vertikal), represented by msm og
 - cim** (Vertikal), represented by mim
 For landmark definitions see:
<http://www.tiops.com/downloads/TiopsLandmarks.xls>
2. Select the icon **ArtikulatorView** and begin initiate the articulator analysis by clicking <Ctrl> and <Q> together.



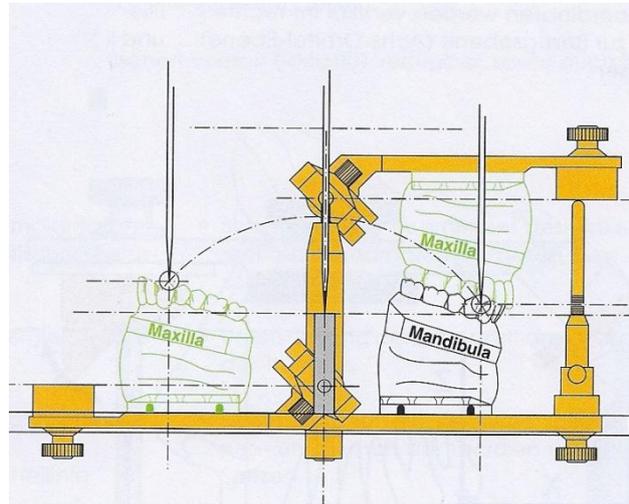
3. Check the Incisor Pin height on the articulator and enter this figure in mm with one decimal under **PinHeight**. Remember to select the correct type of SAM articulator under **ArticulatorType**

Articulator	
Date	24-11-00
ArticulatorType	SAMIII
PinHeight	1.7
Points	

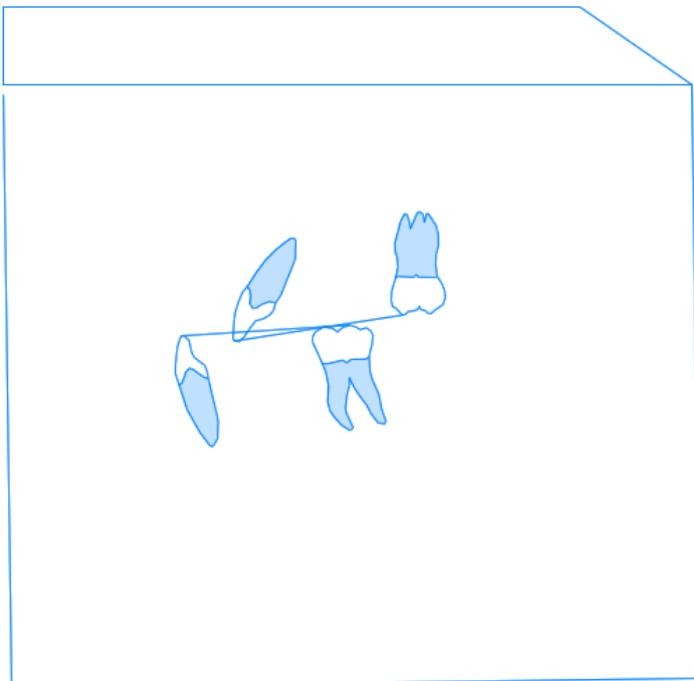
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4. Measure the coordinates of the mounted models using the SAM Reference Measure Instrument in all three planes of space and enter the values in hundreds of a millimeter under the items **LowerMain** and **UpperMain** respectively. The Mounting plates of the articulator mounted model fit directly into the measuring instrument.

Articulator	
Date	24-11-00
ArticulatorType	SAMIII
PinHeight	1.7
Points	
LowerMain	
iii	[9170,4400,900]
X	9170
Y	4400
Z	900
cim	[6170,4250,3170]
X	6170
Y	4250
Z	3170
iii	[.]
ciml	[.]
LowerSym	
UpperMain	
isi	[8170,4620,600]
X	8170
Y	4620
Z	600
csm	[5150,4150,3050]
X	5150
Y	4150
Z	3050



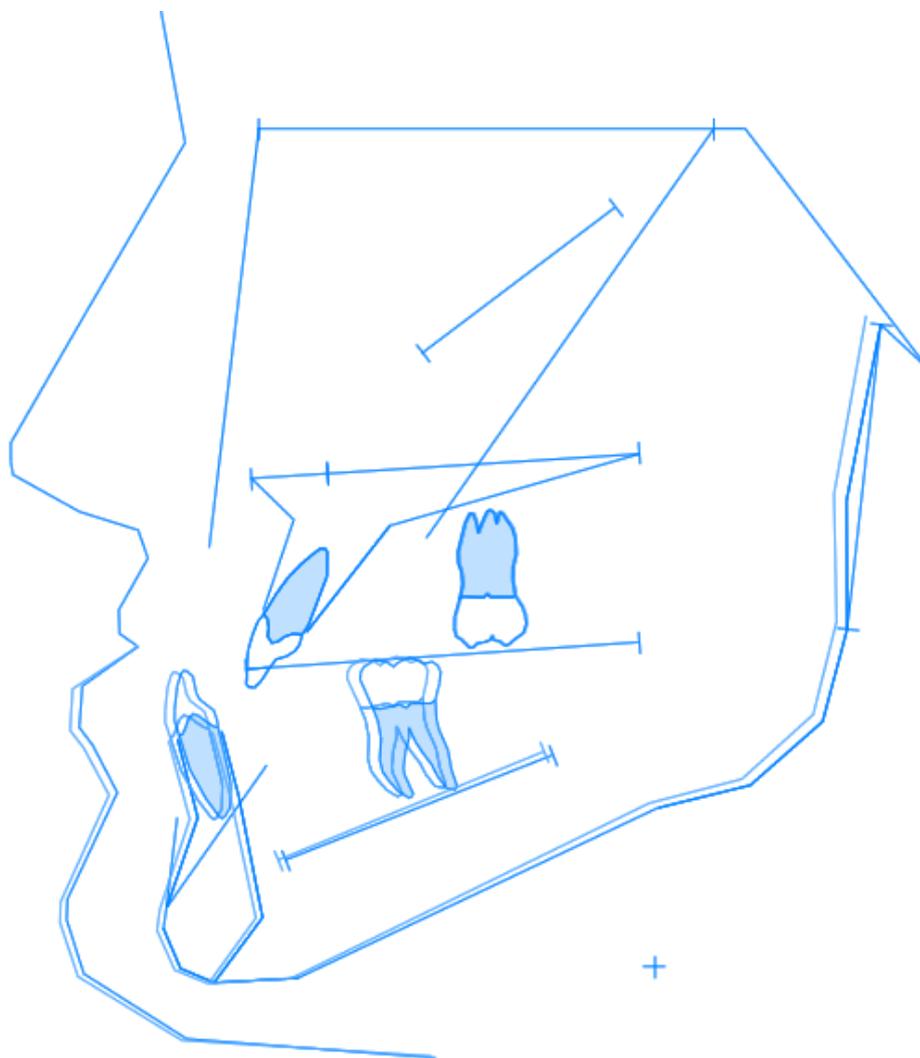
5. This procedure locates the models in the articulator.



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6. Now check the **LateralView** . The teeth/jaw/soft tissue structures drawn in the **pale blue color** is a mirror of the articulator data. Any minor differences are compensated for by the system in the TIOPS simulation, when this difference is due to a discrepancy between the condylar position on the **Mounted Models** and the position of the condyles on the **Lateral Headfilm**. This difference is seen in most cases, but will as mentioned not impair the simulation.

However, when the difference is due to a true difference in recognition and consequently the registration of the teeth on the models and the headfilm, the system will not be able to perform the calculations correctly.



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7. The next step is to separate, by cutting the plinth of either the upper or lower jaw from the articulator mounting plate, which ever makes the most sense for the future surgical plan,. In case of bi-maxillary **surgery it is most practical to release the most asymmetrical the upper jaw first.**

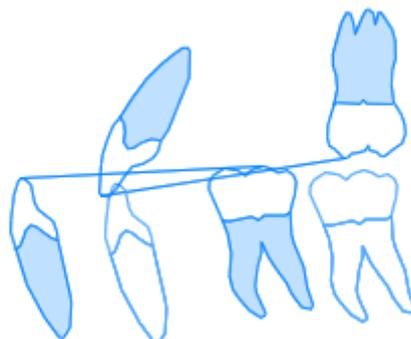
Now the separated model is placed in the desired **OCCLUSION**, with any pre planned transverse/sagittal sectioning of the upper jaw already performed.

While maintaining the upper and lower models in occlusion, the released jaw model is then remounted on the base plate in the articulator maintaining the SAME incisal pin height.

Now the remounted jaw model is measured once again and the coordinates entered into the respective cells in the listing under the corresponding **Main2** Frame.

Articulator	
Date	24-11-00
ArticulatorType	SAMIII
PinHeight	0
Points	
LowerMain	
LowerSym	
UpperMain	
UpperSym	
UpperSplit	
UpperCaud	
LowerMain2	
iii	[8000,4470,600]
X	8000
Y	4470
Z	600
cim	[4920,4300,2750]
X	4920
Y	4300
Z	2750
iii1	[..]
cim1	[..]

8. The teeth can now be seen in the new-planned occlusion, as illustrated below (The pale blue teeth) as well in their initial position (The teeth with the root shadow). In this case the lower jaw was chosen to be repositioned in the desired **OCCLUSION**.

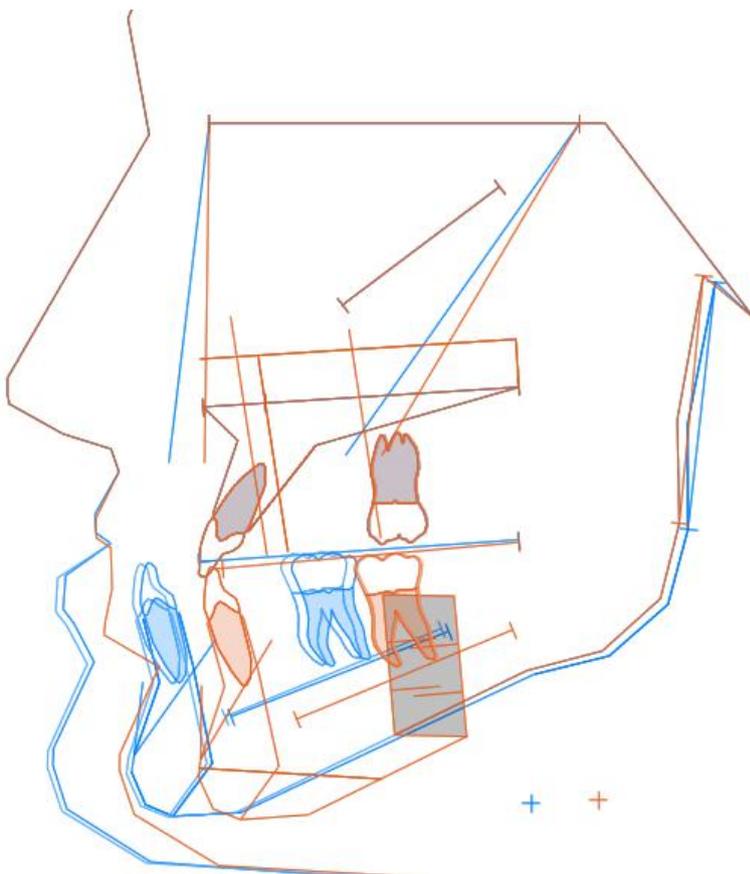


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9. At this point and NOT BEFORE, the actual surgical simulation procedure can be started.

Simulation2	
No	2
Type	Surgical
Reference1	2
Reference2	None
TreatmentScenario	Surgical
GeneralData	
Period	0
GrowthType	Neutral
LoSpaceRight	0
LoSpaceLeft	0
CompensPrinciple	NoChange
AutoArticCorr	True

10. With the above explained procedure a cephalometric simulation has been created where the upper and lower dental arches have been placed in the exact same relationship as on the articulator. Note that the procedure has been changed from earlier versions of the TIOPS program. Now the simulation variable has to be set to true under **AutoArticCorr**. If it is set to **False** the condyles will be shown in their initial position corresponding to the position on the lateral headfilm, which does not match their position on the simulation.



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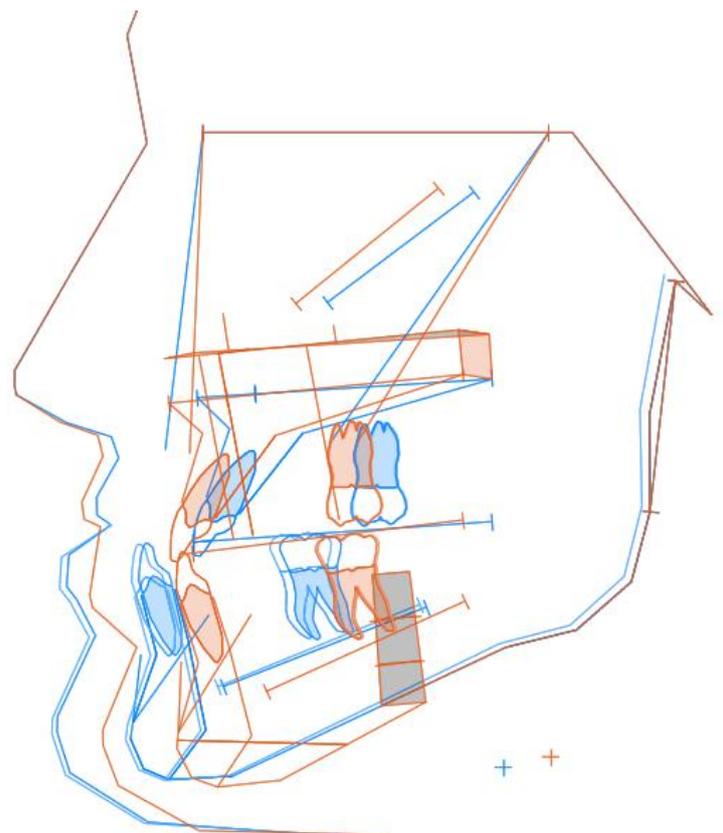
11. In order to proceed further only the following variables should be used:

Simulation1	
No	1
Type	Surgical
Reference1	2
Reference2	None
TreatmentScenario	Surgical
⊕ GeneralData	
⊕ Orthopaedics	
⊖ Surgery	
MaxSpaceToClose	0
Autorot	0
MaxSagLeFort	0
MaxRotMolCen	0
MaxRotIncCen	0
MandSagSplit	0
DisMandRotMolCen	0
DisMandRotIncCen	0
DisMaxVertAdjust	0
DisMaxRot	0
MandMaxSagAdjust	4
MandMaxVertAdjust	0
MandMaxRot	0
ChinSagAdjust	0
ChinVertAdjust	0
ChinRot	0

IMPORTANT ! If any of the other variables, than the ones indicated, are used the measurements will not coincide with the articulator values.

12. Below you see the completed simulation

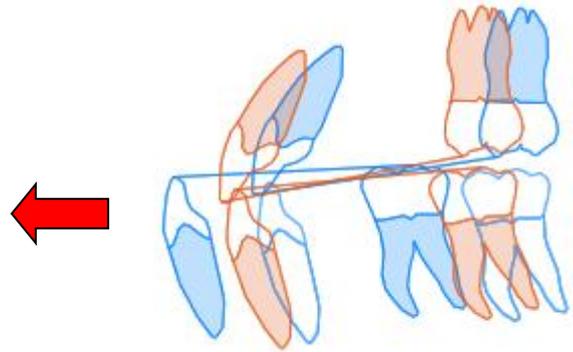
⊖ Surgery	
MaxSpaceToClose	0
Autorot	0
MaxSagLeFort	0
MaxRotMolCen	0
MaxRotIncCen	0
MandSagSplit	0
DisMandRotMolCen	0
DisMandRotIncCen	0
DisMaxVertAdjust	0
DisMaxRot	0
MandMaxSagAdjust	4
MandMaxVertAdjust	1
MandMaxRot	2
ChinSagAdjust	0
ChinVertAdjust	0
ChinRot	0



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13. By selecting **ArticulatorView** and printing out the tracing you will also get the new coordinates for placing the upper jaw in the articulator in the correct simulated **POSITION**. This is done by using the SAM Reference Measure Instrument.

	Stage2			Simulation1		
LowerMain.iii	91.7	44.0	9.0	84.1	45.6	9.0
LowerMain.cim	61.7	42.5	31.7	53.4	42.8	31.7
UpperMain.isi	81.7	46.2	6.0	85.7	47.1	6.0
UpperMain.csm	51.5	41.5	30.5	55.7	41.4	30.5
LowerMain2.iii	80.0	44.7	6.0			
LowerMain2.cim	49.2	43.0	27.5			
UpperMain2.isi						
UpperMain2.csm						



After the upper jaw has been placed and secured in the pre planned **POSITION**, the lower jaw is loosened and then positioned in the planned **OCCLUSION** (See item 7) and then remounted on the base plate in the articulator maintaining the SAME incisal pin height.

This will place the lower jaw in the simulated **POSITION**.
Now the stents for the surgery can be made.