

Protocol to fabricate a Scan Prosthesis

A scan prosthesis is a duplicate of the diagnostic teeth set-up or existing removable prosthesis.

Mixture for the teeth and the base plate:

Bone supported SurgiGuide

Teeth: mixture of resin/BaSO₄ 15%

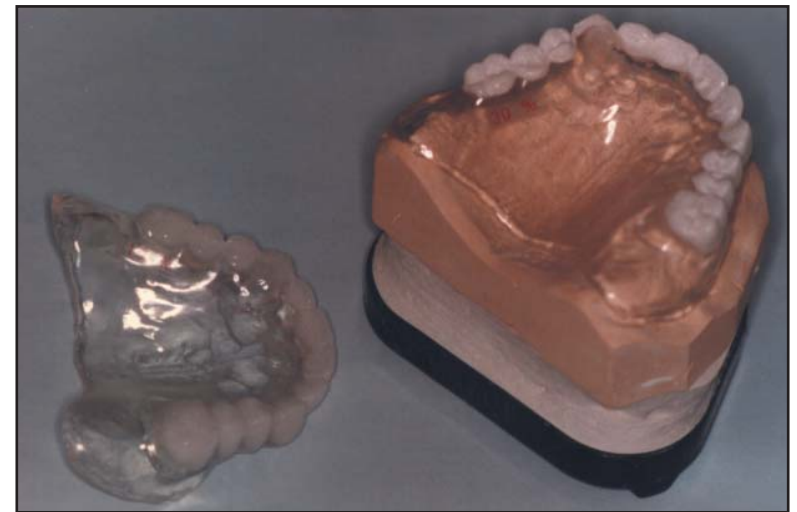
Base Plate: pure resin

Mucosa supported SurgiGuide

Option 1: Teeth + base plate: mixture of resin/BaSO₄ 10%

Option 2: Teeth: mixture of resin/BaSO₄ 20%

Base plate: mixture of resin/BaSO₄ 10%



Insufficient BaSO₄ will result in teeth that are not clearly visible on the CT scan

Excess barium sulfate will create artifacts in the images

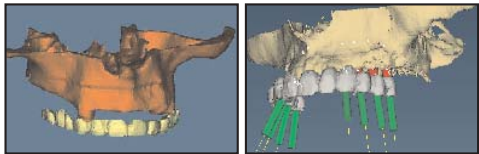
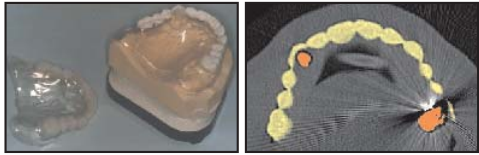
The measuring and blending of the mixture needs to be performed very carefully





Protocol to fabricate a scan prosthesis

This document describes a procedure for the fabrication of a scan prosthesis, which is a radiopaque duplicate of the provisional teeth set-up. When the patient is scanned with the scan prosthesis, the desired tooth set-up is clearly visible in the CT images. This enhances the surgeon's ability to plan the implant placement based on both clinical and esthetic considerations. SimPlant* is the dental planning software of Materialise, which uses high quality CT images for pre-operative planning of dental implants. A properly prepared scan prosthesis is necessary in order to obtain high quality images. The procedure for fabricating a scan prosthesis is described in detail to provide guidelines for its proper preparation. First a standard protocol is described for the purpose of ordering a standard bone supported SurgiGuide. When requesting a mucosa supported SurgiGuide, a slightly different protocol is required and has been added to the last page.



The radiopaque scan prosthesis (top left) is clearly visible in the CT images (top right). In SimPlant, the 3D is calculated (bottom left) and implants are planned. The relation of the implants to the bone and the planned restoration is clearly shown (bottom right).

Procedure to fabricate a standard scan prosthesis

1. Obtain a maxillary and mandibular impression.
2. Produce a plaster cast from the dental impressions.
3. Mount the models into an articulator and fabricate a wax set-up.
4. Verify the provisional wax set-up with the ordering physician.



5. Verify the occlusion of the provisional wax set-up at the laboratory. Seal the wax to the model and invest it in a flask.



6. Apply silicone over the teeth. Note that the cutting edges and the cuspids need to emerge from the silicone.
7. Separate the plaster with separating solution. Counter-cast the flask after closing it.



8. When the plaster is fully hardened, open the flask and remove the wax set-up (including the teeth). Rinse the flask so that it's completely empty.
9. Separate the flask with separating solutions when it has sufficiently cooled (body temperature).
10. Form clear cold-polymerised resin onto the entire denture (including the teeth). Let this harden under a press for about 30 minutes.
11. Once the resin has completely hardened, re-open the flask. Grind away the teeth up to the cervical edge. Do not grind away the teeth up to the gums or the teeth buds, because this can create problems at the time of the scan.



12. Separate the plaster parts again with a separating solution.
13. Combine the clear cold-polymerising resin with 15% barium sulfate by weight (85g resin/15g barium sulfate) and mix them together until a homogeneous mass is formed. Barium sulfate can be obtained from a pharmacist without a prescription (the powder should be very fine). You can use a blender or a vacuum mixer to mix them properly. The measuring and blending needs to be performed very carefully, since the final results will depend on it.
 - Insufficient barium sulfate will result in teeth that are not clearly visible on the CT scan.
 - Excess barium sulfate will create artifacts in the images.
14. Measure the blended powder and the liquid. Mix well with a spatula. Apply this mixture in the area of the teeth impressions, close the flask and apply pressure.
15. This mixture needs to harden under a press for about 45 minutes to 1 hour. Barium sulfate slows down the hardening of the artificial resin.
16. When the resin has completely hardened, remove it from the flask. Place the model in an articulator to check the occlusion and make any necessary adjustments.



17. Remove the prosthesis from the model. Note that some of the excess resin mixed with barium sulfate will have flowed out over the base plate. Remove this excess barium sulfate mixture from the plate. Only the barium sulfate filling the teeth should remain.
18. You may polish the prosthesis to improve its appearance for the patient.



19. When ordered by the surgeon, holes can be drilled into the middle of the cingulum (anterior) and in the middle of the occlusal planes (molars and pre-molars), parallel with the direction of the teeth. These holes will provide the surgeon with a clear reference as to where to place the implants.
20. Optionally, the name of the patient can be inserted into the denture.



Procedure to make a scan prosthesis for a mucosa supported SurgiGuide

Complete base plate in 10% Barium Sulfate

1. Complete steps 1 through 10 from the procedure for the fabrication of a standard scan prosthesis.
2. In step 11, the complete plate should be fabricated with 10% barium sulfate mixture (90g resin/10g barium sulfate) instead of just pure resin. Let this harden under the press for about 30 minutes.
3. Skip steps 12 through 16 and go immediately to step 17.
4. Remove the prosthesis from the model and finish it. You can polish the prosthesis to improve its appearance for the patient.

Base plate and teeth with different % Barium Sulfate

1. Complete steps 1 through 10 from the procedure for the fabrication of a standard scan prosthesis.
2. In step 11, make a mixture of 10% barium sulfate and let it harden under a press for about 30 minutes.
3. Complete steps 12 and 13, as indicated in the standard procedure.
4. In step 14, substitute a mixture of 20 % barium sulfate.
5. Follow the standard procedure for the remaining steps.

* SimPlant is the merged software of SurgiCase and SIM/Plant