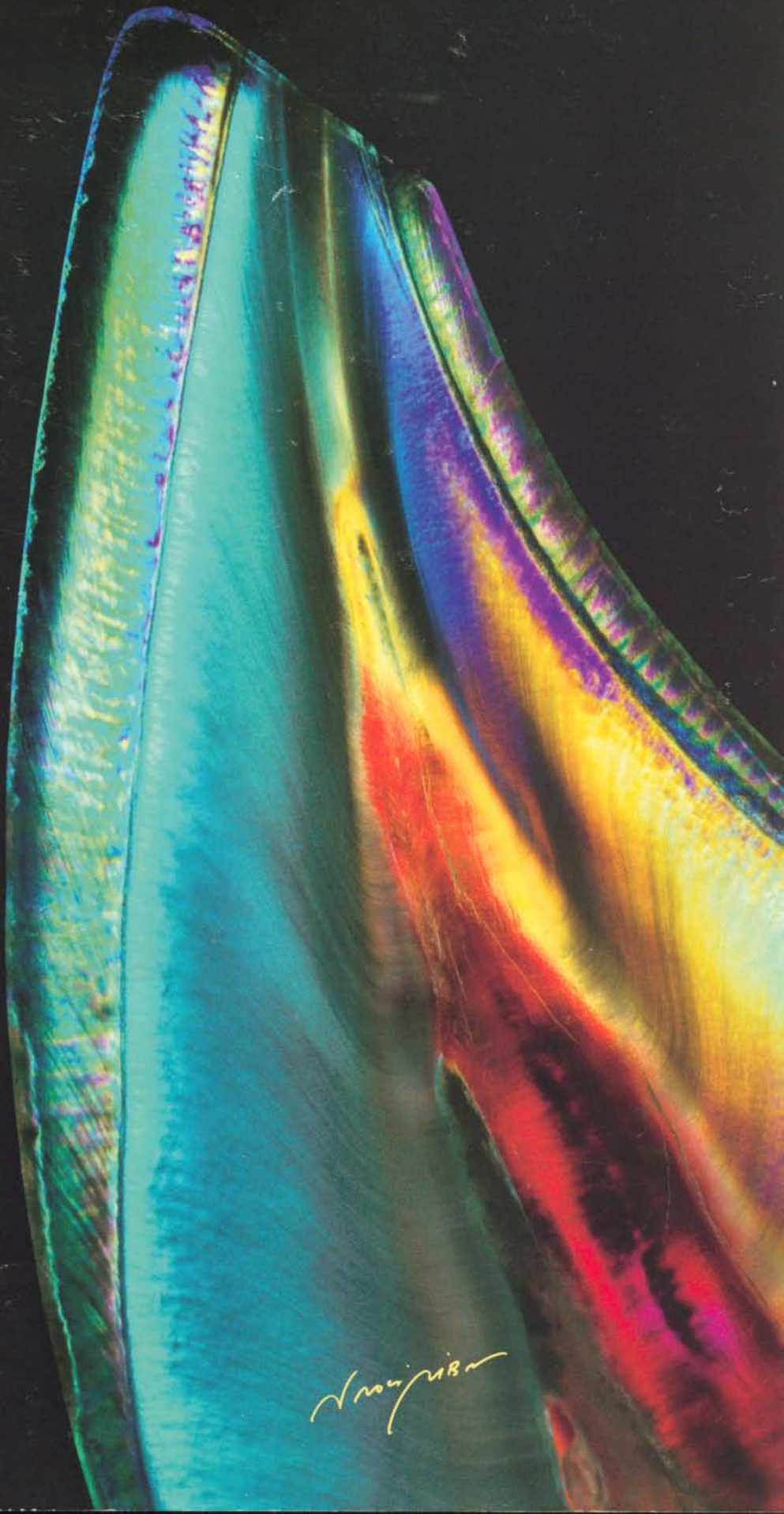


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Transfer technique: secure and reproducible results

The Result of Synergy

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For dental technicians, working precisely, esthetically, and predictably is becoming more important. In this article, Paolo Smaniotto and Dr. Flavio Tura present us with their own successful technique, here in the context of a fixed total prosthesis. Taking this as a sample case, they demonstrate their structured method, which they have been using for several years.

Key Words: correlator, Rossini method, total restoration with a fixed prosthesis, transfer technique

Clinical Case

This 50-year old male patient needed fixed total restorations for both dental arches. An examination of the situation models and initial pictures indicated we had a very complex case in hand. The clinician, Dr. Flavio Tura, informed me that the patient was a heavy smoker and very deficient in oral hygiene (Figs. 1–4). He was also a freelance businessman and had to keep numerous appointments and therefore needed good-looking temporary dentures (Figs. 4–10). So it was a difficult case with few advantages to start from.

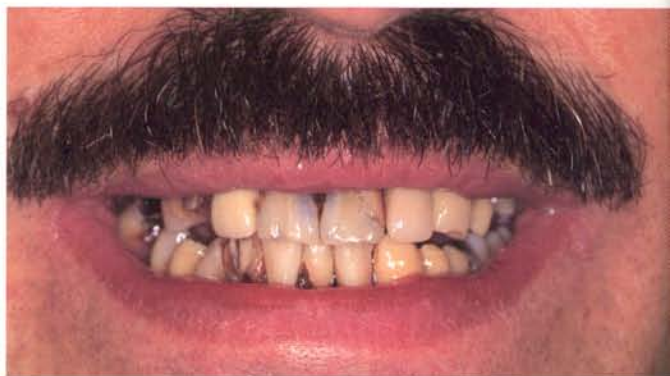


Fig. 1. Initial situation in frontal view ...



Fig. 2 ... and lateral view (from right)



Fig. 3. Initial situation in left lateral view. As is evident, the patient puts little value on oral hygiene and is also a heavy smoker.



Fig. 4. The initial situation not only lacked esthetics but presented serious functional defects.



Fig. 5. The first eggshell temporary restoration in right lateral view



Fig. 6. Fabrication of the first eggshell temporary restoration in left lateral view. Even this temporary shows clearly that numerous functional and esthetic improvements have been implemented compared to the initial situation.



Fig. 7. The framework of the second temporary is modeled on a Zeiser model base with the same precision as we use for the definitive restoration.



Fig. 8. The quality of the metal framework is decisive for the stability of the second temporary; it must be seated passively.



Fig. 9. The finished second temporary defines the seat and appearance of the definitive restoration.



Fig. 10. The second temporary allows us to clinically evaluate the incisor, canine and/or group lines, along with the occlusion and gingival contour and to decide on appropriate measures.



Fig. 11. The pantographic measurement in lateral view. It enables us to incorporate all the functional data of the patient.



Fig. 12. Denar articulator settings: three bite recordings in wax to determine the centric relation and the models of the first and second temporaries were sent to the laboratory along with photos and slides.



Fig. 13. Using these data, we developed our diagnostic wax-up. This is the first step in the definitive wax-up of a patient case. It must include the data from prior steps and improve the situation.

Treatment Plan

The treatment was planned and implemented in stages to maintain optimal communication between chairside and laboratory. We decided that for this article we would let pictures do most of the speaking – a picture tells more than a thousand words.

Occlusal Relief and Incisal Guidance

In this clinical case the centric relation needed restoration. Prof. Ulrich Lotzmann explains that this relation is present when the

condyles stand to a large extent cranially and are not displaced laterally under normal tissue loading. If no disc displacement is present, a relaxed and well-coordinated musculature will guide the condyles to their centric position.

This position is clinically reproducible when the mandible is in maximal intercuspitation and lies within the vertical plane. You can adjust both the incisor guidance and canine disclusion via the articulator setting (through data input from the pantograph). The second temporary models were articulated in turn. This helps to control the direction of the palatal surfaces of the maxillary incisors and canines. We used the cone method devised by Prof. Frank V. Celenza to contour the occlusion (Figs. 11-75).

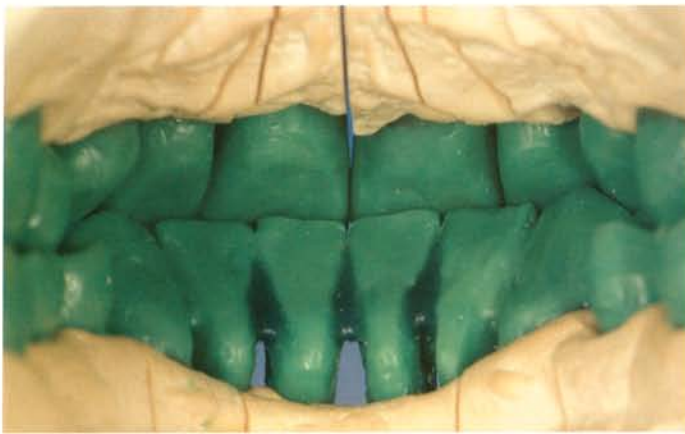


Fig. 14. Diagnostic wax-up of the anteriors in lingual-palatal view

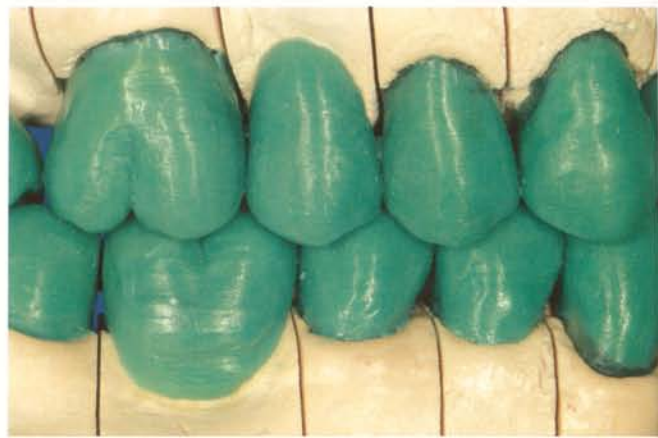


Fig. 15. A detail of the right arch. The diagnostic wax-up was performed for the condylar centrics.

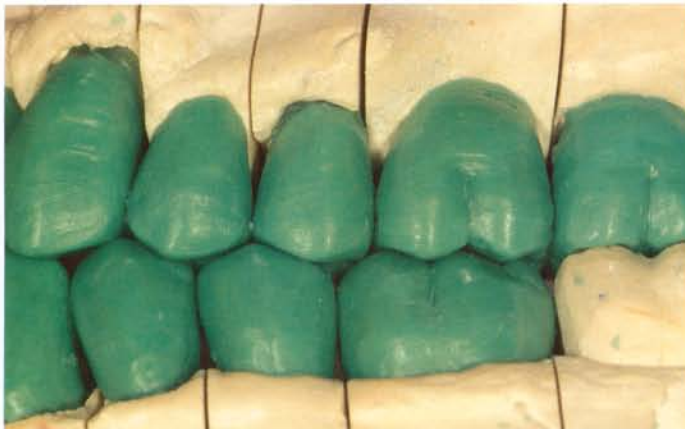


Fig. 16. View of the left arch after the diagnostic wax-up. The centric relation provides optimal occlusal precision.



Fig. 17. Diagnostic wax-up: palatal view of the left arch and ...



Fig. 18. ... of the right arch



Fig. 19. The Rossini technique presupposes axial drilling of the cusp tips, which enables a fresh individual static and dynamic evaluation in the light of cone positioning.

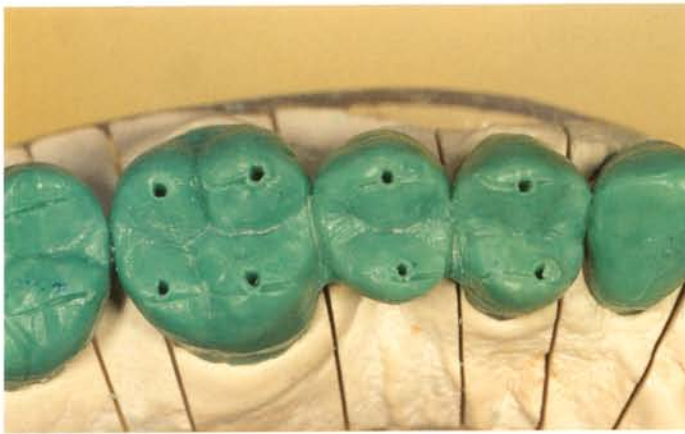


Fig. 20. Right arch following axial drilling of the cusps



Fig. 21. Saw-cut model. Axial drilling makes it possible to obtain information of the exact positions of the cusps through the individual wax-ups.



Fig. 22. The drilled and saw-cut occlusal surfaces are the starting point for individual wax-ups of the posterior occlusal areas.



Fig. 23. Right arch following placement of the cusps. The method devised by Prof. Frank V. Celenza pursues the physiological development of occlusal morphology.



Fig. 24. Individual wax-up: occlusal view of the lower arch



Fig. 25. Movements are dynamically tested in the articulator during the wax-up



Fig. 26. Individual functional wax-up in the maxillary right arch: cusps, inner and outer overhangs, marginal ridge lines and cusp fossae receive their functional configuration.



Fig. 27. Detail of the waxed mandibular right arch. You can easily recognize the esthetic and functional harmony.



Fig. 28. Check on the dynamics of lateral movement to the right; no disruptive contacts should be present.



Fig. 29. Check on the dynamics of lateral movement to the left. The occlusal relief is protected by the canine guidance, just as we indicated in our treatment plan.



Fig. 30. The individual wax-ups are fixed with the correlator. This technique enables a series of procedures to be used for transferring the data from the individual wax-ups. For example, the definitive metal framework and 1:1 veneering can be transferred through wax modeling.

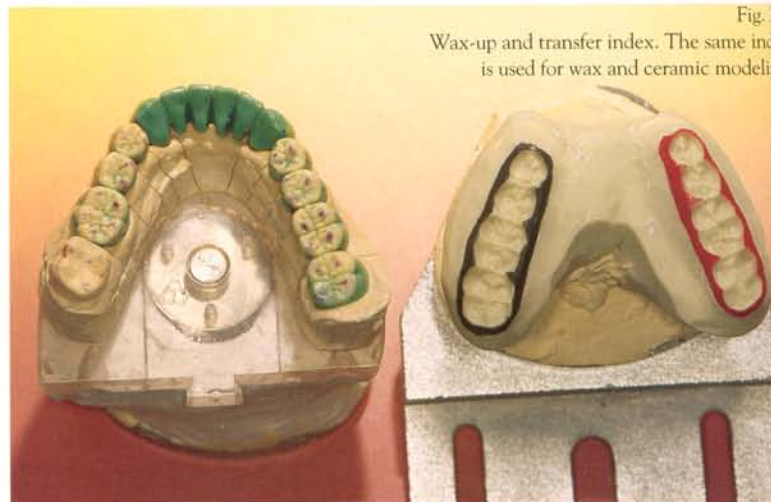


Fig. 31. Wax-up and transfer index. The same index is used for wax and ceramic modeling.

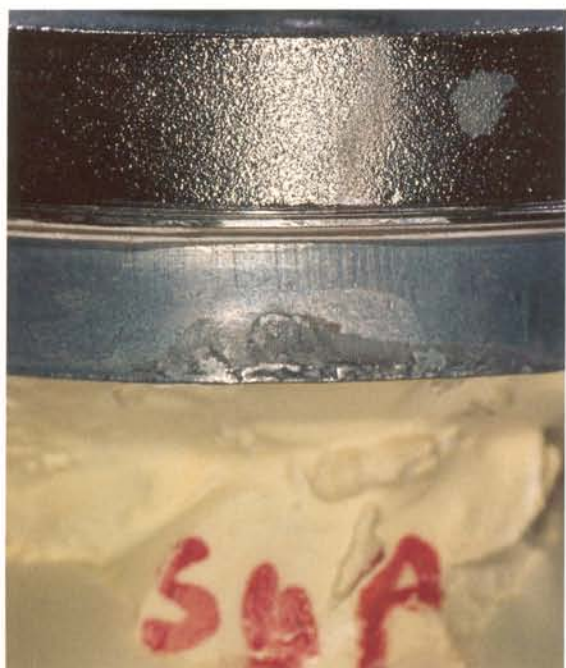


Fig. 32. Calibrated place holders must first be set up on the correlator before transferring the wax-up. This ensures uniform thickness in the ceramic layers.

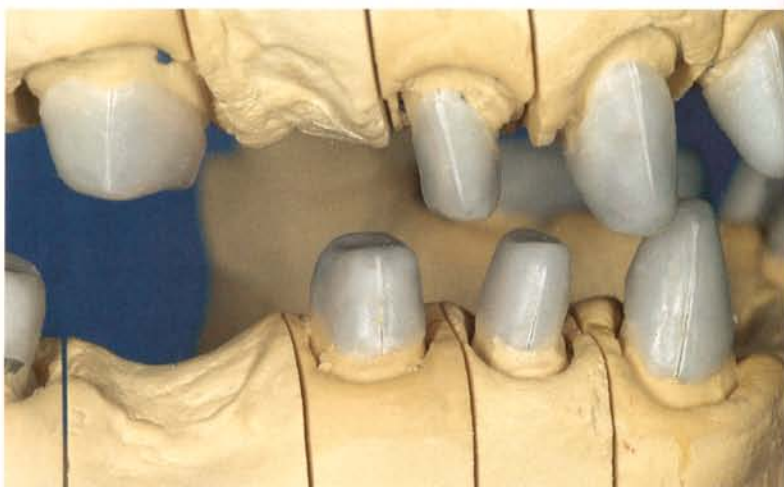


Fig. 33. The wax-up is removed. It will serve again, however, as a reference measure. The next step is to fabricate the thermoplastic coping, in which a small vestibular cut is made to permit residue-free firing in the furnace.



Fig. 34. Detail of the transfer process on the maxilla. It enables you to maintain three-dimensional shapes and volumes.



Fig. 35. Transfer of the maxilla is completed. Touch-ups are carefully performed. Specifically, the interproximal areas should be carefully finished – they should not be less than 3 mm².



Fig. 36. The transferred mandibular wax-up of the lower wax structure. Particular attention must be given to the marginal closure; use of a stereomicroscope is indispensable.



Fig. 37. Detail of the maxillary framework in frontal view. This is a good starting position for veneering; success is guaranteed.

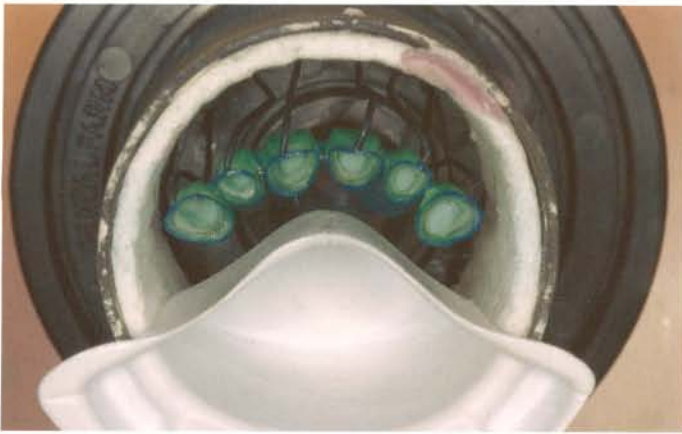


Fig. 38. Detail view of the investment. The maxillary anteriors are fabricated as a group following individual pouring. Because of this you will need special tools to position them centrally in the casting mold. Final precision depends on this precaution.

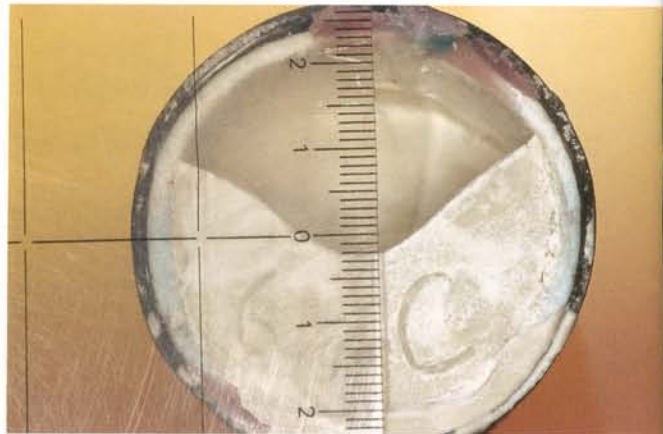


Fig. 39. Precisely controlled expansion of the investment material is critical for the success of the casting procedure.



Fig. 40. Detail of the casting flask after pouring. Sprue staining is uniform and there is no metal cone, indicating that the quantity and quality of precious metal were properly measured.



Fig. 41. The precise centering of the metal and the heat vent becomes visible during devestment. If you note these details and also leave the cast to cool slowly, you can be sure of a satisfactory result.



Fig. 42. Detail view of the cast object. Casting is one of the more delicate operations and it is necessary to apply all one's technical skills.



Figs. 43-44.
The framework is fitted to the mandible and the cast passes muster.

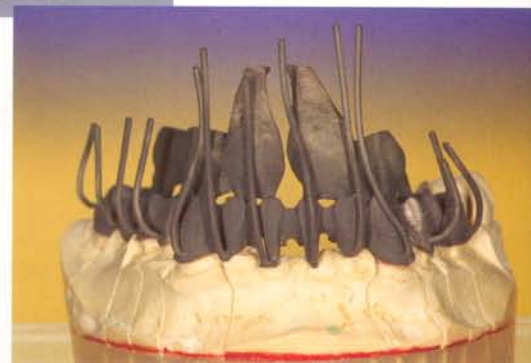




Fig. 45. Frontal view of details of the mandibular cast. The casting channels and heat vents are detached only after a try-in on the master cast is complete.

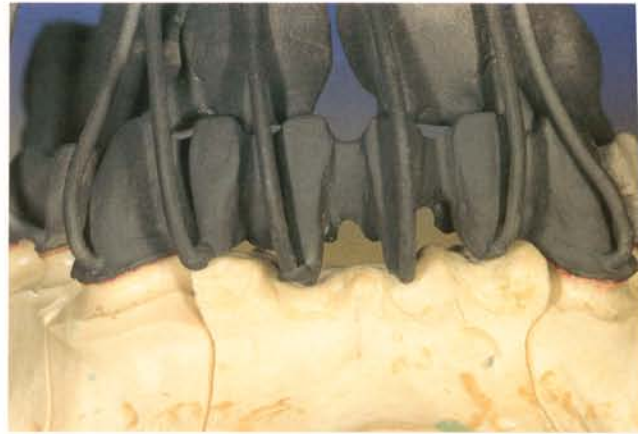


Fig. 46. Detail view of the right mandibular cast after heat treatment to enhance stability



Fig. 47. Maxillary and mandibular cast models on the Zeiser master casts in the Denar articulator



Fig. 48. Autopolymerizing acrylic resin is applied to the metal with the aid of correlator and occlusal matrices. We then send the restoration to the dental office for a try-in.



Fig. 49. Detail view of the anterior area. The application of acrylic to the metal framework provides another opportunity to check the individual guidances originally recorded and adjusted in the articulator



Fig. 50. Detail view of the metal frameworks with the applied acrylic. This procedure is the first important checkpoint to see how accurate our previous work has been.

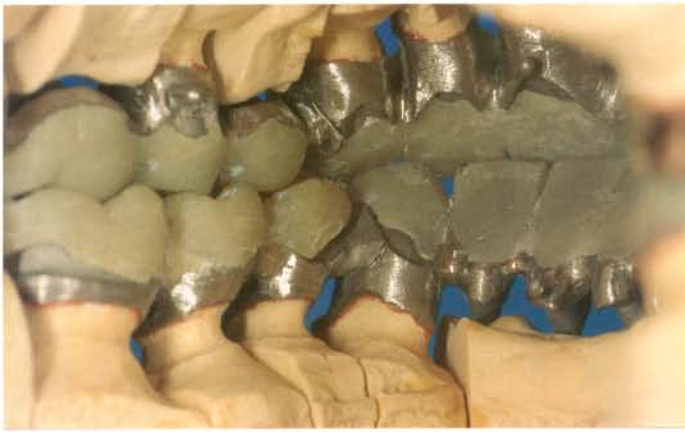


Fig. 51. Both left arches in palatal view...



Fig. 52. ... and both right arches

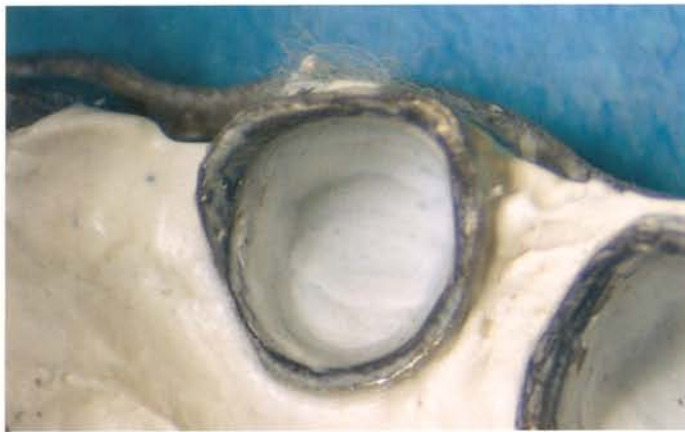


Fig. 53. Chairside try-in using MultiForm



Fig. 54. Everything is fine! We can keep going.



Fig. 55. Using as a counterarch the maxillary framework already tested for function and esthetics and layered with acrylic resin, I begin ceramic veneering in the mandibular anterior area. You can see here the right lateral excursion in detail.



Fig. 56. Canine guidance in a left lateral view



Fig. 57. Occlusal view of the mandible. The dentin materials have already been applied.



Fig. 58. Layering of the different ceramic materials: neck materials, stained 3D Effect materials, desaturated dentin, enamel, etc.



Fig. 59. You can see here how the application works with the aid of the correlator.



Fig. 60. Result after application of the different materials prior to the first firing. The lower right arch is now ready for firing.



Fig. 61. We check the result from the first firing. Here you see both right arches. The maxillary treatment is still in acrylic, but the mandible has already been transferred to ceramic. You can easily detect how the different ceramic layers were applied.



Fig. 62. The mandibular restoration prior to firing. All characteristics have been applied, using different materials and the "internal stain" technique. These will give the restoration an individualistic and natural-looking appearance.



Fig. 63. We have applied the secondary enamel materials to the lower left arch.



Fig. 64. The mandibular restoration after the second firing



Fig. 65. Now it is the turn of the maxilla – the maxillary framework cleaned of acrylic and finished, in occlusal view.



Fig. 66. The maxillary framework now receives opaquer, giving this result. The maxillary framework has three units: one for the anterior area, and two for the posterior sides. All will be furnace soldered following ceramic veneering.

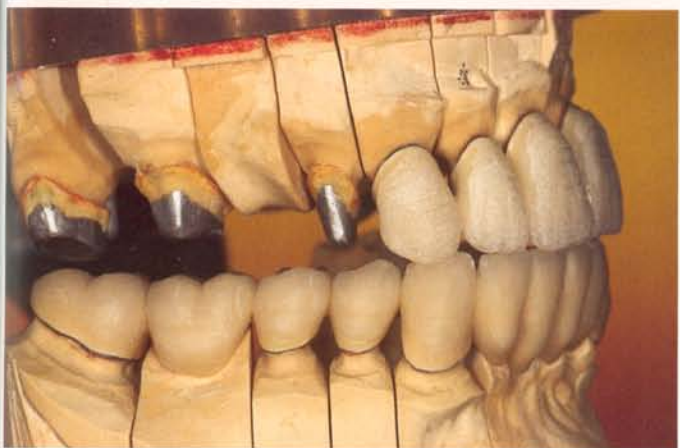


Fig. 67. As previously described, ceramic layering of the maxillary framework begins in the anterior area (right lateral view). The procedure for ceramic application is similar to that for the mandible.

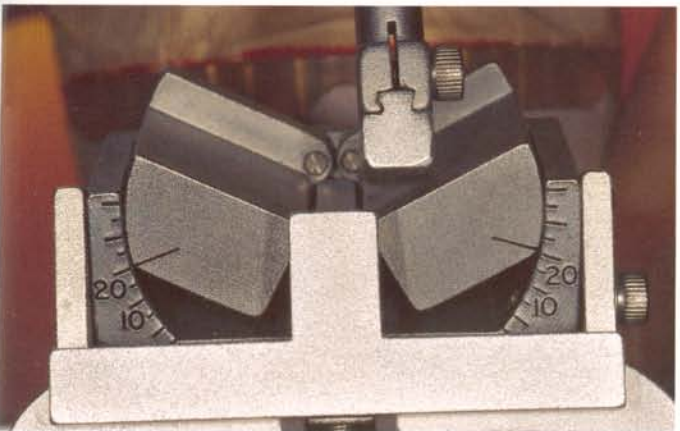


Fig. 68. Detail view of the incisal pin on the adjustable mechanical plate of the articulator



Fig. 69. When the application is complete, the restoration is shipped to the dental office for a chairside try-in. The dentist then performs a try-in of the first firing with MultiForm.



Fig. 70. Finished restoration after remounting in the articulator. The ceramic now polished.



Fig. 71. Detail view of the two left arches after glaze firing



Fig. 72. Lingual-palatal view (left arch). Note the special wings at teeth 11-12 and 27-28 for furnace brazing.



Fig. 73. A plaster occlusal matrix is placed over the entire length of the ceramic-veneered dental arch to enable furnace brazing. Next, a model in investment material is prepared for the brazing procedure. Once this is complete, the matrix must sit perfectly on the occlusal side. The picture shows our check of this.



Fig. 74. The cut-back after remounting on the articulator. Our objective is to ensure maximum stability by eliminating all eccentric obstacles in protrusion and lateral movements.



Fig. 75. Checking the canine guidance. Only when this is satisfactory can we start on the definitive mechanical polishing with rubber wheel and diamond tipped brush. Pay very careful attention to the details, such as the interproximal areas and margin closures.



Fig. 76. The finished maxillary prosthesis in situ. Our numerous checks along the way spare us unpleasant surprises and ensure a predictable result.

Fig. 77.
Finished mandibular arch. Close collaboration between dental office and laboratory is substantially responsible for the pleasing result obtained.

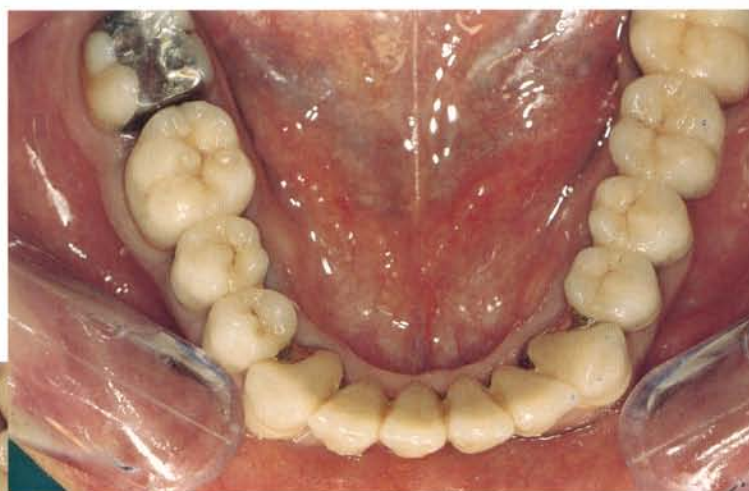
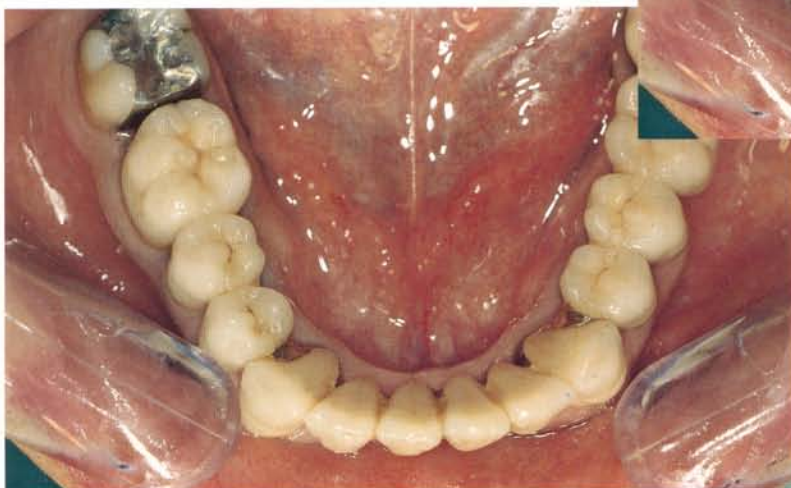


Fig. 78. Routine follow-up examination at 24 months. Although the patient is a heavy smoker (50–60 cigarettes/day), the prosthetic and periodontal situation is good.

Summary

Occlusal stability, the eccentric movement dynamics, and the pleasing esthetics we obtained go to show that the patient received high quality treatment (Figs. 75–80). The planned restoration became possible, due largely to close interdisciplinary collaboration. The single most important aspects were the clinical/technical

treatment plan and the consistent checking of all important steps in our work. The final whole is the result of the synergy of many hands under the coordination of a variety of persons.



Fig. 79. The restoration after prosthetic and periodontal treatment. The picture was taken before dental cleaning in order to emphasize how important correct polishing of the ceramic is – especially in the presence of deficient oral hygiene, as was the case here

About the author

Paolo Smaniotto completed his dental technology education in 1978. Since 1981 he has been the owner of a laboratory in Bassano del Grappa. Between 1983 and 1992 he attended courses by renowned dental technicians from across Europe. Between 1994 and 1996 he attended the Porta Mascarella college in Bologna and participated in the Prosthetic Studies Research Group. He is a founding member of the AIOP, a member of Dental Excellence – International Laboratory Group and a technical consultant for various international professional journals. He is the holder of two international patents and the author of numerous technical publications in Italy and abroad.



Dr. Flavio Tura studied medicine and surgery at the University of Padua until graduation in 1983 and has kept up continuing medical education since then. Between 1987 and 1988 he undertook further studies in implantology under Prof. Albrektsson and since then has specialized in implant-supported restorations. Between 1994 and 1996 he specialized in the field of Prosthetics at the Porta Mascarella college in Bologna under Dr. G.F. Di Febo and Dr. G.F. Carnevale. He is a member of the Italian Association for Osseointegration, the Italian Academy of Prosthetic Medicine, the Italian Association for Periodontology and the Porta Mascarella study group. He is also a presenter and author of numerous articles in professional journals. He has his own practice in Bassano del Grappa.



Fig. 80. This lateral view picks up the harmony of esthetics and function.