



# A prosthetic solution that conforms with nature: *different materials, single goal*

The article presents technical-clinical procedures adopted for a prosthetic solution that conforms with nature, using coordinated clinical procedures and many technical procedures carried out with the aid of different metal-free materials for the fabrication of prosthetic restorations, specifically Zirconium Dioxide (Zirconia) and Lithium Disilicate.

What these two materials have in common is that both have been stratified with special dedicated ceramic masses.

The layering technique described by the images involves the use of ceramics with different densities located in different areas from the cervical third to the middle third to the incisal third.

The described technique makes it possible to obtain good metamerism integration, the ultimate goal of any Morpho/Aesthetic/Functional rehabilitation.

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## About the Authors

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## Case presentation

**Patient:** Margaret

**Age:** 30

**Profession:** Nurse

**Medical History:** Negative

The patient has a history of ceramic metal restorations in the upper arch with a bridge from 14-12, and a constant pain corresponding to tooth 14. Prosthetic margins are presently incongruous due to diffuse marginal gingivitis.

On tooth 15 we note the presence of root canal therapy in congruence with teeth 15, 14, 12, 46 and the presence of carious lesions affecting many teeth. In the lower arch there is a failing prosthetic crown on tooth 46 and incongruous conservative restorations. The



patient is aesthetically dissatisfied with her restorations, due to the presence of prosthetic crowns of inadequate proportion with visible metal margins that show when she smiles along with tooth #22 which has an inappropriate shape. The patient wishes to improve her smile and general oral health.

### Initial extraoral images

The patient, dissatisfied with her smile, presents herself for examination due to recurrent odontalgia, chewing

difficulties and to remedy the exposure of the metal margins of her existing crowns which are apparent when she smiles (Figs. 1 to 3).

We appreciate the presence of prosthetic crown & bridge that are inadequate in terms of shape and proportion and are resulting in masticatory discomfort for this patient.

Tooth 22 appears harmonious in shape and proportion compared to the adjacent teeth (Figs. 4 to 6).

### Initial intraoral images

Details of the occlusal table of the maxillary prosthetic crown & bridge and inadequate lower anatomy, in the presence of chipping in functional areas and conservative failing restorations in both arches (Figs. 7 to 9).

The patient reports masticatory discomfort, aesthetic discomfort and marginal gingivitis due to recurrences of bleeding caused by difficulty in home hygiene maintenance (Figs. 10 to 15).



The presence of bacterial plaque is highlighted on the lingual aspects of the lower arch and in failing conservative reconstructions that are worn (Figs. 16 to 21).

## Analysis of the periodontal situation

Marginal gingivitis with the presence of bacterial plaque and bleeding are at the

level of the prosthetic crowns and on the lingual sides of the mandibular arch. After hygiene therapy, education and motivation for oral hygiene, a general improvement in plaque indexes and gagging were found, despite the patient have difficulty maintaining hygiene due to the horizontal over contour and failing margins of previous prosthetic reconstructions.

## X-ray examination analysis

The radiographic examination reveals inadequate endodontic treatment of 15, 14, 12, 46. Note the presence of a ceramic metal bridge from 14-12 (probably made due to the agenesis of the lateral incisor and the ectopic position of the canine in sextant 1).

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Mobility		0	0	0	0		0	0	0	0	0	0	0	0	0	
Implant																
Furcation																
Bleeding upon Probing																
Plaque																
Gingival Margin																
Probing Depth																
	3	2	2	2	1	2	2	2	2	1	2	2	1	2	2	2

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Gingival Margin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Probing Depth	4	3	2	2	2	2	1	2	3	2	3	2	1	2	1	1
Plaque																
Bleeding upon Probing																
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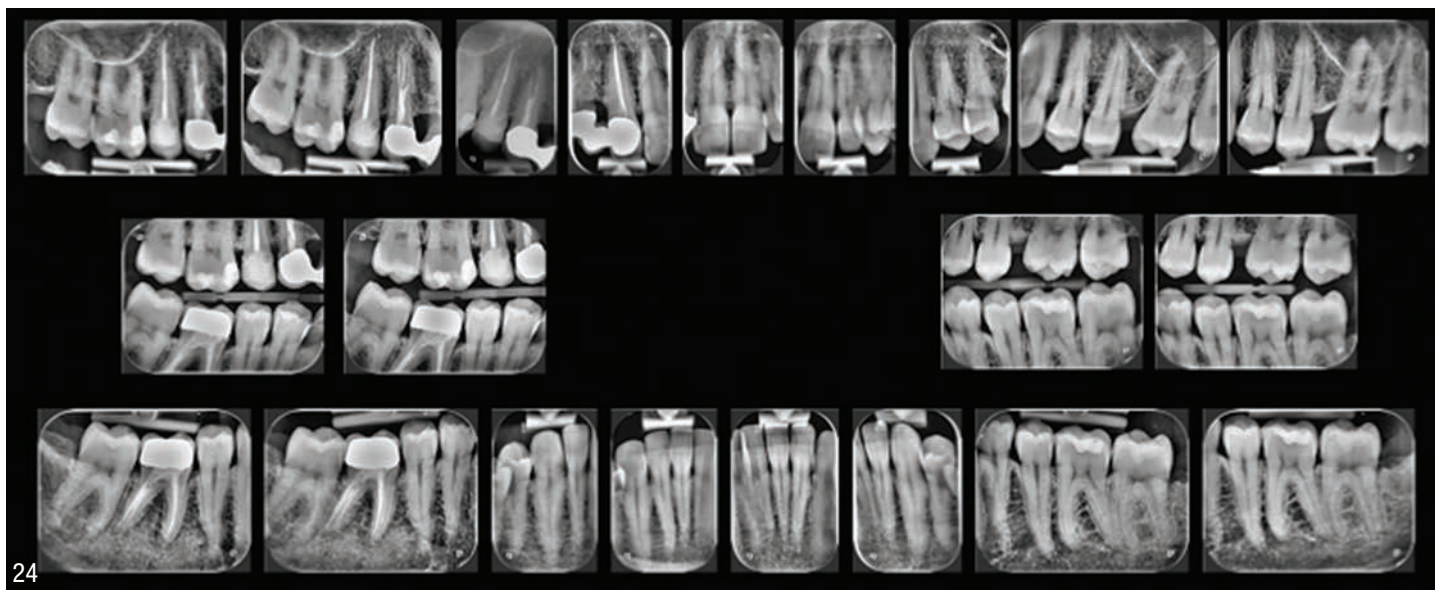
  

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Gingival Margin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Probing Depth	4	3	2	2	2	2	1	2	3	2	3	2	1	2	1	1
Plaque																
Bleeding upon Probing																
Furcation																
Notes																

	Notes	Furcation	Bleeding upon Probing	Plaque	Gingival Margin	Probing Depth
Lingual						
Buccal						

	Notes	Furcation	Bleeding upon Probing	Plaque	Gingival Margin	Probing Depth
Gingival Margin						
Probing Depth						
Plaque						
Bleeding upon Probing						
Furcation						
Implant						
Mobility						

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There is a crown on tooth 46 with over-contoured prosthetic margins. The absence of 12 and the position highlight ectopic tooth 13.

There are conservative composite

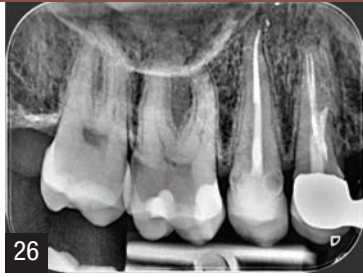
restorations in teeth 16, 17, 27, 35, 36, 37, 45 and 47. Previous odonto-prosthetic restorations create functional discomfort for the patient in static occlusion and interferences in mandibular dynamics. A Class II

Angle relationship is evident between the first and sixth sextant and the third and fourth sextant. Overbite is 3mm. Overjet is 4mm. In protrusion, an incisive guide is noted, in right and left laterality group function.

## Sextant 1



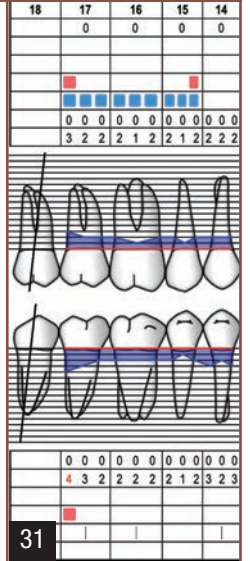
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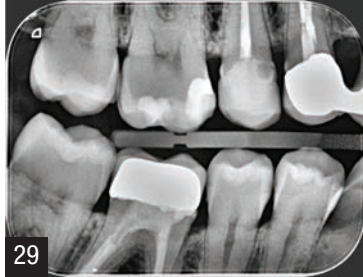
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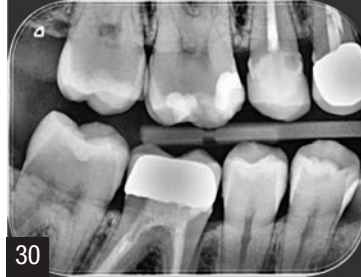
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## Sextant 2



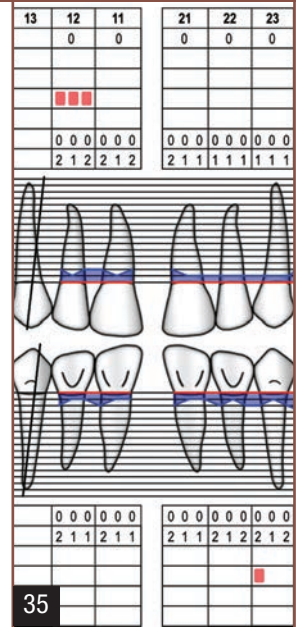
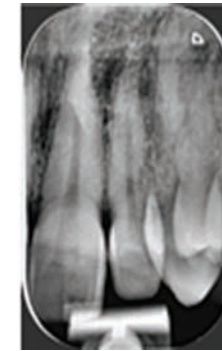
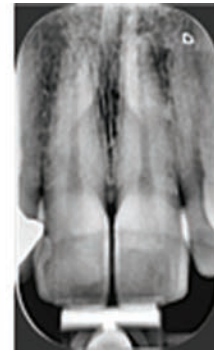
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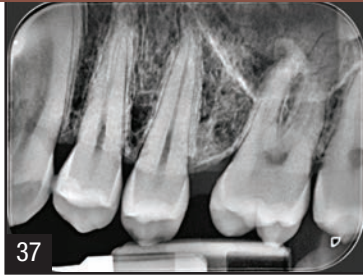


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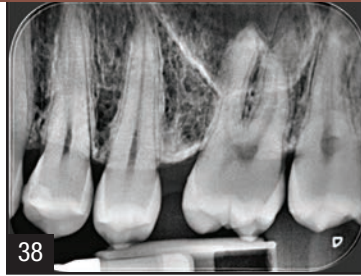
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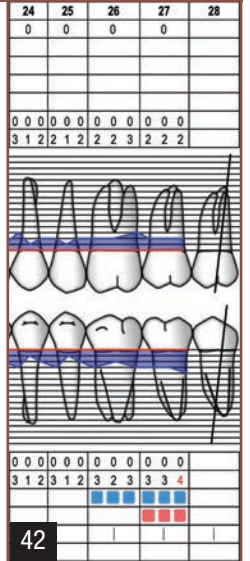
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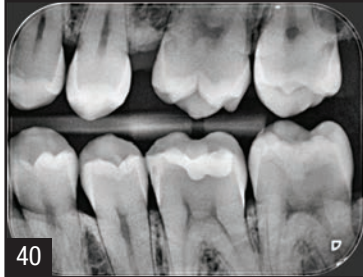
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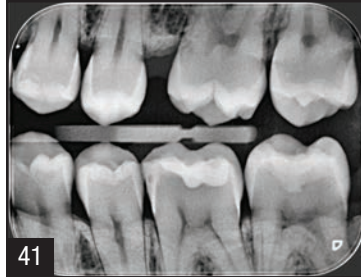
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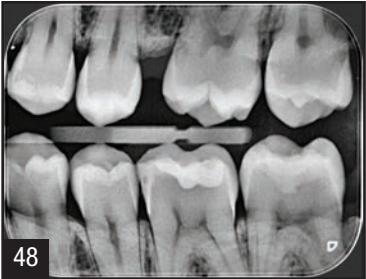


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1	1	1	1	1	1	1	1	1	1

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1







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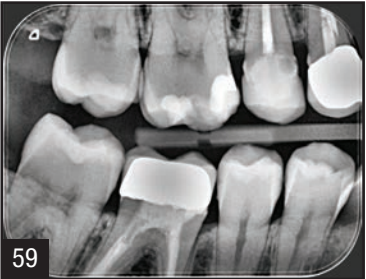
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1	1	1	1	1	1	1	1	1	1



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0 0  
42 41

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31 32 33



## Initial models

The stereolithographic models, mounted in articulator in MI, highlight the inadequacy of the shape and proportion of the prosthetic restorations and the presence of an inadequately shaped lateral incisor in position 22 (Figs. 61 to 63)

## Analysis wax-up

With the digital analysis, we wax-up the positions, the forms and relationships between the teeth, thus defining the best

aesthetic-functional solution for future odonto-prosthetic reconstructions that (Figs. 64 to 66)

## Diagnosis and Prognosis

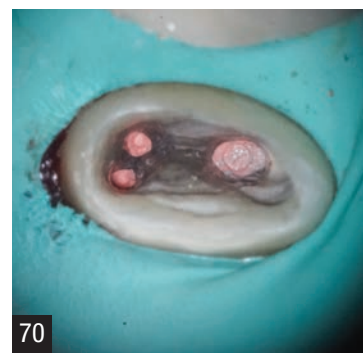
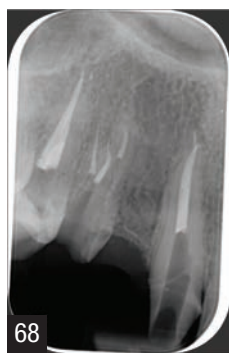
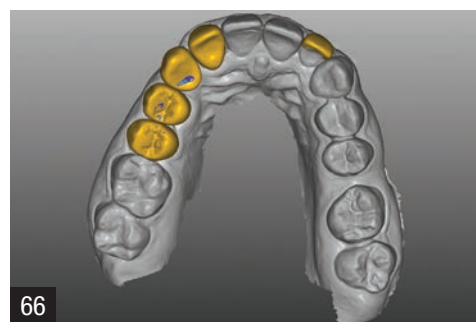
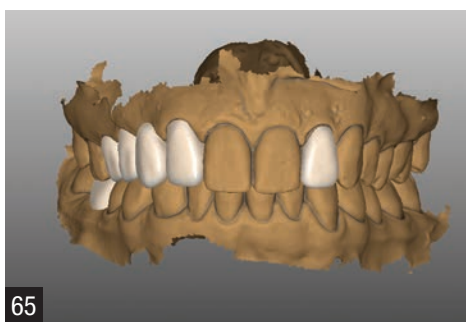
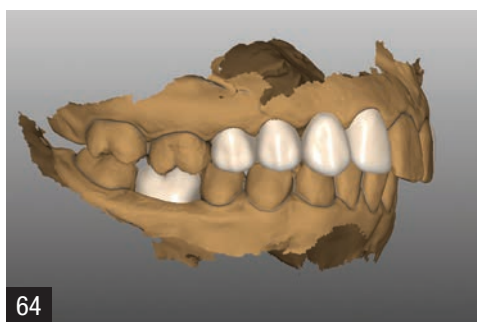
### • Diagnosis

- Metal prosthetic reconstructions: 14 -12 bridge and 46 crown, biologically, aesthetically and functionally inadequate.
- Inadequate endodontic treatment of teeth 15, 14, 12, 46.
- Infiltrated conservative restorations on teeth 15, 16, 17, 24, 27, 35, 36, 37, 45, 47.

- Presence of carious lesions on teeth 25, 26, 34.
- Absence of tooth 12 and ectopic location of tooth 13.
- Presence of lateral incisor in position 22 is of inadequate shape

### • Prognosis

- The prognosis of teeth: 17, 16, 15, 14, 12, 24, 25, 26, 27, 34, 35, 36, 37, 45, 46, 47 is favorable - prior success of endodontic therapy, conservative and definitive prosthetic restorations are congruous and balanced





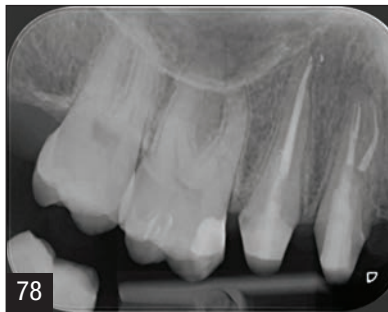
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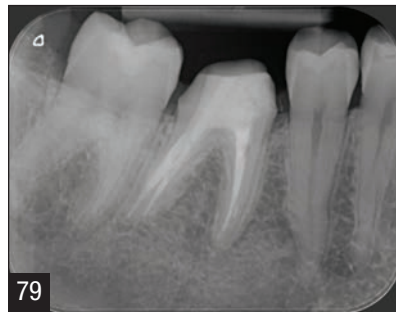
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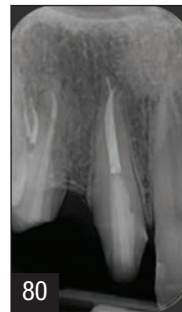
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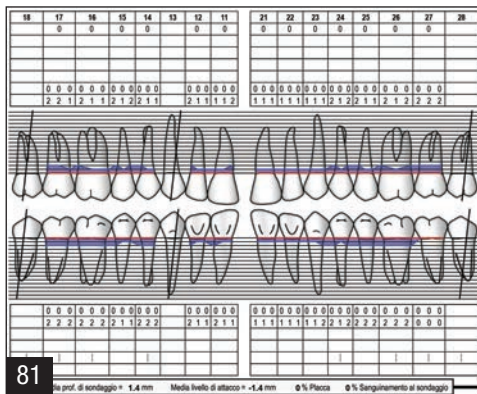
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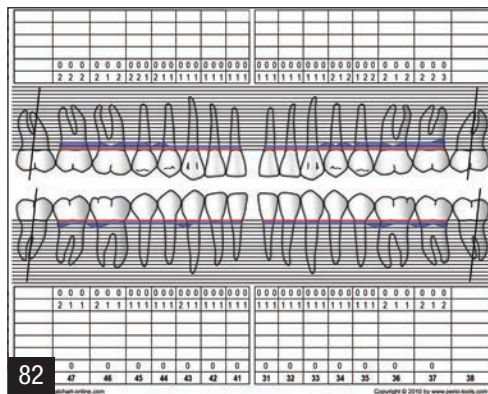
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- Finalization of the ceramics on stereolithographic models
- Definitive cementation
- Nightguard application

## Pre-prosthetic Therapies

12-X Prosthetic Devices. 14 and 46 removed. Endodontic retreatment of 12, 14, 15 and 46 with the aid of the operative microscope. The presence of three independent root canals is highlighted in tooth 14 (Figs. From 67 to 70).

Performed endodontic retreatments, after having evaluated the residual tooth structure, we proceeded with the pre-prosthetic restorations of the teeth with prefabricated posts in fiber glass and composite (Figs. from 71 to 74).

## Temporary Prostheses

The application of the provisional in position 14 -12, 15, 22 and 46 allowed the execution of endodontic and conservative therapies, the recovery of periodontal health, correct management of functional aspects and aesthetic integration of the temporaries themselves (Figs. 75 to 77)

## Pre-prosthetic therapies and control radiographs at the time of the final impressions.

Radiographs highlight the proficiency of endodontic retreatments and pre-prosthetic reconstruction of abutments 14, 15, 12 and 46 before the final impressions (Figs. 78 to 80)

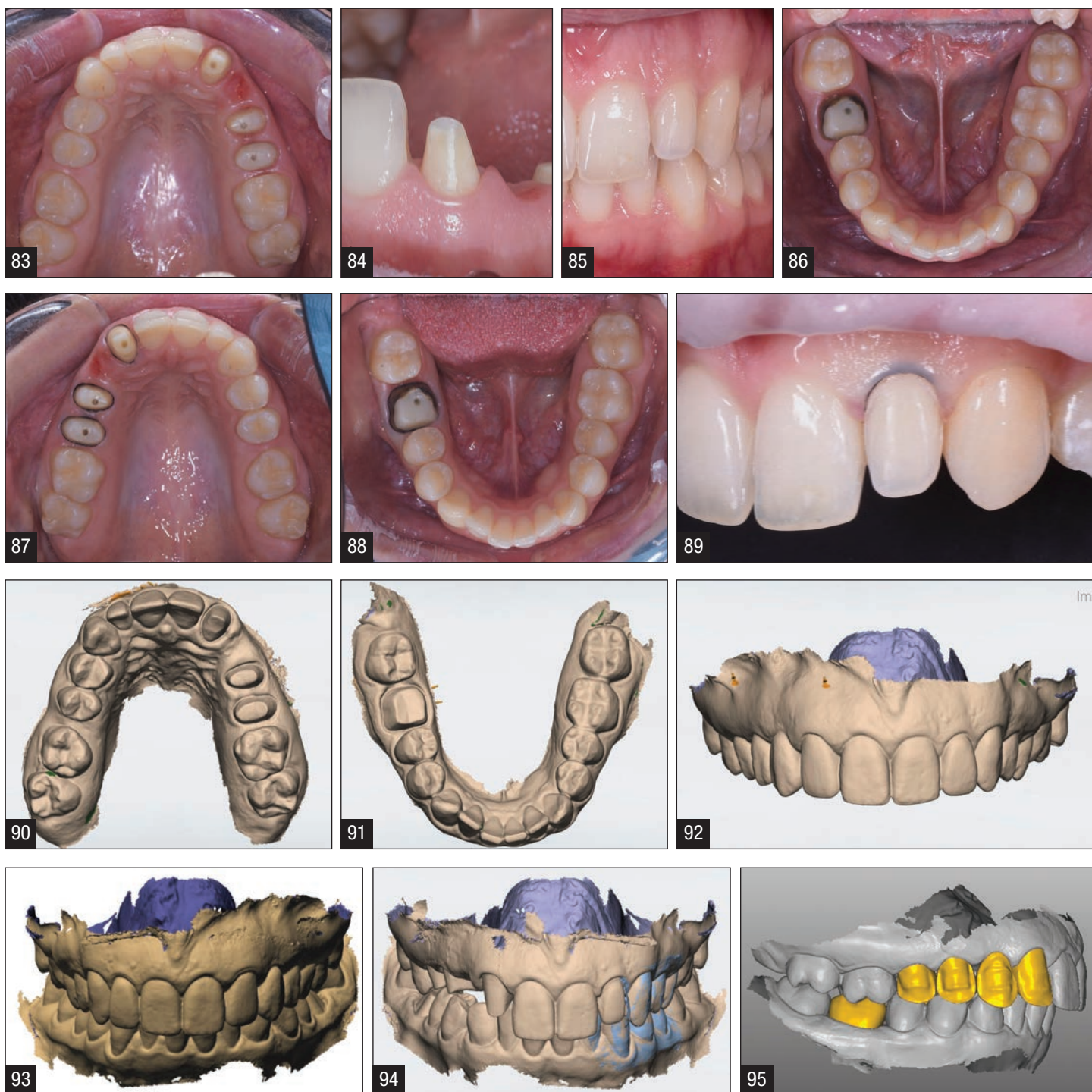
Re-evaluation at the time of final impressions. Periodontal examination (Figs. 81 and 82)

## Treatment plan

- Causal therapy with education and motivation for oral hygiene
- Provisional pre-filing 15, 14-12, 22 and 46
- Conservative reconstructions in direct composite on teeth 16, 17, 24, 25, 26, 27, 34, 35, 36, 37, 45, 47
- Pre-prosthetic restoration of teeth 15, 14, 12 and 46 with prefabricated pins
- Definitive prosthetic finalization in partially stratified zirconia on the vestibular aspect of natural abutments 15, 14-12, 46 and lithium disilicate veneer stratified in ceramic on tooth 22
- Night-guard and maintenance programme for the patient

## Prosthetic Operative Sequence

- Impressions for the construction of the provisionals for 15, 14-12, 22 and 46
- Prosthetic preparation and application of the provisional 15, 14-12, 22 and 46
- Endodontic retreatments and pre-prosthetic restorations of teeth 15, 14, 12 and 46
- Precise final digital impressions and digital bite registrations
- Clinical Trial of Partially Layered Zirconia Frameworks 15, 14-12, 46 and layered lithium disilicate in ceramic for 22
- Try cookie textures with occlusal and aesthetic verification



### Reassessment at the Time of Final Impressions

An excellent state of periodontal health is highlighted before the final precision digital impressions (Figs. 83 to 86).

### Conditioning of the marginal tissues at the time of the final impressions

The intrasulcular retraction cords are inserted into the sulcus of the teeth in the upper arch (Figs. 87 to 89)

### Final Impressions

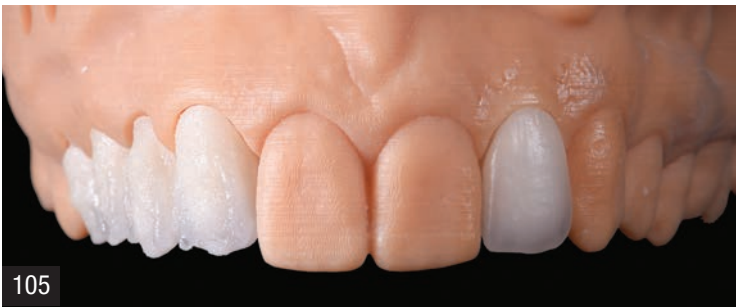
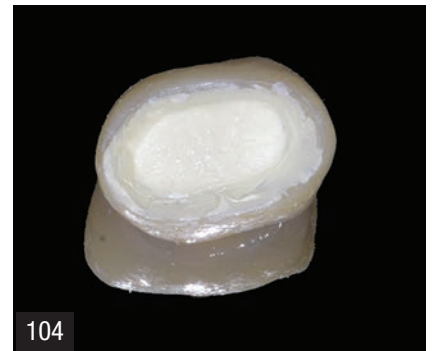
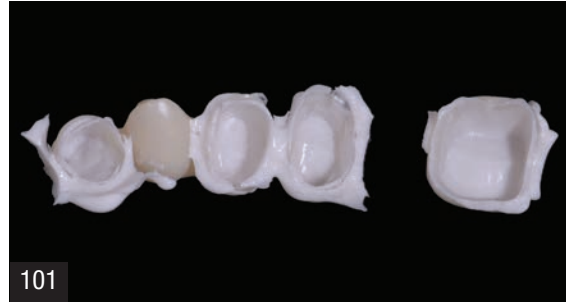
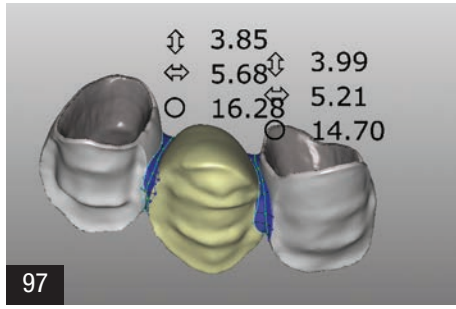
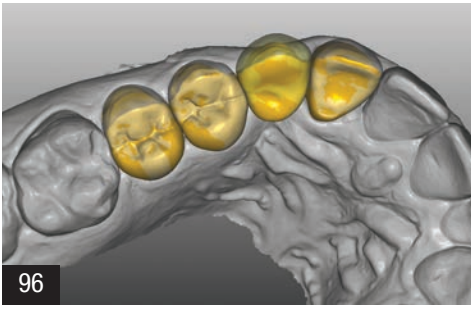
Precision digital impressions of the upper and lower arches were taken (Figs. 90 and 91).

### Records sent to the Laboratory

The digital impressions of the temporaries were taken of the upper and

lower arches and bite registration of the patient in static position. Subsequently, the habitual occlusion was recorded between the model with prosthetic abutments of the upper and lower arches.

Thus, it was possible to create the digital cross-mounting and to transfer all functional information and aesthetics that were achieved with the functionalized provisional (Figs. 92 and 94).



## Structures in Models

The assembled zirconia structures made with CAD provide the cut-back space needed for layering the vestibular ceramic (Figs. 95 to 98).

## Test Structure

The good marginal fit of the internal structures is initially tested and evaluated with silicone fit-checker and then with zinc oxide paste and eugenol. The static

and dynamic occlusion is checked and perfected with respect to the conformative prosthetic rehabilitation approach (Figs. from 99 to 104).

## Finalization of the Ceramics

We proceed after the test structure to the definition of the aesthetic-functional detail. Particular attention is dedicated to the ceramization of the vestibular surfaces of the zirconium oxide dental prosthetics and the management of

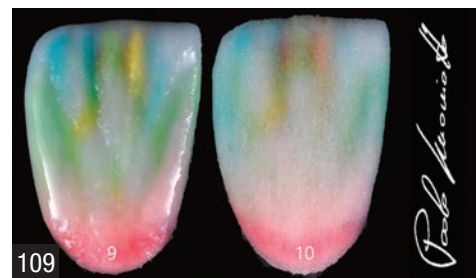
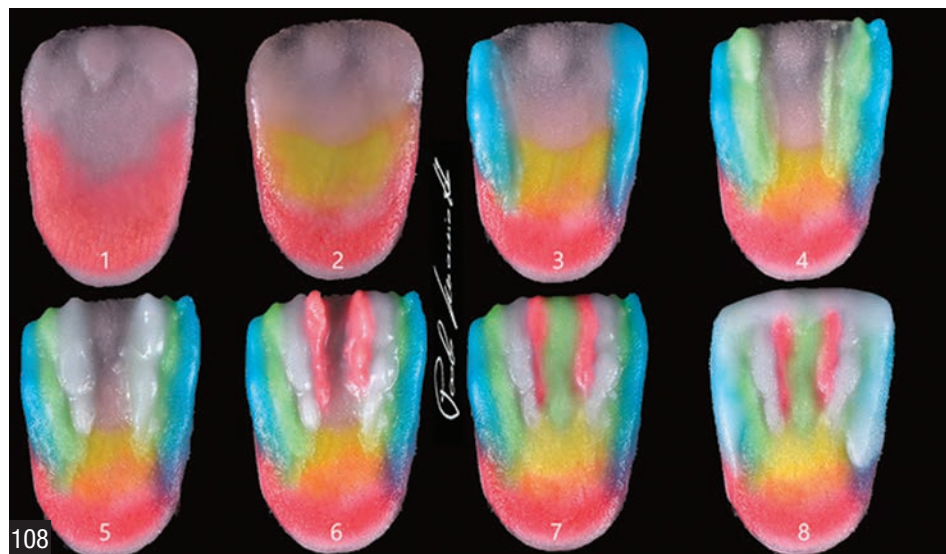
the layering of the vestibular lithium disilicate ceramic on the veneer. (Figs. 105 to 110).

## Bisque Bake Try-in

It highlights the correct seating of the prosthesis and a correct relationship with marginal tissues in relation to hygiene. A good aesthetic integration is appreciated of the odonto-prosthetic restoration with the patient's smile (Figs. 111 and 112).

## Final Extraoral Images

We strive for a good balance between final rehabilitations and a natural integration of the same in relation to orofacial relationships and naturalness of the second sextant teeth (Figs. from 113 to 115)





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123

rehabilitations confirmed the periodontium with plaque indices 15% lower and bleeding indices less than 10%.

#### • X-ray examination

Post-cementation intraoral radiographs highlight the proficiency of the prosthetic restorations and the endodontic retreatments (Fig. 124).

### Final Intraoral Images

The integration and naturalness of the zirconia ceramic and lithium disilicate restorations is seen both at the tissue and dental levels (Figs. From 116 to 118).

Occlusal and anterior aspects of the final prosthetic reconstruction (Figs. 119 and 120).

Static and dynamic occlusal verification final post-cementation (Figs. 121 to 123).

### Final Evaluation of the Case

#### • Dental examination

The absence of symptoms and the restoration of masticatory function with fixed restorations made of partially layered zirconia ceramic and layered lithium disilicate are an expression of stomatognathic rehabilitation integration on natural roots

#### • Occlusal examination

The prosthetic reconstruction was

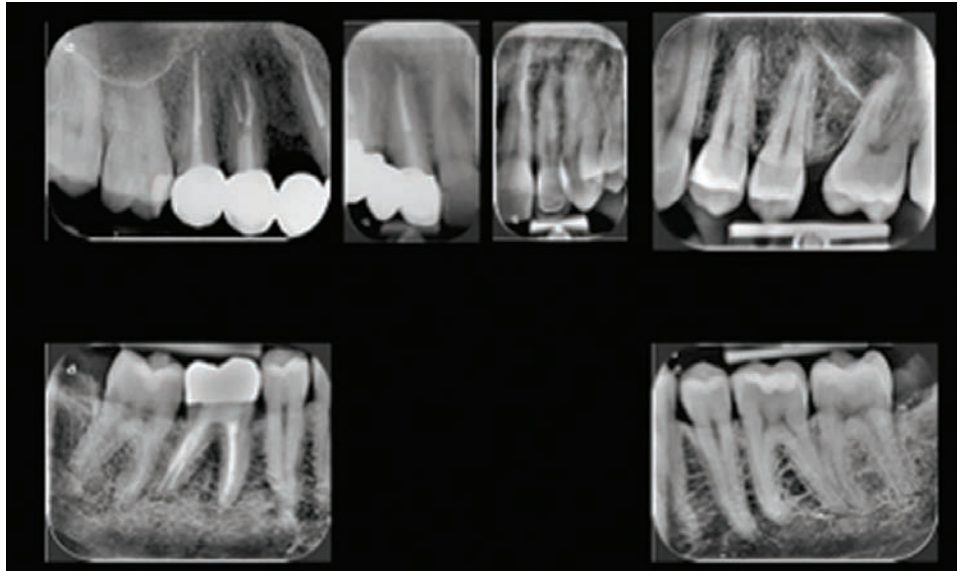


Fig 124: Final radiographic examination

performed with an occlusal relationship Angle Class II, cusp marginal ridge in static occlusion, a protrusive incisive guide, and a group function in laterality right and left.

#### • Periodontal examination

The excellent integration of prosthetic

### Considerations on the Final Results

Satisfaction - both aesthetic and functional - patient is now able to rely on teeth that permit proper chewing and socializing while smiling without conditions and inhibitions. These are reasons for deep satisfaction on the part of the patient. 