



Summary

The technical procedure for individualising prefabricated prosthetic teeth and characterising soft-tissue areas during the fabrication of a complete denture using the Gradia and Gradia Gum range is described. In shaping and shading the author closely follows the example of nature, which he studies extensively and has documented in this article.

Key words

complete denture; gingival shapes; Gradia; Gradia Gum; prefabricated teeth

Individual Characterisation of Prefabricated Prosthetic Teeth and Soft-Tissue Areas

Bernd van der Heyd

Restoration of lost oral structures in terms of aesthetics and function calls for materials that can be integrated into a natural oral environment. These materials must lend themselves to modification if total aesthetic and functional harmony are to be achieved. This newly created harmony makes it easier for the patient not merely to accept the denture but to "make friends" with it, incorporate it and thus allow it to become a new element of his or her body. This article is intended as a brief introduction to the layering technique for age-specific replacement teeth and individual reproduction of the gingiva.

A wide diversity of shapes and colours occurs naturally, both in teeth and the soft tissue areas (Figs 1-7). The technologist needs to be able to recognise and understand this naturally grown diversity in order to copy it functionally and aesthetically (Fig 8).

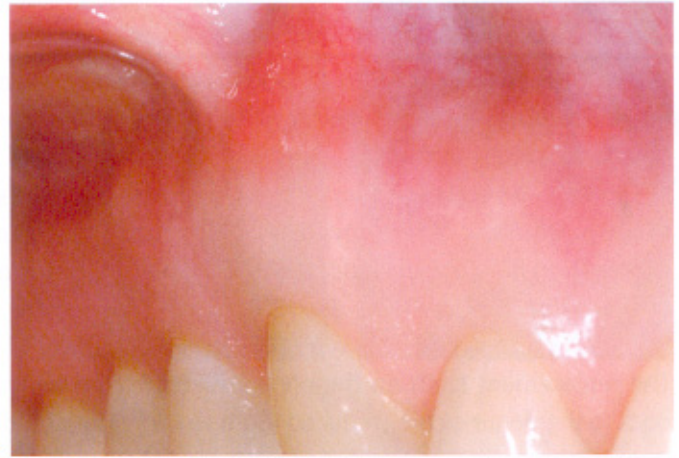
This step-by-step protocol should be followed to help individualise work with the Gradia and Gradia Gum range from GC. The shades available in this range allow the tech-

Introduction

Materials



Figs 1-4 Different shapes and shades of natural teeth and natural gingiva.



Figs 5-7 Detailed photos of natural diversity.





Fig 8 Nature copied in function and aesthetics.

nologist to assemble teeth in such a way that reconstruction can be carried out in keeping with nature. A natural effect with replacement teeth can be achieved simply with the Gradia veneering material.

Gradia Gum comes in two different consistencies: a paste (G) and a gel (GM). Both allow precise and simple modelling. The excellent clinical properties of Gradia and Gradia Gum offer a wide variety of applications, ranging from complete dentures to partly removable implant-borne dentures.

The replacement teeth on the previously fabricated denture (Fig 9) should be ground back to the dentine core (reduced tooth shape) (Fig 10). In order to check the shape and layer thickness, it is advisable to prepare one half of the tooth first (Figs 11-13). In order to increase the surface area, sandblast the prepared tooth with Al₂O₃ at a grain size of between 50µm and 110µm at an acute angle (Fig 14). The prepared surfaces should now be thoroughly cleaned with compressed air (caution: do not use steam because of the risk of water being incorporated).

Coat the prepared prosthetic teeth with GC composite primer and light-cure for one minute in order to prepare for a perfect adhesive bond, then apply intensive colour to produce individual shade characterisation. This is followed by renewed light-curing for 30 seconds. During layering, thinly back the dentine with T0, then layer over with effect and incisal materials and extend into T0 (Fig 18). There should be an interim polymerisation with the GC steplight SL-I light-curing unit after each of these working steps.

Coat the tooth thinly with T0 (Fig 19). Complete the shape of the tooth with various incisal materials, laying on enamel borders and enamel cracks while the material is in an adaptable state (Fig 20).

Individual Characterisation of Replacement Teeth

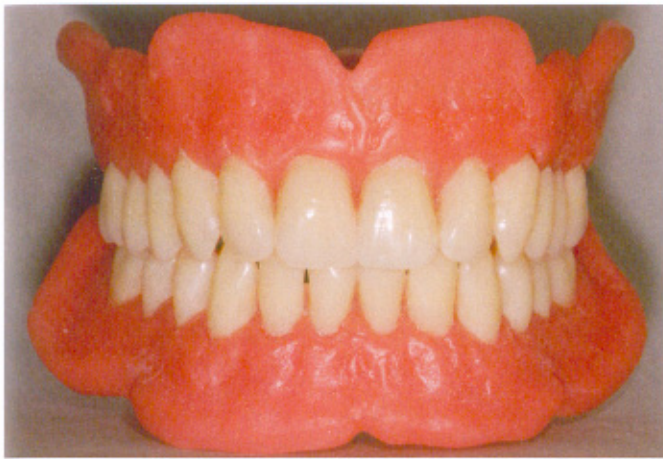


Fig 9 Previously fabricated complete denture.



Fig 10 The replacement teeth are ground back to the dentine core (reduced tooth shape).



Figs 11-13 In order to check shape and layer thickness, it is advisable to prepare one half of the tooth first.

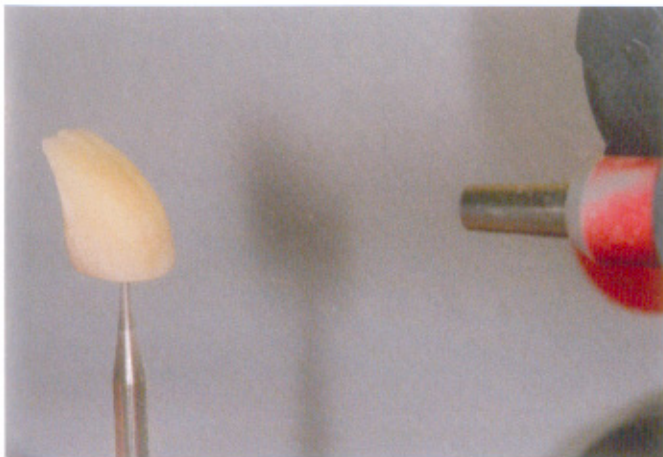


Fig 14 Sand-blasting the prepared teeth.

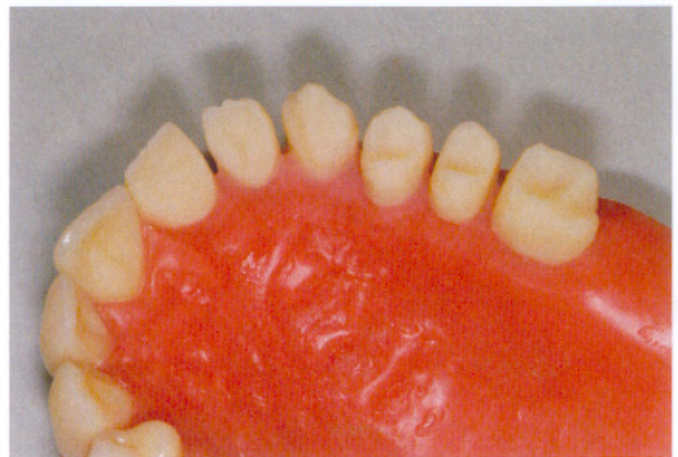


Fig 15 The worked surfaces have been cleaned with compressed air.

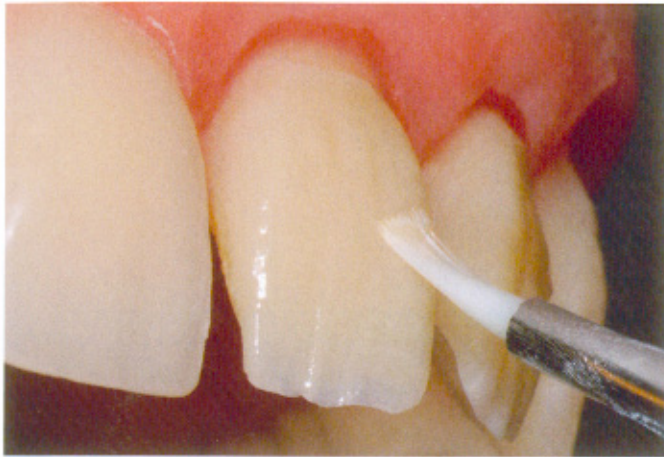


Fig 16 Coating the prepared teeth with GC composite primer.

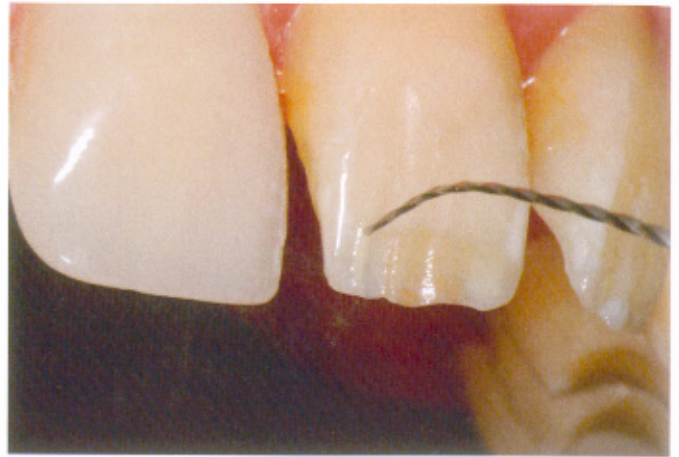
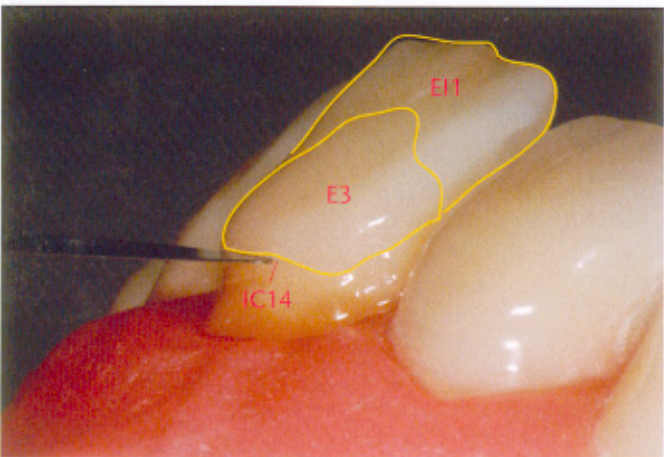
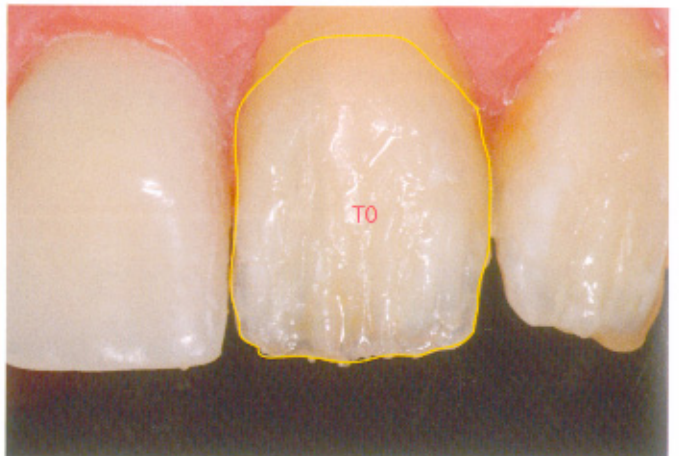
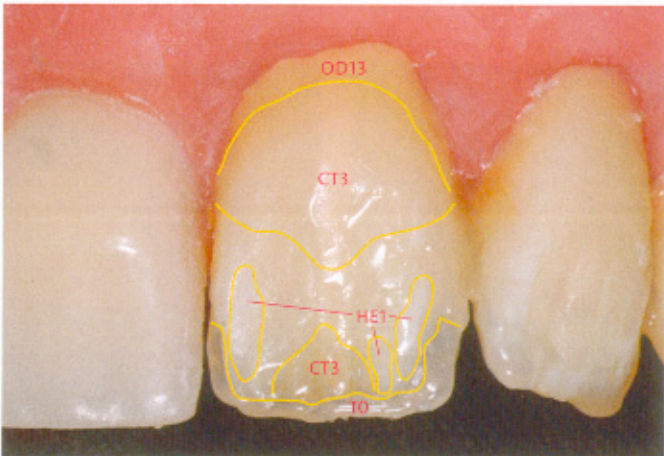


Fig 17 Individual colour characterisation with intensive colour.



Figs 18-20 Layering pattern for individualisation.

Cover the layering with GC Gradia air barrier, carry out final curing for three minutes and thoroughly clean with a steam jet (Fig 21). Final finishing and surface-contouring should be done with commercially available tungsten-carbide and diamond abrasives (Fig 22). Pre-polish the teeth with goat hairbrushes and Gradia diapolisher and carry out high-glaze polishing with a little polishing paste and leather buffer (Fig 23). The individuality and natural opalescence of the finished result are impressive (Figs 24-26).

Individualising the Soft Tissue Areas

In order to imitate the gingiva in form and colour as closely as possible, it is essential to examine the different regions of the gingiva very closely (Figs 27-33). The particular features of the individual regions that are important to personalising work are illustrated in Fig 34. These regions include the attached gingiva, as found, over the alveolar process, for example. There are fewer blood vessels in these areas, which is why they have a lighter



Fig 21 Final polymerisation is followed by cleaning with steam jet.



Fig 22 (top right) The teeth after finishing.



Fig 23 After fine polishing.



Fig 24 The natural opalescence can be clearly seen.



Fig 25 Palatal view of individualised prefabricated teeth.



Fig 26 Occlusal view of individualised prefabricated teeth.

colouring. In addition, connective tissue projections into the epithelium of the attached gingiva give this area a surface structure that resembles orange peel (stippling) (Figs 35-38). Another region is that of the alveolar mucosa, as seen for instance in the region of the mucobuccal-mucolabial fold, which adjoins the alveolar process. These areas contain more blood and thus have a stronger, transparent colour, which is permeated by numerous bluish venules and reddish arterioles. Cheeks and labial frenula can also be seen when the mucobuccal-mucolabial fold is taut.

Another characteristic region is the palatal area with its palatine folds, which serve as friction fields and are packed with salivary glands. Once the technologist is aware of the areas to be individualised, the practical work can be started.

First, gently grind back the surface of the areas to be individualised using suitable instruments (Figs 39-40). Then condition the surface with $50\mu\text{m}$ to $110\mu\text{m}$ Al_2O_3 (Fig 41), clean with compressed air and coat with composite primer (Fig 42), then polymerise the object for one minute.

Thinly apply GM36, a reddish transparent shade, in the region of the alveolar mucosa in order to obtain a strong-coloured background (Fig 43). The base thus prepared should then be overlaid with a mixture of GM30 (transparent resin) and GF71 (fibre) in order to imitate the blood vessels (Fig 44).

With regard to the attached gingiva, considerable importance is attached to differences in shape. Analysis of naturally occurring shapes again provides some valuable guidelines (Figs 45-48).

In order to fashion the attached gingiva apply G23, a light pink shade, with a spatula (Fig 49) and model with a brush and a little GC composite primer (Fig 50). Use a brush to create the stippling while the material is in a plastic state (Fig 41), then carry out intermediate curing of this imitation using the steplight SL-I light-curing unit. For characterisation, now apply GM33, a brownish shade, to the appropriate places on the stippled surface (Fig 52), then GM35 (for light shading) in order to imitate the ligaments and areas with minimal blood vessels (Figs 53-54). The same material (GM35) is also used to



Figs 27-33 Views of different regions of healthy, natural soft tissue areas.



Fig 34 The individual gingival zones:

- 1 = alveolar mucosa
- 2 = mucogingival junction (health line)
- 3 = attached gingiva
- 4 = gingival sulcus
- 5 = free gingiva



Figs 35-38 Examples of "stippling".



Figs 39-40 The surface is lightly reground with suitable instruments in the areas to be individualised.



Fig 41 Conditioning of the surface.

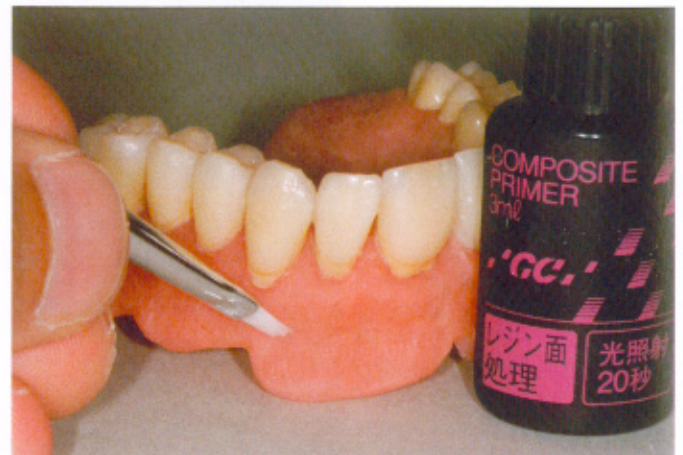


Fig 42 Coating with composite primer.



Fig 43 Applying GM36 in order to obtain a stronger-coloured background.

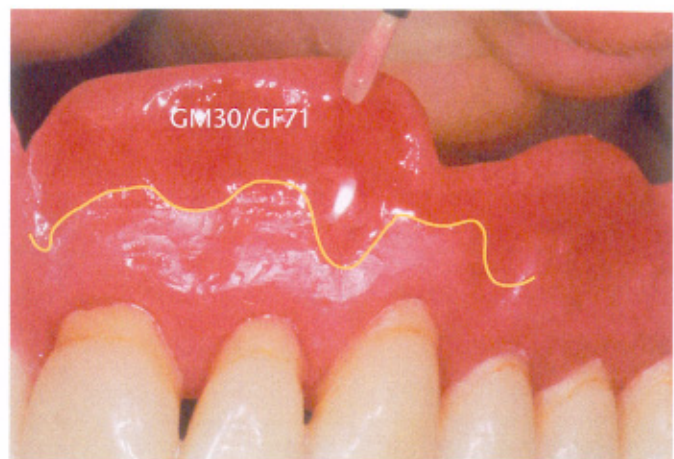
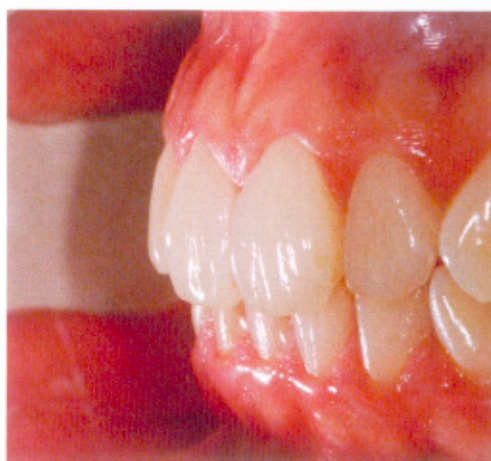


Fig 44 Imitation of the blood vessels.



Figs 45-48 Different shapes of attached gingiva, as found in the natural setting.

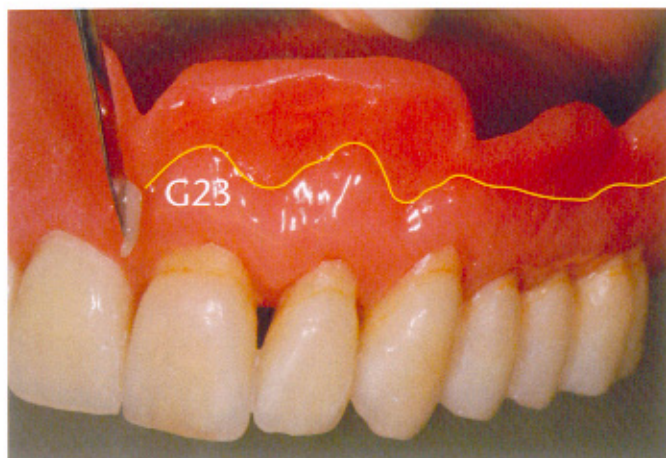


Fig 49 Applying G23 with a spatula.

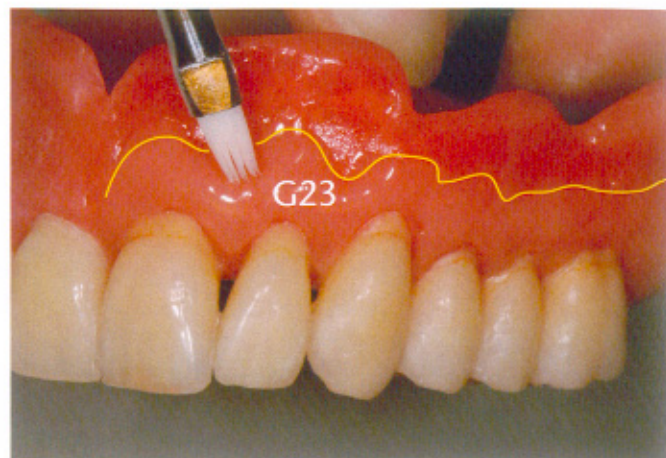


Fig 50 Modelling the attached gingiva.



Fig 51 Using a brush to imitate stippling.

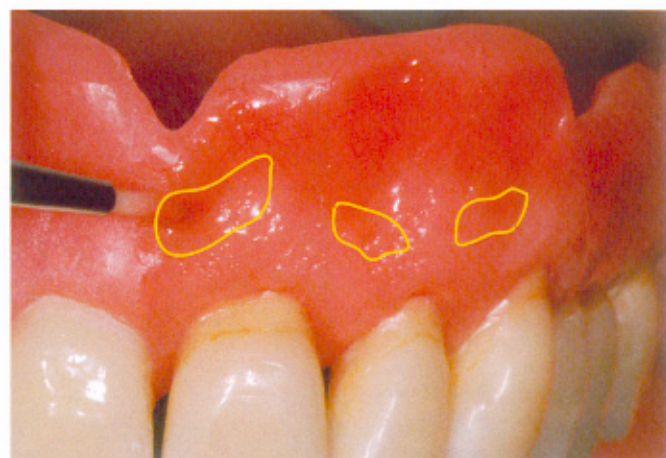


Fig 52 Characterisation of stippling with GM33.

shape the free gingiva and precisely carve out the gingival margin (Fig 55). Apply GM34 in order to achieve a transparent mucobuccal-mucolabial fold with a violet colour shining through and GM30 to fill up and for the last fine detail (Fig 56). The interdental areas can also be built up with GM30 in restoration work for patients in order to create better dental hygiene conditions.

Finally, the areas covered with GC Gradia air barrier should be thoroughly cleaned with a steam jet (Fig 57). The good handling of the material enables the technologist to achieve accurate modelling so that regrinding becomes unnecessary. A pre-polish is then undertaken with a brush and GC Gradia diapolisher (Fig 58). Polish the cervical area with a goat hairbrush and GC Gradia diapolisher (Fig 59). Final polishing should be done with chamois leather and wool buffer and GC Gradia diapolisher (Figs 60-61).

Fig 53 Application of GM35 to imitate the ligaments and less perfused areas.



Fig 54 Detailed picture after application of GM35.

Fig 55 Precise contouring of the gingival margin.

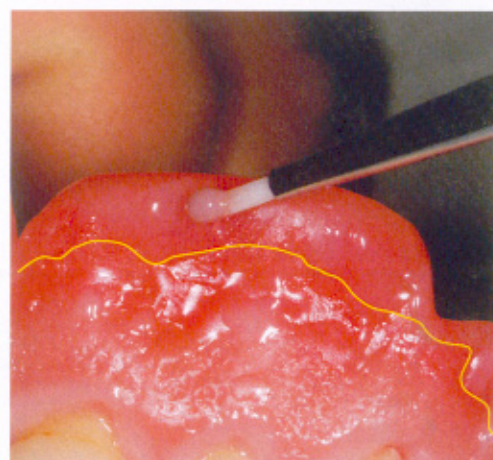
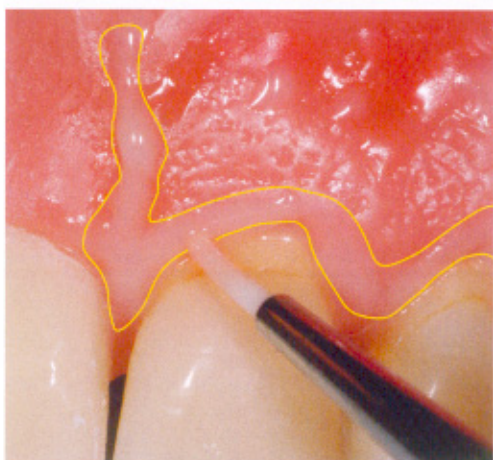


Fig 56 Achieving natural transparency and final detailed work.

Fig 57 Denture cleaned with steam jet.



Fig 58 Pre-polishing is done with a brush and GC Gradia diapolisher.



Fig 59 Polishing the cervical area of the teeth.

Figs 60-61 Final polishing with chamois leather and wool buffer.



Fig 62 Complete upper denture ready for use.

Full or partial removable dentures with an impressive natural appearance can be produced by individual characterisation of prefabricated prosthetic teeth and individualisation of the soft-tissue areas (Fig 62). A study of the various shapes and shades found in nature should enable the technologist to achieve the goal of individual and patient-oriented restorations.

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Conclusion

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