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PROSTHETICS

Fabrication of an overdenture using retentive anchors

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IMPORTANT NOTES

Disclaimer of liability
The Straumann® dental implant is part of an overall concept and may only be used in conjunction with the associated original components and instruments according to Institut Straumann AG's instructions and recommendations.

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The user is also obliged to study the latest developments of the Straumann® Dental Implant System and its applications regularly.

Please note
The descriptions given are insufficient to allow immediate use of the Straumann® Dental Implant System. Guidance in the handling of these instruments by a doctor experienced in their use is strongly recommended.

Validity
Upon publication of this brochure, all previous versions are superseded.

Availability
Not all products listed in this brochure are available in all countries.

Caution
Our products must be secured against aspiration when used intraorally (e.g. use of a throat pack is recommended).

Delivery
Federal law restricts these devices to sale by or on the order of a dentist or physician.

Units per package
Unless stated otherwise, there is one unit in each package.

Documentation
You can obtain detailed instructions on the Straumann® Dental Implant System from your Straumann representative.

Definition
SLA® = Sand-blasted, Large grit, Acid-etched

Description of the symbols on labels and instructions for use

LOT	Lot/batch number
REF	Article number
STERILE R	Sterile by gamma irradiation
~~STERILE~~	Non-sterile
	Do not use on patients
	Do not reuse
	Protect from exposure to strong light or heat
	Refer to instructions for use
	Use before expiration date
CE 0123	

Colored warning labels

YELLOW ➡ CAUTION:	In case of danger or unsafe handling that might cause slight bodily injury or damage to property.
ORANGE ➡ WARNING:	In case of danger that might cause severe bodily injury or death.
RED ➡ DANGER:	In case of danger that may cause immediate severe bodily injury or death.

Straumann is the exclusive industrial partner of the ITI (International Team for Implantology) in the areas of research, development, and education.

Table of contents

Instructions for dentists and dental technicians

Planning principles

Implant-borne full dentures require thorough planning of the surgical and technical procedures. The number and positions of the implants as well as the design of the denture and occlusion should take the anatomical, functional, and hygienic aspects into account. The static/dynamic conditions govern the selection of the retentive units (Besimo, 1993).

Recall appointments

Hybrid dentures with resilient retention units must be examined at intervals of approximately 3 months to ensure harmful excursions of the denture are eliminated in their early stages (possible methods: relining, activating/replacing the matrix, checking the occlusion). In cases of poor oral hygiene, the patient should undergo thorough scaling and polishing, as well as re-instruction and motivation to maintain the necessary high level of oral hygiene. If the patient is co-operative, the interval between check-ups can be increased.

Retentive anchor

Introduction

Purposes of anchors:

– Securing the prosthesis against excursive forces and those which would dislodge the saddles

– Distribution of shear forces

– To transfer the masticatory forces as axially as possible from the denture to the implant

Description/Function

The retentive anchor abutment works in conjunction with the movable attachments. Retentive units that permit rotary movement of the denture in one or more directions and/or vertical translational movements are termed mobile units.

The mobile connector shortens the lever arm of the tilting forces exerted on the implant. The implants must always be placed at an angle of 90° to the occlusal plane to ensure that they are loaded axially. Precisely designed occlusal surfaces – balanced occlusion with freedom-in-centric (Geering et al., 1993) – and optimum design of the denture fitting surface also influence the stability of the denture and the distribution of the masticatory forces (Worthington et al., 1992). We recommend that a new denture always be fabricated as part of the treatment plan or after the provision of implants (Mericske-Stern, 1988).

Indications for retentive anchors

– Use with Standard implants Ø 4.1 mm, RN (Regular Neck)

– Resilient anchorage in the edentulous maxilla and mandible in conjunction with two implants to ensure the degrees of freedom

– Insufficient space available (in such cases, bars often cause the anterior section to be extended too far lingually thus restricting the space available for the tongue and impeding its function)

– In cases of severely tapering anterior arches and/or jaws (Geering et al., 1993)

Retentive anchors are not for use in the following applications:

– Combined tooth-/implant-borne restorations

– Use of more than two implants per jaw

– In conjunction with attachments exhibiting a different degree of resilience

– If the implants are not vertical to the occlusal plane

– In cases where the implants have been positioned in the arch in such a way as to prevent a tangential axis of rotation

– In unfavorable ridge situations

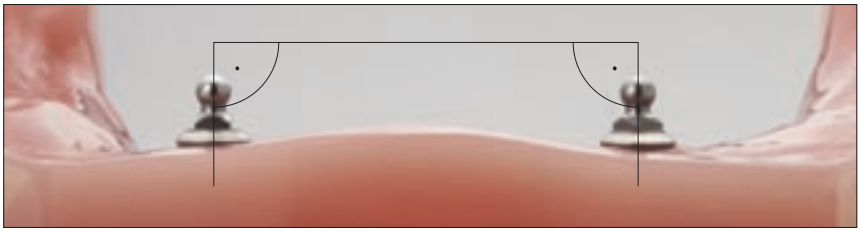
Fabrication of a new full lower denture with a metal reinforcement and two Elliptical Matrices

"Patient" initial situation

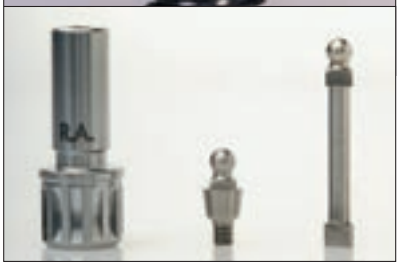
Edentulous lower jaw with two Standard implants Ø 4.1 mm, RN (Regular Neck) replacing the canines with retentive anchor abutments (048.439).

Important: To ensure that the retentive anchors function properly over a long period of time, the implants must be placed as parallel as possible to one another and vertical to the occlusal plane to create a tangential axis of rotation.

The retentive anchor has a square neck to accommodate the driver. It is inserted into the implant with a force of 35 Ncm. Measured from the upper edge of the implant shoulder, the retentive anchor is 3.4 mm high.



RN = Regular Neck (implants that have a 4.8 mm restorative platform)



From left to right: Driver (046.069) with "R.A." marking ("Retentive Anchor"), retentive anchor abutment (048.439), and transfer pin (048.109-1).

Taking an impression of the retentive anchor

The impression is taken with an elastomeric impression material (polyvinylsiloxane or polyether rubber) directly over the anchor, without any impression components.

Important: In view of its low resistance to tearing, a hydrocolloid is not suitable for this application.

Producing the model

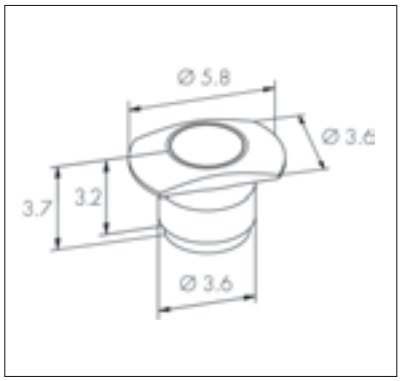
Transfer pins are positioned in the impression and the cast is produced in special, type 4 (DIN 13911) hard plaster. The impression of the retentive anchor provides the square/spherical stud of the transfer pin with sufficient retention in the impression.

To ensure stability, the production and integration of a metal reinforcement in the full lower denture is recommended. Sufficient space must be left for securing the matrices.

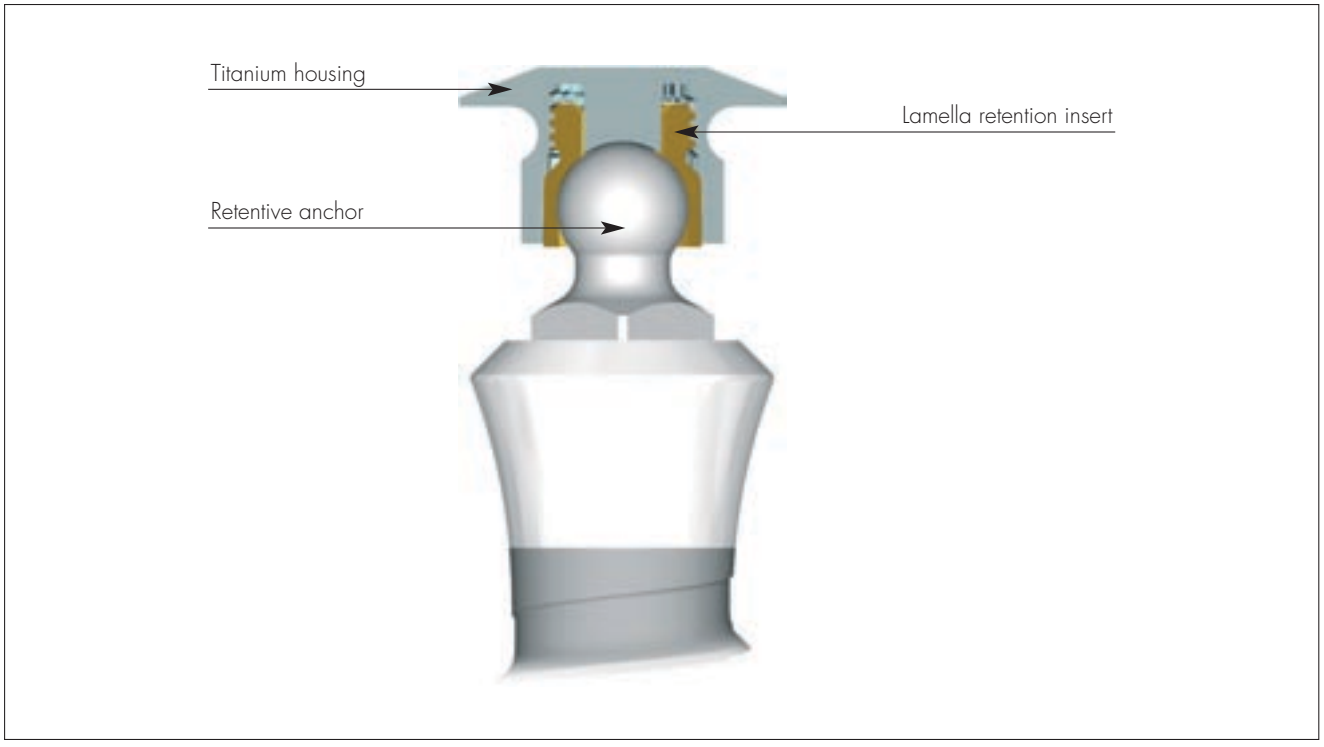
The teeth should be set up using the occlusal concept for full dentures.

The principle of function of the Elliptical Matrix:

The Elliptical Matrix is used for the fixation of removable resilient full dentures on Straumann implants in conjunction with the retentive anchor. It consists of a titanium housing (pure titanium grade 4) with a gold lamella retention insert (Elitor®; Au 68.6%, Ag 11.8%, Cu 10.6%, Pd 4.0%, Pt 2.5%, Zn 2.5%, Ir < 1%). The insert is screwed into the titanium housing.



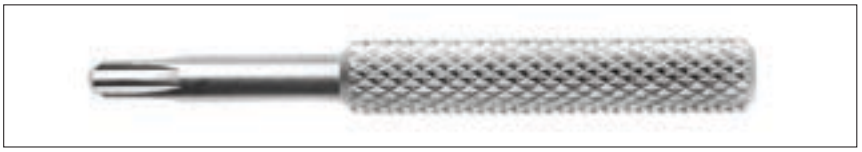
Elliptical Matrix



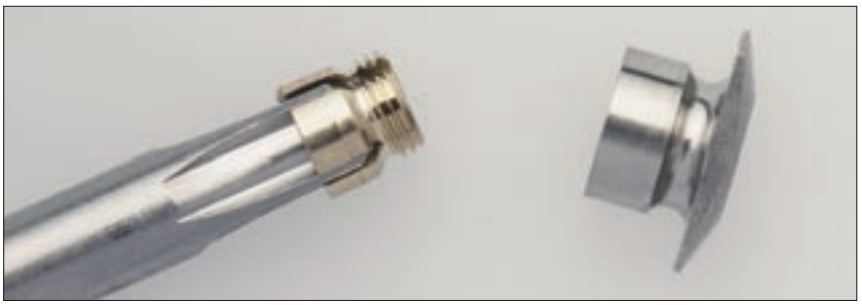
When there is insufficient space, the wings of the titanium housing can be modified individually. However, a minimum diameter of 3.6 mm must be maintained in order to ensure the retention of the housing in the resin.

Adjusting the retentive force

The screwdriver (046.154) is required for activating, deactivating, and removing the lamella retention insert. The instrument is pushed with the correct alignment into the lamella retention insert as far as it will go. The retentive force is adjusted by rotation (increased by turning clockwise and reduced in the opposite direction). The initial retention force is approximately 200 g, which is also the minimum that can be set. The maximum retention force is approximately 1400 g. The lamella retention insert must not project out of the housing. If retention is lost, the insert can be replaced without having to remove the titanium housing from the denture.

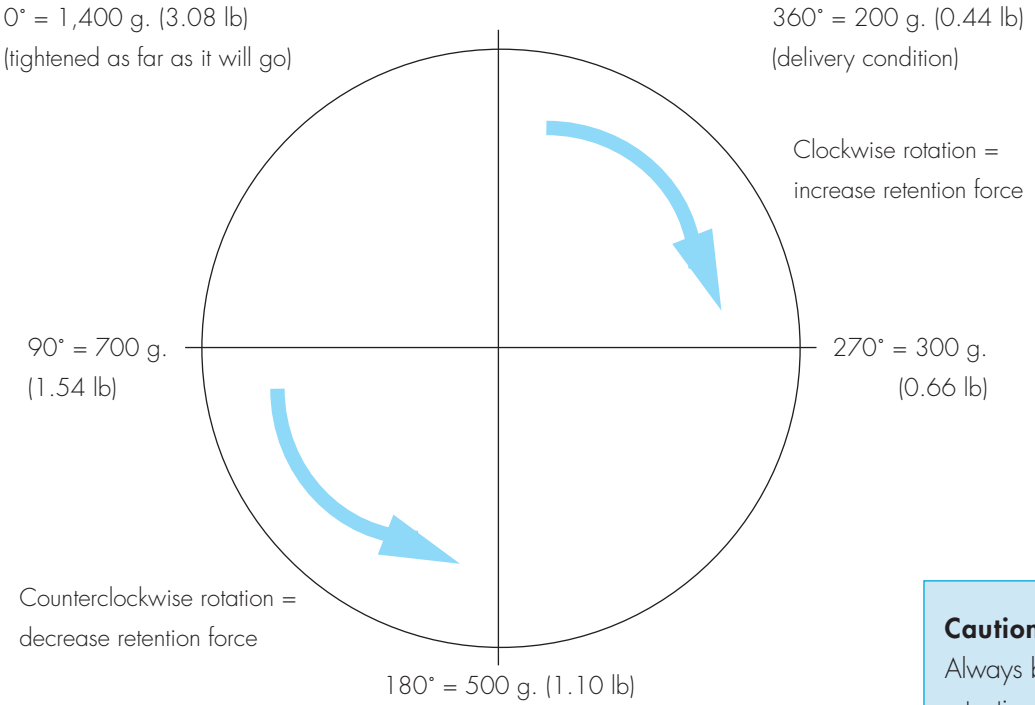


Screwdriver (046.154)



Unscrewed lamella retention insert

The connection between tightening angle and retention force:



* Slight deviations from these average values are possible due to the unavoidable manufacturing tolerances of the lamella retention insert and retentive anchor. If signs of wear are evident on the retentive anchor, the retention force may no longer apply, and the retentive anchor must be replaced.

Caution:
Always begin with the preset retention force of 200 g. (matrix as supplied) and adjust it accordingly based on the patient's comfort level and clinical requirements.

Before curing the matrix into the denture, the lamella should be tightened just enough so that it remains stable on the retentive anchor during processing.

Important:
When trying the denture in the patient, always start with the lowest retention force. The retention force is adjusted by rotating the lamella retention insert and must be done in small increments until the desired retention force is obtained. Otherwise, excessive retention forces may cause difficulties when removing the denture from the mouth.

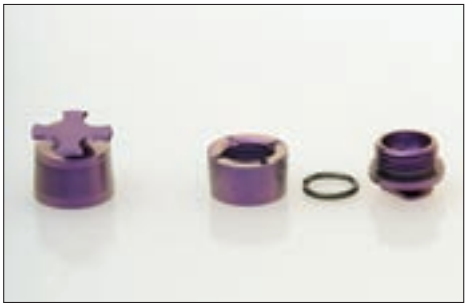
Finished denture

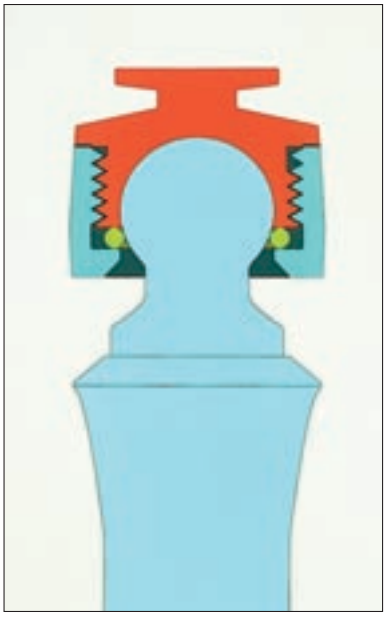
Fabrication of a new full lower denture with metal reinforcement and two titanium matrices

"Patient" initial situation
Edentulous lower jaw with two Standard implants Ø 4.1 mm, RN (Regular Neck) replacing the canines with retentive anchor abutments (048.439).

Model starting situation (procedure identical as previously described for "Fabrication of a full lower denture with metal reinforcement and two Elliptical Matrices").

The titanium matrix (048.450) consists of a titanium alloy (Ti-6Al-4V), hardness HV5 Vickers 350–385. The titanium matrix is available preassembled and consists of the following individual components: housing, spring ring, threaded top (from left to right).





Unlike the Elliptical Matrix, the titanium matrix makes use of a spring ring with a **defined extraction force of 700–1,100 g.** If retention is lost, the spring ring can be replaced.

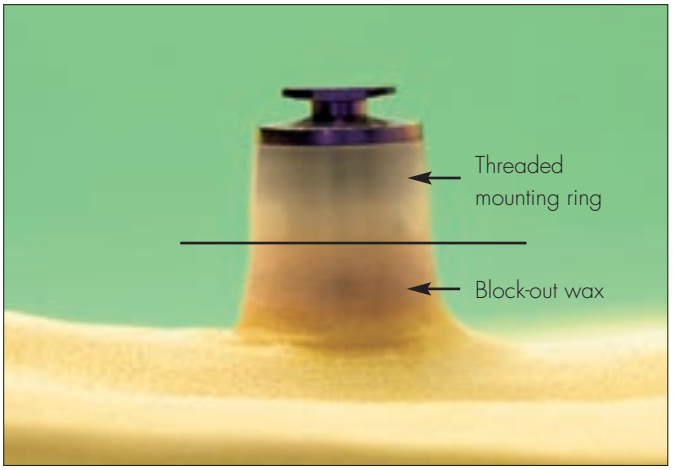
To replace the spring ring, the threaded top on the titanium matrix is unscrewed counter-clockwise using the corresponding screwdriver (048.452), and the spring ring is changed.

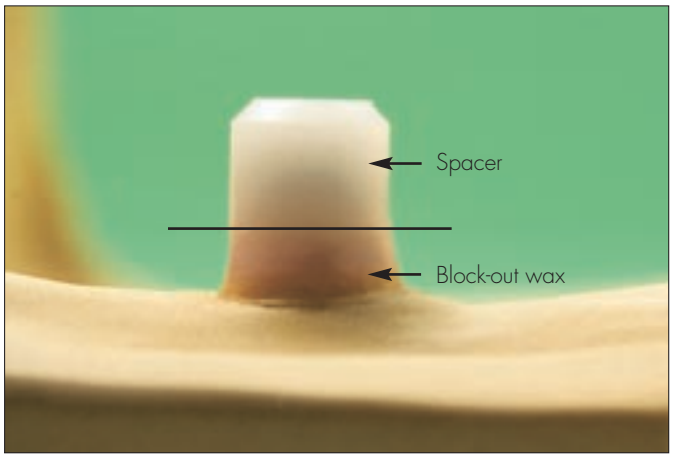
The threaded top is then screwed back in place hand-tight.

The titanium matrices can be polymerised into place as follows:

Method A

Before positioning the matrices on the transfer pins in the model, the original housing is unscrewed and replaced with a plastic threaded mounting ring (048.454V4). The undercuts are blocked out with wax. The plastic ring is 3/100 mm wider in diameter than the titanium matrix housing and acts as a spacer for it. This prevents too tight a fit of the titanium threaded ring on the polymerised acrylic. After polymerisation, the threaded mounting ring is replaced by the titanium housing once more.



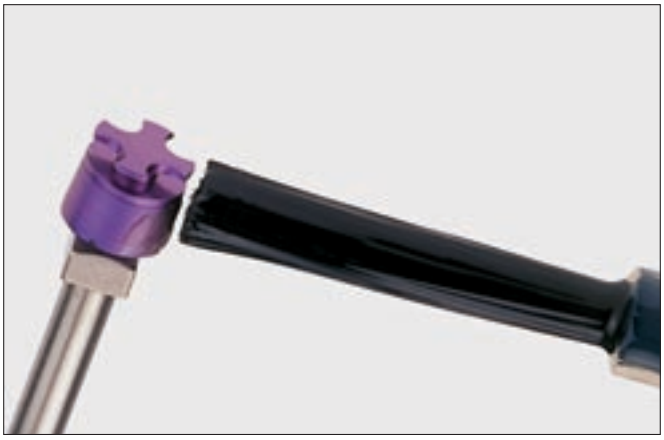


Method B

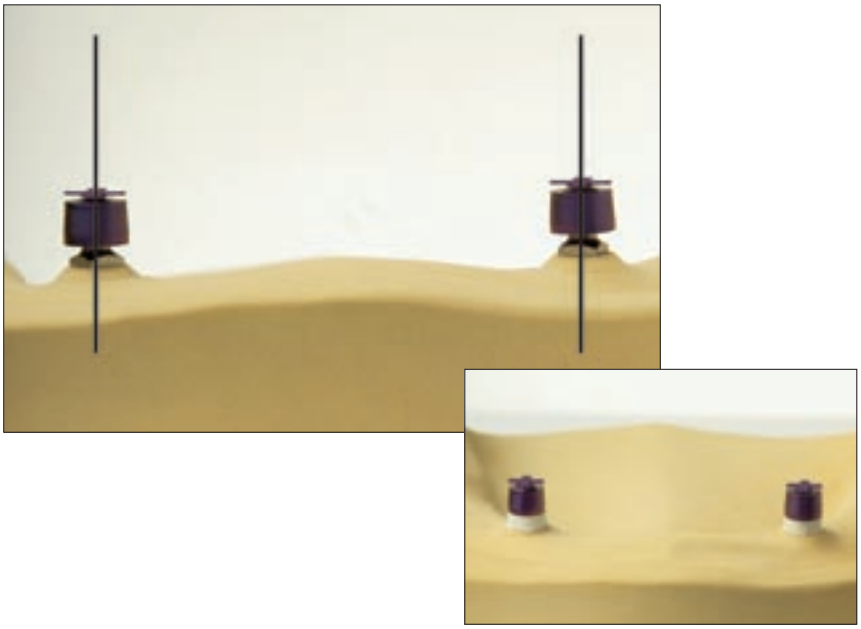
The denture is polymerised with special acrylic spacers only (048.451V4). First, the undercuts are blocked out with wax. Once the denture is ready, the spacers are removed and the dentist can polymerise the titanium matrices into place directly in the patient's mouth. The spacers are also used to produce the model for the metal reinforcement.

Method C

Before being positioned on the edge of the threaded ring, the titanium matrix must be coated with a thin film of die spacer. This ensures that the housing can be released later without excessive force being exerted.



Important: With all three methods, the titanium matrices (or spacers) must also always be positioned on the transfer pins with their axes aligned (parallel to the path of insertion) and the undercuts blocked out.



The finished denture with titanium matrices integrated in the metal framework.

Important: Once the denture is complete, it must be checked to ensure no acrylic has penetrated the matrix. To do this, the housing should be removed and the inner configuration with the spring should be cleaned.

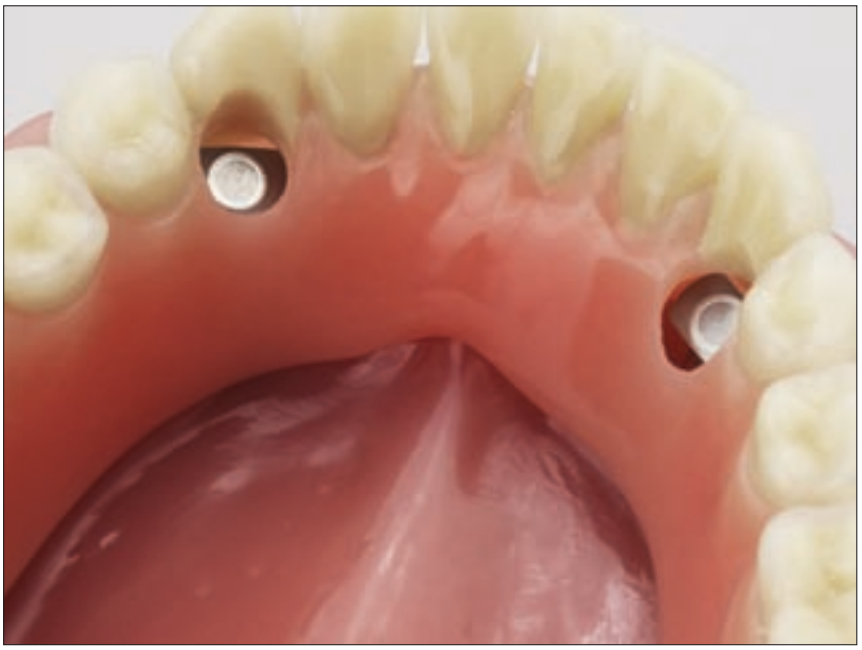
Removal of titanium matrix from an existing denture

To replace an entire titanium matrix, the housing and spring ring must first be removed. The tip of a special extractor (048.453) is then heated over a Bunsen burner and screwed into the threaded top. The top can then be withdrawn from the acrylic denture.

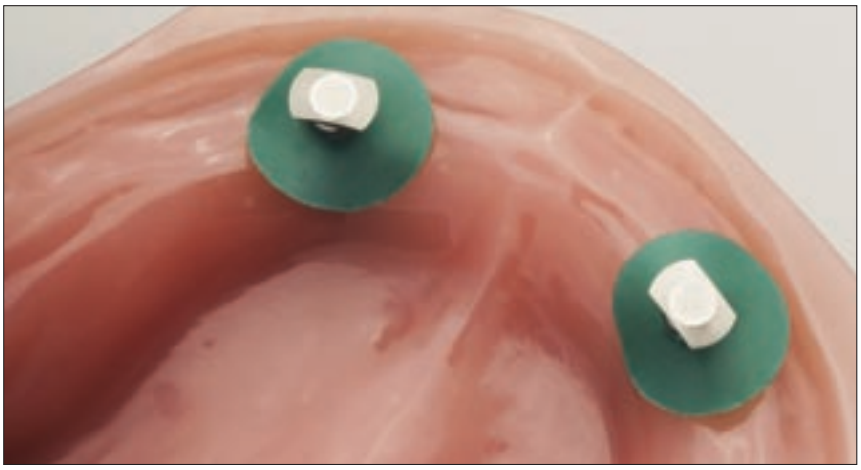
Polymerisation of the Elliptical Matrix in the patient's mouth after implantation and osseointegration:

The existing full lower denture prior to modification.

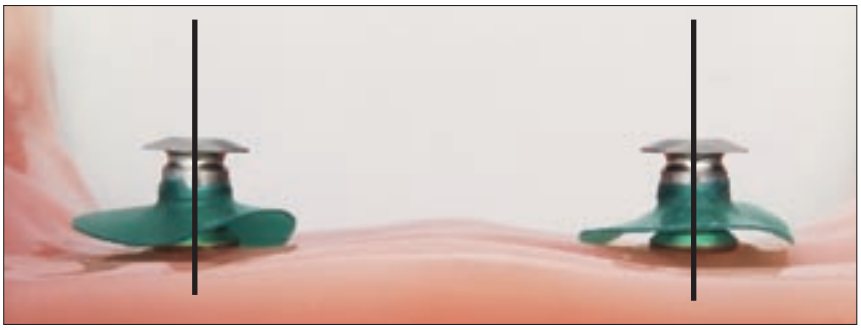
The retentive anchor abutments are inserted into the implants with a force of 35 Ncm. The existing denture is then hollowed out in the region of the anchors. The opening created allows the acrylic to flow in and around the matrices. The Elliptical Matrices positioned on the retentive anchors must not touch the denture after hollowing.



After positioning the Elliptical Matrices on the retentive anchors, a small piece of rubber dam is placed over the matrices to block out the undercut created between the lower edge of the matrix and the abutment. This prevents the acrylic from flowing into the internal matrix configuration, which could lead to "locking" the denture in the patient's mouth.



Important: The matrices must be aligned (parallel to the path of insertion).
The prepared denture is then fixed in the mouth and the acrylic is flowed through the perforation.



The modified denture with the polymerised Elliptical Matrices.

Relining of an implant-borne retentive anchor denture

Hybrid dentures with retentive anchors should be checked at approximately three-month intervals to eliminate damaging denture movements by appropriate measures at an early stage. If the alveolar ridge resorbs after a prolonged wearing time, the denture may sink. This leads to a loss of resilience of the matrices and so to greater stress on the retentive anchor/implants. Relining then becomes necessary.

Relining is carried out directly over the retentive anchors. Care should be taken to ensure that the denture is sitting correctly (retentive anchor/matrix connection). The dental technician then positions the transfer pins (048.109-1) in the Matrices (titanium or Elliptical matrix) in the denture and produces the relining model (see page 5, Producing the model).

After relining, the matrices should be checked for acrylic that may have flowed into them and for their functionality. It must also be possible to activate/deactivate the Elliptical Matrices. After polymerisation, the Elliptical and titanium matrices are opened with the relevant screwdriver and the internal configuration is cleaned.

Important: These measures are vital to ensure the optimum function of the relined, implant-borne retentive anchor denture. If the function of the matrix is impeded, this can damage the implant/anchor.

Edentulous: retentive anchor

Recommended choice of implant Standard implant Ø 4.1 mm or 4.8 mm, RN (Regular Neck)

	Retentive anchor with Elliptical Matrix		Retentive anchor with titanium matrix	
	Abutments and laboratory parts	Instruments	Abutments and laboratory parts	Instruments
Insertion of abutments	Retentive anchor 048.439	Ratchet 046.119 Torque control device 046.049 Driver for retentive anchor 046.069	Retentive anchor 048.439	Ratchet 046.119 Torque control device 046.049 Driver for retentive anchor 046.069
Impression transfer	Transfer pin 048.109-1		Transfer pin 048.109-1	
Fabrication of denture	Elliptical matrix 048.456	Screwdriver 046.154	Titanium matrix 048.450 Spacer 048.451V4 Threaded mounting ring 048.454V4	Screwdriver 048.452
Insertion of final restoration		Screwdriver 046.154	Replacement spring rings 048.455V4	Screwdriver 048.452 Extractor 048.453

V4 = 4 components per pack

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Case presentation:
Courtesy of
G. S. Solnit, DDS, MS
Beverly Hills, CA

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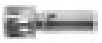
Product Overview

Art. No	Article	Dimension	Material
048.439 	Retentive anchor abutment	Height 3.4 mm	Titanium
046.069 	Retentive anchor driver	Length 19.0 mm	Stainless steel
048.109-1 	Transfer pin for retentive anchor	Length 18.0 mm	Stainless steel
Elliptical Matrix with adjustable retention			
048.456 	Elliptical Matrix	Height 3.2 mm ∅ 3.6 mm	Elitor®/titanium
048.457 	Spare lamella retention insert	Height 2.6 mm	Elitor®
046.154 	Screwdriver	Length 37.0 mm	Stainless steel
Titanium matrix with defined retention			
048.450 	Titanium matrix for retentive anchor	Height 3.1 mm	Titanium alloy
048.451V4 	Spacer for titanium matrix	Height 3.5 mm	Plastic
048.452 	Screwdriver for titanium matrix	Length 60.0 mm	Stainless steel/ anodized aluminum
048.453	Extractor for titanium matrix	Length 100.0 mm	Stainless steel
048.454V4 	Threaded mounting ring for titanium matrix	Height 2.2 mm	Plastic
048.455V4 	Spacer for 048.450		Stainless steel

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Clin Oral Implants Res 1994;5:
9–18

Worthington P, Brånemark PI.
Advanced osseointegration surgery: applications in the maxillofacial region. Chicago:
Quintessence; 1992.

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