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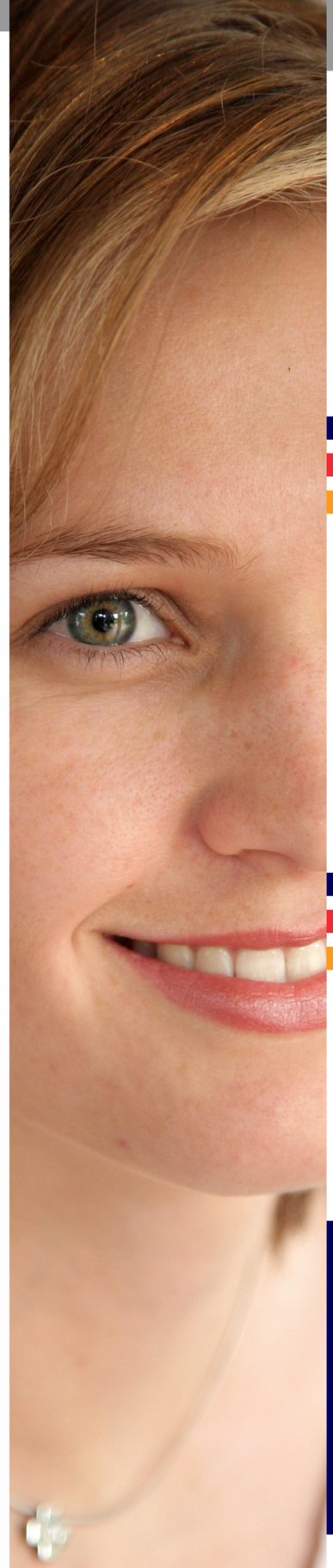
SOUTHERN IMPLANTS

PROSTHETIC & LABORATORY
Instructions Manual Version 4.0

CAT-2001-04

INDEX




CERTIFICATE
For Quality Assurance
Southern Implants (Pty) Ltd.
EN ISO 13485 / 11.2000


CERTIFICATE
for the
Quality Assurance System
Southern Implants (Pty) Ltd.
Annex II, Section 3 of the Directive 93/42/EEC


CERTIFICATE
For Quality Assurance
Southern Implants (Pty) Ltd.
EN ISO 9001 / 12.2000

Complimentary Manuals & Instructions:

Externally Hexed Product Catalogue	CAT-2020
Internal Connections Product Catalogue	CAT-2021
Patient Information Brochure	CAT-2022
Patient Homecare Brochure	CAT-2023
Product Information Brochure	CAT-2028
Overdenture Information Brochure	CAT-2032
Instrument Catalogue	CAT-2006
Prosthetic & Laboratory Manual	CAT-2001
Sprint Implants Catalogue	CAT-2011
Simplex Implants Catalogue	CAT-2015
Extra-Oral Implants Catalogue	CAT-2016
Orthodontic Implants Catalogue	CAT-2017
TMJ Prosthesis Catalogue	CAT-2018
Passive Abutments	CAT-1008
One Piece Implants	CAT-1083
Finger Implants Catalogue	CAT-2010
First & Secondary Stage Surgery Manual	CAT-2024
Publication Catalogues Vol 1	CAT-2002
Publication Catalogues Vol 2	CAT-2007
Publication Catalogues Vol 3	CAT-2008
Instructions for use	PRO-6038

Labeling Symbols:

The following symbols are used on our packaging labels and they indicate the following:

1: **"Use by"**

2: **"Batch code"** LOT

3: **"Do not reuse"**

4: **Symbol for method of sterilization using Irradiation** STERILE R

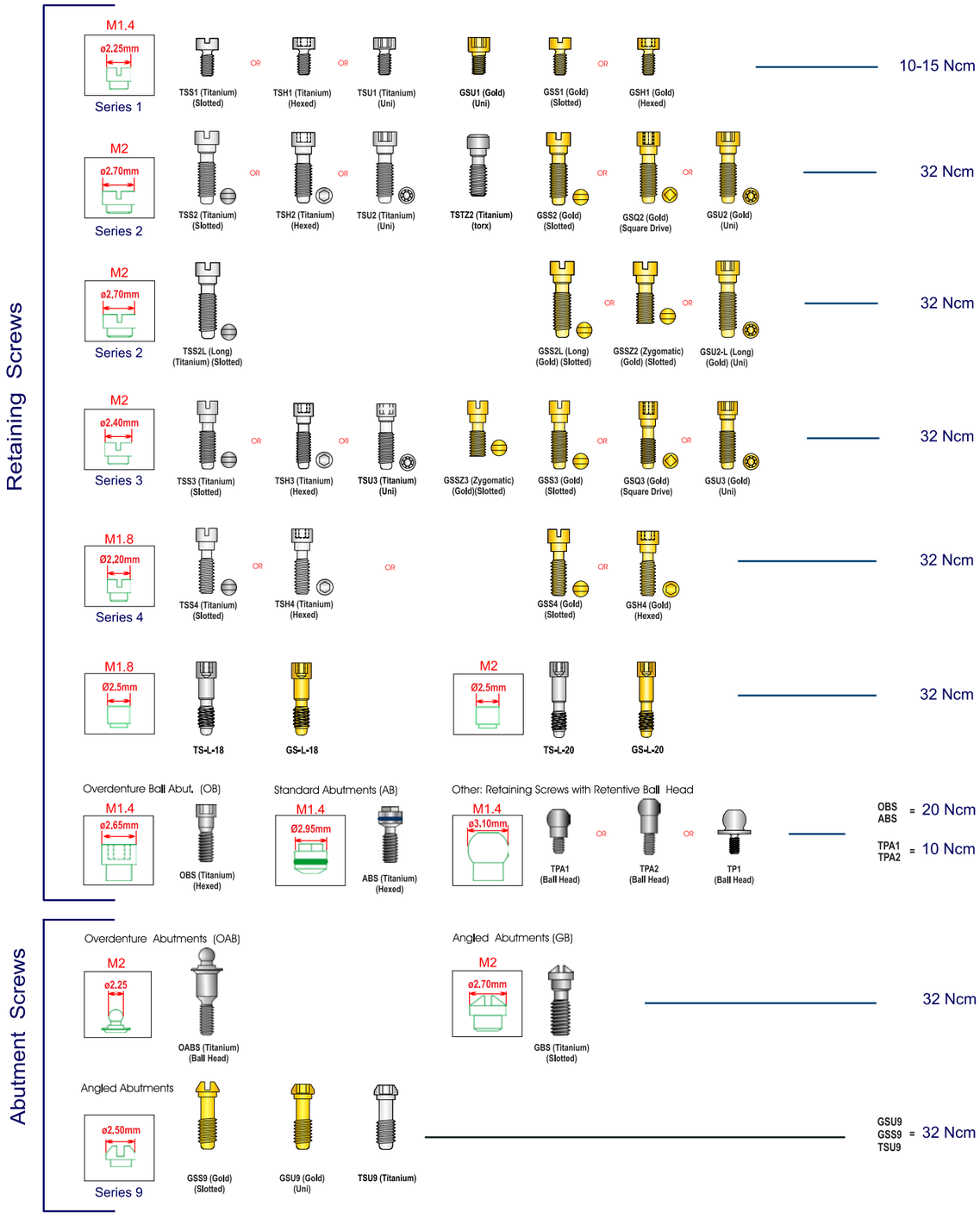
5: **"Attention, see instructions for use"**

6: **"i" Internal drive implant**

7: **CE mark**


Southern Implants (Pty) Ltd. Irene, South Africa

Technical Data : Torque Table for Southern Implants Screws



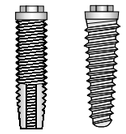
Introduction

Southern Implants is committed to providing customers with dental implants and components of impeccable quality, at affordable prices. Southern's range of externally hexed, internally hexed, tapered and internal drive implants, surgical, prosthetic and laboratory components carry the CE mark. Southern Implants manufacturing facility is also FDA approved and registered. Compatibility with well-known, well-proven designs is important not only for the patient and dentist, but equally so for the convenience of the laboratory technician in whose hands the ultimate aesthetic result lies. Southern Implants' products are based upon sound engineering principles. Optimizing design features and attention to detail in our implant range is a priority, as is Southern's willingness to provide the dental technician with a versatile range of prosthetic and laboratory components to ensure excellent results every time an implant case is received by the dental laboratory.

Identifying the implant system

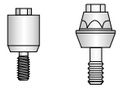
Southern Implants provides Patient Record Cards to Dentists to enable them to accurately record details of the implant placed. This record should be forwarded to the dental laboratory together with relevant impressions, etc. However, should this not be the case, the referring dentist can be approached for more detail. To assist you in identifying the impression, consider the following: Is it an IMPRESSION of:

A. The **Implant** Body.

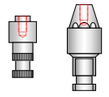


For **A.** You need to order an **Implant Analogue**.

B. The **Abutment** which is on the implant body.



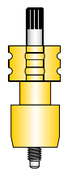
For **B.** You need to order an **Abutment Analogue**.



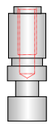
Then, which implant or abutment is it?

The easiest way of obtaining either the code or description of the product, is to request a Product Catalogue from the implant company concerned. Southern Implants product catalogue has easily referenced flowcharts which show the matching componentry in graphic format. The flowcharts also show the colour coding which Southern Implants has introduced for easy identification of the restorative options for the various diameters of implants. Therefore identifying an impression coping is easy - just look at the colour (colour chart below), refer to the relevant flowchart and order the appropriate stainless steel laboratory analogue. Although colour coding has been done on coverscrews, temporary abutments and impression copings, the abutments themselves are not colour coded. An example of the impression coping and appropriate laboratory analogue is shown below, for the ø5mm BA externally hexed implant range.

CBA15
Pick-Up Impression Coping



LSA12
Stainless Steel



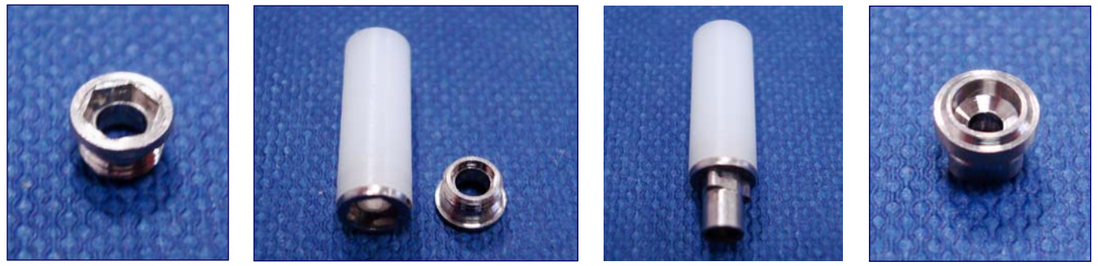
Southern Implants Colour Coding Guide

External Hex	Tri-nex
Ø3.25 Externally Hex Narrow Platform	Ø3.50 Tri-nex Narrow Platform
Ø3.75 Externally Hex Standard Platform	Ø4.30 Tri-nex Standard Platform
Ø5.00 Externally Hex Flat Top	Ø5.00 Tri-nex Wide Platform
Ø6.00 Externally Hex Wide Platform	Ø6.00 Tri-nex Wide Platform

Acknowledgments

Compiled by Dana Galgut (Dent.Tech.). Design & Layout by Ruan Pienaar. Southern Implants would also like to acknowledge the assistance of Bostech Dental Laboratory (Pretoria), Image Dental Laboratory (Johannesburg), Ockert Laboratory (Pretoria), Dr Martin Wucher (General Practitioner, Okahandja, Namibia) and Dr. Andrew Ackermann, with photographs, advice and documented procedures featured in this Prosthetic & Laboratory Instructions Manual.

Technical Data : Southern Implants' Gold Cylinders



A selection of Southern Implants' gold cylinders

The material of these gold cylinders is "Ceramicor". The rods are made in Switzerland and the cylinders are made in South Africa. The same method is used by most European Dental implant manufactures for their gold cylinders.

Chemical composition is: Au-60%; Pt-19%; Pd-20%; Ir-1%

CO-Efficient of Expansion are:
The gold cylinder (Ceramicor) 25-500°C 11.9
25-600°C 12.2

- The cylinders are not made of porcelain-bonding alloy. The alloy is designed to have oxidation during casting-on procedures. Some labs do bond porcelain directly onto the gold cylinders. This could result in the porcelain going slightly green or chipping off due to a poor bond.

- The melting temperature of the gold alloy is approx 1475°C. Labs cast on at +\- 920°C –no higher as this could result in the edges of the cylinders distorting. The furnace should be run up straight to the casting temperature (reduces investment expansion). Too much expansion could result in overflow of metal onto the fitting surfaces of the Cylinders (metal creep).

- Commonly used metals which are used for custom posts (non-ceramic bonding)
  - Stabilor-Betta Dental
  - Procast Y45-Argen
  - Argenco 1

- Commonly used metals for porcelain bonded crowns: Degudent U
  Argident 3
  Degunorm - Golden Gate system
  Bond- on 4
  Degudent G
  Argenco 1

- Casting temperature: At 650°C there is a high chance of a miscast. Usual casting temperature is 900°C. A Phosphate bonded investment must be used.

- When investing, avoid the use of a tension reliever as it leaves a residue, which can result in metal creep.

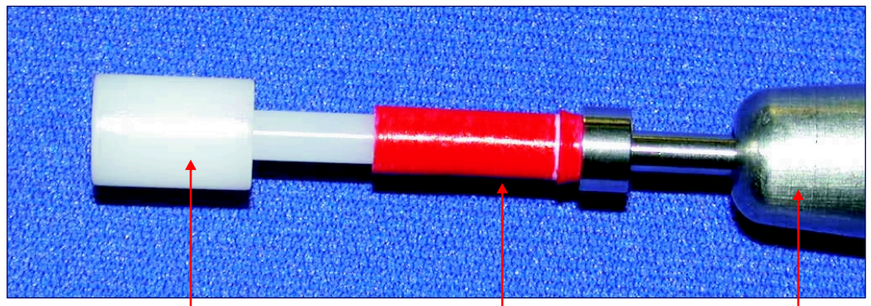
- Once waxing is complete, take an ear bud & clean fitting surface of the gold cylinder to remove any wax residue.

- Once the cast metal has been oxidized, it needs to be sandblasted before applying opaque. The seating surface of the gold cylinder should be blocked out with a thin layer of wax to avoid any damage during the blasting procedure. An alternative is to protect this surface by attaching a laboratory analogue.

Lapping Tool User Guide

This Lapping Tool is used with the UCLA Hexed Sleeve and UCLA Non-hexed sleeve to improve the fitting surface of a cast abutment.

If a bridge is required (more than one implant in the prosthesis, the casting must be divided, ie single elements must be created so that the Lapping Tool can be used on these individual elements. After lapping, the casting can be soldered together once again.

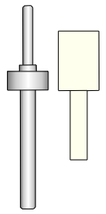


1. Put mandrel into your laboratory handpiece. Put the plastic stabilizer into the screw access hole of the casting.

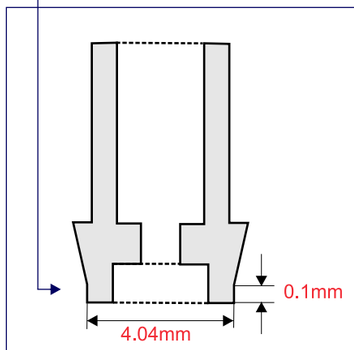
2. Apply diamond grinding paste to the surface of the mandrel. Push the plastic stabilizer into the casting and then insert the mandrel into the casting. Rotate the laboratory handpiece at a very slow speed to remove imperfections from the cast fitting surface.

3. Do not lap away too much of the casting. Lap only the parallel-sided part of the casting, ie do not lap more than 0.1mm.

I-LT6



Lapping tool for SB1 & SB5, SBA1 & SBA5 and SBBB1 & SBBB5



Taking of Pick-up-type Impressions

Primary impression:

Take an impression, with a stock tray, over the temporary abutments (without removing them) and send it to the laboratory so that the laboratory can make a special tray with windows in the areas of the implants. This special tray should be left to cure for at least 24 hours before using.

Final Impression:

1. Remove the temporary abutments, or healing caps, with the appropriate driver.

2. Place two-part impression coping on the implant or abutment and verify full seating. A radiograph is necessary for verification. The implant impression coping is a two-part component as it must record the orientation of the hex of the implant.

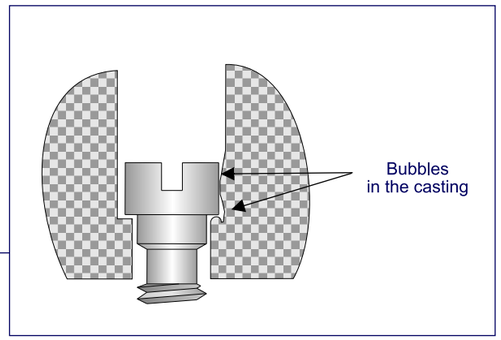
Note: Impression copings should be placed sequentially to prevent the soft tissue from closing.

3. Make sure that the window is in the correct position before commencing with the impression..

Instruments particularly suited for Laboratory work

Mills for refining metal castings

1. During the investing procedure done by the laboratory, it occasionally happens that bubbles appear in the investment. These bubbles are then cast as part of the coping, causing the implant retaining screw to not seat properly.



2. Screws that do not have a smooth seating, could cause:

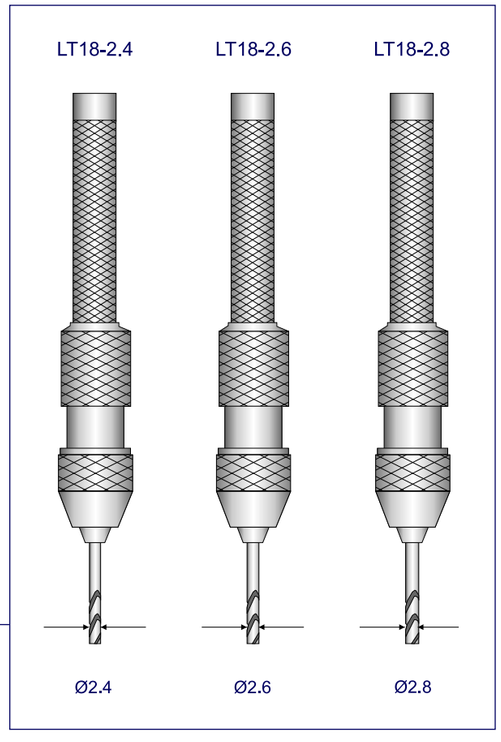
- Low pre-load due to high frictional torque.
- Fracture of screws due to bending moment on screw head.
- Loosening of screws due to low pre-load.

3. Southern Implants has introduced Hand Reamers which are to be used by the Laboratory Technicians to clean the screw access hole, as well as the fitting surface for the screw head. These reamers are available in three diameters, namely Ø2.4 (used with 3 Series screws), Ø2.6 (for Tri-Lobe Prosthetics) and Ø2.8 (used with 2 Series screws in combination with the Ø2.4 reamer) .

These reamers are pre-assembled and the bits are not inter-changeable. In the event that they become blunt, a new reamer must be obtained.

These may also be used in titanium components which are not subject to casting and hence the use is predominantly to remove cement or acrylic which might have gone down the screw hole.

Where the TS***X***1 or GS***X***1 screw is to be used, the ø2.4 is also used on its own.



ITS-CCI Chrome Cobalt Cylinders *(Continued)*

6. The substructure is worked off according to standard laboratory procedures.

7. A slight misfit can be seen here between the substructure and the chrome cobalt cylinders.

8. When the substructure is worked off, the surfaces to be cemented are sandblasted and cleaned meticulously with either a steam cleaner or water.

Note: An alternative to cementing is to lazer weld the chrome cobalt cylinders to the substructure.

9. Mix any anaerobic cement (such as Ceka Site) according to manufacturers specifications and apply to the parts to be luted. To ensure fast curing, oxyguard 2 panavia (from Nova) can be applied. Curing time is at least 10 minutes.

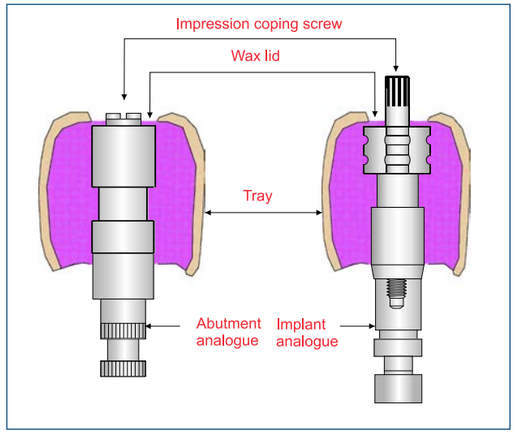
10. After curing is completed the “oxyguard” is cleaned off the substructure. The protruding chrome cobalt cylinders can be trimmed to the same height as the substructure and an overdenture can now be fabricated.

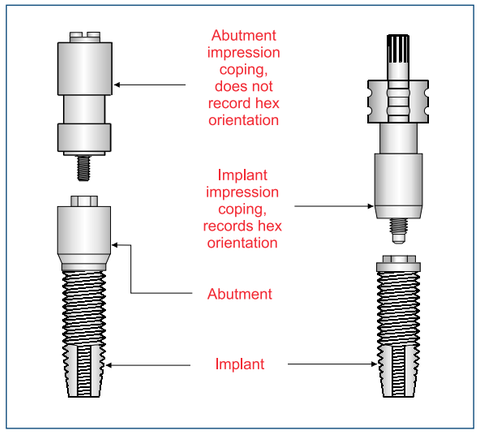
4. Inject impression material around the impression copings.

5. Using the window-type impression tray, take the impression, using firm impression material. The window can be closed with wax. The impression coping screws push through the wax.

6. The impression coping screws must be fully unscrewed before the tray can be removed from the patient’s mouth. The impression coping body is left in the impression material and stays in the tray, ie. It is “picked-up” by the tray.

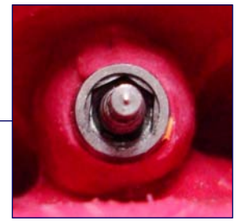
Finally, place the laboratory analogue onto the impression coping and fasten, using the impression screw. The model can now be cast.



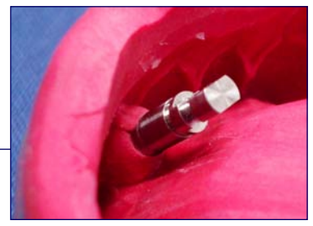


Preparation of the Master Model

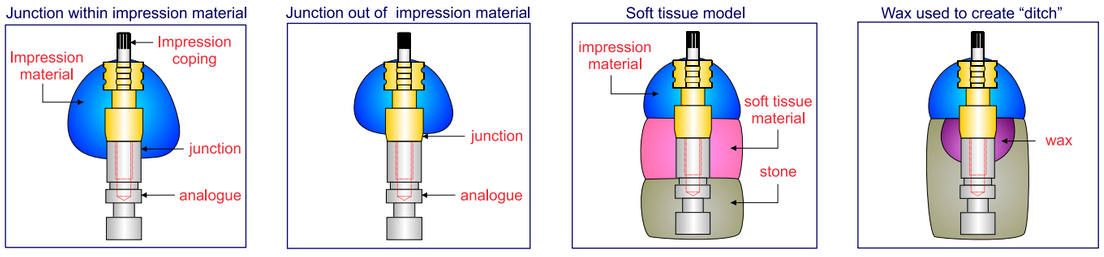
1. Select the correct laboratory analogue according to the impression coping used in the final impression.



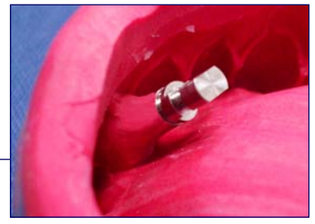
2. Place the analogue onto the impression coping and tighten, using the Impression coping screw. So as not to move the impression coping's position in the impression material, hold the analogue in the one hand whilst turning the impression coping screw with a screwdriver, in the other hand.



If the junction between impression coping and analogue is in the impression material, then you can cast a regular stone model. If the junction is out of the impression material (below the patient's gingival level) then it is best to use a soft tissue model. An alternative to a soft tissue model is to place wax around the junction, and after the stone is set, boil the wax out to leave a "ditch" around the head of the analogue.



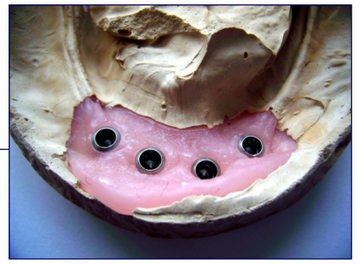
3. Before you can separate the model from the impression, fully undo the impression coping screw.



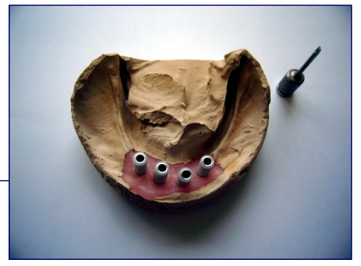
4. If you have used implant stone to cast your model, cut a slot on the model, to enable you to see whether the cylinder is properly seated on the analogue.

ITS-CCI Chrome Cobalt Cylinders

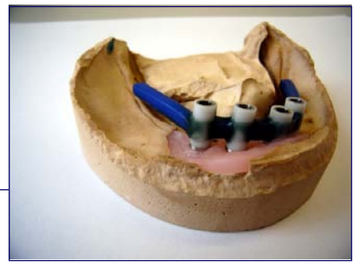
1. A conventional crown and bridge model is cast using LITS4 analogues.



2. Place the ITS-CCI chrome cobalt cylinders onto the analogues and fasten the screws using an appropriate hand driver.



3. The substructure is now waxed onto the plastic cylinders that slide over the chrome cobalt cylinders.



4. The substructure is sprued and removed from the cylinders.

5. Invest the substructure and cast using any metal of choice as there are no gold cylinders to consider.

Belle Glass Abutment and Crown using Titanium Cylinders *(Continued)*

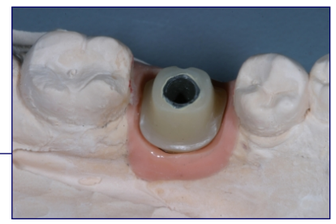
25. Thus achieving a 98.5% cure and less than 1% shrinkage. Belle Glass is the only resin filled composite system to achieve this due to using all three methods of curing. Light, heat and pressure.

26. After carefully grinding and polishing the Belle Glass crown, sandblast the inside of the crown with 100 micron alluminium oxide sand. Etch with porcelain etching material ready for cementation.

27. Ease the plaster of the contact points slightly to create large tight contact points. Paint with separator (Rubbersep). Finish contact points.

28. Note the natural color contrasts between the occlusal 3rd, the middle 3rd and the cervical 3rd.

29. Note how the custom post has the shape of a root and a large profile base creating an ideal profile from the implant head to the crest of the gingiva.

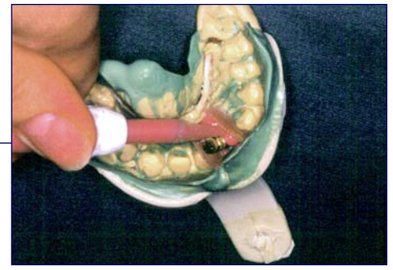


30. The completed custom post and crown made from Belle Glass on a titanium cylinder.

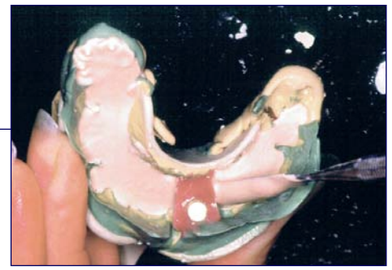
Preparation of the Master Model using gingival mask

1. Position wax strips on either side of the analogue to control gingival mask flow.

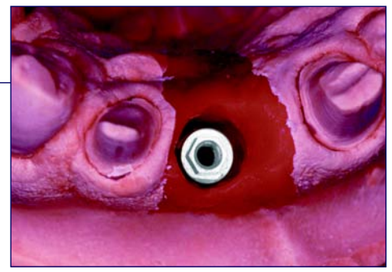
2. Mix the gingival mask and inject into the blocked off area. Take care not to cover the retention grooves of the implant analogues with the gingival mask.



3. Wait for the gingival mask to cure and then using implant stone, cast the model in the conventional way.



4. Cast model with gingival mask.



5. Before you can separate the model from the impression, fully undo the impression coping screw.

Single Anterior Tooth : Ideal angulation

1. Angulation is “ideal” if the axis of the implant is such that the screw access hole comes out the singulum of an anterior tooth or the occlusal surface of a posterior tooth.

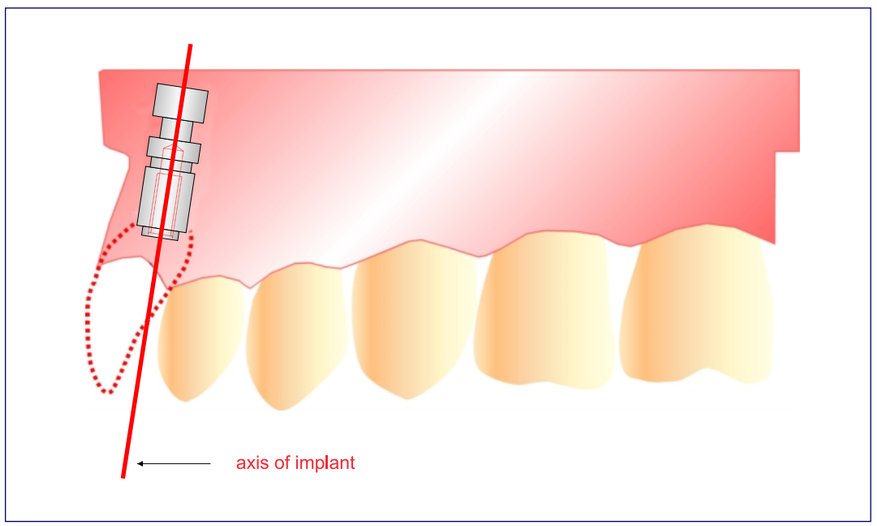
2. Angulation is “not ideal” if the axis is on a cusp, in an abrasure region, or on the buccal face of the tooth!

3. For the ideal angulation cases we have the following options:

- A — A “UCLA one-part” crown (the most popular)
- B — A crown on an Anatomic Abutment
- C — A Ceramic Abutment
- D — A Passive Abutment

The different options are discussed in this manual.

- A — Is how most of these cases are handled.
- B — Is sometimes used for upper centrals, but is usually used for posterior single tooth restorations.
- C — Is the new addition and gaining fast in popularity. It is very similar to A and is suitable to use in areas where the soft tissue is very shallow and aesthetics are vital.
- D — Is also similar to A but is more technique sensitive as the crown needs to be luted to the titanium ring. It has the advantage of a better interface with the implant.



19. Completed polished custom core abutment in denture color. Note: No incisals have been used, thereby giving you a true reproduction of the root.

20. Rubber-Sep is now painted onto the post.

21. After painting rubbersep, the separator is left to airdry for 10 minutes.

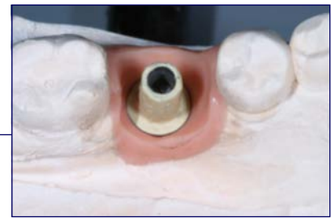
22. An adequate amount of material is dispensed, adapted with Belle Glass spatula and moulded into a round disc.

23. The custom core is placed back into the model. The disc is then adapted around the custom core into the shape of a molar.

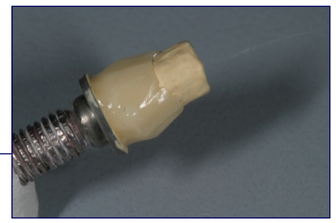
24. Cured in the CU for 20 minutes 6 Bar nitrogen pressure at 140°C.

Belle Glass Abutment and Crown using Titanium Cylinders *(Continued)*

13. Opaqued component showing that all the metal has been covered.



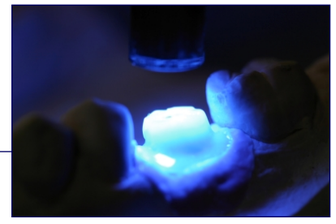
14. The prime core is built up with opacious dentine - making sure that it stops 1mm short of the margin. (Opacious dentine is non-polishable)



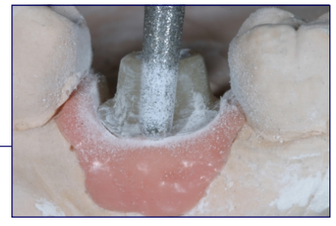
15. Basic second build up in place with translucent dentine. Note that no incisal is used in the manufacture of custom core build ups.

16. Using the Belle Glass instrument, the material is adapted to the gingival mask. “Preformed”.

17. Adapted core is cured for at least 1 minute while still on model. After light curing the custom core is finally cured in the “curing unit” for 20 minutes under nitrogen pressure and 140°C.



18. After curing custom core is adapted 1mm below the gingival mask using a diamond bur.



Steps to follow for the UCLA one-part crown

UCLA Abutments are available for nearly all types of implants. They come in two forms - a plastic cylinder and a gold cylinder.

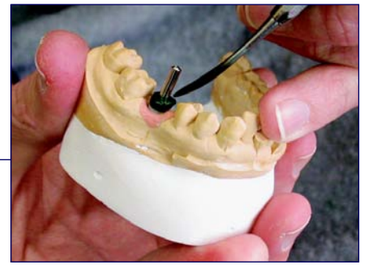
All plastic sleeve:
This type of cylinder is not ideal for a permanent restoration as the surface which mates against the implant will not be smooth and level enough, as a result of the casting process. If the dentist insists that this inferior plastic UCLA be used, then the appropriate milling tool must be used to refine the mating surface.

A gold alloy base with plastic waxing sleeve:
This cylinder has the advantage of a gold base which is pre-machined to give a precise fit to the implant, together with a waxing sleeve, to facilitate an easy wax up process.

1. Prepare the master model and obtain the correct UCLA Abutment.

2. The UCLA abutment is screwed onto the model. Trim the abutment to the correct occlusal height. The Plastic Sleeve is cut away and then wax is added until the ideal shape of the tooth is achieved.

3. The Impression Coping Screw can be used as a waxing sleeve.

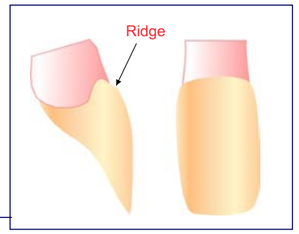


Steps to follow for the UCLA one-part crown *(continued.)*

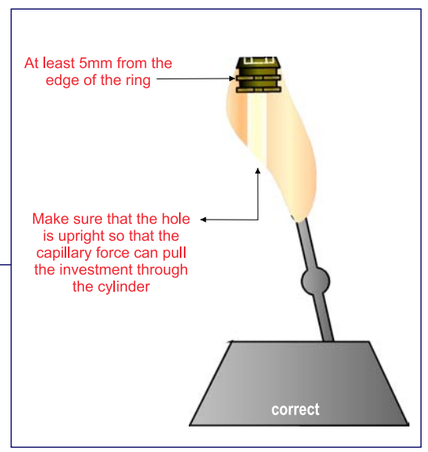
4. A normal wax-up is done around the waxing sleeve.

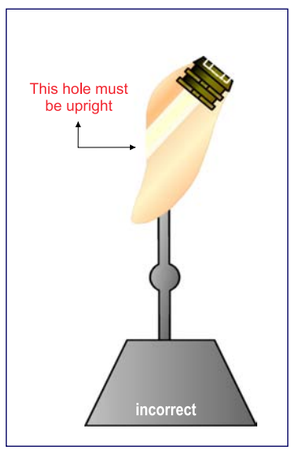
NOTE: The technician can determine the place where the soft tissue will settle against the tooth by making a slight ridge as shown on the left. This must be done to match the adjacent teeth.

NOTE: The shape of teeth is seldom “round”. The shape of the root of the tooth must be developed sub-gingivally so that where it emerges through the tissue it is the right shape and there must be no ridge-lap. This is referred to as the “emergence profile”.



5. Add the sprue to the UCLA abutment with its wax and then invest it.

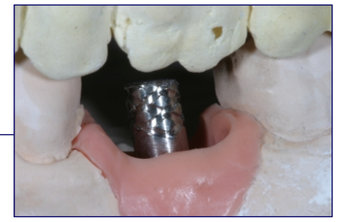




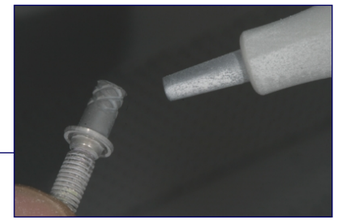
6. Burn out the wax and plastic by placing the model into the furnace according to the investment manufacturer’s specifications and leave at final temperature for at least one hour. The plastic sleeve requires more time to burn out than does wax. It is advisable not to leave these rings at low burnout temperatures, ie 400° to 500°C, as this is the optimum temperature for investment to expand. Too much expansion on an implant case could result in a metal creep on the gold cylinder.

7. After casting, the removal of the investment material is most critical. IT MUST BE REMOVED ULTRASONICALLY. DO NOT sandlbast or blast with glass beads, the fitting surface which must fit on the implant. If this surface is blasted in any way, the precision machined gold part will not fit the implant as intended!

7. Component height is verified.

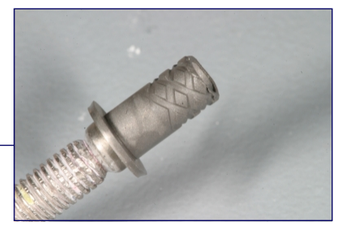


8. Component is sandblasted with 100µ Al/oxide. A uniform grey metal should be achieved.



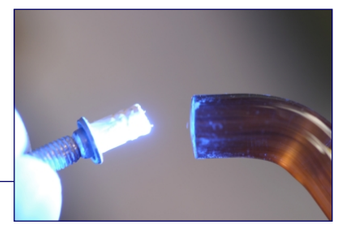
9. Belle Glass NG metal prep is then applied to the sandblasted surface and allowed to airdry.

10. Note: After metal prep has dried, a slight uneven surface texture is normal.



11. Apply opaque in very thin multiple layers. Light. Curing between each application for 20 seconds.

12. A distance of 10mm from the tip of the light should be kept at all times. After an even thickness is obtained and no grey is visible, cure the opaque in a HP unit without nitrogen, to maintain the connective dispersive layer. A slight sticky surface will remain after 10 min curing cycle.

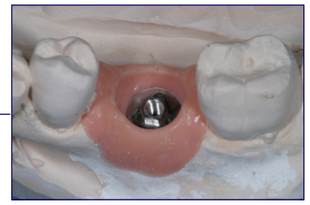


Belle Glass Abutment and Crown using Titanium Cylinders

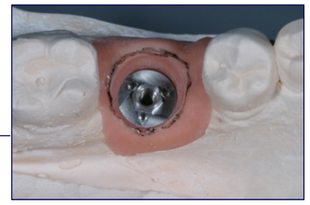
These Cylinders are available with a 1mm or a 5mm collar height. The grooves on the cylinders provide mechanical retention for acrylic or composite. Cylinders like these are available for various interfaces and are available in both engaging and non-engaging formats.

Belle Glass is obtainable from Milners Dental Suppliers (Pty) Ltd.

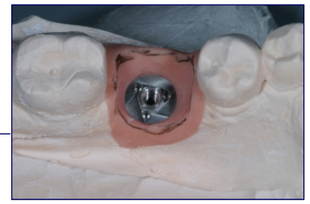
1. Prepare model with tissue mask (GI mask).



2. Prepare tissue mask showing the outline of the custom core to be made.

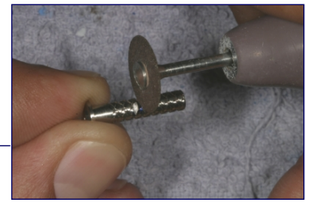


3. Prepared tissue mask after trimming custom abutment profile.

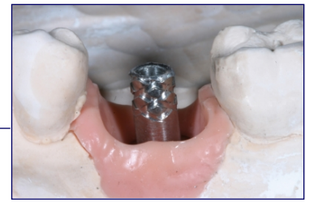


4. Titanium cylinder in position. Correct height to be determined and cut according to bite.

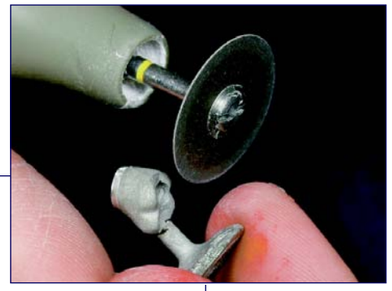
5. Component is cut according to the bite using a carborundum disc and rubber wheeled smooth.



6. Component is placed back onto model.



8. Work off the coping as normal. Take care not to damage the fitting surface.



9. After de-oxidising and opaquing, the porcelain (or composite) can now be added. NOTE: It is not only important to get the shade match correct, but also the surface texture of the crown. Replicate the surface texture of the adjacent tooth as much as possible and a slight shade mismatch will probably not be noticeable.

10. At the screw access hole, a porcelain margin must be built up. This will enable the dentist to do a composite closure of the screw access hole without an unsightly grey metal ring

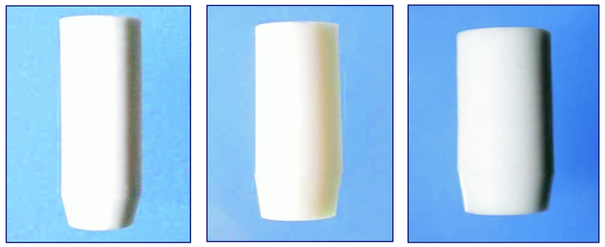
11. Before sending the crown and model to the dentist, clean the model thoroughly with soap, water, and a toothbrush, or steamclean. Then clean the UCLA crown and its screw, preferably in the Ultrasonic bath. Assemble the crown to the model and send it to the dentist.

Occlusion:

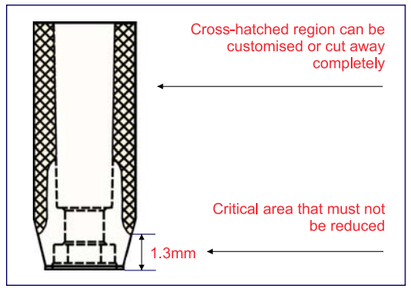
Implant borne crowns are usually kept out of occlusion by about one-tenth of a millimeter. This is because implants are 100% rigid. When masticating, clenching or grinding, the natural teeth move on their periodontal ligament. The implant does not, and therefore if it is in occlusion it will bear 100% of all loads, causing it to eventually break.

Ceramic abutments - the Zirconia Toughened Alumina Abument

Due to increased aesthetic demand of patients, it is not always desirable to use metal cylinders for the permanent restoration. These Zirconia Abutments are indicated for the anterior region, where tissue thickness could possibly vary from 1mm to 2mm. Excessive Zirconia is ground away and then porcelain (or composite) is added directly to the abutment. An added advantage is that due to no metal casting, the crown can be completed within a day. Aesthetics are excellent due to the colour being tooth compatible and not grey.



Zirconia Toughened Alumina ceramic abutments suitable for various diameter platforms



Advantages of a ceramic abutment are:

- No metal discolouration of soft tissue will be evident
- Expensive casting metals will be eliminated
- Laboratory time is reduced, as the porcelain gets packed directly onto the abutment

Bare the following in mind when working with ceramic abutments:

- It is essential to irrigate with water while cutting the abutment. If not irrigated, micro cracks will be generated, and fracture of the abutment in the mouth is likely. If you do not have a system to irrigate while cutting, then the ceramic abutment cannot be used.
- Only ceramic bonding porcelains are to be used with these abutments, eg. Vita VM 7 and Vita Vm9
- It is best to use a resin-bonded diamond grinding wheel, medium grit (126 mesh) to trim the abutment.
- Do not cut or reduce the abutment in the critical zone.

Retaining screws

GSS2 (Gold) or TSS2 (Titanium) Slotted

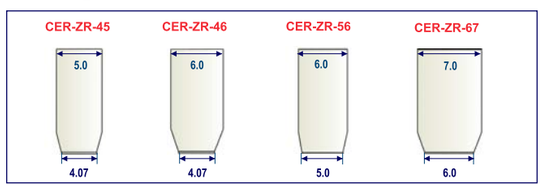
GSU2 (Gold) Uni

GSS3 (Gold) or TSS3 (Titanium) Slotted

GSU3 (Gold) or TSU3 (Titanium) Uni

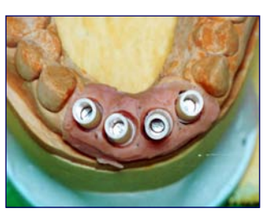
NOTE: **These screws must be tightened to 32Ncm**

Full range of zirconia abutments::



NOTE: It is essential to irrigate with water while cutting. Failure to do so will result in heat-induced micro cracks and ultimate failure of the component.

Only ceramic bonding porcelains are to be used with these abutments.

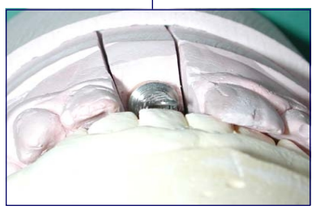


It is best to use a resin-bonded diamond grinding wheel, medium grit (126 mesh) to trim the abutment.

Data Sheet for zirconia abutments

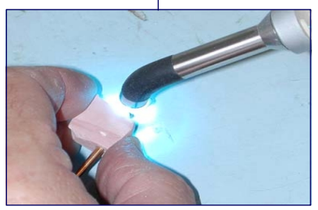
PROPERTY	UNITS	ZIRCONIA
National Composition	100% Zr	
Density	g/cm^3	6,05
Porosity	%	0
MECHANICAL PROPERTIES		
Bending Strength	Mpa	1400
Fracture Toughness	$MPa.m^{0.5}$	5
Hardness (HV) Vickers	$10^3 Nmm^2$	11-12,5
THERMAL PROPERTIES		
Thermal Expansion		
At 400°C	$10^{-6}K^{-1}$	10,4
At 800°C	$10^{-6}K^{-1}$	10,8
At 1000°C	$10^{-6}K^{-1}$	11,8

6. Using a cutting disc and tungsten carbide drill, cut the cylinder to the Correct height and profile.



NOTE: All steps shown here on the model, can be done as a combination of in the mouth and chairside.

7. NOTE: An immediately loaded implant must be protected from all but light occlusal loads, for at least 6 weeks. Therefore ensure that this temporary crown is out of occlusion by at least 1mm, preferably 2mm. It can be built up after 6 weeks to 0,2mm out of occlusion (the Standard for implants).



8. Sandblast the cylinder according to the manufacturer's specifications of the composite / opaque being used. Add the composite layer and light cure.

9. The composite crown is now fabricated in the conventional manner, and the prosthesis is screwed to the implant within 2 days (3 days maximum) and tightened to 32Ncm. The osteolytic phase peaks at 14 days and hence no retightening, loosening or adjusting of the Prosthesis must take place for the following 6 weeks.

Immediate Loading protocol *(continued)*

Restorative considerations: using Titanium cylinders

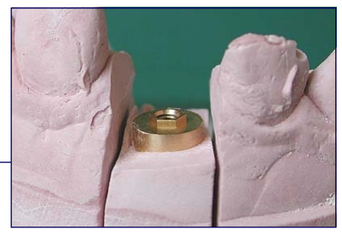
The illustration here is for an immediate load single tooth.
The protocol can be extended to multiple units.

1. Impressions are taken immediately after implant placement. If the Fixture mount is going to be used to take the impression, remove the mount screw and replace it with an impression coping screw.

2. Fixture Mount screw replaced with Impression Coping screw.

NOTE: The fixture mount is made from titanium so it can be cut down and used in place of the titanium cylinder, shown below.

3. Ensure that all the prosthetic parts needed are obtained before surgery commences.



4. The models are cast in the conventional manner described earlier in this manual.

5. Attach the titanium cylinder to the model using the prosthetic screw.

NOTE: A “TC” type titanium cylinder is shown here. A “DB” type Titanium cylinder is an alternative, as is a “CER-ZTA” ceramic Abutment.

Wax up procedure for Ceramic Abutments: Custom Post and Crown

1. The abutments require trimming as they are too labial and too long.

2. Diagnostic wax up to establish exactly where The crowns must be; the diagnostic indicates finished length and labial protrusion of teeth.

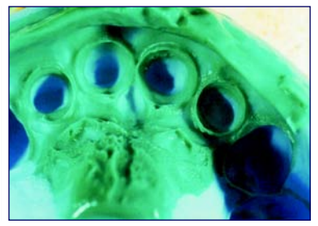
3. Pull a plastic coping over the diagnostic. This is then used as a guide when trimming the alumina abutments as you can see exactly where you need to trim to achieve the best aesthetic result.

4. The trimmed abutments. Cutting must be done while irrigating.

5. Creating a finish line, porcelain is applied using the gingival mask as a guide. The finish line is usually slightly sub-gingival on a case like this (ie. anterior).

6. Placed in the mouth. Note the blanching due to the gingiva being “stretched” by the Alumina Abutments.

7. Cord is placed for the impression and the access holes are blocked off.

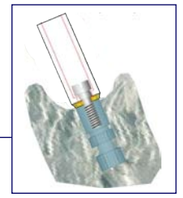


8. The impression.

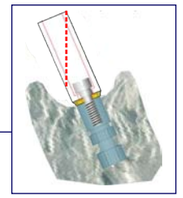
9. Final crowns pre-cementation.

Single Tooth with Angulation problems

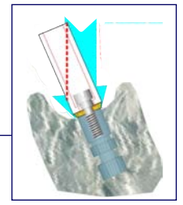
1. Attach relevant hexed UCLA abutment to the analogue on the model, ensuring that the hex is engaged and seated.



2. Trim the plastic pipe so that the post will fall in line with the arch of the existing teeth. You will find that the access hole shows bucally.



3. Wax up your ideal customised post. The neck can be waxed up in order to obtain a definite finishing line between the post and the crown.



4. Unscrew the cylinder and invest your custom-made abutment. Cast your custom-made abutment in a rich yellow Gold Alloy such as Argenco 1 or Degunorm, so that there will not be "greying" of the soft tissue.

5. Once the post has been cast and worked off, the access hole is closed, using soft pink wax. Apply spacer onto the post and then wax coping and cast as normal.

6. Now create a crown.

NOTE: When this procedure involves multiple units using custom posts, they move slightly in the mouth - not the same as on the model. The posts need to be torqued in the mouth, a temporary bridge made, and a new impression taken over the posts for the manufacturing of the final bridge.

8. Sandblast the titanium cylinders and fit the bars onto the abutments. These can be bent and cut as indicated below. Cantilever not to exceed 15mm.

9. Place the denture over the structure to make sure it fits properly.

10. Cure the titanium cylinders into the denture with acrylic. (It can be Cold Cure but could also be done in pressure pot).

11. Work off and polish the denture.

12. Temporary healing abutments are removed from the patient's mouth and the appliance is now screwed back into place. Retaining screws are tightened to 32Ncm. Screw access holes are sealed with Temporary filling material.

Patient is dismissed with the instruction of a soft diet for 6 weeks. Initial swelling will probably close the space between the soft tissue and the appliance.

If the acrylic cracks, the patient must be instructed to return immediately for a repair. Leaving it cracked can jeopardize the integration of the implants.

Check that the retaining screws have remained torqued to 32Ncm at the 6-week recall and the 12-week recall. If all is stable at 12 weeks a more permanent screw closure can be applied.

Immediate Loading protocol *(continued)*

3. Cut away the inner surface of the denture, so that the denture can accommodate both the abutments and the metal bars.
Make sure that the denture lies passively on the mucosa without binding on any of the components.

4. Paint adhesive to the fitting surface of the prepared denture.

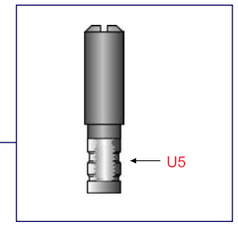
5. Inject impression material around the cylinders and then introduce the whole denture to take the impression, taking care to keep the access holes open.

6. Loosen the prosthetic screws and remove the impression.

7. Attach the laboratory analogues to the cylinders and cast the model.

Using the UCLA Abutment as a Custom Post for a screw-retained prosthesis

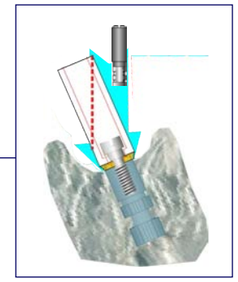
1&2. Follow steps 1 & 2 as described in the section "Single Tooth with angulation problems".



3. Place the CB1 screw into the U5 and place in surveyor.

Before using the U5 gold cylinder, please carefully read the data on the U5 and its correct use, following this chapter.

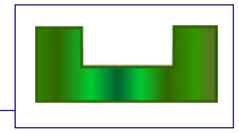
4. The U5 screw thread is incorporated into the custom post, using the surveyor.



5. The custom post is invested with the CB1 screw in the U5 (to prevent investment running into and damaging the screw threads) as well as to locate the U5, so that it will remain in place after the plastic sleeve melts away in the furnace.

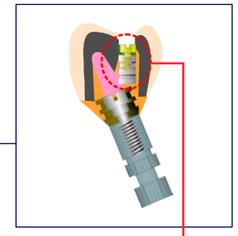
6. When the post is cast, simply remove the CB1 screw.

7. The U5 is supplied with a plastic housing to assist in the waxing of the screw seat.

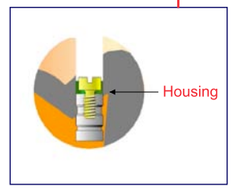


Note: Actual colour of the housing is white - green is used for illustration purposes only.

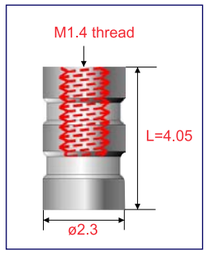
8. Place the housing onto the U5 and fasten, using the gold slotted screw, GSS1.



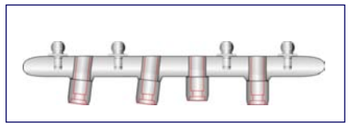
9. A coping is then waxed around the housing.



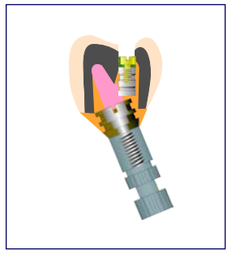
Technical data and use of the U5 Cylinder



U5 cylinder



Removable ball abutments in mezo-bar



Custom posts - for screw-retained prosthesis

The U5 screw thread is made of "Ceramicor" which is sourced from Switzerland. This material is also used by most other European Dental implant manufacturers for their gold cylinders.

Co-efficients of expansion are:	Melting temperature:	Chemical composition:
25 - 500°C = 11.9	1400 - 1490°	Au 60%; Pd 20%;
25 - 600°C = 12.2		Pt 19%; Ir 1%

Cast onto the prosthesis: The U5 can be cast onto the prosthesis. This is, however, not recommended as the CB1 screw can break in the U5 and the screw threads can collapse in the furnace during the casting procedure.

Note: Southern Implants (Pty) Ltd does not accept any responsibility for the breakage of the CB1 screw and U5 during or after casting.

There are **two** recommended ways in which the U5 thread can be incorporated into the prosthesis:

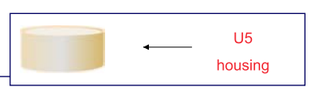
- **Cemented** - using any anaerobic cement, e.g. Ceka Site.
- **Soldered** - familiar to laboratory technicians.

Cementable Option:

1. Wax the prosthesis as normal. Screw the CB1 screw into the U5 and paint some Isolit or any other separating agent onto the U5. Place the U5 in the position that it is required in the prosthesis. The purpose of this is just to make the indentation in the wax-up (keeper) for cementation later. The U5 is then removed and the prosthesis invested. Sectional investing is recommended (Drying time: 30 minutes).

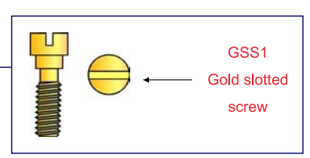
2. Once the prosthesis is cast, blast the inside of the keeper and the outside of the U5. Mix the anaerobic cement, apply sufficient quantity, and avoid any air entrapment. Position immediately. Remove the residue after 10 minutes setting time.

3. The U5 is supplied with a plastic housing to assist in the waxing of the screw seat.



4. Place the housing onto the U5 and fasten, using the gold slotted screw, GSS1.

5. A coping is then waxed around the housing.



Immediate Loading protocol

What is immediate loading?

In the case of multiple implants it is the concept of connecting the implants with one another with a temporary bridge as soon as practically possible, after First Stage Surgery. This is done within the first 5 days, but preferably within the first 2 days, after surgery. (ie. Three treatment phases condensed into 10 days).

Choice Components for Immediate loading

- Standard Abutments, AB or Wide Standard Abutments, AWB (ABA and A6BBB on wide implants). Conical and Compact Conical abutments can also be used to ensure that the restorative procedures are equi or supragingival. Anatomic Abutments and Shouldered Abutments are also alternatives in the case of cemented provisionals.
- The initial prosthesis (for use over 4 months to one year) is most economically constructed in acrylic, on titanium cylinders. (Where a denture exists, the flanges can be removed and the titanium cylinders retrofitted to the denture).

Restorative considerations: using the Simplex system

There are many protocols for the use of the Simplex strengtheners, a common protocol is described here: (NOTE: This example shows 3 implants, but it is most commonly done on 4 implants).

1. Restoration begins directly after surgery. The existing denture is used to create the superstructure.
Holes are drilled through the denture, penetrating right through both surfaces, so that the denture can fit over the titanium abutments.

2. Cut the top of the chimneys off if needed. This can be done in the mouth with plenty of irrigation, but is best done outside the mouth by marking the abutment and removing it for bench top cutting.

Sizing Overdenture Abutments

It is important that the correct height overdenture abutment is chosen in order to obtain maximum retention. If the abutment is too short, it will prevent the retaining clips from fully engaging over the ball abutment and this will result in a loose fit.

The length of overdenture abutment that is chosen should ideally be 1mm more than the transmucosal height ie: Length from the restorative platform to the highest point of the soft tissue. Note that this length excludes the retentive part of the ball abutment which measures ø3.95mm. In cases where there is only 1mm of soft tissue, the shortest abutment is chosen.

Determining transmucosal height using the temporary abutment

Temporary abutments supplied by Southern Implants are laser marked at the top. This marking ends with a number, which indicates the length of the transmucosal / temporary abutment in place.

The following illustration is with a TB6n abutment:

The highest point of the soft tissue is determined. Looking at the abutment we can estimate that the abutment is sticking out 2mm above the highest point of the soft tissue, hence there must be 4mm of soft tissue below that point (total height of abutment =6mm). With a depth of 4mm, we now add 1mm and thus an OB5 abutment is recommended.

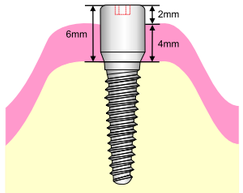


Illustration with TB6n

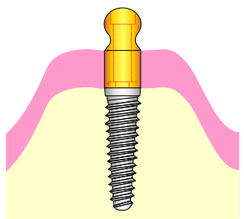


Illustration with OB5 in position on implant

Determining transmucosal using the PDGA depth gauge (for externally hexed implants only)

Unscrew the healing abutment and position the gauge over the hex of the implant. The gauge has markings that correspond to the numbers on the arm of the gauge. The first marking will thus be at the 3mm mark. If the height measure is 3mm, add 1mm and thus an OB4 abutment, in this case, will be recommended.

Using a probe

A probe can be used to measure the distance from the platform of the implant to the highest point of the soft tissue. This point is then marked on the probe and can then be measured with a ruler.

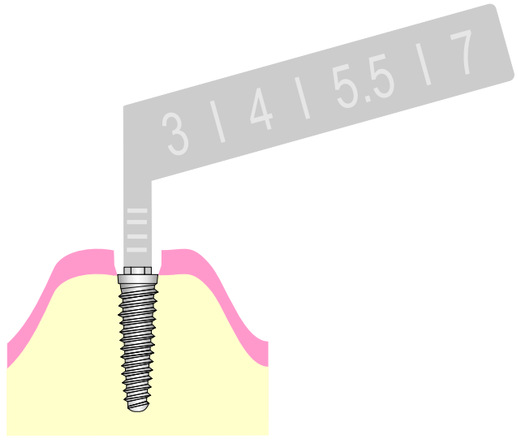


Illustration with PDGA

Angled Abutments

Indications

For use where angle and fit of pre-angled abutment makes it unnecessary to custom-make an abutment by using a UCLA abutment.

Contra-Indications

When a position between the 60° of the hex is needed, it will be necessary to manufacture a custom post. Also where the cuff length of the pre-angled abutment is such that it is not ideal for the case, here again a custom post should be manufactured.

Location, quality and contour of acceptable bony sites for implantation sometimes indicates implant placement with pronounced facial angulation. Customised angled abutments with a 20° and 35° angle can be used to satisfy the widest range of requirements. Both have a secondary screw for a screw-retained prosthesis. These abutments are available for the Ø4.0mm and Ø4.0mm external hex implants.

For a screw-retained prosthesis

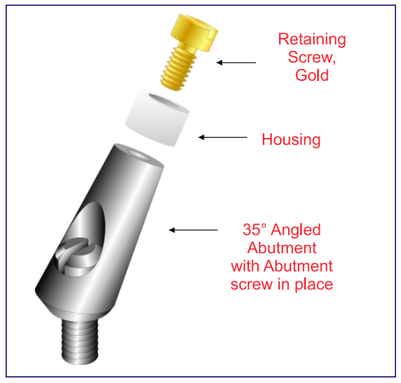
It is recommended for the technician to trim the angled abutment to the correct occlusal height as one cannot take an impression of the screw thread. This can only be done if the crown is going to be cemented onto the abutment.

1. The abutment is trimmed to the correct occlusal height. Take care not to trim away too much of the screw thread. Should it be required to trim away most of the screw thread, then a cementable crown should be made. (If the abutment is trimmed in the mouth, copious irrigation is of utmost importance).

2. Place the trimmed abutment on the model.

3. Place the white plastic housing on top of the screw thread and fasten with the screw. The coping can now be waxed up onto the abutment with the incorporated housing as illustrated in point 4.

4. If you require a longer access hole than what the housing allows, a CB1 screw can be used as a waxing sleeve.

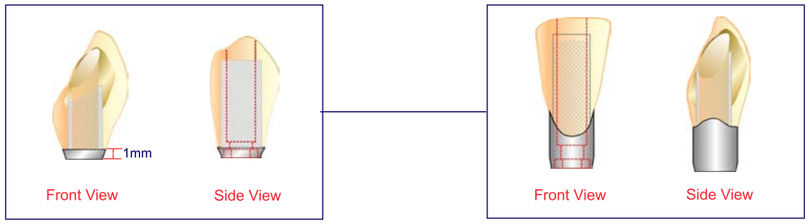


For a cementable prosthesis - trim the abutment to the correct occlusal height. If desired, prepare an aesthetically contoured finishing line. Wax coping as on a conventional post.

Titanium Cylinders

Although the original intention was for making temporary crowns and bridges, they can be used in permanent or definitive roles as they are pure titanium and made to exacting tolerances. Their fit will be superior to any plastic item that is invested and cast.

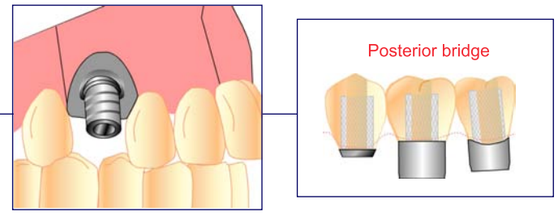
In some patients the soft tissue does not respond well to sub-gingival resin. This may be associated with resins from which free monomer is released (leached). For this reason the titanium cylinders are available in two different collar heights, namely a 1mm and 5mm height.



The 5mm collar cylinders can be prepped using a tungsten carbide or diamond tipped bur, for correct emergence profile and improved aesthetics. New generation materials such as Art Glass & Targis Vectris can be used with these titanium cylinders (mechanical retention).

1. Determine the modifications needed to provide adequate clearance for adjacent and opposing dentition and then trim the titanium cylinder accordingly.

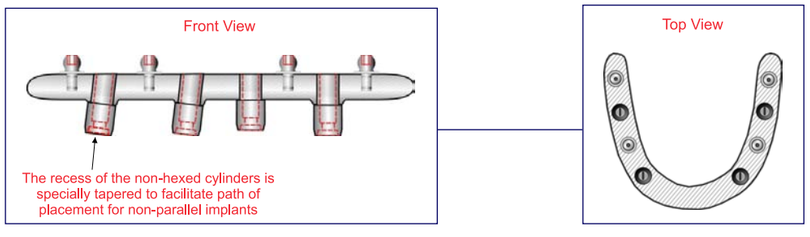
2. Prepare the metal for applying the selected material according to routine laboratory procedures.



3. Permanent Chrome-Cobalt Superstructure : The conventional mezo-bar or fixed bridge is fabricated by casting precious or semi-precious metal directly onto the gold cylinder. These bridges are expensive and have been known to fracture more often than originally anticipated. A high strength chrome-cobalt superstructure can be made by:

- Placing the titanium cylinders on the analogues in the model
- Block out the retention grooves
- Wax up a framework that fits over the titanium cylinders, but does not incorporate them
- Invest and cast the framework in chrome-cobalt on the model
- Now bond the framework to the titanium cylinders using Ceka Site or Panavia.

4. You have thus created a composite framework of chrome-cobalt and titanium and due to the fact that the lamination occurs after casting, the fit on the model will be extremely passive and similarly the fit in the patient's mouth should be highly passive.

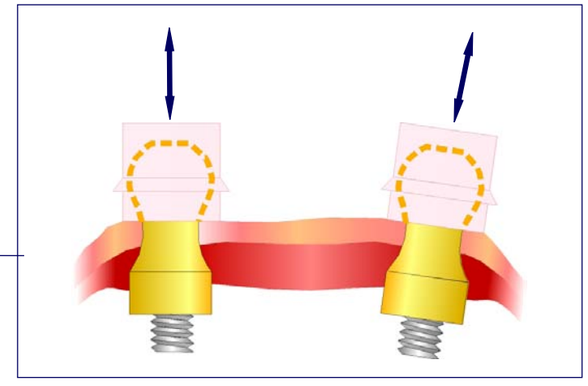


4. Please remember that Overdenture Abutments:

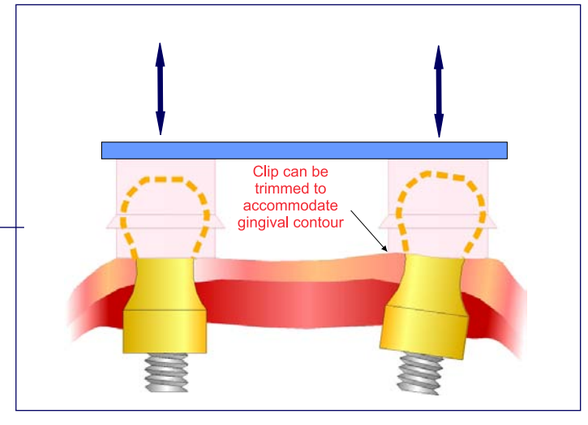
- Are recommended for the mandible only. Free standing implants in the maxilla have an extremely poor prognosis.
- Will give stability and retention to the denture but only limited support. A mezo-bar or fixed bridge will therefore always be superior. The overdenture abutment is therefore selected for primarily financial reasons, ie, it is usually a compromise treatment.
- Should be placed as close to the mental foramen as possible to maximise lateral stability and minimise "rocking", ie ideal implant placement is not the same as one would choose for a doldar bar-type restoration that the length of the overdenture abutment is critical to the success or failure of the restoration. The length must be such that the plastic clip, when applied, rests gently on the tissue.

5. Remember that Overdenture Abutments **MUST BE PARALLEL**:

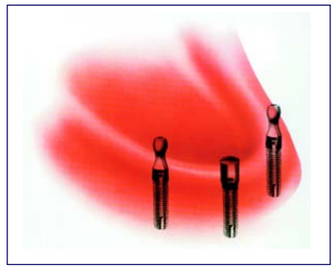
INCORRECT: Implants don't have to be parallel but clips MUST be. Clips that are not parallel have high initial retention but in a matter of months the retension is lost altogether.

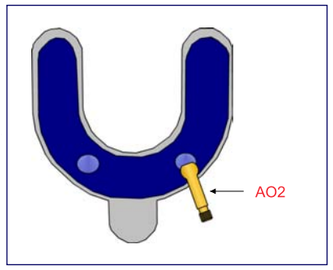


CORRECT: Clips are parallel to one another giving a single path of placement. They are made parallel on the model by placing a flat object on the tops of the clips.

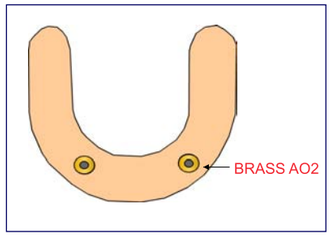


Overdenture Ball Abutment





1. The Overdenture Analogue is inserted into the recess created by the Overdenture Abutment in the impression.



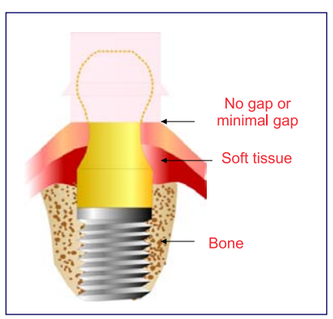
2. The model is then poured to encapsulate the analogues of the ball abutments.

3. The denture is fabricated as per normal. When the patient is happy with the shape, colour and occlusion of the teeth, the denture can be completed. This can be done in many different ways:

- The denture is cured as normal. Once the wax has boiled out of the flasks, the clips are placed onto the analogues using a glass plate to ensure that they are 100% parallel to each other. This is the most critical part of the procedure. Make sure that the undercuts are blocked out.

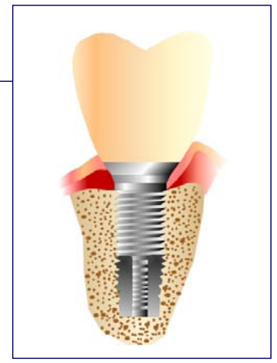
- Where the denture has been made without incorporating the plastic clip (PC2's) or where an existing denture is to be used:

A) A recess is drilled in the area of the balls (in the denture).
b) Drill an escape hole into the recess for escape of excess cold cure acrylic.
c) Place the plastic clips onto the analogues, ensuring that they are parallel to each other using a glass plate.
d) Block out all the undercuts.
e) Cold cure as normal.



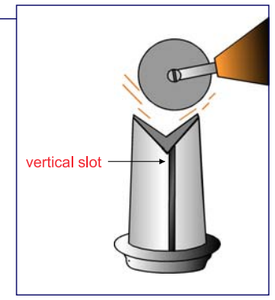
Anatomically-shaped Abutments

These Anatomically-shaped abutments are used for single tooth and bridge restoration.



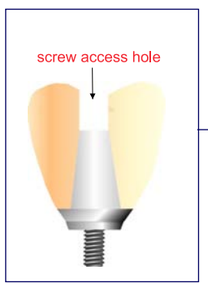
- They are made of commercially pure titanium, ie. at the implant to abutment junction it will be titanium to titanium.
- They come in different collar lengths to suit different tissue conditions.They vary in width, giving the dentist or technician freedom to reduce the dimensions to an appropriate anatomic shape.
- They fit an externally hexed implant very snuggly with a mean hex gap of 10 microns
- The apical sections taper, which means that they can be used for bridges as well as single teeth.

They can be used in a number of ways. A typical protocol is:



- Use a wide temporary healing abutment at second stage surgery to create a suitable tissue opening.
- Take an impression off the head of the implant using an appropriate impression coping. The model is made using an appropriate implant replica and the Anatomically-shaped abutment is applied to the model.
- The Anatomically-shaped Abutment is prepared on the model using a cutting disc. In many cases there will be very little preparation needed, but this will depend on the positioning of the implant, the contour of the soft tissue, and the anatomy of the particular tooth.
- With uneven tissue, it may happen that the abutment's collar will stick out above the tissue in certain areas. The collar may then be trimmed in these areas using a tungsten carbide or diamond bur.
- A vertical slot or any other anti-rotation mechanism should be cut into the abutment. This assists with anti-rotation and correct location of the crown. (The convention is to put such a groove on the buccal or labial side to facilitate orientation in the mouth).
- The Anatomically-shaped Abutment may be returned to the mouth for final contouring, but this is usually not necessary. Note, if the abutment is to be prepped in the mouth, then copious irrigation must be used to avoid heating of the implant/bone interface.
- An all ceramic or metallo-ceramic crown (or bridge) is then fabricated to fit the Anatomically-shaped abutment.

If a closed crown is desired, then cementation must take place in the mouth, necessitating that the cement line be such that it can be controlled (1mm sub-gingivally). In these cases, a temporary resin crown is often useful to facilitate easy removal of the crown for screw re-tightening. The final crown is only placed once it is known that the interface and soft tissue are stable.

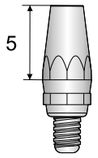


If the screw access hole is conveniently situated then the crown can be made with a corresponding access hole, ie. cementation of the crown to the Anatomic abutment can take place outside of the mouth or in the laboratory. Retrievability is therefore not compromised and the cement line depth is not relevant.

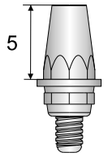
Note: Do not try to pack porcelain directly onto the Anatomical Post. It serves as a post only. There is a range of Anatomically-shaped abutments available to suit restorations for the Ø4.0mm, Ø5.0mm and Ø6.0mm external hex implants.

Straight Octagon Abutments for ITS Implants

SYN-5
FOR Ø4,8MM RESTORATIVE INTERFACE



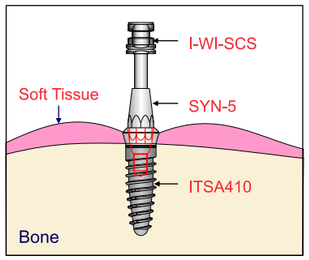
SYN6-5
FOR Ø6,5MM RESTORATIVE INTERFACE

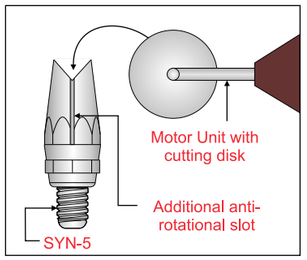


- They are made of commercially pure titanium and therefore provide a titanium to titanium abutment junction.
- The abutment has an apical taper which makes it suitable for both single crowns and bridges.
- Flats on the sides of the abutment provide anti-rotation for single tooth restorations.

DIRECT METHOD

- The lower internal end of the abutment is threaded, thereby preventing the screw from falling through the abutment. Thread the screw through the abutment with an I-SCS-M handheld screw driver until it's free, and then place the abutment into the implant and screw it three quarters down. Locate the abutment in the correct position and proceed with the final tightening of the screw. Torque to 32 Ncm with an I-WI-SCS.

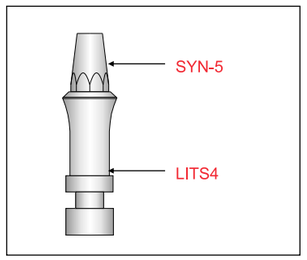




- The abutment can be trimmed with a diamond burr using copious irrigation to avoid heating of the bone/abutment interface. Care should be taken not to trim the anti-rotational flats. If this is unavoidable, an additional anti-rotational slot must be cut.
- The impression is taken using the conventional double cord method. The screw access hole must be closed with a cotton pellet or soft pink wax prior to the impression taking to avoid material going down the hole resulting in a “nib”, which will then have to be cut off before the master model is cast.
- The laboratory can now manufacture a conventional crown.
- The screw access hole must be closed with a cotton pellet before the crown is cemented onto the abutment. This will ensure that cement does not enter the shaft of the abutment, and hinder access to the screw.

INDIRECT METHOD

- Screw the octagon abutment into the analogue using a brass laboratory screw.



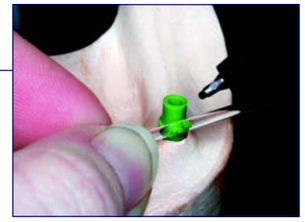
- Trim the abutment to the correct occlusal height.
- A vertical slot or other anti-rotational mechanism should be cut into the abutment if the anti-rotational flats have been trimmed. It is important to give indication of the crowns location. This is achieved by putting a groove on the buccal or labial side of the abutment to facilitate orientation in the mouth.
- A crown is fabricated to fit the abutment.

Round Bar

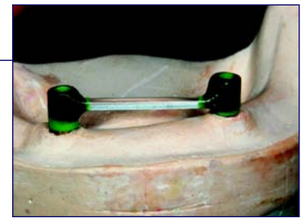
1. Cast the model in the conventional way.

2. The appropriate cylinders are placed on the analogues.

3. The plastic bar pattern is sectioned and applied to the cylinders. Avoid wax from flowing to the bottom edge of the cylinders.



4. The portion of the bar engaged by the retentive clips should be parallel to the axis of rotation of the overlay prosthesis.



5. Check the occlusal height of the bar before investing, and that the bar is parallel to the incisal edge of the upper anteriors.

6. The wax pattern is sprued *(fig A)* and invested *(fig B)*.

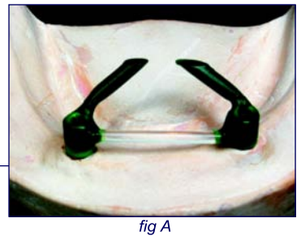


fig A

fig B

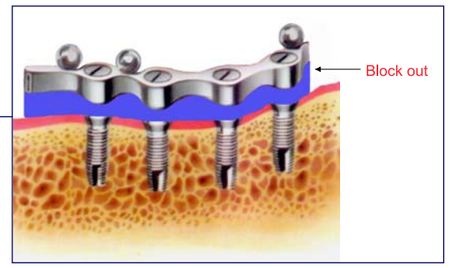
7. The cast bar is finished and polished. Take care not to damage the fitting surface.

Remaking a Denture on an existing Mezo-bar

There are many ways of remaking a denture on an existing mezo-bar, the one described here may be of use to you.

A. Dentist

1. Block out under the mezo-bar using periphery wax (in the patient's mouth).



2. Take an impression over the bar. Send the impression to the laboratory.

B. Laboratory

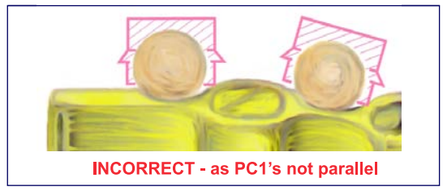
3. Push BP2's (Brass analogues of PP2's) into the sockets in the impression (or the relevant analogues, depending on the precision attachment system that was used on the bar).

4. Cast a model using extra-hard die stone.

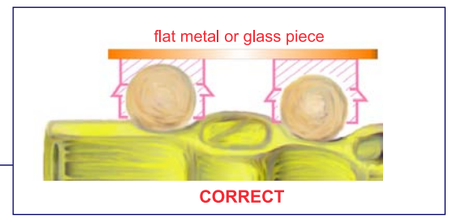
5. The denture is now fabricated as per normal on the plaster model. Send this to the dentist for a try-in.

6. Once the patient and dentist are both satisfied with the shape of the teeth, colour, etc., the denture is ready to be cured in acrylic and completed.

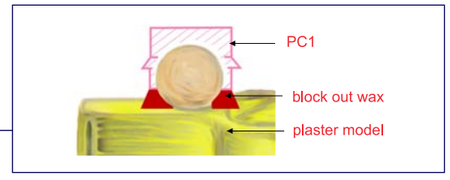
7. Only once the wax has been boiled out in the flasking process, do the PC1's (Plastic Clips) get placed over the brass balls on the model.



8. It is very important to ensure that the plastic clips are placed parallel to each other onto the balls to ensure easy placement of the denture. This can be achieved by using a glass plate.



9. Should there be a gap between the cap and bar after the placement of the caps, it should be blocked out with wax to prevent acrylic from flowing under the cap.



10. Once the caps have been placed, the flasking process is completed as with normal dentures.

NOTE: The best would be to remove the bar, take impressions of the implants and send everything to the laboratory. However, the patients cannot always be without their dentures for a few days.

Cosmetic Abutments for Tri-nex Implants

Indications:

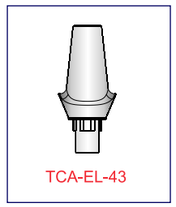
* Single crowns.
* Bridge restorations.

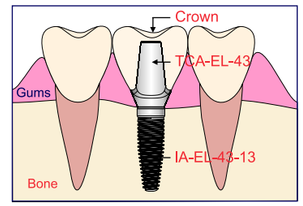
Features:

* The abutments are made of commercially pure titanium and therefore provide a titanium to titanium abutment/implant junction.
* The scalloped collar is shaped to follow soft tissue contours providing better aesthetic results.
* The apical taper makes it possible to use the abutment for single and bridge restorations.
* The abutment interface is designed to localise inflammatory response on the ø3.5mm and ø4.3mm implants.
* Tight tolerances and dimensional selection provide consistent interfacial rotational control.

Important factors when using cosmetic abutments

The scalloped edge of the abutment is at its lowest point in the middle front lobe. It is thus essential that the implant is placed with one lobe facing buccally.





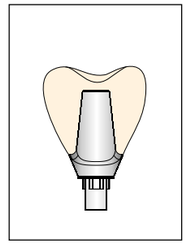
Typical protocols for the use of a cosmetic abutment:

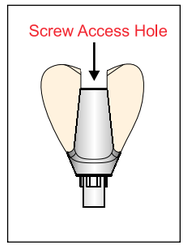
Direct Method:

* Use a wide temporary abutment at second stage surgery to create a suitable gingival contour.
* Place the abutment onto the implant and torque to 32Ncm with a Unigrip Wrench Insert I-WI-UG-S/M/L, using a gold or titanium screw as depicted in the flow chart.
* The abutment may be shortened to the correct occlusal height. Copious irrigation must be used to avoid heating of the abutment and the implant/bone interface.
* The screw access hole is closed with a cotton pellet prior to impression taking and crown placement. This prevents cement/impression material going down the shaft of the screw and ensures retrievability. A closed tray impression is taken and a temporary crown fitted.
* An all ceramic or metallo-ceramic crown (or bridge) is then fabricated to fit the abutment.

Indirect method:

* Take impressions of the implant interface using the appropriate impression coping, as indicated on the flow chart. The applicable lab analogue is used to create a working model. The abutment is now introduced and secured with a brass laboratory screw.
* Shorten the abutment to the correct occlusal height. The scalloped edge will provide for anti-rotation therefore no slot is needed. An all ceramic or metallo-ceramic crown (or bridge) is then fabricated to fit the abutment.
* If a closed crown is desired then cementation will take place in the mouth. The ideal is for the cement line to be 1mm sub gingival. A temporary crown is useful to facilitate easy removal of the crown for screw tightening. Once the soft tissue and the interface are stable the final crown can be placed.
* If the screw access hole is conveniently situated then the crown can be made with a corresponding access hole. The cementation can then be done by the laboratory, the cement line is therefore not relevant and retrievability is not compromised.

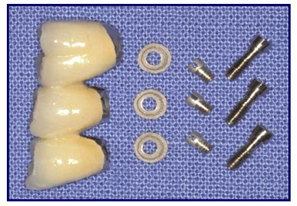




Note: Porcelain cannot be packed on the abutment it serves as a post only.

Passive Abutments

The Passive Abutment is unique to Southern Implants and has been proven in clinical use since 1996.



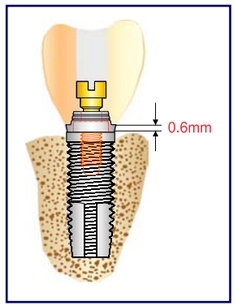
The Concept

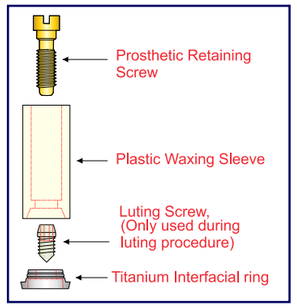
The Passive Abutment concept allows one to achieve predictable passive fit of cast structures in a practical and repeatable way and thus eliminates the need for complex and intensive laboratory procedures usually undertaken to improve the fit of castings e.g. sectioning and soldering of frameworks. Passive fit is achieved by luting a pre-machined titanium interface component into the finished prosthesis, using the laboratory master model as the blueprint for fit. No additional clinical steps are required.

Description

The Passive Abutment consists of four components:

1. Plastic cylinder - this component is incorporated into the wax-up of the structure and thus becomes part of the casting.
2. Titanium interfacial component - this pre-machined component forms the final interface between the casting and the implant.
3. Luting screw - this small PEEK screw is used to clamp the Interfacial component onto the laboratory analogue during the process of luting the casting onto the interfacial component.
4. Prosthetic screw - this screw retains the completed prosthesis to the implant at final placement and provides a compressive force across the cement line.





Overview of Use

The plastic cylinder is incorporated into the wax-up and becomes part of the cast structure. The casting may then undergo further laboratory processing e.g. ceramic firing, finishing and polishing before being assembled with the interfacial component. The titanium interfacial component is kept separate from the manufacturing of the casting and is therefore not subjected to degradation by heat-cycles or de-vesting and finishing procedures as a cast-to gold cylinder would. The integrity of the machined part is therefore maintained in original condition.

The finished cast structure is assembled with the interfacial ring by luting before placement in the patient's mouth. For assembly, the titanium interfacial component is clamped to the analogue on the master model by means of the luting screw. The luting screw ensures that the interfacial component is held in full contact with the analogue.
The finished prosthesis is then luted to the clamped interfacial ring using a resin cement. In this way the resin cement serves as a space filler between the casting and the interfacial ring, thus compensating for any minor casting and finishing discrepancies, so eliminating misfit of the casting to the implant. At placement in the mouth, the prosthetic screw retains the prosthesis to the implant and maintains a compressive force over the cement line. **The cement line is therefore not responsible for retention of the prosthesis, but is merely a space filler. The luting screw is discarded.**

The Application

The Passive Abutment is intended for use in fabrication of implant-supported SCREW-RETAINED CASTINGS (e.g. crowns, bridges, mezo-structures, cast bars, custom posts) on one or more implants where excellent prosthetic fit is desired. The use of a burnout plastic cylinder allows freedom of choice in choosing the casting alloy. The complexity of laboratory procedures is greatly reduced when compared to complex castings incorporating gold cylinders.

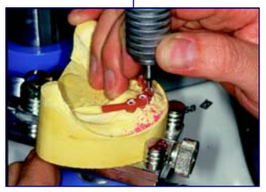
The Passive Abutment System is available for direct connection to all externally hexed and Tri-Lobe implants. Passive Abutments are also available for connection to Compact Conical Abutments.

For direct connection to externally hexed and Tri-Lobe implants, both non-hexed / engaging and hexed / engaging versions are available:

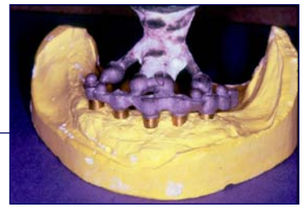
1. **Non-hexed / engaging versions** are indicated for multi-implant cases. The non-hexed / engaging interfacial component has an internal taper fit to allow for non-parallelism of implants of up to 14° per abutment ie. 28° between 2 implants.

2. **Hexed / engaging versions** are indicated for single implant cases and multi-unit custom abutment cases.

6. The bar is then milled parallel or at a 6° angle (if you are not milling) for better placement of the denture. Once the milling has been completed, the precision attachments can be placed. The attachments are usually placed in the area of the 4-5 as these are the teeth that handle the strongest forces of mastication. If ball attachments are going to be used: there is a choice between a fixed ball or a removeable ball. The advantage of the removeable one is that it can easily be replaced once the ball is worn. The Code for the removeable ball is TP1 and is used together with the U5 screw thread. The U5 is placed onto the bar using the screw of the CB impression coping. It fits into the surveyor and can be placed parallel into the bar. The fixed ball PP2, is cast directly onto the mezo- bar having only the ball-part sticking out. If a Ceka attachment is needed, refer to the Ceka catalogue to order the correct one, depending on which metal is going to be used for the casting.



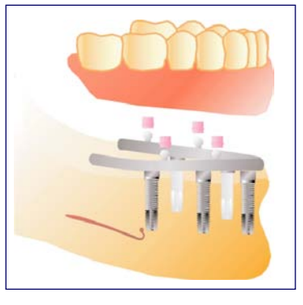
7. The bar is cast using semi-precious or precious metal. When devesting, great care should be taken not to sand blast the fitting surfaces. The bar should be placed in an ultrasonic bath and left there until all the investment is out.



8. When checking the passivity of the bar, one screw on the one end of the bar is tightened. If the bar lifts off the other side, then the bar is not passive and needs to be cut through and soldered. The restorative dentist can do the same test once The bar and denture are returned for a try-in.

9. Once the bar has been worked off and polished, the denture can be waxed up.

10. The bar is blocked out at the bottom with lab putty and the denture made over the bar. The denture, along with the bar, now gets sent to the restorative dentist for a try-in.



11. If the try-in was successful, the denture can be completed. The Bar has to be blocked out with lab putty under the bar as well as a bit around the whole bar (0.5mm) except for the precision attachments. The PC1 plastic clips are also positioned onto the ball attachments. The denture is then adapted to fit the bar again. The flasking process can now be started.

12. If you have forgotten to block out ... have 6 burs ready and a lot of patience! To rate your success, the denture, when using ball attachments should be seated with an audible “click” sound.

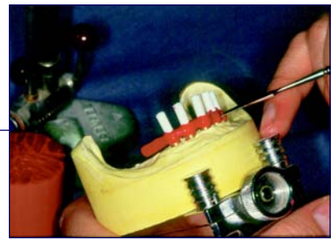
Mezo-Bars

1. The laboratory analogues are attached to the impression using the impression coping screw.

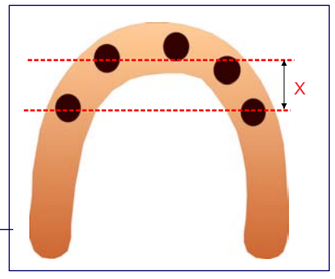
2. Cast the model in the conventional way.

3. The model is now placed on the surveyor at the correct angle according to chrome cobalt rules.

4. The cylinders are placed onto the model and tightened with brass screws. The waxing sleeves are all joined together, using milling wax. The cantilevers are also waxed on either side of the bar.



5. To determine the length of the cantilevers, the most anterior implant and the most posterior implant are taken and a parallel line is drawn between the two. The distance between the parallel bar is X. The cantilevers may not be longer than 1 and a half X. (The lines drawn must be parallel to the arch as a rule : the cantilevers shouldn't be longer than 15mm).



Problems of Conventional Cast Structures

Frameworks incorporating cast-to gold cylinders are very commonly used in implant reconstruction, as are castings fabricated using plastic burnout cylinders. These castings, however, are subject to significant difficulties as follows.

1. **Significant deterioration of the fitting surface of the cast structure occurs as a result of laboratory procedures ie.**
- sandblasting of the casting to remove investment material will degrade the fitting surface and therefore degrade the inter-implant passivity of fit.
- the casting is subjected to repeated high temperature cycles during casting and porcelain firing procedures. This results in oxidation of the fitting surfaces and further deterioration of fit.
- the gold fitting surface is deteriorated by multiple "fittings" on the model, especially if the analogues are not kept clean.

The larger and more complex the casting, the greater the likely degree of discrepancy of fit. Hence, larger castings with fit discrepancies are often cut and soldered, or laser-welded. It is commonly reported that these attempts to improve the fit result in even greater fitting problems and may be amplified by porcelain firing.

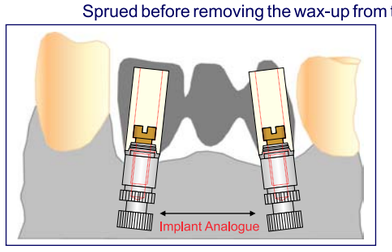
2. **Clinical implications of misfitting implant structures**
Discrepancies in fit are extremely difficult to detect clinically, if not impossible where the interface is subgingival. Vertical misfits will only be detected on x-ray if the misfit occurs interproximally and the x-ray beam is oriented perpendicular to the interface. If the discrepancy is in the bucco-lingual plane, it will not be detected on x-ray. Even gross discrepancies may be missed where x-ray technique is not optimal.

Most importantly, poorly fitting prostheses can result in:
- bacterial accumulation at the prosthetic/implant interface
- mechanical strain being applied to the implant, which may result in bone loss
- poor preload of retaining screws and thus more frequent screw loosening
- fatigue loading of the retaining screws, culminating in screw fracture

The Laboratory Procedure

1. **Model preparation:**
The appropriate analogues must be selected and the model prepared using a silicon or rubber soft tissue mask. The highly recommended use of a removable soft tissue mask will allow easy access to the analogues for further lab procedures and will greatly ease later assembly procedures.

2. **Wax-up:**
The Titanium Ring and Waxing Sleeve are assembled on each implant analogue, using the brass equivalent of the prosthetic screw to hold them in place. Do not over tighten, so as to avoid distortion of the plastic. The waxing sleeve can be cut back or added to as needed. The wax-up is completed and Sprued before removing the wax-up from the model.



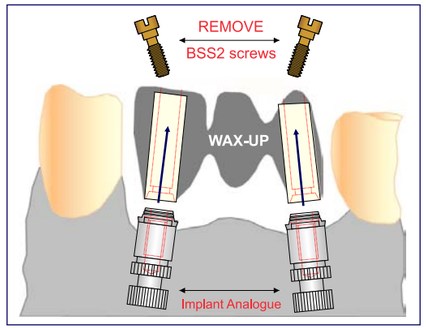
NOTE: Brass retaining screws secure wax-up to model

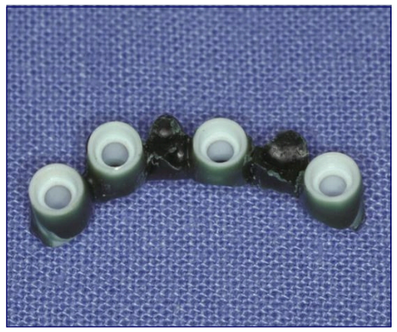
Passive Abutments *(continued)*

3. Investing and Casting:
The retaining screw must be removed to allow the wax-up with plastic cylinders to be lifted from the model, leaving behind the loose Titanium interfacial component. Standard procedures are used for investing and casting. An appropriate casting alloy must be chosen, depending on whether a ceramic veneered bridge or cast bar is being manufactured. Alloys that are commonly used are:
Degunorm, Argipal, Begopal 300, Begocer-G, Pors-on 4, Degudent G etc.

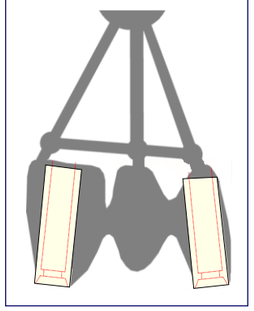
Complete burn-out. The plastic cylinder requires an oven temperature of about 820°C for at least 45 minutes.

As with all implant work, it is best to devest ultrasonically as opposed to blasting with sand or glass beads. This helps preserve the sharp edges and fitting surfaces of the casting.



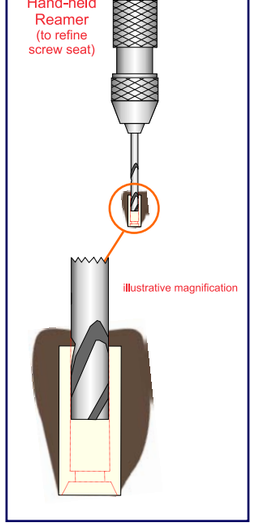


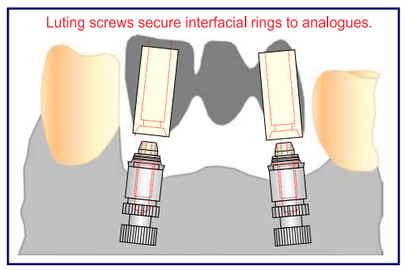
Conventional spruing of wax up

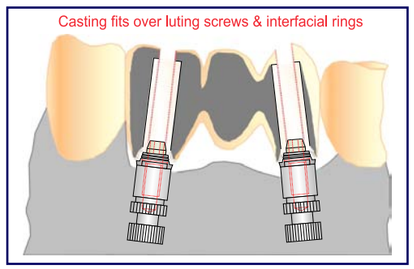


4. Refining the screw seat:
The screw seat is the internal ledge in the casting where the head of the screw will seat. The cast surface of the screw seat will likely be rough due to the casting procedure and must therefore be refined using special hand-held reamers. (LT18-2.4, LT18-2.6 or LT18-2.8) The correct diameter of reamer must be chosen. This is an important step to ensure proper seating and tightening of the prosthetic screw.

5. Fitting the casting to the model:
The titanium interfacial components are secured to the analogues using the small luting screws. The casting can then be placed over the secured interfacial components. The casting can be easily fitted and removed from the model without the need to remove and replace the luting screws. If the prosthesis needs to be screw-retained on the model, then one or more of the small luting screws can be exchanged for a prosthetic screw (the prosthetic screw secures the prosthesis to the analogue, while the short luting screw has a smaller head and can only retain the Titanium interfacial component to the analogue.)







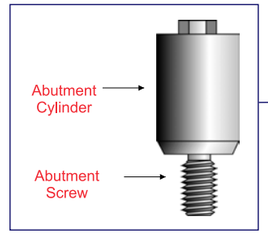
6. Luting the prosthesis to the titanium interfacial component:
After completing the fabrication of the prosthesis, sandblast the fitting surface of the casting and the top surface of the titanium ring. The titanium ring is best clamped to an analogue by the short PEEK luting screw for ease of handling whilst sandblasting. This also protects the fitting surface of the titanium ring. Avoid sandblasting the polished collar of the titanium ring.
After sandblasting, it is very important to disassemble and ultrasonically clean the following:
- the titanium interfacial components
- the short luting screws
- the fitting surfaces of the prosthesis

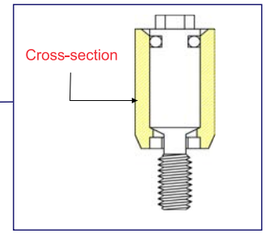
Standard Abutments

The Standard Abutment remains the workhorse abutment of the externally hexed implant system. This titanium transmucosal extension of the implant is routinely used to support mezo-bars, doldar bars and fixed bridges (full and partial).

The design incorporates some safety features, namely:

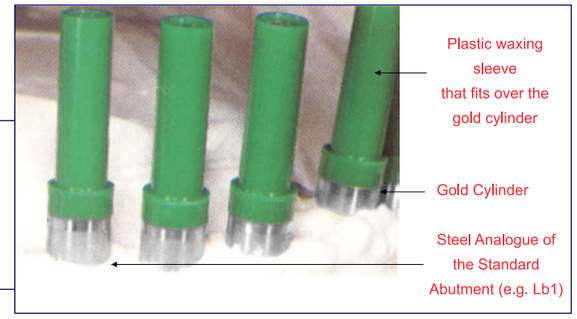
- the gold screw which bolts the bar or prosthesis to the standard abutment, will break between 600N and 850N tensile load, protecting the standard abutment and implant;
- the abutment, being made in two pieces, is not absolutely rigid and therefore does allow for micro-movement of the prosthesis;
- the abutment screw will break at about 1200N tensile load, protecting the implant.





Note: Single teeth cannot be made using Standard Abutments, as there is no anti-rotational hexagon on the Standard Abutment.

1. Make a working model with analogues in the conventional manner. Place the gold cylinders on the analogues and secure them with the prosthetic screws. The brass screw is usually used in the laboratory.



2. Cut the plastic cylinders to the correct occlusal height using a scalpel or diamond cutting disc.

3. Include the plastic cylinders in the wax-up.

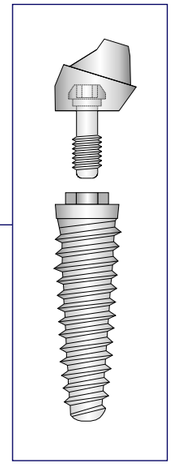
4. The final result.

Placement of the Angled Conical and Compact Conical Abutments

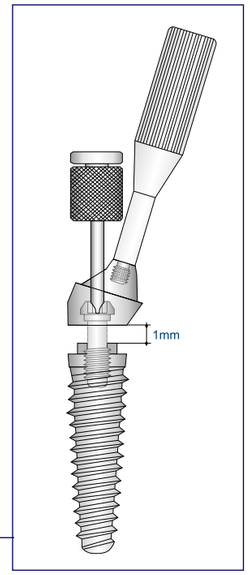
Because of the extremely compact space-saving design of the EB17d, EBA17d, EBBB17d, AMC17d, ABAMC17d, ABBBMC17d, AMC30d, ABAMC30d and ABBBMC30d angled abutments, placement of these must be done in the stages shown below:

1. Place abutment screw in abutment prior to bringing it to the implant.

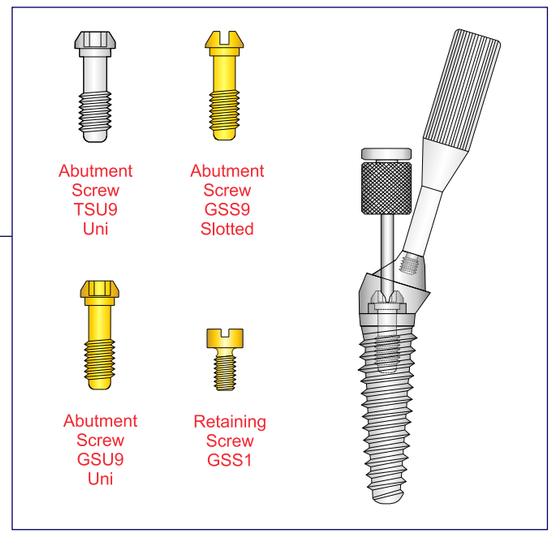
It is not possible to seat the abutment on top of the implant and thereafter introduce the abutment screw.



2. Using tool **I**-1.4H, hold the abutment about 2mm above the implant. Screw the abutment screw into the implant until the abutment is pulled down to about 1mm above the implant.



3. Now seat the abutment down on the implant in the correct position and then proceed with tightening of the abutment screw. Remove tool **I**-1.4H.

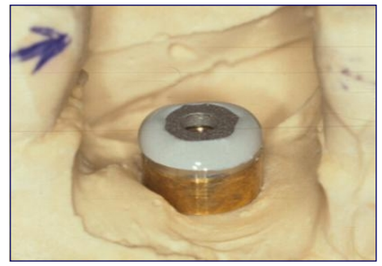


NOTE: The abutment screw fits in underneath the screwthread of the prosthetic retaining screw.

Also clean the analogues (Implant Replicas) in the model by brushing with soap and water or steam cleaning to remove any debris which may interfere with perfect seating of the interfacial components.

Luting of the prosthesis to the titanium rings will now take place on the master model.
- attach the titanium rings to the model with the short luting screws
- apply Ceka Site or similar self cure resin cement or dual cure resin cement (eg. Unicem by 3M) to the sandblasted surface of all of the titanium rings.

(NB refrigeration of self cure resin cements will usually lengthen working time for ease of use on multi-unit structures)



IMPORTANT: Limit the amount of resin cement being applied to the angle between the sandblasted horizontal plane and vertical plane of the titanium ring. This will avoid excess cement extruding upwards through the screw hole in the casting and so inadvertently locking the luting screw into the cement. Definitely avoid placing any cement in the area immediately around the head of the luting screw. In the event that cement does lock the screw, insert a hex driver into the screw hex and tighten the screw until the head breaks off. The prosthesis can now be removed. The PEEK luting screw can easily be unscrewed due to the very deep hex (Refer to figures 1, 2 & 3).

Fig. 1

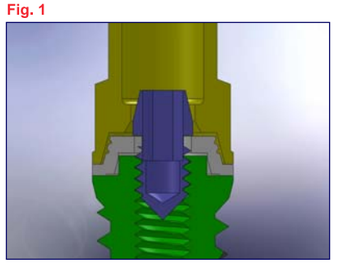


Fig. 2

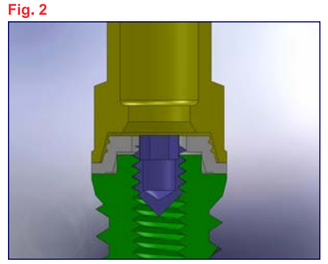
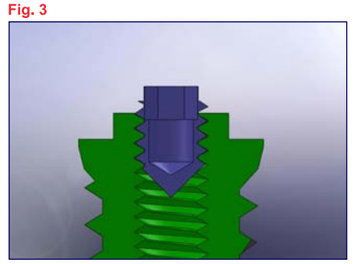


Fig. 3



Fit the prosthesis over the titanium rings and settle the prosthesis firmly into place with finger pressure to extrude excess cement. Arch castings can be left seated under their own weight to allow cement to harden. Smaller bridges or single units need to be held lightly in place by using one or more prosthetic screw in place of a chosen luting screw, to allow cement to harden. (e.g. use the middle screw in a three-unit structure)

VERY IMPORTANT: do not over tighten the prosthetic screw being used to retain the prosthesis during cement hardening as this may result in distortion of a multi-unit structure.

Fig. A

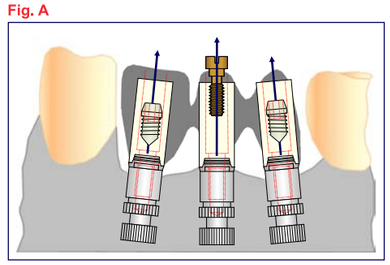


Fig. B Fitment of polishing protectors

Fig. B - After setting of cement, first remove all luting screws, then remove brass screw to allow prosthesis to be lifted off model.

8. Finishing & Polishing

Once resin cement has hardened, remove all luting screws and then remove any prosthetic retaining screws so that the prosthesis can be lifted from the Attach polishing protectors of correct diameter to each of the fitting surfaces of the cemented titanium rings (fig. B). Remove excess extruded resin cement (fig. C) using a sharp blade, probe or hand scaler. (Extruded Ceka Site breaks away easily in large pieces from the outer polished surfaces of the structure and titanium ring) Polish the remaining cement line using a fine edged, lens shaped rubber wheel and blend the casting into the titanium ring where needed. You will notice that the cement line is often not of constant thickness. This variation is indicative of the extent of casting misfit which existed and has now been corrected by the cement space of the Passive Abutment.

Passive Abutments *(continued)*

Once polishing is completed, remove protector caps and replace the casting on the cleaned model analogues to inspect and verify the quality of fit obtained. (Resin cement is best cleaned from analogues using a brush with alcohol) The fit would be expected to be excellent in all areas, but, in the unlikely event that a luting error has occurred, the offending titanium ring may be removed, cleaned and recemented to the prosthesis as required. A titanium ring can easily be removed by forcing a sharp blade into the cementline, or by punching out the ring using the shaft of a lab handpiece drill applied through the screw access hole (place the bridge rings down on a folded towel for padding and give the drill shaft a sharp tap) model.

VERY IMPORTANT: as this technique relies absolutely on the accuracy of the master model to achieve passive fit of the prosthesis, it is vital that accurate impression techniques be used and that the quality and condition of the model and analogues be maintained at all times.

Try-in procedures

Should it be necessary to try-in a Passive abutment case (i.e. the rings are not yet cemented into the framework) the following method may be followed:

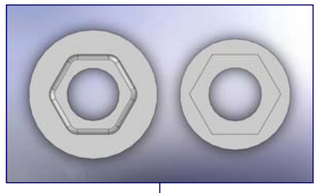
1. Remove the temporary abutments from the implants.
2. Place some petroleum jelly ("Vaseline") or chlorhexidine gel around the head of each implant using a syringe with a blunt delivery tip.
3. Place the loose Passive rings individually into position on the implants and press them down into place using a flat ended "plastic" instrument. When the rings are seated, the jell helps hold them in place. The soft tissue surrounding the rings also holds them in place quite well. Take great care to avoid dropping these small, loose parts into the mouth. The patient must be warned not to swallow if something should drop into the mouth.
4. Place the metal structure over the rings in the mouth, taking care to align the casting properly so as to not disturb the rings.
5. Screw retain the structure by placing a few prosthetic screws in strategic places.
6. When removing the frame, take care of any rings that may drop. Some rings may be found on the removed frame while others may be left on the implants. Count the rings to make sure you have all of them.

Some practitioners may not be comfortable working with loose rings in the mouth. The alternate method is to "lute" the rings into the casting on the model using conventional temporary cement, before placing the structure into the mouth.

Repairs

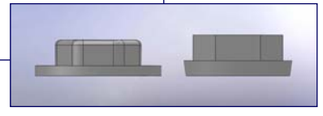
If one needs to put a ceramo-metal Passive case back into the furnace for repair, a gradual heating cycle is used to drive out moisture from the ceramic (usually 600ºC for 6-8 hrs). During this heating phase, the cement will be degraded, allowing the rings to be easily removed from the structure. (A higher temperature of 800ºC will burn out the cement, if required). This is a convenient advantage of the system, as the rings can be recovered for re-use. If the user feels that the condition of the rings is not ideal, one may decide to use new rings for the recementation. It is an advantage of the Passive system that the fitting surfaces can be removed from the casting to avoid damage by heat cycles during the repair process and then be refitted. (It is essential to always keep the master model)

NEW Hexed Passive Rings for Externally Hexed Implant

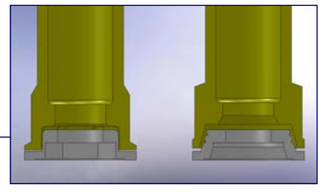


Reduce outer collar from 0.6mm to 0.4 mm (not for IB or IBN) this had less metal for a better esthetic result. Titanium ring is now vertical and does not flare.

Rounded hex corners as well as top of hex to support ceramics (Suitable for copy milling).

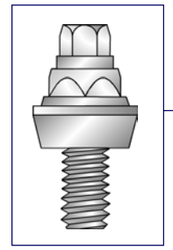


Rounded corners of hex and at the top of hex and seating surface corner to support ceramics. Increased seating height to 1mm to support ceramics - but due to also reducing height of titanium ring the overall height increase is only 0.1mm and so normal screws can be used.

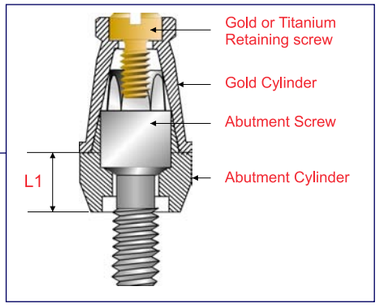


The Conical Abutment and Compact Conical Abutment

This abutment can withstand moderate lateral loads as it has a steeper angle at the gold cylinder interface. This makes it a more suitable component for unilateral bridges which are often subjected to high lateral loading. The interface allows the porcelain to be brought much closer to, or below, the gingival level. This has an obvious aesthetic advantage. The main attraction is therefore in aesthetically demanding bridgework. The height **L1** is available in 1mm, 2mm and 3mm.

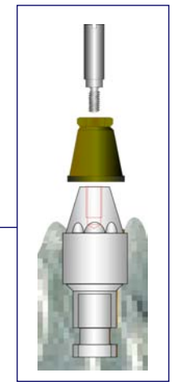


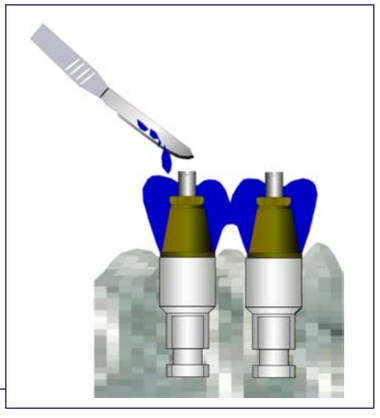
Abutment & Screw assembly



1. The conical abutment replica is mated to the impression coping which remains in the impression, and is then secured with the coping screw and screwdriver. The model is then poured in implant stone.

2. The Conical Gold or Plastic Cylinder is secured to the laboratory analogue, using the impression coping screw. The screw acts as a waxing pin. This will then be replaced with a gold screw to retain the prosthesis to the abutment.





3. Wax-up the copings as per standard procedure (not to be used as a single tooth restoration - to be splinted).

4. The retaining screw should be tightened to 10Ncm.

Note: A 17° angled abutment is also available for the Ø4.0mm, Ø5.0mm and Ø6.0mm external hex implant ranges.