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 model. Attach polishing polishing 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.

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 with a brush using 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 remeasured to the prosthesis as required. Titanium ring can easily be removed by forcing a sharp blade into the cementline, or by punching out the ring using the shaf of a lab handpiece drill applied through the screw access hole (place the bridge rings down on a folded towel for padding and give drill shaft a sharp tap).

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”) on the hex heads of the rings to avoid damage by heat cycles during the repair process and then be refitted. (It is essential to always keep the master model)
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 J hook holds 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 not to disturb the rings.
5. Screw rings retain the structure by placing prosthetic screws in strategic places. If necessary, a small screw is used to crimp the interfacial component onto the laboratory analogue during the process of luting the casting into the interfacial component.
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 above 900ºC). During this heating phase, the ceramic 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)

Custom made Prosthetics

Do not manufacture custom prosthetics without approved products or data approved by Southern Implants Pty Ltd. (Phy.)

Passive Abutments for Externally Hexed Implants

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Passive Abutments for Compact Conical Abutment - Externally Hexed Range

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Passive Abutments for Tri-Nex Implants

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Passive Abutments for Compact Conical Abutment - Tri-Nex Range

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Passive Abutments for Implants

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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-revesting and finishing procedures as a cast-to-gold joint 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 interfacial 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 component, thus compensating for any minor casting and finishing discrepancies, so ensuring a perfect fit to the implant. At placement in the mouth, the prosthetic screw retains the prosthesis to the implant and maintains a compressive force across 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, mono-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 Southern Implants product ranges. Passive Abutments are also available for connection to Compact Conical Abutments.

For direct connection to Externally Hexed, Tri-Nex 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 i.e. 28° between 2 implants.
- 2. Hexed / engaging versions are indicated for single implant cases and multi-unit custom abutment cases.

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 i.e.
   - sandblasting of the casting to remove investment material will degrade the fitting surface and therefore degrade the inter-implant passivity of fit.
   - castings subjected to 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 “fitting” 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 fitting 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.

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 fit. The components e.g. seating 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 screws - the small screws are used to crimp the interfacial component onto the casting 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.
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 techniques are 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 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

2. Wax-up:
The Titanum 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.

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 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 screwed 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.)

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 with special hand-held reamers. (LT18-2.4, LT18-2.6 or LT18-2.8) The correct diameter of reamer must be chosen. This is very important 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. Do not over tighten, as this may result in the head of the Peak luting screw breaking off. 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 screwed 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 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

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 Sil 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.

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