DENTAL SPARK EROSION

Avoiding mishaps with implant-retained prostheses. Passive fit using spark erosion!

Implant-retained prostheses with passive fit

- Exact reproduction of the position of the implant with the abutment control check
- Consistent design of the implant models
- Suprastructures with passive fit using SAE spark erosion

Avoiding complications leads to long-term osseointegration.

The Sheffield Test

One outer screw is fastened
before spark erosion passivation of the structure
Misfit!

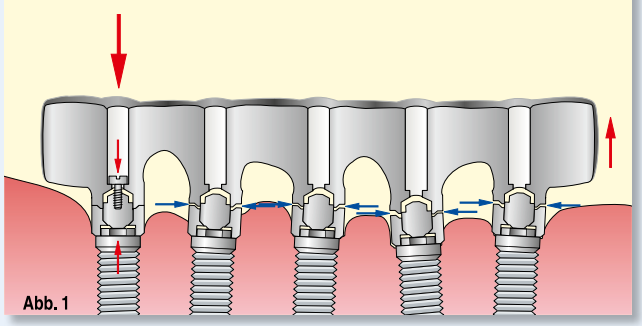
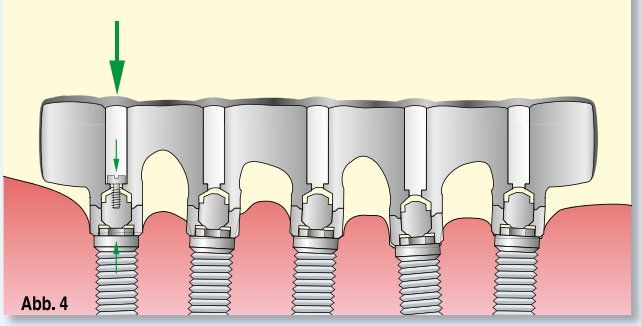


Abb. 1

The Sheffield Test

One outer screw is fastened
after spark erosion passivation of the structure
stress-free fit of the structure on the implants



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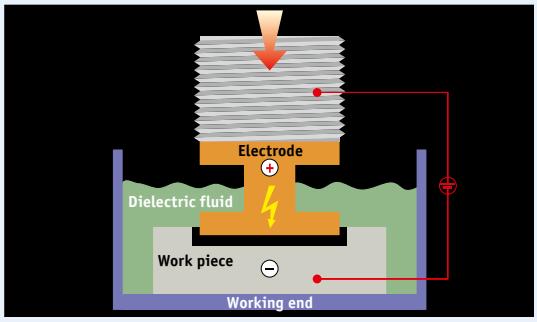
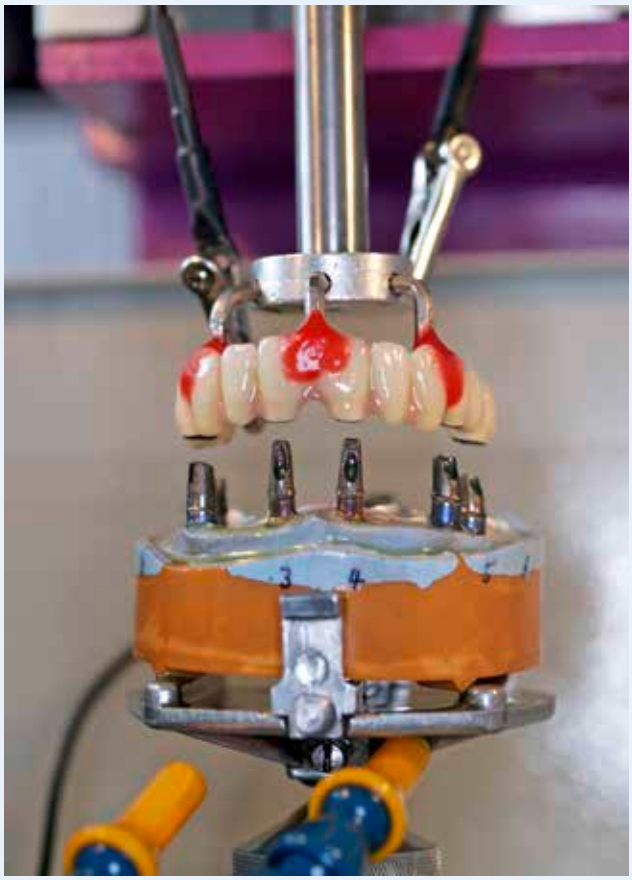


The principle of spark erosion

Systematic steps for the passivation of implant-retained meso and suprastructures using SAE spark erosion

Contents:


SAE spark erosion for the passivation of implant structures on abutments with standardised surface design.


SAE spark erosion for the passivation of implant structures on customized original abutments.

The SAE spark erosion procedure for the passivation of cast or CAD/CAM milled implant structures made of CoCrMo, Au, titanium – bars and bridges with passive fit

In dental technology, it is not possible to achieve an exact fit and a tension-free passive fit of the cast or CAD/CAM milled meso and suprastrcutures on the inserted implants.

However, in order to come anywhere near being able to comply with the requirement of dental medicine for a passive fit of the meso and suprastructure on the inserted implants, many dental emergency routes have to be adopted. The cast structure is separated either once or several times and newly assembled by soldering and welding. This results in new misfits, albeit to a lesser extent. If, however, the multi-span structure (bridge) is going to be ceramic veneered, tension in the structure occurs, caused by the contraction of the ceramic mass during the firing process. In turn, misfits of the suprastructures occur. These technical dental misfits are corrected upon completion of the suprastructure by the SAE Secotec spark erosion procedure. With the spark erosion procedure, a tension-free fit is achieved.
A special and dimensionally stable model is necessary for the spark erosion process.
The Secotec model shells with the implant replicas are linked together in an electrical circuit in the impression by way of an e-cable.

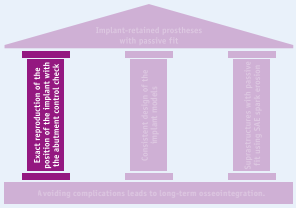
This enables the electric current flow in the model during the spark erosion process.

Prior to spark erosion, the implant replicas are replaced with copper electrodes that can be eroded.

The Secotec procedure is possible for all electrically conductive alloys and titanium, also following the veneering of the suprastructure with ceramic.

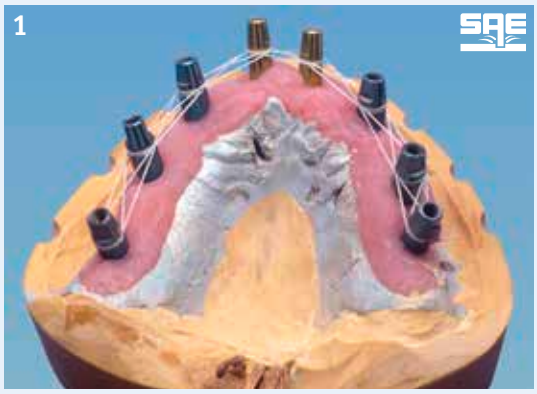
EDM 2000
Year of manufacture 2012

2. Abutment control check



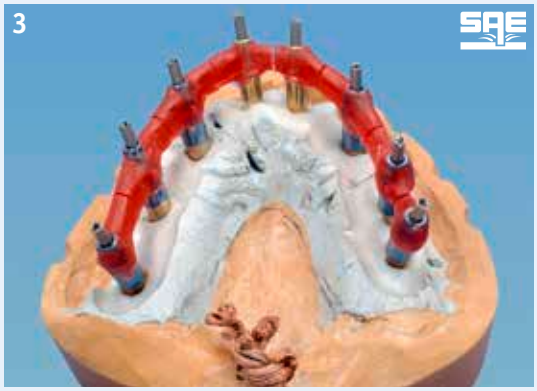
When producing an implant-retained prosthesis, the impression and the creation of the model are of upmost importance. Mistakes made when transferring the position of the implant in the mouth onto the model inevitably lead to misfits of the meso and suprastructures – therefore the abutment control check!
And the dimensionally stable model.

Please read these guidelines carefully before you make the implant structure from metal using the casting technique or R+K CAD/CAM milling technology:



First impression at implant level and first model with the original transfer copings. The transfer copings are intertwined with dental floss for the preparation of the transfer blocks.

Pattern Resin set from Rübeling + Klar



The completed abutment check made of Pattern Resin is separated into 8 segments using a thin diamond grinding wheel and then marked 1 – 8.

The individual segments are transferred from the model into the mouth and screwed onto the implants.

It is important that the segments are screwed into the mouth without touching each other and tension-free, possibly separating them with the thin diamond grinding wheel. The dividing gaps must be very thin so that when the segments are joined together with Pattern Resin, shrinkage is minimal.

The powder/liquid procedure with the Pattern Resin is ideal for linking the segments.

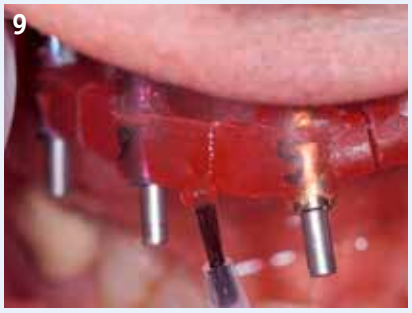
Clinical photos: Prof. Dr. med. dent. German Gomez
Tübingen University, Dentistry, Oral and Maxillofacial Surgery Center
Prosthodontic Outpatient Unit / Prof. Dr. med. dent. H. Weber

2. Abutment control check

The pointed brush is dipped into the liquid and then into the powder.

The acrylate has the correct consistency and is not too liquid.

Separating gaps must be dry



With the help of the brush, the viscous droplet is applied to the prepared separating gaps in the mouth.

The polymerisate – Pattern Resin – is absorbed perfectly into the gap.

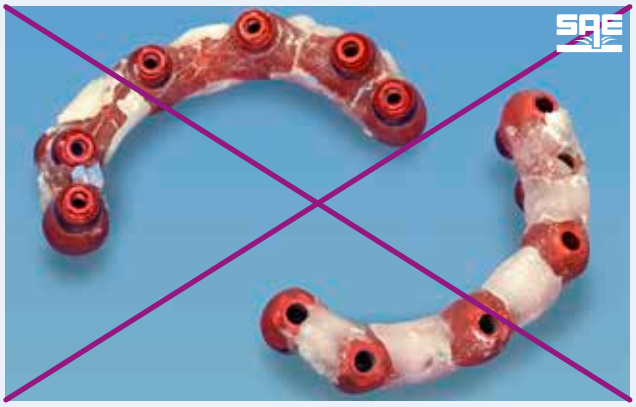
The separating gap is evenly filled and the original form adapted. After approx. 3 minutes, the resin is polymerized.

The procedure is repeated until the gap is finally filled.

An impression is made of the abutment check using Impregum and a customized impression tray. Please first of all inject Impregum under the Pattern Resin block.

Once the Impregum has hardened (5 mins), the pick-up technique is used by removing the positioning screws.

The Impregum must cover the abutment check on all sides. None of the impression material should be seen on the implant shoulders. Then the preparatory work has been a success.



Light-curing composite is not ideal for fixing the segments. There is too much shrinkage and bonding is not optimal.

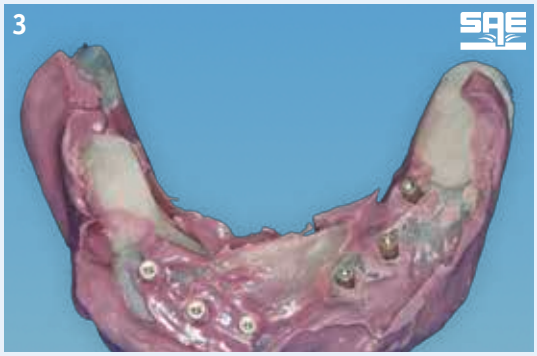
This abutment check cannot be used.

3. The dimensionally stable SAE spark erosion model

The abutment model check – control block made of Pattern Resin joined in the mouth.

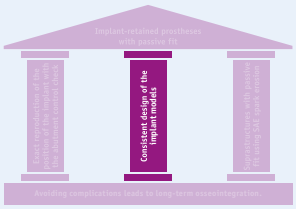
Impregum is moulded over the abutment check using a customized impression tray and Impregum.

Clinical photos: Dr. Constanze Olms
University Hospital Leipzig AöR



Moulding with a customized impression tray and Impregum with the impression posts.

System Straumann Bone Level - RC impression posts for multi-basis secondary piece.



Moulding at abutment level and the SAE model parts:
SAE model shell (Order No. SAE 82-0081)
SAE implant replica (Order No. SAE 82-0178)
SAE screw (Order No. SAE 82-0079)

SECOTEC IMPLANT SYSTEM

SAE-Secotec for straumann Bone Level Ø 4,5

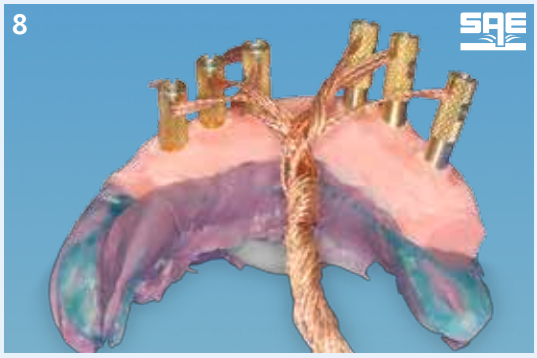
Abb. 150%

Straumann Bone Level ø 4,5

S4 82-0081 1. Model shell standard
S4 82-0178 2. Implant replica
S4 82-0278 3. Implant electrode
S4 82-0378 4. Plastic burn-out cylinder
S4 82-0079 5. Screw
S4 82-0534 6. Driver implant replica
S4 82-0524 7. Driver electrode and screw

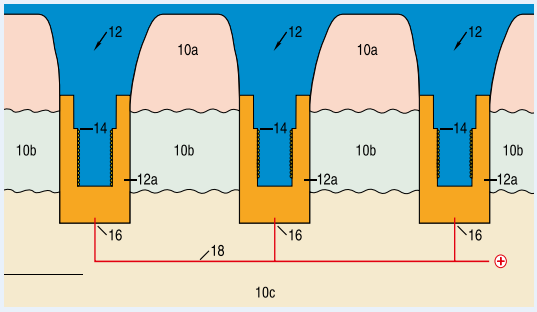
3. The dimensionally stable SAE spark erosion model

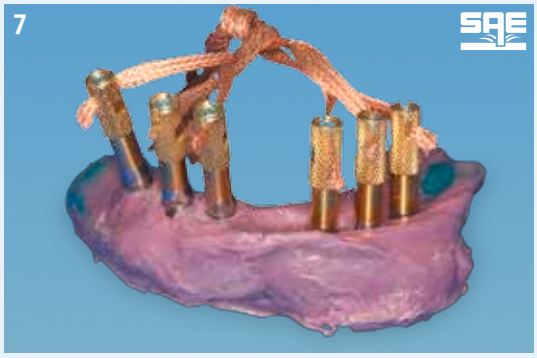
The system-linked implant replicas are screwed into the Secotec model shells which are then screwed into place with the impression posts located in the mould. The screw processes are carried out with the torque wrench (Order No. SAE 82-0521 and 85-0519) and the counter wrench (Order No. SAE 82-0531) taking into account the provided screw values – 20 Ncm.



Permanently elastic silicone gingival mask is applied so that the implant replicas are completely covered with silicone and only the model shells remain completely visible.

This milled-in control window confirms to the dental technician that the Pattern Resin block has been correctly inserted by the dentist.





Each model shell is connected to the copper wire (Order No. SAE 82-0500) so that all model shells are linked to the electric circuit. The free ends of the wires should be linked together and directed away from the model.

A sealing sleeve of wax is applied, then SAE Epoxy Resin that is not prone to contract – shrinkage 0.003 mm (Order No. SAE 40-1060 and 40-1061). And finally SAE implant special die stone (Order No. SAE 70-1121).

The dimensionally stable SAE master model with the removable SAE implant replicas. These are replaced for the spark erosion process by copper electrodes that can be eroded.

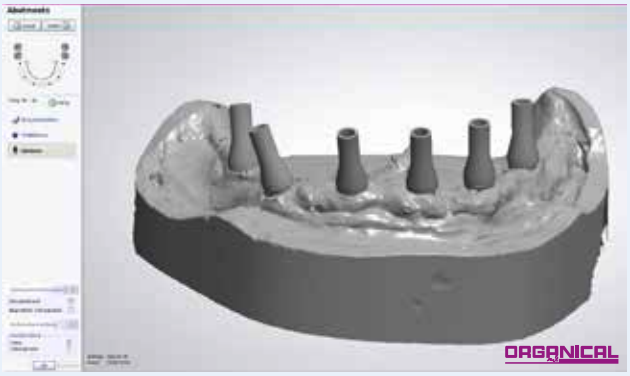
Graphic representation of the model structure

Secotec model structure

10a	Part of model (elastic and removable)	12a	Model shells
10b	Part of model – SAE Epoxy Resin	14	Thread of the SAE model shell
10c	Model made of SAE die stone	16	Contact area for wire
12	Area to receive implant replica and implant electrodes	18	Copper wire for electric current (anode)

4. Scanning (scan posts, sequence) Modelling/constructing – CAD Bar on implants

1. Model with scan abutments



Scanned lower jaw model with SAE scan shells

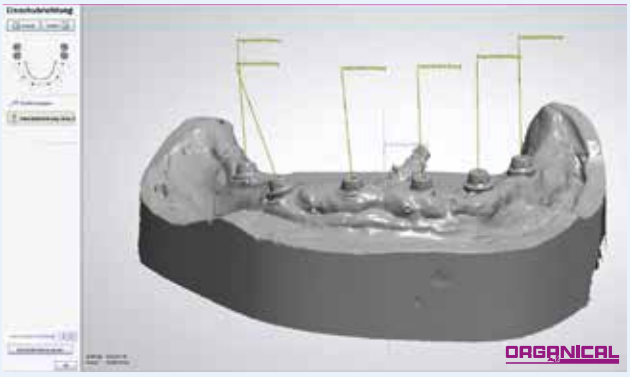
2. Model with scan abutments

Scanned lower jaw model with SAE scan shells

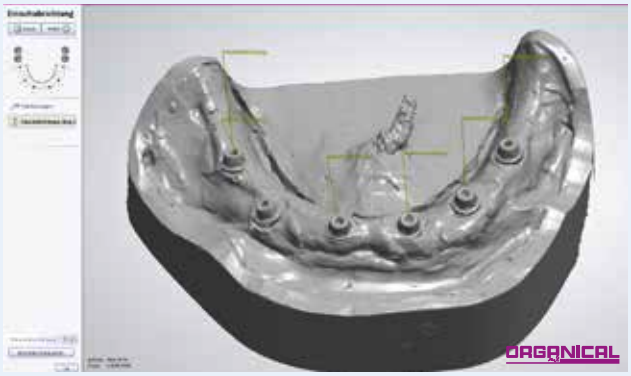
3. Bar on Frialit XiVE implant abutments CAD

The shoulder of the bar structure is aligned to the abutment

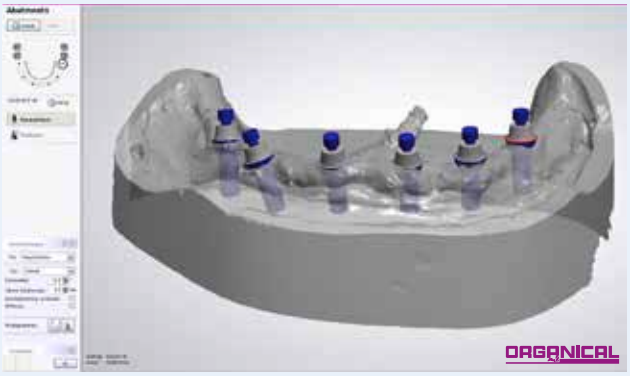
4. Setting direction of insertion



5. Setting direction of insertion

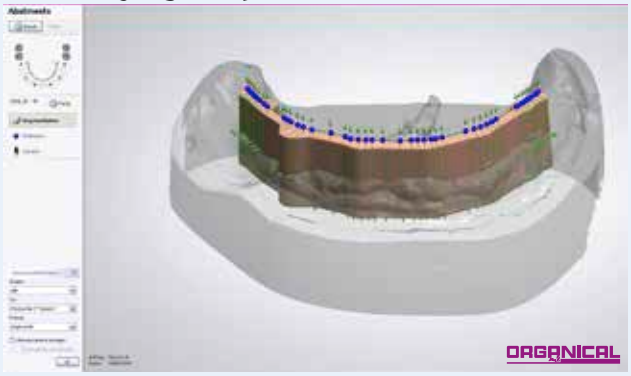


6. Model with implant abutments and screws

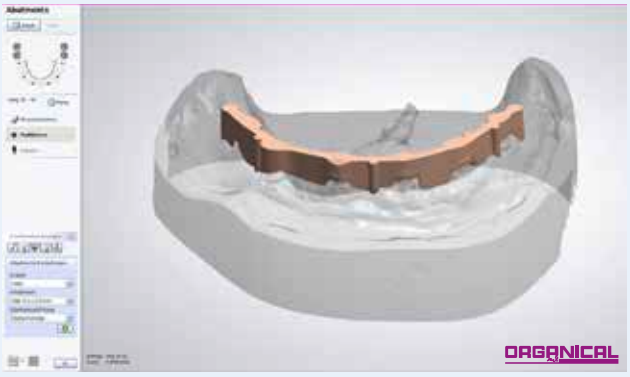


7. Model with implant abutments and screws

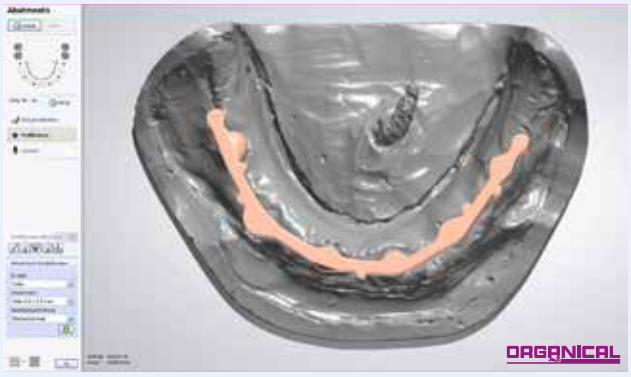
8. Modifying bar profile



9. Modifying bar to jaw
Thickening set for friction pins

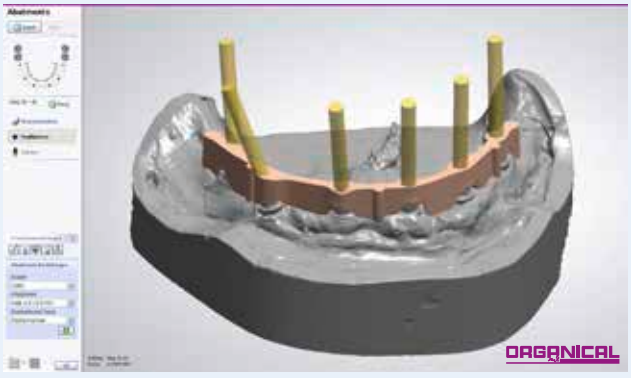


10. Modifying bar to jaw
Thickening set for friction pins

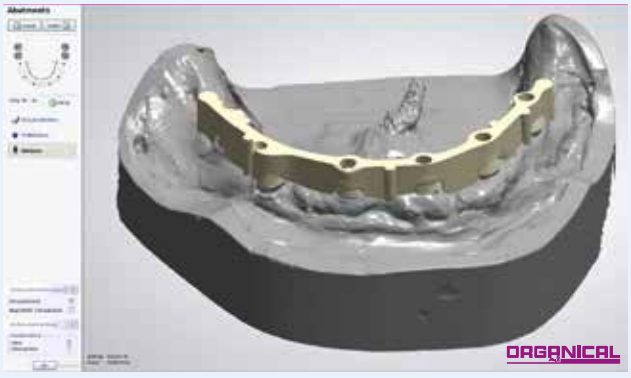


Selecting the bar form from the CAD library and the positioning

11. Check available space for screws



12. The completed constructed bar



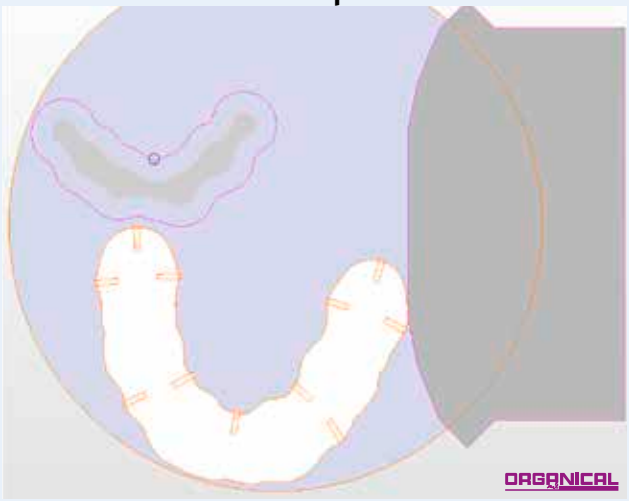
5. Milling – CAM

13. The completed constructed bar

Bar structures are constructed on the Ankylos abutments

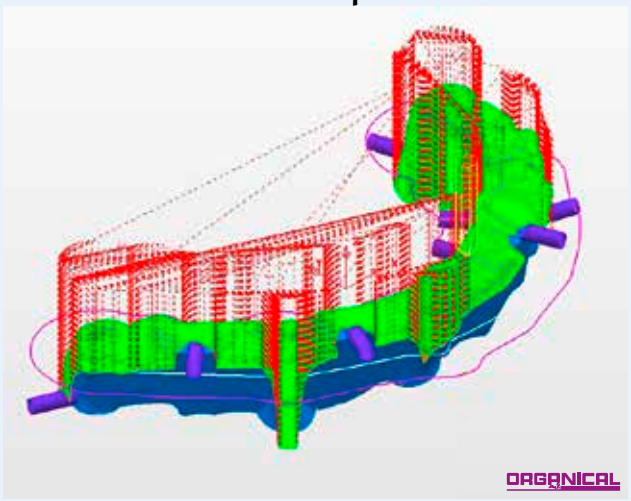
14. Completing the bar structure

15. Bar on Frialit XiVE implants



Placing the CAD construction into the milling blank

16. Bar on Frialit XiVE implants



Final computed structure

17. Milling blank with the milled bar structure

18. The structure is removed

6. Passivation using SAE spark erosion

Bar structure from CoCrMo, CAD/CAM milled – passivated using spark erosion

CAD/CAM milled from CoCrMo / SAE Octa-C prior to passivation using SAE spark erosion

CAD/CAM milled from CoCrMo / SAE Octa-C prior to passivation using SAE spark erosion

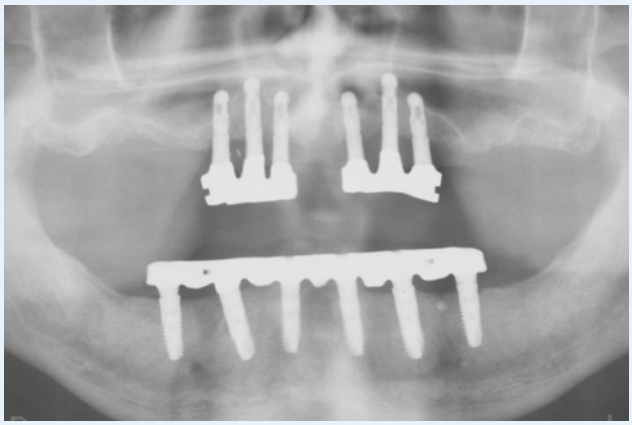
Applying the bar structure in the machine. Implant replicas are replaced by electrodes that can be eroded, **clamping pressure = 20 Ncm**

The spark erosion process in dielectric fluid in the SAE spark erosion machine

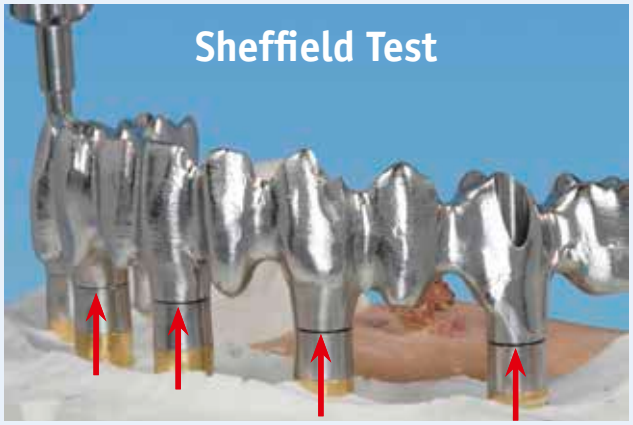
Following passivation using spark erosion

Following passivation using spark erosion

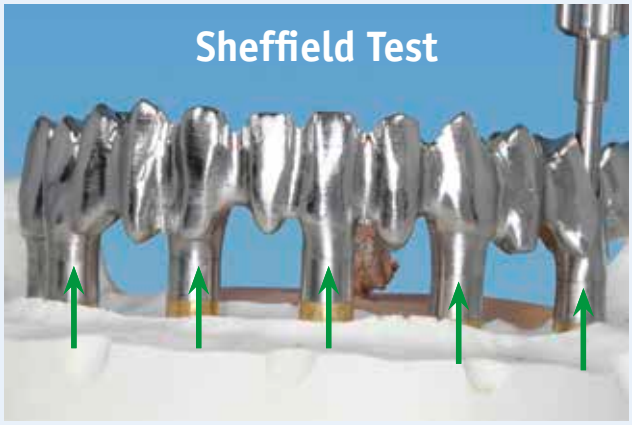
Passive fit



Following passivation using SAE spark erosion



Prior to passivation using SAE spark erosion



Following passivation using SAE spark erosion

Intensive courses for dental technicians

Course I (3-day course)

Combined prostheses made of CoCrMo in solid cast procedure – telescopic with friction bonding using friction pins and/or swivel latches in connection with SAE spark erosion.

Dates on request

Course II (3-day course)

Cast or CAD/CAM milled bar meso structure made of CoCrMo on implants with tension-free fit using spark erosion and the suprastructure in the solid cast procedure with SAE swivel latch.

Dates on request

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