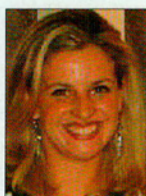


The Metacon System

Part II



Bettina Cortés
CDT

Light cured wax offers completely new ways of waxing up metal structures with maximum passive fit and highest productivity. In the first part of this article the author describes its features and the how to work with Metacon. In the second part Bettina Cortés introduces three different implant cases, which were realized with the Metacon light cured wax system.

Implant borne, screwed ceramic restoration

In our lab we received the case of a patient with just two posterior teeth (tooth 18 and 26) left in the upper jaw and six 3i implants that had been placed. We were asked to produce an implant borne, screwed ceramic restoration.

Model preparation

After pouring the impression, a tissue mask (model) is produced. Once the models are mounted with the centric bite registration in a semi adjustable articulator, the acrylic implant abutments (sleeves) are placed over the model analogues in order to "wax-up" the implant structure (Fig. 20).

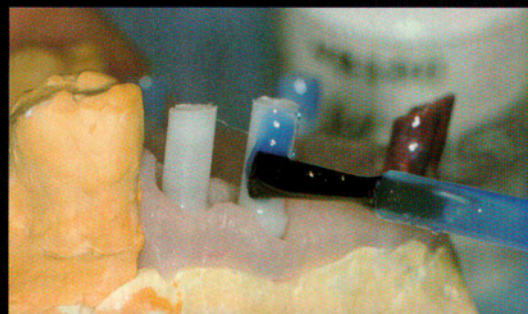
Now the separators are applied onto the models (as already described). In order to achieve the needed bonding between the acrylic abutments and the Metacon wax, Metabond bonding material is applied to these abutments (Fig. 21).

Superstructure

We use preformed sprue patterns for contouring the superstructure, which we form to rod shape (Fig. 22) and apply manually along the alveolar ridge. It needs to be made sure that the modelling wax is attaching well to the acrylic abutments. Then we further proceed with the "cold" modelling technique using instruments to reach to the basic shape of the superstructure, well considering all functional and esthetic aspects (Fig. 23). Final corrections are made "hot" by using an electric wax spatula and applying Metacon modelling wax where it is needed. Once the initial "wax-up" is finished, we clean the openings for the screws (Fig. 24) and polymerise the structure in one of the Metalight light curing units



20. the case in a semi adjustable articulator with the acrylic abutments screwed on the model implants



21. application of the Metabond connecting adhesive to the acrylic implant abutments. This ensures a safe connection between the Metacon modelling and the abutments



22. two 3.5 mm (or alternatively one 6.0 mm Metacon rod) sprues are sufficient for the complete "wax-up"



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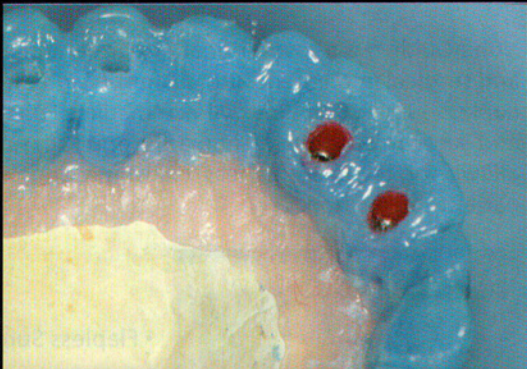
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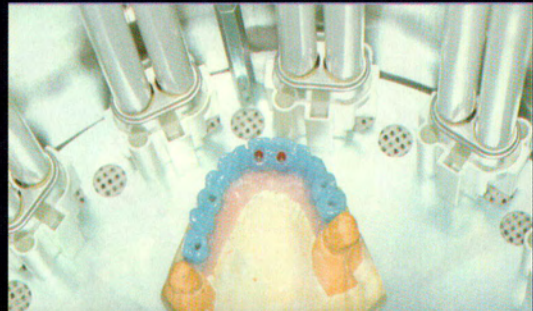
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23. modellation of the implant structure with a spatula normally used for acrylic veneering



24. occlusal view of the modellation



25. the case is polymerised in one of the special Metalight light curing units, as they have a cooling system, supply the correct wave length and light cure slow enough (10 minutes)



26. trimming the light cured structure with a carbide bur

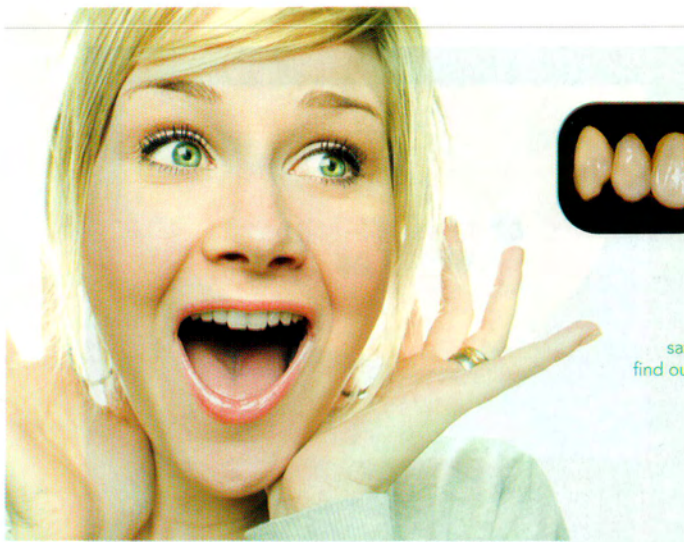
(Fig. 25). After light curing the material has become acrylic and can be trimmed (with carbide burs, separating discs, silicone polishers, and so on.) to the desired shape, making sure that there is sufficient room for the porcelain and that the surfaces are rather smooth. Trimming polymerised Metacon material is very comfortable because it is easy and fast to grind. The material is a bit softer than conventional dental acrylics and the dust created by trimming is not so fine Fig. 26).

As a next step we add hot Metawax modelling wax with an electric spatula in the subgingival areas that were not possible to

reach initially (Fig. 27). We would light cure these additions in case this acrylic structure would go for try-in, otherwise we would polymerise them together with the sprues once they are attached.

Try-In

When the case goes for try-in in this stage, it is helpful that the dentist has familiarized himself with Metacon. The main advantage of this material is that in case of mal fitting it would rather break when screwed to the implants intraorally. If the



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27. hot Metawax modelling wax is added with an electric spatula in the subgingival areas that were not possible to reach initially



28. the implant structure after casting

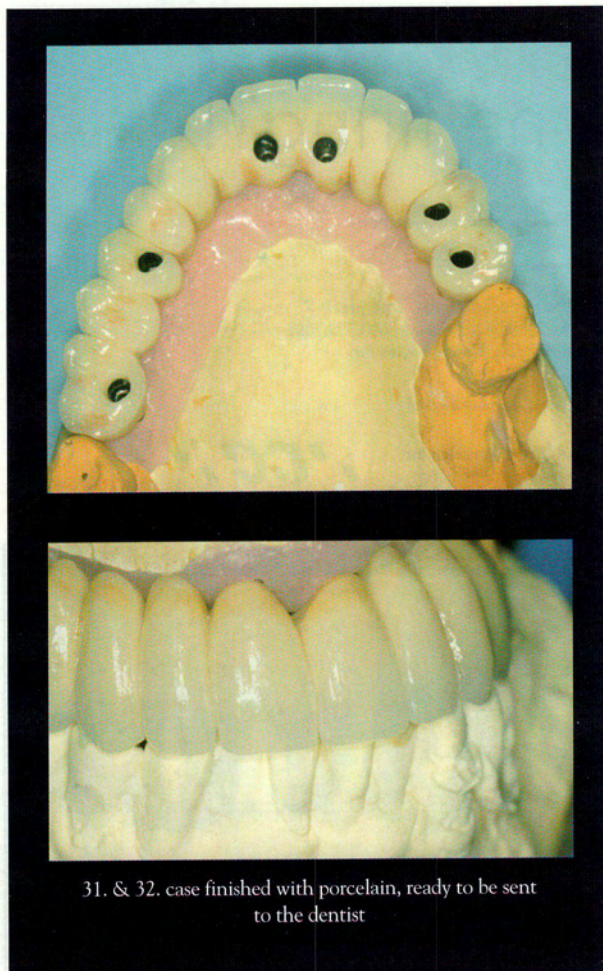


29. & 30. the implant structure after trimming, ready to start the porcelain veneering procedure

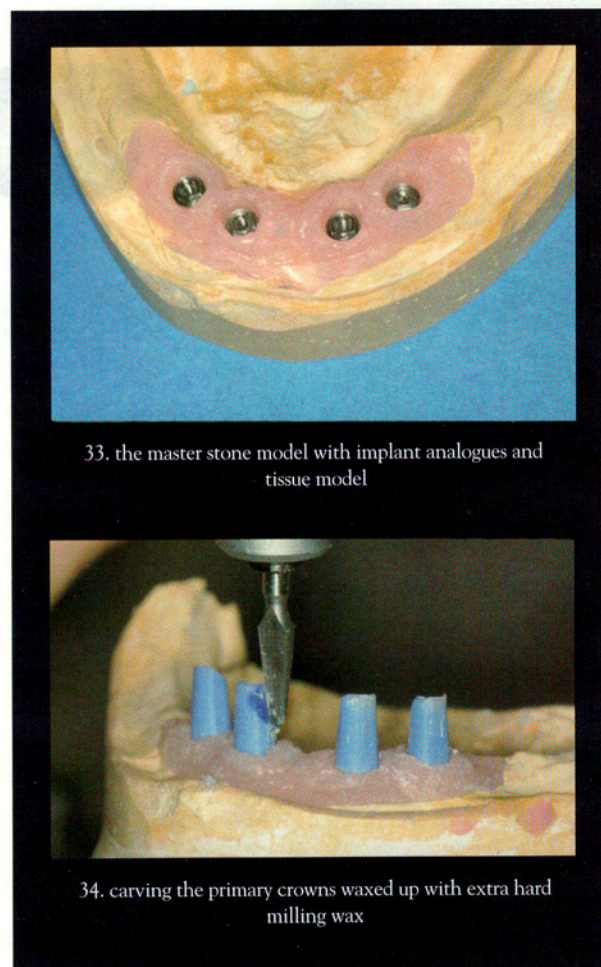
implant structure fits in the mouth as desired, we can be sure to have worked on a proper master model. In case it does not fit properly the dentist can take a new impression from which we make a new correct master model. It's then easy to separate the acrylic Metacon structure, put it on the new model and reconnect it accordingly. If the case was already cast, this procedure would be much more time consuming (welding or soldering), difficult and labour intensive.

Casting and finishing

In this case we used regular wax sprues, even though the light cured wax sprues offer more safety and avoid distortion, especially for larger cases. After casting and divesting (Fig. 28) we check the passive fit on the master model and finish the surfaces of the metal structure. This working step is now much more economical, as most of the trimming had been done before casting, so that grinding after casting is mainly reduced to cutting the sprues. If desired, the case could now go for another try in.



31. & 32. case finished with porcelain, ready to be sent to the dentist



33. the master stone model with implant analogues and tissue model

34. carving the primary crowns waxed up with extra hard milling wax

This is, however, not really necessary when it had already fit well in the acrylic stage (Fig. 29 and 30).

Veneering

After the needed surface conditioning and opaqueing, the metal implant structure is finally veneered with porcelain. We focus clearly on maximal intercuspitation in centric occlusion, meaning that the opposing teeth should touch with as many contacts as possible. Furthermore we want to establish ideal anterior and canine guidance. This way the anterior teeth guide the disclusion from the very beginning of the movement and avoid unnecessary stress to the implants⁽⁵⁾. Last but not least, we check the implant case also in regards to its esthetic value, to make sure that the patient can be happy in this regard as well (Fig. 31 and 32).

Implant borne tertiary structure over conical primaries

The following case study shows an implant superstructure over Branemark implants. We decided to solve this case with conus-crowns, as the labial space, due to the position of the implants, was not sufficient to work with attachments.

Primaries

After pouring the impression and making the tissue model

(Fig. 33), as well as screwing the acrylic abutments to the implant analogues, extra hard milling wax is applied to the abutments. Then these primaries are milled to a 3° conical shape with a wax bur in the milling machine (Fig. 34). After the primaries are cast in a gold alloy they will be once again milled to 3° conical and polished (Fig. 35).

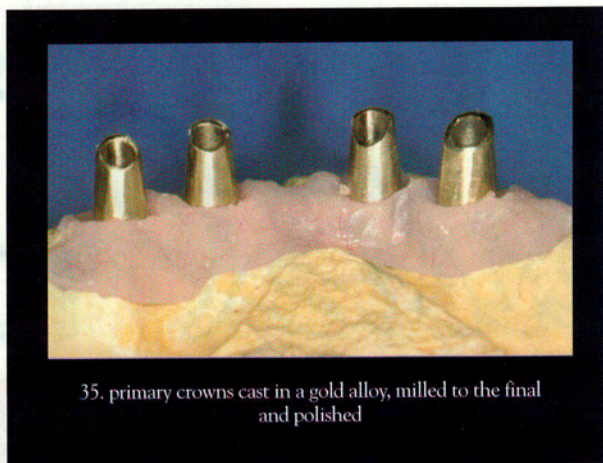
Galvano copings

Over the gold primaries, Galvano copings are produced which will cover these conical primary abutments down to the tissue line. Using the Galvano copings as an “in-between” structure guarantees us a homogeneous, flawless build-up with an even thickness of 0.2 mm⁽⁴⁾. Finally the fit of the 99% gold Galvano copings is checked (Fig. 36).

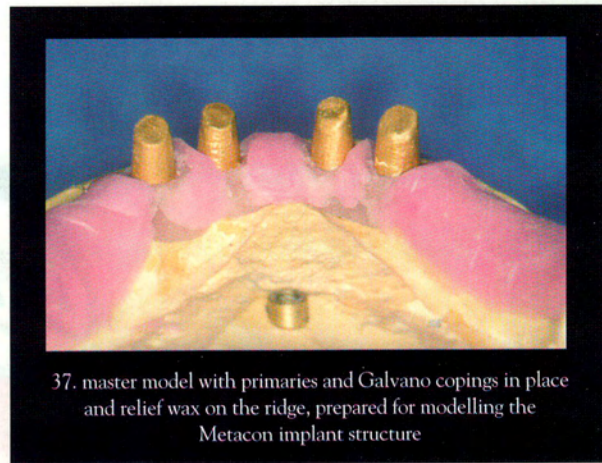
Tertiary structure

In order to do the tertiary modelling with light cured wax, we add relief wax to the model in the ridge area first (Fig. 37). For “waxing-up” this structure we use Metawax modelling wax over the Galvano copings and preformed retention patterns for the ridge areas (Fig. 38).

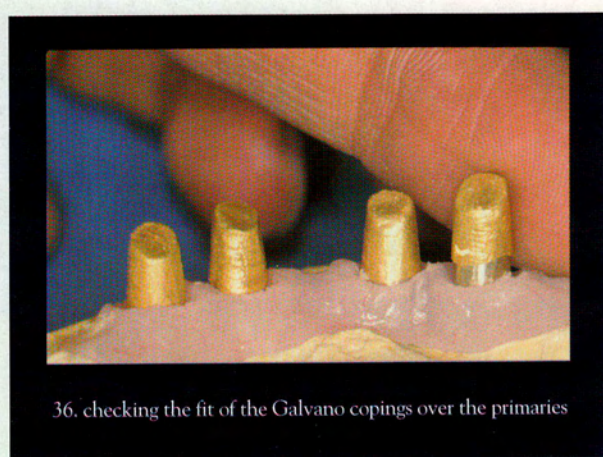
To make sure that the Metawax tertiary structure is easy to remove from the Galvano copings after light curing, we apply a very thin layer of conventional pink wax on the Galvanos before we start the actual build-up. This thin pink wax layer does not



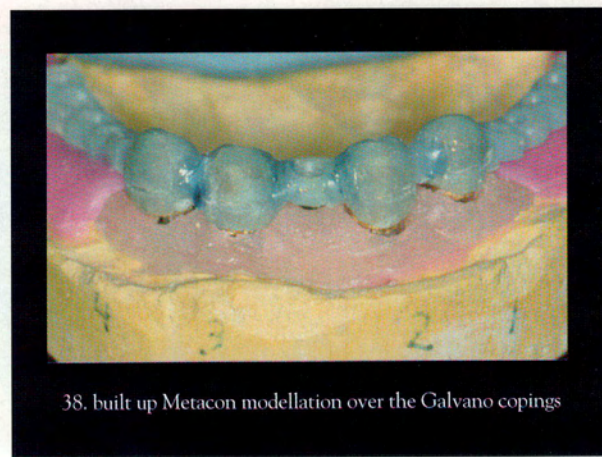
35. primary crowns cast in a gold alloy, milled to the final and polished



37. master model with primaries and Galvano copings in place and relief wax on the ridge, prepared for modelling the Metacon implant structure



36. checking the fit of the Galvano copings over the primaries



38. built up Metacon modelling over the Galvano copings

only facilitate lifting off the tertiary structure but also serves as a spacer for the composite resin used to bond the Galvanos to the implant structure later on.

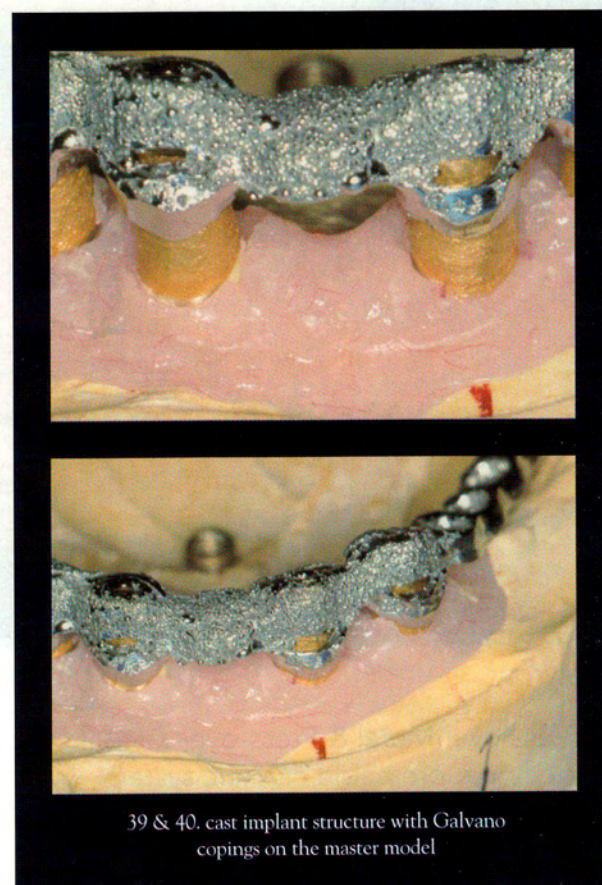
After light curing we cut horizontal slits into the tertiary copings, to allow the excess composite resin bonder to flow out easily ⁽¹²⁾. We attach retention pearls where needed and cast the tertiary structure. After finishing the cast surfaces we check the direction of insertion with the Galvano copings in place on the master model (Fig. 39 and 40).

Try-In and bonding

To determine centric and vertical dimension, we send the complete case including a bite registration rim (only up to the first molar) to the dentist (Fig. 41). The Galvano copings however should be numbered to avoid any mix up. The dentist will, at this same appointment, bond the Galvano copings to the tertiary structure Fig. 42 and 43). The fact that the bonding takes place intraorally guarantees a perfect fit of the case when it's finished.

Veneering

Back in the lab we check the case one more time in regards to fitting and start with the finishing procedure. First we apply an adequate acrylic-metal bonder, then we add pink opaque in the posterior and tooth color opaque in the anterior area (Fig. 44). Both materials (bonder and opaque) are light cured and guarantee



39 & 40. cast implant structure with Galvano copings on the master model



41. master model with primaries and bite rim, ready for try-in.



42. & 43. the fact that the Galvano copings are bonded to the tertiary structure intraorally guarantees a perfect passive fit



44. metal to acrylic bonding material as well as pink and tooth colored opaque are applied to the implant structure

us a very good chemical bonding between metal and acrylic. In addition the esthetic value of the case is increased as no greyish metal is showing through the acrylic. As always we check the function and esthetics of the prosthesis in a semi adjustable articulator (Fig. 45 and 46).

Complex upper and lower implant case

The third case for an edentulous patient describes a complex upper implant structure with a milled bar construction and attachments (ZL anchors) and a lower screwed structure.

For this complete restoration with upper and lower dentures six implants had been placed in the upper and four in the lower jaw. The upper will be constructed as a milled bar with four anchor attachments as infrastructure. So the superstructure with the denture will be resting only on the implants. The patient's situation did not allow a fixed, screwed implant borne construction in the upper. Due to the articulation and to gain more esthetic freedom labially, the case will not be veneered individually, but denture teeth will be used instead. In the lower a screwed implant structure borne by the four implants will be made as a base for a denture with acrylic teeth set in regular denture acrylic.

Primary construction

After pouring the models and mounting them in a semi adjustable articulator we work on the upper case first. We use Metacon light cured wax to build up the bar, connecting the wax to the acrylic modelling abutments of the implants with Metabond. Additionally we place the four ZL-Microdent anchor attachments using a parallelometer (surveyor). It is important to set the anchors in the same direction of insertion as we have found for modelling and milling the primary bar (Fig. 47).

We fix the model with the already light cured primary structure on the milling machine stand and connect the structure with the transfer tool (Fig. 48 and 49). Then we make a stone milling model with exactly the same direction of insertion as the original master model. The milling model allows us to mill without worrying about any damage to the master model during the milling process (Fig. 50). We mill the light cured Metacon primary structure with parallel carbide burs (Fig. 51). Once the milling is finished we send the case in its acrylic state to the dentist for try-in. This way we make sure that the Metacon primary structure fits perfectly in the patients mouth before we cast it. After casting, divesting and cutting the sprues, we put the metal substructure back on the milling model and use carbide burs and silicone robber polishers to achieve totally smooth and parallel surfaces. Once this primary structure is milled and finished we put it back on the master model (Fig. 52), and set up the denture teeth in wax.

Lower screwed implant structure

Up to this point we had already finished up modelling the lower implant structure over the acrylic abutments. This structure was cast and showed a perfect passive fit on the model (Fig. 53). We made sure that the structure did not extend bilaterally more than 20 mm over the last standing implants and provided sufficient retention for the denture teeth ⁽¹⁾.

The lower implant structure is now, together with the upper and lower denture teeth set up, sent for try-in to verify the passive fit of the cast lower structure as well as function and esthetic of the full dentures set up (Fig. 54).

For the set up we have carefully considered all guidelines to achieve a perfect, natural occlusion and chewing capability to avoid any stress to the digestive system ⁽⁵⁾.

Back in the lab, we start "waxing-up" the superstructure over the milled bar (primary structure) in the upper jaw. We can apply Metacon wax (again with the "cold" application technique) directly to the milled bar without using any separator. It is sufficient to just wipe the well polished primary structure with a clean soft cloth⁽³⁾. We insert the male portions of the attachments (including the winding cap) into the females of the primary structure and cover it with Metacon wax. We do, however, not cover the top part of the anchor attachments (winding caps). They need to be accessible as they will be welded to the superstructure later on (Fig. 55). We try to create an even thickness of the superstructure judging it by the translucency of the Metacon wax.

Guided by a silicone matrix key of the denture set up we place the needed retentions which will firmly retain the teeth in the denture once the case is finished, and then light cure the construction (Fig. 56). After polymerisation we lift the secondary structure off the primary implant bar. The attachments (anchors) remain momentarily in the primary structure. We apply retention pearls to the surface, place the sprues, invest and cast the superstructure.

After casting and finishing, the secondary structure is positioned exactly on the primary implant bar. Then the attachment winding caps (still attached to the primary bar) need to be connected to the secondary structure with either cold cure or light cured acrylic (Fig. 57). Once this fixing acrylic has polymerised, we remove the secondary structure together with the winding caps and anchor males from the primary bar. Now we unscrew the male anchor portions and replace them with fixing pins for welding that fit the winding caps. We make a small welding model and remove the fixing acrylic. Finally we weld the winding caps to the secondary structure to achieve a perfect, passive fit of the attachments.

After welding we screw the original anchor males back into place (winding caps) and proceed with finishing the upper denture (Fig. 58 and 59). As described before we always first apply a metal bonder and pink tooth color opaque on the metal structures before we pour the pink acrylic.

We proceed in the same way with the lower denture, finishing it with denture acrylic (Fig. 60 and 61). Since the lower denture is screwed to the implants and can only be removed by the dentist, we have to make sure that the finishing line of the denture base is rounded and well polished to allow the patient good daily dental hygiene⁽¹⁾. After final check of occlusion in the semi adjustable articulator we send the finished case to the dentist (Fig. 62).

Conclusion

Metacon light cured wax offers us new ways to "wax-up" our metal structures in the lab. We can use this versatile material in pretty much every area of our daily work, and assume that there will be even more applications found as the material itself is rather new. The Metacon system saves us a lot of time, shortens or even



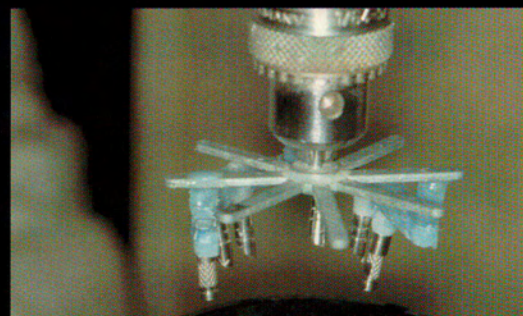
45 & 46. finished case



47. the Metacon primary implant structure over the acrylic abutments with attachment females in place



48. & 49. transfer of the primary structure in order to make the milling model. This way the defined direction of insertion is maintained



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(fig. metalight trend)



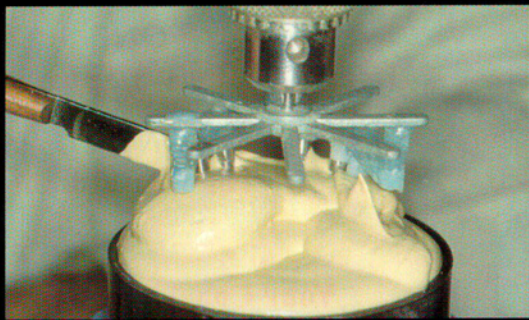
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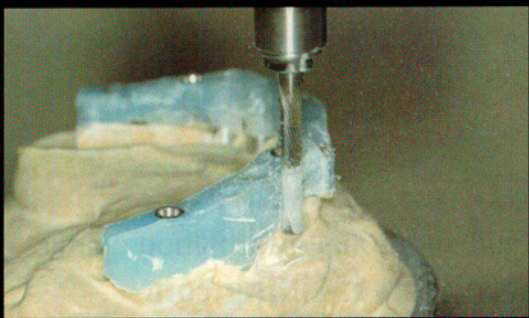
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50. making the dental stone milling model



54. denture set up in wax ready for try-in



51. milling the primary structure with carbide burs before casting



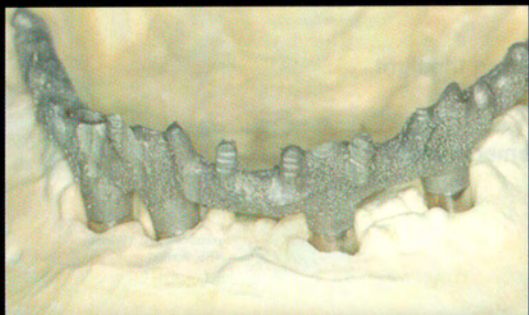
55. Metacon modelling of the upper implant superstructure



52. finished upper primary implant structure



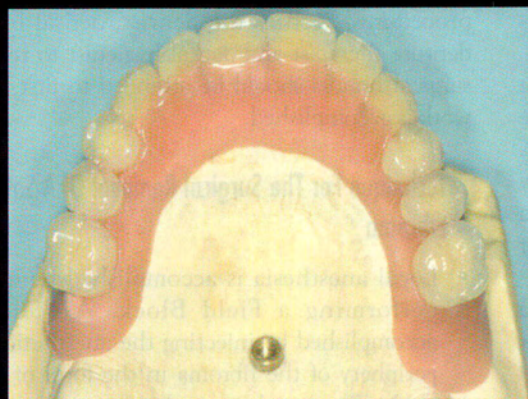
56. exact positioning of the retentions guided by the silicone matrix



53. cast and finished lower implant structure



57. implant superstructure before welding the anchor winding caps



58 & 59. finished upper jaw cover denture with milled bar



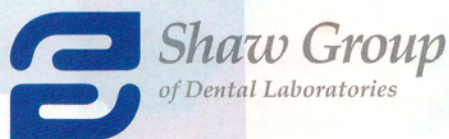
60 & 61. finished lower implant denture



62. case completed, upper and lower implant borne dentures in occlusion

eliminates working steps and reduces our consumption of most different lab materials (i.e. investment material, duplicating material, etc.). We improve passive fit almost automatically, and can design our work flow even more thought through and efficient, which greatly helps to reduce our production costs per case. The system and its working techniques are perfectly

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