

# The Metacon System

## Part I



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CDT

### Introduction

Passed have the times of our grandfathers who used gold bands covered with an occlusal lid to fabricate crowns <sup>(11)</sup>. Since the last 50 years dental technicians cast their metal cases according to the "lost-wax" principle.

Nowadays technicians work with many different dental waxes, which are in general easy to use, and which have relatively little cooling contraction after they had been heated up. However what all waxes are missing is real stability <sup>(8)</sup>.

This missing strength of our dental waxes is where the difficulties come from when lifting a complex bridge or implant case off the model (distortion). It is also the reason why a refractory model is needed when producing partials or full plates.

Alternatively modelling resins had been introduced to the market which provide the needed stability to avoid distortion when lifting the case off the model and could even be tried intraorally. These materials however have high polymerisation shrinkage and are rather difficult to model nicely <sup>(10)</sup>.

After evaluating the advantages and disadvantages of these existing materials for modelling dental cases, a new material that combines the advantages of wax and resin but avoids their disadvantages had been developed: the light cured wax Metacon.

### Light cured wax

This light cured Metacon wax basically handles like conventional wax and can be melted with an electric wax knife or over the bunsen-burner with an instrument. This would be the normal, so-called "hot" modelling technique. At the same time the Metacon wax can also be modelled to the desired shape so to say "cold"—meaning with fingers and metal- or silicon instruments, as it becomes rather soft just a little over room temperature ("Play-Doooh" like

consistency), while it will not start curing under normal laboratory lighting conditions.

By light curing the Metacon wax in a special light curing unit it becomes acrylic. This acrylic is strong enough to grind it with rotary instruments (carbide burs, silicon polishers). The final passive fit can easily be verified on the master model or even intraorally before casting.

With Metacon wax any kind of dental case can be modelled directly on the master model no matter if it is going to be a fixed or a removable restoration. So this material is not only a big time saver, but also the needed amounts of duplicating and investment materials, which had up to this point been inevitable for partial frameworks, can be greatly reduced.

### Step-by-step modelling procedure for fixed restorations (bridges)

In order to wax up an understructure for a ceramic or acrylic veneered bridge, the stone master model is prepared conventionally with pinned dies.

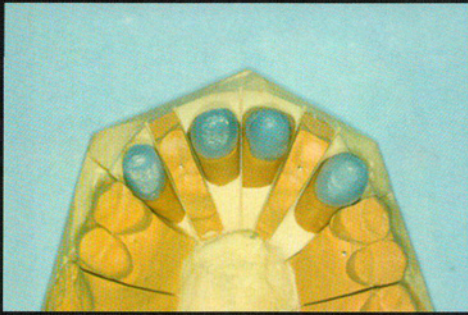
Die spacer is applied as needed in the same way as if working with conventional wax (ending approx. 1 mm above the margin). It is advisable to use white, grey or blue color die spacer, as these colours will not so much absorb the UV-light and consequently will not negatively influence the light curing process <sup>(3)</sup>. As the next step Metaseal model and die separator is applied. Metaseal is a liquid material that penetrates the pores of the dental

stone and seals it. Two layers of Metaseal are needed. The second application can be done 2-3 minutes after the first layer was applied. The result is a fine layer of Metaseal separator that will avoid Metacon wax sticking to the model. One further separator as part of the Metacon system is Metatouch. Metatouch, a pink colored separator with a soft paste like consistency is used on dies where die spacer had already been applied and on fingers or instruments (pic.1). So basically

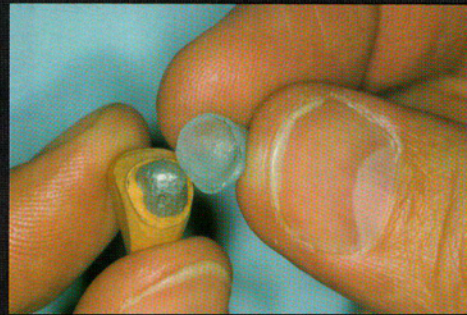


1. Applying Metatouch separator onto the die spacer





2. Copings on the dies before light curing "waxed up" cold with the fingers



3. Checking the copings after light curing

on all surfaces that are dense and don't allow penetration of a liquid (Metaseal).

Metawax modelling wax, which comes in 20 gram jars and Metaform pre formed wax patterns (clasps, plates, bars, sprues, etc.) are chemically equal. Consequently the "left-overs" from the pre formed patterns can also be used as modelling wax.

As mentioned before, there are different ways to model the Metacon wax. Copings, pontics, etc. can be "waxed-up" using the material in its cold stage (Play-Doh like consistency), by just pushing it onto the die and into the desired shape with fingers and appropriate instruments. Since the material has a certain translucency, the applied thickness can be easily estimated and adjusted as needed for the case. Other methods to make the copings are: using cut out stripes or triangles of smooth pre formed sheet patterns which are wrapped around the die, dipping the die in warm, liquid Metawax or waxing up the coping with an electric wax knife or regular wax-up instruments over the Bunsen burner.

We, however, greatly prefer to use the "cold" method with the manual adaptation. It is different, yes, and can only be done with the Metacon wax but we consider this technique the most efficient one for this material (pic.2).

After the copings had been light cured for 10 minutes in the special Metalight light curing unit, we can easily remove them

from the dies (when the separators had been used correctly) and finish them with carbide burs or silicon polishers to the desired thickness and shape (pic.3).

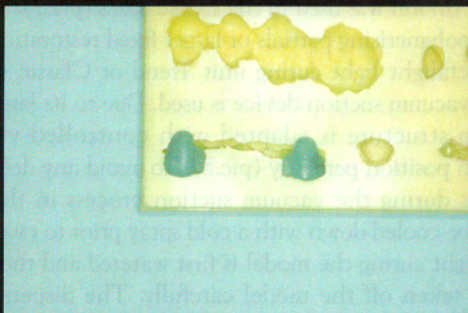
For making pontics we use a self made silicon matrix. We push the Metacon wax into the moulds manually or with an instrument or alternatively we heat the wax to its liquid stage and pour it into the moulds. This way we get uncured pontics in any desired shape (pic.4).

In order to achieve the needed connection between pontic and coping we use Metabond. This "liquid Metacon" is actually a light cured connecting adhesive, with the same basic chemical composition as the Metacon waxes, but a different consistency.

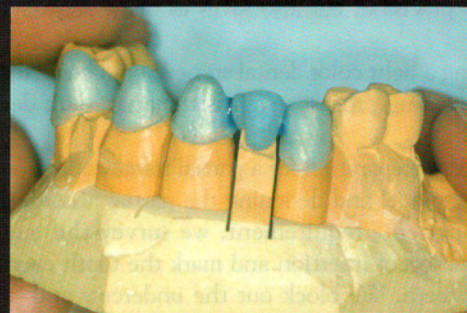
We position and connect the pontics as desired and light cure the complete bridge one more time for 5-10 minutes (pic.5).

Once the material is evenly cured – indicated by the color change from blue to light blue – we can lift the bridge off the model without any worries about distortion. Since acrylic is definitely easier to grind than metal, we try to do as much surface trimming and finishing as possible in this acrylic stage as we want to grind as little as possible after casting (pic.6).

We use Metacon sprues, especially for large and complex cases, in order to give the whole structure extra stability for investing. The sprues are attached to the bridge with Metabond and finally

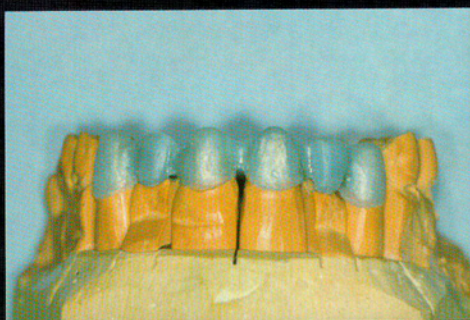


4. Self made silicone matrix for individual preformed pontics



5. Pontic bonded between copings using Metabond

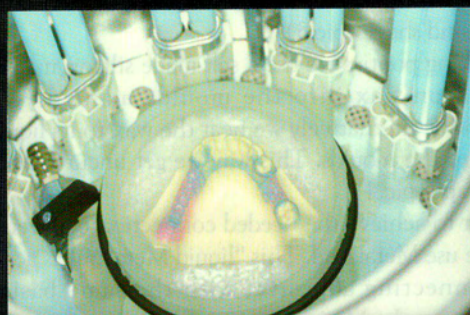




6. Bridge light cured and finished before casting



7. Lower partial modelled with Metacon preformed patterns



8. Light curing of the partial, perfectly adapted in the Metavac suction device



9. Finishing the light cured partial before casting with a silicone rubber

light cured. In case the bridge should be veneered with acrylic, retention pearls need to be added with retention pearl glue before investing.

### Step-by-step modelling procedure for removable restorations (partial frameworks)

The main advantage the Metacon material offers when producing partial frameworks, is the possibility to work right on the master model without duplicating and making a refractory model. This not only increases precision, but also saves us many steps in the work flow.

For model making a light color dental stone should be used as it supports the light curing process much better than dark dental stone colors would.

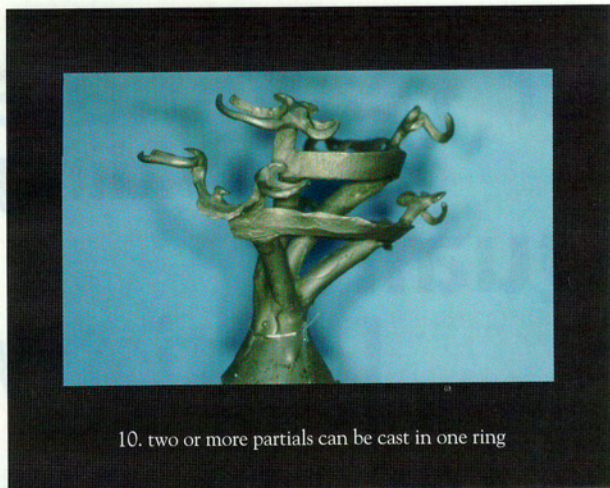
We start the model preparation for a partial framework as usual. After checking the model and designing the partial according to the dentists and patients requirement, we survey the model, determine the direction of insertion and mark the tooth equators on the remaining teeth. We block out the undercuts and place relief wax in the saddle areas where it is needed. For blocking out and underlaying blackout wax as well as tin foil or light cured blackout material can be used<sup>(3)</sup>. After that we apply the Metaseal separator to the whole stone model and use Metatouch on the

blockout and relief materials. For waxing up the partial, we have a large variety of preformed wax patterns (clasps, bars, plates, retentions, etc.) at our disposal. In the modelling stage these patterns are used according to the design that was drawn on the model. It is important to make sure that all patterns are connected thoroughly (i.e. bar or plate to retention or clasp) by melting the two parts in their connecting zone with the electric wax knife or by applying Metabond "glue". When connecting the patterns with the electric wax knife, it is important to make sure that it is not used all the way down to the relief wax, if relief wax instead of tin foil was used in the saddle areas (pic.7).

When polymerising partials or larger fixed restoration structures in the Metalight light curing unit Trend or Classic (pic7b), the Metavac vacuum suction device is used. Due to its latex cover the waxed up structure is adapted with controlled vacuum and remains in position perfectly (pic.8). To avoid any deformation of the clasps during the vacuum suction process in the Metavac, they can be cooled down with a cold spray prior to evacuating.

After light curing the model is first watered and then the cured partial is taken off the model carefully. The dispersion layer is wiped off and the case can be trimmed to final shape with carbide burs and/or silicon polishers (pic.9). Even the rests can be adjusted at that stage, as we can place the master model (which we did build up on) in the articulator. After the trimming is





10. two or more partials can be cast in one ring

final the case is sprued, invested and cast.

The light cured Metacon material has a memory, which means that when it is flexed it always goes back to the original position it has been polymerised into. Due to this "Memory-Effect" the partial can be lifted off and placed back onto the model as desired. The clasps open and close accordingly. Since we lift the partial off the model for investing and casting, we have the possibility, just like with crown and bridge casting, to invest and cast two or even more partials in one ring, which is a big material and time saver (pic.10).

### Routine cases in the lab

In the daily routine work we are facing numerous, most different and sometimes difficult cases where the light cured Metacon wax is ideal to use. Not only because Metacon can fully replace the conventional dental waxes but also because it saves us a lot of time and enables us to work much more flexibly.

Let's check this for example on a full denture case where, after it was already finished in acrylic, it had been decided to reinforce it with an additional metal support. Conventionally we would have had to spend extra time for duplicating and refractory model making before we could have started the actual modelling work. The following case description for an additional metal reinforcement on an implant retained cover denture shows how we proceeded. Initially we have to make room on the denture where the metal reinforcement will be placed later on by grinding off the needed amount of acrylic. After putting the separator on the denture in this area, we apply a preformed stipple sheet pattern (thickness .55 mm) to the desired shape and adapt it properly by using the Metavac vacuum suction device. After light curing in one of the Metalight units, we can lift the case off the denture, contour and finish it with carbide burs or silicon polishers, then sprue, invest and cast it. Rapid fire investment materials work as well as conventional over night materials. After casting the finishing work in metal is absolutely minor. Finally the reinforcement is attached to the denture and the case is finished (pic.11 and 12).

Using the light cured Metacon wax is also very helpful for any other reinforcements for removable dentures as we can wax up right on the master model and consequently come to casting at no time (pic.13 and 14).

In case of a partial acrylic denture with metal insert there is also a Metacon workflow that will lead to the desired result

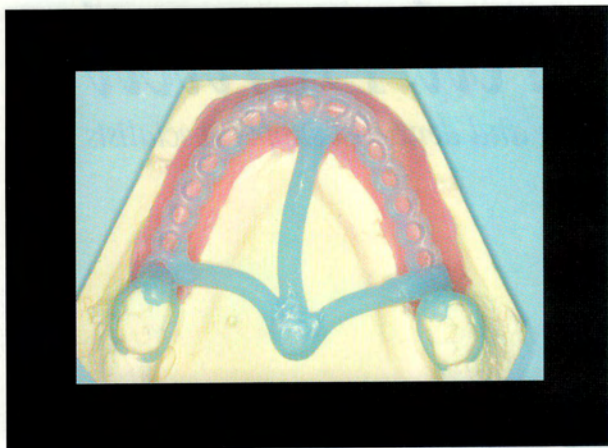


11 & 12. Additional metal reinforcement on an already finished implant retained cover denture, modelling and result

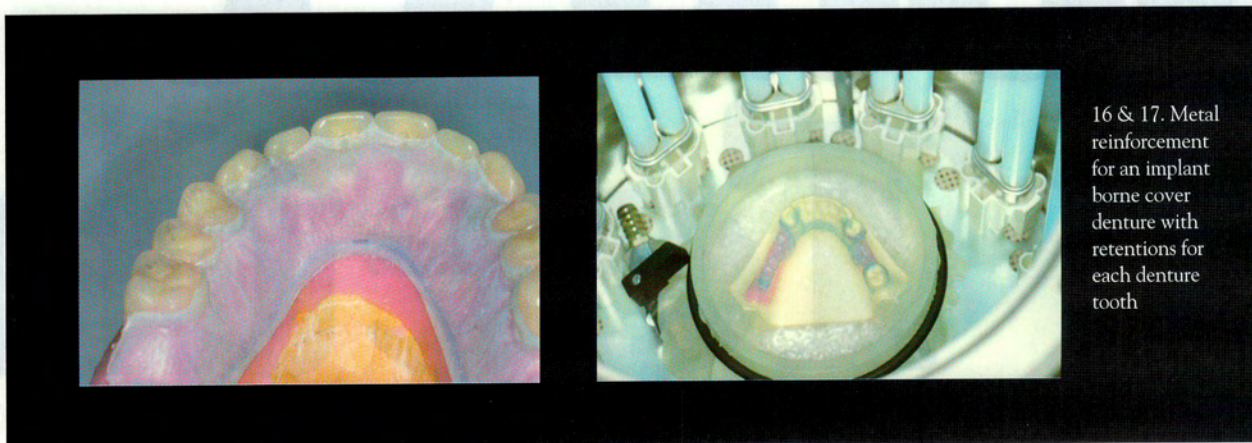


13 & 14. Cast reinforcement for an acrylic partial denture, modelled in light cured wax and result after casting





15. Cast reinforcement for an acrylic partial with two clasps



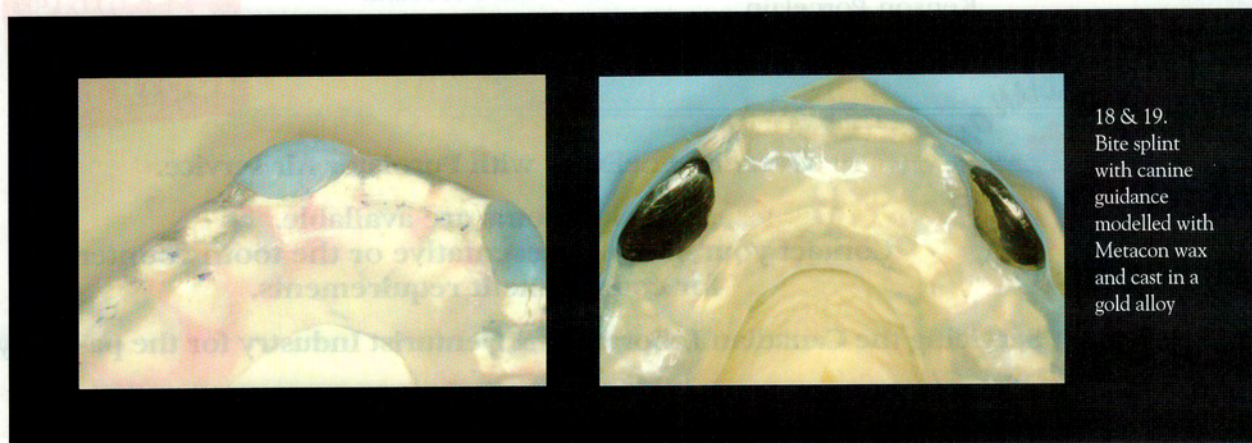
16 & 17. Metal reinforcement for an implant borne cover denture with retentions for each denture tooth

quickly and successfully. We just need to adapt the clasps, use a preformed retention pattern and get a clasp retained high strength metal insert with perfect passive fit (pic.15).

In regards to implant retained cover dentures we always design them with metal reinforcement to avoid any damage from the high pressure applied occlusally during the chewing movements. This reinforcement is easily modelled by just using a .55 mm Metaform stipple sheet pattern (pic.16). After light curing we place the necessary retention per tooth (pic.17). After casting, finishing and polishing we apply a metal-acrylic bonder.

The basal surface of the reinforcement will be covered with pink opaque to avoid the grey metal showing through. The retentions for the acrylic teeth are covered with a tooth-color opaque. Even the extension of partial dentures (i.e when further teeth needed to be extracted), which used to be rather unprofitable and time consuming, has now become a fast and safe job.

Also for bite splints, which we always design with gold canine guidance to avoid premature wear, working with Metacon is highly comfortable. After light curing we place retention pearls on the bottom side of the modelled canine parts. Due to this extra retention we can easily




18 & 19. Bite splint with canine guidance modelled with Metacon wax and cast in a gold alloy



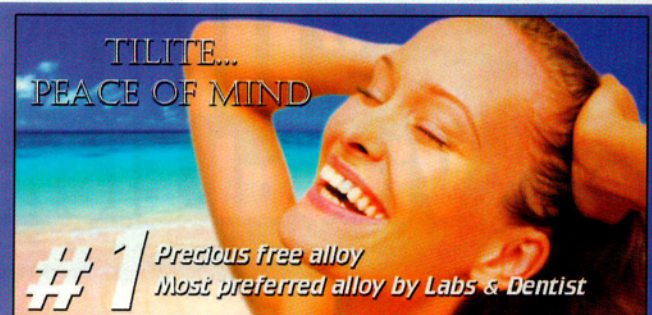
bond these gold canine guidance pieces to the bite splint, once they are cast (pic.18 and 19).

Part two of this article will appear in the next issue of this magazine and will mainly focus on various different implant cases produced with the Metacon light cured wax system.

The literature list will be published at the end of the second part of this article. 

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



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**Metacon light cured wax**  
- from wax to acrylic -




(fig. metatlight trend)

- Wax up one of three ways:**
  1. press, pat or mold wax into proper position with fingers or instrument (ideal for implant bars)
  2. traditional method using electric wax knife
  3. or dip
- No distortion or warping during the light curing process**
- Can easily be milled or trimmed before investing**
- Great for scanning**



pictures by Reg Wilson, FPS, Boston



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