Distortion Free Modeling Using the "cold" Technique

Heat-free-modeling of a 14-unit bridge

Joachim Mosch, CDT and Andreas Hoffmann, MDT

In a modern laboratory environment, the use of a bunsen burner or electric wax knife could soon be a thing of the past when it comes to the modeling of crowns and bridges from a casting perspective. Not because we are working with a computer (CAD/CAM technology) but rather because the new modeling materials do not need to be heated. With Metablue, the light-cured modeling material that is part of the Metacon System (Primotec), even large cases can be fabricated without any heat. This means without running the risk of temperature causing distortion. The Metablue and Metacon material is used "cold", or rather at room temperature. Once light cured, it turns into an acrylic and is highly stable.

The Metacon System includes the light-curing wax (Fig. 1) as "standard" modeling wax (Metawax) for the crown, bridge and implant technique or for pressable ceramics , as well as prefabricated components like stippled sheets, retentions, bar and clasp profiles. The material handles like conventional wax but it can also be shaped to the desired form in its "cold" state (it has a Play-Doh-like consistency). It is easy to kneed and shape with your finger at room temperature. This particular characteristic will be described a little more in detail while looking at the following technique. After the modeling, it is polymerized in the Metalight curing unit and becomes acrylic, without losing the beneficial properties of wax: it burns out cleanly and completely and does not expand in the ring.

This acrylic is strong and will not warp or break. Once light-cured, it keeps its shape and contour and it is the backbone of the heat-free and consequently distortion-free crown and bridge modellation. The following case, ceramic veneering on a 14-unit bridge demonstrates how we proceeded. First we modeled the crown copings using the "cold" application method by shaping a small amount of Metacon wax into a ball and kneading it onto the die evenly, from the incisal or the occlusal surface towards the margin. With a little practice it is quite easy and fast to

Fig. 1:The Metacon-Starter kit with metalight mini

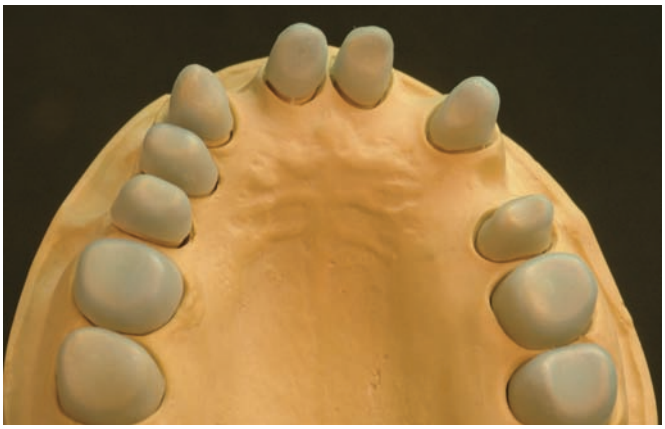

Fig. 2: Due to the well-defined translucency of the Metacon wax it is easy to achieve an even wall thickness

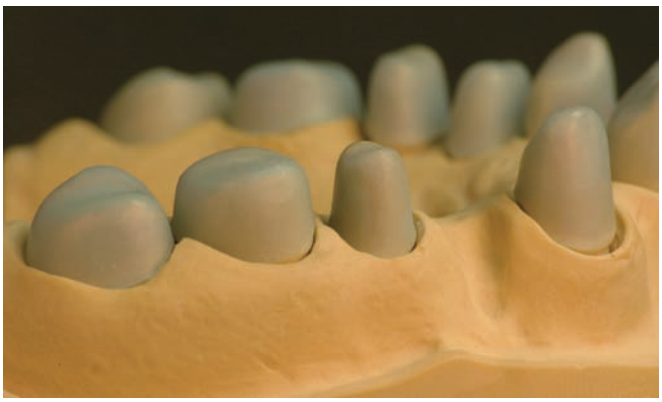

Fig. 3: The finished acrylic copings with a sufficient and strong marginal fit

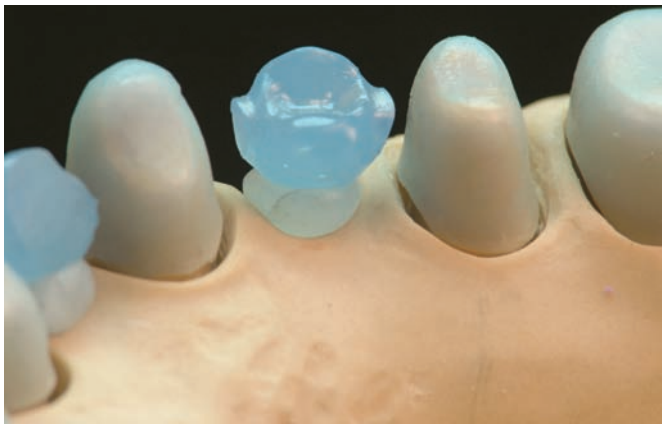

Fig. 4: In this case the individual prefabricated pontic was created with Metablue

Fig. 5: Metablue is a ready to use one component modeling composite and is applied directly from the syringe and burns out cleanly and completely

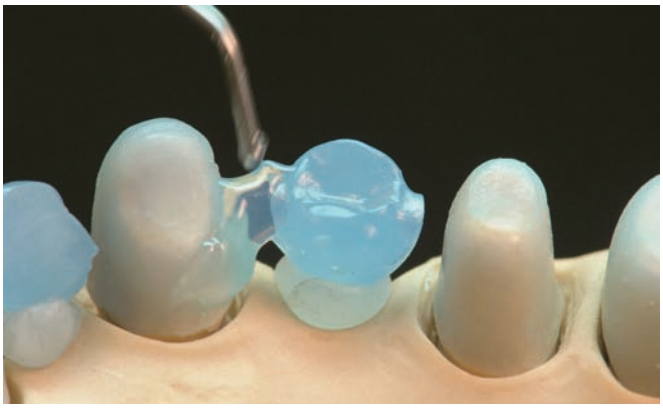

Fig. 6: Metablue is thixotropic, which means it softens when energy (kinetic) is applied…

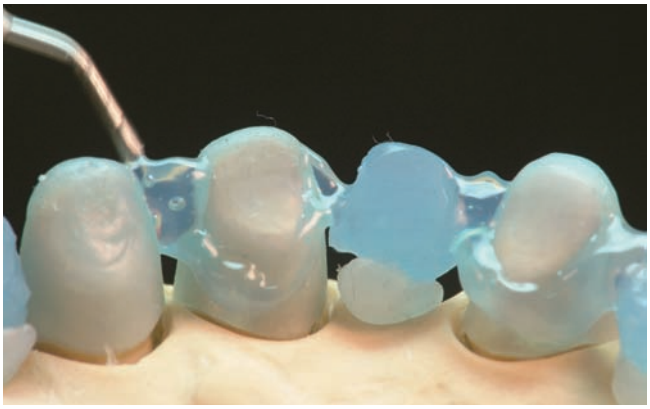

Fig. 7: …once the motion (energy) stops, the material stays in place

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model an entire crown coping with a well defined wall thickness (Fig. 2). The copings are then polymerized in the Metalight curing unit for 10 minutes. Light-curing turns the Metacon wax into acrylic, which is easy to grind and finish with carbide burs and rubber polishers. The wall thickness can be checked with a caliper, contour and margin fit of the individual copings are finished perfectly before the pontics are placed and the individual components are connected with one another (Fig. 3).

The pontics can be fabricated out of Metacon wax or alternatively out of Metablue. The fabrication is most efficient if you use a silicone mold, which are used to duplicate the desired pontics in Metablue or Metacon wax. This lets you create individual prefabricated components that fit your own model style (Fig. 4). Once all pontics have been placed we begin with the connection process using all modeled individual components, which create the actual bridge framework. For the connection procedure we use the "cold" application with Metablue (Fig. 5).

It is worth noting that Metablue can be applied as a ready to use one component material directly from the syringe and it burns out cleanly and completely. It is applied easily and precisely due to its thixotropic material properties and bonds with the polymerized Metacon wax. It has polymerization and dimension stable properties without any noticeable shrinkage or distortion. Due to these characteristics this material is the number one choice when it comes to the connection of the individual pontics (Figs. 6 and 7).

After the light curing was finalized, we created an acrylic bridge modellation, which we were able to cast or scan. In both cases you can trim the bridge to its final shape with cross cut carbide burs and or silicone polishers. It saves a lot of finishing time because the Metacon/Metablue acrylic is much easier to grind than an alloy (cast), zirconia (scan) or ceramics. After the finishing steps, the modellation of the 14-unit bridge framework was completed.

The work fit precisely and is distortion-free, and most importantly, it is strong and stable. Any distortion after light curing is impossible unless conventional wax sprues are used. These rolled up wax wires exhibit considerable internal stress. During the connection of the sprues the cooling shrinkage should not be underestimated. The easiest way to avoid such problems is by using the "cold" application and using acrylic sprues. For this application we prefer to use Primoclick (Primotec). The different components are made of a special hard acrylic, which burns out clean, and are simply plugged into one another (Fig. 8).

These components are specially designed to click together and can be adjusted into any required position (Fig. 9). The Metablue modeling composite is applied directly from the syringe to connect the sprues with the cast object. We did not use heat during this phase and therefore did not have to worry about any expansion/contraction

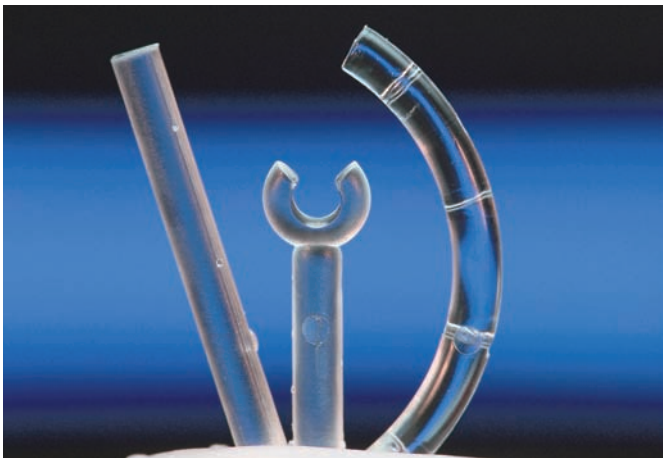

Fig. 8: The different shapes of the Primoclick acrylic sprue components are simply plugged to one another

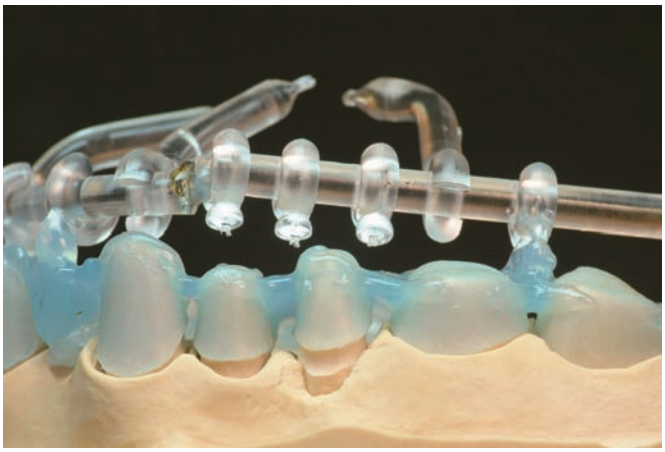

Fig. 9: The volume rings can be moved and turned into any required position

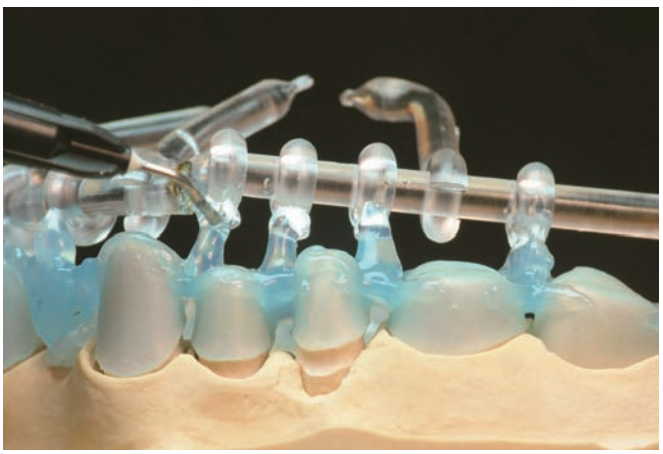

Fig. 10: The casting object and the volume rings are connected with Metablue using the "cold" application method

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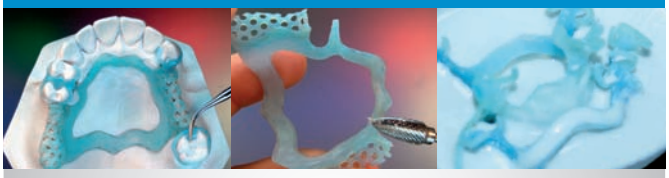

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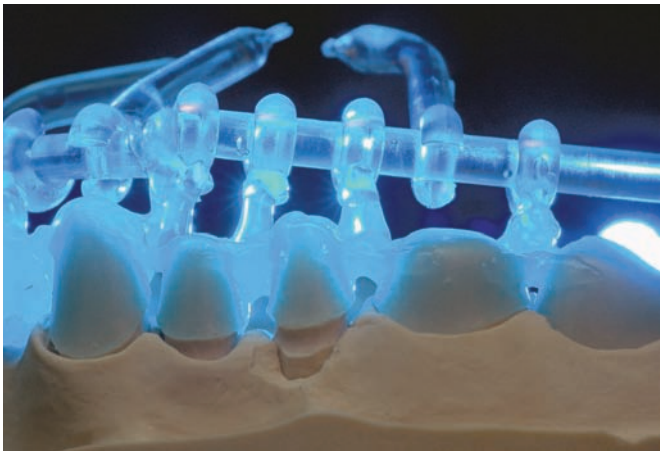

Fig. 11: An UV-A hand held light is sufficient for the setting and intermediate curing process

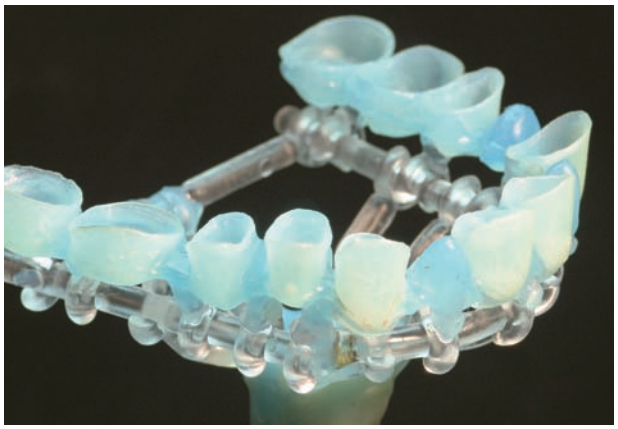

Fig. 12: The 14-unit bridge, entirely "cold" modeled before…

issues (Fig. 10). Metablue can be prepolymerized with a hand-held UV-A curing light (Fig. 11) and transferred to the Metalight or any other light-curing unit afterwards in order to finalize the curing process.

Primoclick is well suited for the sprueing of conventional wax modellations as well. Any distortion of the work while lifting it off the model, eventually caused by inattention (as things had to go very fast, as usual …) or because of high environmental temperatures in the summer month, is impossible.

Due to the precise preparation a perfect result is expected, which can be reproduced on any case (Figs. 12 and 13). If you use the "cold" modeling method consistently you will achieve casting results that fit very accurately (Fig. 14), assuming of course that you have the proper expansion ratios and casting techniques in place, in which case one only requires a minimum amount of metal finishing. Admittedly , the subject of the casting

Fig. 13: …and after the casting process. A minimal amount of finishing was needed

Fig. 14: Efficiency, if all parameters match: divest, place…fits!

technique is a large area with many stumbling blocks (expansion control of the investment material, control of the preheating furnace, flame casting, induction, vacuum pressure casting etc.), however, if the modellation is already distorted, the best casting technique is useless. But if you use the "cold" modeling technique and can turn wax into acrylic then at least you know you will have a properly fitting wax-up.

About the authors

***Joachim Mosch, CDT**, born in 1959, studied dental engineering and technology and is well experienced in international business. He has been managing the European headquarters of an American dental company for 18 years before he started his own businesses (primotec /primodent) in the year 2000. Mr. Mosch has published various articles on different dental subjects such as Light Cured Wax (the Metacon System), functional bite splint therapy using light cured splint materials (primosplint), welding techniques with pulsed micro arc welding (phaser), laser welding, esthetic dentistry with veneers, a.s.o. He lectures and teaches on these subjects throughout the world. Mr. Mosch is married, has two children and lives with his family close to Frankfurt in Bad Homburg/Germany.*

***Andreas Hoffmann, MDT,** born in 1956 achieved his German Master Dental Technician degree in 1985. As of then he was managing director and shareholder of a German dental laboratory group. He sold his shares and started his new laboratory 1. DSZ in the year 2000. At the same time he was appointed director of the "Akademie Umfassende Zahntechnik", a highly respected post graduate education program by one of the major German laboratory associations (VUZ) where he is also a member of the board of directors. 2004 he was appointed associate professor for joining techniques (phaser/laser) at the University of Osnabrück/Germany. Since 2006 he also teaches for the Donau-University Krems at the Master of Science Dental Technology curriculum. He received the Straumann prize in 1998 and is know in Germany and Europe for his outstanding publications, lectures and courses on Metacon (light cured wax), phaser and laser welding techniques, Procera, NobelGuide, Cerec, Cercon and Galvano. Mr. Hoffmann is married, has two children and lives with his family in Bilshausen, Germany.*