Preparing models for thermoforming

By Peter Herring, Adv Dip Dent Tech, ACCDP

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A high quality model is a prerequisite for laboratory manufacture of any dental restoration and this holds true also for thermoformed appliances. Apart from the obvious requirements of model strength, accuracy and freedom of defects, models used for producing thermoformed appliances often require further modification prior to their use. Removal of undesirable undercuts, incorporating reservoirs for bleach materials and creating allowances for erupting teeth are all examples of the need to modify the form of the original model.

The materials used to affect these types of modifications fall into four general categories: Plasters and stones; latex-based solutions; moldable silicones; and waxes.

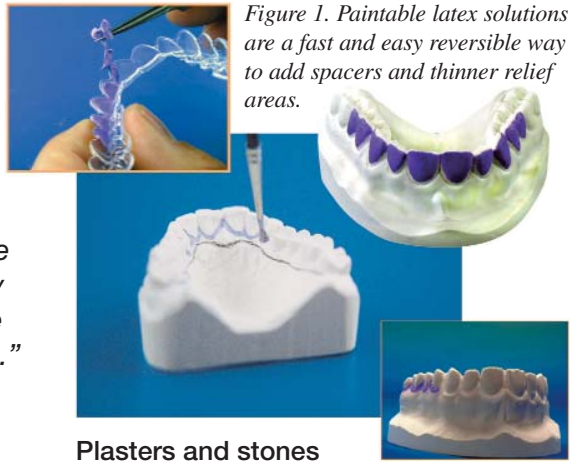

Figure 1. Paintable latex solutions are a fast and easy reversible way to add spacers and thinner relief areas.

Plasters and stones

Gypsum products are mostly useful for gross repairs to models. Blows, bubbles and other defects in models acquired from the impression and model pouring processes are quickly and easily repaired using the original material from which the model was made. Gypsum has the advantage of being readily available, economical and strong. The disadvantages are that the modification is generally not reversible, it is also difficult to judge the thickness of the applied material and the repair must be done well ahead of using the model to allow for setting time.

Latex-based solutions

Paint on latex based material provides a self-hardening protective spacer film for almost all materials. They are permanently elastic, acid and base resistant, rupture-resistant, removable without residues, are fast drying (around 5-10 mins) and easily and quickly applied using the appropriately sized brush.

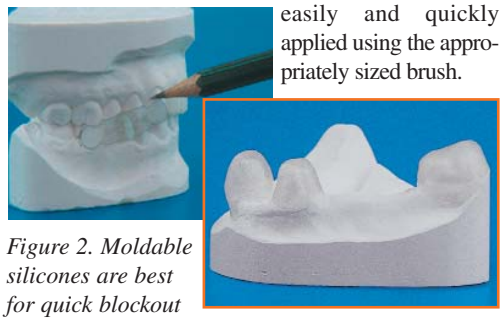

Figure 2. Moldable silicones are best for quick blockout of larger areas - here shown as relief for a custom tray and also being used as temporary support for snore appliance arm templates.

A single layer of this material creates a relief ranging from 0.1mm to 0.3mm in thickness depending on the amount applied and the porosity of the surface on which it is used. These properties make these latex solutions most useful as a spacer for the fabrication of bleaching trays, to provide relief around the gingival margins or for reducing tension on teeth when thermoforming (Figure 1).

Being removable these products are also useful for protection of plaster dies against trimming water, isolation of metal parts when sandblasting and shielding of high-gloss ceramic parts when etching ceramics, etc.

Moldable silicones

This reusable blocking out material has an almost "plasticine" quality when kneaded and ready for use. This product group is designed to resist the heat produced when thermoforming and be easily removed - leaving no damage to the original model. Application is either by molding with the fingers or wiping in place with metal instruments, much like a "no heat" wax.

Silicone gums are especially suited for the protection of residual teeth and for blocking out large undercuts. For example, when constructing mouthguards, if space is required over partially erupted teeth or deciduous teeth they can be covered with this material before thermoforming. Unwanted undercuts can be quickly blocked out when constructing occlusal splints, snoring control appliances or custom trays with this multi purpose material (Figure 2).

It should be noted these types of materials will harden if stored for a long time. To regain the original elasticity simply knead the material. It is also advantageous to slightly moisten very dry gypsum models before using this material.

Waxes

High temperature waxes (Figure 3) have been developed specifically for modifying thermoforming models. With melting points up to 110°C these waxes are able to withstand the temperatures typically used to plastify thermoforming materials. They are manufactured in various contrast colours as well as transparent for easy determination of thickness.

Figure 3. High temperature blockout waxes are great for all-round use - available in different contrast colours as well as transparent.

Waxes can be considered as a general purpose solution: they are convenient, easy to handle (although a heat source and waxing instruments are required) and fast to use. Waxes can be used for almost every situation, from repairing model defects to blocking out large undercuts.

However, because of their high melting temperature these waxes can be difficult to remove completely from the model.

About the author

Peter Herring is a dental technician and prosthetist based in Perth, Western Australia. He is the Australian agent for Erkodent thermoforming machines and also runs a busy laboratory dedicated to thermoformed appliances. For more information, please call 1800-242-634 or pjh@erkodent.com.au