

# Thermoforming with the new hard/soft materials

By Peter Herring, Adv Dip Dent Tech, ACCDP



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**D**ual laminate (Hard/Soft) materials are amongst the most versatile and commonly used of the dental thermoplastics family. Primarily used in applications such as full arch bite splints, anterior type mini splints and snoring/sleep apnea control appliances, the newly developed versions of these hard/soft combination thermoforming materials allow us to provide increased patient comfort and also offer a more rational production process when stood side by side to traditional acrylic systems.

## Material characteristics

The new dual laminate materials are a combination of Copolyester (PETG – the hard layer) and Polyurethane (PU – the soft layer) (Trade name: Erkoloc-pro). They are both biocompatible and intended for longer term use.

This material is characterized by the consistent thickness of the soft (PU) layer, so no matter what the overall thickness of the material used (2, 3, 4 or 5mm) the soft layer (pre-thermoforming) is always the same (1mm). This produces finished appliances which still retain the benefits of superior patient comfort but without the excessive movement which can occur with thicker soft layers.

## Thermoforming and finishing

Compared to the older SBS/EVA materials, much higher temperatures (>165°C) are required to sufficiently plastify the PETG/PU combination for forming. When working with these higher temperatures, the possibility of overheating the material increases: hence they are best formed using machines with programmed heating timers or better still, foil temperature sensors. For machines without either control, the material should be formed after the foil has received sufficient heat so that an indent remains when pressed with an instru-

ment (See material instructions). It is not wise to add more heat than required; excess heat can degrade the PETG layer properties.

Modifications to the hard (occlusal) surface are easily accomplished by either addition or reduction methods. Additions to the occlusion; creation of occlusal ramps and guides; and positioning of third party components can all be reliably carried out using proprietary self-curing acrylics. Reductions are accomplished using tungsten carbide burs followed by silicon polishing wheels. After these modifications,



*Figure 1. Cross section of formed PETG/PU material - note proportions of soft layer (facing the fitting surface) and the hard layer (facing the opposing dentition).*

the glass-like post thermoforming finish can be returned with standard denture acrylic high shine products. However, care must be taken not to introduce excessive heat when polishing as this will, when combined with the pressures applied during the process, present the possibility of distortion to the appliance.

## Patient Care Protocols

The long term care of appliances made from these new dual laminate materials requires a slightly different approach than appliances made with traditional methods.

Firstly, denture cleaners and mouth-washes should not be used to clean or soak these materials. The alcohol and chlorines present in these solutions may cause damage to the polyurethane (soft) layer.

The recommended care regime is as follows:

### 1. Typical care after use

- a) Rinse well with water.
- b) Use a soft toothbrush and soap and brush with care inside and outside of the appliance.
- c) Rinse well again with water.
- d) Shake off water and (optional) dry with a towel.
- e) Very important - allow the appliance to dry completely! Then store the appliance in a dry place - it is best in a container with openings for air.
- f) Rinse with water before use for easier application.



Figure 2. A glass-like finish can be restored after finishing but when final polishing appliances take care not to over heat!

### 2. For a more thorough clean

- a) Follow a) and b) as above.
- c) Prepare a quite strong soap solution (5 times stronger than for dishwashing) and put the appliance into the liquid and leave it there for an hour (if necessary, weigh the appliance down with a spoon or similar). Don't use strongly perfumed soaps.
- d) Rinse well with water and leave the appliance for another 10 mins in fresh water, rinse well again. Follow d) to f) as above.

### Notes

There is no requirement for the appliance to be stored in water, allowing the appliance to completely dry between uses

effectively reduces the microbial load.

Soap produces a strong alkaline solution which kills most of the organisms of the oral flora. This is why the soap bath is the best compromise between disinfection and material protection.

### About the author

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