

A System Approach to 21st-Century Ceramics

INTEGRATED PRODUCTS IMPROVE EFFICIENCY, CONSISTENCY

By Jim Emmons, CDT, FNBC

WE ARE OFTEN CHALLENGED in our ceramic processing technology with all-ceramic restorations. The step processing of the past 50 years has become obsolete and our ceramic process requirements have changed dramatically. An integrated system was necessary to enable efficiency and also be consistent and competitive. The author has found that assembling a random product mix leads to inefficient and inconsistent restorations.

The author found a completely integrated ceramic processing system with Dental Creations, Ltd.'s product line (wonderfill.com), which helps with tasks ranging from building a layered restoration to shading and glazing zirconia and lithium disilicate restorations. The systematic approach completely meets the need to have predictable results from every aspect of layering/finishing to glazing any brand or type of ceramic.

Dental Creations' new Stax Plus Modeling Liquid Kit eliminates porcelain slumping and running of the wet porcelain. It is a self-condensing porcelain modeling liquid. With Stax Plus, firing shrinkage is reduced by more than 50%. Other benefits include the fired porcelain having a natural enamel refraction, and steam tears on bridges being a thing of the past. Also, the firing density is increased by an average of 40 MPa.

Stax Plus has a unique chemistry developed by a master ceramist to help resolve time-consuming step process issues and optimize ceramic restoration results. The author has reduced working time by more than 30% using Stax Plus, without changing his building technique.

When using Stax Plus, the author leaves the bite opening of the wet porcelain buildup open .5 mm in the anterior before carving in the basic anatomy (Figure 1). A root canal file is then used to scribe in the anatomy. With Stax Plus's self-condensing properties, the technician can wet carve the posterior anatomy effortlessly.

After using Stax Plus, the next Dental Creations product in this systematic approach to producing ceramic restorations is Wonderpeg Instant Firing Support. Significant amounts of work time have been lost in the past due to restorations falling or spinning off the firing peg. Although other various refractory putties held the units on the peg to start with, they presented other serious problems. For example, one brand of refractory putty expanded and pushed the restorations off the firing peg and then the restorations fused to the firing tray. Another brand of putty stuck to the inside of the restorations to the point that the inside of the restoration had to be sandblasted between each firing.

Finally, the author acquired Wonderpeg Instant Firing Support from



Fig 1. Leaving the bite opening of the wet porcelain buildup open ½ mm in the anterior before carving in the basic anatomy when using Stax Plus.



Fig 2. Wonderpeg Instant Firing Support. **Fig 3.** Wonderpeg is dispensed straight from the syringe, and the restoration and peg are placed on the firing tray. **Fig 4.** The inner edge of the restoration is cleaned before firing glaze to prevent the wet porcelain from firing to the refractory material.

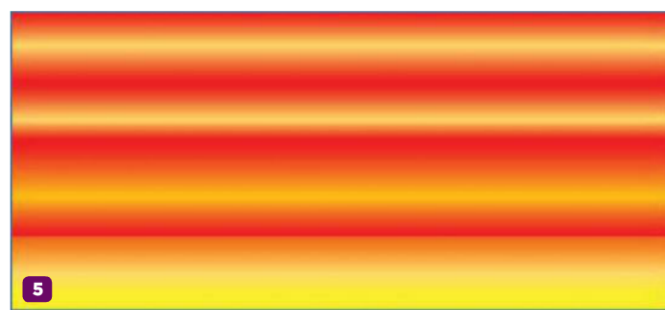


Fig 5. The heat zone of a conventional porcelain oven firing chamber.

Dental Creations. Wonderpeg (Figure 2) does not expand and does not stick to the inside of the restorations. It is easy to use (Figure 3) — simply dispense straight from the syringe and place the restoration and peg on the firing tray. It is best to clean the inner edge of the restoration before firing glaze to prevent the wet porcelain from firing to the refractory material (Figure 4). After firing, Wonderpeg is easily removed from

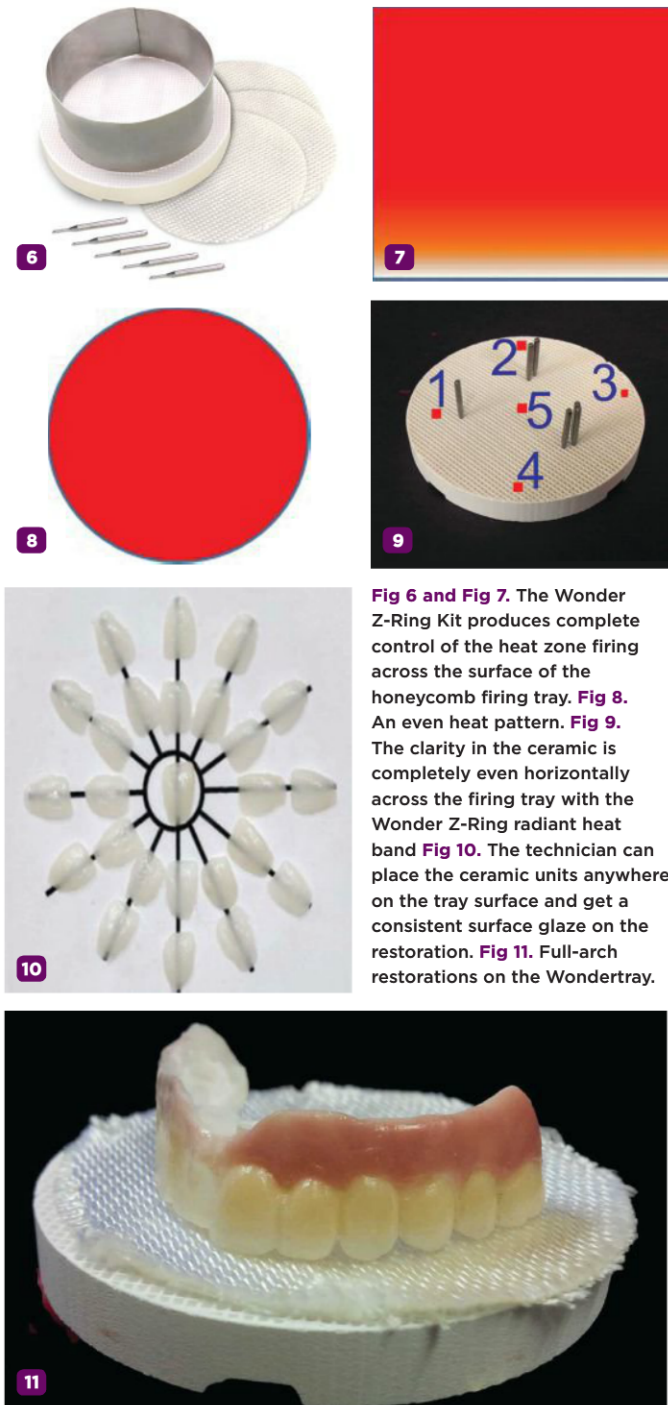


Fig 6 and Fig 7. The Wonder Z-Ring Kit produces complete control of the heat zone firing across the surface of the honeycomb firing tray. **Fig 8.** An even heat pattern. **Fig 9.** The clarity in the ceramic is completely even horizontally across the firing tray with the Wonder Z-Ring radiant heat band **Fig 10.** The technician can place the ceramic units anywhere on the tray surface and get a consistent surface glaze on the restoration. **Fig 11.** Full-arch restorations on the Wondertray.

the firing peg and the inside of the restoration can be conveniently cleaned with a toothbrush.

All-ceramic restorations present some issues in processing that did not need to be considered with PFM restorations. If the firing peg is larger in diameter, the all-ceramic restoration expands when it is heated up and subsequently drops down and sticks to the firing peg. Unfortunately, all

ceramics are prone to sticking to firing pins. When this happens, it can be a disaster that can fracture the restoration when the technician is trying to remove it off the firing peg. Wonderpeg addresses this problem because it prevents all-ceramic restorations from sticking or locking onto the firing pegs. Another major issue can occur when the refractory expansion inside the restoration splits the units in two. This will not happen with Wonderpeg because of its special formulation.

Wonderpeg does not adhere to the all-ceramic (or alloy) restoration. Refractory putty that sticks inside and has to be sandblasted out is another time-consuming step in the process. Most importantly, Wonderpeg Instant Firing Support is consistent batch after batch. It never expands, and it never sticks to any of the all-ceramic materials (lithium disilicate, lithium silicate, or zirconia).

Wonderpeg Instant Firing Support is ideal for holding the ceramic units and preventing restorations from falling off the firing tray when placing the tray in the porcelain oven.

Dental Creations' product line includes solutions to each step in the firing process. The third product the author discovered among Dental Creations' solutions for the firing process was the Wonder Z-Ring Kit, which provides a solution for shading and glazing lithium disilicate and zirconia in one bake.

A common misconception is that quartz-lined muffles equalize the heat distribution. Although the quartz liner does keep a person from touching the coils when the oven is on, tests have shown that a quartz liner does not provide even heat distribution. In fact, the quartz liner can get foggy and block the wave lengths that actually execute the firing.

The heat zone of a conventional porcelain oven firing chamber can be seen in Figure 5: a hot/cold, hot/cold vertical zone of heat that produces uneven heat distribution. The Wonder Z-Ring Kit produces complete control of the heat zone firing across the surface of the honeycomb firing tray (Figure 6 and Figure 7).

Figure 8 shows the even heat pattern, and Figure 9 shows how the clarity in the ceramic is completely even horizontally across the firing tray with the Wonder Z-Ring radiant heat band. This enables the technician to place the ceramic units anywhere on the tray surface and get a consistent surface glaze on the restoration (Figure 10).

To accommodate large full-arch zirconia restorations and full-arch hybrid zirconia restorations (Figure 11), the kit includes Wondertray, a fiber-free, nonstick firing tray. The Wonder Z-Ring provides a completely even heat zone to optimize the heat transfer in the zirconia, and thus minimizes internal stress from uneven ramp-up heat penetration.

The Dental Creations firing system provides a simple, efficient process to optimize firing of any type of ceramic system including PFMs, lithium silicate, lithium disilicate, and zirconia full-arch restorations.

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