

# THE DENTAL ADVISOR™

“Improving Patient Care Through Research & Education”



Photograph by Charles McLaren, Michigan

## CAD/CAM Dentistry

In order to succeed and thrive in the newly digitized world of dentistry, dentists will have to embrace this new technology. The possibilities are endless within the digitized world. Intraoral scans can transfer a digital impression from the operator to the dental laboratory in seconds. Communication among all can be nearly instantaneous. Of course, there are challenges in adopting a new technology: new equipment to use, new procedures to follow, and new skills to learn. This technology is continually evolving and will be reported on in future issues.

This issue of THE DENTAL ADVISOR introduces CAD/CAM dentistry, from basics to the complex, featuring relevant and timely information on chairside intraoral scanners, chairside CAD/CAM, digital workflow, outsourcing, tooth preparation guidelines and more.

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*An Editors' Choice award is given to products recognized by our editors as being a unique or significant product.*

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|           |       |
|-----------|-------|
| Excellent | +++++ |
| Very Good | +++   |
| Good      | ++    |

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## CAD/CAM Dentistry

CAD/CAM is an acronym for computer-aided design/computer-aided manufacturing. The CAD portion of the process involves the use of a scanner to create a digital model of the preparation, and sometimes the adjacent and opposing dentition. Once the model has been generated on a computer workstation, the restoration can be designed by the doctor or a lab technician.

The CAM portion of the process involves the use of a mill or special printer to fabricate what was designed during the CAD process. This could be a coping, the final restoration or a working physical model.

### CAD/CAM in the Dental Office

In-office CAD/CAM systems allow the dentist to take a digital impression and design the restoration, all in the doctor's office. Once the restoration has been milled, it is often polished or glazed before placement. Another approach is to send the scan or digital impression to the laboratory. A laboratory technician designs the restoration on the computer and communicates that to the milling machine. The milling machine can be in the lab or outsourced to a milling center. Once the milling machine has completed the restoration, it may require layering porcelain and staining and glazing.

### CAD/CAM in the Dental Laboratory

Laboratory CAD/CAM systems can be stand alone systems that allow dental laboratories to scan, design and mill restorations; alternatively, restorations can be outsourced to a milling center where a coping is made. Laboratory CAD/CAM systems may also accept intraoral scans from dental practices and fabricate the final restoration.

### Digital Impressions

An intraoral or chairside scanner captures digital images of the mouth to build a virtual 3-D model of the preparation and adjacent teeth on the computer. These scanners use digital images to help design the restoration. Some scanners require the use of powder or scannable bite registration material.

#### **Benefits**

- + Accuracy (no shrinkage or distortion)
- + Ability to scrutinize preparation immediately
- + Ability to modify preparation immediately
- + Instant laboratory input (if applicable)
- + Positive patient response

#### **Factors to consider**

- Cost
- Learning curve
- Continually changing technology
- Size of intraoral scanner
- Lab participation
- Additional materials for scanning

### Ancillary Materials Required for Digital Scanning

Due to the capturing process, some scanners require the use of a contrast medium or scannable bite registration material. These materials treat the surface being scanned, preventing reflective voids and providing optimal anatomy and margin detail.

- Scannable Bite Registration Materials
  - StoneBite Scan** (EXACTA Dental)
  - Virtual CADbite Registration** (Ivoclar Vivadent)
  - Futar Scan** (Kettenbach GmbH & Co)
  - Occlufast CAD Scan Bite** (Zhermack, Inc.)

- Contrast Powder – Not all intraoral scanners require the use of contrast powder.

**EXACTA Blue Spray** (EXACTA Dental)

**CEREC Powder** (Vident)

**Scan Spray** (Vident)

**IPS Contrast Spray** (Ivoclar Vivadent)

- Contrast Powder Delivery Systems

**Powder-Pro** (Advanced Dental Instruments, LLC)

**PowderPerfekt** (Ourglass, Inc.)

**Powder Meister** (Powder Meister, Inc.)

## CAD/CAM System Configurations

**In-office Complete CAD/CAM Systems** - chairside intraoral scan and mill.

These systems allow the dentist in one patient visit to:

- Do an intraoral scan
- Design the restoration
- Mill the restoration
- Stain and glaze the restoration
- Seat the restoration

**CEREC** (Sirona)

**E4D Dentist** (D4D Technologies) – *visit [www.dentaladvisor.com](http://www.dentaladvisor.com) for more information on this product*



**E4D Dentist** (D4D Technologies)

In-office complete CAD/CAM systems are ideal for doctors who want to be able to scan, design, mill and seat restorations in a single visit.

**Benefits** – digital impression, accuracy of CAD/CAM process should reduce final seating time, complete control of the process from scan to design, single patient visit.

**Keep in mind** – requires additional time to design restoration, restorative materials may be limited, patient has to wait during design and milling process.

**In-office Intraoral Scanners** - chairside intraoral scan and outsource milling.

These systems allow the dentist to:

- Do an intraoral scan
- View an interactive digital model
- Design the restoration, in some cases

Final steps to complete restoration:

- Virtual model trimming done by design center, lab or SLA (Stereolithography Apparatus) facility
- Stereolithographic model and dies are created by SLA facility
- If zirconia restoration, coping can be made by milling center
- If PFM restoration, wax coping can be made by milling center or SLA facility
- Model and/or coping sent to laboratory to finalize restoration

**Lava Chairside Oral Scanner C.O.S.** (3M ESPE)

**iTero** (Cadent)



**Lava Chairside Oral Scanner C.O.S.** (3M ESPE)

In-office intraoral scanning systems are ideal for doctors who want to be able to scan, and possibly design a restoration in cooperation with their lab.

**Benefits** – digital impression, accuracy of CAD/CAM process should reduce final seating time, option to design restoration, reduced financial obligations, less chair time.

**Keep in mind** – requires additional time to design restoration, restorative materials may be limited, requires second patient appointment for seating, lab partner needs to be proficient in CAD/CAM.

### Delegating CAD/CAM to Dental Assistants

There are many options for an assistant to become involved in the exciting area of CAD/CAM Dentistry. The Dental Assisting National Board has provided us with a state by state summary of legal guidelines for delegation to dental assistants. A link can be found on our website to view state specific information and guidelines.

# CAD/CAM Dentistry

## Laboratory CAD/CAM Systems -

Laboratory CAD and Laboratory CAD/CAM systems:

- Use traditional impression techniques have the model scanned and the restoration made using CAD/CAM technology.
- Use any intraoral scanner and send the file to a participating lab or milling center for design and finishing.

**Cercon** (DENTSPLY Ceramco)

**Everest** (KaVo)

**Lava Precision Solutions** (3M ESPE)

**Sirona InLab** (Sirona)

**Zeno** (Wieland)

## Laboratory CAD -

Some laboratories have made the investment in digital scanning and design technology. However, to complete the restoration, the lab will outsource the design to another company to mill. Send the restoration back to the design CAD lab for finishing, if applicable.

**Authorized Lava Milling Center** (3M ESPE)

**Cercon** (DENTSPLY Ceramco)

**GC Advanced Technologies Milling Center** (GC America)

**Katana** (Noritake)

**Procera** (Nobel Biocare)

**Vericore** (Whip Mix)

**Zeno** (Wieland)

Laboratory CAD/CAM systems are ideal for doctors who want to be able to take advantage of CAD/CAM technology, but not interested in making the financial investment at this time.

**Benefits** – accuracy of CAD/CAM process should reduce final seating time, financial obligation not necessary for dentists unless digitally scanning.

**Keep in mind** – lab partner needs to be proficient in CAD/CAM.

Laboratory CAD is ideal for laboratories who want to be able to take advantage of CAD/CAM technology, but not interested in purchasing a milling unit at this time. Doctors interested in zirconia can utilize a laboratory that outsources to a specialty milling center.

**Benefits** – accuracy of CAD/CAM process should reduce final setting time, no financial obligations for dentists, time savings for laboratories.

**Keep in mind** – lab partner needs to be proficient with CAD/CAM.

## CAD/CAM dentistry at THE DENTAL ADVISOR

**THE DENTAL ADVISOR** is leading the way in CAD/CAM dentistry. We are quickly becoming industry experts in this very exciting area of growth. Our Editor, John W. Farah, DDS, PhD is lecturing nationwide on CAD/CAM technology. Dr. Farah and Robert Wisler, CDT have been lecturing together to both dentists and laboratory technicians and have published several articles on CAD/CAM for publications such as *JDT* and *Dental Lab Products*. In addition, Dr. John Powers and Ron Yapp have completed research and are planning additional projects in the area of ceramics and zirconia. Currently, **THE DENTAL ADVISOR** is working with a number of leaders in CAD/CAM, including 3M ESPE, D4D Technologies, and Sirona. We are also providing education and training at **THE DENTAL ADVISOR** for dentists, laboratory technicians, and sales representatives. Our goal is to be the worldwide resource for CAD/CAM dentistry.

## Put Your Future in Motion

Lava Chairsides Oral Scanner C.O.S. Seminar

The Lava™ Chairsides Oral Scanner C.O.S. from 3M ESPE features proprietary 3D-in-Motion technology. And the dental industry is the first to benefit from this amazing breakthrough in digital imaging. After taking a digital impression, Doctors send the file to their lab for production of a traditional (PFM) or CAD/CAM (Lava) restoration. The practice of taking impressions in the dental office will never be the same.

**Join us at THE DENTAL ADVISOR to learn more:**

**Wednesday, November 12th 6:00 pm - 8:00 pm**

**Thursday, November 13th 6:00 pm - 8:00 pm**

**Friday, November 14th 6:00 pm - 8:00 pm**

Featuring John Felock, Senior Director of Sales at Brontes Technologies, a 3M Company

## CAD/CAM Workflow

CAD/CAM workflow is a series of steps that involve the dentist, dental laboratory, and at times, milling center. The diagram below provides the options on how information is transferred to create a complete restoration.



## Material Options in CAD/CAM

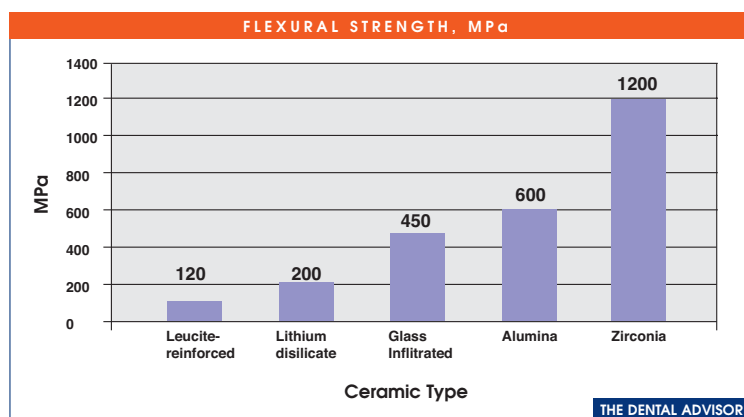
Visit [www.dentaladvisor.com](http://www.dentaladvisor.com) to download a complete version of this table.

| Manufacturer     | Alumina                                          | Feldspathic                                                                                                    | Leucite-reinforced                                                                    | Lithium disilicate | Zirconia                                                           |
|------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------|
| 3M ESPE          |                                                  |                                                                                                                | Paradigm C Ceramic Block for CEREC Systems, Paradigm C Ceramic Blocks for E4D Systems |                    | 3M ESPE Lava Frame Zirconia                                        |
| Benco Dental     |                                                  |                                                                                                                | HD17 CAM Blocks                                                                       |                    | Zirconia CAD/CAM Blocks                                            |
| Ivoclar Vivadent |                                                  |                                                                                                                | IPS Empress CAD, IPS CAD Multi                                                        | IPS e.max CAD      | IPS e.max ZirCAD                                                   |
| KaVo             |                                                  |                                                                                                                | Everest G-Blank                                                                       |                    | Everest A-Blank                                                    |
| Noritake         |                                                  |                                                                                                                |                                                                                       |                    | Katana Zirconia Blocks                                             |
| Sirona           | InCoris AL                                       | CEREC Blocs, CEREC Blocs PC                                                                                    |                                                                                       |                    | InCoris ZI                                                         |
| Straymann        |                                                  |                                                                                                                |                                                                                       |                    | zerion                                                             |
| Vident           | VITA In-Ceram AL, VITA In-Ceram Classic Alumina, | VITA Classical VITABLOC, VITABLOC Mark II, VITABLOC Mark II Esthetic, VITABLOC TriLuxe, VITABLOC TriLuxe Forte |                                                                                       |                    | VITA In-Ceram Classic Zirconia, VITA In-Ceram YZ                   |
| Wieland          | Zeno Aleco Disc                                  |                                                                                                                |                                                                                       |                    | Zeno Zr B2 Disc, Zeno Zr Disc, Zeno Zreco B2 Disc, Zeno Zreco Disc |

**COLOR KEY:** Laboratory CAD/CAM systems Both In-office and Laboratory CAD/CAM systems

## All-Ceramic Restorations in CAD/CAM

These are the ceramics used in dentistry for the last 30 years and their respective flexural strengths. Zirconia is the strongest of these ceramics.



## Tooth Preparation Guidelines for All-ceramic Restorations

### How to prepare a tooth

- Reduce the tooth as uniformly as possible
- Reduce it by 1.0 – 1.5-mm circumferentially
- Use a chamfer diamond
- Reduce the occlusal by 1.5 – 2.0-mm
- Do not leave any sharp line angles

### Preparation is critical

- Uniform reduction results in optimum ceramic strength
- Adequate reduction leads to better esthetics
- Sharp edges result in high stresses
- High stresses increase the potential for fracture
- Scanners read smooth preparations more accurately
- Ceramic restorations require a passive fit

Visit [www.dentaladvisor.com](http://www.dentaladvisor.com) for a tooth preparation illustration.

## Cementation and Bonding of All-Ceramic Restorations

Visit [www.dentaladvisor.com](http://www.dentaladvisor.com) to download a complete version of this table.

| Type of Ceramic           | Type of Restoration                                                          | Bonded or Cemented            | Suggested Cements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Feldspathic</b>        | Inlays, onlays, crowns, veneers (excluding 2 <sup>nd</sup> molar crowns)     | Bond, then resin cement       | <i>3M ESPE RelyX Veneer Cement with 3M ESPE Adper Single Bond Plus Adhesive (3M ESPE); Calibra with Prime and Bond NT (DENTSPLY Caulk); NX3 with OptiBond Solo Plus (Kerr Corp.); Variolink II with AdheSE (Ivoclar Vivadent)</i>                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>High Leucite</b>       | Inlays, onlays, crowns, veneers (excluding 2 <sup>nd</sup> molar crowns)     | Bond, then resin cement       | <i>3M ESPE RelyX Veneer Cement with 3M ESPE Adper Single Bond Plus Adhesive (3M ESPE); Calibra with Prime and Bond NT (DENTSPLY Caulk); NX3 with OptiBond Solo Plus (Kerr Corp.); Variolink II with AdheSE (Ivoclar Vivadent)</i>                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Lithium Disilicate</b> | Anterior and posterior crowns, 3-unit bridges up to 2 <sup>nd</sup> bicuspid | Bond, then resin cement       | <i>3M ESPE RelyX ARC Adhesive Resin Cement (3M ESPE); 3M ESPE RelyX Veneer Cement with 3M ESPE Adper Single Bond Plus Adhesive (3M ESPE); Calibra with Prime and Bond NT (DENTSPLY Caulk); Linkmax (GC America); Multilink Automix (Ivoclar Vivadent); NX3 with OptiBond Solo Plus (Kerr Corp.); Panavia F 2.0 (Kuraray America); Variolink II with AdheSE (Ivoclar Vivadent)</i><br><br><b>OR</b><br><i>3M ESPE RelyX Unicem Self-Adhesive Universal Resin Cement (3M ESPE); BisCem (Bisco Dental Products); G-CEM (GC America); Maxcem Elite (Kerr Corp.); SMARTCEM 2 (DENTSPLY Caulk); seT (SDI (North America), Inc.)</i> |
| <b>Alumina</b>            | Anterior and posterior crowns, 3-unit bridges                                | Cement                        | <i>3M ESPE Durelon (3M ESPE); 3M ESPE RelyX ARC Adhesive Resin Cement (3M ESPE); 3M ESPE RelyX Unicem Self-Adhesive Universal Resin Cement (3M ESPE); BisCem (Bisco Dental Products); Breeze Self-Adhesive Resin Cement (Pentron Clinical Technologies); G-CEM (GC America); GC Fuji Plus (GC America); Maxcem Elite (Kerr Corp.)</i>                                                                                                                                                                                                                                                                                         |
| <b>Zirconia</b>           | Anterior and posterior crowns, 3-6-unit bridges implants, Maryland bridges   | Cement (Good retention cases) | <i>3M ESPE Durelon (3M ESPE); 3M ESPE RelyX Unicem Self-Adhesive Universal Resin Cement (3M ESPE); BisCem (Bisco Dental Products); G-CEM (GC America); GC Fuji Plus (GC America); Maxcem Elite (Kerr Corp.); SMARTCEM 2 (DENTSPLY Caulk); seT (SDI (North America), Inc.)</i>                                                                                                                                                                                                                                                                                                                                                 |

CAD/CAM dentistry is changing on a daily basis. Every part of the dental profession can get involved in some way. The future is promising in terms of the technological advances that CAD/CAM is providing to the dental industry. Future issues will focus on the integration of 3-D imaging, laboratory involvement, the evolution of new materials and equipment, and exciting restorative options.



**BisCem** (Bisco Dental Products)



**seT** (SDI (North America), Inc.)



**HD17 CAM Blocks** (Benco Dental)

# 3M ESPE Filtek LS Low Shrink Restorative + + + +

3M ESPE  
800.634.2249  
www.3MESPE.com

EXCLUSIVE REVIEW

**Ask The Editors:**  
Visit online at [www.dentaladvisor.com](http://www.dentaladvisor.com)  
to view Q & A about this product!



## Description

**3M ESPE Filtek LS Low Shrink Restorative** is a light-cured, radiopaque composite with 55% by volume of inorganic fillers. It is indicated for direct posterior restorations. The composite is based on new resin chemistry, silorane, which minimizes polymerization shrinkage. Polymerization shrinkage is an inherent property of current resin composites based on dimethacrylate chemistry. As the resin is cured, the molecules move toward each other to form a polymer network. This reaction results in significant volume contraction. The polymerization process of **Filtek LS** occurs by a ring-opening reaction that results in lower polymerization shrinkage compared to the methacrylate-based resins. The **LS System Adhesive Self-Etch Primer** and **Bond** have been designed to provide a strong bond to the **Filtek LS** composite. The primer is placed on the tooth surface and light cured, followed by the application of the bond which is then light cured. The composite is available in shades A2, A3, B2, and C3 in syringes and unit-dose capsules and has a working time of up to six minutes. Both the composite and adhesive can be cured by a halogen or LED light. Thirteen editors evaluated **Filtek LS** in over 400 restorations. This product received an 86% clinical rating.

### Suggested Retail Cost

- \$429.00/syringe or capsule into kit

## Editors' Observations

### Manufacturer's Instructions/Packaging

The kit is nicely packaged and contains all the necessary materials for restoration placement including a shade guide, dispensing brushes and wells. Technique guides are included along with detailed instructions.

### Ease of Dispensing and Placement

The composite can be dispensed with very little pressure from either the syringes or capsules. Metal or plastic instruments can be used to manipulate the material into the cavity preparation. The working time of the composite is up to six minutes, which allows it to be manipulated under full operatory light illumination. Each increment should not exceed 2.5 mm. Both the primer and bond bottles need to be shaken before dispensing. Both liquids can be easily expressed as individual drops, minimizing the amount of product dispensed for each procedure.

### Viscosity of Adhesive

The viscosity of the primer and bond liquids results in uniform and complete coverage of the tooth surface.



## Editors' Comments

- ♦ *"Packed well and produced nice restorations."*
- ♦ *"The composite seemed hard and strong."*
- ♦ *"Great esthetics with available shades."*
- ♦ *"Unable to use different adhesive systems. The LS Adhesive takes too much time."*
- ♦ *"Hard to get a good polish - takes lots of time to finish."*

### Ease of Air Dispersal and Lack of Pooling

A gentle stream of air spreads the primer and the bond to an even film. Pooling was not evident unless too much material was placed in the preparation.

### Ease of Band Removal

The adhesive did not stick to metal matrix bands and they could be removed with little effort.

### Time Required for Bonding

Applying and curing the primer and bond separately took longer than many adhesive systems, and the consultants rated that as a negative feature.

### Packability/Sculptability/Non-Stickiness

The composite can be packed to produce good proximal contacts and anatomical form. This feature is enhanced by the fact that the composite does not stick to the placement instruments. The material can be manipulated with no noticeable slumping.

### Shade Match Before and After Curing

The limited available shades compromise the ability to match all tooth shades; however, the supplied shades match well. The shades are slightly opaque but they blend adequately with tooth structure.

### Quality of Polish and Esthetics

The consultants commented that polishing and finishing this  
*continued on page 9*

## 3M ESPE Filtek LS Low Shrink Restorative + + + +

*continued from page 8*

composite was difficult. Excess material was hard to remove and it took considerable time to produce a smooth surface.

### **Lack of Postoperative Sensitivity**

There were no reports of post-operative sensitivity during the evaluation period.

### **Clinical Tips**

- **Filtek LS** is not compatible with conventional adhesive systems.
- **LS System Adhesive** cannot be used with composites other than **Filtek LS**.
- A plasma ARC light cannot be used to cure this product. ■

## CompCore AF Cartridge Stack + + + + 1/2

Premier Dental Products Corp.  
888.670.6100 • 610.239.6000  
[www.premusa.com](http://www.premusa.com)

**Ask The Editors:**  
Visit online at [www.dentaladvisor.com](http://www.dentaladvisor.com)  
to view Q & A about this product!



### **Description**

**CompCore AF Cartridge Stack** is a dual-cured, fluoride-releasing, radiopaque, core build-up material. **CompCore AF Stack** reportedly features “Hyperbranched Technology” for more complete polymerization and less shrinkage. Packaging includes an Intro Kit with a 50-g auto-mix cartridge, dispensing gun, *IntegraBond*, *Bond Boost SE*, disposable *Accor Matrix* core forms, mixing and intraoral tips. Refill kits include cartridge, tips and *Accor Matrix* core forms. Working time for **CompCore AF Cartridge Stack** is 2.5 to 3.0 minutes at 72° F, but decreases at higher temperatures. Setting time for light-cured and chemically-cured material is 40-50 seconds and 4.5 minutes, respectively. The manufacturer stresses the use of a bonding system compatible with dual- and self-cure composites and recommends self-etching primer *Bond Boost SE*™ with *IntegraBond*™ bonding agent. Refrigeration of **CompCore AF Cartridge Stack** is recommended for maximum shelf life, and the material should be allowed to come to room temperature before use. **CompCore AF Cartridge Stack** is available in shades A3 and white. **CompCore AF Cartridge Stack** was evaluated by 20 consultants in 323 core build-ups. This product received a 91% clinical rating.

### **Suggested Retail Cost**

- \$166.70/Intro kit
- \$273.95/Refill kit

### **Product Features**

Consultants rated **CompCore AF Cartridge Stack** overall as good to excellent. Consultants found the initial flow and adaptation to be good for a core build-up. Several consultants commented that the “stack” version was more versatile than the previously evaluated *CompCore AF SyringeMix Flow*. Manufacturer instructions, packaging, ease of preparation, and dispensing were the highest rated characteristics. The shade differentiation to tooth structure is very good, but several consultants found the A3 shade to be very opaque and somewhat challenging to block



### **Consultants' Comments**

- ♦ “Simple, easy, fast dispensing, and predictable results using the *Accor Matrix*.”
- ♦ “Opaque colors help distinguish the core from the tooth structure.”
- ♦ “It would be nice to quicken the setting time for the chemical cure alone.”

out underneath an all-ceramic restoration. A more translucent shade would be a solution to this concern. Several consultants found the working time to be short but were able to compensate for this by working expediently. Setting time is very good when light cured. However, several consultants expressed some concerns about the length of time of the chemical cure, especially when using **CompCore AF Cartridge Stack** during the cementation of a post. Forty-eight percent of consultants found **CompCore AF Cartridge Stack** to be equal to or better than their current composite build-up material, and 44% of consultants would recommend **CompCore AF Cartridge Stack** to a colleague.

### **Clinical Tips**

- Take a probe or explorer and run along margins to improve adaptation.
- Make sure you work fast! Material sets quickly in the mouth. ■

**Kettenbach USA**  
877.532.2123 • 714.892.9820  
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www.kettenbach.com

 **EXCLUSIVE REVIEW**

**Ask The Editors:**  
Visit online at [www.dentaladvisor.com](http://www.dentaladvisor.com)  
to view Q & A about this product!



## Description

**Futar Bite Registration Materials** are a family of thixotropic addition silicones (VPS), available in five formulations: **Futar**, **Futar D**, **Futar D Fast**, **Futar D Slow**, and **Futar Scan**. **Futar** has a reported hardness (Shore A 90) but it is still softer than the reported hardness of the **Futar D** materials (Shore D 35-43). **Futar Scan** has a matte surface for recording opposing dentition using an optical scanner for CAD/CAM systems. It can also be used for routine bite registrations. All five materials are supplied in 50-ml cartridges in packs of 2, 6, or 12 cartridges with mixing tips and are dispensed with a standard dispensing gun. Thirty-three consultants evaluated **Futar Bite Registration Materials** in 346 clinical applications. This product line received a 92% clinical rating.

## Editors' Observations

### Manufacturer's Instructions/Packaging

The instructions are clearly written with a chart depicting the working and setting times for each product for easy reference. The 50-ml cartridges slide into the dispensing gun easily and are convenient to use.

### Ease of Application/Viscosity

Extrusion from the cartridge requires very little pressure regardless of which material is used. The viscosity allows application of the material onto the tooth surfaces without slumping and was very smooth. The **Futar D Slow** appeared runny when initially applied to the tooth surface.

### Working/Setting Time

The working and setting times vary depending on which material is used (see chart below). The consultants overwhelmingly preferred the faster set times and commented that the slow set was too slow for clinical situations. However, the **Futar D Slow** is useful for border molding.

### Ease of Removal from the Mouth/Rigidity

All five materials become very rigid after setting but can still be removed from the mouth without locking into undercuts,



## Editors' Comments

- ◆ "This is a very accurate and hard bite registration material."
- ◆ "The materials are moisture tolerant."
- ◆ "The material gives a well defined imprint of teeth, providing an accurate seating of casts with no rebound."
- ◆ "A ribbon tip would be easier to use than the round tip."
- ◆ "The slow set was much too slow for a bite registration but produced nice periphery for a palatal seal."

### Quality/Detail

**Futar Bite Registration** is moisture tolerant and reproduces occlusal relationships very accurately with good detail. As a result, the restorations fabricated using any of the **Futar Bite Registration Materials** require little occlusal adjustments. **Futar Scan** does not require reflective powder and can be scanned. Laboratory technicians commented that mounting of casts seemed to be more accurate with the **Futar Bite Registration Materials**.

### Ease of Trimming

All five materials can be trimmed with a bur or a scalpel; however, **Futar D Fast** is brittle and tends to break or chip when trimmed with a scalpel. ■

|                     | Futar | Futar D | Futar D Fast | Futar D Slow | Futar Scan |
|---------------------|-------|---------|--------------|--------------|------------|
| Working Time (sec.) | 30    | 30      | 15           | 90           | 15         |
| Setting Time (sec.) | 90    | 90      | 45           | 180          | 45         |
| Hardness            | A 90  | D 43    | D 43         | D 43         | D 35       |

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800.228.5166 - 630.238.8300  
www.sdi.com.au

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to view Q & A about this product!



## Description

**polaooffice+** is an in-office tooth whitening system that contains 37.5% hydrogen peroxide. The whitening gel has a neutral pH and contains desensitizers that are intended to maximize patient comfort. It is also designed for maximum adhesion to the tooth surface. Each kit contains three, 2.8-ml syringes of whitening gel; three, 1-g syringes of gingival barrier; three *OptraGate* (Ivoclar Vivadent) cheek retractors (optional); syringe tips; mixing tips; a shade guide; and instructions. The **polaooffice+** gel requires refrigerated storage and is brought to room temperature before use. The gel is applied directly from the syringe to the teeth in a thin layer and left for eight minutes. Light activation of the gel is optional. The application may be repeated three to four times during the appointment until the desired results are achieved. Ten consultants used **polaooffice+** in over 60 whitening cases. This product received an 91% clinical rating.

### Suggested Retail Cost

- \$206.00/kit with retractors
- \$200.00/kit without retractors

## Product Features

Consultants rated the instructions and packaging of **polaooffice+** as very good. The ease of dispensing the gingival barrier was adequate; however, some consultants commented that it was too viscous. The viscosity of the whitening gel was described as too runny when dispensed but tacky by the end of each eight-minute application. This tackiness enhances adhesion of the gel to the teeth and minimizing leakage under the dam, but makes the gel difficult to remove. Both consultants and patients found the quickness and the ease of treatment without the need for light activation of the gel to be the most outstanding feature of **polaooffice+**. This characteristic improved patient comfort



## Consultants' Comments

- ♦ "The eight-minute application cycles were great!"
- ♦ "Very fast and effective."
- ♦ "Results varied, which is consistent with other products I have used."
- ♦ "The whitening gel was difficult to remove."

## Patients' Comments

- ♦ "I can really see a difference."
- ♦ "It was quick and easy."
- ♦ "I experienced a little sensitivity during the procedure and some afterwards too."

during the procedure; however, a few patients experienced some irritation and sensitivity in both teeth and gums within the first 24 hours after treatment. Seventy-three percent of patients treated had not had in-office whitening before using **polaooffice+**. Consultants reported an average shade change of 3.5 shades (on the *Vita* value-ordered shade guide). Fifty-four percent of patients treated were satisfied with the shade improvement during a single in-office treatment session with **polaooffice+**. Forty-seven percent of consultants noted that **polaooffice+** was equivalent to or better than their current in-office whitening system. ■

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KOLN, GERMANY (USA PAVILLION)

**MARCH 24<sup>TH</sup> - MARCH 28<sup>TH</sup>, 2009**

# Virtuoso Universal 8-year Clinical Performance + + + + 1/2

Den-Mat Holdings, LLC  
800.433.6628 • 805.922.8491  
www.denmat.com

## Description

**Virtuoso Universal** is a high-viscosity microhybrid composite intended for anterior and posterior use. It is supplied in unit-dose capsules in Vita shades A1, A2, A3, A3.5, B0, B1, B2, C1, and C2. This product received a 92% rating for clinical performance at eight years.

## Clinical Evaluation Protocol

- Between the years 2000 and 2003, over 250 restorations were placed in 192 patients using **Virtuoso Universal** composite. Of these, 134 restorations in 77 patients were available for recall (Figure 1).
- A variety of anterior and posterior restorations were placed: 26 were single-surface (occlusal); 97 were two- or three-surface; and 11 were 4-surface restorations (Figure 2).
- Many bonding agents were used, including *Tenure A & B*.
- Restorations were evaluated on a scale of 1 to 5 (1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent).

VIRTUOSO UNIVERSAL YEARS IN SERVICE

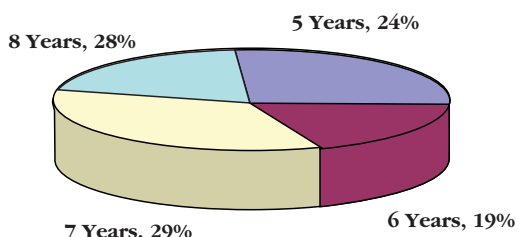


Figure 1

THE DENTAL ADVISOR

VIRTUOSO UNIVERSAL RESTORATIONS

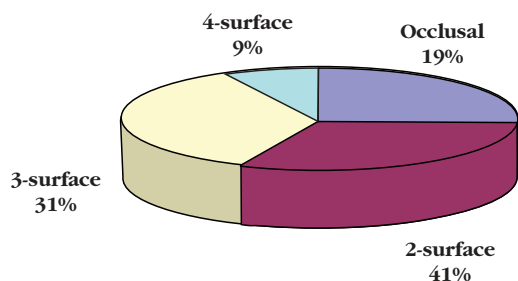


Figure 2

THE DENTAL ADVISOR

## Consultants' Comments

- ♦ "Color is stable."
- ♦ "Restorations look amazingly good at this point."
- ♦ "Nice radiopacity."

## Clinical Observations

### Fracture Resistance

**Virtuoso Universal** has exhibited excellent resistance to fracture and chipping during the evaluation period. Seventeen of the 134 restorations exhibited moderate chipping and four of these required replacement. Many of the chipped restorations only needed to be smoothed; two were repaired with flowable composite (Figure 3).

VIRTUOSO FRACTURE/CHIPPING

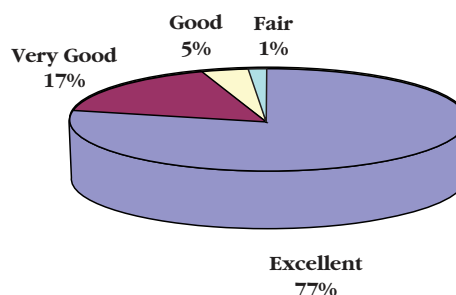


Figure 3

THE DENTAL ADVISOR

### Esthetics

The esthetics has remained fairly consistent over the evaluation period. The pie chart (Figure 4) shows the percentage of restorations receiving excellent to fair ratings. More than half of the restorations received an excellent rating.

VIRTUOSO UNIVERSAL SHADE MATCH/ESTHETICS

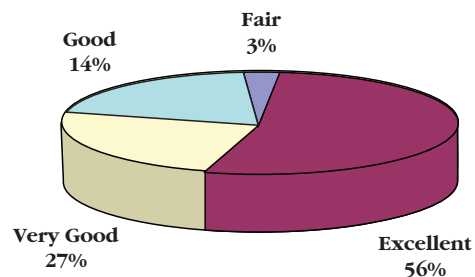


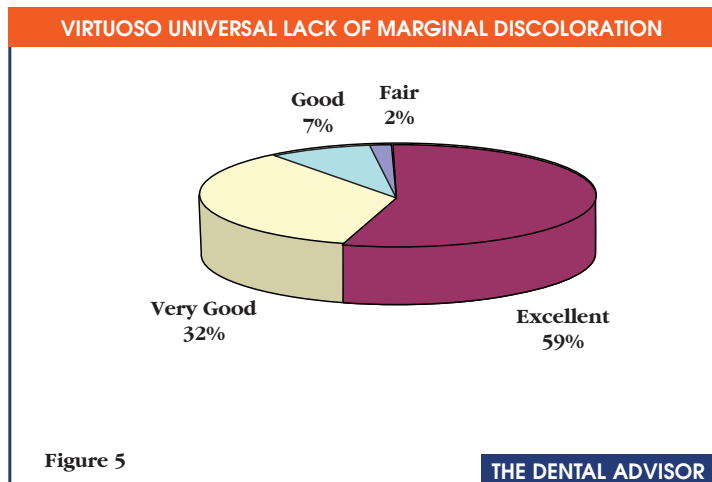
Figure 4

THE DENTAL ADVISOR

# Virtuoso Universal 8-year Clinical Performance + + + + 1/2

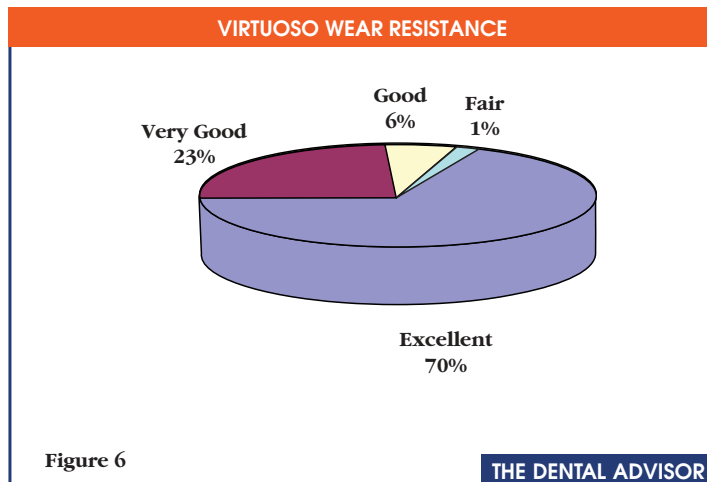
## Lack of Marginal Discoloration

Fifty-nine percent of restorations were rated excellent for resistance to staining at the margin. Slight staining was observed in 32% of the teeth restored. The remaining 9% showed moderate staining. No restorations were replaced for this reason (Figure 5).



## Wear Resistance

Seventy percent of the restoration recalled showed no visible signs of wear. Slight to moderate wear was noted in 30% of the restorations (Figure 6).



# NUPRO WHITE GOLD Take-Home Whitening Gel + + + + 1/2

DENTSPLY International - Professional Division

800.877.0020 • 717.845.7511

www.dentsply.com

### Ask The Editors:

Visit online at [www.dentaladvisor.com](http://www.dentaladvisor.com) to view Q & A about this product!



## Description

**NUPRO WHITE GOLD Take-Home Whitening Gel** is a 15% hydrogen peroxide whitening gel for use in bleaching trays to provide at-home teeth whitening treatment. It is used for whitening dark teeth discolored by congenital, systemic, metabolic, pharmacological, traumatic, or iatrogenic factors. A 15-30 minute application is recommended once per day for one week for optimal results. The take-home gel can also be used in conjunction with **NUPRO WHITE GOLD in-office** when additional whitening is required. The take-home kit contains three, 2.4 g syringes of 15% hydrogen peroxide gel; three syringe tips for dispensing; an application guide; and a soft carrying case. Refrigeration is required to optimize product performance. **NUPRO WHITE GOLD Take-Home Whitening Gel** was used to treat over 100 patients and received an 84% clinical rating.

## Suggested Retail Cost

- \$39.50/kit

## Product Features

**NUPRO WHITE GOLD** received the highest ratings from patients for ease of use. Most patients felt the amount of material

## Consultants' Comments

- ♦ "It only required 30 minutes for use."
- ♦ "Include a desensitizing gel and tray material in the kit."

## Patients' Comments

- ♦ "Fast - I don't have to wear it overnight or for a long period of time."
- ♦ "Kit was convenient. Trays worked and fit well."
- ♦ "I experienced discomfort to my gums, but it was OK after wiping the gel off."

provided was adequate and were able to load the gel into the tray easily. Tissue sensitivity and taste scored poorly, indicating the patients may have been using too much gel per application. Over half of the patients surveyed commented about tooth or gum sensitivity while using the take-home product. Consultants rated **NUPRO WHITE GOLD Take-Home Whitening Gel** highest for minimal treatment time. Consultants also were pleased with the enclosed application guide; however, the lack of tray material in the kit was disappointing. Some consultants expressed concern with the number of their patients experiencing sensitivity.

## Clinical Tip

- Use a brush to spread the gel in the tray to ensure even application of gel material. ■

# NUPRO WHITE GOLD In-Office Tooth Whitening + + + +

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800.877.0020 • 717.845.7511  
www.dentsply.com

**Ask The Editors:**  
Visit online at [www.dentaladvisor.com](http://www.dentaladvisor.com)  
to view Q & A about this product!



## Description

**NUPRO WHITE GOLD In-Office Tooth Whitening** is a 36% hydrogen peroxide power-whitening gel for use in the dental office without a curing light. It is used for whitening dark teeth discolored by congenital, systemic, metabolic, pharmacological, traumatic, or iatrogenic factors. The whitening gel is self-activated by mixing two syringes together, ensuring fresh material for each application. The mixed material is stable for up to 20 days if kept refrigerated. Three, 15-minute applications are recommended for optimal results. The light-cured **NUPRO WHITE GOLD gingival dam** is used to protect soft tissue during the in-office whitening procedure. Plastic cheek retractors (not included) are also recommended to help isolate the teeth. The *In-Office* kit contains two, 1.6-g syringes of hydrogen peroxide gel (Syringe A); two, 1.6-g syringes of activator gel (Syringe B); one, 2.4-g syringe of gingival dam material; three syringe tips; directions for use; and MSDS. Each kit contains enough product for one full-mouth treatment. Refrigeration is required to optimize product performance. **NUPRO WHITE GOLD In-Office Tooth Whitening** was used to treat 22 patients and received an 88% clinical rating.

**Suggested Retail Cost**  
• \$72.95/kit

## Product Features

**NUPRO WHITE GOLD** received the highest ratings from patients for satisfaction with results, lack of taste and odor, and overall opinion of the in-office procedure. Consultants rated **NUPRO WHITE GOLD In-Office** highest for uniformity of mix, amount of material provided, and ability to easily remove

## Consultants' Comments

- ♦ *"Good whitening results in most cases."*
- ♦ *"The gingival dam material is too stringy and clumped in the tip."*
- ♦ *"Provide a desensitizing paste in the kit to minimize post-operative sensitivity."*

## Patients' Comments

- ♦ *"Little tooth sensitivity."*
- ♦ *"It is fast and convenient."*
- ♦ *"Seemed to work really well"*
- ♦ *"Relatively quick and surprisingly painless, completely."*
- ♦ *"Results were not white enough."*

the whitening agent when finished - all attributing to the convenience of this product. Most consultants and patients felt the treatment time was quick compared to other in-office systems - not needing a UV light to activate the gel was a plus. Some patients experienced tissue irritation and others noted tooth sensitivity following the in-office procedure. Some consultants experienced difficulty applying the whitening gel evenly to the teeth and others questioned the effectiveness of the in-office procedure, noting a need for some patients to follow up with **NUPRO WHITE GOLD Take-Home Whitening** product.

## Clinical Tips

- Use a brush for more even application of gel."
- "Use a narrow, surgical suction tip to remove gel from teeth before rinsing."
- "Widen or snip the tip of the gingival dam material for easier application." ■

## Product Update

**Soothe-Guard Air** (DENTSPLY Rinn • [www.rinncorp.com](http://www.rinncorp.com)) is a radiography apron that has the soft, flexible surface of **Soothe-Guard** (THE DENTAL ADVISOR, Vol. 24, No. 9) with new features, most notably a lead-free lining. These innovative aprons are lined with a lightweight alloy that provides 0.3-mm and 0.5-mm lead equivalency. This environmentally friendly material requires no special disposal. **Soothe-Guard Air** aprons are available in nine styles, including the new adult and child **PanoDual** and technician aprons. Six color options are available: navy blue, light blue, beige, yellow, mauve, and grey. Consultants found this "green" product to be patient friendly with one consultant commenting, "I can't imagine using anything else."

# Lasting Touch polish + + + +

DENTSPLY Caulk  
800.532.2855  
www.caulk.com

## Description

**Lasting Touch® polish** is a liquid polish designed to provide a glossy surface on direct and indirect composite restorations. Nano-fillers are added to the composition to improve wear resistance. The liquid polish can be applied to direct and indirect composite restorations and as a surface treatment on provisional restorations. When used on enamel surfaces, the enamel must be etched with phosphoric acid. LED and halogen lights are effective for curing. **Lasting Touch polish** does not require refrigeration, but it should be protected from moisture. The liquid polish is available in bottle or unit-dose. The kit evaluated contained a 5-ml bottle of **Lasting Touch polish**, a 3-ml syringe of 34% phosphoric acid and accessories. Thirty consultants evaluated **Lasting Touch polish** in 410 clinical cases. This product received an 87% clinical rating.

## Suggested Retail Cost

- \$108.15/ intro kit

## Product Features

Full written instructions are supplemented with an illustrated pictorial card for chair-side reference. The viscosity of **Lasting Touch polish** both for dispensing and application was judged by consultants to be somewhat thick but it was rated as very good by most. Before placement of the liquid on both direct and indirect

## Consultants' Comments

- ♦ "Crystal clear coating does not alter the color of the underlying restoration."
- ♦ "Produces a glossy finish"
- ♦ "Flows over surfaces easily."
- ♦ "Becomes thick too quickly."
- ♦ "Polish has a strong odor."

restoratives, the surfaces should be finished, cleaned and dried. A generous amount of **Lasting Touch polish** is applied to the restorations and gently air dried, followed by a 10-second light cure. No noticeable shade change was reported for **Lasting Touch polish**, and the final surface gloss was rated as very good. Stain resistance and retention of surface gloss were also judged as very good during the evaluation period. Sixty-three percent of the consultants would both recommend and switch to **Lasting Touch polish**.

## Clinical Tips

- Do not dispense **Lasting Touch polish** until it is to be used. Protect the dispensed material from ambient light to prevent early thickening of the material. Use of the supplied *CliXdish™* with the intro kit is the recommended well to use for dispensing.
- After light curing, the air inhibited layer can be removed by wiping the surface with an alcohol-soaked cotton pellet or gauze. ■

## UPCOMING LECTURES

### November 2008

#### How to Achieve Optimal Aesthetics with Zirconia Substructures

A hands-on workshop

Presented by William T. Zanin

Thursday, November 6, 2008 or  
Friday, November 7, 2008

\$225 per person  
Ann Arbor Campus – Apex Dental Milling

#### 7 Habits of Highly Effective Dental Labs

Presented by Mark Murphy, DDS

Wednesday November 12, 6:00pm - 9:00pm

\$129 per person  
Ann Arbor Campus

#### Digital Photography: Application and Technique

Presented by Doug Thompson, DDS

Wednesday November 19, 5:30pm - 8:00pm

\$99 per team member  
Ann Arbor Campus

#### Dental Office Study Club

##### The Loyalty Connection: Keeping good patients and team members for a lifetime

Presented by Mary Yakas, BA, CMC

Thursday November 20, 5:30pm - 7:30pm  
Ann Arbor Campus

### January 2009

#### CAD/CAM: The Future of Dentistry

Presented by John Farah, DDS

Thursday January 22, 6:00pm - 8:00pm  
Ann Arbor Campus

#### Digital Photography: Application and Technique

A hands-on workshop

Presented by Doug Thompson, DDS

Wednesday January 21, 8:30pm - 4:00pm

\$550 Package includes dentist and two assistants  
Ann Arbor Campus

### February 2009

#### CAD/CAM Smart-Sourcing: "The Best Kept Secrets in CAD/CAM Technology"

Presented by John Farah, DDS, PhD and Robert Wisler, CDT

February 27 – March 1, 2009  
Chicago MidWinter Meeting

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## Description

**CompCore AF SyringeMix Stack** is a dual-cured, fluoride-releasing, radiopaque composite core build-up material for use in vital and non-vital teeth. The material uses “hyperbranched technology,” which the manufacturer reports it as promoting crosslinking and conversion of monomers to ensure a more complete cure. The product is available in three shades (white, A3, and blue) and refrigeration is recommended for maximum shelf life. The kit evaluated includes two, 9-g syringes; 15 mixing tips; 15 standard intraoral tips; and 10 extra-fine intraoral tips. Bonding agents that are compatible with dual-cured composites, such as *Premier IntegraBond*, are acceptable as long as the manufacturer’s instructions are followed. The working time is 2.5-3.0 minutes with a chemical cure time of 4.5 minutes. The light curing time is 40-50 seconds. **CompCore AF SyringeMix Stack** was evaluated by 34 clinical consultants to build up over 370 teeth. This product received a 95% clinical rating.

## Suggested Retail Cost

- \$106.10/kit

## Product Features

**CompCore AF SyringeMix Stack** provides a consistent mixture of core build-up material that dispenses easily and stacks well. Most consultants liked the smaller mixing tips and syringe delivery, stating this delivery system was easier to manipulate



## Consultants' Comments

- ♦ “The best core material I have used.”
- ♦ “Flows well.”
- ♦ “Sets quickly.”
- ♦ “Too opaque for use under anterior all-ceramic crowns.”

and pass from assistant to operator compared to larger 25-g automix cartridges. Because the material is highly opaque, many consultants waited the recommended time after light curing for the chemical cure before preparing the tooth. The working and setting times are adequate for the majority of core build-ups. Consultants liked the intraoral tips and the ease of placement into post spaces, endodontic accesses and other narrow areas. Sixty-three percent of consultants found **CompCore AF SyringeMix Stack** to be equivalent to or better than their current composite core build-up material.

## Clinical Tips

- Warm the material to room temperature before use.
- To avoid air bubbles, do not pull the tip out of flowing material while injecting.
- Due to the opacity of the material, the depth of light curing is 2 to 3 mm; however, deeper areas self-cure in 4-5 minutes. ■

### SPECIAL THANKS TO:

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