

Creativity with Ceramics

David S. Hornbrook, DDS, FAACD

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[illegible]

Functional Anterior Aesthetic Program BRING YOUR OWN PATIENT!

Give them the smile of their dreams!

The program consists of two weekends, 4 events apiece with guest speakers, and with the guidance of 4 attending dentists, a practice manager, a coordinator and a communication & presentation specialist. A 10% discount for new dentists!

DR DAVID HORN BROOK

DR NINA MONTGOMERY

DRYA ANDERSON

How 3-5 FREE WEEKENDS
LEAVE 2-4 DAY WEEKEND

- 4000+ hours of instruction
- 10% discount for dentists practice less than 3 years
- 20% off second time attendees
- LOCATION: SALT LAKE CITY UT

• Accredited by the American Association of Oral and Maxillofacial Surgeons (AAOMS)

A MEMBER OF THE AMERICAN ASSOCIATION OF ORAL AND MAXILLOFACIAL SURGEONS (AAOMS)

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www.davidhornbrook.com

\$3995
(500 discount for new dentists)

Six Day, Live Patient Course

The Goal

The goal is to provide dentists with a unique hands-on, small group educational experience and the opportunity to explore various case scenarios. The combination of clinical communication, marketing, and management skills, combined with the opportunity to work on actual patients, will also create a sense of clinical purpose and confidence never before possible.

YOU WILL LEARN

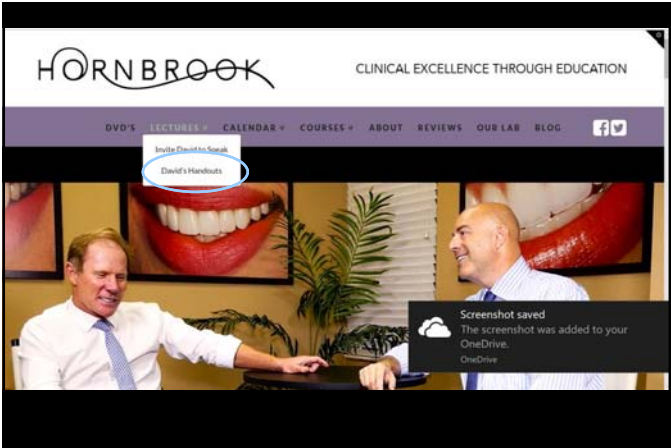
The Nuances of Anterior Smile Design

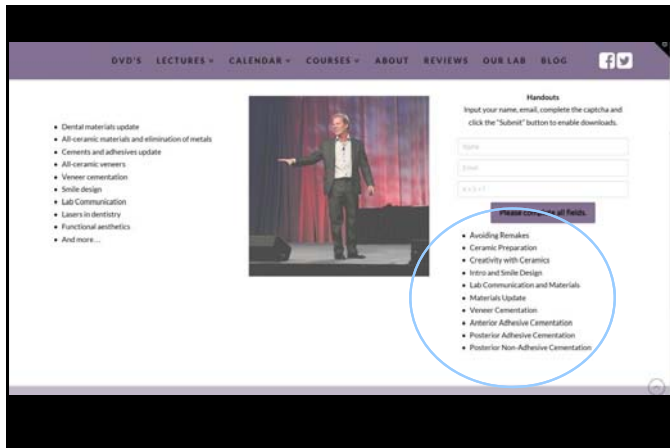
- A complete understanding of anterior design, both technical and business in nature
- Analyzing existing and upcoming "workshops" with detailed instruction
- Case planning, both aesthetic and functional, with clinical and business considerations
- Preparation, including how to present a profitable and sustainable approach
- Implementing technology and design tools, with clinical and business considerations
- A complete understanding of the use of various materials and their applications
- Patient communication, both through the use of clinical and business considerations
- Communication principles designed to provide the patients of multiple cases
- Practice planning to provide the "perfect" patients
- Case Reinforcement

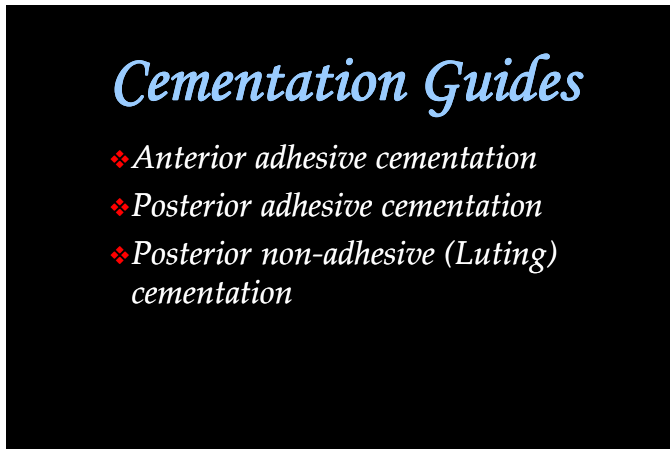
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OR CALL 801 767 9321

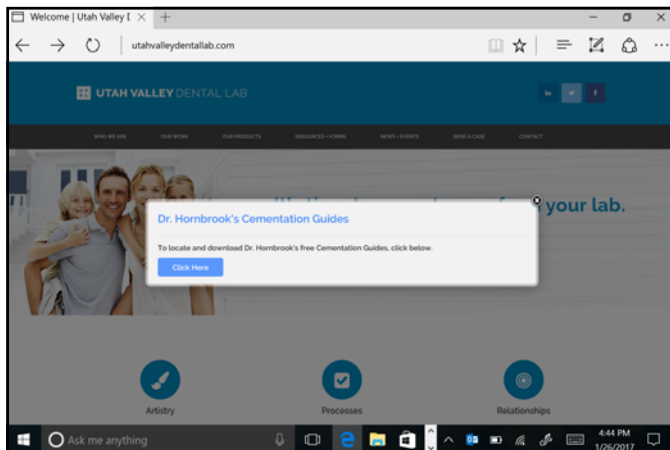








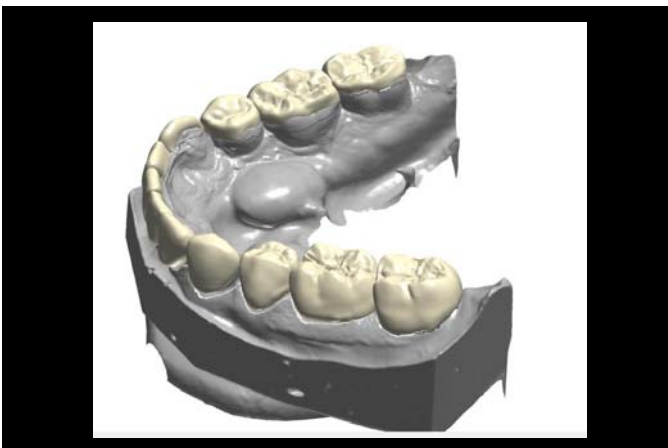


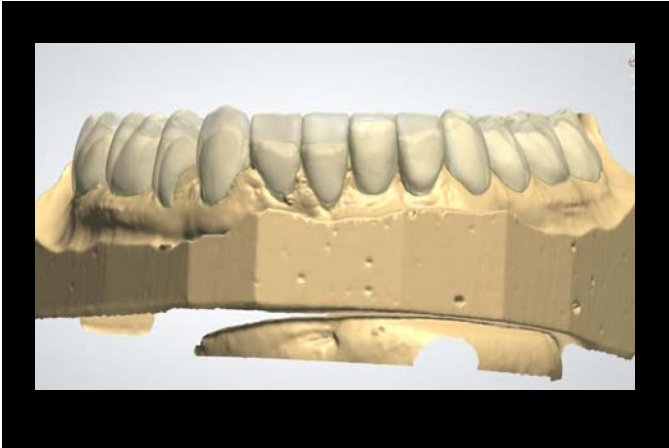


PMMA (milled resin)



















LiteTouch

Erbium:YAG Hard/soft tissue laser

(AMD Lasers)





PMMA Provisional over "H" Abutment





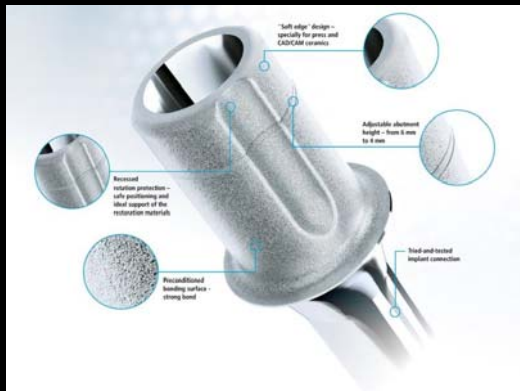












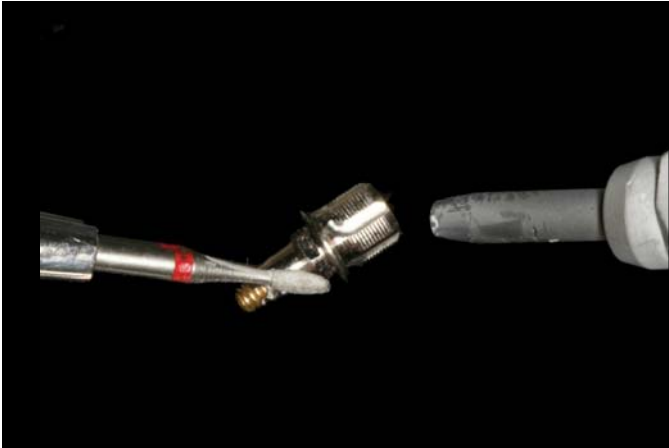




























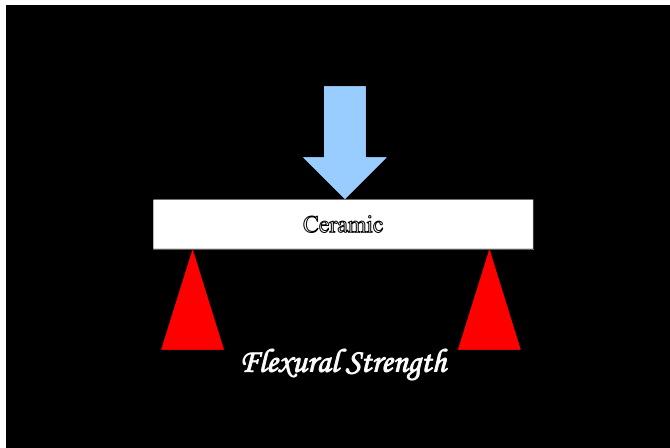




Full Contour Zirconium-oxide

Traditional ZrO₂
HT ZrO₂

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CENTRA FOR DENTISTS

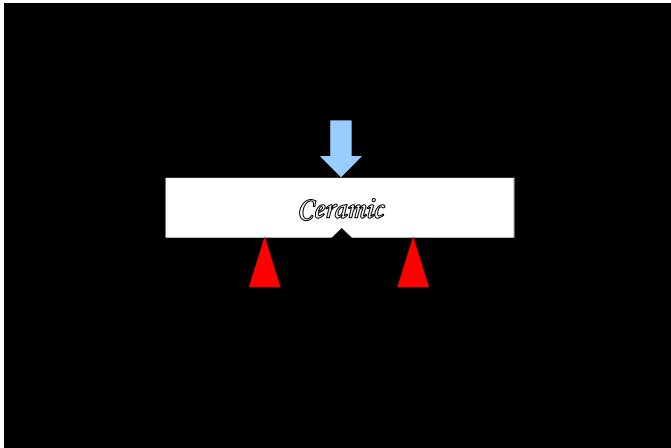


Flexural Strength

- ❖ Powder/liquid ceramic: 100 mPa
- ❖ IPS Empress: 200 mPa
- ❖ E.Max: 400 mPa
- ❖ ZrO₂: 650-1500 mPa

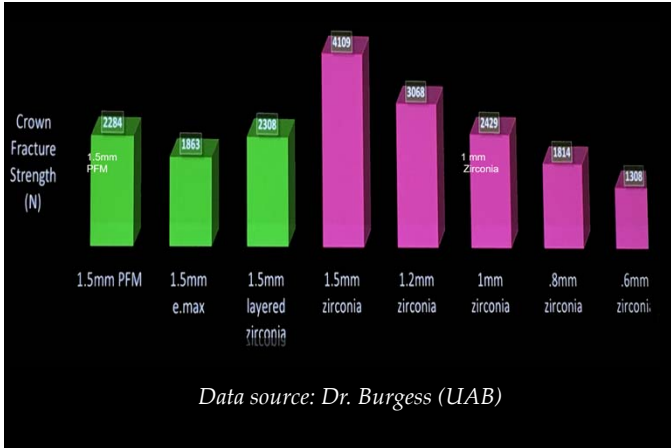
Fracture Toughness

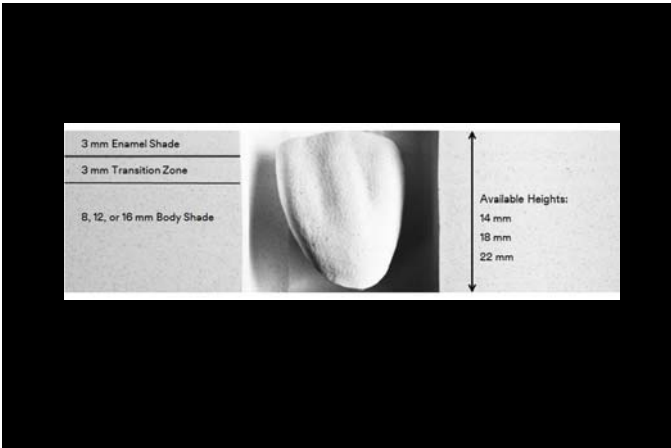
In materials science, fracture toughness is a property which describes the ability of a material containing a crack to resist fracture, and is one of the most important properties of any material for many design applications

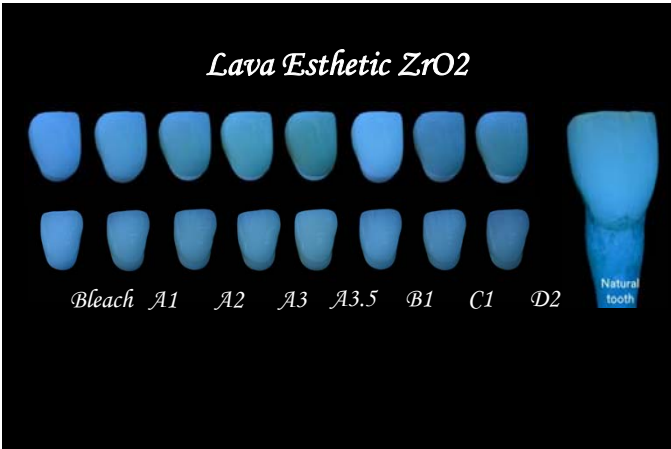


Fracture Toughness

- ❖ IPS Empress: 1 K1c
- ❖ Composites/Hybrid ceramics: 1.5 K1c
- ❖ E.Max/Celtra Duo: 2.0-3.0 K1c
- ❖ Lava Esthetic: 3.5-5.0 K1c
- ❖ Tetragonal ZrO₂: 5.0+ K1c (Lava Plus, Katana STML, Bruxzir, etc)



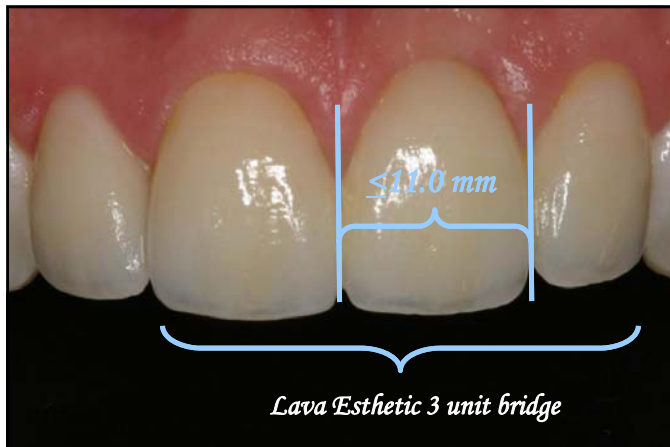






Where do I use the Lava Esthetic?

- ❖ *Posterior single units*
- ❖ *Posterior 3 unit bridges*
(replacing premolars only: pontic width 9.0 mm)
- ❖ *Anterior 3 unit bridges*
(replacing a single tooth: pontic width 11.0 mm)
- ❖ *Anterior crowns on destroyers*





Cantilever Bridges

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What do we cement them with?

*Depends upon prep design,
amount of retention, and
ability to isolate*

Two surfaces we bond (or attempt) to:

❖ *Tooth structure*

❖ *Dentin*

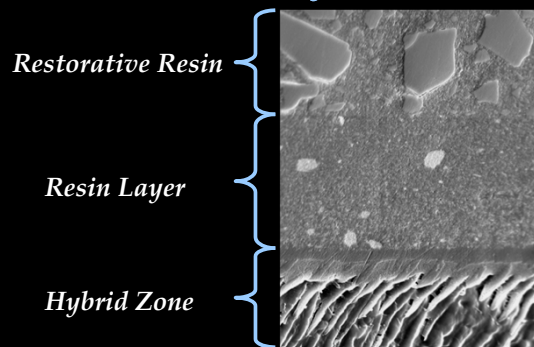
❖ *Enamel*

Adhesive cementation is always the most ideal

❖ *“total etch” followed by a 3-step, 2-step, or Universal adhesive system*

❖ *Resin Cement*

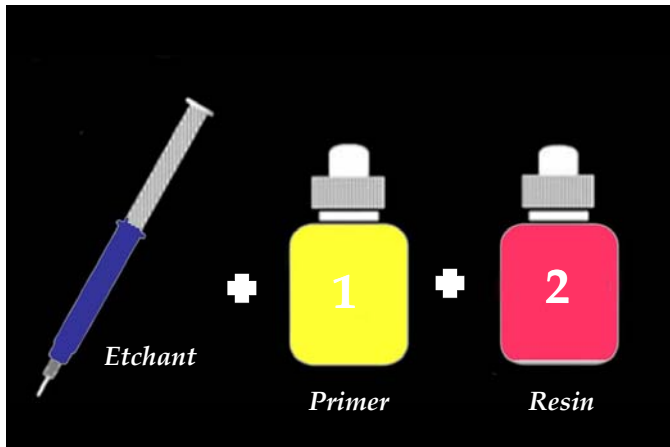
Dentinal Adhesion



Dental Adhesive Systems

❖ *Total-Etch and rinse systems* (Complete removal of smear layer)

❖ 3-Step

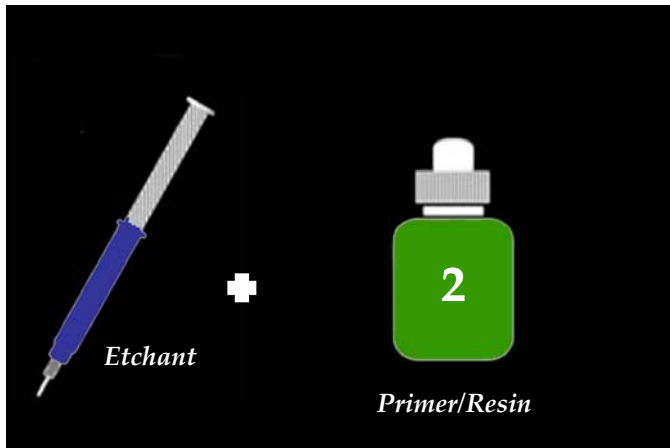


Dental Adhesive Systems

❖ *Total-Etch and rinse systems* (Complete removal of smear layer)

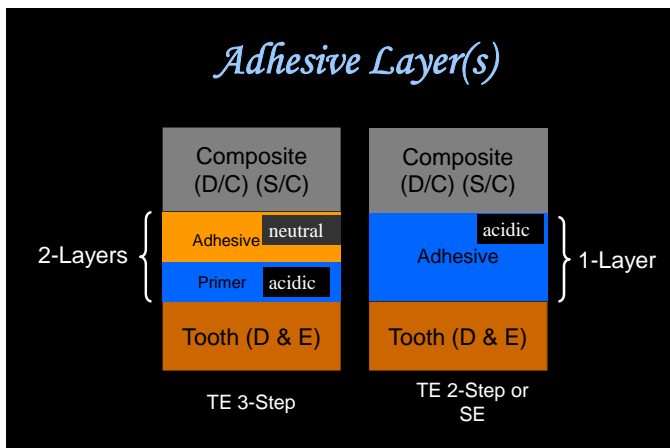
❖ 3-Step

❖ 2-Step



Limitations and applications of total-etch 2-step adhesive Systems

- ❖ Direct Restorations
- ❖ Indirect where it can be polymerized with light
 - ❖ Veneers
 - ❖ Anterior all-ceramic crowns
 - ❖ Ceramic inlays/onlays



Dental Adhesive Systems

❖ *Total-Etch and rinse systems* (Complete removal of smear layer)

❖ 3-Step

❖ 2-Step

❖ *Self-etch Systems* (Dissolution of smear layer and incorporation in adhesive)

❖ 2-Step



Self-etch primer



Adhesive Resin

Limitations and applications of Self-etch 2-step adhesive Systems

❖ *Direct Restorations*

❖ *Etch enamel with phosphoric acid, especially with Indirect*



Select HV Etch (Bisco)

MMPs

Matrix Metalloproteinases

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- ✦ *0.2 % Chlorahexadine*
- ✦ *Benzalkonium Chloride*

Inhibits degradation of Hybrid layer by MMPs

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- ❖ *Cavity Cleanser (Bisco)*
- ❖ *Consepsis (Ultradent)*

Dental Adhesive Systems

- ❖ *Total-Etch and rinse systems* (Complete removal of smear layer)
 - ❖ *3-Step*
 - ❖ *2-Step*
- ❖ *Self-etch Systems* (Dissolution of smear layer and incorporation in adhesive)
 - ❖ *2-Step*
 - ❖ *1-Step*



*There is a direct correlation
between hydrophilicity of the
resin and resin degradation*

Tay, et al.

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*Tay (et al) similarly concluded that 1-
layer Self-Etch adhesives are semi-
permeable membranes.*

(Tay, Suh, Pashley, Cavalho; J Dent 2002; 30:371-382)

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Limitations and applications of Self-etch 1-step adhesive Systems

- ❖ *Direct Restorations*
- ❖ *Etch enamel with phosphoric acid*



Dental Adhesive Systems

❖ Total-Etch and rinse systems (Complete removal of smear layer)

❖ 3-Step

❖ 2-Step

❖ Self-etch Systems (Dissolution of smear layer and incorporation in adhesive)

❖ 2-Step

❖ 1-Step

❖ Select Etch, Universal Adhesive Systems

Adhesive cementation using a resin cement is always the most ideal

❖ "total etch" followed by a 4th or 8 generation adhesive

❖ Dual Cure resin cement

❖ Duolink (Bisco)

❖ NX3 (Kerr)

Non-bonded posterior crown

(ZrO₂ with Adequate Retention)

❖ Clean tooth with Chlorahexadine Pumice (Consepsis Scrub; Ultradent)

❖ Self-etching resin cement

❖ BisCem (Bisco)

❖ MaxCem Elite (Kerr)

❖ Unicem Plus (3M)

❖ BioActive Cements

❖ TheraCem (Bisco)

❖ Activa cement (Pulpdent)

❖ Ceramir (Doxa Dental)



Self-etching resin cement with alkaline pH



Potential advantages of alkaline pH:

- ❖ Promote apatite formation & healing of pulp tissue
- ❖ Inhibition of bacterial growth
- ❖ Neutralize acidic bacterial by-products, prevent secondary caries

	TheraCem	Ceramir
Shear Bond Strength to Dentin (gel-cap method)	5.7 MPa	4.0 MPa
Shear Bond Strength to Cut Enamel (ultradent jig method)	18.0 MPa	2.2 MPa
Shear Bond Strength to Zirconia (sandblasted, no primer applied, ultradent jig method)	26.8 MPa	0
Calcium Release after 7 days	66 µg/cm ²	70 µg/cm ²
Film Thickness	14 µm	14 µm
Flexural Strength	60 MPa	12 MPa
Compressive Strength	199 MPa	109 MPa
Radiopacity	2.4	2.4

Two surfaces we bond (or attempt) to:

- ❖ *Tooth structure*
 - ❖ *Dentin*
 - ❖ *Enamel*
- ❖ *Restorative material*

Clean the restoration with Ivoclean after try-in

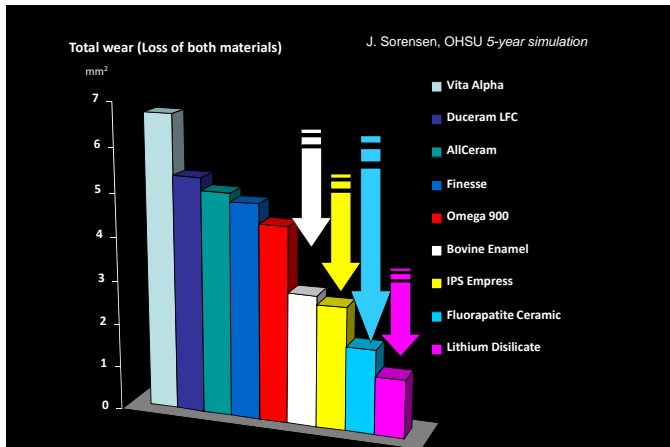


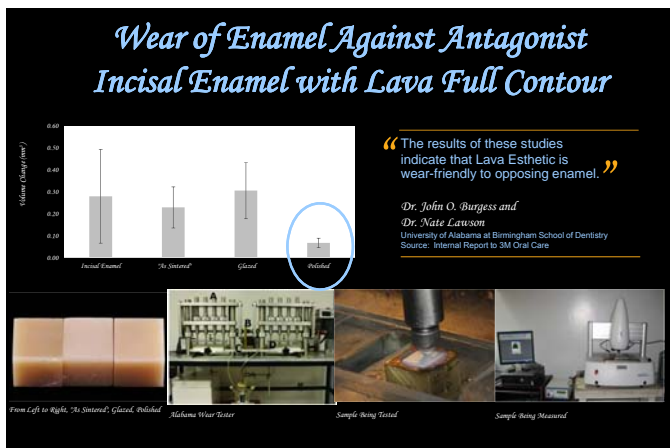


All-Ceramics

*Results limited by your
Creativity and Imagination,
not the
Materials*

IPS Empress
(Leucite reinforced glass ceramic)
e.Max
(lithium disilicate)
Zirconium oxide
(Full contour and core supported)





*What do we adjust
and polish with?*

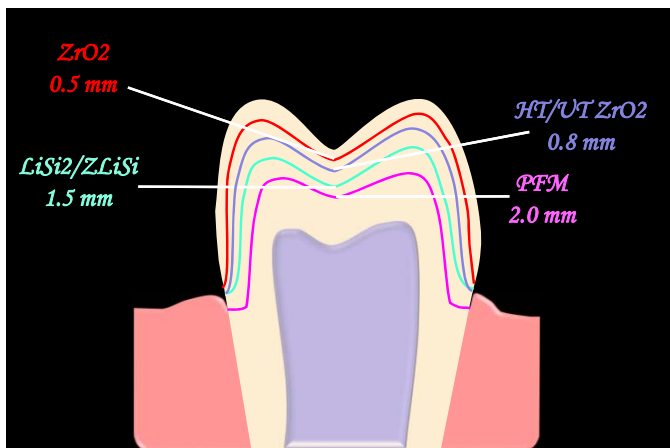
www.diashine.com











Desirable properties of our restorations

PFM

- ❖ Strength
- ❖ Fit
- ❖ Wear Compatibility
- ❖ Aesthetics
- ❖ Conservation of tooth Structure
- ❖ Biocompatibility
- ❖ Lab cost

All-Ceramic

- ❖ Strength
- ❖ Fit
- ❖ Wear Compatibility
- ❖ Aesthetics
- ❖ Conservation of tooth Structure
- ❖ Biocompatibility
- ❖ Lab cost

Review of scientific literature

Fracture strength of four-unit Y-TZP core designed with varying connector diameter: an in-vitro study

Larsson C, Holm L, Lovgren, Kokubo Y, Vult von Stryen
J Oral Rehabil. 2007;34:702-709

Connector dimensions required 4 x 4 mm with ZrO2 frameworks. Metal supported PFD can have 2.5 x 2.5 mm

Fabrication techniques

(IPS Empress and e.Max)

- ❖ **Pressed:** "Lost wax" technique
- ❖ **Milled:** CAD/CAM in- office or in-laboratory

Finishing Techniques

- ❖ *Shaded or stained*
- ❖ *Cutback and layered*
