Choosing the right material for anterior restorations.

Dentistry continues to roll through an "esthetic revolution," with more restorative choices than ever to take better care of your patients. This multitude of information provides you with a tremendous opportunity to provide optimum care from an esthetic, functional and disease prevention standpoint. However, it can also lead to confusion when deciding which option is best for your patients.

(Continued inside)
Choose the material that's right for your patient. Perhaps nothing is more confusing than sifting through the myriad of esthetic materials to choose the right product for any given situation. As practitioners, we have a tendency to get comfortable with one or two materials, and then make our patients fit the material. But that is not the best way to practice dentistry.

Know your options.
A much wiser method is to spend time studying the advantages of as many materials as possible so you can consistently choose the right material to meet the demands of each individual patient. The purpose of this selection guide is to provide you with pertinent information necessary to assist you when considering the optimum treatment plan for your patients.

Material Selection Criteria

There are at least six factors to consider when choosing a restorative material. Let’s take a look at each factor briefly.

1. Esthetic Risk
Typically 1.0-3.0 mm of maxillary incisal tooth structure shows at rest in a youthful smile. From this position, if the patient has a high esthetic demand and shows a great deal of tooth structure (more than 7 mm of lip hypermobility when smiling), choose a material that is as cosmetic as possible. If the patient is not as driven by esthetics and the teeth are not too visible, it is more sensible to choose a more durable material, even though there may be a slight esthetic compromise.

Another consideration is whether the underlying color of the anterior teeth needs to be blocked or if the color is to be visible through the restoration. A material should be used with enough translucency to allow the natural color to shine through or enough opacity to block out undesired underlying chroma.

2. Occlusal Risk
When working up the patient’s case, make sure to note any evidence of intra-articulator TMJ signs or symptoms, occlusal muscle disorders, mandibular muscle aches or fatigue (masseter hypertrophy), neck pain, tooth mobility without periodontal breakdown, or tooth migration. These symptoms should be considered indicators of high occlusal risk patients. Esthetic restorations may still be an option, but extra attention to detail is essential to develop an occlusal scheme that ensures a harmonious stomatognathic system – reassuring stress on the restoration.

3. Quantity of Remaining Enamel
One of the best reasons to preserve tooth structure during an adhesive procedure is to conserve a maximal amount of remaining enamel since the crystalline structure of enamel is far less variable than dentin. Recent reviews of porcelain veneers during the past two years suggest that, of the restorations that failed (4%), six of seven were only partially bonded to dentin. Thus, the question now is whether the wonderful results of porcelain veneers, it also indicates a need to preserve as much enamel as possible.

Factors affecting restoration selection
By Dr. John C. Crumham

You Can Choose DAL Restorations with Confidence.

Dentures of materials may be utilized for anterior restorations. This publication highlights several products that demonstrate common patient situations. These materials were chosen because they allow the most conservative preparation (minimum tooth conservation), provide maximum esthetics, and withstand the functional demands of most patients. In addition, the materials in this selection guide are products that in our opinion provide exceptional esthetics and predictable performance. These choices are based on our knowledge of the industry more than 75 years of experience, recommendations from our accounts and our understanding of the practitioner/patient relationship.

Call for case pick-up & FedEx Overnight Shipping: 1.800.227.4142
Dalton Arts Laboratories, Inc.
Springfield, IL, St. Louis, MO, Lincolnshire, IL.
4. Quantity and Quality of Remaining Dentin
Recent studies also look at how bonding to sclerotic and carious dentin can affect bond strength. While predictable bonding success is hard enough to achieve inside the mouth, it seems that bond strengths may also vary depending on the kind of dentin that exists. A good rule of thumb is to consider a traditional cemented restoration if areas of discolored dentin are present that lack sensitivity to cold water or blast, or to preparation without anesthesia. This evidence may indicate that the collagen network within the dentin has been significantly altered, affecting the necessary optimum bond strengths.

5. Ability to Maintain 100% Isolation
If 100% isolation cannot be obtained during an adhesive procedure, failure is imminent. Deep subgingival restorations, patients with limited access or to areas that are impossible to isolate are pure examples of clinical situations where traditionally cemented restorations may be indicated.

6. Desire for Maximum Tooth Conservation
Generally, it is recommended to only remove the amount of tooth structure necessary to maximize aesthetics, obtain the necessary retainers and resistance form, and preserve necessary tooth structure.

References

Our panel of esthetic restoration experts

Dr. John Congdon
Charlotte, NC
- Director of Education at the Dawson Center for Advanced Dental Education
- Associate Clinical Professor for the Medical College of Virginia Dental School
- Founder of Cranham Dental Seminars
- Member of the Advisory Board for Advanced Education (Published by Dawson Products, Inc.)
- International Lecturer
- Published Author

Dr. Robert Cranham
Chesapeake, VA
- Co-founder and Lecturer for the Charlotte Center for Cosmetic Dentistry
- Clinical evaluator of products and materials for several major dental product manufacturers
- Received the 2004 Gordon Christensen Outstanding Lecturers Award
- National Lecturer
- Published Author

Dr. Leonard Hess
Monroe, NC
- Received his Doctor of Dental Surgery degree from Northwestern Dental School in Chicago
- Member of the ADA (the AADOCR, the Charlotte Dental Society and the Charlotte Dental Society
- Member of the Venetian Smile Program
- National Lecturer
- Published Author
The custom-fabricated stackable porcelain veneer is the material of choice when a case is to be done to correct discolored or misaligned teeth, to lengthen teeth, to create space closures or to simply improve a smile cosmetically. Porcelain veneers can be fabricated using a traditional pressed glass material, like IPS Empress, that requires at least .7-.8 mm reduction or by using a custom fabrication technique referred to as stacked porcelain veneers. This latter technique uses a traditional feldspathic porcelain that is stacked and fired in layers to form a custom veneer. It requires the least amount of tooth reduction and can be as thin as .3 mm (contact lens veneer) or up to .5 mm (traditional stacked veneer), allowing the dentist to keep or even reduce over 95% of the tooth. This veneer technique has the flexibility to either let the underlying tooth structure show through by fabricating with only opalescent porcelains creating the contact lens effect, or to fabricate traditional stacked veneers by adding opaque dentins and body porcelains which block out undesirable underlying colors.

Because of the conservative nature of this preparation, stackable porcelain veneers are the ideal restoration for the patient who requires a cosmetic change. Stacked porcelain, however, needs to be supported by either tooth structure or a high strength core material. Ideally, the porcelain should not have greater than 2.0-3.0 mm of unsupported porcelain. If more than 2.0 mm of unsupported porcelain will exist in the final product, a pressed ceramic material is indicated (IPS Empress). Violating this rule will increase the probability of failure due to occlusal stress.

Indications and Material Benefits

- The material of choice for correction of discolored or misaligned teeth, to close spaces or lengthen teeth and for purely cosmetic reasons
- The most conservative preparation (.3-.5 mm of reduction)
- Bonding to 90-95% enamel
- Allows for underlying color of teeth to shine through (the contact lens effect)
- Underlying dark colors can be blocked out with opaque dentins and body porcelains (traditional stacked veneer) when necessary

Contraindications

- Not to be used when greater than 2.0 mm of unsupported porcelain is required. This will increase the chance of fracture
- Not to be used in anterior zones where maximum strength is required

Bonding/Cementation

Stacked porcelain veneers must be bonded with a light cure resin cement (N3 from Kerr, Variolink Veneer or Variolink II from Ivoclar Vivadent or RelyX Veneer Cement System from 3M ESPE).

Insurance Codes

- Veneer
  - D2962 Labial Veneer (Porcelain Laminate) - Laboratory
  - D2783 Crown - 3/4 Porcelain/Ceramic

Prep Design

- .5 mm reduction with gingival chamfer; 1.0 mm incisal reduction

Facial Prep Interior Incisal Prep Chamfer Margins

- A uniform thickness of .6 mm to .8 mm of facial enamel is removed with the Brasseler 6850-016 Incisal Reduction bur
- Bevel back the incisal edge. Recommended Brasseler bur: 6850-016 Incisal Reduction
- Interproximal depth chamfer margins are prepared with the Brasseler 6850-016 Incisal Reduction bur

Before After

Stacked Porcelain Restorations
Interproximal depth chamfer margins are prepared with the Brasseler 6850-016 Incisal Reduction bur.

Before

After

Recommended Brasseler bur:  6847KR-016 Axial & Incisal Reduction

Recommended Brasseler bur:  6847KR-016 Axial Reduction

Occasionally an all-ceramic restoration that is stronger than incised porcelain is needed to achieve the ideal esthetic goals. Pressed ceramic restorations are ideal in these situations. They can be used for veneers, full crowns, and inlays/onlays.

Pressed ceramics do well in situations when greater than 2.0 mm of unsupported ceramics exist. It is also available to place incised next to crowns of the same material and achieve a beautiful esthetic result. It is important to note that when planning an esthetic rehabilitation, it is wise to allow at least 2 mm of space between the desired incision and the restorative margin. A tetracycline-stained canine or incisor in an older patient can be a helpful guide during the planning phase. When an all-ceramic crown is placed next to a veneer, pressed ceramic materials work extremely well.

IPS Empress Esthetic: For years we have provided our customers with the many benefits and esthetic advantages of IPS Empress pressed glass. Now, more so than ever, IPS Empress Esthetic offers a leucite reinforced glass ceramic with a broader ingot shade range and enhanced ingot density for improved flexural strength. When coupled with the line of IPS Empress Esthetic Layering Porcelains, IPS Empress Esthetic offers the ultimate benchmark for highly esthetic pressed porcelain veneers and anterior single tooth replacement (bicuspids forward).

### Indications and Material Benefits
- All-ceramic option when greater strength is required
- Can be used when greater than 3.0 mm of unsupported porcelain exists
- Use for all-ceramic veneers with 4-8 mm of facial reduction
- Use for all-ceramic crowns with 1.5-2.0 mm of reduction
- Use for incises incisal/edges
- Use to mix and match ceramic veneers with all-ceramic crowns/bridge

### Contraindications
- Not to be used when a more conservative option is possible
- Not to be used when underlying color is to shine through (cannot achieve contact lens affect)

### Bonding/Cementation
IPS Empress Esthetic crowns should be bonded with an enamel-dentin adhesive bonding system – a dual cure resin cement (NX3 from Kerr, RelyX Unicem Self-Adhesive Universal Resin Cement System from 3M ESPE or Variolink II from Ivoclar Vivadent). Veneers should be bonded using a light cure resin cement (RelyX Veneer Cement System from 3M ESPE or Variolink Veneer from Ivoclar Vivadent).

### Insurance Codes
- Single Unit
  - D2740 Crown - Porcelain/Ceramic Substrate
  - D2962 Labial Veneer - Porcelain Laminate - Laboratory
  - D3422 Labial Veneer - Porcelain Laminate - Two Surfaces
  - D3438 Labial Veneer - Porcelain Laminate - Three or More Surfaces
  - D3442 Labial Veneer - Porcelain Laminate - Three or More Surfaces

- Full-Coverage Crown
  - D2610 Inlay - Porcelain/Ceramic – One Surface
  - D2620 Inlay - Porcelain/Ceramic – Two Surfaces
  - D2630 Inlay - Porcelain/Ceramic – Three Surfaces
  - D2642 Onlay - Porcelain/Ceramic – Two Surfaces
  - D2643 Onlay - Porcelain/Ceramic – Three Surfaces
  - D2644 Onlay - Porcelain/Ceramic – Four or More Surfaces

### Prep Design
1.5-2.0 mm circumferential, with rounded heavy chamfer; 1.5 mm incisal reduction.

IPS Empress® Esthetic

Pressed Glass Restorations

Before

After
Designed with simplicity and versatility in mind, IPS e.max is the ultimate in metal-free esthetics and strength, offering high-strength lithium disilicate materials for both the PRESS and the CAD/CAM technique. The nano-fluorapatite layering ceramic, IPS e.max Ceram, completes the all-ceramic system. This material is used to layer or veneer both the PRESS and CAD/CAM lithium disilicate restorations, allowing for highly characterized and natural-looking restorations even with complex cases. This unique material combination provides optimum esthetics yet has the strength to enable conventional or adhesive cementation.

IPS e.max Lithium Disilicate:
One of the primary challenges faced by today's dental restorative team is the need to deliver high-strength restorative options without compromising the esthetic outcome fueled by ever-increasing patient demands. The monolithic glass structure of IPS e.max lithium disilicate offers distinct advantages. By eliminating the traditional veneered ceramic layer and its requisite bond interface, greater structural integrity can be achieved while maintaining functional performance or featuring of the esthetic material during function.

IPS e.max PRESS Lithium Disilicate Glass-Ceramic Ingot: IPS e.max PRESS is a new biocompatible lithium disilicate glass-ceramic ingot. These ingots, after being sintered and sintered, offer a high translucency that can be achieved while maintaining functional performance or featuring of the esthetic material during function.

IPS e.max CAD: IPS e.max CAD offers new CAD/CAM processing technology with a high-performance material. The lithium disilicate glass-ceramic is manufactured in an innovative technological process, providing for a greater variety of esthetic and functional outcomes. In the “soft” phase, the material exhibits a “bluish” color and a strength of approximately 400 MPa. In the “hard” phase, the material can be easily adjusted and carved for fitting. IPS e.max CAD offers an additional strength of 500 MPa and the desired esthetic characteristics such as shade, translucency, and brightness. Using a single and quick crystallization process in a porcelain oven at 850°C, IPS e.max CAD achieves its final strength of 360 MPa and the desired esthetic characteristics (such as tooth color, translucency, and brightness) during a simple and quick crystallization process in a porcelain oven at 850°C. IPS e.max CAD materials are available in three levels of opacity: medium opacity (MO), low translucency (LT), and the new high-translucency (HT) for inlays/onlays.

Indications
Veneers
Thin minimal Prep Veneers (.3 mm)
Inlays/Onlays
Single Crowns
Bridges
Posterior Crowns
Anterior and premolar region

Bonding/Cementation
Because of its high flexural strength and its remarkable structure, IPS e.max PRESS or CAD can be cemented with your choice of conventional cementation materials or resin-bonded bonding systems. A “preliminary” cementation can then be completed with resin-bonded bonding systems or modified acrylics for long-term retention.

Insurance Codes
Single Unit
D2740 Crown – Porcelain/Ceramic Substrate
Bridgework
D2740 Crown – Porcelain/Ceramic
D6245 Pontic – Porcelain/Ceramic
Inlay/Onlay
D2610 Inlay – Porcelain/Ceramic – One Surface
D2620 Inlay – Porcelain/Ceramic – Two Surfaces
D2630 Inlay – Porcelain/Ceramic – Three Surfaces
D2642 Onlay – Porcelain/Ceramic – Two Surfaces
D2643 Onlay – Porcelain/Ceramic – Three Surfaces
D2644 Onlay – Porcelain/Ceramic – Four or more Surfaces

Prep Design
1.0 – 1.5 mm circumferential, moderate chamfer
1.5 – 2.0 mm incisal reduction

Before

After

IPS e.max Lithium Disilicate All-Ceramic Restorations

Recommended Brasseler bur: 6847KR-016
Axial & Incisal Reduction
Recommended Brasseler bur: 6847KR-016
Axial Reduction
Recommended Brasseler bur: 6847KR-016
Axial Reduction
Recommended Brasseler bur: 6847KR-016
Axial Reduction

Full Coverage Crown
Posterior Crown
Anterior 3-Unit Bridge
Posterior Crown

Assessment Criteria
Before

Assessment Criteria
After

IPS e.max Lithium Disilicate All-Ceramic Restorations

Recommended Brasseler bur: 6847KR-016
Axial & Incisal Reduction
Recommended Brasseler bur: 6847KR-016
Axial Reduction
Recommended Brasseler bur: 6847KR-016
Axial Reduction
Recommended Brasseler bur: 6847KR-016
Axial Reduction

Full Coverage Crown
Posterior Crown
Anterior 3-Unit Bridge
Posterior Crown
Zirconia is a high-tech ceramic material that is characterized by its outstanding biocompatibility, strength, and high translucency. It is used in various dental applications due to its excellent mechanical properties. The preparation of zirconia restorations involves precise planning to achieve optimal results.

**Chamfered Preparation**

- 1.0 mm circumferential chamfer applied at an angle of 5° or larger (horizontal).

**Incisal Reduction**

- 1.5 - 2.0 mm incisal reduction.

**Lingual Reduction**

- 1.0 - 1.5 mm lingual reduction.

**Round the Internal Line Angles**

**Zirconia** is a high-tech ceramic material that is characterized by its outstanding stability, biocompatibility, and strength levels that are significantly higher than other all-ceramic materials. In addition, zirconia restorations display excellent esthetics and precise fit characteristics through the use of proven CAD/CAM technology. When conventional preparation and maximum strength are vital factors in the selection of an all-ceramic material, DAL highly recommends the application of any of our several zirconia materials.

**Noritake Katana**

- Features a zirconium substructure with noticeably higher translucency and nine colored core shades for even and stable coloring.

**Noritake CZR Layering or Pressable Porcelains**

- Provide a perfect balance of chroma and value that leads to stunningly lifelike restorations for both anterior and posterior crowns and bridges up to 16 units.

**DAL EZ Esthetic Zirconia**

- Translucent, shaded zirconia frameworks using CAD/CAM Esthetic Zirconia result in beautifully vital esthetics that exceed those of PFM’s. The excellent marginal adaptation of DAL EZ is equal to PFM’s. With Esthetic Zirconia, there is no metal to show through the ceramic and no unsightly black lines at the gingival. Your patients receive the esthetics they demand and you receive the strength and affordability you desire. DAL EZ is indicated for anterior and posterior single unit crowns and 3-unit bridges.

**Procera® Zirconia**

- Offers a proven all-ceramic restoration that combines the vital, translucent esthetics of an all-ceramic with the strength and durability of a PFM. The new Procera Zirconia, made of yttria stabilized zirconium oxide, provides nearly double the strength of the original Procera Alumina and is indicated for anterior and posterior single unit crowns and bridges up to 16 units.

**Lava™**

- The Lava All-Ceramic System is an innovative CAD/CAM technology for all-ceramic crowns and bridges featuring optimal precision and biocompatibility. When conventional cementation and maximum strength are vital factors in the selection of an all-ceramic material, DAL highly recommends the application of any of our several Lava materials.

**Indications and Material Benefits**

- Single units and bridgework up to 16 units for the anterior or posterior region.
- Zirconia Maryland Bridge type restorations, zirconia inlay bridges and zirconia CAD/CAM stressbreaker keyway attachments.
- The all-ceramic option when maximum strength is required.
- An all-ceramic option where conventional cementation is required - can be conventionally cemented or bonded to tooth structure.

**Contraindications**

- We do not recommend a feather edge preparation, as it does not provide adequate reduction for the porcelain build-up, or the trough or “gutter” shoulder because the outermost edge may not be detected when scanned.

**Bonding/Cementation**

- Because of zirconia’s high flexural strength, all zirconia restorations can be cemented with your choice of conventional cements, micro-reinforced glass ionomer cements (RelyX Luting Plus Cement, RelyX Unicem Cement System from 3M ESPE, Variolink II from Ivoclar Vivadent or Multilink Automix from Ivoclar Vivadent).

**Insurance Codes**

- Single Unit: D2740 Crown - Porcelain/Ceramic Substrate
- Bridgework: D6740 Crown - Porcelain/Ceramic, D6245 Pontic - Porcelain/Ceramic.

**Prep Design**

- The optimal preparation is a shoulder or chamfered preparation with a circumferential step or chamfer. This is required to achieve adequate reduction for the porcelain build-up, or the trough or “gutter” shoulder. The angle of the preparation (vertical) must be ≥ 4°. The angle of the preparation (horizontal) must be ≥ 5°.

**Patient Education**

- Before and After images of zirconia restorations demonstrate the high strength and biocompatibility of this material.
It is important for every dentist to have the ability to provide a restoration that is traditionally cemented with the necessary strength to handle both single and multiple unit bridgework cases. Historically, porcelain fused to metal ceramic restorations (PFM's) have been the "workhorse" of fixed restoration dentistry. Providing a very strong restoration, traditional PFM's require a great deal of tooth preparation. In fact, standard facial reduction as great as 1.8 mm is currently being taught in many of the teaching centers throughout the United States. While this amount of reduction will certainly provide the ceramist adequate room for metal, an opaque layer (to block out the gray metal) and layered body porcelains, it also has the potential to leave the teeth in a weakened state. Contemporary metal ceramic systems like the Captek System have the advantage of providing the additional strength required without the gross reduction. Using Captek, facial reduction of 1.0-1.2 mm is more than enough room to provide a strong, traditionally-cemented, esthetic restoration.

### New and Improved Versions

The re-engineered Captek Nano materials offer up to 33% more strength and three new oxide-free materials—perfectly engineered to maximize esthetics and bacteria control while achieving the strength requirements for any clinical situation. Based on each particular case, the experts at DAL will choose one of the following Captek materials:

- **Captek Nano Bridge and Implant™** is perfect for high-strength and maximum toughness in single or multiple unit bridges and implant restorations.
- **Captek Nano Esthetic Zone™** is the thinnest core material available at under 0.2 mm and is perfect for absolutely gorgeous upper and lower anterior restorations.
- **Captek Nano Universal™** is only 0.235 mm, allows for maximum tooth conservation while balancing the strength and aesthetic requirements necessary for premolars and small molars.

### Indications and Material Benefits

- **Anterior and posterior single crowns, multiple unit bridgework up to 5 units and implant retained single and multiple unit bridgework**
- **To be used when maximum strength is required**
- **To be used when maximum esthetics are needed, but a traditionally cemented restoration is most predictable.** This could be due to the inability to isolate properly or due to the presence of sclerotic dentin.
- **To be used for anterior bridgework when additional strength is required or multiple unit bridgework is necessary (up to 5 units)**
- **Does a great job of blocking out dark posts or dark tooth structure**
- **Can be used with or without a porcelain margin**
- **Indicated for patients with periodontal concerns**

### Contraindications

- **Not to be used with bridgework greater than 5 units or in high stress area**
- **Bonding/Cementation** Captek can be conventionally cemented with your choice of cement.

### Insurance Codes

- **Single Crown**
  - D2750 Single Crown - porcelain fused to high noble metal
- **Bridgework**
  - D6750 Crown - porcelain fused to high noble metal
  - D6860 Pontic - porcelain fused to high noble metal
- **Prep Design**
  - Any range design with 0.8-1.0 mm reduction; 1.5 mm occlusal reduction necessary; 1.5 mm incisal reduction, 1.0-1.5 mm axial wall reduction.