

Aesthetic Indirect Restorative Options

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4 CONTINUING EDUCATION CREDITS

COURSE AUTHOR

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COURSE OBJECTIVES

Upon completion of the course, each participant will have a better understanding of the following:

- indications, preparation and cementation requirements for specific all-ceramic restorations.
- indications, preparation and cementation requirements for specific composite restorations.
- the effect, material composition and processing methods for different aesthetic indirect restorative options have on the clinical indications for the materials to be discussed.
- case selection for indirect restorative materials.
- which systems should be used with each restorative material discussed.
- which cementation method should be used with each restorative material discussed.

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Aesthetic Indirect Restorative Options

Like many areas of dentistry, aesthetic indirect restorative materials have improved significantly in the last decade. This ever-changing group of products continues to improve, providing clinicians additional tools in the quest to mimic natural dentition. Currently, dentists have a bevy of indirect restorative materials at their disposal. These options can be classified into two general groups: non-metal restorative materials (the primary focus of this course), and metal supported restorative materials.

Despite the increasing popularity of non-metal restorative materials, the vast majority of full-coverage crowns and bridges continue to be all cast or porcelain to metal restorations. Despite its color, many clinicians and patients believe an artfully fabricated full gold restoration can be an extremely aesthetic restoration. Although some might argue the aesthetics of a full cast restoration, no one can discredit gold as one of dentistry's finest restorative options.

Despite being limited by a cast metal substructure, porcelain-fused-to-metal restorations—the mainstay of indirect restorative options—can provide an excellent aesthetic result when combined with proper preparation and outstanding laboratory support. This staple of indirect materials continues to improve as teams of ceramic engineers from every dental manufacturer continuously work to develop stronger, kinder, more aesthetic porcelains. New porcelain-fused-to-metal ceramics such as Ivoclar's d.SIGN, Degussa's Duceragold and Ceramco's Finesse, to name a few, utilize new or modified ceramic particles and/or new processing methods to create ce-

ramics with improved physical and aesthetic properties.

For example, IPS d.SIGN (Ivoclar Vivident) achieves its improved characteristics by utilizing synthetic base materials, rather than the more traditional materials—such as feldspar, nepheline, or kaolin—found in conventional feldspathic metalceramics. IPS d.SIGN is a glass-ceramic with two distinct crystalline components: fluorapatite and leucite. The integration of these two crystals into a single glass-ceramic promotes a combination of diverse optical and physical properties. The fluorapatite crystals found in d.SIGN have similar size and shape to the hydroxyapatite crystals found in natural tooth structure and subsequently affect light in a similar manner.

Ducergold (Degussa Dental), another state-of-the-art porcelain, is a low-fusing hydrothermal ceramic. Laboratory tests reveal it reacts with saliva to form a silica-hydroxyl layer on the ceramic that is softer, less abrasive, and gentler to opposing dentition than conventional porcelains. Most ceramics develop surface microflaws after exposure to the oral environment. The silica-hydroxyl layer on Duceragold continuously heals surface flaws, thereby strengthening the restoration. Hydrothermal ceramics also promote a true-to-nature opalescent effect that improves aesthetic results.

In addition to improved PFM ceramics, very thin high gold content substructures fabricated using a variety of techniques, conventional casting (Bio2000, Argen Mfg.), capillary action (Captek, Precious Chemicals Inc.), and electroforming (GES, Gramm Technology Inc.) can also improve PFM aesthetics by reducing the

thickness of the substructure and emitting a warm yellow color under the veneering porcelain. Finally, a recent PFM innovation combines conventional PFM castings with all-ceramic pressing technology in a system called Authentic Pressable Ceramics (Microstar Corp.). This hybrid system uses special equipment to press a molten ceramic ingot onto a cast metal substructure creating a restoration with 360 degree all-porcelain margins.

Although significant innovations have improved the characteristics of metal supported restorations, it is generally believed that the best cosmetic results are achieved with non-metal restorative materials. Non-metal restorative materials have gone from relative obscurity to a standardized procedure in many dental offices. These materials can be divided into two groups: all-ceramic restorations and composite restorations.

Most composite resin systems on the market today are highly filled microhybrid composites. The differences in these systems are based on ceramic filler content and particle size, as well as the processing method to achieve polymerization. In the past, composite resins were cured with light exclusively. This technique prevented the restoration from achieving high levels of polymerization and caused the material to wear excessively in the oral environment. Newer composite resin systems such as Belleglass HP (Kerr Mfg. Inc.) and Sculpture cure the final layers of the composite under heat and pressure in an oxygen free environment to achieve maximum polymerization and improved wear resistance. For large restorations and bridgework, many of these systems incorporate synthetic fiber sub-

structures. Belleglass HP (Kerr Mfg. Inc.), Targis (Ivoclar-Vivadent) and Sculpture use fibrous substructures (Connect, Fibercor, and Vectris respectively) to strengthen and support the veneering composite resin.

All-ceramic indirect restorative systems differ significantly from one another in both their material composition and the fabrication process. Dental manufacturers utilize various ceramic materials and particles in their systems to achieve particular strength and aesthetic objectives including feldspathic, lucite, magnesium oxide, zirconium, lithium disilicate, and aluminous oxide. The processing methods for today's all-ceramic restorations are equally diverse.

Some systems, like Fortress (Mirage Dental Co.) and Cerinate (Den-Mat Corp.), utilize a direct build up of a ceramic on a refractory die or on a master die swedged with palladium or platinum foil. This classic procedure yields restorations that lack the strength of newer systems but can provide outstanding aesthetic results and clinically acceptable strength when properly bonded onto tooth structure.

A very popular all-ceramic technique is "pressing." This procedure utilizes the lost wax technique whereby the technician creates a waxup of a full contoured restoration or a coping substructure, and then invests and casts a monochromatic ceramic ingot using specially designed pressing porcelain furnaces. This technique can provide excellent aesthetics on full coverage restorations where 1.5 - 2.0 mm of tooth reduction allows the technician an opportunity to accent the pressed substrate with additional ceramic. With veneers and inlays, a technician

is often limited, by preparation and strength considerations, to pressing the veneer full contour and characterizing the external surface with stain.

All-ceramic restorations are also fabricated with slip casting and CAD/CAM technology. Inceram (Vident Inc.) restorations are fabricated with slip casting, a process which forms a ceramic substructure onto a duplicate die. The substrate is removed and transferred to the master die on which porcelain is built and contoured. Many dental manufacturers are beginning to introduce CAD/CAM systems which fabricate all-ceramic restorations using optical or contact scanning to precisely measure the die enabling a coping or a full coverage restoration to be fabricated through a direct or indirect milling or powder technology process. Primarily, dental laboratories use CAD/CAM systems to produce restorations for their clientele. However, Cerac can be used directly in the dental office. Of the many promising systems being introduced, Procera (Noble Biocare Inc.) is the most popular and proven CAD/CAM system currently available.

In summary, with the current quantity and diversity of indirect restorative materials, dentists, after careful review of the capabilities and indications of these systems, are in the favorable position of having a choice of restorative materials which can satisfy challenging clinical situations as well as the most discerning clientele. The following product summaries of some of the most popular all-ceramic and composite systems provides detailed information on each product, its indications, preparation, cementation, and shade selection guidelines.

COMPOSITE SYSTEMS

Targis Vectris (Ivoclar-Williams)

DESCRIPTION: The Targis Vectris system combines state-of-the-art ceromer technology with a processed fiber substructure. Targis, the ceromer, consists of submicron (.04 -1.0 um) ceramic fillers (75-85% by weight) in a polymer matrix. Targis offers durable aesthetics, abrasion resistance, and a low degree of brittleness and susceptibility of fracturing. Targis can be used alone, with a metal substrate, or with Vectris fiber reinforcement. Vectris is a multiple layered fiber matrix consisting of thousands of presilinated resin-saturated synthetic fibers. The use of this framework in conjunction with Targis resin improves the flexural strength to approximately 1000MPa.

INDICATION: Inlays/onlays, veneers, anterior crowns, posterior crowns, anterior three unit bridges, posterior three unit bridges, anterior and posterior "Maryland Type" bridges.

PREPARATION: Clear margins are a prerequisite for an accurate restoration. Gingival margins can be prepared with a deep chamfer or a shoulder. Avoid featheredges, long bevels and sharp internal line angles.

CEMENTATION: Contemporary bonding and resin luting techniques are recommended. In addition, Vectris-supported crowns and bridges can be conventionally cemented utilizing a modified laboratory technique. A new cement, ProCem, has recently been developed for use in conventionally cementing this material.

SHADE SELECTION: Shades are matched to the Chromascop shade guide.

Sculpture/FibreKor

DESCRIPTION: The Sculpture/FibreKor system unites the latest in polymer ceramics and advanced fiber science technology allowing the laboratory technician to create functional and esthetic restorations. FibreKor is a pre-impregnated fiber reinforcing material with a modulus of rupture comparable to non-precious alloys (approximately 1000 MPa). FibreKor is used, in place of metal, to reinforce single unit and three-unit bridges. Sculpture is an advanced light, heat, and vacuum cured polymer-glass restorative material that is built on the FibreKor substructure. Sculpture has an extremely low water absorption rate (9-12mg/mm), which prevents unsightly discoloration or staining. A Sculpture restoration is projected to have a wear rate similar to that of natural dentition—less than 3 microns per year. Studies available upon request.

INDICATIONS: Anterior and posterior crowns, full coverage bridges, inlay/onlay bridges, encore bridges, inlays and onlays. Bridges should not exceed 15 mm in length.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays should be prepared to avoid undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than conventional porcelain-fused-to-metal. Avoid sharp angles, undercuts, and beveled

or “feather edge” finish lines. On crown abutments a small 2x2x2 mm box is added at the proximal-occlusal line angle to support FibreKor structural bars. Veneers are prepared, as they would be for ceramics.

CEMENTATION: Contemporary bonding and resin luting techniques are recommended.

SHADE SELECTION: Shades are matched to the Vita Lumin shade guide. FibreKor is offered in five shades (A,B,C, and D ranges) and two sizes.

ArtGlass (Heraeus Kulzer)

DESCRIPTION: ArtGlass is a completely new type of material. ArtGlass is the only material using multifunctional methacrylates for three-dimensional highly cross-linked structures. A high output strobe type light source is needed to get the material to form these cross-links. About 55% of ArtGlass is Microglass filler, responsible for its color matching and outstanding shade adaptation. The total filler content is only around 75%, but when the matrix is cured, the amorphous, highly cross linked organic glass forms, together with the inorganic glass and silica fillers, a homogeneous, glass like material, which we call Polymer glass is created. ArtGlass parameters exceed those of conventional composites and with its tough elastic properties, it outperforms porcelain as well. ArtGlass has hardness similar to enamel, flexible strength over 50% higher than porcelain and can be easily adjusted and repaired intra-orally.

INDICATION: Metal-free crowns, veneers, inlays, onlays or metal supported crowns, bridges, and implant supra-structures.

PREPARATION: Preparations are similar to porcelain preparations with bevel or marginal steps and at least 1.5 mm of interocclusal reduction.

CEMENTATION: Contemporary bonding and resin luting techniques are recommended. Recommended cementation material is 2-bond and 2-luting cement. This material increases the bond strength because of its flexibility and is actually made of the same material as ArtGlass.

SHADE SELECTION: Shades are matched to both the Vita Lumin and Chromascop shade guides.

BelleGlass HP (Kerr Mfg.Inc.)

DESCRIPTION: BelleGlass Heat and Pressure Dual Cure indirect polymer ceramic achieves the physical strength of porcelain combined with the benefits and repair ability of a polymer glass. With an average wear rate of 1.2-1.5 um, BelleGlass HP is very forgiving against natural dentition. It achieves a cure of 98.5% through the use of fiber optic light, 140° C heat, and 60 psi. pressure cured under a nitrogen atmosphere. The resulting physical properties, due to the high degree of cure, allow users to achieve excellent opalescent esthetics, and increased wearability. Eight-year in-vivo clinical documentation is available for BelleGlass HP.

INDICATIONS: Traditional inlays, onlays, single crowns extending to three-unit bridges, either metal-free or bonded to metal. BelleGlass works well for the fabrication of anterior veneers due to opalescent and fluorescent additives within the polymer-based glass. Implant reconstructions also benefit from BelleGlass due to the unique effect it has on surrounding periodontium.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays are prepared avoiding undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full-coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain-fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: BelleGlass should be placed with a dual cure resin bonding system. Nexus, by Kerr, is specifically recommended, since the same scientist who developed BelleGlass HP also formulated Nexus.

SHADE SELECTION: Shades are matched to both the Vita Lumin and Vita 3D Master shade guides.

Cristobal (Ceramco Inc.)

DESCRIPTION: Cristobal is an indirect composite system, which is recommended as a replacement for PFM and all-ceramic restorations. Cristobal has a dynamic post curing polymerization process that cures quickly, and creates superior strength, hardness, and wear. The generalized wear of Cristobal was less than half that of the nearest competitor at 1.6 microns after 100,000 cycles using a three-body wear test. The non-porous, biocompatible surface of Cristobal means superior chairside polishability that’s virtually impermeable to micro-organisms. Because Cristobal is me-

chanically polished as opposed to glazed, the finish will not wear off. The unique Cristobal formula is highly fracture-resistant and shock-absorbent with ideal rebounding characteristics so it is ideal for use with implant cases.

INDICATIONS: Cristobal is indicated for 3-unit metal-free/fiber-free bridges through the second premolar, single unit crowns through the first molar, inlays, onlays, veneers, implants bonded to metal, and all types of fused-to-metal restorations.

PREPARATION: Inlays/onlays are prepared avoiding undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: Cristobal should be placed with a dual-cure resin bonding system. Calibra, by Dentsply, is specifically recommended.

SHADE SELECTION: Matched to the Vita Lumin shade guide.

Gradia (GC Lab Technologies Inc.)

DESCRIPTION: Gradia is a light-cured indirect restoration with an innovative hybrid MFR formulation. The unique chemistry of GRADIA couples a micro-fine ceramic/polymer filler with a urethane

dimethacrylate matrix to produce a superior ceramic composite with exceptionally high strength, wear resistance and superior polishability. Gradia is biocompatible and kind to opposing teeth. Since polymerization results in no change to Gradia’s color, technicians see the subtle colors of the final restoration throughout all phases of fabrication.

INDICATIONS: Gradia is a recommended system for crown and bridge, inlays, onlays and veneers.

PREPARATION: Inlays/onlays are prepared avoiding undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: Gradia restorations can be permanently placed with Fuji PLUS, Fuji CEM or resin cement (metal-reinforced crowns and bridges, inlays, onlays and metal-free crowns with sufficiently retentive preparations). Minimally retentive preparations with metal-free Gradia restorations (crowns and veneers) require resin cement.

SHADE SELECTION: Matched to the Vita Lumin shade guide.

Concept (Ivoclar Williams)

DESCRIPTION: Concept is an indirect resin restorative system for aesthetic inlays and onlays. Concept is a highly filled microfil (77% filled by weight) composite that is heat and pressure polymerized extraorally under 85 psi. pressure and at temperatures of 250° F. The result of this process is an inlay/onlay with maximum homogeneity, color stability, and resistance to wear deformation. Concept will not abrade opposing dentition, is highly radiopaque and releases fluoride.

INDICATIONS: Concept is specifically designed for posterior inlay/onlay indirect restorations.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays should be prepared to avoid undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. The gingival floor of the preparation should be between 1.0 to 1.5 mm wide and any isthmus should be between 1.5 and 2.0 mm wide.

CEMENTATION: Concept should be placed with a dual cure resin bonding system. Variolink, by Ivoclar Vivadent, is specifically recommended.

SHADE SELECTION: Shades are matched to Chromascop shade guide.

Herculite (Kerr)

DESCRIPTION: Herculite XR & XRV are Bis-GMA microhybrid light-activated composites with an average particle size of 0.6 um. They are available in Vita Shades in two levels of dentin and enamel transparencies.

Herculite simulates the light refraction, fluorescence and translucency of natural dentition.

INDICATIONS: Recommended for all anterior and posterior applications. Excellent handling properties allow anatomical shaping without composite slumping. Five-year in-the-mouth-clinicals provide reliability as well as proven durability.

PREPARATION: Inlays/onlays are prepared avoiding undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: Herculite should be placed with a dual cure resin bonding system. Nexus, by Kerr, is specifically recommended, since the same scientist who developed Herculite also formulated Nexus.

SHADE SELECTION: Matched to the Vita Lumin shade guide.

ALL-CERAMIC SYSTEMS

Procera AllCeram (Nobel Biocare)

DESCRIPTION: Procera AllCeram is a truly unique restoration. Procera is fabricated using a sophisticated computer assisted design/computer assisted manufacturing system (CAD/CAM). A commercial dental labora-

tory scans a trimmed stone die into a computer and electronically transmits the information to a production facility that produces an accurate, strong (687Mpa flexural strength), densely sintered aluminum oxide coping. Procera copings are used as the understructure on which a special low abrasive ceramic is applied by a dental technician.

INDICATION: Procera AllCeram restorations can be used in all positions in the mouth. At the moment, only single, full-coverage restorations can be fabricated; however, the company will soon introduce laminate and multiple unit applications.

PREPARATION: Procera AllCeram requires conventional tooth preparation. Since the copings exhibit much higher flexural strengths than previous all-ceramic systems, heavy tooth reduction and butt shoulder marginal preparation, previously necessary with metal free restorations is not required. A chamfer margin with rounded internal line angles is the ideal preparation for Procera AllCeram.

CEMENTATION: Clinically, the Procera AllCeram System is quite user friendly. The restoration can be cemented or bonded using any clinically proven crown and bridge cement or resin bonding system. It is important to remember that aluminum oxide cannot be etched using hydrofluoric or orthophosphoric acid treatment. Procera AllCeram restorations, however, have an etched-like internal surface formed during the pressing and sintering operation, which is very conductive to typical bonding procedures. Nobel Biocare recommends using a dual cure bonding system or resin cement like Panavia 21.

SHADE SELECTION: Shades are matched to the Vita Lumin shade guide.

IPS Empress (Ivoclar/Williams)

DESCRIPTION: IPS Empress is a lucite-reinforced castable ceramic, designed primarily for single unit restorations. Its construction is based on the lost wax technique reducing the problems of dimensional change associated with conventional ceramics. The proven strength of Empress restorations is based on the uniform distribution of lucite crystals. Empress restorations exhibit life-like aesthetics, high resistance to abrasion, and do not cause excessive wear of opposing dentition.

INDICATIONS: Anterior and posterior crowns, inlays/onlays and veneers.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays should be prepared to avoid undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: Contemporary bonding and resin luting techniques are recommended. Variolink, by Ivoclar/Vivadent, is specifically recommended.

SHADE SELECTION: Shades are matched to the Chromascop shade guide. Dentin shades should also be

taken using the IPS Empress die material shade guide.

IPS Empress 2 (Ivoclar/Williams)

DESCRIPTION: The IPS Empress 2 system is comprised of two new and distinctly different ceramic materials. The framework material of IPS Empress 2 is composed of lithium disilicate, and a fluorapatite ceramic used in the layering phase of the fabrication of the restorations. These new materials provide more than three times the strength of the original IPS Empress, thus expanding the indications for use. The new IPS Empress 2 material provides strength and esthetics for single-unit crowns and three-unit bridges. The original IPS Empress material continues to be indicated for inlays, onlays, and veneers.

INDICATIONS: Anterior and posterior crowns, and anterior three unit bridges.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays should be prepared to avoid undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: IPS Empress 2 restorations are ideally adhesively bonded

using the Variolink II cementation protocol. In limited indications where the clinical situation does not permit adhesive cementation, the strength of IPS Empress II will allow conventional cementation with ProTec CEM low-expansion hybrid ionomer cement.

SHADE SELECTION: Shades are matched to the Chromascop shade guide. Dentin shades should also be taken using the IPS Empress die material shade guide.

Optimal Pressable Ceramics

DESCRIPTION: Optimal Pressable Ceramics is a high-strength, all-ceramic restoration composed of a shaded, translucent pressed core overlaid with new OPC Low Wear porcelain which is kinder to opposing dentition. When used in conjunction with OPC pressed core materials, OPC Low Wear porcelain offers high flexural and compressive strengths, impeccable fit and natural beauty. Optimal restorations are produced in the dental laboratory using the familiar lost waxed process and porcelain buildup techniques.

INDICATIONS: Anterior and posterior crowns, inlays/onlays and veneers.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays are prepared avoiding undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or

“feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: Contemporary bonding and resin luting techniques are recommended.

SHADE SELECTION: Shades are matched to the Vita Lumin shade guide.

Finesse™ All-Ceramic (DENTSPLY/Ceramco)

DESCRIPTION: This system combines the proven benefits of Finesse low-fusing porcelain with a ceramic core. This translucent and fluorescent ceramic substructure allows the ceramist to fully optimize the esthetics of Finesse porcelains while giving patients the biocompatibility of a metal-free restoration. The Finesse All-Ceramic restoration demonstrates exceptional wear, polishability and esthetics.

INDICATIONS: Finesse low-fusing porcelain and Finesse All-Ceramic can be used to create beautiful and durable full coverage anterior and premolar crowns, veneers, inlays, onlays and PFM restorations.

PREPARATION: Use a shoulder preparation with a rounded line angle or a deep 120° chamfer. Avoid sharp angles and edges. Maintain an even reduction of anatomical form. Crown reduction should be 1.5 to 2 mm with 1.0 to 1.5 mm of gingival reduction. Minimum reduction for veneers is 0.6 mm. For inlays and onlays, provide a 1.0 to 1.5 mm isthmus width and a 1.0 to 1.5 mm of reduction on the gingival floor.

CEMENTATION: Select a light-curing or dual-curing new generation

resin cement and adhesive system and follow manufacturer’s directions.

SHADE SELECTION: The Finesse porcelain line offers a full spectrum of shades including bleached shades for matching whitened dentition. The Finesse All-Ceramic ingots are matched to the Finesse low-fusing dentin porcelains to ensure the ultimate in esthetics.

Cerinate^{ES} (Den-Mat Corp.)

DESCRIPTION: Cerinate^{ES} porcelain is a restorative material crafted to provide aesthetics with the strength to resist occlusal stresses. The patented formulation is feldspathic, yet has the strength of some aluminous porcelains. This unique combination provides great strength and reliability in high stress occlusal restorative situations while producing extremely aesthetic results. Cerinate^{ES} looks natural because Cerinate^{ES} porcelain can be made very thin and translucent without sacrificing strength. Cerinate^{ES} has thermal expansion characteristics similar to enamel and flexural strength comparable to aluminous oxide reinforced core porcelain.

INDICATIONS: Porcelain laminates, all porcelain crowns, inlays and onlays and metal reinforced bridges and splints.

PREPARATION: Cerinate^{ES} Porcelain is used for the fabrication of Rembrandt Laminate Veneers that require standard veneer tooth preparation. Cerinate^{ES} Laminate Veneers can also be fabricated without tooth reduction due to the ultra-thin nature of the material.

CEMENTATION: The Ultra-Bond system (Den-Mat Inc.) combined with the Tenure bonding system (Den-Mat Inc.) should be used for the cementation of all Cerinate^{ES} restorations.

SHADE SELECTION: Cerinate^{ES} shades are matched to the Vita Lumin and Bioform shade guides. The Ultra-Bond system is also available in a choice of shades.

Fortress (Mirage Dental Systems)

DESCRIPTION: Fortress is an all-ceramic system developed for laboratories by dental technicians for fabrication of crowns, inlays/onlays and veneers. Fortress is a high strength lucite-reinforced restoration which obtains its strength from uniform dispersal of from 3 to 4 μ m lucite particles. Fortress is a smooth, low abrasive ceramic which does not require a core for strength. Excellent translucency and life-like vitality can be achieved with minimal preparation.

INDICATIONS: Anterior crowns, laminate veneers inlay/onlays.

PREPARATION: Preparation is accomplished with common, commercially available high-speed burs. Inlays/onlays are prepared avoiding undercuts or thin tapered areas to maintain passive fit. Finish lines should be 90°-100° shoulders or deep chamfers. Full coverage crowns are prepared with 360° circumferential, super gingival shoulders. Reduction is similar to, or slightly less than, conventional porcelain fused-to-metal. Avoid sharp angles, undercuts, and beveled or “feather edge” finish lines. Veneers: reduce the facial surface 0.5 - 0.7 mm. Finish lines should form a continuous chamfer and contact area should be maintained in tooth structure.

CEMENTATION: Contemporary bonding and resin luting techniques are recommended.

SHADE SELECTION: Shades are matched to the Vita Lumin Shade Guide. Fortress is also available in multiple Hollywood white shades which mimic the look of bleached dentition.

In-Ceram (Vita/Vident)

DESCRIPTION: Vita In-Ceram is one of the strongest all-ceramic systems on the market today. Flexural strengths exceeding 450 MPa are routine for this uniquely versatile alumina based material. In-Ceram is completely biocompatible and allows for decreased thermal sensitivity. The combination of In-Ceram with Vitadur Alpha veneering porcelain allows for a combination of high strength and aesthetics. In-Ceram's metal free substructure allows light to be transmitted to the tooth, eliminating dull and lifeless shadows often found with standard metal ceramic restorations.

INDICATION: In-Ceram can be prescribed for any full coverage restoration anywhere in the mouth, including 3 unit anterior bridges.

PREPARATION: A full shoulder or deep chamfer preparation is recommended 1.0 - 1.5 mm of gingival reduction and 2.0 mm occlusal/incisal reduction for anteriors, 1.5 mm buccal/lingual reduction for posteriors. All angles should be rounded to eliminate sharp edges.

CEMENTATION: Due to the inherent strength of In-Ceram Alumina, the core need only be sandblasted to assure adequate retention. In-Ceram Alumina may then be cemented with any of the following: temporary cements, glass ionomers, Bis GMA luting composites or modified Bis GMA such as Panavia 21.

SHADE SELECTION: Shades are matched to both the Vita Lumin and new Vita 3D-Master shade guides.

Inceram Spinell (Vita/Vident)

DESCRIPTION: A second-generation material, Vita In-Ceram Spinell is more aesthetic than its predecessor, Inceram. The primary difference from In-Ceram Alumina is that Spinell is a magnesium oxide based material with increased translucency and flexural strengths up to 350 MPa for proven clinical reliability. The combination of Spinell and Vitadur Alpha porcelain offers the clinician unique esthetic advantages regarding light transmission, natural fluorescence and translucency. Spinell restorations may also be used directly without any overlying porcelain material for inlay, onlays and veneers.

INDICATIONS: In-Ceram Spinell may be used for anterior crowns, inlays, onlay and veneers.

PREPARATION: Full-shoulder or heavy chamfer prep for anterior crowns with 1.0-1.5 mm gingival reduction and 2.0 mm occlusal/incisal reduction. For inlays and onlay, Spinell requires rounded internal line angles and a 2.0 mm isthmus width and 1.0-1.5 mm wide gingival floor.

CEMENTATION: Internal surface of the restoration must be sandblasted, do not etch the restoration (acid etching has no effect on the magnesium-aluminate material). After preparation, Spinell may be cemented with any of the following: glass ionomers, Bis GMA luting composites and modified Bis GMA's like Panavia 21. Always follow the cement manufacturer's instructions.

Inceram Zirconia (Vita/Vident)

DESCRIPTION: A third-generation material, Vita In-Ceram Zirconia is nearly one and half times stronger than the original Inceram. In-Ceram Zirconia is primarily indicated for all-ceramic posterior bridges, making the In-Ceram system, which also includes Alumina and Zirconia, the only complete all-ceramic restorative system for indications anywhere in the mouth. In-Ceram Zirconia features flexural strengths exceeding 700 Mpa, making Zirconia one of the strongest core and bridge materials available.

INDICATIONS: In-Ceram Zirconia may be used for posterior crowns and bridges.

PREPARATION: Full-shoulder or heavy chamfer prep for anterior crowns with 1.0-1.5 mm gingival reduction and 2.0 mm occlusal/incisal reduction. For inlays and onlay, Spinell requires rounded internal line angles and a 2.0 mm isthmus width and 1.0-1.5 mm wide gingival floor.

CEMENTATION: Internal surface of the restoration must be sandblasted, do not etch the restoration (acid etching has no effect on the material). After preparation, Zirconia may be cemented with any of the following: glass ionomers, Bis GMA luting composites and modified Bis GMA's like Panavia 21. Always follow the cement manufacturer's instructions.

SHADE SELECTION: Shades are matched to both the Vita Lumin and new Vita 3D-Master shade guides.

Self-Test

- 1. Which composite, ceromer, or polymer ceramic restoration can be conventionally cemented if a special laboratory procedure is used?**
 - A. ArtGlass
 - B. Concept
 - C. Sculpture FibreKor
 - D. Targis Vectris
- 2. Which composite, ceromer, or polymer ceramic restoration was created specifically for posterior composite inlays and onlays?**
 - A. ArtGlass
 - B. Concept
 - C. BelleGlass
 - D. Targis Vectris
- 3. Inceram Spinell can be used for the fabrication of**
 - A. Anterior and Posterior Crowns
 - B. Posterior Crowns and Inlays
 - C. A&B
 - D. None
- 4. All composite, ceromer and polymer ceramic restorations can be used in conjunction with fiber reinforcement for added strength.**

True or False
- 5. The strength of a FibreKor substructure is comparable to**
 - A. High Noble Alloy
 - B. Noble Alloy
 - C. Non-Precious Alloy
 - D. Porcelain
- 6. Porcelain-fused-to-metal ceramic IPS d.SIGN is a glass-ceramic with two distinct crystalline components, feldspar and kaolin.**

True or False
- 7. Nexus is the recommended dual cure bonding system to be used with which type of restoration?**
 - A. Concept
 - B. Optimal Pressable Ceramic
 - C. IPS Empress
 - D. BelleGlass
- 8. Finesse All-Ceramic restorations are fabricated with which technique.**
 - A. Pressable
 - B. Foil
 - C. Refractory
 - D. CAD/CAM
- 9. Which composite, ceromer, or polymer ceramic restoration utilizes multifunctional methacrylates for three-dimensional highly cross-linked structures?**
 - A. ArtGlass
 - B. Concept
 - C. BelleGlass
 - D. Targis Vectris
- 10. Bevel finish lines are recommended preparations for full coverage IPS Empress restorations.**

True or False
- 11. Herculite composite restorations are recommended only for posterior applications.**

True or False
- 12. The use of a Vectris framework in a Targis/Vectris restoration improves the flexural strength to approximately**
 - A. 100 MPa
 - B. 500 MPa
 - C. 1000 MPa
 - D. 1500 MPa
- 13. The coping for a Procera AllCeram restoration is fabricated by scanning a trimmed die into a computer and sending the information to a production facility via modem.**

True or False
- 14. Aluminum oxide-based restorations should be etched prior to insertion.**

True or False
- 15. The Vectris framework in a Targis/Vectris restoration is offered in five shades.**

True or False
- 16. It is recommended that all composite, ceromer or polymer ceramic restorations be placed using contemporary bonding and resin luting techniques.**

True or False
- 17. Acceptable margin preparation for a Sculpture FibreKor restoration is a**
 - A. Bevel
 - B. Chamfer
 - C. Shoulder
 - D. Chamfer or Shoulder
- 18. Inceram, Inceram Spinell, Cerinate and Fortress are fabricated using the Foil/Refractory technique.**

True or False
- 19. A 2 mm shoulder preparation is ideal for all ceramic restorations.**

True or False
- 20. Procera AllCeram is an all-ceramic restoration which uses CAD\CAM technology.**

True or False

- 21. Which bonding system is recommended by the manufacturer of Cerinate to place its restorations?**
- Nexus
 - All Bond 2
 - Ultra-Bond
 - Lute-It
- 22. Which all-ceramic system can be used to fabricate laminate veneers without tooth preparation according to the manufacturer instructions?**
- Inceram
 - Procera
 - Cerinate
 - IPS Empress
- 23. High gold content substructures, which can improve PFM aesthetics by emitting a yellow color under the veneering porcelain, can be fabricated with which technology.**
- Conventional casting
 - Capillary action
 - Electroforming
 - All the above
- 24. The Fortress all-ceramic system obtains its strength from**
- Patented pressing process
 - 1 to 2 μm feldspathic particles
 - CAD\CAM sintering process
 - 3 to 4 μm lucite particles
- 25. Which all-ceramic systems utilize the lost-wax technique the fabrication process?**
- IPS Empress
 - Procera
 - Optec-hsp
 - B&C
- 26. Which composite, ceromer, or polymer ceramic restoration cannot be used in conjunction with metal reinforcement?**
- ArtGlass
 - Concept
 - BelleGlass
 - Targis
- 27. Most indirect composite resin systems are highly filled microhybrid composites.**
- True or False
- 28. The flexural strength of Vita Inceram restorations**
- Exceeds 1000 MPa
 - Is less than 300 MPa
 - Exceeds 400 MPa
 - Is less than 400 MPa
- 29. Vita Inceram restorations should be etched with 15% phosphoric acid prior to insertion.**
- True or False
- 30. Which restoration has porcelain matched to the Vita 3D Master shade guide?**
- IPS Empress
 - Inceram Spinell
 - Procera
 - None
- 31. Despite being an all ceramic material, Vita Inceram does not allow light to be transmitted to underlying tooth structure.**
- True or False
- 32. All-composite, ceromer, and polymer ceramic restorations match both the Vita Lumin shade guide and the Chromascop shade guide.**
- True or False
- 33. Inceram is more aesthetic than its predecessor, Inceram Spinell.**
- True or False
- 34. Procera AllCeram is a magnesium oxide based material.**
- True or False
- 35. The strongest all-ceramic system fabricated by Vita/Vident is**
- Inceram Zirconia
 - IPS Empress
 - Cerinate
 - Inceram
- 36. The only composite, ceromer or polymer ceramic restoration which achieves a 98.5% cure in a nitrogen atmosphere is**
- ArtGlass
 - Concept
 - BelleGlass
 - Herculite
- 37. Which cement can be used for the placement of Procera AllCeram restorations?**
- Glass ionomer
 - Zinc Phosphate
 - Resin glass ionomer
 - All
- 38. Panvia 21 is specifically recommended for which metal-free systems?**
- Inceram
 - BelleGlass
 - Procera
 - A&C
- 39. Concept is the only composite, ceromer or polymer ceramic restoration which is cured extraorally using heat and pressure.**
- True or False
- 40. Targis should not be used for the fabrication of laminate veneer.**
- True or False

Please circle your answer.

1. A B C D
2. A B C D
3. A B C D
4. TRUE FALSE
5. A B C D
6. TRUE FALSE
7. A B C D
8. A B C D
9. A B C D
10. TRUE FALSE
11. TRUE FALSE
12. A B C D
13. TRUE FALSE
14. TRUE FALSE
15. TRUE FALSE
16. TRUE FALSE
17. A B C D
18. TRUE FALSE
19. TRUE FALSE
20. TRUE FALSE
21. A B C D
22. A B C D
23. A B C D
24. A B C D
25. A B C D
26. A B C D
27. TRUE FALSE
28. A B C D
29. TRUE FALSE
30. A B C D
31. TRUE FALSE
32. TRUE FALSE
33. TRUE FALSE
34. TRUE FALSE
35. A B C D
36. A B C D
37. A B C D
38. A B C D
39. TRUE FALSE
40. TRUE FALSE

Aesthetic Indirect Restorative Options

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