IPS d.SIGN® & IPS EMPRESS®

Treatment and Material Considerations for Veneer Restorations

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Indirect veneers have become a mainstay of the modern dental practice for restoring missing tooth structure and enhancing aesthetics while preserving function. Whether performed for aesthetic and/or functional reasons, ceramic has become the predominant material of choice for these restorations. The subsequent evolution of adhesive materials and techniques with improved bond strengths, composition, handling properties, and aesthetic qualities has increased the success, predictability, and demand for such treatment. While ceramic veneers were traditionally fabricated using feldspathic porcelain, pressed or layered glass-ceramic systems often provide a more suitable treatment option when the inherent properties of the material are considered.

Material Selection

The new IPS d.SIGN® ceramic (Ivoclar, Amherst, NY) is a preferable alternative to the use of conventional feldspathic ceramics when refractory die or platinum foil techniques are used for veneer fabrication. IPS d.SIGN is an innovative glass-ceramic system composed of fluorapatite and leucite crystals combined in a glassy matrix. Its needlelike crystalline structure closely mimics tooth enamel, which enhances aesthetics and reduces the potential of wear to the opposing natural dentition. IPS d.SIGN ceramic is one component of a complete metal-ceramic system that includes IPS d.SIGN alloys and ceramic.

IPS Empress® (Ivoclar, Amherst, NY), with over a decade of clinical success, is a leucite-reinforced pressed glass-ceramic material that utilizes the lost wax technique for its fabrication. The ideal contour of the final restoration is waxed, then pressed from a variety of shaded ingots for proper color. This substructure is either stained or cut back and layered to provide multidimensional aesthetics and unsurpassed marginal fit. IPS Empress is part of the IPS Empress System, which is indicated for veneers, inlay/onlay, full-coverage crown, and multiple-unit restorations utilizing the IPS Empress®2 material.

Treatment Planning

Selection of the restorative material is generally a matter of clinician and laboratory technician preference. The preparations for both options are virtually identical, although IPS d.SIGN veneers can be slightly thinner (minimum of 0.5 mm). While the IPS Empress veneers require a minimum pressing thickness of 0.8 mm, the coping itself can be thinned to 0.6 mm. In either instance, additional preparation thickness may be necessary to address aesthetic or functional concerns. General preparation guidelines and margin placement are all material-independent variables.

IPS d.SIGN veneers may be recommended if subsequent metal-ceramic work is warranted, as the same ceramic can be used for all restorations. If the underlying tooth structure is healthy and of a complementary shade, IPS d.SIGN veneers can minimize tooth reduction facially. IPS Empress veneers may be indicated where additional strength is necessary to lengthen incisal edges or used when additional metal-free restorations will be placed. Since the IPS Empress technique includes a preliminary full-contour waxup during fabrication, it may prove beneficial in the treatment of patients with functional concerns, where contours and contacts can be closely monitored.

The following presentation provides a comparison of the treatment planning, preparation, and seating procedures used for each material and demonstrates how each provides outstanding aesthetic and functional results.

Try-in demonstration of IPS d.SIGN® and IPS Empress® veneers on a patient's maxillary left and right anterior teeth, respectively. Note similar aesthetic control achieved with both ceramic materials.

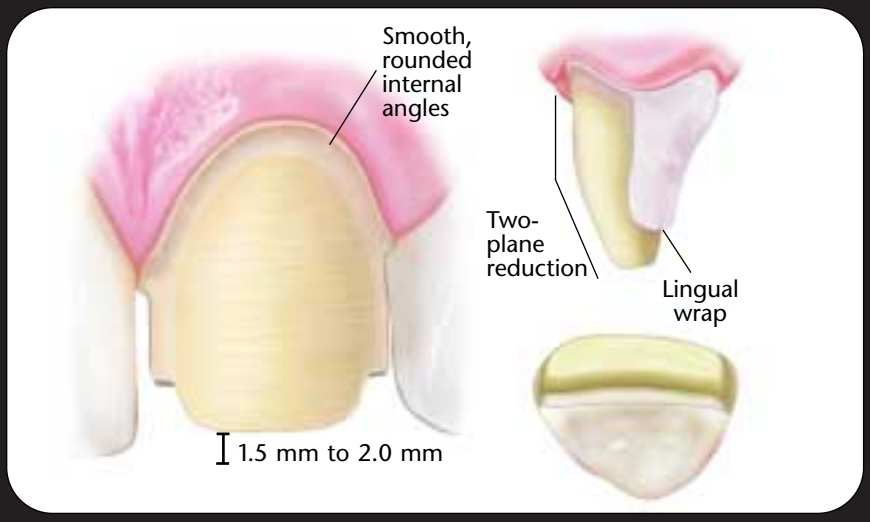
IPS Empress® and IPS d.SIGN® Veneer Preparation Guidelines

1. *Facial Depth Cuts. A 0.5 mm or 0.8 mm depth-cutting bur (868A-021 or 868A-034, Axis by NTI, Irving, TX) is used to establish guidelines for reduction. A round bur (801-016) or similar diameter is used to generate a marginal outline that follows the natural gingival contours.*

2. *Uniform Facial Reduction. A round-ended diamond bur is used to remove a uniform thickness of enamel by joining the depth-cut grooves. Additional preparation thickness is often necessary to address aesthetic, functional, or laboratory concerns.*

3. *Incisal Edge Reduction. The incisal edge is reduced (850-016C, Axis by NTI, Irving, TX) 1.5 mm to 2 mm to allow for aesthetic and functional transitions that result in a lingual wrap. If "black triangles" are present or the veneer must be extended interproximally, interproximal contacts are broken.*

4. *Two-Plane Reduction. The incisal third is prepared faciolingually to establish two-plane reduction. All preparation areas (including the chamfer) are smoothed (850-016F, Axis by NTI, Irving, TX). Slight thinning of the "neck" provides the technician with adequate clearance to restore ideal contour in the definitive restoration.*



5. *The final preparation design must achieve adequate facial reduction, incisal reduction, rounded internal aspects, chamfer margins, and two-plane reduction. A lingual wrap design is preferred to support, restore, and facilitate aesthetics in the incisal edge of the restoration.*

A 32-year-old female patient presented with wear on the incisal edges of teeth #6 through #11, which resulted in a slanted occlusal plane and discrepancies in centric occlusion. The patient requested aesthetic enhancement using porcelain veneers, which would require minimal tooth preparation.

Complete clinical, radiograph, and temporomandibular joint examinations were performed preoperatively to assess the extent of the patient's parafunctional habits. Occlusion was equilibrated (centric occlusion = centric relation); embrasure forms were virtually nonexistent.

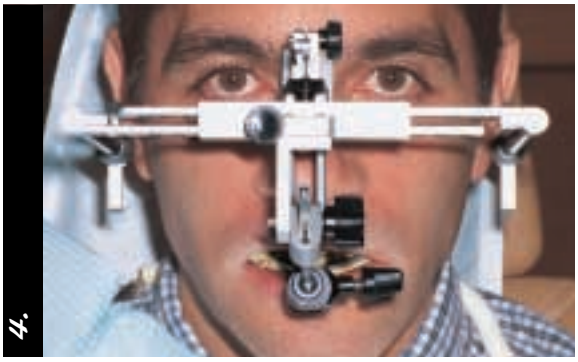
Teeth #6 through #11 were reduced approximately 0.5 mm facially using a depth-cutting bur, since the underlying color was acceptable. Incisal reduction was also performed with a diamond bur in a midrange handpiece to provide space for the final restorations.

A 38-year-old male patient presented with unaesthetic direct composite resin restorations on teeth #6 through #11. A treatment plan that featured pressed ceramic veneers would be used to address the extreme discoloration of the underlying tooth structures on the maxillary and mandibular arches.

Prior to treatment, the patient was equilibrated into centric relation. Once proper occlusion had been verified and radiographs were taken, a complete periodontal examination was performed. This analysis confirmed the presence of healthy gingival tissue.

These IPS Empress® (Ivoclar, Amherst, NY) veneers required facial and incisal reduction of 0.8 mm and 1.5 mm, respectively. All point angles and sharp edges were rounded to prevent the fracture of the restorations. A chamfer margin was also placed supragingivally.

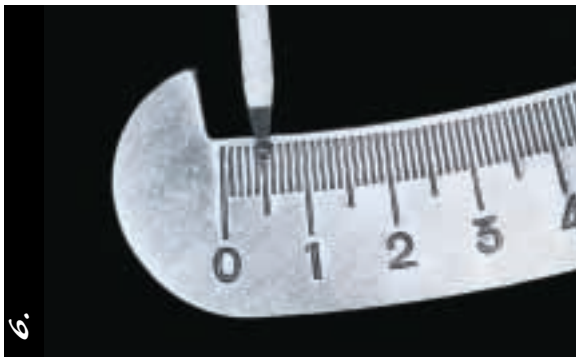
In combination with various additional diagnostic measures (eg, full photographic series, Universal Transferbow, and models), a stick-bite impression was obtained. This would be utilized to evaluate the patient's incisal plane in relation to the interpupillary line.



Full-arch impressions, bite registrations, and related diagnostic materials (eg, stick bite, Universal Transferbow) were obtained and forwarded to the laboratory to permit proper orientation of the models on the Stratos™ 200 Articulator (Ivoclar, Amherst, NY) and a full-contour waxup for the pressed ceramic restorations.

The shade of the abutments was recorded and forwarded to the laboratory. Acrylic resin provisional restorations were fabricated chairside using a silicone stent (Sil-Tech®, Ivoclar, Amherst, NY) and seated with an unfilled resin to maintain the position of the intraoral structures.

In order to facilitate proper color communication between the members of the restorative team, the shade of the preparations was recorded (IPS Empress® Die Material Shade Guide, Ivoclar, Amherst, NY) and forwarded to the laboratory via color photographs and a detailed color map.



The conservative preparation design allowed the fabrication of thin, characterized veneers (IPS d.SIGN®, Ivoclar, Amherst, NY) that would exhibit the proper translucency and value postoperatively. A caliper was utilized to measure the provisional restorations to verify the 0.5 mm extent of the preparation.

Based on the diagnostic waxup provided by the technician, acrylic resin (shade A1) provisional restorations were fabricated using a silicone stent (Sil-Tech®, Ivoclar, Amherst, NY). These restorations were sectioned and removed upon receipt of the definitive veneers from the laboratory.

In the laboratory, a master model was poured in stone and magnetically mounted on the articulator (Stratos™ 200, Ivoclar, Amherst, NY). A refractory model was also created for use in the fabrication of fluorapatite ceramic veneers (IPS d.SIGN®, Ivoclar, Amherst, NY).

The veneers were tried in for fit and color and then treated with phosphoric acid and a silane coupling agent. The preparations were isolated, cleansed, and etched with phosphoric acid (Total Etch™, Vivadent, Amherst, NY) for 15 seconds according to the "total-etch" technique.

Once the veneer restorations had been properly layered, fired, and glazed, glass beads were used to remove all refractory ceramic materials. Innate color characterizations, optical effects, and natural morphology were evident in the veneers.

Following the completion of the total-etch procedure, an adhesive agent (Excite®, Vivadent, Amherst, NY) was applied with a light scrubbing motion for 10 seconds on each prepared tooth. The adhesive agent was then gently air thinned to prevent any excess from pooling.

The definitive restorations were finished and polished; the marginal fit of the restorations was also assessed and adjusted as necessary. The preparation of the anterior teeth permitted sufficient space for the fabrication of veneers with a lingual wrap design.

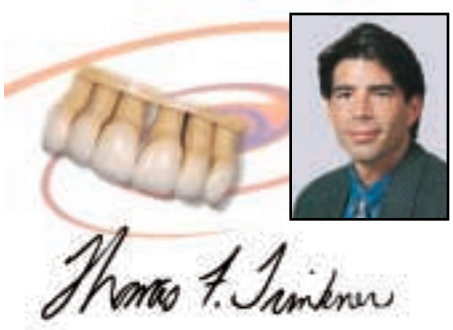
Once 20 seconds of halogen light polymerization was completed, the veneers were seated with light-cured resin cement (Variolink® II, Vivadent, Amherst, NY). The restorations were cured, and excess cement was removed. The veneers were polished to enhance their final luster.

An adhesive agent (Excite®) was applied to the preparations; the veneers were cemented with a dual-cured resin (Variolink® II, Vivadent, Amherst, NY). Enhanced luster and surface texture were evident in the definitive restorations (IPS d.SIGN®), which were well integrated with the existing gingival architecture.

Occlusion was modified as necessary. Utilized with the proper shade of light-cured resin cement, the definitive veneer restorations (IPS Empress®, Ivoclar, Amherst, NY) were harmoniously integrated with the gingival tissue and exhibited natural color and morphology.

The improved aesthetics of the definitive layered glass-ceramic restorations—which allowed the layering of numerous color characterizations—were directly related to proper communication between the members of the restorative team. (Laboratory Work: Matt Roberts, Idaho Falls, ID.)

The natural appearance and characterization of the definitive restorations were attributed to the composition of the ceramic material and the strict treatment protocol that was maintained. (Laboratory Work: Lee Culp, Bradenton, FL.)



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