One step closer to nature: Imitating natural optical properties using lithium-disilicate restorations

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Fig. 1

Fig. 2

Figs. 1 & 2_Pre-op 1:2 view showing discoloured temporary repairs to the central incisors.

_**The dental laboratory industry** has searched for a material that is structurally sound and highly aesthetic. This material is now available in lithium-disilicate glass ceramic (IPS e.max Press, Ivoclar Vivadent), which is a material like no other in dentistry. The IPS e.max Press lithium disilicate is the first structural (long-lasting) material that is aesthetic, even without layering, when its High Translucency ingots are used.

Its high strength comes from the lithium-disilicate crystals. The IPS e.max lithium disilicate is composed of quartz, lithium dioxide, phosphoric oxide, alumina, potassium oxide and other components. Overall, this composition yields a glass ceramic that shows low thermal expansion when it is processed.

Polyvalent ions dissolved in the glass provide the desired colour of the lithium-disilicate material. These colour-releasing ions are homogeneously distributed in the single-phase material, resulting in the elimination of colour pigment imperfections in the microstructure.

With its four levels of opacity and translucency —High Opacity, Medium Opacity, Low Translucency and High Translucency—IPS e.max Press enables laboratory ceramists to satisfy different aesthetic demands and deliver a beautiful and strong restoration. Overall, these materials demonstrate specific advantages, such as higher edge strength versus traditional glass-ceramic materials (can be finished more thinly without chipping); the low viscosity of the heated ingot, which enables pressing to very thin dimension (enabling minimal preparation or no-preparation veneers); and a chameleon effect owing to higher translucency. In some cases, minimal tooth preparation is needed (for example, thin veneers) and IPS e.max lithium disilicate enables restorations to be pressed as thin as 0.3 mm, while still ensuring strength of 400 MPa.

This article guides readers through the process of accurately maintaining the incisal edge position, length, shape and contour of provisional restorations when fabricating final IPS e.max Press anterior restorations. Additionally, if one were to

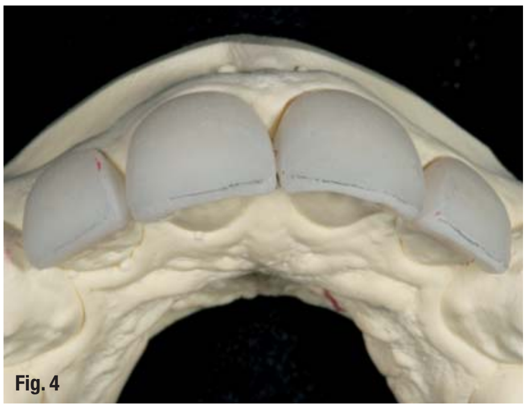

Fig. 3

Fig. 4

Fig. 3_An approved model of the provisional restorations was perfected by adding wax and reducing stone.
Fig. 4_The facial incisal area was bevelled back 0.5 mm using a contour stone.

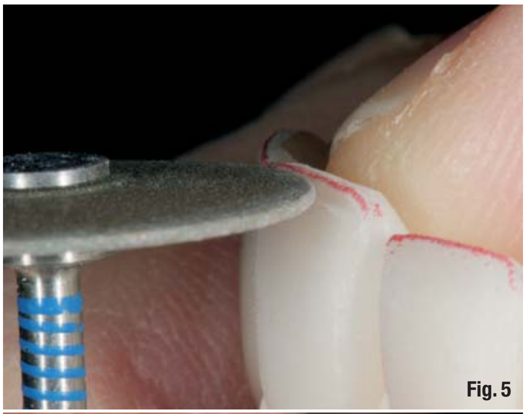

Fig. 5

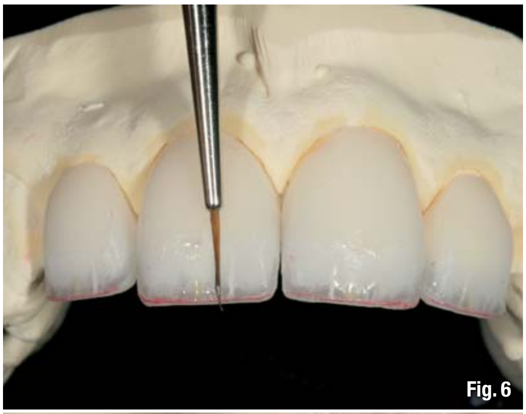

Fig. 6

Fig. 7

Fig. 8

Fig. 5_An undercut was made inside the silhouette of the incisal half to ensure the establishment of a halo effect.

Fig. 6_After smoothing out the incisal facial area, grey, vanilla and salmon stains were applied to create internal effects, then fired.

Fig. 7_IPS e.max OE4 was placed to shape the internal lobe structures. They were feathered out after being formed.

Fig. 8_To reproduce a natural halo effect, IPS e.max MM Light was added.

take the enamel (0.5 mm) off a natural tooth, the internal dentine effects would be visible. The technique described here also provides a step-by-step guide to precisely mimicking these internal effects. By enamelling over these effects quickly and accurately, the restoration can be returned to full contour, while including natural optical effects and segmenting both high- and low-value enamels.

_Case presentation

A 19-year-old male patient wished to improve the overall appearance of his smile (Figs. 1 & 2). As a child, he had chipped both central incisors and needed several temporary repairs that were performed by a dentist over the years.

The patient underwent a thorough examination. To ensure proper shade matching and design of the restorations, a complete laboratory aesthetic prescription, detailed shade mapping, alteration of the type of light source used to take the shade, the amount and colour of the incisal translucency, and surface texture were obtained and recorded.

An approved model of the provisional restorations was perfected by adding wax and reducing stone (Fig. 3). With a pair of dividers, the exact lengths were verified using a model of the provisional restorations.

After the facial incisal edge had been out-lined using a red pencil, a 0.3 mm lead pencil line was placed 0.5 mm lingually. A contour stone (Komet 9001,

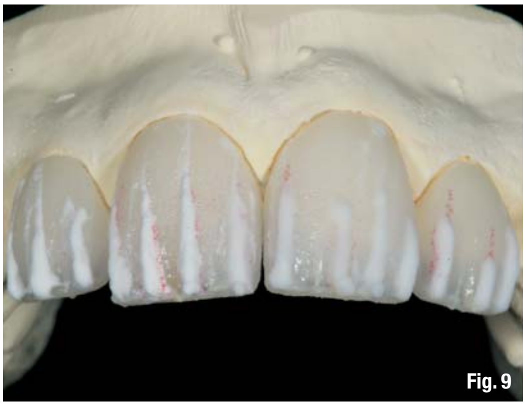

Fig. 9

Fig. 10

Fig. 9_IPS e.max OE3 was applied in thin segments to the line angles and strategic places.

Fig. 10_The IPS e.max TI1 was built in flush with the previously fired OE3 height of contour and high-value segments to full contour.

Fig. 11_A coarse rubber wheel was used to re-establish the deflective zones and redefine the line angles.
Fig. 12_Completed restoration on the model.


Fig. 11


Fig. 12

Komet) was used to bevel the facial incisal edge back 0.5 mm (Fig. 4). The value was drawn in and a centred diamond disc (Komet K6974) was used to carefully cut in the value area, making certain that a halo effect was established (Fig. 5).


Fig. 13


Fig. 14

Figs. 13 & 14_Post-op 1:2 view of the patient's new smile.

Using a contour stone (Komet 9001), the incisal facial area was smoothed out to create a canvas for the internal effects. To create the internal effects, grey, vanilla and salmon IPS e.max Essence stains were applied and fired (Fig. 6).

IPS e.max Opal Effect 4 (OE4) was placed to shape the internal lobe structures softly. Once the internal lobes had been formed, they were feathered out (Fig. 7). IPS e.max Mamelon (MM) Light was added to reproduce a natural halo effect (Fig. 8). After a thorough and careful evaluation, the external effects were fired.

A red pencil was used to identify the line angles, as well as places for a segment of high-value powder. IPS e.max Opal Effect 3 (OE3) was applied to the line angles in thin segments, as well as to strategic places, to achieve a natural optical effect and re-establish the heights of the contour (Fig. 9).

The segments of IPS e.max OE3 were built to 0.5 mm, which was the exact thickness of the initial facial cut-back, making it faster and easier to return to the original full contour. IPS e.max OE3 was fired to ensure that the high-value segments mimicked the enamel optics found in the natural teeth, after which the IPS e.max Transpa Incisal 1 (TI1) was built flush with the previously fired OE3 height of the contour and high-value segments to full contour (Fig. 10).

The restorations were bisque baked. Then, after using a diamond bur (Komet 842R) to smooth the facial surface, a coarse rubber wheel (Komet 9472C) was used to re-establish the deflective zones and redefine the line angles (Fig. 11). The facial lobes were recreated with a diamond bur (Komet 842R) after the desired amount of perikymata had been added with a diamond bur (Komet 850 016). The restorations were then glazed and polished.

_Conclusion

Today's patients have become increasingly more Internet savvy, demanding higher aesthetics and longer-lasting restorations. In my opinion, IPS e.max Press offers the ceramist—for the first time in the history of this industry—a restorative material that is both beautiful and incredibly strong. It surpasses our patients' expectations, as demonstrated in the case illustrated here (Figs. 12–14).

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