What happens after pressing?

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Monolithic restorations made of lithium disilicate are characterized by high flexural strength, precision fit and optimum function. Lithium disilicate is a very popular material, since it is "antagonist-friendly" and easy to use.

Monolithic lithium disilicate (IPS e.max®) restorations have become an established component of routine dental laboratory work. They offer the following benefits:

- precision replication of a wax model in ceramic
- possibility of creating a biomechanical occlusal surface with the wax-up technique
- no risk of chipping
- recreation of anatomical details even if space is limited
- efficient fabrication.

In the fabrication of monolithic restorations, dental technicians benefit from having the possibility of optimally recreating the individual tooth shape and the functional parameters with the wax-up technique. The waxed-up model is subsequently rendered in ceramic by using the hot-press technique or in a CAD/CAM-based process. In both methods, a copy is made of the waxed-up restoration. Nevertheless, I believe that the press method offers the more precise route. In this article, this procedure is described on the basis of an upper posterior crown.

The wide range of IPS e.max Press ingots allows the brightness and opacity of the restoration to be chosen carefully. In our laboratory, we tend to use ingots that demonstrate a relatively high level of brightness. These ingots include Impulse V 1-3 ingots and HT ingots in shade BL3, B1 and A1.

The surface staining of the restorations after they have been hot-pressed allows the chroma and basic colour of the natural teeth to be imitated with IPS e.max Ceram Shades and IPS e.max Ceram Essence materials. Final glaze firing with fluorescent glazing paste (IPS e.max Ceram Glaze FLUO) produces a homogeneous surface and individualized gloss.

Figures 1 and 2: Faithful copy of the original tooth in wax.

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Figure 3: Reproduction of the wax model with lithium disilicate (HT ingot, shade BL3).

Figure 4: Determination of the basic shade with IPS e.max Ceram Shades.

Figure 5 and 6: Result after the second stains firing cycle.

Hot-pressing of the restoration

All the functional and anatomical details of the restoration were waxed-up according to morphological criteria using a special wax for the hot-press technique (ProArt®) (Figures 1 and 2). The sprues were placed and the wax-up was invested. Then the selected ingot was pressed into the mould. The restoration was divested and the sprues were cut according to the instructions of the manufacturer. In ideal cases, only minimal adjustments, if any, need to be made on the pressed restorations (Figure 3).

A precision wax-up is requisite for the detailed reproduction of tooth structures in ceramics.

Individualized surface staining

In order to adjust the shade of the crown, the use of a tooth-coloured acrylic resin die is recommended. The die is fabricated on the basis of the shade of the natural, prepared tooth. For this purpose, the inner surface of the crown is isolated with petroleum jelly and then the acrylic resin is applied with a brush. A plastic stick is useful for holding the restoration. Glycerine gel can be used to prevent the crown from detaching from the die. In addition, this type of gel provides a shade transition between the die and the crown.

In a first step, the body of the tooth and the chewing surface were characterized with IPS e.max Shades that had been modified with Essence materials. It is advisable to apply the stains when the crown is dry to prevent the materials from running. Next, fine colour nuances were

applied to the cusps with IPS e.max Ceram Shade I-2 and the marginal ridges with IPS e.max Ceram Essence creme (Figure 4). The characterized restoration was then fired. Subsequently, the basic colour and chroma were checked and intensified as required.

A second firing is necessary to ensure the precise placement of the stains. The fossa was accentuated with Essence copper and the deepest point was highlighted with Essence mahogany (Figures 5 and 6).

Once all the colour details had been placed, the restoration was ready for glaze firing. For this purpose the FLUO glazing material was applied from a syringe and spread onto the dry chewing surface (Figure 7). It is not advisable to use a very liquid consistency in occlusal areas, since fissures and important details may be lost. However, the glazing material for the sides of the crown should be relatively fluid and applied with a fine brush (Figure 8). The coating should be very thin and even (Figures 9 and 10). Then the restoration was glaze fired with a two-minute holding time and longterm cooling to 450 °C (Figure 11). Generally speaking, long-term cooling is recommended to prevent any build-up of tension.

After glaze firing, any irregularities were removed with a rubber wheel and the restoration was polished with diamond polishing paste (Figure 12). When monolithic crowns are fabricated in conjunction with layered crowns – mainly in the anterior region – the labial transition is characterized or adjusted with a thin layer of dentin and incisal material. Additionally, a morphological texture can be incorporated into the surface. These parts, however, should not be glazed. They should simply be fired according to "atmospheric" techniques.

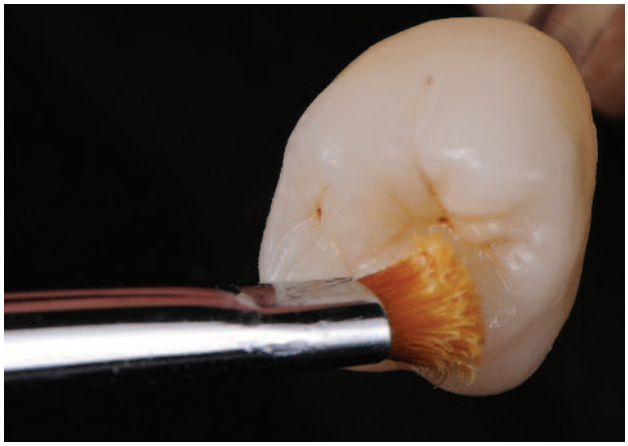

Figure 7: The FLUO glazing material is spread onto the dry chewing surface.

Figure 8: The sides of the crown are coated with a liquid glaze.

Figures 9 and 10: The crown coated with glaze before firing.

Figure 11: The crown after glaze firing.

Figures 13 to 15 show monolithic restorations for an entire quadrant. The restorations were fabricated following the same procedure as the one described above.

Conclusion

The monolithic approach with lithium disilicate allows the waxed-up posterior restoration to be reproduced in ceramic most efficiently. The risk of chipping is eliminated. Furthermore, fine anatomical details can be recreated even if space is limited. The different ingots and individual staining materials ensure customized, esthetic results.

Acknowledgement

This article describes the laboratory steps involved in the fabrication of a hot-pressed monolithic posterior restoration. In conclusion, I would like to highlight the importance of the smooth collaboration between the dental technician and the attending dentist, without which, work of the kind described in this article would not be possible. In this case, I would like to thank Prof. Dr Daniel Edelhoff (LMU Munich).

Figure 12: Polishing with a diamond polishing paste produces the desired even gloss.

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Figures 13 to 15: This restored dental quadrant featuring monolithic restorations represents a symbiosis of form and function with excellent mechanical and esthetic properties (clinical work: Prof. Dr Daniel Edelhoff).