initial LiSi Press

Initial™ LiSi Press for all ceramic restorations on discoloured preps

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Stefan Roozen was born in Tyrol in 1980. In 1995 he began his training as a dental technician, graduating in 1999 in Salzburg. Since then he attended numerous training courses at home and abroad. In 2001 he started at Pils Zahn-technik GmbH where he still works today as laboratory manager and deputy of the management. In 2002, he attended the master school in Baden / Vienna, where he graduated in 2003 as a master. His main areas of work are complex prosthetic reconstruction (tooth and implant supported), demanding restorations in the aesthetic and functional area. He is the author of several international publications, external speaker at the Austrian master school, speaker and co-speaker at international course and congress events focusing on fixed reconstructions, Ceramic, implantology, prosthetics and CAD-CAM.

Lithium disilicate offers us exceptional possibilities for the fabrication of natural looking dentures.
In addition to its high degree of stability, the ability of this material to transmit light is what makes it so valuable. The ceramic shoulder on conventional metal ceramic crowns is a good example of the enormous aesthetic gains that can be obtained by increasing light transmission. For example, lithium disilicate exhibits positive cosmetic results, even when applied monolithically, as is done with fully anatomical restorations, particularly in the posterior region.

GC Initial LiSi veneering ceramic is optimal for refining or veneering in the anterior region. The cutback technique offers a good combination of stability and high aesthetic value for this. The crown's fully anatomical design, pressed with MT (Medium Translucency), slight vestibular reduction, lustre pastes and minimal GC Initial LiSi veneering ceramic overlays, is highly efficient. The use of these variants allows the underlying tooth substance to remain a cosmetic part of the crown without being covered by a light-blocking framework. However, the stumps must not be strongly discoloured.

Medium Opacity (MO) frameworks are generally used to compensate for dark substrates. However, this opaque compact must be covered with veneering ceramics and cannot be fully contoured.

The following case study describes the procedure for an all ceramic restoration with GC Initial LiSi Press (a lithium disilicate glass ceramic) on a strongly discoloured prep.

The initial situation

The young patient complained about the aesthetically unpleasant appearance of her Zr crown 21.
The previous restoration did not match the shape and colour, and the cervical area in particular seems too opaque.
A common phenomenon with zirconia is the unnatural emission of the material into the marginal gingiva.

Fig. 1: The previous Zr crown on 21.

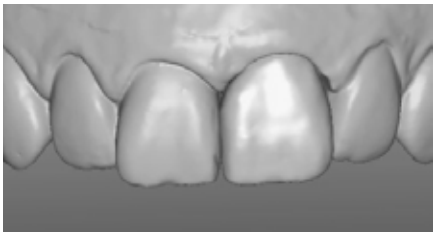
Fig. 2: The dark prep became visible after the crown was removed.

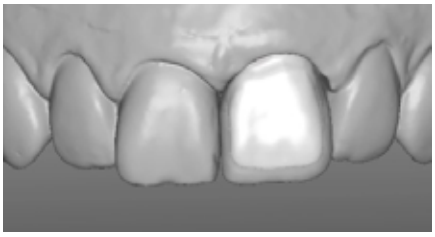
In this case, the degree to which the gingiva in the cervical areas of the natural teeth exhibited a reddish radiation was particularly visible. Little consideration was given to this effect with the previous restoration.

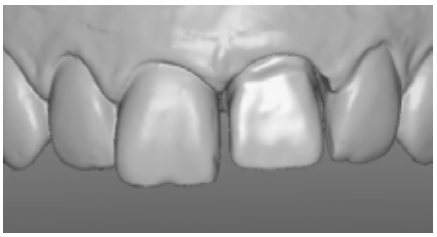
Fig. 3a: Red colouration in the cervical area of natural tooth 11 (compare with colour pattern A1).

Fabrication of the framework

Fig. 4: Production of the wax cap with CAD/CAM.







The crown was removed, prepared once again and moulded. After the model was created, the wax cap was fabricated using CAD/CAM.

The object was pinned according to procedure. Additional air channels were installed to prevent air compression in the marginal area and, therefore, potential inaccuracies in the subsequent pressing result. The surface was sprayed with SR Liquid and then invested with LiSi PressVest (fig 5). After a setting time of approximately 20 minutes, the muffle was placed in the preheating oven. The higher the temperature to which the phosphate-bonded investment is heated, the higher the compressive strength it develops. Therefore, the initial oven temperature was 900°C and was lowered to 850°C after the muffle was inserted.

It is important to install the investment using the fast heating process, as this leads to a relatively constant expansion. This is because, among other things, conventional slow heating leads first to expansion (cristobalite transformation at approx. 250°C) and then to contraction (due to the decomposition of ammonium phosphate at approx. 350°C). The repeated expansion and contraction of the material thus promotes the formation of small cracks.

The shade selected for the pressing material was ingot MO0; this selection was based on the contrast between the black discolouration of the stump and the light target colour. This is perfect for the layering technique with high fluorescence and a high brightness value. It has an excellent covering capacity due to its relatively high opacity.

After pressing and cooling, the object was blasted with glass beads. GC Initial LiSi Press has almost no reaction layer; therefore, the need for acidification is eliminated. The result is a very homogeneous surface with an excellent fit (fig. 7& 9).

Fig. 5: The prepared wax object for investing with LiSi PressVest (according to the method of Toshio Morimoto, Osaka).

The ability of this material to reproduce a natural fluorescence is unique and adding extra fluorescense is not a prerequisite as it is the case with other framematerials. This yields restorations that are true to the natural model, wherein the fluorescence comes from deep inside the restoration (fig 8).

Fig. 6: GC Initial LiSi Press, with a flexural strength of > 500 MPa.

Fig. 7: The pressing gives a homogeneous result, and barely any reaction layer is formed.

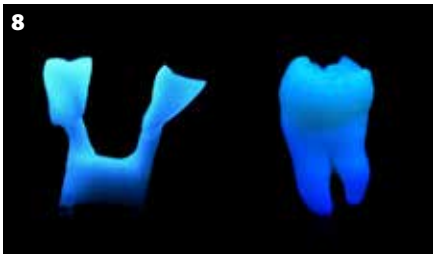


Fig. 8: The MO0 ingot exhibits very good fluorescence.

Fig. 9: Perfect edge fit of the pressed cap.

Wash firing

Fig. 10: We were able to cover the dark tooth prep with a cap thickness of approx. 0.9mm.

Fig. 11: The natural white framework on the working model.

Fig.12: Colouring and adjusting the colour with GC Initial Lustre Pastes NF.

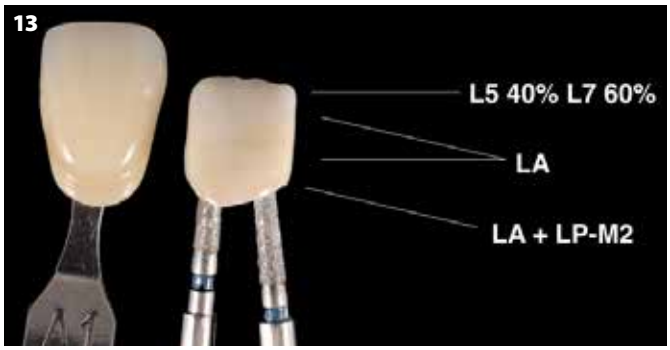


Fig. 13: Lustre with L-A: more depth effect was created in the incisal area with "violet"; the red value in the cervical area was increased by adding the LP-M2 (gum).

GC Initial Lustre Pastes NF were applied to the bare, white cap to adjust its base colour (fig 12).
For this purpose, we used L-N, a light lustre coating with L-A; in the incisal area, we used a mixture of L-5 and L-7. The redness in the cervical area was increased with LP-M2 to mimic the previously described radiation into the surrounding gingiva. It was important to allow only a slight hint of the actual colour, and not with too much intensity (fig 13). After firing in the oven, Glaze Liquid was applied once again and sprinkled with an FD-91 make-up brush. The excesses were blown off by mouth and burned. The result was a very dynamically active framework with established colour and a scattering of light on the surface (fig 15).

Fig. 14: Thin sprinkling of ceramic powder.

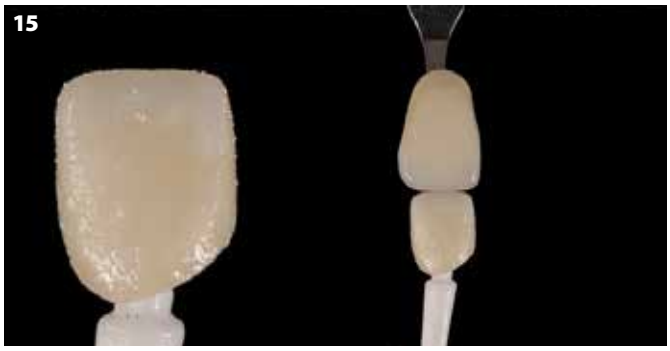


Fig. 15: The result after firing exhibited a dynamic surface with a nice colour.

Ceramic layering

We then proceeded to veneering using GC Initial LiSi veneering ceramic. INside Primary Dentin was used to achieve a relative chromatic effect from deep within the restoration. In this case, an additional 20% of Bleach Dentin was mixed into the IN-44 to increase its brightness slightly. The incisal third was processed with Fluo Dentin FD-91. This was followed by dentin that was mixed with neutral Transpa towards the incisal area to increase the depth effect. A mixture of E-58 and TN was applied to the incisal plate. This was wetted with a little staining liquid to enable the precise placement of the mamelon on it with FD-91. CL-F was thinly layered on the finished internal structure in order to mimic the sclerotic dentin layer. Bluish mesial and distal bands were applied with EOP-3. A subtle horizontal band was applied with EOP-2 to create more brightness. Cervical CT-21 and CT-22. The final shape was fully covered with Enamel E-58 and 25% EOP-2. Finally, to mimic the halo effect, a little more EO-15 was applied incisally. The layering was over-contoured accordingly to compensate for the sinter shrinkage.

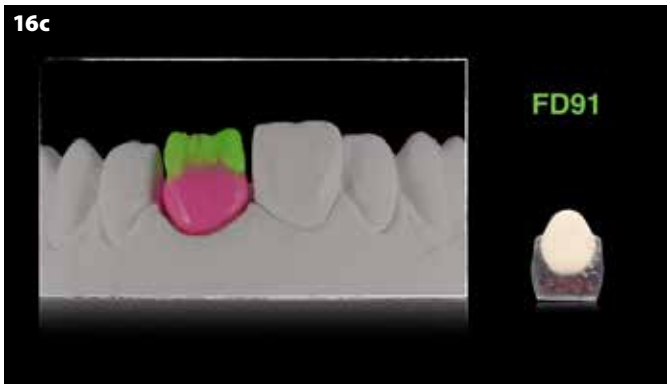
Special care had to be taken with the accuracy of the subsequent firing, as the firing window for lithium disilicate is very narrow. In general, no attempt was made to perform repeated firing cycles in order to obtain the best brilliance, colour and translucency.

The final shaping was followed by a soft, short glaze firing in which the surface pores were closed.

The degree of gloss was determined directly on the patient during the try-in of the crown and produced by mechanical polishing. This additionally solidified the surface and created a natural silk matte effect (fig 18-19-20).


16a

16b



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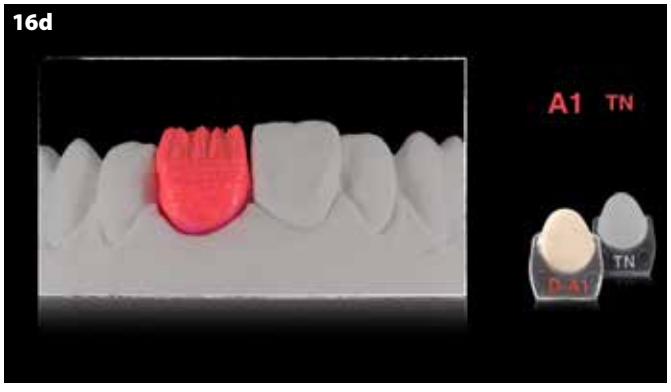

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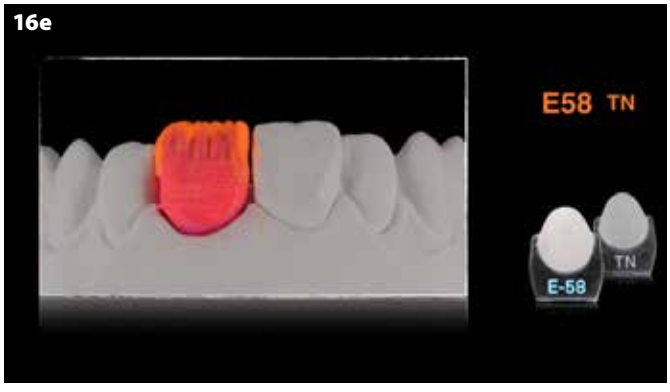

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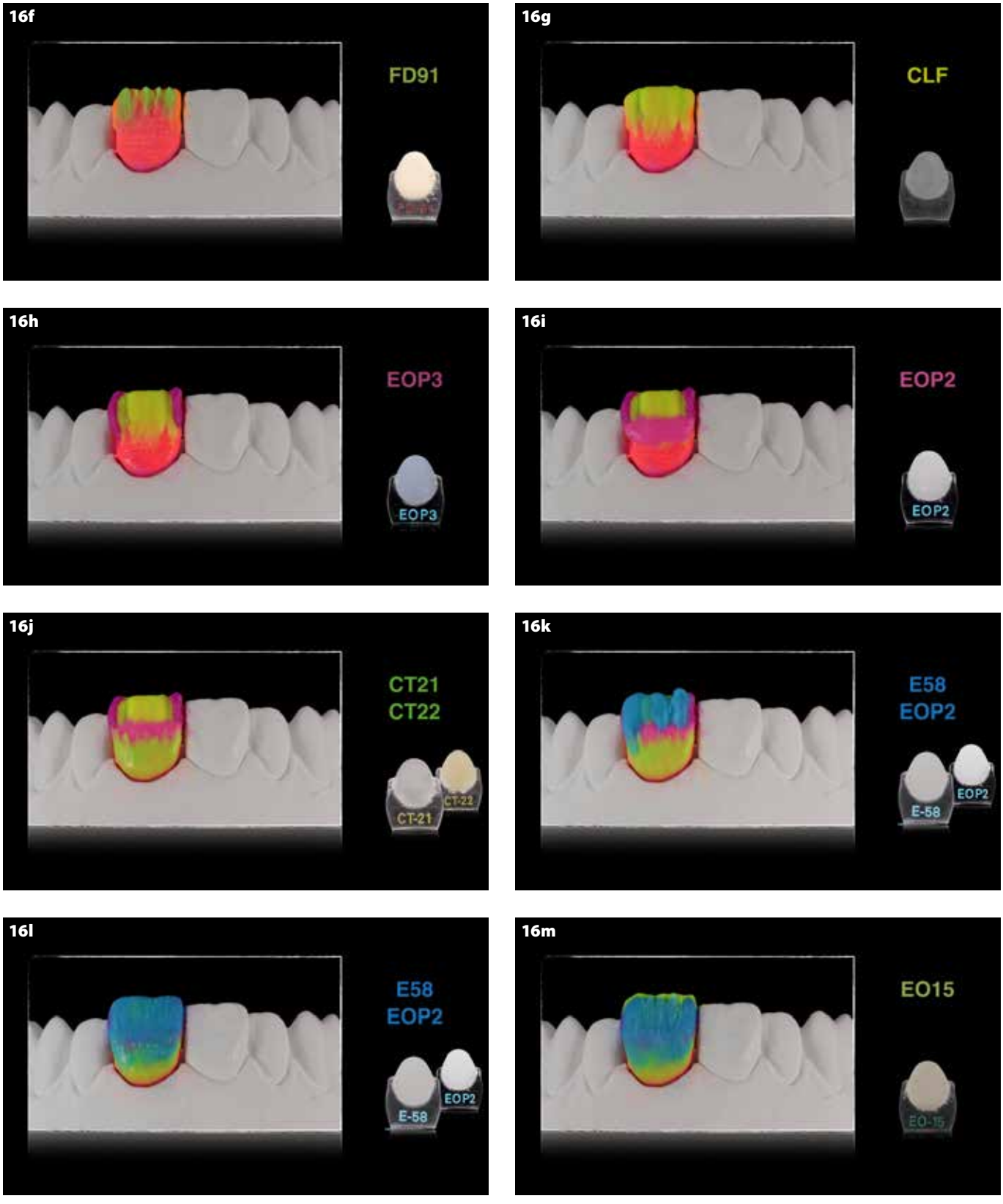

Fig. 16: The steps for layering with GC Initial LiSi veneering ceramic.

Fig. 17: The result after firing.

Fig. 20: The finished crown after glaze firing.

Figs. 18-19: Fitting and surface finishing.

Results and conclusion

After an evaluation and performance check of the restoration in the patient's mouth, some fine-tuning was performed and the crown prepared according to the protocol for cementation. Cementation completed the work process, the goal of which had always been to leave no visible traces of the effort and to achieve a good integration into the natural environment.

Despite the difficult initial situation, the right choice of materials made it possible to meet the patient's high aesthetic standards. The material components were perfectly matched to each other and thus offered a high degree of safety and efficiency in production.

The vitality and natural-looking fluorescence of GC Initital LiSi Press is outstanding. The flow of light through the entire crown into the sulcus area is also appreciable. This lightens it up and prevents grey shadows. The crown appears life-like and natural (fig. 21 & 22).

Figs. 21-22: The final result in the mouth.