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***Bob Bosman Elst** graduated in 1991 as a dental technician. While working at his own independent dental lab in Belgium, he has continuously been working on expansion and developing innovative techniques for the dental industry. Over the years, He has participated in more than 40 master-courses including those from Brüsch, Tyszko, Calgaro, Adolfi, Galle, Hegenbarth, Sieber, Polansky and many more, either as a lecturer or as an active participant. His work has been recognized by many in the field. In 2007, Bob won the '3rd Prize worldwide' (in the category 'Young Ceramics') during the world tour of Nobel Biocare in Las Vegas. He came in as the 1st European of all participants of this highly reputable event. He set up a helpdesk for dentists covering all aspects on implant-supported restorations and porcelain. In 2017, he became a trainer of the GC Europe Campus, where he found a perfect forum to share his passion and experience.*

TEAMPLAY with Initial LiSi

By **Tom Clauwaert** and **Bob Elst,** Belgium

A beautiful smile in harmony with a patient's facial features contribute to the self-esteem and general well-being of a patient. The final result should match the patient's expectations as close as realistically possible. This step-by-step case report shows how a careful planning, material selection and clear communication to the patient can maximise your outcome and patient's satisfaction.

A 40-year-old female patient who was unhappy with the appearance of her maxillary frontal teeth presented at the dental office. Clinical examination revealed severe erosion of the maxillary anterior teeth with loss of vertical dimension, in a pattern strongly suggestive for erosion by gastric acid (Figure 1). The patient had suffered from bulimia nervosa in the past.

Fig. 1a: Patient's smile

Fig. 1b: Mouth in rest

Fig. 1c: Vertical reduction of the frontal teeth by severe erosion.

Aesthetic treatment plan

For the aesthetic treatment plan, a series of pictures was made. A diagnostic wax-up in harmony with the natural setting and taking into account the patient's wishes was created in the laboratory. This wax-up was then transferred to an intraoral mock-up (Figure 2). Both the images and the intraoral mock-up enhance the communication with the patient on a mutual level: The patient will comprehend what is realistically possible at the end of their treatment plan. Influences on function, such as the phonetics are also evaluated in this stadium. On the other hand, they can express the changes they wish to see in more detail. A careful treatment planning is the best guarantee to keep your patient satisfied in the long term.

Fig. 2: Intraoral mock-up. a) frontal view; b) lateral view

Shade determination (Figure 3)

The ingot LiSi MT B2 was chosen for the framework. However, I (Bob Elst, ed.) personally find the choice of the enamel ceramics of much more importance. The Initial Ceramic line offers a wide range of enamel shades. The CLF (Clear Fluorescence) shade, unique to Initial, is particularly interesting. With CLF, a true "dentine enamel junction" is created, which breaks the light in a dynamic way. It ushers the light into the restoration and enables the creation of a natural halo effect. To obtain a nice halo, the CLF has to come from incisally and the corner of the incisal edge should be trimmed in a 45°angle. The most difficult part in the shade determination process is to select the correct value. This is strongly linked with the manipulation of the enamel layers.

Fig. 3 a-c: Shade determination. It is important to keep the key in the same angulation as the tooth to have a similar light reflection. The shades are determined in daylight or lamps of similar intensity. The two enamel shades that most closely matched the teeth, were selected.

Fig. 4: Incisal reduction

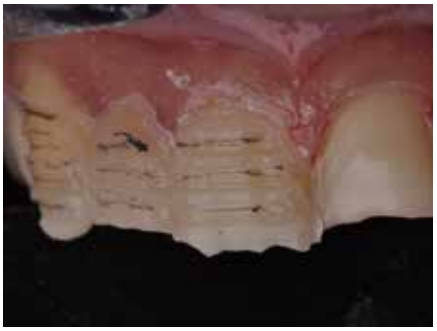

Fig. 5: Vestibular reduction

Fig. 6: Incisal view of vestibular reduction

Teeth were prepared through the mock-up. A mock-up serves as an excellent indicator of the amount of tooth tissue that needs to be removed in each area to obtain the correct restoration thickness. Orientation grooves were prepared to guide the depth (Figure 4-7). The margins were placed equigingivally in order not to violate the biological width and unsupported enamel was removed (Figure 8).

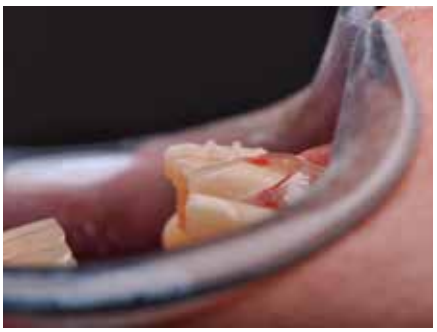

Fig. 7: Lateral view showing the emergence profile and the equigingival margin

Fig. 8: Placement of retraction cords. Note that all margins were placed equigingivally.

With the LiSi system, a very natural emergence profile and a perfect transition from the gingiva to the crown can be obtained while respecting the biological width. The use of porcelain-fused-to-metal and even zirconia frameworks often create a shadow zone at the gingival margin, right below the cervical margin of the tooth due to a lack of fluorescence of that part. The Initial LiSi Press framework distributes the light in a more natural way. Due to the HDM technology, the microcrystals are very evenly dispersed in the LiSi Press ingots and this effect remains after pressing. In the past, a dentist would have had the tendency to make the preparation deeper to avoid this shadow at the edge, with the risk of damaging the biological width and gingival retraction after restoration placement.

Temporary PMMA veneers were created with the same putty index as the mock-up. The index was carefully trimmed following the gingival line (Figure 9a), so that the excess of the material could be removed easily after the transfer. After setting of the PMMA, the index could be easily removed (Figure 9b).

Fig. 9: a) Silicone putty index; b) Transfer to the mouth

After removal of the retraction cords (Figure 10), the PMMA was finished where necessary (Fig finishing) and polished with diamond paste until a high gloss was obtained.

Fig. 10: Removal of retraction cords

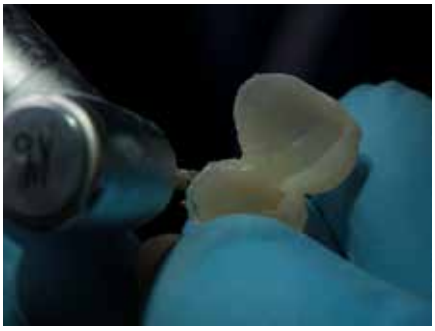

Fig. 11: Finishing and polishing of the temporary restoration.

Pressing

For a small laboratory, the processing and pressing of Initial LiSi Press in combination with LiSi PressVest investment is a huge advantage. With the correct processing, there is no, or virtually no reaction layer, which benefits the fit for sure (Figure 12). We only have one pressing furnace, so the extended time to place the cylinder in the burning furnace, between 20 and 180 minutes, helps to maintain a smooth serial workflow. We put the cylinder from the burning in the pressing furnace after maximum one hour. The press temperature is different for each furnace because there is always a small deviation. We did our calibration firing with CLF. This has to be completely transparent after firing and still show sharp edges. We also did some sample pressings with wax profiles. After pressing, the cutback was optimised. We chose for a simple cutback because additional adjustments could still be made during the build-up of the ceramic (Figure 13).

Fig. 12: Divesting of the restorations. There is virtually no reaction layer.

Fig. 13: Cutback with gold powder showing the surface texture

Fig. 14: Initial Lustre Pastes were chosen for the connection between the cutback ingot and the veneering ceramic. Alternatively, Initial LiSi powders can be used.

Fig. 15: CLF powder was sprinkled on top before the first firing.

Firing

After the preparation of the cutback with diamond burs, the structure was gently sandblasted with 25-50 µm Al_2O_3 at a maximum pressure of 1.5 bar. In this case, the wash fire (first firing) was done with Initial Lustre Pastes (Figure 14). In this case, I preferred to use Lustre Pastes rather than LiSi powders because of the particular build-up of the natural tooth colour. With Lustre Paste, it was easier to visualise the intensity of the colours. CLF was then sprinkled over the Lustre Pastes (Figure 15).

Fig. 16: Result after the wash fire.

Starting from the wash fire (Figure 16), the mamelons will be adapted so that the horizontal line is visually broken and more depth can be added to the incisal zone.

After the wash fire, the incisal zone is created. The most important part is to break the vertical and horizontal lines. The natural pattern within the tooth does not consist of straight lines either, so a more wavy pattern, or S-lines will create a much more natural effect. By using mixtures of different shades, playing with the horizontal line and varying the thicknesses of the build-up, a 3D effect can be obtained that effectively mimics the natural inner texture (Figure 17). After creation of the mamelons, they were again covered with CLF (Figure 18); hence, the mamelons were 'wrapped' entirely with CLF and as such they were naturally accentuated within the structure. It optimises the light transmission, creating the desired halo effect as mentioned before This was followed by a firing cycle to which I like to refer as the 'chroma fire'.

Due to the stability of the LiSi ceramics, multiple firings can be done; however, colour is mostly determined by the build-up of the chroma fire. The temperature of the chroma fire was 20°C lower than the wash fire. I avoid having to make adjustments to the chroma after the shape fire because it will be harder to control the value. Hence, we do our first colour check after the chroma fire (Figure 19).

Thereafter, build-up continued with the enamels. A mixture of EI 14 and EI 11 was used for the main enamel portion. This same mixture was added to the dentine for the build-up of the mamelon structure in the previous step (chroma fire).

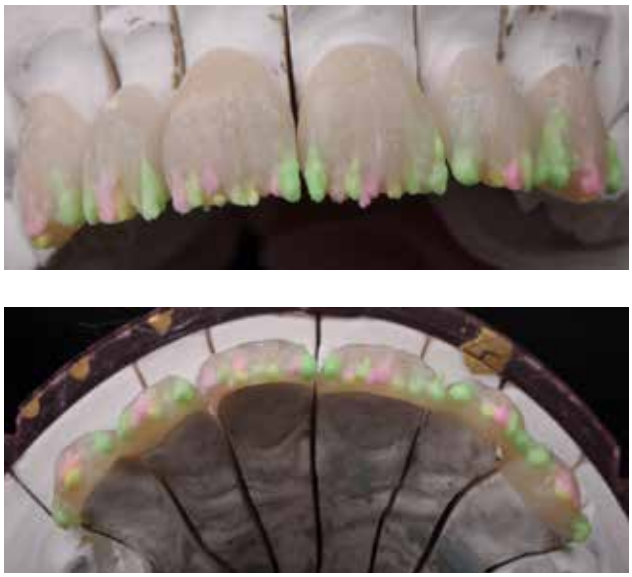

Fig. 17: For both pictures: Creation of the incisal zone with the mamelon structure. Green: enamel mixed with Dentine A2 50%; Yellow: FD 91 met CLF 50% (this softens the FD and makes it less prominent); Pink: pure Dentine A2. Mamelons were also already created with the cutback of the MT B2 ingot. a) vestibular view; b) incisal view.

Fig. 18: The mamelons are covered with CLF powder. This wrapping of the enamel with CLF ensures an optimal light transmission and creates a natural halo effect.

Fig. 19: After the chroma fire

Natural teeth show an opalescence effect; this can be best explained as an iridescent effect with a changing balance between white, blue and orange, depending on the angle and reflection of the incident light. To mimic this effect, 20% of Opal Booster was added to the enamel and a small portion of pure Opal Booster at the enamel rim (Figure blue/green) and the restorations were fired for the last time (Figure 20). For this shape fire, the same settings were used as the chroma fire.

Next, the contact points were optimised. Because a die model always has some minor deviations, the contact points should always be verified on the master model.

After the shape fire, there is still an opportunity to optimise the shape in a correction fire; if a correction fire would be chosen, the temperature is lowered with 3 degrees. It would be too much to lower with 10 degrees because a low-fusing porcelain was used.

Once the desired shape was obtained, we proceeded to the detailed finishing and surface texture was checked with gold powder (Figure 21). For this patient, a subtle texture sufficed (Figure 22).

After removal of the temporary veneers, the teeth were cleaned with polishing paste. The intaglio surface of the restoration was etched with hydro-fluoric acid gel under microscope magnification. After rinsing, the restorations were primed and air-dried. In the mouth, the lateral incisors were isolated with Teflon and

Fig. 20: Build-up of the enamel layers. Blue: enamel mixed with 20% of Opal Booster; Green: pure Opal Booster.

Fig. 21 a-b-(c): the surface texture accentuated with gold powder.

Fig. 22: Restorations after the shape fire on the master model.

Fig. 23: Seating of the central incisors.

Fig. 24: Tack-curing the luting composite resin for easy excess removal

both central incisors were cemented using a dual-cure resin cement, shade A2 (Figure 23). After placement, the cement was tack-cured for 2-5 seconds and excess of cement was removed. After light-curing (Figure 24) they were left to chemically cure for 2-4 minutes. That procedure was repeated for the lateral incisors and the canines.

Remnants of excessive cement was removed under high magnification with a scalpel for all the restorations. The occlusion was checked and small corrections in lateral movements were done with a diamond bur and polished to high gloss.

Fig. 25 – 28: Final result, looking very natural and matching the patient's features.

The patient was very happy with the aesthetics of her teeth and she felt she could smile with confidence again (Figures 25-28). Careful planning and good communication between patient, dentist and dental technician are key in obtaining a satisfactory result.