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Colour and brightness

Proper brightness of a zirconia-ceramic restoration using Initial™ Zr-FS ceramic

By **Luigi Russo**, Italy

Luigi Russo *was born in Pozzuoli on 8 July 1977 and graduated from the Alfonso Casanova Institute in Napoli (Naples, Italy) in 1996. Then, he worked as an employee in 3 different dental labs where he learned the art of prosthodontics. Since 2005, he owns a dental lab in Naples. Over the years, he has developed an in-depth knowledge of the various aesthetic materials by participating in several activities such as congresses, conferences and training courses with outstanding speakers, renowned both on a national and on an international level, including V. Mutone, L. Santocchi, Y. Odanaka, R. Iafrate ,J. Endo, C. Nannini and M. Fukushima. He closely collaborates with GC Italy as he is a member of the Competence Lab team for which he gave live demos at the Colloquium conferences held in Caserta and in Brescia and organised several initiatives at his own laboratory. He was also speaker at the regional conference in the Abruzzo region.*
Facebook page: LuigiRusso Lab

The importance of brightness in a restoration is sometimes underestimated with more emphasis placed on the "hue and chroma", which often are still the decisive aspects for the success of a product. However, from our perspective, a restoration without the proper brightness (value) will be dull and lacking vitality, in other words, unnatural.

To confirm this, we take a look at how this aspect could be enhanced beyond the material upon which we perform the layering.

This specific case involves a case study on a zirconia coping. This concept can also be transferred to metal and lithium disilicate by applying fluorescent white opaque dentin liners and coloured opaque dentins.

Case study

This clinical case study shows an improvised temporary restoration applied immediately after preparation.
The laboratory was asked to produce a rapid intervention due to the young age of the patient (Fig. 1).
After a quick and careful evaluation of the case, a zirconia-ceramic crown on a "white opaque ZrO_2" structure was chosen as the most appropriate option. This decision allowed us to operate from a "high value" initial situation rather than a low one (Fig. 2).

Figure 1: Picture of the temporary restoration sent by the studio.

Figure 2: Model with the zirconia coping in situ.

When testing and defining shade, this image shows how difficult it is to find a good match between the shade of a natural tooth and conventional colour scales; when presented with difficulties of this type, we must rely on our experience and knowledge of our own ceramic system in order to be able to make the best choice for the case at issue (Figs. 3 and 4).

Figure 3 & 4: Comparison of shades with standard V-shade guide.

Chart and layering approach on opaque white zirconia in the anterior region.

The coping was initially conditioned by a connection firing with Lustre Pastes NF (Fig. 5); we then proceeded to create an opaque buffer in the cervical third with a mixture of fluorescent powders and internal stains (IN-44: sand) following the technique described by Vincenzo Mutone (Fig. 6).
The mesial and distal areas were constructed using Opaqus Dentin Modifier with substantially intense chroma modification (ODM-2: yellow/gold and ODM-1: white), with the objective of obtaining more depth (Fig. 7).
The layering phase under consideration involves the application of significant quantities of light Fluo Dentin (FD-91: light) to the entire surface in the cervical third area (i.e. the area where the tooth shows the most brightness when light shines through it), from the middle third to the incisal third in such a quantity and consistency as to enable a glimpse of the underlying structure, and finally, in the incisal third, the simulation of the structure with mamelon features (Fig. 8). A mixture of IN-44, IN-51 (olive) and FD-91 was superimposed to maintain the chroma of the selected dentines in order to attain the shade chosen for the crown (Fig. 9).
The restoration under construction was layered with Dentin DA-3 from the cervical third to the middle third (Fig. 10) in order to complete the morphology with a mixture of dentines B2:2 – C2:1 (Fig. 11).

Figure 5: Firing of connections with Initial Lustre Pastes NF.

Figure 6: IN-44 modified with cervical fluorescent shades.

Figure 7: Mesial and distal modified opaque dentine.

Figure 8: Fluorescent white opaque dentine liner FD-91.

Figure 9: IN-44, IN-51 and FD-91.

Figure 10: Dentine layering of cervical third.

Figure 11: Completion of contour with dentine mixture.

Figure 12: Dentinal cutback.

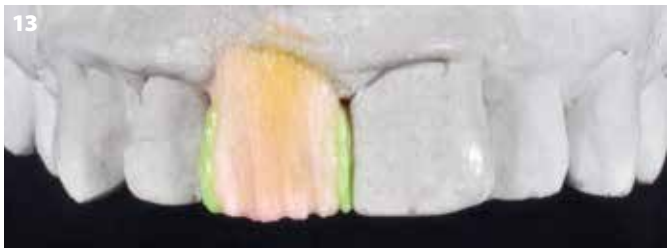

Figure 13: Medial and distal layering of enamel.

Figure 14: Thin, transparent, blue line.

Figure 16: Translucent layering.

When cutting the dentine, the observations made during shade selection must be accounted for. In this case, the depth of the mamelons was shallow; therefore, we removed little material (Fig. 12).
The enamel layer E-59 (which corresponds to VITA Shade A3), was applied in the proximal areas during the first phase; these aided the penetration of light without creating black areas, or so-called "middle-distal shadows" (Fig. 13). A thin layer of blue Transparent Modifier (TM-01:blue) was then applied on top (Fig. 14).
It was completed by constructing a frame with the same enamel, the central part that is distinguished by Intensive Enamel (EI-14: yellow), which creates a warmer area, mimicking the effect present in natural teeth (Fig. 15).

The process was finalised by alternating various Translucent Modifiers (Fig. 16).
The incisal edge was created with buildups simulating the mamelons alternated with fluorescent dentines. In this case, it was considered appropriate to layer horizontally in the middle third, where the colour 'Internal Stains' was applied to wet ceramic (once learned, this technique is preferable, as the colour is more three-dimensional and less static than with the conventional technique of fixating the colours) (Fig. 17).

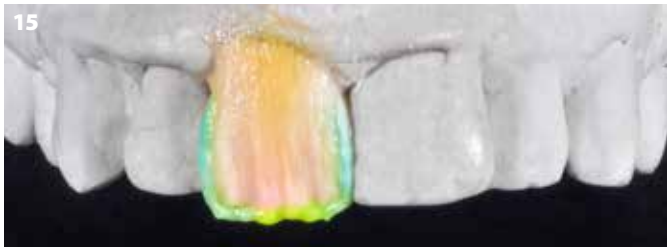

Figure 15: Completion of enamel contour.

Figure 17: Layering of mamelons and stains on wet ceramic.

Figure 18: Completion of first firing with fluorescent clear translucent CL-F.

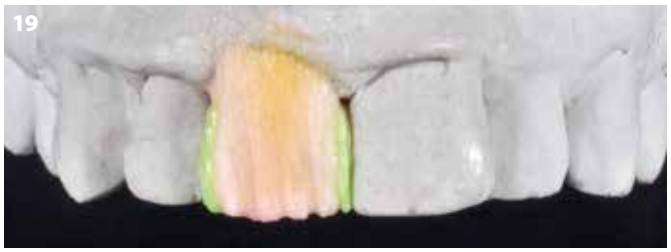

Figure 19: Result of first firing on the model.

Figure 20: In situ control of first firing.

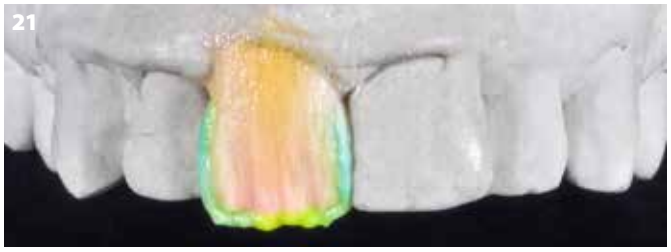

Figure 21: Beginning of second firing with dentine and translucent modifier.

Figure 23: Completion of second firing.

This was completed by covering everything with Clear Fluorescence (CL-F), which is translucent ceramic upon which additional colours can be applied (Fig. 18). The firing of the first layer produced a satisfactory result (Fig. 19). It is essential for the first firing to be validated in the patients mouth , particularly when creating a single central incisor, in order to gain an understanding of where and to what extent issues remain that need to be resolved in order to achieve the targeted result (Fig. 20).

A mixture of dentine (DA-3) and translucent modifier TM-03 (rosa) (Fig. 21) was applied for the second firing at the cervical area, with Opaqus Dentin Modifiers ODM-1 and ODM-2 in the proximal areas; we continued the stratification with coloured transparent and translucent layers (Fig. 22).

The rest of the layering was completed by applying a mixture of TM-02 and BLD-2 (Bleach Dentin White); the central area of the crown was completed with natural Enamel E-58 (corresponds to VITA Shade A2) and E-59 in order to enhance the mesial and distal slopes (Fig. 23). The final result is clearly shown on the model after careful macro and micro surface texturing (Fig. 24) with an

Figure 22: Translucent and translucent coloured layering.

Figure 24: Result after macro and micro texturing.

inherent gloss attained by adding small areas of surface shading and then applying mechanical polishing to better control the various degrees of gloss (Fig. 25).

Figure 25: Result after creating inherent gloss (mechanical polishing).

After several days, the clinical images demonstrate a favourable outcome of the emergence profile with regards to the tissues and a good integration of the superficial texture of the restoration (Fig. 26, 27 and 28). The frontal clinical images and the isolation of the gingival tissues demonstrate a "balanced" correspondence of the chroma, i.e. value of the constructed crown in comparison with the patient 's natural crown (Fig. 29).

This layering technique was inspired by the studies conducted over the years by Vincenzo Mutone on how to imitate the brightness of natural teeth with ceramics.

Figure 26: Frontal view a few days after delivery.

Figure 27: Right lateral view for better perception of texture and gingival emergence.

Figure 28: Left lateral view for better perception of texture and gingival emergence.

Figure 29: Frontal view after a few months.

References

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