The colour gradient of natural teeth and their intelligent imitation. Part 2

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MDT Stefan Roozen *was born in Tyrol (Austria) in 1980. In 1995, he began his training as a dental technician and graduated 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 concluded his Master degree in 2003. His main areas of work are complex prosthetic reconstructions (tooth and implant supported) and demanding restorations in the aesthetic and functional area. He is the author of several international publications, guest speaker at the Austrian Master school, speaker and co-speaker at international course and congress events focusing on fixed reconstructions, ceramics, implantology, prosthetics and CAD/CAM.*

Stages of characterisation of a zirconia restoration

Ceramic reconstruction techniques enable the fulfillment of the highest aesthetic standards and allow for the most natural-looking patient rehabilitation. Zirconia, used either as a veneered or monolithic material, stands out among dental ceramics for its superior mechanical properties. It is biocompatible and covers a wide range of indications.

The combination of translucent zirconia structures with 3D silicate ceramic glaze pastes is a prevalent fabrication variant today and is the classic among monolithic reconstructions. Particularly in the posterior region, the digitally created functional morphology is adopted and manual work is reduced to a minimum. Another option for achieving an even more natural appearance is an aesthetic upgrade with so-called ceramic microlayering. This is used particularly in the anterior region and sets new standards here.

The successful path to an aesthetic result begins in the CAD software. When modelling the anatomy and morphology, form and function are brought together. The right choice of material is an important step in the manufacturing process before the CAM process. With a view to the final result, the course is already set here with regard to colour value and brightness. With an extended colouring liquid concept, zirconia constructions can be coloured before the sintering in order to achieve effective contrasts and colour gradients. The digital data set is thus optimally translated into reality.

Fig. 2: ... in the CAD software,

Fig. 3: ... with Initial Lustre Pastes ONE ... sintering process,

Fig. 4: ... application of Lustre Pastes ONE. The colour gradient of natural teeth can be imitated very easily.

Fig. 5: ... zirconia crowns coloured with Initial Zirconia Coloring Liquid before sintering.

Monolithic and microlayering

The colour accents are painted on with 3D glaze pastes and then fired. The great advantage is that the colour result is visible and assessable even before the firing process. This subsequently fired result is now either the monolithic end result or the colour basis for the possibly extended microlayer variant.

However, the underlying zirconia structure is also of particular importance. Today's pre-coloured blanks, which show a colour gradient from the cervical area to the incisal cutting zone immediately after the sintering process, are a good starting point. Modern multi-generation zirconium oxides with different translucency levels in the same disc already raise this raw material to a more natural level.

Colouring Liquids

The use of colouring liquids offers an additional option for colouring zirconia constructions to resemble natural teeth . These are applied before the sintering according to the colour value, chroma and incisal effect. Zirconia structures are treated individually with the various colour liquids enabling the cost-effective production of all colours, with a very small range of blocks or discs. For example, all colours can be produced from an inexpensive white zirconia blank. The chroma and colour value of pre-coloured multilayer blanks can also be increased with these liquids and are interesting to create natural effects.

Fig. 6: ... sintered monolithic zirconia crowns, Right:Natural model,

Fig. 7: ... finished result with Initial Lustre Pastes ONE fired on, Right: Natural teeth

Fig. 8: White zirconia bridge after milling,

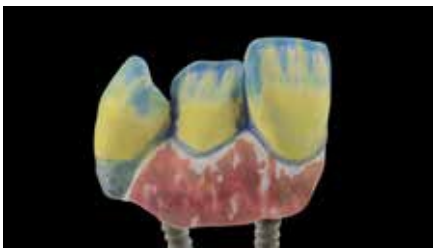

Fig. 9: Red and white areas individually coloured with Initial Zirconia Coloring Liquid

Fig. 14: After sintering with the simplest dipping technique: immersion in a single Body liquid

The liquid range includes all 'Body' shades from A to D matching the Vita® Shade Guide system. Additional 'Cervical' and 'Effect' shades offer the possibility of setting individual accents, such as increased chroma for cervical areas, as well as bluish or violet shades for the incisal part. For the reconstruction of gingival areas, colouring liquids are the only option for pre-colouring zirconia bridges in a reddish shade. Artificial gingival areas play an important role, especially in the case of large vertical substance losses, such as implant suprastructures. A high smile line often presents challenging situations as we strive to meet the patient's requirements.

In addition to the option of precisely assigning the different colours to the respective zone, two other colouring options are available. The incisal area can be soaked in the CL-N liquid and, after further immersion in the Body liquid of the target V-shade, a contrasting lighter third can be created very easily in the incisal area. Or, as the simplest variant, the zirconia structure can immersed in a single liquid of the respective Body shade.

Initial IQ Lustre Pastes ONE

Initial IQ Lustre Pastes ONE are ready-to-use 3D glaze pastes that are applied to the sintered zirconia frameworks and give the zirconia the final touch to finalise monolithic restorations. The highly fluorescent L-NFL (Lustre Neutral Fluo) is a crystal clear paste that compensates for the non-fluorescence of zirconia. The L-A, L-B, L-C and L-D pastes are used to adjust the target Vita shades of groups A to D from 1 to 4. All key shades can therefore be reproduced with these four pastes.

The incisal effect of natural teeth can be imitated with L-4 (Dark Grey), L-5 (Light Blue), L-6 (Dark Blue), L-12 and L-OP (Opal), for example. To give the fossa of a posterior crown a slightly more chromatic appearance, paste L-9 (Orange) is suitable for discreetly colouring the occlusal surfaces. Through various combinations with the compatible Spectrum Stains Kit, the colour options are endless.

Suitable colour pastes are also used for gingival areas, from reddish-pink to dark violet tones, to depict the different zones of the mucosa. Light-coloured areas of the attached gingiva (G-35 | Intensive Cream; G-23 | Base Light) and the dark red alveolar mucosa (G-36 | Intensive Red; G-24 | Base Dark), as well as the gentle transition of the free gingiva (G-34 | Intensive Violet) to the tooth, give these areas a lively appearance.

Figs. 10 & 11: Pressed zirconium oxide bridge with gingival replacement

Fig. 12: Result after veneering with CL-N liquid, colour towards the incisal edge.

Initial IQ SQIN

Monolithic options often reach their limits, especially when designing artificial gingiva. A gingiva painted on purely with glaze pastes usually does not meet general expectations, but rather serves as a colour primer and internal characterisation. Therefore, special ceramic SQIN in GUM-shades are thinly layered on top of the fired Lustre Pastes, providing the final aesthetic touch. The combination with this SQIN micro-layer ceramic ultimately completes the concept for the fabrication of highly aesthetic restorations.

The translucent SQIN materials are also a particularly efficient method of achieving the depth of natural teeth in anterior teeth, the most crucial area concerning aesthetics.

With little effort, you can achieve results that typically require strenuous, multi-layered methods. . This new ceramic development is characterised by notable homogeneity and excellent sintering behaviour. It is therefore possible to achieve an end result in a single ceramic firing.

Fig. 15: Applying the Lustre Paste Gum shades onto the gingival area

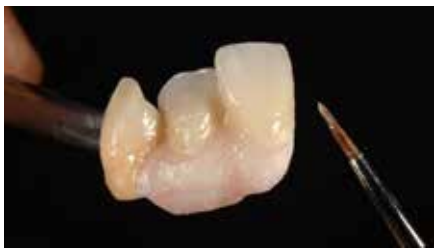

Fig. 16: Lustre Pastes were applied before firing

Fig. 17: After firing the Lustre Pastes. Three-dimensional colour and incisal effects, as well as different gingival zones after the firing cycle.

Fig. 18: SQIN ceramics are applied in thin layers

Conclusion

Initial Zirconia Coloring Liquid offers a flexible solution for the individual colouring of zirconia structures and creating the basis for monolithic variants, whether from an economic or aesthetic point of view. In combination with Lustre Pastes ONE, the colour gradient of natural teeth can be mimicked at any stage of the manufacturing process. With the ONE SQIN concept, highly aesthetic results can be achieved in a very short time using a new generation of ceramics. Three-dimensional effects are achieved with minimal layer thicknesses, thereby ensuring the stability and safety of the restoration.

Fig. 19: Final result: zirconia bridge finalised with Lustre-Pastes ONE and SQIN (ONE SQIN concept).