The single central incisor in the maxilla is classified as the most difficult type of restoration to recreate. Producing a single central to match the adjacent teeth and have acceptable integration is sometimes seemingly impossible, even for the best ceramist.

In nature, no two teeth are exactly the same. Therefore, in my opinion, rather than replication, the key to successfully restoring a central incisor is to achieve harmony with the surrounding teeth.

In order to achieve this, we need to evaluate several areas. Sometimes the value can be higher or lower value even on the same tooth; hue can be supported by a stronger colour or can be fractionated; and the enamel layer needs to be analysed in order to create a smooth and natural translucency. Once we’ve obtained all of this criteria, we then need to work on the shape, including the texture. The final point is lustre. Overall morphology is the key, significant not only for aesthetics, but also for function and soft tissue preservation.

Case report

A 42-year-old female presented with a desire to improve the appearance of the crown on tooth 11. She did not “like” the colour and she felt uncomfortable speaking and smiling. Many people are very sensitive about the appearance of their smile and believe unattractive teeth are a reflection of their personality.

In this case, the analysis was a high smile line with gingival display; the teeth were crossed and slightly rotated. The existing crown, although all ceramic, did not mask the darker underlying tooth...
structure and so had a low value and no “personality” in terms of detail. Therefore, it was decided to replace the existing crown with a zirconia restoration to achieve a satisfactory aesthetic outcome and necessary biological integration.1,2

Figure 1 shows the old crown, with incorrect value and chroma. The shape is also not symmetrical with tooth 21.

Figures 2 and 4 show shade selection using the VITA Classical shade guide. Shade selection should ideally be completed prior to the start of the clinical process to ensure the teeth are still hydrated. Tab B1 indicated the correct value and A2 the chroma. We also made a sketch to memorise the effects detail (Figure 3). I highly recommend this to all clinicians as it is very helpful for the lab during the build up. Photographs are also strongly encouraged.

Once they have the model ready, many technicians trim off the soft tissue to expose the margin. In doing so, it becomes very hard to control the shape and for this reason, I prefer to work on a full contour model with soft tissue design (Figure 5). This allows management of the emergence profile and crown shape for the papillae support.

The coping is waxed (Figure 6) to give correct ceramic support. This step is essential when there is more missing tooth structure.
The die and the wax up are scanned with Nobel Procera, in one-to-one modality (Figure 7). The virtual coping is designed and checked for shape and marginal fit (Figure 8). In this case, the coping is white to avoid the chroma being influenced as prep is discoloured. In Figure 9, the white zirconia coping is fitted back to the master model, ready to be treated before the build-up.

Treatment is necessary to give the restoration fluorescence as zirconia alone lacks the properties to reflect light, thus avoiding the grey shadow look in daylight and on the porcelain shoulder (Figure 10). Once the zirconia is treated, the full dentine build-up is completed (Figures 11 and 12). It’s important to control the shape and the thickness before the cut back (Figure 13), especially when, as is the case here, there are mammelons. These can be complicated to reproduce due to their depth and the coloured layer of enamel next to the incisal edge. In some cases, we can use 25 to 30 different applications between porcelain, internal effects and internal and external stain.

To avoid the risk of the coping showing through after the firing, it’s best to check the thickness. This ensures adequate proportion for the layering steps and ensures effects and colours are in the right position. This is a crucial aspect requiring care and attention. Figure 14 shows the completed build-up, ready to be fired. Because the coping is slightly thicker, I prefer to heat it up very slowly to ensure homogeneous and well fired porcelain.

Following firing, the crown was placed next to the incisal edge of the patient’s natural tooth (Figure 15) to check the anatomy. A thin layer of oil is added to create a polish effect, so the value as well as the shape and proportion can be assessed.
The try-in confirms aesthetics, contact points and occlusion (Figure 16).

The crown is then lightly stained and glazed. Hand polishing then produces the same smooth and bright surface as the enamel at tooth 21. This produces a smooth and homogeneous surface which allows for ideal soft tissue integration and light reflection, particularly in the incisal quarter, achieving the natural translucency effect.

The value, hue, chroma, shape, texture and lustre of the completed crown are in harmony with the existing teeth, allowing a natural and well-integrated result to be achieved (Shown in both Figure 17 and in a larger version on the first page of this article).

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References