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# Achieving a single central shade match at the first attempt

By Marat Awdaljan, the Netherlands

The patient's tooth #11 was fractured during an accident. After correcting it temporarily with composites, the dentist decided to solve the problem with a partial crown. The reason was that the tooth had begun to change colour; it was becoming darker and the patient wanted to have the same colour as tooth #21 (Fig. 1).



**Fig. 1:** Intraoral view, showing the discoloured preparation

## Achieving a single central shade match at the first attempt

In this article, it is demonstrated how easy and predictable a single central shade match can be done with GC Initial LiSi. Matisse Software plays an important role in this process (Fig. 2). Matisse is embedded with artificial intelligence technology to generate precise colour solutions, including which dentin powders to choose and mix and which substructure to use. After applying the recipes, the dental technician will be able to achieve a correct shade match.

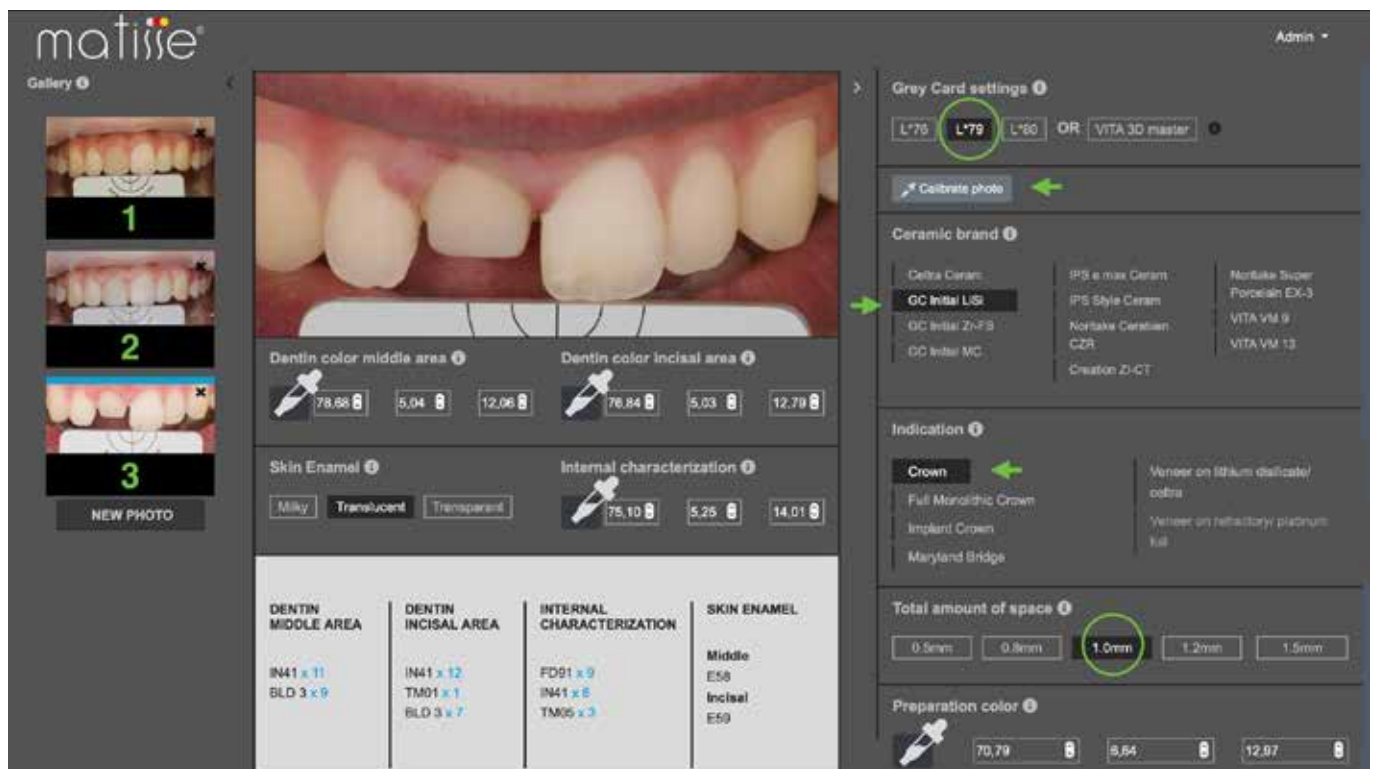


Fig. 2: Matisse, Shade Matching Software

### The preparation for the case:

The patient visits the dental laboratory or the dentist's office for the dental photos and the shade taking. To receive precise recipes, three dental images are necessary (Fig. 2):

- 1: Initial situation with crossed polarization filter.
- 2: Initial situation without filters.
- 3: Photo of the preparation with crossed polarization filter.

### Steps in Matisse software:

#### Dental photos

After importing the images to the software we select the gray card setting, in this case L\*79 is selected (Fig. 2). Matisse is also compatible with Vita 3D Master shade guide in combination with the Whibal card (L\*76).

When clicking on the "Calibrate Photo" button, we choose a spot on the grey card and the photo will be automatically calibrated (Fig. 2).

### Ceramic brands

In this case, GC Initial LiSi was chosen.

### Indications

Crown is selected as case indication. There are other options: Veneer on refractory, implant crown, Maryland bridge, full monolithic crown and veneer on lithium disilicate (Fig. 2).

### Substructure

In this case, we chose a substructure with high opacity to mask the preparation and at the same time to

have enough brightness, to be able to achieve the same value (Fig. 3).

**Total available space**

The space from the preparation to the final thickness of the crown is measured; this is very easy when the crown has been digitally designed (Fig. 2).

**Layering of the crown:**

First, the substructure is stained on the cervical area with Initial Spectrum Stains SPS-2 and incisal area with Initial Spectrum Stains SPS-2 and SPS-13, powdered with FD-91 and washfired (Fig. 4).

The histo-anatomy of the tooth is analysed and a shade map is created. The recipes are mixed with a universal portioner or the smile line portioner.

**Layer 1: Histo-anatomy of dentine**

To create a natural looking transition from dentine to enamel with opalescence, it is advised to start with an enamel canvas (Fig. 5). The enamel canvas that is used comes from the enamel indication E-59 from Matisse software.

The internal characterisation recipe (Fig. 3) is layered on top of the enamel with the exact histo-anatomy of the incisal dentine (Fig. 6). The best way to understand the dentine anatomy is to play with the light in an image of the workpiece; it is advised to use a photo editing program and to increase the clarity and dehaze the image.

The dentine from the cervical to the middle area is layered first (Fig. 7) and

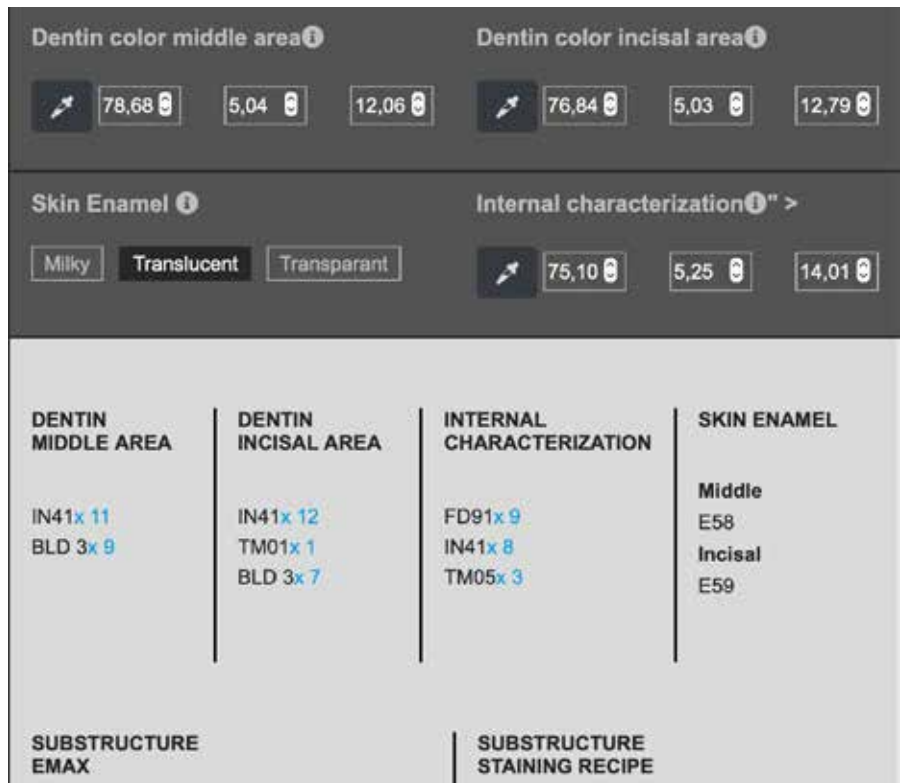


Fig. 3: The ceramic powder recipes



Fig. 4: The advised calculated substructure



Fig. 5: Enamel canvas with E-59



Fig. 6: Internal characterisation recipe is applied as dentin on the incisal area



Fig. 7: Cervical dentine recipe is applied

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the recipe of the middle area is used immediately after that (Fig. 3).

When layering the middle area of the tooth, it is important to focus on the precise volume (Fig. 8). To achieve the same level of opacity and brightness, it is important to decrease the thickness of enamel/transparent ceramics and increase the thickness of dentine.

### Layer 2: Internal effects

#### *Incisal area*

To create a higher level of optical integration, it is important to layer a thin layer of opalescent material from the incisal third, in this case EOP-Booster. Then, the mamelons are created with IN-41. On top of the mamelons a thin layer of CT-23 is used to create the incisal warmth. For the line angles, EOP-3 is used to create a blueish appearance (Fig. 9).

#### *Middle area*

EOP-2 and TM-02 were used to create the bright areas in the middle of the tooth.

#### *Cervical area*

CT-23 shade was added to the cervical area to create a smooth transition to the gingiva.

#### *Try-in after the first firing*

The result after the first bake is very accurate, no colour adjustments are needed. Now we can apply the skin enamel and finish the case. Most cases are done in two firings with very predictable results (Fig. 10)



**Fig. 8:** Dentin recipe middle is applied



**Fig. 9:** Internal effects are applied including EOP-Booster, TM-02, EOP-2 and CT-23



**Fig. 10:** Try-in after the first bake



**Fig. 11:** Final result on the model



**Fig. 12:** Final result in the mouth



**Fig. 13:** Close up of the final result

### Layer 3: Skin enamel

Every case needs a different approach to choosing skin enamel. There are situations where one type of enamel is enough, in other cases each section needs a different type of enamel, and in very few cases a very thin layer of transparent layer is needed on top of the enamel to create an identical match and a better optical integration.

In this case, pure enamel E-58 was used on the middle area and a

mixture of E-59/EOP-Booster and CL-F mixed in the same portions on the other areas. It is advised to always finish the second bake with a Halo effect, in this case IN-41 was used. Very small adjustments, like brown and white spots are made with the glaze firing (Fig. 11).

### Final result

The final result of the try-in in the laboratory is shown in Figures 12-14. To check objectively if the histo-anatomy



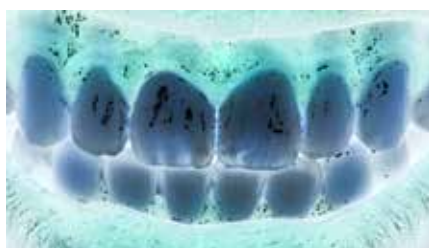
**Fig. 14:** Crossed polarization picture of the final result



**Fig. 15:** Edited picture to see the internal effects



**Fig. 16:** Value check of the final result



**Fig. 17:** The ultimate check of the final result with negative inversion

of the crown is created correctly, it is recommended to import the picture in Adobe Photoshop and play again with the light. Clarity and dehaze of the photo are increased to check the colour intensity (Fig. 15). The greyscale function was used to check the value (Fig. 16). The ultimate test is to invert the image colours (negative) (Fig. 17). In an inverted image, the transition from opacity to transparency is clearly visible. It is advised to do this in every case in order to observe the mistakes and understand what to improve for the next case.

## Conclusion

The ideal for every dental technician is to mimic nature, to create a restoration with ceramics that is hard to distinguish from the natural tooth. Usually, this takes many colour corrections, time-consuming remakes and frustration, and still the goal may never be reached. Now, with the Matisse software, this challenging case had an excellent shade match at the first attempt. The final result is predictable, precise and achieved with the usual process of layering. Matisse makes the dreams of a dental technician come true in less time and effort.

## Acknowledgement:

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