An exciting change
Comparison of the IPS d.SIGN and IPS Style ceramic systems

By Velimir Žujic, Croatia

Change is exciting – also in day-to-day dental lab work. The author switched to using IPS Style layering ceramic some time ago. Before he started working with this ceramic system, he thoroughly tested the material and compared it to the product he had previously used.

The main aim of switching to a new ceramic system is to improve the quality of one’s results. We regularly used the fluorapatite-leucite glass-ceramic IPS d.SIGN® in our laboratory. Then, one day we asked ourselves the following question: Would IPS Style® (the first patented metal-ceramic material containing oxyapatite) offer a sound alternative to our accustomed product? We decided to test the new material on flat cobalt-chromium alloy samples. These test specimens enabled us to take a closer look at the layering ceramic. We used these base metal alloy samples (Culaco CC) to examine and compare several properties of IPS d.SIGN and IPS Style: for example shade, brightness, shrinkage, fluorescence and dimensional stability.

**Conditioning and opaquer application**

One specimen was oxidized at 950°C with a holding time of one minute. The other sample was treated with a bonding agent. Two metal specimens with different bases were now sufficiently prepared for the application of the ceramic materials. Next, the samples were coated with IPS d.SIGN Paste Opaquer and IPS Style Ceram Powder Opaquer. The opaquer products of both systems have a smooth consistency. We had never used an opaquer in powder form before, so applying the IPS Style material was completely new to us. Nevertheless, we were impressed by its ease of application and the excellent results.

**Shrinkage behaviour and shade effect**

In the next step, we compared the Dentin and Transpa T Neutral materials as well as the Opal Effect OCE materials. Each of the ceramics was applied to one of the metal samples. A line was drawn down the middle of the sample with a spatula for the purpose of comparing the shrinkage behaviour. The two different ceramics showed the same colour after firing. It was interesting to note that IPS Style exhibited less horizontal shrinkage than IPS d.SIGN (Fig. 1). The vertical shrinkage of both ceramics was almost identical. The samples were held next to each other and examined under a polarizing light. IPS Style was shown to be somewhat brighter than IPS d.SIGN.

Both materials exhibited almost the same level of fluorescence. In this comparison IPS Style was at a slight advantage because its Transpa T Neutral and the Incisal materials displayed a more lifelike fluorescence.

**Dimensional stability and test results**

The dimensional stability of the ceramics was clearly visible after the first firing cycle. The IPS Style layers successfully maintained their shape after firing. In contrast, IPS d.SIGN did not retain its shape completely. After this test series, we felt that we had gained enough information about the new material for our purposes. Even though the tests were relatively simple, they provided us with valuable insights into the two ceramic systems. Now we were ready to compare the two materials on the basis of an actual case study.

**Case study**

The patient was dissatisfied with the appearance of her upper teeth (Fig. 2). She wanted a new tooth colour, but wished the shape and position of her teeth to be maintained as best as possible. This simplified shade selection, since we “merely” had to select
a slightly lighter tooth shade. Next, the teeth 15 to 23 were prepared (Fig. 3). Then a digital impression of the situation was taken with an introral scanner. From the manufacturing centre we were able to order both printed models and selective laser melting (SLM) metal copings. Both the models and the copings were produced simultaneously. This allowed us to start with the ceramic application immediately (Fig. 4). The restorations were built up on the frameworks with the two ceramic materials so that we could compare IPS Style and IPS d.SIGN in the patient’s mouth. A detailed description of the procedure involving the two ceramics is provided below.

Preparation of the copings
First, the metal copings were ordered according to the instructions of the manufacturer and then the opaquer was applied. The IPS d.SIGN Paste Opaquer and the IPS Style Ceram Powder Opaquer exhibited excellent flow and masking properties (Fig. 5). Two firing cycles were adequate for producing the desired masking effect. The opaquer in paste form was easy to apply, since the material is supplied ready for use from the syringe. Depending on its application, the rather dense paste may have to be diluted with some Paste Opaquer Liquid.

First firing
In order to make a visual comparison of the layers placed with the two ceramics, the materials were mixed with Liquid Visual Eyes (Harvest Dental). The Visual Eyes Liquid is a product that renders the colour of the fired ceramic visible before the material is actually fired (Figs 8 and 9). The basic dentin layer was created with 25 % Ceram Transpa orange-pink and 25 % Ceram Transpa khaki mixed with 50 % Dentin B2. Unmixed Dentin material was used in the central part. The incisal margins were produced with a mixture of 80 % Dentin B2 and 20 % Special Incisal grey. In the horizontal cut-back space, effect material inter Incisal white-blue was applied. The incisal margin was completed with Opal Effect CR 1 and Transpa material (neutral, orange grey). The mamelons and internal characteristics were created with a very fine separating instrument. After the first firing, the colours of IPS Style and IPS d.SIGN looked good and appeared almost identical (Fig. 10). IPS Style Ceram and IPS d.SIGN Transpa as well as Mamelon materials were used to make some slight adjustments to the shape of the anterior teeth. At this stage, a comparison showed that a few distal areas in the incisal edge of the IPS d.SIGN restoration were slightly more translucent.

Customisation of the layers and second firing
After the first corrective firing cycle, the teeth were customized with suitable IPS Ivoceur®* stairs. These materials are used to characterise restorations (e.g. mamelons), inlay external characteristics and adjust the colour intensity and translucency of certain areas. Subsequently, the stairs were fired.

In this case, a reddish hue was imparted to the incisal edge with IPS Ivoceur Medium Red. A tip gloss effect was achieved with a “tip gloss infiltrate” effect in the dentin enamel. For the second firing, the crowns were coated with Transpa Dentin, Transpa Incisal and Transpa Impulse (Figs 10 to 13).

Comparison of the results
After the second corrective firing of the different IPS Style Ceram Transpa materials, we were convinced that the product fulfilled all our criteria: The dimensional and shade stability of the ceramic was impressive. We effectively controlled the brightness of the material by adding Transpa T neutral. All in all, we were completely satisfied with the result. The colours of IPS Style were lifelike and they were identical to those of IPS d.SIGN. A direct comparison clearly shows the excellent colour coordination of the different ceramic ranges (Figs 14 and 15). Furthermore, the same shade system applies to the IPS e.max® all-ceramics and the Zr Neseo® light-curing laboratory composite.

Summary
IPS Style is definitively capable of replacing IPS d.SIGN, which we used in our laboratory for quite some time. It completely satisfied us in terms of its shade and dimensional stability and its high strength. This ceramic offers us incredible flexibility and satisfies all our demands. Moreover, the ceramic system is geared towards modern manufacturing techniques. At present, we use printed, milled and conventionally cast metal to fabricate the frameworks used in our laboratory. The different fabrication methods involve a wide range of CTIs. IPS Style accommodates this requirement and does not cause any problems related to fracture during firing. The ceramic is characterized by minimal shrinkage and high dimensional stability.

IPS d.SIGN, however, shows less dimensional stability and therefore does not perform as well in interdental areas and close spaces. In this respect, it is less predictable than IPS Style. Nevertheless, the shade stability of IPS d.SIGN is comparable to that of IPS Style. In terms of fluorescence, both materials equally meet our criteria (Fig. 6). IPS Style Ceram Incisal and IPS Style Ceram Transpa T Neutral have a slightly more lifelike fluorescence than the corresponding IPS d.SIGN materials.

Conclusion
In the end, the IPS Style solution had a slight advantage. We chose it for the final restoration because of its beautiful tooth shapes and vital appearance in the mouth (Figs 17 and 18).

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![Image 14: The final restoration (IPS d.SIGN) after the second corrective firing cycle](image14)

![Image 15: The final restoration (IPS d.SIGN) after the second corrective firing cycle](image15)

![Image 16: In terms of fluorescence, both materials met our criteria.](image16)

![Image 17: The final choice IPS on the IPS Style restorations: shown in the mouth.](image17)

![Image 18: The seated restorations (layered with IPS Style) harmoniously blend into the overall natural oral environment.](image18)