Avanté®
The Universal Porcelain
A contribution from Francesco Ferretti, MDT
After a decade of pressable ceramics, finally manufacturers of dental porcelains have developed a product indicated for multiple restorative applications. I believe it is advantageous and ergonomic to have a product in the dental laboratory that can be used over metal or as a stand-alone, pressable porcelain core. Avante is such a product; it is manufactured in the United States by Pentron Ceramics, Inc. and exclusively distributed world wide by Zahn Dental Laboratory Division. Figures 1 and 2 show the two forms of the product. The product has four main properties that make the job of the technician easier.

The flexural strength of the porcelain varies between 110 MPa, for powder PFM, and 140 MPa for pressable pellets. This, together with its well documented kindness to the opposing dentition, allows the porcelain to be used for conventionally layered porcelain-fused-to-metal restorations, refractory or platinum foil veneers & inlay/onlay restorations, anterior and posterior pressed & layered restorations and full-contoured, pressed & stained all-ceramic crowns; it may also be used for metal reinforced pressed restorations with confidence.

The kindness to opposing dentition is the result of a patented micro-crystal leucite crystal structure. As evidenced in Fig 3, Avante's leucite crystals are typically 1 to 3 microns in diameter, rather than 10 to 50 microns, as found in conventional porcelains. Additionally, the crystals are uniformly dispersed as a hexagonal network similar to the apatite in natural enamel (see Fig 4 obtained from Prof. Shane White of UCLA). Figure 5 shows the leucite microstructure of conventional porcelain used in PFM restorations.

Low chemical solubility is the third property which benefits Avante porcelain. This attribute ensures biocompatibility and improved tissue health.

The recommended coefficient of thermal expansion range for alloys in the metal reinforced pressed ceramic technique is from 13.8 to 14.8 parts per million. This range takes into account most of the alloys available to the dental lab.
First Case

The patient presented with a need for restoration of multiple anterior teeth and a special lingual inclination (see Fig 6). After consulting with the Doctor (Dr. Marco Nicastro was involved in all the cases presented in this article), we decided to make all-ceramic restorations using Avante pressable pellets and layering porcelain. Figure 7 shows the prepared teeth. Figure 8 shows the pressed cores with a silicone matrix to allow us to determine how much layering porcelain will be needed and assist in planning the layering process. We labially advanced the central incisor to establish more harmonious arch form, ultimately resulting in a beautiful smile. During the layering process of the two centrals, check lines were placed using the Avante LF White Stain. The layering was quite simple. Figures 9 and 10 show the centrals after the first and second bakes. Figures 11 through 15 show the layering and firing sequences of the translucent dentins and incisal porcelains. The incisal were characterized to blend in with the incisal appearance of the adjacent teeth. Four powders were used: translucent and opaceous dentin on the palatal, and Incisals Light and Super Clear. Incisal and body porcelain were mixed and applied to the incisal edge to create a halo. The case was fired twice; however, more importantly, finishing and polishing were accomplished using rubber wheels and pumice (see Fig 16). This technique is preferred to artificial glazing so as to render a more natural appearance. Polishing to the proper luster is easy because of the micro-crystalline leucite particles. Figures 17 and 18 show the case on the model prior to bonding. Figures 19 through 31 show the case in situ after placement. Please note the natural life-like aesthetics. Of particular interest are Figs 23, 24, and 29 in black and white, which show the incisal characterization and Figs 25, 26, and 30 showing the transmission of light matching that of the natural dentition.
Second Case

This case consists of two all-ceramic restorations. We prepared an upper Central and Lateral; these types of cases are always difficult. The material of choice is of fundamental importance. The patient is a dental assistant and was not satisfied with her existing metal ceramic crowns. She visited our facility requesting improved aesthetics. As we can see in Fig 35 the gray from the alloy coping is showing through the gingiva and there she also presented with some problems with her gingival health. A gingivectomy was performed prior to impressioning and before the PFM crowns were placed and this positive effect is visible in the papilla after placement.

The degree of light transmission through various materials is important if one wants to make the restorations as natural looking as possible. Figures 32 through 34 show various dental materials and how light transmits through them and through natural dentition. Figure 32 shows a photo of transmitted light through the alumina porcelain crown and tooth. Note that the crown completely blocks the light. Figure 33 shows transmitted light through two PFM centrals, note that the only light we see transmits through the incisal and mesial-distal portions of the restorations. Figure 34 shows light transmitted through a PFM next to pressed all-ceramic Avante crown, note the high level of light transmitted thorough the pressed layered Avante crown.

Fig. 32  
Fig. 33  
Fig. 34  

Fig. 35  
Fig. 36  

Fig. 37  
Fig. 38
Figure 36 shows the case soon after the PFM restorations were removed. Note the gray shadow in the gingival effectively disappeared. Figures 37 and 38 show the restorations on the model after two firings of layered porcelain on the pressed cores. Figures 39 and 40 revisits the question of the papilla damage. The diastemas we see between the centrals and the replaced central and lateral have closed after two years as visible in fig 40. Figures 45 through 48 show placed restorations and a happy patient. Figures 41 and 44 show transmission of light through the restorations and natural dentition. We are not able to see any difference.
Third Case

In this case, the platinum foil technique was utilized to prepare a porcelain veneer. This technique, albeit old, has its advantages: speed of execution and the ability to use the same firing cycle as for porcelain fused to metal. Figure 45 shows the condition of the tooth before the work was begun. The remainder of the tooth was prepared as a veneer. Figure 46 shows the platinum foil adapted to the die using a tinner’s joint and swedging tool. This technique is not as complicated as it sounds and with some practice it can be mastered.

The new skill will allow the technician the ability to prepare veneers much faster than on a refractory die or by means of pressable ceramics. Pressable veneers are necessary when dealing with thinner than normal veneers because these veneers require higher strength to survive fabrication, as well as breakage during placement. The high strength is available through the Avante pellets. However, when high strength is not required, veneers made using the platinum foil technique are fast and easy to make. Figure 47 shows the veneer on the model and Figs 48 and 49 show the veneer after bonding. Note the remarkable match to the surrounding dentition and the excellent relationship with the gingiva.
Fourth Case

When presented with different restorations as is the case in Fig 50, an upper central crown and a lateral veneer, we are always perplexed on how to best approach the situation. When such restorations are contra-lateral (adjacent), it is an exercise counter to nature. The case in question was prepared during a course and the patient is a dental technician. It was observed that the newly available Neutral translucent pellet had the correct, low chroma, color that would easily blend in with the surrounding dentition. Figure 51 shows the prepared teeth.

The restorations were prepared by lightly staining the cervical area of the core and adding translucent incisal. The incisal area of the crown was cut back and the incisal powder added. Similarly, the veneer was also pressed and cutback. This technique allows the technician to characterize the core with modifiers or internal staining. In the case of veneers, internal staining is more practical than using powdered modifiers since, in most cases, the technician does not have sufficient space to use much powder. Figures 52 to 53 show the case placed and blends well into the surrounding dentition.
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Bibliography

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About the author

Francesco Ferretti was born in Rome on March 15, 1957. Franco received his degree as dental technician at the Institute “Edmondo de Amicis,” in Rome. In 1980, he started working and, from 1987 to 1994, cooperated with Ivoclar Vivadent, consulting as ceramist. In 1992 he started working exclusively with Prof. Mario Martignoni. A year later he started working with the Oral Design Center founded in Rome by Mr. Willi Geller, and became a partner, improving prosthesis esthetics. In 1999, he once again works on his own and begins university. He is currently in the third year at the University of Tor Vergata, in Rome. In 2001, he founded Estech Dental Studios, in cooperation with Pentron for technical training and consulting. He has published articles and studies in Italian and American magazines. He is interested in Metal Free techniques. He is a member of: ANTLO (National Association of Lab Owners); GIRASB (Italian Group for the research applied to Bio-Medical Sciences) and is a consultant of San Raffaele Hospital in Milan. He has been a teacher of prosthectics at the University of Chieti since 2002.
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