



**PENELOPE
CHANG, DDS**

Dr. Chang earned her undergraduate degree from Barnard College and her DDS from the Columbia University College of Dental Medicine (CDM). After graduating with multiple honors, she spent the next several years in private practice with her father in New York City as well as devoting time as an Instructor of Clinical Dentistry at CDM. In 2003, she opened her own practice in Tenafly, NJ, to be closer to home. In 2008, she established the Henry Chang Jr. Memorial Scholarship Fund at Columbia CDM in memory of her father. Dr. Chang is a key opinion leader for Dentsply Sirona and Convergent Dental, as well as a mentor and visiting faculty at CDCOS.com. She frequently travels to the Spear Center in Scottsdale, AZ, and the Dentsply Sirona Center in Charlotte, NC, to both learn and educate other dentists about CEREC digital technology.

A Digital Workflow to Treat Tooth Size Discrepancy

A 13-year-old female presented with the chief complaint, "My teeth are too narrow" (Figure 1). The patient was in the mid-phase of orthodontic treatment and the orthodontist advised the building up of the maxillary centrals and laterals to ideal width so that braces could close the remaining spaces. This would make it simpler to perform final restorations when the child is older.

Digital Wax-Up and Carrier Tray

A digital impression and bite registration were taken (Primescan and CEREC Connect 5.2 Software, Dentsply Sirona) and sent to Michael Keeter at Studio Dental Lab along with photos. Using CAD/CAM design software, the brackets were digitally removed and a digital wax-up of Nos. 7–10 designed, keeping in mind the long axis of the teeth and golden proportions (Figure 2).

The digital wax-up model was then 3D printed using a complete 3D printing workflow (SprintRay Pro 95; SprintRay Die and Model Tan 2 Resin; SprintRay Pro Wash/Dry; ProCure, SprintRay).

Using a scan pressure machine (Drufomat, Dentsply Sirona), a sheet of Essix TRAY RITE 0.02" was pressure formed onto the model as an initial

layer. This layer was trimmed to the distal of the canines. Essix ACE Plastic 0.040" was then pressure formed on top of the primary layer to create a stiff carrier. As the initial layer was not able to mold interproximally very well, the inner layer was removed. Several holes were placed in the outer layer with a 558 bur to provide retention. A clear VPS material was expressed into the tray and forced into the interproximals of teeth Nos. 6–11 and the carrier stent seated back onto the model (Figure 3). This produced a highly accurate impression of the wax-up that was translucent and able to be fully light cured.

Restorative Treatment

At the restorative visit, a cheek retractor (Opra-Gate, Ivoclar) was placed to isolate the teeth, and a



Figure 1—A 13-year-old receiving orthodontic treatment presented with the complaint that her teeth were too narrow.

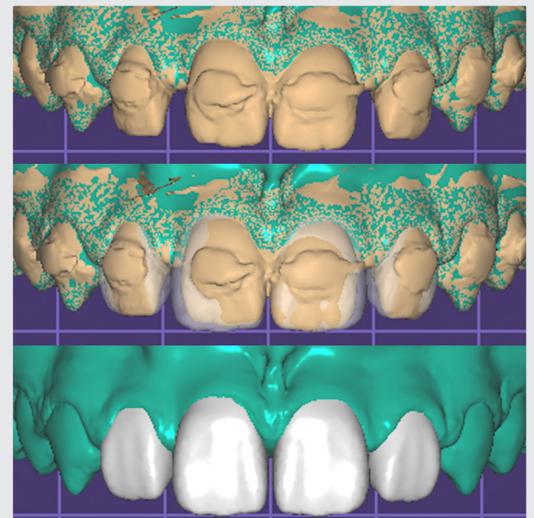


Figure 2—The brackets were digitally removed and a digital wax-up model of Nos. 7–10 was designed and 3D printed.

Bioclear Blaster with an aluminum trihydroxide blasting slurry was used to remove the biofilm from Nos. 7–10. After conditioning the 4 teeth with 35% phosphoric etch for 15 seconds and rinsing, a bonding agent was applied and composite was expressed into the clear stent and placed directly onto Nos. 6–11 (G-aenial Universal Injectable A2, GC America), pressing firmly against the stops of Nos. 6 and 11 (Figure 4). The buccal and lingual were cured

(VALO Cordless, Ultradent), the stent was removed, and the composite additionally cured to the material's recommended time. A fine diamond was used to clean up the margins and the occlusion checked. The patient will return to the orthodontist to replace the brackets and complete orthodontic treatment.

This procedure makes it easier for the orthodontist to move the teeth to the correct position while allowing the

patient to visualize the final size of their teeth (Figures 5a-b). The precision one can obtain from digitally designing the wax-ups and transferring the design allows a more accurate result than if directly applying composite by hand. The patient understands that this is an intermediate step to allow completion of orthodontic treatment with the best possible results, and that future porcelain veneers may be needed.



Figure 3—Clear vinyl polysiloxane was expressed into the tray.



Figure 4—The clear stent with composite was placed directly on Nos. 6–11.



Figures 5a & 5b—Thanks to this procedure, the orthodontist will be able to move the teeth to the correct position, and the patient can visualize the final size of her teeth.

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