



Figure 1. DSD photographic protocol.



“Natural Veneers” using CAD milled monolithic ceramics and the DSD (digital smile design) digital workflow incorporating natural tooth libraries

By Fadi Yassmin, BDS (Syd), MSc Ae Dent (Kings College London), MFGDP (UK)



Digital Smile Design (DSD) is now an integral tool that allows us to produce highly predictable and aesthetic results for our patients. With the advent of DSD and the use of natural teeth libraries being incorporated into a streamlined workflow, facially driven design is now becoming a part of daily practice.

This case demonstrates the incorporation and effectiveness of DSD and the digital natural smile library into the workflow and how it can enhance results using digital dentistry.

A 25-year-old female patient presented with aesthetic concerns regarding her dentition. A thorough examination revealed a malocclusion and old failing composite veneers that had been replaced on a regular basis every few years. This, together with the uneven gingival contour and moderate smile line, indicated indirect restorations as the ideal treatment modality.

The patient also conveyed that she wanted the veneers to look as natural as possible, which made this case ideal for the “DSD Natural Restoration” treatment protocol.



Figure 2 (above). Images captured from DSD video protocol. This helps in identifying function and lip dynamics.

Figure 3 (below). The patient's presenting dentition - note old composite, staining, malocclusion and uneven gingival architecture.



Initially, a complete set of photographic and video records were captured (Figures 1-3) along with an intra-oral scan as part of the DSD protocol for facially driven aesthetic mock-ups. This aids in accurately assessing smile parameters to identify any specific cant or midline issues that may affect positioning of restorations, all in relation to function and lip dynamics.

An initial 2D DSD was first completed using the DSD App software (Figure 4). This allows us to orientate and determine the smile parameters for this patient prior to the 3D modeling.

The smile design is then imported into Nemostudio software and using the designated matching natural libraries in both applications, a digital wax-up is generated (Figure 5a-b).

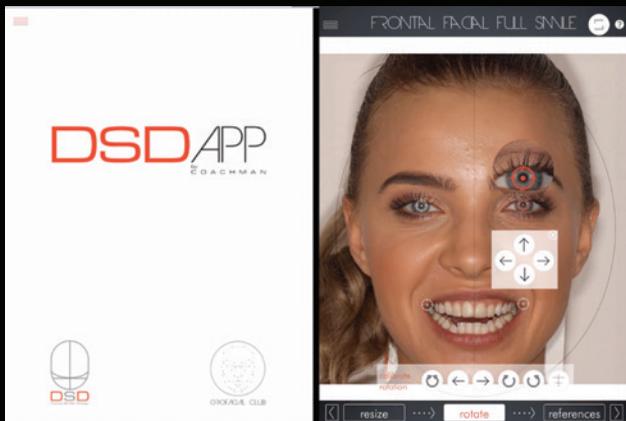


Figure 4. Initial 2D smile design using DSD App.

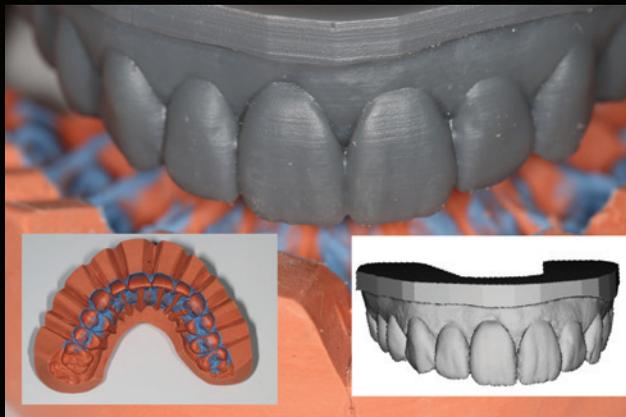


Figure 6. The digital wax-up is 3D printed and a stent created for the mockup.

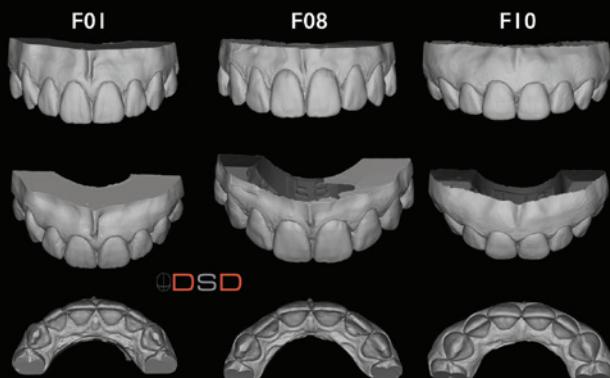
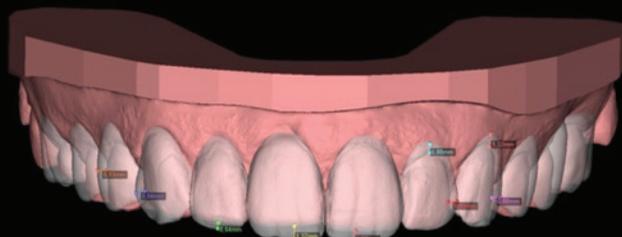


Figure 5a-b. Natural teeth library and exact dimensions of DSD proposal over original dentition producing the "virtual" wax-up.



Figure 7. The mock-up in situ.

The smile library has an array of shapes retaining their natural aesthetics and textures with slight imperfections that can be overlaid between individuals.

This is a crucial step. With the ever increasing libraries of natural teeth available, the key is the use of donors from the same gender and age for ideal propor-

tions and harmony. This further enhances the predictability of the aesthetic result.

A subsequent silicone key (Figure 6) is then created of this "virtual" wax-up that allows an accurate mock-up of the final veneers. Bis-acryl (Luxatemp, DMG) is used to create a mock up as shown.



Figure 8. Gingival recontouring using the mock-up as a guide.



Figure 9. Depth grooves cut through bis-acryl temporaries.



The accuracy and consistency of the proposed design can be seen via the mock-up (Figure 7).

This case required more buccal fill on the posteriors and more length gingivally. This pre-visualisation is the best guide for conservative tooth preparation.

The mock up can be used as a guide if there is any gingival recontouring required as per the DSD prescription (Figure 8.) In this case, electrocautery and a fine scalpel was used. Restoring the gingival harmony is a key factor in creating an ideal aesthetic outcome.

The prepping through the mock-up technique allows for conservative and accurate tooth preparation. The technique of prepping through the bis-acryl mock up and the use of silicone prep guides is really the gold standard (Figures 9-10).



Figure 10. Silicone prep guides for incisal and labial reduction using printed digital wax up.



Figure 11. Gingival retraction cord and Expasyl are used.



Figure 12. Veneer preparations scanned with an intra oral scanner.

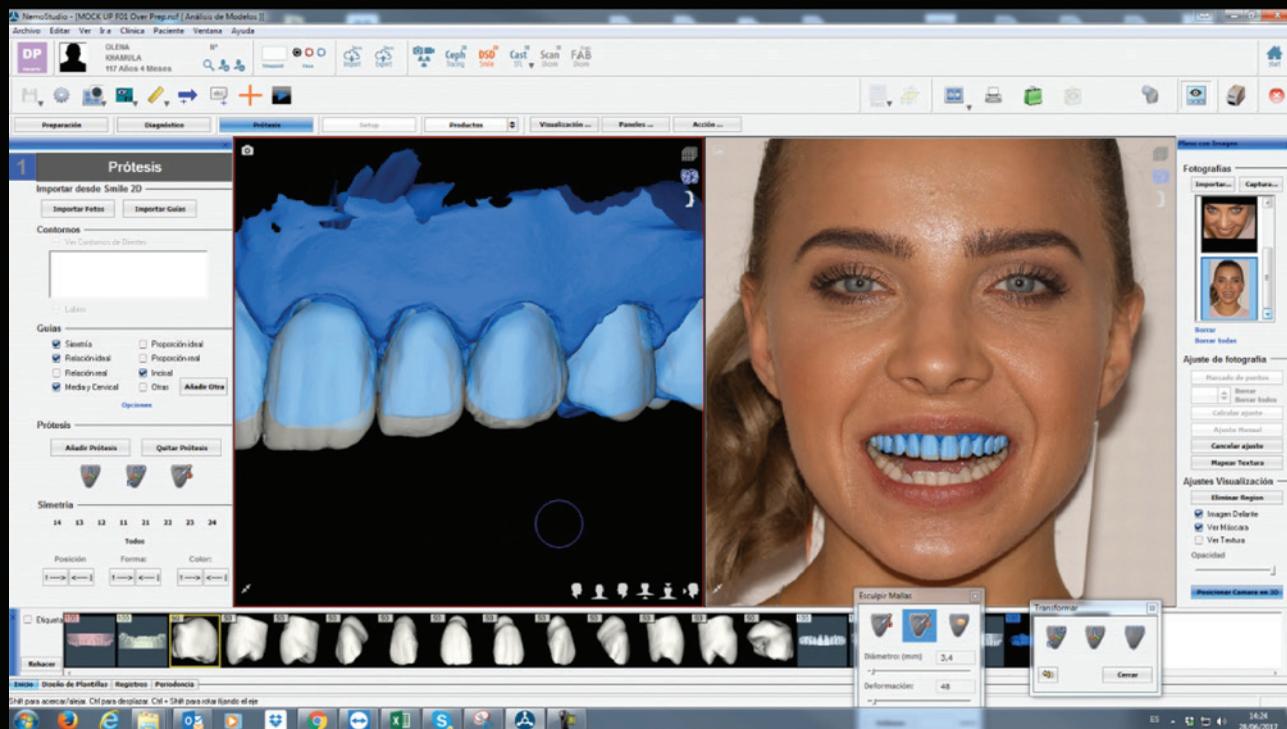


Figure 13. Veneer preparations are digitally overlaid with original teeth chosen in the DSD using the Nemostudio and then imported into the desired milling software.

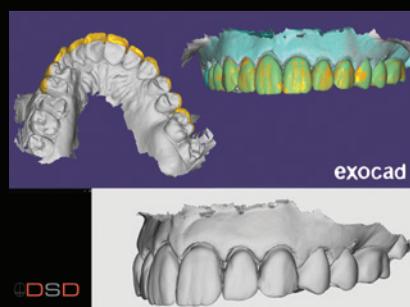
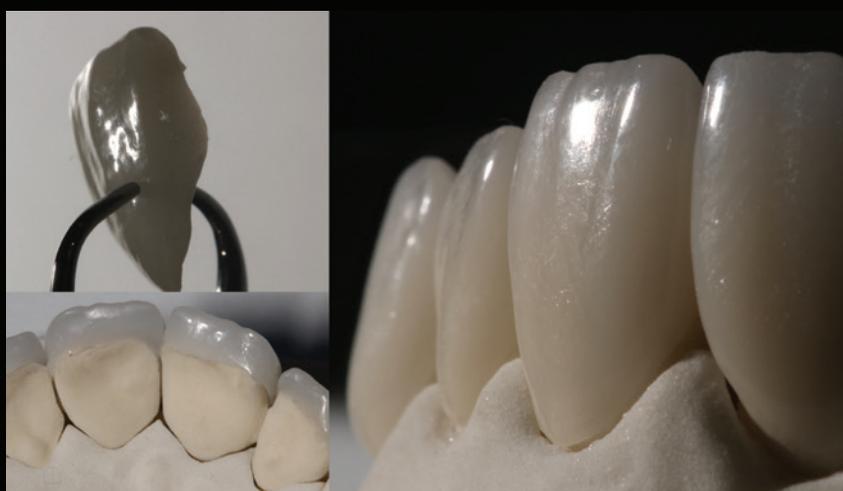


Figure 14 (above). The final design is imported into the milling software.

Figure 15 (right). Note the natural textures on the monolithic CAD milled indirect restorations that have been perfectly reproduced from the digital file.



The preparations are then scanned digitally and a digital “over the prep” model is created incorporating the teeth selected and planned from the natural library (Figures 12-14).

This is initially done in the Nemostudio software and then prepared for milling with your preferred software system package (such as Dentsply Sirona’s Inlab, 3Shape, exocad, etc).

The restorative material chosen was Empress Multi BLT3 (Ivoclar Vivadent). The final restorations are then cemented under rubber dam for ideal bonding and moisture control (Figure 16).



Figure 16. Cementation of veneers under rubber dam.



Figure 17. Polarized image of final restorations and digital design.



Figure 18. Final veneers.



Figure 19. Final images of patient smiling and at rest.



Figure 21. Before and after.



Figure 20. Incorporation of textures in final cemented restorations.

The final photos highlight the beauty of nature (Figures 17-21). The shape and texture of the final veneers are untouched from the original file. This case demonstrates that with a facially driven design and natural tooth libraries using the DSD protocol, we can achieve a perfect natural smile.

About the author

Dr Yassmin first studied DSD with Christian Coachman and not only did he incorporate it into his daily practice workflow but has become a speaker and official instructor for DSD. This training along with his Masters in Aesthetic Dentistry from the Kings College of London has enabled him to further establish his cosmetic and implant practice in Sydney. He is currently running his DSD courses in Australia and Asia.