

Dr. Andre Schertel
The Smile Place Mt Eliza

Same day restoration of an upper lateral incisor



Solutions used:

3Shape TRIOS®

TRIOS Design Studio

3shape 

Background

Female patient in her late 70's, healthy, presented for an urgent appointment due to a broken anterior tooth.

Our assessment found her tooth 22 to be missing the entire mesial incisal edge. The tooth was heavily restored with multiple pinned composites. Radiographs showed that these pins were placed quite deep into the tooth, however it was still vital and responsive to CO2 testing.

The patient has a Class 2 Div. 2 dentition with a very deep bite and traumatic occlusion. Her remaining upper anterior teeth have advanced palatal wear and chipping of the anterior edges. The patient wears a lower partial denture which was recently replaced.

The patient was leaving on the very next day on a caravan trip around Australia, and at this stage was not interested in an extensive treatment plan for her teeth.

We discussed treatment options including:

- A simple composite restoration repair of the fractured portion of her tooth,
- The replacement of all the existing pinned restorations with a single composite build-up
- A lithium disilicate (Ivoclar e.max) milled crown, to be completed in a single visit/single day using our 3Shape TRIOS®/Roland workflow
- A porcelain fused to metal crown with a metal palatal surface, completed over two visits

The patient chose to proceed with the e.max milled crown due to time constraints and her need for a stronger restoration. She agreed to consider a comprehensive treatment approach upon her return.



Fig. 1 Initial presentation



Fig. 2 Initial presentation II



Fig. 3i Deep bite – close up



Fig. 3ii Build up

Treatment Plan

As the fractured tooth was already extensively restored and worn down, the additional preparation required for the crown had to be taken into consideration.

The deep bite was a concern and sufficient thickness had to be achieved in the palatal surface of the crown to avoid a fracture.

The existing restorations were failing and had to be replaced prior to the crown prep. The existing dentin pins were left in place during the preparation due to their depth, and the concern about propagating dentin cracks if their removal was attempted.

Finally, the milled Emax crown would be bonded with an adhesive cement system to assist with retention.

A strong restoration that would last until the patient's return and give her an opportunity to consider a comprehensive long-term treatment plan for her entire dentition.

The entire case was completed in a single day, once the patient gave us consent to proceed with treatment.

After pre-op photos were taken, the patient was anesthetised and we completed the removal of the failing restorations and caries, and placed a new composite core build-up on the tooth.

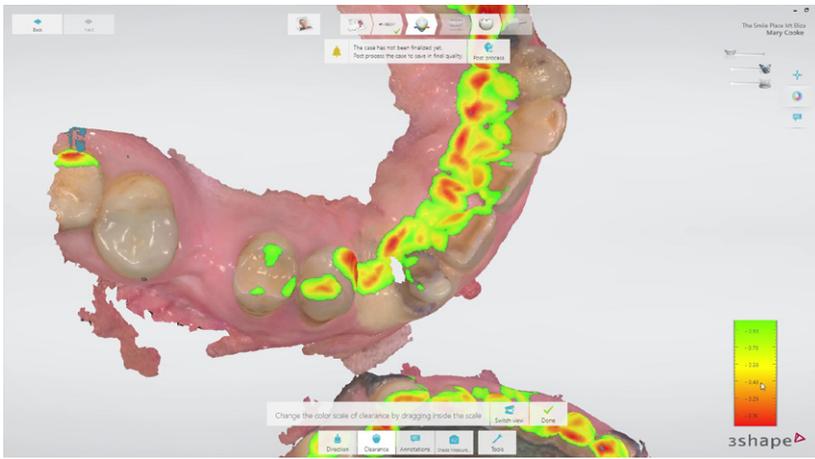


Fig. 4 Preliminary check of prep clearance

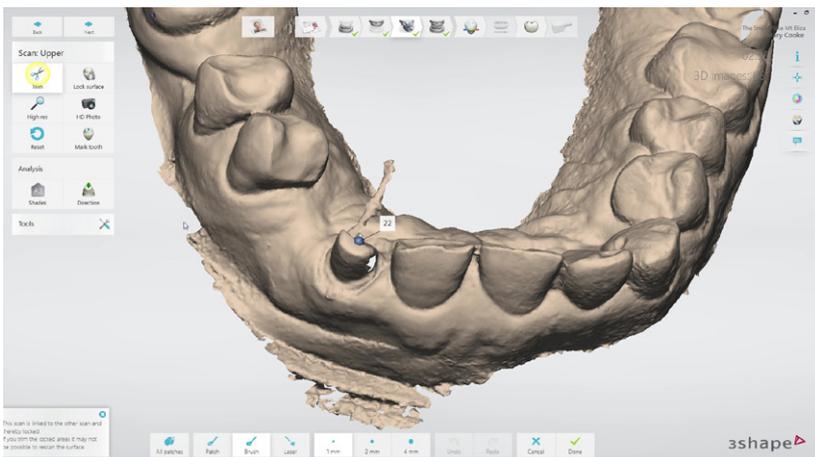


Fig. 5 First scan with two cords

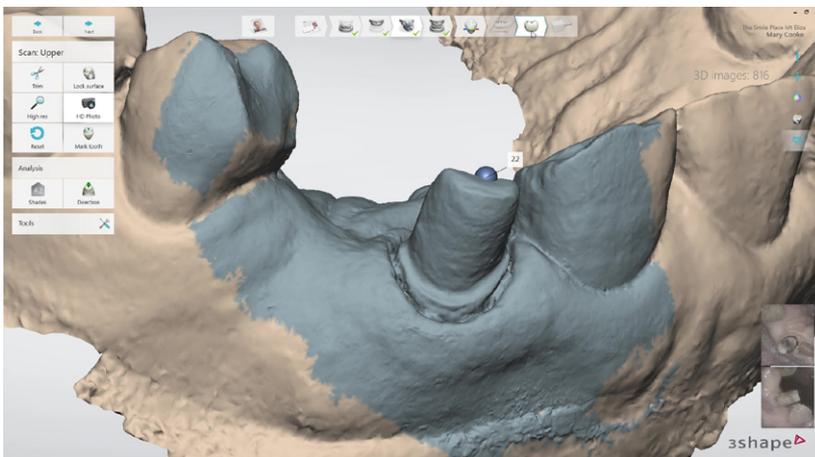


Fig. 6 High definition scan

An OptraGate dam is used to help retract and protect the lips and ensure adequate access while scanning with the 3Shape TRIOS® scanner. Preliminary TRIOS scans of both arches and the bite were immediately completed, making the most of our limited time.

Due to the limited tooth structure and the patient's deep bite, the crown preparation margins were placed equi-gingival, and retraction of the gingival tissue was achieved with a double-cord technique, using a piece of Ultradent's #00 retraction cord soaked into haemostatic agent followed by a piece of size #0 or #1 retraction cord.

The final preparation scan was completed using a two-step technique. We find this makes the scanning process very predictable and easy.

The preparation is first scanned with both cords in place, using the preliminary scan taken at the start of the procedure as a guide. Marking the tooth on the software opens up the next step of the process which gives us the option to review the path of insertion, the occlusal clearance achieved for the new crown and the shade of the prepared tooth and the adjacent teeth.

This feature is particularly useful when we are dealing with cases such as this one with a deep bite. It is the perfect opportunity to go back, re-prepare the tooth if required, and re-scan. This takes little to no time at all, and can save a lot of fit issues and adjustments later on.

The TRIOS software allows us to easily trim the scan as required, and we proceed to digitally remove the retraction cord and the entire margin of the preparation, which at this stage does not look very sharp on the scan. Leaving behind the bulk of the prepared tooth helps the software stitch the images together and quickly capture new images in the following step.

Once we are satisfied with the preparation, the top retraction cord is removed. We then quickly proceed with a second scan, this time using the TRIOS HD/Zoom feature which allows us to see the margins quite clearly. We also take a couple of HD photos to assist with selecting the preparation margins later on.

After a quick inspection of the final scan, the second cord is removed, and we allow the patient to have a break while the new crown is manufactured.

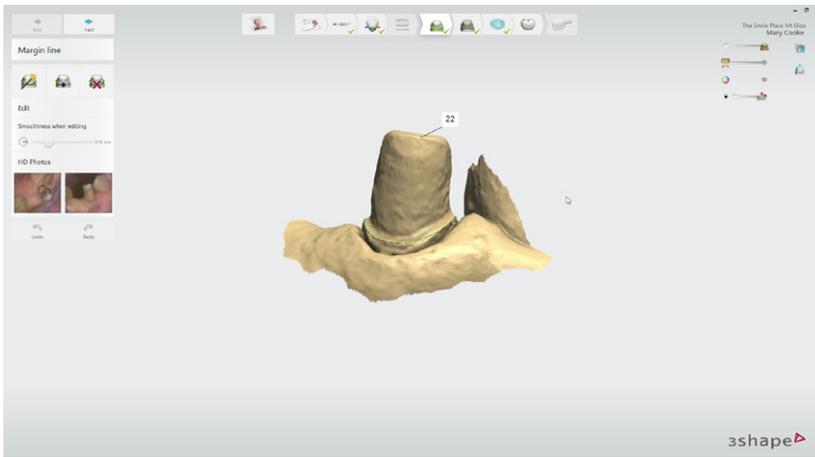


Fig. 7 Crown margin detailed

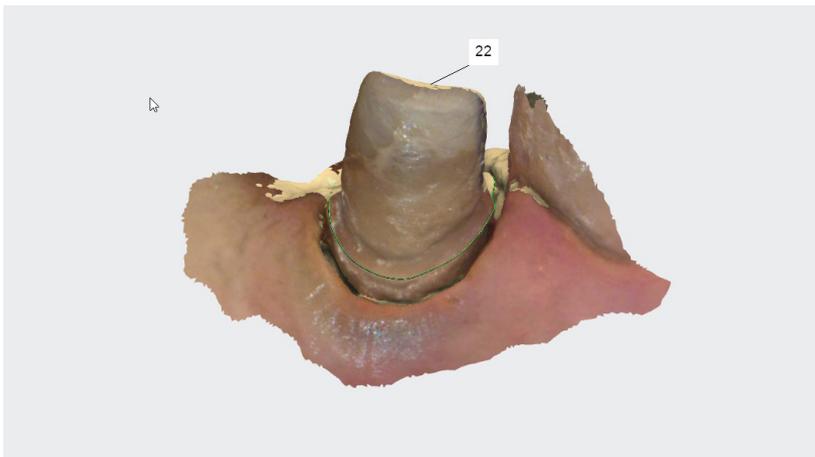


Fig. 8 Crown margin detailed II

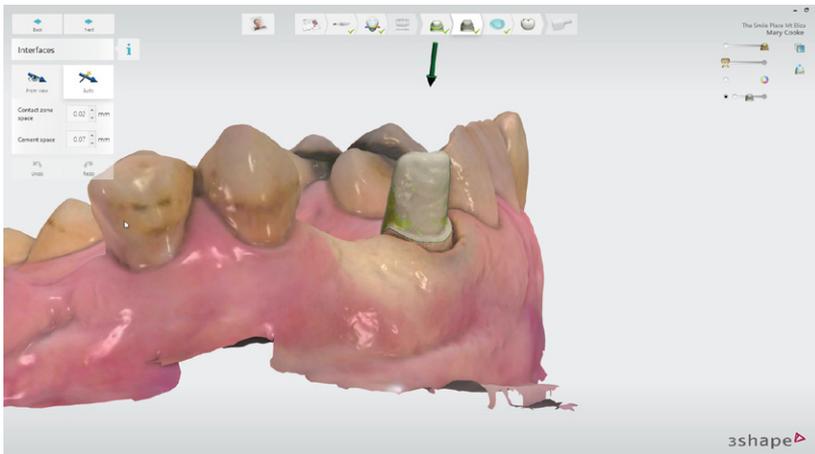


Fig. 9 Insertion path

Crown design with 3Shape TRIOS® Design Studio

Designing the crown is a simple process using the chairside TRIOS package. After the scan is processed by the software, it is pushed seamlessly into Design Studio.

During our assessment, we noticed that teeth 22 and 12 were quite different in shape and length. We warned the patient that an attempt would be made to design the new crown so that it looks as similar as possible to the contralateral tooth.

The first step of the design process is to mark the margin line. This is where all the care taken during the scan process pays off. A well-defined margin is quickly picked up by the software and further adjustments can be made using the HD photos taken during the scan.

The software will then suggest the ideal occlusion plane and the path of insertion for the crown, which can be adjusted along with other parameters such as the thickness of the cement layer. The path of insertion is calculated based on the preparation undercuts and very rarely requires manual tweaking.



Fig. 10 Copy tooth over preliminary scan

Designing the crown comes next. TRIOS Design Studio will at first automatically suggest a tooth design, which we find works very well, with little to no input needed, allowing us to move through the design process very quickly. The software also comes with multiple “teeth libraries” installed, for both anterior and posterior teeth, and we can simply pick one that we feel suits the smile.

In this particular case, our intent was to design the crown to make it look similar to the contralateral tooth 12, to try and achieve an even “look”.

This can be easily done using the aptly named “Copy Tooth” feature. It is as simple as pointing to the tooth we want to make a copy of. TRIOS will then identify its shape and features, and once we are happy, it correctly marked the tooth, Design Studio will mirror the image automatically and this becomes our new crown.



Fig. 11 Copy tooth feature

The crown can be adjusted using the transform, morph, and wax knife tools until we are satisfied with its shape, prior to a final check of the occlusion and contact points using the virtual articulator. Some modifications were required due to the patient’s deep bite.

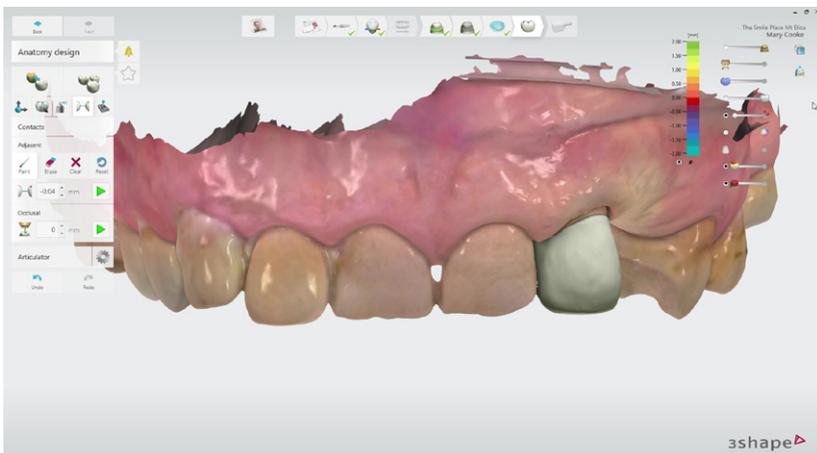


Fig. 12 Crown adjustment

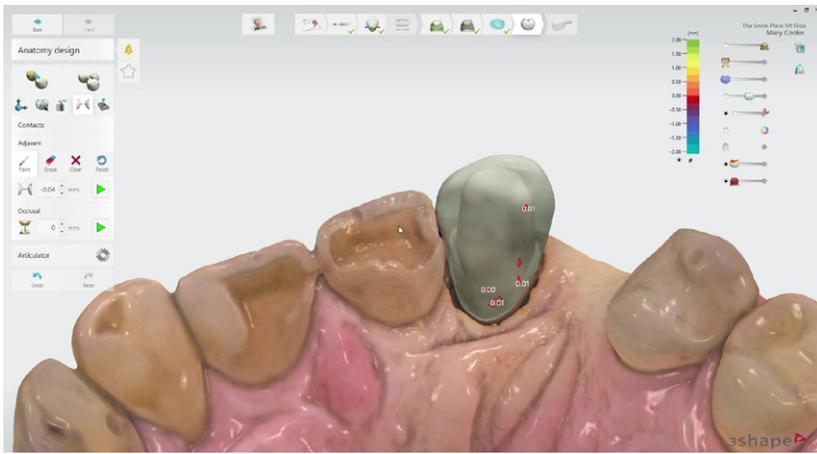


Fig. 13 Occlusal contacts

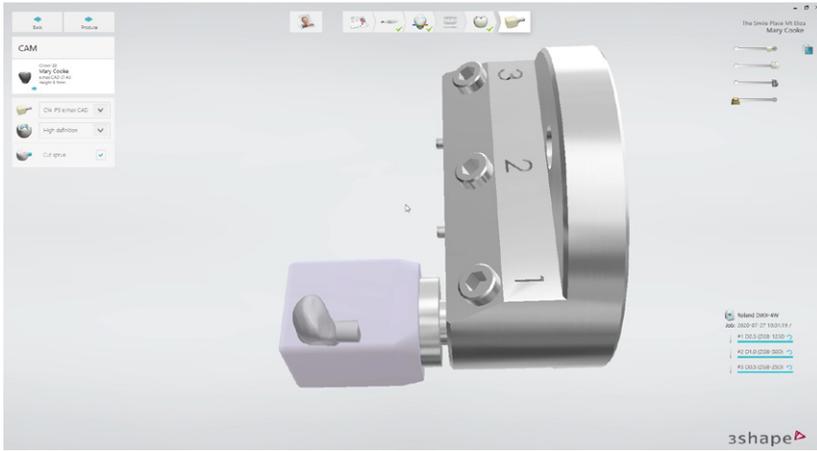


Fig. 14 Crown in block showing sprue



Fig. 15 Sprue on the palatal



Fig. 16 Moving sprue to distal for finishing

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After milling, the only thing left to do is to process the milled crown. In this e.max case, that means polishing off the sprue, mounting the crown into a firing pin and tray, staining and glazing as required and then crystalizing the crown with the Ivoclar Programat furnace.



Fig. 17 After image



Fig. 18 After image close up



Fig. 19 Before and after comparison

Conclusion

A key challenge in this case was the patient's difficult deep bite and worn tooth surfaces. The instant "feedback" of a TRIOS scan allowed us to change and adapt the preparation on the fly, and then design the crown knowing exactly where it needed to be reinforced. This helps ensure a longer lasting restoration.

The patient was brought back in for a try-in. No adjustments were required, and she was quite pleased with the appearance of the new crown, telling us that she was never happy with the look of the old tooth to start with.

The crown and the tooth were prepared and finally bonded together with an adhesive cement system. Our patient was quite thankful that we could help her in such a short period of time, and asked if we could eventually do the same to her adjacent teeth!

Comments

We present the case of a single broken upper lateral incisor, in a patient with advanced tooth wear and a deep bite. Time was an issue, as our patient was due to go on extended travel the very next day. Using the 3Shape TRIOS® scanner and the TRIOS Design Studio chairside package, we were able to quickly design and mill an e.max crown to restore this tooth in a single visit.

Benefits of the digital workflow according to Dr. Schertel

Having TRIOS and TRIOS Design Studio gives me more treatment options to offer our patients. We were able to build a stronger restoration to our patient in a very short timeframe. We have control over the entire process, and flexibility to adjust the design as we see fit.

We also particularly like the TRIOS feature that allows us to immediately inspect the preparations details, giving us the opportunity to "go back" and adjust the work as required. In the past, this would require a set of impressions, pouring up models and waiting for a phone call from the lab, telling us that the preparation was not sufficient, or the impression had bubbles!

We were able to complete the entire process in less than two hours, including the time it took to mill and process the crown, which happened in the background while we continued to see other patients on a busy day.

Benefits to the patient according to Dr. Schertel

The patient appreciated the option to choose a longer lasting restoration, which gave her peace of mind during her extended trip. She was also very happy with the final result, and appearance of the new crown.

About Dr. Andre Schertel

Andre received his dental degree in 2002 in his home town of Sao Paulo, Brazil. He went on to complete post-graduate studies in Restorative and Cosmetic dentistry and, after permanently relocating to Australia, he also completed a Post-Graduate Diploma in Clinical Dentistry (Oral Implants) at the University of Melbourne in 2011. He is passionate for continuing education and the use of technology in dentistry, in particular CAD-CAM applications and 3D printing, having lectured on the topic both in Australia and Internationally.

Andre is the principal dentist of a busy 4-surgery private practice in Mt Eliza, on the beautiful Mornington Peninsula in Victoria.

About 3Shape

3Shape is changing dentistry together with dental professionals across the world by developing innovations that provide superior dental care for patients. Our portfolio of 3D scanners and CAD/CAM software solutions for the dental industry includes the multiple award-winning 3Shape TRIOS® intraoral scanner, the 3Shape X1 scanner, as well as market-leading scanning and design software solutions for both dental practices and labs.

Two graduate students founded 3Shape in Denmark's capital in the year 2000. Today, 3Shape employees serve customers in over 100 countries from 3Shape offices around the world. 3Shape's products and innovations continue to challenge traditional methods, enabling dental professionals to treat more patients more effectively.

Let's change dentistry together

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