



# CAD/CAM Veneer Fabrication

## Using Correlation and Replication Modes with Sirona inLab®

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### Introduction

Patients can be picky people. When it comes to cosmetic dental procedures, they often arrive at the dental office with preconceived ideas of what they want their teeth to look like. Just as a person who walks into a hair salon with a photo of what they would like their hairstyle to look like (usually cut from a magazine, and often a picture of a celebrity or someone they admire), patients looking to beautify their smiles have a clear picture of the results they expect to achieve.

The patient profiled in the case study presented herein was not happy with her two front teeth, in particular (Figure 1). She did not like the way her centrals were “too long” in relation to the neighboring laterals. Nor did she like the shape—the incisal edges of both 8 and 9 were essentially flat, lacking definition due to composite restorations several years prior due to chips at the mesial of both teeth. Another motivating factor was her husband, who was returning home from active duty in Iraq, and she wanted her teeth to look great for him.



Fig. 1: Pre-op condition

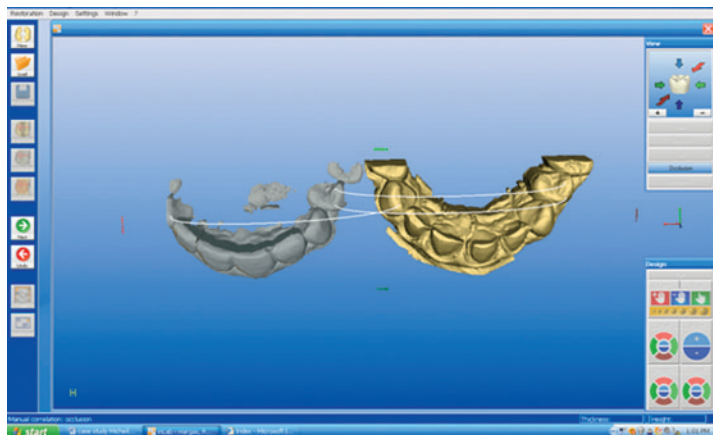


Fig. 2: Digital images of both the temporary model and preparation model are correlated within the inLab software.

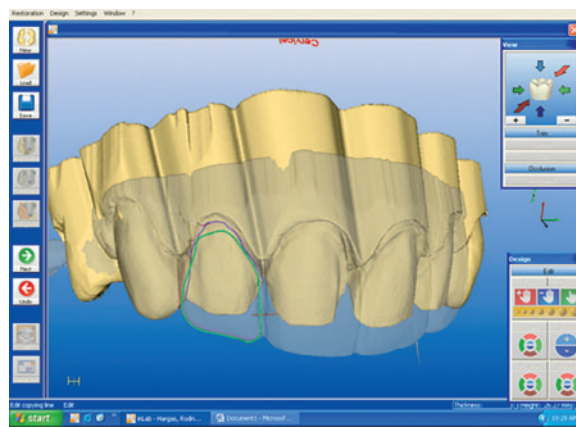


Fig. 3: A translucent image of the temporaries is superimposed onto the preparations.

## Treatment Plan

The patient originally wanted veneers on just tooth 8 and tooth 9, but on the advice of the restoration team, she agreed upon veneers on teeth 7 through 10. This approach was recommended in order to create better anterior balance, in both size and shape, for each of these four teeth, as well as in relation to all the other teeth. Otherwise, restoring only her centrals would have made them appear too big. Overall, her dental health was very good, with no remarkable findings or other areas of concern. Her dentition was functionally sound as well; this was a purely cosmetic procedure.

## Case Study – At the Dental Office

At the dental office, the doctor prepared teeth 7-10 specifically for inLab veneers. This meant a conservative reduction of the incisal edges of each tooth by approximately 2 millimeters, ending in a butt joint at the palatal margin. The mesial and distal proximal margins were extended lingually with an open contact. This preparation technique makes it easier to seat the veneers and polish the lingual margins after seating. A sloping shoulder facial margin with a crisp cavosurface allows the porcelain veneer to “disappear” into the tooth for a more natural appearance.

After prepping the teeth, the preparation impressions were taken. The patient was then fitted with temporaries, and impressions of these were taken. She was so happy with the look of the temporaries, she decided she wanted her final

restorations to look exactly like them. Both sets of impressions were sent to the laboratory. The patient was then scheduled to return to the dental office one week later for placement of the final veneers.

## At the Laboratory

Stone models of both the preparations and temporaries were poured and trimmed, with no other model work needed. To initiate scanning of the models, a new case was created on the inLab software. For this process, “new restoration” is selected and information is entered for doctor name, patient name, scan date, and reference number, if needed. After pressing “OK” the specific restoration type is entered. In this case, the restoration type selected was “veneer” and the design technique selected was “correlation.” Correlation mode was the appropriate mode to use here as the case called for copying the facial surface of the temporaries onto the preparations. This will be explained in detail in the following steps. Correlation is one of the simplest design options available with the inLab System, as it copies the contours to be restored from either a pre-operative tooth, diagnostic wax-up (as in this case), or an intraoral mock-up.

First, the preparation model was lightly sprayed with special imaging powder, which allows it to be “seen” and thereby scanned into the inLab design software using the inEos digital scanner. Scanning of the entire model was accomplished in under 2 minutes. The model of the temporaries was also scanned into the inLab design software in the same manner.

## Designing the Veneers

Now that digital scans of the temporaries and the preparations have been “captured” and stored in the inLab design software, both scans are manually correlated with each other (Figure 2). This enables the system to correctly align the 3-dimensional image of the temporaries on top of the 3-dimensional image of the preparations.

The first veneer to be designed using correlation mode was tooth no.7. The margin is outlined automatically using the software’s built-in margin finder tool, and the next step is to define the appropriate path of insertion. Clicking on “occlusion” in the Display Options menu will superimpose the transparent image of the temporaries on top of the image of the preparations (Figure 3). The proximal contact line (pink line) is drawn to the farthest point on the margin of the preparation, and then the copy line (green line) is drawn around the image of the temporary in order to

obtain as much information to correlate as possible.

When finished editing the shape of the veneer, “solid form occlusion” is chosen in the Display Options menu to turn the veneer design from transparent to “solid” form. If the restoration comes out speckled, as seen here, the design is good (Figure 4). If it shows too much gray (occlusion) or too much white (restoration), the Form Tool may be used to achieve the desired effect. Once satisfied with the design of the veneer for tooth no.7 (Figure 5), it was milled out. While this veneer was milling, tooth no.8 was designed in the same fashion as described for no.7. When the veneer design for tooth no.7 was completed, designing the veneer for tooth no.9 was accomplished quickly and easily by choosing Replication Mode, which is similar to Correlation Mode. The model was then displayed on screen with the previous proposals in stone. Tooth 9 was now ready to be started by first outlining the preparation margin on the preparation model, and then outlining the copy line from the temporaries

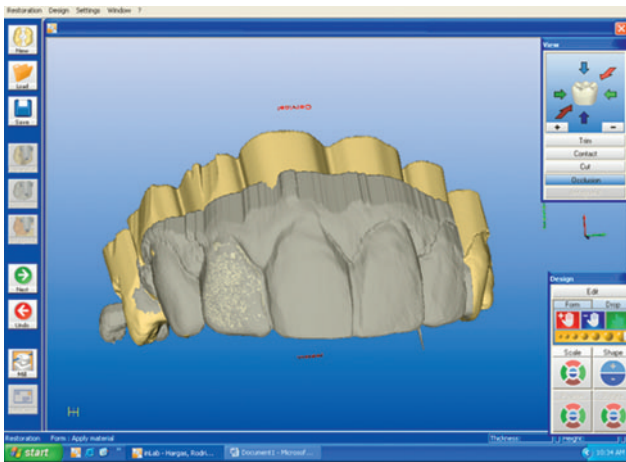


Fig. 4: A “speckled” veneer proposal means that the prep and the temporary were correlated correctly.

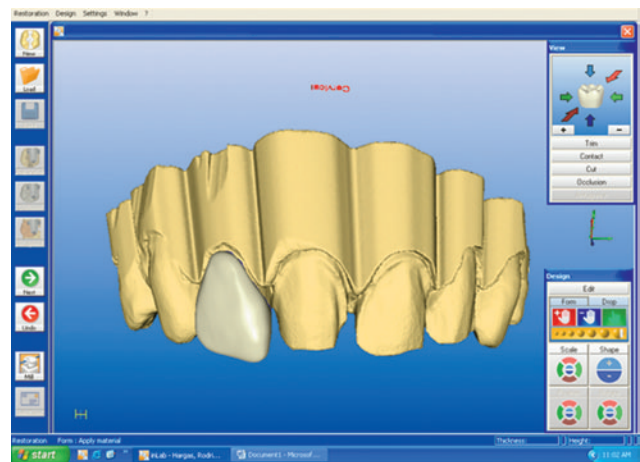


Fig. 5: The final veneer design for tooth # 7.

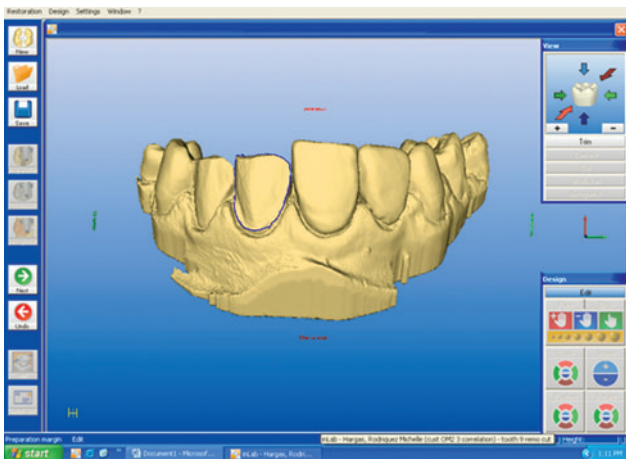


Fig. 6: The model of tooth #8 is displayed, and # 9 is replicated by taking a mirror image of #8.

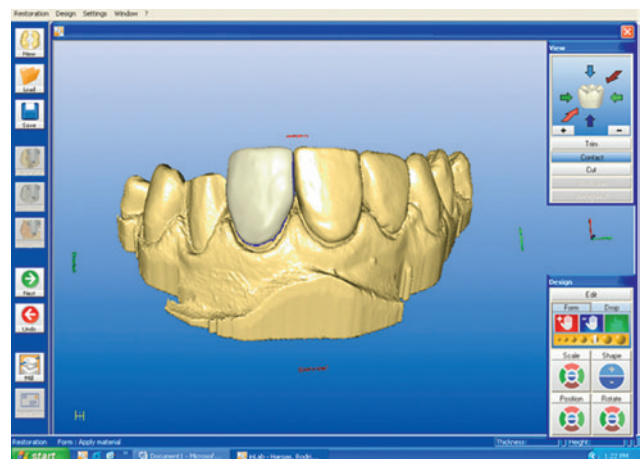


Fig. 7: The inLab software proposes a veneer design for #9 based on a mirror image of the design for # 8.

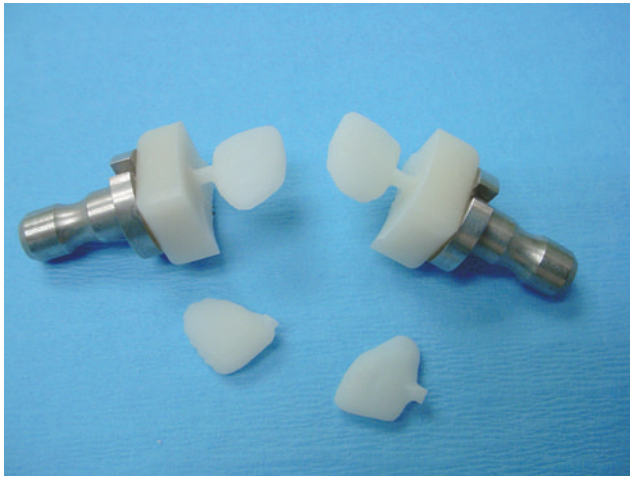


Fig. 8: The 4 veneers were milled from Vita Mark II all-ceramic blocks.



Fig. 9: The milled veneers are tried on the stone model.



Fig.10: Each veneer is stained and glazed to mimic the patient's natural dentition.



Fig. 11: Post-op of seated veneers #7 through #10.

model (Figure 6). The message prompt: “Do you want to mirror this image?” appeared; “Yes” was pressed to proceed. Almost instantaneously, the replicated veneer proposal for tooth no.9 appears, now ready for design.

By using the Design Box, you may position the proposal mesial, distal, cervical, or incisal. It can also be rotated in any direction, or scaled larger or smaller. The green arrow was clicked and the proposal for veneer no.9 appeared (Figure 7); it was now ready to be milled. While no.9 was milling, no.10 was created in a similar fashion by simply replicating the veneer for tooth no.7. Replication Mode can be used when you want to create an identical restoration on one preparation from its contra-lateral tooth.

### Material Selection, Milling, Staining and Glazing

Each of the 4 veneers was milled from VITA Mark II blocs in shade OM1 (Figure 8), and then tried on the stone model (Figure 9). In cases where a lot of translucency is desired, the cutback technique is

typically employed. However, for this case, only a small amount of translucency at the incisal edges was needed to produce restorations that best matched the patient's natural teeth, so they were milled to full contour with no cutback. Simple staining and glazing techniques were used to simulate a natural appearance (Figure 10). On the incisal third of each veneer, VITA Akzent stain color “Niagara” was used, and on the gingival, Akzent stain “Curry” was used.

The restorations were glazed and fired for approximately 20 minutes without vacuum in an IntraTech Pro Press 100 oven. After firing, the veneers were again tried on the model, and required very minimal adjustments with a finishing wheel at the interproximal contacts to ensure an ideal fit.

### Final Veneer Placement

The veneers were sent back to the dentist and were tried-in on the patient. The dentist reported that no adjustments were needed. The veneers were

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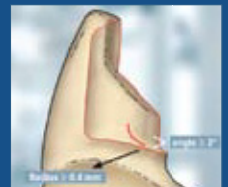
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cemented using the 3M Rely-X bonding system, translucent shade. The patient was extremely happy with her new smile and, as seen in this post-op photo (Figure 11), was also happy with the elimination of the "dark triangles" shown in her pre-op occlusal photo.

## Conclusion

All four veneers took a combined 35 minutes to design, a minute or two each to adjust, 30 minutes combined to stain and glaze, and 5 minutes combined to etch. Milling took place simultaneously—while I was designing one restoration, the previous one was being milled—so there was no time wasted. For a one-man lab like mine, the Sirona inLab System is an invaluable tool that allows me to design, mill, and fabricate full-contour restorations in a fraction of the time it would take to do manually. Because I do everything myself, the inLab is like a second employee for my lab... continuously milling out restorations in the background while I can concentrate on the artistry and creative aspects, such as porcelain build-up and staining and glazing.



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## About the author



**Bill Atkission** is the sole proprietor of Bill Atkission Dental Ceramics, a one man "boutique" lab located in Oceanside, California. He graduated from Dental Technology Institute in Orange, California in 1983. In 1989, Bill opened up his lab and immediately acquired a reputation for quality and service. He incorporates traditional lost-wax techniques as well as high-tech CAD/CAM systems to provide the highest quality restorations including gold, porcelain fused to gold, and pressable and milled ceramics, among others.

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