**Zirconia CAD/CAM bridge in three pieces**

CAD/CAM design, 3D milling used on an 18-unit zirconia bridge completed in three pieces.

The patient, a 50-year-old female, presented with a large diastema, irregular teeth size and dull color. Furthermore, the shape of the teeth on the right vs. left sides was different – as is apparent in the pre-op photo. The teeth on her left side were longer than those on the right.

In order to fill in the gap left by missing teeth Nos. 4, 5, 10, 12 and 13 she had worn a partial for years. However, she had no occlusion and was especially unhappy with the large diastema between her centrals. In addition, the author noted that No. 8 was in a good position but No. 9 was too long, with both Nos. 8 and 9 being too large in size.

The patient and clinician wanted a metal free restoration and chose zirconia for the frame design. In order to be certain of the predictable outcome, the author used the 3D Milling Center in Seattle for the CAD/CAM frame design for teeth Nos. 3-8, 9-14 and 22-27 in three separate pieces. Especially with this case, the parallelism...
with the path of insertion was very important in order to ensure proper fit and no rocking in the mouth. We also checked tissue design for the framework.

3D Milling was also able to design full contour cut-back for proper frame design incisally, facially and lingually - especially in the joint between the teeth. This measure helped protect against fracturing due to extreme bite forces. Too much porcelain could easily lead to fracture in a case like this one - the reason for the cut-back procedure.

CASE STUDY
In (Fig. A) pre-operatively, we have a clear view of the patient’s problems: large diastema between the centrals, discoloration, size discrepancy and the right side teeth are longer than the left side. In the clinician’s image (Fig. B) the prep design and marginal integrity are captured.

Teeth numbers 9, 11 and 14 were not prepared. The CAD/CAM design required detailed work (Figs. C, D) but the results were excellent. 3D Milling Center Digital Design in Seattle then milled the frame design for the laboratory (Fig. E). They also have the capability to fabricate all kinds of restorations, from press to zirconia and titanium. Any 3Shape Scanner owner can scan their frame design and send it to the 3D Milling Center in order to have their restoration completed and sent back in a timely manner (Fig. F), a definite convenience for lab owners.

After sandblasting, cleaning and touching up the zirconia bridge, it had this appearance (Fig. G). Frame modifier from GC Initial Porcelain was applied. The restoration for 22-27 was (Fig. H) finished, with a slight amount of pink porcelain provided to match with existing gum tissue. With back light the restoration had this appearance (Fig. I).

The base shade color chosen by the author was A-1. GC Initial Low Fusing Porcelain for the dentin and enamel colors (Fig. J) was the author choice for porcelain. In order to create contouring, the author applied a second build-up of enamel overlay (Fig. K). To prepare texture for lobe angulation, he drew black lines on the model (Fig. L) and red lines to note where to grind to create depth. The 12 units of maxillary restorations were prepared as two separate bridges (Fig. M) and placed on the model with fluorescent lighting. As a mirrored image, (Fig. N), the completed restorations are beautifully displayed for a translucency check.

Pre-operatively, the patient’s side smile view reveals an unappealing emergence profile (Fig. O). The restorations on the model, same positioning (Fig. P) are much prettier as an alternative.

CONCLUSION
Before choosing a Milling Center, and sending your CAD/CAM design to them for milling, first look into their quality or work and the way they handle fit questions. If they don’t have a systematic way of dealing with cases like the one we have discussed here, or show hesitation in the best way to move forward, chances are they will not provide you with the best possible fit for the patient.

When we receive the cases back from a milling center, we look for a slightly thicker fit rather than thinly made. Our opinion is that the marginal integrity and communication we receive from the milling center must be understood from the get-go so that we are sure we will get back what we request.

ABOUT THE AUTHOR
Luke S. Kahng, CDT, is an accomplished dental technician with more than 20 years of experience in the field of cosmetic restorations. He is the founder and owner of LSK121 Oral Prosthetics, a dental laboratory in Naperville, Ill. Mr. Kahng has published more than 60 articles in many prestigious dental journals, nationally and internationally. His lecture circuit has taken him across the United States and internationally to teach fellow professionals, using a hands-on, demonstrative approach. He has created morphological models to mimic natural teeth and assist in teaching predictable results. In 2009, he created the Chair Side Shade Selection Guide to facilitate effective communication regarding color between doctors, patients and technicians. In 2010, version two of the product was released, to wide acclaim. In addition, he has created 3D Technical Manuals for technicians interested in learning his porcelain techniques.