An alloy alternative: Titanium's versatility is matched by its strength and biocompatibility.

By Jamie Stover, Lab Manager, Ziemek Dental Lab, Olympia, Wash.

As laboratory technicians, we are constantly made aware of new products and materials, and are subjected to much of the same marketing as dentists; however, we are in the unique position of having to fulfill our dentists’ requests to implement these new materials and discern what is hope and what works well. At the same time, now more than ever, we are under increasing pressure to keep costs down.

Add to this the tumultuous gold market today, and it’s no wonder that we fear our bottom line shrinking.

Offering a lower-cost noble alloy as an alternative to more expensive high-noble alloys for PFMs is an important option, but still leaves the alloy cost per crown inconsistent.

**ENTER TITANIUM**

Titanium is lightweight, extremely strong and very bio-compatible. Although I wouldn’t categorize titanium as a “new material,” it is now more affordable and easier to use as a crown and bridge alloy in the past, using titanium in PFMs was not an easy feat, as anyone who has ever tried to cast it will attest. Titanium gives you the ability to change the workflow in your lab by allowing the CAD/CAM fabrication of single copings and bridge frameworks as opposed to traditional waxing and casting.

Additionally, it gives you a fixed alloy cost per unit, which allows you either to charge a flat price for the alloy per crown or structure pricing to include the alloy in the price of the crown, regardless of its size. Labs choosing not to invest in a scanner and software can still use titanium and reap similar benefits by simply partnering with another lab and outsourcing the scan and design steps. Although with the speed that technology is transforming our industry, it’s becoming difficult to imagine any lab without some type of scanning ability.

With titanium, you pay a fixed price per millimeter of coping or pontic regardless of the size or weight. The actual price a lab pays per coping will differ depending on how you acquire your titanium frames, as labs that can cast/design their own understructures will most likely pay less per unit than the ones that choose to outsourcing these steps.

As with zirconia, there are different grades of titanium available today of varying quality, making it important to seek out a reliable source. For this article, I will only discuss the materials I use to produce titanium/PMMA at Ziemek Lab.

**BASIC RULES**

I hear quite a bit about how difficult it is to integrate titanium into a lab, and how tricky it can be to work with. Incidentally, I hear this mostly from labs that have never stacked a titanium crown, and haven’t found this to be the case. There are also basic rules that I follow when working with titanium.

I always use a dedicated carbide burr for metal finishing to avoid cross contamination of our other alloys, which is no different in theory than working with non-pre-alloyed metals for Maryland and Bridges, etc. I would recommend dedicating a work station exclusively for it, however, I haven’t needed to do this as of yet. I keep my work area clean, use a dedicated burr, and don’t have any issues with cross contamination.

Titanium builds an oxide layer by sitting at room temperature for about five minutes, so you don’t fire it in an oven to degas. This is a bonus in my opinion, as five minutes sitting at room temperature will do something else is a quick, easy degas cycle.

Before you prepare your coping, you need to deal with 125-micron aluminum oxide to really rough up the surface texture and also apply a border layer, again, not very ideal. After firing the border, the alloy is still darker gray than our noble and high-noble alloys, so I use a bleach shade for my first opaque application. I also recommend that your dentists cut a porcelain margin prep to avoid any dark line at the gingival.

Other than these differences, I stack it just like any other alloy we use and have been satisfied with the outcome. I would follow the instructions provided with the porcelain kit to you which to choose with. I only use GC porcelain for our titanium PFMs, and subtle differences may exist.

**BUILDING THE PFM CROWN**

We use our NobelProcera scanner to scan the model (Fig. A) and design the coping (Fig. B).

Two to three days after submitting the designed file, we receive the milled titanium coping and zirkalab (Fig. C). Because the coping is milled, the thickness is set at 0.4 mm and requires minimal finishing.

The coping is blasted with 125-micron aluminum oxide to really roughen up the surface (Fig. D). This is a bonus in my opinion, as five minutes sitting at room temperature will do something else is a quick, easy degas cycle.

I apply a thin layer of the Initial Ti border layer and fire (Fig. E). After the border is fired, the coping is quite dark, so I apply a thin layer of Initial Ti coping, steam cleaned and allowed to sit at room temperature for five minutes to build an oxide layer (Fig. F).

I apply a thin layer of the Initial Ti border and fire (Fig. G). After the border is fired, the coping is quite dark, so I apply a thin layer of Initial Ti coping, steam cleaned and allowed to sit at room temperature for five minutes to build an oxide layer (Fig. H).

I apply my sublips as usual with Initial Ti coping (Fig. I). I contour the crown (Fig. J), place and add stain for any desired characterization (Fig. K).

The finished crown is ready to deliver (Fig. L).

Many dentists and laboratory technicians alike are already very familiar and comfortable with titanium when used for custom implant abutments, bars, posts, etc. This will tell if this alloy achieves the same popularity for crown and bridge applications. In the meantime, labs should experiment with it and decide if titanium can improve their workflow and be beneficial to their bottom line. I can honestly say I can do both, and also is surprisingly easy to work with.

**ABOUT THE AUTHOR**

Jamie Stover is Manager of Ziemek Dental Lab (ziemekdental.com), a high-quality fixed restorative lab located in Olympia, Wash. His focus is using his experience at the bench as a technician along with new technology and materials to provide dentists with highly esthetic restorations, while keeping them on the cutting-edge of dental technology. He can be reached by calling 360-943-6071 or by e-mailing info@ziemekdental.com.