FLORIDA'S OUTLOOK ON THE DENTAL LABORATORY PROFESSION
2nd Quarter 2023
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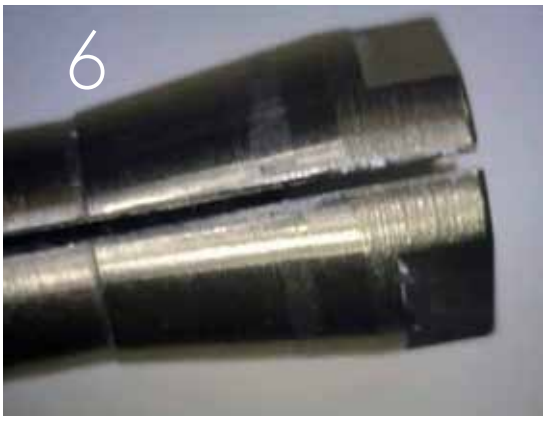
focus

CREATING NATURAL ESTHETICS

for a Single-Tooth Implant Restoration

CONTENTS



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Florida Dental Laboratory Association
325 John Knox Rd,
Ste L103
Tallahassee, FL 32303
Phone: 850-224-0711
Fax: 850-222-3019

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focus Staff

Christina Welty
Executive Director & focus Publisher
christina@fdla.net

Kristi Demuth, CAE
Editor
editor@fdla.net

Maureen Turner
Advertising Sales
advertising@fdla.net

FDLA Team and Symposium

By Chris Peterson, CDT
FDLA President

The relationships and camaraderie I have with fellow dental lab owners, managers, technicians, and suppliers have been life changing.

As we close out Q1 and head into the next quarter, the FDLA Southern States Symposium & Expo is quickly approaching.

When I first joined the FDLA years ago, I thought of the symposium as just a way for me to get my CE credits and see some cool, new equipment. Over the years, I have realized it is so much more. The relationships and camaraderie I have with fellow dental lab owners, managers, technicians, and suppliers have been life changing. The Symposium is not just a trade show; it's a dental cultural event that highlights amazing vendors, reliable manufacturers, and talented technicians all coming together under one roof to learn and have fun. Make it a priority to attend this year!

If you have never considered joining the FDLA Board of Directors, this is the year for you to consider "throwing your hat into the ring." We now conduct our meetings virtually, so if your location or time was ever a concern, then we have made this an easier commitment. If you're nervous, don't be! Our team is looking for all ages, talents, and levels of experience. You might be exactly who we are looking for. If you're nervous about asking your boss, send me an email and I'll help you convey all the reasons why it's beneficial for a lab to have someone on the FDLA board. The time I invested into the organization has come back to me tenfold.

This will be my final president's message to the FDLA organization as my term will be up in June and I pass the baton. During the Symposium in June, we will install Danielle Wuensche as the new president of the FDLA. Danielle is a co-owner at Zahntechnique, Inc., CDL, in Miami, Florida, serving customers around the country with world-class restorations, along with world-class service. The FDLA is in good hands. Welcome Danielle and thank you for the friendship we share.

As a reminder for the FDLA Symposium, book your rooms early with the Signia by Hilton Bonnet Creek. The hotel construction is completed in the lobby and the property looks amazing. Bring your families as well. My kids loved the massive pool and lazy river!

See you all soon.

FDLA

FDLA Mission
Advancing the individual and collective success of Florida's dental laboratory professionals to enhance oral health care.

Values Statement
INTEGRITY - being honest and open in all that we do
LEADERSHIP - being the guiding light in a changing environment
RECOGNITION - honoring those committed to our industry
SAFETY - promoting safe and quality driven manufacturing practices
INNOVATION THROUGH COLLABORATION - fostering an environment where creative and inspiring ideas are encouraged to enhance patient care

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By Nick Alonge

Breaking Down the Importance of QUALITY MILLING TOOLS IN TODAY'S MODERN DIGITAL WORKFLOW

Dental milling tools are an essential component of the modern dental digital workflow, as they play a crucial role in the production of high-quality dental restorations. The use of digital technology in dentistry has revolutionized the way dental restorations are created, allowing for greater precision and accuracy, as well as increased speed and efficiency in the production process. In order for these benefits to be fully realized, however, it is essential that the dental milling tools used in the process are of the highest quality.

The selection of the right tool for a particular application is important in order to achieve optimal results.

THE CAD/CAM WORKFLOW THAT DRIVES SUCCESS

Digital workflow is like a chain; one weak link and the system will break. In this chain of digital workflow, some links will have redundancy and others won't, but the general characteristics of an excellent computer-aided design (CAD) and computer-aided manufacturing (CAM) workflow remain the same: cost-effectiveness, reliability, and consistency for repeatable results. Setting up your digital production process with attention to these characteristics will lead to quality end results.

Before diving into how quality milling tools can be so advantageous for your business, let's consider other supporting aspects for a successful dental lab: people, equipment, and consumables. To start, the people you hire and work with affect the lab's culture. Strong relationships between the lab and the dentist directly translate to better customer retention in all areas. Relationships in the lab can also drastically affect the quality of the cases. Better communication will always produce better products. In terms of equipment, milling systems are mostly reliable these days, but when they do have problems, having good customer support is essential. It can be the difference between getting a case out on time or having to call the doctor with a delay. Finally, consumables can differ from region to region. Between low translucency, high translucency, and gradient or pre-shaded zirconia, the milling characteristics vary and affect the end product. The selection of the right tool for a particular application is important in order to achieve optimal results. For instance, tungsten carbide tools are known for their high durability and resistance to wear, making them ideal for the production of high-precision restorations. Diamond-coated grinding tools, on the other hand, are known for

Figure 1

Consumable Cost per Unit Example

OEM Carbide:	Nano-Di Diamond
20 unit yield from $100 puck = $5/unit	20 unit yield from $100 puck = $5/unit
50 unit yield from OEM Carbide tool @ $35/tool = $0.70/unit	700 unit yield from Diamond tool @ $170/tool = $0.24/unit
X 3 tool system = $2.10/unit tool cost	X 3 tool system = $0.72/unit tool cost
Final cost/unit: $7.10	Final cost/unit $5.72
Tools = 29.5% of cost	Tools = 12.5% of cost
Nano-Di Saves: 20% Production costs, 65% tooling cost	

their ability to produce smooth and polished surfaces, making them well-suited for use in the production of ceramic restorations. This brings us back to why having the correct tool for your milling is essential to minimize the number of in-house remakes.

HOW DOES TOOLING AFFECT YOUR PRODUCTION?

The milling tool is considered the "business end" of the process. It is the last contact with your restoration, so ultimately 100 percent of your production energy leads up to and relies upon that endpoint. Because the geometry of the cutting edge is projected onto the milled part, the cutting tools directly affect the surface finish. In addition, the accuracy of the tool's shape impacts the dimensional tolerance of your units. These direct dependencies mean that the quality of your milling tools directly translates to the quality of the milled parts, the overall product success rate, and ultimately, your bottom line. To put it simply, tool quality equals unit quality, and choosing superior milling tools can make the difference between this being the weakest or strongest link in your digital workflow chain.

TOOL QUALITY AFFECTS OVERALL COST

In addition to their role in the production of high-quality and efficient dental restorations, dental milling tools also play an important role in the cost-effectiveness of the digital dental workflow. High-quality tools tend to have a longer lifespan and produce better results, which can ultimately lead to cost savings for the dental lab, the dental practice, and the patient. Conversely, lower-quality tools may need to be replaced more frequently, leading to additional costs for all involved. The necessary level of precision of finished restorations is only possible when using high-quality dental milling tools, as lower-quality tools may produce inaccuracies in the finished restoration. When you lay out and compare the numbers, it's ultimately better to spend more up front on a long-lasting tool than to save initially on the tool itself. For a specific calculated example, see **Figure 1**.

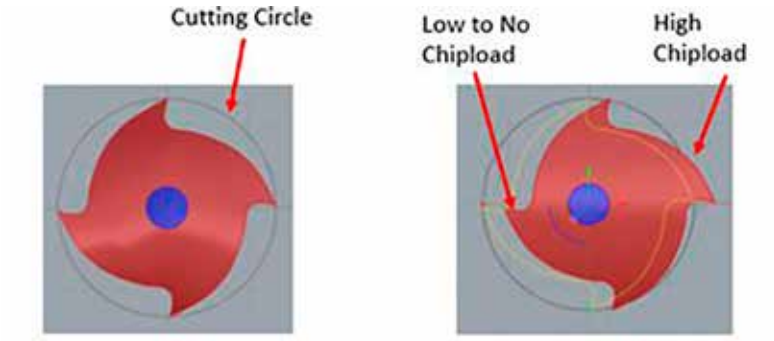
TOOL THEORY: HOW IT APPLIES TO THE DENTAL LAB

All tools are susceptible to their environment. Consider your machine's spindle output power and the rigidity of the machine. These aspects can influence the milling parameters, such as rotations per minute (RPM), feed rate (millimeters per minute pushing through the material), chip load (how deep the flutes are cutting into the material), and material removal rate (MRR). Every one of these parameters can have drastic effects if there is a mismatch between material and tooling. For example, if a machine is underweight or flexy, the machine can "walk" on the counter. This happens when the feed rate is accelerated past the limit of the mill, and the mill starts to move on the counter, shaking. This can impact margin integrity and will most likely end with chipped margins or a golf ball effect around the parts. All these settings greatly affect the wear and tear on the tools and the outcome of the restorations.

Always follow the recommended maintenance schedule.

The lifetime of the milling tools is also dependent on other variables. The top five things that can help or hinder the longevity of your tools are machine calibration and maintenance, milling strategies, runout (collets and spindles), material type and material evacuation, and handling and storage.

Figure 2



No Runout
Perfect Axis Alignment

Runout
10% of Diameter Off Axis

Figure 3

Example: Tool that ran out.

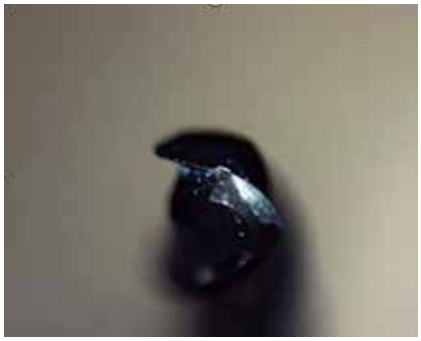


Figure 4

Machine calibration and maintenance are essential for quality units being milled and the overall longevity of the machine. It is important to calibrate regularly even if the machine is not run often, as it is susceptible to thermal variance. Always follow the recommended maintenance schedule in the milling machine's user manual.

Milling strategies also play a huge role in the lifespan of a tool. The production speed tends to be inversely related to tool life. Although it may seem counterintuitive at first, the faster you push a premium milling tool such as Sierra Dental Tool's Nano-Di ™ in zirconia, the longer it lasts (up to 1,000 units or more). Also, tools need to be validated as appropriate for the chosen strategies (i.e., dimensions and profiles), and milling strategies should be updated on a regular basis to keep up with new products and restoration types being released.

Runout is a third consideration. Runout is non-uniform cutting loads that exponentially degrade tool life. Dimensional inaccuracies of your milling tools can cause improper alignments of the collet and/or spindle, potentially leading to wear facets and undesirable tool angles, and will ultimately impact the fit and finish of your milled parts (**Figs. 2-3**). To avoid these issues, clean, inspect, and replace collets and spindles regularly, especially when showing signs of wear **(Fig. 4**). It is also advantageous to source tools with high-precision ground shanks, such as Sierra's centerless ground shanks with tight tolerance of H4 (+/- 0.002 mm vs. standard industrial blanks typically H8, +/-0.014 mm).

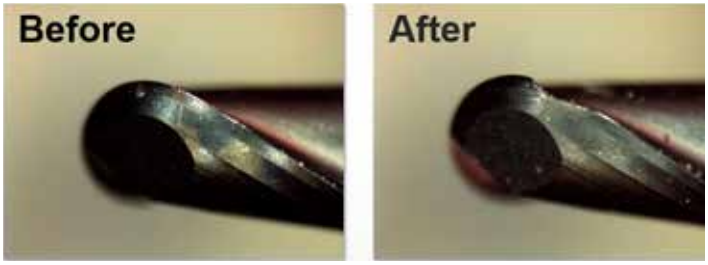
It is similarly important to use the right tools for the material type because each material has unique milling characteristics such as hardness and thermal properties, which require appropriate milling strategies. It is also imperative to have efficient material evacuation (removing material once it is cut) since re-cutting causes more friction, heat, and tool wear. Double-check your air and suction system to ensure properly aimed air, use of the highest reasonable pressure, and a clean suction unit.

Figure 5

Handling and Storage

Figure 6

Handling — Carbide Impact



A final consideration for the longevity of milling tools is appropriate handling and storage. Milling tools are precision instruments that need to be kept clean, stored in original packaging, and installed carefully to avoid damage to the tool before use (**Figs. 5-6**).

COMMON MILLING ISSUES AND THEIR CAUSES

Typical issues seen in the dental industry are chipped margins, poor surface quality of the restorations, cases that don't fit their models, and tools that get broken during milling. Chipping or micro-fracturing in the margin areas can

FDLA BOARD NOMINATIONS – *Now Open!*

FDLA is looking for volunteers to give back to the industry and is currently seeking the following professionals and industry partners to serve in leadership positions:

1) Director

Must be an active member of the association. Each term on the board is a one-year term, and a board member can serve up to three years consecutively in a director position.

2) Supplier Representative (Two-year term)*

*Must be an active Associate or Business Partner member

FDLA Time Requirements

Service on the FDLA board requires attendance at approximately four board meetings a year. March, June (in-person during the Symposium & Expo), September and December.

FDLA Board of Directors installation ceremony at the 2022 Southern States Symposium & Expo

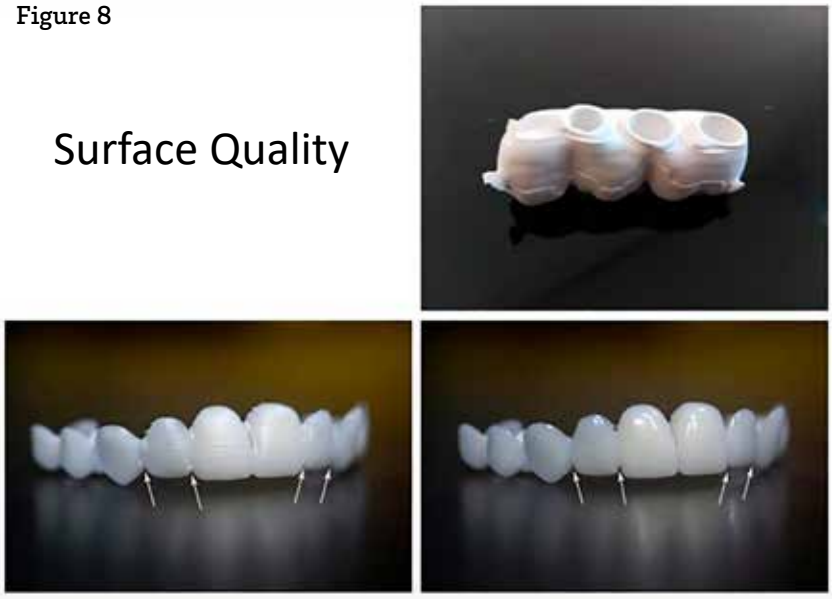
New board members would be installed on Friday, June 9, 2023 and serve at least a one-year term on the FDLA state board. (Supplier Representatives serve one (1) two-year term.)

SPECIAL NOTE: Recent board meetings have occurred via Zoom and will most likely continue for the foreseeable future. **To be considered, please complete the survey below on or before Monday, April 17.**

https://www.surveymonkey.com/r/T6S7SZC

Figure 7

Figure 8



occur from using a tool that is too large or too small. Also, CAD settings need to be set appropriately with a margin offset of 0.2 mm. Collets with runout issues as discussed, or lack of calibration of the milling machine, can also cause chipping. Sometimes even tools used longer than the suggested tool life expectancy can create chipping issues (**Fig. 7**).

Poor surface quality can consist of lines on your restorations or misalignment of top and bottom halves on the equator of the restoration. These problems occur from lack of proper calibration of the milling machine, runout, over-used tools, improper strategies or settings, or other general mechanical issues (**Fig. 8**).

When a case doesn't fit its model, the issue can be open contacts, open occlusion, tight or loose fit, or open margins. These issues can be solved by machine calibration, checking tool tolerances, adjusting the CAD settings (offsets or drill compensation, etc.), and if milling zirconia, ensuring that the expansion factor in your CAM matches the number on the disc.

If broken tools are found in the mill, verify the tools are in the correct slots that match the milling strategy. It is also important to verify that the tool dimensions are correct in the strategy. Lastly, puck thickness needs to be correct in the CAM software, otherwise a collision can occur.

CONCLUSION

It is clear that digital technology in dentistry is advantageous to provide the ability to create highly precise and accurate dental restorations. Selection of high-quality tools as part of the CAD/CAM workflow is essential for overall cost effectiveness, reliability, and consistency. For optimal results, dental professionals should be well-informed about the different types and materials of milling tools available and make a well-informed decision when choosing the right tool for a particular application.

ABOUT THE AUTHOR

Nick is a second-generation dental lab technician with over 25 years of experience. He is the Vice President of Global Sales and Support at Sierra Dental Tool powered by RobbJack.

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By Gary D. Morgan, CDT, CQA/ASQ

Hazardous Substances

IN THE DENTAL LABORATORY

A CHANGING PARADIGM

The most commonly cited OSHA (Occupational Safety and Health Administration) violations in dental laboratories are related to the management of occupational exposures to toxic and hazardous materials.

One of the more significant sets of safety requirements is found in the OSHA standards, specifically the Code of Federal Regulations (CFR) Part 29, Subpart Z, Toxic and Hazardous Substances. These standards address the potential exposures to these substances and how employers must eliminate or at least minimize the exposures to employees in their business. Every employer should be familiar with the standards, but many have never even read them.

Subpart Z establishes the permissible exposure limits (PELs) for hazardous substances based on time weighted averages that employees might work with or may be exposed to in their workplace. Time-weighted average (TWA) is a method of calculating a worker's daily exposure to hazardous substances such as dust, fumes, chemicals, gases, or vapors. It is averaged to an eight-hour workday or 40-hour week, along with the average levels of exposure to the hazardous substance and the time spent in that area. Standards address everything from nuisance dust to highly toxic chemical exposures. The primary source of exposure is through inhalation, so OSHA has developed specific tables with the PELs for these substances.

Table Z-1 of the standard lists the substances and the PELs for air contaminants. It also includes notations for substances that have the potential to cause skin irritation and/or may contribute to overall exposure by the cutaneous route. This includes the mucous membranes and the eyes and may be through the air or direct contact with the substance. Table Z-2 has more specific occupational exposure limits for some of the more hazardous of the contaminants, including Beryllium. Table Z-3 contains the PELs for mineral dusts, including silica and inert or nuisance dust.

OSHA has promulgated specific standards addressing highly hazardous and toxic substances, such as asbestos, beryllium, chromium VI, and respirable crystalline silica. All of these substances may be present in dental laboratories in some

Table Z-1 Substances found in dental laboratories include:

Acetone	Ethyl Alcohol
Alpha Alumina	Gypsum
Ammonia	Isopropyl Alcohol
Carbon Monoxide	Methyl Methacrylate
Chromium III	Plaster of Paris
Cobalt	Yttrium and Zirconium Compounds

form, and exposures to these substances in dental laboratories have been of concern to OSHA.

OSHA additionally has published annotated tables that add PELs from other organizations including CalOSHA, and the American Conference of Governmental Industrial Hygienists (ACGIH) and encourages employers to adhere to these more stringent exposure limits. Determining if exposures are above the PELs requires that air monitoring be performed and accurate measurements of exposure for each employee be captured. This usually requires hiring a professional industrial hygienist to perform this monitoring. Some companies do rent the monitoring equipment to employers to perform their own air testing, but OSHA may not accept the results. OSHA can send its own hygienists to do the monitoring, so employers should ensure that they have taken precautions to minimize the exposures to these substances.

The respirable crystalline silica standard is the most significant special standard that affects dental laboratories since this form of silica is present in so many materials used in the dental lab. For example, silica can be found in porcelains, investments, glass beads, and dental stone. Crystalline silica is dangerous due to its structure. Once it enters the lungs, the body cannot expel it like other dusts. Think of glass that is cutting the lung tissue and creating scar tissue that debilitates the lung's function of exchanging oxygen and carbon dioxide. Silicosis is a serious lung disease that is caused by long-term exposure to silica dust. Lung cancer, COPD, severe asthma, and other lung issues are also associated with silica exposure. Symptoms of these diseases only show up after unprotected exposure over many years.

The silica standard establishes not only a PEL for exposures, 50 micrograms per cubic meter of air, but also establishes an action level that is half of the PEL at 25 micrograms. Microgram is a unit of mass equal to one millionth (1×10−6) of a gram. If air monitoring shows that levels are below the

action level, then employers have controlled the risk of overexposure. If, however, the levels are higher than the action level but below the PEL, then the employer should take action to reduce the level below the action level. Employees should not be exposed above the PEL time weighted average at any time.

We generally think of chemicals as being liquids, but they also exist as solids, gases, and other air contaminants such as fumes, vapors, mists, smoke, fibers, aerosols, and dusts. Fumes are particles formed when a volatilized solid, such as a metal, condenses in cool air. An example of an exposure to a fume could occur when casting, welding, or soldering metals. Vapors are gaseous substances that have been vaporized from liquids or solids. A container of isopropyl alcohol may emit vapors that are not only dangerous to inhale but are also very flammable. Mists contain liquid droplets of a substance or mixture suspended in a gas (usually air). CNC milling creates mists as water mixes with the milled material residue. Smoke is made up of a fine solid formed by incomplete burning. Burnout ovens produce potentially hazardous smoke. Fibers are solid particles with its length many times greater than its width. Think asbestos. Aerosols are created when a material is dispensed from its container as a mist, spray, or foam by a propellant under pressure. Spray accelerants are a very good example of an aerosol. Last, but especially not least, are dusts which are made of fine particles of solid matter. Cutting or grinding on pretty much any material, such as stone, acrylic, and alloys creates dusts.

The changing paradigm is that the hazardous materials and substances utilized in the dental laboratory have been shifting over the years due to changes in manufacturing materials and processes. Therefore, the potential exposure risks have changed as well. With the introduction of milling and additive manufacturing, materials that had not been used in the dental lab are now commonplace. Ceramic materials such as lithium disilicate and zirconia are replacing feldspathic porcelains, which reduce silica exposure. Exposure to all ceramic dust is still considered hazardous. Smoke has been reduced since wax burnout has been reduced. Alloys may be milled instead of casting, therefore, changing the exposure risk from fumes to mists. Liquid resins utilized in 3D printing are replacing materials, such as denture base powdered acrylics. The resins can be toxic and emit volatile organic compounds as the material cures. Exposure to high content isopropyl alcohol used for cleaning printed models and devices is considered hazardous.

To protect employees from overexposure to toxic and hazardous materials, employers must first identify if a risk exists and then initiate controls to eliminate the exposure if possible, or minimize the exposure so that employees are not negatively affected by the exposure. The Hazard Communication Standard is found in Subpart Z. It requires that employers determine and document how they will protect employees from overexposure through engineering controls, administrative or work practice controls, the provision of Personal Protective Equipment (PPE), training and information, chemical labeling, and the maintenance of Safety Data Sheets (SDSs) for all hazardous materials to which employees may be exposed in the workplace. As noted earlier in this article, failure to comply with the Hazard Communication Standard is almost always the number one citation in dental laboratories.

Training employees on the hazardous materials that are in the workplace must be provided at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. The training should be documented.

Managing toxic and hazardous substances in the workplace is a huge challenge for employers and their employees, especially in the changing paradigm of materials present in the dental laboratory. It is a very worthwhile endeavor if the actions prevent exposures to these hazardous substances and protect everyone from potential harm.

About the Author

Gary Morgan, CDT, CQA/ASQ, is the Vice President and Senior Consultant with SafeLink Consulting. Gary guides businesses in implementing employee health and safety programs and quality systems. Gary is an Authorized Trainer under OSHA's Outreach Program, a Certified Quality Auditor and a Certified Dental Technician. His experience as a dental laboratory owner has provided a unique understanding that enables him to help companies integrate compliance in a way that not only mitigates risk but also benefits the business. He performs safety and quality audits throughout the U.S. and internationally.

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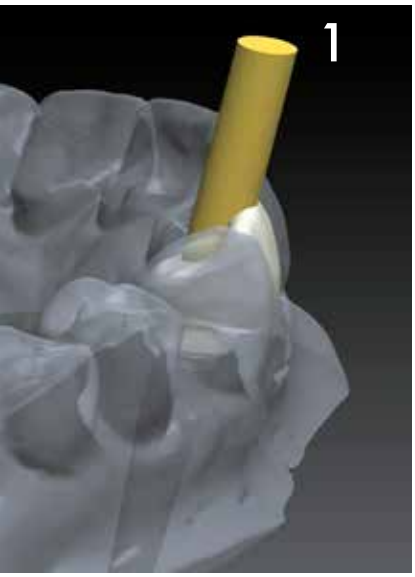
CREATING NATURAL ESTHETICS

for a Single-Tooth Implant Restoration

By ChangHoon Lee, CDT

The clinical preference for screw-retained restorations has grown significantly in recent years. In the United States, screw-retained abutment units grew 10.7 percent in 2019 and are projected to exceed cement-retained abutments in the next few years (iData Market Research). Driven by a need to reduce cement-related complications and promote the long-term success of implant treatment, the growth in screw-retained restorations presents its own restorative complications, especially within the esthetic zone. Fortunately, the advent of titanium base designs that allow for an angulated screw channel has provided a solution for esthetic issues that were once unavoidable. The following case example demonstrates considerations for use of angulated screw channel titanium bases as well as a workflow to combine digital precision with traditional artistry.

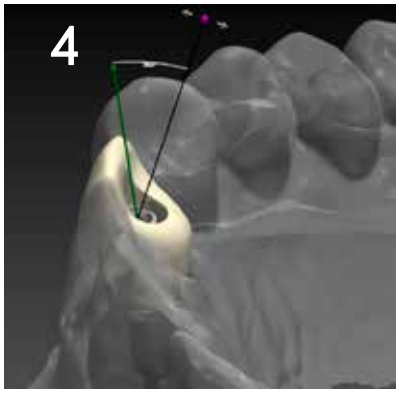


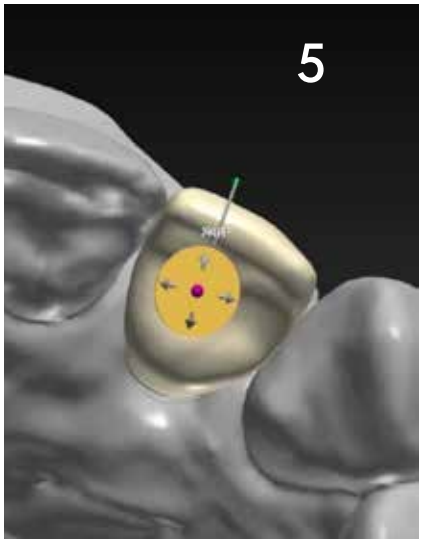
In the initial assessment of the case (a maxillary lateral tooth #10), it was apparent that the angulation of the implant would result in a screw channel that was slightly too facial and would interfere with the incisal edge if not angulated (**Figs. 1-2**). I decided to use a 9mm ASC Ti Base (Preat Corporation) which allows for angulation of the screw channel from 0-30 degrees and is compatible with a wide range of implant platforms, including the Straumann® NC needed for this case. While the 9mm post height can be advantageous for restoring incisors, a 5mm height was more appropriate for the lateral in this case. The ASC Ti Base features pre-marked designations for 9, 7 and 5mm for easy modifications in such situations. The ti base was hand cut at the

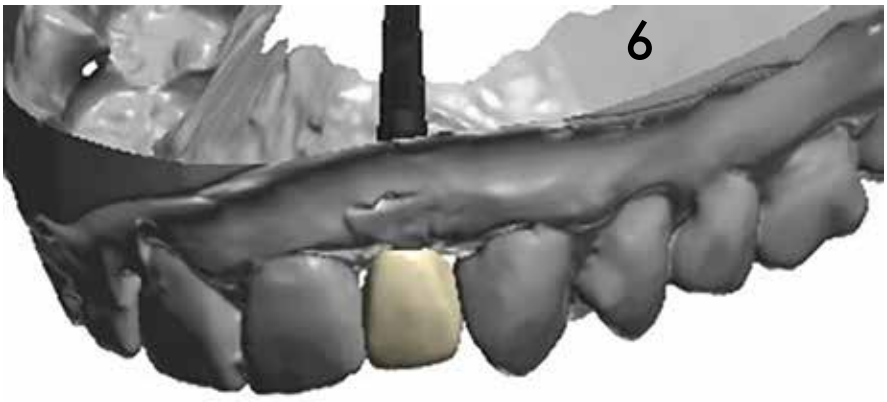
5mm mark (**Fig. 3**) and then I proceeded to use 3Shape CAD CAM to design the restoration.

In addition to the pre-marked height options on the ASC Ti Base itself, the CAD library includes those same height options. To begin the restoration design, I then just had to select the ASC Ti Base for the implant platform and the 5mm height option. I personally prefer 3Shape, but exocad can be used as well. By designing in the CAD software, I can have greater visibility of the contour, margin, and interconnection between the ti base and wax pattern through a variety of angles and magnification. In addition, I can check and adjust the material thickness as well as screw access hole to keep the design precise (**Figs. 4-6**).

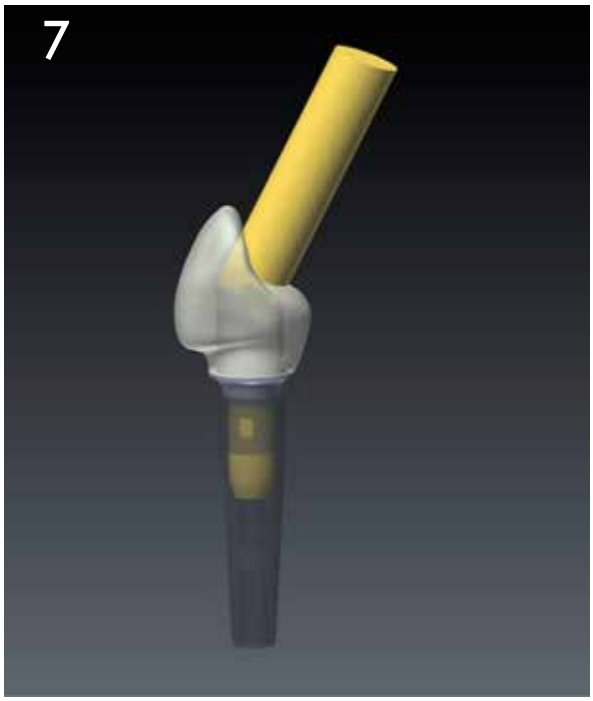
It is my standard technique to cut back the crown and layer porcelain on the facial. This is something I take into consideration when determining the angulation of the screw channel. For my technique, I want the screw channel to be more lingual to accommodate for the thickness needed on the facial (**Fig. 7**). There is, of course, no one correct angulation and it will be determined by the fabrication technique that you use. Alternative approaches include a full contour milled zirconia crown finished with a stain and glaze or milled zirconia crown with a cut back design that is then layered with porcelain.







There is, of course, no one correct angulation and it will be determined by the fabrication technique that you use.



8

Once I complete my CAD design, I mill the crown out of a wax puck, sprue with investment ring, and press with a pressable ceramic (**Fig. 8**). In this case, I used GC Initial™ LiSi Press medium transparency (MT) in shade A3 with the GC investment powder as well. After pressing, I remove the sprue and check the fit on the ti base to make sure there is no resistance when seating from bubbles created during pressing. Next, I remove the sprue from the ring and a little bit from the facial side of the crown so that I will be able to add translucent layering on the incisal area. I use a sharp diamond disc to create shallow grooves for placement of translucent powder to replicate the macrotexture of the tooth anatomy (**Fig. 9**). Pre-glazing and internal staining (**Fig. 10**) follows. The staining and texturing is protected in the event of any chairside adjustments or later wear on the final crown as this is done before applying the porcelain.

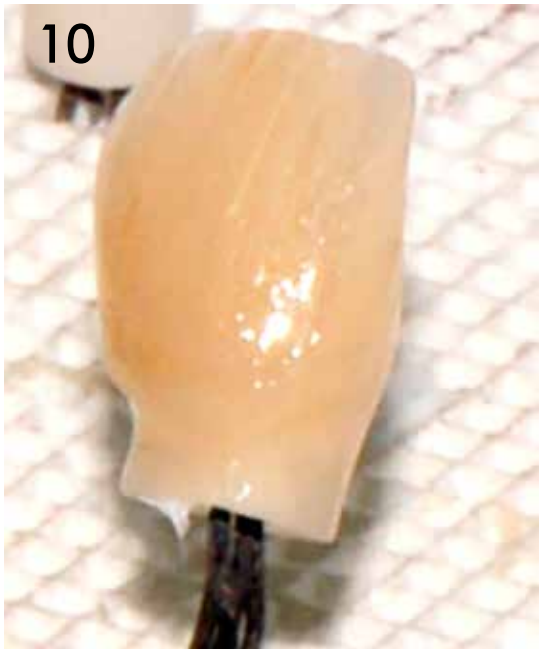
I have standardized to using GC LiSi (GC Corporation) powders for all my case build ups. I believe such standardization is especially important for small to medium labs. Whichever powders you choose to use, remaining consistent across your cases can greatly increase your efficiency and productivity. It is much less time consuming to trace back what was used if a remake occurs, not to mention that you can consolidate your inventory and ordering. For all of the products I use in my lab, I consider the long-term benefits of efficiency and FDA-clearance rather than just the item price.

I begin the build up by matching the dentin shade in the gingival one-third as close as possible to the adjacent tooth as I have found that is key to creating a single restoration that blends well with the patient's smile. For this lateral, I reference how light or dark the mid-portion of the central and the canine are. I also make sure that this color extends into the embrasure (**Fig. 11**).

In order to conduct this color matching, I request that doctors send me a pre-op photo before any preparation is done so I can see the tooth's natural color. I ask for at least three views: the facial and sagittal. If the doctor has a DSLR camera, I will also ask that they use a polarized lens filter when taking the photos to reduce the glare and capture the inner structure mamelons of the teeth. When adding the dentin color, I will include a thin stripe towards the enamel region to replicate the mamelon structure (**Fig. 12**).

9

10



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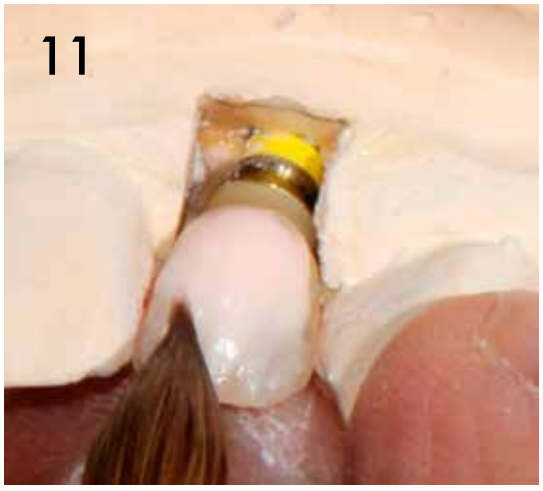


12

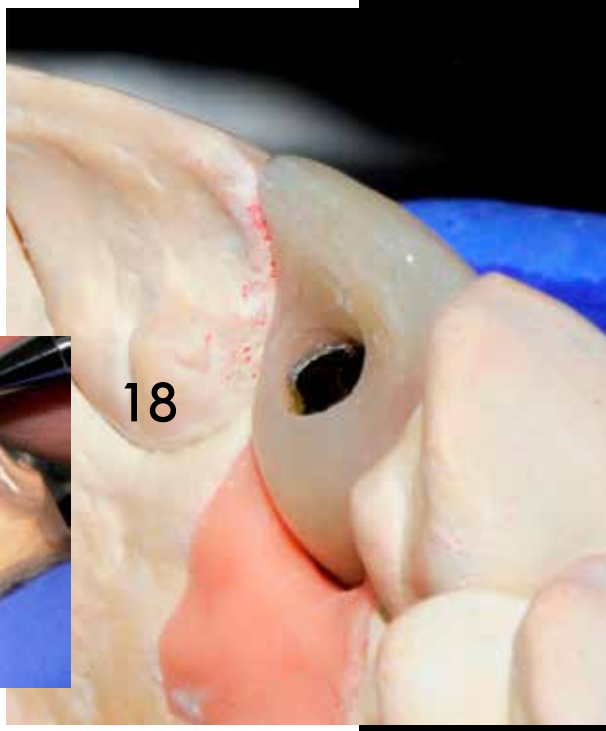
For the enamel build up, I use a micro-layering technique. I alternate translucent and enamel powders in the center of the crown and then apply a bluish halo at each side corner. Once completed, I proceed with the first porcelain bake.

After the first bake, I check the contacts and remove any bubbles that arise. I check the crown in the model again to confirm the fit both facially and lingually as well as the contacts. Next, I mark the desired line angles while referencing the angles of the adjacent teeth (**Fig. 13**). Although a slightly different line angle on a lateral is not as noticeable as it would be for a central, I try to match the angles as closely as possible.

I remove the gingiva replication material from the model and just slightly widen the sulcus. I do this as I design the emergence profile of the crown to just slightly contour the tissue without impinging it and mimic the way a tooth would naturally erupt from the soft tissue (**Fig. 14**). The extent to which this is done will vary with the particular situation of each case and each patient's biology.

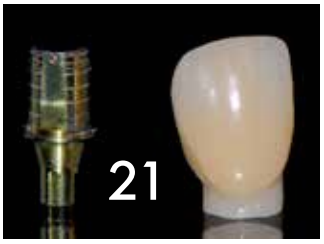
Once I am satisfied with the surface contact and shape, I add the final touches to the surface texture. Returning the restoration back to the model, I further build up the dentin region

I alternate translucent and enamel powders in the center of the crown.



to ensure there is a smooth transition from the gingiva to the crown (**Fig. 15**). At this stage, I make any final adjustments needed to the line angle or incisal pit and proceed to create the skin layer (**Fig. 16**).

I draw the occlusal table line, looking first at the adjacent canine and then the central. I make sure that lateral does not protrude beyond those adjacent teeth (**Figs. 17-18**). Even on the skin layer, I continue to create the texture us-



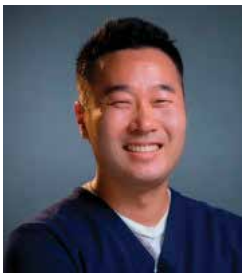
ing a fine diamond bur before moving to the bisque bake stage (**Figs. 19-20**).

The final glaze is applied to capture the detailed characterization seen in the case's preoperative reference photos. I reference the adjacent teeth as well to mirror any necessary elements such as coffee stains. In this case, I added blue highlights to each corner, the halo on the incisal edge and vertical white staining for a subtle crack line.

Once the final crown is ready, I cement it to the ti base (G-CEM ONE™ cement) and use my Labolight DUO (GC Corporation) to cure the assembled restoration (**Fig. 21**). In the past, I would sandblast ti bases before cementation, but this is not necessary with the ASC Ti Base as it features several horizontal grooves for mechanical retention. This thoughtful design not only saves me time, but maintains the gold anodized surface, which provides a more esthetic foundation than gray titanium.

The final restoration is a screw-retained single crown with an undisturbed and naturally characterized facial plane (**Figs. 22-23**). Utilizing both angulated screw channel and digital technology enabled the crown design to properly accommodate the layering techniques for natural esthetics, which would have otherwise been compromised.

About the Author



ChangHoon Lee, CDT, owns and operates Prestige Line Dental Studio in Flower Mound, Texas. In the industry since 2002, he became a Certified Dental Technician in 2016. He studied at UCLA's Master Ceramist Program and completed the Occlusion Residency Program at The Stewart Center in 2019.

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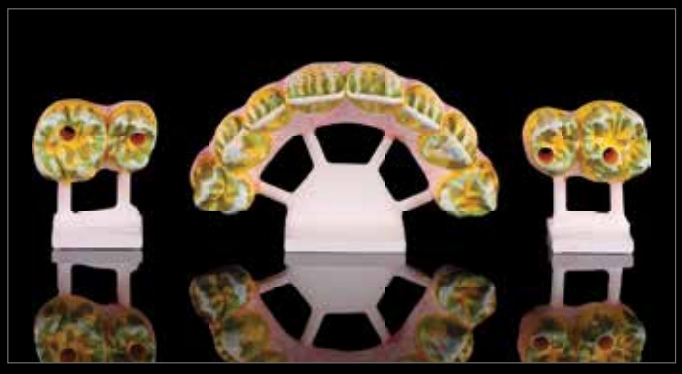

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By Danielle Wuensche

CREATE AD HOC PROCESSES Using Dynamic Spreadsheets

It's so exciting to see the advancements in technology in the dental laboratory industry. With every new implant system or piece of dental equipment, there is a host of new processes a laboratory must develop to support the new workflows. For those who oversee operations, instead of always being excited for change, it may sometimes feel overwhelming determining how to support the team to manage these new workflows while maintaining quality and consistency.

This one tool has allowed me to capture critical information in my business and create automated processes to keep key people informed about need-to-know information.

In the midst of feeling angst regarding change, there were many times when I wished I had an off-the-shelf tool to manage information to support new processes. The thought of multiple software programs with a very narrow scope of possibilities, however, always seemed like more cost than benefit.

A few years ago, I found a dynamic software called Smartsheet that I liken to an Excel Spreadsheet on steroids. This one tool has allowed me to capture critical information in my business and create automated processes to keep key people (both internal and external) informed about need-to-know information.

Figure 1: Material Request Form

Below you will find a problem that was presented in our laboratory and how I used Smartsheet to create a process that enabled our laboratory to function markedly better with very little effort.

Problem #1: Request for Implant Components

For most implant systems in our laboratory, we utilized a just-in-time method of ordering implant components for cases. When implant components were needed for a particular case, a technician would request items from the appropriate person given the task of procuring materials for the laboratory. The act of submitting a request was not adequately structured. "Submitting" a request could range from mentioning the need for a component in a meeting, calling the team member on the phone, or handing them a paper note with the list of components to order. On a few unfortunate occasions, components were not ordered in time or the wrong parts were ordered. With the varying modes of communication used to "submit" a request for components, we lacked the audit trail to identify where the problem occurred – the request or the order. Instead of pointing fingers, we agreed it was necessary to find a solution.

Solution: To create a process where the requestor can remain in their functional area to submit the request. The team member would receive the request with the necessary information needed to place an accurate order. Throughout this process, all parties would have visibility to the status of the request.

Material Request Form (Fig. 1)

I created a SmartSheet form to allow a technician to request a component for a particular case. The requestor identifies the following critical pieces of information: case number, vendor, part number, and date needed. Once the form is submitted, an email is automatically generated to the procurement specialist notifying them that a new order has been requested to support a case.

Material Request Sheet (Fig. 2)

All information input on the material request sheet is automatically populated on a Smartsheet sheet (spreadsheet). The procurement specialist can allow requests to come in throughout the day and batch orders with the various implant vendors. In many cases, the batching of orders enables the laboratory to reach order minimums that could dramatically reduce or even eliminate shipping costs.

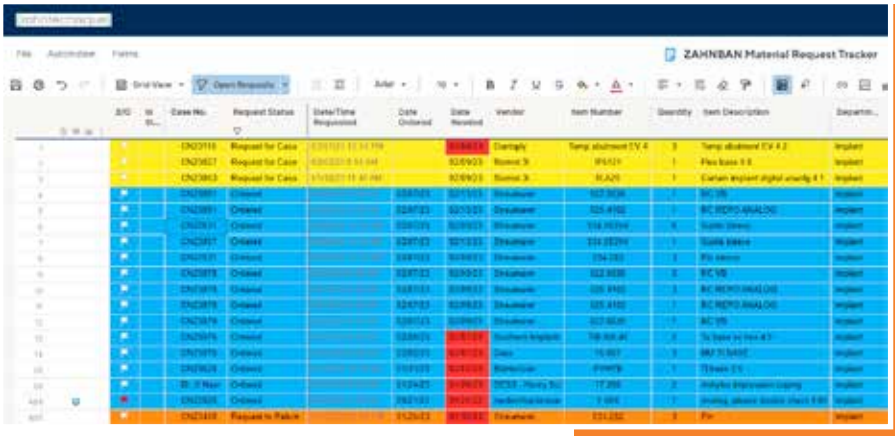
The requestor is notified once the parts are received and issued to the case. In the event of backorders, the requestor is also notified so that they can determine if there is an alternative part available to support the case.

This process was extremely easy to design and the benefit to the business by supporting on-time arrival of cases has been priceless.

With Smartsheet, the opportunities are endless. I use this powerful tool to manage other important processes such as:

- **Department Portals:** Centralized location need-to-know information
- **Loaner Database:** Keeps track of tools sent on a loaner basis to clients and automatically requests the items back if not returned by the due date

Figure 2: Material Request Tracker



- **Machine Maintenance:** Tracks maintenance schedules and completed tasks
- **Local Case Pick-Ups:** Receives requests for pickups and tracks the status to ensure cases arrive to the laboratory

While I enjoy using Smartsheet, there are other software programs on the market that also have compelling solutions. A few alternatives to consider are:

- GoogleSheets
- BaseCamp
- Asana
- Monday

The benefit to the business by supporting on-time arrival of cases has been priceless.

About the Author

Danielle Wuensche is the co-owner and vice president of Zahntechnique, Inc. Danielle was born and raised in Allentown, Pa. She attended college at Indiana University of Pennsylvania, where she obtained a degree in marketing. She found her passion for the dental industry when she moved to Palm Beach Gardens, Fla., in 2007, to work as a product manager for a world-leading dental implant manufacturer. In 2015, Danielle decided to leverage her skills and passion to support Zahntechnique, Inc. in a full-time capacity. In her free time, Danielle enjoys paddle boarding with Alex and their dog Lucky.

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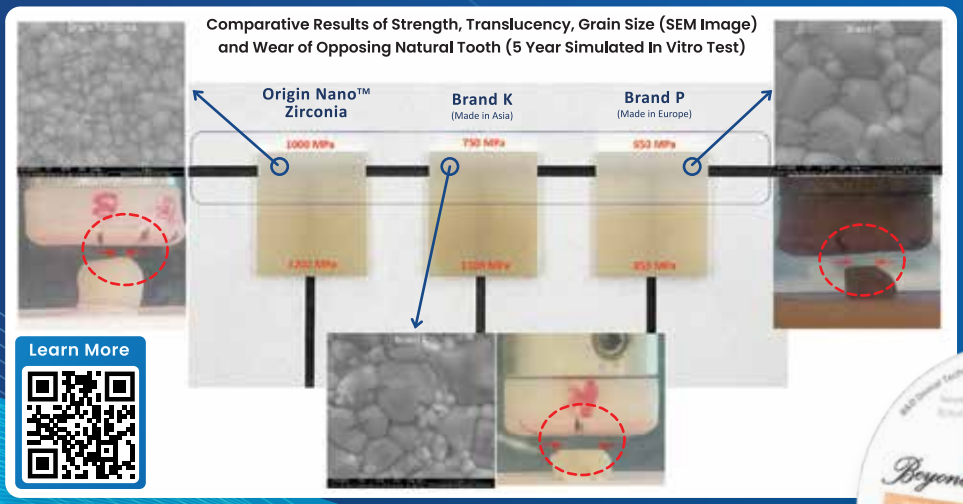

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At the Forefront

Shawn Nowak, *president of Nowak Dental Supplies in Carriere, Miss., talks more about the right resources.*

How does Nowak help dental laboratories be successful?

I'm proud to say that next year is Nowak's 80th anniversary, and over the course of the last 79 years, whenever we have added new products, we first ensure that it fits the criteria. We aren't just looking to add everything under the sun from A to Z. We look for products that make sense for our customers, and fit our philosophy, our company, and the companies we work with. We excel at finding the right products that meet the workflow needs of our customers. In addition, we are a great technical resource for our customers. With the digital side of our company, we offer technical support. Whether east or west coast, we always have someone available to help our customers navigate the waters of the digital landscape in order to help them be successful.

Where do you see the industry headed in the next five years, and how can lab owners differentiate themselves?

I feel the dental laboratory industry is at a plateau in the 3D printing world. Recently, though, I read that in the coming year, 25 percent more general dentists are expected to purchase 3D printers for in-house restorations. These dentists are screaming for education, and laboratories need to be the resource. My advice to the labs is, don't fight it. This wave is going to happen, and your doctors will be buying printers for their office and doing restorations. It is up to the laboratories to decide how to partner with the doctor in order to best utilize the printer. There are so many questions doctors are asking on social media; they are grasping at straws on how to use the expensive machines they just purchased. They need answers. If you know your doctor bought a printer, partner with them. Be their resource. You might lose a few inexpensive cases, but you will get the high-end ones.

Why is being an FDLA Business Partner valuable to you?

Nowak has partnered with FDLA for a very long time; it was a decade ago when I served on the board of directors. Out of all of the state organizations we work with, FDLA does their best to work with government agencies in order to help the dental laboratory industry. That's why we love supporting FDLA as a business partner, because I know that the funds are spent wisely. They are constantly looking to help the dental lab space, whether on the legislative side or by advancing the DLT community as a whole. I remember visiting the House of Representatives with the FDLA group, and making the case on who we are as an industry and what we need from the state. FDLA has always been progressive and at the forefront, and this is going continue to be needed in the future. I'm always happy to partner with that.

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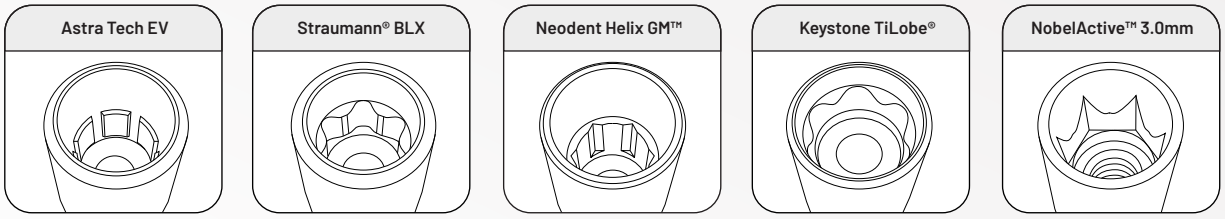

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