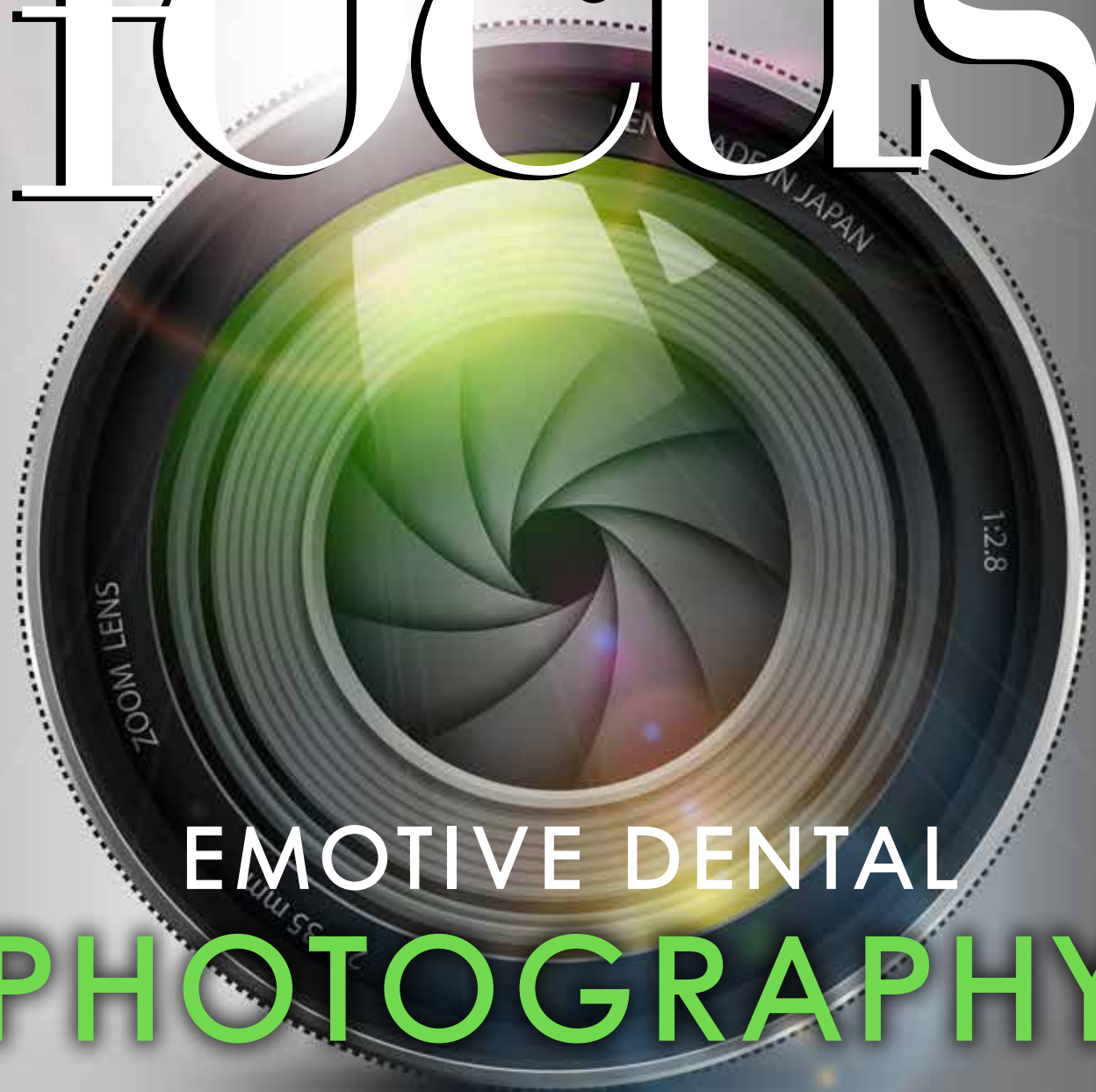


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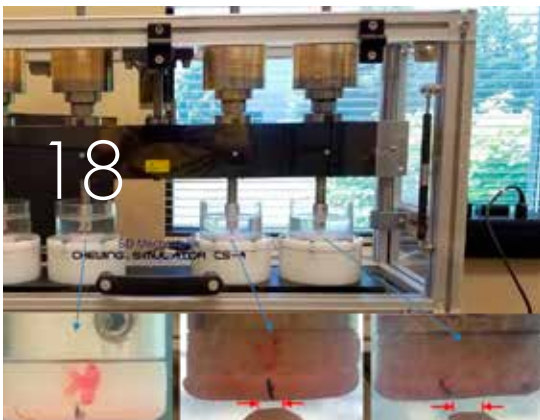
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Invest in Process of Others



We all have a role to play in leading and serving the people around us.

By Chris Peterson, CDT

FDLA President

If you have been in the dental industry or business in general for any length of time, I'm sure you have seen new equipment, people or processes come into your organization. Sometimes these new components fail miserably. Why?

These components fail because at our core, we sometimes forget to think of others. The planning and work we put into implementing these new components is wasted if we have forgotten that people have to work within these systems.

As we look through this quarter's articles, let's not just think about our lab's systems. More importantly, let's also look at how others think and feel about them. If you are a technician, then think, "How would my manager feel about this?" If you are a financial controller at a lab, then ask, "How would a technician feel about this?" If you are in customer service, then ask, "How would a person working on the 3D printers feel?" If you are an owner, then possibly ask, "How am I empowering my team to succeed?"

As you read the articles in this month's magazine, consider the content from the viewpoint of others. Think about how team members in different parts of the lab would think, feel, and react to these articles. Leadership means serving others. Whether you are just starting your career pouring up a model or in upper management, we all have a role to play in leading and serving the people around us.

Find your role on the list below, and as you read, try shifting your perspective by asking the following questions:

Technical Readers:

- How will this affect our customer?
- How will this affect our quality management system?
- How will this affect our team's technical philosophy?
- How will this affect cost (can I get an "amen" from our controllers reading this)?

Financial Readers

- How will this affect the technician?
- How will this affect our purchasing person?
- How will this affect our customer service team as they interact with customers?

Management Readers

- How will this affect the technician in the model department?
- How will this affect the delivery driver or person packaging the product?
- How will this affect the patient?

Customer Service Readers

- How would this affect the ceramic manager if this was implemented?
- How will this affect the quality management representative if we change to this process?
- How will this affect the purchasing agent's inventory system?

For further reading on perspective taking, refer to the FDLA's 2022 Q3 Focus article, "Essential Skills," written by Sasha Der Avanesian, CEO of Harvest Dental. The article discusses perception, self-control and other skills that help with placing the needs of others first. I found it enlightening, and I hope you will too!

Conclusion

As we ponder the questions above, may we always strive to expand our thinking and leading. May 2023 be a year of growth and fulfillment for you, your families, and your careers! 📍



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By Miles Cone, DMD, MS, CDT, FACP

EMOTIVE DENTAL

PHOTOGRAPHY: *A Laboratory Technician's Guide for Marketing to Dentists*

INTRODUCTION

I am a board-certified prosthodontist and I am also a Certified Dental Technician. Having each foot on either side of the fence within the dental profession (one in the chair, one at the bench), the question that I get asked most often by other laboratory technicians is, “How do I attract more high-end clients?” It’s a fair question; after all, nobody wants to get stuck in a rut milling out low-quality, full-contour zirconia second molar crowns, or, setting teeth on bilateral distal extension mandibular partials. Yes, these types of prosthetics are a necessity and a great service for many patients – but let’s be honest, they aren’t sexy, they don’t help build your brand or reputation, and they aren’t the treatment modalities that the superstar cosmetic dentists are advertising to their patient base. In this article, I will outline what it would take to catch my attention as a specialist and earn my confidence as a colleague and a new client.

I crave the intangibles: the obsession, the commitment, the philosophy, the true art of the science in dentistry.

STEP 1: DENTAL PHOTOGRAPHY: YOUR TICKET TO PLAY

You are a highly skilled and motivated dental technician – the only problem is that your potential and future customers may not know that you exist. Consider that dentists are also creatures of habit. Once we find something we like (a special bur, an impression material, or a ceramist), we stick to it. With this in mind, you need to disrupt the system. You need to be that sudden jolt of icy cold water over the head that makes me gasp. I’m a detail-oriented dental

specialist and I rely heavily on visual imagery. If I can’t see it, I can’t covet it. Possessing highly-tuned skills at setting teeth, layering porcelain and designing CAD/CAM frameworks is no longer enough. The contemporary dental laboratory technician must become proficient at dental photography and be able to show future prospects a portfolio of high-resolution images documenting their work. I want to see more than just the physical fruits of this labor. Any technician can show me pictures of titanium, porcelain and acrylic. I crave the intangibles: the obsession, the commitment, the philosophy, the true art of the science in dentistry.

Figure 1

Equipment checklist for essential dental laboratory photography: a) camera body, b) dedicated 100mm macro lens, c) speedlight, d) ring-flash diffuser



STEP 2: SELECTING THE RIGHT EQUIPMENT

There is a major misconception within the dental profession that acquiring the kit necessary to produce great photographs is expensive. This is simply not true. Nearly every photograph shown in this article was produced with camera products ranging in total price from around \$900 to \$1,300. This is not altogether so bad when you consider the potential return on investment from a single new account. When it comes to selecting your camera set-up, it is not recommended to purchase a brand-new package deal online or in large electronics and technology chain stores. Most of the “extras” that accompany the camera are unnecessary and are not ideal for the purposes of dental photography. Instead, consider bidding sites, such as eBay, for individual gear. There may be apprehension in regard to obtaining second-hand camera equipment, however, bear in mind that the original owners of expensive gear are also likely to be the type of individuals that are inclined to care for and maintain their equipment. My own personal experience has been very reliable and without issue. The four essential items that you will need are:

1) A camera body (**Fig. 1a**) This will run about \$500 on eBay.

- 2) A dedicated 100mm macro lens (**Fig. 1b**) Again, look on eBay for great deals on used lenses between \$300-\$400.
- 3) A mounted speedlight flash (**Fig. 1c**) At around \$60-\$75, these lights are so well-priced on Amazon, that it really doesn't make sense to buy used.
- 4) A ring flash diffuser (**Fig. 1d**) This item is so easy to use and works very well for creating that silky look on virtually all restorations (**Fig. 2**). Again, at under \$30 on Amazon, it is hard to argue against having one on hand. Of course, there is a lot more equipment that you could buy, but this is a great start to get you out of the gate.

Really look around you and find the magic in the mundane objects.

Figure 2

The use of a dedicated 100mm macro lens in combination with a speedlight and ring-flash diffuser creates a beautiful wet and silky look to ceramic, metals, zirconia, and acrylic.



Figure 3

Wax crowns weighed, sprued, and ready to press



Figure 4

Processed record base for an implant overdenture



Figure 5

Semi-adjustable articulator with mounted casts and milled titanium implant hybrid framework

STEP 3: CHOOSING YOUR SUBJECT TO PHOTOGRAPH

From wax patterns to processed record bases (Figs. 3-4), and articulators to porcelain brushes (Figs. 5-6), the sheer volume of fascinating subject matter within the dental laboratory is astounding. If you are unable to discover inher-

ent interest in the colors, patterns, shapes and textures of the materials and objects surrounding you at your workstation, then allow me to be the first to inform you that you are in the wrong profession. Really look around you and find the magic in the mundane objects that have been sitting right underneath your nose for years, such as a tube of 9.6 percent hydrofluoric acid etch (Fig. 7), a shade guide (Fig. 8), a freshly relined

Figure 6

Porcelain brushes shown in macro, and in context of their protective leather pouch

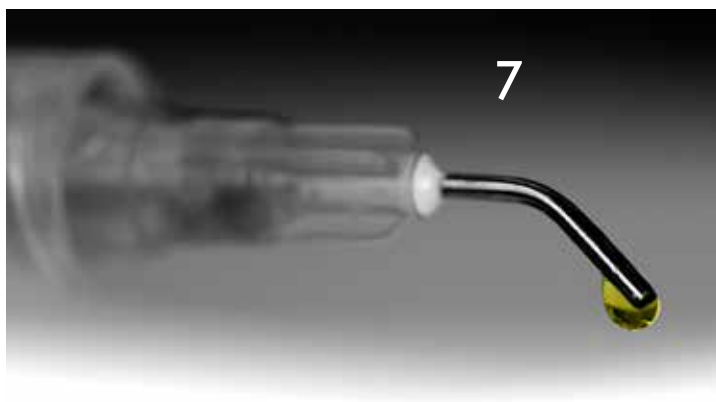
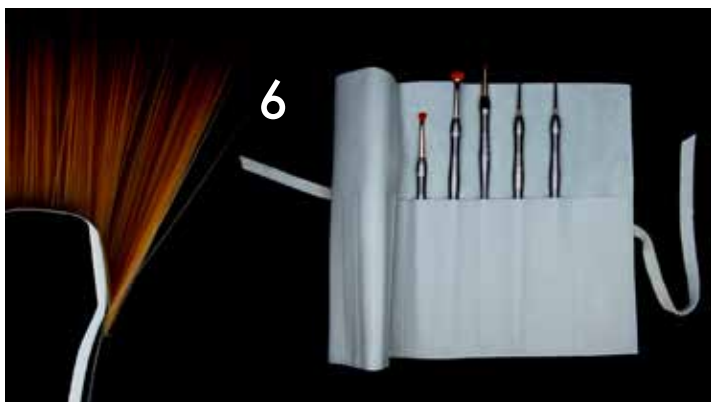


Figure 7

A drop of honey-gold 9.6 percent hydrofluoric acid emerges from the syringe tip prior to ceramic etching.

Figure 8

A shallow depth of field helps to generate interest for an everyday shade guide.

Figure 9

A vinyl polysiloxane chariside re-line of an immediate denture



denture (**Fig. 9**), or even a commonplace stock metal impression tray (**Fig. 10**). A little imagination can make any of these static and sterile subjects jump to life, but you must learn the basics of composition. Don't take all of your photos from the same boring head-on vantage point. Mix it up, get creative, and most importantly, be patient with the process. Master photographer Henri Cartier-Bresson once noted, "Your first 10,000 photographs are your worst." Learning how to make great photographs is accomplished in the same way that you figured out how to properly pour and trim models. You learn by repetition. Now be inspired and get practicing!

STEP 4: THINKING OUTSIDE THE BOX

Of course, all of the photographs shown so far can be obtained by anybody with a digital camera and 15-20 minutes of free time. It takes a little more grit and a lot more hustle, however, to walk into the lion's den to get the images you are after. You **MUST** go to the dentist's office to get live patient images to build your photo resume, because let's be honest, 1) every restoration you make will look great on the model (**Fig. 11**), but I want to see what it actually looks like in the head (**Fig. 12**), and 2) you cannot depend on your clients to take the photos for you considering that very few dentists have had adequate formal training or experience regarding high-end digital dental photography. I would wager my dental license that every technician reading this article has an inbox full of e-mails from the accounts they work with that include numerous out-of-focus shade photos taken with a cell

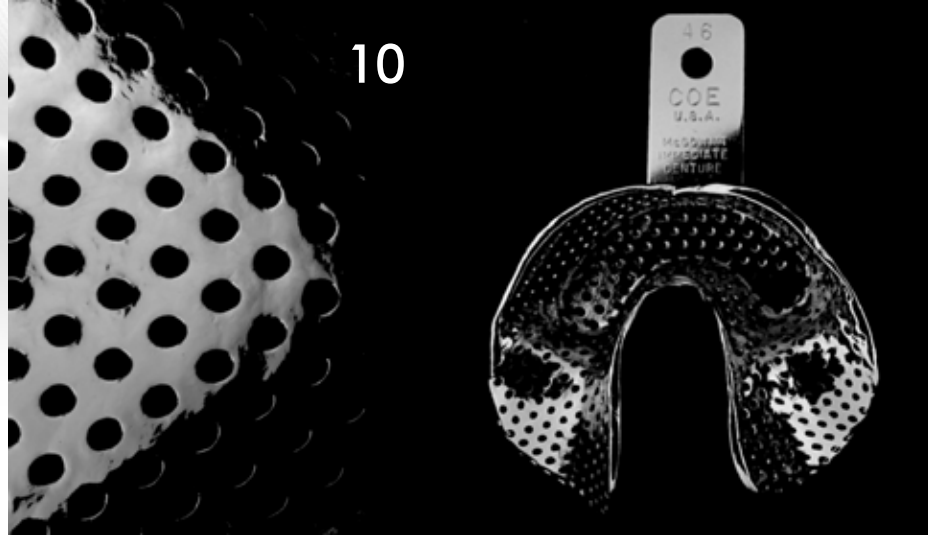


Figure 10

The repeating pattern of perforations on this stock tray (shown right) create an abstract and industrial aesthetic.

Figure 11

Definitive restorations shown on solid cast



Figure 12

Definitive porcelain laminate veneers on central incisors from Figure 11, shown intraorally following bonding procedure



Figure 13
Intraoral images taken during a crown-lengthening and implant surgical procedure



Figure 14
The end result of a full-mouth extraction

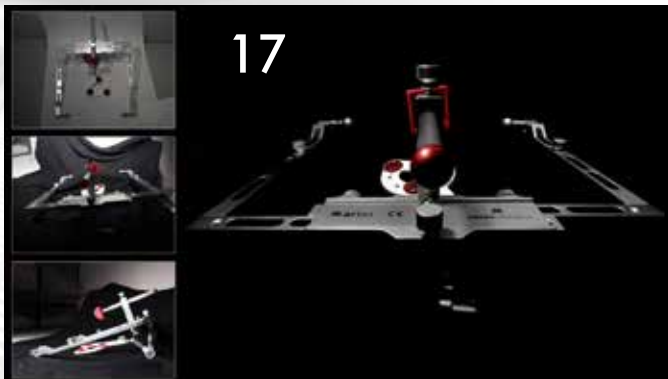


Figure 15
Immediate denture ready for delivery

Figure 16
Portrait photography adds a human element to the cold and clinical aspects of the dental profession.



Figure 17
Numerous photos are often made (inset images) before the right lighting and composition are achieved.



phone, coupled with harsh, washed out, over-exposed images of the final crowns immediately after cementation. We live in the information age and you should really think about all of this extra time as an investment in creating content. Take a look at the webpage of the doctors you currently collaborate with. I will double down on wagering my license to practice and say that most of them have generic stock images posted for their smile gallery (if their office has a website at all). If you feel any pushback from the staff about making time for you to photograph the patients chairside, offer to send them your stunning final photos as a courtesy. The economics is simple – this is value added to a commodity they've already paid for. Trust me, it works. If I didn't know how to take decent photographs, I would pay good money for this service. Also, make time to document many of the surgical procedures chairside. Ask the dentists you are working with for any scheduled implant placements (**Fig. 13**), or full-mouth tooth extractions (**Fig. 14**) and show up with the immediate denture you made (**Fig. 15**), plus a fully charged battery and a blank SD card in your camera. The top folks who you want to attract need to know that you understand and have experience with all phases of the profession. It also wouldn't hurt to learn the basics of portrait photography so that you can capture flattering before and after headshots of the patients (**Fig. 16**). This can be done at your laboratory, and is also very low-hanging fruit that will certainly make you stand out amongst a sea of uninspired, less hungry technicians.

STEP 5: PUTTING IT ALL TOGETHER

OK, you've completed the legwork of running all over town between dentist's offices taking pictures, arriving to work early to document each case, and skipping dinner with the family so that you can edit your photos. Congratulations. You've done your due diligence. You've put in the work. Now what? Now you need to sort through all of your photographs and select the few that really show you at your best. Recall the words of Henri Cartier-Bresson and remember that most of your images won't be exceptional – many in fact will be quite poor, and you will often need to take many images before you get just the right lighting and composition (**Fig. 17**). Begin by



Figure 18
A well-organized slide layout will help eliminate photographs and streamline the composition of the final portfolio.



Figure 19
Patient presentation and pre-operative situation

creating an easy, at-a-glance layout of your photographs that tells a story from start to finish (Fig. 18). My recommendation when first starting to put together a series of case studies is to make them as simple and straightforward as possible – nothing too complex. As an example, I have presented an ordinary single-tooth flipper that I customized with stains for a patient. Notice that in this sequence, there is a small segment of each treatment phase shown, beginning with a portrait photograph and pre-operative condition, moving through diagnostic stages and surgical procedures, and finally, the definitive prosthesis on display as is, and in the head (Figs. 19-25). Whatever the restoration is, it should be easy to photograph, at least in the beginning. As your abilities and skills progress with a camera, you can experiment further and take on progressively more challenging cases to document.

Figure 20
Radiographic examination, intraoral examination, extraction of hopeless dentition

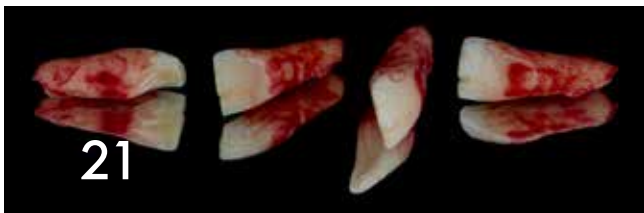


Figure 21
Extracted central incisor shown from multiple viewpoints on mirror.



Figure 22
Using the fluorescent celining lights in the operatory as a backdrops creates a dramatic view of the bone graft.

Figure 23
Interim removable dental prosthesis (IRDP) shown on mirror prior to staining and glazing.

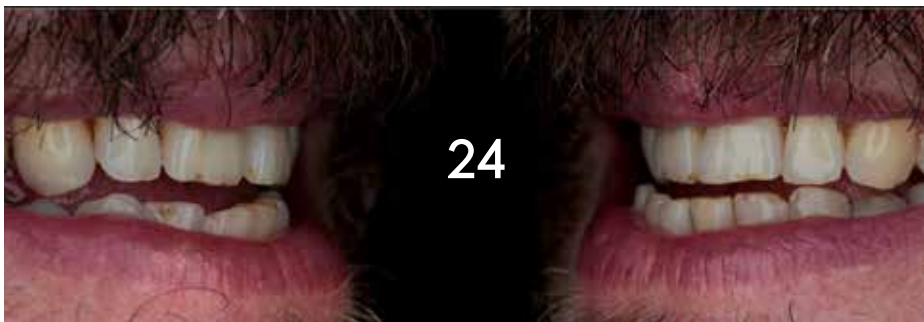
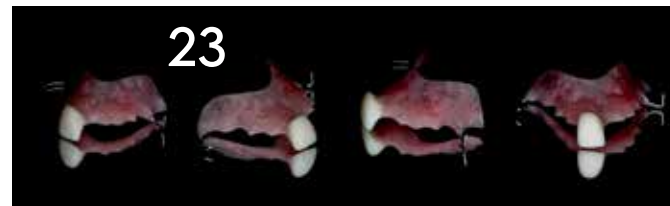


Figure 24
IRDP shown in right and left profile views in the head.



Figure 25
IRDP shown in anterior view reveals the chameleon effect of the stain and glaze application on the prosthesis.

STEP 6: MARKETING YOURSELF AND YOUR PRODUCT

Once you have assembled and edited all of the necessary photographs, the best way to really showcase your hard work and efforts is to compile the images into a professionally bound book of about 10-20 pages in length (Fig. 26). There are many services available online that will do this for around \$10 to start (the book in Figure 26 was made in iPhoto on a Mac laptop). This means that for \$300 or so, you could have your entire portfolio in the hands of several dozen of the top local dentists. Finally, there are eyes on the prize! You still need to sell each clinician on the going rate for your product, but not in the way that you might think. My arousal level plummets, for example, when a lab tries to attract my business with deals and discounted dentition. Competing on price is the hallmark of a production lab that values quantity over quality. When I receive flyers for a \$79 all-ceramic crown, I immediately assume that the final restorations will look like \$79 all-ceramic crowns. Race to the bottom anyone? Do not be afraid to charge what you are worth for your services. Be bold. Be the apex predator in the dental technology ecosystem. Proudly display your increased rates for characterization and festooning of hyper-realistic complete dentures and your \$300-\$400+/single-unit fixed restoration fees, which will likely be twice the going rate of what every other underwhelming dental laboratory in town is charging. This, however, is the way to get my attention!

Be bold. Be the apex predator in the dental technology ecosystem.

Figure 26

A professionally bound "Look Book" is an economical and effective medium to communication and show-off your talents.



CONCLUSION

It can be argued that of all the implements and contrivances possessed in the armamentarium of the laboratory technician, the digital camera is the most robust and impressive tool currently available. The lens is unburdened from emotional biases and is very unforgiving in all that it sees. These qualities are what make photography such a powerful medium for communication and collaboration with the dental clinician. A little time and effort on the front end has the potential for a massive return on investment on the back end and presents itself as a task certainly worth endeavoring toward. 📌

ABOUT THE AUTHOR

Dr. Miles R. Cone is a graduate of Tufts University School of Dental Medicine, and completed a three-year prosthodontic residency program while serving in the United States Army before being honorably discharged as a field grade officer in the rank of Major. In addition to achieving board certification and diplomate status within his specialty, Miles has also successfully challenged all the requirements necessary to earn his designation as a Certified Dental Technician. When Miles is not at the chair, in the classroom or at the bench, he serves as a Key Opinion Leader and international guest speaker for Amann Girrbach, GC America, Garrison Dental Solutions, Innovato Holdings, Smile Line, and Straumann Implants.

Dr. Miles Cone would like to express his deepest appreciation and gratitude to the following dental laboratory technicians who fabricated various removable, fixed and implant prosthetics that were photographed and used in this article.

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Olivier Tric, MDT (Figs. 11-12)

Alexander Wünsche, CDT (Fig. 9)

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BACKGROUND CHECKS: What Employers Need to Know

Background checks have always been an integral part of the onboarding process; they help employers gain a better understanding of who they are hiring. Over the years, the employment regulations have become more complex. Employers have a responsibility to create a sound onboarding process that they utilize with each potential new hire. The following are some best practice recommendations that we suggest in an effort to strengthen your current process.

➔ More Information

Learn more about Seay Management Consultants and the benefits available to FDLA members on page 16 of this issue.

Once you have established a relationship with a reputable Consumer Reporting Agency (CRA), you must ensure that each potential new hire signs a consent form authorizing the background check. The potential new hire must also receive a Summary of Rights as a requirement of the Fair Credit Reporting Act (FCRA). We recommend that you have the (CRA) run a local, state and federal records check. According to recent guidance issued by the EEOC, you cannot use an applicant's ar-

rest records when considering employment. For example, if an applicant has been arrested but never convicted, you should not take the arrests into consideration when deciding whether or not to hire that individual.

After you have received the results of the background check, the decision process can begin. The Equal Employment Opportunity Commission asks that employers consider three factors when deciding whether or not

to hire an applicant with a criminal background. The three factors are:

1. The nature or gravity of the offense;
2. The time that has passed since the offense occurred; and
3. The nature of the job held or sought.

For example, if you have an applicant who has a criminal conviction on their record, you must consider the nature of the offense. Was it violent? The second factor revolves around the length of time that has passed since the conviction. Did it happen within the last six months or did it happen five years ago? If it has been several years, the EEOC would take the position that the conviction should not be considered when making an employment decision. The final step requires that an employer analyze the position the applicant is applying for and the conviction. Does this conviction have a direct impact on the job they would be performing for your company? Linking the criminal conduct to the essential functions of the position can help an employer prove that a decision not to hire was made out of business necessity. A hiring decision should be made after considering the above factors.

The question we get most often when a potential new hire has a record of some sort is, “what do I do next?” When the answer is not clear cut, we recommend contacting a professional who is well-versed in employment regulations. Each situation you face will differ and it is important to seek the advice of a professional. At Seay Management, we are always glad to discuss your concerns and provide guidance on appropriate steps to take with your applicants and new hires.

If you chose not to hire an applicant based on their criminal background, we recommend that you follow the Adverse Action steps. By following these steps, you are complying

with the regulations and limiting the potential for future liability.

Adverse Action is a two-part process. The first part is the preliminary notice of adverse action. This letter is sent to the applicant stating that a preliminary decision has been made to not employ them, and should they choose to dispute this information, they can contact XYZ Consumer Reporting Agency. A copy of the report should be enclosed in addition to a summary of their rights. The applicant has 3-5 days to dispute the information that was furnished on the report. We recommend that the letter be sent certified mail. After the 3-5 day window has passed for the dispute and you have not heard from the applicant, you can then move forward with part two. The second notice you will send is the Notice of Adverse Action. This letter is similar to the first stating that a decision has been made to not employ based on the results of the background check. This should also be sent certified mail to ensure proper delivery. Following these procedures keeps your company in compliance with the regulations.

Ban the Box

In the past few years, there has been legislation to “ban the box” on employment applications. This refers to questions on an application form requesting information on any criminal history. The question is most often asked in the following way: “Have you ever been convicted of a crime, plead no contest or had adjudication withheld?” The logic behind the “ban the box” movement is that many applicants are not hired if they check the box acknowledging that they have been convicted of a crime. The conviction could have been 20 years ago, but they still have to check the box, therefore, making it hard to secure employment.

In recent years, many states have adopted a law to remove this question from the application. The ordinance can be adopted by individual cities. San Francisco, Chicago, Baltimore, Newark, New York City, Portland, Philadelphia, and Seattle have all adopted this ordinance. What does this all mean for employers? If you operate a business in one of these cities, you must comply with the regulation and update your application. If you are in a city or state that does not have this ordinance, you can choose to keep it on your application. You cannot, however, use the question as a screening technique for applicants.

Remember, if you have an employment issue or challenge, and you need an answer right away, and you want the very best human resources management advice available, you need to call . . . The Seay Team! 📞



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FDLA HR HOTLINE

As valued members of Florida Dental Laboratory Association (FDLA), you have access to a complimentary HR & Employment resource through our partnership with Seay Management Consultants.

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Sometimes a simple question can turn into a complicated and/or costly concern if it's not handled properly.

When you have a question and need an accurate and concise answer, simply contact Seay Management Consultants and identify yourself as an FDLA member and we will happily assist.

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- If a salaried employee doesn't come to work, may I deduct this from his or her salary?
- When an employee gives me two weeks notice, do I have to accept it? If I don't accept it, do I have to pay the employee for two weeks?
- If an employee leaves the company owing money, may I deduct this amount from the employee's final paycheck?
- If an employee is dismissed, am I required to pay accrued vacation pay?

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Prettau® – a name deeply connected to my South Tyrolean homeland. A commitment and a promise at the same time. Now, we are persistently pushing the path of our Prettau® zirconia towards monolithic design. Zirconia is and remains our passion – and our pride.

You can count on that!
Yours, Enrico Steger

PRETTAU®



Translucency



Flexural strength



Without color gradient

PRETTAU® 2 DISPERSIVE®



Translucency



Flexural strength



With natural color gradient

PRETTAU® 3 DISPERSIVE®



Translucency



Flexural strength



With Gradual-Triplex-Technology*

NEW!

PRETTAU® 4 ANTERIOR®



Translucency



Flexural strength



Without color gradient

PRETTAU® 4 ANTERIOR® DISPERSIVE®



Translucency



Flexural strength



With natural color gradient

NOTE: in the USA bridges are limited to 3 units for Prettau® 3 Dispersive® (except bar-supported structures) as well as Prettau® 4 Anterior® and Prettau® 4 Anterior® Dispersive® materials.

*Gradual-Triplex-Technology: the zirconia is already provided with color, translucency and flexural strength gradients during the production process. This ensures a natural-looking restoration with a highly translucent incisal edge and an extremely high flexural strength at the tooth neck.

BALANCING ESTHETICS AND PATIENT HEALTH

A study of the relationship between beauty and function (durability and opposing wear)

The use of metal-ceramic restorations has been significantly declining in favor of all ceramic prosthetics, mainly for esthetic and biocompatibility reasons. On the other hand, ceramics are fragile and brittle in nature. Compared to other ceramic materials, the use of monolithic zirconia often drastically reduces mechanical complications and requires a much less invasive preparation of the tooth structure, thereby allowing the patient to retain as much of the natural tooth structure as possible.

Dental zirconia has traditionally been manufactured from tetragonal zirconia polycrystalline with a minor proportion of yttria as a stabilizer (3Y-TZP); this type of zirconia is extremely strong, but presents relatively low translucency. After many

years in the market, 3Y-TZP was followed by partially stabilized zirconia with a greater yttria concentration, such as 4 mol% (4Y-PSZ) or 5 mol% (5Y-PSZ). Newly developed monolithic zirconia ceramics have substantially enhanced esthetics

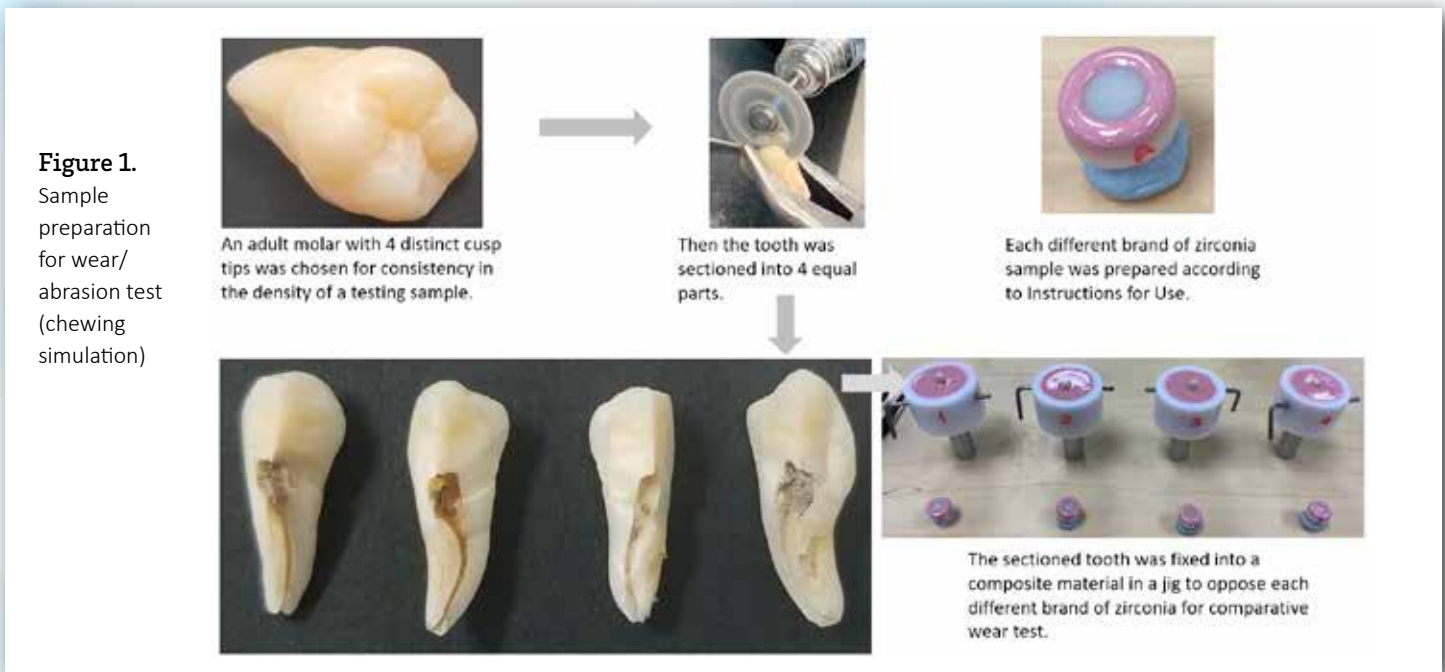


Table 1: Testing sample information

Multilayer Zirconia Brand	Manufacturing method		Manufactured in
B&D Dental - Beyond Plus Multi-Y	Colloidal method	Wet process, particle reduction to nano size (200-300 nm)	USA
Brand K	Biaxial, Isostatic pressing	Dry compaction of powder	Asia
Brand A	Biaxial, Isostatic pressing	Dry compaction of powder	USA
Brand P	Biaxial, Isostatic pressing	Dry compaction of powder	Europe

and translucency. This material (4Y and/or 5Y), however, must be further studied in vitro and in vivo to determine its long-term ability to maintain its exceptional properties. The cubic phase in 4Y and 5Y zirconia reduces the stress-induced transformation toughening of zirconia, resulting in reduced strength (from 1,200 MPa of 3Y to 600-750 MPa of 5Y) and toughness.

Many zirconia materials are available today, and their properties are all different. The decision on what zirconia material to use should include consideration of 1) the wear/abrasion factor against the opposing natural tooth, 2) the durability (crack/fracture resistance) of the restoration, and 3) esthetic features.

Test of different zirconia materials for the wear/abrasion of opposing natural tooth

Four leading brands of multilayer zirconia (shade A2) were prepared to measure the degree of wear/abrasion of the opposing natural dentition in a simulated in vitro test. The human molar tooth was cut into four pieces, as shown in **Figure 1**. It was then fixed in a device with die epoxy, and positioned to be a mandibular tooth opposing each of four different multilayer zirconia materials (**Table 1**), and sintered per manufacturer's instructions for use for each zirconia. A weight of 5kg (comparable to 49 N of chewing force) was exerted a total of 1,250,000 times to simulate chewing (Research Source: SD Mechatronik, Dental Research Equipment, Germany). One simulated chewing cycle per second resulted in two weeks of accelerated mastication (**Fig. 2**). 1,250,000 cycles equals five years of simulated chewing in this in vitro testing.

Wear/abrasion test result

Figures 3 and 4 show that the degree of wear/abrasion of opposing mandibular natural teeth increased substantially as the sintered grain size (especially the cubic grains) increased. In addition, as the yttria content of the zirconia increased, the cubic grains correspondingly increased, as shown in the SEM images (scanning electron microscope, FEI Quanta 600 FE, USA). Specifically, the yttria content of Brand K and

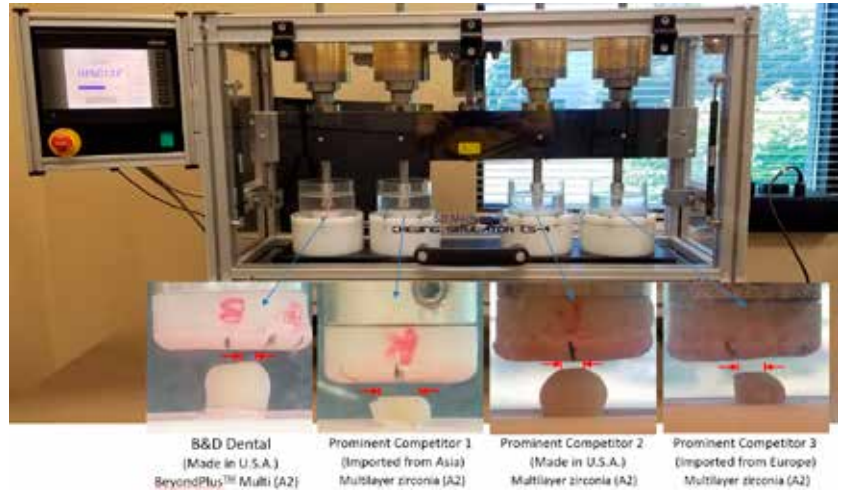


Figure 2. Chewing simulator test

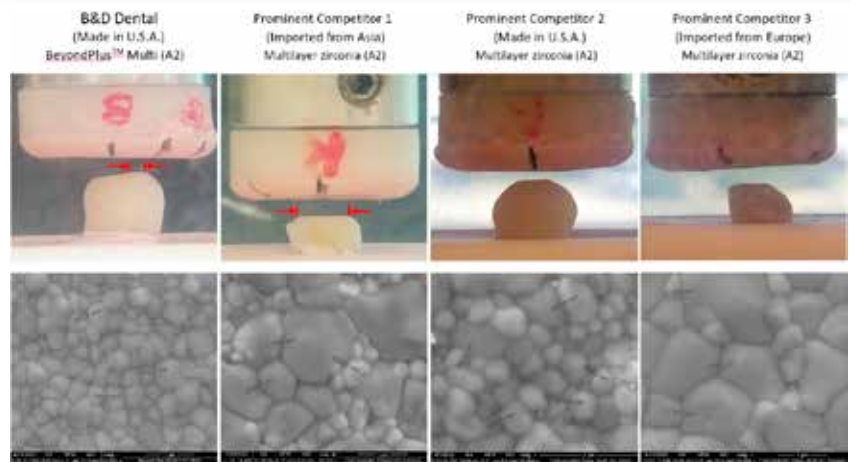


Figure 3. Chewing simulator test result with SEM image of each sample

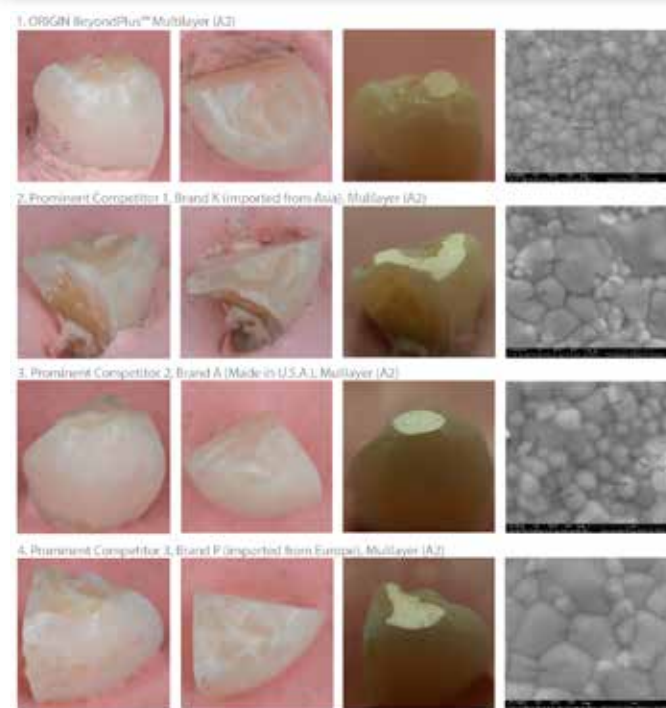


Figure 4. Photos and SEM images of each sample after Chewing simulator test.

As the yttria content increases, the zirconia gains more translucency/esthetics from the cubic grains.

Brand P are substantially higher on the incisal/occlusal area, which was confirmed through an independent elemental analysis (EDS test, Energy-Dispersive X-Ray Spectroscopy).

One noticeable characteristic is that Origin™ zirconia has smaller sintered grain sizes than Brand A, even though it has higher yttria content than Brand A. This was due to the fact that the zirconia was manufactured using the colloidal process in which zirconia powders (granules) were downsized to nanoparticles overnight in a liquid using a grinding medium. The average nanoparticle sizes were between 200-300 nanometers.

Durability (crack and flexure resistance) and esthetic features

The first generation of zirconia contains a tetragonal crystalline structure. The tetragonal zirconia has high mechanical strength and resistance against crack propagation. The crack propagation is inhibited by the changing of the crystalline structure from tetragonal to monoclinic. At an early stage of crack initiation, the gaps between grain boundaries are filled by increased volume due to this transformation of the crystalline structure known as transformation toughening. The tetragonal (3Y) zirconia's strength and ability to inhibit crack propagation are not limited by the grain size or the uniformity of the grain size because most of the grains are tetragonal in structure. While tetragonal zirconia has significant strength benefits, the application is limited due to its opacity.

Disadvantages of traditionally manufactured 4Y & 5Y

The new generation, cubic-containing zirconia (4Y, 5Y), contains a mixture of cubic and tetragonal grains in the zirconia facilitated by an increased amount of yttria. As the yttria content increases, the zirconia gains more translucency/esthetics from the cubic grains. This provides a far superior esthetic. Mechanical strength, how-

Figure 5. Abrasion factors by particle size

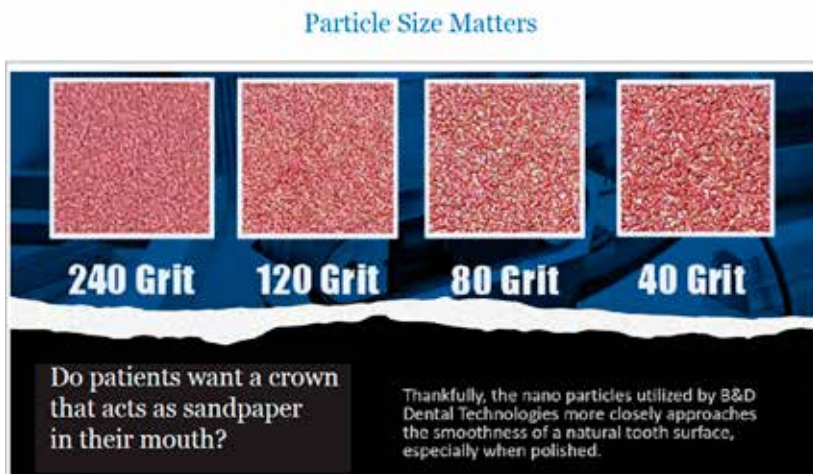
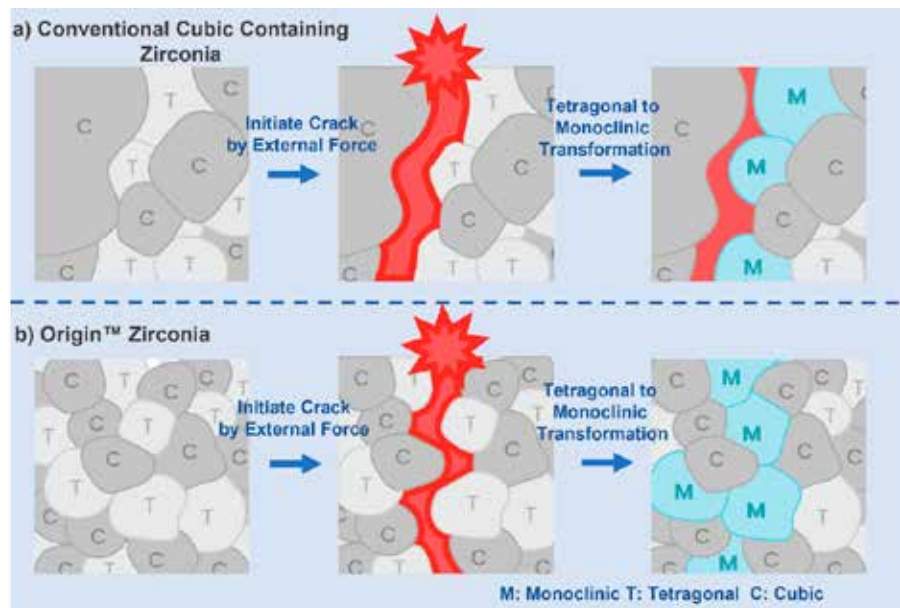


Figure 6.

SEM images of a) conventional cubic containing zirconia and b) Origin™ zirconia



ever, such as the flexural strength and fracture toughness, is compromised and the effects of transformational toughening are lost due to the increased amount of cubic structure when produced by conventional methods. As shown in **Figure 6**, conventional cubic-containing zirconia has large cubic grains; these large grains reduce the grain boundaries' surface area. Since crack propagation occurs at the grain boundaries, because the grain boundaries do not have a covalent bond, these large cubic grains become detrimental to zirconia durability.

Durability benefits of nano sized particles

Grinding the particles down to nano sizes through a colloidal manufacturing process not only reduces wear on opposing dentition as shown above, but it also increases the surface area between grain boundaries. The more surface area the grain boundaries have, the greater the durability and resistance to crack propagation. As illustrated in **Figure 6**, compared to conventional cubic containing zirconia, nano sized particle zirconia such as Origin™ zirconia both inhibits crack propagation and utilizes transformational toughening to expand into the crack area. This is only possible when the cubic grains are small and comparable in size to the tetragonal grains as is the case with nano particle zirconia.

Conclusion

The consideration when choosing a dental zirconia must include the overall aspects of 1) the wear/abrasion against the opposing natural tooth, 2) the durability/crack resistance, and 3) the esthetic features. The traditional manufacturing method of cubic-containing multi-layered zirconia (4Y and/or 5Y) has an esthetic effect (translucency) but results in larger cu-

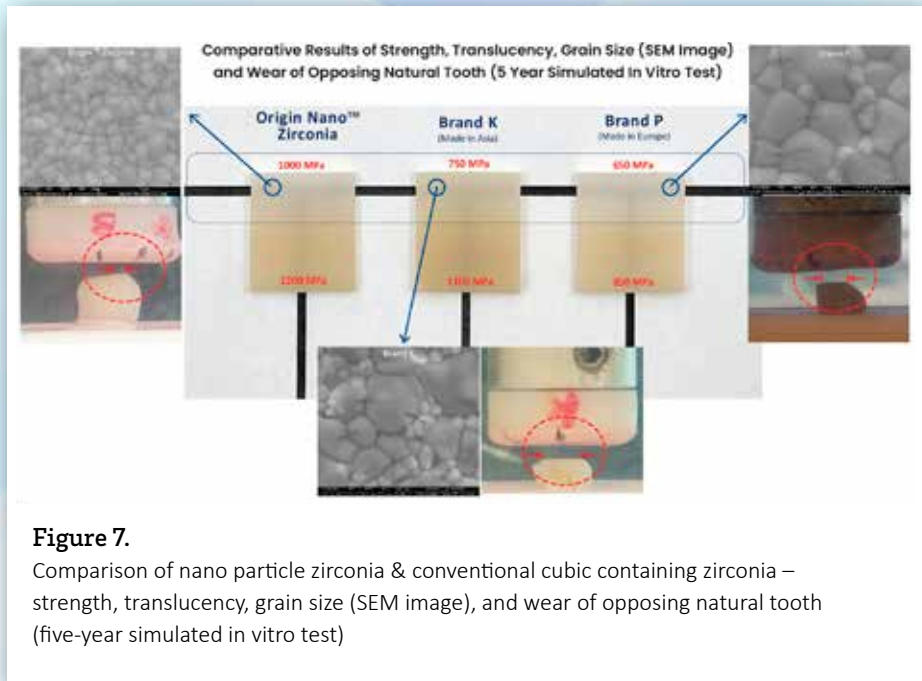


Figure 7.

Comparison of nano particle zirconia & conventional cubic containing zirconia – strength, translucency, grain size (SEM image), and wear of opposing natural tooth (five-year simulated in vitro test)

bic grain sizes that compromise mechanical strength and increase opposing natural tooth abrasion, causing potential problems for patient's health. Alternatively, as shown in **Figure 7**, manufacturing zirconia through a colloidal process that reduces the particle sizes down to nano particles can provide industry-leading esthetics while maintaining the benefits of durability and wear/abrasion resistance to opposing dentition. 📌

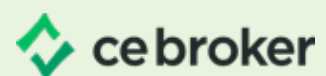
About the Author

B&D Dental Technologies is the leading developer and manufacturer of dental zirconia. B&D has 12 issued patents related to zirconia and is focused on providing high-performance zirconia with patient centric benefits.

The more surface area the grain boundaries have, the greater the durability and resistance to crack propagation.

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THE WHY, WHEN, AND HOW OF Verification Jigs

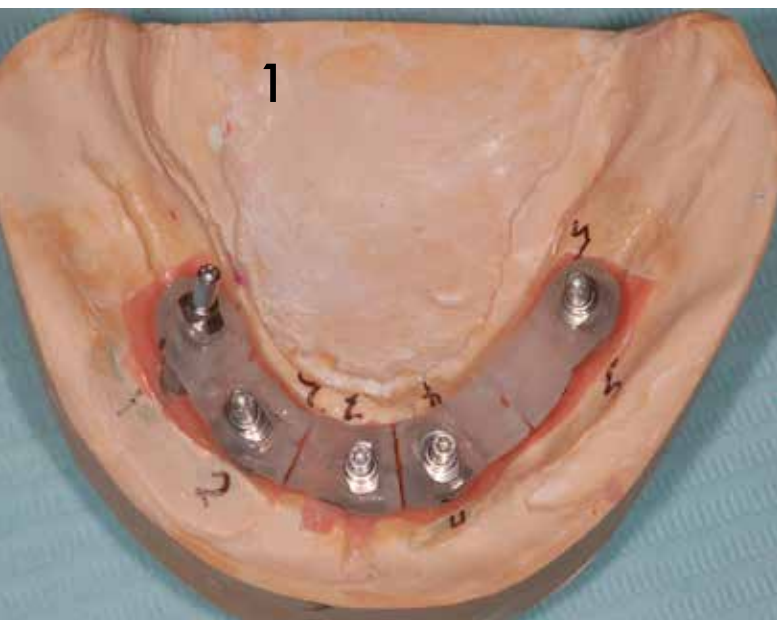
Over the past eight years, implant dentistry has seen a return to the screw-retained implant restoration. Clinicians such as Dr. Chandur Wadhvani and his book, “Cementless in Seattle” have moved the needle toward screw-retained restorations being the preferred choice over cement-retained to avoid any foreign-body reaction from leftover cement. The consequences of leftover cement can include crestal bone resorption, soft-tissue resorption, and eventually, implant failure if left unchecked. While single unit screw-retained implant restorations are quite straightforward, things can become a bit more complicated when fabricating and placing multiple unit restorations.

Along with the move to screw-retained restorations, we have also seen a movement to implants being placed at or below the crest of the bone. The concept of using a platform shift at bone level was first popularized by Bicon in the early 2000s, but now all manufacturers have some type of platform-switched implant designed to be placed at the crest of the bone or slightly below. Many clinicians will restore multiple unit cases directly to the implant, which puts the implant-crown interface at bone level. Alternatively, a transmucosal abutment can be used to bring the restorative

interface to the tissue level. Regardless of bone-level or tissue level, passive fit of the restoration is critical to long-term prosthetic success, and the gold standard in achieving passive fit is the implant verification jig, or IVJ. The International Congress of Oral Implantologists (ICOI) defines a verification jig as follows:

“An IVJ, or implant verification jig, is an important player in full-arch implant reconstructions. This method, when used during the last impression stage, ensures that the final prosthesis fits well onto multi-unit abutments or onto the implants themselves. The implant verification jig offers a solid structure that links the impression copings to make sure the inter-implant relationship is preserved in the final impression. This is especially critical for full-arch cases. With multiple adjacent implants connected securely at the time of the final impression, the implant verification jig allows for a very accurate master cast, a passive fit, and fewer potentially destructive forces that could result in prosthetic failure or bone loss. When impression material flexes, the relative position of two adjacent and unconnected implant transfer copings can move inside the impression material. By using the jig, the periodontist can significantly heighten the accuracy of the master cast that the last restoration will be designed on.”

The most important sentence in this definition is, “With multiple adjacent implants connected securely at the time of the final impression, the implant verification jig allows for a very accurate master cast, a passive fit, and fewer poten-



tially destructive forces that could result in prosthetic failure or bone loss.” Why is a sectioned verification jig luted at time of the final impression? Passivity. A passive-fitting restoration is critical to long-term prosthetic success; the consequences of not achieving passivity include broken screws, strain-induced fractures of zirconia bridges, and costly remakes from restorations not seating. These would be classified as prosthetic failures, but the potential biological failures are far more destructive. Microgaps at the tissue level allow for fluid penetration and bacterial colonization that can result in a build-up of biofilm, which eventually leads to soft tissue inflammation and resorption. Far more critical and destructive is micro-leakage at the bone-implant interface when a restoration is done directly to the implant. Micro-leakage at this interface can result in bone resorption and eventual loss of the implant. Our patients deserve better.

This leads us to the next question of WHEN to use a sectioned verification jig? One has to assume every initial impression has some degree of distortion, regardless of how small. Impression copings with a 0° taper will cause deformation in the impression when removed as it's impossible for multiple-unit implants to be placed perfectly parallel. As we don't know if the impression material rebounds to its initial position, the possibility of distortion is present in every impression. The answer then is to use a sectioned verification jig on every screw-retained case of two units or more.

How is the verification jig designed to create a master verified cast? **Figures 1-2** show a typical implant verification jig made of light-cured resin both for full arch and smaller splinted restorations.

STEP 1: An impression coping or verification cylinder is hand-tightened to the analog model made from the preliminary impression.

STEP 2: Once all components are hand-tightened, they are joined together with a “bar” design using PrimoSplint (Primotec USA) and light-cured.



STEP 3: Section between abutments leaving the thinnest gap possible, grind in undercuts and flow channels.

The clinician will insert each component individually, prime the joint with PrimoStick, connect each component with red PrimoPattern LC Gel and light cure. The red gel with a clear jig ensures the clinician has full penetration and filling of the gap with the LC gel (**Fig. 3**). The jig is then picked up in an impression with a custom tray and sent to the lab for fabrication of the master verified cast and used for both temporary and final restorations.

The gold standard in achieving passive fit is the implant verification jig, or IVJ.

Clinicians depend on us to make implant dentistry more predictable.

The preliminary impression that is used for this step does not require a high degree of precision; it's simply used to create a verification jig, custom tray, and occlusal rim. It can be made from an open tray, closed tray analog impression or an intra-oral scan. Its purpose is simply to capture the basic implant position for case planning and jig fabrication and/or trans-mucosal abutment selection. A final multiple-unit screw-retained restoration should NEVER be made from the initial open or closed tray impression where passivity has not been verified.

Some basic rules to remember when using verification jigs:

1. Avoid sending the luted jig on its own where it can be damaged in shipping. Always pick up in an impression.
2. Avoid sending a one-piece resin jig to the clinician. Resin can flex when screwed down thus providing a false sense of security regarding passivity. They will always appear passive.
3. Avoid using Pattern Resin if the lab is on a time constraint. Pattern resin exhibits the highest shrinkage rates of all resins used for IVJ's



and continues to shrink for 24 hours after initial set. Because of this reason, it's even more critical to section any jig prior to shipping.

4. If a doctor insists on a one-piece jig, a stone verification jig should be fabricated (Figs. 4-5). Requirements for a stone jig include low-shrinkage stone (GC Fuji Rock or Dentona Zero-Rock), and should be designed in such a way that allows the jig to fracture if not seating passively; these should NOT be as tall as the temporary cylinder. The stone verification jig should always be verified with The Sheffield Test prior to leaving the lab.

John C. Maxwell once said that "the longest distance between two points is a shortcut" and when it comes to passivity in implant dentistry, ignoring the implant verification jig is not the shortcut we should be taking. Patients pay a lot of money, and put their faith, oral health, and confidence in their clinicians, and clinicians depend on us to make implant dentistry more predictable. Use verification jigs and use them in the manner they were intended. 📌

About the Author

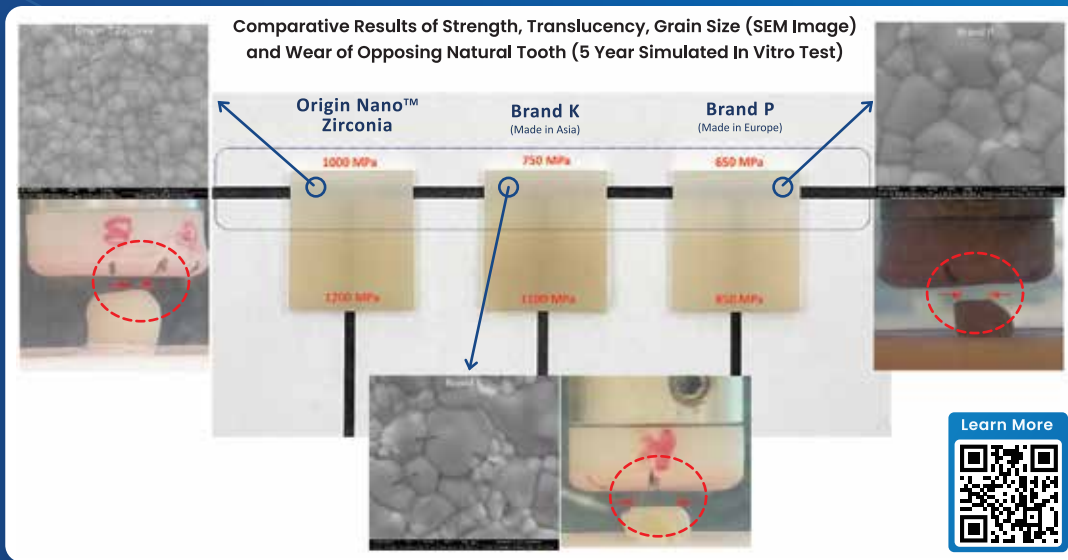
Rick Sonntag, RDT, is president and founder of 4Points Dental Designs in St. Petersburg, Fla. 4Points Dental Designs specializes in building relationships that optimize patient-centered outcomes in implant and functional-esthetic dentistry. Rick's vision



for the lab was inspired by his experience as an in-house ceramist at The Dawson Center and accreditation with the American Academy of Cosmetic Dentistry. With 26 years of experience in the U.S., Germany, and Canada, Rick's passion for education has brought him together with numerous world-class clinicians and ceramists including Dr. Peter Dawson, Willi Geller, Ernst Hegenbarth, Dieter Schultz, Shigeo Kataoka, Oliver Brix, and many others. With Rick's extensive level of experience leading the company, the 4Points team is able to achieve its ultimate goal of helping dentists work smarter.

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2023 Chicago Seminars (CE Credit)



Optimizing Restorative and Implant Solutions to Avoid All on X Remakes - (1 CE Credit)

Presenter: Pinhas Adar, MDT, Adar Dental Laboratory, GA

From impression taking to final delivery, this class will show you how to achieve almost NO remakes on full mouth reconstruction by addressing the following objectives: 1) using the digital workflow as a planning tool for predictable results; 2) following reliable new processes to shorten appointments, save time and ensure final seat times are around 10 minutes for screw retained zirconia; 3) Communication - laboratory, clinician and patient confusion unscrambled for predictable results.



How to Fully Utilize Zirconia From Single to Full Mouth Rehab While Achieving Uncompromising Esthetics - (1 CE Credit)

Presenter: Luke Kahng, CDT, LSK121 Oral Prosthetics, IL

Luke Kahng will provide education on how to approach single central, anterior, cosmetic and implant cases with a focus on opacity and translucency to achieve stellar esthetics and life-like color on cases that also offer patients excellent durability and longevity.



Winning Techniques with the Most Popular Zirconia Liquid Ceramic / Porcelain Systems - (1 CE Credit)

Presenter: Dan Henry, CDT, Dynamic Dental Arts, WA

Learn how to easily integrate the cutting edge zirconia system into any type of lab environment. Whether focused on high end restorations or high production in volume, we will teach you all the tricks and tips with some of the most popular finish porcelain/one fire systems, including liquid ceramics (GC Initial One Squin & Soprano). Our team has spent countless hours perfecting these methods so you don't have to.



A Simple and Predictable Solution to Fixed Full Mouth Restorations - (1 CE)

Presenter: Jeff Anderson, CDT, Whitecap Dental Lab & Milling, UT

Creating a smooth restorative process for fixed full mouth restorations has always been a challenge for both the Doctor and the Laboratory... until now. The Whitecap Institute together with DIO USA has developed a complete solution for edentulous patients. See how a digital approach can optimally place implants to compliment a thoughtful restorative plan. In turn, the workflow streamlines the restorative process and takes advantage of the symbiotic relationship between Titanium and Zirconia, resulting in a simple and predictable restoration.



Zirconia - Balancing Esthetic Needs and Patient Outcomes - (1 CE)

Presenters: Rich Green, CDT, ; Steve Campbell, Managing Director, B&D Dental, UT

Many zirconia materials are available today, and their properties differ greatly. The following factors should be considered when deciding which zirconia to use in your lab: 1. crack and fracture resistance; 2. suitable esthetics; and 3. abrasive wear on the opposing surface.

In our presentation, we will look at current information regarding these issues and other considerations that can enhance your product offerings. Following this seminar, you will be able to speak knowledgeably with your doctors about these concerns.



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➔ A suggested format is 1,500-2,000 words with 10-15 photos, but this is flexible.

➔ Editing and writing assistance can be provided upon request.

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Invaluable Partnership

*Argen Corporation is a long-time supporter of the Florida Dental Laboratory Association. **Donnie Bridges, CDT**, Eastern Regional Sales Manager/Argen US, talks about the future of the industry and what will help laboratories succeed.*

How does Argen help dental laboratories be successful?

Argen has a long-sustained history of supporting the dental laboratory industry, which has both grown and evolved throughout the years. Argen began as a dental alloy and refining company and over the years expanded its product offering to become one of the largest dental zirconia disc manufacturers in North America, a quality digital manufacturing outsource partner, and a trusted equipment and resin supplier. The fixed, removable, and ortho product lines include milled zirconia, PMMA, gold, CoCr, SLM, DPM, custom abutments for a wide variety of implant systems, models, denture bases, and clear aligners. Argen continues to innovate and bring new products to market to help dental laboratories offer their customers high-quality and consistent products. Products currently in development or beta include SLM RPDs and milled titanium bars.

In addition to a growing product line, Argen's award-winning digital and technical support teams help dental laboratories succeed through offsite and onsite support. Continuous education and training are available via free educational webinars and pre-recorded videos. A quality and robust product line, efficient workflows, timely support, well-rounded education, continuous process improvements, and a focus on helping to make lab life easier all contribute to helping dental laboratories be successful.

Where do you see the industry headed in the next five years?

Continuous improvements in quality and efficiency will be a focus in the coming years. The dental laboratory industry has already witnessed and will continue to see significant changes brought on by interconnected information systems that drive process improvement, automation, and digitalization. Efficiencies in manufacturing to meet the needs of customers while maintaining competitive pricing will also be a priority.



Longer term, the DSO market of dentistry will continue to gain market share, driving the need for laboratories to find efficiencies to remain competitive.

How can lab owners differentiate themselves in today's environment?

It's more critical now than ever for dental laboratories to differentiate themselves. One way that labs can do this is by acting as the primary knowledge resource for their customers. Providing dentists with accurate information goes a long way in their ability to achieve the best possible outcomes for their patients. Helping dentists select the best materials and actively participating in case planning are just a few ways to accomplish this.

Another benefit for labs to act as the primary knowledge resource is to keep clients informed of dental technology trends. Given the continuous advancements in the dental industry, dental practitioners need assistance to keep up to date on products and emerging technology. Providing this knowledge will help keep customers well-informed and build strong relationships.

Why is being an FDLA Business Partner valuable to you?

Argen's partnership with FDLA is invaluable, as it gives Argen the opportunity to intimately communicate with laboratory owners/employees in one location. As fellow advocates of the laboratory industry, Argen's partnership with FDLA will continue for many years to come. 📍

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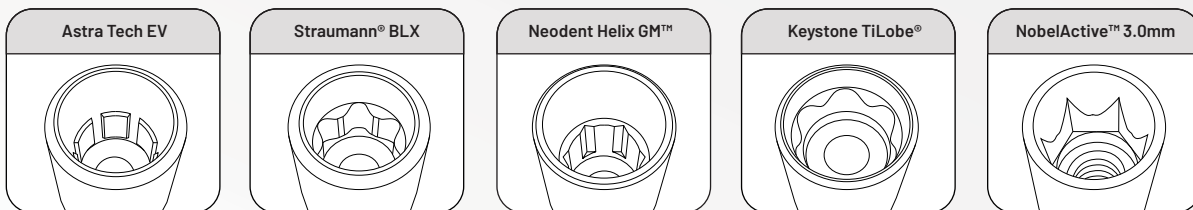
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