

DECIPHER the DIGITAL DENTURE



Do you remember the stigma when online dating started to gain speed two decades ago? Many couples would shy away or lie when asked how they met, or the bold ones would proudly proclaim to have met online and predict that this was just the new way to meet people. Turns out they were on target. In February 2020 the Pew Research Center released a report that 30 percent of U.S. adults have at some point used a dating app or website. Twelve percent of Americans say they have been in a committed relationship with or married someone they met through a dating site or app.

In 1973 Steven Sasson went to work for Eastman Kodak, and in 1975 he invented digital photography and made the first digital camera. In 2017, more than 1.2 trillion digital photos were taken. Of the pictures taken in 2017, 85 percent were on smartphones, 10.3 percent were on digital cameras, and 4.7 percent were on tablets.

On a cold night in Paris in 2009, Travis Kalnick and Garrett Camp couldn't get a ride. This spurred their development of a smartphone app where users could tap a button and get a ride; otherwise known as Uber. In June 2018, Uber announced they have 75 million riders and 3 million drivers worldwide.

There are countless other examples of trends that have been introduced, perhaps with at first some trepidation, and over time quickly overtook what "used to be" and became what is. When it comes to the influx of technology in the dental lab, all have witnessed how zirconia has transformed the crown and bridge world in the past decade. Since then, the industry has been waiting for the right combination of materials and equipment to ignite the same revolution in the denture world. Many are saying that not only is that time now, but it is about to descend with hurricane force and speed. Whether a lab chooses to go full digital, hybrid, or remain analog, the successful lab of tomorrow needs to establish exactly what removable road they are taking and how they will remain ahead of the curve.

THE COMPANIES

When walking the exhibit floor during industry meetings, it is clear that the number of companies jumping into the digital denture world are quickly expanding. There have been a few major players, however, that are starting to stand out. Each approach to conquering the digital denture is different; some vendors have even decided to work together as seen with the collaboration between Carbon and Dentsply Sirona.

In September 2019, Dentsply Sirona and Carbon announced the launch of the Lucitone Digital Print Denture workflow and material system optimized for the Carbon M-Series printers. The Lucitone Digital Print™ 3D Denture Resin enabled labs to print up to eight denture arches in approximately two hours and offered a workflow designed for laboratories of all sizes.

Iain McFarlane, Senior Manager, Dental Applications at Carbon, has worked with a variety of labs. This includes labs that have been identified as early adopters and have a lot of experience with dentures and digital integration, clinical labs with only 3-4 technicians, and completely analog labs employing generally older technicians doing traditional denture setting. While it's more challenging to work with a lab that has been strictly analog removable with no digital exposure, it can be successfully accomplished. The key is to overcome the mental block.

McFarlane said, "With digital, they're still using that same knowledge and understanding; that will never be replaced. It just feels different because of how the information passes through the process, and how the hands and mind are employed differently throughout the manufacture of the denture. They're still utilizing their mind—their understanding of dentures—to design dentures, but

{Iain McFarlane photo}

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it's now software and machinery that works together to physically manufacture the part. As long as they can reconcile that they are just substituting wax and knife for a mouse and a computer screen, it frees them up mentally to make the transition. The key is to understand that the same expertise is ultimately driving the creation of the final part."

It remains a weighty decision of either starting small with a scanner and outsourcing, or purchasing the equipment and doing everything in-house. If it is strictly a removable lab, Carbon recommends a certain amount of volume before diving into manufacturing. For a full-service lab that can also utilize the printer for nightguards and models, the requirements might be different. While there are multiple entryways to consider, and formulas that can help determine the ROI before purchasing equipment, it is nearing the tipping point where timing is critical.

"I liken the adoption of digital dentures to digital crown and bridge, but on a much more compressed time scale," said McFarlane. "With crown and bridge, especially early on, there was a period of resistance and assessment of digital as a concept, as a viable alternative to analog. But that period is past. People no longer question if digital is for real. It's been proven. Now it's a matter of buying into the materials. In terms of digital dentures, as more people recognize that digital is a viable way to streamline workflows and increase production with a solid product, more companies will jump in and accelerate the rate that new products hit the market. I'd say five years from now digital will hold a very large share of all dentures produced, just as digital now dominates crown and bridge. 3D printing has blown open the door on how much can be produced in a single day, and that increase in production capacity will also translate into faster adoption of digital dentures."

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—Lisa Aguirre



Ivoclar Vivadent has also invested significant time and resources into the digital denture with the introduction of Ivotion, a monolithic, single disc milling solution along with the PrograMills. William Barton, MBA, CDT, TE is the senior technical consultant and lead R&D technician responsible for the Ivoclar digital denture testing, evaluation and support in North America. He has worked with laboratories of all sizes as well as dental practices and denturists. He recognizes that going digital is not inexpensive, and smaller labs may have a harder time adjusting pricing to accommodate growth into the digital realm.

"Larger laboratories with the investment capital and digital savvy technicians typically go with the all-in approach," said Barton. "They may have a 3Shape system and will purchase a denture add-on module and a mill. Smaller labs with limited denture and/or CAD/CAM experience may choose to outsource the design and fabrication as they learn the digital ropes and gain the capital to move toward the all-in."

In order to be successful, labs must be willing to commit resources to overcome the learning curve, including manpower and the appropriate scanner and software platform. Education for both technicians as well as clinicians ensures successful collaboration and implementation. Along with this collaboration, Barton predicts that the next five years will reveal a significant rise of in-practice digital laboratories.

"At the rate additive materials, software, and manufacturing processes are advancing, dentures will become same-day dentistry," he said. "Large and niche labs will tough out the weather of change, however, I see opportunities for my fellow technicians who find themselves in-between. Technicians who embrace the technology early and master the digital denture workflows will be invaluable to the in-practice lab."

Digital dentures will emerge as the primary choice in denture fabrication as it provides a reliable, high-quality solution with minimal turnaround time, easy denture replication and minimal bench time for lab technicians. Lisa Aguirre, Roland DGA Product Manager, Dental Solutions, is proud to see labs take the leap into digital denture fabrication with much success.

She said, "Advanced yet easy-to-use dental mills like the DWX-52 series, along with innovative offerings like our denture time reduction kit, make it simple and cost-effective for labs of all sizes to integrate digital denture production into their respective workflows."

THE CONSUMERS

"I was the guy who said I will NEVER take that direction," said Conrad Rensburg, ND, NHD, co-owner of Absolute Dental Services, Durham, N.C. "I saw the dismal printed dentures on social media and couldn't believe people would sell them. I also never saw the ROI in printing models on a \$100k machine. When Dentsply Sirona invited me to Charlotte to look at Lucitone, I initially thought it a waste of time. When I actually saw the printed product, I ordered a Carbon that day. I've now been doing it for nine months and I'm saying publically it was the best investment I ever made in equipment; technology proved me a fool!"

For the first time, Rensburg saw a way to scale dentures in a high-end application. After going through a relatively seamless transition with the equipment installation and training, he now waits for the software library denture modules to catch up. Having the ability to digitally archive a case and provide a replacement within 24-hours instead of waiting for six appointments is a huge service for clinicians. Even with this excitement, a major deciding factor was determining the ROI before taking the leap.

Rensburg said, "At first I didn't understand the value of leasing. Yet when I look around, I have more equipment in my garage that I need to throw away



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than I'd like to admit. Now I'm getting excited about not owning it. I don't have to spend another \$50k for another machine I don't want in three years and I can have the newest technology when it's released. Run the numbers, establish your scale and determine what other products you can print. As for me, I'm ready to buy a second one."

Jerry Kaizer, CDT is the owner of Murray Kaizer, Inc., Farmington, Conn., and his daughter Emily Kaizer Murphy, CDA, RDH heads up the technology department. Their lab is only removable, with twenty technicians including eight CDTs. They believe in the importance of staying ahead of the technology curve and after watching the 20-year transformation in the fixed world, logic dictated that removable was next. They had the opportunity to get in on the ground floor when Carbon and Dentsply Sirona reached out and asked them to be a resource in the development of their removable workflow.



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"I was excited to be a part of the process with these companies, and getting involved with 3Shape was the icing on the cake," said Kaizer. "Emily now has a back-and-forth relationship with a 3Shape designer who is part of the software development. He knows the software, Emily knows dentures, and they are working together for a better result; this type of collaboration creates a new level of mutual respect in the industry."

Even with these three titan companies working together to innovate the removable side, it's still a big pill for the industry to swallow. The industry hasn't changed the manufacturing of dentures for almost 100 years, and with this revolution technicians are now supposed to design on a machine and manufacture in a printer. Acknowledging that there could potentially be better materials for digital than analog is a significant hurdle for removable technicians. Murphy, a dental hygienist, was the first to start playing around with the digital denture design in their lab.

"When our technicians saw that I could do it, and I don't even know how to set up, they realized they could do it and wanted to learn it themselves," said Murphy. "We are now going to begin weekly classes in setting teeth on an articulator in both the analog way and digital. Technicians need to learn both processes simultaneously."

Kaizer chimes in and said, "I'm an analog guy, but the opportunities that were around for me simply aren't there anymore for the younger technicians. This is their opportunity. Any crown and bridge tech knows that zirconia will not go away. Once ceramics can be printed, it's a question of inserting lifelike colors; this digital world isn't far away. Although it may not be what any analog technician over fifty wants to hear, the forward-thinking owner needs to recognize it. It's like stepping out on a frozen river in late March. The ice breaks away, and the piece of ice you're on gets smaller. Most analog techs are

balancing on that piece of ice and they don't know if it will sustain or go under."

Although there is enthusiasm to jump onboard with new materials and equipment, due diligence is mandatory. Andrew Theberge, CDT, **TITLE** at Drake Precision Dental Lab, CDL, DAMAS, Charlotte, N.C., is vigilant that all materials, equipment and workflows are FDA validated to be in compliance and protect their investments. There are many scenarios in the marketplace that do not conform to established requirements, so they choose their supply partners on the basis that they have done their homework. He also analyzes the cost and labor benefits of digital versus analog, and it isn't always in favor of digital. Admittedly, introducing digital workflows into the lab can be chaotic but it does bring with it renewed energy and anticipation over the future possibilities.

"I envision that materials and technologies will develop to better applications over the next ten years," said Theberge. "Even as acceleration advancements continue to gobble up our attention, I find it hard to imagine that the human element will or can ever be taken out of the equation. From impression acquisition to data input through post-processing and final detail applications, we will find ourselves, as technicians, in greater demand to differentiate our product offerings in a more commoditized environment."

Steve Hatch, owner of Hatch Dental Lab, is based in the rural community of Montrose, Colo., and as is case with many labs, he struggled with finding good, trained technicians that wanted to stick around. He wanted to go digital as an avenue to consistently and reliably grow the lab. At first, however, he started off by taking the wrong turn.

"My biggest obstacle was getting the right equipment. Financially, going digital is a huge hurdle to overcome," said Hatch. "At first, I went cheap. We quickly discovered the equipment couldn't mill the dentures the way we needed and we spent way too much time trying to make it work. The goal in this investment is to be better than analog. We ended up sending it all back which set us back 3-4 months. We then decided to mill with the Ivoclar PM7 mill and do try-ins with the Asiga printer because they were biocompatible with FDA approved material and it was a method that had already been proven in the field."

While still remaining a small lab, going digital has enabled him to grow. He has more than tripled productivity the last year with the same number of staff. All of his dentists are only using digital and recognize it's a better system. With today's equipment and materials, he comments that his workflow has



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—Andrew C. Johnson, DDS, MDS, CDT, FACP

been streamlined to produce an incredibly strong and perfect fitting denture every time.

He said, "Before, it depended on which technician was working on it. Some technicians are really good, and others are still learning. They might grind too much and when the dentist places in the mouth, something is off. Now, the mill does what you tell it to do."

As a board-certified prosthodontist and technician, Dr. Andrew C. Johnson, DDS, MDS, CDT, FACP, PreciDent Center for Dental Medicine, Rogers, Ark., saw that the factors relating to patient needs and expectations, procedural techniques, and dental clinic and laboratory economics were all converging to accelerate the decline of denture standards. Few people can afford to spend the time and money on dentures that actually meet or exceed expectations, but also fit within a real-world time and expense revenue model. Unfortunately, most attempts at keeping everyday dentures above water from a profitability standpoint also erode the service quality. He realized that he had to focus on a faster way to achieve a better result, rather than allowing those two end goals to remain mutually exclusive. The digital denture materials and processes now available, along with the denture production capabilities of devices like the DGSHAPE DWX-52DCi mill from Roland, were the answer for him.

"Until we achieve quality, esthetic, durable, and proven printable materials

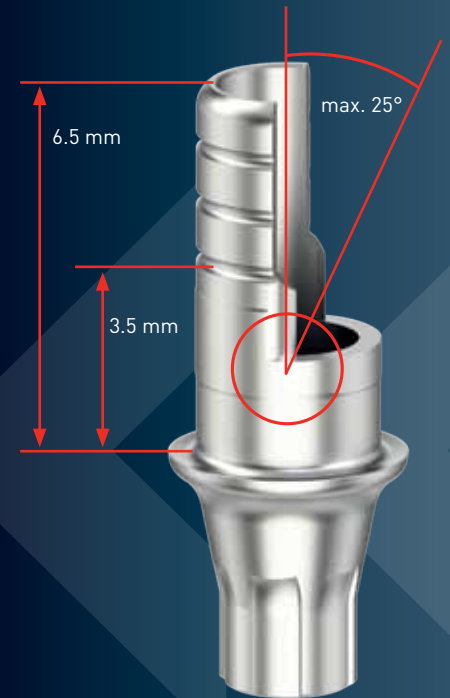
for all denture components/steps, we will need to lean on milling as a modality," said Johnson. "Having outsourced my digital denture milling since 2013, I had to give up some level of product control. Since the denture product is the clinical service I'm providing, I felt that my service level was sometimes inconsistent when outsourcing. By taking things in-house, the digital denture production capacity is within my own control. I have full control over my own results, and my denture services can stand on their own again."

With the cost of milling equipment dropping, and the quality and turnaround time increasing, it's easier for labs to jump in with a hybrid approach. While Johnson does presume there will be a huge surge in printable material availability and applications in the coming years, he suggests there's always the need to make cross-over appeals to the full gamut of provider preferences.

Johnson said, "The good news is, once we get clinical processes (i.e., patient data acquisition and digitization) down, the sky will be the limit. If the majority of dentists are virtualizing their patients, that will open the door for more appropriate case design, and we will be able to select prescribed treatment with the best contemporary methods in mind, whatever they may be."

Clearly there are many different opportunities for labs and technicians, and it is exciting to see where these paths will lead. **JDT**

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