

Crowning Achievements

Glidewell Labs shares some exciting news about CAD/CAM crown fabrication, zirconia and the future of dentistry

President and CEO Jim Glidewell, CDT

*An interview with Thomas Giacobbi, DDS, FAGD, Editorial Director
by Benjamin Lund
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When it comes to dental laboratories, dentists have several to choose from, but few labs are as well-known or more on the cutting edge of technology than Glidewell Laboratories. Unless you've been seeing patients under a mountain for the last 36 years, you have heard of Glidewell.

The company opened in 1970 by President and CEO Jim Glidewell, CDT, who was 25 years old and had a few years of experience as a dental technician under his belt. By 1981, Glidewell had expanded to nine labs in southern California. Today, Glidewell has facilities in Lake Havasu, Arizona; Irvine and Newport Beach California; Miami, Florida; Costa Rica; and Mexico.

Things have definitely changed since the company's early days, not just in the exponential growth of the company itself, but in the way it makes its products. Glidewell is embracing computer-aided design/computer-aided manufacturing (CAD/CAM) technology as the future of dentistry. CAD/CAM will not only assure



greater consistency in the quality of Glidewell products, but it also offers crowns and bridges that will fit better.

“Fit becomes important because chair time is something all labs claim that they save, but in reality most labs are more the same than different,” says Jim Glidewell. “Digital manufacturing really does differentiate the products. Most hand-made crowns are too tight in the contact area and this is because the technician does not want to have a loose contact. Digitally manufactured crowns can be made down to 20um tolerances.”

Glidewell staffers Mervyn Rudgley, vice president of digital manufacturing technology; Rudy Ramirez, CDT, general manager, fixed prosthodontics; and Wolfgang Friebauer, MDT, CDT, director of education, research and development, are the vanguard for the company's new technologies and processes.

“We're doing almost half of our traditional PFMs in CAD/CAM,” says Rudgley. “We're producing about 700 units a day using CAD/CAM. We're outputting millings in press technology. We're not milling any metal, just wax, but stay tuned. As of now, about 25 percent of the crowns we produce are run through a CAD/CAM process, and we're targeting to be around 40 percent by the end of 2007.”

“The main criteria is always to serve patients and dentists with restorations that give the strength they need,” says Friebauer. “We also have to keep our prices down.”

CAD/CAM and new automated technologies are not only changing the quality of Glidewell's products, but also how the staff does its job. As technology changes within the company, present employees will be retrained to jobs that will use their technical knowledge to operate CAD design stations.

“Historically we've looked for intelligent people, not just computer-savvy people, but that skill helps,” says Ramirez. “Younger applicants with computer game skills have an advantage, but we tend to look for basic ability of using the keyboard and mouse.” A little while back, there was a concern that Glidewell was getting too big. For example, when Friebauer started in the company's education department, he could remember an influx of 15 to 20 new employees arriving every Monday. The hire rate has slowed down considerably, partly due to the fact that some of the company's new processes will reduce the labor need.

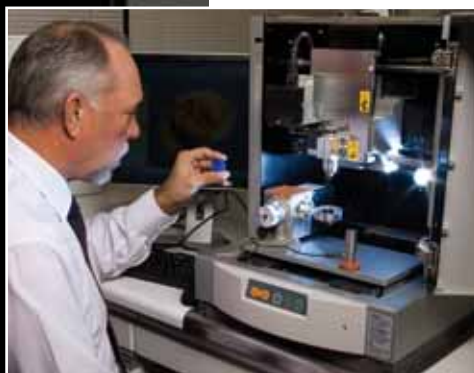
“The funny part about this is CAD/CAM is supposed to save labor. We have not seen labor savings yet in our implementation. Maybe we've done it wrong,” says Glidewell with a laugh.

Glidewell is convinced that the more CAD/CAM his company does, the more it will eliminate

Top left: Jim Glidewell examines a milled wax crown from the Roland Wax Mill.

Bottom left: Jim Glidewell takes over the controls of the Haas Zirconia Mill.

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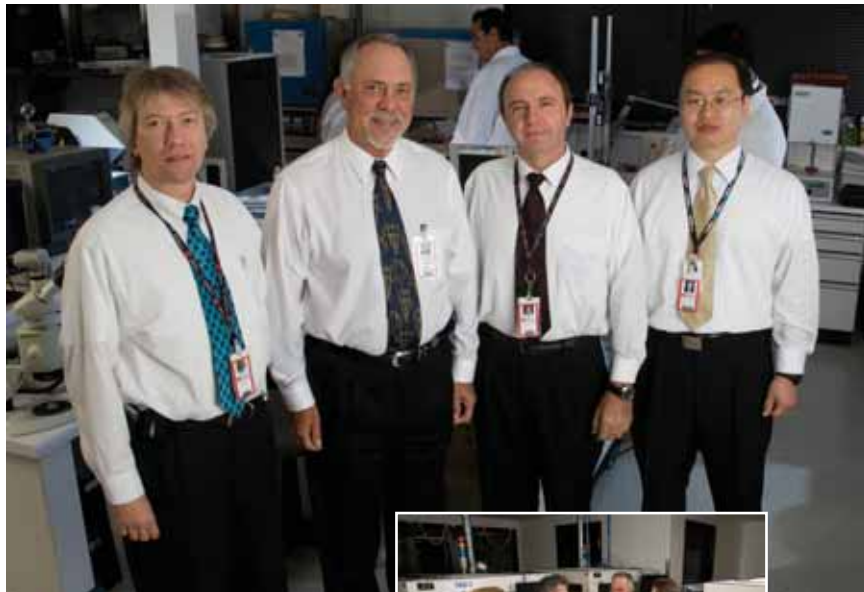


human-introduced errors. “When the eye-glass industry went CAD/CAM in the early 90s from the hand grinding of lenses to the machine grinding of lenses, the error rate went down dramatically. That’s why we’re leaning toward CAD/CAM so much,” says Glidewell. “We think we can eliminate the error rate. The dentist may have a few more check boxes to hit on a prescription pad, but by and large the machines can make crowns fit to tolerances that humans don’t seem to be able to, especially on a repeatable basis.

“Contacts, which are very difficult to adjust, are very easy for a computer to grind within a 15 micron accuracy. If you were to leave contacts about 15 microns, this crown will fit into the mouth and it will give your dental floss a resounding click when it goes through because remember, the dental floss is 100 microns thick and it’s going through a 15 micron gap. So it feels like an extremely tight crown but in reality it has a 15-micron opening. With CAD/CAM, we can do that repeatedly. Technicians tend to leave them too tight, so when a dentist is putting a crown in the mouth, the hardest thing for him to adjust is not the occlusion, but the contact. You’ve got to pull the crown out of the mouth, grind it chairside and put it back in the mouth. And often you’ll overgrind and leave one side slightly loose and leave the other side too snug. I’m a chairside technician.

That’s how I started – working with dentists. I realize how important the fit of crowns are. There’s nothing worse than getting a crown that’s too light on contact. To prevent a crown from coming back, a technician will tend to give you a ‘plus’ contact, but then that’s 10 minutes of the dentist’s time to have to play with this thing to get it to fit properly. The machine doesn’t know that, but it has the accuracy to sneak up to that wall and stay off 15 microns and leave it that way. The machine knows it’s not going to be minus, it’s not going to be plus, it’s going to be accurate every single time.”

As Glidewell looks to the future with CAD/CAM technology, it is working more and more with Zirconia today. Glidewell has four different types of Zirconia manufacturing machines: the Cereon system, the Lava system, Cerec InLab (Ivoclar’s Zir-Cad block) and its own Intellitek and Haas machines for its Prismatic Clinical Zirconia brand. It also offers Procera Zirconia and Procera Bridge Zirconia. All machines are up and operational but not much differentiates one system from another.



Top: Jim Glidewell (second from left) with his material science team Wolfgang Friebauer, CDT, MDT (left); Mike Tkachev, GDT (second from right); and Haksung Moon, Ph.D. (far right).

Bottom: Jim Glidewell (second from right) confers with his digital manufacturing team Vince Muñoz, CAD manager (far left); Mervyn Rudgley, VP digital manufacturing (second from left); and Robert Manwell, CAD/CAM engineer (far right).

“They’re darn near all the same,” says Glidewell. “I hate to say that, except there’s some intellectual property that protects Lava’s coloring system. It’s pretty good too. They’ve got six different shades they use for all their copings and it’s a pretty good system. I think that the inexorable turn toward Zirconia is going to be here forever. We keep waiting for the Zirconia crowns we have out there to start coming back for repair, but we’re just not getting them back. We’re also getting a finer margin. We tell the guys what we want and we’re able to take this stuff and feather it out and get a finer edge. The smart people are onto it. As we get more sophisticated about machining, I think you could eliminate metal totally in the not too distant future.”

Glidewell has even tried a fully contoured Zirconia crown, but the results didn’t come back as expected. “I used to think anything would be better than a colored metal in the mouth,” says Glidewell. “So even if we put an all-white Zirconia in the mouth, I thought it would look superior. Wrong. The thing looks like the whitest tem-

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porary you've ever seen. Yellow gold is far superior than a bright white. The all-white Zirconia crown looks like a big piece of gum in someone's mouth. I think we'll be making all Zirconia crowns someday. We can color it down, but there will have to be six to eight shades of it. We're going to have to add a color to it before we compact it into a solid. Color goes all the way through it that way. Then you'll have some really acceptable looking crowns. We've done a few more and got the colors down by the hand staining process. They look pretty good and they're just tough as hell. It's really hard stuff, but it polishes up pretty easily. We're thinking a smooth surface is not going to be that aggressive against natural dentition."

Glidewell has always prided itself on being a high-quality yet low-cost provider. That's where the Research and Development Department (R&D) comes in. Glidewell has invested quite a bit in R&D, initially to test products and independently backup manufacturers' claims, but further driven by the desire to develop products that cost less.

"Most research by the traditional dental vendors today introduce products that cost more and are sold on the concept that new is more expensive. The material costs in a traditional PFM would have about one dollar worth of porcelain in each crown," says Glidewell. "Today most of the Zirconia systems add about \$40 in cost of materials to a crown. Is that crown that much better? Porcelain fused to metal is still stronger and has passed the test of time. Even our company's price for a Zirconia crown at \$139 is still too high. Our materials researchers are very close to being able to make a significant decrease in costs." Glidewell has already reduced the cost of Zirconia crowns to below that of porcelain fused to gold, and now it's become a real choice for the patients who ride in coach, not just those who sit in first class.

"There are a lot of ranges of quality in our industry," says Glidewell. "The very high-end quality is completely overpriced as far as the guys getting \$250 to \$350 per crown. If you ask them what they put in that someone else doesn't put in, it's usually ego. We all buy our porcelain

from the same place and we all use the same exact metal. So you receive a crown back at your office. Does it have contacts that fit? Does it have occlusion that fits? Are the shades the correct shade? Are the materials FDA approved? What we've done as a large lab is be able to offer the quality of a small lab but with incredibly lower prices. It's the same as whether you buy your Panasonic TV from an expensive retailer or you buy it at Wal-Mart. You're getting the same product. When we deliver a crown, we always like to ask, 'What do you think we left out, doctor? Because we'll put it in if you can explain it to us.' We know we exceed FDA and ISO standards for fits of under 75 microns. We beat those numbers all the time. Where else do we go?"

A completely automated CAD/CAM ceramic crown isn't too far off from being produced, but for now it is still necessary for humans to remain involved in the process. "This CAD/CAM thing is interesting," says Glidewell. "It's the buzz word of the day. But it's benefiting people, I think. The Zirconia era is here today, but when it comes down to making partials and dentures and things like that, CAD/CAM doesn't get too close to it really. It might make a few wax patterns. It still doesn't make perfect crowns yet, but it's close. You still need a lot of people in the pipeline to do that."

CAD/CAM's eventual elimination of human error and production of consistently accurate products will revolutionize how dentists and patients receive their crowns. Dentistry is on the cusp of some amazing, profession-changing technology with the implementation of CAD/CAM technology and Zirconia products and you can be sure that Glidewell Laboratories will remain at the forefront. ■



Top: Jim Glidewell explains tooth morphology contours in a virtual world.

Bottom: From left: Annamaria Muresan, CAD/CAM PFM manager; Rudy Ramirez, PFM manager; and Jim Glidewell.